NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION NEWSLETTER

A cursory glance through New Zealand archaeological literature reveals that on the whole, archaeologists are not very familiar with petrological terms, but have selected a few 'omnibus' terms to use (or more often, misuse) particularly the words 'basalt', 'quartzite', 'argillite' and 'jasperoid'. It is very necessary to have a quick and ready field terminology, but at the same time it is strongly desirable to have a terminology which is unambiguous as far as possible, bearing in mind that even where the knowledge is present, hand specimen determinations are at best, a tentative 'guess' and the last word rests with thin section determination. To meet the need for field description, the term 'basaltic appearance' might be used for rocks which are certainly igneous, (i.e. those which have passed through a molten stage to solidify at a lower temperature), have a relatively high density and are fine grained. The word 'quartzite' is properly applied only to siliceous sediments etc., which have been completely recrystallized, not to well cemented siliceous sandstones, various cherts and so on. To distinguish a true quartzite in the field is in most cases well nigh impossible if the speciment is not from an outcrop, so the term silite is proposed for all those tough, fine to medium grained siliceous rocks which break to give a sharp cutting edge and with a subconchoidal fracture and which have been known variously in the past as quartzites (ortho- or meta-). In most cases where the worker has little knowledge of petrology, it would be preferable for him to give a very general description of a rock within the limits of his knowledge rather than to give a name which could be very misleading.

To sum up, it is suggested that quarries be recorded and the rocks from them be adequately described in hand specimen and thin section; that material from well documented excavations be sectioned and described and that rock names be used with more precision.

DATING SHELL MIDDENS - A SOUTH AFRICAN CHEMICAL AID FOR RELATIVE DATING

J.B. Palmer

Stretching from East London to beyond the Mozambique border is a belt of sand dunes known as the Natal Old Red Dune. Rising in places to 500 feet above sea-level, the belt is four miles or so at its widest point. In parts the dune slopes directly onto a rocky beach but is often separated from the sea or covered by lighter coloured sands. [1]

Along this dune belt are sites of Later Stone and Iron Age peoples who left middens at many points close to fresh water. Many of the problems that South African archaeologists have to contend with in such terrain are those that face New Zealand archaeologists where there is a paucity of cultural material in similar dune belts. Common to both countries is the problem of determining the relative ages of local concentrations or clusters of middens spatially separated and often unstratified, yet similar in their characteristics. Quantitative analyses of mollusca may not always give a guide and

New Zealand field workers need a simple test which will provide the answer as far as relative dating is concerned.

It seems as though the work of Dr. C.A. Schoute-Vanneck of Howard College, University of Natal holds some promise of providing the means to do this.[2] Modestly and emphatically Dr. Schoute-Vanneck stresses that more work needs to be done with his method which he states is reliable only for middens which have been subjected to identical chemical and physical conditions. His test then is ideal for local areas with the same soil type and climatic conditions but further testing may open up more possibilities for its application in a wider range of contexts.

The basis of the test (Dr. Schoute-Vanneck used Mytilus perna shells), concerns two constituents of midden shells, namely the rates of decay of calcium carbonate compared with conchyolin, in a matrix of which the former is set. Carbonic and other acids in the sand covering the midden dissolve the calcium carbonate in the shells and cause the conchyolin to disintegrate and decay at a higher rate than the calcium carbonate. According to Dr. Schoute-Vanneck: "The ratio of conchyolin to calcium carbonate in the shell thus steadily decreases with the passage of time and consequently at any instant this ratio is an indication of the period of time which has elapsed since the shell was removed from its natural environment."[3] Shells from the oldest middens, therefore, will have the smallest conchyolin-calcium carbonate ratio and Dr. Schoute-Vanneck's tests on various shell samples show that this is indeed the case. He tabulated results from both stratified middens and what he describes as midden assemblages,[4] meaning spatially separated deposits. All these midden samples had associated cultural materials, mainly pottery and stone tools, by which the sites could be dated independently of the shell test.

In most cases the conchyolin residue was lowest for the oldest samples (the conchyolin-carbonate ratio was determined in cubic mm. of conchyolin per gram of dissolved shell and this quantity is the chonchyolin residue). The two midden samples which did not conform to the established sequence both came from a more alkaline section of the beach where there would be a relatively slower rate of shell decay.

To prepare a test specimen, fragmented shell samples selected at random from one layer, should be well mixed and a 20 gm sample taken from this. After removing extraneous matter the fragments are washed and dried in warm air and finally powdered. From different parts of the powder small quantities are taken to give a weighed specimen of 2.00 gm. Dr. Schoute-Vanneck described the subsequent procedure as follows: "This powder sample was then dissolved in an excess aqueous solution of acetic acid. When all chemical action had ceased, the solution and its residue representing conchyolin were transferred to test tubes and, after settlement under gravity, the residue with some of the clear liquid was transferred by pipette to a standard glass specimen tube having an internal diameter of 8 mm. and a length of 70 mm. The tube was well corked and the residue allowed some days to settle. The volume of the tube occupied by the residue was then determined and the 'volume' of residue obtained per gram of dissolved shell was calculated."[5]

A more satisfactory method would be to determine the mass of the sediment rather than using the volume. Dr. Schoute-Vanneck points out that this would involve refined methods of weighing where he really wanted, in the first stages at least, a simple field test.

It would seem that this test is simple enough to be used by most field workers in New Zealand. Our need is to use it on certain representative types of midden shells to see how effective it is for our conditions and then follow Dr. Schoute-Vanneck's suggestions for further investigation of the influence of environmental factors on the rate of decay of the shells. These factors include the acidity, the moisture content, the temperature and the bacterial content of the surrounding soil since decay will be slower in cold, alkaline, dry and anaerobic soils. As investigations are at present going on into obsidian dating in New Zealand, it should be possible to obtain both obsidian and shell samples for the chemical dating method from the same midden layers. This would give an immediate cross-check and further environmental studies, together with more refined test methods could extend the possibilities of this chemical aid. Indeed, with a conversion scale that takes into account all the local environmental factors, and based on data from other dating methods such as C14 from control samples, it may be possible to estimate absolute dates for local areas. Correlation with results of shell tests in other soils and climates may open the way for a wider spatial application in the future.

Whatever success we may achieve with it in New Zealand we owe a debt to Dr. Schoute-Vanneck for pioneering a new field and for allowing this summary of his article to be printed in the Newsletter.

References:

1. Frankel, Jack Joseph, 1960 p. 573. "Late Mesozoic and Cenozoic Events in Natal, South Africa", Transactions of the New York Academy of Sciences Ser. II, Vol. 22, No. 8, pp 565 - 77.

2. Schoute-Vanneck, Dr. C.A. 1960. "A Chemical Aid for the Relative Dating of Coastal Shell Middens", South African Journal of Science Vol. 56, No. 3, pp 67 - 70.

3. Schoute-Vanneck 1960: 67. 4. Ibid 68-9. 5.Ibid 68.

NOTE : In order to test the possibilities, an attempt was made to apply the technique to cockle shells (Chione stutchburyi) from a stratified moa-bone midden. In the first place it should be noted that it takes a whole evening to prepare four samples..grinding is a laborious process. Secondly, it takes 50cc of a 10% aq.solution of acetic acid to dissolve the calcium carbonate. Owing to the small quantities of residue, 4Gm. samples were finally prepared. The results : a control of recent shell collected from the seashore dissolved completely away. The three samples from the midden had a residue of approximately 0.10ml. each, there being no detectable volumetric difference. It is concluded that cockles will not provide us with any useful data.

A.G.Buist.