

MAMMOTH RADIOCARBON DATES FROM THE NORTHERN
CHANNEL ISLANDS, CALIFORNIA

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ABSTRACT

We report the first mammoth tusk found (1985) on Santa Cruz Island, California. The tusk was secondarily deposited in alluvium of a former Pleistocene streambed. Wood in contact with the tusk radiocarbon dated at $10,290 \pm 100$ ^{14}C yr B.P. (AA-1268). As this date obviously was equivocal relevant to the age of the tusk, we reviewed all dates published for mammoth fossils on the Northern Channel Islands. We conclude all of these dates also are equivocal. The reasons for this conclusion are discussed.

INTRODUCTION

Hundreds of mammoth fossils (Mammuthus jeffersonii exilis [Kurten and Anderson 1980]; the nomenclature of American mammoths is still unsettled, cf., Agenbroad 1984) occur on the Northern Channel Islands, California. These remains figure prominently in an hypothesis, generally considered unconfirmed, that the last island mammoths were killed and "barbecued" by the first humans to occupy the islands (cf., Cushing et al. 1986; Glassow et al. 1983; Moratto 1984; Orr 1968). This paper concerns the radiocarbon dating of these fossils. This matter is of significance, as these dates continue to be given validity by being perpetuated in the archaeological literature (e.g., Breschini et al. 1988).

The discovery of the first mammoth tusk on Santa Cruz Island in 1985 (also see Cushing et al. 1984) led us to review critically the original publications of island mammoth dates and the conclusion presented here. We believe this review is complete and note that we did not extend it to secondary citations (some of these are not accurate or are confusing) or to other dates which are not published in edited journals. We emphasize that our review concerns only those island dates specifically concerned with mammoths.

DISCUSSION

The tusk, a left one some 215 cm in length and 12 cm at its greatest circumference, had the two curves, often characteristic of mammoth tusks (no mastodont, Mammut americanum [Kerr 1796] remains have ever been found on the islands). It had become exceedingly fragile due to the diagenesis which affects the island fossils in varying ways. It was lying in a partially consolidated mixture of rocks, gravel, sand and clay composing the alluvium of a Pleistocene streambed, exposed by erosion, in the north bank of Christy Arroyo, in secondary association with fossil vegetation. A piece of wood directly in contact with the tusk was radiocarbon dated for us courtesy of A.J.T. Jull at $10,290 \pm 100$ ^{14}C yr B.P. (AA-1268). Obviously, however, due to their secondary association, the age of the tusk could not be inferred from that of the wood. This situation led us to our literature review.

We found that there were 14 mammoth related radiocarbon dates. These fell into two groups. The first group of 8 dates (Table 1) were those inspired from the radiocarbon dates of "charcoal" (see below) associated with mammoth remains.

Table 1. "Charcoal" associated radiocarbon dates for mammoths on the Northern Channel Islands, California.

Date in ^{14}C yr B.P.	Laboratory	Reference
11,800 \pm 800	UCLA-106	Fergusson and Libby 1962
12,500 \pm 250	L-290T	Broecker and Kulp 1957 (cf., Orr and Berger 1966 for mammoth reference)
15,820 \pm 280	L-244	Broecker et al. 1956
16,520 \pm 150	ISGS-518	Liu and Coleman 1981
16,630 \pm 460	ISGS-525	(leached 0.1 NaOH)
16,700 \pm 1,500	M-599	Crane and Griffin 1958
27,000 \pm 800	UCLA-746	Berger and Libby 1966 (cf., Orr 1968 for mammoth reference)
>40,000	UCLA-749	Berger 1980, 1982

None of these reports commented on whether or not the associations were primary or secondary. The few comments relevant to this point suggested that the associations were loosely inferred and in all probability secondary ones. Added probability to this inference was given by several comments that most of the dated fossils were in the Tecolote alluvial fan and by Orr's (1968) statements that all island mammoth remains were disarticulated and so scattered that no essentially complete skeletons were found. Our own observations support Orr's, as does the statement of D.L. Johnson (personal communication, in

Stanford 1983) that "It is thought, however, that all the finds to date are probably situated in a redeposited context". Finally, the probable occurrence of island mammoths throughout at least the Wisconsin glaciation (Orr 1968) and the complex island geological changes during this period raise questions as to whether or not mammoth fossils of very different ages might have come to be redeposited in the same context.

Consideration of the above points led us to the conclusion that all of the dates shown in Table 1 are equivocal.

The second group of ^{14}C dates were 4 derived directly from the skeletal material of two individuals. The first of these, S.B.M.N.H. Paleo. No. 102, was a collagen date of $8,000 \pm 250$ ^{14}C yr B.P. (UCLA-705) (Berger et al. 1965). However, this fossil was associated with "charcoal" dated at $12,500 \pm 250$ ^{14}C yr B.P. (L-290T) (cf., Table 1) which led Orr to note: "Discrepancy between dates not understood." This seeming discrepancy, the recent great advances in collagen dating methods (cf., Stafford and Tyson 1989; Taylor 1987) and the young age of the date lead us to conclude that it is equivocal.

The second individual, S.B.M.N.H. Paleo. No. 240, was dated in three different ways. The first was from "thoroughly charred mammoth bone" (cf., Cushing et al. 1986) reported at $29,700 \pm 3,000$ ^{14}C yr B.P. (L-290R) (Broecker and Kulp 1957). The second, on collagen from "unburned bone" that was used as a control in studies on dating by aspartic acid racemization (Bada et al. 1974), was $30,400 \pm 2,500$ ^{14}C yr B.P. (UCLA-1898). The third was the racemization date of approximately 33,000 yr B.P.

Consideration of the continuing arguments concerning the validity of racemization dating and the recent advances in collagen dating methods noted above, led us again to the conclusion that these dates are equivocal.

Finally, two additional dates, one of $29,500 \pm 2000$ ^{14}C yr B.P., the other of $64,500 \pm 7,400/6,900$ ^{14}C yr B.P., have been reported, using Uranium-thorium dating methods (Madden 1981). However, there is insufficient information to evaluate the validity of these dates which also leaves them equivocal.

The above considerations bring us to the overall conclusion that all dates for the mammoths on the Northern Channel Islands are equivocal and, more positively, should be stated as "unknown" in future publications.

We note that the abundant fossil carbonized vegetation on the islands should not be indiscriminately referred to as "charcoal." Carbonization can be caused by ground water as well as by fire (Cook 1964; Haynes 1967; Riddell 1969) and there are no generally applicable methods to directly distinguish between these two actions (Cushing 1987). So far there is only evidence

on the islands for groundwater carbonization (Cushing et al. 1986), but, while possible, none as yet for hypothesized carbonization by fire (Wendorf 1982).

We believe our study emphasizes a general point, not always recognized in archaeology, that the use of collagen and TAMS methods for dating archaeological and other materials does not mean that the dates obtained are necessarily more accurate archaeologically. To the contrary, these methods show that since the mid-1980s far greater precautions must be taken in both methodology and site interpretations, as well as in accepting radiocarbon dates made before this critical period (cf., Stafford and Tyson 1989).

NOTES

The initial find of the tusk, its subsequent excavation and transport to the Santa Barbara Museum of Natural History for exhibit, involved, besides ourselves, the cooperation of too many persons to acknowledge individually excepting the late Carey Stanton, Santa Cruz Island Company, for his generous support in all phases of this work, and Robert Gray, Santa Barbara Community College, for his supervision of the excavation of the tusk.

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