

- the model fits all the other data we have for solar system and cosmic magnetic fields ... remarkably well. The good fit would not be possible without the original material being water, all the hydrogen spins being aligned, and the age of the solar system being close to 6,000 years.
5. Humphreys, D.R., The creation of planetary magnetic fields, *Creation Research Society Quarterly* 21(3):140–149, December 1984. Archived (with predictions highlighted in red) at: [www.creationresearch.org/crsq/articles/21/21\\_3/21\\_3.html](http://www.creationresearch.org/crsq/articles/21/21_3/21_3.html).
  6. Humphreys, D.R., The creation of cosmic magnetic fields; in: Snelling, A.A. (Ed.), *Proceedings of the Sixth International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, PA, and Institute for Creation Research, Dallas, TX, pp. 213–230, 2008. Archived in colour at: [www.icr.org/i/pdf/research/ICC08\\_Cosmic\\_Magn\\_%20Fields.pdf](http://www.icr.org/i/pdf/research/ICC08_Cosmic_Magn_%20Fields.pdf).
  7. Humphreys, D.R., Mercury's Messenger, *Creation Matters* 9(4):1,9, July/August 2004. See [www.creationresearch.org/creation\\_matters/pdf/2004/CM09%2004%20low.PDF](http://www.creationresearch.org/creation_matters/pdf/2004/CM09%2004%20low.PDF).
  8. MESSENGER is an acronym for 'Mercury Surface, Space ENvironment, GEOchemistry, and Ranging' and of course refers to the alleged role of the Roman mythological god Mercury.
  9. Humphreys, D.R., Mercury's magnetic field is young! Creation Ministries International feature website article, 26 August 2008, archived at: [creation.com/mercurys-magnetic-field-is-young](http://creation.com/mercurys-magnetic-field-is-young).
  10. Anderson, B.J. *et al.*, The global magnetic field of Mercury from MESSENGER orbital observations, *Science* 333:1859–1862, 30 September 2011. Less detailed report, Mercury's Oddly Offset Magnetic Field, 15 February 2012, at [messenger.jhuapl.edu/soc/highlights021512.html](http://messenger.jhuapl.edu/soc/highlights021512.html).
  11. For comparison, Earth's dipole magnetic field tilts about 11.5° away from its rotation axis, and the dipole source is offset about 7% of Earth's radius northeastward from the centre.
  12. The cause of the offset could be any of a variety of things. One would be an inner core having a higher effective electrical resistance than the outer core. That would cause the decay half-life to be shorter in the inner core, making current in the outer core more likely to persist.
  13. Anderson, B.J. *et al.*, The magnetic field of Mercury, *Space Science Reviews* 152:307, 2010. The particular values they used for their comparison are in table 1, Internal model 3.
  14. Ness, N.F., The magnetic field of Mercury, *Physics of the Earth and Planetary Interiors* 20:209–217, 1979. I used the 1975 maximum field Ness reports in the right side of fig. 2, plus the latitude and distance of closest approach in the right side of figure 1.
  15. Rikitake, T., *Electromagnetism and the Earth's Interior*, Elsevier Publishing Company, Amsterdam, 1966. On pp. 91 and 102, Rikitake gives information that the earth's dipole is moving at about 2 km/year. A proportional change in the offset of Mercury's dipole would be nearly negligible during a 36-year period.
  16. Anderson *et al.*, ref. 10, p. 1860, fig. 2. From the graph, I got the maximum total field, plus altitude and latitude at that moment. Then I compared it with similar data from Ness, ref. 14. I kept the ratio of dipole and quadrupole moments the same, setting all other coefficients to zero (as did Anderson *et al.*), and then found the ratio of dipole moments for 1975 and 2011. I ignored the possible effects of external field changes, see next note.
  17. Anderson, *et al.* 2011, p. 1861. The most likely cause of error is the external field, which is influenced by the solar wind, possibly different in 1975 than it was in 2011. This article says "From MESSENGER's orbit, the external field contributes more than 20% of the total field only at lower latitudes and higher altitudes." That is why I chose to compare the maximum observed values of total field, recorded at high latitudes (near the North Pole) and at the lowest altitudes. I take half the 20% above as the maximum perturbation from external field, giving me error bounds of ± 0.8%.
  18. A reviewer points out that the universe-wide accelerated nuclear decay postulated by the Radioisotopes and The Age of The Earth (RATE) research initiative could have produced a strong pulse of heat in Mercury's interior during the Genesis Flood, and that such heat would still be affecting the core today.
  19. Humphreys, D.R., Earth's magnetic field is decaying steadily—with a little rhythm, *Creation Research Society Quarterly* 47(3): 193–201, Winter 2011. For 'effective resistance' explanation, see "Accounting for Fluid Motion" section on p. 197. Archived at: [www.creationresearch.org/crsq/articles/47/47\\_3/CRSQ%20Winter%202011%20Humphreys.pdf](http://www.creationresearch.org/crsq/articles/47/47_3/CRSQ%20Winter%202011%20Humphreys.pdf).
  20. Smith, D.E. *et al.*, Gravity field and internal structure of Mercury from MESSENGER, *Science Express*, 21 March 2012, at [www.sciencemag.org/content/early/2012/03/20/science.1218809.full#comments](http://www.sciencemag.org/content/early/2012/03/20/science.1218809.full#comments). This late-breaking online article gives new gravity-mapping data from MESSENGER indicating that Mercury's fluid core has a radius of 2,030 (± 37) km, a whopping 85% of the planet's radius.
  21. Humphreys, ref. 6, pp. 219–221, see eq. (18) and fig. 7. Using the latest core radius (in above reference) in eq. (18) gives an average core conductivity of 28,000 S/m. That is very close to the value of 33,000 S/m for Earth's core I found from the latest data on its dipole decay rate (see Humphreys, ref. 19, p. 200). That would drop the data point for Mercury in fig. 7 of this reference down to the same level as those of Mars and Earth, indicating that the core materials may be the same in all three planets.

## Is *Archaeopteryx* a feathered dinosaur?

Michael J. Oard

Practically all paleontologists think of *Archaeopteryx* as the first bird or the missing link between dinosaurs and birds. The fossil is used as a showcase for evolution.

However, Chinese paleontologists now challenge this classification, and instead make a case that *Archaeopteryx* is a feathered theropod dinosaur.<sup>1</sup> This belief is based on the finding of an *Archaeopteryx*-like fossil in China called *Xiaotingia zhengi* (figure 1), the affinity of which is supposedly with the early theropod dinosaurs and feathered dinosaurs. The new fossil is said to resemble theropod dinosaurs and, just like *Archaeopteryx*, it has teeth, claws on its wings, and a vertebrate tail. But the new fossil still has many features of birds, such as: feathers; small size; boomerang-shaped wishbone; and features of enantiornithines, unique fossil birds.

### Based on questionable phylogenetic analysis

To back up their claim, the Chinese paleontologists have used numerical phylogenetic analysis, cladistics, that compares anatomical features of many individuals. The idea is that the more similar the fossils, the closer they are related by evolution. But the researchers also admit: "It should be noted that our phylogenetic hypothesis is only weakly supported by the available data."<sup>2</sup> They go on to add that other phylogenetic analyses have demonstrated just the opposite, that *Archaeopteryx* is a basal bird: "Although *Archaeopteryx* is placed within the Avialae [basal birds] by nearly all numerical phylogenetic studies..."<sup>3</sup> In order to attempt to weaken the cladistics data that says *Archaeopteryx* is a bird, the Chinese paleontologists claim that some of the traits used in the cladistics analysis are questionable.

So, it seems that the classification of *Archaeopteryx* and *Xiaotingia zhengi* depends upon the traits selected for the cladistics analysis.

Perhaps this is one of the reasons that cladistics analysis has been claimed to be subjective by some researchers.<sup>4,5</sup> This new designation for *Archaeopteryx* supports this belief. Cladistics is a poor tool by which to classify unique fossils as feathered dinosaurs,<sup>6,7</sup> or any fossil for that matter.<sup>8</sup> Michael Balter, in *Science*, acknowledges that the Chinese paleontologists admitted to the weak statistical connection for claiming *Archaeopteryx* is a feathered dinosaur, but adds: “And other researchers say such ambiguities in classification are not surprising.”<sup>9</sup> This shows the widespread ambiguity of cladistics analysis.

### The claim is controversial

This new designation of *Archaeopteryx* is of course based on the opinion of four Chinese paleontologists,

who are challenging a major icon of evolution. Lawrence Witmer states:

“For the past 150 years, the famous feathered fossil species from Bavaria in Germany has been a symbol of evolution, a textbook example of a transitional fossil and, above all, the oldest and most primitive bird. ... The finding is likely to be met with considerable controversy (if not outright horror), in part because of the historical and sociological significance that *Archaeopteryx* has held, but also because it may mean that much of what we thought we knew about the origin and early evolution of birds will need to be re-evaluated.”<sup>10</sup>

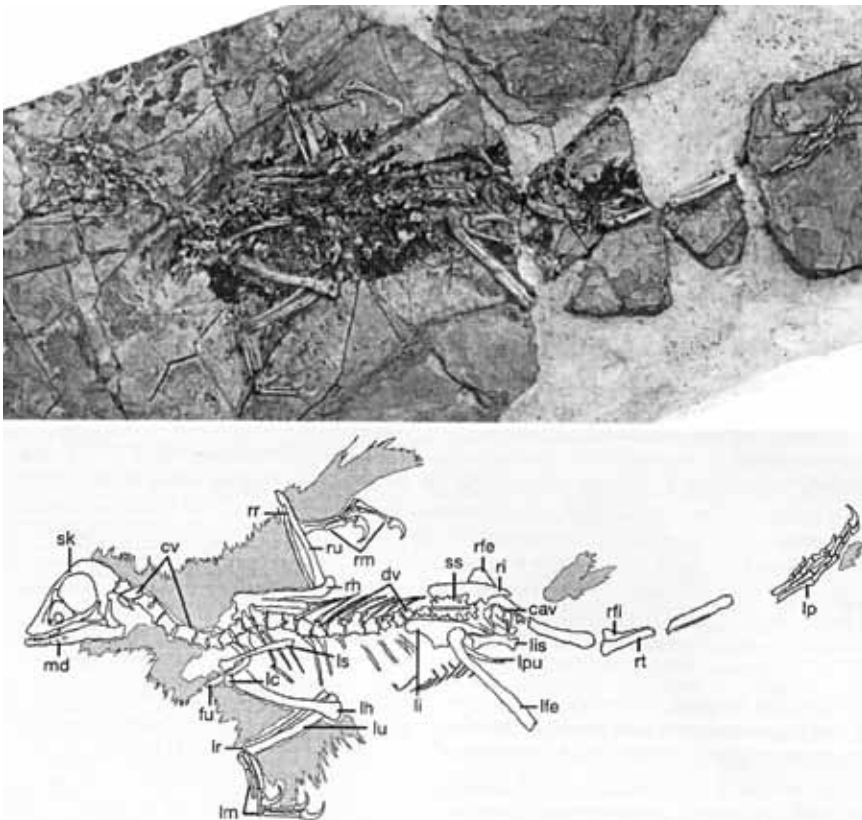
### Could ‘feathered dinosaurs’ be unique fossil birds?

Because of all the subjectivity, I lean toward the idea of several ornithologists that ‘feathered dinosaurs’, those with true feathers and not probable collagen

fibers,<sup>11</sup> are really unique, fossil birds.<sup>12–14</sup> Some of the feathered dinosaurs were first classified as birds, showing the equivocal nature of the classification.<sup>15</sup> Many of the true extinct birds found in China have unique features that are shared by some dinosaurs, but they are still birds. True birds are also found with so-called feathered theropods, suggesting that maybe all the animals in the location are types of birds. And even one cladistics analysis on the subject, if it can be trusted, concluded that ‘feathered dinosaurs’ are in fact birds.<sup>4</sup>

### References

1. Xu, X., You, H., Du, K., and Han, F., An *Archaeopteryx*-like theropod from China and the origin of Avialae, *Nature* **475**:465–470, 2011.
2. Xu *et al.*, ref. 1, p. 467.
3. Xu *et al.*, ref. 1, p. 469.
4. James, F.C. and Pourtless IV, J.A., Cladistics and the origin of birds: a review and two new analyses, *Ornithological Monographs* **66**:1–78, 2009.
5. Jenner, R.A., the scientific status of metazoan cladistics: why current research practice must change, *Zoologica Scripta* **33**(4):293–310, 2004.
6. Oard, M.J., Did birds evolve from dinosaurs? *J. Creation* **25**(2):22–31, 2011.
7. Oard, M.J., *Dinosaur Challenges and Mysteries: How the Genesis Flood Makes Sense of Dinosaur Evidence Including Tracks, Nests, Eggs, and Scavenged Bones*, Creation Book Publishers, Atlanta, GA, pp. 144–155, 2011.
8. Doyle, S., Cladistics, evolution and the fossils, *J. Creation* **25**(2):32–39, 2011.
9. Balter, M., Bad birthday news for first bird? *Science* **333**:511, 2011.
10. Witmer, L.M., An icon knocked from its perch, *Nature* **475**:458, 2011.
11. Oard, ref. 6, p. 24.
12. Feduccia, A., Lingham-Soliar, T. and Hinchliffe, J.R., Do feathered dinosaurs exist? Testing the hypothesis on neontological and paleontological evidence, *J. Morphology* **266**:125–166, 2005.
13. Feduccia, A., Martin, L.D. and Tarsitano, S., Perspectives in ornithology and *Archaeopteryx* 2007: Quo Vadis? *Auk* **124**(2):273–280, 2007.
14. Jones, T.D., Farlow, J.O., Ruben, J.A., Henderson, D.M. and Hillenius, W.J., Cursoriality in bipedal archosaurs, *Nature* **406**:716–717, 2000.
15. Xu *et al.*, ref. 1, p. 466.
16. Oard, ref. 6, p. 26.



**Figure 1.** Photograph and line drawing of *Xiaotingia zhengi*,<sup>15</sup> a new *Archaeopteryx*-like creature from China claimed to be a theropod dinosaur.