technology to the social soul in the machine and to remind us that with artifacts, as with all outcomes of human action, it could have been otherwise. The task is to understand the roads not taken and why.

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The Invertebrate Record

Fossil Invertebrates. RICHARD S. BOARDMAN, ALAN H. CHEETHAM, and ALBERT J. ROWELL, Eds. Blackwell Scientific, Palo Alto, CA, 1987. xii, 713 pp., illus. $49.95.

The potential audience for paleontological information is larger than ever before. Not only are there more geologically oriented workers using paleontological data for such traditional tasks as biostratigraphic correlation and environmental reconstruction, there is a host of biologists and paleobiologists intrigued by the possibilities offered by the fossil record's rich document of evolutionary histories and past ecologies. Thus a major new textbook edited by three prominent paleontologists and collectively written by these and 24 more is most welcome.

The book is organized taxonomically and after a rather rushed treatment (occupying less than 10 percent of the volume) of such general topics as evolution, ecology, and preservation gets down to the business of reviewing the morphology, classification, evolution, and geologic history of all the major invertebrate contributors to the fossil record. These chapters are well written and superbly illustrated, and the authors are indeed world-class specialists in their fields. The book suffers from few of the failings of multiauthored works: the chapters are written in a consistent style and yet are not forced into a rigidly standardized format. The chapters are in large part up-to-date, although I could find only two post-1984 references (both on p. 293): the topics emphasized here are not evolving and shifting so rapidly as the more theoretical side of paleontology.

One surprise is the minimal reflection of the present upheaval in systematics, the advent of cladistic methodology and classification. The controversy engendered by cladistics is anything but a musty debate of interest only to archivists. For better or worse, cladistics is changing the ways in which systematics and evolutionists pursue their science and even, for some of the more dogmatic advocates, the kinds of questions viewed as legitimate subjects for research. Cladistic analysis is discussed in the chapter on classification at the beginning of the book but is conspicuously absent from most of the taxonomic chapters, although the approach is used to good effect in Rowell and Grant's treatment of the origins and interrelationships of the major groups of brachiopods. Clearly cladistics has not yet made many inroads into the core of invertebrate paleontology, which is unfortunate because an explicit cladistic analysis of character states among taxa is of great use regardless of the nature of the formal classification derived (in part or solely) from that analysis. Part of the problem may derive from the uncertainty—indeed occasional hostility—among cladists regarding the use of paleontological data. However, such workers as C. R. C. Paul and A. B. Smith (*Biol. Rev.* **59**, 443 [1984], an important reference absent from this book) are attempting to apply cladistic methodologies to even the most knotty phylogenetic problems in the fossil record, such as the relationships and rank of stem groups and the pattern of adaptive radiation during times of explosive evolution. There is still plenty of controversy, but the approach is bound to aid in the focusing of discussion.

The fossil record is certainly rich in data on evolutionary originations, and this is reflected in *Fossil Invertebrates*, particularly for higher taxa. The origins of most phyla and classes are given at least brief treatment, and groups of lower rank are often discussed as well. It is impossible not to be impressed by the exuberance of form in the fossil record as documented here. Some general messages on evolutionary process emerge, simply from a working through of the taxonomic chapters. For example, heterochrony—evolutionary changes in the timing of development—is a recurrent theme. The authors note that this process played a role in the origin of major groups of bryozoans, crinoids, trilobites, brachiopods, and cnidarians, and no doubt this pathway has been exploited by many other higher taxa over the past 600 million years.

The book may be a bit intimidating and massive (it weighs well over 4 pounds) as an introductory textbook, and the condensed treatment of general principles will probably prompt the collateral use of Raup and Stanley's classic *Principles of Paleontology*. But its value extends far beyond this single application. Here at last is a single volume to which paleontologists can refer geological or biological colleagues—not to mention one another—in the face of the spectacular diversity of the fossil record.

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Exemplars

Women of Mathematics. A Biobibliographic Sourcebook. LOUISE S. GRINSTEIN and PAUL J. CAMPBELL, Eds. Greenwood, Westport, CT, 1987. xxii, 292 pp. $45.

In the latter part of the 19th century, women in mathematics pioneered in breaking down barriers to higher education for women in many fields. Nearly a century later, however, women still confronted discrimination in the mathematical community. Such was the context for the founding of the Association of Women in Mathematics in the early 1970s, which, like committees appointed by the professional organizations, has labored "to combat discrimination against women in mathematics" (p. xi).

Recent calls for more biographical information about "women mathematicians of the past and the present" (p. xii) are in some ways a measure of progress on this front. *Women of Mathematics: A Biobibliographic Sourcebook*, with its 43 biographical essays, is meant to answer such calls. Its intended audience includes professional mathematicians, those interested in history of mathematics or history of women, and high school and college students in need of "inspirational reading" (p. xii) and positive role models.

The entries, many written by women mathematicians, follow a set formula with sections on biography, work, and bibliography. The entries vary considerably in length, depth, and technical content. The editors warn readers, however, that the length of an essay is not necessarily to be taken as an index of fame or importance. The bibliographical section in each entry offers a chronological ordering of "works by," abridged if a list of the subject's publications is easily accessible elsewhere, and a selection, sometimes annotated, of "works about." Some entries also refer to available manuscript sources. The entries are supplemented by a list of references in biographical dictionaries and other compilations; a graph depicting birth date and lifespan for the 43 subjects; a tabular summary of information about place of birth, highest degree, place of work, and mathematical specialties; indexes of personal names and subjects; and brief descriptions of the contributors.

The women featured in this volume all satisfied several of the following criteria for inclusion: advanced degrees despite social or family pressures; innovative research; influence through teaching; significant participation in professional societies; extensive publications; service on editorial boards for mathematical journals. The earliest is Hypatia (370?–415), "first woman known to have written on mathematical subjects" (p. 76). Agnesi and Chatelet represent the 18th

century; Germain, Lovelace, and Kovalevskaia the 19th. Eighteen of the women were alive at the turn of the century; the remainder were born after 1900. In the interest of achieving a certain historical perspective, only those born before 1925 or now deceased are included. All are American or European.

Jeanne LaDuke's introduction stresses the preliminary and provocative nature of the compilation: "It suggests questions rather than themes, issues rather than syntheses." Alice Schafer's foreword lists some of these questions. The essays themselves suggest other historical issues worth pursuing. They include the experience of women mathematicians in the scholarly emigration of the 1930s, changes in the life of science wrought by World War II, the extent and import of collaborative work in mathematics, funding for mathematical research, and the growth of such fields as applied mathematics, computer science, and mathematical logic.

With its thoughtful essays (which range from the depressing to the inspiring), bibliographies, and summary of sources of biographical information, the volume should prove useful both as a reference work and as a stimulus for further investigations of the history of women in mathematics. The volume is attractively designed and features a sturdy library binding and alkali paper.

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Some Other Books of Interest

The Latest on the Best. Essays on Evolution and Optimality. JOHN DUPRÉ, Ed. MIT Press, Cambridge, MA, 1987. xiv, 359 pp., illus. $27.50. A Bradford Book. Based on a symposium, Stanford, CA, April 1985.

The Conference on Evolution and Information held at Stanford University, from which this volume is derived, brought together representatives of the disciplines of biology, anthropology, psychology, and economics to consider issues of the relation between natural selection and adaptation (or optimization). In part 1 of the volume, methodological issues are taken up in contributions by P. J. Richerson and R. Boyd (on cultural evolution), John Beatty, and Philip Kitcher. Part 2 consists of papers by and an exchange between Elliot Sober and John Maynard Smith having to do with the modeling of evolution and an essay by Richard C. Lewontin the intent of which is "not to refute optimality theory but to demand its nontrivial formulation." In part 3, John M. Emlen and John E. R. Staddon examine the optimality approach as applied in evolutionary ecology and in comparative psychology, respectively. Part 4 is devoted to applications of optimality considerations to human behavior, with contributions by Eric Alden Smith on ecological anthropology, Roger N. Shepard on cognition, Leda Cosmides and John Tooby on behavioral evolution, Jack Hirshleifer on the utility of emotional responses, and John Dupré on the generalizability of optimality theory to cultural phenomena. The volume includes an introduction in which Dupré provides an interpretative summary of its contents, as well as name and subject indexes.—K.L.

The Psychology of Women. Ongoing Debates. MARY ROTH WALSH, Ed. Yale University Press, New Haven, CT, 1987. xiv, 484 pp. $40; paper, $12.95.

This volume presents its subject in the form of essays reprinted from various sources to serve as expositions of "yes" and "no" answers to a series of questions about women chosen by the editor. The volume opens with a historical introduction by Walsh, who also provides a brief exposition of each question, with suggestions for further reading. Part 1 of the text considers issues of psychoanalytic theory: whether it is relevant to women (S. Chehrazi; H. Lerman) and whether women are masochistic (N. Shainess; P. J. Caplan). Part 2 deals with questions pertaining to psychological health: whether women are more likely than men to be mentally ill (W. R. Gove; M. Johnson), whether menstruating women are "at the mercy of raging hormones" (K. Dalton; R. D. Koeske), and whether menopause is a deficiency disease (P. W. Budoff; J. B. McKinlay and S. M. McKinlay). In part 3, under the rubric "new theories and evidence," are discussions of whether women fear success (M. S. Horner; M. A. Paludi), "Is androgyny a solution?" (S. L. Bem in two essays), whether "mothering behavior" contributes to the devaluation of women (N. Chodorow; A. S. Rossi), and whether women "speak in a different moral voice" (C. Gilligan; A. Colby and W. Damon). The remainder of the book is devoted to "social issues": whether sex differences in mathematics achievement are biologically grounded (C. P. Benbow and J. Stanley; J. S. Eccles and J. E. Jacobs), whether mothers should stay home with young children (B. L. White; J. C. O'Connell), whether abortion causes psychological harm to women (J. D. Osofsky and H. J. Osofsky; K. M. Lodl, A. McGettigan, and J. Bucy), whether lesbianism is a sickness (N. Gartrell; C. W. Socarides), and whether pornography is harmful to women (R. Green; N. M. Malamuth). Except in the case of the last three questions the "yes" answers are placed first. The answer essays range in length from about 5 to over 40 pages. Research findings are cited and discussed, but it is recognized that many of the questions and their answers have ideological components and are not simply matters of empirical verification. The volume includes name and subject indexes.
—K.L.

Advances in Physiological Research. H. MCLENNAN, J. R. LEDSOME, C. H. S. MCINTOSH, and D. R. JONES, Eds. Plenum, New York, 1987. x, 505 pp., illus. $89.50. Based on a congress, Vancouver, B.C., June 1986.

The present volume consists of a selection of review lectures from the 30th congress of the International Union of Physiological Sciences. Opening the volume are five historical papers, dealing with the development of physiology in British Columbia, the lives of Michael Sarrazin ("the father of Canadian physiology") and Walter B. Cannon, research on central nervous system synapses since the time of Charles S. Sherrington, and controversies over the Gaskell effect. Among the more general of the 21 papers that follow are a lecture entitled "Fads and fallacies in contemporary physiology" by Ernst Florey and the August Krogh lecture, an account by the late Kjell Johansen of his own research on the environmental physiology of organisms ranging from cephalopods to giraffes. Erik Torebjörk, in the Adrian-Zotterman lecture, describes experiments bearing on the validity of the pattern theory of cutaneous sensation, and J. Szentágothai discusses the architecture of neural centers. Topics of remaining papers include the generation of rhythmic movements, the computational study of vision, muscle mechanics and energy metabolism, thyroid hormones and the evolution of endothermy, diving in ducks, and water-salt homeostasis. The volume, printed from typescript, includes an index.—K.L.

Books Received

Advances in Epileptology. 16th Epilepsy International Symposium (Hamburg, Sept. 1985). Peter Wolf *et al.*, Eds. Raven, New York, 1987. xxviii, 787 pp., illus. $166.

Advances in Local Area Networks. Karl Kümmerle, Fouad A. Tobagi, and John O. Limb, Eds. Institute of Electrical and Electronics Engineers, New York, 1987. xii, 604 pp., illus. $ 56.50. Frontiers in Communications.

AIDS. Acquired Immune Deficiency Syndrome and Other Manifestations of HIV Infection. Gary P. Wormser, Ed. Noyes, Park Ridge, NJ, 1987. xliv, 1103 pp., illus. $98.

Alcohol and Addictive Behavior. P. Clayton Rivers, Ed. University of Nebraska Press, Lincoln, NE,