

quences are the subjects for the final interesting chapters. Evidence is also reviewed that competition among gametophytes, embryos, and immature fruits (termed "soft selection sieves") might permit plants gracefully to dispose of many of their mistakes at minimal cost (but biasing our estimates of load).

The book judiciously reviews a wide and modern literature with over 700 references and many figures reproduced from original publications (not always well). Though such scope is impressive, it makes the book read at times like a succession of review articles. Specialists will probably be unsatisfied with the treatment of particular areas. This reviewer felt that too much detail was presented for certain topics (as in the case of the elementary mathematical models, one of which contains errors), whereas other relevant topics (like the potential for meiotic drive under gametophytic selection) remained unexplored. Nevertheless, the book as a whole achieves a noteworthy synthesis by posing the right questions and exposing the need for further experimental and theoretical work. It should fuel interest in somatic plant mutations and their phenotypic and genetic consequences, as well as contribute to the genetic literacy of botanists and the botanical literacy of geneticists.

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## The Geology of Fluid Flow

**Fluid Flow in Sedimentary Basins and Aquifers.** J. C. GOFF and B. P. J. WILLIAMS, Eds. Published for the Geological Society by Blackwell Scientific, Palo Alto, CA, 1987. x, 230 pp., illus. \$72. Geological Society Special Publication no. 34. From a meeting, London, U.K., June 1985.

The study of sedimentary basins is a venerable area of research in the earth sciences. Basins are large sediment-filled depressions in the shallow continental and oceanic crust, and as such they play an important role in preserving earth history as a stratigraphic record. Basins also contain nearly all of the oil and gas fields distributed in the earth's crust and host some of the largest metallic and nonmetallic ore deposits. Geologists have long been interested in the nature of fluid circulation within sedimentary basins because of the economic importance of groundwater flow systems, petroleum migration, geothermal reservoirs, and ore-forming hydrothermal fluids. It is clear also that groundwater-sediment interactions have a profound influence on the chemical transport of toxic wastes in the subsurface,

on the alteration of sedimentary and crystalline rocks, on the geomorphic evolution of landforms, and on the mechanics of crust deformation.

In this publication Goff and Williams have put together a collection of 13 papers from a symposium the theme of which was the principles and geological controls of groundwater flow at scales from regional systems down to individual aquifers.

The book is conveniently divided into four sections. The first section contains two papers that describe large-scale geologic controls on fluid migration in compacting sedimentary basins. The material here is somewhat dated, drawing heavily on the authors' published books on petroleum geology. Both papers are too short to provide significant background on the mechanics of flows in compacting basins, nor do they take into account the recent literature on compaction-driven flow in intracratonic basins, passive margins, or accretionary wedges.

The second section contains four papers on the analysis of present-day and ancient groundwater flow in the Western Canada sedimentary basin. The most notable here is the paper by Tóth and Corbet, who document the effects of erosional unloading on the hydrologic history of groundwater systems in southern Alberta. The authors argue that transient adjustment of the flow patterns over the last 20 million years has had a profound influence on the accumulation of petroleum. A second novel paper in this section is presented by Bradbury and Woodwell. They utilize stable isotope data for rock oxygen and carbon to theorize on the hydrology of mountain-building thrust sheets. Two field data sets are discussed briefly, one from the front range of the Canadian Rockies and one from the southern Pyrenees. Bradbury and Woodwell interpret two scenarios of fluid migration in thrust belts based on their geochemical data. Groundwater flow in the Rockies was restricted to a basal aquifer, where flow was most active during thrusting. Basement shear zones in the Pyrenees channelized flow up into the cover sediments, where flow was pervasive. These geochemical models for fluid migration are intriguing but have yet to be verified with hydrodynamic theory.

Section 3 of the book contains four papers describing aquifers in the United Kingdom. The paper by Michael Price on the Chalk Aquifer should be of great interest to groundwater geologists. Price summarizes the hydraulic properties and demonstrates the close association between fracture permeability and dissolution near groundwater discharge zones. Readers needing a more quantitative treatment of dual-porosity flow in the Chalk ought to refer to R. Bibby's

1981 benchmark paper in *Water Resources Research*.

The last section of the volume contains three papers on fluid migration in low-permeability rock. J. H. Black's paper on the hydrogeology of crystalline rock summarizes useful permeability data from laboratory and borehole packer tests on some of the European and Canadian sites being explored as repositories for high-level nuclear wastes.

On the whole, this volume will be of most use to practicing geologists and hydrologists who have limited access to major journals and want an overview of basin hydrology in the United Kingdom and Alberta. Several of the papers in the book have since been published as full-fledged journal articles. For conveying the general principles of groundwater flow and oil migration in sedimentary basins, a more valuable work would be *Groundwater* by R. A. Freeze and J. A. Cherry.

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## Books Received

**Benzodiazepine, Receptor Ligands, Memory and Information Processing.** Psychometric, Psychopharmacological and Clinical Issues. I. Hindmarch and H. Ott, Eds. Springer-Verlag, New York, 1988. x, 317 pp., illus. \$78.70. Psychopharmacology Series, vol. 6. From a workshop, Puerto Rico, Dec. 1986.

**The Big Bang.** Joseph Silk. 2nd ed. Freeman, New York, 1988. xvi, 485 pp., illus., + plates. Paper, \$14.95.

**Bioanalysis of Drugs and Metabolites, Especially Anti-inflammatory and Cardiovascular.** Eric Reid, J. D. Robinson, and Ian D. Wilson, Eds. Plenum, New York, 1988. xiv, 415 pp., illus. \$89.50. Methodological Surveys in Biochemistry and Analysis, vol. 18A. From a symposium, Guildford, U.K., Sept. 1987.

**Chemistry of Nucleosides and Nucleotides.** Vol. 1. Leroy B. Townsend, Ed. Plenum, New York, 1988. xii, 394 pp., illus. \$69.50.

**Chemistry of Oxide Superconductors.** C. N. R. Rao, Ed. Blackwell Scientific, Palo Alto, CA, 1988. viii, 199 pp., illus. \$23.

**Childhood Obesity.** A Biobehavioral Perspective. Norman A. Krasnegor, Gilman D. Grave, and Norman Kretschmer, Eds. Telford, Caldwell, NJ, 1988. xiv, 218 pp., illus. \$45; paper, \$27.50.

**Chinese Students in America.** Policies, Issues, and Numbers. Leo A. Orleans. National Academy Press, Washington, DC, 1988. viii, 144 pp., illus. Paper, \$10.

**Chromatographic Enantioseparation.** Methods and Applications. Stig. G. Allenmark. Horwood, Chichester, U.K., and Halsted (Wiley), New York, 1988. 224 pp., illus. \$64.95. Ellis Horwood Series in Analytical Chemistry.

**Eukaryote Cell Recognition.** Concepts and Model Systems. G. P. Chapman, C. C. Ainsworth, and C. J. Chatham, Eds. Cambridge University Press, New York, 1988. xiv, 315 pp., illus. \$65.50. From a symposium, London, U.K.

**The Evolution and Classification of Flowering Plants.** Arthur Cronquist. 2nd ed. New York Botanical Garden, Bronx, NY, 1988. x, 555 pp., illus. \$45.35.

**Evolution in Language.** Bernard H. Bichakjian. Karoma, Ann Arbor, MI, 1988. xii, 178 pp., illus. \$24.95.

**Extreme Value Theory in Engineering.** Enrique Castillo. Academic Press, San Diego, CA, 1988. xiv, 389 pp., illus. \$59.95. Statistical Modeling and Decision Science.

**The Facts on File Dictionary of Archaeology.** Ruth D. Whitehouse. 2nd ed. Facts on File, New York, 1988. x, 597 pp. Paper, \$16.95.