subfields of cognitive science: mathematical psychology, information processing, cognitive psychology, psycholinguistics, psycholexicology, and cognitive neuroscience. It offers insight into the development of the thinking, theorizing, and research of George Miller, who has contributed so much to the advancement of cognitive science, as well as illuminating the development of the chapter authors' work. All in all, it makes for fascinating reading.

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Surface Science

Physics at Surfaces. ANDREW ZANGWILL. Cambridge University Press, New York, 1988. xiv, 454 pp., illus. $69.50; paper, $27.95.

If a fresh surface exposed by cleaving a sheet of mica is sprayed immediately with distilled water, the water seems to disappear as it uniformly wets the surface. If several seconds are allowed to pass before the surface is sprayed, the water will generally bead up in distinctly visible droplets. In that brief interval, organic vapors from the laboratory air have contaminated the surface, profoundly altering its physical and chemical properties. Yet, before 1967, no general method existed by which the surface composition of a solid could be analyzed. The invention of Auger spectroscopy in that year seemed to release a creative force.

For two decades, new surface techniques have been spawned one after another. Driven by these inventions, surface physics has experienced phenomenal growth. Indeed, it is the techniques of surface physics, both experimental and theoretical, that define the field. Such disparate topics as heteroepitaxy of germanium on silicon and the reaction of cyclopentane on platinum, after all, have little in common aside from the fact that both systems have been studied by low-energy electron-loss spectroscopy. It is not, in my opinion, possible to understand surface physics without first understanding the methods of surface characterization.

Andrew Zangwill has taken up the challenge of writing a textbook for surface physics. He has attempted to synthesize this diverse field in just 450 pages, divided into two parts: Clean Surfaces and Adsorption. That is a lot of territory to cover. How did he manage to condense it into a book of such modest dimensions?

A little inaccuracy, it has been said, saves a world of explanation. Zangwill "covers" Auger spectroscopy in a record-breaking three pages and x-ray photoelectron spectroscopy in one paragraph. Field emission is confined to a single sentence in a chapter on kinetics and dynamics. This sort of condensation is not achieved without cost. One winces at the oversimplifications and at the occasional misuse of terminology.

In spite of these flaws, the book does manage to relate an enormous body of knowledge and provide a remarkably current picture of the field. I particularly liked the liberal use of figures taken from the recent literature. The figures serve in many cases to fill in gaps in the text, and they have a way of making the literature more accessible to the student. In some cases the figure captions are too cryptic, but that adds a note of realism.

Zangwill insists in the preface that this is not a textbook in the traditional sense. The field, he says, is too "untidy" for that. Anyone who has attempted to teach a course in surface physics will sympathize with that assessment. But if this is not a textbook, what is it? The question is, would I use this for a course in surface physics? I think good use could be made of parts of it, but it would have to be supplemented heavily in such areas of traditional surface concern as secondary emission and scattering theory.

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Sedimentary Geology

New Perspectives in Basin Analysis. K. L. KLEINSPEHN and C. PAOLA, Eds. Springer-Verlag, New York, 1988. xx, 453 pp., illus. $64. Frontiers in Sedimentary Geology. Based on a symposium, Minneapolis, MN, May 1986.

This significant addition to the literature of "soft-rock" geology derives from a conference of the same title held at the University of Minnesota to honor Francis J. Pettijohn (Ph.D. Minnesota 1930!). Pettijohn came to sedimentary geology with a lifelong passion for field observation (his presidential address before a learned society was "In Defense of Outdoor Geology") and after years devoted to integrating field observation with microscopic and laboratory analysis to unravel the mysteries of the very hard rocks of the Canadian Shield. He should be pleased to have a super-avuncular relationship to this collection of papers by a younger generation that includes his students' students plus other representatives of a wide spectrum of supporters and admirers. As is pointed out by Harold Reading in his introduction to a group of the papers, the conference and its product represent a return to the Pettijohn-fostered first principles of basin analysis after two decades of fixation on the fluid-dynamic, chemical, and organic processes represented by sedimentary rocks.

Basin analysis concerns the geography that controlled the sources and distribution paths of sediment reaching ancient sedimentary basins and that determined the equilibria (or disequilibria) between the critical rates of sedimentation, sea-level change, and basin subsidence. All of these were governed directly or indirectly by tectonic factors and all were important determinants of the volume, character, and distribution of the basin fill and the fluids it contains.

The book before us contains 21 separate contributions plus brief introductions to four subsets among which the papers are apportioned. As might be expected, the titles of the subsets (Source-Area Characterization, Lithostratigraphy and Chronostratigraphy, Tectonics and Sedimentation, and Precambrian Basins) are not particularly apt descriptors, but the divisions are welcome because each is preceded by a few thoughtful words by its organizer and each organizer has something interesting to say about the evolution of basin analysis and about Pettijohn's role in maintaining a focus on synthesis of significant observations from both field and laboratory.

The individual contributions range in length from a few pages to more than 30; many readers with a driving concern for sedimentary basins will profit from reading almost all of them. Those who are not totally enslaved by the subject but who want a quick and painless short course on forefront thinking on basis analysis will do well to study some of the longer contributions, which are fine review papers to which are added the authors' current pet solutions to major problems.

Many of the mechanisms that drive sedimentary basins (for example the initiation and recurrence of subsidence, sea-level change, and shifts in basin geometry and in depocenters) are incompletely understood. In these circumstances there is an almost irresistible urge toward the development of unique models that satisfy isolated data sets but that lose credibility in application to a wider universe of observations. The editors of this collection are to be congratulated for treating this problem with balance.

Finally, it should be noted that the section on Precambrian basins, included in recognition of Pettijohn's long interest in ancient

rocks, contains two papers (one on the >3-billion-year-old sediments of southern Africa) that lose nothing in translation to Phanerozoic conditions and that have much to offer for investigators of younger strata.

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Some Other Books of Interest

Foundry Processes. Their Chemistry and Physics. SEYMOUR KATZ and CRAIG F. LANDEFELD, EDS. Plenum, New York, 1988. xii, 525 pp., illus. $89.50. General Motors Research Laboratories Symposia Series. From a symposium, Warren, MI, Sept. 1986.

The Physical Properties of Liquid Metals. TAKAMICHI IDA and RODERICK I. L. GUTHRIE. Clarendon (Oxford University Press), New York, 1988. xviii, 288 pp., illus. $75.

The ability to "handle great amounts of data by computational means, using new and more complicated treatments than we could deal with before" has made foundry processing into a "new science," Robert A. Frosch writes in his foreword to *Foundry Processes*. Hence the choice of this "subject with ancient beginnings" for a symposium in a series that has generally been focused on "new and emerging" areas of technology. The symposium brought together some 145 participants from universities and industry, including a few representatives from outside North America. In all, the proceedings volume consists of 16 long and 4 shorter papers on topics "carefully selected to address important issues." An opening set devoted to "fundamentals" includes a "critical overview" of foundry processing and discussions of physicochemical phenomena in iron casting, slags and their refining capacities, and the partition of alloying elements in cast iron. The remaining papers are presented in sections on the production of liquid metals (including processes in cupolas and ladles and the modeling thereof), on their purification, and on casting defects. (The subject of melt solidification was excluded from the symposium as too broad to be adequately treated in the time available.) The papers, which are clearly intended for those already knowledgeable about foundry processes, are each preceded by an abstract and followed by transcribed discussion from the symposium.

Also noting the recent advances in process metallurgy, the authors of *The Physical Properties of Liquid Metals* observe that, despite the importance of a knowledge of the physical chemistry of liquid metals in the manufacture of high-quality metallic materials, there has heretofore been no book on the subject intended specifically for materials engineers and metallurgists. Here they set out to provide such a book, assuming some elementary knowledge of statistical and quantum mechanics. They hope especially to provide guidance for hydrodynamical analyses, which "are playing an increasingly important role" but where "accurate theoretical predictions are still not available" for some parameters and "considerable discrepancies exist among experimental values," to provide an up-to-date account of continuum theory as applied to liquid metals, and more generally to demonstrate the importance of the microscopic approach to the processing of liquid metals. The authors present the subject in eight chapters, on general properties, structure, density, thermodynamic properties, surface tension, viscosity, diffusion, and electrical and thermal conductivity. The book also includes a list of symbols used, appendixes on the "application of some expressions to molten salts" and on SI units and physical constants, a list of references, and author and subject indexes.

—K.L.

Books Received

The Academic Life. Small Worlds, Different Worlds. Burton R. Clark. Carnegie Foundation, Princeton, NJ, 1987 (distributor, Princeton University Press, Princeton, NJ). xxx, 360 pp. $28.40; paper, $24.50. A Carnegie Foundation Special Report.

AIDS in Children, Adolescents and Heterosexual Adults. An Interdisciplinary Approach to Prevention. Raymond F. Schinazi and André J. Nahmias, Eds. Elsevier, New York, 1988. xxviii, 443 pp., illus. Paper, $34.95. From a conference, Atlanta, GA, Feb. 1987.

Amber. The Golden Gem of the Ages. Patty C. Rice. 2nd ed. Kosciuszko Foundation, New York, 1987 (distributor, Geoscience Press, Prescott, AZ). xii, 289 pp., illus. $29.95; paper, $19.95.

American Education. The National Experience, 1783–1876. Lawrence A. Cremin. Harper and Row, New York, 1988. xiv, 607 pp. Paper, $35. Reprint, 1980 ed.

Atomic Physics with Positrons. J. W. Humberston and E. A. G. Armour, Eds. Plenum, New York, 1987. xvi, 456 pp., illus. $89.50. NATO Advanced Science Institutes Series B, vol. 169. From a workshop, London, U.K., July 1987.

Bacterial Endotoxins. Pathophysiological Effects, Clinical Significance, and Pharmacological Control. Jack Levin *et al.*, Eds. Liss, New York, 1988. xxii, 417 pp., illus. $70. Progress in Clinical and Biological Research, vol. 272. From a conference, Amsterdam, the Netherlands, May 1987.

The Biochemical Pathology of Astrocytes. Michael D. Nornberg, Leif Hertz, and Arne Schousboe, Eds. Liss, New York, 1988. xxiv, 638 pp., illus. $118. Neurology and Neurobiology, vol. 39. From a symposium, Miami, FL, May 1987.

Biological Control. Pacific Prospects. D. F. Waterhouse and K. R. Norris. Inkata, Melbourne, Australia, 1988 (U.S. distributor, International Specialized Book Services, Portland, OR). viii, 454 pp., illus. $130.

Biological Organization. Macromolecular Interactions at High Resolution. Roger M. Burnett and Henry J. Vogel, Eds. Academic Press, San Diego, CA, 1987. xiv, 359 pp., illus. $81.50. Based on a symposium, Harriman, NY, May–June 1985.

Biology of Isolated Adult Cardiac Myocytes. William A. Clark, Robert S. Docker, and Thomas K. Borg, Eds. Elsevier, New York, 1988. xii, 441 pp., illus. $95. From a workshop, Pacific Grove, CA, Sept. 1987.

Brain Structure, Learning, and Memory. Joel L. Davis, Robert W. Newburgh, and Edward J. Wegman, Eds. Published for the American Association for the Advancement of Science by Westview, Boulder, CO, 1988. xvi, 301 pp., illus. Paper, $35. AAAS Selected Symposium Series, vol. 105. Based on a symposium, New York, May 1984.

Catalog of Chromosome Aberrations in Cancer. Felix Mitelman. 3rd ed. Liss, New York, 1988. xxxiv, 1146 pp., $165.

Coastal-Offshore Ecosystem Interactions. Bengt-Owe Jansson, Ed. Springer-Verlag, New York, 1988. xvi, 367 pp., illus. Paper, $41.80. Lecture Notes on Coastal and Estuarine Studies, vol. 22. From a symposium, Tiburon, CA, April 1986.

Color for Philosophers. Unweaving the Rainbow. C. L. Hardin. Hackett, Indianapolis, IN, 1988. xxiv, 243 pp., illus., + plates. $32.50; paper, $16.

Colorado Flora. Western Slope. William A. Weber. Colorado Associated University Press, Boulder, 1988. xviii, 530 pp., illus. Paper, $14.50. Reprint, 1987 edition.

Comparative Invertebrate Neurochemistry. G. G. Lunt and R. W. Olsen, Eds. Cornell University Press, Ithaca, NY, 1988. viii, 327 pp., illus. $52.

The Complex Analytic Theory of Teichmüller Spaces. Subhashis Nag. Wiley-Interscience, New York, 1988. xiv, 427 pp. $54.95. Canadian Mathematical Society Series of Monographs and Advanced Texts.

Computation of Solution Equilibria. A Guide to Methods in Potentiometry, Extraction, and Spectrophotometry. M. Meloun, J. Havel, and E. Högfeldt. Horwood, Chichester, U.K., and Halsted (Wiley), New York, 1988. xii, 297 pp., illus. $69.95. Ellis Horwood Series in Analytical Chemistry.

Computer Simulation of Liquids. M. P. Allen and D. J. Tildesley. Clarendon (Oxford University Press), New York, 1988. xx, 385 pp., illus., + microfiche in pocket. $95.

Concepts in Biochemistry. William K. Stephenson. 3rd ed. Wiley, New York, 1988. x, 229 pp., illus. Paper, $19.40.

The Concepts of Science. From Newton to Einstein. Lloyd Motz and Jefferson Hane Weaver. Plenum, New York, 1988. x, 435 pp., $23.50.

The Conquest of the Microchip. Hans Queisser. Harvard University Press, Cambridge, MA, 1988. xii, 200 pp., illus., + plates. $24.95. Translated from the German edition (Munich, 1985) by Diane Crawford-Burkhardt.

Control of Head Movement. Barry W. Peterson and Frances J. Richmond. Oxford University Press, New York, 1988. xiv, 322 pp., illus. $47.95.

Coping, Behavior, and Adaptation in Prison Inmates. Edward Zamble and Frank J. Porporino. Springer-Verlag, New York, 1988, xvi, 204 pp. $40. Research in Criminology.

The Curse. A Cultural History of Menstruation. Janice Delaney, Mary Jane Lupton, and Emily Toth. 2nd ed. University of Illinois Press, Champaign, 1988. xvi, 334 pp. $29.95; paper, $10.95.

Darwinism and the Divine in America. Protestant Intellectuals and Organic Evolution, 1859–1900. Jon H. Roberts. University of Wisconsin Press, Madison, 1988. xviii, 339 pp. $26.75. History of American Thought and Culture.

Design and Analysis of Integrated Manufacturing Systems. W. Dale Compton, Ed. National Academy Press, Washington, DC, 1988. viii, 239 pp., illus. $29.50. Based on a conference, Washington, DC, Feb. 1987.

Dictionary of Effects and Phenomena in Physics. Descriptions, Applications, Tables. Joachim Schubert. VCH, New York, 1988. xiv, 140 pp. $24.95.

The Diffusion of Medical Innovations. An Applied Network Analysis. Mary L. Fennell and Richard B. Warnecke. Plenum, New York, 1988. xiv, 285 pp. $34.50. Environment, Development, and Public Policy.

Doctors. The Biography of Medicine. Sherwin B. Nuland. Knopf, New York, 1988. xxii, 519 pp., illus. $24.95.

Eclipse. David and Carol Allen. Allen and Unwin, Winchester, MA, 1988. viii, 123 pp., illus. Paper, $16.95.

Ecological Relationships of Plants and Animals. Henry F. Howe and Lynn C. Westley. Oxford University Press, New York, 1988. xiv, 273 pp., illus. $29.95. Intended to be understandable to those "with only a good course in introductory biology."