developed in competitive social arenas in response to their powerful neighbors (Welch).

The chapters accurately reflect the nature of current archeological research in the eastern United States. Since the late 1970s, well-funded surveys and excavations in areas threatened by construction projects have revolutionized knowledge about prehistoric cultures. This volume simply would not have been possible 10 years ago. Paradoxically, the strength of salvage projects—the opportunity to do otherwise prohibitively expensive work—is closely related to their greatest weakness; most of the authors, like their colleagues elsewhere, must try to make sense out of samples from projects whose location and scope are dictated by the needs of sponsoring agencies. Furthermore, several authors make extensive use of information and specimens from projects conducted many years ago. Despite well-known problems with existing collections, these materials are irreplaceable because modern land use practices have destroyed many sites.

Once again, Bruce Smith has been successful in assembling regional specialists to produce a reference work that will be cited by archeologists for many years to come. These reviews of Mississippian origins in intensively studied parts of the Eastern Woodlands will serve as an impetus for much-needed comparable work elsewhere.

GEORGE R. MILNER
Department of Anthropology, Pennsylvania State University, University Park, PA 16802

An Assemblage of Fossils

Solnhofen. A Study in Mesozoic Palaeontology. K. W. BARTHEL, N. H. M. SWINBURNE, and S. CONWAY MORRIS. Cambridge University Press, New York, 1990. x, 236 pp., illus. $59.50.

The Solnhofen deposits near the German city of Munich are probably the most famous fossil deposits in the world. They yield a unique record of marine and terrestrial life buried nearly 150 million years ago in the fine-grained, limy muds of hypersaline lagoons. Articulated skeletons of fish, flying reptiles, and birds are preserved along with such unusual invertebrate fossils as insects and jellyfish. In many cases there is evidence of soft structures like feathers and the skin of pterosaurs.

This account of the deposits is presented as a revised and updated translation of *Solnhofen: Ein Blick in die Erdgeschichte* by Werner Barthel. Barthel died in 1978, the year of publication of the German original. The bibliography of the present work lists over 40 references from 1978 or later. These references are widely cited in the text and so influence the discussion that it is clear that Swinburne and Morris have presented us with a new work rather than a revised translation.

The book is divided into eight chapters and has an appendix that includes a complete faunal and floral list for the Solnhofen Plattenkalk. The first two chapters give a brief history of limestone exploitation in the region around Solnhofen and the early development of fossil collections and describe the general geological setting of the region. The next two chapters deal with petrography and environments of deposition. These two chapters may be difficult for readers who lack a geological background. The rest of the book is written in a clear, readable

style. The heart of the book is probably contained in the two chapters on paleoecology and taphonomy. The scenario favored by the authors is a series of lagoons delineated by coral reefs and sponge mounds. Water circulation was restricted, and a regional hot, arid climate promoted evaporation and locally elevated salinities. Most of the animals and plants preserved in the lithographic limestones did not actually inhabit the bottom of the lagoons but were introduced accidentally from the surrounding land, air, and more normally saline water. Such accidents would be rare events, and in fact fossils are uncommon. The prominence of fossils from those sites is a result of the hand-quarrying techniques utilized in the Solnhofen quarries and in the fossils' exceptional preservation.

The last two chapters of the book give a review of the fossils from Solnhofen and a summary of the geology. The fossil sections seem to be thorough and well illustrated. There is a fairly extensive and I think reasonable discussion of the two most famous vertebrate genera, *Archaeopteryx* and *Compsognathus*. I detected few serious errors, but at least two are worth noting. H. V. Meyer described *Pterodactylus crassipes* (the Haarlem *Archaeopteryx*) in 1857, not 1875 as indicated in table 1.1, and the Berlin specimen was figured as early as 1879 by Carl Vogt. The caption of figure 7.77 labeling the living *Sphenodon* as a "purported" rhynchocephalian is strange, as the term was created for this genus. There are other small mistakes and some seemingly too literal translations of German words, but these flaws do not really detract from a highly readable and informative text. I recommend the book to a wide audience ranging from rock-hounds to scientists seriously interested in the environments of the European late Jurassic and the evolution of vertebrate communities.

LARRY D. MARTIN
Department of Systematics and Ecology, Museum of Natural History, University of Kansas, Lawrence, KS 66045

Similarity in Chemistry

Concepts and Applications of Molecular Similarity. MARK A. JOHNSON and GERALD M. MAGGIORA, Eds. Wiley, New York, 1990. xxii, 393 pp., illus. $65. From a symposium, Los Angeles, CA, 1988.

This is the first book to attempt to codify the vague but general concept of molecular similarity. In the preface the editors state that results in the area are widely scattered and that the "unifying concept of molecular similarity remains unstated and largely unrecognized." The book is meant to be a set of definitive overviews, but their authorship and points of view are diverse, and so the "unifying concept" is still elusive. Nevertheless, it is important to have such a collection.

The background for these 12 essays and hence the readership they will interest are highly varied, but most of the essays are highly mathematical. All the approaches represented are crystallizing at this time because of the availability of computing power to assess their validity and success in prediction, and all are incomplete and under active development. In the first chapter, by the editors, the ideas of matching, ordering, and equivalence classes, expressed as distances in some computed function space, are delineated with the use of measures of proximity and distance to describe similarity. The second chapter illuminates the importance of similarity in the history of chemistry with major similarity concepts such as the periodic classification of the elements.

Chapters 3 and 4 focus on the problems of ordering and retrieving information from databases by means of substructure searches and their relation to physical properties. The discussions are rather technical, and the nonexpert would have benefited from examples on how the systems work. Chapters 5 through 8 develop the idea of relating molecular similarity to scalar physical properties, such as boiling or melting points, or to bioactivity data. Chapter 5 is a spirited defense of the value of the correlations possible between physical properties and the mathematical indices derived from graph theory. Well sprinkled with worked-out examples, this is an excellent review for the nonexpert. Chapter 6, for quantum mechanicians, is a mathematical presentation of the use of electronic density functions as molecular descriptors to order relationships in n-dimensional molecular similarity space, reduced to three-dimensional nearest-neighbor graphs for comparing physical properties.

In chapters 9 and 10 the focus is on chemical reactions. In the former we find the use of *be-* and *r*-matrices to describe all possible interconversions between two molecules in algebraic rather than graphical form. This affords the idea of a computed chemical distance between any two molecules as a measure of their similarity. Though the concepts are well explained with examples, the authors skate over the difficulty of the $n!$ problem of establishing the canonical matching of related molecules or their *r*-matrices. Chapter 10 applies these ideas to develop graph transform "kits" to model reaction pathways in biochemistry in order to ascertain what molecular features disallow certain otherwise similar reactions.

Though most of the chapters deal with structure similarities and structure-property relations in two-dimensional systems, the focus of three of them is directly on quantitative structure-activity relationships in drug action and the three-dimensional molecular shape in ligand-receptor interactions. In chapter 7 molecular superposition is defined both by steric volume and charge potential, and the need for conformational analysis in defining similarity is addressed. Chapter 8 deals with the same problem with a focus on the similarity in the contact region of ligand surfaces to identify response similarities at receptors. Chapter 11 codifies the problem in topological terms as domains of convex, concave, and saddle forms on the surface of a ligand. Unlike chapters 7 and 8, however, this chapter is completely theoretical and without illustrative examples or applications. Finally, the last, rather short, chapter in the book describes a fully theoretical approach to a comprehensive mathematical theory of molecular similarity.

It must be noted that the book has an excessive number of mechanical errors, including errors in structures and tables.

JAMES B. HENDRICKSON
Department of Chemistry, Brandeis University, Waltham, MA 02254

Books Received

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Cellular and Molecular Mechanisms of Inflammation. Vol. 1, Receptors of Inflammatory Cells. Structure-Function Relationships. Charles G. Cochrane and Michael A. Gimbrone, Jr., Eds. Academic Press, San Diego, CA, 1990. x, 255 pp., illus. $49.95.

Dispatches from the Deep Woods. John G. Mitchell. University of Nebraska Press, Lincoln, 1991. xiv, 304 pp. $24.95.

Evolution. Monroe W. Strickberger. Jones and Bartlett, Boston, 1990. xii, 579 pp., illus. $45. Jones and Bartlett Series in Life Sciences.

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