Handbook on Soil Resistivity Surveying: Interpretation of Data from earthen archaeological Sites. By Christopher Carr. 1982. 704 pp. Evanston, Illinois: Center for American Archeology Press. $27.50.

This volume deserves singling out for its deceptive title: only a quarter deals with the variables involved in electrical-resistivity prospection, while the remainder is a report on a single Middle Woodland site in the lower Illinois River drainage. The general data consist mainly of compilations on soil properties and nutrient cycles, culled from standard pedological texts. But Carr's goal is to utilize the Barnes layer method, coupled with spatial filtering techniques, to show that resistivity anomalies can be linked to site use-areas, as inferred primarily from functional interpretation of lithic artifact distributions. In my view there are several basic problems: (a) the microstratigraphy and sedimentology of the site were not systematically studied, (b) the resistivity survey was limited to transects, (c) artifact functions can only be interpreted in probabilistic terms, and (d) cation and soil moisture anomalies within a site

cannot yet be quantitatively linked with specific human activities or biological processes. Under such circumstances the use of multivariate statistics is most likely to produce configurations of dubious significance.

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The Identification of Slags from Archaeological Sites. By H. G. Bachmann. 1982. London. Institute of Archaeology Occasional Publication No. 6, vi + 37 pp. + 34 pp. plates, tables and illus. £8.00 (obtainable from the Institute of Archaeology, Gordon Square, London).

The study of ancient metallurgy is growing rapidly, and occupies an important place in the now separately established discipline of archaeometry. This interest is justified. Throughout the ages man's main experience and experimentation with practical pyrotechnology, physics and chemistry was through metallurgy, which provided the stimulus for some of the most sophisticated technical processes of antiquity. The detailed examination of ancient metals and the correct appreciation of the scientifically revealed information has already begun to transform our understanding of the processes involved. Until recently the majority of the investigations have been on the surviving artifacts themselves. This has been inevitable because of the extreme paucity of excavated material from production sites. Although the trace elements and inclusions can give valuable clues to the metal smelting process it is clear that most of the information can only be obtained from the production sites themselves. However, to most digging archaeologists brought up on a diet of burials, habitations and ritual sites, metallurgical sites are an alarming prospect. Generally nothing survives, nothing that is, which can be satisfactorily excavated or planned, just enormous heaps of production debris for which a bulldozer is a more appropriate excavation tool than a trowel. It is instructive to study old excavation reports on metal production sites to see the prominence given to the nearby road systems, the burial ground, and the bath house. It is not that the secrets of the process were to be found in these places, it was all the archaeologist had been trained to cope with.

Most ancient furnaces were small, ephemeral structures and many reported ancient furnaces are either not ancient (for example the 'Roman' furnaces reported at the end of the 19th century at Rio Tinto, Spain which seem to have been 18th century structures), or not furnaces (such as the burnt out store-room at Ezion Geber, Jordan, or the pottery kiln at Fucinaia, Italy).

Thus the archaeologist is usually left with the slag heaps, and until recently it has not been at all clear what information could be usefully derived from excavating them. Together with the slags the heaps contain fragments of the furnaces, tuyeres, crucibles cupels etc, and the detailed scientific examination of these from a very few sites such as the Mitterberg, Austria, or Timna, Israel have already shown that a wealth of information on the smelting process can be built up. The degree and penetration of vitrification of the refractories and the composition and phase analysis of the slags are often enough to estimate the temperature and duration of the smelting process, together with many other important parameters. By far the most copious remains are the slags and Prof. Bachmanns book is a clear and concise statement on their collection, scientific study and identification. The book is in two parts; in the first, formation of slag is discussed together with the scientific methods of investigation and a lucid description of phase diagrams which are used succinctly to represent most of the information on any slag. Having described how slags are studied and the results interpreted Prof. Bachmann then takes the reader with great clarity and assurance through a comprehensive series of slags exemplifying most of the metal smelting operations of antiquity. The descriptions are backed up by a first rate series of black and white and colour photographs of the microstructures. These are more numerous and of better quality than any this reviewer has seen before and with Prof. Bachmann's descriptions will be a basic reference for many years to come.

Sometimes the sheer excellence and authority of the exposition can give a misleading impression of finality. As Bachmann warned in the first section, ancient slags are very heterogeneous and prone to internal weathering and their scientific study is only now beginning.

Not everyone would agree with some of the statements, for instance that primitive smelting would always produce slag. Smelting experiments using high grade malachite in a very simple furnace sat on the ground have produced excellent copper but no slag. This is significant as