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Journal Title: Archaeological prospection.

Volume: 5 **Issue:** 3
Month/Year: 1998 **Pages:** 123-138

Article Author:

Article Title: Martijn Van Leusen; Dowsing and archaeology

Imprint: Chichester, West Sussex, England ; Wiley

ILL Number: 45311447

Call #: CC76 .A75

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Archaeological Prospection
Archaeol. Prospect. **5**, 123–138 (1998)

Dowsing and Archaeology

MARTIJN VAN LEUSEN*
Groningen Institute of Archaeology, University of Groningen, Poststraat 6, 9712 ER Groningen, The Netherlands

ABSTRACT Both among the general public and among archaeologists there is a widespread belief in the presumed abilities of dowsers to locate underground archaeological features. This article reviews the nature of such beliefs as evidenced in published materials from professional archaeologists in the UK. It is found that there is a contradiction between largely privately held convictions that dowsing works and public rejection, caution or silence. An examination of the best available published evidence for the validity of dowsing shows that field tests were badly designed and executed, ignoring important statistical biases and modifying test parameters in order to obtain positive results. These methodological shortcomings are traced to archaeologists' lack of training in controlled test design, and prior belief in the validity of dowsing. Where field tests were properly designed and executed, no evidence for the validity of dowsing was obtained. The article concludes that properly designed tests are entirely feasible, and that it is up to the proponents of dowsing to conduct such tests. © 1998 John Wiley & Sons, Ltd.

Key words: dowsing; archaeology; test design; test controls; statistical bias; church archaeology.

Introduction

> A diviner who believed that gold treasure lay under the ruins of Viroconium, the Roman city near Shrewsbury, was permitted to excavate at a spot where the divining rod appeared to give the most pronounced indications of metal. A stone weighing half a ton had to be removed, and then digging to a depth of six feet gave a negative result. (*Antiquity* 8:350 — *Birmingham Daily Mail*, 13 April 1934)

Next to buried treasure and water, archaeological remains have long been the object of dowsers' efforts, leading to frequent encounters with professional archaeologists. Archaeological dowsing techniques are essentially identical to the techniques used for water dowsing (Figure 1). Metal dowsing rods, bent at right angles, are held in each hand in a position that is inherently unstable so the points easily deviate up to 90 degrees either side of the 'straight forward' or resting position. The dowser moves over the area to be surveyed, interpreting and mapping the movement of the rods until archaeological features have been located. Large numbers of dowsers offer their services to archaeologists on a regular basis and in good faith, but does their work have any value beyond fostering good community relations?

In informal contacts with fellow archaeologists both in England and the Netherlands I found that many believe there is something worthwhile in it, and no one categorically denies its value. Strangely, such beliefs appear to be based on anecdotal evidence rather than any serious study. Many practitioners and proponents of dowsing advocate an openly paranormal view of the phenomenon, in which the practitioner has the

* Correspondence to: M. van Leusen, Groningen Institute of Archaeology, University of Groningen, Poststraat 6, 9712 ER Groningen, The Netherlands.
E-mail: p.m.vanleusen@let.rug.nl

CCC 1075–2196/98/030123–16$17.50

Received 21 August 1997
Accepted 9 June 1998

PLATE 14.

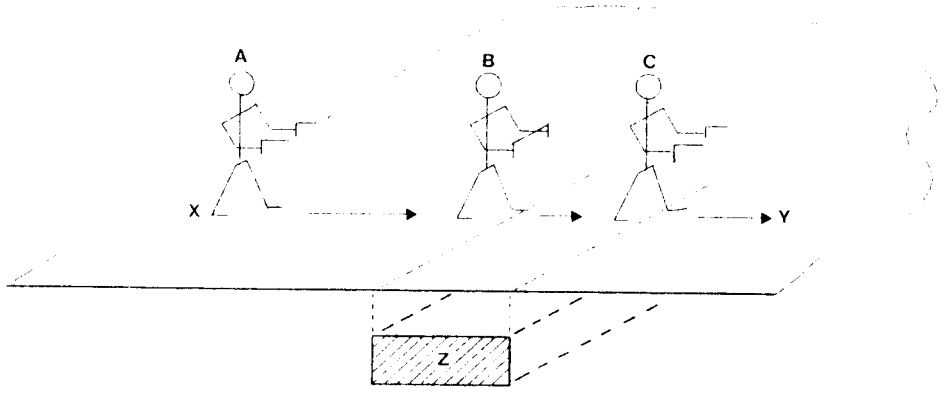


FIGURE 32.

Figure 1. The technique of archaeological dowsing as portrayed in Bailey *et al* (1988, plate 14 and figure 32). Note that the movement of the dowsing rods at B and C precludes any uncertainty about the nature of the interfaces -- the rods turn inward for as long as the dowser is over buried feature 'z'.

extraordinary powers needed to detect buried archaeology (some even claiming to do this by dowsing from *maps*) or the archaeological features radiate some paranormal 'force' (as in the 'energy' and 'ley lines' emanating from Stonehenge and other important sites; see the article by Hancock (1998)). Although dowsing has therefore been one enduring theme within psychic archaeology in general (Cole, 1980, p. 14), such views do not win many converts among professional archaeologists. Rather, the alternative view that dowsing is based on some physical force that some (or all) people are sensitive to, especially when aided by dowsing rods, seems to be the one that is regularly encountered among students and professional archaeologists. The main candidate for this physical force is taken to be magnetism which, in the form of the Earth's magnetic field, several species of bacteria, birds and perhaps some mammals have been shown to be sensitive to (Williamson, 1987). Proponents of dowsing argue that humans are similarly sensitive to the weak magnetic fields generated by some buried archaeological features.

If dowsing was found to work, it would not just constitute a major scientific discovery, but would also add a valuable new tool to today's archaeologist's tool kit of non-invasive prospecting techniques. It strikes me as incongruous that one could believe in the existence of a remarkable sensitivity ('sixth sense') or even of an unknown force of nature, and at the same time show no interest in studying it. We all know hardly anyone would ever mention the subject at a scholarly conference — do we shy away from it for fear of losing our academic standing and, if so, why should this be so?

There is an enormous literature on the subject of dowsing, which can be located with standard library catalogue or Internet searches, but most of it concerns dowsing with the purpose of finding water or utility lines. Of the remainder little could be taken as serious research (see, for instance, Graves, 1980). Since my aim here is to understand why professional archaeologists, rather than the general public, believe dowsing for archaeological remains might work, I will restrict my discussion to that very small body of serious study into the subject.

Dowsing and archaeological prospection

The obvious starting point for delving into the subject are archaeological geophysicists involved in teaching and research, among whom one would expect to find well-founded opinions regarding the phenomenon of dowsing. The first bit of evidence I hit upon, via the Internet (Clark, 1996), was 'a blind dowsing test', part of a short practical course introducing the use of geophysical techniques in archaeology at the University of Southampton (UK). Students were to compare dowsing with results obtained with standard geophysical equipment. When asked for more details, the course tutor explained that she feels dowsing is 'not a science, nor unscientific' as nothing at all is known about it. To her it is 'an interesting phenomenon which no one has the time or appropriate scientific background to investigate objectively and with a properly devised methodology.' She added that dowsing is 'not a gift, as anyone can get a result of some sort' (K. Clark, Pers. Comm., 1996).

Others do not take such an open-minded stance. A technical review paper on non-invasive surveying published by the British Institute of Field Archaeologists, until recently Europe's only professional body for archaeologists, has the following on the subject of dowsing:

> This technique has long been practised by archaeologists. Unfortunately the scientific principles, if there are any, are not understood, and as such the technique should not be used for evaluation purposes. (Gaffney *et al*, 1991, p. 6)

The reader might be forgiven for thinking this an example of scientific closed mindedness — not knowing the mechanism behind dowsing does not in itself invalidate the technique. Set this against the final paragraph of the section on dowsing in Clark's well-known treatise on archaeological prospecting:

> Many controlled tests of dowsing have proved totally negative, and many results remain speculative and untested, or scientifically

> incredible, for instance the 'imprint' effect, by which the dowser appears to be able to detect structures no longer present. But the growth of knowledge has overturned scientific orthodoxy more than once, and it is seemly to keep an open mind. (Clark, 1990, p. 123)

Clark quotes a review article in the *New Scientist* (Williamson, 1987) that argues for the possibility that humans are sensitive to weak magnetic fields, and sets this against experimental results (e.g. Aitken, 1959) in which no sensitivity to typical magnetic field strengths associated with buried archaeological features was found. Interestingly, this line of argument ignores the fact that the magnetic disturbances caused by archaeological features are so weak that the surveyor must wear special non-magnetic clothes and shoes in order to obtain useful results. Thus, there is a huge difference between being able to detect the direction of the Earth's magnetic field, which has a typical strength of about 50,000 nanotesla (nT), and being able to detect the *local deviations* in that field caused by near-surface buried archaeology. The latter are of the order of only a few nT in strength, that is, they are about ten *thousand* times weaker than the Earth's magnetic field itself. The suggestion that dowsers are sensitive to local variations in field strength is therefore unlikely a priori. Clark (1990) notes the then recent publication of *Dowsing and Church Archaeology* (Bailey *et al*, 1988) for its use of proper scientific experiment in studying dowsing. This important publication will be discussed in some detail further on.

Separating, for a moment, actual *proof* that dowsing works from the mechanism that *allows* it to work, we see a range of different reactions to the phenomenon among professional archaeological geophysicists in Britain. Gaffney *et al* (1991), although admitting that dowsing is used in practice, advise against its use because no mechanism has been established; they do not comment on the availability or quality of the evidence at all. Clark (1990) discusses one possible mechanism (human sensitivity to magnetic fields) and returns a verdict 'not proven', then goes on to give favourable mention to experimental work that seems to indicate that dowsing does sometimes work. Finally, Dr Kate Clark is aware that no scientific explanation is available for dowsing yet, but accepts subjective evidence that it works in practice.

Dowsing is seen as residing somewhere on the fringes of science, a phenomenon established enough (if only by anecdotal evidence) to merit mild professional interest, but not respectable enough to be firmly associated with, and with a disconcerting tendency to resist or vanish in the face of probing. Yet geophysicists' opinions as outlined above were less positive about dowsing than I encountered *informally* among non-geophysicist archaeologists. Why should this be so? Perhaps archaeological geophysicists would attach more importance to knowing the *mechanism* behind dowsing, whereas other archaeologists might be more interested in knowing whether it *works* — that is, whether dowsed features coincide with actual archaeological features. Geophysicists might also have a more science-oriented educational background and be less prone to accept anecdotal evidence, whereas many 'digging' archaeologists have little if any education in scientific methodology such as the use of controlled tests.

Field tests of dowsing

Just as water dowsers tend to locate 'underground streams' and 'sources' (disregarding the fact that these occur only in rare geological circumstances, whereas in most areas one will find groundwater fairly close to the surface wherever a well is dug), so the archaeological dowser often has a predilection for buried treasure, walls or graves. Such features have an appealing conceptual clarity that ought to make for easy field testing, witness the report of the early unsuccessful dowsing attempt with which I began this article. In another early field test carried out by Aitken (1959) the question of whether the dowser was able to pick up typical magnetic field strengths associated with buried archaeological features was studied. Aitken compared the locations of dowsed features with those of actual features known to exist through excavation and geophysical survey, and found that the dowser had not picked up even the most strongly magnetic features (pottery kilns) in the

test area. These examples of early field tests illustrate two important ingredients of successful scientific testing — simplicity and controls. The treasure was predicted to be there, but it was not. The dowser claimed to be able to pick up magnetic fields, but proved insensitive to the magnetic fields of known Roman pottery kilns. As we shall see, these ingredients have been sadly lacking in more recent work.

A review of attitudes toward dowsing both in the general and the archaeological literature shows that, as 1960s and 1970s New Age thinking made its mark in academia generally, a more favourable view of dowsing slowly made its way into influential introductory books on archaeology in the USA, Britain and parts of western Europe (e.g. Noël Hume, 1969, pp. 37–38; Greene, 1983, p. 51; Rahtz, 1985, p. 127). A study by Feder (1984) shows that by the early 1980s dowsing was the fringe claim least likely to receive negative treatment in class by professional teaching archaeologists and was the most likely to receive positive (13.3%) or neutral (16%) coverage.

By the early 1980s, therefore, treatment of dowsing by archaeological educators was relatively positive. More than one generation of today's archaeologists has been raised on such fare, explaining in large part the favourable attitudes I have encountered among colleagues. Such beliefs must have received further boosts through selective reporting, i.e. the tendency not to report tests that have a negative outcome. For example, one such test was conducted recently on behalf of a popular UK TV series that deals with 'paranormal' phenomena. The test involved dowsing over an undisputed Roman villa whose plan had been determined by geophysical techniques. The dowsing was carried out 'blind', although the dowsers were informed as to the likely nature of the targets. When no correlation was found it was revealed that this result was of no interest to the viewing public (C. Gaffney, Pers. Comm.).

The case for dowsing was further strengthened by the publication, in 1988, of a book about dowsing and church archaeology, written by two academics and a retired engineer (Figure 2; Bailey *et al*, 1988).

Foreworded by yet another academic, the book convinced at least one reviewer of the essential validity of the dowsing technique (Rahtz, 1988) and is often cited as providing the strongest evidence yet to substantiate dowsers' abilities in locating buried archaeological features (e.g. Clark, 1990, p. 123; Locock, 1995; Wilcock, 1996). The authors claim that dowsing was successful in tracing buried features in eight out of eleven tests Bailey *et al*, 1988 p. 87. These successes were reportedly obtained in the absence of documentary evidence and other extraneous clues, and several 'hits' were claimed to be accurate to less than 3 cm at depths of up to 1.4 m. If true, such accuracy would compare favourably with that of all other archaeological prospecting techniques. For these reasons, *Dowsing and Church Archaeology* deserves a thorough examination.

Dowsing and Church Archaeology

The book is well written, and the early chapters describing the history and aims of church archaeology, the subterranean structures associated with churches, and the use of conventional geophysical devices are interesting in themselves if not directly relevant to the dowsing tests. The second, and greater, part of the book presents the case for dowsing as a possibly useful archaeological technique by detailing a series of case studies where dowsed maps are compared with the results of excavations in and around churches in Britain.

Now church archaeology, as a testing field of archaeological dowsing, is particularly fraught with practical difficulties, as churches tend to be the most stable elements in archaeological landscapes, both preserving and making inaccessible remains often dating back as far as the Anglo-Saxon period. They are preserved because churches were rebuilt and expanded at the same location over and over again, with earlier phases often partly preserved underneath later buildings. They are made inaccessible because in addition to the difficulty of having a standing building of doubtful structural integrity on top of the archaeological remains, there are often restrictions of a religious nature if the building is still in use as a church or if (as is very often the case) people have been buried inside as well as around it. So, with over 1000 years of building phases superimposed, plus the likelihood that only 'keyhole' archaeology can be conducted,

Dowsing and Church Archaeology

Figure 2. Cover of *Dowsing and Church Archaeology*, often cited as the strongest case yet made for the reality of dowsing in archaeology.

churches must count among the worst places in which to conduct dowsing tests.

The authors of *Dowsing and Church Archaeology* argue that a non-invasive method of tracing earlier building phases (which by their morphology would give the archaeologist clues for dating and function) would be a major step forward for church archaeology. They proceed to

argue that dowsing merits a more thorough and open minded evaluation than it had received hitherto and, commendably, set out a number of 'arguments which, although superficially convincing, must be rejected as unassailable proofs of the dowser's capabilities'. Briefly, these are (i) the presence of visual clues, (ii) the availability of documentary information, and (iii) general plausibility (Bailey *et al*, 1988, pp. 33–44). The authors emphasize that although they find it unlikely that the dowsers in their experiments ever used such extraneous sources of knowledge, the need to exclude this possibility from their experiments is recognized.

In other words, although they are aware of the need for experimental controls, they have chosen the test environment very poorly, apparently putting their desire to find a solution for the *archaeological* problems posed by church buildings before their desire to test dowsing *per se*.

The core of the book consists of a presentation of nine excavations and one watching brief (one excavation is later split into two separate observations, yielding a total of 11 tests) that were conducted after dowsed plans had been obtained with the help of up to six dowsers, and for which, the authors contend, no prior visual or documentary evidence was used — significantly, right from the start no further mention is made of their third experimental control, disallowing general plausibility. Only two of the excavations, at Woodhorn (Figure 3) and Ponteland (Figure 4), were specifically mounted in order to test dowsed plans; the others were opportunistic excavations wherever building works allowed the researchers to check on the dowsed plans. The former two should therefore yield the most unambiguous evidence for the validity of dowsing.

Yet, by the authors' own account, at St Mary's Church, Woodhorn, they found a wall foundation where the dowsers had indicated one in the first of two excavation trenches, whereas the second trench uncovered no remains of *any* of the predicted junctions of linear features (pp. 45–49). Again, at St Mary's Church, Ponteland, *no* apse foundations were found where the dowser had indicated them (pp. 70–74). A charitable reckoning would therefore claim one hit and two misses here — yet the authors sum up the results as two hits and one 'undecided'!

They reach this remarkable conclusion by citing, in the Woodhorn trench two case (pp. 66–70), documentary evidence that the dowsers picked up 'imprints' of *temporary* wooden structures rather than extant wall foundations, and in the Ponteland case (pp. 74–81) archaeological evidence that an apse had originally been there but had been destroyed *completely* in later construction phases. It is instructive to separate the authors' *archaeological* reasoning here from their discussion of the dowsing test itself. Their detailed reconstruction of a series of building phases at Ponteland, resulting in the complete removal of an early apse, is quite valid; however, their conclusion that experiments at both sites support the validity of dowsing relies completely on the hypothetical 'imprint' effect, by which dowsers can apparently trace the former existence of structural and even temporary features for which *no physical evidence whatsoever* remains. (This ability to detect imprints is reminiscent of the above-ground 'electro-magnetic photo field' detected at one time by Karen Hunt in her dowsing surveys of vanished buildings (see Plummer, 1991).) In the process they relinquish what limited experimental control they had established at the outset, for they use documentary evidence to prove the former existence of temporary wooden features.

The authors follow a similar pattern at the other minor sites. At Hexham an excavation was carried out to test four dowsed lines (Figure 5), interpreted by the dowser as indicating two parallel foundations. Instead, one trench cut and one foundation were found, with no archaeological features coinciding with the fourth dowsed line (pp. 50–53). The authors here again use documentary evidence to prove that a foundation once existed at this spot, breaking their own rules. In addition they choose to ignore the dowser's own interpretation when it suits them — strictly speaking, *none* of the four interfaces were found as predicted.

At Kyloe (Figure 6) no evidence to substantiate the dowsed lines was found in one of two trenches; the second trench yielded ambiguous evidence interpreted as strongly positive (the dowser is said to have 'very accurately located the inner line of a feature at a depth of 1.21 m below the surface', p. 58). At St Oswald's,

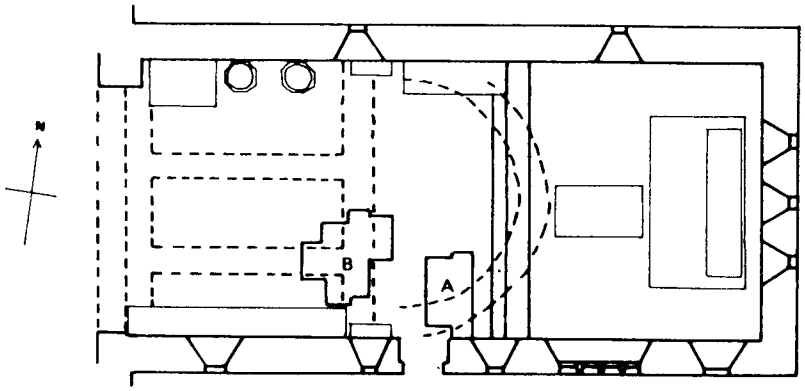


FIGURE 6.

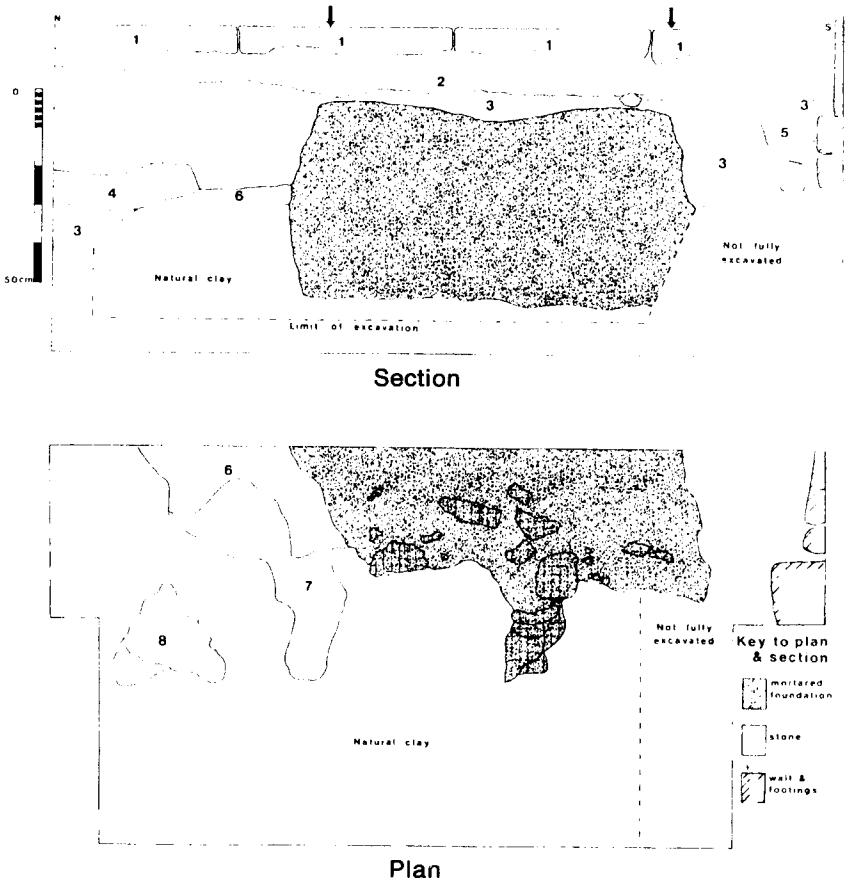


FIGURE 7.

Figure 3. Location of trenches A and B in relation to dowsed features at St Mary's Church, Woodhorn. Of the three foundations dowsed here (top), only one was in fact present. The enlarged plan and section of trench A (bottom) show the dowsing 'hit'. After Bailey *et al* (1988, figures 6 and 7).

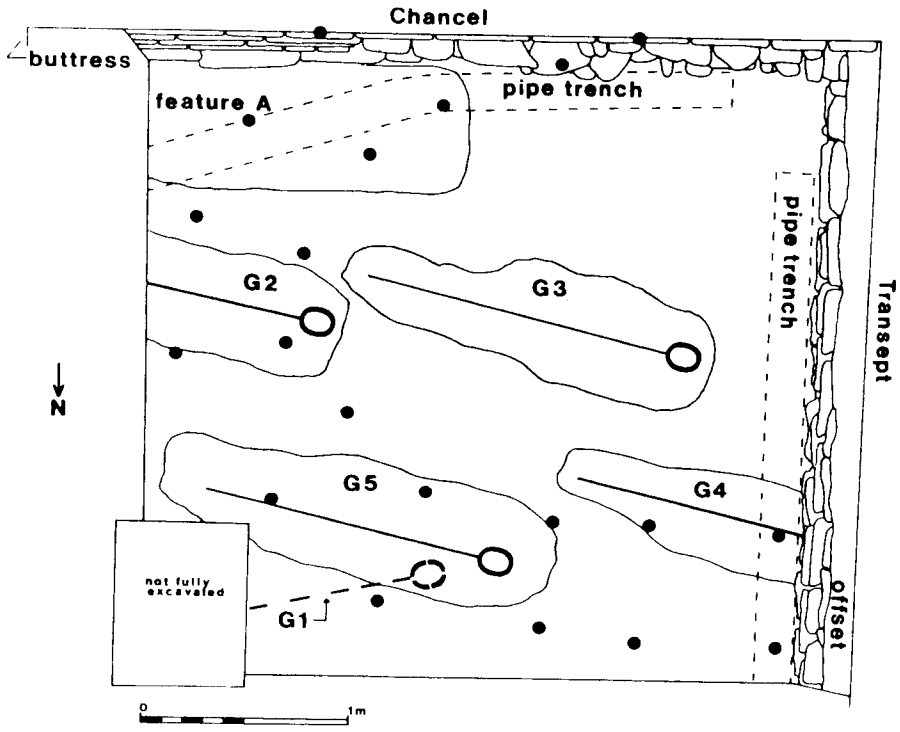


FIGURE 20.

Figure 4. Plan of trench at St Mary's Church, Ponteland, with dowsed lines overlaid as parallel rows of dots. After Bailey *et al* (1988, figure 20).

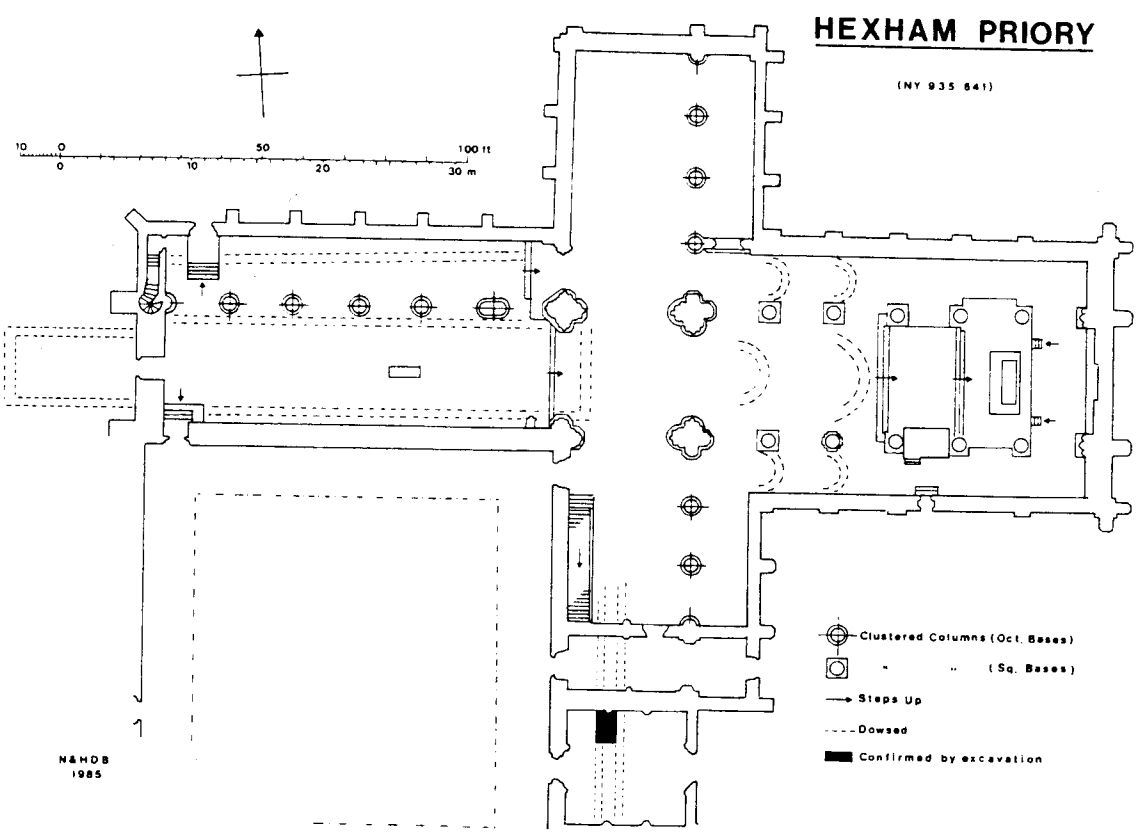
Durham (pp. 58–60), virtually non-existent evidence is blown up to provide 'might be' evidence for dowsing. At St John's, Newcastle (pp. 60–63), the dowsed lines are linked to a very minor feature not related to foundations, which judging from the dowsed plan is clearly what the dowser 'found'. At St Mary's, Morpeth, finally, a foundation interface is found at one of the dowsed lines (p. 64).

Reading through these cases a pattern became increasingly clear. All the *archaeological* discussions were fine, which is how it got by some of its reviewers and many of its readers, but the dowsing 'tests' were so vaguely defined and uncontrolled that it would hardly have been possible to *disprove* the existence of some archaeological feature at a dowsed line. But how exactly have Bailey *et al* (1988) managed to do this?

To assess the outcome of each test, one needs to know the prior probability of finding an archaeological feature in any particular location associated with a church. In many excavations we document hundreds if not thousands of 'contexts' and 'features', any of which might coincide with a dowsed line. For this reason attempting to test dowsing on any but the simplest of sites is a bad idea. Yet the authors do not discuss this at all. Thus they have no yardstick against which to decide whether the tests do or do not support the hypothesis that dowsing works, and are forced to operate at a much simpler level, namely that of accumulating instances of negative or positive evidence, 'hits' and 'misses'.

They then go about redefining the test parameters such that the prior probability of a 'hit' grows, whereas that of a 'miss' decreases. If they do not find a foundation interface where one is indicated by the dowser, and they cannot convince themselves that a foundation had been there in the past, they simply disregard the dowser's interpretation. When they found no foundation at Kyloe, they simply assumed the dowser must have 'felt' a weak and deep interface — so they can count this as a dowsing hit and at the same time claim it as evidence for the high quality of the dowsing response. The reverse also happens: when they found a major stone feature at Newcastle where none had been

PLAN 19.



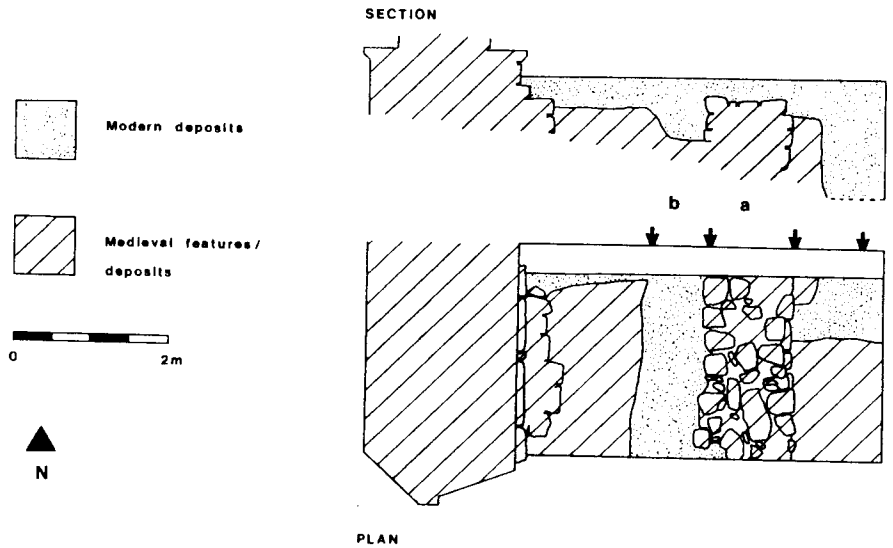


FIGURE 9.

Figure 5. Excavations at Hexham priory did not show two parallel foundations as predicted by the dowser (top); instead one foundation was found for which documentary evidence was also available, one dowsed line could not be matched to any underground feature, and the remaining dowsed line was assigned to a modern trench cut (bottom). After Bailey *et al* (1988, plan 19 and figure 9).

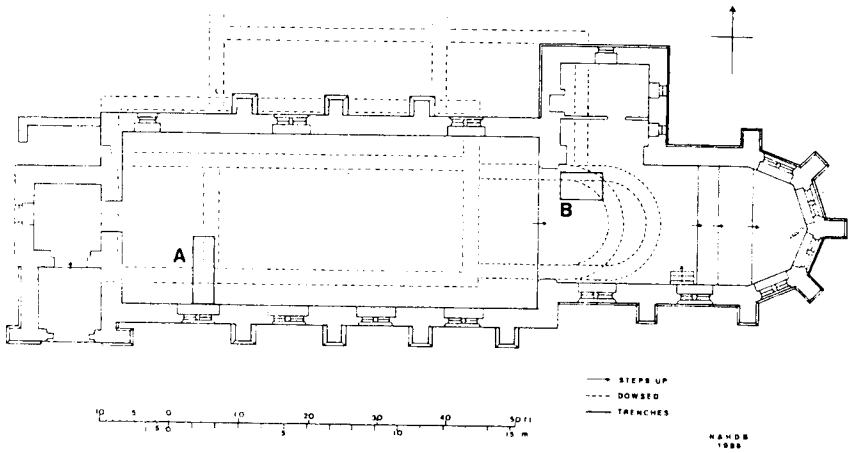


FIGURE 10.

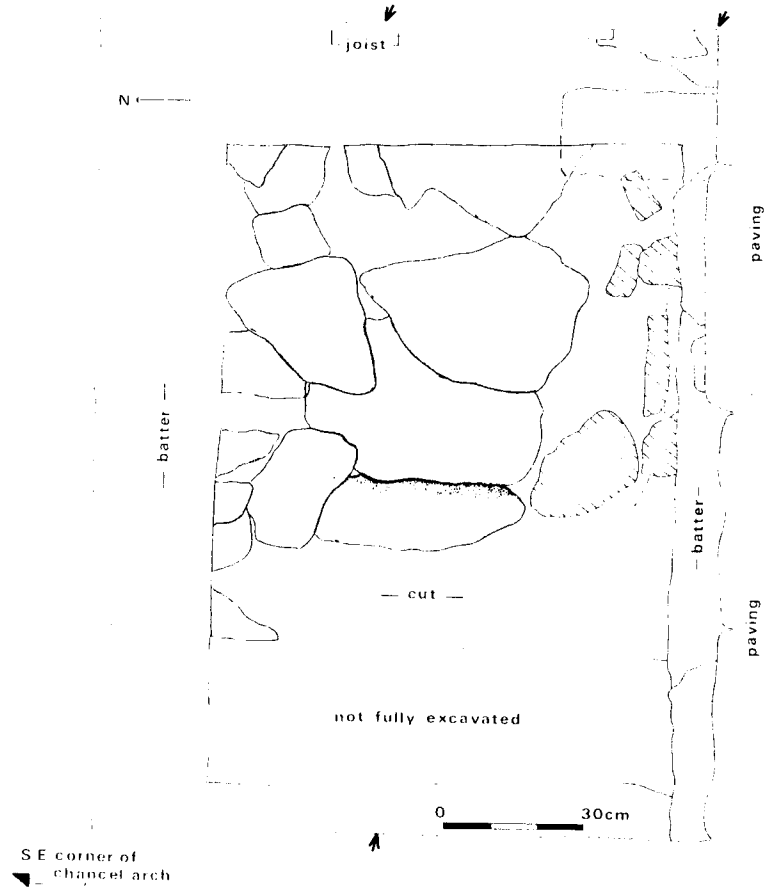


FIGURE 11.

Figure 6. Dowsed plan, trench and excavation plan at Kyloe. The small dimensions of the trench, the depth of excavation, and the irregular jumble of foundation stones allow Bailey *et al* to claim that the dowser 'accurately located the inner line' of the foundation of an early nave. After Bailey *et al* (1988, figures 10 and 11).

predicted by the dowser (p. 62), they assumed the dowser had been 'targeting' foundations (p. 88) and was therefore insensitive to other types of features. Never mind that these assumptions contradict each other!

The most infamous example of this type of reasoning, however, is the 'imprint' hypothesis, whereby dowsers locate features that have been *totally* destroyed (as at Ponteland) or otherwise removed (Figure 7). In one case the authors argue that the dowsers had picked up the imprint of wooden plinths that had been removed (pp. 67–70). They are aware of the danger of using such an argument yet feel that it is admissible if the former existence of the feature can be proved (p. 88). Of course this would require exactly the kind of evidence that the authors specifically excluded at the outset — visual, documentary, or general plausibility!

By such means, the authors extend the range of outcomes they can count as a 'hit' until it is hard to think of circumstances which they would be willing to count as a 'miss'. Basically, *any type of evidence* that indicates the (former) presence of *any type of 'interface'* has been ruled admissible, even if it flatly contradicts the dowser's interpretation or has been expressly disallowed by the authors themselves. In the authors' topsy-turvy world, the very weakness or obscurity of the link between evidence and prediction now serves claims of high accuracy and surprising sensitivity — how else could the dowser have picked up, with an accuracy of a few centimetres, some minor feature at a depth of over 1 m, or the presence, some decades ago, of some piece of furniture in this very spot?

Subsequent field tests

In a more recent trial, Locock (1995) did only slightly better when he arranged for a dowser to map archaeological features alongside existing but back-filled excavation trenches at the historic garden site of Castle Bromwich Hall. The locations of the dowsed points were compared with archaeological and geophysical evidence for the existence of major buried features at those points, and a scoring system applied. Locock recognizes that dowsing 'hits' might simply reflect the density of archaeological features on the test site, and he will have none of the 'imprint' hypothesis. Of a total of 19 points so tested, six were found to have been located close to major buried features, four were 'within 1 metre of some change in buried deposits', and nine were not located near any buried feature.

To assess the significance of these results, one needs to know what experimental controls were in place. Did the dowser have access to visual or historic clues to the location of buried features? We are told that the dowser had previously worked on several other historic garden sites; he successfully located three iron pergola posts; would a pergola not be located in a predictable position (south-facing, parallel or at right angles to existing buildings and walls)? The other three 'hits' were points close to a large masonry culvert that ran across a lawn otherwise free from buried features; the dowser also located two incorrect points there; without knowing the relative sizes of the lawn and the culvert we simply don't know whether this represents a significant deviation from random chance.

It is clear that Locock (1995), like Bailey *et al* (1988), is not aware of some of the pitfalls involved in deciding whether a particular outcome is statistically significant. He states that the test produced 'evidence suggesting that [dowsing] performed better than random selection for metal objects, but not for old soil disturbance or some masonry features'. This is equivalent to having a hundred people flipping coins, then selecting the few who happen to be the extreme 'outliers' on the distribution curve and claiming these 'perform better than random in picking heads'.

Painful lessons

There is a lot to be learnt from these failed attempts at proving the reality of archaeological dowsing. They highlight the unfamiliarity of archaeologists with formal test design, and the uncontrollable nature of archaeological test environments.

The core of the problem, I believe, is the complexity of real-life archaeological environments, which makes the design of good tests almost impossible. The main effect here is the

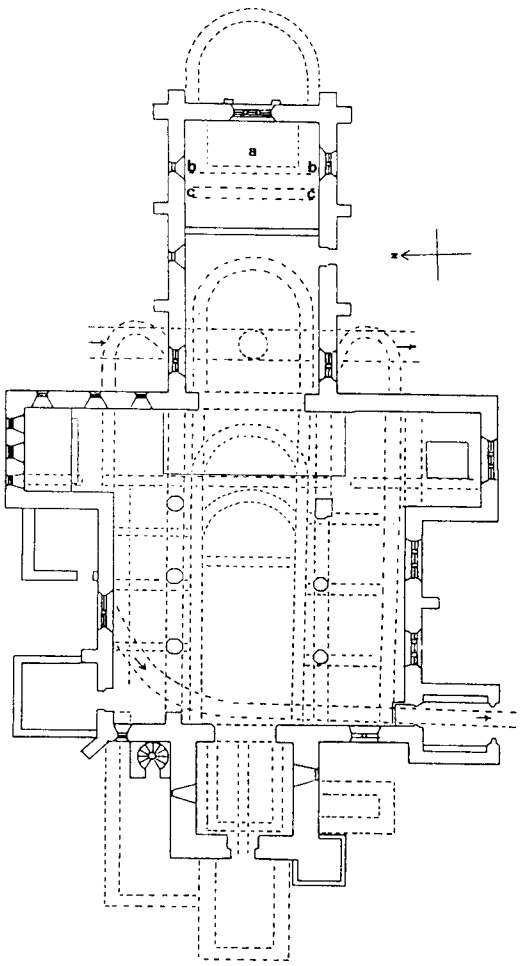


FIGURE 17.

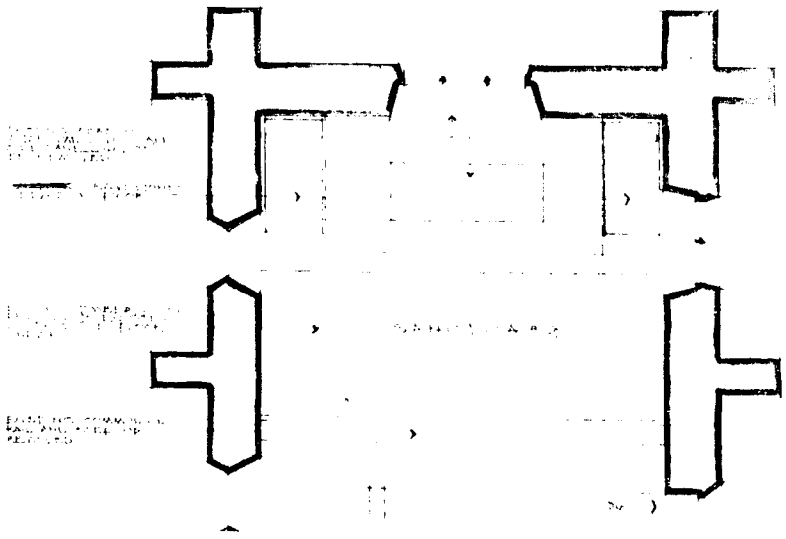


FIGURE 18.

Figure 7. The 'imprint' effect at work: dowsed feature 'a' at Ponteland (top) was found to coincide with an alter platform that had been removed in 1972 (bottom). After Bailey *et al* (1988, figures 17 and 18).

very high probability of a 'hit', especially when the exact nature of a hit is left undefined, but another consequence is the difficulty of producing, from a small observation trench, a reliable plan of the archaeological features. Bailey *et al* (1988) used a series of generally very small interventions from which they claim to be able to extract exact directions, curves and angles of linear features. There must be some doubt as to whether such measurements can be made sufficiently accurately.

The second reason for failure is a basic lack of understanding among archaeologists, due in part to their lack of education in these areas, about the nature of proof and probability, and the importance of controlled test conditions. I have already discussed some examples of this above; one more will serve to drive the point home. Among the three sources of extraneous information mentioned by Bailey *et al* (1988) — visual and documentary evidence, and general plausibility — the most difficult one to exclude from experiments is that of general plausibility. If the dowser produces a plan typical of Norman churches, how do we know that he is not simply proceeding from his general knowledge of such plans?

In fact, if one looks at the 30-odd church plans included in an appendix to *Dowsing and Church Archaeology*, it is quite clear that a pattern was adhered to by the medieval architects and builders. The evolution of church buildings generally proceeds along a limited number of possible lines occurring in certain roughly datable waves. For instance, extensions of the main church building *at the apsidal end* are fairly common, and make it very difficult to assess the dowser's performance should he have correctly dowsed such a buried feature. The same problem bedevils Locock's (1995) attempts to establish whether his dowser's performance was above chance. As I have argued above, this problem can be avoided only by giving absolute priority to control of the test environment, either by restricting the test to one isolated archaeological phenomenon (as in Aitken, 1959) or by creating an artificial test environment (as in Randi, 1979). Simple tests such as these have unambiguous outcomes, whereas messy ones are open to wildly divergent interpretations.

Where tests cannot be carried out under such restrictions, various simple ploys can be used to avoid the more obvious pitfalls. Blindfolding the dowser can eliminate many extraneous effects that otherwise complicate or even invalidate field tests. A protocol stipulating the exact circumstances of each test and describing the abilities of the dowser being tested, would be agreed upon between the researchers and the test subjects prior to any tests taking place; tests would take place under conditions where unambiguous outcomes can be obtained, either by selecting known single period sites, or by creating an artificial site by burying some archaeological object; the test subjects, and preferably the researchers conducting the tests, should not be allowed access to any knowledge that might induce them, consciously or unconsciously, to influence the outcome of the tests.

Finally, there is the 'will to believe'. Belief in dowsing, despite the protestations of its adherents, is not a rational matter. The question of a dowser's sensitivity to weak magnetic fields is a case in point. As we have seen, the a priori argument for such sensitivity is extremely tenuous. In tests, Aitken (1959) reached a negative conclusion, whereas Locock's (1995) is rather more positive. So what? Perhaps Aitken's dowser was not very good, or had a bad day — who knows? However, many times one could prove that a particular dowser did not perform above chance level, that number will always be far outweighed by a myriad of anecdotes to the contrary. This is the old 'proving a negative' problem — somewhere, sometime, there may be someone who *is* sensitive to weak magnetic fields!

Such an attitude is of course easier to maintain if one does *not* investigate dowsing too closely — and indeed, given the claims put forth by some archaeologists there is a surprising lack of enthusiasm for studying dowsing in a manner similar to other non-invasive prospecting techniques. Although the danger to their reputations may be one reason, I would suggest that most archaeologists judge that investigating dowsing is not a good use of their time, because in essence they see it as a *supernatural* phenomenon! This is not a reason for rejecting it — instead, it puts dowsing safely beyond the pale of

scientific pursuit. In seeing no conflict, academically trained archaeologists are no different from the rest of us. We tend to apply logic and reason to some areas of our lives, while happily suspending scepticism in others. Academic training is of little or no relevance here.

Conclusions

As tests of dowsing, the work of Bailey *et al* (1988) and Locock (1995) fails to establish anything — yet their lack of experimental control allows both the researchers themselves and most of their readers to believe that the tests provide at least a partial validation of archaeological dowsing. The conduct of proper dowsing tests would involve establishing a test protocol, controlling test conditions, and 'blind' (preferably even double blind) execution of the tests.

It is clear that archaeologists have not yet come to terms with dowsing. Where it has been the subject of tests, these have been so poorly designed and executed that any conclusion whatsoever could have been drawn from them. The fact that such tests are usually only carried out by researchers with a prior positive view of dowsing means that the conclusions will also be positive. The normal processes of peer review and scholarly discussion have also failed to uncover the lack of properly controlled test conditions in such studies as those of Bailey *et al* (1988) and Locock (1995), causing a generation of students and general readers in the UK, at least, to remain under the impression that the reality of archaeological dowsing had been all but confirmed by science.

The impact of the Internet as a relatively young information source is as yet unclear. Will the accessibility and 'authority' of web pages lead to a further growth of public faith in paranormal claims? One obvious route for Internet documents expounding on the value of dowsing to reach the public will no doubt be through journalists who are strapped for time when doing background searches. Scientists should therefore put more effort into the provision of web pages that offer quality information to the public.

Why should we care? To quote Cole (1980, p. 27):

> ... a cult archaeology may not be as seriously affected internally [by criticism] because the belief is more important than the evidence, logic, or theory to the believers — but not to the neutral observers, which is the audience scientists have a reasonable chance and even a duty to reach. The process of testing cult archaeologies can affect their public credibilities and, more importantly, perhaps, give the public a better understanding of how science works. Scientists cannot afford to go through this process for every odd claim that arises, but doing it fairly regularly can do much to defuse potential challenges and can help to cope with the more significant public-education problem.

Acknowledgements

I would like to express my thanks to Kenneth Feder of Central Connecticut State University, who supplied me with additional material relevant to archaeological dowsing in the USA. Both he and Arnold Aspinall suggested several valuable improvements to this article. Any remaining errors and omissions are of course my own. Finally, I would like to thank Intercept Ltd, publishers of *Dowsing and Church Archaeology*, for their kind permission to reproduce figures and plates.

References

Aitken, M. J. (1959). Test for correlation between dowsing response and magnetic disturbance. *Archaeometry* **2**: 58–59.

Bailey, R. N., Cambridge, E. and Briggs, H. D. (1988). *Dowsing and Church Archaeology*. Wimborne: Intercept.

Clark, A. (1990). *Seeing Beneath the Soil: Prospecting Methods in Archaeology*, 2nd edn. London: Batsford.

Clark, K. (1996). http://avebury.arch.soton.ac.uk/CourseNotes/Yr3HandBk.html. Southampton Archaeology — Student Handbook — 3rd Year Students, Geophysical Survey Practical.

Cole, J. R. (1980). Cult archaeology and unscientific method and theory. In Schiffer, M. B. (ed.), *Advances in Archaeological Method and Theory* **3**: 1–33.

Feder, K. L. (1984). Irrationality and popular archaeology. *American Antiquity* **49**(3): 525–541.

Gaffney, C., Gater, J. and Ovenden, S. (1991). *The Use of Geophysical Techniques in Archaeological Evaluations.* IFA Technical Paper **9**. Birmingham: Institute of Field Archaeologists.

Graves, T. (ed.) (1980). *Dowsing and Archaeology.* Wellingborough: Turnstone Books. (Reviewed in *Antiquity* **58**: 231–223.)

Greene, K. T. (1983). *Archaeology: an Introduction.* London: Batsford.

Hancock, P. A. (1998) Dowsing the Rollrights. *Skeptical Inquirer* **22**: 1.

Locock, M. (1995). The effectiveness of dowsing as a method of determining the nature and location of buried features on historic garden sites. *Archaeological Prospection* **2**: 15–18.

Noël Hume, I. (1969). *Historical Archaeology.* New York: Knopf.

Plummer, M. (1991). Locating invisible buildings. *Skeptical Inquirer* **15**(4): 386–397.

Rahtz, P. (1985). *Invitation to Archaeology.* Oxford: Oxford University Press.

Rahtz, P. (1988). Review of Bailey *et al*, *Dowsing and Church Archaeology. Antiquity* **62**: 808–809.

Randi, J. (1979). A controlled test of dowsing abilities. *Skeptical Inquirer* **IV**(1): 16–20.

Wilcock, J. (1996). http://zenon.inria.fr:8003/agos/sis/dowsing/downsdean.html. The use of dowsing for the location of caves, with some results from the first Royal Forest of Dean Caving Symposium, June 1994.

Williamson, T. (1987). A sense of direction for dowsers? *New Scientist* **113** (19 March): 40–43.