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the uses for new molecular phylogenies will be in question until these basic assumptions are validated.

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MEMORIE, VOLUME XXVII—FASCICOLO I. *Systematic Biology as an Historical Science. Conference held in Milano, Italy, 24–26 June 1993. Biology as History, Number 1.*

Edited by Giovanni Pinna and Michael T Ghiselin. Milan (Italy): Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano. Price not available (paper). 133 p; ill.; index. ISSN: 0376-2726. 1996.

NEW PERSPECTIVES ON THE HISTORY OF LIFE: ESSAYS ON SYSTEMATIC BIOLOGY AS HISTORICAL NARRATIVE. *Conference held in San Francisco, California, 21–23 June 1994. Biology as History, Number 2. Memoirs of the California Academy.*

Edited by Michael T Ghiselin and Giovanni Pinna. San Francisco (California): California Academy of Sciences. \$30.00 (paper). vii + 107 p; ill.; no index. ISBN: 0-940228-43-2. 1996.

These volumes contain contributions from a pair of informal symposia held in 1993 and 1994. The goal of the symposia was "to investigate some alternatives to the kind of phylogenetics that has recently become fashionable" (p 1), which editor Michael Ghiselin contends has emphasized cladograms to the exclusion of historical narrative. The result is an assortment of 21 papers that range from the philosophy and history of science to evolutionary biology itself.

A philosophical backdrop is offered in papers by J R Griesemer (volumes 1 and 2), which explore the characteristics of an historical science. In two thought-provoking contributions, R J O'Hara (volumes 1 and 2) examines the content (and implicit biases) of diagrammatic historical representations in biology and philology. F Scudo (volume 1) discusses the symbiotic origins of prokaryotes and other taxa, and the challenge they pose for systematics. Others argue for supplementation of cladistic approaches. Notably, N Arnold (volume 1) offers compelling arguments for considering biological "process" in phylogenetics, as a means of recognizing transformational sequences and character independence. Iconoclastic perspectives are offered by A Simonetta (volume 1), who continues his challenge to current practices in systematics (although without offering an alternative), and A Minelli (volume 1), who argues for expanding the concept of homology to include nonhistorical parameters.

Some of the contributions in Volume 2 offer novel perspectives on traditional issues. T Rowe considers evolution of the mammalian middle ear

in terms of functional interdependence of components. Drawing on elegant x-ray CT analyses of cranial ontogeny in marsupials, he offers evidence that separation of the jaw and auditory apparatus in mammal evolution was a byproduct of cerebral hypertrophy. N D Holland applies evidence from recent homeobox research to vertebrate origins; among his more surprising conclusions is that much of the vertebrate hindbrain is homologous to the posterior nerve cord of cephalochordates. However, since the genetic marker also labels the spinal cord, to claim that the amphioxus "[has] a very large hind-brain" (p 67) is rhetorically excessive; one might justifiably conclude that the chordate nerve cord extends well into the vertebrate rhombencephalon. D M Wake concludes the volume with an incisive and optimistic appraisal of the prospects of a true synthesis of development and evolution.

These works will be of value primarily to evolutionary biologists and philosophers interested in the particular issues addressed in the individual papers. Notably scarce are chapters that illustrate the value of cladistics in historical reconstructions, and of the utility of formally framing and testing evolutionary scenarios as falsifiable hypotheses. While not offering a comprehensive survey, these volumes do illustrate several aspects of the theory and practice of historical biology.

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ANIMAL EVOLUTION: INTERRELATIONSHIPS OF THE LIVING PHYLA.

By Claus Nielsen. Oxford and New York: Oxford University Press. \$95.00 (hardcover). ix + 467 p; ill.; systematic and subject indexes. ISBN: 0-19-854868-0 (hc); 0-19-854867-2 (pb). 1995.

In this encyclopedic coverage of animal groups and their structural characteristics, the author offers his view of how animal phyla evolved. Morphological characteristics (including subcellular molecules and organelles, ciliary arrays, nervous system traits, and many traditional characters) from all stages of the life cycle are discussed and analysed, but the primary focus is on embryonic and larval stages and their implications for uniting adult body plans.

This book is an extensive expansion of earlier work by the author and a colleague on the Trochozoa theory, which presents a hypothetical scenario for how primitive gastrula-like organisms elaborated their ciliary arrangements, developed feeding and digestive systems, pelago-benthic life cycles, and eventually gave rise to all metazoa. The book begins with a proposed phylogeny for 31 phyla of the Kingdom Animalia and proceeds through 56 chapters that discuss individual phyla and supraphyletic taxa. Each chapter summarizes adult body plans