

fail to note, however, that symbol-based models can often do so only in the way elephants can do seal tricks—somewhat unnaturally. Also, the connectionist “abolition” of higher-order symbols is an attractive scientific goal. For it would show there is a “deeper” reality to surface appearances, just as apparently unitary matter turns out to be made of microlevel parts that look as though they act as units.

If somewhat weak on analyzing the attraction of connectionist models, though, these papers are brilliantly apt in analyzing their present and perhaps permanent difficulties. Indeed, some of the critical arguments seem quite simply and straightforwardly correct, especially the general ones in the initial essay by Fodor and Pylyshyn (some of which are repeated in various forms in the later essays). It seems unlikely that connectionism in its present forms can cope with these difficulties; a connectionism that could cope would be one in which the basic equipment necessarily lost the stripped-down representational nature that constitutes much of the appeal of the present forms.

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A Burst of Phages

The Bacteriophages. RICHARD CALENDAR, Ed. In two volumes. Vol. 1, xviii, 596 pp., illus. \$105. Vol. 2, xviii, 760 pp., illus. \$125. Plenum, New York, 1988. The Viruses.

In these two volumes Calendar has assembled an excellent collection of papers summarizing the life history or the development of the major groups of bacteriophages. All the favorites are here, though λ is covered more as a collection of components than as an intact organism. Also reviewed are several lesser-known phages including the much-maligned T1 (Drexler remonstrates against those who live in dread of this phage), *Bacillus subtilis* phages, cyanophages, and the various viruses that parasitize the equally various archaeobacteria.

Many of the phages whose life-style is described in these volumes have not been the subject of a comprehensive review for several years and, if for no other reason, their presence here is welcome. Others, T4 and Mu among them, are the subject of recent monographs, but Mosig and Eiserling (T4) and Harshey (Mu) have largely succeeded in avoiding duplication of detailed material.

The dust jackets of the volumes refer to

two types of papers: discussions of issues exemplified by many kinds of phages and comprehensive reviews of individual phage families. Both volumes contain both types, and their order of presentation is randomly permuted. However, the chapters are all independent and are unlikely to be read in sequence. Nevertheless, I would have liked to have seen the detailed list of the contents of both volumes in each. I would also like to have seen a chapter including both a retrospective analysis of bacteriophage biology and an optimistic prognosis. We are still faced with many fundamental questions, the answers to which may best be obtained by studying these “simple” organisms. An enthusiastic, but considered, summary might have been infectious and helped stem the decline in popularity of phage research.

Including general reviews and specialized papers in one publication almost necessarily leads to repetition. This is especially noticeable when the chapters “Changes in RNA polymerase” and “Strategies of DNA replication” are compared with chapters on individual phages. Readers familiar with these topics will no doubt prefer the pertinent sections in the more specialized chapters, though even they may be rewarded by perusing these overviews. The introduction to “Strategies . . .” by Keppel *et al.* is particularly thoughtful.

Few of the papers on double-stranded DNA phages cover morphogenesis in detail, but this complex topic is thoroughly discussed in the contributions of Casjens and Hendrix (dsDNA phage assembly) and Black (DNA packaging). Both reviews are written with exceptional clarity, and even a casual reading of them should provide the nonspecialist with a good grasp of the subject and of the problems yet to be solved.

The reader will find little information on recombinant DNA technology in these pages. The use of phages as cloning or sequencing vectors receives only a couple of passing comments, and there is no description of phages that yield blue (or sometimes white) plaques. These topics are well covered elsewhere, and their absence from *The Bacteriophages* is probably intentional. What one will generally find, in the chapters on individual phage families, are comprehensive and often stimulating discussions of a diverse group of organisms. As might be expected, the contributions vary in quality, but any disappointments I may have had while reading some were more than compensated by the pleasures of reading others. Of several superb essays on individual phage families, that by Yarmolinsky and Sternberg stands out, partly because it occupies a quarter of a 13-chapter volume. Readers of

this essay, while learning more than they thought possible about P1, can also feast on its fine English, its coarse French, and its humorous anecdotes.

These two volumes summarize our current knowledge of all the major groups of phages. The diversity of pathways used by one or another phage in subsuming the biosynthetic machinery of the host in order to promote its own development is truly remarkable. These strategies are well documented, with comprehensive reference lists extending into 1987 and even 1988. Anyone who wants to find a precedent for a particular mechanism of, for example, gene regulation is more than likely to find it in *The Bacteriophages*. These volumes contain a mine of information and ideas that are pertinent to all facets of biology. Both students and researchers should find them a valuable resource.

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Cementation Patterns

Diagenesis of Sedimentary Sequences. J. D. MARSHALL, Ed. Published for the Geological Society by Blackwell Scientific, Palo Alto, CA, 1988. vii, 360 pp., illus., + plates. \$135. Geological Society Special Publication no. 36. Based on a meeting, Liverpool, U.K., Sept. 1986.

The process known as diagenesis is the sum of physical inorganic chemical or biochemical changes, excluding metamorphism, in a sedimentary deposit after its initial accumulation. It involves compaction, addition of material, removal of material, and transformation of material by change of mineral phase or replacement of one mineral phase by another. The most important aspect of the process is the transformation of loose sedimentary particles into solid bedrock by cementation.

As well as being of academic interest diagenesis has applications in the industrial sphere. The location of oil, gas, and water depends on the presence of pores that have escaped cementation or have been created through dissolution of newly formed cement or of particles of the original sediment. Pores such as vugs, channels, and caves resulting from percolating subsurface dissolution of the rock generate space of possible use for the disposal of industrial waste.

The aim of the meeting at which the papers collected in this volume were presented was to bring together workers on different kinds of sedimentary rocks. The

papers are organized in three sections, Diagenetic Processes, Early Diagenesis, and Regional Studies and Burial Diagenesis. The sedimentary rocks covered include sandstones (six papers), cherts (two papers), dolomites (three papers), phosphates (one paper), magnesite (one paper), and limestones (ten papers). Most of the authors are from the United Kingdom, with a sprinkling from Norway, Spain, Canada, the United States, and China. Almost all the studies represent case histories from various geographic areas, mostly in the United Kingdom. Hence a valuable new set of data has become available.

In the section on early diagenesis a paper by Pueyo and Urpinell describing the discovery of magnesite in modern playa lakes of Spain was of particular interest to me. Although in recent years magnesite (MgCO_3) has been found in undeformed carbonate strata of the rock record, this may be the first observation of this mineral in a modern continental environment. The authors explain magnesite formation as a result of both an increase in CO_2 activity caused by the decay of organic matter and the formation of strong concentrations of magnesium in brines in summer. Yet playas that have been studied in West Texas, New Mexico, and the Middle East experienced similar CO_2 increase and magnesium concentrations. Was magnesite in these playas missed in sampling, or was it indeed absent? In my own playa studies dolomite ($\text{CaMg}[\text{CO}_3]_2$) was the observed magnesian mineral and magnesite was never present. In these playas dolomite formed as a evaporite mineral. This observation relates to the next paper, by Taberner and Santisteban, whose title, "Mixed-water dolomitization . . .," invokes a popular explanation for dolomitization. Not only has the concept of mixing marine and freshwater to precipitate dolomite been overstated, much of the evidence is equivocal or negative. Could not hypersalinity explain the origin of such dolomite? After all, following the inflow of marine waters brines are generated. In the section on regional studies and burial diagenesis Boles explains the diagenetic history of a large petroleum reservoir in which the migration of 500 million barrels of oil closely followed or was contemporaneous with extensive dissolution of plagioclase and calcite from influx of acid during kerogen migration. In the section on diagenetic processes Goldsmith and King discuss hydrodynamic modeling of cementation patterns in modern reefs. Reef samples have shown that the variation in the volume and spatial distribution of precipitated cement is controlled by the microenvironmental permeability alone. Large pores initially receive a greater volume

of cement than smaller pores, and the rate of cementation is reduced as the pores become restricted.

Other subjects of interest include controls on the geometry and distribution of carbonate cements in sandstones, kinds of silicification fabrics, porosity development in sandstones, and phosphate cements. No paper discusses deep-burial diagenesis and its effect on cementation, porosity development, dolomitization, or changes in mineral phase.

I would have welcomed a synthesis of this mass of data, showing especially how it relates to existing knowledge. The introduction by Marshall encourages readers "to delve into the papers for themselves." For specialists this is good advice. However, the subject of diagenesis is now so central for academic and industrial researchers that a useful synthesis could have been an important contribution.

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Books Received

Comparative Perspectives in Modern Psychology. Daniel W. Leger, Ed. University of Nebraska Press, Lincoln, 1988. xvi, 327 pp. \$33.95; paper, \$18.95. Current Theory and Research in Motivation, vol. 35. From a symposium, Lincoln, NE, 1987. Six papers, dealing with monogamy, parental solicitude, animal intelligence, and vocal communication, including bird song and ape language.

Computers in Mathematical Research. N. M. Stephens and M. P. Thorne, Eds. Clarendon (Oxford University Press), New York, 1988. xii, 251 pp., illus. \$57.50. Institute of Mathematics and its Applications Conference Series, vol. 14. From a conference, Cardiff, Wales, Sept. 1986.

Control of Cell Proliferation and Differentiation during Regeneration. H. J. Anton, Ed. Karger, Basel, 1988. x, 246 pp., illus. \$147.50. Monographs in Developmental Biology, vol. 21. From a colloquium, Cologne, F.R.G., 1986.

Diffusion at Interface. Microscopic Concepts. M. Grunze, H. J. Kreuzer, and J. J. Weimer, Eds. Springer-Verlag, New York, 1988. viii, 205 pp., illus. \$59.50. Springer Series in Surface Sciences, vol. 12. From a workshop, Campobello Island, New Brunswick, Aug. 1987.

Downstream Processes. Equipment and Techniques. Avshalom Mizrahi, Ed. Liss, New York, 1988. xiv, 370 pp., illus. \$96. Advances in Biotechnological Processes, vol. 8.

Encyclopedia of Human Evolution and Prehistory. Ian Tattersall, Eric Delson, and John Van Couvering, Eds. Garland, New York, 1988. xxxvi, 603 pp., illus. \$87.50. Garland Reference Library of the Humanities, vol. 768.

Endothelial Cell Biology in Health and Disease. Nicolae Simionescu and Maya Simionescu, Eds. Plenum, New York, 1988. xx, 458 pp., illus. \$89.50.

Energy and Problems of a Technical Society. Jack J. Kraushaar and Robert A. Ristinen, 2nd ed. Wiley, New York, 1988. xii, 512 pp., illus. Paper, \$35.75.

Enriching Heredity. The Impact of the Environment on the Anatomy of the Brain. Marian Cleeves Diamond. Free Press (Macmillan), New York, 1988. xiv, 191 pp., illus. \$24.95.

Ethnographers in the Field. The Psychology of

Research John L. Wengle. University of Alabama Press, Tuscaloosa, 1988. xxiv, 197 pp. \$21.95.

The Evolution of the Calusa. A Nonagricultural Chiefdom on the Southwest Florida Coast. Randolph J. Widmer. University of Alabama Press, Tuscaloosa, 1988. xviii, 334 pp., illus. Paper, \$18.95.

Exercises in Physical Stratigraphy and Sedimentology. William J. Fritz and Johnnie N. Moore. Wiley, New York, 1988. x, 221 pp., illus. Paper, \$22.35.

Family Farming. A New Economic Vision. Marty Strange. University of Nebraska Press, Lincoln, and Institute for Food and Development Policy, San Francisco, CA, 1988. xii, 311 pp. \$18.95.

Flagellates in Freshwater Ecosystems. R. I. Jones and V. Ilmavirta, Eds. Kluwer, Norwell, MA, 1988. viii, 279 pp., illus. \$145. Developments in Hydrobiology, vol. 45. Based on a meeting, Lammi, Finland, June 1986. Reprinted from *Hydrobiologia*, vol. 161.

From Clocks to Chaos. The Rhythms of Life. Leon Glass and Michael C. Mackey. Princeton University Press, Princeton, NJ, 1988. xviii, 248 pp., illus. \$45; paper, \$13.95.

Generative Processes in Music. The Psychology of Performance, Improvisation, and Composition. John A. Sloboda, Ed. Clarendon (Oxford University Press), New York, 1988. xviii, 298 pp., illus. \$75.

Genetic Resources of Phaseolus Beans. Their Maintenance, Domestication, Evolution, and Utilization. Paul Gepts, Ed. Kluwer, Norwell, MA, 1988. xiv, 613 pp., illus. \$138.50. Current Plant Science and Biotechnology in Agriculture, vol. 6.

Ging's ohne Forschung Besser? Der Einfluss der Naturwissenschaften auf die Gesellschaft. Max F. Perutz. 2nd ed. Wissenschaftliche Verlagsgesellschaft, Stuttgart, 1988. 110 pp., illus. Paper, DM 16.50. Paperback der Zeitschrift Naturwissenschaftliche Rundschau.

Glim. An Introduction. M. J. R. Healy. Clarendon (Oxford University Press), New York, 1988. x, 130 pp., illus. \$39.95.

Global Climatic Catastrophes. M. I. Budyko, G. S. Golitsyn, and Y. A. Izrael. Springer-Verlag, New York, 1988. viii, 99 pp., illus. Paper, \$29. Translated from the Russian edition (Leningrad, 1986) by V. G. Yanuta.

Gravity's Lens. Views of the New Cosmology. Nathan Cohen. Wiley, New York, 1988. xviii, 237 pp., illus. \$19.95. Wiley Science Editions.

Green Photosynthetic Bacteria. J. M. Olsen et al., Eds. Plenum, New York, 1988. x, 327 pp., illus. \$69.50. Based on a workshop, Nyborg, Denmark, Aug. 1987.

Insulin Receptors. C. Ronald Kahn and Len C. Harrison, Eds. Liss, New York, 1988. Two volumes. Part A, Methods for the Study of Structure and Function. xiv, 304 pp., illus. \$96. Part B, Clinical Assessment, Biological Responses, and Comparison to the IGF-I Receptor. xiv, 220 pp., illus. \$70. Receptor Biochemistry and Methodology, vol. 12.

International Environmental Diplomacy. The Management and Resolution of Transfrontier Environmental Problems. John E. Carroll. Cambridge University Press, New York, 1988. viii, 291 pp. \$54.50.

International Mineral Economics. Mineral Exploration, Mine Valuation, Mineral Markets, International Mineral Policies. W. R. Gocht, H. Zantop, and R. G. Eggert. Springer-Verlag, New York, 1988. xiv, 271 pp., illus. Paper, \$39.50.

Introduction to Causal Analysis. Exploring Survey Data by Crosstabulation. Ottar Hellevik. 2nd ed. Norwegian University Press, Oslo, 1988 (U.S. distributor, Oxford University Press, New York). xx, 211 pp., illus. Paper, \$24.95.

Invention and Evolution. Design in Nature and Engineering. M. J. French. Cambridge University Press, New York, 1988. xvi, 324 pp., illus. \$59.50; paper, \$19.95.

Learning Strategies and Learning Styles. Ronald R. Schmeck, Ed. Plenum, New York, 1988. xxii, 368 pp. \$47.50. Perspectives on Individual Differences.

Lectins and Glycoconjugates in Oncology. H. J. Gabius and G. A. Nagel, Eds. Springer-Verlag, New York, 1988. x, 224 pp., illus. \$59.40.

The Living Tundra. Yu. I. Chernov. Cambridge University Press, New York, 1988. xiv, 213 pp., illus. Paper, \$17.95. Studies in Polar Research. Reprint, 1985 edition.

Messengers of Paradise. Opiates and the Brain. Charles F. Levinthal. Anchor (Doubleday), New York, 1988. x, 229 pp., illus. \$17.95. New York Academy of Sciences Book Project.

Metal Clusters in Proteins. Lawrence Que, Jr., Ed. American Chemical Society, Washington, DC, 1988. x, 413 pp., illus. \$84.95. ACS Symposium Series, vol. 372. From a symposium, New Orleans, LA, Aug.-Sept. 1987.