The use of dowsing for the location of caves, with some results from the first Royal Forest of Dean Caving Symposium, June 1994

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Abstract

Biolocation, more commonly known as dowsing, is an ancient technique. That it is a cross-cultural technique is evident from the fact that words exist in most languages for the technique, the rod and the operator. However, its recent use for the detection of caves from the surface is a controversial practice which has received much discussion. The paper will commence with the history of the technique and continue with a discussion of the possible scientific explanation of the mechanism involved. The author has researched widely in the geophysical location of caves and hydrological systems. During the last ten years he has become convinced that the traditional dowsing method, when used on site, produces consistent and reproducible results, and that there is a case to be answered. He is not willing to entertain the possibility of a psychic or extra-sensory explanation, and continues to plan experiments with a view to discovering an explanation of the technique within physical and medical science. Case studies have been carried out in all the caving regions of England and Wales, as well as in France and Spain. Many of these studies have suggested the existence of cave systems not yet entered, and several have been proved to be correct by later cave diving and exploration. Publication of the results has aroused much controversial discussion; the results stand as hypotheses, however, until disproved. The paper concludes with some results from the Royal Forest of Dean Caving Symposium held in June 1994. The appendix contains master maps of dowsing traces throughout the Forest of Dean carried out before June 1994.

1. On the possible scientific justification of dowsing for the detection of caves

1.1. The history of dowsing

The first recorded use of dowsing is thought to be a cave painting at Tassili nAjjer in the Sahara, dated to approximately 6000 B.C. This seems to show an eager crowd watching a dowsers search for water. Use of the technique is recorded by the Egyptians (c. 3000 B.C.), and after their escape from the Egyptians the Hebrews are thought to have used it (c. 2000 B.C.). The activities of their leader Moses are recorded in the Bible:

Thou shalt smite the rock, and there shall come water out of it, that the people may drink (Exodus 17:5 6)

Take the rod...and speak ye unto the rock...and it shall give forth water (Numbers 20:9 11)

and some readers have taken these references to indicate that Moses was dowsing using his staff. During Roman times the author Cicero (50 B.C.) recorded use of the VIRGVLA DIVINATORIVM, the dowsing rod. Martin Luther denounced dowsing in 1528 A.D. as being the work of the Devil, and dowsers of breaking the First Commandment. A well-known publication by Georgius Agricola,

studies):

- Flowing water
- Springs, and lines of springs
- Wells
- Circulating groundwater
- Service pipes and trenches (not just water pipes, but electricity cables and gas pipes, so the trench may be what is being detected)
- Buried foundations
- Roots of big trees
- Geological faults, some of which will have ore deposits
- Caves with flowing water
- Large dry caves

It is undeniable that dowsing has been profitably used for the detection of new wells for water supply (e.g. Mullins et al. 1894).

1.5. Possible physical fields

It has been suggested that dowsers are detecting a physical field on site. If this is true then what could it be? The following types of fields have been suggested as possible candidates:

- Gravitational
- Magnetic
- Electric
- Electromagnetic
- Radioactive
- Seismic (the stress field around fractures, fissures and faults)
- Geothermal
- Geochemical

Of these, the magnetic, electric and electromagnetic fields are probably the most likely candidates. However, for this to be accepted, a physical explanation must be provided for the generation of the signals by the features, and for the detection mechanism within the human body.

1.6. What do dowsers experience?

Dowsers claim that they experience a variety of phenomena, such as tingling like an electric shock , a chilly sensation, shivering, trembling, or an unpleasant sensation in the stomach. In attempts to determine the source of this apparent shock to the central nervous system, instruments have been attached to subjects to measure muscular contractions, changes in heart potential and changes in electrical skin potential. Involuntary muscular contractions have been observed, and convulsive spasms, sometimes violent. Electrocardiogram responses have been seen which exhibit a 20mV step change when the dowsing rods are observed to move (Tromp 1949), and changes in skin potential have also been measured. In experiments when artificial fields have been produced, a delay of between 5s and 10s is observed between production of a field change and the electrocardiogram response. This suggests processing via the brain and central nervous system, rather than direct nerve stimulation. Furthermore, the rods are observed to move after the field change.

1.7. Why do the rods move?

The movement of the dowsing rods is clearly initiated by muscular action. This is observed to be sometimes violent enough to peel bark from a Y-stick, and to scratch hands painfully. Novice

In 1933 De Vita placed electroscopes over underground streams, and found that they discharged more rapidly than control electroscopes placed over normal ground of the same soil type and rock type. Jemma confirmed de Vita's results in the following year, and also found that dowsers are affected by the ionisation of the air. This so called fine-weather field is affected by the altitude and position of the sun, and is to do with atmospheric electricity. There are also indications that dowsers are affected by electrical storms.

Maby and Franklin ,both physicists (1939), found that dowsers reacted to electromagnetic waves. The frequency may well be important, however, since I have conducted a series of experiments under overhead electricity pylons, and have found no reaction for a 50Hz electromagnetic field, and I have also visited transmitters and found no reaction for radio and radar transmissions at higher frequencies.

Tromp (1949) proposed a possible mechanism where the human body passing at speed through a field will increase in capacity as it approaches the conductor (stream of water), and skin potential will decrease. If this is the mechanism, it will be affected by the initial skin resistance, the relative conductivities of the soil and the underground stream, the speed of movement and the conductivity of the atmosphere. Tromp pointed out that carrier pigeons became disoriented near radio and radar transmitters, and in the high potential gradients caused by whirling snow. He also discussed a number of animals which appear to have navigational ability, such as carrier pigeons, salmon, eels, dolphins, whales and bees (see also Kirschvink (1981)). Other interesting matters pointed out by Tromp are that magnetite is found in the beak and wing feathers of carrier pigeons, and Papuan humans can often navigate in dense jungle.

In 1952 a team of electrical engineers tested the famous dowser Henry Gross, and found that his skin potential changed by up to 200mV over subterranean water, compared with a change of 10mV for non-dowsers.

Rocard, a French physicist (1964) reported that dowsers react to changes in the earth''s magnetic field caused by underground water, and claimed that electric currents of 50mA/m2 in water and magnetic field gradients of 1mG/m were detectable by dowsers. He also claimed to have found that a high skin conductivity is desirable for good dowsing results.

Barrett and Besterman (1968) carried out field studies for finding water, using a number of independent experiments with two or more dowsers, and compared the results with those suggested by consultant engineers and geologists. They found the dowsers got twice as much water as the engineers, while the geologists got hardly any . They concluded that the movement of the dowsing rods is due to unconscious muscular action, the tension of the grip being converted to sudden neuro-muscular spasms when the operator is in the presence of water.

Harvalik (1970), a physicist, found that the dowser reacts to changing magnetic fields produced by electric ground currents with frequency in the range 1 500Hz, but not to static magnetic fields. Using magnetometers he deduced that the dowser reacts to as little as 10-9G change. There was some indication that dowsing ability was enhanced by drinking water, perhaps indicating that conductivity in the region of the kidneys is important. It is impossible to exclude the earth''s magnetic field from the brain or any other part of the body, and there is therefore no reason why the development of a field-detecting ability should be ruled out. Harvalik conducted elaborate experiments with metal shielding of the human body, and a torch-like instrument to concentrate and direct an artificial magnetic field in an attempt to locate the positions of possible sensors. When the operator was carried horizontally on a stretcher, the reaction occurred when the solar plexus was over the feature. When the metal shield was between the navel and the breast bone the signal was not detected, indicating a detector site slightly below the solar plexus, perhaps the adrenal gland in the kidney region (which contains magnetite, as reported by Kirschvink (1981)). Shielding of the head indicated a second possible detector site at the base of the brain, perhaps the pineal gland. It

Mogila (1986) reported a field study at the Monastery of the Caves, Kiev, where conventional sub-surface radar had failed to locate secret passageways. Of 130 sites indicated by dowsers, 73 (56%) corresponded with existing passages, previously known to the curators but not to the dowsers. At a further 29 dowsed sites (22%), previously unknown to the curators, test drillings revealed cavities. This gave a total success rate of 78%.

Williamson (1987) suggests magnetic anomalies as the basis of dowsing. This may be given greater credence by the work of Hess et al. (1987), who have shown that magnetic stimulation of the human brain from coils placed over the human scalp causes twitches of the hand muscles, which can be greatly enhanced by concurrent voluntary contraction.

The Greensites Project (France 1990; Herbert 1990) has aimed to compare the results of various methods for detecting caves from the surface, including geophysical, botanical and dowsing techniques. Electromagnetic traversing (resistivity, magnetometry) gave the best results at unknown cave locations, but there is good correlation for several dowsers. An experiment over Pant Mawr involved several independent dowsers, and was carried out using a pegged-out grid over passages which had been accurately radiolocated. Nobody who dowsed the grid was present on the day the surveying was done. The dowsers participated on different days and did not exchange information between themselves, nor were they given any indication of the other results obtained. There was some correlation between dowsers, and with the known cave position, and one dowser produced a plan which appeared to be an enlargement of a small part of the cave, at the correct angle (France 1991a). The conclusion on this was the jury is still out (France 1991b).

Vilchko (1993) reported his experiments with migratory birds in the BBC4 Science Now programme on 24.8.93. Magnetite is found in birds near the brain, in the flight feathers and in the beak. His experimental birds when released flew out of the cage in the migratory direction. He has also found that birds use white, green or blue light to magnetise the retina of the eye, while red light disorientates them. This magnetic orientation therefore uses magnetite, the retina of the eye and light, and a similar mechanism could clearly also apply to humans.

Wilcock (1994) has reported the results of The Dowsing Welly Experiment held to detect any correlation between earthing of the dowser and lack of dowsing reaction. While the experiment suffered from some technical design problems, it was concluded that there was no connection between earthing and lack of dowsing reaction.

1.10. Case studies of feature location by dowsing

Wade (1961) was one of the earliest cavers to use dowsing for speleological purposes. He attempted cave location on Greenhow Hill, assisting diggers in the search for an entry to Mongo Gill Caverns, and found Strans Gill Pot in Wharfedale. He also undertook experiments at Black Keld (in an attempt to detect the Mossdale Caverns to Black Keld route from the Black Keld end), at Gill House Pot, on Fountains Fell and in Chapel-le-Dale.

Bossart (1968) has reported the regular use of dowsing by U.S. troops to detect Vietcong tunnels in Vietnam in 1967. A detailed plan and section of the tunnels used for the experiments is given by Bird (1979, Chapter 11).

Ogil'vy carried out a search for a lost underground drainage system at the Ostankinsky Palace in Moscow, and dowsing predictions for its location were proved accurate by digging (Bird 1979, 240). Pluzhnikov undertook a search for medieval escape tunnels between the citadel and two monasteries in Serpukhov (Bird 1979, 242 244). The tunnels were located by dowsing in less than eight hours, and proved to be 2m wide, several km in length, and to pass under the River Nara in two places.

- The dowser is endowed with a subconscious cognitive faculty which results in unconscious muscular reaction, accompanied by a nervous sensation
- The mechanism for detection may be magnetic or electric in nature, and high skin conductivity seems to be a contributing factor
- The detector sites in the human body may be magnetite dispersed in tissue with nerves running through it, or the retinas of the eyes (needing light to activate them), the pineal gland and/or the adrenal glands.
- The movement of the rods is caused by amplification of small involuntary muscular contractions resulting from stimulation of the central nervous system, perhaps by magnetic stimulation of the brain or spinal column using two detectors
- Water divining survives today because its practical utility does not place too great a strain on pragmatism. Dowsing results will ultimately be validated by their accuracy and practical value rather than theories and opinions

What is now required is the development of a general theory which will permit scientists to incorporate the biolocation mechanism into scientific knowledge.

2. Results from the Royal Forest of Dean Caving Symposium held in June 1994

The organisers of the walks to Slade Valley and Bearse(Maurice Febry) and Coldwell/Symonds Yat/The Dropper (Dave Parker) must be thanked for putting up with the dowsing training trips, and for letting me in particular walk in front without comment, except when something had been found by dowsing reaction.

2.1 Slade Valley and Bearse, 11th June 1994

The results are plotted on Figure 1. The area had never before been visited by me, I was not shown the map of the route, and before the end I must confess I had a profound sense of disorientation. The results were drawn on the map after our return. From the car park at the track crossing within the wood at Bearse Common (572058), I was asked to walk along the track in both directions, SE towards the main road, and NW into the forest. Nothing was found between the main road and the car park, but a positive indication was obtained heading SW across the track, just to the W of the car park.

We walked down the track SW. A reaction was obtained crossing the track in a southerly direction passing under a barn (571057), and then heading out SW into a flat field. This was followed back N to a depression and sink (I was told later that this was Barn Sink). Proceeding WSW down Slade Valley, a quarry was inspected north of the track, but nothing was detected there. Continuing down the track, a strong reaction was obtained crossing NE-SW (this was later found to go to Slade Valley Rising (W side) at 566055, but was not followed at the time). A branch track was taken, crossing the stream and proceeding uphill into the wood SSW. Here two reactions were obtained: one ran from the eastern boundary fence of the wood due W to Dark Hill Cave. Another ran WSW downhill through very dense woodland, and was followed to the stream. Returning to the main track and proceeding WSW, the above mentioned strong reaction was confirmed to Slade Valley Rising (W side), as were two others, the second being Slade Valley Flood Rising, and the third having a pump blockhouse.

At Slade Bottom a track was taken SE and then E through Slade Wood. The first reaction crossed ENE-WSW and was later revealed to be a continuation of the second reaction near Dark Hill Cave. A reaction to Slade Wood Resurgence from the ENE, traced to the wood boundary, is probably a continuation of the feeder from Barn Sink. Three further reactions were obtained along the track E

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Sink
- Coldwell Swallet predicted connection to Redhouse Swallet
- Bicknor Court Swallet predicted connection to Redhouse Swallet
- Redhouse Swallet predicted connection to neighbourhood of Chunnel Passage, passing under Chapel Hill and Bicknor Street
- Slaughter Resurgence is thought to be leakage through the roof of a flooded passage which goes beneath the River Wye. The reaction is detectable on the opposite bank near The Biblins. It is then predicted to dramatically change direction to the SSE to join other drainage from the W side of the Forest of Dean, and to eventually go beneath the River Severn near Lydney

Figure A2. This map covers the central section of the western side of the Forest of Dean coalfield, and part of the course of the River Wye. The work during the symposium in the Slade Valley and Bearse area on 11th June 1994 is not shown. Points of note are:

- Two former meanders of the River Wye at Newland and Lower Meend. These have been visited to see if former sinks could be detected, but nothing has been found
- Continuation of the southwesterly predicted course for water passing under the River Severn, with sinks at Trowgreen and Noxon

The continuation to the SW to the region of Lydney is not shown. Here it is predicted to join a similar deep feeder from the eastern side of the Forest of Dean coalfield running SSW, and probably drainage also from the trough of the syncline under the coal. The eastern deep feeder picks up drainage from sinks at Westbury Brook, Trow Ditch at Greenbottom, Cinderford Brook at Ruspidge Valley, Howbeech Trough, and Blackpool Brook at Blakeney Walk. After the feeders join near Lydney, they are predicted to continue SE under the River Severn.

Figure A3. The map covers the southern part of the course of the River Wye, showing part of the Otter Hole System (described on Figure A4), and also a series of predicted caverns along the Tidenham Chase Syncline. Points of note are two separate groups of feeders (shaded differently):

- Ban-y-Gor feeder joins a complex series of feeders from Parson's Allotment and Poor's Allotment (Madcats)
- Dennel Hill via Boughspring

  These feeders are predicted to join, to pass under Dayhouse Quarry (which is flooded) and to feed SSW under the River Severn, where the (first) Severn Bridge boreholes found artesian fresh water and a cavity.

  Figure A4. This map covers the area to the west and south-west of Chepstow. Three main systems are covered, Otter Hole, Well Head/Grondra/Lavant Well, and the Severn Tunnel Great Spring System. Points of note are:

- Apart from the well-known Rookery Sink and Rogerstone Grange Sink feeders to Otter Hole, predicted routes are shown from Croes Bleddyn Swallet, Itton North Swallet, Itton South Sink, and a sink in the stream bed of the Mounton Brook 300m NW of Pandy Mill at 492945
- Complex connections are predicted between a sink in Mounton Brook at Pandy Mill (494944) and Well Head Resurgence, and further sinks at 495942 and 499938 together with The Grondra to Lavant Well
- Section of the Severn Tunnel Great Spring feeders south of Caerwent to Whirley Holes Resurgence (now dry, but which was reported to have vast volumes of clear water before the Severn Tunnel Great Spring was tapped) and the Nedern Brook Sink (which was capped with a concrete invert as it was thought to be a source for the Great Spring). The System is further described on Figure A5