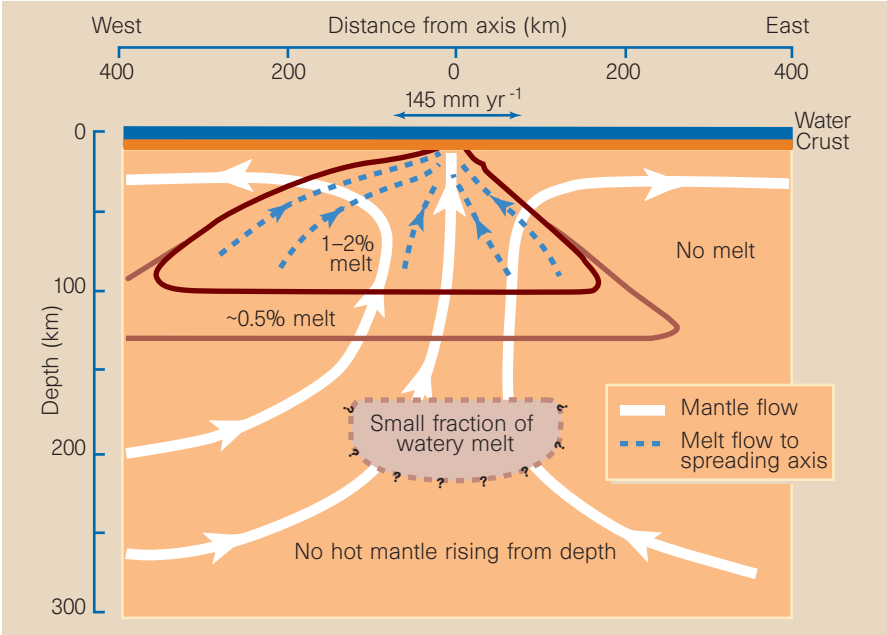

Figure 2 **Cross-section through the East Pacific Rise at 17° S showing the initial results of both the seismic and electromagnetic parts of the MELT experiment. The crust is a uniform 6 km thick across the section. Note the asymmetry across the spreading centre, apparently caused by hotter mantle on the west side than on the east, and the asymmetry in mantle flow lines that results. The flow lines of the magma up to the spreading centre simply indicate the overall flow of magma without specifying a precise path. There is no indication from the experiment of deep mantle flow rising beneath the spreading axis. (Modified from Fig. 3 of ref. 1.)**

distributed (Fig. 2). Exactly how much there is there depends on how the results are interpreted, which in turn depends on the shape of the droplets of melt and how connected they are to one another. Seismic results indicate that the droplets are elongated, but not stretched into thin films as some theories would require, and that there is about 1–2% of melt in the region. Electromagnetic results show that there can be only a small fraction (less than 1%) of connected melt in this region, because electrical resistivity depends strongly on whether the droplets of melt are joined into a continuous network. Both experiments cannot exclude a narrow zone beneath the spreading axis, less than 10 km wide, much richer in melt, but neither experiment requires it.

The base of the region with 1–2% of melt is defined seismically at about 100 km, but smaller amounts of melt are indicated down to about 130 km. This is important confirmation of deep melting indicated by geochemical reasoning, which had previously been difficult to image seismically. Below this depth, and not detected seismically, is a highly electrically conductive region below 170 km under the spreading axis, which may indicate a very small fraction of well-connected watery melt according to the electromagnetic experimenters (Fig. 2). At greater depths than this there is good seismic evidence that the mantle is no hotter than normal, because the transition zone between the upper and lower mantle is of normal thickness, and not thinner, as it would be if hot deep mantle were upwelling.

The upper part of the section is intriguing too. Despite the hot mantle close to the axis on the west side, and all of the magma that this contains, one of the seismic experiments shows that the crust is no thicker than normal, and is the same thickness on both sides of the spreading axis. Does this mean that a significant proportion of the magma produced in the hotter area is somehow held back in the hotter mantle? That would be a real surprise.

The interpretation of the seismic experiments in terms of temperatures is not straightforward, as similar seismic anomalies also arise from anisotropy caused by the alignment of crystals in the mantle as it flows. The investigators consider that these problems have been taken into account, but further work is clearly needed to sharpen up these and other conclusions.

Overall, the experiment has been an impressive success, and a great testimony to the power of the complementary evidence to be obtained by combining electromagnetic and seismic data. The results of the experiments strongly favour some models over others. Provided that this area is representative of mid-ocean ridges as a whole, a number of models have bitten the dust in a satisfactorily Popperian way. But models, of course, have a nasty and unPopperian way of bouncing back. □

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100 YEARS AGO

Want of accommodation in more than one department of the University museum renders it impossible to carry on satisfactory work. The extracts printed below, from the report of the delegates of the museum, tell of a condition of "hope deferred, which maketh the heart sick." … After twelve years of fruitless effort to obtain extended accommodation for Honour students, and the means of providing for the increasing number of those working for the preliminary examination … it is probably quite useless to trouble the delegates with any further application for assistance in this direction. It will be difficult for men of science on the Continent and in the United States to believe that so little encouragement is given to scientific work in the University of Oxford.

From *Nature* 16 June 1898.

50 YEARS AGO

This is one of the most strange, even inexplicable, tragedies in the world of Nature. Of the millions of Pacific salmon which enter the rivers to spawn, not one returns to the sea. It is strange … that they should all die, not one escape, and strangest of all that the change should be from fullest life to death, with no intermission of growing weakness between. The act of spawning, both in the female and in the male, soon brings death, grim and inevitable. … I once watched two spawned-out, huge fish, in the shallow water of a long, broken rapid. They showed at first just over the lip of the pool above, dorsal and caudal fins breaking as the current forced them down. They drifted a little way, weakly and awkwardly and then, as though suddenly afraid of death, one threshed its way with furious strength for ten or a dozen yards upstream. The other followed instantly, and for a while they held, side by side again, weaving back and forth until the current caught their sides and swept them down. … It is strange that they should all die, that life should go out with the spawn; for it does go out with the spawn.

From *Nature* 19 June 1948.

Many more abstracts like these can be found in *A Bedside Nature: Genius and Eccentricity in Science, 1869–1953*, a 266-page book edited by Walter Gratzer. Contact David Plant. e-mail: subscriptions@nature.com