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.

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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.

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