

NEW RADIO CARBON (C^{14}) AGE DETERMINATIONS OF MAMMAL REMAINS FROM THE PERMAFROST IN SIBERIA

BY

A. HEINTZ

(Paleontologisk museum, Sars gate 1, Oslo 5)

Abstract. The ages of four different mammals — a horse, a mammoth, a woolly rhinoceros, and a bison — all from the permafrost in Siberia, have been determined with the aid of radio carbon (C^{14}) dating at Laboratoriet for Radiologisk Datering in Trondheim, Norway. The age of the horse, mammoth, and rhinoceros varies from 37,700 to 33,000 years. The age of the bison, however, was only c. 15,000 years.

In a recently published paper HEINTZ and GARUTT (1964, 1965) gave the results of some C^{14} age determinations for six mammoths and a woolly rhinoceros from the permafrost in Siberia.

In 1965, Dr. V. E. Garutt, Zoological Institute, Leningrad, kindly sent me four new samples of different mammals from Siberia in order to obtain additional age determinations. In a forthcoming paper, Dr. Garutt will give a more thorough description of these four samples. In this note, I will therefore only state the results of the C^{14} determinations, which were performed, as before, at Laboratoriet for Radiologisk Datering in Trondheim, under the supervision of Dr. R. Nydal. Here I would like to express my thanks to Det Råd-givende Utvalg for Radiologisk Datering for allowing the work to be performed.

Two methods were used in treating the material. Samples T-461 and T-489 were first treated with dilute hydrochloric acid (5%) to remove any carbonates, and samples T-462 and T-488 were heated in dilute hydrochloric acid (5%) until the boiling point was reached. In this way, the fat was separated, and it was only this fat which was subsequently used for the age determination. The actual age deter-

mination was identical for all the samples. Each was burned in oxygen to convert carbon to carbon dioxide, and the C^{14} content of the latter was then estimated by means of a proportional counter.

Sample T-461 represents part of the skin and muscle of a horse, *Equus caballus fossilis* L., found on the bank of the river Garyn in the Indigirka district, NE Siberia. The age was determined as $37,700 \pm 2,200$ years (from 1950).

Sample T-462 represents part of the skin of a mammoth, *Mamuthus primigenius* (BLUMBACH), which was discovered on the Taimyr peninsula in N. Siberia. It will be remembered that one of the mammoth remains previously used for age determination (T-297) also originated from Taimyr and proved to be the most recent mammoth known — living only approximately 12,000 years ago (HEINTZ and GARUTT 1965).

A note appearing in the newspaper *Vecherniji Leningrad* of 6 August 1965 — and kindly sent to me by Dr. Garutt — reports that there are now at least 10 mammoth carcasses with more or less well-preserved soft parts known from Taimyr. The most recently discovered specimen treated in this paper (T-462) was found by fishermen on the bank of the river Pjasina ($72^{\circ}N$), region Taimyr, in May 1964. The fishermen reported the find of an 'unknown animal', and a preliminary investigation was carried out by the zoologist M. Geller. Apparently the carcass had been transported some distance (by the river?) after death but, in spite of this, it is almost as well preserved as that of the well-known Beresovka mammoth. It is truly remarkable that such a large quantity of the soft parts of the carcass is present. This amounts to about 500 kg, including the stomach with food remains. The flesh was so well preserved that polar foxes had dug passages through the ground into the carcass in order to eat the frozen meat.

Parts of the soft tissues and stomach of the Pjasina mammoth have now been sent to several Russian and foreign specialists for more detailed investigations. (The above information is taken from the newspaper note.)

The C^{14} age determination of fat separated from this sample has given a maximum age of 37,600 years, calculated with 95% (2 σ) certainty.

In a letter to me in October 1965, Dr. Garutt mentions that Professor Pudenko, Archaeological Institute, U.S.S.R., has also recently determined the age of the Pjasina mammoth, and his results

give an age of only approximately 25,000 years. The relatively large differences between the determinations can be explained partly by the different techniques used. It will be very interesting to carry out new investigations to resolve this discrepancy.

Sample T-488 represents a portion of the skin from the mouth of a woolly rhinoceros, *Coelodonta antiquitatis* (BLUMBACH), discovered in the Yana river territory of NE Siberia. Here also, only the separated fat was used. The age was determined as 'less than 33,000 years' (from 1950) with a certainty of 95% (2 σ).

Sample T-489 is the horn of a bison, *Bison priscus* BOJANUS, collected near the river Bnolkalaach in NE Siberia. The outermost layer of the horn was removed and only 50 g of the inner part was used. The age was determined as $14,980 \pm 120$ years (from 1950).

Three of the new determinations, the horse from Garyn ($37,700 \pm 2,200$ years), the Pjasina mammoth (less than 37,600 years), and the woolly rhinoceros from Yana (less than 33,000 years) fall within the period of the Göttweiger Interstadion, and thus correspond well with the values previously published by HEINTZ and GARUTT (1965, p. 76, Fig. 1).

However, according to Prof. Pudenko the age of the Pjasina mammoth is only 25,000 years. If this is correct, the Pjasina mammoth must have lived in Siberia at the beginning of the Main Würm Stage, when the climate rapidly deteriorated.

The age of the bison is only about 15,000 years, and this corresponds to the last part of the Main Würm Stage, when there was a distinct improvement in the climate.

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