Dowsing for opals

by Tom Williamson

When geologist Peter Blythe opened an opal mine in Mintabie, South Australia, he thought the miners' tales of how they had 'used the wires' to find opal were 'hogwash'. But after discussions in a local pub, he agreed to take part in a test with five other miners. At Mintabie deposits of opal are often associated with near-vertical fractures or joints in sandstone, and Blythe agreed to see if the six of them could locate one of these fractures. Gripping a pair of L-shaped brass rods in both hands, the miners independently walked over a site beneath which a miner had already blasted a tunnel, each man noting the spot where his rods opened up. According to Blythe all six spots lined up, and when they went underground, there was the fracture, right beneath the line on the surface.

While Peter Blythe would be the first to admit the limited scientific value of an uncontrolled test like this, the fact remains that hundreds of miners at Mintabie and elsewhere in Australia believe 'the wires' have helped them find fractures or 'slips' where circulating silica-rich groundwater has sometimes deposited gem-grade opal. And it's not only in Australia that people have been using dowsing to find such fractures or faults. In Russia, where some geologists have used dowsing for many years, (Dowsing achieves new credence, New Scientist 81, 371-373, 1979) scientists at the Buryat Research Centre of the Russian Academy of Sciences have used the technique, in conjunction with geophysical and geochemical methods, to help locate deposits of gold in Siberia. Most impressively of all, the German government technical aid agency, the GTZ, has kept detailed records of the remarkable success rate achieved by one dowser on its staff, engineer Hans Schröter, in locating faults and other water-bearing structures in a variety of geological settings around the world (Branches, twigs and rods, New Scientist 148, 54-55, 1995). Using a traditional V-shaped dowsing rod rather than the L-shaped 'wires' favoured by Aussie opal miners, Schröter has apparently pinpointed water-bearing fractures in the ancient crystalline rocks of Sri Lanka, fissures in the volcanic rocks of Verde Island in the Philippines, fracture zones in the Sinai desert, Egypt and solution cavities in karst limestone terrain in the Congo. Schröter's results have impressed a number of German scientists, including physicist Hans-Dieter Betz, of the University of Munich and geophysicist Hans Berckhemer, of the University of Frankfurt.

The recent evidence that dowsers may respond to faults and other geological discontinuities beneath their feet – rather than to minerals or water themselves – accords well with the history of the ancient art. Miners in the German-speaking lands of northern Europe were probably the first to use forked twigs in their search for lodes of metal ore. By the seventeenth century migrant German miners had introduced dowsing to England, where the use of 'deusing-rods' to search for lead and zinc lodes in Somerset intrigued scientists like Robert Boyle. In all these historical examples, miners used their rods to locate shallow mineralised faults and fractures, structures similar to those sought today by dowsers like Schröter and Blythe.

But despite the impressive pedigree of dowsing for faults, most scientists remain unconvinced. Dowsing is a classic example of a psychological phenomenon known as ideomotor action, sceptics say. Dowsers unconsciously twist their rods themselves, not because of faults or other underground features, but as a result of preconceived ideas in their own minds.

To confirm the role of ideomotor action in dowsing, sceptics argue, walk into the "Mind, Body and Spirit' any large popular bookshop or library. There, among the titles on space gods and crystal healing, you will learn how dowsers can detect mysterious 'earth energies', harmful or benign. The bad 'energies' cause illness or even death, the good ones form 'energy lines' linking ancient sacred sites. Scientific instruments can detect none of these 'energies', therefore, sceptics argue, they exist only as ideas in the minds of these dowsers.

If dowsing is an ideomotor phenomenon, how do dowsers like Schröter come up with such impressive results? 'By unconsciously responding to visual cues' sceptics reply. Experienced dowsers have learnt to recognise subtle surface cues, such as changes in plant growth, linked with faults or fractures below. Deprive dowsers of such cues, sceptics say, and their amazing powers suddenly vanish.

Sceptic Jim Enright, of the Scripps Institution of Oceanography, La Jolla, cites experiments that Betz himself carried out with Hans Schröter. In the late 1980s Betz, together with Herbert König, of the Technical University at Munich, conducted a major investigation of dowsing, funded by the German government. In a series of nine hundred double-blind trials, Schröter and forty-two other dowsers walked along a test path on the upper story of a wooden barn, attempting to locate the successive positions – chosen by a random number generator - of a pipe conducting flowing water on the floor below. Although Schröter turned in the best performance of all – results that could only have been duplicated by chance on less than one in five hundred occasions - the overall significance level of the tests was low. So low that Enright claims that the barn tests carried out by Betz and König provide the best evidence yet *against* the existence of a dowsing effect.

But what if dowsers like Schröter and Blythe respond to geophysical anomalies caused by faults or fractures in the field but not by water-filled pipes? In Sinai and Namibia, Betz claims, geological fractures indicated by Schröter's dowsing were later confirmed by electromagnetic measurements. In Mintabie, too, faults of the kind sought by opal miners with their 'wires' can be detected by methods such as airborne thermal infrared imagery. Like visual hints, geophysical cues could trigger dowsers' ideomotor rod movements.

Several groups of scientists have developed double-blind protocols to test this possibility. One approach has been to record the positions of the dowsers' rod movements before making geophysical measurements – as in Betz's field trials with Hans Schröter. In the early 1980s a group of scientists at the University of Lund in Sweden tested 29 dowsers who walked over a flat field on the limestone island of Gotland in the Baltic Sea. The scientists knew that an underground limestone cave system channelling water ran beneath the field, but its precise position was unknown. The dowsers' rod movements showed a significant clustering within a narrow band about 50 metres long. Later ground radar measurements indicated that the underground channel ran directly beneath this band.

An alternative way of achieving double-blind conditions in dowsing field trials is to build a mobile laboratory that can be placed in position over suitable faults or other geological discontinuities. Dowsers can walk the length of the laboratory, their responses being recorded by experimental assistants who, like the dowsers themselves, are in the dark about the exact position of the fault below.

Betz and König constructed a wheeled wooden mobile laboratory as part of their investigation of dowsing. But they found it impracticable to tow and position their cumbersome contraption over suitable sites. Instead the scientists settled for a much simpler device – an eleven metre long wooden plank.

Blindfolded dowsers 'walked the plank' at several sites but at first the results were the same as in the barn experiments. Deprived of visual cues, the dowsers could no longer dowse. Then the researchers had a brainwave. Why not incorporate one of Hans Schröter's actual borehole sites into the tests? They decided to use a borehole site for carbonated water the dowser had pinpointed in the valley of the river Sinn, near Burgsinn in the Spessart region of Bavaria. Schröter believed that his dowsing had revealed a fault in the sandstone beneath the unconsolidated valley sediments, so the site would provide an ideal opportunity to test dowsers' vaunted abilities to detect hidden faults.

The results of the Sinn valley field tests were arguably the most important in the history of dowsing research. Despite being blindfolded and subjected to full experimental controls, several other dowsers succeeded in locating Schröter's site within a metre or so. As a result, the overall significance achieved by the 40 dowsers who took part in the walkway experiments was high – the odds were less than one in a million that the results were due to chance. Here at last, claimed Betz and König, was experimental proof that dowsers could locate a concealed fault without using visual cues.

Sceptics like Jim Enright aren't so impressed. When the German researchers replaced their mobile laboratory with a humble wooden plank, they abandoned full double-blind protocol, Enright points out. He dismisses the German walkway experiments as 'fishing expeditions'.

But Betz has a response to his critics. After recording the results of the dowsing experiments, the researchers carried out ground resistivity measurement indicating a northwest-trending fault in the sandstone directly below the dowser's site. As this information was not known at the time of the experiments, it adds a double-blind element to the result, Betz argues.

Taking the results of the German walkway experiments at face value, then, what non-visual cues could have revealed hidden faults like the one in the Sinn valley to dowsers? The water-bearing fractures apparently detected by Schröter typically create distortions in natural electromagnetic fields – such as the 'sferics' created by world thunderstorm activity – so sensitivity to such distortions is one possibility. Betz has led a group at the University of Munich investigating human sensitivity to 'sferics' and believes that this research would ultimately throw light on the abilities of dowsers like Schröter.

A Magnetic Sense for Dowsers?

Another possibility is that dowsers may unconsciously respond to magnetic cues (A sense of direction for dowsers, 19 March 1987). Leading French physicist Yves Rocard – father of one-time French Prime Minister Michel Rocard – supported this idea in 1962 and then, in 1980, Robin Baker, of the University of Manchester, performed experiments with students suggesting that like many other animals – for example tuna, pigeons and whales – humans possess a magnetic sense. An ability to sense minute changes in the strength of the Earth's magnetic field would certainly help dowsers detect some faults or fractures. Moreover in 1992 Joseph Kirschvink and two colleagues at Caltech identified tiny crystals of magnetite in the human brain that might have a role in magnetic sensing.

However, other researchers have repeated Baker's experiments but so far failed to confirm a human magnetic sense. And even if further work supports the idea, magnetic sensitivity could not have helped dowsers locate the Sinn valley fault – the German team found no magnetic anomaly there.

Or Earth Vibrations ?

The German researchers did however measure one geophysical variable at the Sinn valley site that could not only account for dowsers' highly significant results there but might also help explain dowsers' apparent ability to locate faults. That variable was the amplitude of tiny earth vibrations or microseisms.

Joseph Wűst, a German physical chemist, first proposed that dowsers might respond to such cues in the 1950s. There was anecdotal evidence, Dr Wűst claimed, that some dowsers working in mines could only locate mineral lodes accurately when mining machinery was active. This suggested they might rely on small vibrations or sound waves passing through the rock. Dowsers could also exploit vibrations caused by distant earthquakes or volcanic eruptions, atmospheric pressure changes, ocean waves breaking against distant shores – not to mention anthropogenic noise from aircraft, road traffic and industrial activity.

As a result of all this activity, the ground is always shaking at frequencies between 5 and 40 hertz. Like their large and dangerous cousins, earthquake waves, microseisms vary in amplitude from place to place according to the underlying geology. Amplitudes increase above unconsolidated water-saturated sediment and above faults or fractures, an effect exploited in some geophysical prospecting techniques. Where water-saturated sediments overlie a fault, as at Schröter's borehole site in the Sinn valley, amplitudes should reach a maximum – and dowsers should have their best chances of success.

And that is precisely what the German researchers found. Making simultaneous measurements on a summer evening with two equally calibrated geophones, they found the earth vibrations at a frequency of around 20 hertz were larger at Schröter's site than at points nearby. The researchers repeated the measurements the following morning when local road traffic was lighter. The effect remained – though smaller than before, vibrations were still larger at the dowser's site than at other points nearby.

How might dowsers detect ground vibrations above geological faults or the sound and infrasound waves caused by them? Like elephants, who may use earth vibrations to communicate (see Rumble in the jungle, New Scientist. 4 August 2001) humans possess vibration-sensitive cells called Pacinian corpuscles. But whereas elephants have these sensors in their trunk tips and possibly their feet, humans have them in their fingertips and inner surface of the hand. These are precisely the parts of dowser's bodies in contact with their taut, delicately balanced rods. Therefore it's possible, as Wűst suggested, that the hand-held dowser's rod acts as a supersensitive sound or infrasound detector. Another more obvious possibility is that dowsers detect minute increases in volume of sound or infrasound above faults with that amazingly sensitive pair of air vibration detectors we all possess – their ears.

So at last scientists have come up with a plausible theory to explain how dowsers can locate faults and fissures without using visual cues. If new double-blind experiments support the earth vibration idea, there is one group of people who may draw comfort from the results. The opal miners of Mintabie will be able to use 'wires' without so many wisecracks from their colleagues. For the noisy mining environment is a prolific source of the vibrations that could be the dowsers' secret of success. Vibes that might even make them rich.