The devil and the deep blue sea

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Science-based Dating in Archaeology. By M. J. Aitken. Longman. 1990. Pp. 274. Hbk £22; pbk £12. Distributed in the United States by Addison Wesley \$53.75.

FEW developments have had a greater impact on archaeology over the past forty years than the advent and refinement of scientific dating techniques. The initial application of the radiocarbon method, for example, effectively doubled the documented time range of prehistoric farming communities, while the development of potassium–argon dating had much the same effect on studies of early human origins. The impact of the ‘second radiocarbon revolution’ (arising from systematic tree-ring calibration of ‘conventional’ radiocarbon dates) was almost equally dramatic, and called for a radical reappraisal of most of the conventional reconstructions of prehistoric trading networks and cultural ‘diffusion’ patterns across Europe.

Confronted by these developments, of course, the archaeologist is often caught between the devil and the deep blue sea. New dating techniques emerge, new batteries of dates are thrown into the archaeological arena and, not infrequently, the scientific specialists themselves often seem to be caught up in debates over the relative reliability or significance of the results produced by different dating methods. The archaeologist is left with the task of finding his way through the array of dates produced, and trying to make some sense of the results in terms of potentially conflicting models for the development of early human societies.

Martin Aitken’s review of *Science-based Dating in Archaeology* provides just the kind of lucid, well-balanced view of these new dating methods which archaeologists have long been waiting for. The author is one of the most respected authorities in this field, and has himself made significant contributions in several different fields of scientific dating — particularly those of archaeomagnetism and the recently developed technique of thermoluminescence. As he points out in the preface, Aitken has written the book primarily with the needs of the professional archaeologist in mind. But the volume will be equally useful to students, and will be no less intriguing to professional physicists, palaeobotanists and geologists as an illustration of how their disciplines have been brought to bear on the problems of unravelling the human past.

The coverage of the book is certainly wide-ranging and comprehensive. After

discussing the contributions of the biological and Earth sciences (as for example in the use of pollen analysis and oxygen-isotope studies of deep-sea cores), Aitken comes firmly to grips with the more basic ‘absolute’ methods of dating, such as radiocarbon, potassium–argon, thermoluminescence, electron spin resonance and uranium series. The author’s aim is to make all these methods comprehensible to a non-specialist audience. How far this aim is totally achievable is, no doubt, a matter of debate, but the book comes closer to this goal than most earlier textbooks in the same field. At the same time,

over anyone’s eyes. In the long section on radiocarbon dating, for example, Aitken draws attention to the inherent problems of dating very old samples (more than 20,000 years old) and illustrates how even minuscule quantities of modern contaminants can easily clip several thousand years off the real age of the dates produced. Aitken is equally cautious in discussing some of the more recent techniques, such as thermoluminescence and electron-spin resonance, and again draws attention to the wide range of variables that need to be fully controlled (‘environmental’ radioactivity, moisture content of deposits,

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The Oxford radiocarbon accelerator is able to date samples up to 100,000 years old when used in conjunction with a high-energy mass spectrometer.

Aitken has kept the needs of more specialist readers clearly in mind. His footnotes to different chapters provide detailed documentation of some of the more technical and mathematical aspects of the various methods, whereas the bibliographies provide an impressively wide-ranging review of the specialist literature in each field. The illustrations have been equally well chosen to show both the basic scientific principles of the different methods, and the kinds of results which have been achieved in specific archaeological applications.

One of the most impressive and refreshing features of the book is the author’s frankness in stressing the limitations — and in some cases potential ambiguities — of many dating methods in current use. Clearly, archaeologists are totally at the mercy of their scientific colleagues for the reliability and accuracy of the dates they use, and they have a right to expect the scientists providing the dates to be their own most severe critics. No one could accuse the present book of pulling the wool

variable rates of uranium uptake and so on) to provide any kind of ‘absolute’ confidence in the results achieved. Above all, Aitken stresses the need for a wide-ranging integrated approach to dating, where the results from several, independent, complementary techniques can be compared and evaluated by the archaeologist. All this is highly laudable, and provides just the kind of hard-headed, critical approach to geochronology which archaeologists are fully entitled to expect from their scientific colleagues.

But this is in no sense a negative or pessimistic text on the problems of archaeological dating. Clearly, some outstanding progress has been contributed by the natural sciences during the past few decades. It is a tribute to Aitken that he communicates much of the optimism and excitement of this work, without making premature or exaggerated claims that all inherent problems have been resolved. □

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