Odyssey Archaeological Research Program
Bluefish Caves, Yukon Territory, Canada
Report of Investigations, Summer 2009

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BLUEFISH CAVES, YUKON TERRITORY, NORTHWEST CANADA

INTRODUCTION

The Bluefish Caves site may represent the earliest well-documented evidence of humans in North America. However, the stratigraphic context of the cultural deposits has been challenged, and the site formation processes have not been clearly defined. In 2019, Odyssey conduct limited archaeological testing at Cave III to determine if cultural deposits occur and are in direct association with the remains of Pleistocene fauna. Also, a reconnaissance was conducted to determine if other caves are present in the immediate vicinity of Bluefish Caves I, II and III.

SETTING

The site of Bluefish Caves is in the northern Yukon Territory of Canada (Figure 1). The site is located in the Keele Range about 54 km southwest of Old Crow village. The site is comprised of three small karstic cavities, ranging from 10 to 30 m^3, situated below a limestone ridge about 250 m above the right bank of the Bluefish River (Figures 2 and 3). All three cavities contain a unit of loess (Unit B) up to 1 m thick above bedrock (Unit A) (Figure 4). Unit B is mantled by a humus layer mixed with cryoclastic debris (Unit C), and finally, a modern humus layer (Unit D).

HISTORY OF RESEARCH AND RESULTS OF PREVIOUS INVESTIGATIONS

Bluefish Caves were excavated from 1977 to 1987 under the direction of Jacques Cinq-Mars of the Archaeological Survey of Canada (Cinq-Mars 1979, 1990; Morlan and Cinq-Mars 1982; Cinq-Mars and Morlan 1999). Small artifacts were recovered from the loess in Cave I and Cave II, and rich

faunal assemblages were recovered from all three caves. The lithic assemblages (which number about one hundred specimens) include microblades, microblade cores, burins and burin spalls as well as small flakes and other lithic debris. Most of the artifacts were recovered from the loess of Cave II at depths of about 30 to 155 cm. The deepest diagnostic artifacts – a microblade core, a burin, and a core tablet found inside Cave II, as well as a microblade found near the cave entrance – were recovered near the bottom of the loess at a depth of about 110 to 154 cm below datum. Although the artifacts cannot be dated with precision, they are typologically similar to the Dyuktai culture that appears in Eastern Siberia about 16,000-15,000 cal B.P., or possibly earlier, at ca. 22,000-20,000 cal B.P. There are no reported hearth features.

Paleoenvironmental data from Bluefish Caves, including evidence of herbaceous tundra vegetation and vertebrate fauna typical of Pleistocene deposits found elsewhere in Eastern Beringia, is consistent with previously obtained radiocarbon dates that suggest the loess in the caves was deposited between 30,000 and 11,000 cal B.P. Chronological evidence from Bluefish Caves I and II led to the initial suggestion that human occupation of Eastern Beringia occurred before the LGM, as early as 24,800 ^{14}C yr B.P. (Cinq-Mars 1979, 1990; Cinq-Mars and Morlan 1999). However, doubts as to the stratigraphic integrity of the site and anthropogenic nature of the bone samples submitted for radiocarbon analysis did not encourage the scientific community to accept this hypothesis (see Dixon 1999; Hoffecker and Elias 2007; Goebel et al. 2008). In order to clarify the nature of the bone assemblages and to establish the chronology of human occupation of the site, Bourgeon (2015) undertook a re-analysis of the faunal assemblage from Bluefish Cave II from a rigorous, taphonomic perspective. She demonstrated that humans partially contributed to the modification of the bone material. Bourgeon et al. (2017) extended the taphonomic analysis to the faunal assemblage of Cave I. They focused on identifying undisputable traces of human activity and provided new, reliable AMS

^{14}C ages on cut-marked bone specimens from both caves.

Bourgeon et al. (2017) analyzed 36,000 mammal bones from Caves I and II. As previously reported (Cinq-Mars 1979, 1990; Cinq-Mars and Morlan 1999), the faunal spectrum of the Bluefish Caves is diversified and includes several carnivore taxa. The taphonomic analysis revealed that wolves, lions and, to a lesser degree, foxes were the main agents of bone accumulation and modification, but that humans also contributed to the bone accumulations in both caves (Bourgeon et al. 2017), partially confirming earlier taphonomic studies. The archaeozoological evidence, together with the small size of the lithic assemblages, suggests that human occupation of Caves I and II was probably sporadic and brief.

Bourgeon et al. (2017) recorded a total of fifteen bone samples with cultural modifications confidently attributable to human activities (N = 10 in Cave I and N = 5 in Cave II), based on morphological and morphometrical criteria, and twenty more samples with probable cultural modifications for a total of less than 1% of the faunal remains. Different activities are attested, including skinning, dismembering and defleshing. Cut marks were observed on horse (*Equus lambei*) (Figure 5), caribou (*Rangifer tarandus*) (Figure 6), wapiti (*Cervus elaphus*), and possibly Dall sheep (*Ovis dalli*) and bison (*Bison priscus*), and include a previously published bird scapula. Six of the cut-marked bones were selected for AMS dating. The radiocarbon ages range from 10,490±55 ^{14}C B.P. to 19,650±130 ^{14}C B.P. (12,000 to 24,000 cal B.P.), and are consistent with previously reported radiocarbon ages for Bluefish Caves. An old date that was determined by the RadioIsotope Direct Detection Laboratory on a cut-marked horse metatarsal from Cave I (17,440±220 ^{14}C B.P.; RIDDL-278) is now strengthened by two new ages determined on the same specimen: 17,660±100 ^{14}C B.P. (OxA-33774) and 17,610±100 ^{14}C B.P. (OxA-33775). The oldest age reported by Bourgeon et al. (2017), 19,650±130 ^{14}C B.P. (OxA 33778) came from the cut-marked horse mandible from Cave II

(Figure 5) and is consistent with the stratigraphic position of the bone, which is reported to have been found in the basal loess, at a depth of 142 cm below datum. Unfortunately, the exact depths at which the other dated bone specimens were recovered could not be established from the archival records, but the vast majority of the faunal material came from the bone beds contained in the lower loess layers in both caves (Bourgeon et al. 2017).

Based on the results of their analysis, Bourgeon et al. (2017) conclude that the Bluefish Caves site is the oldest known archaeological site in North America and furthermore proves that people were in Eastern Beringia during the LGM, by at least 24,000 cal B.P., thus providing long-awaited archaeological support for the "Beringian standstill hypothesis." According to this hypothesis, a human population genetically isolated existed in Beringia from about 15,000 to 23,000 cal B.P., or possibly earlier, before dispersing into North and eventually South America after the LGM.

2019 ODYSSEY RESEARCH AT BLUEFISH CAVES

Methods

In July 2019, a four-member Odyssey team comprised of Dr. Rolfe Mandel (KU and Kansas Geological Survey), Dr. Dennis O'Rourke (KU), Dr. Lauren Norma (KU), and Dr. Lauriane Bourgeon (Kansas Geological Survey) traveled to the village of Old Crow in the Yukon Territory of Canada. From there, the team traveled daily by helicopter to Bluefish Caves, for a total of four days at the site.

Caves I and II were inspected, but it was determined that most if not all of the late-Quaternary deposits within and in front of the rockshelters had been removed during previous archaeological excavations. At Cave III, however, most of the deposits were intact. Jacques Cinq-Mars excavated only a single trench in that rockshelter, and the trench, which is 1-m-wide x 5-m-long, was never backfilled. The Odyssey team focused on the open trench (Figure 7).

Beginning at the back of the rockshelter and continuing 2.5 m to the south, excavation of Unit B (loess) in the west wall of the open trench was conducted at 10 cm depth intervals down to bedrock. Only hand trowels were used. The excavation extended 20 cm horizontally into the wall of the trench and to a maximum depth of 1.77 m.

All soil and sediment removed from the west wall was passed through a 1/8" mesh screen. Bones and bone fragments recovered in the screen were collected and assigned provenience. Also, bones and bone fragments observed in the wall during excavation were removed after their provenience was recorded. Faunal materials recovered from the site were placed in labeled plastic bags and shipped to the Kansas Geological Survey for analysis. In addition, soil samples were collected for eDNA analysis (Figure 8). That analysis currently is underway at the University of Kansas Ancient DNA Laboratory and will be completed in the summer of 2020.

Results of Investigations

Archaeological testing of Unit B in the west wall of the abandoned trench exposed many bones of Pleistocene mammals, especially remains of horse and caribou (Figures 9 and 10). Also, nearly 150 bones and bone fragments were recovered during screening of the sediment. However, no lithic artifacts were recorded. Bones recovered from Cave III are at the Kansas Geological Survey, where Dr. Lauriane Bourgeon currently is inspecting them for butcher marks.

The reconnaissance of the immediate area around the caves resulted in the discovery of Cave IV (Figure 11). The entrance and interior of Cave IV are almost completely filled with sediment; hence, there is high potential for intact cultural deposits in this rockshelter. Cave IV, therefore, is a good target for future archaeological testing.

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Figure 1. The red dot on the map indicates the location of the Bluefish Caves site.

Figure 2. View of the limestone ridge at Bluefish Caves.

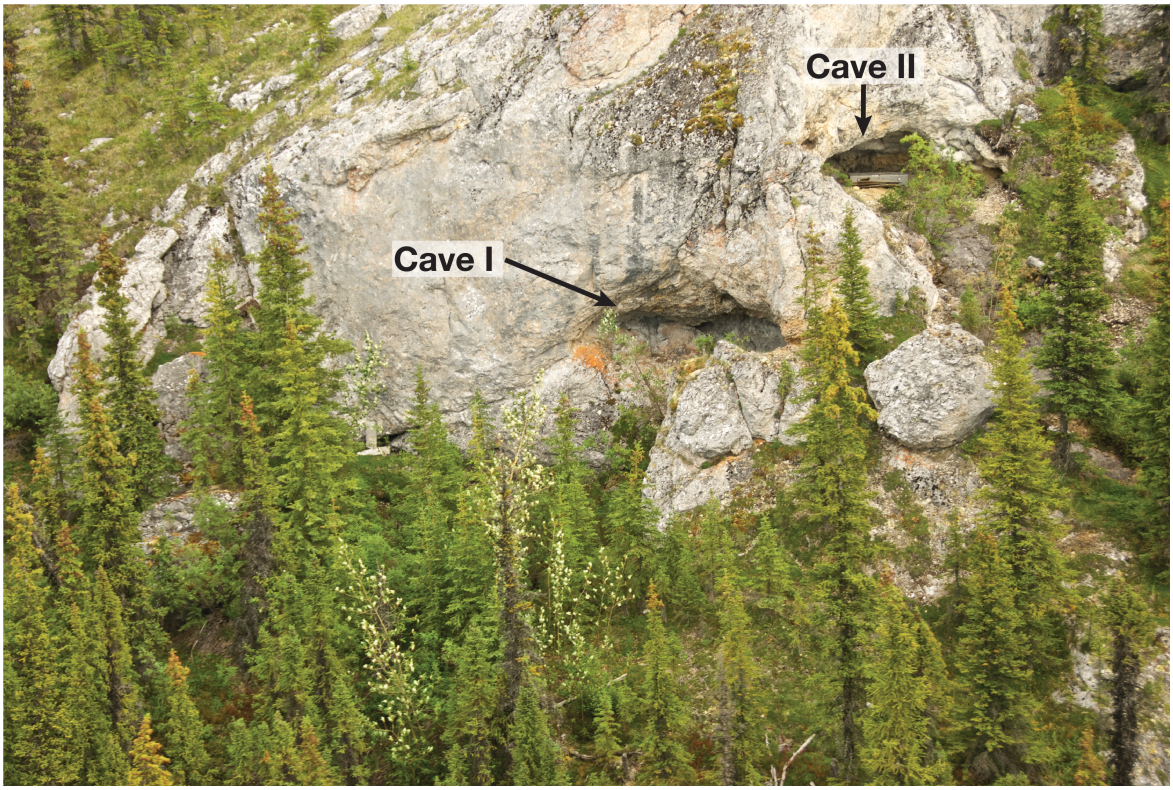

Figure 3. Bluefish caves I and II. View is to the east.

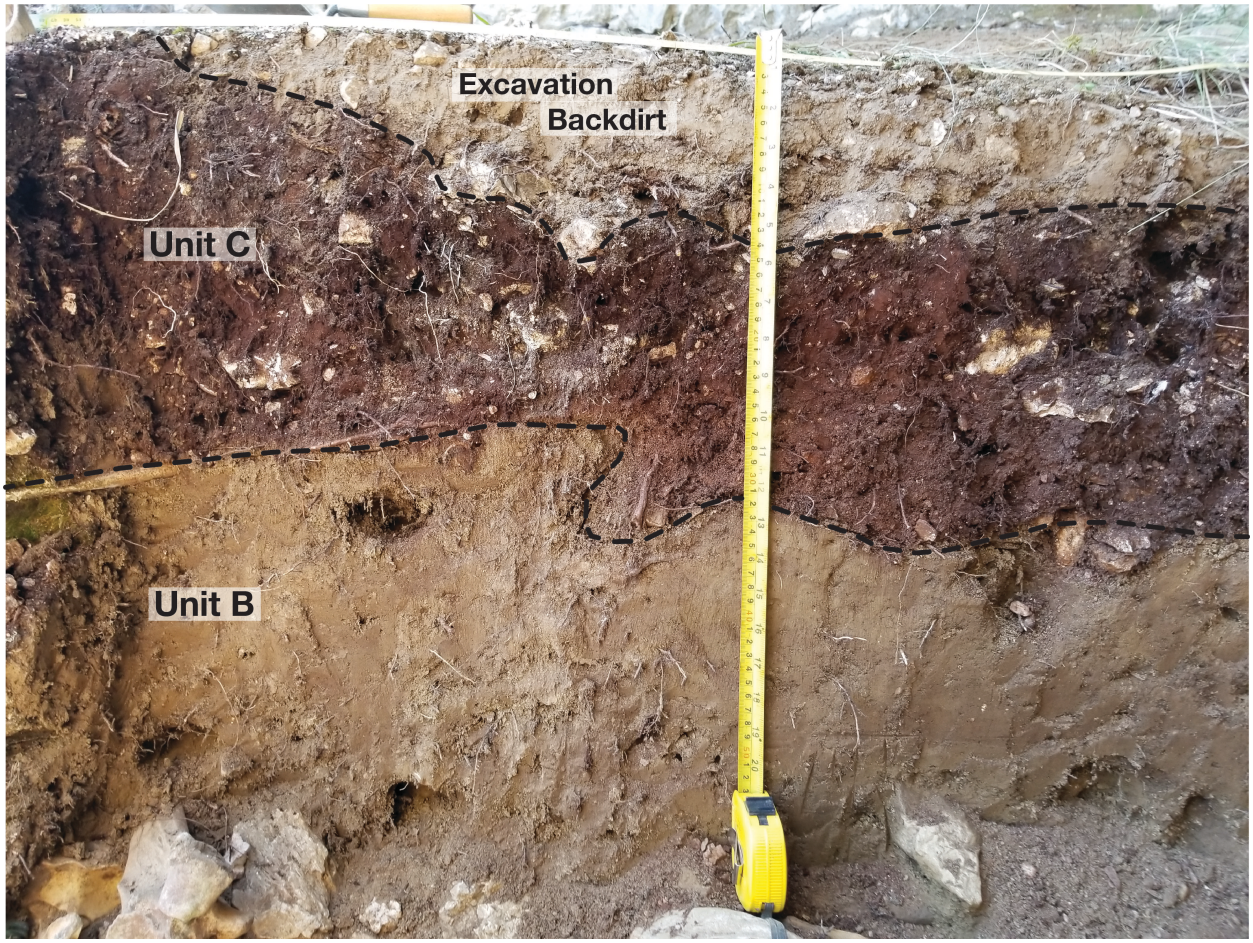

Figure 4. Stratigraphy exposed in the west wall of the trench at Bluefish Cave III.

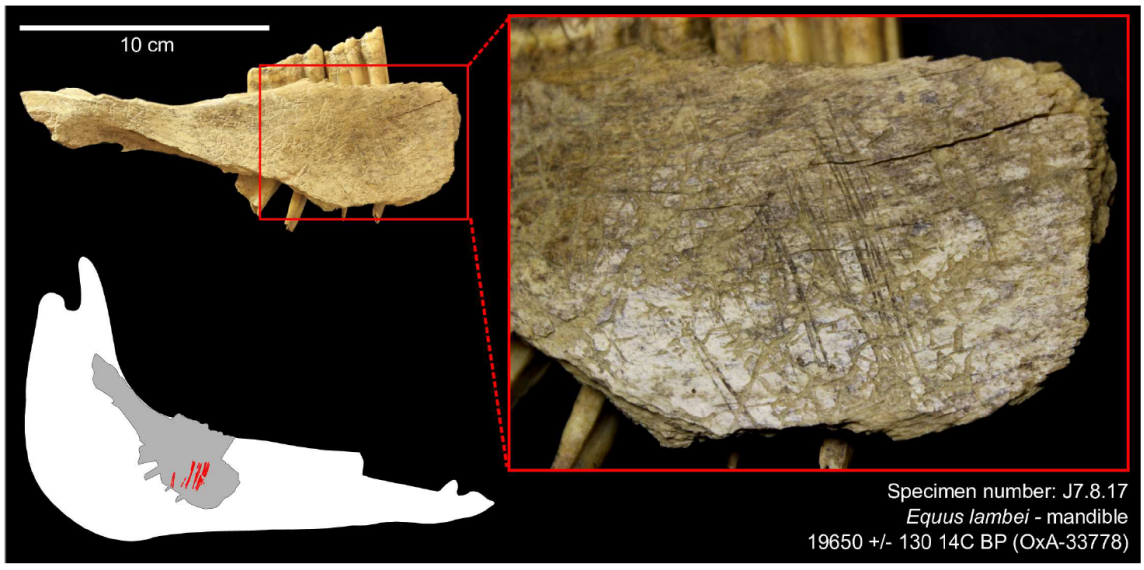

Figure 5. Cut marks on a horse mandible from Cave II. The specimen is dated to 19,650±130 ^{14}C BP (OxA-33778). The bone surface is slightly weathered and altered by root etching, but the cut marks are well preserved (from Bourgeon et al. 2017: Figure 1).

Figure 6. Cut marks on a caribou coxal bone from Cave II. The specimen yielded a an AMS age of 18,570±110 ^{14}C BP (OxA-33777) and shows straight and parallel marks resulting from filleting activity (from Bourgeon et al. 2017: Figure 2).

Figure 7. Cave III trench that was tested by the Odyssey team in 2019. The photograph was taken after excavation of the west (left) wall was completed.

Figure 8. Drs. O'Rourke and Norman collecting eDNA samples from the west wall of the trench in Cave III.

Figure 9. Five bones exposed at the bottom of Unit B in the west wall of the Cave III trench.

Figure 10. Horse mandible exposed at the bottom of Unit B in the west wall of the Cave III trench.

Figure 11. The entrance of Cave IV. View is to the northeast.