

A FEMALE BISON BISON FROM QUATERNARY SEDIMENTS OF LYMAN COUNTY, SOUTH DAKOTA

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ABSTRACT

In August, 2004, during on-going paleontological surveys of the Missouri River basin, a nearly complete specimen of a *Bison* cranium was recovered. Anatomical features, comparative measurements, and the conditions of its dentition all indicate a mature female *Bison bison bison*. It is the third specimen recovered during the current surveys, and was in the flood basin of the river in Lyman County. A pair of innominate bones and several vertebrae were apparently associated with the cranium. No evidence of human association was found.

The terrace sediment from which it was excavated was immediately adjacent to the west bank of the existing lake, and only a short stratigraphic interval above an outcrop of the Niobrara Formation (Cretaceous). The matrix, presumed to be mostly reworked from the Niobrara Formation, is a poorly-sorted mixture of angular and rounded chalk chips in clay matrix.

Bone from the skull was submitted for radiocarbon testing, as was done with the previous two specimens. Results indicated the specimen, SDSM 73802, is 850+/-40 radiocarbon years B.P., differing somewhat from the other two specimens in being somewhat older.

Keywords

Bison, South Dakota, Missouri River, Quaternary, radiocarbon

INTRODUCTION

Paleontological surveys of the Missouri River Basin have been conducted by the South Dakota School of Mines and Technology for more than a decade. In the present situation, the locality is on tracts of the United States Army Corps of Engineers, and conducted by permit of that federal agency. Although the emphasis is on fossils of Cretaceous age, there have been other incidental discoveries. Of particular interest have been the several *Bison* cranial specimens that have been found. We have subjected these specimens to more detailed study than has often been the case, hoping to obtain absolute dating of them, and to determine depo-

sitional circumstances and sediment information. This specimen, SDSM 73802, is the third to be reported by our surveys. (See Grandstaff, B. S., *et al.*, 2000, and Martin, J. E., 2003.), and was recovered during the first week of August, 2004.

We have periodically received casual reports of bones eroding from Quaternary sediment near Oacoma, Lyman County. Specimens brought to our attention from the locality reported here have all been loose isolated specimens, and most were not identifiable to species. In this case, however, not only was the specimen still largely *in situ*, but there were other bones in apparent association. The discovery by one of us (J. M. B.) was incidental while prospecting for fossils in the underlying bedrock of the Niobrara Formation (Cretaceous age). The locality is in the SE1/4 of the SW1/4 of the NW1/4 of the NE1/4 of Section 17, T.104N., R 71W., Oacoma, Lyman County, South Dakota. It is along the west bank of the Missouri River (Lake Francis Case) just north of the Chamberlain-Oacoma causeway. The matrix appears to be a poorly sorted accumulation of both angular and rounded clastic particles, largely eroded and redeposited from the underlying Niobrara Formation. A substantial sample of matrix has been retained for potential future analysis.

The bones were exposed at the surface and eroding from it. They were readily recovered without elaborate collecting methods, but with substantial matrix adhering to them. Positions were recorded by photograph. The skull was identified as the genus *Bison* in the field, but subsequent examination was needed before making any decisions as to how to proceed with subsequent study. It was decided to take it to the New Jersey State Museum for preparation and analysis. It was carefully prepared by volunteer Jared Williams at the Museum, and bone samples were submitted to Geochron Laboratories for radiocarbon date determination, as has been done with previous finds of *Bison*.

DESCRIPTION AND DETERMINATIONS

By comparison with the criteria and illustrations of Skinner and Kaisen (1947) and McDonald (1981), SDSM 73802 is judged to be a female *Bison bison bison*. Notable features include the relatively small overall size (Table 1) and gracile proportions, notably the modest size of the horns. Accordingly, comparison to the criteria of generic diagnosis is desirable (McDonald, 1981), in order to justify its distinction from the genus *Bos*. Specifically, the horns extend outward from the frontals forward of the occipital plane. The parietals are in the same plane as the frontals and make an obtuse angle with the occipital plane. The orbits are tubular and project antero-laterally. These distinctions certainly justify referral to the genus *Bison*.

The horn cores are elliptical in cross-section, including the tip portions, with a straight posterior margin, lacking a basal burr, and the length along the upper curve is less than 200mm (specifically 130 mm), justifying the identification as a female. The cranium is practically complete, lacking only the nasals and right premaxilla, with only a few broken projecting bones. All twelve teeth of an adult individual are present. Comparison to the illustrations of Skinner and Kaisen

Table 1: Measurements of *Bison bison* specimen (female), SDSM 73802, described herein, according to standards established by McDonald (1981) and followed by Grandstaff et al. (2000).

Tip-tip Core Width	430mm
L.core on upper curve	130
L. core on dorsal cord	120
D.-v. diameter horn base	60
Min. circ. horn base	160
W. at ext. aud. meatus	210
W. occipital condyles	110
D. nuchal line-for. mag.	100
a-pt. diam horn base	50
Min. width frontals	210
Max. width frontals	260
M1-M3 length (labial side)	90
Max. width M3 (mesial cusp)	22
Total length of skull	470
Length of frontals	210

(1947) indicates a stage four dentition, a mature (but not old age) female. Indeed, the entire specimen compares well to stage four of their Plate 11.

In close proximity to the specimen were a pair of innominates and the intervening sacral vertebrae in two portions. These are identified as *Bison* also, and there is no reason to doubt the apparent association with the cranium.

No certain cultural evidence was found in or near the specimen. However, during preparation, Jared Williams noted the presence of a marked surface on the ventral side of the right occipital condyle. This portion had been covered by matrix prior to preparation, and thus antedated the discovery and collection of the cranium.

The specimen was determined to be 850+/-40 radiocarbon years BP (based on Sample # GX-31627-AMS). This is somewhat older (by approximately a century) than the two crania previously determined.

DISCUSSION AND CONCLUSIONS

Standards for recording specimens of *Bison* were proposed by Grandstaff *et al.* (2000), and we are reporting this one accordingly. Females of the subspecies *Bison bison bison* are presumed to be the smallest individuals of the genus, and could conceivably be misidentified as domestic cattle. That is certainly the case with this specimen, as demonstrated by the list of measurements and comparison with other published specimens. Most of the measurements are comfortably

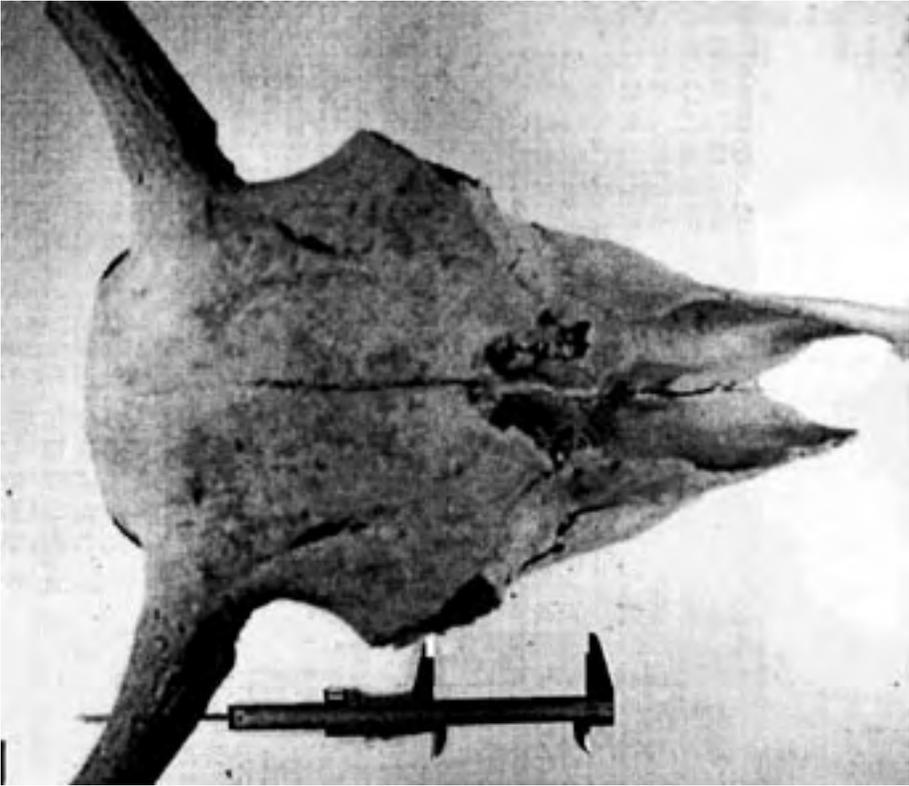


Figure 1. Specimen in dorsal view. Micrometer span set at 100mm.

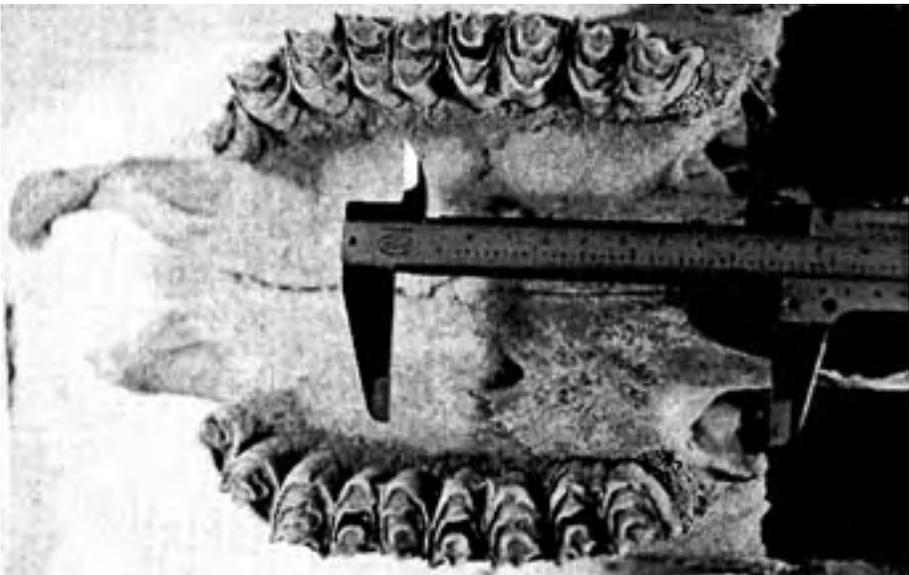


Figure 2. Palatal view of dentition. Micrometer span set at 100mm.

within the ranges for females of that subspecies, and those which are outside the ranges are only slightly so (McDonald, 1981).

The age of this specimen differs only slightly from the two previously determined, and probably can be considered comparable in relation to the flooding and depositional history of the Missouri River basin.

LITERATURE CITED

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