# PALEOMAGNETIC ROCK COLLECTING VISIT TO LUNDY 1971

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(Dr. A. E. Mussett led a party of five members of the Sub-Department of Geophysics, Liverpool University on a visit to Lundy for almost three weeks in August 1971. Among the party was D. J. Blundell, whose previous work is mentioned in the following report.)

After the granite mass of Lundy had been formed deep beneath a land that has long been eroded away, volcanic magma, similar to lava, was injected into cracks to give rise to the dykes which occur all over the island. The dykes contain a few percent of iron oxides and as they cooled below a certain temperature they became magnetised in the magnetic field of the Earth at the time. The direction of this magnetism can still be detected by sensitive laboratory instruments, so that we can investigate the Earth's magnetic field in the remote past—the dykes retain a 'fixed' magnetism.

The dykes of Lundy have already been sampled by Dr. Blundell in 1957, but since then both aims and techniques of paleomagnetism have changed. Instead of investigating the paleomagnetism of Lundy itself, we are interested in the whole of the British Tertiary Province (40–60 million years old), which includes lavas and dykes of Skye, Arran, Mull and Northern Ireland, which though roughly contemporary with Lundy seem to be quite separate geologically. One of our aims is to deduce detailed knowledge of irregularities of the Earth's magnetic field, which in turn tells us something of the deep interior of the Earth ('core') where the magnetic field is generated. For this sort of investigation we need statistically large numbers of samples, oriented accurate to a degree or two.

For this reason we use a motor-driven, diamond-tipped coring tool to remove 1 in diameter cores about 3 in long. This is long enough to penetrate the surface weathered layer, without the core breaking off too often at internal cracks. The still-attached core is oriented using a simple solar compass, or by sighting on a distant object of known position, such as Hartland Point lighthouse. Four cores are taken from each dyke as a check on consistency.

In the laboratory the cores are sliced into 1 in long pieces and their magnetism (10,000 times weaker than a piece of iron) measured with sensitive magnetometers, after treatment to uncover the original magnetism. This information, plus the orientation of the drilled core, is fed into a computer to give the direction of the ancient magnetic field. As each core may require 36 measurements and four cores are measured from each dyke this is a slow business.

We collected only 68 of the 250 or so dykes on the island, a small collection by our standards (for instance, Arran gave over 500 dykes) for which the ruggedness of Lundy is largely responsible. However, they are fairly representative of the whole.

A second aim is to determine the age of the dykes. They must be younger than the granite which has been dated as 52 million years, but that is all we know at present. We shall try to date them by the potassium-argon method, in which a very small amount of natural radioactive potassium decays at a known rate into the inert gas argon. The ratio of potassium to argon will yield the age, provided no argon has leaked out—and it has had many millions of years to do so.

## REFERENCE

Blundell, D. J. (1957). A paleomagnetic investigation of the Lundy Dyke Swarm. *Geol. Mag.* XCIV, p. 187.