

Age and Diet of the Mummified Eskimos from Qilakitsoq

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By means of C-14 measurements, six samples from the mummies found at Qilakitsoq have been dated to the period AD 1460–1510, with a mean close to AD 1470. Combined C-13 and C-14 analyses of tissue from the four-year-old boy in Grave I suggest that $75 \pm 7\%$ of his diet consisted of marine food components, while the remaining 25 % were of terrestrial origin.

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It is known from contemporary drawings and paintings that the characteristic pattern and fashion of the remarkably well-preserved skin garments of the mummies from Qilakitsoq were in use in the 16th and 17th centuries; but it has not been known so far how early this fashion came into existence. It was therefore decided to try a direct dating of the mummies by means of their C-14 content in order to assess their ages and to see if any age differences could be detected between the individual mummies or between the two graves.

Precise datings of tissues from human beings by means of C-14 are only possible if the ratios of marine to terrestrial food components in their diets are known (Tauber 1983). Since these ratios can only be estimated within wide limits, considerable uncertainties in the dating of human tissues from the mummies could be envisaged. It was therefore decided to base the datings on samples of the skins of animals with a well established marine or terrestrial association, like seal and caribou. These samples were taken from the skins that covered the individual mummies, specifically from the topmost and lowermost mummies in each of the two graves. These samples were further supplemented with an additional skin sample from each grave. After thorough pretreatment to purify the skin samples of possible extraneous carbon compounds, the samples were combusted to carbon dioxide, the gas was further purified, and the C-14 content was determined in a gas proportional counter. After a correction for differences in the original C-14 content of marine and terrestrial materials, as monitored by the measured differences in C-13 content, the results given in column 4 of Table 1 were obtained. The ages are expressed in conventional C-14 years with uncertainties ranging from ± 45 to ± 65 years.

Due to secular variations in the C-14 content of atmospheric carbon dioxide, and thus of plants and animals, ages calculated directly from the C-14 content of samples need a correction in order to be comparable with solar years, i.e. the usual calendar years. This is done by comparisons with the C-14 content of dendrochronologically dated wood samples. A calibration curve based on such measurements from the long American bristlecone pine chronology was constructed by Clark (1975). The calibrated ages according to this curve are also given in Table 1. After the datings were made, a new and more precise calibration curve, this time based on a dendrochronologically dated sequence of Douglas fir from the northwestern USA, was published by Stuiver (1982). If calibrated in accordance with this new curve the ages of the skin samples deviate only 5–20 years from the previous values.

It may, however, be noted that the more precise calibration curve by Stuiver shows rapid variations in the C-14 content of plant material. As a consequence of these rapid variations an age in conventional C-14 years does not always correspond to a single calendar year. In certain periods a C-14 age may correspond to a whole time interval, all ages within this interval being almost equally probable. This applies to the age of the topmost mummy in Grave II (K-3395). According to the Clark calibration curve the C-14 age of K-3395 corresponds to AD 1510 in calendar years, while the more recent Stuiver curve allows all calendar ages in the time bracket AD 1500–1625, though with slightly higher probability for ages within AD 1500–1520.

As mentioned, the uncertainties in the C-14 ages vary from ± 45 to ± 65 years. When this is taken into consideration no significant difference in age between the individual mummies, or between the two graves, has

Table 1. Measured C-13 values and C-14 ages of samples of seal skin, caribou skin, and one of the mummies from Qilakitsoq.

Sample	Material	$\delta^{13}\text{C} \text{ ‰}$	Measured ages in years AD		
			^{14}C years	Calendar years	
				Clark	Stuiver
Grave I:					
K-3393	Seal	-14.1	1550 ± 65	1470	1450
K-3019	–	-13.6	1540 ± 50	1465	1450
K-3394	Caribou	-19.7	1570 ± 65	1480	1475
Average				1470	1460
K-3020	Human	-14.8			
Grave II:					
K-3395	Caribou	-19.0	1610 ± 45	1510	(1510)
K-3018	–	-18.8	1530 ± 50	1460	1445
K-3396	Seal	-14.8	1550 ± 45	1470	1450
Average				1480	(1470)

been established. All the mummies may thus originate from a single burial, the most likely age of this event then being close to AD 1470. On the other hand, the C-14 datings do not exclude the possibility of successive burials over a time span of some decades. The C-14 method is not precise enough to distinguish between these alternatives.

The C-14 content of tissue from the four-year-old boy in Grave I (K-3020) was also measured. Although this measurement cannot be used for a meaningful calculation of the age of the boy, in combination with a measurement of the C-13 content in the tissue it allows an estimate of the diet of the boy in terms of marine and terrestrial components.

The stable carbon isotope C-13 makes up about 1 % of the carbon atoms in all living organisms, but the precise content varies slightly depending on whether the carbon compounds ultimately originate from photosynthesis in a terrestrial or a marine environment. If applied to samples from human beings C-13 measurements therefore contain information of the origin of the dietary components (Tauber 1981a, 1981b). The C-13 content is usually measured relative to the international PDB-standard and expressed in $\delta^{13}\text{C}$ values, which give the per mille differences from the C-13 content in the standard.

Measured in this way, proteins in bones and skin from marine animals usually have $\delta^{13}\text{C}$ values in the range -10 to -17 ‰ (the negative values only indicate that the C-13 content is lower than that of the standard), while

proteins of terrestrial animals usually have $\delta^{13}\text{C}$ values in the range -18 to -23 ‰. The sample taken from the four-year-old boy had a $\delta^{13}\text{C}$ value of -14.8 ‰, which indicates a predominance of marine food components in the diet.

If it is assumed that the age of the boy is equal to the mean age of the skin samples in the two graves, i.e. AD 1470 in calendar years, the measured C-14 content of this tissue (normalized for isotopic fractionation) allows a more direct calculation of the ratio of marine to terrestrial food components in his diet. This calculation gives the result that $75 \pm 7 \%$ of his diet consisted of marine components like seal meat and fish, while the remaining 25 % originated from terrestrial sources, presumably mainly from caribou.

References

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