MAGNETISM AND MESMERISM

David Vaughan

Magnetism, the subject of this issue of Elements, was probably the first ‘invisible’ physical force to be investigated by humankind (with the obvious exception of gravity). Indeed it was the subject of the first major scientific treatise written in the English-speaking world (De Magnete, by William Gilbert, published in 1600). From the ancient use of lodestone in the first primitive compass to modern industrial applications in electronics and computing, magnetism is a force which has fascinated and, at times, bemused those seeking to understand it. Although the essential principles and laws of electromagnetism were laid down in the 19th century and their application made a major contribution to the industrial revolution, a unified theory embracing the electromagnetic, gravitational, and weak and strong nuclear forces continues to elude physicists. Such a theory remains the holy grail for theoreticians.

The role played by magnetism in many branches of science – not least in the geosciences – has been extraordinarily important. It was the magnetic record held in the rocks of the ocean floor that provided the key evidence for sea floor spreading and continental drift, and it was the subsequent use of palaeomagnetic data to reconstruct the movement of the rocks of the Earth’s crust that led to the development of plate tectonics. As the articles in this issue eloquently attest, the magnetism of minerals, rocks and bio-mineral materials continues to produce surprises that challenge existing theories.

The history of research on magnetism is itself a fascinating subject and one from which lessons can be drawn. In the late 1700s, it was widely believed that magnetism could be used to cure illness. Although there were many practitioners, the person most associated with this idea was Franz Anton Mesmer, who claimed that harnessing invisible streams of magnetic fluid passing through the body, what he termed ‘animal magnetism’, was the basis of a revolutionary new medicine.

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If individuals wish to explore alternatives to conventional medicine, they should certainly be entitled to do so, and we should not close our minds to the unexpected or even the miraculous. But caution should be exercised where public funding of medical services is concerned, and vulnerable individuals, like Mesmer’s patients, should not be misled by baseless claims. The development of nuclear magnetic resonance spectroscopy enabling imaging of internal human organs (‘MRI scans’) – now a key aid to medical diagnosis – would have been seen as ‘miraculous magnetism’ by the patients of Mesmer, and that is surely miracle enough for us all.

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1 David Vaughan was the principal editor in charge of this issue.