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## THE PALEOINDIAN COMPONENT AT CHARLIE LAKE CAVE (HbRf 39), BRITISH COLUMBIA

Knut R. Fladmark, Jonathan C. Driver, and Diana Alexander

*Charlie Lake Cave (HbRf 39) is a stratified site in northeastern British Columbia, Canada, containing a fluted-point component at the base of the excavated deposits. The small artifact assemblage includes a fluted point, stone bead, core tool, and retouched flake. A diverse associated fauna includes fish, birds, and mammals, indicating a more open environment than exists today. Radiocarbon dates suggest that the artifact assemblage was deposited about 10,500 years ago.*

Fluted points are found in most areas of southern Canada, but with the exception of Debert (MacDonald 1968), none has been found in direct association with datable material. In Alaska fluted points may date as early as 11,000 B.P. (Clark and Clark 1983) but, as in Canada, these fluted-point sites tend to have shallow or compressed stratigraphy with the possibility of mixing. There are no fluted-point sites north of the 49th parallel which contain points and faunal remains in a securely sealed and dated context. Consequently, the excavation of a dated fluted-point component in an undisturbed deep stratigraphic position with associated fauna is of significance for the prehistory of northwestern North America. This paper describes the stratigraphic sequence at Charlie Lake Cave, associated radiocarbon dates, and the artifacts and associated fauna of the earliest cultural component known from the site.

### SITE LOCATION, ENVIRONMENT, AND EXCAVATIONS

Charlie Lake Cave (HbRf 39) is located in the Peace River district of northeastern British Columbia, near the south end of Charlie Lake, 9 km northwest of Fort St. John (56°16'35"N, 120°56'15"W) (Figure 1). The site occupies the south-facing slope of a low, sandstone bedrock ridge above Stoddart Creek. The site lies at about 730 m a.s.l., and overlooks a flat-to-low relief plateau surface to the east and south predominantly composed of glacial and glaciolacustrine sediments (Mathews 1978). To the north and west the ridge merges with a complex of rolling, dissected uplands. Prior to modern land clearance, upland vegetation would have been spruce-dominated boreal forest, while south-facing slopes and the plateau would have supported a more open parkland community of grasses, aspen, spruce, and lodgepole pine (Farly 1979; White 1983).

Regional paleoenvironments of the late Pleistocene/early Holocene are known from geological and palynological studies (Mathews 1978, 1980; White 1983). The Charlie Lake area was covered by Wisconsin Laurentide ice. As the ice retreated, large lakes were formed, and most stages of glacial Lake Peace covered HbRf 39 (Mathews 1978, 1980). The Clayhurst stage of Lake Peace has shorelines of approximately the same elevation as HbRf 39. A small beach deposit just below the site probably dates to one of the Clayhurst stages (William H. Mathews, personal communication 1983). Mathews (1980:19) has suggested that Clayhurst terminated prior to 10,000 years B.P. The Clayhurst stage was followed by a number of stages with more restricted ice-dammed lakes, and it therefore is likely that the late Pleistocene/early Holocene human occupation at HbRf 39 took place in a landscape with a significant lacustrine component.

Palynological studies of the HbRf 39 sediments failed to yield more than a few grains of pollen. However, White's (1983) study of lakes about 120 km to the southeast provides data on the early

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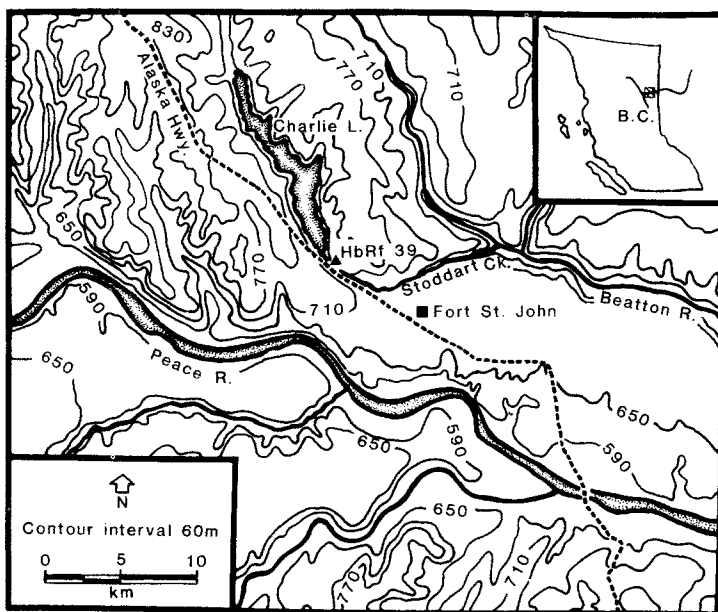


Figure 1. Location of HbRf 39.

vegetation of the region. The earliest deposits yielded a vegetation of herbs, grasses, sedges, mosses, and algae close to melting ice (12,000 to 11,700 B.P.), followed by the establishment of a deciduous tree-shrub-herb assemblage (11,700 to 11,300 B.P.) (White, 1983:109–115). Following this, spruce and pine pollen become dominant, suggesting that the establishment of coniferous forests probably took place between 11,000 and 10,500 B.P.

Charlie Lake Cave is situated near the top of a ridge, about 20 m above Stoddart Creek. The ridge slopes steeply down to the creek from the cave, but the gradient declines above the cave, forming a low-relief ridge crest about 10 to 15 m above the roof of the cave. Sandstone intermittently outcrops along the slope, with a well-defined small vertical escarpment at the site. The northern boundary of the site is defined by this escarpment, in which the cave has formed (Figure 2). The cave consists of a single room averaging about 4.5 m wide running about 6 m into the ridge. The roof is about 1.5 m above the floor, though in places it rises to 2 m. The floor of the cave today consists of loose dry sediments with a very high organic content, largely resulting from packrat accumulations. This deposit is only about 20 cm deep and covers a bedrock floor. The single entrance to the cave has a maximum dimension of 1.5 by 1 m.

The south boundary of the site lies three to four m outside the cave where a large sandstone outcrop (the "parapet") parallels the bedrock escarpment for about 12 m. Although the ground between the escarpment containing the cave and the parapet is now level, in the past a deep gully existed between the two sandstone masses, and this gully has trapped sediments since at least 10,500 B.P. Most excavations have been concentrated between the parapet and the escarpment, an area known as the "platform" (Figure 2).

Charlie Lake Cave was first recorded by Fladmark in 1974 during heritage-impact surveys relating to proposed hydroelectric development on the Peace River. A single 50 × 50-cm test pit was excavated in 1974, penetrating to a depth of 1.3 m. In the fall of 1974, A. Bryan, R. Gilbert, and J. Burns excavated a second test pit to a similar depth on the platform. In 1983 Fladmark returned to the site for a larger-scale excavation, the results of which are reported here.

The 1983 excavations were concentrated on the platform, where it quickly became evident that the greatest sediment depth occurred. Eight 1 × 1-m units were excavated in this area, with four partial units, for a total of 9.2 m<sup>2</sup> (Figure 2). Seven units (3 to 9) were exceptionally deep, terminating

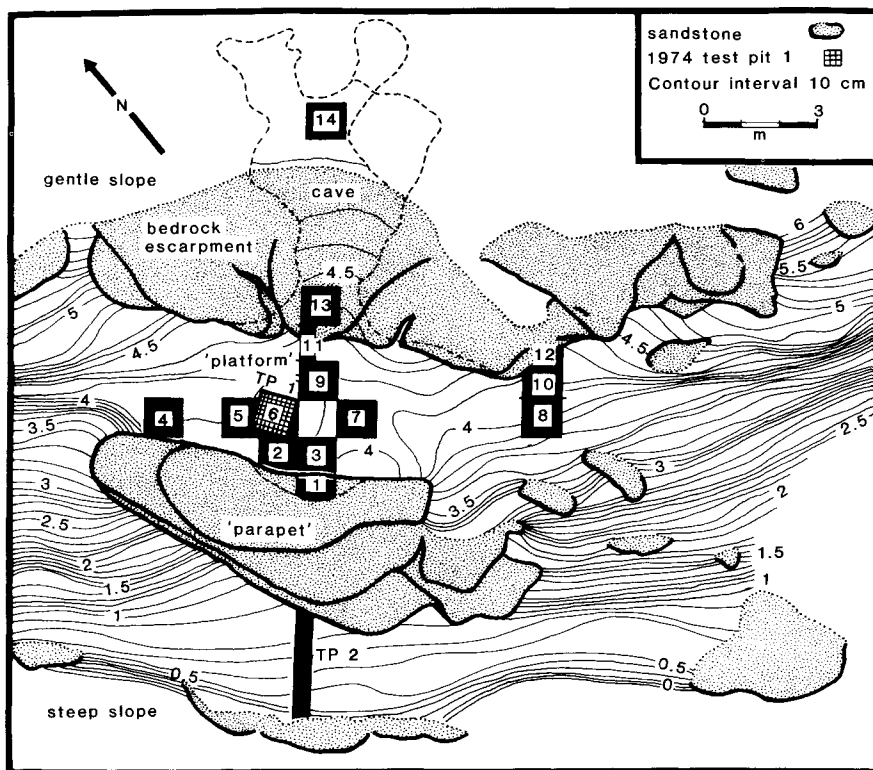


Figure 2. Local topography and excavation units, HbRf 39.

at 3.5 to 4.0 m below surface without reaching bedrock. Excavations in the cave itself demonstrated that deposits were shallow.

Most excavations were undertaken with trowel and  $\frac{1}{8}$ -inch (3-mm) mesh screen. Large sandstone blocks were encountered in increasing numbers with depth, and were broken up with cold chisel and sledge hammer. Sediments at the base of the excavations contained considerable quantities of sandstone, and small picks were used in their excavation. Sediments for the most part were dry and fine (except for sandstone fragments), and were screened easily. Sediment columns were taken from a number of units for later processing. Excavations proceeded as far as possible by "natural" stratigraphic units. When these were thick, they were subdivided into arbitrary layers contoured to the upper contact of the layer, which often sloped quite steeply.

#### STRATIGRAPHY AND CHRONOLOGY

The sedimentary sequence at Charlie Lake Cave can be divided into five general stratigraphic zones traceable across the entire platform excavation area on the basis of visual interunit correlation of stratigraphic profiles. The zones and their contacts are defined by marked visual changes in texture and the relative proportion of organic and mineral constituents. Analysis of sediments from column samples supports the zonation. The stratigraphic zones are labelled I to V from bottom to top (Figure 3). Internal subdivisions exist within these zones, but will be discussed here only when relevant to the earliest cultural component.

All deposits are contained between Dunvegan sandstone, which forms the escarpment and the parapet. As can be seen from Figures 2 and 3, the parapet lies parallel to the escarpment, but the two are separated by a gully with slightly tapering vertical sides 2 to 3 m apart. Excavations have failed to find sandstone bedrock at the base of the gully, indicating that further excavation ultimately

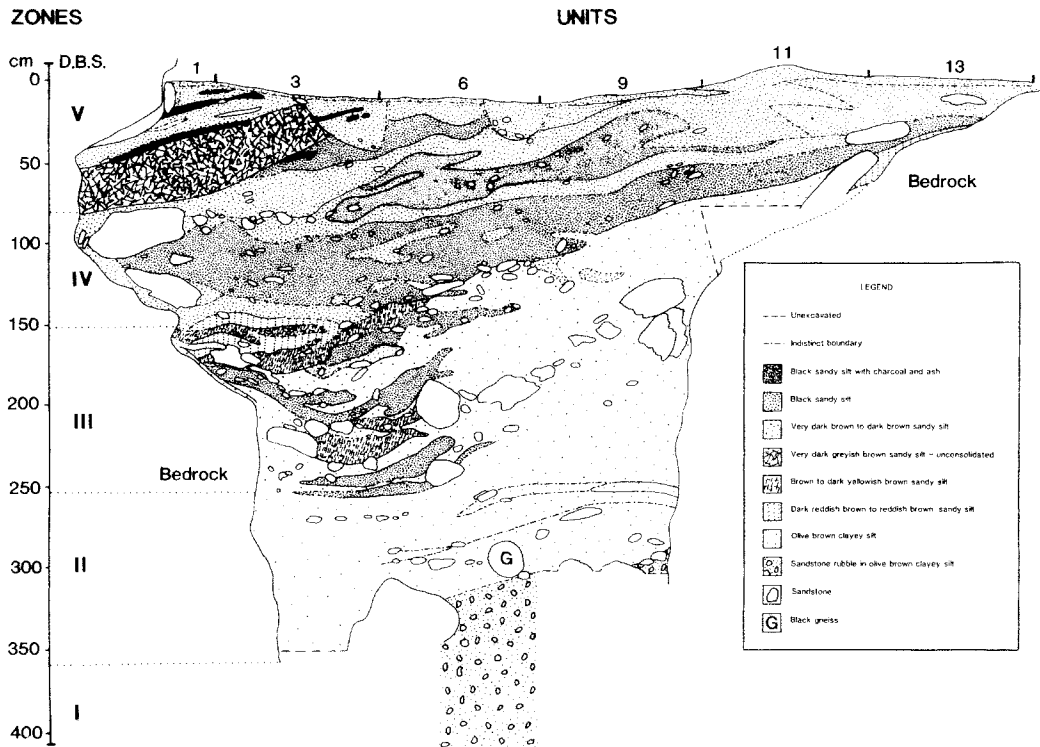


Figure 3. North-south stratigraphy, Hbrf 39.

is required. Our current view is that the parapet represents a large slab of bedrock detached from the escarpment prior to 11,000 B.P., possibly by combined effects of solution (which formed the cave) and cryoclastic action. However, for present purposes, it is sufficient to note the presence of the gully and its infilling.

Zone I is the lowest stratum reached in excavation. It consists of an olive-colored, resistant sandstone rubble, with larger clasts ranging from boulders over 1 m in maximum dimension to granules. In the less than 16 mm range, mean particle size is about .55 mm (medium sand) (Figure 4). Excavation was very difficult, with the fine matrix appearing compacted or slightly cemented. The sandstone blocks were relatively unweathered, and could be broken only with extreme force, whereas boulders higher in the sequence could be cut with a cold chisel. Organic content generally is low, and decreases with depth, as do allochthonous pebbles of quartz, quartzite, and chert (Figure 4). The few small bones from this layer occur near or at the Zone I/II contact, and probably all are derived from Zone II. No artifacts or other cultural material were found in Zone I, but excavations penetrated only to a depth of 40 cm in a few test areas. Zone I currently is interpreted as a period of rapid bedrock spalling and weathering immediately following detachment of the parapet from the escarpment.

Zone II directly overlies Zone I, and Zone II was found in all units excavated in the platform area. It is an olive, pebbly, silty sand with mean particle size in the less than 16 mm range of .30 mm (fine sand) (Figure 4). Zone II is divided into lower (IIa) and upper (IIb) subzones, based on gradational changes in lithology and texture. These subzones also contain separate cultural components. The fluted-point assemblage is contained in IIa, the earliest known cultural component at the site. Sediments are characterized by a high proportion of allochthonous pebbles (quartz, quartzite, chert, shale, schist), with up to 60 percent of pebbles in the 2 to 3-cm size range of nonlocal provenience. Total organics remain low, but are still higher than in Zone I. Zone IIa also was difficult

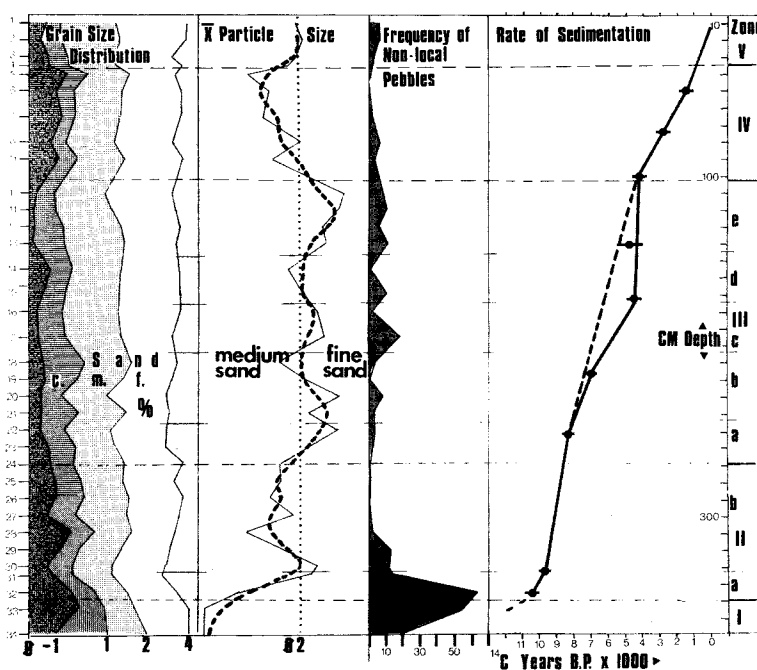


Figure 4. Sedimentology of column sample, unit 5.

to excavate because of the high silt/clay content, and material had to be broken into small fragments with a hand pick and then screened. Most bones and artifacts therefore were recovered from the screens. Examination of broken lumps of sediment indicated numerous small voids, possibly formed by decomposition of organics. These may be pedogenic features.

For Zone IIa, radiocarbon dates were obtained on bison bone collagen, producing values of  $10,450 \pm 150$  B.P. (SFU 300) on a sample of bison tibia from the same unit and level as the fluted point,  $10,380 \pm 160$  B.P. (SFU 378) on a bison ulna from the same unit and level as the quartzite core tool, and  $10,770 \pm 120$  B.P. (SFU 454) from a bison humerus in the same unit as the fluted point from a stratigraphically contemporaneous level. These three dates provide an age estimate for the Paleoindian component. Two of the dates (SFU 378 and 454) are on bones which display cut marks. Two AMS dates were obtained from bone collagen in unit 3, which produced an abundant microfauna but no cultural material. A ground-squirrel femur from the lowest excavated level in this unit gave a value of  $10,100 \pm 210$  B.P. (RIDDL 392), and a bison humerus from the uppermost Zone IIa deposits was dated at  $9990 \pm 150$  B.P. (RIDDL 393). These dates suggest that Zone IIa deposition ceased at about 10,000 B.P. A bison bone-collagen date of  $9760 \pm 160$  B.P. (SFU 355) was obtained from above the IIa/IIb interface, also suggesting that the interface dates to about 10,000 B.P. The inception of Zone IIa deposition must date to at least 10,500 B.P. One should note that all dates have been corrected for  $^{13}\text{C}$  values except SFU 300. Assuming that the  $^{13}\text{C}$  value is approximately the same as for other bison bones, this date would be older by about 80 years than reported here.

The Zone IIa/IIb boundary is gradational rather than sharply defined. Silt-clay content is reduced, and nonlocal pebbles decline markedly. Organic content increases. The upper limit of IIb is not well dated. However, two dates of  $7800 \pm 800$  B.P. (SFU 370) and  $8400 \pm 240$  B.P. (SFU 357) on charcoal from within Zone III suggest that IIb deposition had probably ceased by 8500 to 9000 B.P.

Zone III is characterized by alternately intercalated light-colored mineral beds and dark organic beds dipping from north to south. Angle of dip lessens with decreasing depth. Thickest organic

deposits occur against the parapet, suggesting some downslope movement. In the less than 16 mm size range, mean particle size is .22 mm (fine sand) (Figure 4). Organics are common, and pH values decline. As discussed above, the base of the zone probably dates to 8500/9000 B.P. A radiocarbon date of  $4400 \pm 400$  B.P. (SFU 385) in upper Zone III and a date of  $4270 \pm 160$  B.P. (SFU 382) in lower Zone IV bracket the Zone III/IV boundary, and other dates within Zone III are consistent with this age.

Zone IV is a relatively thick, highly organic sediment, with much floatable organic material. It is suspected that packrat accumulations may have assisted considerably in the formation of this zone. It is capped by Zone V, distinguished only by the presence of historical period disturbance and artifacts. Mean particle size increases in these zones (Figure 4).

In summary, Charlie Lake Cave may have begun to form along a sandstone bedding plane or line of weakness prior to the detachment of the parapet. The main weathering mechanism for that event, as well as cave formation, probably was large and small scale cryoclastism. The parapet may have been detached at the end of the last major glacial episode, presumably after lake levels of Glacial Lake Peace had receded below 730 m a.s.l. because no lacustrine sediments were noted in Zone I. The deep gully created by the detachment of the parapet was filled by coarse mass wastage and cryoclastic rubble, producing the resistant and sterile rubble of Zone I. In the early postglacial period, tills and glaciolacustrine sediments were washed into the gully from deposits on the hillside above the cave, producing the strongly nonlocal lithology of Zone IIa. This process certainly had begun by 10,500 years ago, and possibly as early as 11,000 B.P.

The first human use of the gully occurred during this time. It is possible that glacial Lake Peace had not yet drained completely at this period, and that the valley which now contains Stoddart Creek was a narrow arm of the lake. Zone IIb is characterized by continuing active weathering of sandstone. By about 8500 B.P. organic matter becomes visually significant in the profile, with richly humic beds intercalating with lenses and layers of sand. A major rock fall occurred at about 8100 B.P. Zone III generally is characterized by finer sediments and increasing organic content. After 4300 B.P. mean particle size increases, similar to that of Zone IIb, but with a much higher organic content. It is of interest to note that particle size at Charlie Lake apparently reflects the mid-Holocene "hypothermal" climatic episode. After an initial period of active weathering, there is a trend toward reduced weathering rates, increased aeolian deposition, and higher organic content from 8,500 to about 4,000 years ago. This phase is followed by a return to more active weathering during the last 4,000 years.

### *Cultural Components*

Eleven cultural components have been defined on the basis of the 1983 excavations, numbered from the bottom up. The following discussion deals only with the fluted-point assemblage—Component 1. The Component 1 assemblage contains four stone tools and six flakes, all found at the base of Zone IIa. These include a complete basally thinned or "fluted" projectile point, a retouched flake, and a perforated stone bead, all found within 1 m of each other in unit 5, a large, quartzite core tool from unit 4, and six small, black chert flakes found in units to the east. Radiocarbon dates SFU 300 and SFU 454 are associated with the artifacts in unit 5, while SFU 378 is associated with the artifact from unit 4.

The most diagnostic artifact is a stubby, extensively resharpened but complete lanceolate point of very dark gray chert (Figure 5.1). The point was broken during excavation of the hard basal sediments with a small pick, and all pieces were recovered from the screen. It weighs 6.7 g, is 39.3 mm long with a maximum width of 28.4 mm about 30 mm from the tip, and has a maximum thickness of 5.6 mm at the midpoint of the central axis. Hafting modification consists of a 6 mm deep basal notch and multiple, shallow basal-thinning flakes on both faces. There are five thinning flakes on one surface. Two initial-thinning flakes terminate in hinge fractures 19 mm from the base. A pair of second-generation flakes overlap these, but terminate 15 mm from the base, and a third flake to the left also is a second-generation flake. The opposite surface of the point retains the distal remnant of a single first-generation thinning flake, with possible remnants of two other flakes on

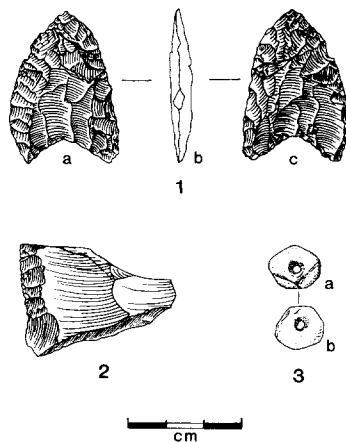


Figure 5. Artifacts from Component 1: 1, fluted point; 2, retouched flake; 3, schist bead.

either side. These are overlain by two shorter second-generation flakes. There is slight lateral-edge grinding, extending 13 mm up one edge and 20 mm up the other. Flake-scar ridges are lightly polished, a feature which also may relate to hafting.

In terms of overall shape, the point is asymmetrical. The straighter edge is worked steeply, while the opposite, excurvate edge is thinner. This asymmetry, coupled with the extensive resharpener, suggests that the specimen may have functioned as a hafted knife in its final stage of use.

The retouched flake (Figure 5.2) was found in situ in the same excavation unit as the projectile point just above the Zone IIa/I contact. It is a dark gray chert flake fragment with one edge retouched to an angle of about 50°.

The third stone tool was found about 2 m west of the point and retouched flake. It is a large “boat-shaped” or keeled core tool of light yellow, medium-grained quartzite (Figure 6). It measures 148.5 mm long by 60 mm wide by 47 mm high. Its elongated ovate striking platform consists of a single flake scar which served as the platform for the removal of a large number of flakes around the entire edge of the core, producing the keeled form. One end carefully is worked to a chisel-like edge with a bit angle of 50–60° on a general edge angle of 30°. The opposite end is blunted by a series of hinge fractures. The specimen largely remains unwashed for future residue analysis, but it is possible to tell that flake-scar ridges and the “keel” are well rounded. No debitage of this material occurred in the site, and it would appear that the artifact must have been brought in from some distance away.

The fourth artifact from Zone IIa is a perforated schist bead (Figure 5.3), also found in the screen during excavation of unit 5. Approximately pentagonal in shape, measuring 13.5 by 11.6 by 1.7 mm, the bead is a thin, unmodified schist pebble with a rough conical hole drilled in each face, meeting more or less on center.

Zone IIa also yielded six black chert flakes from excavation units 1 to 3 m east of the fluted point. It is notable that no debitage occurred in the two units that produced the four formed artifacts.

While this assemblage is extremely small, it also is diverse, and three of the artifacts are worthy of comment. The fluted point is similar to surface finds from the Peace River area (Fladmark 1981), and the associated radiocarbon dates confirm that fluted-point users were in the Peace River area prior to 10,000 radiocarbon years ago. However, these specimens are isolated examples, and to make comparisons to them one must search some distance. To the north the nearest assemblages lie some 1,500 km away in Alaska and Yukon. There are no comparable assemblages to the west or east, and to the south, fluted points in dated contexts lie in the U.S., some 1,000 km away. The Charlie Lake specimen is most similar to ones reported by Gryba (1983:Figure 30) from Sibbald Creek in the foothills of Alberta. The Sibbald Creek site contains in situ Paleoindian material in a



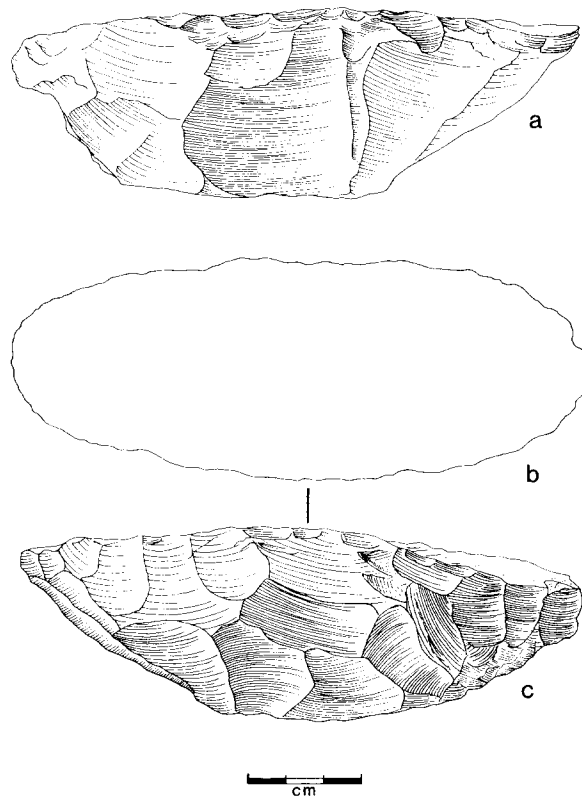


Figure 6. Core tool from Component 1.

shallow stratigraphic sequence with little visible stratigraphy. Although a radiocarbon date of  $9570 \pm 320$  B.P. (GX-8808) was obtained from the lower sediments of the site, this was based on very small particles of wood charcoal scattered through the sediments, and the date cannot be considered as necessarily associated with the fluted points. Probably as a result of compressed stratigraphy, the fluted points at Sibbald Creek were found in association with late Paleoindian points. Furthermore, there appears to be a possibility that equipment failure may have affected the radiocarbon date (Gryba 1983:123). For these reasons we prefer to treat the fluted-point component at Sibbald Creek as undated. Charlie Lake and Sibbald points share certain features with some late Palaeoindian complexes from the northeast woodlands. Some fluted points from New England dated 10,000 to 10,500 B.P. exhibit multiple short basal thinning flakes, deep basal indentations, and often exhaustive resharpening (e.g., Gramly 1982:Plate 7f). These features distinguish the northern points from the classic fluted points of the central and southern plains and mountains of the U.S. Thus the Charlie Lake specimen fits with broadly distributed, though poorly dated, late northern fluted points. Although the point lies within the proposed "ice free corridor" it clearly is at least 1,000 years too late to have anything to do with peopling the New World south of the ice sheets, and in fact lends some credence to the idea that fluted points were introduced to the north from the south. However, the site is too small and too isolated to provide conclusive evidence for such a movement, and one should not forget that the lowest Charlie Lake sediments remain unexcavated.

The quartzite core tool has no precedents in western Canada of comparable age and no such artifacts have been reported in association with fluted points.

The stone bead is, to our knowledge, the first such artifact associated with a fluted-point assemblage.

Table 1. Zone IIa Faunal Remains Associated with Component 1 Artifacts (Units 4 and 5) and in Adjacent Units

Taxon	Units 4 and 5	Units 3, 6, 7
Large mammal		1
Small mammal	3	44
<i>Lepus americanus</i> (snowshoe hare)	2	16
Large <i>Lepus</i> (large hare)	2	2
Lagomorph		1
<i>Spermophilus</i> (ground squirrel)	2	120
Sciuridae		1
<i>Ondatra zibethicus</i> (muskrat)		1
<i>Microtus</i> (vole)		2
Microtine		2
<i>Peromyscus</i> (mouse)	1	7
<i>Bison</i>	7	1
Large ungulate	3	
Unidentified bird	4	5
<i>Anas</i> (surface duck)	1	
Small wader		2
<i>Petrochelidon</i> (cliff swallow)		16
Passerine		11
Fish	1	3
Total	26	235

## FAUNA

Faunal remains are well preserved throughout the sequence at HbRf 39. In this paper only the fauna from Zone IIa are discussed (Table 1). These remains show considerable variation from one excavation unit to another in all stratigraphic zones, apparently reflecting subtle differences in depositional variables. For example, the greatest concentration of fauna for all zones is in units 1 and 3, which lie partly under an overhang of the "parapet." These units also are dominated by microfauna, probably deposited by owls roosting under the overhang. In this report two faunal assemblages are defined. The first assemblage is from units 4 and 5 which produced the artifacts of the fluted-point component and the earlier radiocarbon dates on bison bone. This assemblage is associated strongly with the human occupation and can be dated directly. The second assemblage occurs in units 3, 6, 7, and 9, which contain little or no artifactual material and radiocarbon dates slightly later than those in units 4 and 5, but which are thought, on stratigraphic grounds, to belong to Zone IIa.

The fauna from the two assemblages forms one of the few dated late Pleistocene/early Holocene assemblages in western Canada not dominated by large mammals. It is likely that most of the fauna results from noncultural events, probably deposition of owl pellets under the overhang in unit 3. The only specimens which can be associated clearly with human activity are the bison bones which exhibit cut marks, and it is notable that bison are common in the assemblage directly associated with the Component 1 artifacts.

The mammalian fauna contains a number of taxa which are not found in the area today. Speciation of *Spermophilus* is difficult, and cannot be undertaken on postcranial elements which form the bulk of the ground squirrel assemblage. On the basis of size and morphology, one can exclude Arctic (*S. parryi*), Thirteen-lined (*S. tridecemlineatus*), Golden-mantled (*S. lateralis*), and Franklin's (*S. franklinii*) ground squirrels. Comparison of mandibles and maxillae from HbRf 39 with modern Columbian (*S. columbianus*) and Richardson's (*S. richardsonii*) ground squirrels suggests that either species may be represented. No ground squirrels occur in the area today, with the nearest population being Columbian, about 100 km to the south in the Rockies. Modern Columbian ground squirrels occupy open alpine habitats (Banfield 1974:118), and the lack of any ground squirrels in the Peace River area today probably is the result of the modern forested environment. Ground squirrels are rare in

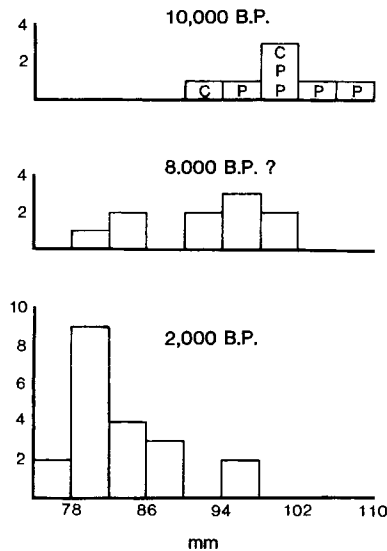


Figure 7. Breadth of trochlea (distal humerus) from Charlie Lake (C), Peace River terraces (P), Duffield (ca. 8000 B.P.), Muhlbach (ca. 2000 B.P.).

the site fauna after 10,000 B.P. and absent after 8000 B.P. While one cannot discount the possibility that these specimens may have burrowed into the site from a slightly higher level, the absence of burrows suggests they are contemporary with the rest of the Zone IIa fauna, as does the radiocarbon date (RIDDL 392) on a ground-squirrel femur.

Another important indicator of a more open habitat are the large *Lepus* specimens. Four lagomorph postcranial elements are much too large for *Lepus americanus* (Snowshoe hare), which dominates the fauna at HbRf 39 after about 10,000 B.P. Large lagomorphs are very difficult to speciate osteologically. However, assuming that an extant species is represented, these four bones must derive from either Arctic hare (*Lepus arcticus*) or from one of the southern species (e.g., *Lepus townsendii*, White-tailed jackrabbit). Although the former perhaps is more likely, either would indicate the presence of a much more open habitat.

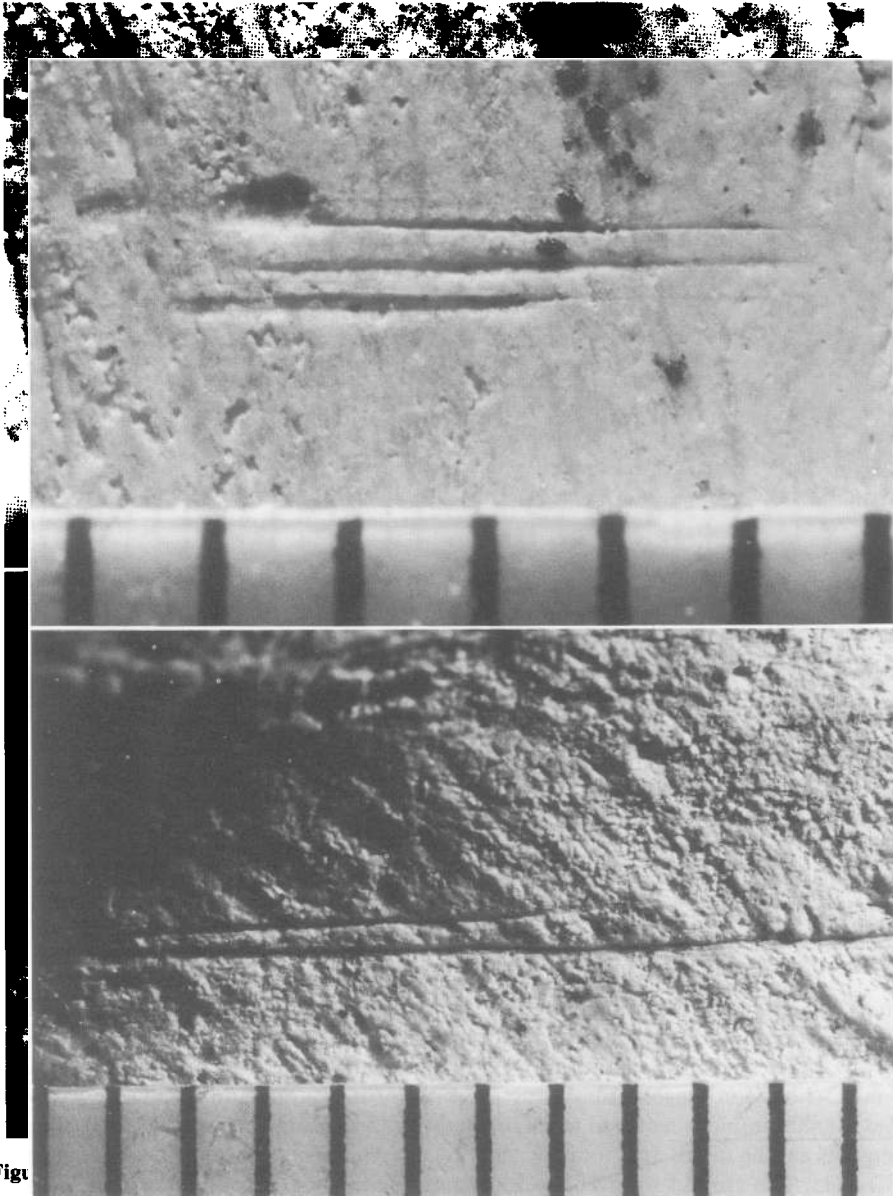
Although *Bison* occurred in the Peace River in historic times (Williams 1978), their presence at Charlie Lake and the absence of elk and moose also suggest more open conditions than prevail today. The bison cannot be speciated, but measurements of long bones show that they were of similar size to bison dated to about 9900 B.P. from the Peace River terraces in Alberta (Churcher and Wilson 1979) and are larger than mid-Holocene specimens from Duffield (Hillerud 1966) and the late Holocene Muhlbach site (Gruhn 1971), both in central Alberta (Figure 7).

All other mammalian species are represented in modern faunas from the area. However, one should note that the single muskrat tooth may be intrusive. Muskrat is very common in later zones at the site, and it is possible that this specimen (which is stained a very different color than the other specimens in Zone IIa) fell from the section during excavation of lower deposits. It should not be used as evidence for this species in the area in early Holocene times.

All avian species also are known from the area today, though the assemblage is somewhat unusual. *Petrochelidon* is almost certainly *P. pyrrhonata* (Cliff swallow) which build colonies of nests on cliff faces. Presumably such a colony existed at HbRf 39. Observations of modern colonies show that substantial "middens" may accumulate under such colonies, and these deposits include mud nests, droppings, and bones.

Other identified birds include a large duck (*Anas*) and a small wader, both suggesting nearby aquatic habitats. One fish bone can be identified as from a sucker (*Catostomus*).

Bison and "large ungulate" bones are the only specimens from Zone IIa with cut marks produced



Figt

Figure 8

by stone tools. Although positive identification of cut marks has been rendered less certain by recent studies (Behrensmeier et al. 1986), we are reasonably confident that the specimens from Charlie Lake have been subject to human butchering. First, the cut marks occur as shallow, narrow, parallel striations, making rodent or carnivore activity an unlikely cause (Figure 8). Second, there are no rock types within the sediments of HbRf 39 capable of producing such striations except for flaked chert. Third, the cut marks occur on areas of bones where cut marks have been observed frequently on large ungulates from North American archaeological sites and from modern ethnographic studies. Cut marks occur at the following locations: epicondyles of humerus (two specimens), midshaft of rib, and above the semi-lunar notch of the ulna. Finally, some bones deliberately have been fractured

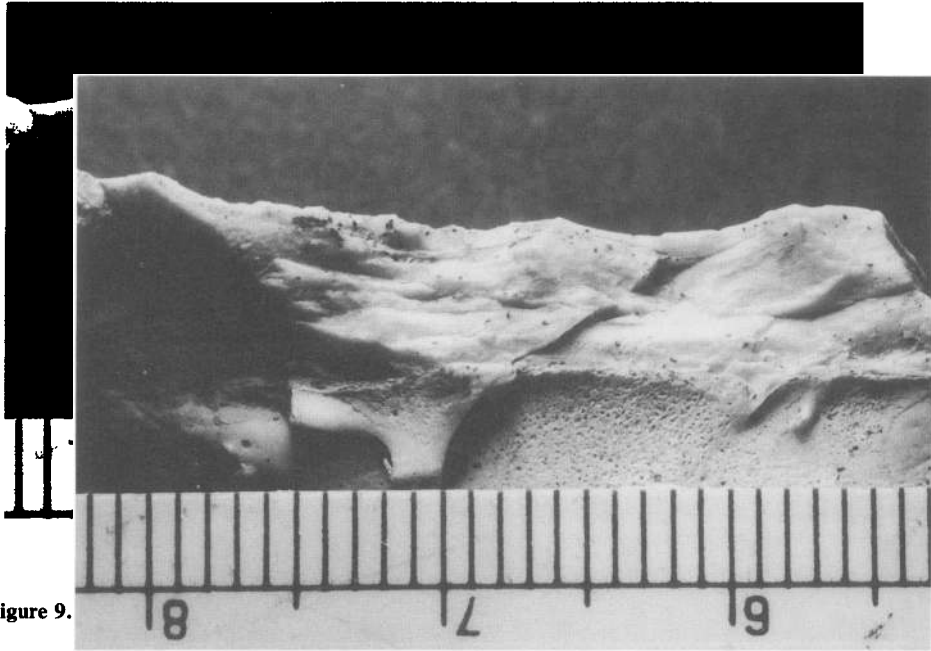


Figure 9.

for marrow, as demonstrated by the evidence for a point of impact and negative “flake scars” on the interior surface opposite the point of impact (Figure 9).

A number of the bones which exhibit cut marks also have been chewed extensively by large carnivores. While one cannot rule out the possibility that large carnivores dragged these bones to HbRf 39 from a human site located elsewhere, this is an unlikely explanation, given the presence of stone tools in association with the fauna.

#### PALEOENVIRONMENTAL IMPLICATIONS

Between ca. 10,500 and 10,000 B.P. the Charlie Lake area supported a varied fauna, including large and small mammals, birds, and fish. Two taxa—a large hare and a ground squirrel—suggest that forest was either absent or significantly less than occurs in the area today. The association of these two taxa with bison suggests that some form of northern grassland or tundra was present. A more varied faunal sample is required to establish the nature of the environment, but some preliminary statements can be made. It is unlikely that the environment resembled the modern tundra of northern Canada. The ground squirrel species represented is not *Spermophilus parryi* and neither bison nor cliff swallow are a component of the modern tundra fauna. While it obviously is dangerous to use negative evidence, one should note that no modern tundra species such as lemming or caribou are present.

There currently is some debate about the nature of late Pleistocene environments in northern North America (e.g., Guthrie 1985). The Charlie Lake faunal data support the view that environments quite close to major ice masses included abundant and diverse fauna, and there is nothing in this fauna to suggest environmental conditions approaching those of modern Arctic environments. Churcher and Wilson (1979) have described faunas from the lower terraces of the Peace River valley in Alberta, and these assemblages add a number of taxa to the late Pleistocene/early Holocene environment, including mammoth, a variety of equids, camel, elk, and musk-ox. Their suggestion that the environment resembled open prairie or woodland rather than closed forest (Churcher and Wilson 1979:75) is confirmed by the Charlie Lake specimens and by White's (1983) palynological analyses. The later stages of the ice-free corridor clearly were not inhospitable.

## DISCUSSION AND CONCLUSIONS

The fluted-point component at Charlie Lake Cave exists in virtual isolation. The nearest dated assemblages containing fluted points are in Alaska (1,500 km to the northwest) (Clark and Clark 1983), Montana (1,200 km to the southeast) (Frison 1978), and Sibbald Creek (700 km to the southeast), if one accepts the Sibbald Creek date as a *terminus ante quem*. This isolation renders comparison with other areas somewhat fruitless. Charlie Lake Cave also provides the northernmost evidence for dietary and hunting practices associated with fluted points. The "big game hunting" adaptation at Charlie Lake parallels evidence from many sites to the south, which hardly is surprising in the light of the reconstructed late Pleistocene environment or subsequent adaptations in the area.

The morphology of the fluted-point specimen can be compared with specimens from Alberta and Alaska, and also with points found in the northeast region of North America, some of which also date in the 10,500 to 10,000 B.P. range. These late fluted points are quite distinct from the contemporary Folsom points being made to the south on the High Plains.

The function of the small lithic assemblage from Charlie Lake Cave is problematic. It is unlikely that a kill site is represented, as the artifact assemblage seems too diverse, and the bison remains suggest very selective transportation of elements from a kill site to this location. The simple bead is, as far as we are aware, the only such specimen recovered in association with a dated fluted-point assemblage. However, bone beads have been reported from some sites, and perforated soapstone pendants are thought to be associated with the Reagen site late fluted-point assemblage in Vermont (Funk 1978). The large, keeled core tool also has no precedent in other fluted-point assemblages. Later assemblages at the site suggest short occupation periods, probably during hunting excursions, as indicated by low artifact density and the predominance of projectile points and bifacial thinning flakes. Without a larger artifact sample it is difficult to make more concrete statements about activities which occurred at the site during the Paleoindian occupation of Component 1.

The site is of importance because it begins to fill a major gap in our knowledge of late Pleistocene/early Holocene adaptations in northern North America. It is only the second reliably dated fluted-point site in Canada, and the only such component which lies under a long stratigraphic sequence and which has an associated fauna. It suggests that the later stages of the ice-free corridor were characterized by environments which supported a varied fauna inhabiting the uplands of a largely open landscape which probably contained significant areas of proglacial lakes and wetlands.

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