

situations; there are chapters on principal arcs, the inner sides of principal arcs, arc-related rifts, oceanic-type crust, intracontinental hotspots, different stages of rifting, and collisional events. Sawkins also recognizes the "gray" areas, with separate discussions of additional aspects of arc-related metallogeny and the metallogeny of different stages of rifting, and he concludes the book with "an attempt at perspective."

As to content, there is something for everyone, whether general reader or specialist. The general reader will learn about how and why many of the well-known mines and mining districts of the world are found where they are. Not only do discussions of such subjects contribute to understanding, they show the elegance with which a vast accumulation of diverse and seemingly disconnected geological and even geographic data integrate into a coherent story.

The specialist will wonder why he or she didn't think of many of the seemingly obvious things. For example, chapter 3, "Metal deposits of arc-related rifts," boldly unites the molybdenum deposits of the climax type, those "potentially" associated with the McDermitt district of Nevada and Oregon, the Kuroko deposits of Japan, the analogous but older deposits of Buchans, Newfoundland, and the vein deposits of the Colorado Mineral Belt. These geographically diverse and tectonically related deposits are then related to isotopic and other fundamental data, many of which originate from Sawkins and his students.

In those cases where the applicability of plate tectonics is still in doubt, such as the massive base metal sulfide deposits of ancient Archean greenstone belts, the Sudbury nickel deposits, or the uranium deposits of the unconformity type, sufficient information is given to make possible independent assessment.

Exploration and discovery of new deposits provide the test of any hypotheses concerning mineral deposits, and there is always a temptation among writers and researchers to indicate the applicability of their own concepts. Sawkins has not been immune to this temptation, and he concludes many sections of chapters with "suggestions for exploration." While the pragmatic explorationist may find these to be of limited value on the ground, they may well stimulate new ideas on area selection for large-scale regional exploration programs. Certainly, the explorationist would enjoy and probably benefit from this book, as will the student and professor. Sawkins has avoided what must also have been a temptation to include much more materi-

al, so that his book is just a comfortable length. It can be read in a couple of sittings and will reward repeated returns. I recommend it to all who are interested in mineral deposits or plate tectonics.

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Heat Production in Mammals

Mammalian Thermogenesis. LUCIEN GIRARDIER and MICHAEL J. STOCK, Eds. Chapman and Hall, London, 1983 (U.S. distributor, Methuen, New York). viii, 359 pp., illus. \$77.

Heat is generated as a by-product of metabolic reactions in all biological systems. In mammals, where this heat contributes to the homeothermy of the animal, cellular thermogenesis is under neuronal and hormonal regulation. This book, in a series of review chapters, discusses such regulation and provides a timely summary of several recent advances that have increased our understanding of the biochemical basis of thermogenesis as well as the significance of its contribution to mammals.

A major concern of seven of the 11 chapters is brown adipose tissue, a tissue whose only known physiological function is that of heat production. The recent demonstration by Foster and Frydman that small amounts of this tissue can generate significant quantities of heat (brown fat can account for 60 to 65 percent of the nonshivering thermogenic response of cold-acclimated rats even though it represents less than 2 percent of their body weight) has focused attention on this tissue as a major effector of nonshivering heat production in mammals.

Although some of the morphological characteristics of brown fat are described briefly in the volume, *Mammalian Thermogenesis* emphasizes the regulation and functional responses of thermogenic effectors. In an early chapter, Nicholls and Locke deal with the biochemical basis of increased thermogenesis in activated brown fat. As was originally described by Nicholls, brown fat mitochondria possess what appears to be a unique proton conductance pathway regulated by a protein in the inner mitochondrial membrane. Nicholls and Locke lucidly summarize evidence supporting the current view that activation of brown adipocytes results in changes in

the conformation of this protein, which in turn lead to an opening of the pathway, a loosening of mitochondrial coupling, an increased rate of oxidation of mitochondrial fatty acids, and hence an increased rate of heat generation. Although the cytosolic signal for effecting these mitochondrial changes is still uncertain, Nicholls and Locke argue for a prominent role for fatty acids. The chapter brings the reader to the current edge of the field.

Another subject of intense investigation reviewed in the book is the relationship between thermogenesis, food intake, and obesity. The report of Rothwell and Stock in 1979 that overfeeding enhanced thermogenesis in rats and attenuated their weight gain captured the interest of nutritionists as well as physiologists. Much of the subsequent work on the subject is reviewed in a chapter by Rothwell and Stock and supports the hypothesis that brown fat is an energy-dissipating tissue that, at least in rodents, is responsive to excess caloric intake. In another chapter, Trayhurn and James summarize data indicating that blunted thermogenesis in brown adipose tissue is an important contributor to the maintenance and, most likely, to the onset of obesity in rodents. Although similar mechanisms may be operant in humans, the contributors are careful to emphasize that it is premature to extrapolate and that evaluation of the role of brown fat in the energy balance in humans will be difficult.

The book not only deals with the increased metabolism occurring under physiological (cold, feeding) and pathological (trauma, fever) conditions, it contains chapters that discuss the regulation of thermogenesis by thyroid hormones and the autonomic nervous system. There is also one chapter devoted to the energetics of maintenance and growth that focuses primarily on large mammals.

Overall, *Mammalian Thermogenesis* reflects the multidisciplinary approach currently being used by investigators in this field. Although it is not an exhaustive review of the subject (for example, there is not a chapter on the thermogenic effects of exercise), the book achieves its objective of presenting an updated summary of much of the current work in thermogenesis. Moreover, one attractive feature of the book is the integration of studies on obesity, diet-induced thermogenesis, and cold-induced thermogenesis, which brings to the reader's attention the similarities between the effects of feeding and cold exposure on mammalian heat production. The book should

thus appeal to established investigators who want a convenient summary of the field as well as to those who are looking for an entry point to the literature.

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Reprints of Books

Previously Reviewed

Evolution and the Genetics of Populations. Sewall Wright. University of Chicago Press, Chicago, 1984. Vol. 1, Genetic and Biometric Foundations. Vol. 2, The Theory of Gene Frequencies. Vol. 3, Experimental Results and Evolutionary Deductions. Vol. 4, Variability within and among Populations. Paper, \$15 each volume. *Reviewed* 163, 556 (1969); 168, 722 (1970); 196, 1191 (1977); and 207, 173 (1980).

Geographical Ecology. Patterns in the Distribution of Species. Robert H. MacArthur. Princeton University Press, Princeton, N.J., 1984. Paper, \$15. *Reviewed* 178, 389 (1972).

The Hunger for Salt. An Anthropological, Physiological and Medical Analysis. Derek Denton. Springer-Verlag, New York, 1984. *Reviewed* 219, 1419 (1983).

Quantum Fields in Curved Space. N. D. Birrell and P. C. W. Davies. Cambridge University Press, New York, 1984. Paper, \$27.95. *Reviewed* 218, 369 (1982).

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Air Monitoring Methods for Industrial Contaminants. David A. Halliday, Ed. Biomedical Publications, Davis, Calif., 1984. xii, 428 pp., \$35.

Alterations in Food Production. Dietrich Knorr and Tom R. Watkins, Eds. Van Nostrand Reinhold, New York, 1984. xiv, 241 pp., illus. \$24.95.

America's Electric Utilities. Past, Present and Future. Leonard S. Hyman. Public Utilities Reports, Arlington, Va., 1983. viii, 297 pp., illus. \$25.

Analysis and Control of Unsteady Flow in Pipelines. Gary Z. Watters. 2nd ed. Butterworths, Boston, 1984. xii, 349 pp., illus. \$39.95.

Analytical Calorimetry. Vol. 5. Julian F. Johnson and Philip S. Gill, Eds. Plenum, New York, 1984. x, 402 pp., illus. \$69.50. From a symposium, Seattle, March 1983.

Analytical Pyrolysis. Techniques and Applications. Kent J. Voorhees. Butterworths, Boston, 1984. x, 486 pp., illus. \$69.95.

Annual Review of Medicine. Selected Topics in the Clinical Sciences. Vol. 35. William P. Creger, Cecil H. Coggins, and E. William Hancock, Eds. Annual Reviews, Palo Alto, Calif., 1984. x, 720 pp., illus. \$27.

Annual Review of Pharmacology and Toxicology. Vol. 24. Robert George, Ronald Okun, and Arthur K. Cho, Eds. Annual Reviews, Palo Alto, Calif., 1984. xii, 556 pp. \$27.

Chromosomes in Evolution of Eukaryotic Groups. Arun Kumar Sharma and Archana Sharma, Eds. CRC Press, Boca Raton, Fla., 1983. Two volumes. Vol. 1. viii, 254 pp., illus. \$86. Vol. 2. viii, 269 pp., illus. \$89.

The Classification of Psychopathology. Neo-Kraepelinian and Quantitative Approaches. Roger K. Blashfield. Plenum, New York, 1984. xvi, 328 pp. \$35.

Clinical Laboratory Safety. Susan L. Rose. Lipincott, Philadelphia, 1984. xvi, 304 pp., illus. Paper, \$24.95.

Clinical Pharmacology of Antiarrhythmic Therapy. Benedict R. Lucchesi, James V. Dingell, and Richard P. Schwartz, Eds. Raven, New York, 1984. xvi, 275 pp., illus. \$45. Perspectives in Cardiovascular Research, vol. 10.

The Coevolution of Climate and Life. Stephen H. Schneider and Randi Londer. Sierra Club Books, San Francisco, 1984 (trade distributor, Random, New York). xii, 563 pp., illus. \$25.

Commutative Semigroup Rings. Robert Gilmer. University of Chicago Press, Chicago, 1984. xii, 380 pp. \$27; paper, \$11. Chicago Lectures in Mathematics.

The Doctor and the Damned. Albert Haas. St. Martin, New York, 1984. xii, 336 pp. \$16.95.

Drug and Alcohol Abuse. A Clinical Guide to Diagnosis and Treatment. Marc A. Schuckit. 2nd ed. Plenum, New York, 1984. xx, 267 pp. \$25. Critical Issues in Psychiatry.

E. C. Stakman, Statesman of Science. C. M. Christensen. American Phytopathological Society, St. Paul, Minn., 1984. x, 156 pp., illus. \$18.

Early Biotic Responses to Advancing Lake Acidification. George R. Hendrey, Ed. Butterworths, Boston, 1984. xiv, 173 pp., illus. \$32.50. Acid Precipitation Series, vol. 6. An Ann Arbor Science Book. From a symposium, Las Vegas, March 1982.

Earthquakes, Earth Scientists, and Seismic-Safety Planning in California. Arthur G. Svenson. University Press of America, Lanham, Md., 1984. xvi, 130 pp. \$18.75; paper, \$8.50.

Ecological Aspects of Radionuclide Release. P. J. Coughtry, J. N. B. Bell, and T. M. Roberts, Eds. Blackwell Scientific, Palo Alto, Calif., 1983. xiv, 279 pp., illus. Paper, \$60. Special Publication No. 3 of the British Ecological Society. From a meeting, Colchester, England, April 1982.

Economic Perspectives on Acid Deposition Control. Thomas D. Crocker, Ed. Butterworths, Boston, 1984. xiv, 180 pp., illus. \$32.50. Acid Precipitation Series, vol. 8. An Ann Arbor Science Book. From a symposium, Las Vegas, March 1982.

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Effects of Nuclear War on Health and Health Services. World Health Organization, Geneva, 1984 (U.S. distributor, WHO Publications Centre USA, Albany, N.Y.). vi, 176 pp., illus. Paper, \$10.

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Elm. R. H. Richens. Cambridge University Press, New York, 1983. xii, 347 pp., illus. \$69.50.

The Embers and the Stars. A Philosophical Inquiry into the Moral Sense of Nature. Erazim Kohák. University of Chicago Press, Chicago, 1984. xiv, 269 pp., illus. \$17.50.

Empire of Knowledge. The Academy of Sciences of the USSR (1917-1970). Alexander Vucinich. University of California Press, Berkeley, 1984. x, 484 pp. \$29.95.

Gene Function in Prokaryotes. Jon Beckwith, Julian Davies, and Jonathan A. Gallant, Eds. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1983. x, 328 pp., illus. \$52. Cold Spring Harbor Monograph Series, 15. From a symposium, Cold Spring Harbor, N.Y., June 1982.

General Chemistry. Darrell D. Ebbing, Mark S. Wrighton, Ed. Houghton Mifflin, Boston, 1984. xxiv, 970 pp., illus., + plates + appendices. \$34.95.

Handbook of Powder Science and Technology. M. E. Fayed and L. Otten, Eds. Van Nostrand Reinhold, New York, 1984. xiv, 850 pp., illus. \$79.50.

Hazardous Waste Management. In Whose Backyard? Michaelann Harthill, Ed. Published for the American Association for the Advancement of Science by Westview, Boulder, Colo., 1984. xii, 205 pp., illus. \$22. AAAS Selected Symposium Series, 88. From a symposium, Toronto, Jan. 1981.

Health Information Systems. A Bibliography. Donald G. Ziegenfuss and James T. Ziegenfuss, Jr. IFI/Plenum, New York, 1984. viii, 247 pp. \$85. IFI Data Base Library.

Hitler's Psychopathology. Norbert Bromberg and Verna Volz Small. International Universities Press, New York, 1984. xii, 335 pp. \$27.50.

Liquid Crystals and Ordered Fluids. Vol. 4. Anselm C. Griffin and Julian F. Johnson, Eds. Plenum, New York, 1984. xiv, 1157 pp., illus. \$135. From a symposium, Las Vegas, March 1982.

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Localization and Orientation in Biology and Engineering. D. Varjú and H.-U. Schnitzler, Eds. Springer-Verlag, New York, 1984. xvi, 371 pp., illus. \$46. Proceedings in Life Sciences. From a conference, Tübingen, Germany, March 1983.

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Nutritional Considerations in a Changing World. Geoffrey H. Bourne, Ed. Karger, Basel, 1984. x, 216 pp., illus. \$99. World Review of Nutrition and Dietetics, vol. 44.

Ocean Tides. Mathematical Models and Numerical Experiments. G. I. Marchuk and B. A. Kagan. D. E. Cartwright, Transl. Ed. Pergamon, New York, 1984. xii, 292 pp., illus. \$65. Translated from the Russian edition by E. V. Blinova and L. Ya. Yusina.

An Offshore Eddy in the California Current System. J. J. Simpson et al. Pergamon, New York, 1984. 111 pp., illus. Paper, \$37.50. *Progress in Oceanography*, vol. 13, No. 1.

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Proceedings of the Fourth IASA Task Force Meeting on Input-Output Modeling. (Laxenburg, Austria, Sept. 1983.) Anatoli Smyslyayev, Ed. International Institute for Applied Systems Analysis, Laxenburg, 1983. viii, 329 pp., illus. Paper, \$15. IASA Collaborative Proceedings Series, CP-83-S5.

Proceedings of the 38th Industrial Waste Conference. (West Lafayette, Ind., May 1983). Butterworths, Boston, 1984. viii, 1000 pp., illus. \$75.

Progress in Inorganic Chemistry. Vol. 31. Stephen J. Lippard, Ed. Interscience (Wiley), New York, 1984. vi, 474 pp., illus. \$65.

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Sleep Mechanisms. A. Borbély and J.-L. Valatx, Eds. Springer-Verlag, New York, 1984. xiv, 314 pp., illus. \$33. Experimental Brain Research Supplementum 8. From a school, Zuz, Switzerland, 1983.

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Tropical Nature. Adrian Forsyth and Kenneth Miyata. Illustrations by Sarah Landry. Scribner, New York, 1984. xx, 248 pp. \$16.95.

Uncertain Power. The Struggle for a National Energy Policy. Dorothy S. Zinberg, Ed. Pergamon, New York, 1983. xxxvi, 260 pp. \$32.50; paper, \$11.95. From a workshop, May 1981.