VERTEBRATE PALEONTOLOGY

Millennial Status Report As Debate Wanes

Bradley C. Livezey

The recent and highly publicized spate of newly found Mesozoic birds and their dinosaur kin (popularly referred to as "feathered dinosaurs") has led to several syntheses of this paleontological revolution (*1*–*4*). In the most recent compilation, *Mesozoic Birds: Above the Heads of Dinosaurs*, Luis Chiappe and Lawrence Witmer bring together an impressive roster of researchers whose primary taxonomic descriptions have sustained the pace of this continuing era of discovery. The 31 contributors offer a variety of perspectives on their topics, despite the strong presence of the editors. (Chiappe is a joint or solo author of 8 of the 20 chapters.) Although this comparatively technical collection of papers is not suitable for the general reader, it will be welcome by all researchers and students interested in dinosaurs and birds.

As an ornithological systematist drawn into this fray and preoccupied with identification and characterization of birds' closest relatives, I welcome the volume for its new analytical insights and basic information. Some chapters provide definitive descriptions, figures, and abundant photographs of controversial or poorly known taxa such as *Avimimus*, enantiornithines, *Mononykus*, *Patagopteryx*, *Vorona*, and alvarezsaurids. The illustrations are generally quite good, even though the unavoidable variation in expertise of illustrators available to systematists prevents them all from attaining the elegance of the drawings that accompany the long-needed redescription of *Sinornis* by Paul Sereno *et al.* Other contributions present reviews of underutilized character complexes (feathers, skeletal histology, and fossilized tracks) and evolutionary assessments of selected attributes (including avian flight). Several chapters present up-to-date cladistic reconstructions. These are accompanied by descriptions of characters and data matrices, although the two largest data sets—James Clark *et al.*'s 208 characters for theropod dinosaurs and Chiappe's 169 for basal birds—are taxonomically expanded versions of previously published studies. These two data sets have become standards for phylogenetic classification of newly described taxa in their respective groups.

Mesozoic Birds
Above the Heads of Dinosaurs
Luis M. Chiappe and Lawrence M. Witmer, Eds.
University of California Press, Berkeley, 2002. 532 pp. $95, £66. ISBN 0-520-20094-2.

A key fossil, but how crucial? Although interpretations have changed considerably since Rudolf Freund's classic 1966 reconstruction, *Archaeopteryx*'s lifestyle and its importance to the origins of avian flight remain disputed topics.

CREDIT: RUDOLF FREUND/SECTION OF BIRDS, CARNEGIE MUSEUM OF NATURAL HISTORY

Prompted by the persistent debates and dynamics of discovery, the editors allowed contributors to use diverse definitions of taxa as fundamental as "Aves." Traditionally synonymous with "birds," Aves was formerly diagnosable by the possession of feathers, but that dichotomous simplicity is obsolete in the face of new taxa that present diverse combinations of characters.

In contexts as diverse as the evolution of flight and the origins of birds, the volume repeatedly reminds one of the pivotal importance of the decades-old works of John Ostrom and the focal role of *Archaeopteryx* (which is tantamount to synonymy with *Urvögel*, the ancestral bird, largely by its fortuitous primacy of description).

I especially enjoyed Witmer's opening historical overview, an objective chronicle of the debates on avian ancestry. The chapter reveals the power of even-handed prose to differentiate between rhetorical heat and empirical fire pertaining to the controversy that afflicts the theropod origin of birds. As in several previous reviews, Witmer's conceptual synthesis delves into philosophical premises as well as specific interpretational differences. It often seems that present intensity of controversy is directly related to the importance of insights provided by an historical perspective; such clearly is the case here.

As a perhaps unintentional result of editorial latitude and the differences in perspectives among contributors, the volume spans most current paleontological persuasions. In marked contrast to the overt cladistic focus of much of the volume, other chapters stress simple descriptions or informal analytical assessments.

The volume's most disappointing chapter is an exercise in speculation about fossil fragments based on informally evaluated characters of modern taxa: Sylvia Hope's narrative of Mesozoic fossils purportedly representative of modern birds (Neornithes). She confusingly combines an intuitive systematics of fossil material with sporadic and uncritical citation of molecular phenetics (*5*) and biogeographic rationalization. Whereas most of the volume's chapters that are devoted to single taxa include at least a preliminary cladistic analysis, this consideration of more than 30 taxa (assigned, though often only tentatively, to eight modern orders) does not. Hope implies that her overview represents a bona fide analysis, but her intuitive "tree" is at odds with the results from a number of recent, formal studies based on diverse data. For example, these studies indicate that Galliformes (fowl) and Anseriformes (waterfowl) form a clade, and they undermine claims of a basal position for Charadriiformes (shorebirds). The chapter also suffers from an uncritical acceptance of a number of referrals of poorly known taxa to higher-order taxa and a seeming reliance on key fossil "links" as empirical necessities for phylogenetic reconstruction. Given that most of the taxa Hope considers are from the latest Cretaceous (barely within the volume's timeframe), this chapter presents something of a mystery of editorial tolerance.

In his introductory overview, Witmer emphasizes the importance of the "long view" in this and similar debates. His admonishment finds support throughout the volume: there are frequent references to additional fossil descriptions and analyses still under way by contributors and colleagues. Such activity contributes to the pace with which syntheses on the origin and early evolution of birds cease to be cutting edge while stimulating a continuing period of discoveries, hypotheses, and evolutionary insights.

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CREDIT: F. E. CLEMENTS, *RESEARCH METHODS IN ECOLOGY* (UNIVERSITY PUBLISHING, LINCOLN, NE, 1905), P. 39/COURTESY R. E. KOHLER

Works like *Mesozoic Birds*, essentially a status report in an active field of inquiry, tend to be fated for quick obsolescence. But the comprehensive surveys and abundant provision of primary evidence should ensure the utility of this reasonably priced volume for a substantial term. Serious students of early birds and closely related theropods would be prudent to include this progress report among their core references.

References

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2. L. Dingus, T. Rowe, *The Mistaken Extinction* (W. H. Freeman, New York, 1997).
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5. C. G. Sibley, J. E. Ahlquist, *Phylogeny and Classification of Birds* (Yale Univ. Press, New Haven, CT, 1990).

HISTORY OF SCIENCE

Fielding Biology

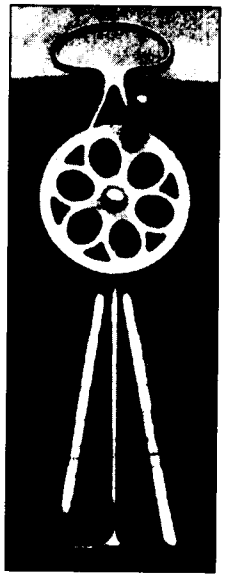
Vassiliki Betty Smocovitis

In his latest book, Robert E. Kohler examines the boundary between field studies and laboratory research in biology. Kohler, a veteran historian of science at the Department of the History and Sociology of Science at the University of Pennsylvania, has previously explored the development of laboratory sciences such as biochemistry in the United States. *Landscapes and Labscapes* continues his focus on science as practice by concentrating on the place of scientific activity—this time the field—to discern "what it is like to do field biology in a world of labs and experiment." Tracing the evolution of the notion of "field" as a place of scientific activity, Kohler argues that it was joined to both the notion and acceptance of "laboratory," a place of science that began to gain in popularity sometime between 1840 and 1870. Only as laboratories increasingly came to be seen as legitimate locales of scientific knowledge-making did the field emerge as a place of activity, a kind of "not-lab." Initially, at least, field scientists had to work at making their practices more legitimate by adopting laboratory methods, procedures, and values to field contexts. Kohler delineates these efforts from 1890 to 1950, a period that, he argues, was critical for the transformation of American field biology.

Landscapes and Labscapes
Exploring the Lab-Field Border in Biology
by Robert E. Kohler

University of Chicago Press, Chicago, 2002. 342 pp. $58, £41. ISBN 0-226-45009-0. Paper, $22, £15.50. ISBN 0-226-45010-4.

The historical argument and theoretical underpinnings of the book are, however, far more complex than this. No simple history of field biology, Kohler's account concentrates on the historical transformation of the lab-field border and on a set of practices that he refers to as "border biology." For Kohler, border biology is composed of the set of biological sciences that are associated mostly with the field but do cross into the laboratory zone. He excludes those disciplines that are "exclusively of the field" such as paleontology, paleoecology, and biogeography, as well as others like systematic zoology and botany (which he leaves for another book). He also excludes those laboratory sciences that "deal in some way with field material," sciences like animal behavior and population genetics. Instead, he focuses on "the subset of field disciplines that lie closest to the laboratory side of the lab-field border," namely ecology and evolution, "and that have been most strongly influenced by laboratory culture." To understand the cultural dynamic between lab and field, he explores at length the notion of "frontier": borders and boundaries—and their crossings. His analysis draws on a wide-ranging body of literature from the sociology of science and from "frontier history" (including Roman history and Asian history).



Household technology. To measure relative humidity in small places, Clements mounted wet and dry thermometers on a 75-cent eggbeater.

CREDIT: F. E. CLEMENTS, *RESEARCH METHODS IN ECOLOGY* (UNIVERSITY PUBLISHING, LINCOLN, NE, 1905), P. 39/COURTESY R. E. KOHLER

The book is loosely organized around pertinent themes that follow a rough chronology. These include the launching of a "new natural history" in institutional contexts that mixed practices from laboratory and field; the adoption and adaptation of procedures and methodologies (counting techniques, modeling, instruments, and surveys) across the lab-field border; the experiences of early border dwellers and the career trajectories of border-zone biologists; natural experiments; and

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