

finished and make up for some of the carelessness in the choice of words. To anyone unfamiliar with the conventions applied in describing mollusc shells the definition of a sinistral shell will mean very little: "if it be held upright with the aperture towards the observer the aperture is to the observer's left". Readers requiring a definition of sinistral in this context are the very ones least likely to know the meaning of 'upright'. Fortunately most of the ambiguities and other obscurities can be resolved by reference to a figure or to an opposing couplet in the key; but this takes a little time, and the distractions they evoke are further aggravated by expressions like "Swimming quick" which may be a grammatically appropriate antithesis to "Swimming laboured", but could easily have been avoided.

Apart from these minor blemishes the "Guide" is a pleasure to use. The practice of giving the dimensions of the specimens figured in millimetres rather than giving the magnifications is commendable and will save much mental arithmetic. It is, however, unfair to expect all the readers for whom the book is intended to know that the length of an insect, for example, does not include in its measurement any appendages projecting at either end.

Most authors of taxonomic keys become slaves to the system, and for the sake of uniformity attempt to find simple characters to separate large groups which are too complex for this to be done satisfactorily. It is for this reason that most keys require the reader to inquire into the most obscure and insignificant details, particularly in the early stages of the key, where the groups to be separated are the most complex. This is very discouraging until the student learns by experience how to bypass the difficulty by recognizing the major groups by sight rather than by resolving the alternatives presented in the key. Dr. Macan avoids this trouble in a delightfully simple way: where to persist in the format of a key would lead to the use of impracticable alternative questions he abandons the format and substitutes a straightforward explanatory paragraph. By way of compensation, perhaps, the author makes use of the key format for his references to further literature. The number of species of freshwater invertebrates in Great Britain is far too great for them all to be dealt with in a single work, so in many places the key inevitably ends in a family or other group name rather than a genus or species, and here where the investigator wants it is a reference to further literature on the group. Macan's "Guide" is thus more than a key to the invertebrates, it is also a master key to other keys. J. P. HARDING

DOWSING—FACT OR FICTION?

Water-Witching U.S.A.

By Evon Z. Vogt and Ray Hyman. Pp. xi+248. (Chicago: University of Chicago Press; London: Cambridge University Press, 1959.) 37s. 6d. net.

THE difficulties of popularizing science are well known; they are probably greatest in fields such as psychology and sociology, where most readers are quite unaccustomed to the possibility of a scientific approach. The book under review shows what can be done even in a field that superficially

might seem rather unlikely. In turning to dowsing or 'water witching', the writers, of course, have the advantage that most lay readers will have some interest in the problem and will at least have heard of the claims made for this 'science'. Their account is well written, well documented, critical in the best sense and, above all, intensely readable. It can be recommended to anyone interested in the subject as a model of popularization, and few people will lay down the volume without having learned a few new facts at least from the authors' wide-ranging discussion.

In their book they pass from the reasons for dowsing, through its history, to a consideration of the question of whether it does in fact work or not. As they point out, there is fairly universal agreement that the stricter the controls become which are imposed on the dowser, the less frequently does his score deviate from the chance-level. In this, there is a striking parallel to other sets of beliefs, such as those associated with mediums, clairvoyants, phrenologists, graphologists, and Freudian psychotherapists. The unbiased reader will be unlikely to disagree with their conclusion that there is no scientific basis for water divining, and that recourse to it and belief in it are both based on psychological causes which are independent of reason and scientific proof. Particularly good in this connexion is their discussion of scientific methodology applied to problems of this type; even those least aware of modern psychological methodology could scarcely fail to follow their description step by step of the reasons why controlled experiments are necessary, and the way in which such experiments should be carried out.

The authors go on to discuss psychological theories which might account for the muscle twitches of the dowser, including a discussion of the famous 'talking horses' and other so-called 'parapsychological' phenomena. Here again, the discussion is lucid, well supported by strictly experimental findings, and altogether convincing. Their main point in bringing in these apparently extraneous facts is this. Modern psychology has demonstrated the truth underlying Carpenter's ideo-motor theory, to wit, that a person's thoughts tend to be mirrored in certain small incipient muscle movements or twitches. These can be used as signs or signals by a clever medium. By the same token, they can also, when amplified by the forked twig held by the water diviner, lead to an unconscious indication of the diviner's thoughts about the likelihood of water-bearing properties of a particular piece of ground—notions themselves in many cases derived from his personal familiarity with the neighbourhood, or even semi-scientific knowledge of geological indications.

The book ends with some chapters on the kind of people who undertake dowsing, the kind of people who employ dowsers, and the reasons why they do so. The facts discussed there are derived from the United States only, where dowsing appears to be much more prevalent than in Britain. The interested reader might like to consider whether the descriptions furnished by Vogt and Hyman of the typical dowser and his employer fit in with national stereotypes about the United States and Britain; it would certainly be interesting to have some similar facts about dowsing in the latter. Even without this, however, most readers will find this an interesting, enjoyable and well-written book, which will tell them all they need to know about 'water witching'.

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