A LATE PALEOINDIAN ANIMAL TRAPPING NET FROM NORTHERN WYOMING

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A net made of juniper (Juniperus *sp.) bark cordage and designed for capturing animals the size of deer or mountain sheep has been radiocarbon dated to late Paleoindian times. It was recovered in the Absaroka Mountains of north-central Wyoming and provides insight into prehistoric animal procurement strategies that did not require the use of stone artifacts.*

A net made of juniper (*Juniperus* sp.) bark fibers and suitable for capturing animals up to the size of deer and mountain sheep was discovered recently in northern Wyoming. The specimen dates to 8,860 radiocarbon years (6910 ± 170 B.C.; RL-396), and the discovery provides new information about late Paleoindian animal procurement practices at higher elevations. The net was recovered in the Absaroka Mountains of north-central Wyoming. Although preserved in its entirety, it is too friable to be unfolded. This limits access to details of the net's size, shape, construction, and use. However, other archaeological occurrences of nets and net fragments together with ethnographic observations allow an informed discussion of its probable use.

The probability that such an extremely perishable item of such great age would be preserved at all is extremely low. The net had been folded in antiquity and then presumably stored in a small cave in the highest rim of a prominent landmark known as Sheep Mountain on the eastern slopes of the Absaroka Mountains. Discovery of the net was accidental, and the circumstances of preservation were unique. Packrat (*Neotoma cinerea*) midden covered and protected the object, and there was no associated evidence of human occupation of the cave. Perishable materials, including net fragments of more recent age, have been recovered from other caves in the area (Frison 1962; Husted 1978). Older net fragments are known from the Great Basin (Jennings 1957), but previously reported complete specimens are of later age (Aikens 1970) and were made to trap smaller animals.

Sheep Mountain covers approximately 60 km² and lies between the confluence of the North and South Forks of the Shoshone River (Figure 1). It was named for the numbers of mountain sheep (*Ovis canadensis*) that wintered there in early historic times as they do to a lesser extent at present. The base of Sheep Mountain is a 1,700 m elevation, and the mountain rises to 2,440 m. The topography is extremely rough (Figure 2), and the entire area is currently excellent mountain sheep habitat.

Assuming that the Sheep Mountain net was used in procuring the larger terrestrial mammals that inhabit the area where it was found (e.g., *Ovis canadensis*), it is safe to conclude that, at this time, it is the oldest reliably documented archaeological example recovered in the Americas of a net designed to ensnare or retard the flight of such large animals. The presence and use of an animal procurement device such as this provides the basis for a model of late Paleoindian human subsistence especially adapted to the mountains, a subsistence adaptation distinct from that of contemporaneous groups who lived mainly by hunting bison and pronghorn on the open plains.

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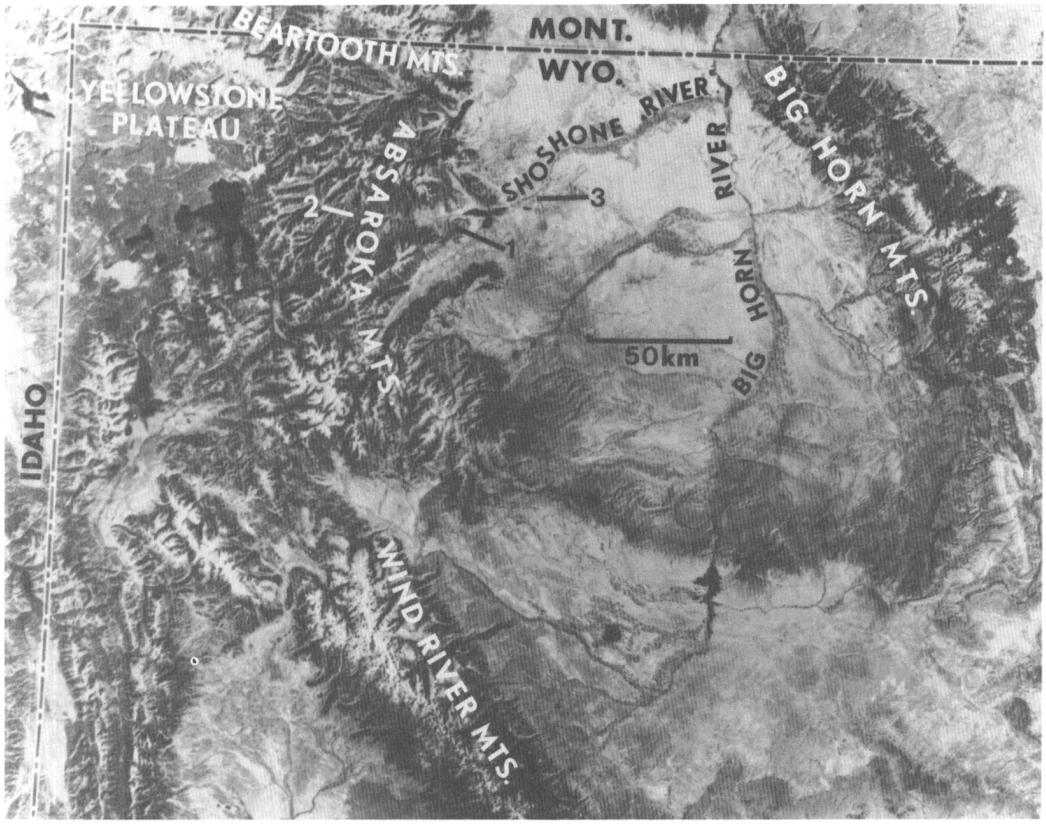

Figure 1. Satellite photo of northwest Wyoming with major physiographic features indicated. 1, Sheep Mountain; 2, Mummy Cave; 3, Horner Site.

NET TECHNOLOGY

Netting falls into a class of open-work fabrics built up by the repeated interworking of a single, continuous element with itself. According to Emery (1966) the structure of any single element fabric:

> . . . is based on the formation of rows (or courses) of "stitches" of varying types and degrees of complexity, into which successive rows are worked. It is classified according to the types of connection that the element makes with the previous row. The element is used in one of two ways: either it is the *free end* and the full length of the element is drawn through the appropriate opening, or a *loop* of that part of it closest to the working edge of the fabric.

The technology of net construction is complex, but the specimen from Sheep Mountain was produced via the free end process and falls into the "knotted loop" category, which is also called "knotted netting" (Andrews and Adovasio 1980). It consists of a quadrilateral mesh constructed of a series of sequential, regularly spaced, and fixed fishnet knots (Emery 1966).

The specimen is made of two ply, Z spun, S twist juniper bark cordage of various diameters (Emery 1966). To facilitate description of the net, the diameters of its cordage components are grouped into four analytical categories labeled simply "large" (4.10 mm to 5.20 mm), "medium/large" (2.65 mm to 3.00 mm), "medium/small" (1.10 mm to 1.65 mm), and "small" (0.70 mm to 1.00 mm). As found, the net was folded into a rough rectangular configuration measuring 21 × 38 cm (Figure 3). Mesh gauge varies from ca. 0.71 cm to 3.01 cm and is a function of cordage diameter. Three nearly straight, peeled sticks of an unidentified hardwood were incorporated into the net, and each had been sharpened to a point on one end. They are believed to have been related to the use

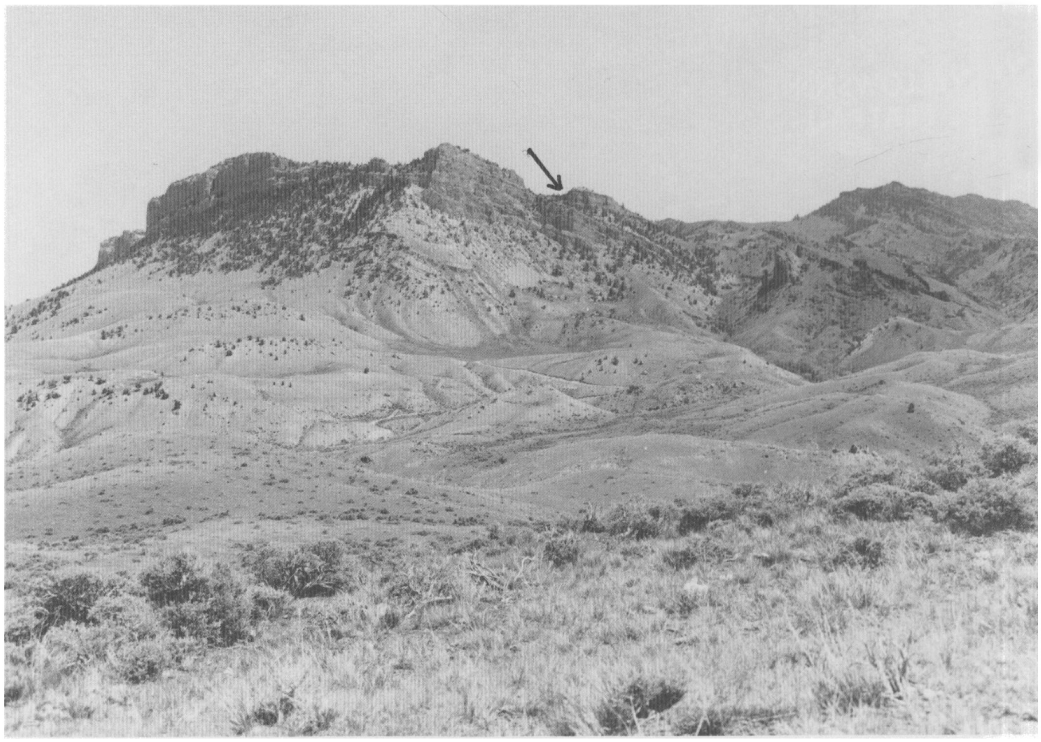

Figure 2. The north side of Sheep Mountain. Arrow points to the location of the net discovery.

of the net and not to its manufacture. The end of the largest stick was charred and was used to obtain the radiometric date.

FORM AND FUNCTION

The net would resemble the elongated, rectilinear appearance of a tennis net if it could be unfolded. The largest diameter cordage probably circumscribes the net and grades continuously into cordage of progressively smaller diameter toward the center. This would maximize the utility of the net while minimizing weight. Placing the smaller diameter cordage to the interior may have also helped prevent the net from sagging under its own weight. When arrayed, the net was apparently supported by at least three upright stakes. It was systematically folded for storage into its present configuration by first folding the sides toward the center of the long axis and then accordion-folding it from each end toward the middle. This reduced the risk of mesh entanglement and facilitated unfolding for use. Overall net size cannot be determined, but it is probably at least 50 m to 65 m long and 1.5 m to 2 m high. These estimates are based on the length and width of the exposed portions of the specimen multiplied by the apparent number of times the net had been folded.

A net is a highly portable item that can be adapted to the requirements of a number of landforms and vegetative covers. It is designed to entangle its prey when stretched across an area through which they normally travel. Animals also can be driven into the net. The animals lose their footing, become disoriented, and while struggling to free themselves, are vulnerable to hunters stationed at the net who are armed with clubs. In this situation the arrow, dart, or thrusting spear was neither necessary nor even the most efficient method of dispatching the animals, although ethnographically all of these weapons were used in conjunction with net hunting.

Most nets recovered from archaeological sites were designed to entrap or retard the flight of comparatively small animals such as jackrabbits (*Lepus* spp.). However, the Sheep Mountain spec-

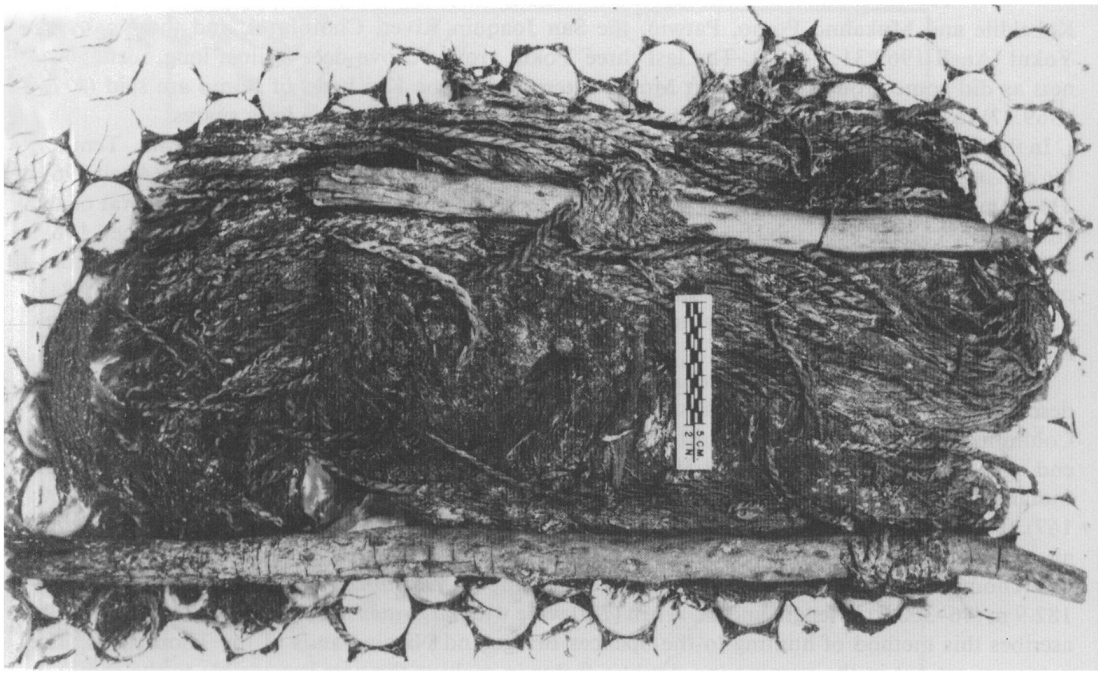

Figure 3. The Sheep Mountain net in its present condition resting on a bubble pack support. Approximately one-third of the net is missing from the left end.

imen is of much sturdier construction and probably was intended to be used in taking animals such as pronghorn, deer, or mountain sheep, especially those individuals within the size range of nursery herds. The average mesh size and cordage diameter of the Sheep Mountain net far exceeds the average for other archaeological net specimens described from North America. For example, typical archaeological specimens of small game nets from Hinds Cave in Val Verde County, Texas (Andrews and Adovasio 1980) average 0.29 cm in mesh diameter and 1.82 mm in cordage diameter. The mean Hinds Cave net mesh diameter falls well below the smallest Sheep Mountain mesh size. The mean cordage diameter in the Hinds Cave netting does overlap that of the smaller Sheep Mountain net cords; however, the larger Sheep Mountain netting cords are significantly greater in diameter than anything in the Hinds Cave assemblage. It is therefore reasonable to think that this specimen was indeed constructed to assist taking land animals of comparatively large size. In fact, the net is similar to ones used up to a decade ago in trapping mountain sheep for transplantation to other areas by the Wyoming Game and Fish Department at the Whiskey Mountain habitat area in northwest Wyoming. Prehistorically, nets probably would not have been as effective in trapping animals the size of elk or bison, but there are ethnographic reports that nets were used by some tribes in elk hunting (see below).

Although there are abundant references to net trapping of small game, particularly rabbits, documented ethnographic occurrences of the netting of larger land mammals are much less common in the North American anthropological literature. The practice (Figure 4) was apparently limited to certain tribes of California and to select interior Salish tribes of the Plateau in British Columbia (Anell 1969:36, 45). Although unreported for southern California tribes, the practice is documented for both the Central and Southern Sierra Nevadas. According to Driver (1937:61), two groups of Western Mono and two groups of Yokut took deer with long nets. Aginsky (1943:396) records that the Valley Speech division Yokut and perhaps also the Western Mono and Plains Miwok hunted deer using nets. Other documented California tribes known to have used the net in deer hunting include the Atsugewi, Foothill Maidu, Klamath, Nomlaki, Hill Wintu of Paskienta, Yokaia Pomo,

Kabeldile and Mukanno Pomo, Patwin, the San Joaquin River, Choinimni, and the Kocheyali Yokut (Anell 1969:31, 36–37). The last three Yokut groups drove deer against long, rectangular nets as did some groups of Western Mono. Interestingly, the Koi band of Pomo are said (Anell 1969:37) to have taken elk and even bear with nets used in combination with snares.

In the Western Plateau country where rabbit nets are sparsely represented (e.g., Umatilla, Tenino), the driving of large game toward hunting nets is reported for the Klikitat and Umatilla (Anell 1969: 31). Some ethnographic particulars are available on large-game net hunting among several of the groups noted above (e.g., the Hill Wintu of Paskienta, Miwok, Klamath and Nomlaki; Anell 1969: 36); full documentation of this hunting strategem, however, is rare. Don Tuohy (personal communication 1984) has commented that netting of larger land animals was also practiced in Baja California, but published ethnographic documentation of the practice in this area has not been located.

One of the few ethnographic accounts of net hunting for deer is given by J. A. Teit (1900) in his description of the Thompson Indians of the Fraser, Thompson, and Nicola river valleys of British Columbia (Teit 1900:167). The practice apparently had died out by the time of Teit's visit at the end of the nineteenth century (Teit 1900:248) for he speaks of it in the past tense. The Thompson Indians were known to the Hudson's Bay Company as the Couteau or Knife Indians (Teit 1900: 167). Tribe members on the Upper Thompson River had no knowledge of the Coast Salish, who also hunted deer (but not with nets) and among whom nets of any kind were few (Barnett 1955). The Thompson Indians' nets were made of Indian hemp (*Apocynum cannabinum*). They were 13.7–182.9 m (46–300 ft) in length and ca. 2.1 m (7 ft) wide with large meshes. Teit (1900:248) specifically ascribes this method of hunting to the Spences Bridge and Nicola bands of the Thompsons. The nets were set out in the evening (no doubt a factor in making the nets less visible to the game) in "open patches, between clumps of bushes" and across deer trails (Teit 1900:248). The next morning often found deer within the net corral; these were then shot with arrows by hunters who entered the enclosure. The hunters sometimes drove the animals already impounded by the enclosure into the nets to entangle them. Animals also could be driven into the net enclosure ". . . by men, women, and children who formed a large half-circle, and gradually drove towards the entrance of the net" (Teit 1900:248).

Net hunting for larger land animals was also particulary well-developed among the Okanagon who bordered the Thompson Indians on the southeast. Although nets were often used, the Okanagon hunting repertoire included a variety of other techniques such as "still hunting," hunting with dogs, driving to bay, driving to streams, drives into corrals, snaring, the use of calls and disguises, drives over cliffs, shooting from trees and pits, etc. (Teit 1930:248). The Okanagon hunted deer and sheep in the spring of the year; a longer (up to two months) late fall hunt was held for both of these animals in addition to elk. In mid-winter, a deer hunt took place, and a sheep hunt occurred in late winter (Teit 1930:243). When out from camp, hunting parties often carried nets used ". . .for corralling deer in bushy parts of the country" (Teit 1930:245). The net method was particularly effective for capturing white-tailed deer (*Odocoileus virginianus*), which purportedly could not jump as high as mule deer (*Odocoileus hemionus*) and were therefore more likely to be restrained by the nets (Teit 1930:246). Teit's (1930:245) account of an Okanagon deer hunt is an excellent description of how the net was employed:

> If fresh tracks were seen entering a clump of bushes, nets were set in the surrounding woods in the form of a half-moon, or sometimes, if it could be managed, in a circle. The shape and size of the corral varied according to the size of the area to be set, the arrangement of the bush patches, and the number of nets at hand. They were stretched across the open glades, the ends being fastened to trees and bushes. In places where the open ground was wide, and the net could not be drawn tight enough, the middle parts where the net sagged were held up and kept taut with light poles placed at intervals. Any space left open, owing to shortage of nets or because too inconvenient to be closed, was guarded by two men with bows and arrows, concealed one at each side. If no men were available, a woman lay down in the center of the opening, and if the deer approached, she jumped up and shouted, thus driving them back. The places where deer were most likely to run were netted first. When all was ready, one or two hunters entered the corral and started the deer out of the bushes. Sometimes this was done with dogs. The hunter let them loose on the fresh scent, and followed

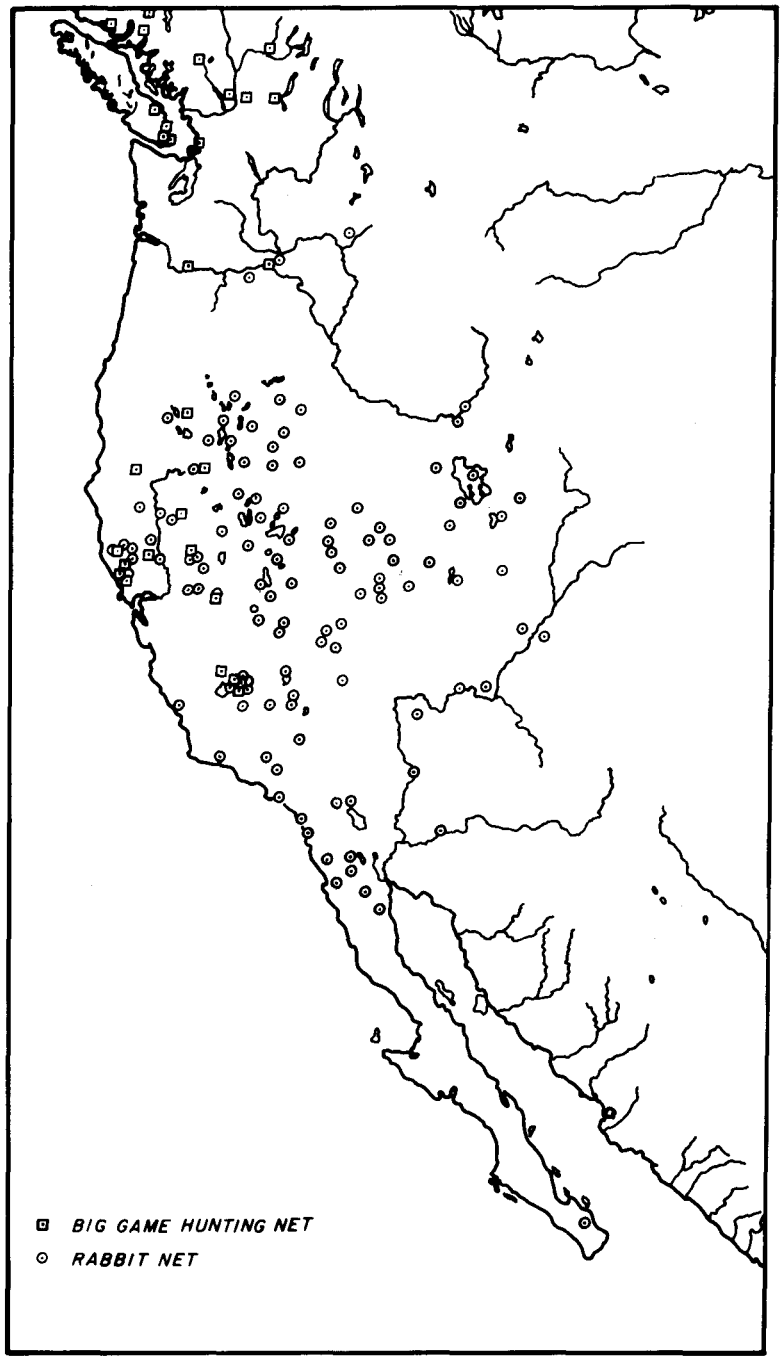

Figure 4. Distribution of rabbit hunting and big game hunting nets in western North America (from Anell 1969: 125, Map 7).

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Figure 5. Mountain sheep under drop net a few minutes after release of the net.

them on the run; or he simply let them go and remained at the opening of the corral. The other people hid here and there a short distance away. As soon as a deer was caught in the nets, they clubbed, speared, or shot it. In daylight, and when not too much rushed, deer sometimes did not attempt to pass through the nets, but ran around the corral until they came to the opening, where they were shot by the hunters.

ABORIGINAL MOUNTAIN SHEEP PROCUREMENT

There is evidence of at least 9,000 years of mountain sheep procurement in the immediate area where the Sheep Mountain net was found. Mummy Cave (Wedel et al. 1968), about 20 km west of Sheep Mountain (see Figure 1), has a nearly continuous stratigraphic record of human occupation dating to 9,000 years ago. The faunal remains in all human occupation levels are dominated by mountain sheep. Eighteenth-century mountain sheep trapping with procurement complexes constructed of timber and brush fences and reinforced with stones of various sizes leading into corrals and catch-pens is well-documented. Some of the fences, corrals, and catch-pens still exist but in badly deteriorated condition (Frison 1978). Still older procurement complexes are indicated by stone alignments, which are all that remain after the wooden parts deteriorated.

The feasibility of using nets to trap mountain sheep is demonstrated by the animal's behavior during present-day drop netting to capture them for transport to other areas. They violently resist the constraints of the net for a short period but then become calm. In most cases, they simply stand or drop to a sitting position (Figure 5). They periodically struggle for short periods of time but do so less violently than when the net was first dropped over them. The net allows the sheep to be restrained and avoids crippling. Mountain sheep are also more amenable to driving and herding than are mule deer or pronghorn. Their behavior in these situations is strongly reminiscent of domesticated Old World sheep.

The likelihood that aboriginals used clubs to dispatch mountain sheep can be demonstrated with reasonable certainty. A wooden object 77.5 cm long and 5.1 cm in maximum diameter was found

in a catch-pen associated with one of the late eighteenth-century communal sheep trapping complexes in the Absaroka Mountains. One end of the wooden object had deteriorated somewhat where it was in contact with the ground; however, its shape is reminiscent of a small baseball bat with a flange on the proximal end. The context in which this artifact was found strongly suggests that it was a club used for killing animals in the catch-pen.

Another probable club was found in the immediate vicinity of another nearby sheep trap. This specimen is made from 56 cm of the proximal end of the beam of a large elk antler and averages about 5.0 cm in diameter. The rough burr, or coronet, where the antler attached to the skull has been smoothed, and brow tine, which projected at the wrong angle, has been removed. The bez tine, 12.5 cm long and projecting at about a 90° angle from the beam, has been sharpened. Although the beam was chewed by rodents on the distal or handle end, there are remnants of a circular groove where the beam was removed from the distal end of the antler. The residue that collected on the handle during use of the implement is probably what attracted the rodents to this part of the artifact. This elk beam is believed to be a club, and in its worked form would have been ideal for dispatching animals constrained within the nearby catch-pen.

IMPLICATIONS FOR FUTURE STUDY

Prehistoric procurement of large ungulates was usually accompanied by the use of stone projectile points that are diagnostic of certain cultural complexes and which were also highly adaptive for their original purpose. Thus, interpretations of prehistoric hunting are based largely on the weaponry recovered in the context of bone beds in animal kill sites from Paleoindian to Late Prehistoric times. Bison kills are a prime example. Natural landforms, such as a knick points in arroyos, sink holes, and parabolic sand dunes were used as well as the classic jump or bluff over which the animals were stampeded (Frison 1974; Frison et al. 1976; Reher and Frison 1980; Wheat 1972). Corrals were also commonly built in prehistoric times, and in all of these cases the animals were killed with projectile points (Frison 1971, 1973). In each case, the imperishable segment of the weaponry assemblage, the stone projectile point, is diagnostic of the age and cultural complex, and the reconstruction of the hunting strategy is based largely on the evidence of the weaponry and the landforms involved.

The Sheep Mountain net provides evidence of another strategy in prehistoric animal procurement—the systematic exploitation of animals using a product of fiber arts technology. This is an adaptation that required no stone projectile points and under most conditions, has left no hint of its former existence or use. A hunting strategy of this nature required the cooperation of many individuals. The manufacture of nets was itself time-consuming; the Sheep Mountain specimen, for example, required the preparation of more than an estimated 2 km of two-ply cordage of various diameters. In use, two or three persons would have been needed to properly maneuver the animals, and at least two more would have been needed to tend the net. It is highly unlikely that more than one or two animals the size of mountain sheep could have been taken at any one time. However, the net could easily have been folded and taken to another location. A single net kept in good repair and stored in a safe place, such as the one recovered on Sheep Mountain, would have provided systematic access to a resident herd of mountain sheep by a multi-family human group and would have constituted an important segment of their year-round economy. The same procurement pattern was probably widely spread over the mountainous areas of the Rocky Mountains where mountain sheep were a major food source.

CONCLUSIONS

The Sheep Mountain net is, at present, the oldest known prehistoric net in the Americas designed to be used in taking larger animals, such as deer and mountain sheep. The context in which it was recovered suggests that mountain sheep were the primary target, although deer may also have frequented the area. In addition to these two species, an occasional jackrabbit is the only other animal that might have been trapped and that is known to have been found in the area over the past 9,000 years.

We know that the foothills and mountains of the central Rocky Mountains have been occupied by humans for at least 10,000 years (Frison 1976; Wedel et al. 1968), but the subsistence strategies of these people are incompletely known and understood. Plains bison hunters were within 25 km of the Sheep Mountain area at the Horner site (see Figure 1) at the same time period that the Sheep Mountain net was in use, but there is no evidence of the diagnostic weaponry (Jepsen 1953) of the Cody Cultural Complex on Sheep Mountain or at Mummy Cave. The present interpretation is that mountain-foothill cultural groups were separate and practiced subsistence strategies different from those used by the classic Plains bison hunters of the same time period. The Sheep Mountain net provides support for this concept and also offers new ideas about late Paleoindian animal procurement in the central Rocky Mountains. These studies are further enhanced by evidence of Shoshonean mountain sheep procurement in proto-historic times in the same general area and by observations of the behavior of mountain sheep in present-day trapping situations.

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SULPHUR SPRINGS WOMAN: AN EARLY HUMAN SKELETON FROM SOUTHEASTERN ARIZONA

Michael R. Waters

Sulphur Springs Woman, an early human burial, was recovered from alluvial deposits dated between 8,200 and 10,000 years before the present in Whitewater Draw, southeastern Arizona. These are the oldest human remains from the Southwest and are some of the oldest in North America. These bones provide data on the earliest inhabitants of the New World.

Sulphur Springs Woman was discovered in Whitewater Draw, a deep arroyo in the arid Sulphur Springs Valley, Arizona. This early human burial was recovered from site Arizona FF:10:14 (GP Sonora F:10:17) approximately 150 km southeast of Tucson, Arizona. This site was first investigated by Sayles and Antevs (1941) and artifacts from it were assigned to the Sulphur Spring stage of the Cochise Culture. My geoarchaeological investigations of site Arizona FF:10:14, to understand the geologic context and determine the age of the Sulphur Spring stage, led to the discovery of the skeleton in February 1983.

GEOLOGIC CONTEXT

Nine stratigraphic units are defined at site Arizona FF:10:14 and the stratigraphic relationships are shown in Figure 1. The unit designations follow those of Waters (1983, 1986).

The oldest deposit at the site is a late Tertiary to early Pleistocene age reddish-brown clay (unit A). On the eroded surface of the clay rests a fluvial stream-deposited gravel (unit Da) and sand (unit Db) containing disarticulated mammoth and camel bones. A radiocarbon date of 15,400 ± 700 years: 13,450 B.C. (AA-233) on dispersed charcoal was obtained from the base of unit Da and a charcoal sample from the base of unit Db dated 12,400 ± 530 years: 10,450 B.C. (AA-269). The values for these two dates were revised by the Arizona–NSF Regional Accelerator Dating Facility

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