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THE MURRAY SITE: A LATE PREHISTORIC GAME DRIVE SYSTEM IN THE COLORADO ROCKY MOUNTAINS

By

James B. Benedict

ABSTRACT

The Murray site (5 BL 65) is a tundra game drive near the summit of Mount Albion, Boulder County, Colorado. Rock walls and lines of cairns at the site were used in driving large grazing animals from a broad saddle onto a narrow ridgecrest, where they were killed from ambush by hunters concealed in shallow, rock-rimmed pits. Geological, lichenometric, and radiocarbon dating show that the walls and pits were constructed between about 950 and 1000 yr. BP. Initial use of the system was by people related to the Hog Back Phase (Nelson 1971), who wintered in the Front Range foothills, and who hunted north and south along the continental divide in summer and fall. The site was later modified and re-used by an unidentified Late Prehistoric complex.

INTRODUCTION

The Indian Peaks region of the Colorado Front Range is a scenic blend of calendar-photograph peaks, ragged aretes, and deeply inset valleys, dotted with snowfields and small cirque glaciers, and liberally splashed with tarns, moraine-dammed lakes, and racing clearwater streams. Remnants of an old, high-level erosion surface, subdued and softened by hundreds of thousands of years of periglacial mass-wasting, contribute textural and topographic diversity to the alpine landscape.

To prehistoric man, the upland erosion surface was important for two principal reasons: (1) where east- and west-slope remnants met at the continental divide, they provided easy travel routes between the plains and high mountain parks; (2) in summer and early fall, the upland meadows supplied forage for grazing animals such as elk, bison, antelope, and mountain sheep, fueling a seasonal game-drive hunting and gathering economy that persisted along the continental divide for at least 5800 years (Benedict 1975a). The Murray site (5 BL 65) is one of an estimated fifty stone game-drive systems in a 35-km-long sector of the Front Range crest between James Peak and the southern boundary of Rocky Mountain National Park.

LOCATION AND ENVIRONMENT

The site is located above tree limit in the Boulder City Watershed, east of the summit of Mount Albion (Fig. 1). Its altitude varies from 3600 to 3720 m (11,800 to 12,200 ft.). The drive system consists of dry-laid stone walls and lines of cairns, used in conjunction with steep cliffs and grassy natural corridors

Figure 1: Winter view of Mount Albion, showing the location of the Murray site (arrow). South Arapaho Peak and Arapaho Glacier, in the left background, are partially hidden from sight by the crest of Albion Ridge. January 10, 1969.

to guide animals to a location where hunters were concealed in stone-rimmed pits.

A map of the Mount Albion region (Fig. 2) is helpful in visualizing the topographic setting of the Murray site. A broad saddle between the summits of Kiowa Peak and Mount Albion served as the collection area for several game-drive systems. The floor of the saddle has an area of approximately 0.4 km^2. Large portions of its surface have been disturbed by Neoglacial frost activity, but a sufficiently large area is vegetated to make the saddle an attractive grazing area for game. Steep cliffs surround the upland surface on all sides, and there are only two easily-negotiable routes to the valley floor below (Fig. 2). Both routes are blocked by game-drive walls and pits.

The most direct of the two routes provides the *raison d'etre* for site 5 BL 65. Departing the saddle in a southeasterly direction, it skirts the northern flank of Mount Albion, and follows the gentle crest of Albion Ridge to timberline. At a narrow point along the crest of the ridge, eastward passage is restricted by a group of low rock walls and lines of cairns, arranged so as to funnel animals into the kill area. Animals were shot from ambush on the ridgecrest, rather than being driven over the

cliffs that flank the ridge to the north and south.

Except for its strategic location and its commanding view of the surrounding countryside, the Murray site has little to offer in the way of amenities. Firewood must be carried to the site from lower elevations. Water is available on the ridgecrest during the early summer melt season, but later in the year must be obtained from snowbanks that persist in couloirs along the flanks of the ridge. The site is exposed to strong westerly winds, and there is little natural shelter.

STRUCTURES

The game-drive system, in its entirety, consists of 483 cairns, 13 stone walls, and 16 circular, semi-circular, or oval rock-walled pits. An aerial photograph showing the relationships of the structures is given in Figure 3.

Cairns

Two lines of widely-spaced cairns begin 270 m east of the summit of Mount Albion and extend to the northeast, parallel to the cliff edge, and 10 to 30 m back from the break in slope (Fig. 3); their course is sinuous, and they merge and cross repeatedly. Silhouetted against the southern skyline, the cairns are disturbingly unnatural — disquietingly human. Their purpose seems to have been to discourage animals from escaping the ridgecrest through couloirs to the south. Because the couloirs are precariously steep, and are filled with snow or unstable scree, a continuous wall was not considered necessary.

Twenty to fifty meters to the north, a less conspicuous line of cairns trends in the same direction (Fig. 3). Additional cairns are scattered throughout the kill area.

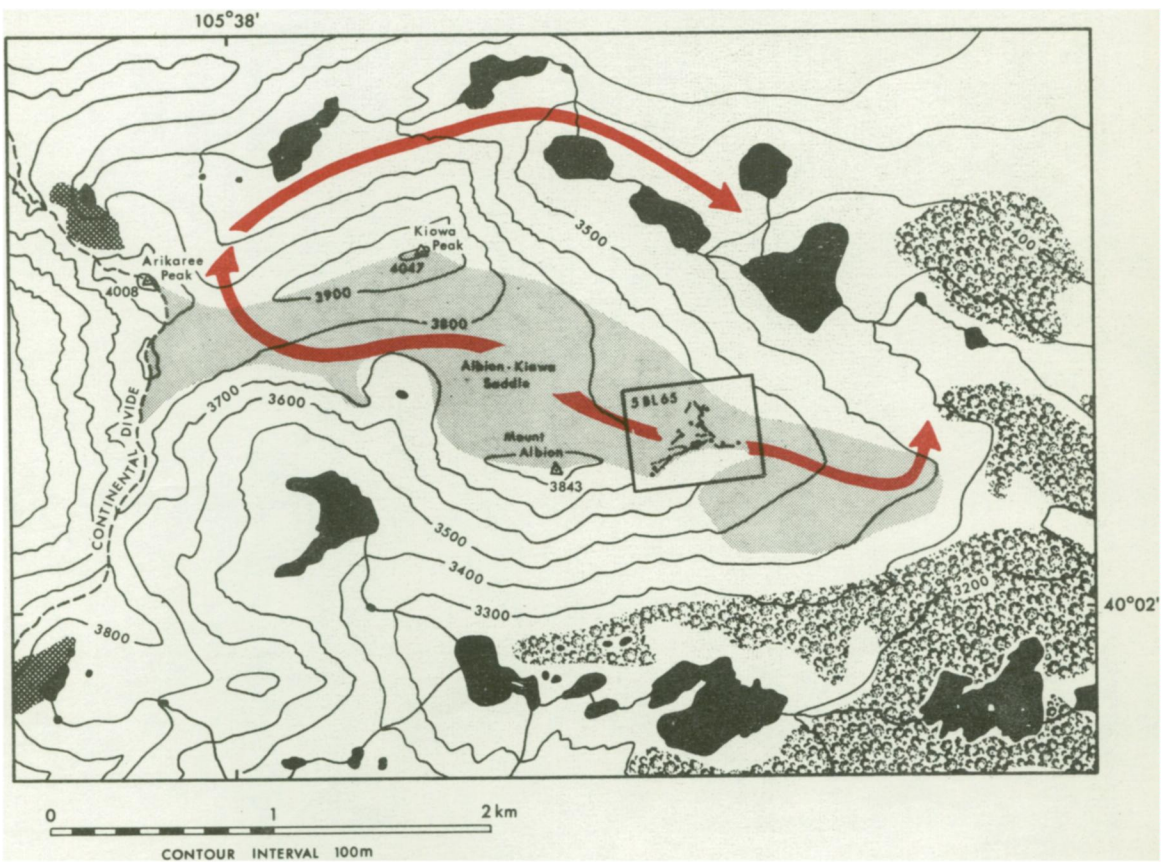

Figure 2: Topographic map of the Mount Albion area, showing the location of the Murray site (5 BL 65). Remnants of the upland erosion surface are lightly shaded, and glaciers are cross-hatched. Routes to timberline from the Albion-Kiowa Saddle are indicated with red arrows. A rectangle shows the approximate area included in figure 3.

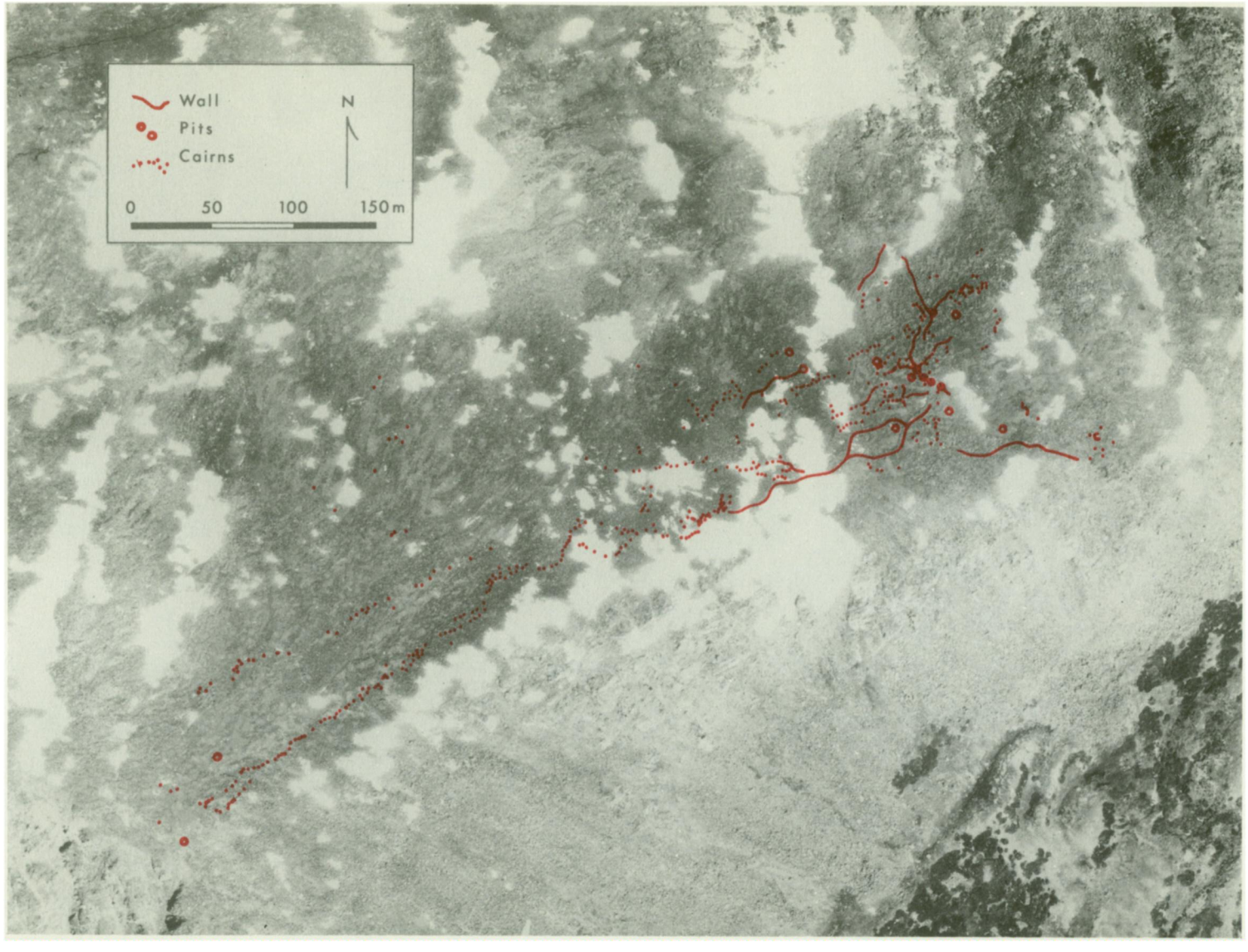

Figure 3: Vertical aerial photograph of the Murray site. Game-drive walls, pits, and cairns are shown in red. September 10, 1968.

Two types of cairns occur at the site. The most common is a simple pile of cobbles and small boulders, stacked to a height of two to five stones. A less common variety consists of a single elongate boulder, propped on end by smaller stones packed tightly around its base (Fig. 4). Cairns at the Murray site may originally have been decorated with blocks of sod or fluttering pieces of hide, much as the Copper Eskimos decorated their "*inukshuk*" cairns to give them a more human appearance (Rasmussen 1927).

Stone Walls

Where the ridgecrest narrows and the stone enclosures of the kill area first come into view, the cairn lines are replaced by a continuous wall of stones (Figs. 3 and 5). The wall is fresh and distinct, 0.4 to 1.1 m in width, and 0.2 to 1.0 m high, composed of cobbles and boulders loosely piled to a maximum height of seven or eight stones. Most of the stones are 10 to 70 cm in length. A heavy lichen cover is characteristic, and the junctions between stones are bridged by foliose lichen thalli. Quartz-biotite gneiss is the predominant rock type, although medium-textured granitic boulders also occur.

Size-frequency analysis of the *Rhizocarpon geographicum* community growing on the wall (Benedict 1967: 828) suggests that 70 percent of the original lichen cover was destroyed as a result of wall construction. This is higher mortality than I have found at other game-drive sites, supporting the idea that blocks of turf may have been piled along the crest of the wall. Alternately, stones may have been placed with their lichen-free surfaces facing outward to make the structure more conspicuous.

The wall extends to the northeast, parallel to the edge of the cliff, as a continuation of the lines of cairns. After a gap of several meters, other walls continue northward, almost totally blocking the passable portion of the ridgecrest (Fig. 5). Additional wall segments, generally rather short, are scattered throughout the kill area (Fig. 3).

Pits

There are sixteen pits at the site. Fourteen are located in the kill area, and two — perhaps related to a different drive system — are located near the upslope end of the major

Figure 4: Leaning-slab cairns along the eastern flank of Mount Albion. The structures are similar to the "inukshuk" cairns of Arctic Canada. By acting "in the capacity of a man", they reduced the number of people required to drive animals into the kill area.

cairn lines (Fig. 3). Six of the pits are physically connected to game-drive walls; the remainder are closely associated with drive lines, but are not physically connected.

The pits are circular, semi-circular, or oval in shape. Their rims are composed of stones and small boulders, loosely piled to a height of 0.3 to 0.6 m above the general ground surface (Fig. 6); stones removed in digging the pits were used to build the encircling walls. Most of the pits were dug in rocky areas, where stones could be easily removed without the aid of digging tools.

The pits are variable in size. Interior diameters range from 1.5 to 2.7 m, and exterior diameters from 2.6 to 5.2 m. Prior to excavation, the pits were 0.2 to 1.1 m deep, generally deepest on their uphill sides.

Pits that are filled with loose rock rubble are unvegetated except for lichens and an occasional alpine thistle. Pits that are filled with fine-textured slopewash debris support communities of tundra herbs dominated by *Kobresia myosuroides, Dryas octopetala*, or alpine cushion plants, depending upon local microenvironmental conditions.

STRATIGRAPHY

All pits at the site were tested, and eleven were excavated. Only three contained cultural

Figure 5: Low-level aerial-oblique view of the kill area at site 5 BL 65, looking eastward from the perspective of an approaching animal, and illustrating the relationship of the drive walls to underlying patterned ground. Pits discussed in the text are indicated with numbered arrows. September 9, 1968.

material. Because the drive system was built in an area of frost-patterned ground (Fig. 5), considerable textural variability was encountered below the occupation level. A rocky "pattern-border facies" and a finer-textured "pattern-center facies" were differentiated. Pits that were constructed in areas of openwork rock contained no recognizable occupation surfaces; if charcoal or cultural material were originally present, they must long since have filtered downward through interstices in the blocky debris.

The occupation surfaces in pits 1, 4, and 5 (Fig. 5) were marked by more-or-less continuous layers of charcoal-rich gravel, thickest near the center of each pit, and thinning laterally. The thickness of the charcoal varied considerably, due to its tendency to wash downward into interstices between stones in the "pattern-border facies" of the subsoil, and to the fact that several large boulders were too deeply embedded for the builders of the structures to remove. Charcoal was thickest (*ca.* 20 cm) near the center of pit no. 1.

With the exception of a single side-notched projectile point and flanged drill, all of the cultural material from the site came from the upper 2 cm of gravelly charcoal in pits 1, 4, and 5. Pit no. 1 contained 14 corner-notched projectile points, a multiple-notched point, an ovate bifacial knife, 100 small flakes, oxidized splinters of quartz-biotite gneiss, small pieces of partially burned spruce wood (identified by the U.S. Forest Products Laboratory), and a few chalky fragments of burned bone. The largest and best-preserved bone fragment was examined in thin section by Dr. Nils-Gustaf Gejvall (Osteological Research Laboratory, Museum of Natural History, Stockholm), who tentatively identified it as antler, probably of elk or deer. This is the closest we have come to a species identification at any Front Range game-drive system.

The charcoal layer in pit no. 4 contained 6 corner-notched projectile points, a side-notched point, 93 flakes, a few small scraps of bone, and brightly oxidized splinters of quartz-biotite gneiss. Twigs and needles of spruce (*Picea engelmanni*) and fir (*Abies lasiocarpa*) were abundant on its upper surface. The needles were unburned, but were stained black by prolonged contact with the charcoal. The reason for their presence in the pit is unknown. The absence of large pieces of wood argues against a substantial superstructure. More-likely possibilities include the use of green boughs for camouflage, to make the rocky floor of the pit more comfortable for the hunters, or — when there was no danger of alarming the animals — to create smoke for signalling, preserving meat, or repelling insects.

Cultural material from pit no. 5 included 2 corner-notched projectile points, a triangular end- and side-scraper, the tip of an ovate biface, and 4 small flakes.

The occupation surfaces in all three pits were overlain by 15 to 30 cm of openwork rubble, derived from collapse of the encircling walls. A side-notched projectile point was recovered from the rubble fill of pit no. 4, and a chalcedony drill was found in a crevice among the wall rocks.

AGE

Because of the possibility of undetected mixture within the charcoal-rich gravel, geological and lichenometric dating techniques were used to evaluate two radiocarbon ages from the site.

Figure 6: Pit no. 1, looking westward from the prespective of a waiting hunter. The mountain is Kiowa Peak (4047 m). To its left is the floor of the Albion-Kiowa Saddle. The heads of animals, silhouetted against the skyline near the left side of the photograph, would have given the hunters their first indication that the drive was underway. May 29, 1968.

Rock Weathering

At various times during the Holocene, medium-textured igneous rocks along the crest of the Front Range have experienced strong cavernous weathering, causing their exposed surfaces (but not their buried or overturned surfaces) to become scalloped and deeply pitted. Stratigraphic evidence (Benedict 1970: 206) suggests that cavernous weathering was last important between about 3000 and 1850 radiocarbon years ago, during the non-glacial interval that separated the Triple Lakes and Audubon stades of Neoglaciation (Benedict 1973: 592). On a simple presence or absence basis, cavernous weathering pits can be used as an indication of whether a rock surface was first exposed to weathering processes *before* or *after* the close of the Triple Lakes-Audubon interstadial.

Several granitic boulders on the wall at 5 BL 65 are pitted on their lower surfaces, but are smooth and relatively unweathered on their upper surfaces. This suggests that the stones were placed upside-down on the wall sometime following the close of the most recent interval of intense cavernous weathering. If the stones were part of the original wall, as seems likely, the structure must be younger than 1850 years.

Relationship to a Late-lying Snowbank

Part of the longest wall at site 5 BL 65 crosses a snow accumulation area, where it is exposed to view only during the late summer and early fall. A zone of sparse and relatively small lichens, concentric with the snowbank, indicates that the feature was larger and more persistent during the Audubon stade of Neoglaciation (*ca.* 1850-950 BP) than it is today. If the wall had been built during the Audubon advance, it would have skirted the margin of the enlarged snowbank; because it does not, its age is probably either greater than 1850 years, or less than 950 years.

Modification by Periglacial Mass-wasting Processes

Under present conditions, frost sorting and downslope soil movement are important in the Front Range only in specialized microenvironments (Benedict 1970). At several times during the past, however, these processes have been more generally effective, producing solifluction lobes and terraces and various kinds of patterned ground. An interval of rapid downslope soil movement, between about 1150 and 1050 radiocarbon years BP, affected local snow accumulation areas (Benedict 1970: 218). An earlier and more important episode of rapid movement, between about 3000 and 2500 radiocarbon years BP, affected drier Front Range sites, and was experienced in periglacial environments throughout the world (Benedict 1975b).

The longest stone wall at site 5 BL 65 crosses a group of inactive sorted nets, a kind of patterned ground described by Washburn (1973: 123-126). The slope is to the east at 10 to 15°. Although the patterns are elongated in the direction of steepest slope, the drive wall has not been deflected or seriously disturbed by downslope movement (Fig. 5), nor has moving soil accumulated against its upslope side (for photographs of a stone wall modified by downslope movement in North Wales, see Goodier and Ball 1969). Construction of the wall must therefore post-date the most recent episode of patterned-ground activity and rapid downslope movement on the slope, which — in some parts of the site — may have occurred as recently as 1150-1050 BP.

Lichenometry

Walls at the site were constructed using lichen-covered stones gathered from the borders of patterned ground in the surrounding area. Although some of the stones were placed on the walls with orientations that permitted continued lichen growth, others were oriented unfavorably, and many fresh rock surfaces were exposed. Because of the severity of disturbance, the modern lichen population growing on the wall is a composite of two communities, one older than the wall, and the other younger.

Statistical comparison of the size composition of *Rhizocarpon geographicum* communities growing on the longest wall at the site and in the borders of stone nets beyond the zone of disturbance suggests that the species has grown to a maximum diameter of 40 to 47 mm since wall construction (Benedict 1967: 826-829). Because the wall is a control point for the Front Range lichen-growth curve, the curve cannot be used to date the structure. However, in Arapaho Cirque, several kilometers to the southwest, *R. geographicum*

has grown to a maximum diameter of 49 mm on rock glacier debris with an exposure age of 1000 + 90 radiocarbon years (I-2562, Benedict 1973: table I). Extrapolation from the rock glacier locality suggests that the lichenometric age of the game-drive wall at 5 BL 65 is approximately 900-1000 years.

Radiocarbon Evidence

Charcoal from the floor of pit no. 1 was dated at 970 ± 100 BP (M-1542). The date is consistent with typological cross dating of small, corner-notched projectile points found in the pit, and with geological and lichenometric evidence suggesting a construction age slightly younger than 1000 BP.

Charcoal from the floor of pit no. 4 was dated at 670 ± 150 BP (SI-301). Corner-notched and side-notched projectile point styles were both recovered from the pit, and it is uncertain whether the date applies to re-use of the structure, or is an "average" age for several unrelated occupations. In either event, the date does not apply to wall construction or to initial use of the game-drive system.

CULTURAL MATERIAL

Excavations at the site produced 25 projectile points and projectile-point fragments, a small collection of cutting, scraping, and perforating tools, and 197 flakes. The material is available for study at the University of Colorado Museum, Boulder, Colorado.

Projectile Points

Group I (Fig. 7, *a-l*)

Tip: Sharp to very sharp.

Blade: Variable in shape and symmetry. The blade edges of at least 15 of the points are delicately serrated, with 4 to 7 serrations per centimeter. Four of the points are fully flaked on both faces. The remainder retain large unworked areas on one or both sides of the blade and stem, accounting for 5 to 40 percent of the surface area of the points.

Shoulders: Oblique to strongly oblique. Rarely abrupt.

Hafting Area: Unground to very lightly ground.

Stem: Expanding to slightly expanding, accounting for 19 to 29 percent of the total length of the point.

Base: Slightly convex to convex, rarely straight. One of the bases is lightly ground, and the remainder are unground.

Cross-Section: Bi-convex to plano-convex in transverse section. Bi-convex to concavo-convex in longitudinal section.

Dimensions: Length 17-26 mm, width 10-17 mm, hafting width 5-7 mm, thickness 2.4-3.9 mm.

Rock Types: Chert (11), chalcedony (7), petrified wood (2), jasper (2).

Remarks: Remnant striking platforms and hinge fractures suggest that at least three of the points were made with their bases at the distal ends of small, curved flakes.

Several of the points (Fig. 7, *g, j*) appear to have been resharpened after use as cutting tools. One may have been heated prior to resharpening, but it is uncertain whether or not heating was intentional.

The multiple-notched projectile point shown in figure 7, *l*, probably never existed as it is illustrated. The point was originally a corner-notched form with serrated blade edges, but it was burned, and its reverse side was spalled away. Attempts to repair the corner notches seem to have failed. The lower third of the point was therefore discarded, and side notches were added to the usable tip section. This too was subsequently broken. All 3 fragments were found in pit no. 1.

Group II (Fig. 7, *o*)

Tip: Blunt.

Blade: Ovate. Slightly asymmetrical. Flaking is restricted to fine marginal retouch of the base and notches, and to the removal of a few small flakes from along the blade edges. Approximately 95 percent of the original flake surface is unmodified.

Shoulders: Oblique.

Hafting Area: Lightly ground.

Stem: Expanding, accounting for 18 percent of the total length of the point.

Base: Slightly convex. Unground.

Cross-Section: Plano-convex in transverse section. Concavo-convex in longitudinal section.

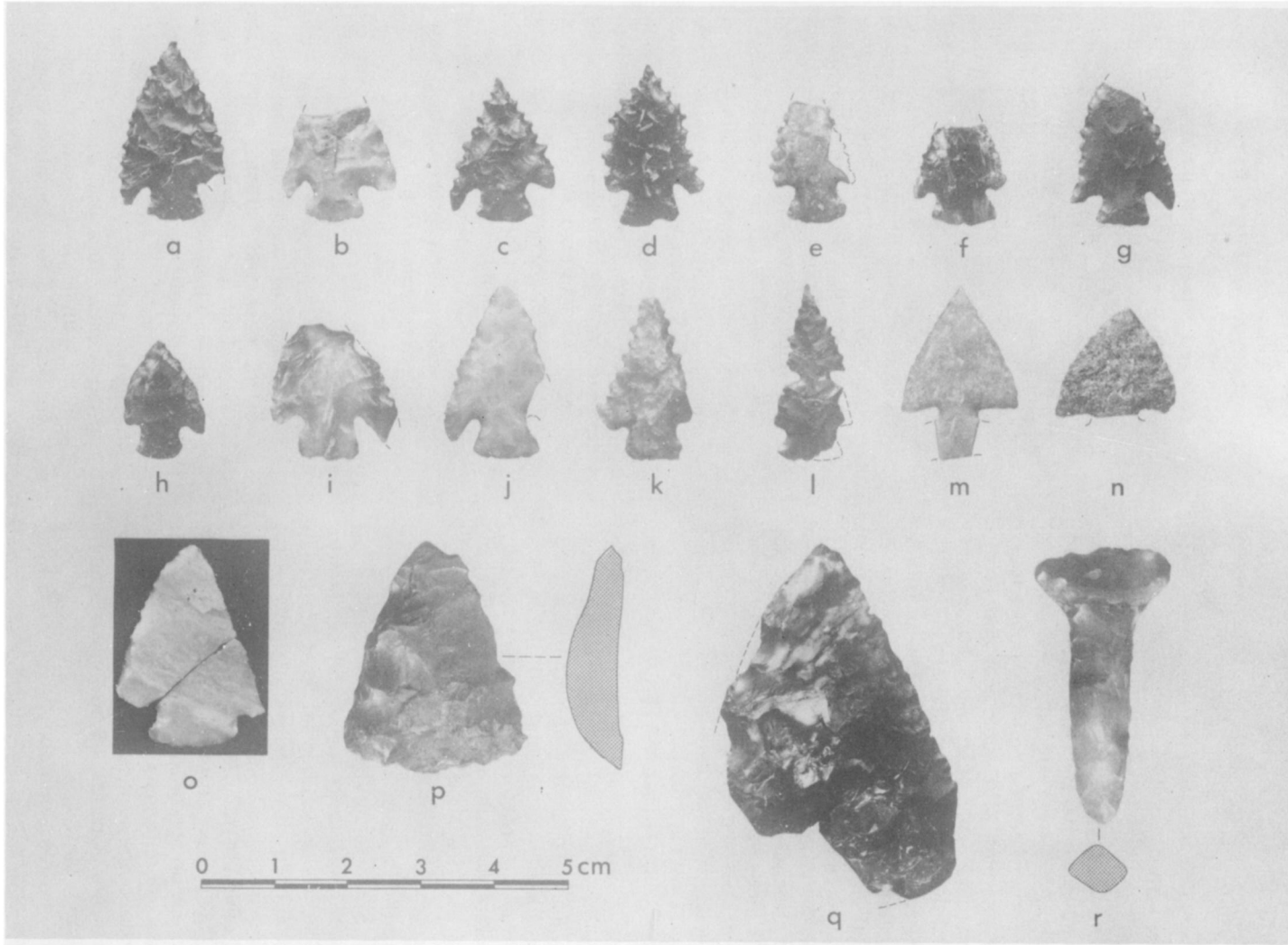

Figure 7: Cultural material from the Murray site. *a-l,* corner-notched projectile points; *m-n,* side-notched projectile points; *o,* edge-trimmed flake point; *p,* end- and side-scraper; *q,* bifacial knife; *r,* drill.

Dimensions: Length 28 mm, width 20 mm, hafting width 11 mm, thickness 2.2 mm.
Rock Type: Chert (1).
Remarks: Irwin and Irwin (1959:34) suggest that similar edge-trimmed flake points from the LoDaisKa rockshelter may have been used as toys by children. This seems unlikely at 5 BL 65, considering the nature of the site. The tool is possibly a hafted knife rather than a projectile point, although evidence of wear along its blade edges is minimal.

Group III (Fig. 7, *m-n*)
Tip: Sharp.
Blade: Ovate. Symmetrical to slightly asymmetrical. Fully worked on both faces.
Shoulders: Abrupt.
Hafting Area: Unground.
Stem: No data.
Base: No data.
Cross-Section: Bi-convex in transverse and longitudinal section.
Dimensions: Length 23 mm, width 16-17 mm, hafting width 6-7 mm, thickness 2.8 mm.
Rock Types: Quartzite (2).
Remarks: One of the points was lodged between stones in the rubble fill of pit no. 4, suggesting re-use of the pit after partial collapse of its encircling wall.

Chipped Stone Tools

A triangular end- and side-scraper (Fig. 7, *p*) was recovered from charcoal-rich gravel in pit no. 5. The dorsal surface of the flake is fully worked by percussion. Retouch of the ventral surface is limited to the removal of a few shallow flakes, mainly from along one lateral edge of the tool. Edge angles of 45° to 60° suggest a scraping function. All edges are lightly ground and battered by use.

Fragments of a severely fire-spalled bifacial knife, shown reassembled in figure 7, *q*, were found at the surface of the charcoal layer in pit. no. 1. The tool is made from a curved flake, and is fully worked on both faces. Edge angles range from 30° to 45°. Blade edges are worn by use. A fragment of a second biface was recovered from gravelly charcoal in pit no. 5.

A flanged chalcedony drill (Fig. 7, *r*) was found in openwork rubble along the northeast wall of pit no. 4. The base of the drill is thinned bifacially to a wedge-shaped cross section, and is lightly ground. Flake scars originating at both edges of the bit meet near its center to form a medial ridge. The tip and bit of the drill are ground and battered by use; faint striations at right angles to the axis of the bit suggest that the tool was used with a rotary, rather than a punching motion.

Chipping Debris

Most of the 197 flakes recovered from the site are small, reflecting the delicacy and fine pressure flaking of tools used at the site. Fifty-six percent of the 82 flakes with striking platforms show definite evidence of wear, suggesting detachment from the edges of use-dulled tools. Judging from the number of rock types present, at least 15 tools were resharpened at the site. There was no conclusive evidence of tool manufacture; decortication flakes, cores, and preforms were absent. Cryptocrystalline rock types predominate in the debitage, with quartzite accounting for only 3 percent of the total collection. Many of the flakes are spalled and crazed by exposure to heat. Two of the largest flakes show evidence of use after detachment.

CULTURAL RELATIONSHIPS

Small corner-notched projectile points with serrated blade edges are widely distributed in the foothills of the Front Range, where they are part of a tradition that Nelson (1971:12) has designated the "Hog Back Phase". Hog Back Phase components have been reported from foothills caves and rock overhangs, such as LoDaisKa (Irwin and Irwin 1959), Willowbrook (Leach 1966), and Hall-Woodland Cave (Nelson 1967), and from open sites such as Magic Mountain (Irwin-Williams and Irwin 1966), Van Bibber Creek (Nelson 1969), and Lindsay Ranch (Nelson 1971). All of the foothills components contain cord-impressed pottery, generally thought to be Plains Woodland; several also contain a small number of plainware sherds. Radiocarbon dates for Hog Back Phase components in the foothills range from 1290 ± 100 BP (GX-526, Leach 1966:46) to 970 ± 150 BP (M-1003, Irwin and Irwin 1961:114).

Comparable projectile points are found in timberline campsites on both sides of the continental divide, and at high-altitude game-drive systems such as the Flattop Mountain site, in Rocky Mountain National Park. A radiocarbon age of 1260 ± 95 yr. BP (I-3265) has been obtained for the Scratching Deer site, a Hog Back Phase campsite at timberline on the north flank of Albion Ridge (Benedict 1975c).

According to Nelson (1971:12), Hog Back Phase projectile points are common in surface collections from the South Park and Buena Vista areas, but decrease in abundance eastward from the mountain front.

Corner-notched projectile points with serrated blade edges occurred at all levels in the shallow fill of the Saguache rock shelter, east of the continental divide near Cochetopa Pass. The site was attributed to Ute hunters (Hurst 1939:59), primarily because of its location within the historic range of the Ute.

Huscher and Huscher (1943) recovered small corner-notched projectile points from circular stone enclosures on hilltops and mesa rims in southern and western Colorado. Examination of the Huschers' collections shows that some of the points are delicately serrated, and fall within the range of variation of the Hog Back Phase material; others are not closely comparable.

Corner-notched projectile points with serrated blade edges are illustrated for the Turk Burial site, in the southern Big Horn Mountains, Wyoming (Grey 1963: fig. 1), where they were associated with skeletal remains tentatively identified as Shoshonean (Birkby and Bass 1963:107). A radiocarbon age of 760 + 160 BP (A-583, Haynes *et al.* 1966: 18, revised in Haynes *et al.* 1967: 13) was obtained for human bone from the burial.

Cultural relationships beyond the limits of the immediate mountain area are poorly understood. Irwin-Williams and Irwin (1966: 210-211) attributed cord-marked pottery at LoDaisKa and Magic Mountain to the Parker Focus of the Plains Woodland Culture (Withers 1954: 1), but thought that the plain coiled pottery and serrated projectile points were a result of contact with the Fremont Culture of western Colorado and eastern Utah. Nelson (1969:102-105) considered the projectile points and cord-marked pottery to be Plains Woodland, but attributed the plainware to Shoshoean influences. Husted and Mallory (1967:226-229) suggested that a resident Shoshonean population, using the small, corner-notched projectile points, acquired cord-marked pottery through contact with southward-migrating Athabascan groups.

I am less certain than Irwin-Williams and Irwin (1966:210), Nelson (1971:11), and others, that the Hog Back Phase was a variant of the Plains Woodland Culture, although I do not doubt that it was influenced by contact with neighboring Woodland complexes. The distribution of Hog Back Phase components suggests a strong mountain orientation, and an economy based upon seasonal transhumance westward from the Front Range foothills. From an ecological perspective, it would have been infinitely easier for mountain-adapted Shoshonean people to acquire cord-marked ceramics by trade than for Plains Woodland potters to adapt to the unfamiliar environment and resources of the Rocky Mountain crest.

Re-use of the Murray site is suggested by (1) multiple, overlapping lines of cairns, with duplication in function; (2) a 300-year age difference between two radiocarbon dates from the site; and (3) the occurrence of side-notched projectile points stratigraphically higher than corner-notched points in pit no. 4. The cultural identity of this second group of game-drive hunters is unknown.

SUMMARY AND CONCLUSIONS

The Murray site (5 BL 65) is located above present tree limit in western Boulder County, Colorado. Lines of cairns and low stone walls were used in conjunction with natural topographic features to guide large grazing animals from a grassy saddle between Albion and Kiowa Peaks to the crest of Albion Ridge, where they were killed from ambush by hunters concealed in rock-walled pits. The system included 16 pits, suggesting that a minimum of 20 to 25 people would have been required for a full-scale hunt. Three of the pits contained cultural material, all of which was related to hunting and butchering activities, and to the repair of tools. Bone fragments were too small and badly disintegrated to yield information on butchering techniques; resharpening flakes from at least 15 cutting and scraping tools suggest that preliminary

butchering took place within the kill area. A lack of fuel, shelter, and water at the site implies that hunters who used the drive system probably commuted from timberline campsites in adjacent valleys. Snow-filled couloirs would have simplified the task of transporting the partially butchered animals back to camp, and pits in the kill area would have served admirably as meat caches following a successful hunt.

Projectile point styles suggest that initial use of the site was by people of the Hog Back Phase, who wintered in the foothills of the Front Range, and who hunted along the continental divide during the summer and fall. Because of their apparent preference for the mountain-foothills environment, it seems unlikely that Hog Back Phase hunters were related to Plains Woodland people from the east. Geological and lichenometric evidence is consistent with a radiocarbon age of 970 + 100 yr. BP for initial construction of the drive system. The drive was later re-used by an unidentified Late Prehistoric hunting party.

The Murray site is one of 35 high-altitude game-drive complexes recorded along the Front Range crest. Many others are undoubtedly present. The drive structures represent a significant expenditure of time and labor, invested in a communal hunting technique similar to techniques used for hunting caribou and musk oxen in Alaska, Greenland, and the Canadian Arctic. (Porsild 1920; Jenness 1922; Rasmussen 1927), but strikingly different in concept from the bison jumps and pounds of the Northwestern Plains. The choice of game-drive hunting techniques seems to have been governed less by cultural relationships than by environmental factors and the behavior patterns of the animals hunted.

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Dept. of Anthropology
Colorado State University
Fort Collins, Colorado 80523

Mailing Address:
Overland Road
Ward, Colorado 80481
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