

promise that must be made between the opposing needs of economic development and conservation in the tropics. *The Tropical Rain Forest* by Paul Richards has been the standard work of reference in tropical plant ecology, but its coverage is largely limited to the forests and it has been in print for 20 years without any revision. The time is more than ripe for a new and comprehensive treatment. Schnell succeeds to some extent in filling this need.

In this book the literature coverage is particularly strong before 1960 and is more complete for West Africa than for any other part of the tropical world. This is far from disadvantageous for students of neotropical botany, for the West African literature is much less familiar than it deserves to be. However, some of the subjects Schnell treats have advanced very rapidly while the book was in production. For example, his preference for a historical treatment of tropical floras based upon permanence of the continents in their present positions but with land bridges to connect them cannot be applauded in the face of recent work on ocean-floor spreading and plate tectonics.

Schnell is good at description; his treatments of lianes, epiphytes, parasites, xerophytes, and hydrophytes are notable, for these kinds of plants have been sadly neglected by comparison with trees in most considerations of tropical flora. He is equally good when describing various kinds of vegetation, from the aquatic to the xerophilic and from high forest to the grasslands. Always, when there is controversial matter of which he is aware, he is careful to give attention to all sides of the question. In discussing the controversial matter he presents he is less successful. By comparison with the descriptions, the discussions are often brief, weak, and conducted without the utilization of modern evolutionary and ecological approaches. Thus, the "strategy" analogy, which is helping greatly in our understanding of such evolutionary developments as those in plant reproduction (pollination and seed dispersal) is never used in this book. Indeed, adaptation by plants to the effects of the presence of animals is given relatively little weight by comparison with climatic and soil influences. Ecosystem thinking is not really involved. Where there is difficulty in visualizing the adaptive significance of a feature in terms of the physical environment, the feature is liable to be written off as a sort of hereditary burden. This is the

explanation given for spines on humid forest trees, palms, and lianes. Schnell does not believe that ants are protective to plants (contra D. H. Janzen); consequently, the structures that house them are not adaptive. Neither are extra-floral nectaries.

Chapter after chapter in these two volumes is replete with information that biologists need in building working hypotheses for tropical ecology. This, rather than the discussion matter, is what makes them invaluable library reference works for those who will work in the tropics and for those who will get there vicariously because of them.

However, as reference works the volumes suffer from a terrible disadvantage in the arrangement of the bibliography. This is to be found at the end of each volume in a total of 27 topical groups that do not correspond to the chapters. The reader on encountering a reference in the text must make a guess as to which group will contain the actual citation; there is nothing in the reference to indicate its location. I was completely unable to find five of the first random sample of ten references that I sought. But, these frustrations aside, Schnell's encyclopedic work is a great pleasure to read. That one man could collect and collate so much information is very remarkable; we who will make use of it owe him a big debt.

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## Books Received

**Advances in Cancer Research.** Vol. 15. George Klein, Sidney Weinhouse, and Alexander Haddow, Eds. Academic Press, New York, 1972. xiv, 360 pp., illus. \$19.50.

**Advances in Organometallic Chemistry.** Vol. 10. F. G. A. Stone and Robert West, Eds. Academic Press, New York, 1972. x, 464 pp., illus. \$24.

**Alicyclic Chemistry.** F. J. McQuillin. Cambridge University Press, New York, 1972. vi, 186 pp., illus. Cloth, \$13.50; paper, \$5.95. Cambridge Chemistry Texts.

**Alone and with Others.** A Grammar of Interpersonal Behavior. Murray Melbin. Harper and Row, New York, 1972. xiv, 334 pp. \$12.95.

**Analytical Trigonometry.** Thomas J. Robinson. Harper and Row, New York, ed. 2, 1972. xvi, 288 pp., illus. \$7.95.

**Antarctica.** Authentic Accounts of Life and Exploration in the World's Highest, Driest, Windiest, Coldest and Most Remote Continent. Charles Neider, Ed. Random House, New York, 1972. viii, 464 pp., illus. \$10.

**Aquatic Oligochaeta of the World.** R. O. Brinkhurst and B. G. M. Jamieson with contributions by D. G. Cook, D. V. Anderson, and J. Van der Land. University of Toronto Press, Buffalo, N.Y., 1972. xii, 860 pp. + plates. \$35.

**L'Aquisition du Langage.** Marc Richelle. Dessart, Brussels, 1971. 216 pp. Paper, 35.45 F. *Manuels et Traités de Psychologie et de Sciences Humaines, Psychologie du Langage* 2.

**Arms and Foreign Policy in the Nuclear Age.** Milton L. Rakove, Ed. Oxford University Press, New York, ed. 2, 1972. viii, 486 pp. Paper, \$3.95.

**Assessment of Airborne Particles.** Fundamentals, Applications, and Implications to Inhalation Toxicity. A conference, Rochester, N.Y., June 1970. Thomas T. Mercer, Paul E. Morrow, and Werner Stöber, Eds. Thomas, Springfield, Ill., 1972. xx, 540 pp., illus. \$32.75.

**An Atlas of British Recent Foraminifera.** John W. Murray, Elsevier, New York, 1971. xii, 244 pp., illus. \$22.50.

**Atlas of Human Anatomy.** Luis Lopez-Antunez with the collaboration of Francisco Garcia Herrera, Carlos Mendez Garcia, Felipe Vazquez Guzman, and D. Leopoldo Centeno Norma. Illustrated by Luis Amendolla Gasparo. Translated from the Spanish edition (Mexico City, 1970) by Harry Monsen. Saunders, Philadelphia, 1971. xxxii, 366 pp. \$20.

**Autoradiography.** H. A. Fischer and G. Werner. De Gruyter, New York, 1971. x, 200 pp., illus. Working Methods in Modern Science.

**L'Avenir d'une Prediction.** Notes pour une Philosophie des Sciences. Gilles Lane. Presses de l'Université du Quebec, Montreal, 1971 (U.S. distributor, International Scholarly Book Services, Portland, Ore.). x, 164 pp. Paper, \$1.95.

**Basic Dynamics of Some Moon Effects.** G. L. Luebbbers. Published by the author, P.O. Box 1034, La Costa Station, Malibu, Calif., 1972. iv, 76 pp., illus. Paper, \$4.

**Bergson and Modern Physics.** A Reinterpretation and Re-evaluation. Milič Čapek. Reidel, Dordrecht, Holland, 1972 (U.S. distributor, Humanities Press, New York). xvi, 418 pp. \$23.50. Boston Studies in the Philosophy of Science, vol. 7. Synthese Library.

**Beyond Freedom and Dignity.** B. F. Skinner. Knopf, New York, 1971. 226 pp. \$6.95.

**Biochemical Actions of Hormones.** Vol. 2. Gerald Litwack, Ed. Academic Press, New York, 1972. xiv, 542 pp., illus. \$26.

**The Biochemistry and Physiology of Tetrahymena.** Donald L. Hill. Academic Press, New York, 1972. xii, 230 pp., illus. \$12.95. Cell Biology: A Series of Monographs.

**The Biology and Chemistry of the Umbelliferae.** V. H. Heywood, Ed. Published for the Linnean Society of London by Academic Press, New York, 1971. x, 438 pp., illus. \$26. Botanical Journal of the Linnean Society, vol. 64, supplement 1.

**Boundaries of the Universe.** John S. Glasby. Harvard University Press, Cambridge, Mass., 1971. 296 pp. + plates. \$11.

**Bulletins from the Ecological Research Committee.** Swedish Natural Science Research Council, Stockholm, 1971. No. 11,

Ecology in Semi-Arid East Africa. A Selection of Recent Ecological References. Staffan Ulfstrand. 62 pp. Paper, \$2. No. 12, Natural Resources in East Africa. A Report on Research Services, Development and Organization of Research Activity in East Africa. Majda Žumer. 88 pp. Paper, \$2. No. 13, Ecology and the Less Developed Countries. A symposium, Stockholm, Apr. 1971. Bengt Lundholm, Ed. 134 pp. Paper, \$2. No. 14, Systems Analysis in Northern Coniferous Forests. A workshop, Kratte Masugn, Sweden, June 1971. Th. Rosswall, Ed. 194 pp., illus. Paper, \$3.

**The Calculus with Analytic Geometry.** Louis Leithold. Harper and Row, New York, ed. 2, 1972. xvi, 1014 pp., illus. + appendix. \$15.

**Celestial Mechanics.** Vol. 2, Perturbation Theory. Yusuke Hagihara. M.I.T. Press, Cambridge, Mass., 1972. Part 1, xviii pp. + pp. 1-504, illus., + index. Part 2, xvi pp. + pp. 505-920, illus., + index. Each part, \$30.

**Cellular Biochemistry and Physiology.** N. A. Edwards and K. A. Hassall. McGraw-Hill, New York, 1972. xiv, 442 pp., illus. \$12.50.

**Cellular Physiology.** Henry T. Yost. Prentice-Hall, Englewood Cliffs, N.J., 1972. xvi, 926 pp., illus. \$14.95. Prentice-Hall Biological Science Series.

**Cerebral Blood Flow.** Relationship of Cerebral Blood Flow and Metabolism to Neurological Symptoms. John Stirling Meyer and J. P. Schade, Eds. Elsevier, New York, 1972. viii, 438 pp., illus. \$36.25. Progress in Brain Research, vol. 35.

**Charles Sumner Slichter.** The Golden Vector. Mark H. Ingraham. University of Wisconsin Press, Madison, 1972. xiv, 316 pp. + plates. \$10.

**The Chemical Statics and Kinetics of Solutions.** E. A. Moelwyn Hughes. Academic Press, New York, 1971. xiv, 530 pp., illus. \$29.50. Physical Chemistry.

**Chemisorption and Catalysis.** A conference, London, Oct. 1970. Peter Hepple, Ed. Institute of Petroleum, London, 1971. viii, 188 pp., illus. £4.50.

**Classical Conditioning II.** Current Research and Theory. Abraham H. Black and William F. Prokasy, Eds. Appleton-Century-Crofts, New York, 1972. xii, 498 pp., illus. \$14.95. Century Psychology Series.

**Climates of Africa.** J. F. Griffiths, Ed. Elsevier, New York, 1972. xvi, 604 pp., illus. \$77. World Survey of Climatology, vol. 10.

**Clinical Toxicology.** Clinton H. Thienes and Thomas J. Haley. Lea and Febiger, Philadelphia, ed. 5, 1972. x, 460 pp., illus. \$18.50.

**Comparative Genetics in Monkeys, Apes and Man.** A symposium, Ernice, Sicily, July 1970. A. B. Chiarelli, Ed. Academic Press, New York, 1971. x, 346 pp., illus. \$16.50.

**Competition, Collusion, and Game Theory.** Lester G. Telser. Aldine-Atherton, Chicago, 1972. xx, 380 pp., illus. \$12.95. Aldine Treatises in Modern Economics.

**A Computer-Mapped Flora.** A Study of the County of Warwickshire. D. A. Cad-

bury, J. G. Hawkes, and R. C. Readett with a section on Bryophytes by T. Laflin and contributed chapters by F. W. Shotton, H. Thorpe, and G. T. Warwick. Published for the Birmingham Natural History Society by Academic Press, New York, 1971. x, 768 pp., illus., + maps. \$30.

**Computer Simulations of Voting Behavior.** William R. Shaffer. Oxford University Press, New York, 1972. xii, 164 pp., illus. Cloth, \$7.50; paper, \$2.95. Studies in Behavioral Political Science.

**Coercion.** J. Roland Pennock and John W. Chapman, Eds. Aldine-Atherton, Chicago, 1972. xvi, 328 pp., illus. \$8.95. NOMOS, No. 14.

**Comprehensive Chemical Kinetics.** C. H. Bamford and C. F. H. Tipper, Eds. Elsevier, New York, 1972. Vol. 4, Decomposition of Inorganic and Organometallic Compounds. xii, 272 pp., illus. \$29.50. Vol. 5, Decomposition and Isomerization of Organic Compounds. xvi, 780 pp., illus. \$69.

**Crystal Structure Analysis.** A Primer. Jenny Pickworth Glusker and Kenneth N. Trueblood. Oxford University Press, New York, 1972. xvi, 192 pp., illus. Cloth, \$10; paper, \$4.50.

**Degrees of Unsolvability.** Joseph R. Schoenfeld. North-Holland, Amsterdam; Elsevier, New York, 1971. viii, 112 pp. Paper, \$6.45. North-Holland Mathematical Studies, 2.

**Digest of Technical Papers.** 1972 IEEE International Solid-State Circuits Conference, Philadelphia, Feb. 1972. Lewis Winner, New York, 1972 (available from H. G. Sparks, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia). 256 pp., illus. Paper, \$20.

**Diving for Science.** The Story of the Deep Submersible. Edward H. Shenton. Norton, New York, 1972. 268 pp. + plates. \$8.95.

**Dynamic Programming and Partial Differential Equations.** Edward Angel and Richard Bellman. Academic Press, New York, 1972. xii, 206 pp., illus. \$11.50. Mathematics in Science and Engineering, vol. 88.

**The Ecology of Man.** An Ecosystem Approach. Robert Leo Smith. Harper and Row, New York, 1972. xii, 436 pp., illus. Paper, \$6.95.

**Electrodeposition and Corrosion Processes.** J. M. West. Van Nostrand Reinhold, New York, ed. 2, 1972. xiv, 206 pp., illus. \$15.

**Elements of Linear Algebra.** Daniel T. Finkbeiner, II. Freeman, San Francisco, 1972. xii, 268 pp., illus. \$9.50. A Series of Books in Mathematics.

**Encyclopedia of Astronomy.** Gilbert E. Satterthwaite. St. Martin's, New York, 1971. x, 538 pp. + plates. \$15.

**The Environmental Problem.** Selections from Hearings on the Environmental Education Act of 1970. Irving Morrisett and Karen B. Wiley, Eds. Social Science Education Consortium and ERIC Clearinghouse for Social Studies/Social Science Education, Boulder, Colo., 1971. xiv, 228 pp. Cloth, \$8.95; paper, \$6.95. Social Science Consortium Publication, No. 140. ERIC/ChESS Reference Series, No. 3.

**The Family in Transition.** A conference, Bethesda, Md., Nov. 1969. National Institutes of Health, Bethesda, 1971 (available from Superintendent of Documents, Washington, D.C.). x, 342 pp. \$3. Fogarty International Center Proceedings, No. 3.

**Handbook of Reason.** Dagobert D. Runes. Philosophical Library, New York, 1972. 200 pp. \$6.

**The History of British Geology.** A Bibliographical Study. John Challinor. Barnes and Noble, New York, 1972. 224 pp. \$11.25.

**Kontrolle des Verhaltens.** Das Lernen am Erfolg. W. F. Angermeier. Springer-Verlag, New York, 1972. xii, 206 pp., illus. Paper, \$4.60. Heidelberger Taschenbücher, Band 100.

**Laboratory Manual in Principles of Animal Biology.** Joseph Frankel and Norman E. Williams. Burgess, Minneapolis, ed. 2, 1972. x, 196 pp., illus. Spiral bound, \$5.25.

**Man's Impact on Terrestrial and Oceanic Ecosystems.** William H. Matthews, Frederick E. Smith, and Edward D. Goldberg, Eds. M.I.T. Press, Cambridge, Mass., 1972. xvi, 540 pp., illus. \$19.50.

**The Search for a Theory of Matter.** Mendel Sachs. McGraw-Hill, New York, 1971. 222 pp., illus. \$6.95. The History of Science.

**The Structure of the Retina.** Santiago Ramón y Cajal. Compiled and translated by Sylvia A. Thorpe and Mitchell Glickstein. Thomas, Springfield, Ill., 1972. xl, 196 pp., illus. \$12.50.

**Vectors and Matrices.** Pamela Liebeck. Pergamon, New York, 1971. viii, 184 pp., illus. \$2. Commonwealth and International Library Mathematical Topics.

**Vector Control in International Health.** World Health Organization, Geneva, 1972 (U.S. distributor, American Public Health Association, Washington, D.C.). vi, 148 pp., illus. Paper, \$8.

**The Voice of the Symbol.** Martin Grotjahn. Mara, Los Angeles, 1971. xiv, 224 pp. \$8.

**Water and Aqueous Solutions.** Structure, Thermodynamics, and Transport Processes. R. A. Horne, Ed. Wiley-Interscience, New York, 1972. x, 838 pp., illus. \$37.50.

**Water-Resources Engineering.** Ray K. Linsley and Joseph B. Franzini. McGraw-Hill, New York, ed. 2, 1972. xii, 690 pp., illus. \$17.50. McGraw-Hill Series in Water Resources and Environmental Engineering.

**Weather Record Book.** United States and Canada. David M. Ludlum, Ed. Weatherwise, Princeton, N.J., 1971. 98 pp., illus. Paper, \$3.25.

**Xochipala.** The Beginnings of Olmec Art. Carlo T. E. Gay. Princeton University Art Museum, Princeton, N.J., 1972 (available from Princeton University Press, Princeton, N.J.). 64 pp., illus. Cloth, \$8; paper, \$3.95.

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*Erratum.* The price of *The Archives of the Royal Institution of Great Britain in Facsimile: Minutes of Managers' Meetings, 1799-1900*, volumes 1 and 2, was given erroneously in the book list of 24 March. The price is \$66.66.