Response to Mayr and Peters

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Response to Mayr and Peters.—We welcome the reply by Mayr and Peters (2007) to our article on the relationships and morphology of early birds (Feduccia et al. 2007), because such discussion may lead to a better understanding of avian evolution. We believe that the figures in their original papers adequately illustrate the points we discussed, but we look forward to actually examining the specimen when it becomes available for study. It now appears that they did not intend their description of the new *Archaeopteryx* to indicate that *Archaeopteryx* had a terrestrial lifestyle and was unable to perch in trees. If they also believe that the hallux of their specimen was only inclined medially (but not at a nearly right angle), their description corresponds to the reflexed hallux of most other birds and we would not disagree with it. However, if that was their intention, they should have used a term such as "posterio-medial" to describe its position.

The expansion of the hallux ungual in *Archaeopteryx* is not a character of birds adapted to an aquatic or terrestrial habit, but is characteristic of arboreal birds. Other *pes* characters that they use include a supposed expansion of phalangeal condyles that is not clearly evident in *Archaeopteryx*, and a proper understanding would necessitate comparison of scaled measurements between theropod dinosaurs, birds, and other archosaurian taxa that are not provided. Mayr and Peters (2007) agree with us that *Archaeopteryx* does not have the special morphology characteristic of deinonychosaurs on *pes* digit two and did not code these features as a synapomorphy with *Archaeopteryx*, although they did claim that this is a morphology "uniting archaeopterygids and deinonychosaurs."

The presence or absence of serrations on the teeth varies widely among related groups, but the avian character of maniraptorian teeth is demonstrated by the waisted crown and expanded root seen in at least some examples. We are sure that there is still significant disagreement between our interpretations and those of Mayr and Peters, but the explanations they now offer seem to greatly diminish those differences. Perhaps these discussions will lead to a better exchange of ideas among students of avian evolution with contrary views, and contribute toward new and better hypotheses concerning the ancestry or sister-group relationships of birds.

Our phylogeny is only slightly modified from that of Nick Longrich, as we noted (Feduccia et al. 2007), by moving *Archaeopteryx* to a basal position with respect to microraptors and other Mesozoic birds, a position that conforms to its temporal occurrence. This view of superficially theropod-like Mesozoic birds being derivatives of the early avian radiation is not new to us, but was suggested in some form or other as early as 1911 by O. Abel, and most recently by Gregory Paul, George Olshevsky, Stephen Czerkas, A.F., L.M., and others. By our interpretation of the current evidence, birds are monophyletic and are nicely defined by their unique possession of feathers.—Alan Feduccia, *Department of Biology, University of North Carolina, Chapel Hill, North Carolina 27599, USA (e-mail: feduccia@bio.unc.edu)*; Larry D. Martin, *Museum of Natural History, University of Kansas, Lawrence, Kansas 66045, USA*; and Sam Tarsitano, *Biology Department, Worcester State College, Worcester, Massachusetts 01602, USA.*

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