

### Other claimed feathered theropods are extinct birds

After *Sinosauropteryx* was discovered, other supposed theropod dinosaurs with true feathers were discovered. These discoveries seemed to prove the case. Feduccia writes:

“In 1998, *Nature* triumphantly announced ‘the debate is over’ following a cover article describing two 125-million-year old putative dinosaurs, *Protarchaeopteryx* and *Caudipteryx*, with true avian feathers.”<sup>3</sup>

Feduccia believes these and other claimed dinosaurs, like the four-winged *Microraptor*, were true birds. It is now believed that the feathers of *Microraptor* were iridescent, like some birds today, and that iridescence evolved more than once.<sup>6</sup>

Some of these fossils were described as birds when first discovered, and there are undisputed birds found with the supposed feathered dinosaurs, suggesting that the so-called feathered theropods were indeed birds. It boils down to a classification problem in which the evolutionary bias for ‘feathered dinosaurs’ has taken over.

Feduccia concludes there is obvious evidence that there is no such thing as feathered dinosaurs; there are birds and there are dinosaurs.

### References

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3. Feduccia, A., Is it a bird? Is it a dinosaur? *New Scientist* 214(2862):28, 2012.
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## Mercury’s crust is magnetized—more evidence for a young solar system

D. Russell Humphreys

NASA’s *MESSENGER* spacecraft (figure 1) has continued to surprise us analysts with new evidence that Mercury’s magnetic field is as young as the Bible says. Since March 2011 the spacecraft has been in a near-polar orbit around Mercury. By now it has orbited the planet well over a thousand times, repeatedly passing over the entire surface. Swooping low over the northern volcanic plains, the spacecraft discovered that the planet’s outer crust in that region is strongly magnetized.<sup>1</sup> The strongest magnetization coincides with a broad topographic rise near the centre of those plains. That leads the analyzing team to believe that the magnetization comes from basalt solidified from lava flowing up out of the deeper crust throughout the plain.

The crust magnetization is nearly vertical, just as is the planet’s overall magnetic field in those high latitudes. But *MESSENGER* found that the magnetization is *opposite* to the direction of today’s field, indicating that Mercury has reversed the direction of its field at least once in the past.<sup>2</sup> The team of analysts says this

“... implies that the magnetization is a remanent [remaining, permanent] magnetization acquired [in the past] when Mercury’s magnetic field was of the opposite polarity, and possibly stronger, than the present field.”

### Past magnetic field was much stronger

The last phrase in the quote above would have been more accurate if it had said, ‘... and very probably much stronger than the present field.’ Here’s why: The amount of magnetization depends on the amount and mineral

form of iron in the rock, and on the strength of the field when it cools. The analysts conjectured that the iron in the crustal rocks is metallic, uncombined with other elements, and that it is in micron-sized particles.<sup>3</sup> Enough such particles might have allowed the past magnetizing field to be as weak as today’s field.<sup>4</sup> However, basalts from the moon, the similar vacuum conditions of which allow some metallic iron to exist, show far too little metallic iron to allow a low-field explanation for the high rock magnetizations on Mercury.<sup>5,6</sup>

In fact, observations with *MESSENGER*’s x-ray spectrometer indicate that the basalts of the northern plain have a rather ordinary composition, between that which is typical of basalts and that in high-magnesium lava with less silicate, such as komatiites.<sup>7</sup> Paleomagnetic studies of basalts<sup>8</sup> and komatiites<sup>9</sup> here on Earth suggest that Mercury’s crustal basalts acquired their magnetism in a field at least *ten times stronger* than Mercury’s field today.

This adds to the string of surprises Mercury’s magnetic field has given uniformitarian<sup>10</sup> space scientists. Before *Mariner 10* zoomed by the planet in 1974 and 1975, experts had expected the planet to have zero field. Instead, those flybys showed that Mercury has a significant magnetic field, about 1% of the earth’s. Since then, theorists have tried many versions of the ‘dynamo’ theory (which imagines a planet’s core acting like an electric generator) to explain how Mercury could have a field and sustain it for eons. In the last few years, they have been trying to understand why the field is so low compared to Earth’s.<sup>11</sup>

Especially relevant here, all versions of the dynamo theory assert that, except for brief periods when the field might have reversed itself, Mercury’s field should have stayed at much the same strength throughout the alleged billions of years of its existence. Evidence for a large decrease of the field sometime in the past adds to the theorists’ perplexity. That may be why the analyzing team apparently wanted to dilute that detail.

### Magnetized crust validates prediction

In contrast, the above result vindicates one of two scientific predictions about Mercury's magnetic field made by a biblically based creationist theory. I offered it in 1984 to explain how God created magnetic fields of planets in our solar system.<sup>12</sup> If the theory were correct, the article said, then

“Older igneous rocks from Mercury or Mars should have natural remanent magnetization, as the Moon's rocks do.”

By ‘older’, I meant rocks that formed not long after creation, while the fast-decaying magnetic fields of those two planets would be still moderately strong. I said ‘from’ because I was picturing that rocks from Mars and Mercury would have to be brought back by astronauts for lab tests, the way they did for moon rocks. I had no idea that low-orbiting spacecraft would someday be able to detect crustal magnetizations. I had even forgotten about this particular prediction until recently. But new space science developments have opened the door to such measurements, in 1997–1999 for Mars,<sup>13</sup> and during the last year for Mercury.

### Fast-fading field validates a second Mercury prediction

Measurements *MESSENGER* made from orbit last year, compared with the 1975 *Mariner 10* data, show that Mercury's magnetic field has weakened by nearly 8% in the past 36 years, an astonishingly fast decrease. That supports a prediction in the 1984 paper: “Mercury's decay rate is so rapid that some future space probe could detect it fairly soon. In 1990 the planet's magnetic moment should be 1.8 percent smaller than its 1975 value.”<sup>14</sup>

The observed rate agrees with Mercury's core having an electrical conductivity close to that of the earth's core.<sup>15</sup> A previous issue of *Journal of Creation* gives more details.<sup>16</sup> The fast rate of decay (half-life of 320 years) implies the crust was magnetized only thousands of years ago.

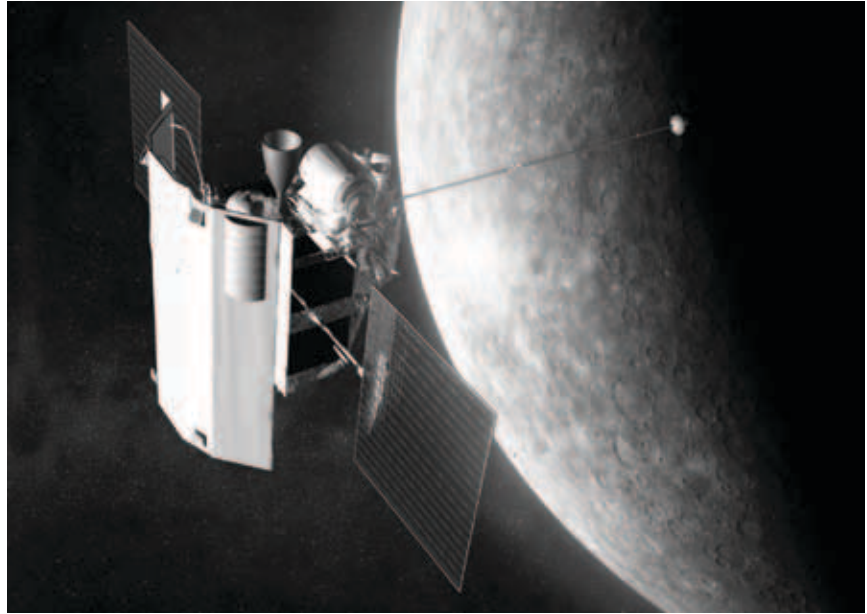


Photo: NASA

**Figure 1.** *MESSENGER* spacecraft over Mercury. Magnetometer at end of the long boom to the right.

### Valid predictions are important

The above two items for Mercury's magnetic field, its fast fading and its magnetized crust, completes the five predictions in my 1984 paper, all of which spacecraft have now verified.<sup>17</sup> Also, I have extended the application of the theory to other astronomical objects inside the solar system (asteroids, meteorites, moons of other planets) and outside the solar system (stars, magnetic stars, white dwarfs, pulsars, magnetars, galaxies, the cosmos itself). Amazingly, the theory fits these objects well, too.<sup>18</sup>

The main importance of the good fit to known data and the verified predictions<sup>19</sup> is that they support the biblical account of creation and Scripture's young age for the cosmos. The theory could fit the magnetic data we now have for the solar system only if:

1. The original material God created was water (which God then transformed to the present materials), per 2 Peter 3:5 (Greek and NAS) and other passages.<sup>20</sup>
2. The earth and solar system were close to the 6,000-year age given by a straightforward reading of Scripture.

Thus, magnetic fields in the cosmos serve as God's signature on his creation, and like everything in the heavens, they give glory to Him (Psalm 19:1).

### References

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2. Humphreys, D.R., Physical mechanism for reversals of the earth's magnetic field during the flood, *Proceedings of the Second International Conference on Creationism*, Walsh, R.E. (Ed.), Creation Science Fellowship, Pittsburgh, PA, pp. 129–142, 1990. See: [static.icr.org/i/pdf/technical/Physical-Mechanism-Reversals-of-Earths-Magnetic-Field.pdf](http://static.icr.org/i/pdf/technical/Physical-Mechanism-Reversals-of-Earths-Magnetic-Field.pdf). Magnetic field reversals on Mercury were probably rapid, as they were on Earth, resuming nearly the same intensity after each one, though of opposite polarity. Their occurrence does not affect the general considerations of intensity and decay rates in this article.
3. Mason, B. and Berry, L.G., *Elements of Mineralogy*, W.H. Freeman and Company, San Francisco, CA, p. 212, 1968. Near the end of their abstract the *MESSENGER* team suggests that the magnetic carrier in the rock consists of easy-to-magnetize ‘single-domain’ (micron-sized) particles of ‘native’ (metallic) iron. But to have a

- significant amount of such a composition is rare in basalts, as Mason and Berry note, because microscopic particles of highly reactive elemental iron would almost always chemically combine with other elements in hot silicate rock, particularly oxygen, as it cooled down from its molten state.
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  6. Fuller, M., Wu, Y. and Wsilewski, P.J., The magnetic characteristics of returned lunar samples and their implications for regolith processes, *Earth, Moon, and Planets* **13**(1–3):327–338, 1975. The total iron that is chemically combined with other elements in the mare basalts is between 14 and 16% by weight, about a hundred times greater than the metallic form. So the main source of magnetization in the lunar basalts is chemically combined iron, similar to basalts on Earth.
  7. Head, J.W. *et al.*, Flood volcanism in the northern high latitudes of Mercury revealed by *MESSENGER*, *Science* **333**:1853–1856, 30 September 2011. On p. 1855 the authors say, 'In particular, Mg/Si, Al/Si, and Ca/Si ratios lie between those typical of basalt and more ultramafic rocks comparable to terrestrial komatiites, which are high-Mg (22), high temperature, low-viscosity lavas (23) that erupted mostly during the Archean on Earth.' (The geologic period label 'Archean' has little relevance here.)
  8. Coe, R.S. *et al.*, Geomagnetic paleointensities from radiocarbon-dated lava flows on Hawaii and the question of the pacific nondipole low, *J. Geophysical Research* **83**(B4):1740–1756, 10 April 1978. The ordinate of fig. 1(a) at zero "TRM" gives the initial 'NRM' (magnetization) of one basalt sample, ~23 A/m ( $10^{-3}$  emu/cm<sup>3</sup> = 1 A/m) from cooling in a field of 51.4  $\mu$ T (0.514 Gauss). Fig. 3 similarly gives a magnetization of ~2.9 A/m for basalt that formed in a field of 14.4  $\mu$ T. Other references give a similar range of magnetizations for basalts. (The relatively recent radiocarbon dates associated with these basalts, when corrected for incorrect assumptions on initial amounts, indicates they probably formed during the post-flood Ice Age.) Ref. 1, fig. 3, gives minimum magnetizations (to cause the observed perturbations to Mercury's field) for various possible thicknesses of the magnetized layer. For 15 km thickness (below which depth the crust is probably too hot to retain magnetization for long), the minimum is 1 A/m. For the 2 km thickness the analysts say is a likely regional maximum, extrapolating the figure gives about 5 A/m for the crust magnetization. Using all the above figures gives us a magnetic field between 5 and 25  $\mu$ T. Such intensities are considerably higher than today's field in the high latitudes of Mercury, about 0.5  $\mu$ T. These numbers imply the field was at least ten to fifty times higher when the crust cooled than today.
  9. Yoshihara, A. and Hamono, Y., Paleomagnetic constraints on the Archean geomagnetic field intensity obtained from komatiites of the Barberton and Belingwe greenstone belts, South Africa and Zimbabwe, *Precambrian Research* **131**:111–142, 2004. Comparing komatiite NRM's in table 1 with the magnetizing field intensities  $F_m$  in table 7 gives similar results to those given by the basalts in the previous reference.
  10. Uniformitarianism is the skeptical belief that 'all continues just as it was from the beginning' of the universe (2 Peter 3:4) without any large-scale interventions by God. It is the basic assumption behind long-age interpretations of geological, nuclear, and astronomical data.
  11. Heyner, D. *et al.*, Evidence from numerical experiments for a feedback dynamo generating Mercury's magnetic field, *Science* **334**:1690–1693, 23 December 2011. Based on an unproven scaling model for planetary dynamo theories, the authors of this paper assume that Mercury's field should be as strong as that of the earth today. They propose that the solar wind might be suppressing the alleged dynamo so that Mercury's field is much lower than modelled. The references in the paper will give some of the previous history of speculations about the source of Mercury's magnetic field.
  12. Humphreys, D.R., The creation of planetary magnetic fields, *Creation Research Society Quarterly* **21**(3):142–149, December 1984; see [creationresearch.org/crsq/articles/21/21\\_3/21\\_3.html](http://creationresearch.org/crsq/articles/21/21_3/21_3.html).
  13. Connerney, J.E.P. *et al.*, Magnetic lineations in the ancient crust of Mars, *Science* **284**:279–293, 30 April 1999.
  14. Humphreys, ref. 12, p. 147, item 2 in conclusion. I estimated the 1.8% decrease by assuming a constant-rate decay from the strength at creation (from my theory) down to the strength in 1975, and then extrapolating from 1975 to 1990. Extrapolating further implies a 4.3% decrease from 1975 to 2011. The additional 3.5% (to make the 7.8% actually measured for the 36-year period) may be due to a non-constant decay rate, which has perhaps steadily increased from creation until now. See conclusion of Humphreys, 2012, cited below, for a reason why that may have occurred.
  15. Smith, D.E. *et al.*, Gravity field and internal structure of Mercury from *MESSENGER*, *Science* **336**:214–217, 13 April 2012. These measurements show that Mercury's core radius is a whopping 85% of the planet's overall radius. The decay time depends on the product of core conductivity and the square of the core radius. The new figures reduce the estimate of Mercury's core conductivity I made earlier, bringing it into line with those of Earth and Mars. Details in next reference.
  16. Humphreys, D.R., Mercury's magnetic field is fading fast—latest spacecraft data confirm evidence for a young solar system, *J. Creation* **26**(2):6–8, August 2012. My calculation of the decrease, giving 7.8 ( $\pm$  0.8) %, re-analyzes the 1975 *Mariner 10* data in terms of the zero tilt and significant offset *MESSENGER* found in 2011.
  17. Humphreys, ref. 12, p. 147. There is also a less important prediction: that Pluto will turn out to have no magnetic field when a spacecraft visits it. That should be tested in July 2015 by NASA's *New Horizons* space probe. The prediction rests on the assumption (from Pluto's density) that Pluto is entirely ice, which I expected would have a low electrical conductivity. Uniformitarians also expect it to be entirely ice, so according to their 'dynamo' theories (which must rest on it having a fluid conducting interior), they also expect no magnetic field.
  18. Humphreys, D.R., The creation of cosmic magnetic fields, *Proceedings of the Sixth International Conference on Creationism*, Snelling, A.A. (Ed.), Creation Science Fellowship, Pittsburgh, PA, and Institute for Creation Research, Dallas, TX, pp. 213–230, 2008. See [www.icr.org/i/pdf/research/ICC08\\_Cosmic\\_Magn\\_%20Fields.pdf](http://www.icr.org/i/pdf/research/ICC08_Cosmic_Magn_%20Fields.pdf).
  19. Humphreys, ref. 12, p. 147. As I pointed out in the conclusion, testable predictions are a counterexample to the frequent skeptics' claims that creationists have no scientific theories because they offer no predictions that make the theories open to scientific testing. The fact that this theory has now passed five predictive tests—tests intimately linked to its central assertions—should give skeptics some reason to reconsider their position.
  20. Humphreys, ref. 18, pp. 214–217. The present constituents of the earth and heavenly bodies do not have the right amounts of nuclear magnetic moment per unit mass for this theory to work. Stars, mostly hydrogen, have about nine times too much. Gas giant planets also have too much. Terrestrial planets, mostly iron, oxygen, silicon, calcium, magnesium, etc. have far too little. Of the possible materials, only water has the right ratio of nuclear magnetic moment to mass.