phology has provided "what is clearly a wrong answer . . . DNA revealed the surprising truth" (p. 118). Bird phylogeny is indeed problematic, but Cracraft, McKitrick, Olson, Raikow, and others have made enormously important morphological contributions that receive little recognition here, nor are other molecular data considered.

Tetrapod phylogeny is examined by Bishop and Friday. This topic is being hotly debated by morphologists, and no strong consensus is evident in this paper. Only myoglobin coding sequences were sufficiently sampled among tetrapods to permit molecular analysis. Maximum likelihood estimates group birds with mammals but leave the positions of turtles, squamates, and crocodilians uncertain. Because only two myoglobin sequences had been reported for birds and turtles and only one for squamates and crocodilians, Bishop and Friday urge caution in viewing their results.

High-level vertebrate relationships and the concepts of orthology and paralogy are explored by Goodman, Miyamoto, and Czelusniak. These authors summarize recent morphological debates on the monophyly of cyclostomes, on which fish-like vertebrate is the sister taxon of Tetrapoda, and on whether Lissamphibia is monophyletic. Using maximum-parsimony—maximum-homology methods, they analyze sequence data for myoglobin, alpha and beta adult hemoglobin, lens alpha crystallin A, cytochrome c, fibrinopeptides A and B, and ribonuclease. In contrast to published morphological systematics, this yields a monophyletic Cyclostomi, actinopterygians as the sister group of tetrapods(!), and an unequivocally monophyletic Lissamphibia. Contrary to Bishop and Friday, these and McKenna's findings support mammals as the sister group of all other amniotes. Unlike McKenna, they find monotremes, not marsupials, to be the sister group of placentals. Despite these few differences, they observe that "classical and molecular approaches yield basically the same picture or, rather complementary views of the same phylogeny. Each approach sees something about phylogeny that the other misses but each approach also sees many of the same features" (p. 141).

Bacterial phylogeny is discussed by Woese. Morphology has been poorly informative for bacteria, and as a result, according to Woese, "microbiology developed essentially without an evolutionary framework" (p. 178). He uses a modified distance measure of rRNA oligonucleotides to develop a network that recognizes two groups, Eubacteria and Archaebacteria, each as distinct from each other as from Eukaryota. Thus, bacteria may not be monophyletic. The simplicity of these organisms then affords Woese an opportunity to devise a provocatively simple relationship between their genome size and rates of evolution.

Fitch and Atchley use a known phylogeny for ten strains of inbred mice to assess the relative effectiveness of molecules, morphology, and life history traits in phylogeny reconstruction. Their molecular data are allelotypes for 158 genetic loci, morphological data consist of 14 measurements of the mandible of 10-week-old mice, and life history traits include growth curves, litter size, and so forth. Unweighted pair-group analysis, parsimony, EVOLVES, neighborliness, and distance Wagner methods were used on each data set. All tests on molecular data yield the true phylogeny, but none on morphology or life history traits do so. Although beginning with a known phylogeny might seem to be the ultimate test, Fitch and Atchley list a number of factors, such as the comparatively poor morphological data set, that constrain extrapolation of their results to other situations.

An intriguing picture develops in this volume in which molecular and morphological phylogenies sometimes agree and sometimes not. Different philosophies and methods complicate the comparison and may themselves be responsible for much of the conflict. Nevertheless, there is general agreement that both molecular and morphological phylogenetics face similar fundamental problems and that a "touchstone" has not been found. Most interesting of all, this symposium suggests that the apparent conflicts between molecules and morphology will eventually dissipate as we come to better understand the molecular and developmental basis of morphology. The stage for such understanding is now being set as data from molecular, ontogenetic, and morphological sources are all brought to bear on estimating the historic pattern of phylogeny.

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Lighthearted Nomenclature

Organic Chemistry: The Name Game. Modern Coined Terms and Their Origins. ALEX NICKON and ERNEST F. SILVERSMITH. Pergamon, Elmsford, NY, 1987. xii, 347 pp., illus. $75; paper, $29.50.

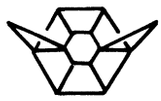
Organic chemists dealing with complex molecular structures nearly always avoid complicated IUPAC-approved names by using either acronyms or nonsystematic coined names. This book—a first—is the lightheartened record of recently invented trivial names for organic structures, reactions, and techniques. Many older names of organic compounds, and those of elements, are given in two of several appendixes, but systematic IUPAC nomenclature is intentionally almost wholly ignored. Likewise nearly all of the immense array of natural product names, based on the names of the sources, is excluded. Compounds nicknamed for people are cited, but not the many reactions remembered for their discoverers or popularizers.

As well as being full of humor, the book is authentic, scholarly, and fully supplied with references chapter by chapter. Many of these are to private communications of stories that would otherwise never come to public attention. Nickon and Silversmith are obviously fascinated by names and name-calling, and they delight in reporting anecdotes industriously accumulated over 10 years about authors of names and their contributions, serious and otherwise. Indeed the book is as much about people as about chemicals, tracing the learned or whimsical origins of terms. The text is positively packed with pungent puns. The authors do not hesitate to stray from organic chemistry to include potential *Guinness Book of World Records* material on chemical publications (pp. 67–68) and complex compounds (pp. 149–151), hoax articles (pp. 76–78), and even a U.S. government logo (pp. 160–161). Names of minerals, subatomic particles, biological species, planets, and chemical elements are all noted, and the ubiquitous acronym is not immune.

Because the book is about names, it contains no more plot, or other nonarbitrary sequence of topics, than a dictionary, which after all does have alphabetical order. Chapters are carved out ingeniously; the first eight concern molecular structures imagined to resemble animals, headpieces, tools, buildings, containers, geometric figures, furniture, and food, but thereafter assignment to themes is still more tenuous. The book is ideal for pickup reading, since one can start and stop anywhere—if not seduced by the next interesting item.

I myself have collected about 100 shape-descriptive names, with brief references to their invention. With the usual classical-language-department help, I concocted the word "morphodelotic" (Greek, shape-descriptive) to describe such names; our authors would probably prefer "morphonym." I am relieved of wondering what to do with the collection by the appearance of this book, which is vastly more comprehensive and entertaining than any routine list. It is a pleasure to report that all but three of my hoard are included by Nickon and Silver-

smith, and their index covers more than 1000 names—not, to be sure, all shape-descriptive. The more numerous and elegant epithets have been coined from Greek or Latin roots, but such caconyms as snoutene, barrelene, and screwene are also noted. This is nomen-clatter. One morphodelotic name appearing too late to be included is *garudane,*



recalling Garuda, the mythical Hindu demigod, part man, part bird, who had such wings (G. Mehta and S. Padma, *J. Am. Chem. Soc.* **109**, 7230–32 [1987]).

The book is extremely well printed and illustrated; the multitudinous structural formulas are beautifully done, misprints are uncommon, and the nomenclature of building blocks for complex structures is (almost) irreproachable.

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Crustal Extension

Continental Extensional Tectonics. M. P. COWARD, J. F. DEWEY, and P. L. HANCOCK, Eds. Published for the Geological Society by Blackwell Scientific, Palo Alto, CA, 1987. xii, 637 pp., illus. $115. Geological Society Special Publication, vol. 28. From a conference, Durham, U.K., April 1985.

This volume, like the conference on which it is based, is dedicated to Bert Quennell, who was active in studies of extensional tectonic regions of Africa. The book summarizes a decade of data from field, geophysical, seismological, and experimental studies demonstrating the presence of listric and detachment faults, rotated blocks, and other features in extensional terrains.

The papers, which present many conflicting viewpoints, show an excellent mixture of approaches. The general papers review fault geometry and associated processes and experimental studies. The regional papers include 16 on the Basin and Range Province and the Pacific Margin, 8 on the Northwest European continental shelf, 3 on the Middle East, and 2 on thrust belts.

I was especially interested in the paper by J. A. Jackson on the geometry and rheology of active normal faults and crustal extension and the paper by A. Gibbs on the development of extension and mixed-mode sedimentary basins, with its potential for applications in seismic geology and fault segmentation. The other papers in this first group are also useful for understanding the regional papers that follow. Two papers furnish visual models: "Physical models of extensional tectonics at various scales," by B. Vendeville *et al.*, and "Analogue models of extensional fault geometries," by K. R. McClay and P. G. Ellis.

Four papers on the Basin and Range Province, the region with which I am most familiar, are outstanding, state-of-the-art tectonic reviews by leading investigators (W. Hamilton; P. J. Coney; L. J. Sonder *et al.*; and B. P. Wernicke *et al.*). Another 12 papers provide a variety of methods for evaluating the character of this area. They include an up-to-date study of tectonic heredity and deep seismic reflection data from the layered lower crust (R. W. Allmendinger *et al.*), a shear-zone model for structural evolution of metamorphic core complexes in Arizona (G. H. Davis), a case study of ductile strain and metamorphism in the Snake Range, with fabric analyses and geochronology (J. Lee *et al.*), and studies of low-angle and imbricated faulting and mid-crustal faulting in the Colorado River area (K. A. Howard; B. E. John). Some other topics covered in this section are rupture characteristics of the Wasatch fault zone, including segmentation (R. L. Bruhn *et al.*), the origin of broad-scale topography in the southern Rocky Mountains (G. P. Eaton), and kinematics of strain rates based on seismologic, geodetic, and geologic data for the Basin and Range extension (P. K. Eddington *et al.*). Footwall structural evolution in the Tucki Mountain detachment system in Death Valley is discussed by K. V. Hodges *et al.*, and continental extension in other regions is reviewed in papers by B. Thompson *et al.* (Canada), S. W. Garrett and B. C. Storey (Antarctica), and I. W. D. Dalziel *et al.* (Gondwandaland).

Tectonic analysis of the Northwest European continental shelf has great economic, as well as scientific, application, and the papers on this region form a good nucleus for further evaluations and studies. They also show some of the relationships among analyses based on seismic reflection, fault rupture pattern, timing and style of deformation, thermal, mechanical, and tectonic development, and kinematics.

Although the last five papers deal with areas that are scattered throughout the Middle East and in thrust belts, they contain key and well-described examples from the very active and youthful Suez rift (P. Y. Chenet *et al.*) and the Sinai triple junction (V. Courtillot *et al.*). A. M. C. Sengor discusses accommodation cross-faults, using excellent block diagrams, and gives examples of stretching in hanging walls of low-angle normal faults in Turkey. Two papers deal with extensional relations in thrust belts: J. K. Leggett *et al.* for the Honshu fore-arc, and L. H. Royden and B. C. Burchfiel for thin-skinned extension within a convergent Himalayan region.

In summary, this is a major reference that should be readily accessible to most geologists, and especially to researchers working in extensional terrains.

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A Model Microorganism

Phycomyces. ENRIQUE CERDÁ-OLMEDO and EDWARD D. LEPSON, Eds. Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 1987. xvi, 430 pp., illus. $88.

This book is dedicated to Max Delbrück, whose energy, insight, and hard work with his many students and collaborators turned *Phycomyces* into a model system for sensory biology. In his delightfully human portrayal of Delbrück in the dedication, Walter Shropshire points out that Delbrück was mistaken in his belief that this "simple" fungus could be used to provide a rapid solution to fundamental problems of sensory physiology and range adjustment. The succeeding chapters document well the complexity of the problem, which is highlighted by the plea of Cerdá-Olmedo and Lipson in chapter 1: "To avoid complications, further research should be concentrated on strain NRRL 1555." It is equally clear from the wealth of information presented that considerable progress has been made by a relatively small number of scientists. A complete bibliography through April 1985 occupies 38 pages at the end of the book—impressive, but surely small next to those of other model microorganisms, *Escherichia, Saccharomyces*, or *Neurospora.*

The stated purpose of the book is to provide access to *Phycomyces* to students and nonspecialists, in such a way that the individual chapters as well as the book can stand alone. The inclusion of appendixes giving readable descriptions of procedures of investigation, not the terse, highly referenced descriptions usual in research papers, is an imaginative device that offsets the arcane references in the detailed, research-oriented chapters. Each chapter begins with an outline that comprises the headings and subheadings used within, each has a useful introduction to guide the nonspecialist, and most have good summaries of the main