NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION NEWSLETTER

Members

Les and Rosemary Groube, both past secretaries of the Society to which they devoted much time and effort, have left Auckland to take up a teaching position on the East Coast. Another committee member, Dave Simmons, has taken a position at the Otago Museum. We are sorry to lose these members, and wish them well in the future.
Wilfred Shawcross and Kath Clemow were married recently. To them we extend our congratulations and best wishes.

ARCHAEOLOGICAL INFERENCE

P. Riddick

In archaeology, more so than in other sciences, where investigation does not entail destruction of the raw data, the excavator has a duty to extract the maximum information from any given site. An area once dug can tell us no more.

The information that a dig can give is limited by two factors, the kind of questions which the investigator wishes to examine, and his ingenuity in finding ways of answering these questions. If one is, for example, interested in the diet of pa dwellers one could investigate representative samples of midden material and compare the proportions of shells of different species found there with those of present-day samples taken from the regions from which the fish are believed to have come: only if there is a reliable difference between the two is one entitled to make any suppositions about dietary preferences, climatic change or the like, in the absence of independent evidence. Or, if it is believed that a site was abandoned because of increasing scarcity of food, one could take samples at suitable intervals throughout a bed of midden material and compare, say, size of shells of the same species throughout the sequence. One needs, of course, all the relevant information that can be obtained: the climatologist and geologist can perhaps provide information about climatic or geological change such as a change in the course of a river: but the point is that these questions can be examined objectively.

Archaeology is in rather a different position from the experimental sciences, in that experimental method cannot be

employed in the usual way. Theories are not directly testable by experiment, and the usual rule of an experimenter setting up and manipulating his experimental and control group cannot apply. Nonetheless, as we have seen, there are some situations where the archaeologist is able to make some sort of examination of a hypothesis, provided that the hypothesis is examined in a critical fashion by a worker who has some familiarity with the principles behind elementary statistical inference. The purpose of this note is to show, in an archaeological context, how this is possible.

The archaeologist deals with end products of processes which, being unable to observe directly, he must infer, and the occurence of which he cannot control. "Proving" a theory is here equivalent to finding no discrepancies between predicted and actual effects of the process.

Before proceeding, it will be necessary to explain what is meant by "experimental" and "control" groups. An experimental group is one which has been subjected to some process which will, it is hypothesised, produce a reliable and measurable change in some characteristic of the group: a control group is one which has not experienced this process. In its simplest case, the paradigm is thus:-

Experimental group (E)	Measurement E1	Apply procedure X	Measurement E2
Control group (C)	Measurement C1	———	Measurement C2

The two groups E and C are previously arranged to be as equivalent as possible. The difference, if any, between E2 and C2 can then be said to be due to experience of X, which is the only systematic way in which the two groups differ: if there is no reliable difference, X can be said to have no effect. The relevance that this model has for the archaeologist is that the conditions have been set up in the past, and it is one part of the archaeologist's job to make use of them. The archaeologist who sets up a hypothesis should realise that by its nature, it is tentative, and examine it critically for ways of disproving it.

An example of the type of problem referred to may help to make the point clear. Hunt[1] reports that at Tamahere Pa four hut sites had "no vegetation growing in them even though acacias were growing thickly right up to their edges .... Our excavations revealed that fern had been used almost exclusively for bedding .... One member subsequently put forward the theory that the fern had made the hut sites too acid for acacias which .... dislike an acid soil. Soil

samples were accordingly taken at various levels and subsequent tests revealed the PH count (sic) of one sample to be 4.9 and of the other 5.5. Both thus show a fairly high acidity and would support the theory that had been propounded."

The central idea is that the soil within the hut sites is too acid for acacias. However, before one is entitled to say this, one must show that the soil where they will grow is, in fact, less acid. In terms of the paradigm:-

E group	Measurement E1 (PH inside living site before site lived on)	Procedure X (Being lived on)	Measurement E2 (PH inside living site after site lived on)
C group	Measurement C1 (PH outside living site before site lived on)	———	Measurement C2 (PHoutside living site after site lived on)

Measurements E2 and C2 are, of course, the only ones available to the archaeologist.

It can be seen that we are able to test the hypothesis that the use of bracken has acidified the soil because we do have a control: an area which has not been subjected to the process which has prevented the growth of vegetation inside the hut sites. We can use the information which this will give us simply by sampling the areas around, as well as within, the hut sites.

If we take these two parallel series of samples from within and without the hut sites we will find, if we measure each member of each set, that each set tends to group itself about a mean or average value, with a certain spread among the values. The means of the two sets will also differ. It is by comparing the difference <u>between</u> groups with the variability <u>within</u> groups that one can assess the stability of this difference. If the difference is likely to arise by chance, one can say that the difference is not significant, and that the experimental treatment X produced no effect: if the difference is sufficiently large, the treatment may be said to have produced a real effect. If there is no effect the hypothesis must be re-examined. For instance, in our case it is conceivable that habitation could compact the floor of the hut sufficiently to make it unattractive to plants.

The point is that only by making comparison measurements is one meaningfully able to place one group as high and another as low. We do not know, and we are not told, what the basis was for describing PHs of 4.9 and 5.5 as "fairly

high acidity": until we do know, there is the possibility that another worker, given the same data, might describe these values as showing low acidity.

There is here an implied control group which does not in fact exist. It is by making this group a reality that the archaeologist will reduce his chances of misleading himself and others.

Reference

(1) Hunt C.G. 1961. "Tamahere Pa". N.Z.Arch. Assn. Newsletter Vol.4. No.2.p9-12.

OBSIDIAN ITS APPLICATION TO ARCHAEOLOGY.

By R.C. Green

The December 1958 issue of this Newsletter carried an appeal to members of the Association for obsidian flakes from archaeological sites for study. The response then was gratifying and allowed the study to commence. Again, however, I issue the same appeal, for our collections are still inadequate for solving fully the problems encountered. At the Department of Anthropology of the University of Auckland we are endeavouring gradually to build obsidian collections from every source and sample collections of waste flakes from fully documented and adequately recorded archaeological sites. I emphasise the need for samples, not one or two scattered surface flakes, and for adequate recording, because without this information, the material has little or no value. Eventually we hope to have materials which will be adequate for investigation of the two goals discussed more fully below.

In the 1958 article it was noted that several American scientists, while investigating the nature of obsidian, had become interested in its properties as a dating tool for the archaeologist. They have since published their results.[1] In addition, an archaeologist, using their methods, made a detailed analysis of obsidian in central Californian sites.[2]