

tary exploration. My suspicion is that although the moon is an oddball in some respects, we will eventually gain better insight by looking more carefully at other planets and their satellites. Meanwhile, I strongly recommend this book because it provides plenty of intellectual sustenance—but don't expect to find the answers in the back.

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Strings

Workshop on Unified String Theories. (Santa Barbara, CA, July 1985.) M. GREEN and D. GROSS, Eds. World Scientific, Singapore, 1986 (U.S. distributor, Taylor and Francis, Philadelphia). x, 745 pp., illus. \$79; paper, \$37.

In the wake of the 1984 renaissance of string theories numerous workshops, symposia, and conferences have been devoted to this exciting subject. This book contains the proceedings of a three-week workshop that took place in Santa Barbara in the summer of 1985. To judge by the table of contents the organizers, M. Green and D. Gross, set themselves the task of obtaining an overview of the full range of string theory both as practiced in the '70's and in the year preceding the workshop. To judge by the contents proper, they have succeeded handsomely.

At the outset important ideas and techniques from the '70's are described along with novel uses to which they can be put (C. Thorn, S. Mandelstam, L. Brink). These presentations should be useful to younger readers, who will thus be spared the effort of retrieving this material from the necessarily less focused original papers.

String theory has had a major impact in certain branches of mathematics, most notably on the theory of Kac-Moody algebras and the theory of sporadic groups. Conversely, major modern developments in topology, differential geometry, and Riemann surfaces find natural applications in string theory. Much of this remarkable physics-mathematics interplay is lucidly covered here (P. Goddard, D. Olive, I. Frenkel, J. Lepowsky, A. Meurman, O. Alvarez, E. Witten). These are presentations not readily paralleled elsewhere in the literature. Their inclusion gives this collection its most distinct flavor and may ensure its interest for a

long time to come. Superstrings, the star attraction, are rendered excitingly by Green and Gross.

String theories are two-dimensional conformally invariant field theories. Recently developed general techniques for dealing with such theories are elegantly presented (D. Friedan, S. Shenker).

One of the crucial open questions of string theory asks for the underlying geometry. A lot of work has been devoted to this problem over the last year and a half; some of the earlier work is covered here (W. Siegel, B. Zwiebach, T. Banks, M. Peskin). Another subject on which much remains to be done is spontaneous space-compactification in superstring theory. This along with the related, and up to now notoriously unyielding, phenomenological problems is the subject of many contributions (G. Horowitz, A. Strominger, and others). Numerous interesting contributions on special topics are also included.

The book ends on a nine-page pun/which properly trimmed would be more fun.

This book is certainly not the last word on strings, nor was it intended to be. Much of the recent material is susceptible to fast obsolescence; this is a fast-moving field after all. Still, some of the presentations may be useful to string theorists for some time to come.

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Books Received

Ape Language. From Conditioned Response to Symbol. E. Sue Savage-Rumbaugh. Columbia University Press, New York, 1986. xxx, 433 pp., illus. \$40. Animal Intelligence Series.

Applied Geochemistry in the 1980's. Iain Thornton and Richard J. Howarth, Eds. Halsted (Wiley), New York, 1986. xiv, 347 pp., illus. \$54.95. From a meeting, London, April 1983.

The Art of Creative Thinking. Robert W. Olson. Perennial Library (Harper & Row), New York, 1986. xiv, 265 pp., illus. Paper, \$5.95. Reprint, 1980 ed.

Artificial Intelligence. Principles and Applications. Masoud Yazdani, Ed. Chapman and Hall (Methuen), New York, 1986. xiv, 348 pp., illus. \$49.95; paper, \$22.

Astrometric Techniques. Heinrich K. Eichhorn, Robert J. Leacock, and Jeanne M. Kerrick, Eds. Published on behalf of the International Astronomical Union by Reidel, Dordrecht, 1986 (U.S. distributor, Kluwer, Norwell, MA). xxii, 838 pp., illus. \$144; paper, \$61.50. From a symposium, Gainesville, FL, Jan. 1984.

Biotechnology. Strategies for Life. Elizabeth Antebi and David Fishlock. MIT Press, Cambridge, MA, 1986. 239 pp., illus. \$39.95. Translated from the French edition (Neuilly-sur-Seine, France, 1985).

Central Actions of Acth and Related Peptides. David de Wied and William Ferrari, Eds. Liviana Press, Padua, Italy, and Springer-Verlag, New York, 1986. viii, 240 pp., illus. \$69. Fidia Research Series. Symposia in Neuroscience, vol. 4. From a conference, Villasimius, Italy, June 1985.

Evolutionary Processes and Theory. Samuel Karlin and Eviatar Nevo, Eds. Academic Press, Orlando, FL, 1986. x, 786 pp., illus. \$62.50; paper, \$34.50. Based on a workshop, Israel, March 1985.

The Experimental Manipulation of Ovule Tissue. G. P. Chapman, S. H. Mantell, and R. W. Daniels, Eds. Longman, New York, and Wiley, New York, 1986. xvi, 256 pp., illus. + plates. \$84.95. Monographs and Surveys in the Biosciences.

Fast and Slow Chemical Signalling in the Nervous System. L. L. Iverson and E. C. Goodman, Eds. Oxford University Press, New York, 1986. xiv, 316 pp., illus. \$47.50. Oxford Medical Publications. Based on a symposium, Harlow, England, May 1985.

Hormone Binding Sites in Plants. Michael Venis. Longman, New York, and Wiley, 1986. viii, 19 pp., illus. \$39.95. Research Notes in Plant Science.

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Immunology and Cancer. Margaret L. Kripke and Philip Frost, Eds. Published for the University of Texas System Cancer Center, M. D. Anderson Hospital and Tumor Institute, Houston, by the University of Texas Press, Austin, 1986. xii, 304 pp., illus. \$47.50. University of Texas M. D. Anderson Symposium on Fundamental Cancer Research, vol. 38. From a symposium, Houston, Feb. 1985.

The Lewin Legacy. Field Theory in Current Practice. Eugene Stivers and Susan Wheelan, Eds. Springer-Verlag, New York, 1986. xx, 281 pp., illus. Paper, \$28. Recent Research in Psychology. From a conference, Philadelphia, May 1984.

Little Science, Big Science ... and Beyond. Derek J. De Solla Price. Columbia University Press, New York, 1986. xxvi, 301 pp., illus. \$35; paper, \$14.95. A collection of 13 reprinted essays including those in Price's 1963 work, with added material by Robert K. Merton and Eugene Garfield.

Local and Global Methods of Nonlinear Dynamics. A. W. Sáenz, W. W. Zachary, and R. Cawley, Eds. Springer-Verlag, New York, 1986. viii, 263 pp., illus. \$26.40. Lecture Notes in Physics, 252. From a workshop, Silver Spring, MD, July 1984.

Mathematical Ecology. An Introduction. Thomas G. Hallam and Simon A. Levin, Eds. Springer-Verlag, New York, 1986. xii, 457 pp., illus. \$80. Biomathematics, vol. 17. Based on a course, Trieste, Italy, 1982.

Mathematics and Optimal Form. Stefan Hildebrandt and Anthony Tromba. Scientific American Library, New York, 1986 (distributor, Freeman, New York). xvi, 215 pp., illus. \$29.95.

Meaning and Context. An Introduction to the Psychology of Language. Hans Hörmann. Robert E. Innis, Ed. Plenum, New York, 1986. xiv, 294 pp., illus. \$35; paper, \$18.95. Cognition and Language. Translated, with revisions, from the German edition (Darmstadt, 1981).

Numerical Methods in the Theory of Neutron Transport. G. I. Marchuk and V. I. Lebedev. 2nd ed. Harwood Academic, New York, 1986. xx, 601 pp., illus. \$125. Translated and edited from the Russian edition (Moscow, 1981) by O. Germagenova.

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An Ontology of Consciousness. Ralph Ellis. Nijhoff, Dordrecht, 1986 (U.S. distributor, Kluwer, Norwell, MA). viii, 205 pp., illus. \$42. Martinus Nijhoff Philosophy Library, vol. 18.

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Residue Number System Arithmetic. Modern Applications in Digital Signal Processing. Michael A. Soderstrand *et al.*, Eds. The Institute of Electrical and Electronics Engineers Press, New York, 1986. viii, 418 pp., illus. \$50.95; to members, \$30.20. IEEE Press Reprint Series.

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Sweet Track to Glastonbury. The Somerset Levels in Prehistory. Bryony and John Coles. Thames and Hudson, New York, 1986 (distributor, Norton, New York). 200 pp., illus. \$29.95. New Aspects of Antiquity.