GEOLOGY AND ARCHAEOLOGY OF THE YARDANG FLINT STATION

by

R. D. Reger, Troy L. Péwé, Frederick Hadleigh-West, and Ivar Skarland

INTRODUCTION

One of the difficulties chronically besetting archaeologists working in interior Alaska has been all too often a complete lack of geological context from which inferences of age might be made.

In the following pages is set forth the geology of a site in the Alaska Range for which there is available also one radiocarbon date. The stratigraphic situation is good but, unfortunately, at the present time the artifacts themselves appear to be undiagnostic.

Location

The site, designated the Yardang Flint Station (Mount Hayes 81), is on an alluvial fan of Ruby Creek in the Delta River Valley, a through north—south valley in the Alaska Range, approximately 163 km. southeast of Fairbanks (Fig. 1). The artifacts were found by R. D. Reger and G. C. Bond in loess in a roadcut of the Richardson Highway near where it crosses Ruby Creek at an elevation of 580 m. above sea level (Fig. 1). The loess was artificially exposed in the roadcut and yardangs are currently being eroded in the loess by the wind. The yardangs are a subject of study by geologists at the University of Alaska and the U.S. Geological Survey and give rise to the name for the flint station.

GEOLOGY

Physiography

The Delta River Valley was glaciated at least three times (Péwé, *et al.*, 1953). Since the glacier of Wisconsin age has withdrawn, tributary streams have built large alluvial fans of gravel into the Delta River Valley. The artifacts were found in loess on the alluvial fan of Ruby Creek on the east side of the valley (Fig. 1). The fan is approximately 1.7 km. wide and 1.4 km. long and has a slope of about 4°. The outer edge of this large fan was nipped by the Delta River and a well-developed scarp 20 to 35 m. high exists facing the Delta River. Ruby Creek is entrenched 1 to 2 m. into the gravel fan and a younger, much smaller, lower-level fan is currently being built at the base of the scarp. The apex of the younger fan is at the present Richardson Highway bridge over Ruby Creek. The surface of the lower fan slopes approximately 12°. The large fan is blanketed with a loess cover approximately 1 to 6 m. thick (Fig. 2) but the surface of the smaller fan has no loess.

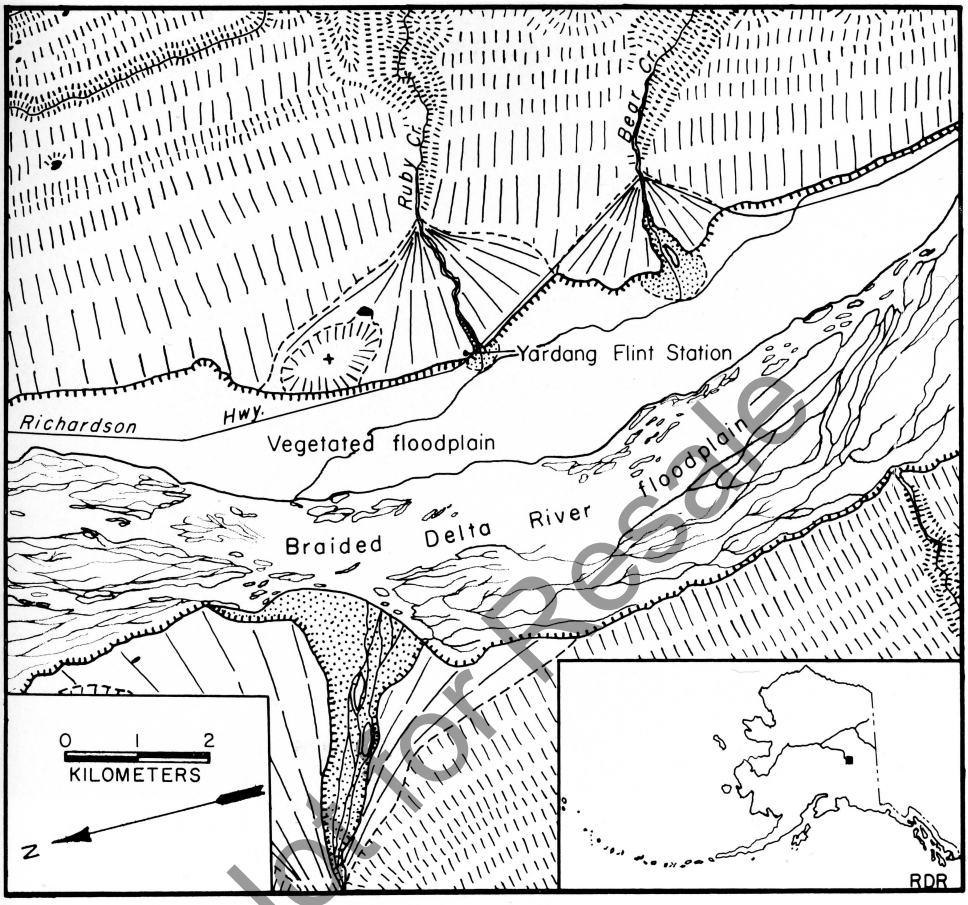

Figure 1. Landform map of part of the Delta River Valley in the vicinity of the Yardang Flint Station, Central Alaska Range.

Stratigraphy

The gravel of the alluvial fan is at least 10 m. thick and consists of particles, averaging 8 to 20 cm. in diameter, in a sandy matrix. Most of the large particles are schist, gneiss, and quartz from the Birch Creek Schist formation that forms the walls of the Delta River Valley in this area. However, a large percentage of pebbles and cobbles are of coal and orange-brown, non-siliceous siltstone of Tertiary age which crop out in the headwaters of Ruby Creek in the Jarvis Creek coal field (Wahrhaftig and Hickcox, 1954). The gravel of the fan is predominantly grey and poorly stratified. At the top of the gravel there is some interfingering between the gravel and the loess.

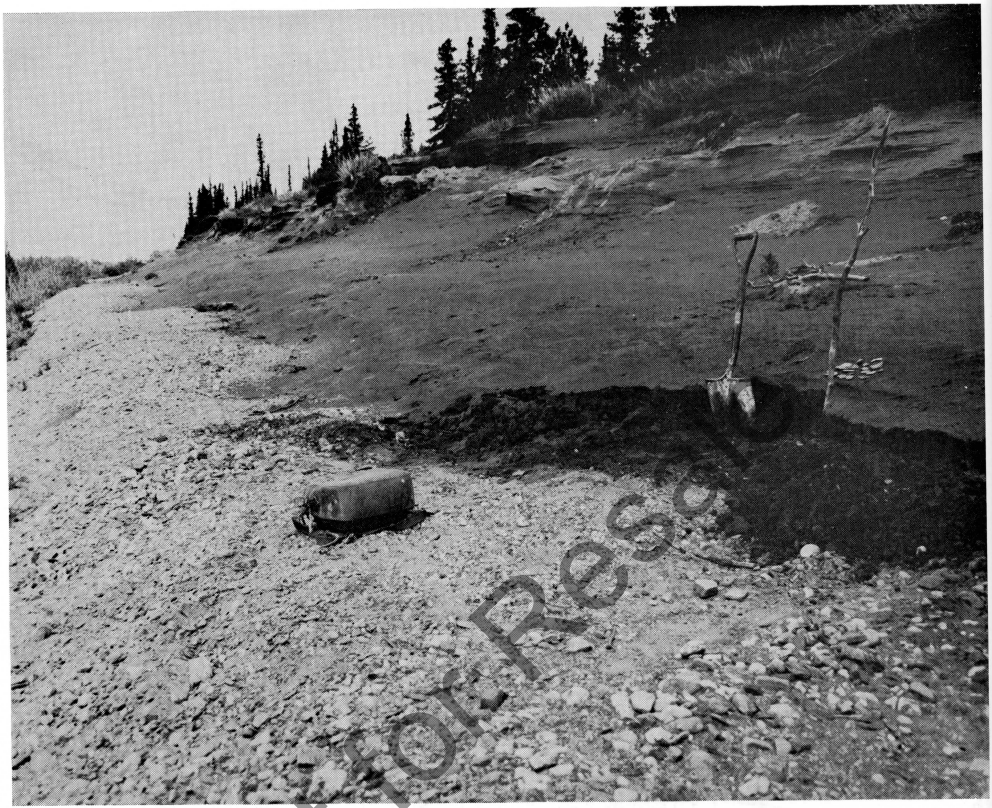

Figure 2. Loess overlying alluvial fan gravel at Yardang Flint Station, Ruby Creek, Alaska. Shovel point at artifact location. (Photograph by T. L. Péwé, July, 1962).

The upper 5 m. of the section (Figs. 2 and 3) of the fan exposed at Ruby Creek consists of loess. The loess is unconsolidated except where frozen, possesses crude vertical jointing, and is tannish grey, mottled with iron-oxide staining and organic material. The silt has rather distinct laminations parallel to the surface of the alluvial fan which are caused by the presence of forest layers or iron-oxide staining (see Table 1).

Stumps of white spruce up to a maximum diameter of 0.8 m. are common in the loess (Figs. 2 and 3). Tree remains and organic-rich layers indicate that the loess has been deposited on a forest floor, thereby burying successive forest layers. Péwé and Holmes (1964) record small cones of silt around trunks of standing spruce on the west side of the Delta River in the vicinity of Donnelly Dome, and have noted the collection of dust on spruce branches in this same area. Spruce trees grow in the area today indicating that climatic

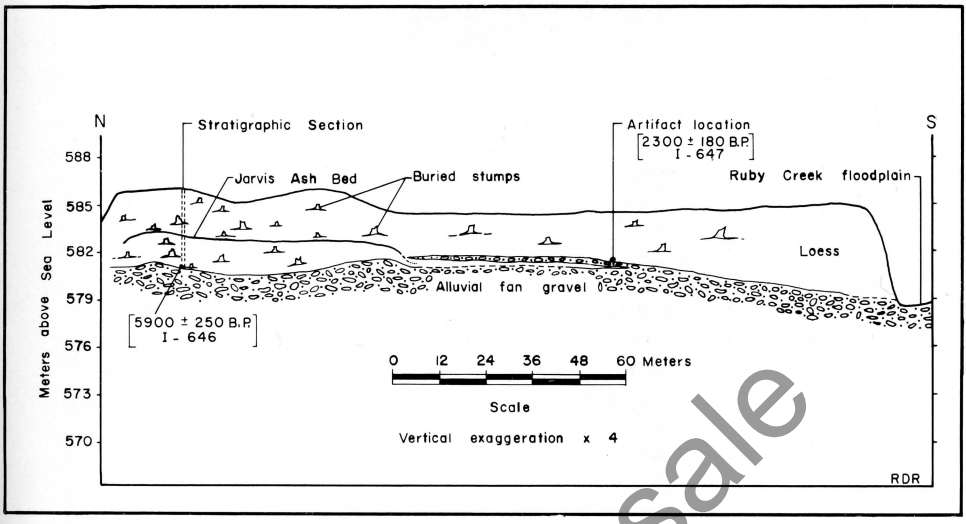

Figure 3. Stratigraphy of the Yardang Flint Station along the Richardson Highway in the Delta River Valley, Central Alaska Range.

conditions have changed very little since the beginning of loess deposition. As much as 5.2 m. of loess has been deposited on the fan in the last 6,000 years. Winds continually pick up silt from the exposed sand and silt bars in the summer in the braided Delta River floodplain today and loess is currently being deposited in the area (Péwé, 1951). Studies of rates of loess deposition are in progress.

Approximately 1.5 m. above the gravel-loess contact in the northern part of the section occurs an ash bed, here termed the Jarvis Ash Bed for the excellent exposures at Jarvis Creek 25 km. to the north. This is a volcanic ash layer which is conformable with the crude stratification of the underlying and overlying silt layers. The ash is cream colored when dry and light grey when wet. It has a relatively uniform thickness of 1 to 3 cm. The ash consists mostly of glass (index of refraction is 1.53–1.54) particles approximately the same size and sorting as the enclosing loess. Near the center of the exposure, the Jarvis Ash Bed dips beneath the tongue of gravel and is pinched off into isolated pods and lenses (Fig. 3).

Age and Geologic History

The Pleistocene and Recent glacial history of the Big Delta area, including Ruby Creek and vicinity, has been summarized by Péwé (1952, 1953). After the retreat of the glacier of Wisconsin age that occupied the Delta River Valley, alluvial fans of gravel were built into the valley. These fans perhaps took thousands of years to attain their present size.

TABLE 1. *Stratigraphic section of loess near Ruby Creek, Alaska Range*
T. L. Péwé, 1960

Depth from surface (meters)	Unit
0.0–0.6	eroded loess and turf mat
0.6–1.3	tan loess, homogeneous, massive, mottled with iron-oxide staining and organic material
1.3	wood fragments
1.3–1.9	loess as above
1.9–2.1	wood stumps (C-14 sample #134)
2.1–2.7	tan-grey to black, micaceous loess, homogeneous, unstratified, mottled with iron-oxide stains, remnants of former logs (flattened tree limbs)
2.7–2.9	tan loess, homogeneous, massive, mottled with iron-oxide stains and organic particles
2.9	wood fragments
2.9–3.7	loess as above, wood (roots) at 3.65
3.7	ash layer 1 mm. to 4–5 mm., pods to 2 cm.; forest bed at level of ash, root (C-14 sample #136)
3.7–4.7	loess as above (at 3.9 silt sample #U-530)
4.7–5.2	grey, micaceous silt; at 5.0 C-14 sample (I-646) root or limb (5,000 ± 250 year B.P.)
5.2–5.4	coarse quartz sand with 1.3 cm. diameter pebbles; iron-oxide staining

Ruby Creek wandered back and forth over its gravel fan, removing any loess that accumulated. About 6,000 years ago, however, Ruby Creek began to entrench its fan, perhaps because of downcutting by the Delta River, or more likely because of the shift of the Delta River to the east side of the valley, nipping the fan and thereby shortening the course of Ruby Creek. For the last 6,000 years loess has been accumulated on the fan because Ruby Creek became entrenched and could no longer wander over its fan removing the loess. A radiometric date (I-646) of 5,900 ± 250 years was obtained on a spruce root 25 cm. from the base of the loess 112 m. north of the artifact location (Fig. 3).

Between 2,000 and 4,000 years ago (Péwé and Holmes, 1964) the Jarvis Ash Bed was deposited on the fan and became buried by subsequent loess accumulation. At this time the Ruby Creek floodplain extended 170 m. north of its present location (Fig. 3) and the ash, therefore, was not preserved. The position of the north bank of the Ruby Creek floodplain at that time is indicated by the downward plunge of the ash bed in the center of the section (see Fig. 3). Shortly before 2,300 years ago Ruby Creek moved to the south side of its floodplain and loess began to accumulate over the gravel of the inactive floodplain. For the last 2,300 years Ruby Creek has not swung to the north and 3 m. of loess have accumulated over the gravel surface and artifact site burying forests as it accumulated.

TABLE 2. *Artifacts from Yardang Flint Station, Central Alaska Range*

Tool category	Length	Width	Thickness	Material	Remarks	Figure reference
(1) End scrapers						
a—Keeled	6.1 cm.	2.9 cm.	1.9 cm.	grey siliceous siltstone	some lateral edge retouch	4:A
Snub nosed, flat	2.4 cm.	2.4 cm.	0.7 cm.	brown chert	one edge retouched	4:B
Keeled, triangular	3.6 cm.	3.2 cm.	1.1 cm.	grey siliceous siltstone	surface completely reworked	4:C
Keeled	3.4 cm.	2.3 cm.	0.8 cm.	grey chert	fine retouch along right rear edge	4:D
Keeled	5.8 cm.	3.8 cm.	1.5 cm.	grey siliceous siltstone	distinct point at end opposite scraper end. Some secondary flaking at sides on vertical surface	4:E
(2) Flake side scrapers						
a—Straight edge	3.8 cm.	2.2 cm.	0.6 cm.	grey siliceous siltstone	one edge only retouched	4:F
Straight edge	5.2 cm.	2.8 cm.	0.7 cm.	grey siliceous siltstone	one edge only retouched	4:G
Straight edge	6.2 cm.	3.2 cm.	1.5 cm.	grey siliceous siltstone	crudely bifacial slight on two other edges perhaps a knife	4:H
Straight edge	5.5 cm.	2.8 cm.	0.8 cm.	white silty or impure chert	one edge retouched	4:I
Straight edge	5.9 cm.	3.8 cm.	1.4 cm.	grey siliceous siltstone	one edge retouched; some use retouch on opposing edge	4:J
Straight edge	5.9 cm.	3.6 cm.	0.6 cm.	grey siliceous siltstone	retouching on several edges	4:K
Straight edge	4.3 cm.	3.1 cm.	0.6 cm.	grey siliceous siltstone	fine marginal retouch on two opposite edges. Perhaps a broken end scraper	4:L
b—Convex edge	4.3 cm.	3.4 cm.	0.8 cm.	grey siliceous siltstone	fine marginal retouch along a concave edge	4:M
Convex edge	7.4 cm.	3.7 cm.	1.4 cm.	grey siliceous siltstone	the one retouched edge is slightly convex probably a knife	4:N
c—Concave edge	5.2 cm.	4.1 cm.	0.6 cm.	white silty or impure chert	some possible use retouch on edge opposite concave working edge	4:O
Concave edge	5.7 cm.	3.9 cm.	0.9 cm.	grey siliceous siltstone	small area of retouch on edge opposite concave	4:P
Concave edge	5.0 cm.	3.5 cm.	0.6 cm.	grey siliceous siltstone	some retouch on edge opposite concave	
(3) Knife fragment		5.5 cm.	1.3 cm.	grey siliceous siltstone	on large flake apparently rounded base of a knife. Possible use retouched sides	4:Q
(4) Utilized flakes, 4	(5.0 cm.–6.0 cm. roughly)			grey siliceous siltstone	deliberate retouch on some; use retouch on others.	

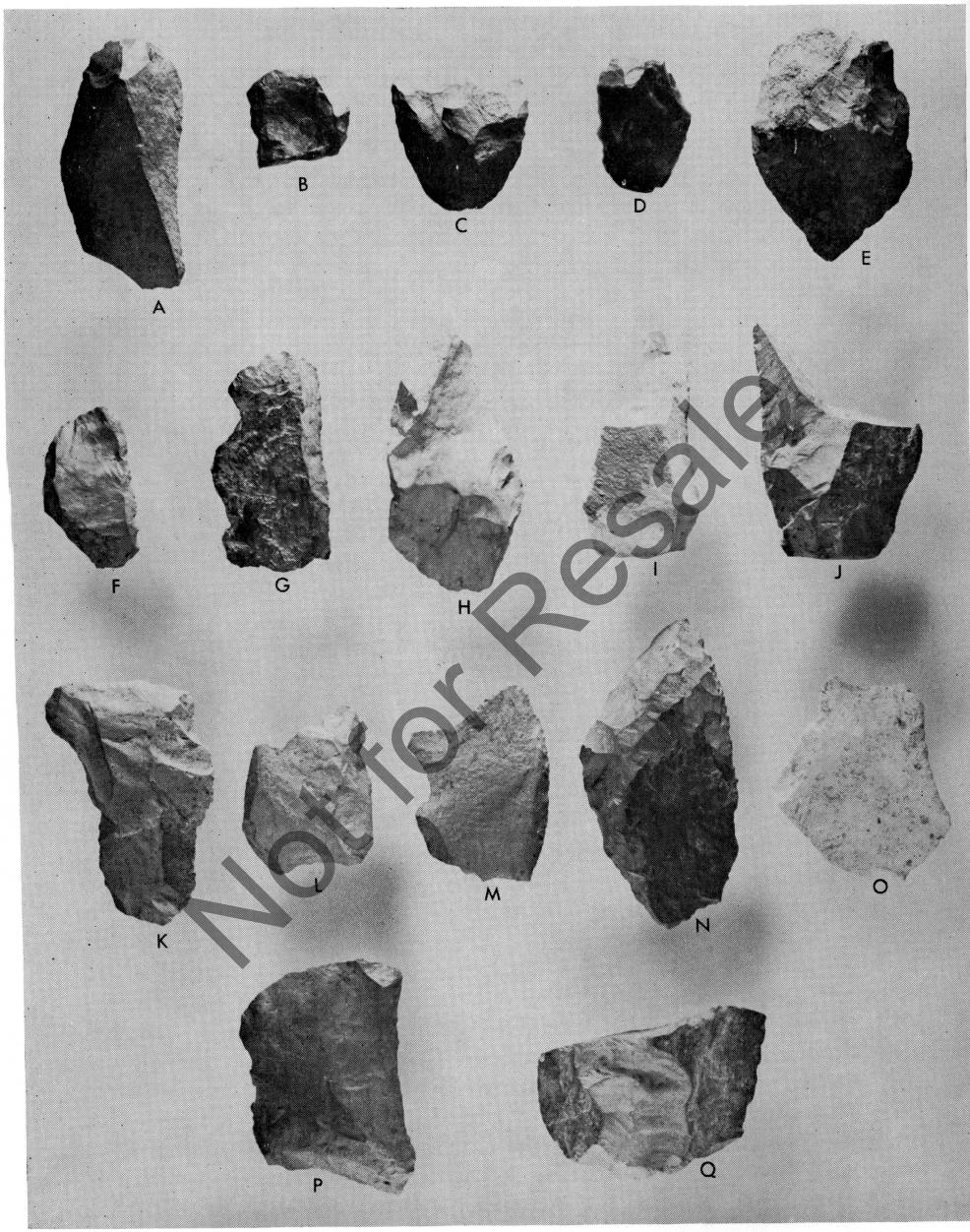

Figure 4. Artifact assemblage from Yardang Flint Station, Central Alaska Range. Length of specimen number 1 is 6.1 cm.

ARCHAEOLOGY

Twenty-four stone artifacts, concentrated in an area 25 cm. in diameter, were found in an organic-rich layer 1–10 mm. thick 13 cm. above the gravel-loess contact in the southern part of the exposed section (Fig. 3). The artifacts are listed and briefly described in Table 2 and the entire assemblage, excepting the four utilized flakes, is illustrated in Figure 4. The organic material in the artifact layer was determined by radiocarbon analysis (1-647) to be 2,300 ± 180 years old.

The artifacts from the Yardang Site are unfortunately of a degree of characterization that we presently can say nothing about their affinities. They are, for the most part, "tools of the movement"—scrapers and/or knives fashioned on rather large irregular flakes. One specimen may, on the basis of its relative complexity, ultimately prove to be of diagnostic value. This is the end scraper with pointed tail shown as E in Figure 4. It appears unusual in its form, apparently having served multiple purposes. However, we are not familiar with any similar specimens from the North and hence cannot now make a statement as to whether this artifact is idiosyncratic or not. Measurements of all specimens are presented in Table 2.

Functionally, the following observations seem pertinent: 1) Of the seventeen illustrated specimens, all but one are classed as scrapers. 2) Side scrapers predominate by more than two to one over end scrapers. 3) Nineteen of the total of twenty-four pieces appear to have been derived from a common core stone of grey siliceous siltstone. 4) No indications were present of a hearth or structural remains.

It must be concluded therefore that this was neither a habitation nor a kill site. In fact, it appears more probable that a brief instant of time is recorded here—perhaps no more than 1 day. One may imagine a single family or small hunting group pausing near the scene of a kill and dressing out on this hillside the skins of animals taken close by. The location was convenient to a clear water stream which probably was a factor in its choice.

In conclusion it must be said that in view of the presence at this site of a clear stratigraphic situation and of the radiocarbon date, it is truly unfortunate that the artifacts themselves have so little to tell us. Perhaps future research will achieve a degree of refinement whereby materials such as those we have described may be made to yield more information. It is with that thought in mind that we place these data on record.

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