

## The Beginnings of Birds

Proceedings of the International *Archaeopteryx* Conference Eichstätt 1984. M. K. Hecht, J. H. Ostrom, G. Viohl, P. Wellnhofer, eds. 382 pp. Freunde des Jura-Museums Eichstätt, 1985. DM 93 (\$46).

*Archaeopteryx*. The *Urvogel*. A 140-million-year-old creature with perfectly developed feathers and wings yet possessing teeth and a long, reptilian tail. A superficially perfect mixture of bird and reptile, it is still the classic example of an "intermediate" stage in evolution. That such a find would be hailed as important was so obvious that the significance of *Archaeopteryx* was denied from the outset and wondrously diverse controversies have continued to swirl about the six known specimens, all from the late Jurassic Solnhofen limestone of Bavaria.

To bring together the modern warring factions, John Ostrom, a dedicated student of *Archaeopteryx*, initiated a conference devoted solely to this subject that was held at the Jura Museum, the repository of one of the more recently discovered specimens of *Archaeopteryx*. By all accounts this was as lively a gathering of scientists as one could hope for, one I much regret having missed.

Although edited volumes of conference proceedings tend to be rather unsatisfying, as they usually lack sufficient cohesion or comprehensiveness to be considered authoritative, *The Beginnings of Birds* is much more successful in this regard, in part because of its directed focus. The volume will be a definitive reference long into the future. Among the introductory chapters that set the stage for the subsequent debates are two excellent reviews of the geology and paleoecology of the Solnhofen deposits that are essential to understanding the environment in which *Archaeopteryx* lived and died. Perhaps not enough has been made of the fact that the known individuals were inhabitants of islands. There is also an entertaining terminal collection of four papers dealing with historical aspects of the discovery and interpretation of *Archaeopteryx*.

The remaining papers run the gamut from reviews and flights of fancy to highly original and innovative contributions. Although the most hotly debated topics

mainly involve ideas, even the "facts" are not always firmly established, as there continues to be dissension over whether certain osteological features of *Archaeopteryx* are distorted, broken, missing, or not even bones.

The greatest emphasis—and among the best and the worst contributions—concerns matters of "life style," mainly the various manifestations of the flight question. Most of the more original papers conclude that *Archaeopteryx* was more birdlike than previously believed and that it was probably or certainly capable of active flight. When it comes to the "trees down" vs. the "ground up" theories of the origin of flight, we find that the issue is not so simple. One proposal has the proto-bird living in mountainous terrain with steep slopes from which it could jump to gain the

speed needed for flight (I suppose this could be called the "ground down" theory). Another hypothesis would have *Archaeopteryx* as an aquatic animal that evolved flight to traverse from wave crest to wave crest (this I would term the "all wet" theory). My overall impression was that the arboreal theory gained considerable momentum over competing views.

The volume closes with the darkest and most unsavory chapter so far in the history of *Archaeopteryx*, a postconference refutation of the completely irresponsible accusation made by astronomer Sir Fred Hoyle and accomplices to the effect that the specimens of *Archaeopteryx* are fraudulent. This has since been followed by an even more definitive refutation by Charig and colleagues (*Science*, 232: 622-26, 2 May 1986). The most elementary investigation on the part of anyone motivated



In 1965 Rudolph Freund painted this reconstruction of *Archaeopteryx* to illustrate an article on the origin of feathers by K. C. Parkes. Courtesy of K. C. Parkes and the Carnegie Museum of Natural History.

by a desire for scientific truth and accuracy would have cleared up all doubts about the authenticity of these specimens from the outset. Gould (*Natural History*, Sept. 1986) has reviewed this "flap" and has heaped well-justified abuse upon its instigators, who still have not received sufficient contumely and opprobrium from the scientific community for their actions.

*The Beginnings of Birds* is an exercise in the vigorous interplay between fact and speculation that characterizes good paleontology, and it reflects both the frustrations and the joys of scientific inquiry. A condensed version would make an excellent basis for a graduate seminar on the scientific process. In such a context, the Hoyle incident could provide a stark but useful footnote as a looming object lesson in how scientists should never conduct themselves.—Storrs L. Olson, *National Museum of Natural History, Smithsonian Institution*