Meanwhile, back on Planet Earth...

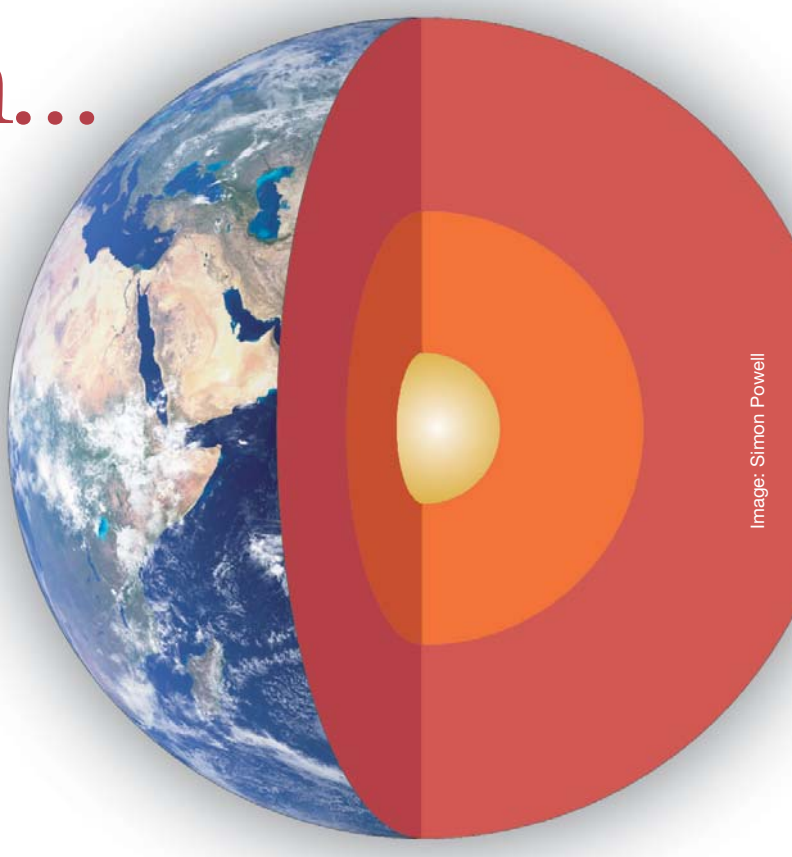

Image: Simon Powell

In the week that saw the US announce plans to put a man on Mars, two papers from the Earth Sciences Department were published in *Nature* showing just how little we know about the interior of our own planet, or how life evolved on it.

Large volcanoes, like those on Hawaii, form in response to the up-welling of hot, molten lava in so-called 'plumes'. These plumes have long been thought to originate from depths of almost 3,000 km within the Earth, right on the boundary with the core. If this were the case, they would be expected to contain small amounts of material from the core, which would tell scientists a great deal about how the interior of the Earth works. However, while it has been known for some time that the rare element tungsten contained in the core has different isotope ratios to the rest of the Earth, analysing the core's characteristic tungsten signature was extremely difficult because the necessary precision-tools were not available.

To overcome this problem, the team at Bristol developed a new, high-precision method for this very challenging test and then analysed samples of Hawaiian lavas and South African kimberlites – rocks that bring diamonds to the surface from great depths. Dr Anders Scherstén, principal investigator, said: 'Surprisingly, we found no evidence in these rocks of any contribution from the Earth's core. While it is disappointing that we cannot 'see' into the innermost Earth beneath Hawaii, these results are crucial to our understanding of the evolution of the core.' The magnetic field around the Earth results from the movement of liquid iron in the core, affecting everything from bird migration to the navigation of aircraft. It is therefore important to understand how it has been sustained over geological time.

Meanwhile, evidence from another group in the Department showed that fossilised embryos of worm-like creatures that lived 500 million years ago must have developed in much the same way as their living relatives do today.

Because embryos are composed of tissues that decay very rapidly they are very rarely preserved in the fossil record, but Dr Phil Donoghue and his Chinese colleagues sifted through 6,000 kg of rock from China and found 100 exquisitely preserved embryos. They are less than half a millimetre in length. Donoghue believes that the adult form of these embryonic *Markuelia* were fairly large worm-like creatures with a mouth at one end, surrounded by a series of spines. They lived in the sea during the Cambrian, when animal life was just emerging.

These fossil embryos have enabled the team to determine that they represent creatures that are early relatives of both arthropods (insects, lobsters, trilobites, etc) *and* nematodes (parasitic worms that can be found almost anywhere – in our guts, in the soil, and even in beer mats). Understanding this relationship indicates that the changes in the embryological processes underlying animal evolution must have occurred long before these fossils were living 500 million years ago, and even before the earliest fossil remains of any animals that have been found in the geological record. ■

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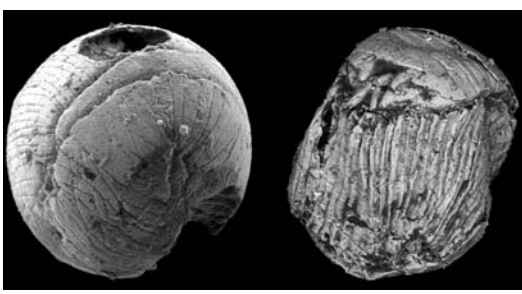
The full articles can be found in Nature, 15 January 2004

Phil Donoghue



Fossilised *Markuelia* embryos. Each is about 0.5 mm in diameter