NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION NEWSLETTER

THE EIGHTH INTERNATIONAL CONFERENCE ON RADIOCARBON DATING

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The conference was held in Wellington between the 18th and 25th of October. It was hosted and superbly run by the Royal Society of New Zealand. Altogether 61 papers were presented in eight sessions (see Table).

		No. of Papers	
A.	Secular Variation of C^{14}	13	(6)*
B.	C^{14} Dating Techniques	10	(1)
C.	C^{14} Variations in the Ocean	8	(1)
D.	C^{14} in Fresh water	8	(3)
E.	C^{14} in Soil Development	6	(2)
F.	The Use of R.C.	5	(2)
G.	Sample Contamination	5	(3)
H.	Reference Standards	6	(1)
		61	(19)

*No. of papers of direct or indirect interest to the archaeologist

Breakdown of Papers Presented at the Eighth International Radiocarbon Conference

Of these, 19 were of direct or indirect interest to most archaeologists. Indeed an impressive fact to emerge from the conference papers (speaking now as an archaeologist) was that radiocarbon technology has extremely wide fields of application, including studies of environmental pollution, geomagnetism, sedimentology, pedogenesis, dendrochronology and directly to archaeology. Most of the papers were published by the Royal Society in two volumes before the conference began, allowing conference members the opportunity of reading them in advance, while enabling the speakers to elaborate and talk to them. This admirable practice is one that could well be copied beneficially at future archaeological conferences, as there is no doubt that prepublication stimulates discussion during and in between conference sessions.

I do not intend to outline any of the conference papers in detail. Instead I will endeavour to direct the reader to those papers which have some interest for the archaeologist and more particularly for the New Zealand archaeologist.

Several of the papers dealt with the question of dating corrections (see Damon et al, Fergusson, and Michael et al), but it is clear there is no firm agreement on this subject as yet. The corrections proposed by different authors and based on dendrochronology studies, often differed markedly, which is confusing for the user. Part of the problem lies in the disagreements between research workers upon the method of deriving the corrections. Suess, for example, insists on drawing in the "wiggles" on his correction curves by hand, and maintains that they are real. Indeed Mook et al produced some evidence at the conference to support this assertion. However, other researchers use sophisticated statistical techniques to draw curves of best fit which tend to mask the "wiggles" out. It is not clear which is the best approach.

Again, since the suggested corrections are all based on data derived from areas in the northern hemisphere, and there appears to be some evidence for slight differences in past C^{14} concentrations in the two hemispheres (Farmer et al; Rafter et al), it may be premature to apply corrections to C^{14} dates from the southern hemisphere until more dendrochronology studies have been completed in this part of the world. Indeed Farmer et al have gone as far as suggesting that the bristlecone pine calibration curve "is not applicable in the quantitative sense to material from the southern hemisphere" and have alluded to "the possibility of latitudinal variations in C^{14} rates of exchange". Although these variations are likely to be small ($\frac{1}{2}$ to 1%), the resultant error in dates will be of the order 50-80 years, and while such errors may be tolerable in archaeological contexts elsewhere in the world, they cannot be ignored here in New Zealand.

In my own paper I tried to elaborate on some of the typical uncertainties of the method for studies of culture change in New Zealand. The crux of the problem is that New Zealand prehistory has a time span in the order of $2\frac{1}{2}$ times the extreme estimated error range of the C^{14} method (about 400 years all told). Such an error range effectively masks a solid slab of the period of human occupation in New Zealand with obvious implications for studies of culture change and for site conjunction. It remains an unfortunate fact of life for us here in New Zealand, that many of our sites yield little artefactual or other material which enable us to correlate sites meaningfully, and we can be tempted to fall back or even rely on radiocarbon dating to bridge this gap. Clearly radiocarbon technology is not sensitive

enough to enable us to do this with any real confidence at present.

L. M. and W. F. Libby discussed the possible effects of volcanism on radiocarbon dates, coming to the conclusion that the release of extra CO_2 into the atmosphere over the last 7-8 millennia from volcanoes has little or no effect on C^{14} dates. However, I think it is worth bearing in mind that much of the North Island of New Zealand has been subjected to volcanic showers at some time or other, and presumably the local atmosphere has been enriched with CO_2. Admittedly the volcanic activity has probably only lasted for a few years at a time (probably never more than 30). However, the C^{14} content of lake waters in volcanic areas has certainly been diminished (Willkomm et al) and other effects on the local natural environment may well have occurred both within and beyond the lifetime of these bursts of volcanic activity. Hence it may be that radiocarbon samples taken from areas of the North Island which have been subjected to recent volcanic activity, will be in error, and more particularly any sample which might be approximately contemporary with that activity. Indeed Bailey et al have worked on charcoal samples from one such volcanic area, concluding that significant quantities of alkaline-soluble materials have affected the radiocarbon dates of parent charcoals in this area.

The subject of radiocarbon samples and their pre-treatment was discussed in several papers. Farmer et al, for example, suggested that any sample which had had a lifetime of the order one year was susceptible to a maximum dating error of the order $\pm$ 120 years. Goh et al showed that large particles of charcoal tended to give older ages than smaller particles and that this unwanted effect could be largely eliminated by means of pre-treatment of the charcoals with an alkaline mixture. The topics of contamination and isotopic enrichment of soil samples were discussed variously by Olsson, Goh et al, Leamy et al and Stout et al. As far as isotopic enrichment is concerned the most important factors seem to be the type of vegetation canopy, the presence of soil animals, the local climate and soil properties. It was shown that C^{14} enrichment of organic matter occurs mainly in the top soils and that there is a tendency for this effect to decrease with increasing age of the soil and a degree of soil development. Such facts have relevance for the archaeologist, in that he needs to be aware of the kind of pedogenic processes which may have taken place subsequent to occupation at his site. Soils develop above his site, organic materials accumulate both above and within archaeological deposits; if the archaeologist dates the post occupation soils, he must be alert to potential sources of error; if he takes samples for dating from within the archaeological deposits he must be alert to possible sources of contamination inherited from the

pedogenic processes which have taken place since occupation ceased.

Pursuing the subject of contamination, Bailey et al have conducted tests on three aspects of charcoal samples: on the original sample, on the alkali-extractable material, and on the residue. They argue that where there has been no effective contamination, all three dates should be the same and that where dates differ, the older ones are likely to be nearer the true age.

Still on the subject of soils, Leamy et al produced an interesting study on palaeoclimatic reconstruction. They have dated a series of pedogenic carbonates from a soil profile and attributed dating reversals in the profile to palaeoclimatic variations - that is "increasing amounts of precipitation result in deeper penetration of moisture and consequently in the leaching of pedogenic carbonates to a greater depth." Hence we must be mindful not only of the potential contributions of the radiocarbon method to palaeoclimatic studies, but that some date reversals in archaeological or geological contexts may be meaningful.

Again a paper by Tate propounded a method of determining the imprint of former vegetation covers which has important implications for the study of prehistoric environment, and side by side with pollen studies may provide a powerful tool in documenting the emergence of agricultural societies from hunter-gathering. In New Zealand contexts, the method is likely to be of some assistance in carrying out the type of research being conducted by Cassels (1972) in the Waikato area of the North Island, and possibly in the Wairarapa where B. F. and H. M. Leach are completing their work.

Rafter et al reviewed the New Zealand radiocarbon reference standards and perhaps the most important point to emerge from their paper was an apparent pessimism about current marine shell standards. It was suggested that we may well have to derive shell standards for each shell species and for each region of New Zealand. Once again attention was drawn to the wide disparities between shell, charcoal and moa bone collagen dates from the same deposits.

Finally, and on the lighter side, Noakes et al described a mobile archaeological laboratory, currently in use in America. However the role of such a device is questionable. It conjured up pictures of archaeologists racing about the countryside ransacking sites until they found one about the "right" age. Perhaps such a laboratory could be useful to a problem orientated archaeologist, but I fail to see its utility in more conventional archaeological contexts

(and here I must add that the errors contracted by this method of dating are extremely large) where each layer has to be dug out successively and C^{14} samples still have to be sent back to a reputable laboratory for dating.

The revised proceedings have now been reprinted in two volumes and for a modest cost of $8.00 they are a must for the New Zealand archaeologist.

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