

This book will appeal to researchers in this field as well as to the general audience of physicists and mathematicians seeking assurance that supermanifolds are mathematically respectable objects rather than formal tricks with "anticommuting numbers."

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## Adaptations

**The Colonisation of Land.** Origins and Adaptations of Terrestrial Animals. COLIN LITTLE. Cambridge University Press, New York, 1984. viii, 290 pp., illus. \$99.50.

Study of the adaptations of terrestrial groups of animals and plants and their origins from aquatic stocks has long been a classic example of the confluence of different biological disciplines, particularly physiology and biochemistry, functional morphology, and paleontology. Among animal groups, the origin of terrestrial vertebrates and the apparently related question of the history of movement from salt water to freshwater in primitive gnatostome fishes have been an especially rich vein for workers such as Baldwin, Berrill, Romer, and Watson, and among invertebrates the mollusks and arthropods have received considerable attention. In recent years, however, notwithstanding an excellent volume edited by Panchen, the subject as a whole has received less attention, perhaps in part owing to the decline of comparative approaches to organ-level physiology.

Little, who is an authority on molluscan osmoregulation, has now produced the first really thorough review of the relevant characteristics of the various animal groups that have colonized the land environment, including taxa from flatworms to vertebrates. It is a long and careful literature review with a single concluding synthetic section. Little emphasizes the common problems faced by invaders from the water: osmoregulation and nitrogen excretion, respiration, behavior, and sensory adaptations, reproduction, and (to a lesser extent) biomechanics in the absence of a strongly supporting fluid medium. He gives an interesting counterpoint to the discussion in a treatment of the filter or plankton feeders, larger forms with hydrostatic skeletons, and most notably the echinoderms and cephalopod mollusks that have never managed to invade land. He delves into the relative success of differ-

ent groups, measured by species diversity or biomass. And he also takes up the collateral question of the problems faced by terrestrial groups in reinvading fresh or salt water.

All of this is familiar in parts, but Little's review is more than a convenient summary. The broad range of data that he covers turns out no longer to support the easy generalizations that have long dominated this field of work. One view that needs to be revised is the simple scenario for the relationship between environment and the pattern of nitrogen excretion that predicts excretion of ammonia in the water and urea or uric acid on land. In oligochaetes, for example, "The ratio of urea to ammonia changes with nutritional state, but is probably more related to the control of acid-base balance than to availability of water." Also, with respect to respiration Little notes a fact of which biologists have become increasingly aware—that elimination of carbon dioxide is a more complex problem than uptake of oxygen. But most important of all, he demonstrates that it is no longer sufficient to consider the various subjects of classical physiology in isolation from each other. This fine review clears the way for future biologists who will take up this fascinating subject in the light of modern advances and produce the next generation of generalizations.

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## Books Received

**Equations of Mathematical Physics.** V. S. Vladimirov. Mir, Moscow, 1984 (U.S. distributor, Imported Publications, Chicago). 464 pp., illus. \$10.95. Translated from the Russian edition (Moscow, 1981) by Eugene Yankovsky.

**Erythrokinetics.** Radioisotopic Methods of Investigation and Mathematical Approach. Maria Ważewska-Czyżewska. Published for the National Library of Medicine and the National Science Foundation by the National Center for Scientific, Technical and Economic Information, Warsaw, 1984 (available as PB 84-201979 from the National Technical Information Service, Springfield, Va.). 221 pp., illus. \$15.

**Ethylene and Plant Development.** J. A. Roberts and G. A. Tucker, Eds. Butterworths, Boston, 1985. x, 416 pp., illus. \$99.95. From a conference, Sutton Bonington, March 1984.

**Evaluation of Short-Term Tests for Carcinogens.** Report of the International Programme on Chemical Safety's Collaborative Study on In Vitro Assays. John Ashby *et al.*, Eds. Elsevier, New York, 1985. x, 752 pp., illus. \$139. Progress in Mutation Research, vol. 5.

**Evolutionary Aspects of Gonadotropins.** Edited by Institute of Endocrinology, Gunma University. Center for Academic Publications Japan, Tokyo, 1984 (U.S. distributor, International Specialized Book Services, Beaverton, Ore.). 210 pp., illus. \$28. Gunma Symposia on Endocrinology, vol. 21. From a symposium, Maebashi, Japan, Dec. 1983.

**The Evolving Universe.** Donald Goldsmith. 2nd ed. Benjamin/Cummings, Menlo Park, Calif., 1985. xiv, 562 pp., illus., + plates. \$31.95.

**Experimental Behavioral Ecology and Sociobiology.** In Memoriam Karl von Frisch 1886-1982. Bert Hölldobler and Martin Lindauer, Eds. Sinauer, Sunderland, 1985. xiv, 488 pp., illus. \$55; paper, \$30. From a symposium, Mainz, Germany, Oct. 1983.

**Histocompatibility Testing 1984.** E. D. Albert, M. P. Baur, and W. R. Mayr, Eds. Springer-Verlag, New York, 1984. xxviii, 764 pp., illus. \$98. From a conference, Munich, May 1984.

**Hot-Electron Transport in Semiconductors.** L. Reggiani, Ed. Springer-Verlag, New York, 1985. xvi, 275 pp., illus. \$43.50. Topics in Applied Physics, vol. 58.

**Human Intelligence.** Perspectives and Prospects. Robert Kail and James W. Pellegrino, Freeman, New York, 1985. x, 224 pp., illus. \$19.95; paper, \$12.95. A Series of Books in Psychology.

**The Hypothalamus of the Rhesus Monkey.** A Cytoarchitectonic Atlas. Ruth Bleier. Photomicrographs and plates prepared by Inge Siggelkow. University of Wisconsin Press, Madison, 1985. xiv, 122 pp., \$50.

**I'll Take Tomorrow.** The Story of a Courageous Woman Who Dared to Subject Herself to a Medical Experiment—the First Successful Heart-Lung Transplant. Mary Gohlke with Max Jennings. Evans, New York, 1985. 204 pp. \$12.95.

**Neutron Contamination from Medical Electron Accelerators.** Recommendations of the National Council on Radiation Protection and Measurements. National Council on Radiation Protection and Measurements, Bethesda, Md., 1984. vi, 128 pp., illus. Paper, \$14. NCRP Report No. 79.

**New Approaches to Research on Cereal Carbohydrates.** Robert D. Hill and Lars Munk, Eds. Elsevier, New York, 1985. xii, 415 pp., illus. \$101.75. Progress in Biotechnology, vol. 1. From a conference, Copenhagen, Denmark, June 1984.

**New Approaches to Vaccine Development.** Rosemary Bell and G. Torrigiani, Eds. Schwabe, Basel, 1984 (distributor, World Health Organization, Geneva). viii, 519 pp., illus. Paper. From a meeting, Geneva, Oct. 1983.

**Nonhuman Primate Models for Human Growth and Development.** Elizabeth S. Watts, Ed. Liss, New York, 1985. x, 327 pp., illus. \$46. Monographs in Primatology, vol. 6. From a symposium, Atlanta, Aug. 1982.

**Nonlinear System Theory.** John L. Casti. Academic Press, Orlando, Fla., 1985. xii, 261 pp. \$45. Mathematics in Science and Engineering, vol. 175.

**Normal Human Aging.** The Baltimore Longitudinal Study of Aging. Nathan W. Shock *et al.* National Institutes of Health, Bethesda, Md., 1985 (available from the Superintendent of Documents, Washington, D.C.). xxii, 400 pp., illus., + appendixes. \$18. NIH Publication No. 84-2450.

**Notes on Radiation Effects on Materials.** J. N. Anno. Hemisphere, Washington, D.C., 1984. x, 342 pp., illus. Paper, \$24.95.

**The Nuclear Connection.** A Reassessment of Nuclear Power and Nuclear Proliferation. Alvin Weinberg, Marcelo Alonso, and Jack N. Barkenbus. Paragon House, New York, 1985. viii, 295 pp., illus. \$27.95; paper, \$19.95. A Washington Institute Book.

**Nutrient Requirements of Dogs.** 2nd ed. National Academy Press, Washington, D.C., 1985. viii, 79 pp. Paper, \$10.25.

**Permafrost.** Fourth International Conference, Final Proceedings. (Fairbanks, Alaska, July 1983.) National Academy Press, Washington, D.C., 1984. xvi, 413 pp., illus. \$32.50.

**Phase Transformations and Material Instabilities in Solids.** Morton E. Gurtin, Ed. Academic Press, Orlando, Fla., 1984. x, 217 pp., illus. \$17. Publication No. 52 of the Mathematics Research Center, The University of Wisconsin-Madison. From a conference, Madison, Wis., Oct. 1983.

**Physical Methods on Biological Membranes and Their Model Systems.** F. Conti *et al.*, Eds. Plenum, New York, 1985. x, 459 pp., illus. \$65. NATO Advances Science Institutes Series A, vol. 71. From an institute, Alto Villa Milicia, Italy, Sept. 1982.

**Physicians of Western Medicine.** Anthropological Approaches to Theory and Practice. Robert A. Hahn and Atwood D. Gaines, Eds. Reidel, Boston, 1984 (distributor, Kluwer, Hingham, Mass.). x, 345 pp. \$54. Culture, Illness, and Healing.

**Physics of Highly Charged Ions.** R. K. Janev, L. P. Presnyakov, and V. P. Shevelko. Springer-Verlag, New York, 1985. x, 330 pp., illus. \$52. Springer Series in Electrophysics, vol. 13.

**Picosecond Optoelectronic Devices.** Chi H. Lee, Ed. Academic Press, Orlando, Fla., 1984. xiv, 406 pp., illus. \$60.

**Plant Diseases.** Infection, Damage and Loss. R. K. S. Wood and G. J. Jellis, Eds. Blackwell Scientific, Palo Alto, Calif., 1984. viii, 327 pp., illus. \$44. From a symposium, Dec. 1982.

**The Plutonium Business and the Spread of the**

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