Archaeopteryx: Do Feathers Make a Bird?

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A controversy is brewing over the type specimen for *Archaeopteryx lithographica,* one of the most famous of all fossils. This animal, first named in 1861 by the German paleontologist Hermann Meyer, is widely accepted to be the "first bird," hence the name *"Archaeopteryx*," or "ancient wing." Discovered and named just two years after Charles Darwin published *On the Origin of Species* in 1859, *Archaeopteryx* has been touted for a century and a half as a transitional fossil: Although it has some reptilian features, such as teeth and a long bony tail, in other aspects it more closely resembles a feathered bird with a light-weight skeleton.

The problem is that the name *A. lithographica*, like any taxonomic name, is based on a single specimen. In the case of this ancient bird, Meyer's name was originally coined for a single, isolated feather collected from 145-million-year-old limestones in Bavaria. This attribution has led to a good deal of confusion among paleontologists over the years as more skeletons, also considered to be *Archaeopteryx*, have been unearthed from the same deposit, thought to represent a brackish, shallow-water lagoon.

We know about 10 skeletal specimens that have been referred to, at various times, as *Archaeopteryx,* all of them certainly very closely related and together preserving a good deal of the anatomy of this, no doubt, primitive bird. Since the mid-1960s, the so-called London specimen of *Archaeopteryx* (because these fossils are so famous, they are commonly referred to using the name of the museum collection in which they are housed) that was discovered in 1861 and named by the infamous British paleontologist Richard Owen in 1863 (who also founded the Natural History Museum, London) has been used by paleontologists as the de facto holotype for this bird.

It is this issue, which fossil should be used as the name-bearing specimen for *A. lithographica*, that has vexed paleontologists in recent months. The pages of the *Bulletin of Zoological Nomenclature* (BZN), the formal mouthpiece of the International Commission on Zoological Nomenclature (ICZN), have seen several claims and counter-claims regarding the status of Meyer's isolated feather versus the almost complete London *Archaeopteryx* skeleton. Is the isolated *Archaeopteryx* feather, a single secondary feature shed from somewhere in the wing, complete enough for us to be certain it is really from the same kind of bird as the known skeletons? At the time of its description in the 1860s, dinosaurs with feathers were unknown; the presence of a feather equaled a bird, in other words. Recent discoveries, especially from China, of small, theropod dinosaurs covered in feathers, often extremely bird-like feathers that potentially could have been used for flight, have greatly changed this perception.

The ICZN is the body charged with resolving issues of nomenclature in zoology, including names applied to fossil animals. A trivial mandate, you might argue, but it isn't: At stake is what is meant by the name "*Archaeopteryx*" in terms of evolutionary biology, as well as the question of what names in biology are actually for. On one side of the debate, some paleontologists have argued in the pages of the BZN for stability: There is no need to change the status of the specimens used to refer to *Archaeopteryx*; Meyer's 1861 feather alone is enough to form the basis for the name. Others have argued, quite strongly, that the time is right to redesignate the specimen that underpins the name: Lose the feather as the holotype and denote the London *Archaeopteryx* skeleton as a so-called neotype for this name.

This is important because holotype specimens, and their possible replacements, form the basis of comparative biology. The species is also the fundamental unit of taxonomy in biology; for us to include *Archaeopteryx* in a phylogenetic hypothesis—to track and understand the evolution of flight, for example—we have to be sure what is meant by this name. What if comparisons are required with known and named species to understand and interpret the discovery of additional fossils? As with all such matters, the ICZN will make a ruling, due in this case before the end of 2010, but the jury is still out. Is a feather still enough to make a bird?

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