

Book Reviews

Historical Biology

Problems of Phylogenetic Reconstruction. Proceedings of a symposium, Cambridge, England, April 1980. K. A. JOYSEY and A. E. FRIDAY, Eds. Published for the Systematics Association by Academic Press, New York, 1982. xii, 442 pp., illus. \$64.50. Systematics Association Special Volume no. 21.

Reconstructing the history of life is a key goal of comparative biology, and no aspect of this aim has been the subject of more discussion in the past decade than the methodology involved in discovering the genealogical relationships of living and fossil organisms. This collection of essays, a portion of those presented at the 1980 meeting of the Systematics Association, addresses many of the important issues in historical biology. Although several of the papers contribute little to the debate, a number do break new ground and present novel approaches to major issues in comparative biology.

Within the context of the recent vigorous discussions of historical methods and aims, three issues stand out, and most of the papers in this volume address one or more of them. First, the concept of homology: how can we recognize homologies, and what is their meaning in a comparative or phylogenetic study? Second, the role of fossils in the construction of patterns of genealogical relationship: do they provide critical information about the past, or must paleontological concepts and approaches be secondary to analyses of living organisms? Finally, the role of evolutionary theory in genealogical reconstruction: can organisms be clustered into groups without regard for theories of transformation, or are natural processes an inevitable component of any attempt to organize the diversity of life?

In the most innovative paper of this collection, Colin Patterson addresses the problem of homology. Homologous attributes of organisms are often defined as those exhibiting "essential similarity of structure," as by Cain and others (for example, Fortey and Jefferies) in this book. But how is the concept of similarity to be applied? As Patterson illus-

trates, attempts to specify exactly what "similarity" is have plagued definitions of homology since the pre-Darwinian origin of the term. If, as he proposes, homology is instead a relation that characterizes natural groups, then every hypothesized homology defines a group of organisms and is defined in terms of monophyly. Patterson extensively reviews previous considerations of homology and discusses three ways to test any proposed homology: (i) similarity in topology, ontogeny, or composition, (ii) co-occurrence of all proposed homologies in a single individual, and (iii) congruence of taxonomic distribution with other homologies. These tests also distinguish between convergence and parallelism because characters acquired in parallel will not exhibit congruent distributions and convergences will (usually) show neither similarity nor congruence.

An issue related to the recognition of homologies is the determination of primitive versus derived characters and the algorithms used to cluster characters into a branching diagram. Patterson's position is that a priori attempts to create transformation series, presumably reflecting the evolutionary sequence of character modification (and thus indicating primitive and derived conditions for a given character complex), result in untestable hypotheses. This is because such transformation series fail to characterize groups of organisms (and are thus immune to testing by finding congruent character distributions) and because the traditional criterion of similarity is difficult to apply to a process of transformation. Other authors feel differently. Halstead uses an analysis of agnathan phylogeny as a case study in determining primitive and derived characters and evaluates the previously proposed phylogeny of Janvier and Blicek. Halstead's approach exemplifies the transformational view outlined by Patterson, as he argues from a priori models of the probable direction of character transformation and fails to use character congruence to evaluate proposed homologies. Decisions about primitive and derived states are made before the phylogeny is con-

structed. Charig, in a lengthy analysis of current controversies in systematics (much of which is devoted to redefining widely used terms and to partitioning the field of systematics into named factions), argues that both transformation series and unnatural groups are acceptable in phylogenetic analysis. He advocates a procedure of classification that produces clusters of organisms that "do not necessarily correspond to natural groups" and that "may sometimes be entirely artificial concepts (existing only in the minds of systematists)."

A second issue that receives considerable attention in this volume is the role that fossils play in reconstructing phylogeny. Forey's position is reflected in his title, "Neontological analysis versus palaeontological stories." On the basis of detailed analyses of brachiopod phylogeny and studies using stratigraphy as a guide to phylogeny, he contends that paleontology has made little contribution to understanding genealogical relationships. He especially criticizes the central role that the search for ancestral taxa has played in paleontology. Fortey and Jefferies present what they call a "compromise approach" to fossils and phylogeny and provide several interesting examples and models to illustrate their view of the relative roles of stratigraphy and morphology in constructing genealogies. They do not, however, address a major component of many paleontological analyses, the use of a priori adaptive models to create transformation series.

The final and in many ways the most important theme, addressed by several authors, is the role of evolutionary theory in constructing ordered arrangements of organisms. Forey and Patterson both argue that interpreting character distributions as resulting from a process of ancestry and descent is justifiable only within the context of evolutionary theory. They hold that such interpretations have led to confusion in the past and are best avoided. They propose instead that the proper basis of comparative biology is the pattern of order obtained without reference to evolutionary processes of transformation and rely heavily on ontogenetic patterns to form groups of organisms. (This contrasts with the goals of Hill and Crane, Fortey and Jefferies, and Crowson, who aim to reconstruct phylogenetic trees.) At the same time, however, Patterson and Forey attempt to discover "natural groups." But is it possible to identify natural groups (or individuals in the philosophical sense) without reference to a covering law or natural process? If one rejects any explanatory foundation for the enterprise of cluster-

ing organisms, there would appear to be little basis for distinguishing classes from individuals, a separation critical to comparative and evolutionary analysis. Groups of organisms achieve their individuality on the basis of their history, not by virtue of characters alone, and a hierarchical pattern does not itself guarantee individuality: a covering law is needed.

The diversity of views found in this book mirrors those within the field of comparative biology. Current debates over the goals, assumptions, and methods of phylogenetic analysis are likely to continue, reflecting as they do the extraordinary vitality of historical and comparative inquiry.

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The Self

Psychological Perspectives on the Self. Vol. 1. JERRY SULS, Ed. Erlbaum, Hillsdale, N.J., 1982. x, 274 pp. \$24.95.

There was a time when researchers studying the self evoked contempt and condescension. That time is behind us now. *Psychological Perspectives on the Self* ratifies the reemergence of the self as a viable topic of scientific scrutiny.

Suls has brought together a distinguished group of scholars whose work represents several major themes in the recent social psychological literature. After Bandura's opening paper on the antecedents of self-efficacy, several authors explore the nature of self-knowledge. McGuire and McGuire review evidence that indicates that people identify themselves along dimensions that set them apart from others. For example, blacks will be more apt to define themselves in terms of ethnicity if they are among whites than they will if they are among blacks. The authors speculate that this tendency may undermine efforts to lower racial salience through integration.

Papers by Markus and Sentis and Greenwald borrow ideas from cognitive psychology in hopes of elucidating the nature of self-knowledge. After Freud, Greenwald assumes that there exist a number of components of the self that are independent (such as conscious and nonconscious, verbal and nonverbal). He argues that the manner in which these components are articulated with one another can be best understood by

assuming that self-knowledge is structured like a computer program. Although Greenwald's arguments are too general to generate testable hypotheses, the basic notion of synthesizing ideas from social and cognitive psychology seems promising.

One central issue raised here concerns the impact of people's beliefs about themselves on their behavior. Wicklund's approach has been to specify the conditions under which people become self-focused and consequently act on their underlying beliefs and dispositions. In contrast, Jones and Pittman assume that people generally ignore internal guides to action and instead conspire to present the particular "self" that will enable them to evoke desired responses from others. Their wide-ranging account provides one of the richest treatments of self-presentational phenomena since Goffman first delineated the subject in 1959.

The major themes of both the Wicklund and the Jones and Pittman papers surface in a paper by Snyder and Campbell. These authors argue that just as some people characteristically act on their beliefs and dispositions (like Wicklund's self-focused individual), others act to elicit certain reactions from others (like Jones and Pittman's manipulative individual). Snyder and Campbell review research that documents the behavior patterns of individuals who vary along this personality dimension.

If the book has a major shortcoming it is that most of the authors' generalizations are based on the results of laboratory investigations of college students. The only authors who directly confront this problem are Suls and Mullen. They question the conclusions drawn from previous work on self-evaluation by arguing that the manner in which people formulate self-evaluations changes dramatically over the life-span. Further, they offer interesting speculations concerning the antecedents of phenomena such as mid-life crises.

Other authors fail to acknowledge the hazards of generalizing from laboratory studies of college students. For example, on the basis of findings that indicate that people in experiments change their moods and self-ratings in response to recent events, Gergen argues that self-concepts are quite malleable. This conclusion is undermined by evidence that self-concepts are very difficult to change in nonlaboratory situations such as therapy.

But if some of the claims made in the book are debatable, none are entirely unreasonable or unsubstantiated. On

balance, this is an extremely solid, well-written volume, one that makes it easy to understand why research and theorizing on the self have gathered so much momentum of late. And if it is disappointing that it offers little insight into such important issues as the antecedents and consequences of low self-esteem and pathological self-concepts, this too may soon be remedied. Next year Suls plans to publish volume 2.

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Biological Oceanography

Physiological Bases of Phytoplankton Ecology. Papers from a NATO Advanced Study Institute, Lipari, Sicily, Oct. 1980. TREVOR PLATT, Ed. Department of Fisheries and Oceans, Ottawa, 1981 (available from Canadian Government Publishing Centre, Hull, Quebec). x, 346 pp., illus. Paper, \$C21.95; in Canada, \$C17.95. Canadian Bulletin of Fisheries and Aquatic Sciences 210.

Whereas on land the measurement of plant production may be as simple as mowing the grass and weighing the clippings, at sea the analogous measurement is problematic. Primary producers, herbivores, decomposers, and detritus co-occur in as little as a liter of seawater. They are impossible to separate, and given a constantly shifting and moving ocean they are difficult if not impossible to sample repetitively. Therefore, to a much greater degree than terrestrial ecologists, biological oceanographers have come to rely on measures of physiological activity to grapple with questions of ecological relationships. Photosynthesis, respiration, and nutrient uptake measured in isolated samples of seawater become means of assessing growth and material cycling. Solving the measurement problem, however, at the same time presents a new set of interpretational problems. To be meaningful, determinations of physiological activity made in the field must be calibrated against laboratory observations, although one could never hope to achieve in the laboratory the same environmental or biotic diversity found in the ocean.

This volume is a selection of the major contributions to a NATO Advanced Study Institute. The idea behind the workshop, according to the editor's foreword, was to encourage the development of the science of the physiological ecology of phytoplankton by exposing biological oceanographers to advances made by laboratory physiologists. Though this