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ON THE EASE OF 'SOURCING' ARTEFACTS AND THE DIFFICULTY OF 'KNOWING' PREHISTORY

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Abstract

The interpretation of the data of artefact 'sourcing' studies requires attention to the logical bases of the arguments used to select the source of the raw material. A stronger argument for one locality is obtained by rejecting other possible sources.

In New Zealand, as elsewhere, in recent years there has been manifest increasing interest in artefact 'sourcing' by the application of techniques of materials analysis (for a recent review see Reeves and Ward 1976, and for an optimistic preview see Leach 1977). The ultimate aims of such research are, validly enough, to provide data for the discussion of the means by which exchange took place, the possible and evident results of such transactions, and to depict, at various levels of inference, 'lifeways' and 'culture-historical' canvases, within both local and more broadly, regionally, defined frames. But it is the more immediate interpretation of the data provided by petrologic or geochemical techniques that is the concern of this note.

The 'hard' data, particularly those provided by spectrographic analyses, have given a much needed rigour to the discussion of inter-community relationships in prehistory. However, the potential of the obverse being true should not be lost sight of: that is, that the reference to the results of spectrographic analyses, say, should not obfuscate the logical arguments providing the basis upon which cultural conclusions are drawn.

There have been published recently a small number of papers which reinforces the opinion that such dangers periodically require restatement. The success of sourcing studies requires critical attention to these basic points:

1. The accuracy of the data being used;
2. The logic of the procedures by which decisions are made to assign material to one or another 'source'.

In scientific investigations, the requirements of 'objectivity' for the former point pose problems but seldom these days: the results of spectrographic analyses may be published in some detail (see recommendations by Ward 1974: 58 ff.); petrographic data may be published or otherwise made available in the form of mineral counts per unit area, or in the form of microphotographs. The data are available for the sceptic to satisfy himself - and scientific process is as much as not a matter of systematic scepticism.

The major concern, however, is with the second point. The logic of the decision making process is one, while too often given secondary weighting or not considered at all, which is so fundamental to the sourcing procedure (as to other aspects of how archaeology and science is 'done') as to involve questions of how we 'know' anything at all. At another level, the problem is one of 'exclusiveness' and the size of the 'universe' involved (*cf.* Ward 1972: 67).

Better to illustrate, select at random a real example for detailed consideration; in a recent number of this *Newsletter* there appeared the suggestion that two adzes had a cultural proveniance within the Cook Islands but, it was argued, petrological examination of thin sections cut from these adzes showed that the material from which they were made was indistinguishable from that of the basalt quarry at Tahanga at Opito Bay on the Coromandel Peninsula. So, "It can be stated, with a very high degree of probability, that the adzes originated from that source" (Best 1976: 102). Leaving aside the problem of the provenance of the adzes as witnessed by the museum catalogue cards (*op. cit.*: 103), the problem of origin of the material used to manufacture the artefacts becomes debatable in terms of this question: "How can one *be sure* that the raw material derived from the Tahanga source?" The answer must be that, on the available evidence, there is no way in which one can be sure. Allowing that the evidence so far presented is suggestive of this derivation, what criteria need to be fulfilled so that one might be sure? In other words, what is meant by *sure?*

Best's discussion is carefully worded; clearly he does not commit himself to the view that the adzes were made in the Coromandel area and transported to the Cook Islands, but merely that it is highly probable that they were made from the Tahanga basalt. There is no fault of commission here but, rather, an error of omission. What Best fails to point out to his readers is that there is insufficient evidence considered in the report to come to any conclusion regarding the likelihood of the adzes being made of material other than that of the Tahanga basalt deposit.

At this point must be invoked the criteria of exclusiveness and the size of the relevant universe. The difficulty in the present

situation is that *no other possibilities have been rejected.* There may exist other deposits of material which can be shown to be similar to that composition seen in the adzes themselves and which were potential sources of that material. The question misformulated above might better be phrased then: "How can one know that the material from which these artefacts were made has not been quarried from some other deposit?" To demonstrate that other deposits of similar material were not 'potential sources of that material' would require the investigator to show that

1. The material of the deposit being considered was sufficiently dissimilar to that of the adzes (taking into account variation within the deposit) to be unlikely to provide the source of that material; or

2. In the past the material within that potential source was not available for exploitation for tool manufacture (for, say, geomorphological or cultural reasons); or

3. Some other or further exclusivising reason.

That is, that other possibilities must be rejected before the favoured one can be accepted with any degree of confidence.

Clearly, one of these may be *sufficiently* significant or probable to *exclude* the possibility of a given deposit providing the material; any number of these factors partially borne out may provide a cumulative weight of evidence to *exclude* that deposit from further consideration as a possible source on grounds of improbability. It must be emphasized, that only in this negative area of elimination of other possibilities is evidence likely to be found of a weight sufficiently high to make it conclusive. Further, only when other possibilities are rejected, is the positive evidence of *similarity* with the Tahanga quarry material acceptable evidence. The stronger the rejection of other possibilities, the *stronger the conclusion* for the Tahanga quarry as a source may be arrived at.

Perhaps, ultimately, the researcher must ask this question of himself: "Have I attempted honestly to eliminate all other non-trivial possibilities before strongly advocating acceptance of this conclusion?" And this, surely, is the essence of good scholarship.

(This argument, that knowledge progresses by conjectures controlled by criticism (that is, by attempted refutation which they may survive), but that such conjectures can never be positively justified, can be explored in detail in the works of its author Karl Popper (see especially, Popper 1969).)

Consideration of the problem of exclusiveness raises the related one (only here heuristically distinct) of the size of the universe. Clearly, to attempt, in the wake of the preceding discussion, to exclude from further consideration all available deposits of basalt in Egypt, say, would be a ludicrous, or at best, 'fringe' activity. What then are the limits of the universe with which the researcher must concern himself? This problem is amenable to no easy solution. Such limits must be defined in terms of the accepted criteria of the broader canvas, in the present case, knowledge of the settlement history of the Pacific Islands. One would not wish to argue that potential source deposits in New Zealand be placed beyond the limits of the present universe, but whether, say, Rapanui and Peruvian, or New Hebridean and Thai deposits should be considered 'unlikely' and beyond the bounds of this universe is something the researcher must decide - and, if in the context of a current debate these decisions could be seen to be unusual, justify them where necessary.

Clearly, the answer to this kind of question depends on one's understanding of the culture history as well as other related factors of a region. The investigator would draw his own boundaries but be prepared to admit readily that these might require revision; it is only a little more than the turn of the century since Egypt might not have been too far to go to seek a source of New Zealand or Cook Island adzes. As an example of another factor, the majority of the Tuamotu group, say, in this case might be excluded from further consideration, if it were shown that, because of their recent reef and alluvium formation, the presence of basalt outcrops was unlikely.

Again, it is a matter of personal integrity for the researcher; he must have answered affirmatively his own question: "this is a good explanation, but have I tried sufficiently hard to refute it?" This discussion is not unrelated to many areas of decision making (or non-decision leaving) in archaeology and related disciplines. Too frequently, 'explanations' are advanced tentatively to 'explain' observations made during surveying, excavation, the processing of excavated material - in many areas of archaeological investigation - but the next logical steps are not pursued to show, by rejecting other possible explanations, that the favoured one is more likely (*cf.* Binford 1968). More sure knowledge of the past could be gained by application of these criteria.

An instructive example of the dilemma of the universe's boundaries is found in another situation whose focus is the Chatham Islands (Leach 1976). Here was found an assemblage of obsidian in which there existed a number of pieces seen to show a pale olive green hue in transmitted light but with a matt surface. Similar

coloured obsidian has been found at source deposits on Mayor Island in the northeast of New Zealand (Ward 1973). Spectrographic analysis of some Chatham Island material showed it to be less different from the Mayor Island source material than from other North Island, New Zealand obsidians and it was allocated to this area (Leach 1973). However, it was observed subsequently, from the results of neutron activation analysis, that the Chathams material was also similar to obsidians from Rapanui in the eastern Pacific, some 6200 km east of the Chatham Islands (Mayor Island is 1200 km to the west). The XRF spectrographic analyses were checked against data from some Rapanui obsidians (Smith *et al.* 1977) and found to be relatively close. The possibility of derivation of the Chatham Islands artefacts from the eastern Pacific source had not been contemplated earlier, but now an expansion of the relevant universe was indicated. The data available for each group currently are being increased to check upon the derivation of the Chathams material: if it transpires that the Rapanui deposits can be rejected as being unlikely to have provided the source of these artefacts the argument for allocation to a Mayor Island deposit will be strengthened thereby.

In summary, geochemical or petrographic similarity is insufficient argument for a similar source; but characterizational dissimilarity *is* a good argument for difference in geographic source. In other words, the 'identification' of sources of material can be made suggestively but not absolutely; confidence in such tentative identification is gained from rejection of the other possible identifications that can occur within a universe of possibilities which is sometimes difficult to delimit.

There are excellent reasons to be very hopeful of the contribution to the study of prehistory that materials analysis-based sourcing studies will make to the more soundly based discussion of prehistory in the Pacific region, especially to culture historical reconstructions for which less than satisfactory criteria often have been invoked in the past, but it is necessary to emphasize that this position requires even more critical assessment of the evidence upon which such discussion is based.

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