

visible change in the fossils. This can scarcely be evidence of evolutionary change, but instead is more reasonably interpreted as evidence of *no change*.

Cheetham's very careful study is therefore of great importance to the creation/evolution debate, as it has helped convince more palaeontologists

that punctationism is the dominant reality of the record, after all.

Some had been able to point to studies which suggested gradualism in at least some fossil species. However, Cheetham's collaborator Jeremy Jackson of the Smithsonian points out that these are mostly flawed.

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C.W.

## The 'Principle of Least Astonishment'!

So ran the heading in the journal *Nature*, as geophysicist Ronald Merrill of the University of Washington (Seattle) tried to grapple (unsuccessfully) with the newly published evidence confirming that 'extraordinarily rapid' reversals of the Earth's magnetic field have indeed occurred.<sup>1,2</sup>

A decade ago, Prévot and Coe (and colleagues) reported in three papers the evidence they had found of extremely rapid changes of the Earth's magnetic field recorded in lava flows at Steens Mountain in southern Oregon (USA).<sup>3-5</sup> Scientists regard Steens Mountain as the best record of a magnetic reversal because the volcano spewed out 56

separate flows during that episode, each of these rock layers providing time-lapse snapshots of the reversal (see Figure 1). Within one particular flow, Prévot and Coe discovered that rock toward the top showed a different magnetic orientation than did rock lower down. They interpreted this to mean that the field shifted about 3° a day during the few days it took the single layer to cool.<sup>6</sup> Such a rate of change is about 500 times faster than that seen in direct measurements of the field today, so,

*'most geomagnetists dismissed the claim by applying the principle of least astonishment — it was easier to believe that these lava flows did not accurately record the changes*

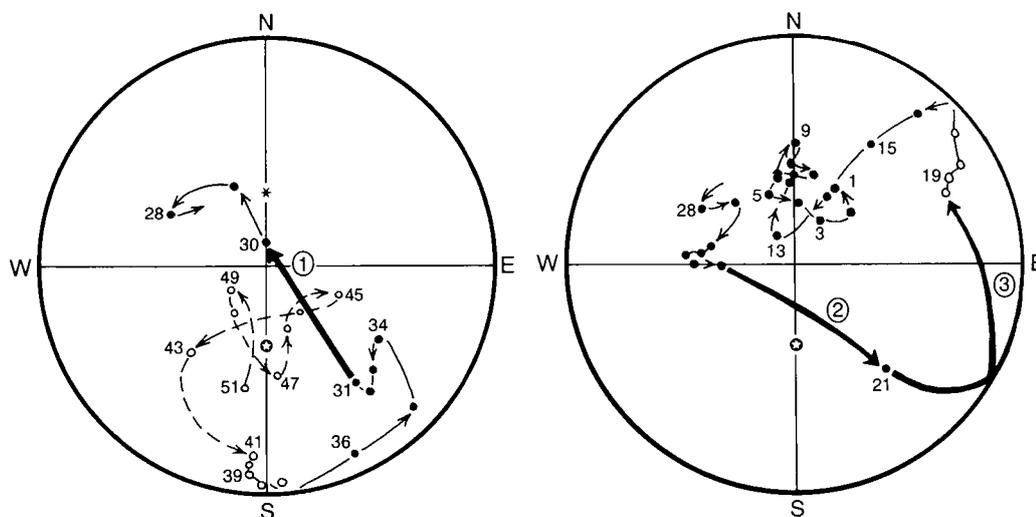
*in the earth's magnetic field than to believe that there was something fundamentally wrong with the conventional wisdom of the day'* on the origin and history of the field.<sup>7</sup>

There the story would have ended, except that Coe and Prévot have continued their painstaking work. Now they have reported that the rate at which the orientation of the ancient magnetic field rotated reached an astounding 6° per day over an 8-day period, and have argued that these field changes recorded in these lava flows at Steens Mountain do reflect changes in the Earth's main magnetic field.<sup>8</sup>

These findings veer far from the textbook image of how the Earth is supposed to work. Says Roberts of the University of California, Los Angeles, *'To a theoretician like myself, these results are almost inconceivable'*.<sup>9</sup> Yet earth scientists lack a firm

understanding of the Earth's magnetic field. According to current theory, swirling currents of molten iron within the Earth's outer core create a dynamo that powers the magnetic field. It is believed that once every few hundred thousand years, the field flips orientation, swapping north pole for south pole. These so-called magnetic reversals supposedly take about 10,000 years from start to finish.

Most geophysicists questioned the original finding. *7 can't really understand the mechanism',* says



**Figure 1.** The Steens Mountain palaeomagnetic directional record showing three large jumps or gaps (labelled). The projection is equal area, and each point is a directional group that represents one to nine consecutive lava flows with indistinguishable directions. Stars denote normal and reversed geocentric axial dipole directions. Filled (open) symbols are plotted on the lower (upper) hemisphere.

Hoffman of California Polytechnic State University.<sup>10</sup> In the face of this conundrum, some geophysicists are trying — so far unsuccessfully — to pin the rapid shifts on something other than the core itself. Critics have thus pointed out that the magnetisation might not be primary; it is not uncommon to find lava flows that have been remagnetised long after they cool, for example, because of chemical alteration. Thus they concluded that the alleged rapid changes in the Earth's field really reflect an imperfection in the magnetic recording process, an 'artefact' according to Bloxham of Harvard University.

However, Coe and Prévot (with Camps) have now tackled such criticism head-on, making a convincing case against the 'magnetic artefact' argument. The two lava flows they have studied have quite different magnetic properties and yet show similar signals, making it harder to blame some glitch in the record. Hoffman agrees:

*'We haven't found anything really questionable about the rock magnetics.'*

Similarly, they have convincingly countered other hypotheses, such as that the changes in the magnetisation reflected changes in the external magnetic field associated with, say, a magnetic storm.

Bloxham acknowledges that he and his geophysicist colleagues are having a hard time explaining away the findings. 'People are taking them seriously', he says.<sup>11</sup> Indeed, Merrill agrees.

*'They are some of the best experimentalists in the world. They've made it much more difficult to be a skeptic',*

he says.<sup>12</sup>

*'In short, if Coe et al. are correct, then the consequences could be much more profound than they say',*

concludes Merrill.<sup>13</sup>

*'All this leaves us with a dilemma: we would like to apply the principle of least astonishment, but to which data and interpretations? Some scientists will accept the view as given by the authors [Coe et al.]. Others, I suspect, will choose to believe the rock magnetic record is still inaccurate ...'*

However, Merrill and all his uniformitarian colleagues have failed to consider his own stated alternative — that there is

*'something fundamentally wrong with the conventional wisdom of the day'*

on the origin and history of the Earth's magnetic field! Why? Because they would have to abandon their dynamo theory and its millions of years time-scale? In fact, there is a viable alternative explanation for both the origin of the geomagnetic field and for the rapid field reversals (in days and weeks, not thousands of years) that fits all the data — freely decaying electric currents in the Earth's core, as proposed by young-earth creationists Barnes and Humphreys,<sup>14,15</sup> with the rapid field reversals associated with the Flood event. Indeed, Humphreys predicted that evidence of rapid reversals would be found before Coe *et al.* announced their 'discovery'. How much more data then do Coe *et al.* need to generate before the geophysical community is prepared to abandon its failed dynamo theory? Perhaps Merrill could be right on one point —

*'Eventually, the consequences*

*should be profound.'*

We may yet all be astonished!

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A. A. S.

## Y-Chromosome Adam?

Mitochondrial DNA is inherited from the mother, via the egg, and has been checked for variations in the worldwide human population in an attempt to determine genetic ancestry and

geographic location of human origins.<sup>1</sup> From this approach came the idea of 'African Eve'—the hypothesis that humans had a female parent, in Africa, and at a time so recent as to surprise

most evolutionists. Maryellen Ruvulo, using the 'molecular clock' hypothesis, estimated that modern humans diverged from a common ancestor between 55,000 and 455,000 years ago.<sup>2</sup> Of course such age estimates depend on what rate the 'clock' is chosen to run at, and that is very much determined by