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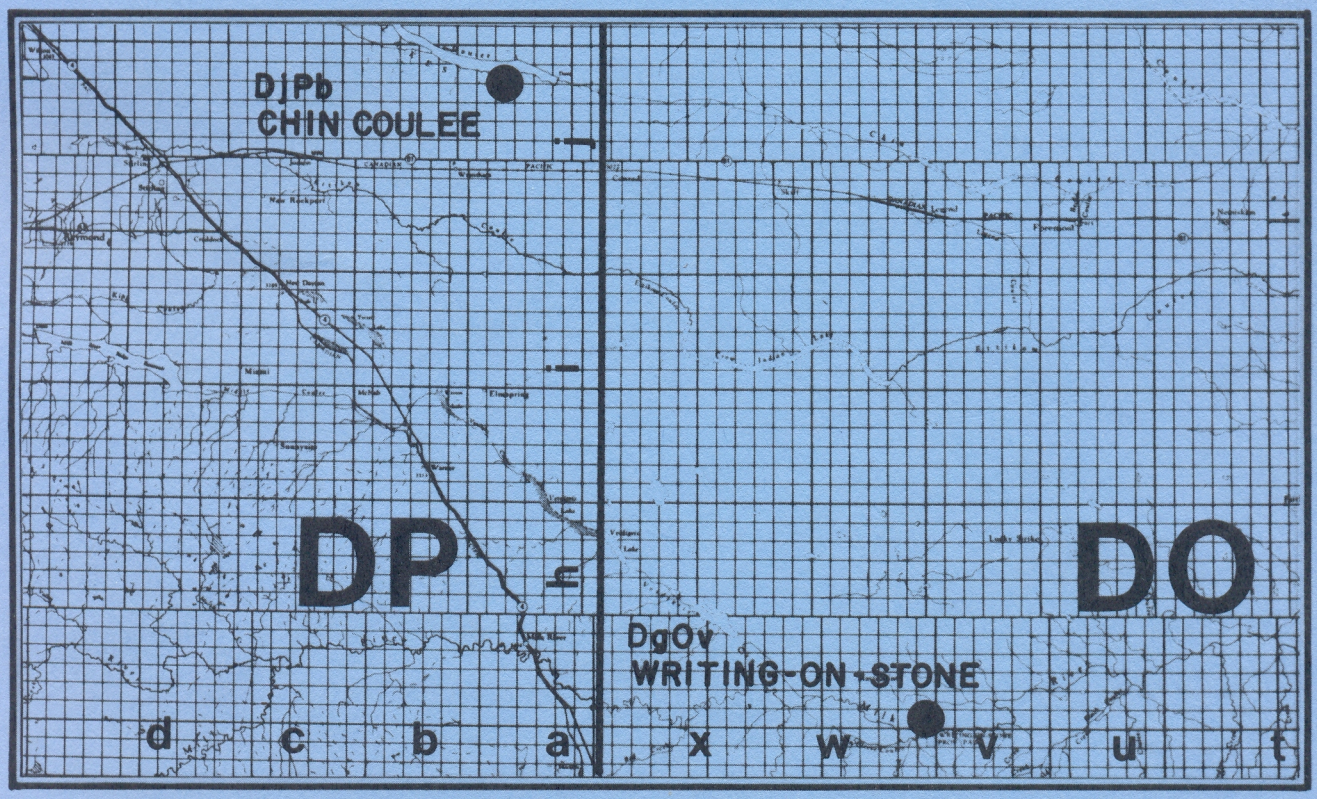
ARCHAEOLOGY IN SOUTHERN ALBERTA

EXCAVATIONS AT WRITING-ON-STONE
Jack Brink

STONE CIRCLES AT CHIN COULEE
Jim Calder



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ARCHAEOLOGY IN SOUTHERN ALBERTA: ARCHAEOLOGICAL INVESTIGATIONS AT WRITING-ON-STONE, ALBERTA

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Archaeological Survey of Alberta

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Objectives

These Occasional Papers are designed to permit the rapid dissemination of information resulting from Historical Resources' programmes. They are intended primarily for interested specialists, rather than as popular publications for general readers. In the interests of making information available quickly to these specialists, normal publication procedures have been abbreviated.

ABSTRACT

Excavations at selected locations of the rock art site of Writing-On-Stone Provincial Park demonstrate repeated native occupation of the area from approximately 3,000 B.P. into Historic times. These occupations are characterized by small, localized scatters of artifacts and faunal material, with minimal evidence of large camps. Significantly, bone tools found directly beneath petroglyph panels are interpreted as engraving tools used in the production of rock art. If this interpretation is correct, then rock art was being created at Writing-On-Stone some 1,500 years earlier than previously suspected. Ethnographic information is presented indicating that during Historic times, the resident native peoples regarded Writing-On-Stone as a sacred or ceremonial centre. On the basis of the recovered archaeological data, it is argued that these same ethnographic beliefs may extend back several thousand years in prehistory.

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DEFINITION AND SCOPE OF PROJECT

This paper reports the results of archaeological excavations conducted during the fall of 1977 at Writing-On-Stone Provincial Park, Alberta. At the request of Alberta Recreation, Parks and Wildlife, the Archaeological Survey of Alberta sent a crew of three people to the park with three specific objectives: 1) to test-excavate below certain petroglyph panels on the north bank of the Milk River prior to the fencing of these glyph panels; 2) to test-excavate reported hearths observed in the cut bank on the north side of the Milk River at the west end of the park; and 3) to survey and test the area of the present rodeo grounds at the far west end of the park. These three objectives are geographically divisible into project areas, referred to henceforth as Areas 1, 2 and 3 respectively (Figure 1).

The primary stimulus for this study was mitigative in that Parks was contemplating development of Areas 1 and 3 which might disturb archaeological sites. At the same time, however, prolonged excavations at any one site almost always yield data with which to examine archaeological problems. In addition, I was allowed complete freedom in selecting the testing procedures, the extent of these tests, and the examination of additional areas which I deemed to be of significant archaeological potential. In short, while Parks specifically requested testing certain sites, they clearly indicated their desire to know more about the general archaeology of the west end of the park. Consequently, the results of this project can be addressed to archaeological issues beyond the simple clearance of an area for development.

PREVIOUS RESEARCH

Writing-On-Stone park is the site of one of the largest collections of rock art in North America. It includes thousands of petroglyphs and a few pictographs (Keyser 1977). As such, these prehistoric art forms have been the subject of several intensive examinations (Dewdney 1964, Habgood 1967, Keyser 1977). These studies, and others, have focused on the artistic, ceremonial and chronological aspects of the glyphs, with little or no

attention having been paid to possible associated archaeological material. Indeed, archaeological excavations at rock art sites appear to be exceedingly rare. To my knowledge, the only published report of a project similar to ours is McQuires's (1977) report on the excavations at the Skull Point glyph site. Thus, the Writing-On-Stone archaeology project permitted us to examine types of relationships which have received little previous attention; specifically those between material culture, settlement and subsistence patterns as they may relate to the artistic and ceremonial aspects of rock art.

Except for the removal of a proto-historic or Late Prehistoric burial (Getty 1971), no previous prehistoric excavations had been conducted in the park. Graspointner (1977) surveyed and conducted limited excavations of sites in the adjoining portions of the Milk River Valley. Historic sites excavations were conducted within the park in conjunction with the investigation and reconstruction of the Writing-On-Stone Northwest Mounted Police Post on the south bank of the Milk River (Adams et. al., 1977).

GEOGRAPHIC SETTING

Writing-On-Stone is a small provincial park located in south central Alberta, eight kilometers north of the U.S. border (Figure 1). The park is famed for its natural and cultural resources; the vertical sandstone cliffs and exotic "hoodoo" formations which line the Milk River valley and the numerous petroglyph and pictograph sites situated along these cliffs.

In general, the Writing-On-Stone area is part of the lower half of the Alberta Plain Region of the Interior Plains of Canada (Beaty 1972). The dominant physiographic features of the park are the upland prairies and the incised Milk River valley (Figure 2). Some 10 to 20 km to the south, but clearly visible from the park, the Sweetgrass Hills rise above the Montana plains. The prairies surrounding the park are gently rolling and almost entirely cultivated. The Milk River, the major drainage system of extreme southern Alberta, meanders through these glaciated plains. Valley cutting occurred mainly as a result of glacial meltwater runoff near the end of the Pleistocene (Beaty 1975). Channeling of the glacial meltwaters also created the numerous coulees which join the Milk River valley in the Writing-On-Stone area. These include, from west to east, Verdigris, Police

and Rocky coulee. Ephemeral creeks flow through most of the deeply-entrenched coulees.

The Milk River lies some 50 m below the surrounding prairies, and, in the park area, is flanked on both sides by near-vertical sandstone cliffs. The horizontally-bedded sandstone deposits are Upper Cretaceous in age and are part of the Milk River Formation (Atlas of Alberta 1969:7). Water and wind erosion have sculpted the interbedded sandstone/shale deposits into boulder-capped "hoodoo" features which are especially common in the park area. Glacial till overlies the prairies but not the valley.

The climate of the region is generally semi-arid with cold, but not snowy, winters and warm, sunny summers. Extended periods of either extreme cold or heat are quite rare (Fletcher 1972:20). Some amelioration of winter's effects may be achieved by virtue of the park's location on the very eastern edge of the chinook belt. Annual precipitation is 28-35 cm, of which 23 cm falls as rain during the spring and summer, the remainder falling as snow (Adams et. al., 1977). Strong southwest winds are common for much of the year.

The park is situated in the "short-grass prairie ecological zone" (Sharp 1972). The flora of the immediate area is primarily composed of xerophytic species reflecting the semi-arid weather and the well-drained sandy soils of the park. Typical of the park are blue gamma and spear grass, pin-cushion and prickly pear cacti, sagebrush and buffalo berry bushes. Exceptions to this floral composition are found on the moist lower flood plains and in the protected coulee bottoms, where aspen and cottonwood trees are found together with more luxuriant brush cover.

The extant faunal population in the park is composed of mule deer, antelope, beaver, porcupine, skunk, coyote, jack rabbit and cottontail, pack rat, marmot, ground squirrel, bull snake and rattlesnake. The avifauna is too numerous to mention in detail but includes geese, ducks, hawks, owls, pheasant, grouse, magpies, swallows and sparrows. Fishes indigenous to the Milk River include rainbow trout, whitefish, northern pike and suckers. Historically, mammals common to the region included bison, wolf and plains grizzly bear (Sharp 1972).

Parent materials of soils in the area relevant to this report are of two types; colluvial "talus" material found along the sandstone cliffs and alluvial deposits on the flood plains of the Milk River.

The colluvial talus deposits line both sides of the Milk River valley extending from a few to dozens of meters out from the sandstone walls and thinning toward the river. Typically, the talus is sparsely vegetated with bunch grass and cacti. The talus is composed of sand and small sandstone rock fragments which have weathered off the cliff faces. Silts of aeolian origin are mixed with the sands. The overall effect is a loose, unconsolidated, sandy deposit which shows no soil development and thus is classed as a Regosol. The talus deposits do exhibit local stratification as indicated by alternating horizons of coarser and finer sand and sandstone fragments (Figure 3). However, extremely localized factors such as exposure of a sandstone face to sun, wind, rain, differential freeze-thaw cycles, and whether or not sandy deposits wash down over the tops of the cliffs, will all result in different local depositional sequences. Consequently, stratigraphic correlations may be inappropriate over distances of more than a few meters. Some talus deposits in the park have an estimated thickness of 10 - 15 m. All excavations in Area 1 were in talus material.

The alluvial deposits are found in the valley bottom and in the tributory channels which flow during peak runoff season. On the higher terraces above the Milk River, brown chernozemic soils have developed (Kjearsgaard 1972). However, the lower benches are periodically flooded, hindering soil development and resulting in reworked regosols. The texture of all alluvial soils is a sandy silt, clay content is low, stones are absent. All excavations in Areas 2 and 3 were in alluvial deposits.

ETHNOGRAPHY

Southern Alberta, as part of the Great Plains, was a crossroads for native groups in historic times. The effects of white contact and expansion were such that the pre-contact positions of native groups in Alberta are difficult to establish. It can be stated with certainty that, in the nineteenth century, the Blackfeet and the related tribes of Piegan and Blood Indians were the dominant groups of southern Alberta and northern Montana (Wissler 1910: 7-13). In addition, other tribes known to have lived in or moved through the Milk River area include the Kootenay, Pen d'Oreille and Gros Ventres (Graspointner 1977:39-42). Graspointner (1977:45-47) argues that all of these groups, including the Blackfoot Confederacy, are relative

newcomers to the area and that the most likely candidate for a prehistoric occupant of the Milk River area is the Shoshoni (Snake) tribe. This argument is admittedly weak, being based mainly on analogy with the southern Shoshoni who were well adapted to life in a semi-desert area similar to the Milk River region.

METHODOLOGY

Excavation methodology was essentially the same for all three project areas. Three types of pits were excavated: 1) units, which were either 1 x 1 m, 2 x 2 m or 1 x 2 m in size; 2) test trenches, which were always 0.5 m wide and from 2-3 m in length; and 3) test pits, which were 0.5 x 0.5 m. All units and test trenches were excavated in arbitrary 10 cm levels; test pits were excavated without level designations unless cultural material was found. The extremely rocky soil along Area 1, plus the fact that a heavy calcium carbonate deposit had formed on many artifacts, colouring them the same as the soil, necessitated the use of a screen. A ¼ inch mesh screen was used at all excavations along Area 1 and, in fact, this technique was responsible for the recovery of most of the small artifacts. Screening procedures were started at Area 2 but were discontinued when it was apparent that all material was being found in situ in the stone-free, silty soil.

Exact provenience was kept for most materials recovered in situ in the units and trenches, but not in the test pits. Vertical provenience was measured and is presented here by reference to depth below surface (b.s.). Using a Brunton and a tape, baselines for horizontal grid systems were established at all of the DgOv-2 glyph panel sites and at DgOv-81. In the absence of grid systems, horizontal provenience was maintained internally within the pits and these were then mapped with reference to a fixed point at each site.

CHAPTER TWO - PROJECT AREA 1

Testing of Area 1 consisted of excavating at or near the following petroglyph sites: DgOv-81, 77, 76 and DgOv-2 panels 6-7, 12, 14-15 and 17 (Figures 1, 4, 8). In accordance with Park's mandate, we also examined others of the 21 designated glyph panels at DgOv-2 which we considered to possess archaeological potential. All of the glyph scenes on the north bank of the Milk River had received Borden site designations. I employed these numbers to refer to our own excavations, and only one new Borden number (DgOv-93) was assigned.

DgOv-81 (THE BATTLE SCENE PETROGLYPH)

This famous glyph scene lies on a south-facing sandstone wall on the north side of the Milk River in the approximate centre of the park. The ground surface is highest at the base of the cliffs, sloping south towards the river at an angle of 10^{o}. The immediate vegetation is very sparse, consisting of cacti and bunch grass. There is no sandstone rubble on the surface.

Testing of this glyph was accomplished by excavating three trenches, two perpendicular to, and one parallel to, the cliff face and seven test pits placed over a wide area ranging from 4.4 to 52.0 m from the glyph. The north ends of the two perpendicular trenches abutted directly against the sandstone wall, thereby exposing portions of the rock face as the pits were dug. All trenches and test pits were excavated to a depth of at least 50 cm b.s., with most pits terminating at 60 cm b.s.

Only one definite piece of cultural material was recovered, this being a lead bullet. The bullet was recovered from a depth of 15 cm in one of the trenches. The specimen had been fired and is badly contorted and cannot be identified. Some faunal material was found; however, there was no evidence linking the bone to human occupation.

Aside from the Battle Scene itself, which is believed to be a single cohesive story probably executed by a single individual, there was no evidence of native occupation of the surrounding area.

DgOv-77

Glyph scene DgOv-77 is situated on a south-facing wall on the north side of the Milk River, approximately 650 m east of DgOv-81. At this site, the

talus slopes at an angle of 12^{o}, the grass cover is thick and continuous and large rockfall is minimal.

The glyph area was tested with the placement of nine test pits, several of which were placed directly beneath the glyph scenes. No cultural material was recovered.

DgOv-93

The Borden number DgOv-93 does not designate a glyph site, but rather was assigned to an eroded prehistoric site located some 20 m west of DgOv-77 (Figure 5). The site was discovered when artifacts were noted in the steeply-sloping talus material immediately adjacent to the cliffs. The talus here is unvegetated, completely unconsolidated and slopes at an angle of about 22^{o}. The cliff face above the site curves out slightly, forming a bit of a shelter at the base.

Still standing against the sandstone wall is a thin vertical column of stratified sandy deposits about 1 m high, 8 m long and 20 m thick (Figure 6). This column has escaped erosion and offers a profile view of the former depositional sequence, including the level of the prehistoric occupation. The majority of the profile is composed of stratified silty sand and silty clay sediments deposited when the small, ephemeral creek located 15 m west of the site was cutting its channel. Interbedded between the alluvium are layers of colluvial talus material from the weathered sandstone cliffs, presumably deposited during extended periods of low water. Within the remnant profile, cultural occupation appears only in one thin dark horizon approximately 5 cm thick and 7 m long, 75 cm below the top of the profile. The once-buried occupation was probably eroded by the undercutting of the nearby stream which initiated a slumping process. At the time of prehistoric occupation, the ground surface would probably have been more level than today, sloping gently towards the Milk River.

The distribution of recovered cultural material suggests that originally the prehistoric occupation was immediately adjacent to the sandstone wall; shovel holes dug some 5 m away from the sandstone walls were all sterile. I interpret this to be an indication that the site was originally quite small in extent.

The remnant profile of the site suggests that a small camp was made directly against the sandstone wall. Evidence of this consists of two

partial hearth stains in the profile indicating that the hearths were built less than one meter away from the wall. The thinness of the occupation horizon on the profile, in light of the probably rapid rate of sand deposition, suggests that the site was the result of a single or at most a few occupations.

A very small portion of the site at the east end of the profile remained intact, not subject to deflation. At this important area, the profile dips below the talus and we were able to trowel down onto part of the in situ site surface. Part of the eastern hearth was excavated in this manner, and bones (collected for radiocarbon dating) were taken only from this buried, undisturbed section of the site. Faunal material observed on the slump talus was not collected due to uncertainty over its association with the lithics. With the exception of a few pieces recovered from the small buried part of the site, all artifacts were surface-collected and thus have no provenience. There can be no doubt, however, that all the recovered material originated from the single occupation horizon indicated in the profile. Recovery of the material was accomplished by shoveling the loose talus into a screen.

FEATURES

Features recorded at DgOv-93 included two hearths, both in a poor state of preservation. One hearth stain was visible near the west end of the profile, as evidenced by a slightly convex band of red-stained sand mixed with bits of burned and calcined bone, charcoal and a few pieces of fire-cracked rock. Obviously, the profile retained only the barest edge of the former hearth, and estimates of original size and shape are impossible.

The eastern hearth was better represented in that a portion was still intact under the talus at the east end of the site. This hearth is situated some 3.4 m from the western hearth. The eastern hearth was definitely bowl-shaped in plan and profile view. Approximately 1/3 of the hearth remained in place, and judging from this segment, the original feature would have had a diameter of about 50 cm. As we found it, the hearth was not rock-lined. However, 12 fire cracked rocks were collected in the vicinity so the possiblity of lining cannot be ruled out. This hearth was also marked by an abundance of burned and calcined bone, charcoal, ash and red-stained earth. Several soil samples as well as charcoal and bone material

were collected from this hearth. The entire bottom concavity of the hearth contained a grey ash deposit. Radiocarbon dating of this site, as discussed below, was based on bone collected from this hearth.

ARTIFACTS FROM DgOv-93:

Both in terms of sheer numbers of artifacts and in the number of finished tools, DgOv-93 was the richest site discovered in the park. In total, 256 lithic pieces (not including fire cracked rock) and several hundred bones were collected. Additional faunal material of doubtful provenience was observed but not collected.

Projectile Points:

Three points were recovered; 1.2% of the lithic sample. Because of the small sample size, each specimen is described individually. The point terminology is essentially that of Binford (1963). All measurements, unless otherwise indicated, are maximum values and are given in millimeters.

DgOv-93-2 (Figure 15c)

Length	20.0
Width	14.1, occurs at the base/stem juncture.
Thickness	3.2
Cross-Section	
Transverse	plano-convex (almost biconvex)
Longitudinal	plano-convex (almost biconvex)
Weight	0.82 g
Material	chert
Colour	light gray

Description: This small side-notched point has a moderately sharp tip with an angle of approximately 58^{o}. The blade portion of the point is ovate in outline and is 13.8 mm long: 69% of the total length of the point. The blade edges are symmetrical, smooth and slightly convex. One face of the blade is completely worked, the centre portion of the reverse face is unworked. Workmanship is of good quality with evidence of both pressure and percussion flaking. None of the blade edges are ground. The shoulders exhibit minimal development resulting in a very obtuse angle between the notches and the blade edges. The notches are broad, shallow and minimally developed. One notch, slightly better defined, is crescent-shaped, 1 mm

deep and 3.5 mm wide. The other notch is about 1 mm deep but grades into the stem edge. The notches are perpendicular to the longitudinal axis, are flaked from both faces and are heavily ground throughout. The point is 11.6 mm wide at the inside of the notches. The stem is indistinct as the point flares out in an "ear"-like fashion below the notches. The stem is expanding, about 5 mm long, flaked completely on one face and incompletely on the other. The stem/base juncture forms an acute angle. The ears are rounded projections and form the widest part of the point. The stem edges are very blunt and smooth but not polished. The base is concave and thinned from both faces. The interior of the basal concavity is heavily ground. The overall size is such that this point would probably have been used to tip an arrow.

Use-Wear: The tip area is lightly rounded and smoothed; there is no evidence of impact fractures or polish. The blade edges are well rounded and smooth with small local occurrences of bright polish. Grinding is absent from the blade edges and shoulders, but is present in the notches and basal concavity. The stem edges and "ears" are very rounded and smoothed. These use-wear characteristics suggest the specimen was definitely hafted and may have been used as a cutting tool on a soft material such as hide.

Comparison: The overall outline form of the specimen is similar to the type identified as Avonlea. However, the specimen is atypical of Avonlea in several respects: the size is about 40% larger than the average Avonlea size; the minimal notch development is atypical, as are the extremely rounded ears. The indistinct notches and rounded stem are not unknown features in Avonlea assemblages, as seen at the Ramillies site in southwestern Alberta (Brumley 1976:105, Plate 86). The specimen in question also has similarities to the Carmichael Wide-Eared variety of Avonlea defined and illustrated by Kehoe (1973:54, Plate 13 cc-dd). Generally, however, the differences between this point and Avonlea types are more striking than the similarities. I would not assign the specimen to this, or any other, recognized type. As will be discussed, the dating of this site is not consistent with Avonlea dates.

DgOv-93-3 (Figure 15b)

Length	N/A
Width	20.2, occurs at shoulders
Thickness	5.0
Cross-Section	
Transverse	biconvex
Longitudinal	biconvex
Weight	1.51 g
Material	chert
Colour	red-brown

Description: This basal portion of a side-notched point is broken 5.5 mm above the shoulders. There has been no re-working after breakage. Reconstruction based on blade curvature suggests that the point would have been about 34 mm long, with the blade comprising 71% of the total point length. The form in outline would have been ovate. The remaining portion of the blade and stem are completely worked on both faces. Workmanship is excellent and appears to have been executed by pressure flaking. Blade edges are sharp and not ground. One shoulder is rounded, the other angular; both form obtuse angles with the notches. The rounded shoulder is heavily ground. The notches are well-defined, perpendicular to the longitudinal axis, "U" or parabolic in shape, 2.0 and 2.1 mm deep and 4.1 and 5.1 mm wide, respectively. The notches are heavily ground, have a few spots of polish and are flaked from both surfaces. The notch/stem junctures form obtuse angles. The stem expands, then contracts again at the base, forming two "pointed" stem edges. The stem edges appear heavily ground and polished. The base is slightly concave, symmetrical and well thinned on both faces. The entire base is heavily ground. The overall size suggests the specimen was designed to be used on a dart or lance rather than an arrow.

Use-Wear: The remnant blade edges lack use-wear. The notches, stem edges and base are heavily ground but also exhibit a polish, thus suggesting haft wear superimposed over intentional grinding. Apparently, the point was used and broke during use. The transverse truncation of the blade and the absence of wear on the blade edges leads to the interpretation that the point was in fact used as a projectile and broke during such use.

Comparisons: While incomplete, the specimens can be compared. The pointed, oblique angles on the stem edges are similar to some Avonlea points from the northern plains. While most Avonlea types have squarish stems oriented parallel to the long axis of the point, the pointed stem edges are not rare. However, the specimen in question, when complete, would have been well beyond the size range for Avonlea. No typological association is proposed.

DgOv-93-83 (Figure 15a)

Length	34.50
Width	20.50, occurs at shoulders
Thickness	4.6
Cross-Section	
Transverse	biconvex
Longitudinal	biconvex
Weight	3.40 g
Material	chert
Colour	olive brown

Description: The side-notched point is complete. The tip is sharp with an angle of about 58^{o}. The blade is ovate in outline, the edges are symmetrical and smooth. On the long axis, the blade measures 27.1 mm, or 78.5% of the total point length. Both blade faces are completely worked, predominantly by fine, parallel, oblique pressure flaking. The net result is an expertly crafted point. The blade edges are extremely worn, as discussed below, but not ground. The shoulders are roughly rounded and are very smooth, apparently from wear rather than grinding. The shoulder/notch juncture forms an obtuse angle. The notches are completely smooth from wear; if they were once ground it is no longer discernible. The notches grade into the stem, which expands to a width of 17.5 mm at the base. The stem/base junctures are rounded in outline forming a slight "eared" appearance. The stem edges are heavily worn by rounding and smoothing. The base is concave, thinned on both faces and worn such that any grinding is not obliterated. The size of the point suggests its use as a lance or dart tip.

Use-Wear: As already noted, the entire point exhibits a rounding and smoothing of all edges. In addition, the central portion of the blade

edge displays areas of unifacial microscarring, as if the point had been held perpendicularly and scraped across some hard surface. The pronounced rounding of the blade edges occurred after the chipping. The extreme notch, stem and basal wear is interpreted as evidence of prolonged hafting. The point was probably hafted and extensively used as a cutting tool. Prior to this, the point may have been used to scrape or shave a hard surface.

Comparisons: The specimen is roughly similar in shape to types identified as Avonlea. Except for the rounded, "eared" appearance of the stem/base edge, the point is similar to the Gull Lake variety of Avonlea (Kehoe 1973: 52-53). A number of the Avonlea points recovered from the Ramillies site tend to have more rounded stem edges than the "typical" Avonlea (see Brumley 1976:104-107). However, the size of this specimen is nearly twice that of most Avonlea points. This, combined with other features noted above, precludes the classification of this point as Avonlea. The size and the rounded "eared" basal area are vaguely reminiscent of Oxbow points, specifically several from the Long Creek site (Wettlaufer 1960:58-59). No definite typological affiliation is assigned.

Bifaces:

Two specimens were recovered; 0.8% of the lithic sample.

DgOv-93-4 (Figure 16d)

Length	69.0
Width	23.9
Thickness	8.5
Cross-Section	
Transverse	plano-convex
Longitudinal	plano-convex
Material	chert
Colour	dark brown

Description: This pointed, bifacially-flaked specimen is roughly triangular in outline but has one straight and one convex blade-edge, resulting in a crescent-shaped appearance. The tip is thin but not well pointed. The body is crudely flaked, with short crescent-shaped step-scars along the edges of both faces. These short percussion scars have failed to thin the interior of the body and the piece is quite thick. The wide step-

scars give rise to a serrating effect along both edges. The interior of one face is unworked. The base is straight but is not at right angles with the lateral edges. The shoulders are gradual and rounded. The proximal portion of the tool has been thinned from the base. Neither the base nor the proximal portions of the blade edges appear to have been ground but both exhibit some signs of use-wear.

This wear consists of a slight rounding and polishing of the basal and proximal side edges. When considered along with the basal thinning, these features suggest hafting. The distal portions of the blade edges also exhibit rounding and polish especially on the projections forming the serrations of the edge. It is suggested the specimen was used to cut or saw unknown materials.

DgOv-93-86 (Figure 16c)

Length	63.9
Width	41.1
Thickness	18.2
Cross-Section	
Transverse	biconvex
Longitudinal	roughly biconvex
Material	quartzite
Colour	pink

Description: This biface is rectangular in outline. The lateral edges have been crudely flaked, probably with a hard hammer. The edges at the two ends are straight and at right angles to the axis of the tool. They are obliquely angled, forming a bevel or chisel-like edge at each end. It may be significant that the direction of the bevel is reversed at opposite ends of the biface. The two ends are better made than the lateral sides and were probably formed with a soft hammer.

That the tool was heavily used is demonstrated by the extreme use-wear on one of the beveled ends. The entire edge at this end is extremely rounded and smoothed, the wear is so pronounced as to be easily visible to the naked eye. The rounded edge is brightly polished, and superimposed over the rounded, polished area are hundreds of tiny scratch-marks or striations. Similar wear is not found on any other portion of the tool. In fact, the opposite beveled end appears to be unused. The

lateral edges exhibit only slight signs of wear. The type of wear on the one beveled end suggests use in a shaving, planing or gouging fashion. The numerous tiny scratch marks indicate use on an abrasive surface (Brink 1978a), in this case probably a material which had picked up sand from the immediate area.

Unifaces:

Two specimens were recovered; 0.8% of the lithic sample.

DgOv-93-1 (Figure 16a)

Length	29.0
Width	12.7
Thickness	5.0
Cross-Sections	
Transverse	plano-triangular
Longitudinal	plano-triangular
Material	chert
Colour	white

Description: This unifacially-flaked endscraper is rectangular in outline, parallel-sided with a long central ridge on the dorsal surface. The specimen was made from a narrow flake: the bulb is present at the proximal end. The distal end is unifacially retouched on the dorsal surface with very fine, parallel, pressure flaking scars perpendicular to the edge. The edge angle of the distal end is 70^{o}. The lateral edges are straight except for a slight constriction just proximal to the distal end. Both lateral edges exhibit tiny flake scars suggestive of utilization rather than manufacture. In addition, one edge is well rounded and polished. The proximal end has been slightly thinned by the removal of several flakes from the dorsal surface parallel to the long axis. The entire ventral surface is smooth, unworked and slightly concave. The proximal end, like the lateral edges, is rounded and polished which, together with the proximal thinning, suggests hafting. Heavy use-wear on the distal end and one lateral side indicates extensive use of this tool. The distal end exhibits a mass of striations perpendicular to the tool edge. As with the biface discussed above, this abrasion of the tool edge was probably caused by use on a sandy surface. The fact that the abrasion of the distal end

has a flat, or faceted, appearance suggests that the tool was used on a hard rather than a soft surface. It is suggested this tool was hafted and used to scrape sandy bone, antler or other hard material. alternatively, the tool may have been used on the sandstone walls themselves.

DgOv-93-84 (Figure 16b)

Length	28.5
Width	18.5
Thickness	11.2
Cross-Section	
Transverse	roughly bi-plano
Longitudinal	trapezoidal
Material	chert
Colour	black

Description: This tool is unifacially retouched on both proximal and distal ends, and on both lateral sides. Many of the scars suggest use of a pressure flaker; however, percussion flaking is also evident. The tool is rectangular in outline, the sides are parallel, the dorsal and ventral surfaces are flat except for a protrusion on the dorsal surface of the proximal end. The edge angle of the distal end is 81^{o}. The distal end is crudely flaked, with multiple step-scars on the beveled face parallel to the edge. Thes scars are a result of manufacture or resharpening, not use. The working edge shows moderate use-wear in the form of a dulling of the edge by rounding and abrasion. These wear-patterns are also found on both lateral edges and the proximal end. Narrow, parallel oblique flake-scars have shaped the proximal end of the tool, suggesting the intentional use of both ends as scraping implements. Quite possibly, the tool was reversed in a handle to maximize tool life. It appears the tool was used to scrape a material of moderate density such as wood (Brink 1978b).

Utilized Flakes:

Eleven specimens were recovered; 4.3% of the lithic sample.

	N	Range	Mean
Length	11	14.5 - 45.5	32.77
Width	11	10.3 - 38.7	25.23
Thickness	11	2.6 - 16.0	8.7

Description: Five of these tools are made of chert, five of quartzite and one of an unknown material. Only one of the flakes shows evidence of deliberate retouch (Figure 16e): this specimen may be a drill with the tip broken. The remaining 10 specimens appear to be retouched by use. Five of the tools are made on cortical flakes; two of these are from longitudinally-split chert pebbles. Two of the quartzite flakes are core-fragments or core-rejuvenation flakes which were subsequently utilized.

Debitage:

The vast majority (N=238; 93%) of the recovered lithics consisted of debitage. The category of debitage as used here includes identifiable flakes (with bulbs, platforms, etc), and non-diagnostic shatter. Seventy (29.4%) of the specimens are of chert; 152 (63.8%) are quartzite; one (0.4%) is Knife River Flint and 15 (6.3%) are of unknown materials. Most of the debitage (n=190, 79.8%) consists of small resharpening or biface-thinning flakes which have no dimension larger than 20.0 mm. The remainder of the debitage consists of cortical flakes and shatter.

Faunal Material and Miscellaneous Specimens:

As mentioned previously, several hundreds of bones were collected at DgOv-93 and hundreds more were observed but not collected. Faunal remains were badly fragmented and eroded. The majority of pieces were long bone fragments; burned and calcined fragments were common. Only a few pieces could be positively identified: species present include prong-horn antelope (Antilocapra americana) as represented by proximal and distal phalanges; bison (Bison bison) represented by tooth fragments, a canid, probably coyote or dog, represented by tooth fragments; and Homo sapiens, represented by a single cheek-tooth. This tooth is a right upper molar (probably second) from a young individual of indeterminant sex. An age of 14 to 15 years is assigned on the basis of root development. Second molars usually begin to erupt around the age of 12, and since the roots of this tooth were incomplete, an age of 14 to 15 years is probable.

Despite the young age, the crown was well-worn suggesting a rugged diet of gritty foods. As the pathologic loss of a second molar at this age would be uncommon, it seems more likely that the individual died.

DgOv-93-82; bone tool (Figure 21b)

Description: One possible bone tool was identified; a midsection of a long bone fragment from an unidentified large mammal. The specimen is 60.5 mm long, 10.7 mm wide, 6.7 mm thick and rectangular in traverse cross-section. Evidence of use of this specimen is confined to one end, which has been rounded into a semi-circular form. Microscopic examination of this portion of the bone revealed numerous linear grooves, most of which run parallel to the long axis of the bone, and several areas of bright polish located at the juncture of the non-abraded and abraded portions of the tool (Figures 22,23). It appears that this bone was used to rub some highly abrasive surface.

Shell: Several pieces of burned and unburned shell were also collected at DgOv-93. Unfortunately, identification of these small fragments is impossible beyond "mollusc".

Red Ochre: Several pieces of red ochre were collected at DgOv-93. The sandstone cliffs are rich in ironstone concretions and these may be found in many states of hydration, from hard rock nodules to soft, paste-like stains in the soil. As this material does occur naturally in the park, its presence at DgOv-93 does not necessarily indicate aboriginal use of the substance. However, it may be noteworthy that the glyph site DgOv-77 situated a few meters east of DgOv-93 includes a single red ochre pictograph.

Dating:

A single radiocarbon date was obtained from DgOv-93: 2675 ± 145 B.P.; 725 B.C. (S-1404). The date is a bone-collagen date from a sample of 125 g of bone collected from the east half of the remnant profile where buried and undisturbed materials were still in situ. All of the bone used for this date was associated with the eastern hearth and definitely affiliated with the occupation of the site. I have argued above that DgOv-93 represents a small, short-term campsite, as indicated by the

profile and the frequency and distribution of cultural material. There is no reason to suspect the date is not an accurate indication of the age of this occupation.

According to generally accepted temporal schemes, this date falls near the end of the Middle Prehistoric period, approximately 5500 B.C. - A.D. 200-700 (Reeves 1970:18). Correspondence of the 2675 B.P. date with artifact typological dating is obscured by the uncertain affiliation of the projectile points found at DgOv-93. The above-noted similarities of these points to Avonlea conflicts with the generally accepted time span of this phase; approximately A.D. 400 to 900 in Northern Montana (Reeves 1970:102). It is believed that the points from DgOv-93 are not affiliated with any well-defined typology, but rather represent a transitional form, perhaps a prototype for Avonlea. The vague resemblance of the eared points to Oxbow is interesting in light of the recent argument that Oxbow may be longer lived than previously accepted, perhaps extending until 1100 B.C. (Dyck 1977:32).

DgOv-76

The petroglyph panel DgOv-76 is located some 100 m east of DgOv-77 and 120 m east of DgOv-93.

The surface topography at this site is characterized by steeply-sloping talus material littered with massive sandstone boulders. The talus slopes at an angle of about 25^{o} for some 12 m, then levels out, forming the edge of the Milk River flood plain. Access to the glyphs is obtained by climbing over coarse rockfall and walking along exposed bedrock platforms. There is thus no suitable area for occupation directly beneath the glyphs. The DgOv-76 area was sampled with eight test pits, three of which were located adjacent to the sandstone cliff at the top of the talus mound and the remaining five placed at various locations along the bottom of the talus mound at its junction with the flood plain. In addition, the sandy deposits which rest on the bedrock platforms beneath the petroglyphs, were troweled in search of discarded artifacts.

Recovered cultural material was extremely minimal. One quartzite cortical flake, one quartzite fire cracked rock and four lead bullets were recovered from three of the test pits at the bottom of the talus

mound. The test pit which yielded the flake was enlarged to a 1 x 1 m pit but no additional material was found. Three of the bullets were found in one 0.5 x 0.5 m test pit, the other in a test pit a few meters away. All were buried some 15 to 20 cm b.s. All the bullets are .457 calibre, probably from a .45-75 Winchester, which, in musket form, was the principal N.W.M.P. weapon around the turn of the century (M. Mihajlovich, personal communications). Interestingly, all four bullets had been fired, but remain in excellent condition, with only one specimen exhibiting a slight flattening from impact (Figure 20a). It appears that the bullets were fired from a distance and landed without striking a hard surface. Yet, if fired from a distance, the recovery of three bullets from one test pit and one from another nearby seems highly coincidental. As an explanation, it is suggested that DgOv-76 lies on a direct line with the target range at the N.W.M.P. post across the river. It is known that a target range existed at the police post but its location is still unknown (M. Forsman, personal communications). The distance from the glyph site to the post is about 1.4 km, or just about the maximum range of the .45-75 musket.

DgOv-2

DgOv-2 is an extensive series of petroglyphs and pictographs which form the major tourist attraction at Writing-On-Stone Park, and as such has been subjected the greatest vandalism. The glyphs occur along a roughly convex section of south-facing sandstone ciffs over a distance of 1 km (Figure 4). The glyphs have been divided into 27 panels by Keyser (1977) and his designations are followed here (Figure 8). Alberta Recreation, Parks and Wildlife requested that Panels 6-7, 12, 14-15 and 17 be tested in anticipation of the possible installation of fences to protect the glyphs. In addition, we were invited to test any other locations along DgOv-2 which seemed archaeologically promising.

DgOv-2, PANELS 6-7

Glyph panels 6 and 7 occur on opposite sides of a squarish block of sandstone which juts out from the otherwise straight cliff face (Figure 7). The surface topography at these panels is nearly level for some 5 m out from the cliffs at which point the talus begins to slope down at an

angle of 12° towards the flood plain. The more or less level ground extends for some 30 m east-west along the cliffs, permitting the panel 6-7 area to be one of the more favourable areas for habitation at DgOv-2. The area was sampled with four test pits, one 2.5 x 0.5 m trench (Unit 1), one 2.0 x 0.5 m trench (Unit 4), one 1 x 2 m pit (Unit 2) and one 2 x 2 m pit (Unit 3).

The panel 6-7 area was one of the few locales in the park where cultural material was collected on the surface. A total of six glass beads and one chert flake were found on the loose sandy deposits below the panels. Nine additional beads were recovered from the uppermost 10 cm of the excavations. Lithic and faunal remains were recovered from levels one through ten inclusive. Despite this vertical spread, there is evidence that much of the cultural material is representative of only a few separate occupations. In Unit 3, a black quartzite core fragment from Level 2 fits with a fragment recovered from the bottom of Level 6 at 60 cm b.s. (Figure 18a). Thus, materials between Levels 2-7 are probably part of a contemporaneous assemblage which includes the bulk of the recovered material. The surface and near-surface beads indicate a second, historic, occupation. Finally, between 90 and 100 cm b.s., excavation Units 1, 2 and 3 yielded slim evidence of an earlier, ill-defined occupation represented by two flaked cobbles and a cortical flake. However, because of the scarcity of material and the evidence provided by the flake core of considerable vertical separation of contemporaneous material, all the artifacts recovered from panels 6 and 7 are here presented as a single sample. In total, only 39 lithic pieces were recovered, nearly half of which (N=17) were fire cracked rocks. The remainder of the lithic sample consisted of flakes, points, core fragments and flaked cobbles. Faunal material was abundant but could not always be linked with the prehistoric occupation.

Glass Artifacts:

Fifteen complete glass beads were recovered from the surface and Level 1 at panels 6 and 7. All the beads are the small "seed" bead variety (Figure 20b). Light blue is the dominant colour (N=8), followed by white and brown (N=3 each); there is a single red bead The beads are cylindrical or tubular in shape. The outside diameter ranges from 2.0 to

4.0 mm with a mean of 3.10. The length ranges from 1.5 to 3.5 mm with a mean of 2.34. The central perforations are all nearly 1.0 mm.

Lithic Artifacts:

Projectile Points: Of the 23 pieces of flaked stone, 3 (13%) are classed as projectile points.

DgOv-2-11 (Figure 15e)

Length	14.1
Width	4.8, occurs at shoulders
Thickness	3.0
Cross-Section	
Transverse	asymmetrically biconvex
Longitudinal	asymmetrically biconvex
Weight	0.37 g
Material	chalcedony
Colour	brown

Description: This very small corner-notched point is complete. The tip is blunt with an angle of about 75^{o}. The blade is ovate in form and widest at the shoulders. The blade edges are symmetrical, except that one edge is longer than the other (8.2 vs 9.9 mm). The blade is 8.2 mm long, 58% of the total point length. The blade edges are smooth, but fine, parallel, pressure flaking near the tip of the blade has produced a serrated edge. Both faces of the point are completely worked by pressure flaking. The blade edges are not ground. The shoulders are roughly rounded and form an obtuse angle with the notches. The notches are broad, shallow, crescent-shaped and perpendicular to the long axis. One notch is fairly distinct: 1.1 mm deep and 3.8 mm wide. The other notch grades into the stem and base. Both notches are well ground. The point is 6.9 mm wide at the inside of the notches. The notch/stem angle is obtuse. The stem is slightly expanding and well ground. The base is asymmetrically convex with a serrated edge caused by the alternating pressure flake scars directed upward from the base. No basal grinding is evident. The size of the point suggests it was designed for an arrow shaft.

Use-Wear: The tip lacks impact fractures but displays a bit of polish. The blade edges are smoothed, rounded and polished over their entire length. The notches appear to have been ground rather than worn from hafting, yet the base is smoothed and polished but not ground. From the aspect of the base, the point was hafted, and judging from the edges, it had been used to cut a soft material.

Comparisons: The specimen is, in general, typologically nondescript; but it bears some similarities to a number of Late Prehistoric points. Specifically, the point resembles several Nanton points recovered from the Ramillies site (Brumley 1976:Plate 8 and 9), but lacks the pronounced ears typical of Nanton points. The small size of the point, its wide notches and its base narrower than the proximal end of the blade allows comparison of the specimen with the smallest variety of Prairie notched points -- the High River small corner-notched points (Kehoe 1973:58; Forbis 1962:102). In sum, however, the point is not representative of any defined type.

Provenience: The point was recovered from Unit 2, Level 4 (30-40 cm b.s.).

DgOv-2-15 (Figure 15d)

Length	26.2
Width	8.5, occurs at shoulders
Thickness	3.7
Cross-Section	
Transverse	biconvex
Longitudinal	biconvex
Weight	1.04 g
Material	chert
Colour	light gray

Description: This specimen is a nearly complete side-notched point with one side of the stem and base broken. The tip is very sharp with an angle of 48^{o}. The blade is asymmetrically ovate in outline with one edge nearly straight, the other convex. The blade is 19.8 mm long, or 76% of the total point length. Its edges are finely serrated with approximately five serrations per centimeter. Both faces of the point are completely worked by pressure flaking. The blade edges are not ground. The shoulders are

nearly angular and form an obtuse angle with the notches of just over 90^{o}: the shoulder edges are sharp and not ground. One notch is complete and is parabolic in shape, 2.4 mm deep, 3.8 mm wide and parallel to the base. The remnant portion of the broken notch appears identical to the complete one. The point is 7.2 mm wide at the inside of the notches. Both notches have sharp edges and are not ground. The stem would apparently have been slightly expanding. The single stem edge is straight and parallel to the blade edge. The base is straight, very sharp and not ground. The size of the point is indicative of use on an arrow shaft.

Use-Wear: The specimen exhibits no wear. The tip, blade edges, notches, stem and base all have very sharp edges. There is no evidence of grinding. It is suggested that this specimen has never been hafted nor used, but rather, probably broke during manufacture and was discarded.

Comparisons: The specimen, in general, is similar to Late Prehistoric side-notched points. Again, however, the specimen varies in a number of features from the major established types. The Samantha side-notched points illustrated by Reeves (1970: Figure 17) may be the most similar. No typological identification is assigned.

Provenience: The point was recovered from Unit 4, Level 6 (50-60 cm b.s.).

DgOv-2-32 (Figure 15f)

Length	37.0
Width	20.8, occurs at shoulders
Thickness	5.9
Cross-Section	
Transverse	plano-convex to biconvex
Longitudinal	plano-convex to biconvex
Weight	3.72 g
Material	chert
Colour	brown

Description: The point is complete. The tip is sharp with an angle of about 55^{o}. The blade is ovate in outline, symmetrical and measures 29.2 mm long; 79% of the length of the point. The blade edges are smooth and worn but not ground. Both blade faces are completely worked. Craftsmanship is generally fair to good with the point's appearance marred by a

long step-flake scar on one face which runs diagonally across the proximal half of the point. Flaking appears to be primarily by percussion with some secondary pressure retouch evident. Both shoulders are rounded and form obtuse angles with the notches. The notches are broad, shallow, parabolic in shape, 3.0 mm deep and 4.5 - 5.4 mm wide. Grinding is evident in both notches. At the inside of the notches, the point is 16.0 mm wide. The stem expands to a width of 19.5 mm at the base where the stem/base juncture forms an acute angle. The base is convex, well-rounded and thinned. The size of the point suggests use on a dart or lance.

Use-Wear: The specimen is well used as evidenced by the very smooth, well-rounded and brightly polished blade edges and tip. Also, several flake-scar ridges on the interior of the blade body exhibit rounding and polish. This latter feature suggests the specimen was used on a soft material which the tool penetrated to some depth. The notches and stem edges exhibit a faint trace of polish on the ground surfaces. The base appears to be ground and not polished. The specimen was probably hafted and used to cut soft, clean materials such as hide or meat.

Comparisons: The specimen is most similar to Besant point types. It compares favourably with the Besant side-notched points from the Mortlach site (Wettlaufer 1955: Plate 7); from the Muhlbach site (Gruhn 1971: Plates 5, 6); and as defined and illustrated by Reeves (1970).

Provenience: The specimen was recovered from Unit 3, Level 6.

Other Lithics: The remaining 20 pieces of flaked stone consisted of non-diagnostic shatter (N=3); cortical flakes (N=2); secondary or thinning flakes (N=11); core fragments (N=2) and flaked or broken cobbles (N=2). Thirteen of the pieces are made from quartzite, three are of chert, three are of basalt, and one flake of obsidian. One of the quartzite flakes exhibited signs of deliberate retouch.

The two core fragments are parts of a single core recovered in Unit 3 (Figure 18a). The quartzite core measures 77.5 mm long, 44.6 mm wide and 25.8 mm thick and was impacted from all directions on both surfaces, apparently with a hard hammer.

The single obsidian flake was recovered form Level 6 of Unit 4. It measures 2.51 x 2.0 x 0.5 mm and thus was too small for hydration analysis.

Of the 17 fire cracked rocks, 12 were recovered in the north east corner of Unit 3, Level 8, suggesting a hearth feature at this location. However, no charcoal, burned bone, stained earth or other indications of a hearth were found in the rocky soil and a feature designation was not assigned. If there once was a hearth here, it would have been placed directly against the sandstone cliffs, much like the hearths at DgOv-93.

Faunal Remains: Over 1,000 pieces of bone were recovered from the panel 6-7 area, the vast majority of which are small pieces which can neither be identified nor analyzed in terms of numbers of individuals. Also, the smashed condition of the bone does not necessarily indicate human processing, as activity of the rodents and canids which den along the cliffs could account for the same features. Definite butcher marks were observed on only one long bone fragment from Unit 3, Level 4. The severe erosion of much of the bone found below Level 2 may account for the absence of butcher marks. Bone erosion is also responsible, in part, for the difficulties in separating Bos from Bison bones. It is presumed that bones from the surface and Level 1 are probably all Bos, and that all the others are Bison.

Identified faunal material from the surface and Level 1 includes domestic cattle (Bos taurus) and ground squirrel (Citellus sp.). Identified faunal material from Levels 2 - 7 inclusive includes bison (Bison bison), ground squirrel (Citellus sp.), deer or antelope (Odocoileus hemionus or Antilocapra americana), and coyote (Canis latrans). From Levels 8 through 10, 75 bones were collected, the only identifiable species being Bison bison. Most of this latter sample was small mammal remains and may not have cultural significance.

Shell - Avian and Mollusc: Fragments of an unidentified form of egg shell were recovered from Unit 3, Levels 2 and 3. Mollusc shell fragments recovered from Unit 4, Level 9, were also too small for identification.

Dating:

A single radiocarbon date was obtained for the Panel 6 and 7 area from a bone sample collected in Unit 3. Bone fragments from Level 6 and 7 were combined to total 104 g of unburned bone which yielded a collagen date of 1910 ± 150 B.P.; A.D. 40 (S-1403). This date thus pertains to

the 50 to 70 cm b.s. level in Unit 3 which contained the Besant point (DgOv-2-32). The date of 1910 B.P. corresponds well with the early temporal assignment of the Besant phase. Reeves (1970:10) maintains that the Besant phase in northern Montana begins around 1970-1870 B.P. When the standard deviation is applied, this date falls at the early end of the Besant range.

DgOv-2: PANEL 12

The immediate area around petroglyph panel 12 is level but very rocky. The glyphs are located on south- and west-facing rock faces in an L-shaped protected area (Figure 9). Within this protected area, large sandstone boulders and slabs have topped from the cliffs producing a rugged topography which at present is not well suited for occupation. Vegetation is almost entirely absent.

Because of the rugged landscape, pit locations were dictated by where excavation units would fit rather than by where we would have liked to place them. Rocky areas were also sampled by troweling and shoveling loose talus into a screen. Specifically, a protected cavity directly below the glyphs was designated Area 1 and was troweled and shoveled to a depth of 90 cm (Figure 9). Panel 12 was also sampled with two 2.0 x 0.5 m trenches and three test pits.

Recovered cultural material was minimal, consisting of one projectile point, three flakes and one bone tool. Horizontally, the material was very dispersed with all four lithic pieces recovered from separate pits up to 6 m away. The point, two flakes and the bone tool were from the upper 10 cm of talus. The third flake was recovered from 50 cm b.s.

Lithic Artifacts:

Projectile Point: Of the four lithic artifacts found, one is classed as a projectile point.

DgOv-2-P12-1 (Figure 15g)

Length	30.8
Width	22.9, occurs at shoulders
Thickness	3.3
Cross-Section	
Transverse	biplano
Longitudinal	biplano
Weight	2.36 g
Material	chert
Colour	green

Description: The specimen is complete and has a moderately sharp tip with an angle of about 60^{o}. The blade is asymmetrically ovate in outline; one edge is slightly re-curved. The blade length measures 23.5 mm; 76% of the point length. The blade edges are generally smooth but have a serration effect caused by the fine pressure-flaking of both edges. The point is made on a thin flake and the interior of one face is the unworked ventral flake surface. Craftmanship is excellent. The shoulders are both angular and form acute angles with the notches. The notches are very deep, relatively narrow, U-shaped and obliquely angled. The notches are 4-5 mm deep and 4 mm wide; the point is 14.0 mm wide at the inside of the notches. Both notches are well ground and worn. The stem expands to a width of 19.0 mm at the base. The stem edges are extensively worn, ground, or both, as discussed below. The stem/base juncture forms an acute angle. The base is asymmetrically concave due to a re-curve on one side of the base. The centre of the basal concavity is neither worn nor ground; however, the lateral sides of the basal edge are extensively worn.

Use-Wear: The tip is very dull and rounded but only faintly polished. There are no impact fractures at the tip. The blade edges are also rounded and lightly polished with the degree of wear decreasing near the shoulders. The shoulders are extensively rounded and lightly polished. Apparently the notches were originally ground and then heavily worn. This same wear continues onto the stem edges and adjacent portions of the basal edges and is interpreted as haft wear. The wear on the tip and blade suggest this tool was used in a piercing manner where the tip was twisted and

pushed through soft materials.

Comparisons: The specimen closely resembles specimens identified as Pelican Lake. Specifically, the specimen strongly resembles the Blue Slate Canyon variety of Pelican Lake (Reeves 1970: Figure 12), and is similar to several Pelican Lake points from the Mortlach site (Wettlaufer 1955).

Provenience: The point was recovered from the sheltered cavern at Panel 12 (Area 1) directly below the petroglyphs. The specimen was buried under 12 cm of loose talus material.

Other Lithics: Three flakes were recovered, all from separate excavations: one from Area 1, one from Unit 2 and one from test pit #2. Two flakes are made from chert, one is from "Knife River Flint". All are secondary or thinning flakes. No other cultural material was found in association with any of these finds.

Faunal Material: The Panel 12 area is noted for its rugged topography. Denning activities of various animals have resulted in great amounts of surface and buried bone. Inside the cavern of Area 1, a pack rat's nest was situated about 2 m above the outside ground surface. Several tens of thousands of bones were excavated from Areas 1 and 2; the majority of which were small mammal and bird bones. Most of the large mammal bones present were smashed or gnawed. Undoubtedly, most of the bones had no cultural significance. Indeed, it is possible that the projectile point from Area 1 was brought in by pack rats. Nevertheless, we examined many of the larger bone fragments, one of which is believed to be a bone tool.

Bone Tool: DgOv-2-6 is a mid-section fragment of a long bone from either Bison or Bos (Figure 21c). The piece is 125.0 mm long, 37.7 mm wide and 21.0 mm thick. The bone is badly eroded, the entire surface being rough and flaky. One end of the fragment, however, has a large, smooth, faceted surface diagonal to the long axis of the bone. This smooth surface is approximately 17.0 mm wide and 34.0 mm long. The texture of the faceted area is very distinct, both visually and to the touch, from the remainder of the bone surface. Microscopically, the smooth area exhibits tiny grooves parallel to the long axis of the bone (Figures 24, 25). Such grooves are not observed on the remainder of the specimen. No part of the tool is polished. In general, the wear on this tool suggests it

was held at an oblique angle and rubbed against a hard, abrasive surface.

The tool was recovered from Area 1 at Panel 12, at a depth of approximately 10 cm. This depth places the tool in stratigraphic association with the Pelican Lake point; however, due to the extensive pack rat activity, this association must be questioned.

DgOv-2, PANELS 14-15:

Panels 14 and 15 are adjacent glyph scenes on a straight, continuous, south-facing section of sandstone. The ground surface is roughly flat for 3 or 4 m away from the sandstone wall, then slopes down towards the flood plain. The whole area dips slightly from east to west. Vegetation and surface rock debris are entirely absent. The area was tested with two 2.0 x 0.5 m and one 3.0 x 0.5 m trenches, all with their long axes perpendicular to the sandstone face, and cross-cutting the level deposits in front of the glyphs (Figure 10).

Cultural material was very scarce. One lithic artifact was recovered; a small flake of obsidian which measured 9.5 mm long, 8.9 mm wide and 1.5 mm thick. The flake was recovered from a depth of 15 cm. The specimen was submitted for hydration analysis and returned a date of 545 ± 155 hydration years B.P. (L. Davis, personal communications). Although there have been problems with obsidian hydration dating in the northern plains, this date should be fairly accurate as it is based on a hydration rate established from a radiocarbon date at DgOv-94 (Area 2). The radiocarbon date was directly associated with other obsidian samples which were also subjected to hydration analysis, thereby permitting the formulation of a reliable hydration rate of the park area. These matters are discussed in the section on Dating and Hydration Analysis in Chapter 3.

The only other buried item of cultural significance was a bone fragment which is believed to be a tool. The specimen was recovered from a depth of 25 cm. The bone is a triangular-shaped half-section from a long bone of an unidentified large mammal (Figure 21a). The bone is pointed at one end and one lateral side near the tip is faceted and abraded. The abraded area is etched with microscopic grooves parallel to the lateral edge (Figures 26, 27). The very edges of the facet are brightly polished, especially near the tip. This specimen appears to have been used on a

hard, abrasive surface.

The only other artifact recovered from the Panel 14 - 15 area, was a lead bullet found at the west end of the glyphs. The bullet is .457 calibre and identical in all respects to the bullets from DgOv-77.

DgOv-2, PANEL 17:

The glyph panel 17 is situated on a southwest-facing cliff. At this point in the park, the sandstone cliff turns north, upslope, and follows a small gulley. The glyphs are situated on the apex of the turn in the sandstone wall and thus are open and exposed. The whole area slopes down toward the river at angles of about 8 to 12°. The area was sampled with one 2.5 x 0.5 m trench and six test pits.

The small gulley immediately west of the glyph was formed by runoff from heavy rains and spring meltwater from the snow collected above the site. Channeling of this runoff has resulted in the deposition of fluvial sediments alternating with talus material. All excavations at Panel 17 contained some fluvial sediments.

Artifacts recovered from Panel 17 consisted of four flakes and a core fragment. Of these, all but one flake were definitely re-deposited from a prehistoric site located on the prairie level above the sandstone cliffs. The re-deposited artifacts were obviously water-worn and were found only in fluvial deposits in the test trench directly below the glyph panel. We followed the gulley upslope to the prairies where we found a wide area of surface detritus, bone, tools and fire cracked rocks. Many of the lithic materials were identical to those recovered from Panel 17. One test pit was placed on the upland prairie in stabilized sandy deposits and several flakes were found between 18 and 49 cm b.s. suggesting the possibility that some parts of this prehistoric occupation may be more or less undisturbed. Largely, however, the area is deflated and the materials have no doubt been picked over for years by local collectors. This area was designated DgOv-95, but, as it was not part of our project, no further work was done here.

The only artifact from Panel 17 which can be confidently regarded as in situ, was one chert cortical flake located 2 cm b.s. in a test pit placed directly against the sandstone wall a few meters east of the glyph and thus out of the gulley. Other than this unremarkable flake, no fur-

ther evidence of historic or prehistoric utilization of the Panel 17 area was recovered.

DgOv-2, GENERAL TEST:

As mentioned, Recreation, Parks and Wildlife instructed us to test any other portions of DgOv-2 which we regarded as having archaeological potential. Accordingly, 10 additional 0.5 x 0.5 m test pits were placed along the sandstone cliffs in areas which were intuitively considered to be of high potential or which yielded surface cultural material, suggesting the possibility of buried material.

All test pits contained exclusively talus material; all were excavated to a depth of 1 m. Test pits 1-4 were placed along Panels 2-4; test pits 5-9 were placed along Panels 8-10; and test pit 10 was located approximately 25 m east of Panel 16 (Figure 8). From Panel 17 to the east end of DgOv-2, the talus slopes very steeply and massive rockfall litters the ground leaving virtually no suitable place for occupation.

The surface cultural material which led to the placement of test pits consisted of flaking detritus and glass beads. There were two main areas where these materials were found (aside from the Panel 6 and 7 areas already discussed): the Panels 1 and 2 region at the west end of DgOv-2, and the region between Panels 15 and 16.

Test pits 1-4 were completely sterile. The remaining six pits all contained some lithic cultural material totalling 18 pieces. The "richest" pit was #7, which contained four flakes and one fire cracked rock; the "leanest" pits, 5, 6, 8, 10, contained two artifacts each. In total, the lithic material consisted of 11 flakes or shatter, five fire cracked rocks and two unmodified cobbles of exotic material which are considered manuports. Four of the flakes or shatter are chert, five are quartzite, one is argillite and one is believed to be basalt. As usual, faunal material was abundant, ranging from a few to hundreds of pieces per pit. The association of this material with the artifacts was always dubious and none was collected although large mammal bones were examined for evidence of butchering or wear.

Interestingly, all six of the productive pits contained cultural material at two distinct levels suggesting repeated occupation, yet these levels differed from pit to pit. For example, test pit five contained a

chert flake at 70 cm b.s. and a fire cracked rock at 90 cm b.s.; test pit seven contained a fire cracked rock at 45 cm b.s. and four flakes at 58-70 cm b.s.; test pit 10 yielded one fire cracked rock at 8 cm b.s. and a quartzite cobble at 60 cm b.s. Because of the differential rates of talus deposition across the cliffs, it is impossible to assess the relationships, if any, among these minimal data. No tools or diagnostic artifacts were recovered and no dates were obtained from any of the test pits.

DISCUSSION: AREA 1

All along the main tourist area (DgOv-2) and continuing east along the cliffs on the north bank of the Milk River (DgOv-81, 93, 77, 76), there exists evidence of sporadic prehistoric occupation at the base of the sandstone cliffs in the immediate vicinity of petroglyphs and pictographs. In the great majority of cases, this evidence consists of a scattered artifact or two, a few pieces of fire cracked rock, some lithic debitage and faunal material. Almost never were these materials found in large numbers, the exception being bone which is abundant for natural reasons. In general, the distribution and frequency of material culture suggest occasional encampments of small numbers of people for short periods of time. Large camps would, of course, be prohibited in most areas by reason of adverse topography. Only DgOv-93 represents what might be called a small campsite. The remainder of the Area 1 sites are best described as isolated and multiple finds indicate prehistoric "visitation" rather than encampment.

Activities carried out along the cliffs included the occasional butchering, processing and cooking of animal foods, and some stone working. The paucity of cores and cortex flakes suggests the areas were not used for primary core reduction or tool manufacture. Rather, the majority of lithics recovered consist of thinning or re-sharpening flakes indicative of tool repair. The material types of the few recovered formed tools (mostly points) never matched the recovered debitage. These tools were probably brought to the site in completed form and either lost or intentionally discarded. Given the extensive wear observed on most of the tools, the latter alternative seems most likely.

Another likely activity at Area 1 was the actual engraving of sand-

stone. While excavating at Area 1, one of our concerns was the recovery of possible engraving tools, hence the placement of many pits directly below the glyphs. All lithic artifacts and the large mammal bones were examined with this concern in mind. None of the lithics showed wear which indicated use on a hard, abrasive surface. However, the three bone tools described above display just such wear. On the basis of personal experimentation, Keyser (1977:161) claims that a pointed bone implement is the optimal engraving too for the production of petroglyphs. Well-documented experimentation would be necessary to confirm or refute this contention.

Evidence of subsistence consists solely of animal bones found in direct association with artifacts; specifically bison, antelope or deer, canid, ground squirrel and presumably Bos. There is some ethnonographic information to suggest the Writing-On-Stone area was valued for its ample supply of berries, especially chokecherries (Dempsey 1973:43). If the exploitation of this kind of resource has considerable time depth, then it might be expected that seeds would be found in and around hearths where charring would have preserved them. In an effort to recover seed remains, we collected soil samples from several excavations, including about 0.5 kg from the profile of the hearth stains at DgOv-93. Subsequent floatation, however, yielded only a few unidentifiable seed fragments.

The radiocarbon dating of the glyph sites indicates occupation during the terminal stages of the Middle Prehistoric period (ca. 2700-1900 B.P.). The hydration date of 545 years B.P. from the obsidian flake found at Panel 14-15 indicates native visitation of the area during the latter stages of the Late Prehistoric period. Evidence of additional undated occupations consists of 1) the historic trade beads found on and near the surface at several panels of DgOv-2; 2) the two projectile points from Panels 6 and 7 which are interpreted as Late Prehistoric varieties and thus somewhat younger than the date on the Besant point of 1910 years B.P.; 3) the scanty cultural material found at a depth of 1 m at Panels 6 and 7; and 4) the numerous instances of repeated occupation found in DgOv-2 general test pits. While all of these occupations are probably no earlier than the late to middle stages of the Middle Prehistoric, given

the thickness of the talus deposits, there is every reason to believe that deeper, earlier components are present.

Formed tools from Area 1 sites were extremely rare: seven points or fragments and two unifaces and bifaces. The points from DgOv-93 are interesting in that most defy confident placement in a defined typological category. This is not surprising in light of the uncertainties and complexities of northern plains prehistory. Still, it should be pointed out that the date of 2675 B.P. on the points from DgOv-93 is near the middle of the accepted temporal range for the Pelican Lake phase (Reeves 1970:74), yet the points bear no resemblance to Pelican Lake. This may indicate contemporaneous occupation of the Milk River area by peoples who differed in at least one cultural concept -- that of projectile point style. A few points and a single date cannot be considered adequate support for these theories.

Evidence of travel or trade is supported by the presence of obsidian and basalt which are not locally available. Precise identification of the material sources has not been possible. Most likely the obsidian is from the Yellowstone area of Wyoming. The fact that only a few tiny chips of these two materials were recovered suggests intentional curation of the finished tools.

CHAPTER THREE - PROJECT AREA 2

DgOv-94, RIVER TERRACE AREA:

The Borden number DgOv-94 was assigned to the broad, extensive flood plains situated between the north bank of the Milk River and the west half of DgOv-2 (Figures 1, 8). Recreation, Parks and Wildlife had requested the examination of this area based on the reported observation of hearth stains in the cutbank on the north side of the Milk River.

The physiography of the region is one of extremely flat terrain interrupted by three minor terraces or benches (Figure 11). Each terrace represents a change in elevation of approximately 1 m. For convenience, the terraces are referred to as the low, middle and high terraces. The middle terrace, upon which most work was done, lies some 3 m above the present river level.

The deposits on all three benches are entirely of alluvial origin. The soil is mostly a sandy silt with occasional horizons of higher clay content. Soil profiles on the three benches differ considerably. The lowest flood plain is still periodically flooded in spring and there has been little or no true soil development. These deposits are classed as Regosols. The middle and high flood plain shows increasing soil development with increasing height above water level. The upper terraces have well developed Ah horizons 3-7 cm thick which overlie Bm horizons some 30 to 40 mm thick. Below the Bm are thick deposits of calcareous silts and sandy silts. Soils on these two flood plains are classed as Brown Chernozems (Kjearsgaard 1972).

Archaeological procedures used at DgOv-94 included a preliminary survey of the river cutbank on the north side of the Milk River at the west end of the park. This survey produced several locations along the cutbank where bone, lithic artifacts, hearth stains or all of these were observed in the eroding bank and these locations were recorded. One definite and one probable hearth were recorded. These locations were then tested, using six 1 x 1 m pits, all of which were placed about a meter back from the edge of the cutbank (Figure 12). In addition, 15 test pits were placed along the cutbank and over a wide area back from the river. One of the 1 x 1 m units (Unit 1) and four test pits (#11, 12, 13, 14)

were placed on the lowest flood plain; the remaining five 1 x 1 m units were located on the middle terrace along with seven test pits (#1, 6-10, 15); the highest terrace was sampled with four test pits (#2-5).

All six of the 1 x 1 m units and seven of the test pits (#1-5, 7, 8), contained definite cultural material. Test pits 6, 10, 13, 14, and 15 contained possible cultural material in the form of large and small mammal bone fragments, and occasionally some charcoal and burned bone fragments. With the exception of a few parially-exposed fire cracked rocks, which are interpreted as recent hearths, all cultural material was buried. Excavation procedures were similar to those used at Area 1 except that after a trial period, screening was halted.

In total, the excavations at DgOv-94 recovered approximately 650 pieces of bone, 156 lithics, two metal artifacts, two pieces of mollusc shell and several wood fragments. Nearly 1/3 of the lithics (N=45) were fire cracked rocks. Only a representative sample of these were retained as specimens. In general, the amount of recovered material was low: the most productive pit (Unit 3) contained 53 lithic pieces. More typically, pits contained a few flakes, bone fragments, and a few fire cracked rocks. The most productive pits were the 1 x 1 m units located adjacent to the cutbank and the test pits on the high terrace.

On each of the three flood plains, there was evidence of at least two separate occupations. This evidence was best displayed on the lowest terrace, where discrete horizontal strata of cultural material were encountered at 28 and 60 cm b.s., and on the highest terrace, where artifacts were recovered between 1-10 cm b.s., and again at 30-40 cm b.s. On the middle terrace, nearly all cultural material was recovered evenly between 15 and 30 cm b.s. An exception was Unit 2, where artifacts were recovered between 15-30 cm and again at 35-45 cm b.s. Although there was no change in stratigraphy between these levels, about 5 cm of sterile silty deposits separated them. Also, the 35-45 cm occupation contained eight obsidian flakes; a material absent from the 15-30 cm occupation.

FEATURES:

The only features discovered at DgOv-94 were hearths. The initial survey of the cutbank located one definite and one probable hearth and the former was fully excavated as Unit 1. The surface occurrences of

fire cracked rock were interpreted as probably belonging to hearth features but none were excavated. Finally, most of the pits at DgOv-94 yielded a few pieces of fire cracked rock; insufficient by itself to justify hearth designation. However, the two most extensive concentrations of fire cracked rock are considered here as hearth features:

H-1 - The best defined of all the hearths was exposed in the cutbank at the lower edge of the border between the lower and middle terraces (Figure 13). From the cutbank profile it was observed that this hearth was bowl-shaped in cross section, measuring 73 cm across and a maximum of 26 cm deep to the centre of the bottom. In plan view the hearth was circular.

The 1 x 1 m pit, Unit 1, was placed directly over the hearth, the top of which was buried some 60 cm b.s. At this depth, bone fragments, charcoal, ash, some fire cracked rock and a few flakes were encountered all across the 1 x 1 m pit floor. Cultural material became confined to the hearth itself with increasing depth. Most of the bones were small fragments mostly charred or calcined. The larger bones, including several complete specimens, were not burned and were located away from the hearth. The soil in and around the hearth was heavily mottled with charcoal, ash, bits of bone, and fire-reddened sands. Soil samples were collected and floated but the recovered charcoal was insufficient for radiocarbon dating, and no seeds were found. Also recovered from the hearth were a few fragments of mollusc shell and some incompletely charred wood, neither of which could be identified. The basal 5 cm of the hearth consisted entirely of white ash and calcined bone. Outlining the bottom of the hearth was a bowl-shaped stain of red sand.

The hearth was not rock lined. Eight small pieces of fire cracked rock were recovered, six of which are apparently from the same rock, which may have been a boiling rock. The only other lithics recovered consisted of two chert flakes. Approximately 1/3 of the hearth had eroded away; the remaining 2/3 were fully excavated. This hearth is presumed to be prehistoric in age, a conclusion based solely on the absence of historic material.

H-2 - While shoveling through the presumably sterile deposits on the lower terrace to get to H-1, we encountered a thin buried soil horizon at

a depth of 27 cm b.s. This horizon extends horizontally over much of the lower terrace and is about 5 cm thick. At a depth of 28-30 cm b.s., two metal points were recovered from the buried soil in association with a few burned and unburned bone fragments and charcoal stained earth. These materials clustered at the west edge of the pit and as the wall was cleaned, it became apparent that the very eastern edge of an historic hearth had been contacted. Unlike H-1, this second hearth did not appear in the river cutbank and thus was presumably fully intact. As only the very edge of the hearth was encountered, its size and shape cannot be determined. No fire cracked rock was found and, other than the metal points, no additional artifacts were recovered. No further testing of this hearth was done.

H-3 - Test pit #2 on the edge of the higher terrace yielded 10 pieces of fire cracked rock between 5-10 cm b.s. The rocks were arranged in a curved line extending into the north and east walls. By probing with chaining pins, the remainder of the circle was located. In contrast to the two hearths previously described, this hearth was obviously rock-lined and did not contain charcoal, ash or calcined bone. Associated with the hearth were a few unburned bone fragments and one quartzite flake. No additional pits were excavated over the remainder of the feature.

H-4 - Test pit #5, also located on the edge of the high terrace, yielded 20 pieces of fire cracked rock from a depth of 5 - 10 cm b.s. The stones did not form a ring, but rather were clustered together in the rough form of a circle. In association with this probable hearth was one chalcedony flake and a few pieces of unburned and burned bone. Again no charcoal, ash or stained soil were observed.

Lithic Artifacts:

A total of 111 lithics were catalogued, 18 of which are quartzite fire cracked rocks. Of the remaining 93 pieces, 48 (52%) are chert, 23 (25%) are quartzite, 12 (13%) are chalcedony, 9 (10%) are obsidian and one is quartz crystal. These 93 pieces are classed as non-diagnostic shatter (N=23, 25%); retouch or re-sharpening flakes (N=48, 52%); secondary thinning flakes (N=6, 6%); cortical flakes (N=5, 5%); cores (N=4, 4%); core fragments (N=4); a single core tool and a point base.

Shatter and Core Fragments:

Most of the pieces in these categories are yellow chert and are by-products of core reduction activities carried on in the area of Unit 3 discussed below. All pieces were examined for retouch or utilization but none were found.

Flakes:

None of the sharpening, secondary or cortical flakes are modified or utilized. A number of the sharpening flakes display pronounced use-wear on their proximal ends, dorsal surfaces, attesting to the extensive use of the tools from which they were struck.

Cores:

All four cores are small chert bipolar flake cores (Figure 17). Their size is as follows:

	RANGE	MEAN
LENGTH	18.9-28.9	24.3
WIDTH	10.0-27.9	17.3
THICKNESS	8.1-10.9	9.7

One core (Figure 17a) has a square outline and shows impact scars on all four edges. One rectangular-shaped core (Figure 17d) shows battering on two opposing poles and on one lateral side. The remaining two cores are roughly rectangular and are worked only at two opposing poles.

The two yellow chert cores (Figures 17 c,d) were found together in Unit 3 along with small flakes, shatter and core fragments to a total of 41 pieces of the same yellow chert. Part of the core reduction process involved the use of an anvil stone, which was also recovered (Figure 18b). One of the batter marks on this anvil stone is the exact size and shape of one end of one of the bipolar cores (Figure 19).

One of the bipolar cores from Unit 3 has also been utilized as a tool (Figure 17d). One lateral edge between the two poles is pointed in transverse cross section and is concave from one pole to the next, forming a sharp cutting edge. The edge is heavily worn as evidenced by pronounced chipping, rounding and polish. The tool was probably hand-held and used to shave or cut some moderately hard material. Opposite the utilized

edge is a broad cortex platform which could have served as "backing" for the sharp edge. The core was utilized as a tool sometime after the core itself was exhausted.

Core Tool: A single, unifacially flaked quartzite river pebble was recovered in Unit 3 (Figure 18b). Three large flakes were removed from one end of the pebble forming a "chopper" type of tool. The sharp edge of this tool was then used in some heavy duty task as evidenced by numerous small use-flakes detached from both faces of the working edge. The presence of this wear on both faces suggests that the tool was brought straight down on its edge in a chopping or pounding fashion causing bifacial use-retouch. The specimen is 95.5 mm long, 85.4 mm wide and 33.1 mm thick. The unflaked surface of the core tool was used as an anvil (Figure 19).

Projectile Points:

One small chalcedony fragment recovered from Unit 3 is probably part of the stem and base of a projectile point (Figure 16f). The specimen is bifacially-flaked, the base is slightly concave, heavily ground and was thinned mainly from one face. The maximum width is 16.5 mm. The stem edges are straight and smooth, the stem/base junctures form acute angles. The point would probably have been notched. The specimen is too small to permit meaningful comparisons. However, the base is reminiscent of Besant point types.

Metal Projectile Points:

As mentioned, two metal points were recovered from Unit 1 at depths of 28-30 cm b.s. in association with the buried soil horizon and the very eastern edge of hearth #2 (Figure 15 h,i). Both points are made from barrel hoop straps which were probably folded and bent repeatedly till they broke. The result is that each point has one straight, smooth manufactured edge and one rough, serrated edge from breakage. The overall workmanship is poor. One point is triangular in outline and stemmed; the other point is triangular with a straight base. Measurements are as follows:

	Triangular	Stemmed
Length	46.3	45.6
Width	17.3	15.0
Thickness	2.4	2.2

Faunal Remains:

Approximately 650 pieces of bone were recovered from DgOv-94, the vast majority of which were very small fragments. Most of the bone was unburned except for pieces recovered from hearths 1 and 2. The highly fragmented nature of the bone suggests intentional smashing, perhaps for grease extraction. The highest concentrations of bone were recovered from Units 1 and 2 (about 125 pieces each), and from Unit 4 (about 110 pieces). The general impression was that the majority of bones from each pit appear to represent only a few osteological parts from one or a few separate animals.

Faunal remains associated with Hearth 1 included a calcaneum and pelvic fragment from a mature female bison (Bison bison); unidentifiable bones from a deer or antelope-sized mammal; and unidentifiable bones from a beaver or porcupine-sized mammal.

In Unit 2, several badly fragmented teeth were tentatively identified as bison (Bison bison). None of the other bones from this unit could be identified, but all are large mammal, probably bison.

The only other identifiable bones from DgOv-94 came from Unit 4 where canid tooth fragments were recovered. One of the bone fragments from this unit exhibited butcher marks.

None of the faunal material from DgOv-94 exhibited evidence of modification or utilization.

Dating and Obsidian Hydration:

One radiocarbon date was obtained from a bone sample collected from levels 3 and 4 (20-35 cm b.s.) in Unit 2. A total of 120 g of unburned bone yielded a collagen date of 575 ± 165 B.P.; A.D. 1375 (S-1458). This date should apply to the material recovered from the middle terrace between depths of 20-40 cm.

The absence of diagnostic artifacts from DgOv-94 makes evaluation of this date difficult. However, because of the presence of several obsi-

dian flakes in Unit 2 at the same depth as the dated bone, it was possible to use the date to arrive at a hydration rate for the obsidian found in the park. A hydration measurement was obtained for one of the flakes associated with the radiocarbon date and the following rate was established: 7.7 ± 1.7 microns squared per 1000 years B.P. (L. Davis, personal communications). This rate was then applied to the other three obsidian samples for which hydration measurements were obtained. The results of the specimen recovered from panel 14-15 have already been discussed; the remaining two samples are described below:

1) Flake from test pit #3 on high terrace, recovered from a depth of 35 cm b.s. Hydration reading = 2.64 microns: Date = 900 ± 260 hydration years B.P.

2) flake from Unit 2 on middle terrace, recovered from a depth of 45 cm b.s. Hydration reading = 1.95 microns: Date = 500 ± 130 hydration years B.P.

The date from this second obsidian sample is very close to the radiocarbon date which was obtained from bone collected 10 cm above the obsidian sample. The closeness of the two dates suggests that there is no significant temporal difference between the material recovered at 35 cm b.s. and that from 45 cm b.s. The fact that the deeper date is slightly younger is insignificant in light of the large standard deviation.

The hydration date of 900 years B.P. from test pit #3 seems to be quite reasonable given the location of this pit on the higher terrace: it may be assumed that occupation here would be slightly older. This date, along with the others from DgOv-94, indicates native utilization of the area during the Late Prehistoric period.

The metal points recovered from Hearth 2 in Unit 1 also provide dating evidence for DgOv-94. David Thompson reported that the Blackfoot and Piegan Indians were supplied with metal by the year 1730 (Glover 1962: 240). Thus this occupation on the low terrace is probably no more than 250 years old. The hearth (#1) below this historic occupation in Unit 1 could be a few years to several years older than this date.

DISCUSSION - AREA 2:

While the testing of the area designated project area 2 was by no means extensive, the placing of 21 pits over a large area does give some indication of the potential for prehistoric and historic occupation of the area. That at least 13 and possibly as many as 18 of the pits contained cultural material and that materials were found on all three flood plains, and that both historic and prehistoric artifacts were found, attests to the widespread and repeated utilization of this area by native peoples. On the other hand, the minimal amount of material recovered and the evidence from some pits suggesting the presence of only a single individual at a single point in time argues for low intensity of native utilization. Many of the features and much of the cultural material could have been the result of a single day's activities. Nothing which could be identified as the true "living floor" of a camp was ever encountered. The high and dry flood plains of DgOv-94 offer excellent camping potential, yet this potential was only slightly utilized by native peoples. The absence of tipi-rings and similar stone arrangements is noteworthy, in light of the fact that these features form the dominant archaeological element of the surrounding Milk River Valley (Graspointner 1977).

The near total absence of finished tools makes discussion of activities at this site particularily difficult. It can be said that some animal butchering was done and several meals, which included bison and mammals in the size range of deer and beaver, were cooked. Molluscs and coyote or dog may also have been consumed. Many of the hearths appear to have been only used once. From a technological standpoint, the major activities seem to have been tool-resharpening and bipolar core-reduction. Undoubtedly, most of the re-sharpened tools were carried away from the site. At least one of these tools was made of obsidian, probably gathered from Wyoming. Whether or not this material was traded northward in Alberta or actually carried by the people who camped at Writing-On-Stone cannot be determined.

The bipolar core reduction poses some interesting questions. The yellow chert cores from Unit 2 were found along with the anvil stone, complete flakes, shatter and core fragments from the reduction process.

Yet, except for one of the cores which had been utilized along one edge, none of this material seems to have had any purpose. Nearly all of the flakes and shatter are less than 1 cm along any one axis and as such are useless. The fact that none of the flakes are worn, and that they were left essentially in situ next to their cores and anvil, also supports the contention that the production of this debitage was not for the purpose of obtaining small flakes. Given this, two interpretations may be advanced: 1) the final stages of core reduction were executed in order to shape the core (rather then the flakes) for some particular use; 2) the cores were being flaked mainly as a pastime. Bipolar cores have received multiple interpretation in the literature; they have been seen as wedges, pièces esquillées or other tool types (Forsman 1976). Although the specimens from DgOv-94 are unquestionably bipolar cores, this does not preclude their possible use as wedges or some other tool. Unfortunately, the severely-battered ends make the recognition of use-wear nearly impossible. The fact that the two cores were left in place next to their debitage and anvil suggests that at least the latter stages of bipolar reduction in Unit 2 were done to pass the time.

CHAPTER FOUR - PROJECT AREA 3

THE RODEO GROUNDS AREA:

The third area examined lies approximately 1 km northwest of Area 2 and ½ km west of Area 1. Area 3 is a U-shaped meander-core cupped by a bend in the Milk River, with an area of approximately 1 km^2 (Figure 14). The eastern edge is the access road to the parking area at gOv-2; the western boundry is the Milk River. Currently the area is used as a rodeo grounds with a corral and bleachers at the east end near the access road.

Area 3 is much like Area 2 in that it is composed of level flood plains interrupted only by minor terraces. All of Area 3, however, is estimated to be a minimum of 1 m lower in elevation. All of Area 3 is probably lower than the lowest terrace from Area 2. The vegetation reflects this, with many tall cottonwood and aspen trees and dense shrub cover over much of the rodeo grounds.

All of the near-surface deposits are recent alluvium. All of the excavations on these flood plains revealed alternating horizons of leaf-litter and sod, etc. Thus, most, if not all, of Area 3, has been frequently flooded in recent times. The area was examined by foot traverse of the entire perimeter and several intuitively-selected transects through the interior. During the course of this survey, thirteen 0.5 x 0.5 m test pits and nine shovel holes were excavated.

All pits were completely sterile. In addition, the exposures afforded by the cutbank were examined with negative results.

This area has little, if any, archaeological potential.

CHAPTER FIVE - SUMMARY AND CONCLUSIONS

A total of 104 pits constituting 46.65 m^2 of excavated area were dug in Writing-On-Stone Provincial Park in 1977. While the excavated area is not large, the pits were widespread in the west end of the park and, in my opinion, give a representative picture of the occupation pattern in this particular segment of the Milk River Valley. This pattern may be summarized as one of low-intensity utilization. That the study areas were used repeatedly in prehistoric and historic times is demonstrated by the presence of what are unquestionably temporally distinct, buried, stratified occupations at Areas 1 and 2, and by radiocarbon and hydration assays which, together, indicate at least four different temporal occupations. Our sampling suggests, however, that none of these occupations involved either a large number of people or a long period of encampment. Rather, our evidence strongly indicates a pattern of short term occupation by very small numbers of numbers of people.

Certainly the topography at most of the glyph sites precludes large camps, and their absence is to be expected. However, a few of the glyph sites along Area 1, and the broad, dry flood plains of Area 2, offer excellent camping conditions and yet were only minimally utilized. If we assume that testing of Areas 1, 2 and 3 did not miss any moderate or large-size camps, and thus the sample of the archaeology of these areas is representative of the whole area, then we are forced to develop an explanation for the observed pattern of prehistoric occupation.

The writer suggests that there has existed a continuity of religious beliefs and practices in this region extending back over the last 3,000 years and the roots of these religious beliefs lie in the sacred or ceremonial feelings which prehistoric and historic native peoples have attached to the rock art at Writing-On-Stone. The implementation of these beliefs and practices subsequently gave rise to the patterns observed in the archaeological record.

This theory of continuity is developed by juxtaposing ethnographic information pertaining to native utilization of the area in recent times, with the archaeological data recovered from our excavations. Through comparison of these two sets of data, I conclude that the park has been

utilized in similar ways and probably for similar reasons during the Late Middle and Late Prehistoric periods. I assume that a people's religious, ideational and behavioural system, when operationalized at a given locale, will have a direct effect on the nature, distribution and frequency of the material culture of the people.

As previously discussed, during the later part of the Historic period, the Milk River area was most heavily utilized by members of the Blackfoot Confederacy, including the Blood and the Piegan tribes. Ethnographic accounts, drawn primarily from members of these tribes, provide ample demonstration of the attitudes of native peoples in recent times towards the area now contained by the park, specifically the glyph areas. Perhaps the best source is Dempsey's (1973) unpublished manuscript, A History of Writing-On-Stone. Dempsey presents a strong, well-documented argument that Writing-On-Stone in the Ninteenth Century was

> A sacred place where the spirits wrote upon the rocks. It was a place to be respected and feared. Nearby, the country was rich in berries and the tribes often camped there in the summer. But they did not remain at the writings themselves, for it was too dangerous to be close to the spirits of the dead. But it was a place they often visited and wandering war parties stopped to learn what their future would be. If not a shrine, Writing-On-Stone was a place of great spiritual importance (Dempsey 1973: 46).

Habgood (1967:23) concurs that the major function of the glyphs was probably of a magico-religious nature. The elaborate grave goods associated with the human burial recovered from Area 1 by Getty (1971), and the occurrence of other native burials in the park area (Dempsey 1973), also attests to the sacred feelings which natives attached to the area in recent times.

It is clear that the glyphs themselves are the reason for attaching strong sacred feelings to the park area. There is no evidence that any other regions of the Milk River valley were regarded as ceremonial centers. It is also obvious that there is a direct relationship between the sacred feelings towards the park area and the actual creation of petroglyphs. That is, the historic peoples of the area were not just viewing ancient art forms at Writing-On-Stone but were, in fact, crea-

ting new glyphs well into the Historic period. This can be demonstrated by the abundance of glyph scenes which contain European trade items. Rock art experts maintain that the majority of glyphs now visible in the park were created in the Historic period, with the remainder dating to the later stages of the Late Prehistoric period (Dewdney 1964, Habgood 1967, Keyser 1977).

Given the belief in the sacred nature of the park in recent times, the ethnographic literature documents two important behavior patterns which were considered appropriate at a religious site. These patterns are relevant because of their potential effect on the structure of the "archaeological culture" one would expect to find at a sacred site. First, for most intents and purposes, the natives avoided the Writing-On-Stone area. It was not a place where one camped; rather, one visited the area only for well defined, highly specific purposes. Second, these specific visits to the park were often individualistic undertakings or, at most, involved groups of a few people.

In support of the first behavior pattern, the quote from Dempsey cited above, defines the unwillingness of native people to remain at the glyphs. More specifically, Dempsey documents the native practice of avoiding the Writing-On-Stone area as a campground:

> Because of the power of the pictographs, the Blackfoot were afraid to stay there overnight. "In earlier days the Piegan camped in the Milk River valley, but never camped close to Writing-On-Stone", said Yellow Kidney. "Groups visited it at times to see the writings. People feared it". Not only were they afraid of the spirits and their messages, but because the site was sacred ground, there was always the danger that a visitor might cause offense (Dempsey 1973: 26).

With reference to the second behavior pattern, Habgood (1967:23) argues that visitation of the glyph area may have been directly related to a vision quest; a practice which was widespread among Plains Indians and which was almost always an individualistic undertaking. These same points are underscored by a story recounted by Dempsey (1973:28):

> So strong was the feeling that this was a holy place that all the inscriptions were said to have had a supernatural origin. Any Blackfoot who did add pictographs to the rock faces likely did so because of a vision. Not only were these visions highly individualistic but they also contained secret knowledge from which the dreamer obtained his power.... In one instance a Blackfoot warrior had enough power so that he spent the night beneath the pictographs at Writing-On-Stone. In the morning, there were new inscriptions on the walls, which he was able to read. Because of this singular act of bravery, the man was given the name Apinaksinaks, or Morning Writing (Dempsey 1973: 23, 28).

Even today, many natives visiting the park avoid the glyphs; if native groups do visit the park to view the glyphs, they are led there individually by a "medicine man" who interprets the writings (S. Shearer, personal communications).

Finally, support for the postulated ceremonial nature of Writing-On-Stone may lie in the recovery of a relatively high frequency of projectile points compared with other formed tools. This idea is inspired by the findings from excavations at Spider Cave in Michigan where a large number of points but few other formed tools were recovered (Cleland and Peske, 1968). Most of these points were broken near the tip and, in several cases, the tip fragments were also recovered inside the cave. Spider Cave also has pictographs on the walls. The authors hypothesized that prehistoric hunters were using the cave as a ceremonial centre, firing arrows or spears at the pictographs as a form of sympathetic magic and not using the cave as a campsite (Cleland and Peske, 1968:30-34). The recovery of the Writing-On-Stone points in close proximity to petroglyphs can be interpreted as evidence of a similar practice. However, the majority of points from Writing-On-Stone are not broken in a manner expected if fired at the sandstone walls, and thus the question remains equivocal.

In sum, a review of the ethnographic literature indicates that in recent times the resident native peoples regarded Writing-On-Stone as a sacred or ceremonial centre. Part of the belief system associated with the sacred area included a concept of great power contained in the writings, and in the area in general; a power of a spiritual nature which

was more likely to be malevolent than benign. Unquestionably, during the Historic period these beliefs were linked with the actual production of symbolic rock art by the natives. The glyph area was one to be visited, not inhabited. These visits were for religious purposes such as vision quests, and were often the acts of single individuals or small groups.

The archaeological data from the excavations at Writing-On-Stone suggests that these recent native attitudes and practices may extend back in prehistory for several thousand years. Although there exists no prehistoric record of native attitudes concerning Writing-On-Stone, the archaeological data does provide supportive evidence of certain behavior patterns from which inferences about attitudes and beliefs can be drawn. The numerous findings of a single or a few artifacts at each locale amounts to an occupation pattern best described as "visitation" rather than camping. Such finds were especially common along DgOv-2: a point and a flake at Panel 12; an obsidian flake at Panel 14-15; a single flake in situ at Panel 17; and one flake and one fire cracked rock from DgOv-76. South of the sandstone cliffs, on the flood plains, the archaeology is of an equally small scale: typically a few pieces of lithic debitage per pit, and an absence of evidence of even a moderate-sized camp. The surface and subsurface absence of tipi rings at Area 2 is conspicous in light of the frequency of these features in surrounding regions of the Milk River valley (Graspointner 1977). This suggests that the prehistoric settlement strategies employed in the area were regionally atypical. It seems warranted to postulate a very low intensity of prehistoric and historic utilization of this small part of the Milk River vally.

Moreover, there is some evidence that the visitation to the park area which did occur involved only small groups or single individuals. For example, the hearth features found at Areas 1 and 2 and at DgOv-93 almost invariably indicate short-term usage. The anvil, cores and flakes from Unit 2 of DgOv-94 are likely the result of a single knapper's work. The repeated recovery of single artifacts from pits along Area 1 strengthens this interpretation.

While it cannot be ruled out that these observations are the result of inadequate sampling, the writer suggests that the data recovered are

very likely representative of the whole area.

A final part of the argument that the park area was used in similar ways for the past 2,000 - 3,000 years rests with the interpretation that the prehistoric peoples were also contributing petroglyphs and pictographs to the sandstone walls. If this continuity of artistic behavior can be demonstrated, then, by inference, it can be argued that the beliefs or attitudes which accompanied the behaviors would have also been similar to those documented in historic times. Given the highly perishable nature of a peoples' religious system it is doubtful that "proof" of the existence of a particular religious belief in prehistory can be established. However, by use of inference, it can be argued that the creation of rock art at Writing-On-Stone in Middle and Late Prehistoric times was probably accompanied by a belief in the spiritual nature of the writings and the sacred or ceremonial nature of the area itself.

The strongest evidence for ancient artistic activities consists of the three bone tools from Area 1 which are believed to have been used to scratch or incise glyphs (Figures 21-27). In the absence of documented information on wear patterns associated with the use of bone on a sandy surface, it seems warranted to suggest that the wear observed on the bone tools is in keeping with logical expectations. Certainly, the wear patterns bear close resemblance to thoseobserved on lithic tools used on an abrasive surface (Brink 1978a).

Also, the recovery of all of these tools from pits placed directly beneath petroglyph panels is interpreted as support for this postulated function. Unfortunately, given the rapid rate of erosion of the sandstone cliff faces, it is likely that any early petroglyphs or pictographs have probably weathered away.

Less convincing, but noteworthy, is the recovery of red ochre from excavations at several glyph sites. While pictographs are relatively rare in the park, those which exist are all made from a red or orange ochre probably mixed with grease (Habgood 1967). As previously noted, the ochre occurs naturally at Writing-On-Stone and its presence in a prehistoric component cannot be considered a conclusive association.

Finally, the simple fact that archaeological materials were found at locations in Area 1 can be interpreted as evidence of another specialized

use of the area. That is, with little or no available camping area, and few, if any, immediate resources, it is surprising that any material at all was found at some of the glyph sites. Potential human activities at these sites would have been severely limited; the viewing and producing of rock art is one of the few possible tasks which can be postulated.

In sum, while the evidence is by no means conclusive, given the archaeological and ethnographic data at hand, it can be said that there is evidence for the continued use of the park in particular ways from approximately 3,000 years ago until recent times. By inference, the continuity of behavior argues for a continuity of beliefs associated with the behavior patterns. It is postulated, therefore, that Writing-On-Stone has, for the past several thousand years, been regarded by native people as a sacred area reserved primarily for the specialized purposes of communing with and/or creating symbolic rock art. Anthropologists have repeatedly documented the tendency of non-industrialized peoples to maintain and perpetuate aspects of their religious belief system even when confronted with rapid changes in other segments of native culture (e.g., technology, subsistence, economy). Accordingly, the conclusions reached in this paper are not particularly surprising in that they lend support to this generally accepted tendency.

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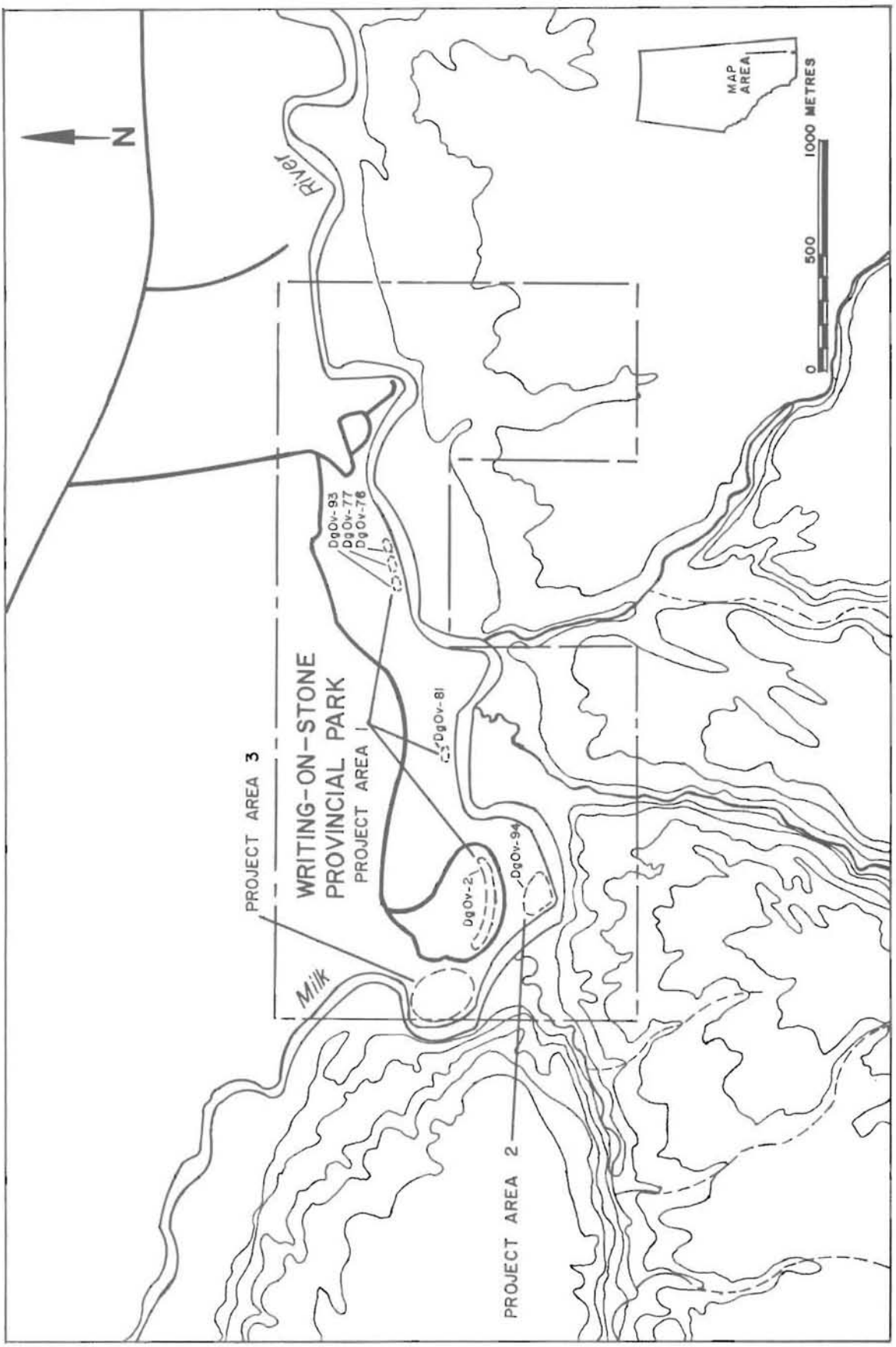


Figure 1: Map of Writing-On-Stone Provincial Park showing locations of three Project areas

Figure 2: Looking south into the Milk River valley and Sweetgrass Hills of Montana in background. Note vertical sandstone valley walls.

Figure 3: Typical profile of excavations in sandy talus material at Area 1. Note exfoliated sandstone slabs at bottom and abrupt change in particle size at depth of about 40 cm.

Figure 4: Looking North at overview of DgOv-2. Petroglyph Panel 1 would be at extreme left; panel 27 at extreme right. Note upland prairies above bedrock.

Figure 5: Crew excavating and surface collecting at east end of DgOv-93.

Figure 6: Sifting slumped talus material at DgOv-93. Note *in situ* deposits clinging to bedrock in centre of photo.

Figure 7: Excavations at DgOv-2, Panel 7. Panel 6 is behind squarish block of sandstone at left corner.

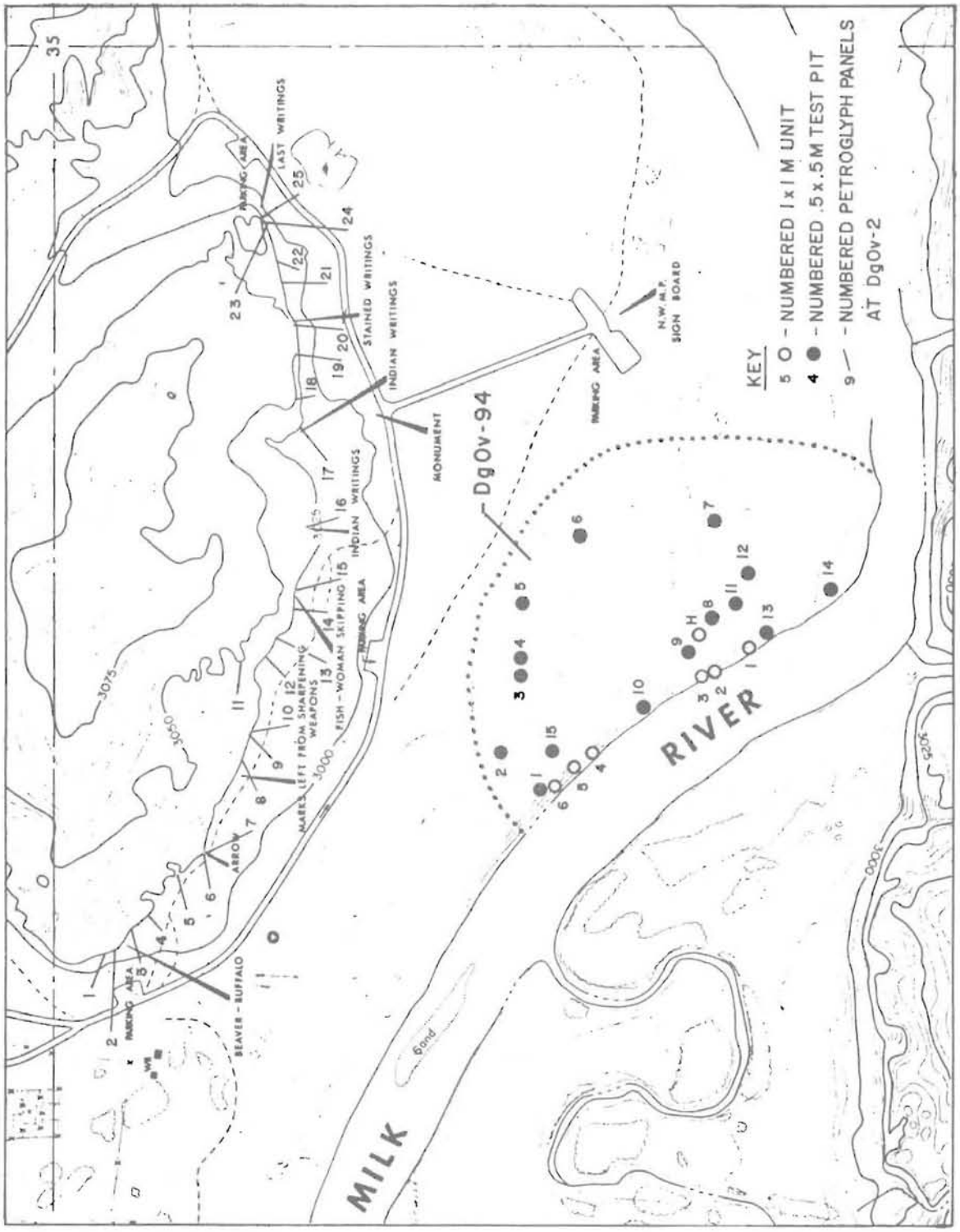


Figure 8: Map of DgOv-2 (Area 1) and DgOv-94 (Area 2). Panel numbers at DgOv-2 are from Keyser (1977).

Figure 9: Looking east at DgOv-2, Panel 12. Excavation trench in centre; cavern at top centre.

Figure 10: Looking northwest at DgOv-2, Panels 14-15.

Figure 11: Flood plains of Area 2, DgOv-94, looking south towards Milk River. Note backdirt pile of Unit 1 on lowest terrace at left, and crew on middle terrace.

Figure 12: Looking west at excavation of Units 2, 3 and 4, DgOv-94, above cutbank on north side of Milk River.

Figure 13: Profile of Hearth #1 in Unit 1, DgOv-94. Floor of Unit 1 visible at top of photo; hearth stain dips to maximum depth of 90 cm in centre of photo.

Figure 14: Project Area 3, the rodeo grounds, at west end of park.

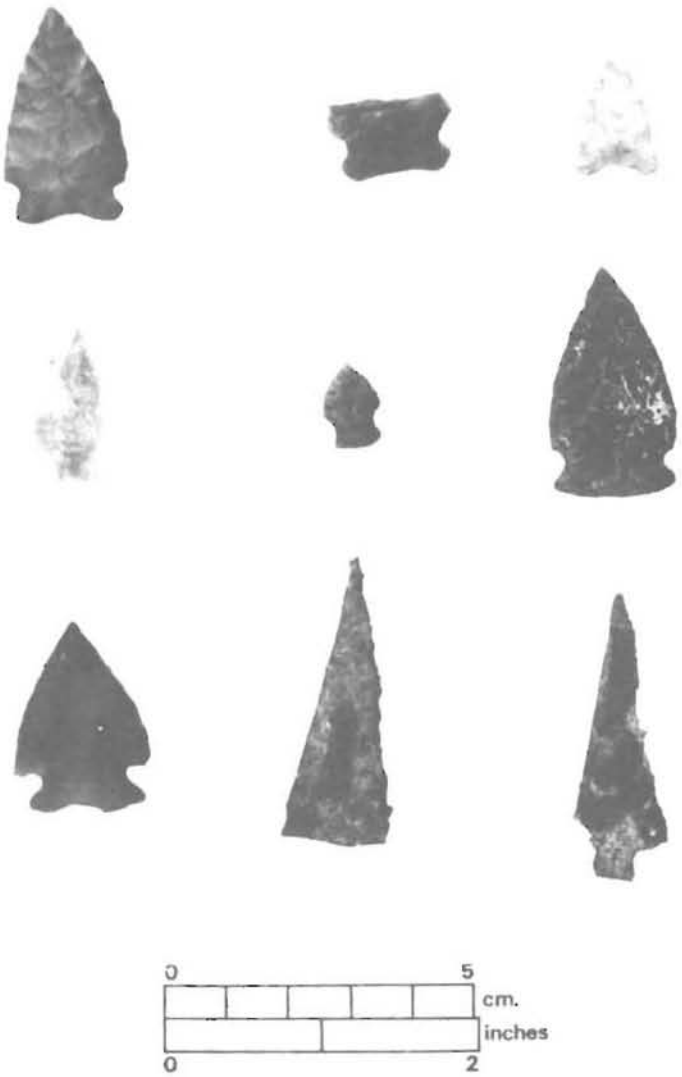


Figure 15: Points from Writing-On-Stone: a-c, from DgOv-93; d-f, from DgOv-2, Panel 6-7; g, from DgOv-2, Panel 12; h and i, metal points from DgOv-94.

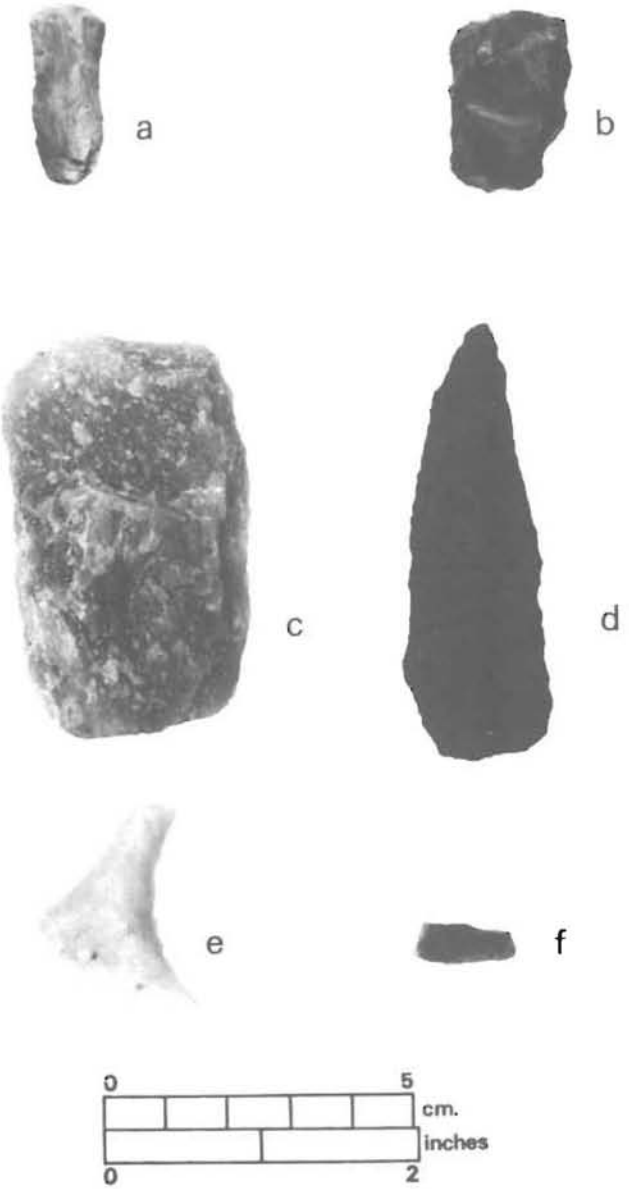
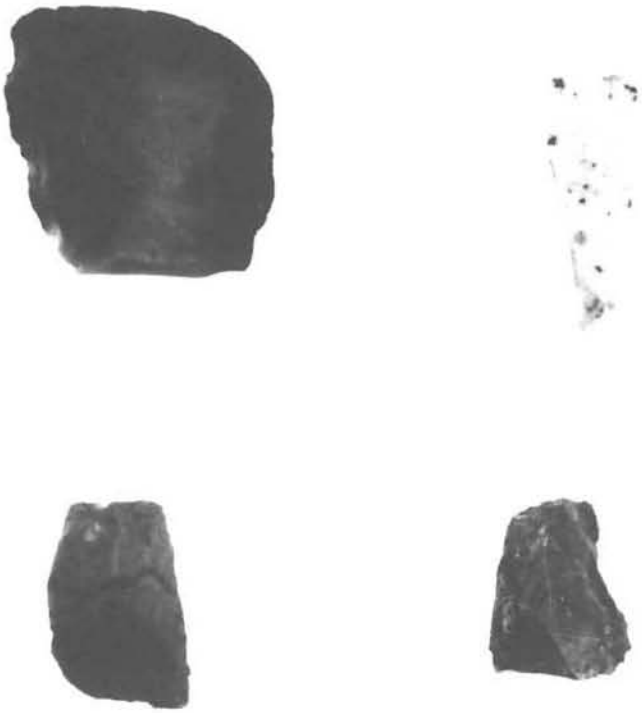


Figure 16: a and b, endscrapers from DgOv-93; c and d, bifaces from DgOv-93; e, retouched flake from DgOv-93; f, point base from DgOv-94.



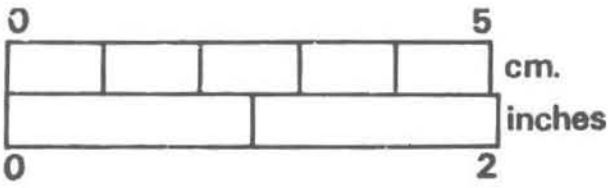


Figure 17: a-d bipolar cores from DgOv-94.

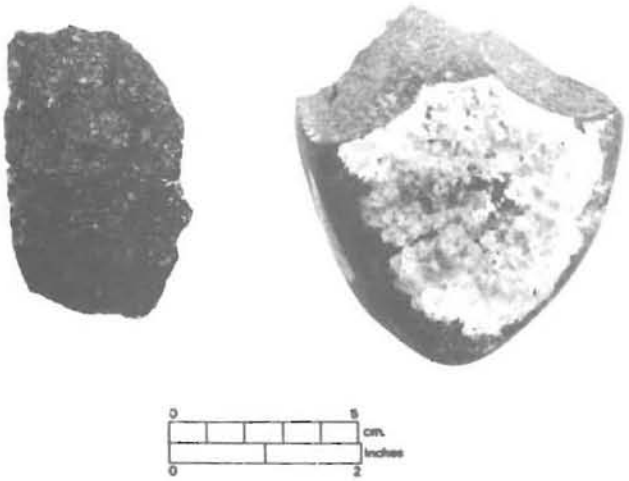


Figure 18: a, core from DgOv-2, Panel 6-7; b, unifacial core tool from DgOv-94.

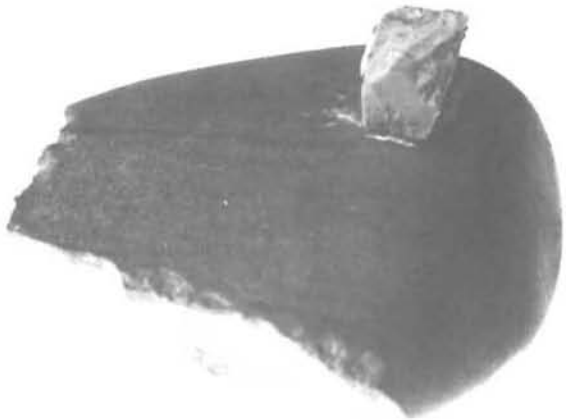


Figure 19: Reverse of Figure 18b showing anvil marks on quartzite pebble and bipolar core.

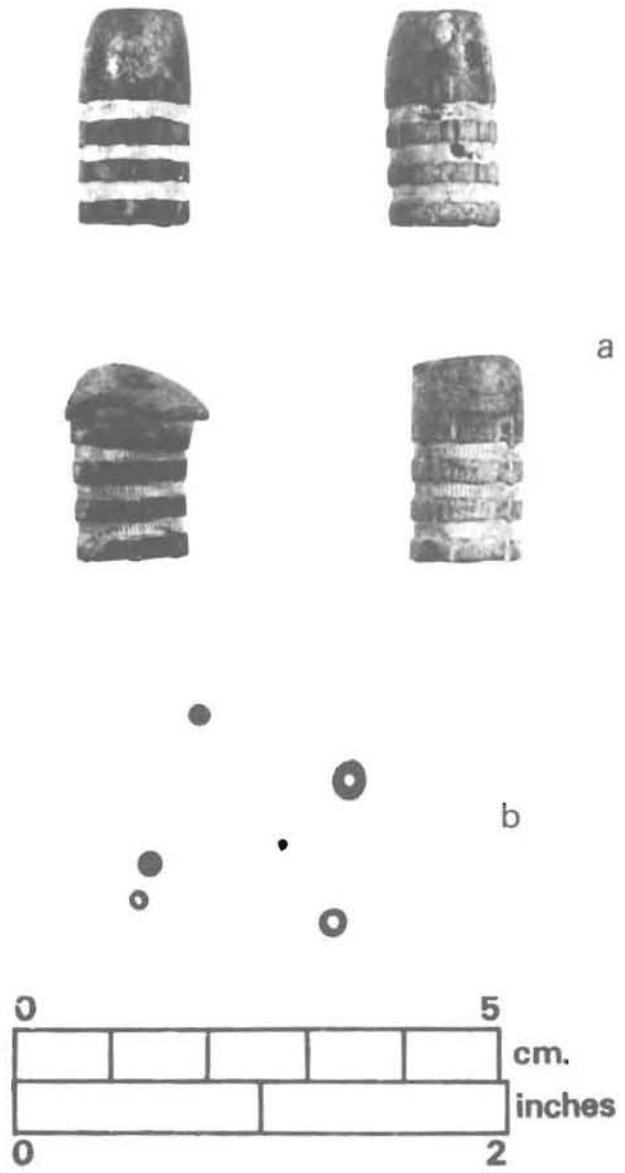


Figure 20: a, 45.75 calibre bullets from DgOv-76; b, sample of glass beads from DgOv-2, Panel 6-7.

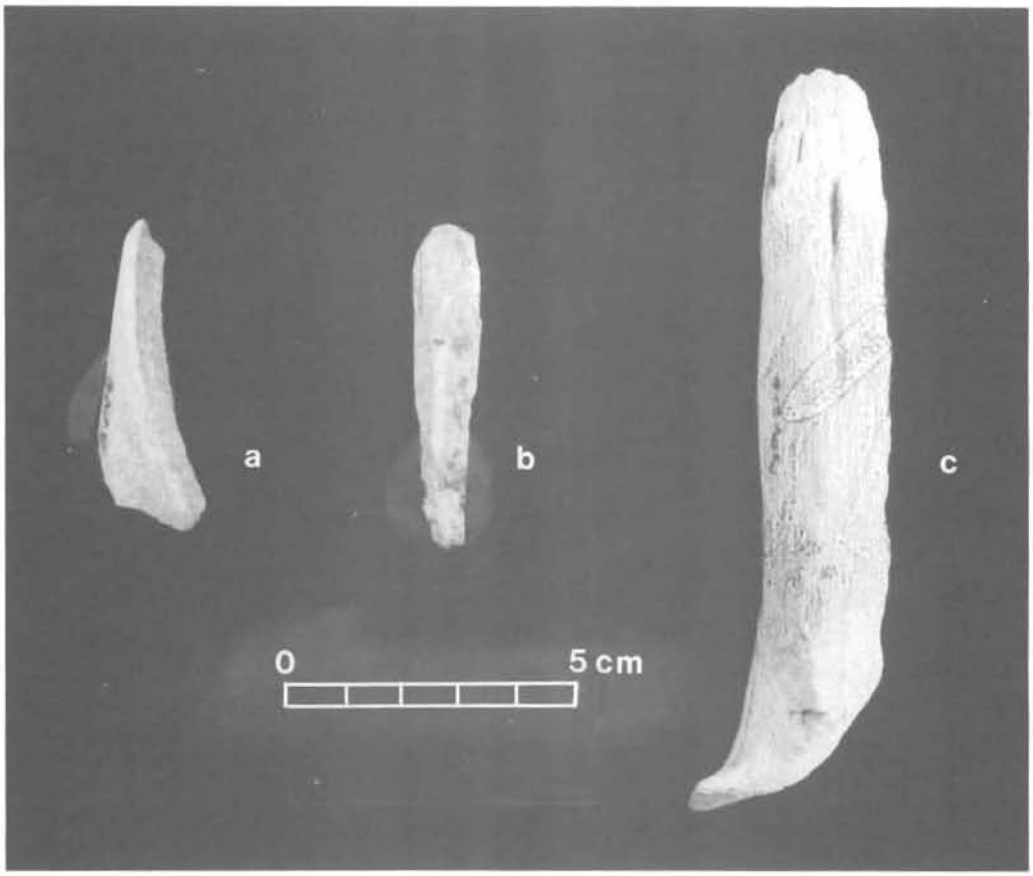


Figure 21: Bone tools: a, from DgOv-2, Panel 14-15; b, from DgOv-93; c, from DgOv-2, Panel 12.

Figure 22: 6.3 X photomicrograph of Figure 21b. Note rounded, worked end and polish on lateral edge.

Figure 23: 16 X photomicrograph of Figure 21b. Note smoothed end of bone and polish running diagonally from tip.

Figure 24: Close-up of Figure 21c. Note smoothed surface diagonal to long axis of bone.

Figure 25: 16 X photomicrograph of Figure 24 showing abroded surface of bone and apparent surface etchings parallel to fracture in bone.

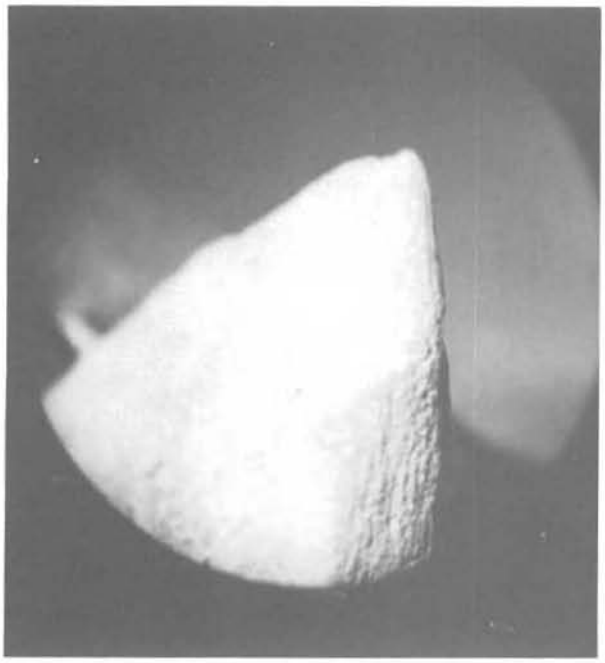


Figure 26: 6.3 X photomicrograph of Figure 21a showing faceted area at tip and down lateral side at right.

Figure 27: 16 X photomicrograph of Figure 26 showing apparent etching on faceted area and polish at left edge of facet.

ARCHAEOLOGY IN SOUTHERN ALBERTA:
STONE CIRCLES AT CHIN COULEE

By
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OBJECTIVES

These Occasional Papers are designed to permit the rapid dissemination of information resulting from Historical Resources' programmes. They are intended primarily for interested specialists, rather than as popular publications for general readers. In the interests of making information available quickly to these specialists, normal production procedures have been abbreviated.

ABSTRACT

Salvage archaeological studies were carried out, in October 1975, of two tipi ring sites (DjPb-2, -3) located on Chin Coulee, south of Taber, Alberta. Proposed realignment of Highway 36 to provide a southern approach to the bridge over Chin Reservoir would impact these sites.

DjPb-2 and -3 are situated on prairie benches overlooking Chin Coulee. DjPb-2 is situated on a semi-isolated spur of land and is separated from DjPb-3 by a gully.

DjPb-2 consists of 48 rock features, including tipi rings, external hearths, cairns and rock alignments. Rather than representing a single settlement, analysis of collected data indicates DjPb-2 represents a series of small encampments. Projectile points dating between 5150 and 4450 Before Present were recovered. The site was mapped and three rings within the Highway 36 right-of-way were excavated. A ring containing a large fire-cracked rock hearth was also excavated. It also yielded artifacts, and butchered bone, including fetal bone, indicating it was occupied in the winter, about 1,500 years ago.

One of the large rings in DjPb-3 would be destroyed by planned highway development. Excavation recovered a number of artifacts. Eighty percent of its rocks were buried below surface, indicating that it was of considerable antiquity.

Large ($>$ 5.5 m) and small ($<$5.5 m) rings were present in DjPb-2. Some small rings were built inside large rings and scavenging of the smaller rings to construct large rings was noted.

ACKNOWLEDGEMENTS

On-site studies were done by Diane Malmberg, Marie Murray and John Walker under the direction of James Calder. Calder subsequently undertook the analysis and preparation of first draft, assisted by Marie Murray. Brian Reeves edited and prepared the final draft. Diane Malmberg prepared the illustrations and Noni Higgs and Kate Connolly typed the various drafts.

The research presented here was undertaken under Archaeological Research permit number 75-17, and supported by Alberta Culture through the Archaeological Survey of Alberta.

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INTRODUCTION

In Fall 1975, salvage-oriented archaeological studies were undertaken at two tipi ring sites (DjPb-2 and -3), located south of Chin Coulee (Plate 1), some 14 miles south of Taber, Alberta (Figure 1). The sites were recorded in 1974 during an inventory of proposed highway construction projects (Poole and Reeves 1975). Certain rings in these sites would be impacted or destroyed by the planned realignment of the southern approach of Highway 36 to the bridge over Chin Reservoir (Plate 1).

The site studies detailed in the following report were carried out under contract to Alberta Culture. They were designed to mitigate this potential impact by mapping and selective excavation of various rock features in the two sites. These studies were conducted in October of 1975 by a crew of three archaeologists under the direction of the writer.

ENVIRONMENTAL SETTING

Chin Coulee lies in the southeastern Alberta short-grass plains, here characterized by a glacially-modified land surface comprised of gently-rolling to flat till and glacial lacustrine plains, bisected by a series of southeast-trending meltwater channels, which were formed during various retreat stages of the last Laurentide ice to enter the area some 20,000 or more years ago (Reeves 1973). These U-shaped channels, which include Chin, Etzikom, Verdigris and Forty Mile Coulees (Figure 1), are permanent features of the landscape. Many miles in length, they are characterized by relatively steep walls and flat floors. Small intermittent streams may be present on the floors, fed by springs issuing from aquifers at various locales along the valley walls. Seasonal ponds occur on the adjacent prairie.

Various high, gravel-filled terraces, or benches formed by channel downcutting, occasionally occur along the valley sides. These and the valley floor are marked by varying amounts of colluvial accumulation. Seasonal runoff channels and spring heads, in some locales, have cut back into the till plain from the channel edge to form narrow V-shaped tributary gullies (Plate 1). Woody shrubs - chokecherry, willow and saskatoon, among others - are found in these breaks and occasionally along the channel floors. Sage and cacti occur in association with the

short grasses which characterize the landscape. Long grasses occur in wetter areas.

The area is moisture deficient (less than 25 cm annually). Low winter and summer precipitation are characteristic, mostly falling as rain in spring storms. Cold winters are modified by chinooks. These, in combination with low snowfalls in winter, reduce standing snow-cover to a minimum. Summer temperatures in the region are significantly warmer than in the remainder of the province. The July mean is 17°C.

Bison were the dominant ungulate in historic and earlier times. They ranged in vast numbers in the region at various seasons of the year when they were observed in 1858 by members of the United States Army Stevens Expedition, travelling out of Fort Benton (Reeves n.d.). Occasional elk travelled with the bison herds, deer were present in the breaks and antelope on the plains. Only deer and antelope remain today.

Historically the area was part of the Blackfoot territory which extended south from the North Saskatchewan to the Missouri River.

ARCHAEOLOGICAL RESEARCH

While the southern Alberta region has been the focal point of prehistoric research (Reeves 1969) since 1955, intermediate areas such as Chin Coulee, and tipi ring sites in general, have not been investigated in any systematic manner. Some sites were reported to, and/or recorded by, staff of the Glenbow Foundation along Chin Coulee in years past. The only excavated site on Chin Coulee is the Fletcher site, a Cody complex kill (Forbis 1968), 15 miles to the east.

Other studies in the region include archaeological surveys along the Milk River by A. Graspointner, mapping of tipi rings in the Lake Pakowki area by the Edmonton Centre of the Alberta Archaeological Society, and near Lethbridge by the Lethbridge Centre. Late prehistoric sites on the Oldman River near Coaldale were excavated in 1955 by the Glenbow Foundation (Forbis 1960).

SITE SETTING

DjPb-2 and -3, adjacent tipi ring sites, are situated west of Highway 36, on the prairie level immediately south of and above Chin Coulee (Plate 1, no. 2a). In this area, the sides of Chin Coulee are cut by a

series of V-shaped erosional gullies, formed by headward cutting of springs issuing from bedrock aquifers. These channels have bisected the valley edge, producing through headwall and sidewall erosion isolated peninsulas. DjPb-2 is situated on a finger-like remnant (Figure 2, Plates 1, 2) of the gently-sloping benchland bordering the coulee. DjPb-3 lies on the benchland on the east side of a gully separating the two sites. It is bordered on the east by another gully occupied by Highway 22. An abandoned grade (Highway 36?) descends to the coulee floor.

The two ring sites are but two of almost a continuous series of tipi rings scattered along both valley sides, on the prairie level and isolated benchland in the Chin Coulee area.

SITE STUDY TECHNIQUES

A limited number of tipi ring site studies have been developed in the Northern Plains (see McIntyre, 1976 for a recent review). These studies have varied in the detail and amount of data observed, recorded and subsequently published on the individual rings or the sites. For example, studies such as Mulloy and Steege's (1967), which involved 305 rings situated on the North Platte River, omit details on ring-rock counts, axial and mean diameters, spacing between rocks, etc. Lack of detailed data makes comparisons difficult. Following tipi ring studies of a site near Lundbreck (Quigg and Reeves 1975) and along Highway 1A west of Calgary, a variety of data were recorded (Table 1) on the rock features in the site. Hopefully, this information can eventually be compared to other sites observed in a similar or more detailed manner. The following phases of work were carried.

PHASE ONE

The entire surface of each site was examined by the crew. As rock features were distinguished, a wooden stake was placed at its approximate mid-point to serve as the reference point for construction of the site map. Each feature was assigned a number which was written on the stake. Artifacts observed on surface were marked for later location, recording and collection.

PHASE TWO

A general sketch map of the site, locating the rock features in

relation to the site topography, was prepared. This map not only served as an on-going visual aid and reference in subsequent steps, but ensured that the features could be relocated if cattle removed or destroyed the stakes. During this phase, most features were photographed from a variety of angles.

PHASE THREE

A topographic map of the site was constructed, using a one-half meter contour interval and surveying the positions of the stakes for each rock feature. At the same time, planimetric-scale maps were drawn of each feature (48 in DjPb-2 and two in DjPb-3), utilizing a portable 20 cm grid. Artifact positions were recorded and the items were collected.

PHASE FOUR

At the same time the individual rock features were being mapped, a detailed set of notes was compiled on each feature, defining its relationship to other features and to the site topography.

For tipi rings, the following data were recorded (Table 1):

The shape of the ring - round or oval in most cases - and the diameters of the north-south and east-west axes.

The completeness of the ring. A complete ring was one which had clearly evident circles, even though the rocks may be widely spaced or with large gaps existing in the circle. Partial rings are represented only by an arc of a circle.

The number of rocks comprising the feature, the depths of their base below surface, the weights and the rock types.

The type of stone arrangement. Stone arrangements were defined as single or double row. Single rows were rings in which the outline was formed by a single circular row of rocks. Double rows are rings in which a pavement of up to four or five rocks wide formed a part or all of the ring. Pavement width was not consistant in any ring. Broad pavements were often confined to one part of the ring, while the rest was defined by a single row.

Spacing of individual stones. Stones were defined as tightly-spaced - laid very near to or touching one another - or loosely-spaced - a

moderate distance between stones. Spacing varied within individual rings. Some sections were characterized by tightly-spaced rocks and others by widely-spaced rocks.

Evidence for scattering or scavenging of the ring. Scattered rings were those characterized by a dispersal in the immediate ring area of the rocks from the feature. Scavenged rings were those with sections of their rings removed, leaving the rest of the feature relatively intact. Scavenging presumably indicated re-use of the rocks by later occupants of the site.

The presence or absence of rock concentrations or piling at points around the ring perimeter. Presence of these features indicate the use of extra rocks for stabilizing the three or four main support poles which the tipi would have had.

The presence or absence of door gaps, their widths and locations if present. In many rings, the rocks were widely-spaced and as many as three or four small entrance-like gaps might be present, making it impossible to determine the true position of a door. Only those with well-defined entrances were recorded.

The presence or absence of hearths within or outside the rings. Hearths were defined on the basis of surface features - a grouping or tight cluster of fire-cracked or reddened rock, or a circle of rock near the centre of the ring. Questionable hearths lacked fire-cracked rock. They are so noted in Table 1. Size, location and number of stones present were recorded when possible.

Observations were made on the relationship of the rings and other features to each other and to site topography, to characterize the pattern of settlement by attempting to define camp configurations and distinguish the numbers of encampments represented.

PHASE FIVE

The final step in on-site studies prior to ring excavation was to whitewash the rings and to re-photograph them from various ground vantage points and from the air.

PHASE SIX

Step six consisted of the excavation of certain rings (features 2, 3 and 5 in DjPb-2 and feature 1 in DjPb-3), within the two sites which would be impaired in road construction. In DjPb-2, a tipi ring (feature 41) and hearth (feature 10) adjacent to the alignment were also excavated.

SITE DjPb-2

LOCATION

DjPb-2 lies on a finger-shaped spur of land 400 meters in length, joined to the plains by a thin landbridge ten meters wide (Plates 1-3, Figure 2). This bridge will eventually be breached by erosion, isolating the DjPb-2 site area. From the south end, the surface slopes gently north, steepens, then flattens and widens out in the middle area to 100 meters in width, and then narrowing to the tip where it is 30 meters in width. The floor of Chin Coulee lies 46 meters below this prairie surface.

The site surface is characterized by overgrazed short grasses and occasional cacti, growing in a thin brown chernozemic soil developed in aeolian deposits (15 cm thick) and glacial gravels and tills. Large boulders occur exposed at the northern tip (Plate 4) in a deflating erosional till hummock. Other surface rocks are common in the area.

Aside from a vehicle track extending along the site surface, the area has suffered little damage. A pole erected by Calgary Power is present in the centre of one of the rings (Plate 6a). Cattle grazing does not seem to have appreciably disturbed the rock features.

DjPb-2 is barren and not protected from the elements. Desolate in nature, it is typical of the ring site locales found on the prairie adjacent to these meltwater channels in southern Alberta. Scattered across its surface are 48 rock features. The majority of these are located at the northern end (Figure 2, Plates 3-4).

EXCAVATIONS

Archaeological reconnaissance in 1974 indicated that the proposed realignment of Highway 36 would remove a portion of DjPb-2, destroying

four features in the process. The excavation here reported took place at these sites and at two additional areas outside the right-of-way, at feature 10, a large fire-cracked rock surface-hearth, and at feature 41, a small tipi ring which contained a large internal surface-scatter of fire-cracked rock.

Individual excavation grids defining two meter squares were established for each feature excavation, and selected units were excavated by shovel and trowel. All removed sediment was passed through motorized screens to maximize recovery of cultural objects. The excavations are described in the following sections.

STONE FEATURES

The 48 rock features at DjPb-2 are divided into four categories: tipi rings, hearths, stone piles and "rock alignments", as defined below. Tipi rings are separated into two descriptive groups defined by diameter, small rings (N=34; $\bar{x}$=4.03 m; range 3.2-5.1 m) and large rings (N=7; $\bar{x}$=6.8 m; range 5.0-7.5 m). Each group is described separately.

SMALL TIPI RINGS

Thirty-four individual small rings (features 1-3, 5-7, 15-17, 20-21, 23-24, 29-30, 32-36, 38-49)(Figures 3-11; Plates 5-9, 15-17) and three small rings within larger rings (features 12, 19, 22)(Figures 14-16; Plates 10-11) were identified.

The rings were oval (69%) to round and ranged in diameter from 3.2-5.1 m, averaging 4.03 m. From 10-92 ($\bar{x}$=45) rocks were used in construction. These ranged in weight from a minimum of 0.9-6.8 kg/ring to a maximum of 10-72.6 kg/ring ($\bar{x}$ per ring: 5.4-14.1 kg; $\bar{x}$ per site: 9.5 kg). The rocks were moderately to well-rounded cobbles and boulders typical of those littering the prairie surface and erosional cuts.

Depths of rock bases below surface ranged from 11-28 cm, varying widely within an individual ring. This suggests that burial relates to surface stability; to deflation or accumulation, rather than time of emplacement of the rock by man. Upslope rocks were generally less deeply buried than those downslope.

The spacing of rocks vary from tight (8%; e.g., feature 1, Figure 1a, Plate 9) to loose (61%; e.g., feature 6, Figure 5a). A combination of

tight clusters with widely-spaced rocks in between is most common (e.g., features 46, 47, Figure 4, Plate 5). Rocks were not found placed in contact with each other. The majority of rings were constructed of a single row of rock (e.g., feature 6, Figure 5b, Plate 7). Only 36% had double rows or pavement-like outlines (e.g., features 46-47, Figure 4, Plate 5).

Most rings are complete. Twenty-two percent are partial arcs (e.g., feature 13, Figure 1a, Plate 9), either the result of removal of rocks by later site-users from complete rings, or of the original construction form. Three partial rings (features 20, 26, 38) are adjacent to large rings. Perhaps they were scavenged in the larger rings' construction. Some 52% of the small rings, on the basis of observable configurations, were disturbed sometime after construction, possibly through rock scavenging by later occupants or by random scattering.

Doorways were not readily identifiable, as most rings have gaps of varying widths in their circumference (e.g., features 46-47, Figure 4, Plate 5). Four rings (features 7, Figure 5b, Plate 7; 17, Figure 6d, Plate 6; 23, Figure 7c; and 41, Figure 10d, Plate 17) have single gaps in otherwise continuous rings. These may represent doorways. They face south to east, and range in width from 80-140 cm.

Internal hearths may be represented in 25% of the rings, as marked by small clusters of rocks and fire-cracked rock (e.g., features 46-47, Figure 4, Plate 5). Outlined by two to nine rocks, these surface features range from 40 to 180 cm in diameter. Ring feature 41, which was excavated (see below), contained a large interior hearth. The position of the hearths vary from just off-centre (N=4) to northeast of centre (N=5), with one each to the southeast, southwest and west.

Eighteen of the small ring perimeters have rock clusters. While they may have been used for supports for main posts, most rings (N=10) contain only one cluster or pile; three have three piles and one has four piles.

Four of the small rings were excavated; features 2, 3 and 5, Group B (Figure 3, Plates 15-16) on the west edge inside the Highway 36 right-of-way, and feature 41, with its large internal hearth, outside the right-of-way. Group B were excavated by use of 23 two-by-two meter squares to

a depth of 15-20 cm below surface, in the B-horizon of the surficial sediment. Fifty-six artifacts were recovered, 40 of which came from inside the rings (Table 2), but neither a living floor nor fire-broken rock were found.

Tipi ring feature 41 (Figures 10d, 12; Plate 17) was excavated by use of four two-by-two meter square quadrants, utilizing shovel and trowel, to a depth of 10-15 cm. A few bone fragments, 12 pieces of fire-cracked rock, and 11 artifacts were recovered from the northwest, southwest and southeast quadrants.

The northeast quarter yielded 13 artifacts in association with a rock-filled hearth. This hearth, after excavation, measured 0.9 (north-south) by 2.0 m (east-west) in diameter (Figure 13, Plate 18), with fire-cracked rock scattered over a 1.4 m area of the ring. The soil fill was slightly darker, 5 cm in thickness. No evidence of excavation of a fire pit was found. Artifacts and unburned bison bone fragments were recovered. Upon cross-section excavation, the hearth was found to extend into the southeast quarter, with the scatter of fire-cracked rock extending to the periphery of a possible door in the eastern edge (Plate 17). Some 155 pieces of extremely well-fired, reddened and fire-cracked rock were recovered. The cobbles lay in their original fracturing location, indicating the hearth had not been scattered after its use. Some small charred bone fragments were found underneath the rocks. Charcoal flecks were scattered in the dirt fill.

LARGE TIPI RINGS

Seven large tipi rings (features 8, 12, 18, 19, 22, 27 and 37; Figures 14-20; Plates 10-14), ranging in diameter from 5.7-7.5 m ($\bar{x}$=6.8 m) were identified. Large ring features 12, 19 and 22 also contain small rings inside (Figures 14-16; Plates 10-11).

Circular in outline (except for feature 22, a scattered ring), these features were constructed of 55 to 150 rocks ($\bar{x}$=107), weighing from 0.5-36.3 kg ($\bar{x}$=10.9 kg). The bases of the rocks were found at depths between 16-22 cm (ring $\bar{x}$=10.4-15.4 cm), and are here considered to reflect surface stability rather than age of emplacement.

Rock spacing in the rings varied from tight (two rings; e.g.,

feature 12; Figure 14, Plate 10) to loose (two rings; e.g., features 22, 8; Figures 16, 17a; Plates 11, 13). Three were constructed of single rows (e.g., feature 22; Figure 16, Plate 11), and four of double rows (e.g., feature 18; Figure 17b, Plate 14). Three rings (features 12, 19 and 22) appear to have been scavenged. Features 12 and 22 also contained small rings; perhaps some of the rocks used in their construction were removed from the larger rings.

Doorways could not be identified, as all seven rings had four to six seemingly randomly-located gaps. Rock clusterings, possibly indicative of extra weight for main support poles, were found in five rings (e.g., feature 8; Figure 17a, Plate 13). These vary from one to three clusters per ring.

A hearth was identifiable only in feature 12 (Figure 14). It may be associated with the smaller internal ring, rather than with the large outer ring.

EXTERIOR HEARTHS

Two exterior hearths (features 10-11) were identified. Feature 10 (Figure 20a, Plate 19) was excavated by a single two-meter square unit (Plate 21). The hearth was isolated by trowel, exposed as a pedestal, photographed and then cross-section excavated (Figure 21, Plate 22). The hearth is oriented northwest/southeast and measured 1.15 by 0.65 m. Evidence of a fire-pit is lacking, indicating that the hearth was constructed on the surface. Outlined by round cobbles, it was filled with 84 pounds of fire-cracked rocks, up to 12 pounds in weight, derived from cobbles similar in size to those around the perimeter of the hearth. Unburned bone fragments were recovered, but charcoal and ash were absent. The soil was only slightly darkened. Thirty-five artifacts were recovered (Table 2).

Feature 11 (Figure 20b, Plate 23) is a 45 cm diameter, circular hearth, 3 m from a large ring (feature 12). It consists of seven closely-spaced rocks outlining a 1.0 m diameter circle, and enclosing small fragments of fire-cracked rock. A rock alignment is associated.

ROCK PILES

Four rock piles (features 11, 14, 28 and 31; Figures 20b, 21; Plate

23) were identified. These features, consisting of small concentrations of four to 14 stones ranging in weight from 6.3-15.4 kg, could have been used for many functions; supports for poles, storage piles for rings, cache piles, etc. Feature 11, situated 3 m south of the hearth (Figure 20b, 13a), appears to be a scattered cairn.

Feature 14 (Figure 22a) consists of three lightly-scattered concentrations of four to six rocks each, oriented in a northwest/southeast direction. Approximately one meter in diameter, these "clusters" are one meter apart. This feature lies north of small ring feature 13.

Feature 28 consists of a rock alignment which begins two meters from the edge of a large ring (feature 27) and runs south to a rock pile eight meters distant (Figure 22b). The latter is a roughly rectangular-shaped cluster of ten rocks (40 x 100 cm) weighing from 4.5-13.6 kg each.

Feature 31 is a scattered cluster (50 x 90 cm) of 14 rocks (Figure 22c) weighing from 0.5-6.3 kg, situated nine meters southwest of large ring feature 22 and six meters north of small ring feature 21.

ROCK ALIGNMENTS

Four rock alignments (features 9, 11, 28 and 50) were identified. Feature 28, as noted above, consists of a rock line and cairn running in a north-south direction over an eight meter distance (Figure 22b). The alignments in feature 11 (Figure 20b, Plate 23), also with a hearth and rock pile, consist of eight rocks forming a northwest/southeast-oriented line south of the hearth.

Feature 9 (Figure 23a, Plate 24), lying east of ring feature 10, consists of two east/west-oriented loose alignments of rocks, four meters in length and 2.4 meters apart. Feature 50 (Figure 23b), situated near the centre of the site, consists of a six meter north/south-oriented line of rocks which terminates three meters north of hearth feature 10.

The function of these rock lines in tipi ring sites is unknown. They may represent ring sections, visible hearth rocks, scattered rock piles, or scattered rings, etc.

FAUNAL REMAINS

The majority of faunal materials identifiable as bison were recovered

from feature 11, an excavated small tipi ring. It yielded 636.9 g of bone, 546 g of which was recovered from the hearth area. Fifty percent of the recovered bone were tiny, unburned, fragmented bone chips, indicative of boiling bone for bone-grease preparation.

Identifiable bison elements include an astragalus, a right scaphoid, a left magnum, a distal left metatarsal, a distal right radius, seasamoids and a tibia fragment. The shafts of these bones were probably shattered into unrecognizable chips for the preparation of bone-grease. An articulated unit, recovered from the northeast quarter of the ring, consisted of a proximal right metatarsal, right navicular cuboid and a right cuniform pes, indicating that a hind limb was probably brought to the site in articulation after primary butchering elsewhere.

Two butchered fetal long-bone shafts were found, indicating the butchering and utilization of fetal bison during the winter. Unidentifiable bone fragments (7.6 g) were also removed from the external hearth feature 10, and more in Group B (17.6 g). A left second phalanx was also found in this area.

ARTIFACTS

A variety of chipped stone tools, chipping detritus and cores was recovered from the surface, and during excavation, of features 2, 3, 5, 10 and 41 (Table 2). The stone tools are described below in functional categories, based on a series of attributes used in other studies (Calder 1975, Reeves 1970, 1972) to facilitate comparison with other excavated sites.

PROJECTILE POINTS

Projectile points are bifacially chipped stone tools manufactured for use on the end of a spear, atlatl or arrow.

Plains Triangular Arrow Point (N=1; Plate 27:1)

Form and Modification - triangular body outline, concave base, broken at mid-point, distal half absent; base thinned and unground; left corner of base barbed; dorsal surface completely pressure-retouched; ventral surface marginally retouched.

Metric Range - width of base: 11.9 mm; body width: 15.7 mm; thickness:

4.2 mm.

Lithic Type - white opaque chert.

Provenience - excavated tipi ring, feature 41, northwest corner.

Oxbow Side Notched (N=2; Plate 27:2-3)

Form and Modification - body outline triangular; body edges straight to excurvate; notches rounded and ground (N=1); V-shaped narrow unground base (N=1; Plate 27:3); basal edge well defined, straight and square (N=1; Plate 27:3); shoulder obtuse, sharp; base thinned, unground and deeply notched to give eared appearance (Plate 27:3; reworked into perforator); bifacially pressure-retouched, exhibiting perpendicular to oblique proximal flaking; flake scar widths 2-3 mm.

Metric Range - body width 16.4-20.3 mm; thickness 4.5-4.6 mm.

Secondary Use - specimen 41 (Plate 27:2) has tip and part of both ears missing. The right lateral edge has been notched 3 mm above the original side-notch, probably to produce a perforating or engraving tool. The four projections produced by the notches, plus the sharp projection at the point of fracture with the left lateral edge, exhibit extensive crushing and polish as would be produced by use as a graver or perforator.

Lithic Type - black chert and pink semi-opaque chert.

Provenience - ring group B, ring feature 2 (inside) and between ring features.

Broken Unclassifiable Point (N=1; Plate 27:4)

Body fragment of opaque grey chert, exhibiting perpendicular flaking, from a broad side-notched atlatl point, excavated from inside ring feature 2.

SIDE SCRAPERS (N=1; Plate 27:6)

Side scrapers are those tools on which the primary working edge is located along one or both lateral edges. The working edge is a steep face designed to withstand the pressure applied during scraping.

Form - tabular flake with triangular body outline; convex transverse and longitudinal sections.

Metric Range - length 50.2 mm; width 35.5 mm; thickness 11.2 mm.

Modification - dorsal surface partially percussion-flaked; right lateral edge pressure-retouched along entire length; left lateral edge retouched along distal half; proximal end slightly thinned; distal end is a sharp point which exhibits some crushing; the left proximal flake corner is broken and missing and the broken distal tip was recovered in place; both fracture surfaces exhibit wear patterns, indicating the tool was used after the breaks occurred.

Lithic Type - white opaque chert.

Provenience - excavated from inside and outside ring feature 3.

Scraper Fragment (N=1)

Small fragment of white opaque chert; dorsally finished end or side scraper exhibiting extensive wear on working edge; excavated from north-east quadrant of ring feature 41.

UNIFACE FRAGMENT (N=1; Plate 27:5)

Broken triangular sharp tip of a unifacial tool. Tip is a very sharp point but does not appear to have been used, as wear patterns are absent.

Metric Range - length 14.1 mm; width 13.4 mm; thickness 4.3 mm.

Lithic Type - white opaque chert.

Provenience - excavated from exterior hearth feature 10.

PIÈCES ESQUILLÉES (N=2; plate 27:12-13)

Form and Modification - manufactured on rectangular split-pebble (N=1) or secondary flake (N=1); both of which exhibit bipolar bifacial flaking, battering and crushing along the length of the edge; transverse sections are concave on one surface and convex to straight on the opposite surface.

Metric Range - length 13.4-34.6 mm; width 12.2-39.0 mm; thickness 3.6-9.6 mm.

Lithic Type - green argillite pebble; dark grey chalcedony.

Provenience - excavated inside ring feature 2 and on surface of ring feature 5.

RETOUCHED FLAKE FRAGMENTS (N=5; Plate 27;8-9)

Form - triangular to irregular-shaped, thin (N=4) or tabular (N=1) secondary flake fragments.

Metric Range - length 9.5-22.5 mm; width 11.6-19.6 mm; thickness 2.0-5.8 mm.

Modification - marginal retouch present on one (N=3) or both (N=2) lateral edges. On the former, retouch is confined to the dorsal surface and the steep end; the edge was presumably modified to produce a scraping tool. The remaining two specimens have retouch present either on both lateral edges on the dorsal surface or on alternating dorsal and ventral surfaces along both lateral edges. The edges of both these specimens appear to have been straightened, possibly for hafting.

Lithic Type - brecciated black and dark brown chalcedony (N=1), grey quartzite (N=1), banded light brown chert (N=3).

Provenience - excavated inside ring feature 5, exterior hearth feature 10 and ring feature 41 (N=3).

LARGE MICROCRYSTALLINE STONE TOOLS

Cortical Spall Tools (N=15; Plate 28:1-5)

Form and Modification - primary (N=12) and secondary (N=3) flakes of roughly rectangular to ovoid outline, with use retouch on one or more edges.

Metric Range - length 45.5-122.0 mm; width 37.3-101.8 mm; thickness 10.8-52.6 mm; weight 10.0-584.0 g.

Lithic Type - white/beige quartzite (N=10), grey quartzite (N=3), black quartzite (N=1), green argillite (N=1).

Provenience - excavated from tipi ring feature 41 (N=7) and surface hearth feature 10 (N=1), and also surface (N=7).

Split Cobble Core Choppers (N=4; Plate 29:4-5)

Form and Modification - well-rounded cobbles, split along a natural fracture plane to produce a flat fracture surface on a section of the cobble. The edges of the fracture surface exhibit wear-patterns characteristic of those produced by chopping. Large flakes have also

been removed from random locations on the form, suggesting their use also as cores.

Metric Range - length 107.6-169.8 mm; width 72.3-127.8 mm; thickness 39.6-65.9 mm; weight 431.0-1475.0 g.

Lithic Type - white/beige quartzite (N=2), red quartzite (N=1), grey quartzite (N=1).

Provenience - surface.

Uniface Cobble Choppers (N=8; Plate 29:1-3)

Form and Modification - large to medium-sized cobbles, rectangular to oval in outline; large flakes have been removed unifacially from one (N=7) or two (N=1) edges, to produce a sharp edge suitable for chopping; basic shape of the cobble is retained. In all cases, these edges exhibit crushing and battering characteristic of chopping tools.

Metric Range - length 114.0-219.0 mm; width 111.0-174.0 mm; thickness 50.0-114.0 mm; weight 786.0-3240.0 g.

Lithic Type - beige/white quartzite (N=7), black quartzite (N=1)

Provenience - surface.

Core Nuclei (N=2; Plate 27:10-11)

Core nuclei represent exhausted pebble cores. Because of their size and shape, they were of no further potential for the production of flakes suitable for modification and/or use. Both specimens are irregular in outline. Flakes have been removed from one end only (N=1) or both ends (N=1).

Metric Range - length 17.4-34.6 mm; width 11.2-36.8 mm; thickness 8.9-14.7 mm.

Lithic Type - yellow-brown chert (N=1); white opaque chert (N=1).

Provenience - excavated from exterior hearth feature 10 and from tipi ring feature 41.

FLAKE DEBITAGE

A total of 96 flakes were recovered by excavation at DjPb-2. These consist of seven primary and nine secondary decortication flakes; 28

secondary flakes, 34 retouched/resharpening flakes, ten block flakes and five flake fragments. They represent both microcrystalline and cryptocrystalline lithic types (Table 3), and indicate that tool manufacture and resharpening occurred at the site. The majority of the lithic debitage was recovered from the excavated areas of ring group B, from exterior hearth feature 10 and from tipi ring feature 41, as the surface was not intensively collected. The presence of these specimens inside the tipi rings (note the differences in B between inside and outside ring), and in the exterior hearths indicates that these were focal locales for flintknapping.

LITHIC TYPES

The following classification (see Tables 3, 4) is based on hand specimen examination of specimen colour, structure, optical and material properties. Lithics are divided into two categories: cryptocrystallines, cherts and chalcedonies utilized for small tool manufacture; and microcrystallines, quartzites, generally utilized for large stone tool manufacture.

CRYPTOCRYSTALLINES

Non-local versus local cherts and chalcedonies are distinguished. Some, e.g., type 01 (Avon chert), are from known quarry sources; others were probably imported from non-local sources.

Non-local Cherts and Chalcedonies

Five varieties are distinguished: 01 (N=1), porcellaneous white chert with dentrites, known as Avon chert, derived from quarries near Avon, Montana (Reeves 1970); 02 (N=1), pink, semi-opaque chert with red inclusions, source unknown; 03 (N=2), brecciated beige/white opaque chert pieces in clear silicate cement, similar to cherts of the Avon Suite (Reeves 1972); 04 (N=1), brecciated black/dark brown chalcedony in cloudy silicate matrix (source unknown); 05 (N=1), dark grey translucent chalcedony (source unknown).

Local Cherts

06 (N=1), flat black chert from local pebble sources; 07 (N=1), opaque grey chert with cream streaks and opaque white lens (probably from

a pebble source); 08 (N=4), banded light brown chert; 09 (N=5), white opaque pebble chert with cream inclusions; 10 (N=1), translucent white pebble chert; 11 (N=3), yellow-brown pebble chert with red inclusions; 12 (N=1), opaque grey pebble chert; 13 (N=1), red/grey semi-translucent pebble chert; 14 (N=4), vein quartz from secondary pebble sources; 15 (N=14), siliceous pink/grey quartzite pebbles; and 16 (N=4), petrified wood derived from local secondary sources.

MICROCRYSTALLINES

Two types of microcrystallines are here distinguished: 17 (N=2), green argillite pebble, probably derived from local pebbles originating from the PreCambrian Grinnel Formation of the Lewis Range (Reeves 1972); and 18-21 (N=80), quartzites, probably all originating from cobbles in Laurentide tills; four colour varieties are distinguished - 18 (red; N=3), 19 (black; N=2), 20 (grey; N=14), and 21 (white/beige; N=61).

SETTLEMENT FEATURES

Visual analysis of the features' spatial associations with each other and their relations to topographic areas of the terrace suggests that they can be divided into five "groups" (Figure 2, Plates 3-4).

Group A consists of a single isolated ring (feature 1), 3.6 m in diameter, situated at the southern end of the peninsula (Figures 2, 3a; Plate 9), 90 meters south of the nearest rings. It may represent a single encampment on the site.

Group B consists of three small rings (features 2, 3 and 5) in a tight cluster in an eastern-facing arc, on the eastern edge of the site, overlooking the gully (Figure 3b, Plates 3-4). They are 70 meters southeast of the major ring area. Ring feature 5, 4.1 m diameter, lies seven meters north of features 2 and 3 (3.6 and 3.9 m diameter rings), which are touching each other. This group was excavated, with a total of 56 artifacts recovered, 38 of which were found within the rings (Table 2). These included an Oxbow point, various other tools and flakage, and they indicate that a variety of activities occurred within this encampment. Their tight clustering, their isolation from other sets and their similar structural characteristics (Table 1) suggests that they represent a contemporary encampment of three tipis occurring ca. 3200-

2500 B.C. (Reeves 1969). This age is supported by the side-hill erosion along the cluster's eastern edge, which, in the case of feature 2, seems to have largely camouflaged its eastern edge. It now lies on a deflating rock surface.

Group C consists of two rings (features 46, 47), 3.4 m and 4.5 m in diameter, situated immediately adjacent to each other (Figures 2, 4; Plates 3-5) on a bench, 60 meters west of B and above and south of the general ring area E. They were probably contemporary structures which may or may not be associated with the other groups.

Ring feature 46 overlies a hearth which extends outside the ring's eastern edge. While it was not excavated, the hearth's position suggests that construction of ring 46 post-dates the use of the hearth.

Group D consists of two rings (features 6 and 7), 4.4 and 4.2 m in diameter (Figure 5; Plate 7), situated near the eastern edge of the peninsula, 30 meters east of Group E. Lying some eight meters apart, and situated on flat land equally as suitable as the lands to the west occupied by the numerous rings in Group E, their isolation from that settlement area suggests a separate encampment.

Group E consists of the remainder of the rings and other features on the site. They lie in a dispersed-clustered pattern along the western border and northern extremity of the peninsula (Figure 2; Plates 3-4), suggesting a preferred settlement area.

This group represents a number of encampments. Some clusters can be distinguished, such as the group of ten or so rings at the south end, a tight cluster of rings including features 35 and 36, a general grouping of rings including feature 12, which is a small ring constructed inside a large ring, and the cluster on the northern extremity. The latter represents a number of encampments, as indicated by scavenged rings and small rings within larger rings.

Scattered amongst the small rings in Group E are seven large rings, four in the northern end and three in the southern half. Three large rings have small rings constructed inside them, indicating sequential use, as does the construction of two large rings over parts of small rings, leaving only an arc of the small rings remaining.

Ring feature 41 was excavated in Group E. It contained a large hearth, some 23 artifacts, including a Plains Triangular point, some tools and flakes, and bison bone, including fetal bison bone. The fetal bone is indicative of a winter utilization of the site. A large rock-filled exterior hearth (feature 10, also excavated) produced 35 artifacts.

The time range represented by these encampments is considerable, dating from Late Prehistoric times (ring feature 41) back to Middle Prehistoric times (ca. 2500 B.C. [Group B]). Well arranged rings are often in proximity to very disturbed ones, suggesting either their scavenging or their disturbance by later occupants. Sixteen of the small rings are scavenged and three are scattered. Five partial rings (features 20, 26, 30, 32 and 38) and their association with other features indicates sequential use. Ring feature 20 is a partial arc adjacent to large ring feature 19 (Plate 10), suggesting that feature 19 post-dates the earlier construction. A similar case applies to small ring feature 26, represented by an arc which intersects with a large ring (feature 27; Plate 12), and partial small ring feature 38 and large ring feature 37 (Plate 4).

While these data indicate that some small rings predate large rings, the occurrence of three small rings inside large rings (features 12, 19 and 22; Plates 10-11) indicate that some small rings were also constructed later than some large rings (assuming each represents a normal tipi for domestic purposes). Here, the rocks seem to have been removed from the larger rings for construction of the smaller ones.

In sum, the rings at DjPb-2 represent varying-sized encampments, ranging from small groups of one to three tents to encampments of ten rings. Both small and large tipis are present; the ones excavated date typologically within the last 4500+ years. At least one encampment was utilized in winter.

SITE DjPb-3

LOCATION

DjPb-3 is situated east of DjPb-2 (Plate 1) on the western edge of a section of benchland. It is cut at its eastern end by Highway 36 and

along the west by the gully separating it from site DjPb-2.

The site consists of two tipi rings, five to ten meters away from the north edge and 30 meters apart, situated at the northwestern end of the landform (Figure 24). The surface is well covered with grass growing in some 20 cm of fine sediments overlying basal glacial till. Few rocks are strewn on its surface.

ROCK FEATURES AND EXCAVATION

The two tipi rings on the site range in diameter from five meters (feature 2) to 5.9 meters (feature 1). They are round (Figure 25), and are characterized by rows of well-buried rocks only a few of which are exposed on the surface (compare features 1 and 2, Figure 25). Only 20-25% of these rocks were visible in feature 1 before excavation.

Feature 1 (Figure 25a; Plate 26) lies within the proposed Highway 36 realignment. A grid of 13 two-by-two meter and three one-by-two meter squares was laid out over the ring and excavations to a depth of 15 cm by trowel and shovel were accomplished. All sediments were screened (Plate 25) and 90 artifacts were recovered. The soil consisted of a 5 cm thick Ah-horizon overlying a light brown B-horizon developed in fine materials which were underlain by sands and gravels. The excavation of sediments in squares which lay outside the ring was done separately. Few artifacts were found (N=5), except in the area adjacent to the doorway, where 45 specimens were recovered from six adjacent squares.

Neither a packed living floor nor a hearth was encountered. Excavation recovered some 40 fragments of fire-cracked rock and 30.4 grams of unidentifiable bone scattered about inside the ring.

ARTIFACTS

A total of 90 artifacts consisting of a variety of chipped stone tools, chipping detritus and cores were recovered from the tipi ring excavation (Table 5).

Biface Fragment (N=1; Plate 30:1)

Form - specimen appears to represent a portion of an ovate form.

Metric Range - length 39.0 mm; width 27.5 mm; thickness 13.0 mm.

Modification - oblique pressure-retouch along edges; remainder of

surface probably percussion-flaked.

Lithic Type - white opaque chert.

End Scraper (N=1; Plate 30:2)

Form - oval body outline, straight transverse section; convex single-bevel longitudinal section.

Metric Range - length 19.7 mm; width 16.7 mm; thickness 4.6 mm.

Modification - dorsal surface unaltered; distal end and right lateral edge marginally retouched on dorsal surface.

Lithic Type - Avon chert.

Split Pebble End Scraper (N=1; Plate 30:2)

Form - rectangular body outline, concave longitudinal section, convex transverse section.

Metric Range - length 23.4 mm; width 19.0 mm; thickness 8.0 mm.

Modification - manufactured on split pebble; dorsal surface of pebble cortex; distal end retouched to produce a scraping edge; right lateral edge marginally retouched on ventral surface.

Lithic Type - yellow siliceous quartzite.

Uniface Fragment (N=1; Plate 30:3)

Form - unidentifiable fragment, possibly portion of dorsally-finished end scraper; straight, convex, longitudinal-transverse section.

Metric Range - width 12.7 mm; thickness 4.4 mm.

Modification - dorsal surface completely pressure-retouched; ventral surface unaltered; distal and proximal ends absent; both lateral edges retouched.

Lithic Type - opaque grey chert.

Flake Knife (N=1; Plate 30:5)

Form and Modification - manufactured on a thin secondary flake which expands to the mid-point, then contracts to the distal end; marginally retouched from the distal end to approximately the mid-point of the flake, on the dorsal surface of the left lateral edge, and the ventral

surface of the right lateral edge. Retouching has steepened and dulled the edge, which was subsequently ground.

The above section of the flake is the hafting area. The proximal half of the flake was used as the cutting tool. On this half of the form, the left lateral edge is unaltered. The thin right-lateral edge has been used extensively. It is crushed, ground and step-flaked.

Metric Range - length 45.5 mm; width 23.8 mm; thickness 6.1 mm.

Lithic Type - grey/cream chalcedony.

Flake and Core Pièces Esquillées (N=3; Plate 30:9, 12-13)

Form and Modification - manufactured on rectangular, tabular, blocky flakes or core fragments which exhibit bipolar (N=2) or unipolar (N=1) flaking, crushing and battering, extending the length of the edge; transverse sections concave on one surface and convex on the opposite.

Metric Range - length 19.6-29.7 mm; width 15.0-31.3 mm; thickness 10.3-12.8 mm.

Lithic Type - white opaque chert (N=1), opaque grey chert (N=1), petrified wood (N=1).

Retouched Flakes (N=3; Plate 30:6-8)

Form - flakes of variable outline which exhibit a continuous area of marginal retouch along one or more edges: specimen 66 is a distal half of a primary decortication flake (opaque grey chert); bifacial marginal retouch extends along both lateral edges and to the distal end; the fracture surface exhibits considerable wear. Specimen 78 is a thick, blocky, triangular expanding flake produced from an opaque yellow chert pebble; the proximal end is thick, the distal end is thin and has been marginally retouched bifacially. Specimen 3 is a thin secondary flake of Knife River Flint; the right lateral edge has been marginally retouched along its length on either the dorsal or ventral surface to straighten and strengthen the edge.

Pebble Cores (N=7; Plate 30:10-11)

Form - four cores (Plate 30:11) and three nuclei (Plate 30:10) are represented. All were reduced from small cobbles or pebbles. Three cores and one nucleus are unidirectional; one core and two nuclei are

polymorphic.

Metric Range - length 35.1-56.2 mm (cores), 24.7-28.9 mm (nuclei); width 29.0-48.7 mm (cores), 13.2-23.2 mm (nuclei); thickness 13.6-28.8 mm (cores), 10.5-13.0 mm (nuclei).

Lithic Type - beige/white quartzite (N=2), yellow siliceous quartzite (N=1), opaque yellow chert (N=1), vein quartzite (N=1), brown-banded pebble chert (N=1), black pebble chert (N=1).

Flake Debitage

A total of 72 flakes were recovered: one block flake, three secondary flakes, 11 flake fragments, 32 retouch/resharpening flakes, five secondary decortication flakes and 20 primary decortication flakes. By far the greatest number of flakes (61%) are manufactured from local quartzite cobbles. Other lithic types include dark grey chalcedony (N=1), black pebble chert (N=3), opaque grey chert (N=6), opaque yellow chert (N=4), vein quartzite (N=3), siliceous quartzite (N=1), petrified wood (N=2), white opaque chert (N=2), Avon chert (N=4), brown-banded pebble chert (N=2), and Knife River Flint (N=1).

LITHIC TYPES (Table 5)

CRYPTOCRYSTALLINES

Non-local Cherts and Chalcedonies

01 (N=1), Avon chert, white chert with dentrites called Avon chert, having its source near Avon, Montana; 02 (N=1), dark grey chalcedony of non-local origin; 03 (N=2), dark brown chalcedony with white and black inclusions, called Knife River Flint, with its source in quarries in North Dakota; 04 (N=1), grey-cream chalcedony with opaque white lines and speckled black shading. Source unknown, but may originate from mountain sources in Montana.

Local Cherts

05 (N=5), white semi-opaque pebble chert with cream inclusions; 06 (N=3), brown-banded pebble chert; 07 (N=3), black pebble chert; 08 (N=8), opaque grey pebble chert; 09 (N=6), opaque yellow and cream pebble chert; 10 (N=8), vein quartzite from secondary pebble sources; 11 (N=3), pink/yellow siliceous quartzite pebbles; 12 (N=3), petrified wood derived from

local secondary sources in the plains Cretaceous gravels.

MICROCRYSTALLINES

Three colour varieties of quartzite are present: 12 (N=1), red; 13 (N=9), grey; and 14 (N=36), beige/white.

SETTLEMENT FEATURES

The two rings identified at DjPb-3 were very deeply buried. Others which are completely buried could also be present. The rings are relatively large; 5.0 and 5.9 m in diameter. The excavated ring had a well-defined double row construction and doorway.

A large number of artifacts were recovered from the excavated feature, indicating that a variety of activities occurred during the time it was occupied, particularly in the vicinity of the doorway. Fire-cracked rock, while scattered, was common, suggesting (as did the artifacts) an occupation of some considerable time, perhaps during the winter. The number of rocks used in construction, and internal activities, may be indicators of winter use.

Time-diagnostic artifacts were not recovered; however, complete burial of a large portion of the ring suggests some antiquity for the rings, as they lie on a flat, stable surface which would accumulate sediments slowly. The presence of a large biface fragment suggests that the site predates Late Prehistoric times, for large thick bifaces are generally absent in late assemblages (e.g., the Ross Site; Forbis 1960).

SUMMARY AND CONCLUSIONS

The DjPb-2 and -3 tipi ring studies described above have revealed a variety of data through the study of surface rock features and the excavation of three rings.

DjPb-2 contained tipi rings in spatial association with external hearths, rock piles and rock alignments. These represent a series of small encampments of two to three tents or so, dating, on the basis of recovered projectile points, within the last 4,500 years. The one ring excavated in DjPb-3, while it yielded no diagnostic materials, is of

considerable antiquity, for 80% of the rocks were buried below the present ground surface.

The ring diameters vary from 4.2-7.5 m and are divisable into small (4.2-5.1 m) and large (5.7-7.5 m) rings. In three instances, small rings were found within larger rings, and some of these latter were later scavenged for rocks to be used in small ring construction. Two instances of large rings being built over small rings were also recorded. These data indicate no temporal changes in overall ring size, as suggested by T. Kehoe (1960). While they remain undated, some large rings at DjPb-3 suggest considerable antiquity. These data are consistant with conclusions drawn from recent studies at other tipi ring sites in southern Alberta: at Coal Valley, west of Cochrane on Highway 1A, where buried rings 5.6 m in diameter and 2,500 to 2,000 years in age were found (McIntyre 1976); and at Lundbreck, Alberta, where large and small rings of similar antiquity were also associated (Quigg and Reeves 1975). A terrace campsite near Strathmore, Alberta, also contained large-diameter rings (Murray, Smith and Reeves 1976) in Late Prehistoric contexts, ca. A.D. 1000.

Differences in ring sizes must therefore reflect other social factors: wealth, status, family size, and marital status, for example, are all cultural factors which would influence the household's size.

Tipi ring sites situated in locales such as the Chin Coulee site are generally considered to be summer sites, because of their exposed locations. The recovery of fetal bison from one excavated ring in DjPb-2, of Late Prehistoric age, indicates that this locale was also used during the winter or early spring months, as were tipi rings found in more sheltered settings, such as those on Coal Creek (McIntyre 1976) and the Strathmore site (Murray, Smith and Reeves 1976), where evidence of winter use was also recovered.

Artifacts in the excavated rings at DjPb-2 were relatively frequent (Table 2), indicating that various activities went on inside as well as outside the tipis. This relatively high frequency is comparable to that found in other excavated ring sites; the buried rings at Coal Creek, Alberta, the Sprenger site in North Dakota (Schneider and Treat 1974), and the T-W Diamond site in northern Colorado (Flayharty and Morris 1974),

among others. This contrasts to some tipi ring sites which had very low frequencies of artifacts; the Lundbreck site and the surface rings at Coal Creek, for example.

The differences in artifact frequencies and in other features - the internal versus external hearths and the type of interior hearths, the interior heating versus interior cooking hearths with fire-cracked rock - might also be indicative of differences in seasonal activities.

To answer these and many other questions and problems, particularly those of contemporaneity and settlement size, detailed excavations are required of ring sites. While many tipi ring sites have been mapped (see McIntyre 1976 for recent summary), few have been excavated and none have been extensively examined outside the ring perimeters.

Tipi ring sites are a common cultural phenomenon of the western Plains, and have been generally neglected in prehistoric investigations, which have centred on high data yielding camp and kill sites. This has resulted in both a biased and a partial picture of past native land and resource use, a major settlement component of which was the use of tipi ring sites. The continued study of these features and the use of additional observation techniques will assist in the classification of this aspect of past native culture.

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TABLE 1: DjPb-2 and 3 - TIPI RING CHARACTERISTICS

FEATURE NO.	SHAPE			INSIDE DIAMETER (M)			COMPLETENESS *		ROCKS			HEARTHS				
	Round	Oval	Indeterminant	NS	EW	Mean	Complete	Partial (Arc)	Rock Depth (cm) Max	Mean	No. In Ring	Presence	Absence	Maximum Size (cm)	Ring Location	Rocks No.
DjPb-2, Small Rings																
1	x			-	3.6	3.6		x	15	11.5	25		x	-	-	-
2			x	3.4	4.4	3.9	x		15	11.8	73	?		70	NE	5
3	x			3.4	3.4	3.4		x	17	12.5	50		x	-	-	-
5	x			4.2	4.0	4.1		x	20	12.5	44	?		50	Center	3
6		x		4.2	4.6	4.4	x		28	14.6	59		x	-	-	-
7		x		3.8	4.6	4.2	x		22	12.1	92		x	-	-	-
12	x			4.0	3.8	3.9	x		14	10.7	40	x		90	N	9
13	x			4.2	4.2	4.2	x		17	11.4	22	?		40	NE	2
15	x			4.8	4.8	4.8	x		19	14.1	34		x	-	-	-
16	x			4.2	3.8	4.0	x		13	10.8	38		x	-	-	-
17	x			3.6	3.6	3.6	x		16	10.7	46		x	-	-	-
20			x	5.0	5.0	5.0		x	16	11.3	57		x	-	-	-
21		x		4.4	5.6	5.0	x		15	9.7	37		x	-	-	-
22		x		3.6	4.0	3.8	x		14	9.4	20		x	-	-	-
23		x		4.2	4.8	4.5	x		20	10.9	44	?		70	NE	4
24		x		4.8	4.6	4.7	x		18	11.2	45		x	-	-	-
26	x			-	4.4	4.4		x	14	11.1	28		x	-	-	-
29		x		5.0	5.6	5.1	x		12	8.1	43	?		50	SE	2
30			x	4.0	-	4.0		x	11	9.5	10		x	-	-	-
32			x	3.6	3.6	3.6		x	14	9.3	27		x	-	-	-
33	x			3.6	3.4	3.5	x		11	8.9	29	x		60	Center	6
34		x		5.2	4.4	4.8	x		23	13.1	34		x	-	-	-
35		x		4.2	4.8	4.5	x		24	12.6	76	x		80	Center	5
36		x		4.2	4.8	4.5	x		18	11.9	50		x	-	-	-
38			x	-	3.6	3.6		x	15	10.9	38		x	-	-	-
39		x		3.4	3.0	3.2	x		14	11.3	52	x		80	NE	6
40			x	4.2	4.2	4.2	x		23	13.2	49		x	-	-	-
41	x			4.2	4.0	4.1	x		19	11.5	72	x		180	NE	47
42			x	3.2	3.2	3.2	x		13	10.3	44	?		70	SW	8
43	x			3.6	3.4	3.5	x		18	12.2	36	x		50	N	3
44			x	3.2	3.8	3.5	x		15	9.4	29		x	-	-	-
45		x		3.4	3.2	3.3	x		23	13.0	62		x	-	-	-
46		x		3.2	3.6	3.4	x		18	12.6	60	x		50	N	3
47	x			4.4	4.6	4.5	x		20	13.9	80	x		40	Center	4
48			x	3.4	4.0	3.7	x		17	10.1	27	x		70	W	9
49			x	3.2	3.6	3.4	x		12	9.5	32		x	-	-	-
DjPb-2, Large Rings																
8	x			6.6	6.6	6.6	x		22	14.0	55		x	-	-	-
12	x			7.2	7.6	7.4	x		21	15.4	150	x		90	N	9
18	x			5.8	5.6	5.7	x		16	13.6	98		x	-	-	-
19		x		7.4	7.4	7.4	x		16	11.4	150		x	-	-	-
22	x			7.8	7.2	7.5	x		20	12.3	79		x	-	-	-
27	x			7.2	7.0	7.1	x		19	10.6	108		x	-	-	-
37	x			5.8	6.0	5.9	x		18	10.4	115		x	-	-	-
DjPb-3																
1	x			5.4	6.4	5.9	x				160		x	-	-	-
2	x			5.0	5.0	5.0	x				37		x	-	-	-

DOORWAYS				ROCK CLUSTERINGS					ROCK ARRANGEMENTS				SPACING		WT. (Kg) OF ROCKS		
Presence	Absence	Location	Size (cm)	Presence	Absence	No.	Location	Rocks No.	Single Row	Double Row	Scattered	Scavenged	Tight	Loose	Minimum	Maximum	Mean
	x				x					x		Disturbed	x		3.2	22.7	10.0
	x									x		-	x	x	0.9	24.9	5.9
	x			x		1	NE	73		x		-	x	x	1.8	34.0	8.2
	x				x				x		x	x		x	1.8	38.5	8.6
	x			x		1	SE	8	x					x	1.8	72.6	5.4
x		SE	90	x		2	NE-SW	11-14		x			x	x	1.4	45.4	9.5
	x			x		2	N-SW	8- 6	x			x		x	1.8	20.4	8.2
	x				x				x			x		x	2.3	20.4	12.7
	x				x				x			x		x	1.8	44.4	10.9
	x			x		1	W	7	x			x		x	1.4	31.7	10.0
x		S	90	x		3	NE-NW-SE	5-5-5		x			x	x	2.3	24.9	12.2
	x				x				x			x		x	0.9	24.9	6.8
	x				x				x			x		x	4.5	20.4	9.5
	x				x				x			x		x	4.5	36.3	13.6
x		SE	80	x		1	NW	5	x					x	0.9	45.4	13.2
	x				x					x	x			x	3.2	24.9	12.2
	x				x					x		x		x	6.8	24.9	14.1
	x				x				x			x		x	0.9	31.7	9.1
	x				x				x			x		x	4.5	20.4	12.7
	x				x				x			x		x	3.2	20.4	9.1
	x				x				x			x		x	2.3	22.7	9.5
	x			x		2	NW-SW	6- 4	x			x		x	3.6	20.4	9.1
	x			x		4	SW-S-E-E	11-8-6-7		x			x	x	0.9	20.4	7.3
	x			x		1	NE	8	x				x	x	0.9	18.1	7.7
	x			x		1	SW	7		x		x	x	x	2.3	20.4	7.7
	x			x		1	E	10	x				x		1.4	22.7	9.5
	x		4		x				x		x			x	3.2	18.1	8.6
x		E	140	x		3	S-NW-N	6-5-6		x			x		0.9	22.7	7.3
	x			x		2	S-N	6-4	x		x			x	1.4	22.7	11.3
	x			x		1	E	6	x			x	x	x	0.9	26.8	9.1
	x				x				x			x		x	2.7	24.9	10.0
	x			x		3	N-SW-E	11-10-9		x			x	x	1.4	29.5	10.9
	x			x		1	SE	10	x				x	x	0.9	20.4	6.8
	x			x		1	E	9		x			x	x	0.9	27.2	9.1
	x				x				x			x		x	0.9	10.0	5.9
	x			x					x			x		x	0.9	19.5	7.3
																(x/sml. ring -	9.4)
	x			x		1	W	6	x					x	4.5	27.2	13.2
	x			x		3	W-NE-N	6-9-10		x		x	x		0.5	20.4	7.7
	x			x		2	S-E	10-5		x			x	x	0.9	27.2	11.3
	x			x		3	NW-N-SW	13-8-9		x	x	x	x		0.9	31.7	10.0
	x				x				x			x		x	3.6	36.3	13.6
	x				x				x				x	x	1.4	22.7	10.4
	x			x		1	E	8		x			x	x	0.9	36.3	9.5
																(x/lge. ring -	10.9
x		E	60		x					x			x		0.9	34.0	14.1
	x				x				x			x		x	-	-	-

TABLE 2: DjPb-2 ARTIFACT DISTRIBUTIONS

LOCATION	ARTIFACTS																				
	TOOLS AND CORES											FLAKES									
	Plains Triangular Projectile Point	Oxbow Side Notched	Point Fragment	Side Scraper	Scraper Fragment	Uniface Fragment	Piece Esquillee	Retouched Flake	Cortical Spall Tool	Split Cobble Core Chopper		Uniface Cobble Chopper	Core Nuclei	Primary Decortication	Secondary Decortication	Retouch/Resharpening	Secondary	Block	Fragments		TOTAL
Excavated																					
Inside Ring 2		1	1				1		1					3	3		5	1			16
3				1					3						2	1	3	1			11
5								1						3		1	3	2	1		11
Between 3 & 5		1							1						1		1		1		5
North of 2									1							1	1				3
South of 3				1																	1
West of 3									1						1	1	1	1			5
Northeast of 5																1	1				2
Northwest of 5																	1		1		2
Totals		2	1	2			1	1	7					6	7	5	16	5	3		56
Exterior Hearth 10						1		1	1				1	1	1	20	7	1	1		35
Tipi Ring 41 NW	1							1									2				4
SW																1	1	1			3
NE					1			1					1			5	1	2	1		12
SE								1								2		1			4
Totals	1				1			3					1			8	4	4	1		23
Surface																					
Feature 1									1												1
5							1														1
6												1			1						2
7												1									1
11												1									1
16									1												1
18												1									1
19									2								1				3
20									1	1											2
22									1	1											2
37												1									1
42												3									3
48										1											1
Center Site										1											1
West Site									1							1					2
Totals							1		7	4		8			1	1	1				23
GRAND TOTALS	1	2	1	2	1	1	2	5	15	4		8	2	7	9	34	28	10	5		137

TABLE 3: DjPb-2 - LITHIC TYPE/ARTIFACT TYPE ASSOCIATIONS

ARTIFACT	CRYPTOCRYSTALLINE																MICROCRYSTALLINE					Total
	Non-local					Local																
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	
POINTS																						
Plains Triangular									1													1
Oxbow		1				1																2
Fragments												1										1
SIDE SCRAPER									2													2
SCRAPER FRAGMENT									1													1
UNIFACE FRAGMENT									1													1
PIÈCE ESQUILLÉES					1												1					2
RETOUCHED FLAKES				1				3												1		5
CORTICAL SPALL TOOLS																	1		1	3	10	15
SPLIT COBBLE CORE CHOPPER																		1		1	2	4
UNIFACE COBBLE CHOPPER																			1		7	8
CORE NUCLEI									1		1											2
FLAKES																						
Primary Decortication															1			1			5	7
Secondary Decortication																					9	9
Retouch & Resharp	1								7						10	2				4	10	34
Secondary			2						1		2			1	2	1		1		5	13	28
Block							1			1			1	3		1					3	10
Fragments								1	1						1						2	5
TOTAL	1	1	2	1	1	1	1	4	15	1	3	1	1	4	14	4	2	3	2	14	61	137

TABLE 4: DjPb-2 LITHIC TYPE DISTRIBUTIONS

	CRYPTOCRYSTALLINE																MICROCRYSTALLINE					
	Non-Local					Local																
LOCATION	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	Total
Excavated																						
Inside Ring 2		1			1							1		1						1	11	16
3									2					1						1	7	11
5							1		1									1		1	7	11
Between 3 & 5						1															4	5
North of 2																1				2		3
South of 3									1													1
West of 3														1							4	5
Northeast of 5																					2	2
Northwest of 5																					2	2
Totals		1			1	1	1		4			1		3		1		1		5	37	56
Exterior Hearth 10								1	4		3		1		12					7	7	35
Tipi Ring 41 NW			1					1	2													4
SW			1												1						1	3
NE				1				1	5	1						2					2	12
SE	1							1						1		1						4
Totals	1		2	1				3	7	1				1	1	3					3	23
Surface																						
Feature 1																					1	1
5																	1					1
6																					2	2
7																					1	1
11																					1	1
16																					1	1
18																					1	1
19																		1	1		1	3
20																		1			1	2
22																				2		2
37																					1	1
42																			1		2	3
48																					1	1
Center Site																					1	1
West Site															1		1					2
Totals															1		2	2	2	2	14	23
GRAND TOTALS	1	1	2	1	1	1	1	4	15	1	3	1	1	4	14	4	2	3	2	14	61	137

Table 5: DjPb-3 - LITHIC TYPE/ARTIFACT TYPE ASSOCIATIONS

	CRYPTOCRYSTALLINE											MICROCRYSTALLINE				
	Non-Local					Local										
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	TOTAL
BIFACE FRAGMENT					1											1
END SCRAPER	1															1
SPLIT PEBBLE END SCRAPER											1					1
UNIFACE FRAGMENT								1								1
FLAKE KNIFE				1												1
PIÈCE ESQUILLÉES					1			1				1				3
RETOUCHED FLAKES			1					1	1							3
PEBBLE CORES						1	1		1	1	1				2	7
FLAKES:																
Primary Decortication						1	1	1					1	2	14	20
Secondary Decortication														2	3	5
Retouch & Resharp	4	1	1		2	1	1	4	4	3	1	1		3	6	32
Secondary															3	3
Block					1											1
Fragments												1		2	8	11
TOTAL	5	1	2	1	5	3	3	8	6	4	3	3	1	9	36	90

FIGURE 1: Site vicinity map of DjPb-2 and 3.

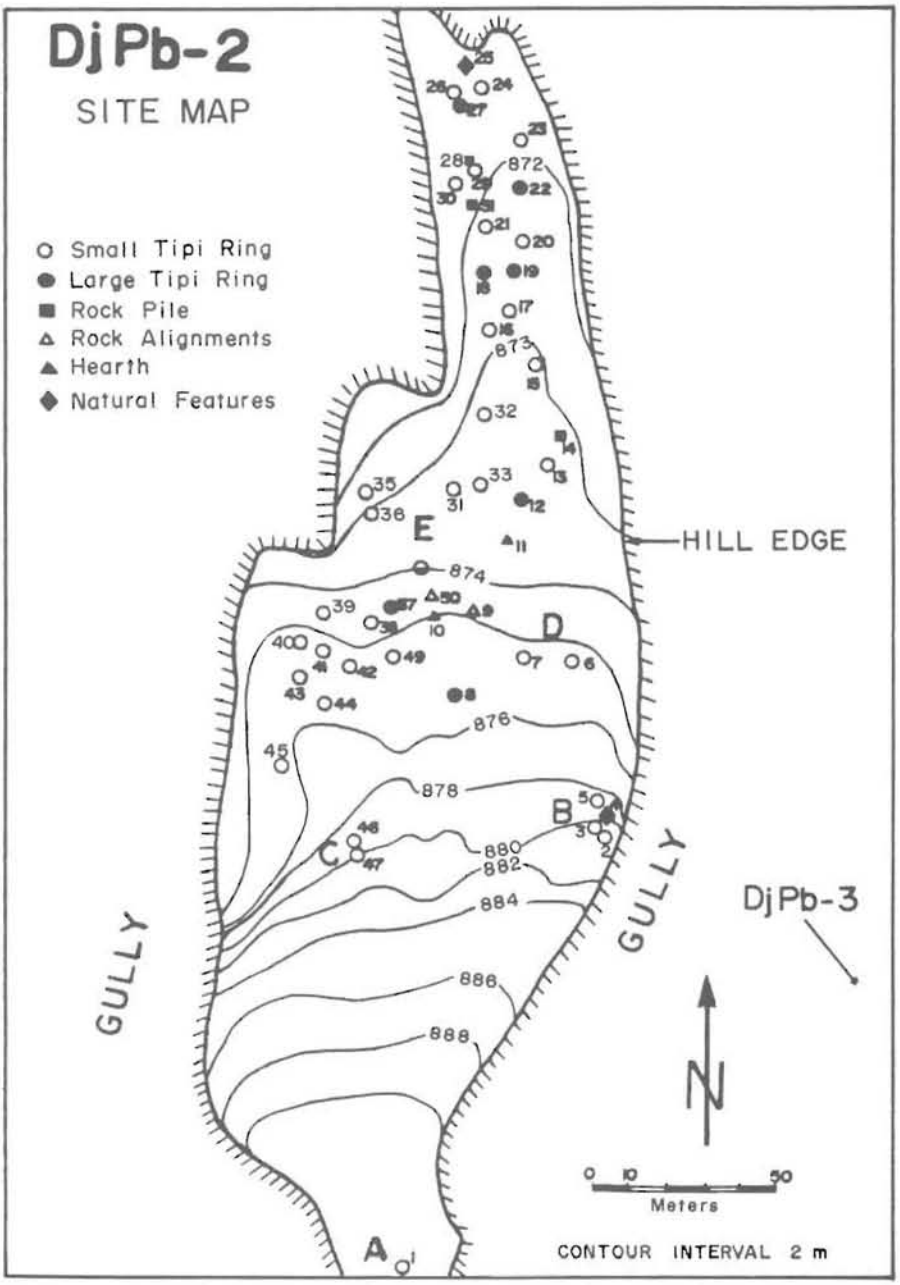
DjPb-2
SITE MAP
Small Tipi Ring
Large Tipi Ring
Rock Pile
Rock Alignments
Hearth
Natural Features
HILL EDGE
GULLY
GULLY
DjPb-3
A
A'
B
C
D
E
872
873
874
876
878
880
882
884
886
888
N
0 10 50
Meters
CONTOUR INTERVAL 2 m

Figure 2

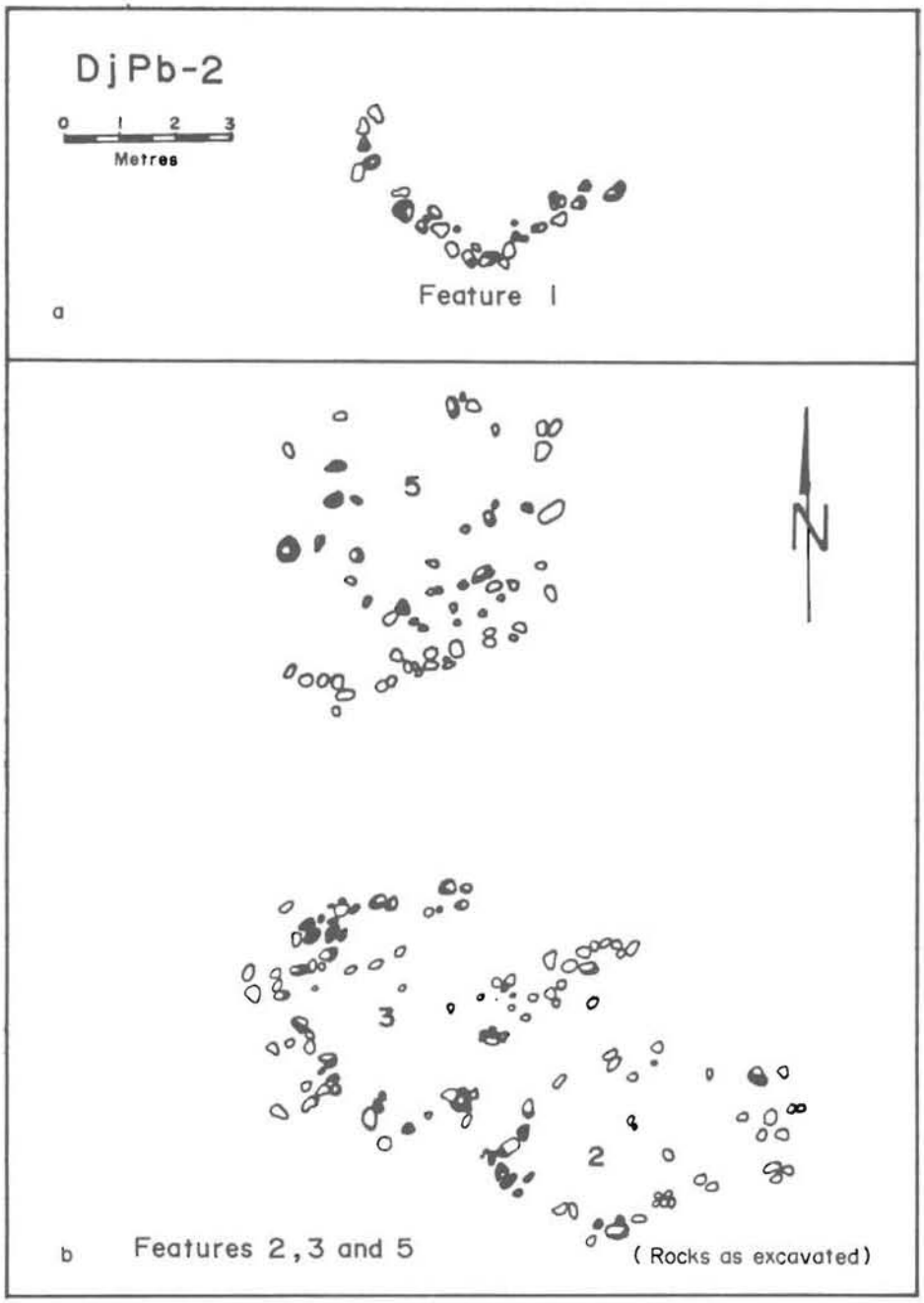

Figure 3: Small Tipi Rings Groups A and B.

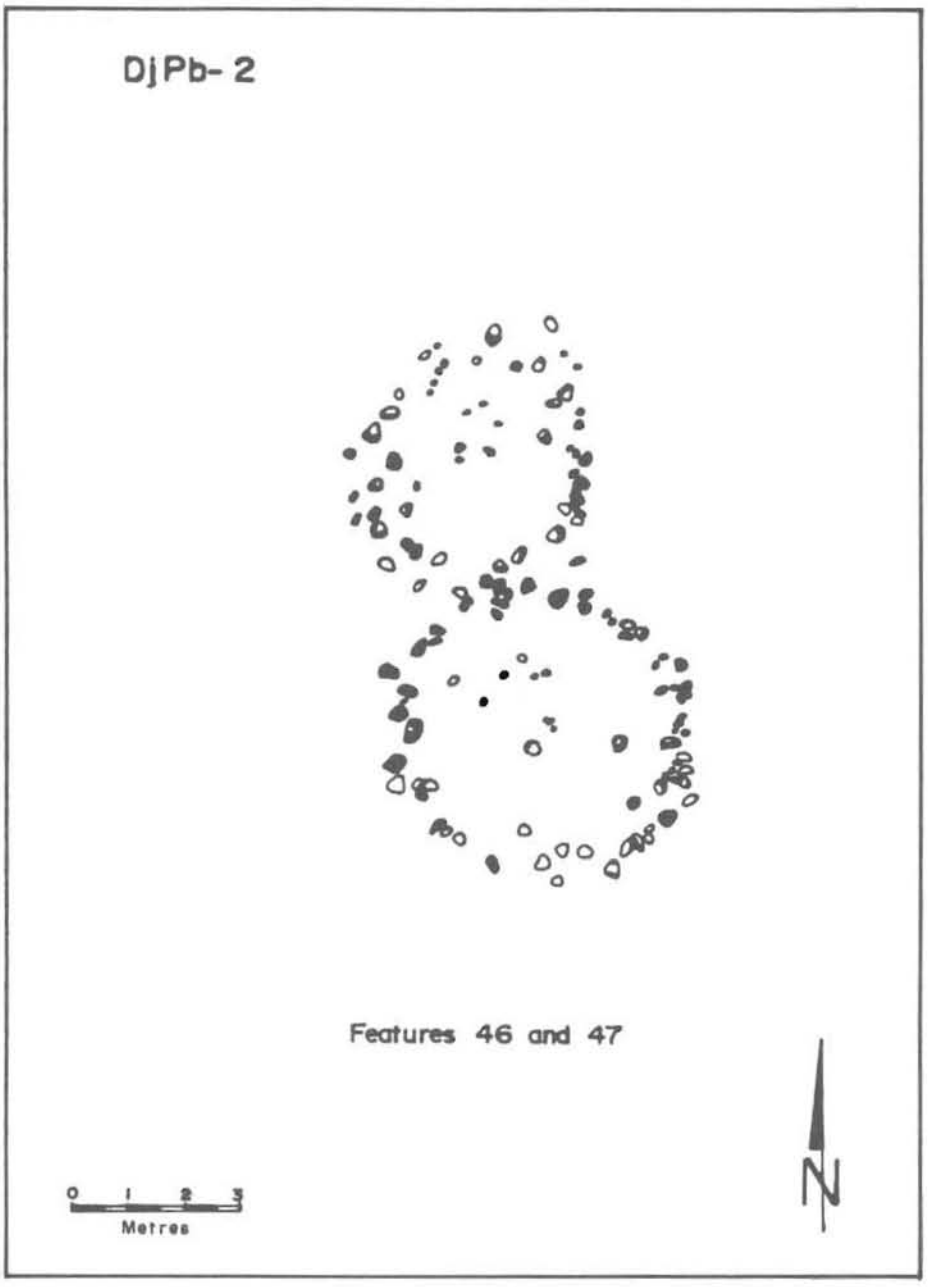

Figure 4: Group C Small Tipi Rings.

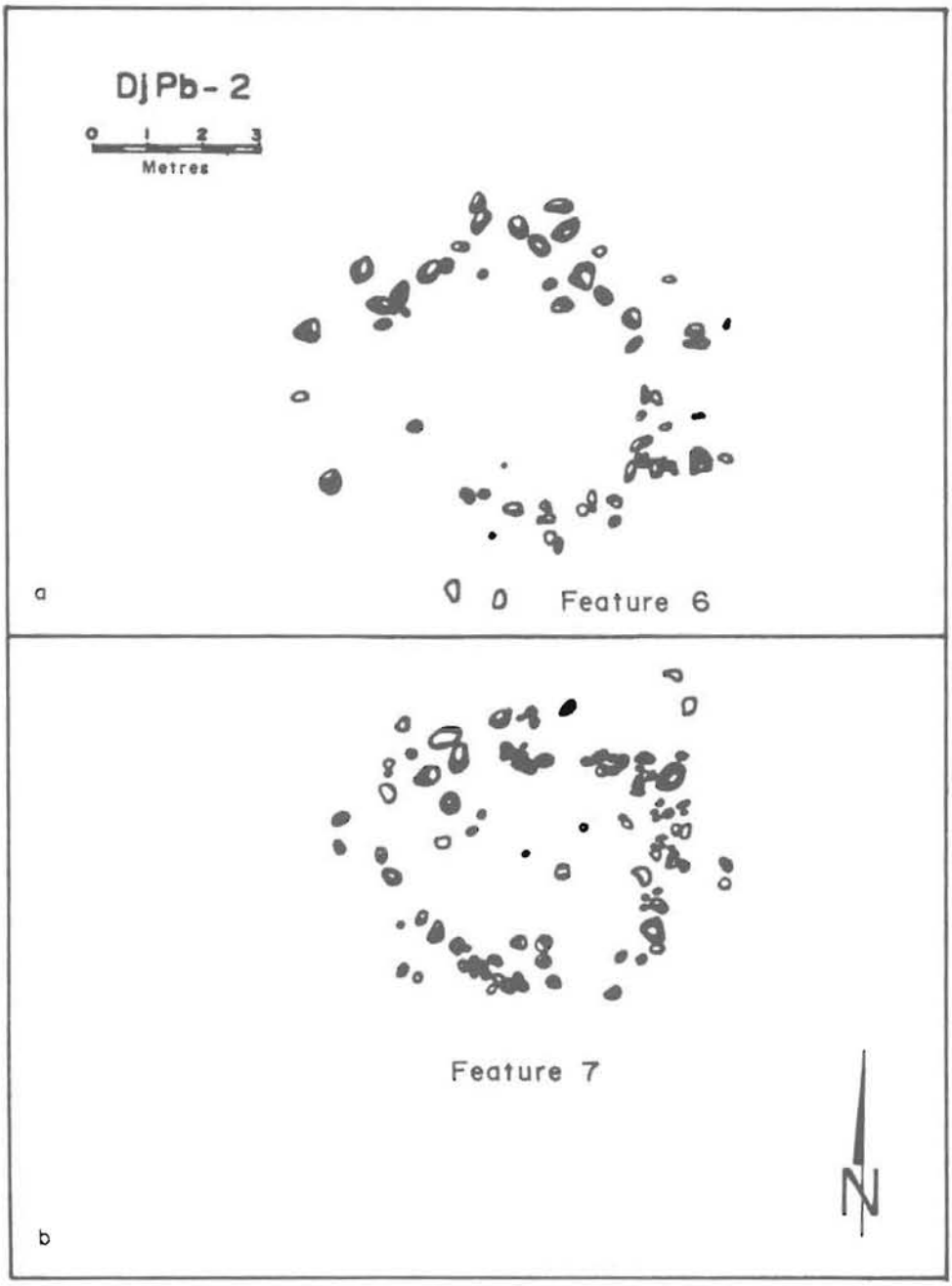

Figure 5: Group D Small Tipi Rings.

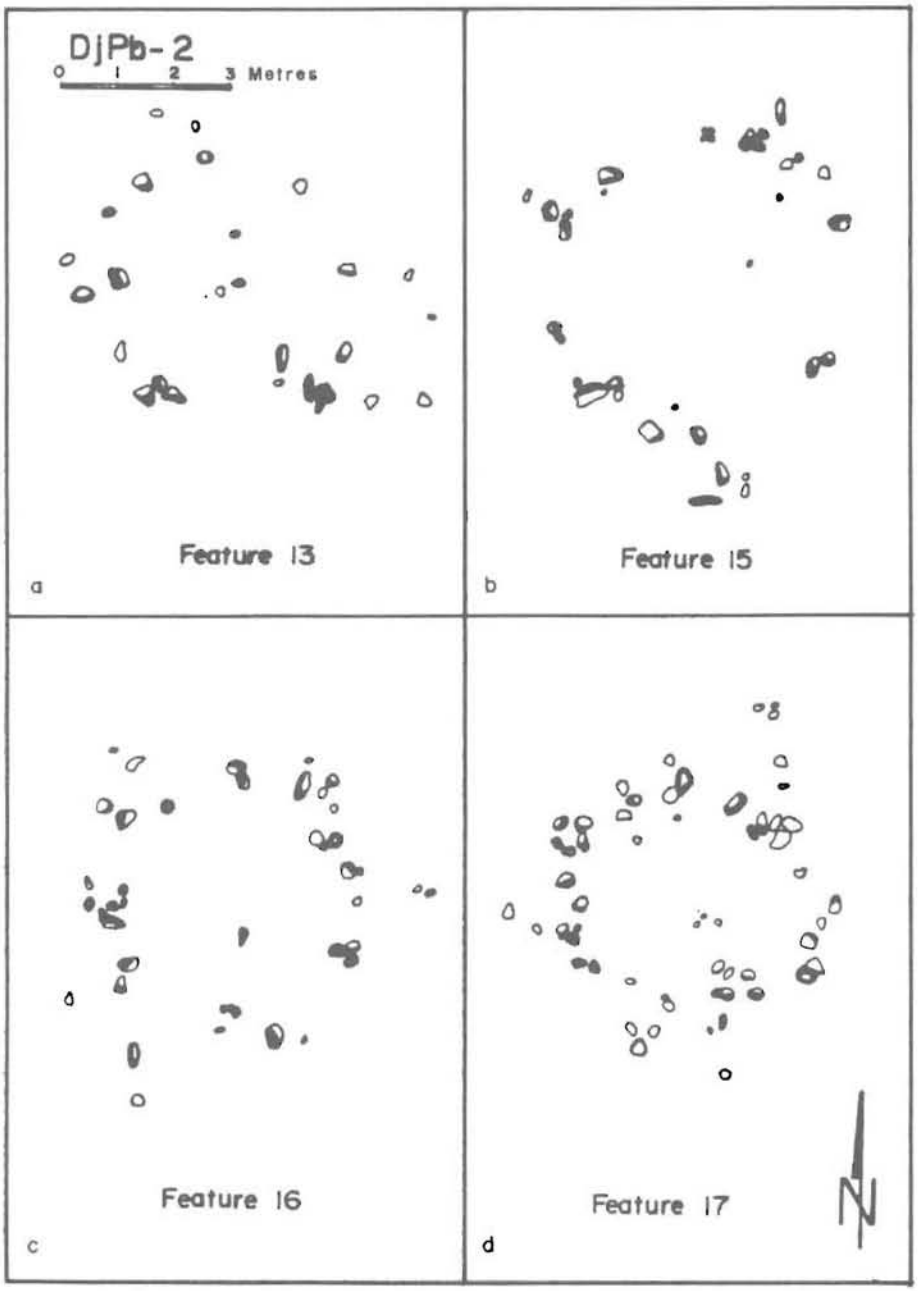

Figure 6: Group E Small Tipi Rings.

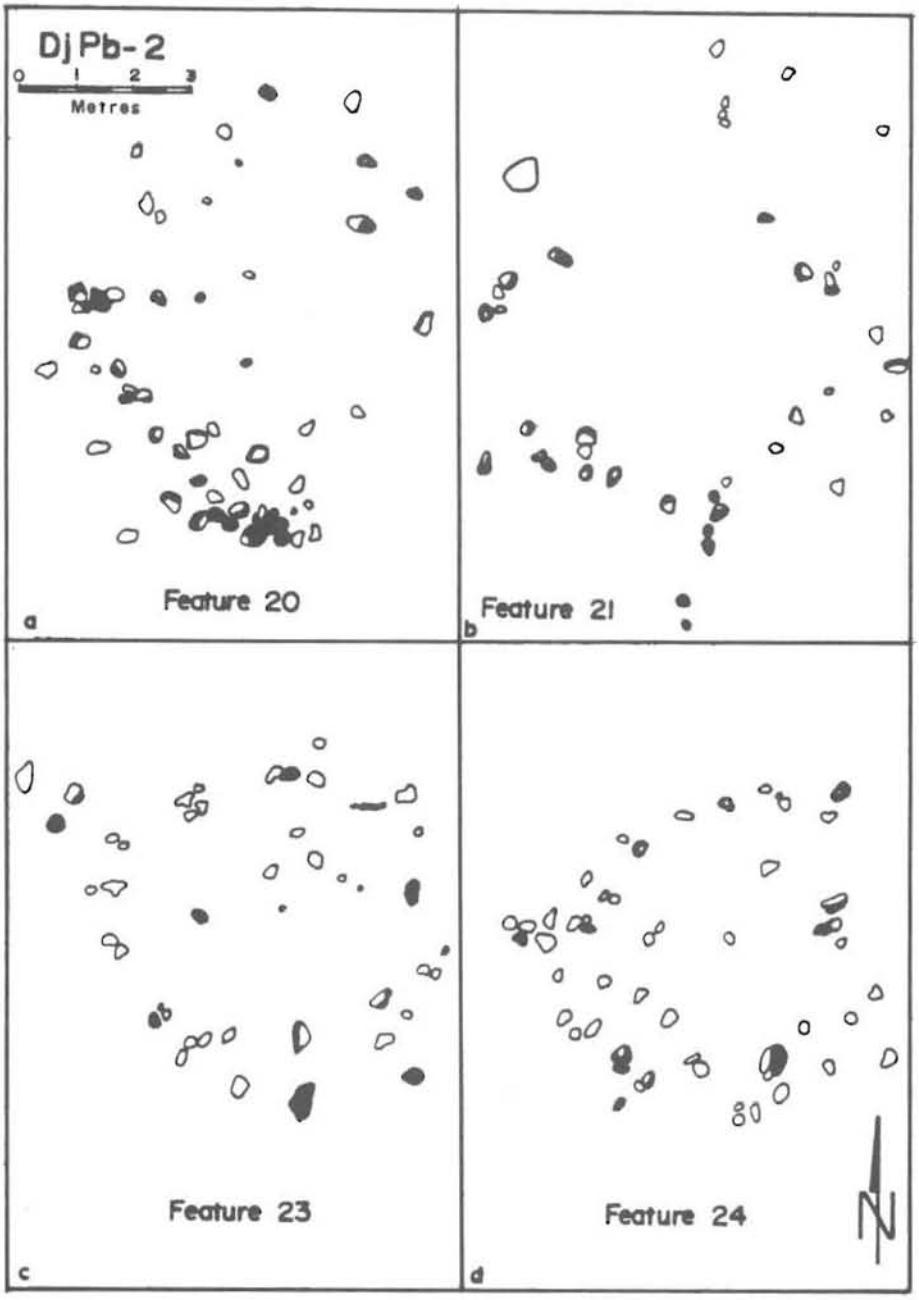

Figure 7: Group E Small Tipi Rings.

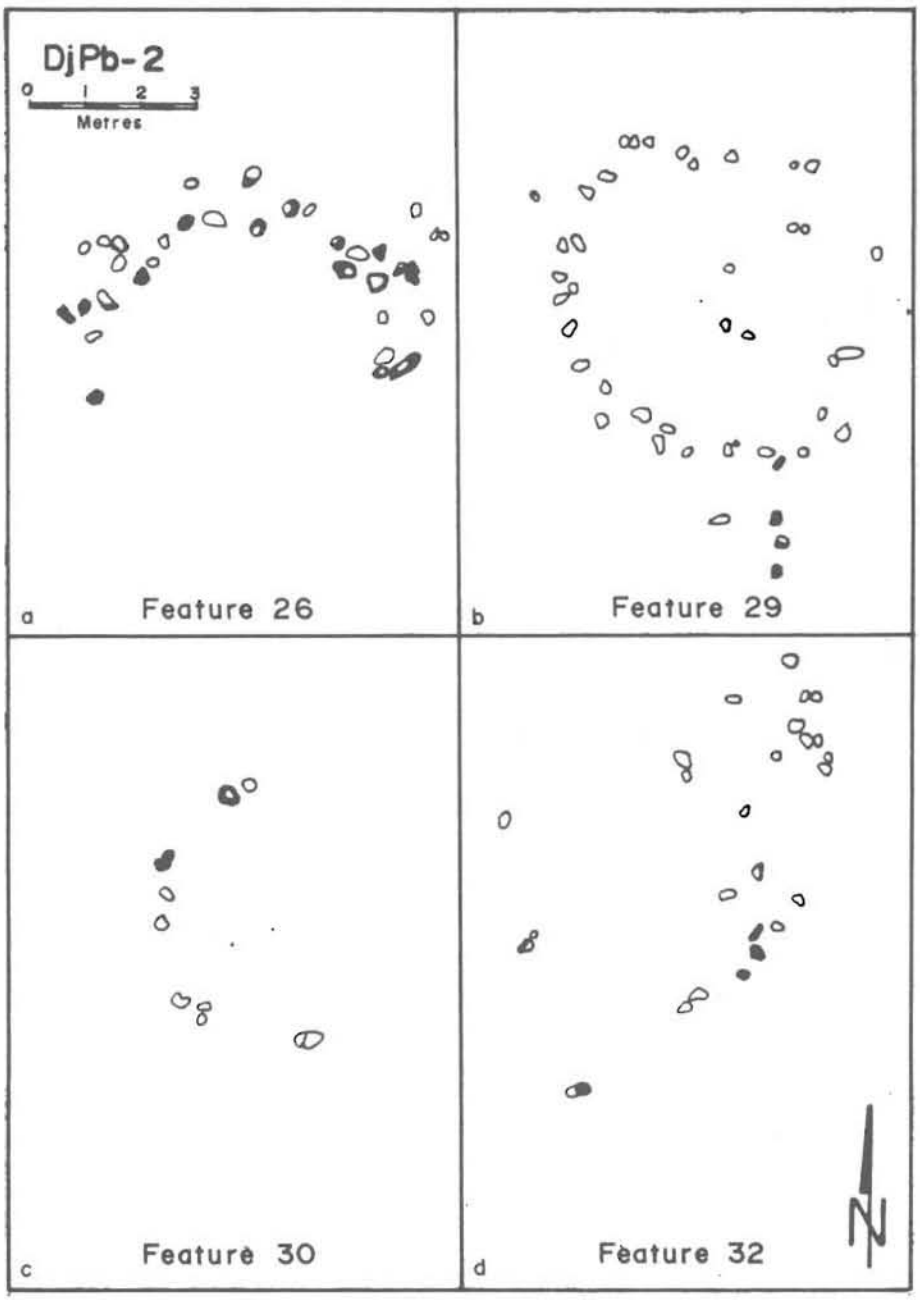

Figure 8: Group E Small Tipi Rings.

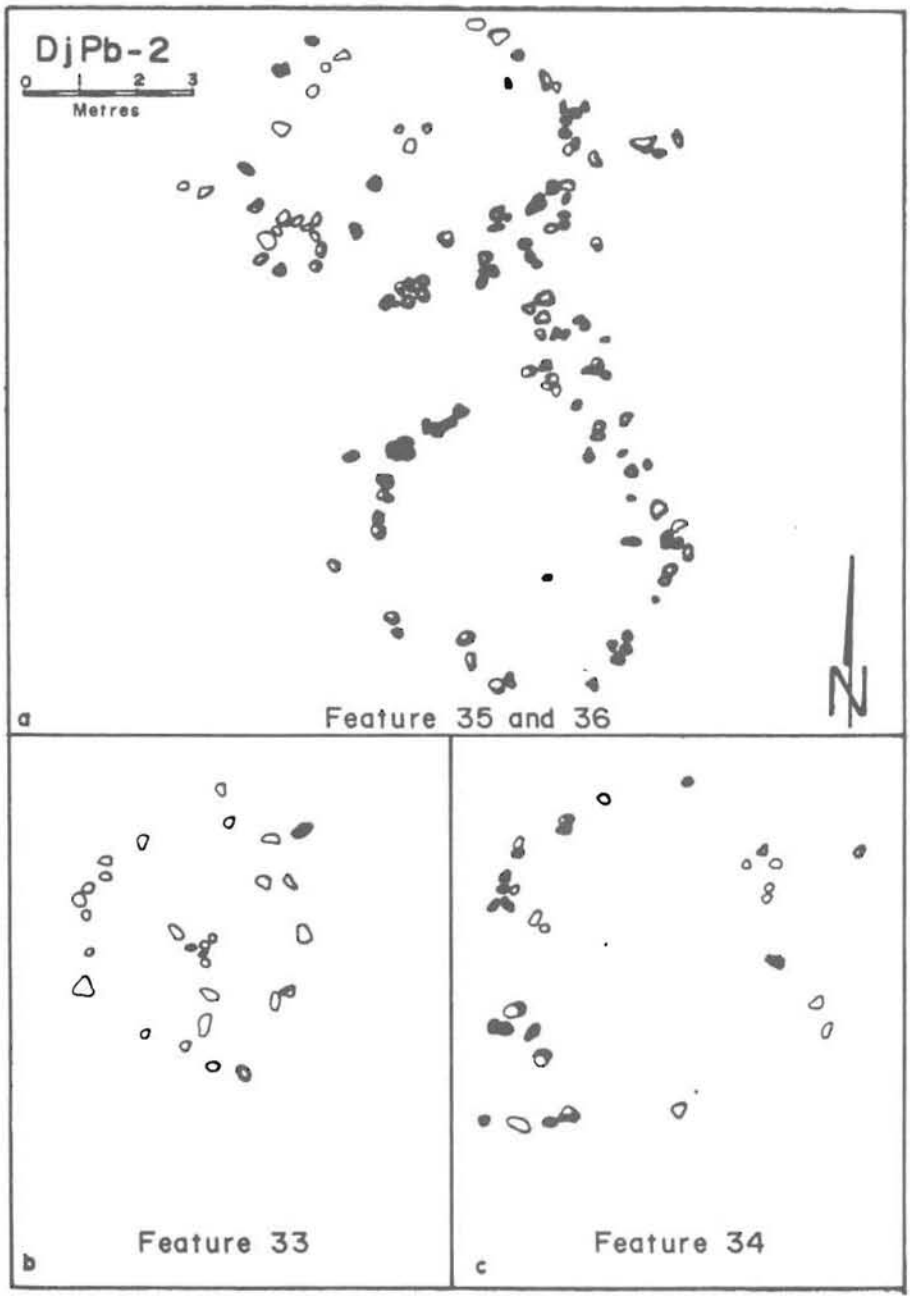

Figure 9: Group E Small Tipi Rings.

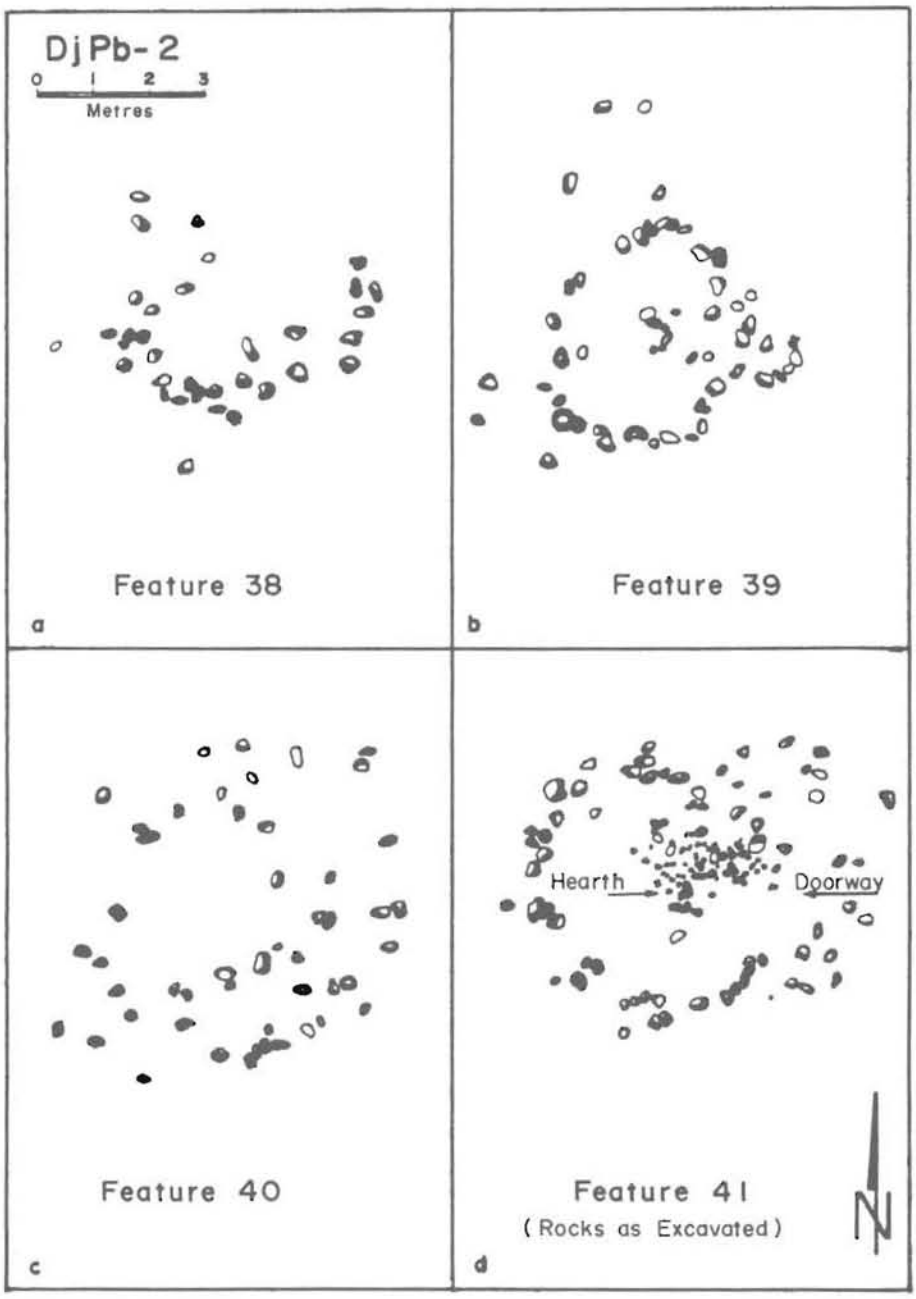

Figure 10: Group E Small Tipi Rings.

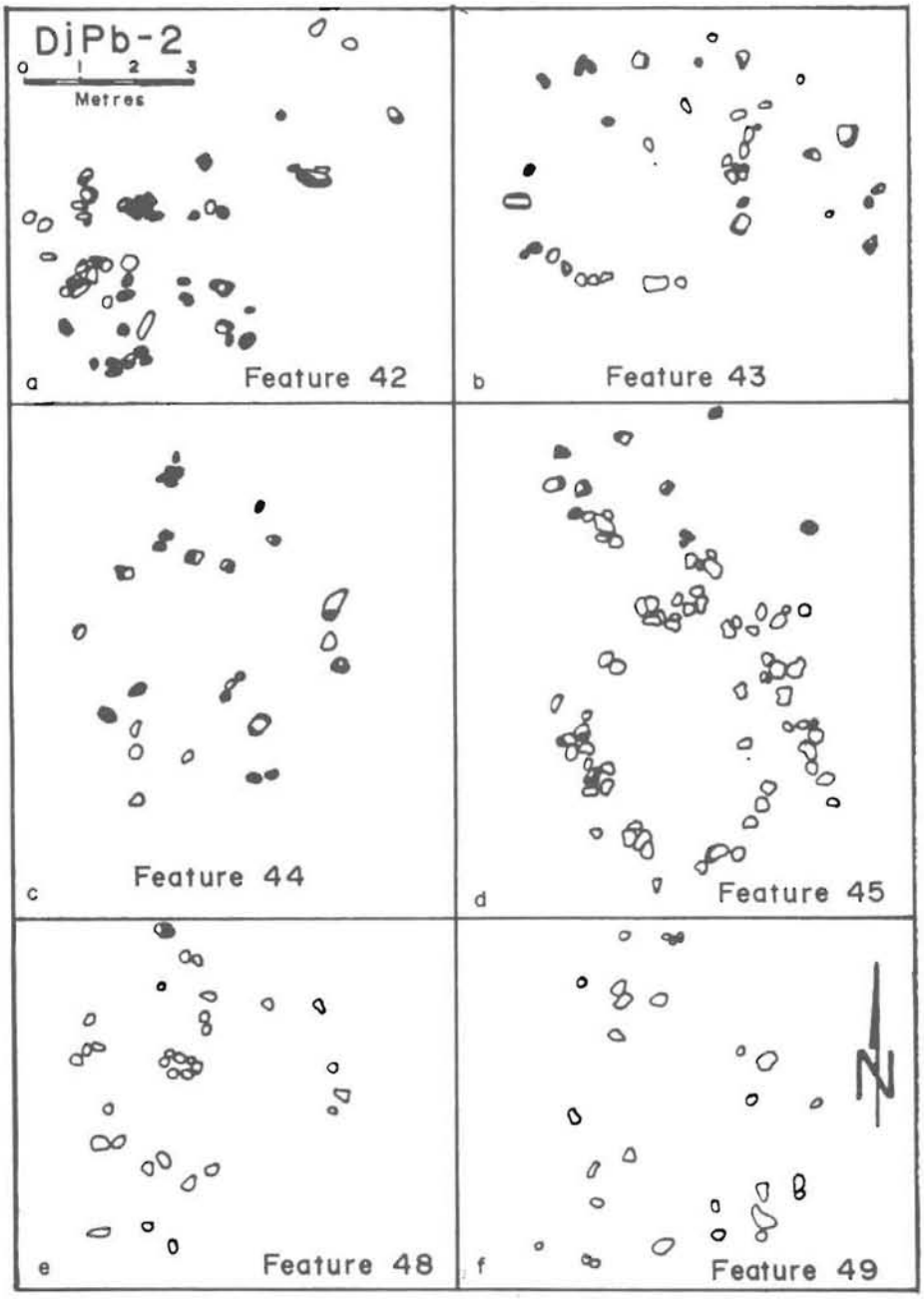

Figure 11: Group E Small Tipi Rings.

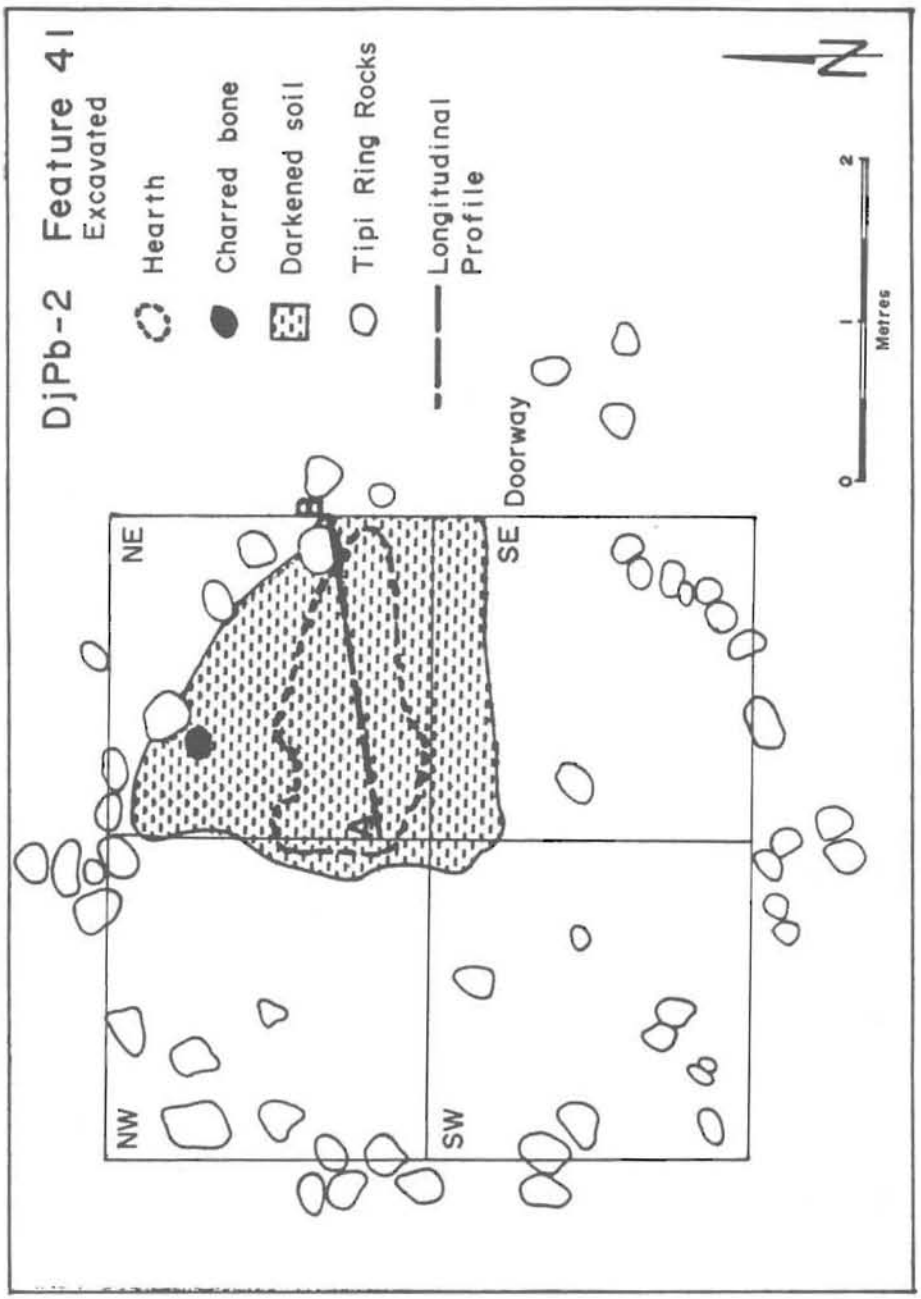
DjPb-2 Feature 41
Excavated
Hearth
Charred bone
Darkened soil
Tipi Ring Rocks
Longitudinal Profile
N
0
1
2
Metres
Doorway
NE
SE
NW
SW
A
B

Figure 12

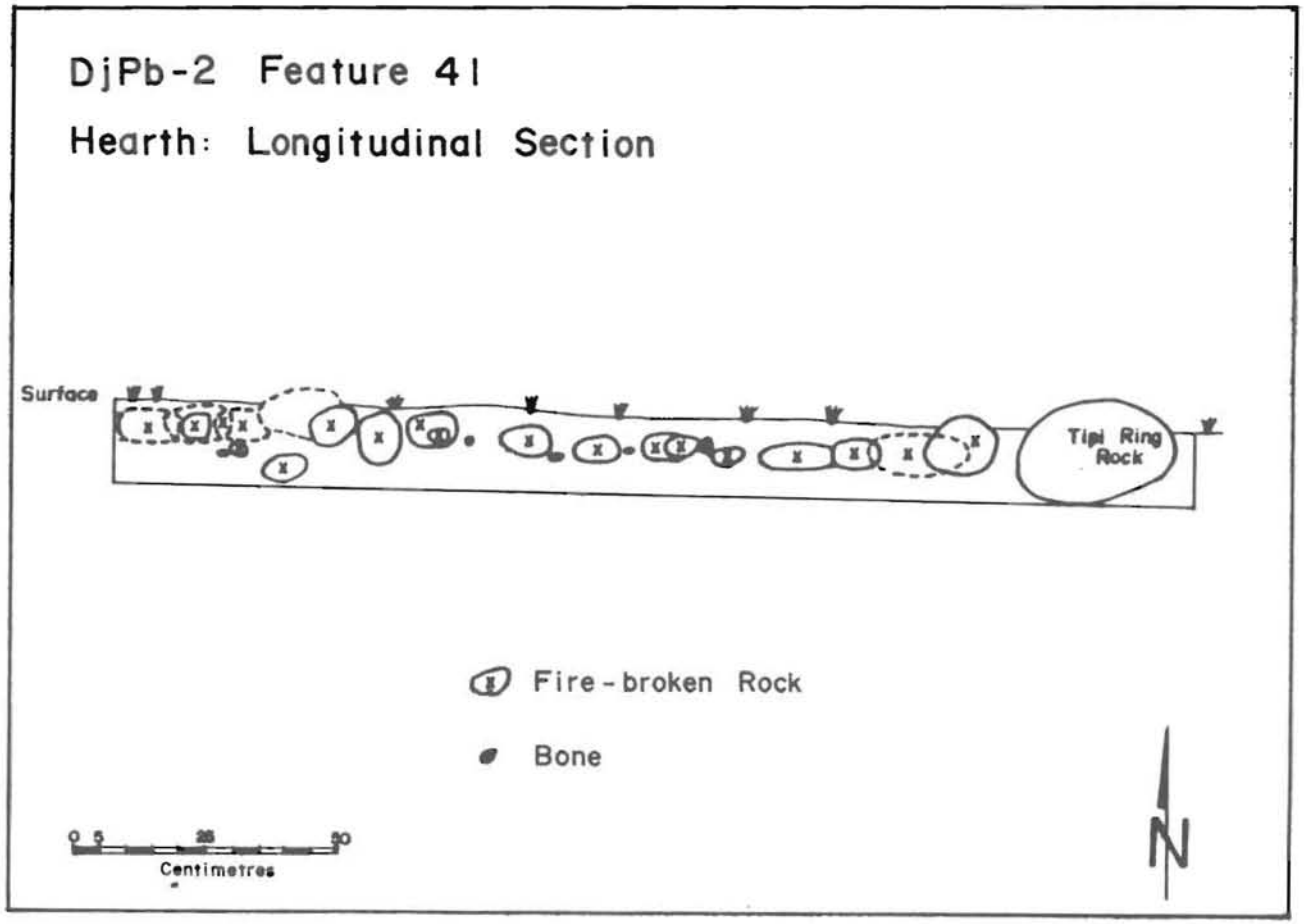
DjPb-2 Feature 41
Hearth: Longitudinal Section
Surface
Tipi Ring Rock
Fire-broken Rock
Bone
0 5 25 30
Centimetres
N

Figure 13

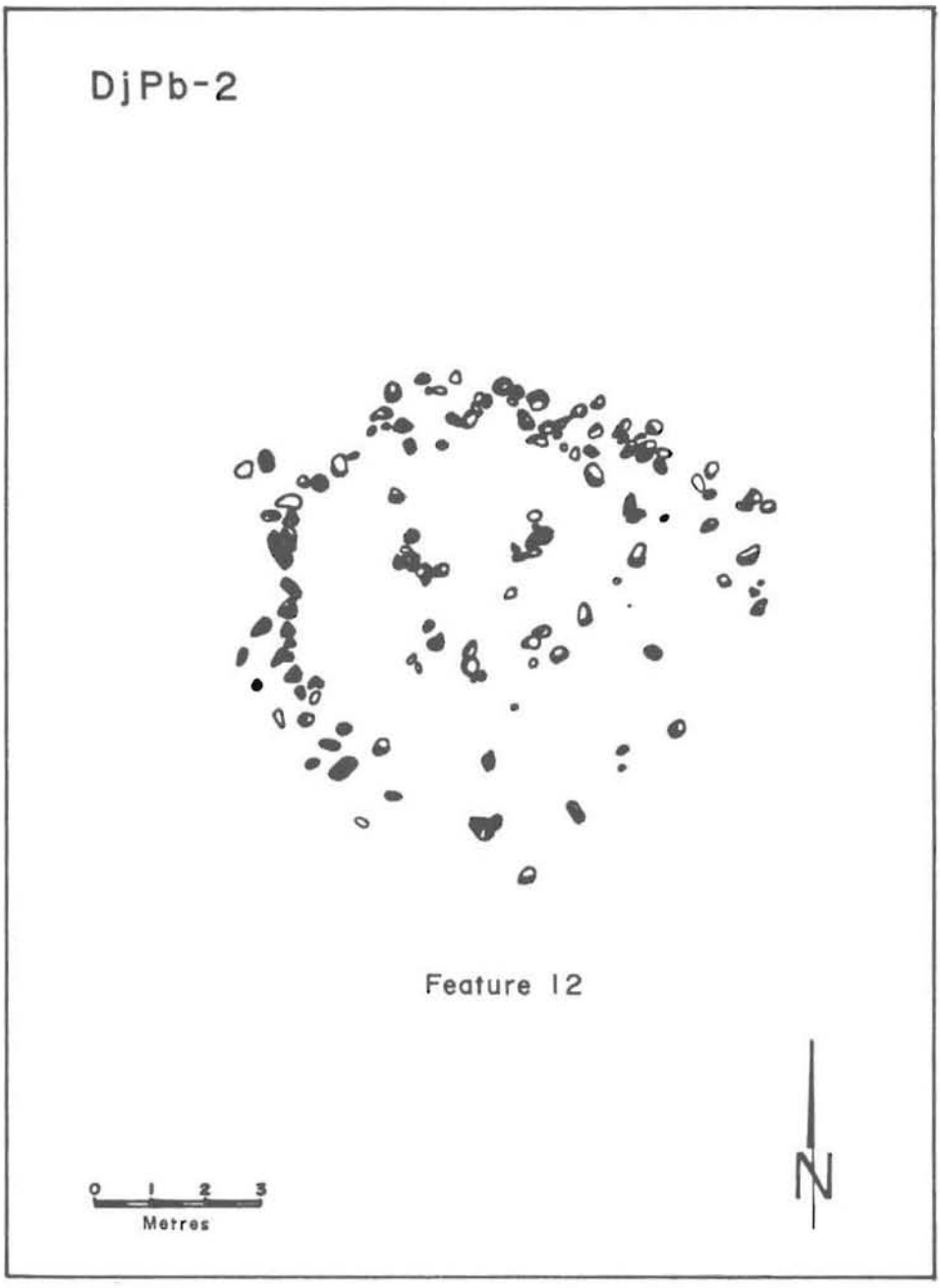

Figure 14: Group E Large Tipi Rings/Small Ring Inside.

Figure 15: Group E Large Tipi Ring/Small Ring Inside.

Figure 16: Group E Large Tipi Ring/Small Ring Inside.

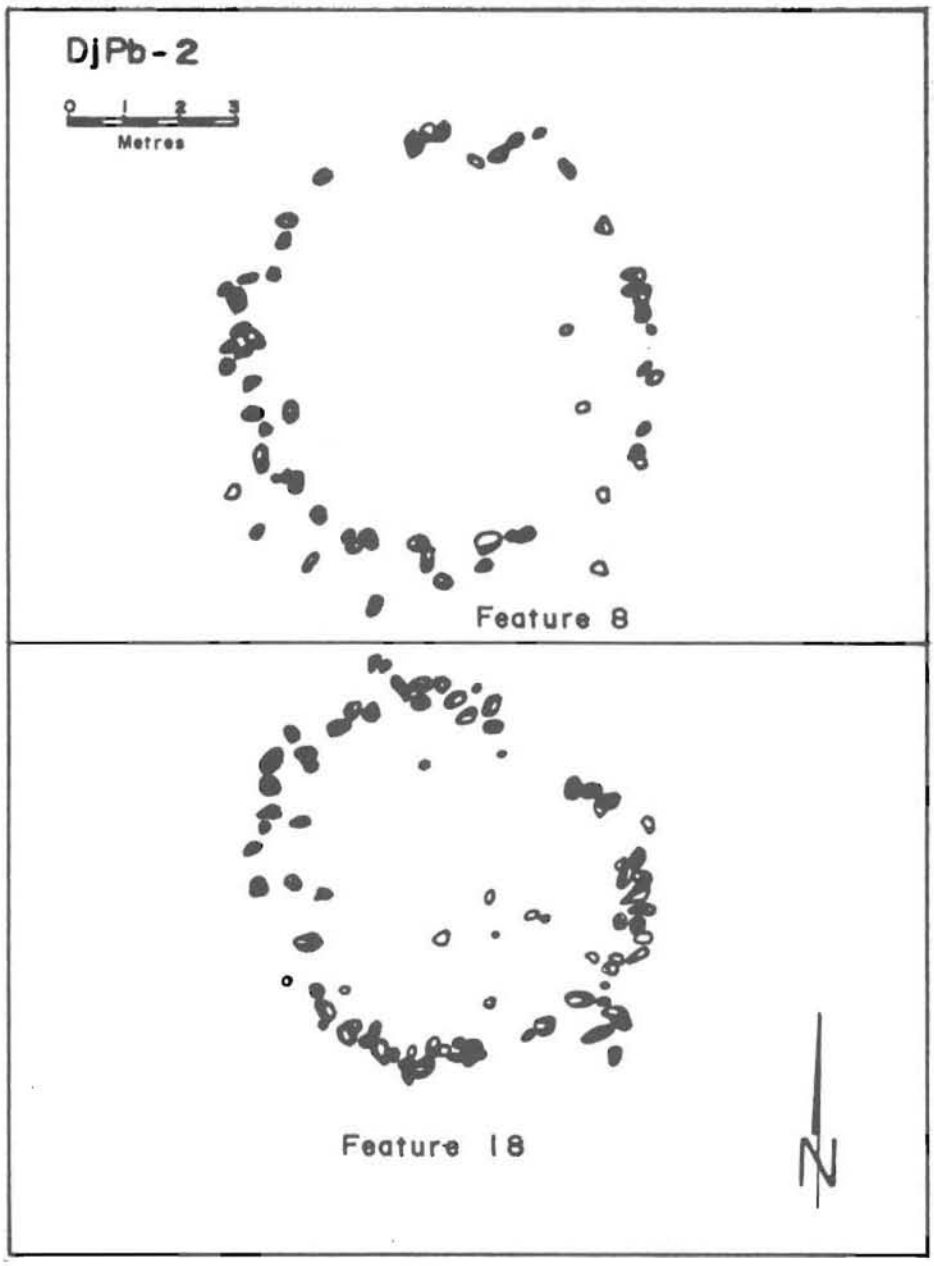

Figure 17: Group E Large Tipi Rings.

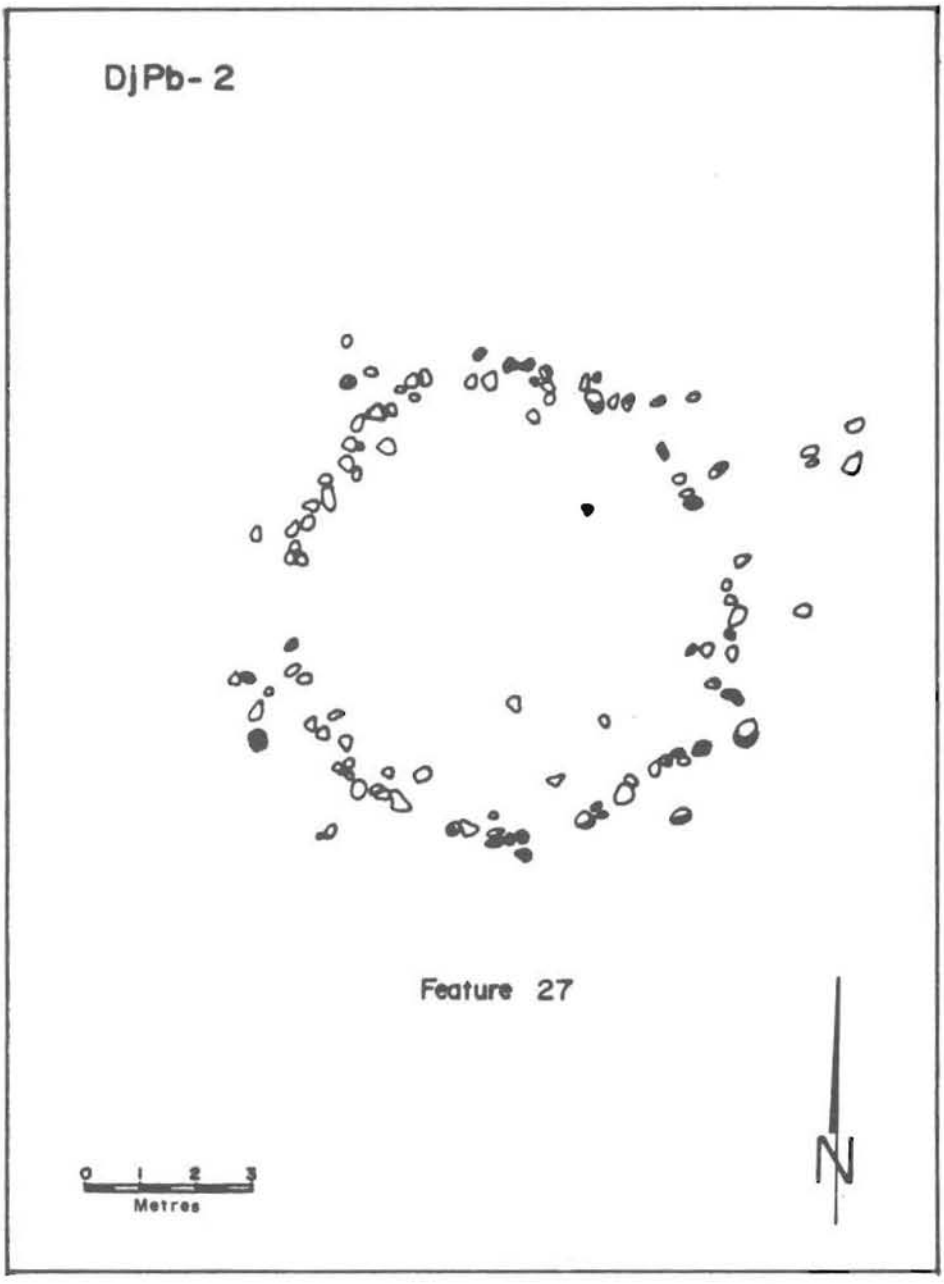

Figure 18: Group E Large Tipi Ring.

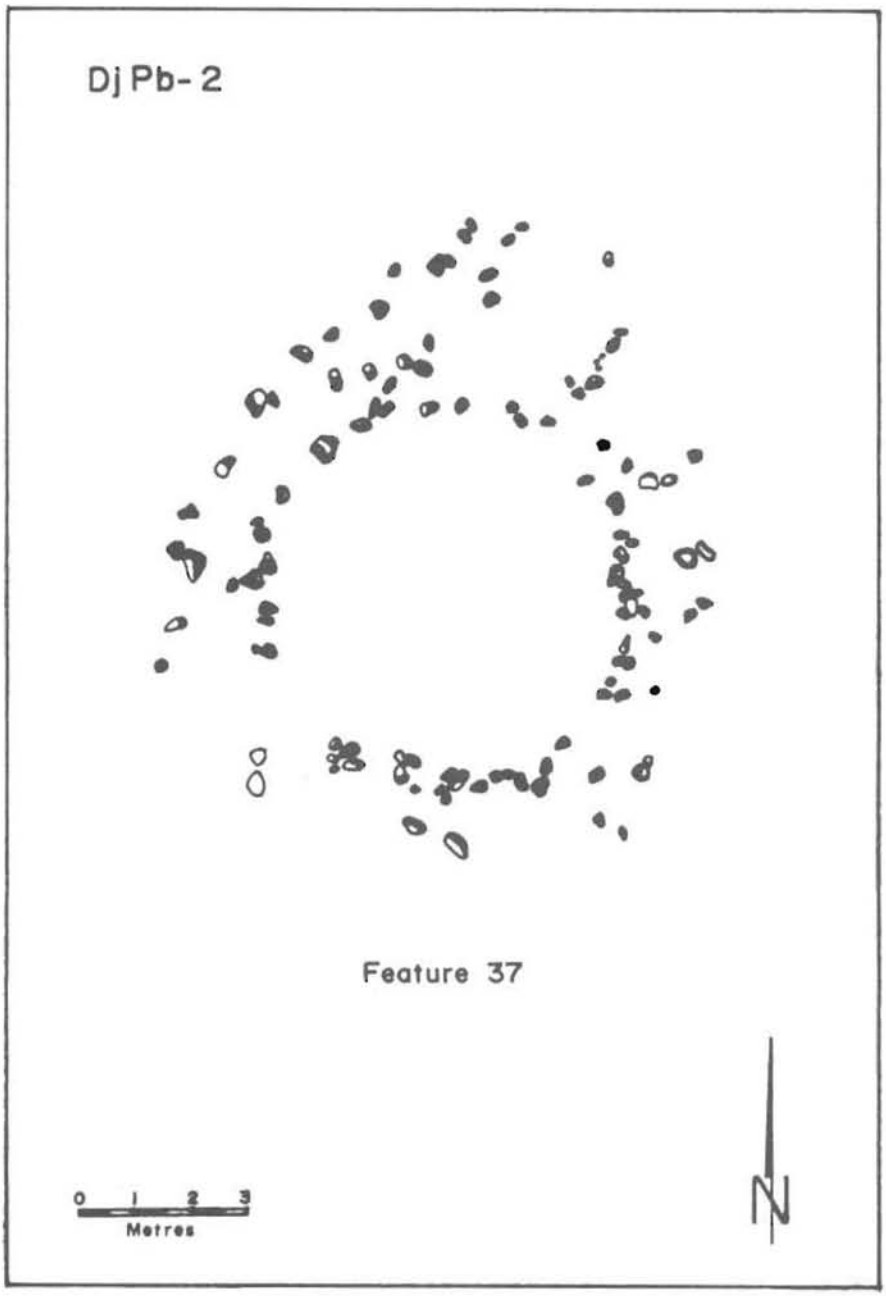

Figure 19: Group E Large Tipi Ring.

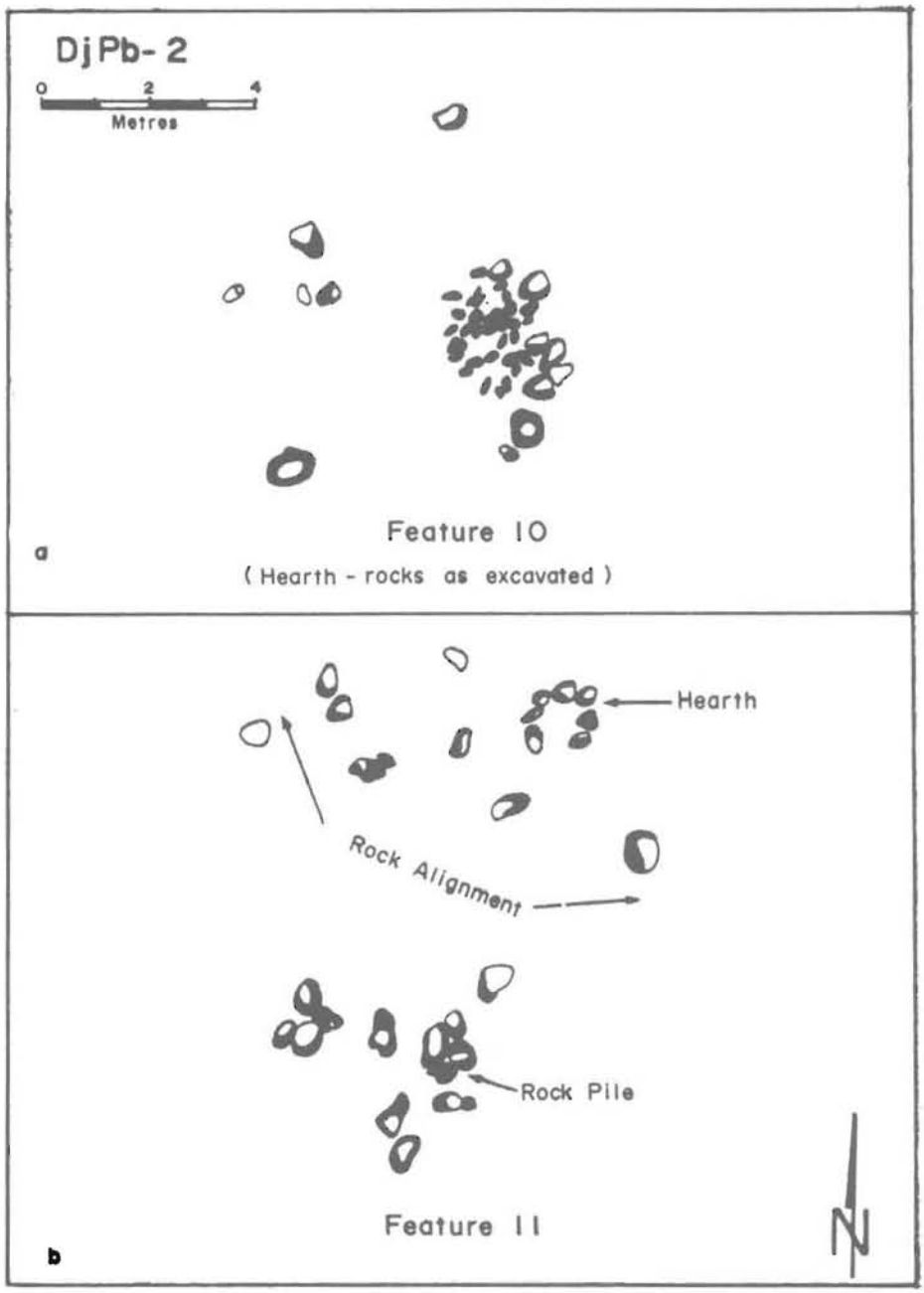

Figure 20: Group E Hearths and Other Features.

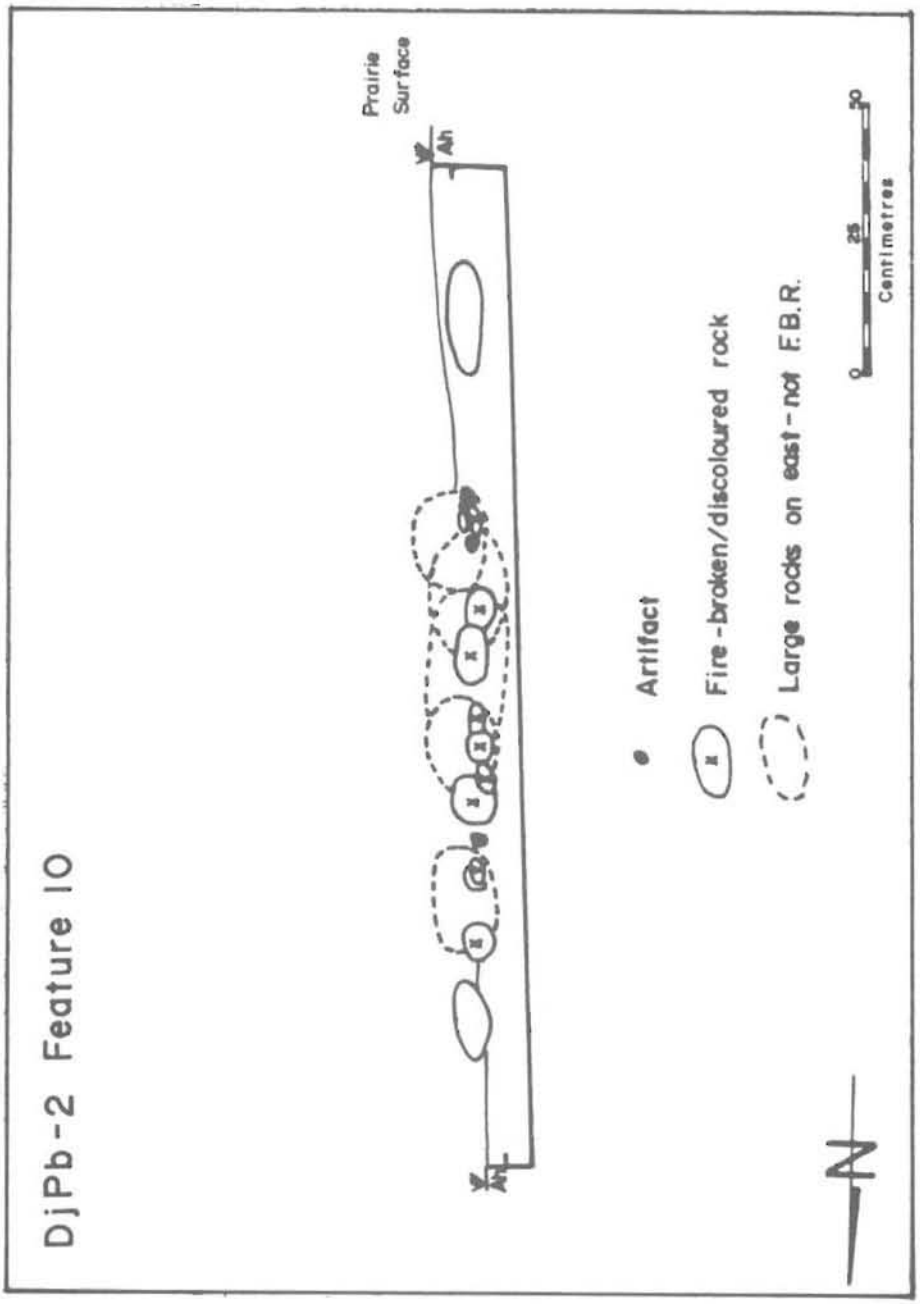
DjPb-2 Feature 10
Prairie Surface
Ah
Ah
Artifact
Fire-broken/discoloured rock
Large rocks on east-not F.B.R.
0
25
50
Centimetres
N

Figure 21

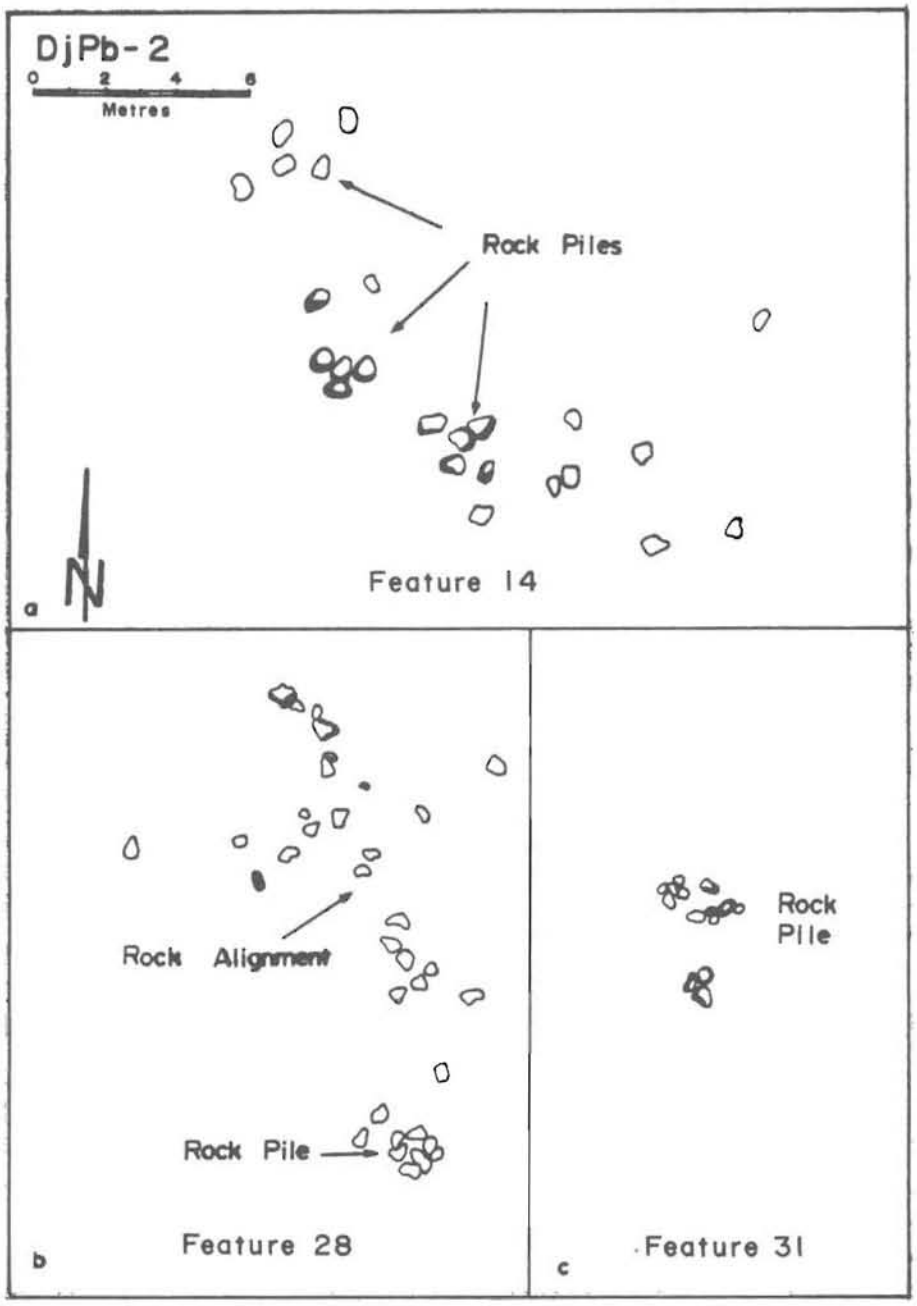

Figure 22: Group E Rock Piles and Features.

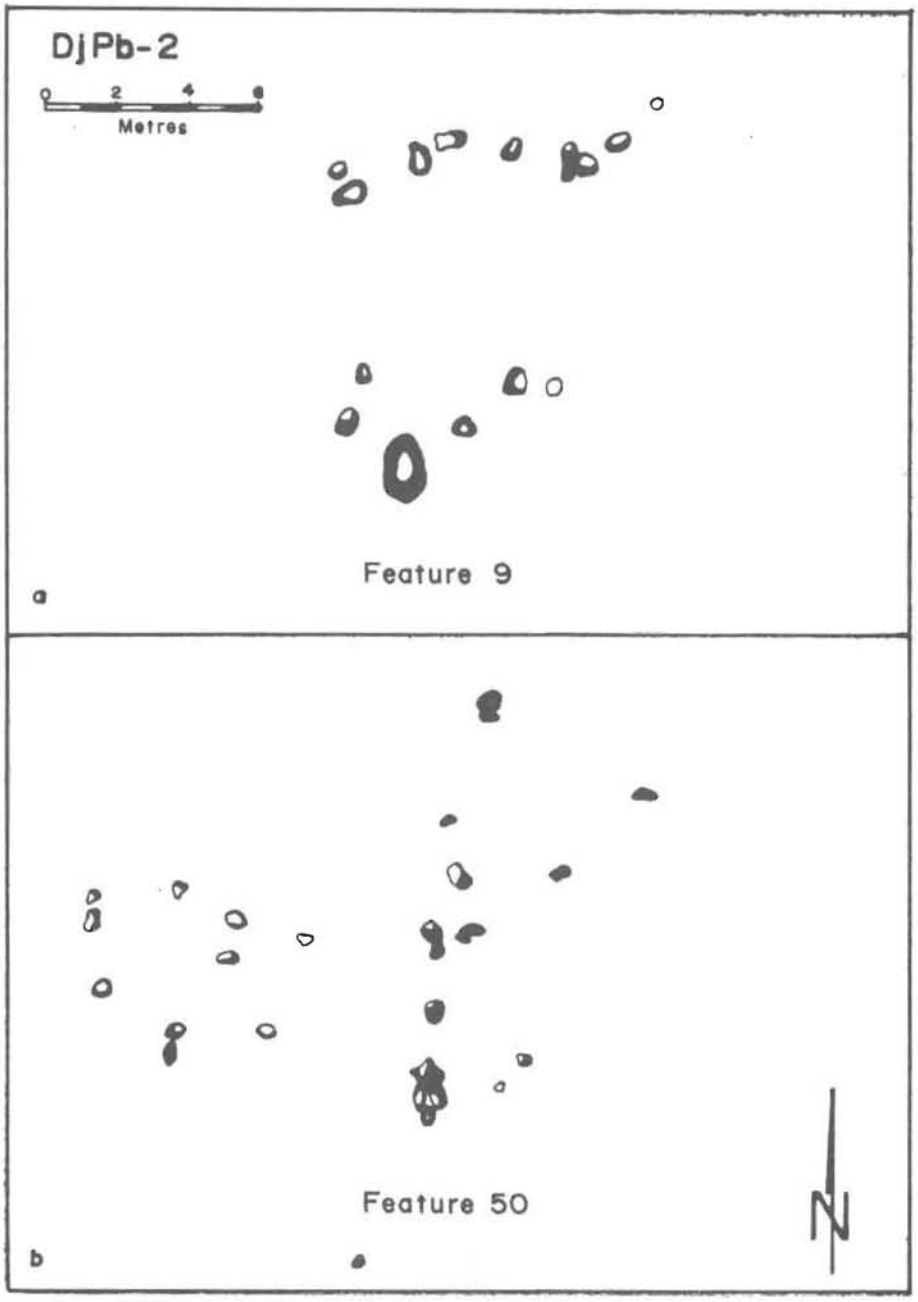

Figure 23: Group E Rock Alignments.

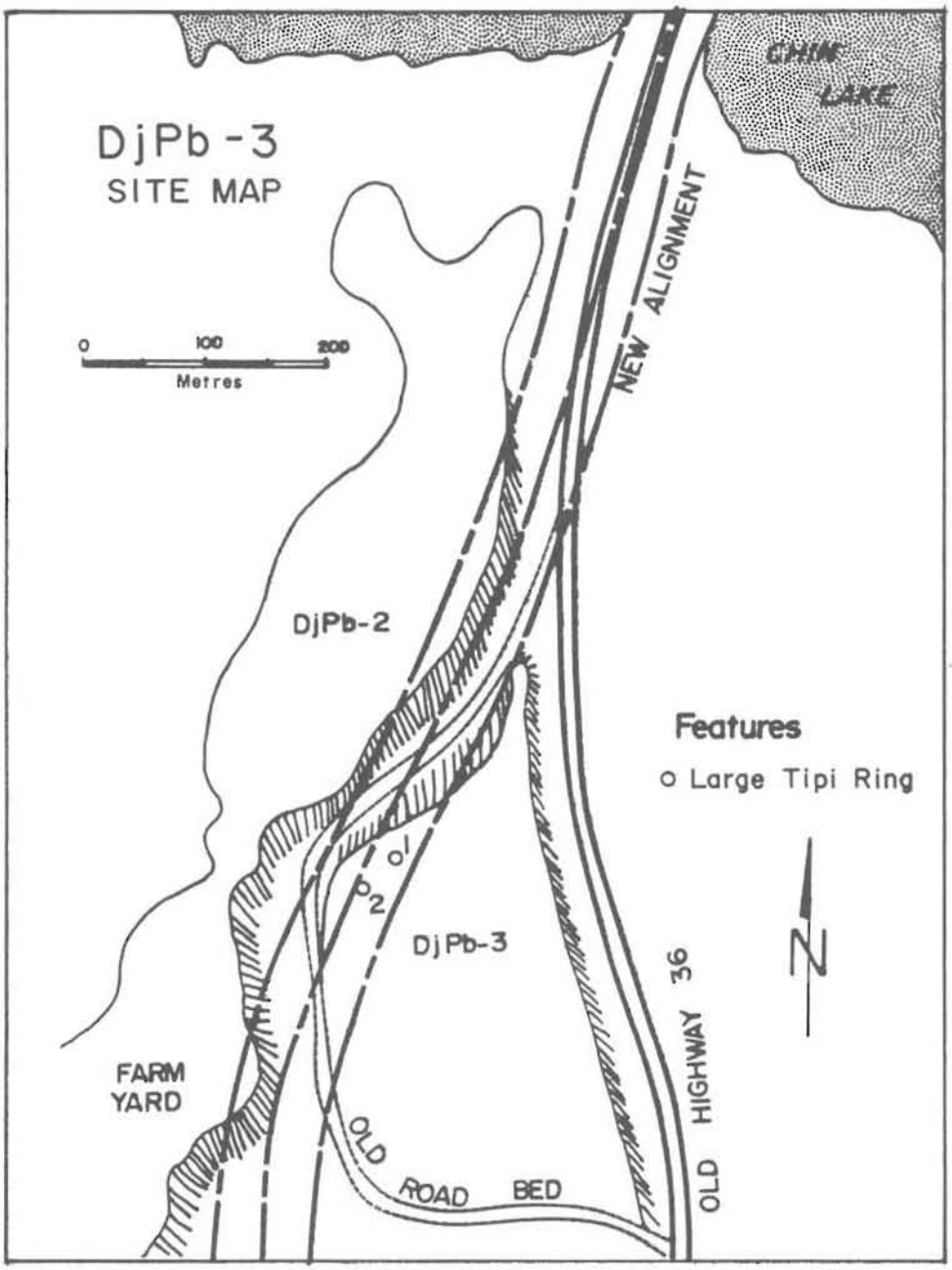
DjPb-3
SITE MAP
0
100
200
Metres
GHIM LAKE
NEW ALIGNMENT
DjPb-2
Features
o Large Tipi Ring
o1
o2
DjPb-3
N
OLD HIGHWAY 36
FARM YARD
OLD ROAD BED

Figure 24

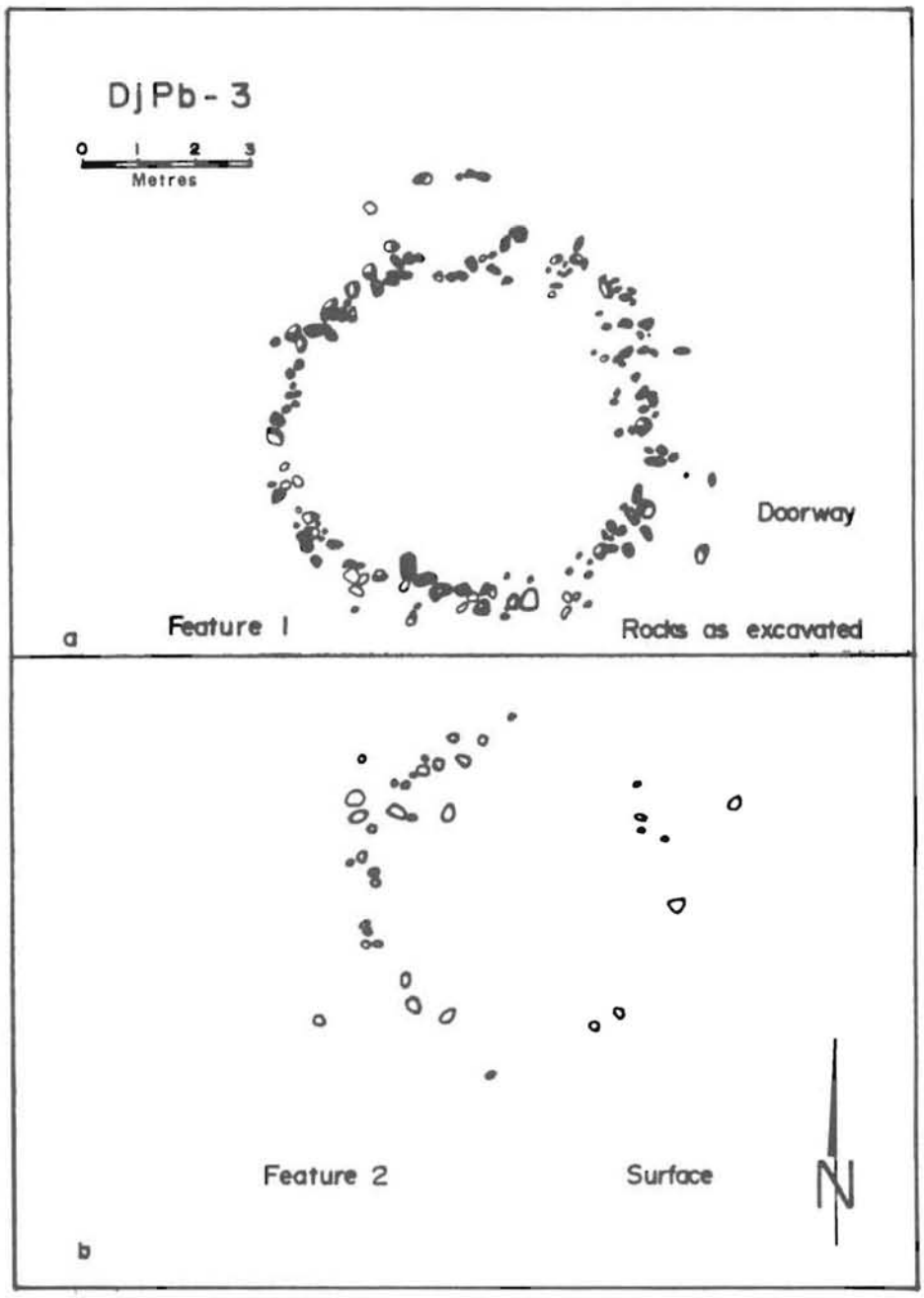

Figure 25: Large Rings.

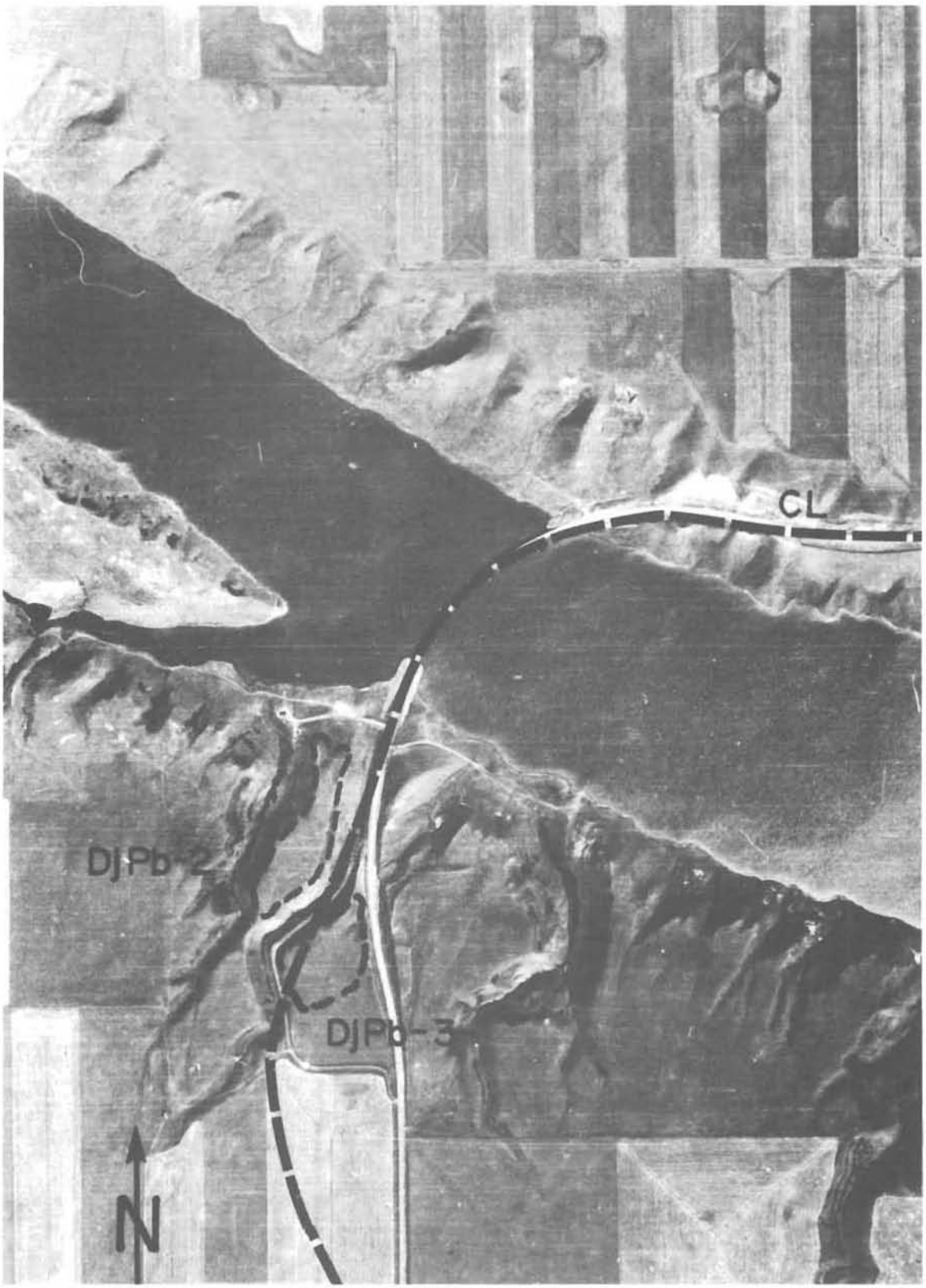

Figure 26: DjPb-2, -3. Aerial photograph of the area.

Figure 27: Aerial view, looking south, DjPb-2 is in the centre, and DjPb-3 in the upper left. The ravine on the left is the proposed right-of-way for Highway 36. The Chin Reservoir is in the foreground.

Figure 28: Aerial view looking north, of DjPb-2. Highway 36 is shown in the upper right corner.

Figure 29: Aerial view of DjPb-2, looking east.

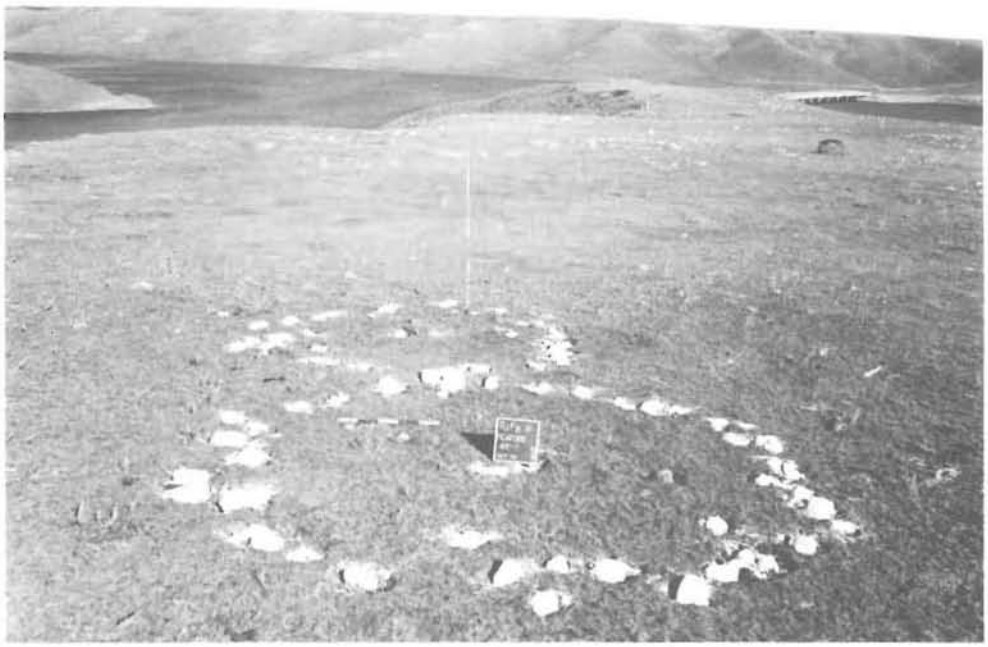

Figure 30: DjPb-2, small tipi ring feature 46, in foreground, and feature 47 behind, looking north. Note the apparent hearth beneath the photo board.

Figure 31: DjPb-2, small tipi ring feature 17, looking north. Note the apparent doorway on the south side of the ring. In the immediate background are features 18, left, and 19, right.

Figure 32: DjPb-2, small tipi ring, feature 7, looking west. In the background are features 37-45.

Figure 33: DjPb-2, small tipi ring feature 45, looking west over the ravine.

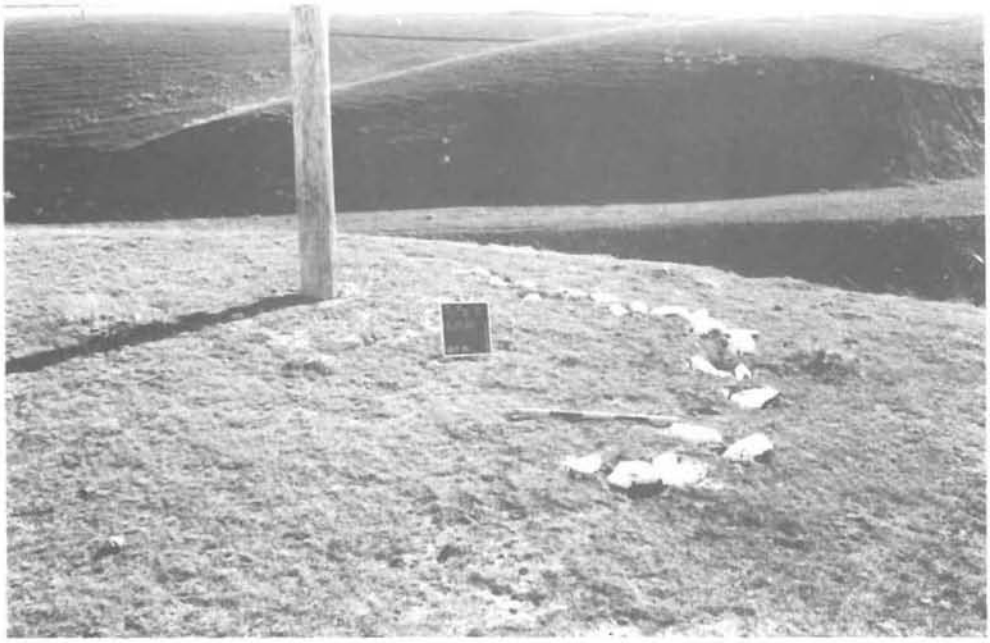

Figure 34: DjPb-2, small tipi ring feature 1, looking east. Note the portion of the ring obliterated by the placing of the power pole. The hill in the background is site DjPb-3.

Figure 35: DjPb-2, small tipi ring feature 19, looking north. Note the scattered rocks of a possible tipi ring inside the main ring. Immediately north of feature 19 are the remnants of the small ring feature 20.

Figure 36: DjPb-2, large tipi ring feature 22, looking north. Note the clear configuration of a small tipi ring inside the larger ring.

Figure 37: DjPb-2, large tipi ring feature 27, looking north. Note the remaining arc of the small tipi ring feature 26, immediately adjacent to the ring on the north side. Note also the density of surface rock to the north and east of feature 26.

Figure 38: DjPb-2, large tipi ring feature 8, looking west. Note the gaps in the ring; these make the positive identification of doorways impossible. In the background are features 39-45.

Figure 39: DjPb-2, large tipi ring feature 18, looking north.

Figure 40: DjPb-2, excavation of tipi ring features 2-5 is in progress. View to the north; figure 3 in centre foreground and feature 2 to the right.

Figure 41: DjPb-2, excavation of tipi ring features 2-5 has been completed. Feature 5 is in the background, feature 3 in the left foreground and feature 2 in the right foreground. Note the area to the right of feature 2, where erosion of the edge of the hill has obliterated the east side of the ring.

Figure 42: DjPb-2, small tipi ring feature 41, looking west; excavation complete. Hearth feature in north-east half of ring extends from ring centre to east wall. Ice picks mark boundary of hearth. The majority of rocks in situ are fire-cracked rock. Ring doorway in centre foreground.

Figure 43: DjPb-2, feature 41 (hearth) looking north. East/west section shows depth of rock and darkening of soil in hearth area.

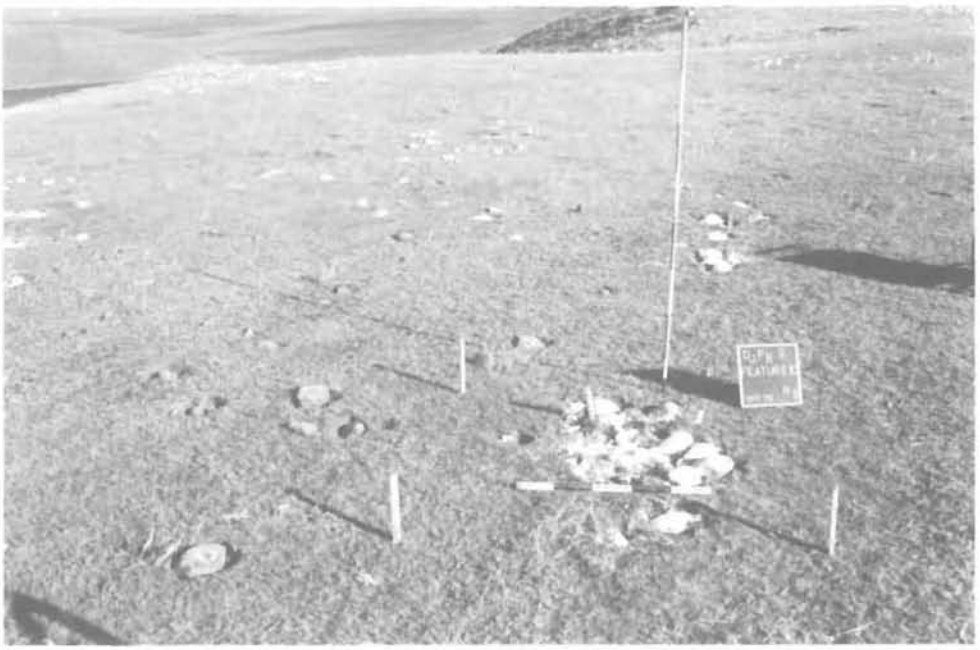

Figure 44: DjPb-2, feature 10 (exterior hearth), looking north, before excavation. Directly to the north of this feature is the rock alignment, feature 50.

Figure 45: DjPb-2, feature 9, a rock alignment, looking west. Feature 10 is in the background.

Figure 46: DjPb-2, feature 10, an exterior hearth. Excavation, here completed, has isolated the hearth. The trowel marks the position of artifacts.

Figure 47: DjPb-2, feature 10, the exterior hearth. The north-south section by the hearth shows the depth below surface of the hearth rocks and the surface character of the hearth.

Figure 48: DjPb-2, features 11, a rock pile and hearth in the foreground, and 12, a large tipi ring in the background, looking north. Note the rock pile in the immediate foreground, the rock alignment running just north of the stake and the small circular hearth just beyond and to the right of the stake. Note also the small tipi ring inside the larger one in feature 12.

Figure 49: DjPb-2, feature 14, looking north. The feature consists of a line of small rock piles.

Figure 50: DjPb-3, feature 1, a large tipi ring, during excavation looking north.

Figure 51: DjPb-3, feature 1, the large tipi ring with excavation complete, looking west. Note the doorway in the east side of the ring, in the left centre foreground. The view is taken across the ravine toward the south end of site DjPb-2.

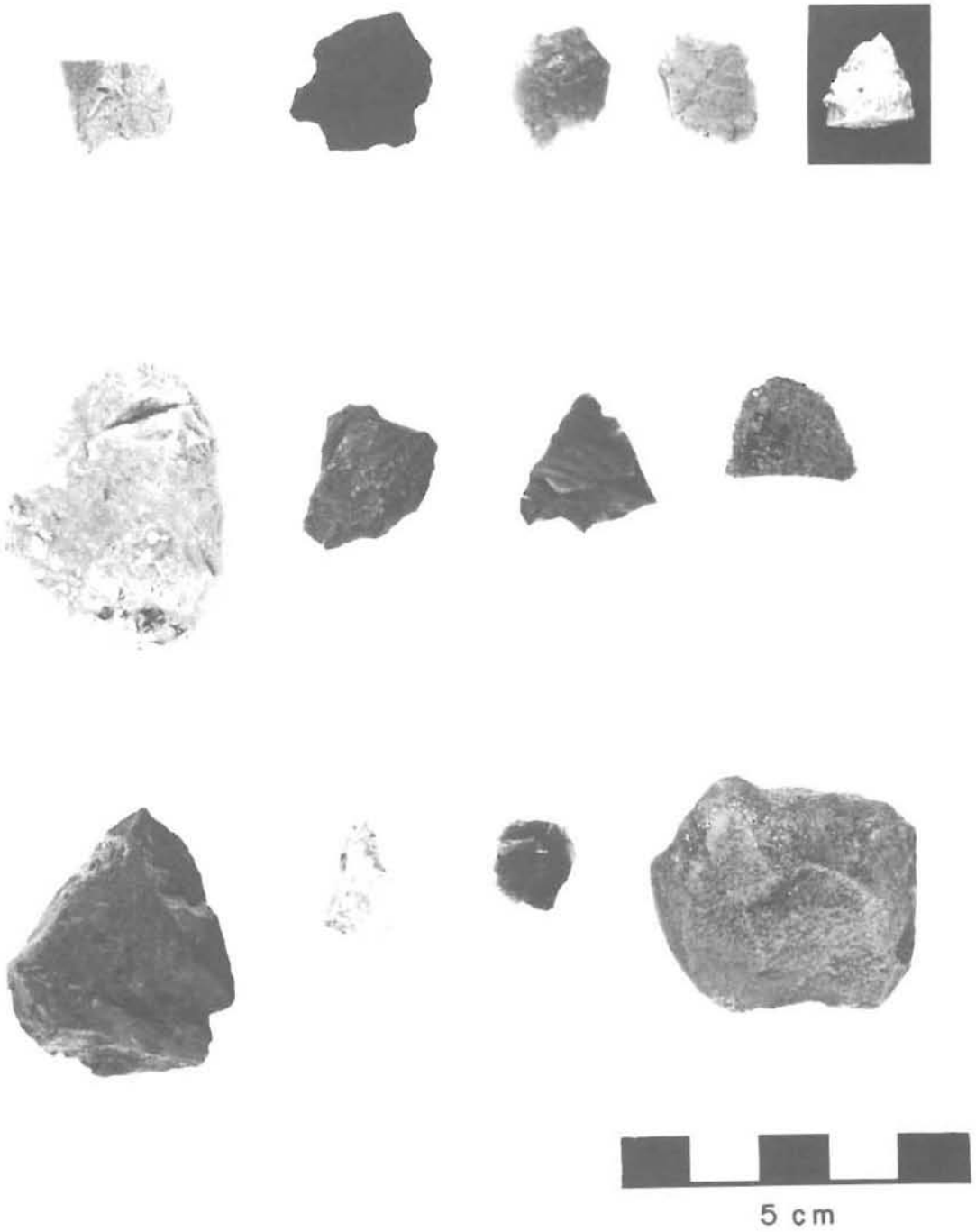

Figure 52: DjPb-2, small tool artifacts: (1) Plains Triangular arrow point; (2,3) Oxbow side-notched points; (4) broken point, unclassifiable; (5) uniface fragment; (6) side scraper; (7-9) retouched flake fragments; (10-11) core nuclei; (12-13) pièces esquilées.

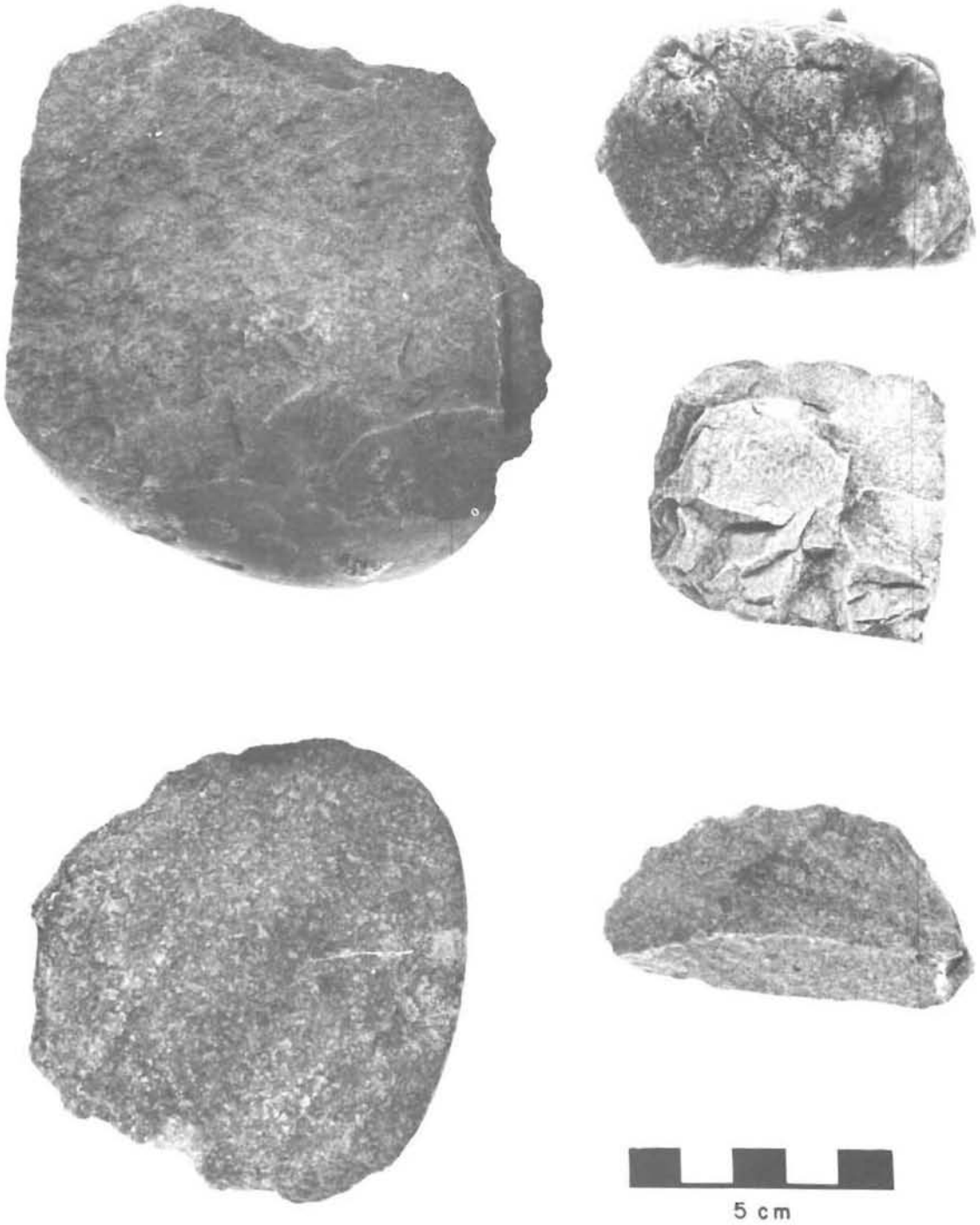

Figure 53: DjPb-2, artifacts, large tools: (1-5) cortical spall tools.

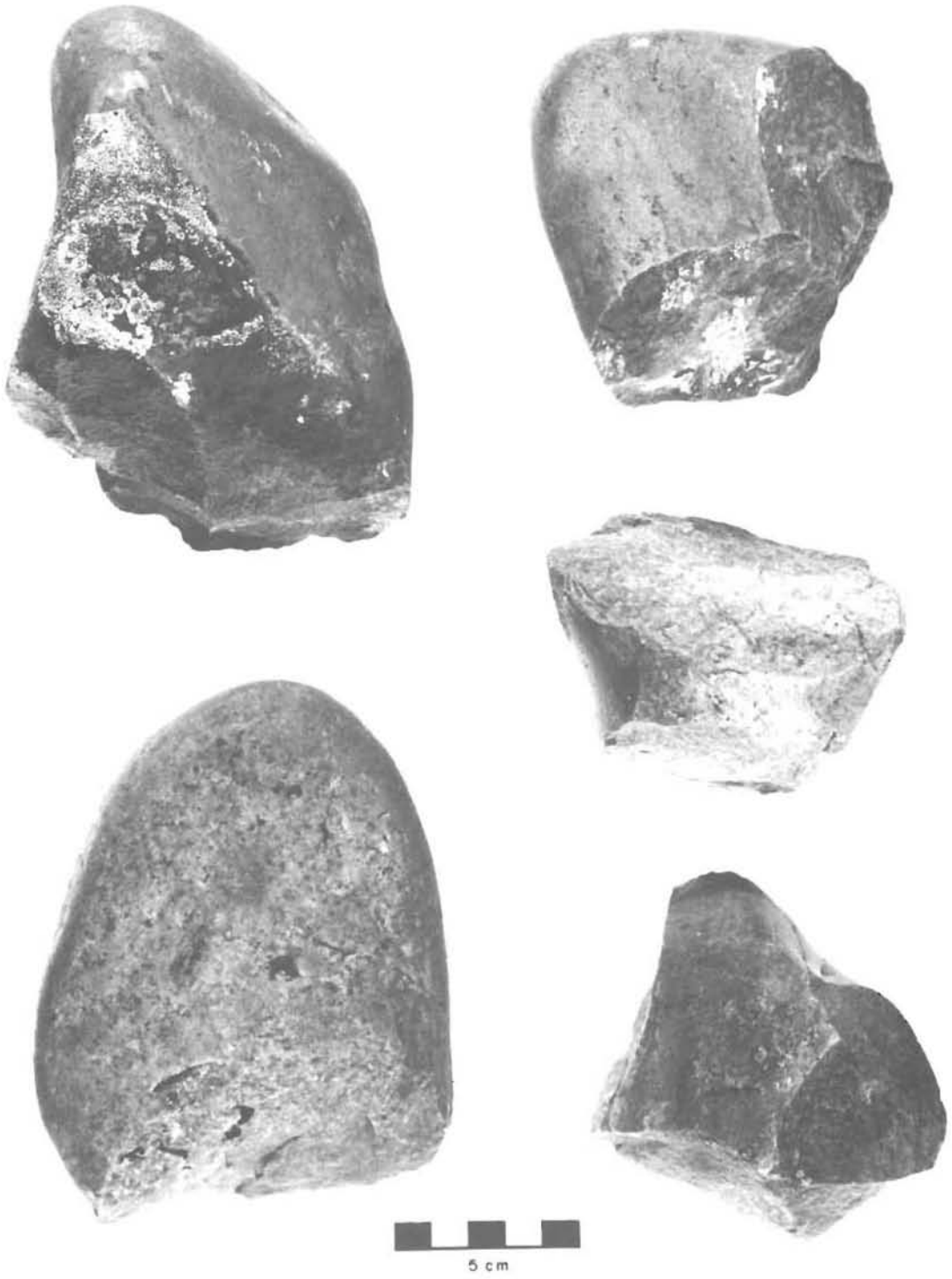

Figure 54: DjPb-2, artifacts, large tools: (1-3) uniface cobble choppers; (4-5) split-cobble core choppers.

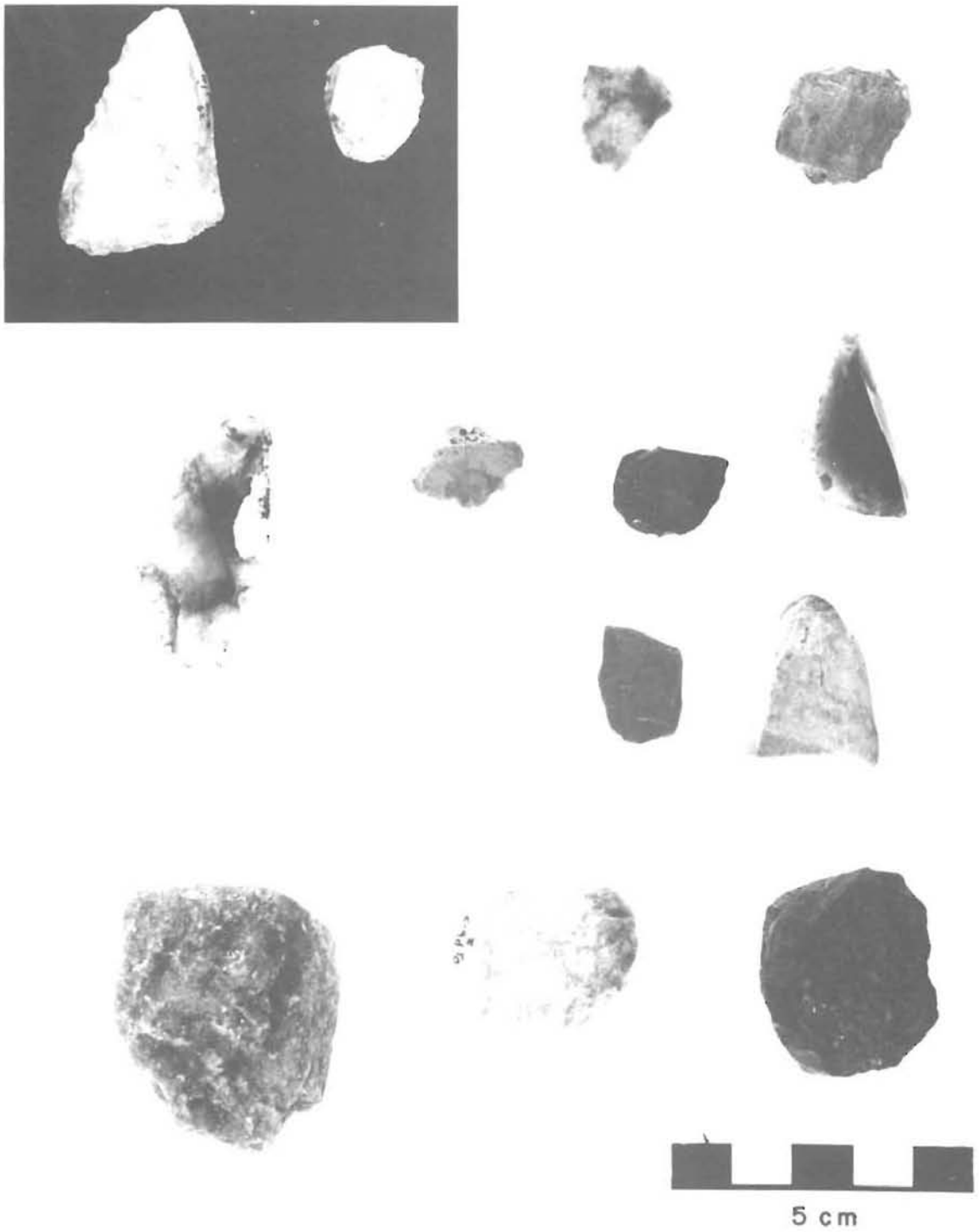

Figure 55: DjPb-3, artifacts, small tools: (1) biface fragment; (2) end scraper; (3) uniface fragment; (4) split-pebble end scraper; (5) flake knife; (6-8) retouched flakes; (10-11) pebble cores; (9, 11-13) flake and core pièces esquillées.