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NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION NEWSLETTER



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BIOCHEMISTRY OF THE MOA - A PILOT STUDY

John Campbell and Murray Munro
Physics Dept. Chemistry Dept.
University of Canterbury

We alas will never know the finger licking delight of 'Kentucky Fried Moa'. As second best though, a pilot programme has been initiated to see if we can learn anything about the bio-chemistry of moas through studying the greasy soils that occur in the ovens left for posterity by the moa hunters. This work is being carried out in the Chemistry Department of the University of Canterbury using their gas-liquid chromatograph.

Gas-liquid chromatography (GLC)

The fat samples are prepared for chromatography by chemically breaking down the fats to fatty acid methyl esters using a standard process. But first of all what is chromatography? It is primarily a method of chemical analysis and the basic principles can be illustrated as follows. If an ink containing two dyes is dropped onto blotting paper, then as the ink stain spreads out the two colours will separate because the two different dye molecules are being transported at different speeds.

In the gas-liquid chromatography the vapours of the esters are transported by helium gas through 30 m of heated silica capillary tube whose inner walls are lined with a polymer. The ester molecules travel at different speeds through the capillary depending on the mass of the molecule and the chemical bonding in the molecule. Each species of molecule thus emerges out of the end of the long capillary tube, at a different time. The time delay is characteristic of the molecule and the apparatus. Standard ester samples injected under identical conditions are used to calibrate the chromatograph. Thus the composition of fats in the original sample can be determined.

Greasy oven sample

A sample of black, greasy soil was taken from 65 cm below the surface in an oven in Square AG13 of the Fyffe moa hunter site at Kaikoura (Site S49/46:December 1982 excavation). Figure one shows the time delay (retention time) between when the processed sample is injected into the chromatograph (at time zero) and when its components emerge from the far end of the capillary.

Discussion

As the Fyffe site also contained seal bones and was later a whaling station, two modern fat samples were run for comparison

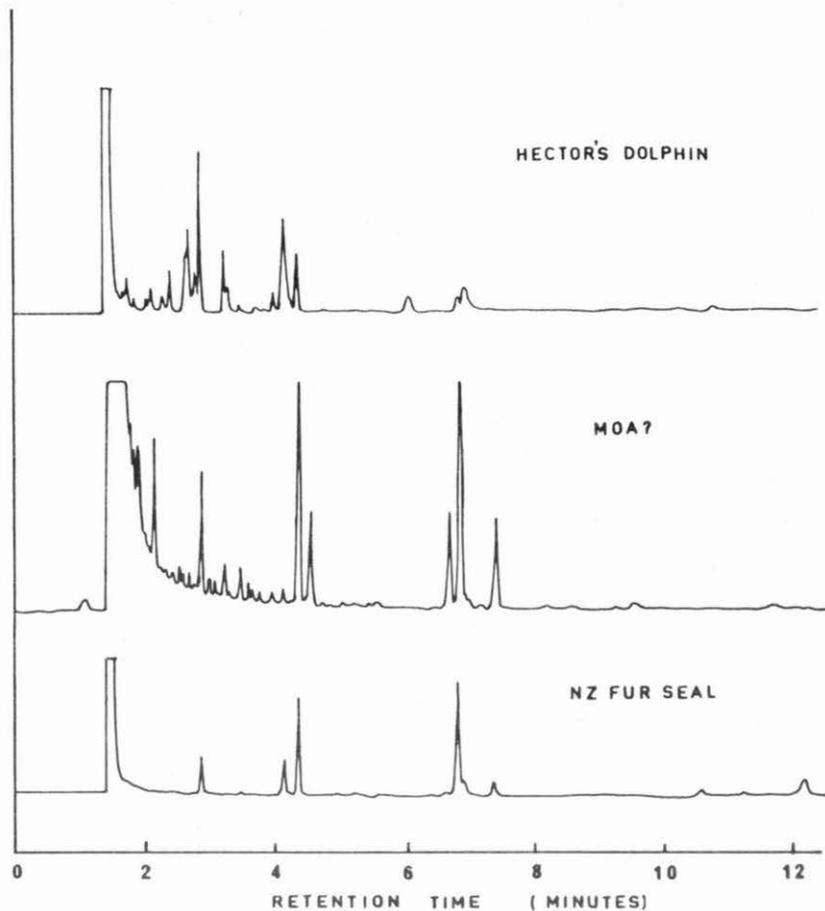


FIGURE 1. Gas-liquid chromatography 'fingerprint' of fat residues from a moa cooking area at the Fyffe site, Kaikoura (S49/46), compared with modern samples of blubber from a New Zealand fur seal and a Hector's dolphin.

purposes. Blubber from the New Zealand fur seal and from Hector's dolphin (the closest thing to a whale that the Canterbury Museum had in its freezers) yielded significantly different retention time graphs. The Fyffe sample (moa?) was very complex at short retention times. There is much work to be done in studying the breakdown of fats during cooking and during weathering in the soil.

Conclusions

It may be possible to identify which species of animal was cooked in a particular oven, that now contains no bone material, by extracting the fat residues from the soil and examining their composition with a gas-liquid chromatograph.

It may also be possible to learn something of the biochemistry of the moa. To do so we will need to study the degradation of fats in soil with time and with soil characteristics. A more direct way would be to use moa skin from a dry cave. The scrapings of about 1 cm² from the inside of a dried piece of moa skin should give a sufficient sample to work with.

If anyone is excavating a moa hunter oven please send us a small handful of the greasy soil with full particulars of location for both site and sample. A similar sized control sample will be needed from an equivalent depth outside the oven. In particular, initially, we would like oven samples where there appears to be no other animals cooked in or above the oven. Once we have chemical 'fingerprints' for individual animals then we can tackle the problem of ovens containing several types of animal.

Should anyone just happen to have in their back pocket a slab of blubber from an identified species of whale or a soil sample from a boiling down area of a whaling station, this too could be studied.