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Another Great Basin Atlatl with Dart Foreshafts and Other Artifacts: Implications and Ramifications

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IN February, 1981, I received a telephone call from a resident of an eastern Nevada community who said he had found a whole atlatl, or dart-thrower. The man stated that he had been exploring for prehistoric sites in southern Nevada and he had discovered a cave on the flanks of a mountain range in northwestern Lincoln County (Fig. 1). While excavating a pack rat's nest within the cave, he had recovered a complete atlatl and several dart foreshafts, other wood and fiber artifacts, and some unidentified animal bones, plant parts, and so on. I expressed my interest in seeing the atlatl and other specimens, and arranged to meet with him and to borrow the collection for study in April, 1981. The collection subsequently has been returned to the finder.

The inventory consists of 40 artifacts, 13 mammal bones, and 16 botanical specimens, for a total of 69 items. The collection, of course, represents only what the finder perceived to be important while rummaging through the cave's deposits. He did note an apparent association between the atlatl and the dart foreshafts. Since neither the surrounding environment nor the immediate context of the artifacts and ecofacts as yet has been examined, very little can be said about the local archaeology. The closest

regional study of any magnitude or significance is Colin Busby's (1979) study of the prehistory and human ecology of Garden and Coal valleys.

The purpose of this paper then is to add new data on yet another distinctive Great Basin atlatl with attached weight and associated dart foreshafts, one of which still has a stone point attached to the shaft, and to explore the implications of such a find to studies of Great Basin culture dynamics. At the same time, the fallibility of the statistical support for the discriminant analysis which purportedly allows one to classify unknown projectile points as either arrowheads or dart tips (Thomas 1978) is examined. This paper, of course, builds upon extant studies of Great Basin atlatls (Hester, Mildner, and Spencer 1974), and other studies of atlatls known archaeologically and ethnographically in the New World (Grant 1979; Hester 1974*a,b*; W. Taylor 1966; L. G. Massey 1972; W. Massey 1961; Driver and Massey 1957; Metraux 1949; Cressman, Williams, and Kreiger 1940; Cressman, *et al.* 1942; Cressman 1944) and particularly in the Southwest (Kidder and Guernsey 1919; Guernsey and Kidder 1921; Guernsey 1931; Aveylera, Maldonado-Koerdell, and Martinez del Rio 1956).

Throughout this study I shall refer to the find spot of the collection as the "NC" site. This temporary designation should suffice

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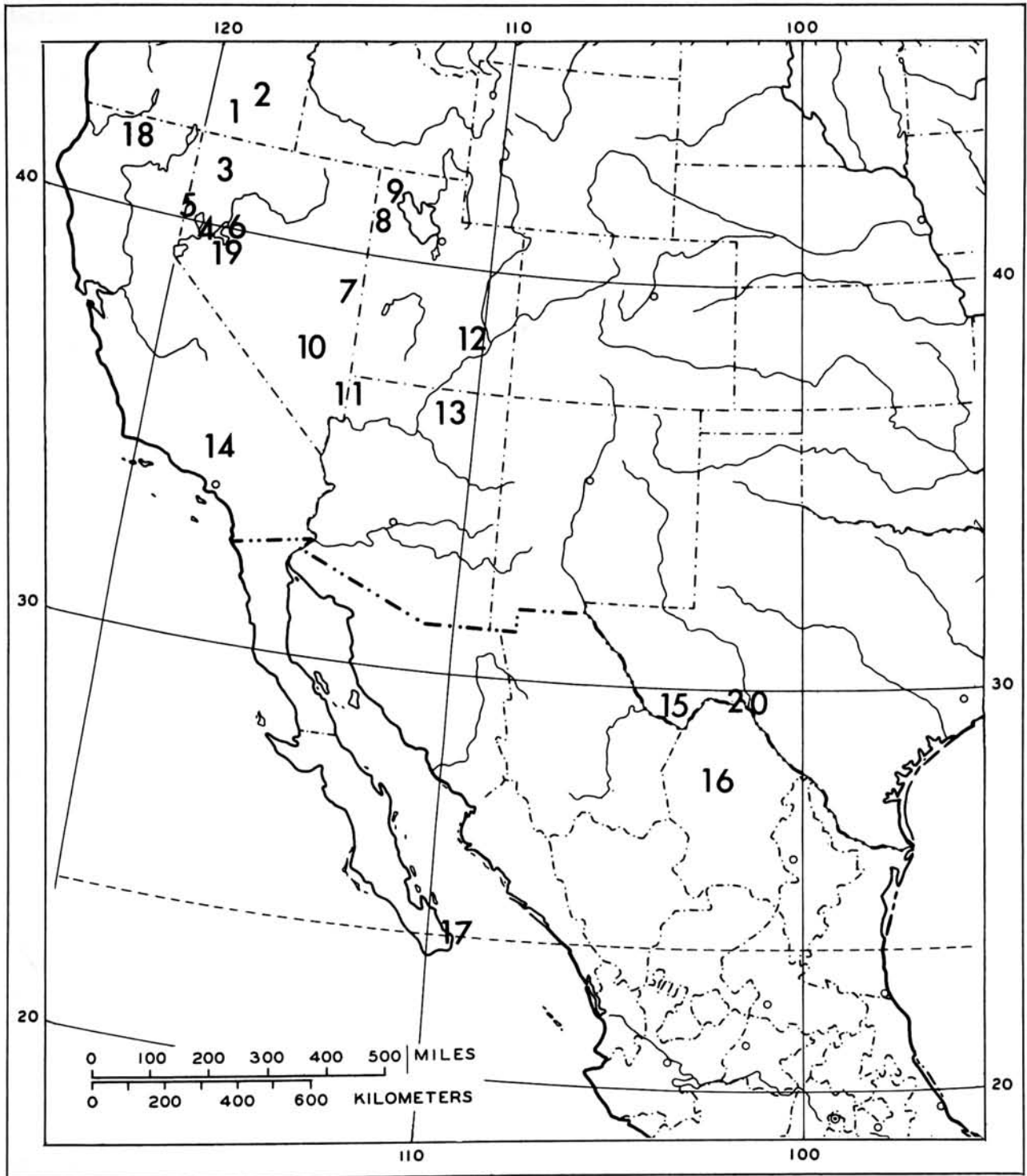


Fig. 1. Map of a portion of western North America showing areas mentioned and the distribution of atlatls and atlatl fragments in the Great Basin and northern Mexico, or in the peripheral Southwest (after Hester, Mildner, and Spencer 1974: Fig. 1). The sites shown are: (1) Plush Cave; (2) Roaring Springs Cave; (3) Last Supper Cave; (4) Nv-Wa-197, the Nicolarsen Site; (5) Kramer Cave; (6) Lovelock Cave; (7) Council Hall Cave; (8) Juke Box Cave; (9) Hogup Cave; (10) "NC" Cave; (11) Virgin Area; (12) Kayenta Area; (13) Cowboy Cave and 42Em70; (14) Santa Barbara and Newberry Cave localities; (15) Big Bend Area of Texas; (16) Coahuila complex; (17) Las Palmas culture, Baja California; (18) Potter Creek Cave, California; (19) Hidden Cave, Nevada; and (20) Lower Pecos caves, Texas.

until such time as the cave is visited personally and recorded using Smithsonian system designators. The "NC" designation conveniently refers to the initials of the finder whose full name, I believe, should not be disclosed at this time. I acknowledge "NC's" patience and trust in allowing me to complete this study, and can only hope the collection will find its way to a permanent repository in the state of its origin. One may also hope this experience has taught "NC" the importance of not disturbing or removing anything from deposits in caves unless professional help or supervision is available.

THE GEOGRAPHICAL REGION

In lieu of other control data it seems prudent to describe the environment in the vicinity of the cave. In general terms, the region may be described as typical Great Basin basin and range country of southeastern Nevada. The site is located in the vicinity of a high mountain range with elevations over 8000 feet (2438 m.). The range trends north-south, and is bordered by two valleys, one of which is structurally connected with pluvial White River (Hubbs and Miller 1948:50), and the other with modern drainages cutting through a semi-bolson and an adjacent range to drain into a modern playa. (To protect the identity of the site, both the mountain ranges and the adjacent basins will not be named.) Apparently the cave or rockshelter was discovered along the southwest flank of the mountain range at a moderate elevation where the youngest rocks, of Devonian age, occur. The mountain range is quite steep-sided, and contains a variety of other sedimentary deposits such as limestone, and volcanic and granitic rocks which have been thrust-faulted (Tschanz and Pampeyen 1970).

According to Houghton, Sakamoto, and Gifford (1975:69), the climate in the vicinity of the site is classified as a semi-arid mid-latitude steppe type, which, when rainfall

data are extrapolated, indicates a precipitation rate of four to eight inches per year, most of which falls in the winter. The temperature regime is continental, with the winter months averaging close to freezing or below, and with warm to hot summers.

At the elevation of the site the dominant vegetation has been mapped as part of the Northern Desert Shrub type which is dominated by sagebrush, other shrubs, grasses, and forbs. At lower elevations the blackbrush community, dominated by the dark-gray blackbrush (*Coleogyne ramosissima*) is interspersed with the desert shrubs. The Joshua tree (*Yucca brevifolia*) is commonly found throughout the community, as is the banana yucca (*Yucca baccata*), sagebrush (*Artemisia spinescens*), and a variety of other shrubs (Bradley and Deacon 1967: 213-218). At higher elevations where there is greater rainfall there is an open shrub woodland composed mainly of pinyon pines (*Pinus monophylla*), and junipers (*Juniperus osteosperma*). Prior to 1850, the mountain range served as habitat for a variety of mammals including the mountain sheep (*Ovis canadensis nelsoni*), now extinct there (McQuivey 1979: 13-14). The range of mountains is not considered critical habitat for desert bighorn sheep populations currently present in southern Nevada.

MISCELLANEOUS ARTIFACTS

The collection of 40 artifacts may be split into three classes. The first class is composed of chipped stone pieces, of which there are four types and a total of four specimens. Wood artifacts comprise the second class, of which there are eight types and 18 specimens, including a stone-tipped dart foreshaft. The third class, fiber artifacts, was also split into four types also with a total of 18 specimens.

Chipped Stone Artifacts

Only four chipped stone artifacts were retrieved from the "NC" site. Three of them

were made from a variety of obsidian which, when candled, has a banded gray, dendritic appearance. Since all of the obsidian pieces had this attribute and other surficial similarities, the immediate (and possibly erroneous) conclusion was that all material for these tools probably came from the same source. The fourth specimen was a dart point made from a mottled and banded brown jasper. It was attached to a hardwood dart foreshaft by means of wrapped sinew. The foreshaft and the hafting detail will be described more fully later. Description of the lithics, three bifaces and a uniface, follows, and they are illustrated in Fig. 2a, b, c, d.

The terminology used in the descriptive analysis follows Crabtree (1972) for the flint-working, and Heizer and Hester (1978) for the projectile point typology. While many Great Basin archaeologists prefer to use Thomas's "Key 1" system (1970: 27-60) to quantify and to classify Great Basin projectile point types, I prefer to follow Heizer and Hester (1978). As the latter typologists note, the "Key 1" system as promulgated by Thomas (1970) and his followers (Hatoff and Thomas 1976; Bettinger 1976; Thomas, Leventhal, and Williams 1976; Thomas 1981b) reproduces the accepted Great Basin morphological types (Heizer and Hester 1978:1) (*italics mine*). Since the "Key 1" system does not perform its function without great investments in time and funds, the typology I prefer follows Heizer and Hester's (1978) morphological groupings buttressed by technological analyses of flake removal patterns as codified by Crabtree (1972), Knudson (1979), and Green (1975), among others. Tucker (1980: 1-11) recently has summarized the arguments in favor of, and quantified an affirmation of, an intuitive Great Basin projectile point typology, and his position on this matter is not far from mine.

Obsidian Biface Core. The obsidian biface classified as a core is a bidirectional core of

small size and weight; 5.3 cm. long, 3.4 cm. wide, 1.5 cm. thick, and weighing 24.8 g. Both faces of the core exhibit overall flake removal, but one face shows an imperfect collateral flaking pattern, while the obverse face exhibits random, or non-patterned flake removal scars. Secondary flake removal attempts along the convex edges have resulted in step fractures being located closer to the edges than to the mid-line. The non-patterned chipped face contains one small area of the original cortex. The cortex suggests the parent material was an obsidian nodule. All edges of the core tool are quite sharp, seemingly lacking any type of obvious use wear. In fact, the only obvious "EU" (employable unit) (Knudson 1979:105), or segment of an implement individually defined, is located at the distal tip where a small retouched protuberance, possibly a functional graving tip, exists (Fig. 2a).

Ovate Keeled Flake Scraper. The second obsidian artifact to be considered is an ovate-shaped flake with one concave, and one convex, or keeled face. It is 4.4 cm. long, 2.3 cm. wide, and 1.0 cm. thick. It weighs 6.5 g., and is more a uniface than a biface (Fig. 2b). When viewed from the proximal end of the planar face the scraper does show retouching at both ends. The convex distal end also shows use wear that is obvious even when viewed through a low-power hand lens. The proximal end which contains a platform remnant has also been retouched creating the "EU" there. When the flake scraper is turned over to the keeled side, all of the retouching is confined to both convex edges of the implement. The retouching on one edge appears to be use-wear nibbling rather than purposeful secondary retouching.

Elko Corner-notched Point of Obsidian. The unhafted obsidian point is rather large, being 5.7 cm. long, 2.8 cm. wide, and 0.5 cm. thick, and weighing 5.9 g. The base is not deeply notched, but it shows considerable

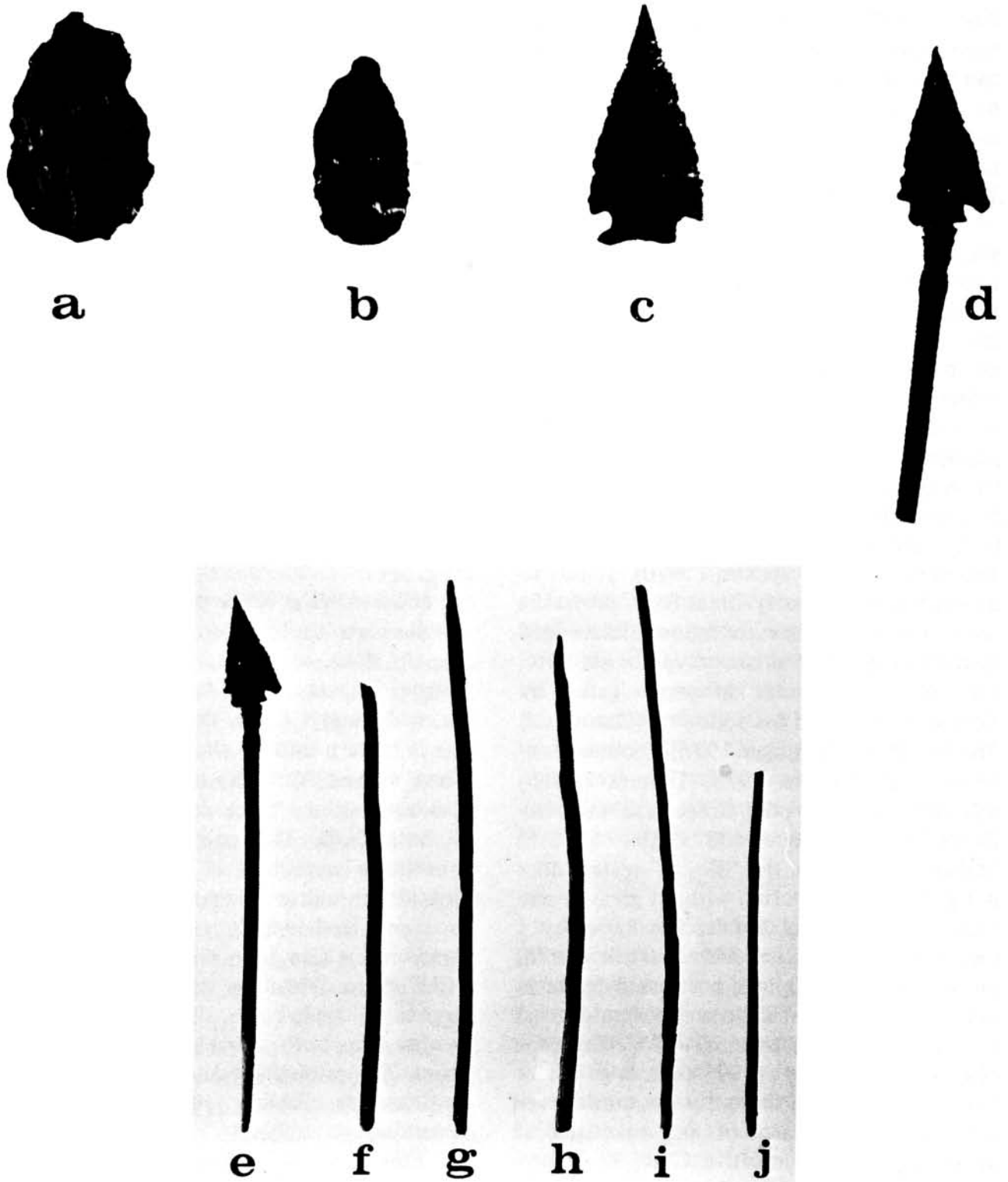


Fig. 2. Obsidian scrapers, projectile points, hafted Elko Corner-notched point, and hardwood foreshafts from "NC" Cave; *a*, obsidian biface core; *b*, ovate keeled flake scraper; *c*, Elko Corner-notched point; *d*, Elko Corner-notched point; *e*, the same point showing the full length of the foreshaft; *f-j*, hardwood foreshafts.

thinning scars from flake removals on both faces. Both faces of the blade also exhibit well-controlled diagonal thinning scars. These diagonal scars dominate the pattern on one face, and are evident on the other. This form of retouching has created partially serrated edges on the point blade. The point is illustrated in Fig. 2c.

Elko Corner-notched Point of Jasper. The single hafted dart point appears to be of the same style as the obsidian dart point, and thus may be classified as an Elko Corner-notched point, although it is somewhat smaller, and the base appears to be straight rather than concave. The point and foreshaft together weigh only 6.2 g., while the point itself is 4.2 cm. long, 2.2 cm. wide, and 0.5 cm. thick. Flake removals on both faces appear to be randomly placed, but well-controlled with some flake scars extending well beyond the mid-line. The point is illustrated as Fig. 2d, e.

The hafting material is slightly Z-twisted sinew which is wrapped in two places around the distal end of the foreshaft. The lower of the two sinew wrappings appears to have been used to bind together a split in the notched end of the foreshaft. Apparently the maker, while notching the distal end of the shaft, split the shaft and had to bind it together. Either that had happened, or the shaft had split at the notch through use, and it was mended prior to rehafting and reuse. The upper sinew binding is also slightly Z-twisted and is a one-ply piece which binds the point to the foreshaft.

It is interesting to note at this time that the base of the atlatl dart which is 1.4 cm. wide exceeds the diameter of the dart, 0.5 cm., by 9 mm. This discrepancy indicates that some neck widths of dart points may not be directly related to shaft diameters (Corliss 1972).

Wood Artifacts

The Hafted Foreshaft. The unidentified

hardwood foreshaft hafted to the jasper Elko Corner-notched point is rather short, being only 19.7 cm. long, and varying in diameter from 0.6 cm. near the distal end to less than 0.3 cm. at the proximal, or pointed end. As previously mentioned, the foreshaft was notched at the distal end to receive the stone point. In addition to being split longitudinally at the notched distal end, one of the lateral halves adjacent to the notch is also split. Extending from a point just below the sinew binding to a point about 3.4 cm. from the proximal end, the hardwood mid-shaft area exhibits painted decorations. The embellishments appear to be black spirals ranging from 0.3 to 0.6 cm. in width. Although difficult to discern, the final spiral near the tapered end of the foreshaft appears to have been painted with red pigment. The foreshaft is shown in Fig. 2d-e.

The distal end of the hafted foreshaft is the tapered end of the foreshaft that fits into the usual cane mid-shaft of atlatl darts. The beveling of the distal end appears to have been accomplished by rotating the piece while holding a sharp cutting edge, such as might be provided by one of the obsidian scrapers, against the wood. Many hardwood foreshafts have distal ends that are rounded or blunted instead of being pointed (Hester, Mildner, and Spencer 1974: Fig. 18b).

Other Presumed Foreshafts. There are five other slightly tapered or pointed hardwood sticks that may well have been intended for use as foreshafts, as all have appropriate diameters and lengths commensurate with those of the hafted foreshaft. All have one pointed or carbonized end, and one blunted end, and all have been partially peeled. The five presumed foreshafts range in length from 21.0 cm. to 13.8 cm., and in diameter from 0.4 cm. to 0.8 cm. They are illustrated as Fig. 2f-i.

Close inspection reveals all of the foreshafts have blunted tips, and they may well

have been designed as foreshafts never intended to have stone points on their tips. Their desiccated state makes identification of the plant species used difficult, but they appear to be *Salix* spp. (2), and *Sarcobatus vermiculatus* (3). Such materials, willow and greasewood, were commonly used to make atlatl foreshafts in the Great Basin (Dalley in Aikens 1970:159; Hester, Mildner, and Spencer 1974).

Other Worked Sticks. There are five other cut or carved wooden sticks, and a bent and tied twig in the collection. They are illustrated in Fig. 3a-f. Greasewood (*S. vermiculatus*) and willow (*Salix* spp.) are represented. While all of these sticks are artifacts or implements, suggestions as to their function are offered for only two of the specimens (Fig. 3c, e). The tabular artifact (Fig. 3c) has a black dot on one face, and it may very well be a wooden die, or gaming counter. The peeled withe (Fig. 3e) may well have been part of a snare. The bent and tied twig of triangular shape (Fig. 3f) has several counterparts in the eastern Great Basin, and they were reported at Swallow Shelter, Utah (Dalley 1976:96).

Snare Parts. Two wooden sticks with cordage still attached have been identified as parts of scissors snares. The larger of the two is made of greasewood (*S. vermiculatus*), and is 10 cm. long and 0.8 cm. in diameter (Fig. 3g). Attached to one end is a piece of cordage, broken and repaired many times by tying the broken ends together with groups of overhand knots. The cordage itself is two-ply S-twisted, single-ply Z-twist milkweed (*Apocynum*) fiber.

The second cord-wrapped piece is shorter and stouter than the first, and it is tapered at one end (Fig. 3h). It is a willow stick (*Salix* spp.) 7.5 cm. long and 0.8 cm. in diameter. The bark is left on the piece, and one end of the twig was grooved to receive the cordage. The cordage is two-ply S-twist, single-ply Z-twist *Apocynum* fiber tied with what was

once a granny knot, but now appears to be a single overhand knot. The end opposite from the cordage is V-shaped and it appears to have been made to fit into a slot of some sort. The tapering end is 1.8 cm. long. Janetski (1979: 306-321) has recently reviewed the distribution and implications of small snares in the Desert West.

Promontory Peg. Another useful and diagnostic artifact type is the Promontory peg. H. G. Wylie (1974: 46-47) has produced the latest summary of the distribution and significance of this artifact type in the Desert West. The specimen from "NC" Cave is 4.1 cm. long, and 0.8 cm. in diameter (Fig. 3i). It was made in the usual fashion by first making a deep transverse cut in a twig and then splitting away the pointed end. The pointed end is 2.5 cm. in length, and the whole piece shows some fire blackening.

Warp-face Twined Basketry Fragment. One fragment of a warp-face twined basket was present in the collection. The piece is 4.5 cm. long, and 13.3 cm. wide (Fig. 4a). Warps are five in number, and they are peeled willow (*Salix* spp.) twigs 0.3 to 0.6 cm. in diameter. They are held together by double ply, S-twisted, unpeeled, split-twig wefts spaced at 1.5 cm. intervals. The fragment is apparently a selvage piece as the wefts are looped around one of the end warps, and they slant down to the left. Warp-face baskets are commonly used as cradleboards in the ethnographic Great Basin, but they are also used for a variety of other purposes.

Digging Stick Tip. One wood artifact is tentatively identified as a tip to a digging stick. The piece is 2.8 cm. long, 3.2 cm. wide, and 1.2 cm. thick (Fig. 4b). The pointed tip shows considerable scuffing wear, and linear striations from repeated contact with the earth. The distal end has been burned, and then cut. While the use is inferred as a digging stick, it possibly was used as a shinny stick. The hardwood it is made from is unidentified.

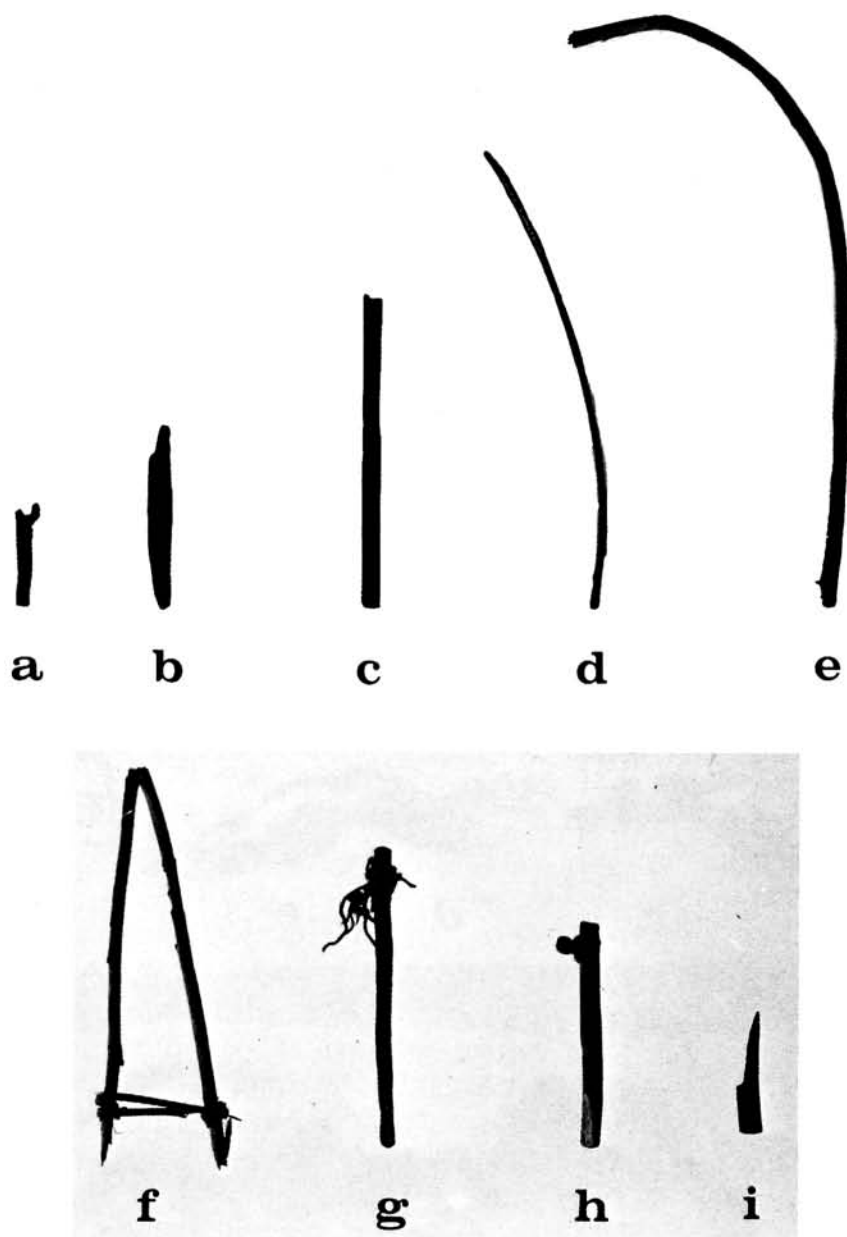


Fig. 3. Worked wooden artifacts from "NC" Cave; *a*, notched greasewood stick; *b*, rounded stick, use unknown; *c*, wooden die or gaming counter; *d-e*, bent willow (*Salix* sp.) twigs; *f*, tied twig; *g-h*, wooden snare parts; *i*, Promontory peg.

A similar complete specimen was recovered in Painted Cave (Haury 1945: 50-51, Pl. 23*a*), and it was called a scraper.

THE ATLATL

As mentioned previously, one complete atlatl or spearthrower was recovered in the cave (Fig. 5*a-e*; Fig. 6*a-e*). Spearthrowers are widely distributed throughout the world

(Krause 1902, 1905; Krieger in Cressman, Williams, and Krieger 1940; Grant 1979) and in the Desert West (Mildner 1974). Modern replication studies and other important summary data on Great Basin atlatls have been published by Hester, Mildner, and Spencer (1974). The latter authors follow Krause's typology for classifying atlatls on the basis of the presence of both features. Thus, a "male"

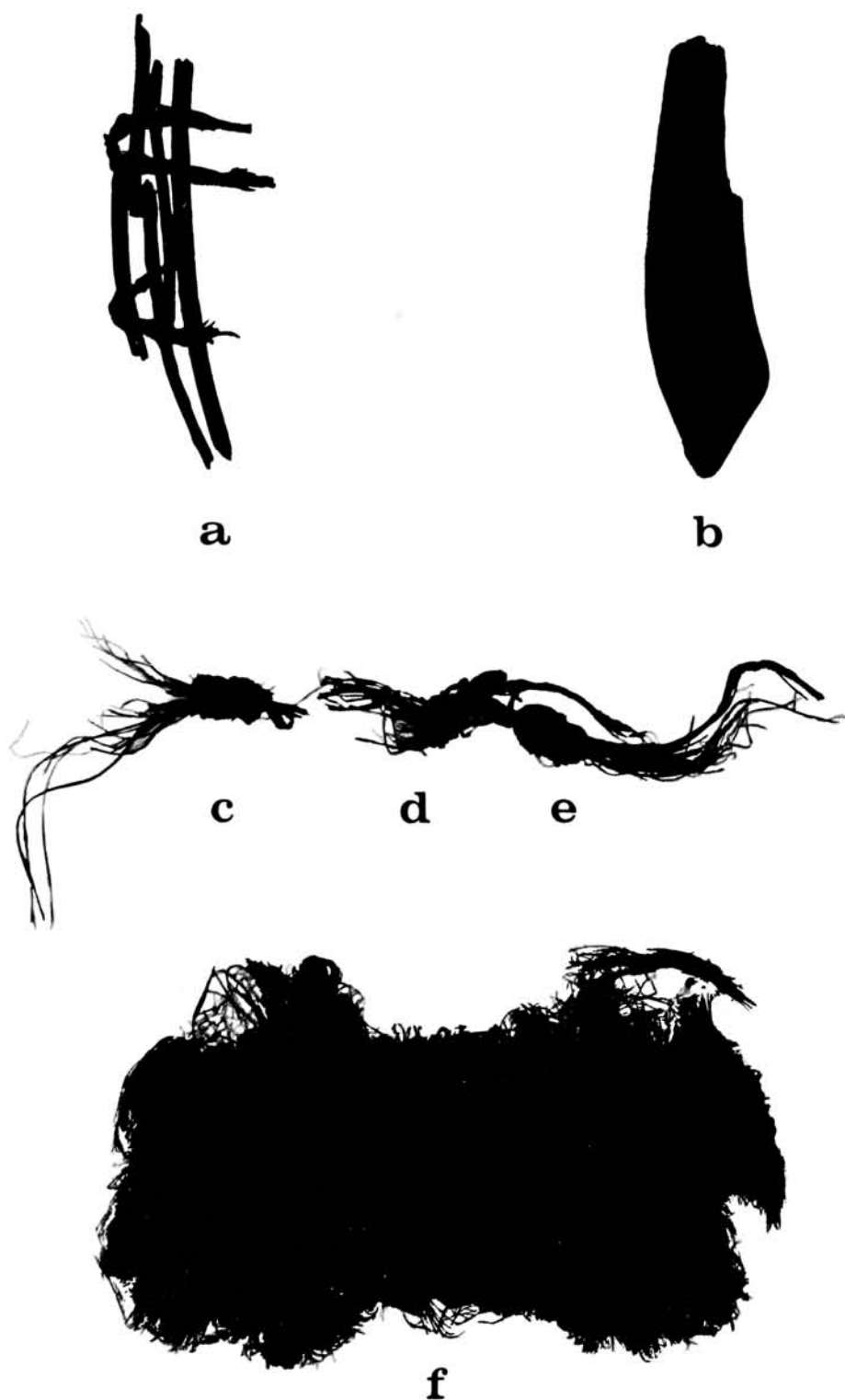


Fig. 4. Miscellaneous wood and fiber artifacts from "NC" Cave; *a*, warp-face twined basketry fragment; *b*, digging stick tip(?); *c*, three square knots in yucca fibers; *d*, yucca fiber sandal of two-warp wickerwork.

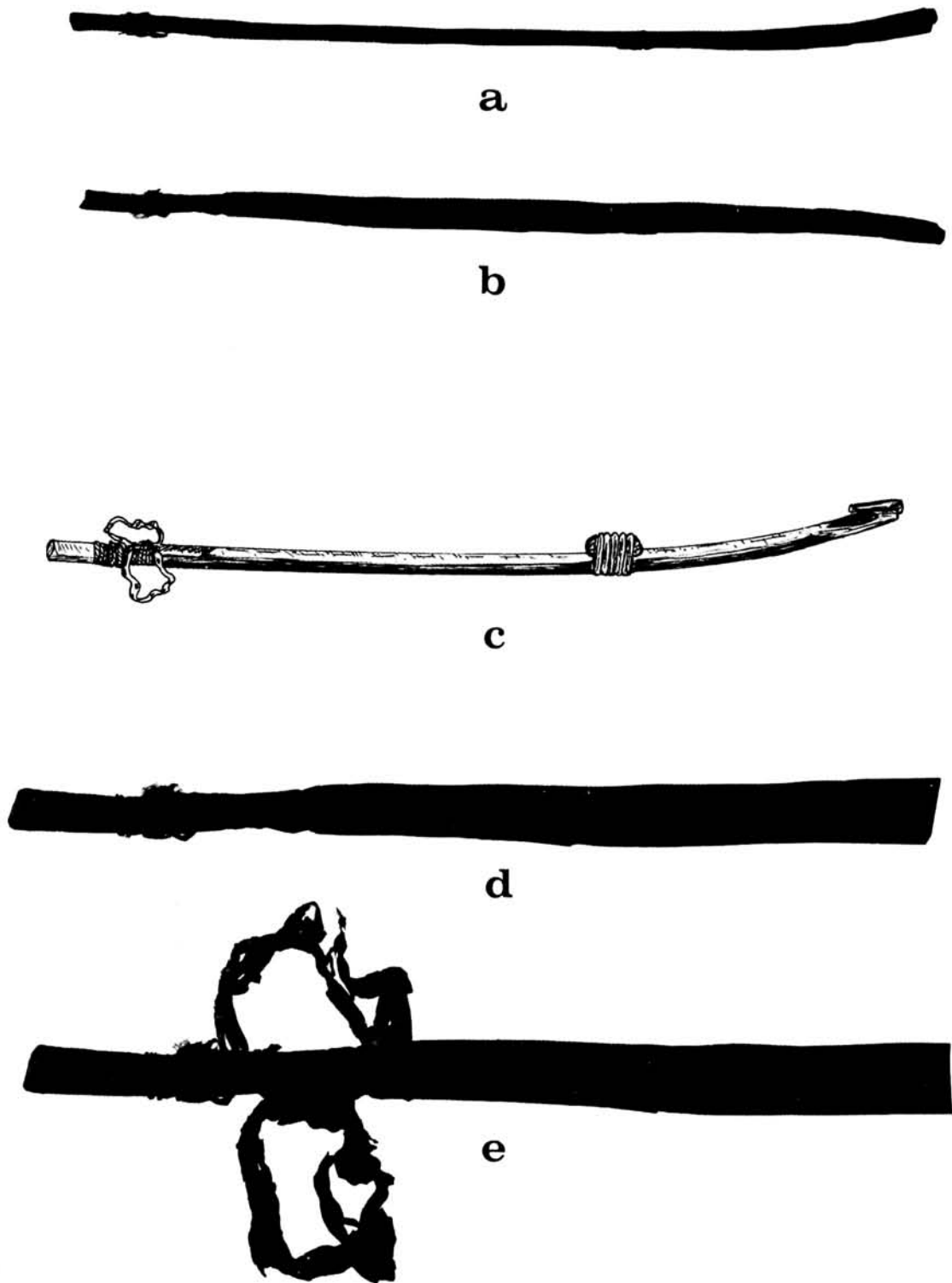


Fig. 5. Several views of the "mixed" type of atlatl from "NC" Cave; *a-b*, two views of the entire specimen; *c*, sketch of a reconstruction of the atlatl; *d-e*, two close-up views of the proximal end of the atlatl, the latter with the buckskin finger loops draped over their approximate original location.

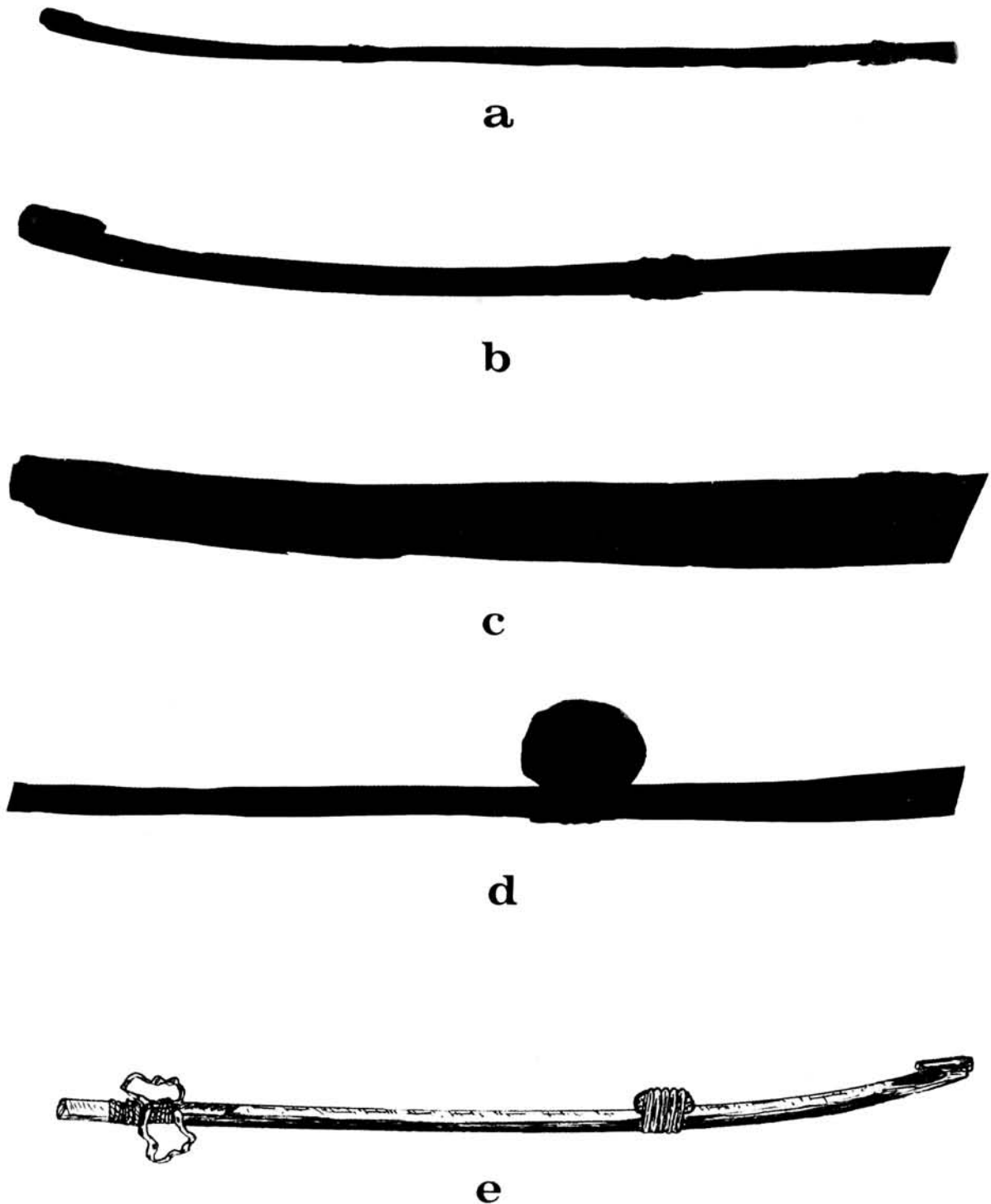


Fig. 6. Several views of the distal and mid-shaft areas of the "NC" spearthrower; *a*, view of the entire atlatl showing cordage at handle end and place where weight was attached; *b*, close-up view of the projecting "spur" at the proximal end; *c*, close-up view of the spearthrower showing dorsal spur and dorsal groove as well as pitch adhering to mid-shaft for attachment of weight; *d*, sandstone weight placed in its original position on dorsal side of mid-shaft area; *e*, sketch showing a reconstruction of the original atlatl.

atlatl has a projecting hook at the distal end, while a "female" type lacks a pronounced hook, and it is usually flush with the dorsal groove. A third type is the "mixed" type which combines both the dorsal groove and the projecting hook or spur. The "NC" Cave atlatl is of the latter type.

Fourteen atlatls and atlatl fragments were reported and described in some detail by Mildner (1974: 7-35) in his survey of Great Basin atlatls. The variety of atlatl styles in the Great Basin is indicated by the fact that three each of his total number were either "male" or "female" types, while eight whole or fragmentary specimens were categorized as belonging to the "mixed" type. No two atlatls could be regarded as identical in size, weight, or in placement and nature of the design features, such as shape and proportion of the body, placement of the weight (if present), nature of the mechanism for engaging the dart, and the nature of the handle.

The complete atlatl reported herein is most interesting as it is only the fourth spearthrower in the Great Basin to be recovered with the weight intact, or present in such a manner that its position on the body of the atlatl can be determined accurately. It is also the first recorded find of a Great Basin atlatl in which the weight was attached to the dorsal surface of the body; i.e., the same surface as contains both the short dorsal groove, and the integral spur or hook. Before proceeding further with this discussion, it is imperative to describe the atlatl in detail. The dimensions of the atlatl are given in Table 1. A description of the individual design features follows.

In general appearance and design features, the "NC" site atlatl most closely resembles the Basketmaker II atlatls from Arizona (Nusbaum 1922; Lindsay *et al.* 1968), and one from Culberson County, Texas (Fenenga and Wheat 1939: 221-223). The fact that it was partially carbonized and warped out of its

Table 1

DIMENSIONS OF THE ATLATL

Overall length	53.9 cm.	Weight of atlatl	58.0 g.
Length of spur	3.5 cm.	Weight of weight	30.3 g.
Length of groove	4.2 cm.	Total weight	88.3 g.
Length of weight	3.9 cm.		
Proximal end (width)	1.5 cm.		
	(thickness)	0.9 cm.	
Middle	(width)	2.1 cm.	
	(thickness)	1.0 cm.	
Distal end	(width)	1.8 cm.	
	(thickness)	1.2 cm.	

normal shape obscured some features such as the extent to which the atlatl had been painted. Barely detectable was some black pigment still adhering to an area just above the carved proximal end, and to some barely discernible painted bands on the shaft. The shaft was made of hardwood, as yet unidentified. As indicated by the measurements in Table 1, the mid-shaft area is wider than either end.

The Proximal End (Fig. 5d, e)

The proximal end does not have carved finger notches *per se*. Instead, the entire proximal end was reduced in width by irregular sawing and whittling. This carving technique, which appears to have utilized a stone flake as a cutting tool, resulted in an irregularly beveled proximal end. Still attached a few centimeters from the end was a layer of wrapped sinew and a 2-mm. thick, 2-ply S-twist, one-ply Z-twist piece of cordage that were used to secure the two buckskin loops or grips to the handle. Pairs of leather finger grips or loops were commonly used on Basketmaker II atlatls in the Southwest (Woodbury and Zubrow 1979: 54-55). The buckskin grips from the "NC" site atlatl were detached from the handle, but they still held their double loop shape which indicated their function (Fig. 5e). The finger grips also were slightly twisted and perforated to receive sinew and cordage as reinforcement.

The Mid-shaft Atlatl Weight Area (Fig. 6b, c, d)

Located on the dorsal side of the mid-shaft area, closer to the distal end than the handle was evidence of a thick coating of pine pitch marking the spot where the sandstone atlatl weight (Fig. 6d) had been attached to the atlatl. The weight itself was a partially carbonized piece of sandstone having the shape of a miniature loaf of bread. It was clearly a Type III weight in the Butler and Osborne (1959: 215-244) typology for western atlatl weights. The piece did have a flat base and lacked a medial groove, and had some sinew and pitch not been attached to both the weight and the shaft, one might not have recognized the purpose of the piece as a weight or charm. As has been indicated, broken pieces of sinew still adhering to the ventral side of the shaft and to the sandstone weight itself clearly indicate that the weight was attached to the dorsal side of the spear thrower. This placement of the weight meant that when the atlatl dart was thrown, the dart itself had to clear the weight in order to gain free flight from the momentum imparted by the spur. The logical solution to this problem is to increase the curvature of the atlatl between the distal and proximal ends. Unfortunately, post-depositional warping of the spearthrower precluded accurate knowledge of the actual amount of curvature present when the atlatl was functional. The author's reconstruction of this curvature is shown in Fig. 5c and Fig. 6e.

The Distal End (Fig. 6a, b, c)

Examination of the distal end clearly shows that the spur or "hook" was raised some 0.6 cm. above a short V-shaped dorsal groove, about 4.2 cm. in length. The integral spur was gouged and was carved from the same wood used as the shaft, and at the distal end, the hook and shaft together are only 1.2

cm. thick. The dorsal groove is U-shaped in cross-section. Thus, the atlatl clearly is of the "mixed" type since it has both a slightly raised spur, and a short, dorsally placed groove located beneath the spur.

FIBER ARTIFACTS AND OTHER PLANT MATERIALS

There are 18 items in this class of artifacts made from plants and plant parts, and plant materials that were modified in some way.

Yucca Fiber Sandal (Fig. 4f)

One crudely made yucca-fiber sandal with a straight toe was the only item of clothing recovered from "NC" Cave. The sandal appears to be a two-warp wickerwork sandal, or what Wheeler (1973:18) called a type of "Figure-eight" sandal. This type of shredded yucca-fiber sandal is made on a loosely twisted yucca string, looped and tied with square knots. The three square knots shown in Fig. 4c-e may be parts of either the warp loop or the remains of tie strings. The woof, also of yucca fibers, was woven over and under the opposite sides of the loop to form the sandal. The ends of the woof were then wound around the heel. The illustrated sandal (Fig. 4f) is 19.5 cm. long, 11.0 cm. wide, and 2.0 cm. thick.

Bluhm (1952:235) reports a variety of two-warp wickerwork sandals from Tularosa and Cordova Caves in New Mexico, and suggests the wickerwork sandal technique is earlier in the Mogollon and Hohokam areas than elsewhere in the Southwest and its peripheries.

Carbonized Yucca Leaf Tips and a Needle (not illustrated)

Three pieces of cut *Yucca brevifolia* leaves comprise this group. One is a complete needle 6.5 cm. long, and 0.7 cm. in diameter. Yucca leaf spine needles are said to be used to repair sandals after which the spine tip is cut off and

discarded (Grange 1952:408). The other two pieces are yucca leaf tips from which the spines have been removed. These two specimens are heavily carbonized and are both less than 5.0 cm. in length and 1.0 cm. in diameter.

Yucca Quids (not illustrated)

Four yucca quids were also retrieved from the cave, but they were merely loose bundles of fibers lacking toothmarks or other features of intrinsic interest.

Yucca Pod (not illustrated)

One carbonized piece of a Joshua-tree, *Yucca brevifolia*, fruit pod was in the collection. The fruit of the Joshua tree is contained in a three-sided capsule 4 to 10 cm. long, with flattish seeds in six rows (Billings 1945:85).

Grass Bundle (not illustrated)

One loose group of unidentified grass fibers was also part of the group of items that were collected. The bundle did not appear to be man-made.

Other Plant Materials (not illustrated)

Two large pieces of charcoal from hardwood, and four small pieces of heavily carbonized organic material, seed pods resembling corn cobs, but unidentified as yet, comprise the balance of plant materials.

FAUNAL REMAINS

Thirteen identifiable bone fragments were in the collection from "NC" Cave. These were identified by Amy Dansie, faunal analyst at the Nevada State Museum. Four species of mammals are represented in the collection; Mountain sheep (*Ovis canadensis*), deer (*Odocoileus*), jackrabbit (*Lepus californicus*), and *Bison/Bos*, more likely domestic cattle rather than *Bison*. The faunal remains are illustrated in Fig. 7a-m, and a brief description of each is given in Table 2.

Table 2

ANALYSIS OF FAUNAL MATERIALS

Illustration	Identification	Description
Fig. 7a	<i>Ovis canadensis</i>	Left proximal femur, spirally fractured
Fig. 7b	<i>Odocoileus</i>	4th cervical vertebrae, carnivore gnawed
Fig. 7c	<i>Lepus californicus</i>	Left tibia shaft, charred
Fig. 7d	<i>Lepus californicus</i>	Left tibia shaft, charred
Fig. 7e	<i>Ovis canadensis</i>	Front first phalanx
Fig. 7f	<i>Ovis canadensis</i>	Left scapula, glenoid fragment
Fig. 7g	<i>Ovis canadensis</i>	Anterior mandible, with incisors, right, adult
Fig. 7h	cf. <i>Odocoileus</i>	Left femur shaft fragment, spirally fractured
Fig. 7i	<i>Ovis/Odocoileus</i>	Rib shaft fragment
Fig. 7j	<i>Bison/Bos</i> size	Rib shaft fragment
Fig. 7k	<i>Ovis canadensis</i>	Horn core tip
Fig. 7l	<i>Ovis canadensis</i>	Horn fragment
Fig. 7m	<i>Bison/Bos</i> size	Pelvis fragment

CULTURAL AND CHRONOLOGICAL IMPLICATIONS

Not expressed so far is an indication of the identity of the people whose handiworks and ecofacts were left behind in "NC" Cave. What the people were doing to exploit the adjacent environment is implied by the recovered ecofacts, and these presumed activities will be made explicit later. Some indication as to the antiquity of the cultures involved is suggested by the artifact types found in the deposits. Experience suggests retrieved surface artifacts from disturbed Great Basin caves are more apt to represent a diachronic sample of a cave's contents than a synchronic one. Also, no direct dating techniques were applied to specimens taken from the cave. The artifacts, therefore, may only be cross-dated, or demonstrated to be contemporary with artifact types known from other dated Great Basin sites, largely on the basis of morphological types.

As already noted, the Elko Corner-notched, chipped-stone dart points, the

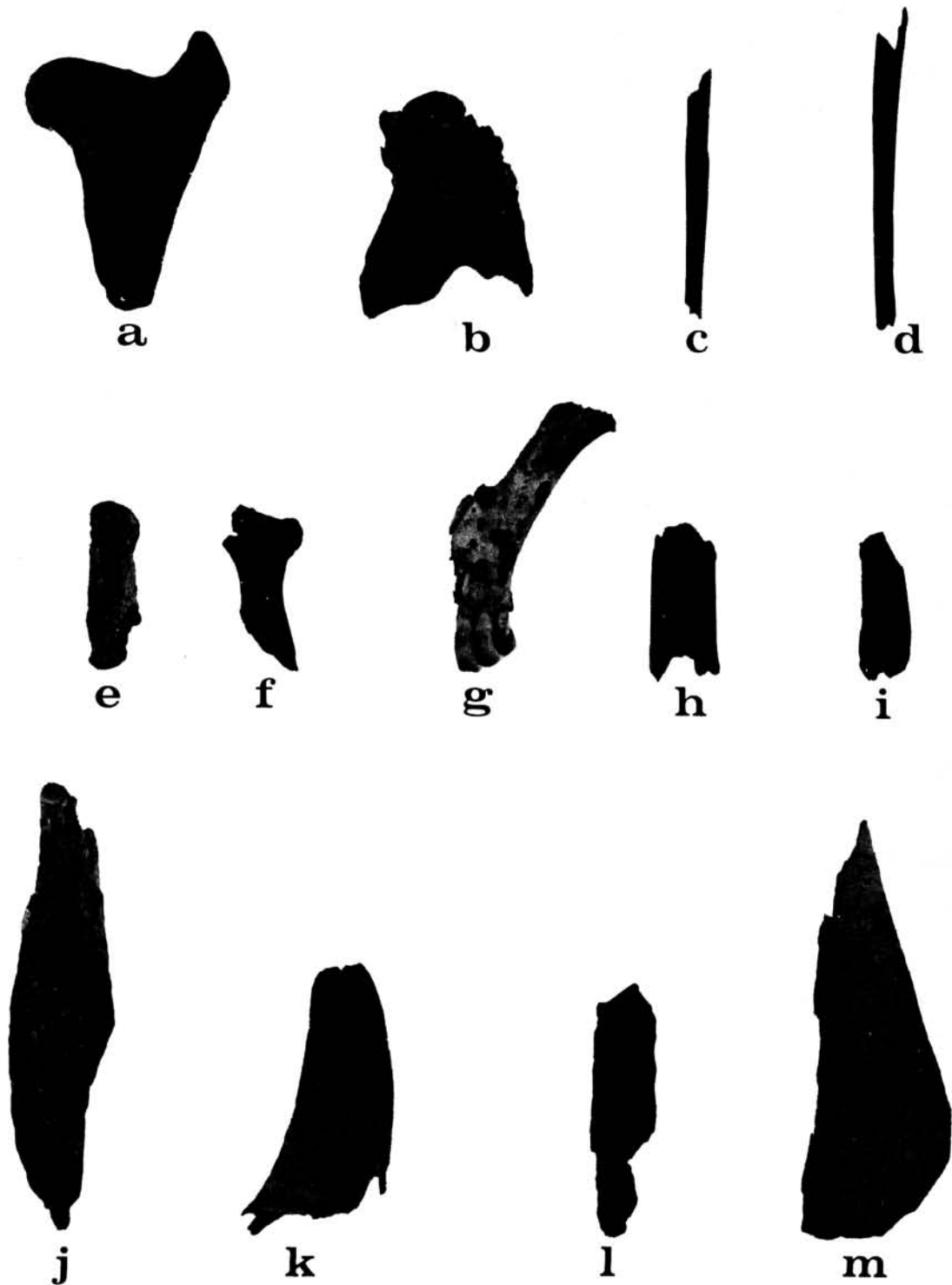


Fig. 7. Faunal materials from "NC" Cave; *a*, left proximal femur, *Ovis canadensis*, spirally fractured; *b*, fourth cervical vertebrae, gnawed by carnivore, *Odocoileus*; *c-d*, both *Lepus californicus* left tibia shafts, charred; *e-g*, front first phalanx, glenoid fragment of left scapula, and anterior mandible with incisors of *Ovis canadensis*; *h-i*, left femur shaft fragment and rib shaft fragment, *Odocoileus*; *j*, *Bison/Bos*-size rib fragment; *k-l*, horn core tip and horn fragments of *Ovis canadensis*; *m*, *Bison/Bos*-size pelvis fragment.

"mixed" type of atlatl, scissors snares, the Promontory peg, and the yucca fiber, two-warp wickerwork sandal are "index" artifact types useful for cross-dating purposes.

Elko Corner-notched points generally range in age from about 1500 B.C. to A.D. 500-700 (O'Connell 1967; Heizer and Hester 1978:5-7). Elko series points apparently are somewhat older in the eastern Great Basin than in the western Great Basin, but in both sub-areas they are coeval with Pinto points (Aikens 1970: 52-53, Figs. 24-25; Layton 1970:238; Layton and Thomas 1979:266). Some Elko morphological types identical with some Pinto series points may date as old as 6000 B.C. in the eastern Great Basin (Aikens 1970, 1972), but Elko Corner-notched points are more common in later stratigraphic levels there than on the Colorado Plateau (Holmer 1980a, 1980b).

O'Malley Shelter in Nevada, a site close to "NC" Cave, has yielded two of the three youngest Great Basin radiocarbon dates for Elko Corner-notched points. The dates, 870 ± 100 B.P. (RL-43) and 890 ± 100 B.P. (RL-42), or A.D. 1080 and 1060, respectively, are considered to be aberrant by Heizer and Hester (1978:7). Another nearby site yielded the third youngest date 864 ± 80 (I-9795), or A.D. 1085 (Busby 1979:51). This radiocarbon date from Civa Shelter II in Garden Valley was on charcoal from a fire hearth which had several Elko series points and younger point types associated with it (Busby 1979:61). Until such time as the "NC" Cave Elko Corner-notched points are directly dated, the three late dates from southeastern Nevada clustering around A.D. 1000 would appear to be reasonable.

Less support for such a late cross-date comes from the type of atlatl found in association with the darts, one of which has the hafted Elko Corner-notched point. The atlatl is clearly a "mixed" type closely resembling Basketmaker II atlatls from the San

Juan or Kayenta area of Arizona. In the San Juan drainage, Basketmaker II sites date from about 100 B.C. to A.D. 400 (Woodbury and Zubrow 1979:57), a temporal range that is somewhat more restrictive than the time range for Elko Corner-notched points. Basketmaker II atlatls do differ from all other known Great Basin atlatls, especially in their various attributes, such as paired finger loops made of dressed skin secured with sinew, spurs and grooves to position the dart, and the placement of the weight. Since typologically the "NC" Cave dart thrower exhibits all of these attributes there is no question that the cross-date of 100 B.C. to A.D. 400 for Basketmaker II atlatls appears to be valid for the "NC" Cave specimen.

Additional cross-dating support for the age estimate on the "NC" Cave atlatl comes from Janetski's (1979:309) study of Great Basin snare types. He states that snare use in the Great Basin probably was not widespread until shortly after the time of Christ. There apparently are three radiocarbon dates on snares; two on scissors and noose snares from Cowboy Cave (Janetski in Jennings 1980: 75-96), and one on a scissors snare from Ord Shelter in California (Janetski 1979:311, Table 1; Echlin, Wilke, and Dawson 1981). Since the "NC" Cave snares are believed to represent parts of scissors snares, the radiocarbon dates listed by Janetski (1979) for that type seems appropos. The dates are: A.D. 370 ± 60 (SI-2426) for the Cowboy Cave scissors type, and A.D. 110 (SI-2423) for the noose type in the same cave, and A.D. 180 ± 100 for the scissors type in Ord Shelter. None of these cross-dates is incompatible with previously discussed cross-dates for the Elko Corner-notched point and the Basketmaker II atlatl; so again, the comparative data on age estimates for Great Basin scissors snares support the suggested cross-dates for other "NC" Cave artifact types.

The final artifact type to be considered

here as possibly time sensitive and suitable for cross-dating is the two-warp wickerwork, yucca-fiber sandal from "NC" Cave. Such sandals appear to have a limited distribution in the eastern Great Basin as they are not present at Cowboy Cave (Hewett 1980: 58-60), Sudden Shelter (Jennings, Schroedl, and Holmer 1980), Hogup Cave (Aikens 1970: 119-121), or Danger Cave (Jennings 1957). According to Aikens (1966:33), sandals of the "Basic Southwestern" stage are known in the Kayenta area from a number of White Dog focus sites, and in the Virgin River area of Utah at Antelope Cave near Hurricane, Utah, at Cave Du Pont in Utah (Nusbaum 1922: 73-80, Pls. 36-9), as well as at Etna Cave (Wheeler 1973:18) in Nevada. The Nevada distribution of the two-warp wickerwork or figure-eight woven-yucca sandal seems to be restricted to three sites, Etna Cave (Wheeler 1973: 18-20), Footprint Rockshelter (Shutler 1962:53), and Mule Springs Cave (Turner 1978:64). Bluhm (1952:235), as previously mentioned, does note the appearance of two-warp wickerwork sandals earlier in the Mogollon and Hohokam areas than elsewhere in the Southwest. Clearly the figure-eight sandal type is of Southwestern origin as none like it occurs in the western Great Basin (Loud and Harrington (1929:54, 150).

Wheeler's (1973: 18-20) detailed technological description of the figure-eight woven sandal, or two-warp wickerwork type, is quite complete. He does note that this type was distributed throughout the deposits within Etna Cave, and that it was used from Basketmaker II times through the historic period, during the latter period by local Paiutes (Wheeler 1973:21). Fowler also notes the considerable persistence from Desert Archaic to Puebloan times for the figure-eight sandal in Etna Cave (Fowler, Madsen, and Hattori 1973:4).

Despite the sandal's persistence through

time at Etna Cave, it does appear to be part of the "Basic Southwestern" stage in existence in the Virgin and Muddy River area from some time prior to A.D. 200 to approximately A.D. 700 (Aikens 1966:19). This suggested temporal range for the two-warp wickerwork, yucca-fiber sandal is another of the several temporal concordances useful for cross-dating "NC" Cave artifact types. When the presumed cross-dates for five potential "index" artifact types are compared, a consensus estimate of ca. A.D. 400 ± 500 seems tenable at least for part of the site's cultural content. The relatively late carbon dates supporting the A.D. 1000 temporal placement for Elko Corner-notched points found in nearby caves, as yet represents an unresolved temporal anomaly.

The artifact types recovered from the site, together with the ecofacts, give some indication of what the people were doing in the vicinity of the cave. The hunting and taking of large and small game is implied by the atlatl and darts, the snare parts, and as well by the Promontory peg. Mountain sheep, deer, and jackrabbit were taken and some bones were carbonized. The presence of warp-face twined basketry, a digging stick part, and a small-size yucca-fiber sandal, on the other hand, imply the presence of women and probably children in the cave. These are somewhat simplistic deductions, but they do suggest something more than cave use by sporadic male hunting parties using spear-throwers and darts.

RAMIFICATIONS: DISCUSSION OF DART FORESHAFT DIAMETERS

Not wishing to stretch inferences from limited data too far, particularly those made from data on a nonprofessionally excavated site, the focus of the following comments will be upon suggestions made by previous researchers as to the importance of neck widths (Corliss 1972) and other quantitative

measures purportedly allowing one to separate and to classify unknown projectile points as either arrowheads or dart tips (Thomas 1978: 461-472). The latter article by Thomas (1978), in particular, needs rebuttal as his conclusions, in my opinion, are not supported by the data from which they derive. This is not often the case with Thomas's many important contributions to Great Basin prehistory, but extremely productive scholars are bound to have at least as many critics as converts in order for the science of archaeology to proceed in normal human fashion (Madsen 1981: 637-640; Thomas 1981a: 644-648; Corliss 1980: 351-352).

In fairness to Thomas (1978: 468-469), he does indicate that his sample of *ten* hafted atlatl points was too small to yield meaningful conclusions about procedures to quantitatively distinguish arrowheads from dart points, yet he proceeds with the exercise anyway, and compares correlation coefficients for ten hafted atlatl dart attributes with those for 132 hafted arrow attributes.

If, for example, the attribute data from the five dart foreshafts and the one hafted point from "NC" Cave were combined with attribute data on an additional 14 dart foreshafts from a Winnemucca Lake cave (Fig. 8a-n) presently in Nevada State Museum collections, the inescapable conclusion would be reached that the majority of dart foreshafts known from the combined sample, or 95 percent of them, lack chipped stone points altogether! The sample size of the above, $n = 20$, is double the size of Thomas' dart sample ($n = 10$) used in his 1978 study. If Hattori's (1981: 156-172) new data on 42 atlatl darts from Kramer Cave, Winnemucca Lake, were included, the sample size ($n = 62$) would have reached truly credible proportions.

What is being suggested here is that all of the available data on dart foreshaft dimensions, hafted or not, are important, particu-

larly to help determine how they differ from dimensions of arrow foreshafts. Also, extreme care must be exercised as to where on the foreshaft shaft diameters are measured (Fig. 8a-n). A list of eight excavated Great Basin sites where data on dart foreshaft dimensions are available has been compiled by Aikens (1970:159). In addition to Aikens' study listing eight Great Basin sites, site 42Em70 (Gunnerson 1962:73), Swallow Shelter (Dalley 1976:58), Cowboy Cave (Janetski 1980:77), Newberry Cave (Smith 1963: 161-162, 179), Winnemucca Caves (Hattori 1981:156-172), and now "NC" Cave also may be considered as sources of metrical data for such studies of atlatls and dart foreshafts. At the same time, *caveat emptor* should be foremost in the minds of shoppers at the archaeological marketplace contemplating the "buying" of computerized studies manipulating inadequate metrical data to infer cultural usages. In short, I am not convinced that enough data have been marshalled to segregate arrow foreshafts from dart foreshafts on the basis of size or variability in dimensions such as length, width, weight, or shaft diameters, and the new data from "NC" Cave and the Winnemucca Lake foreshafts from a cache support this contention (as shown in Table 3).

COMMENTS ON ATLATL DISTRIBUTIONS

Cumulative data on the distribution of New World atlatls have strengthened the conclusion made years ago by Cressman, Williams, and Kreiger (1940:38) that a common prototype for the "male" atlatl has not been found, and that the "male" atlatl type has an early and disjunctive world-wide distribution. It is the only type present in South America (Fig. 9, inset) and Australia, two continents which occupy peripheral positions with respect to human cultural development *per se*. It is also the dominant type of atlatl present in the Upper Paleolithic of Western

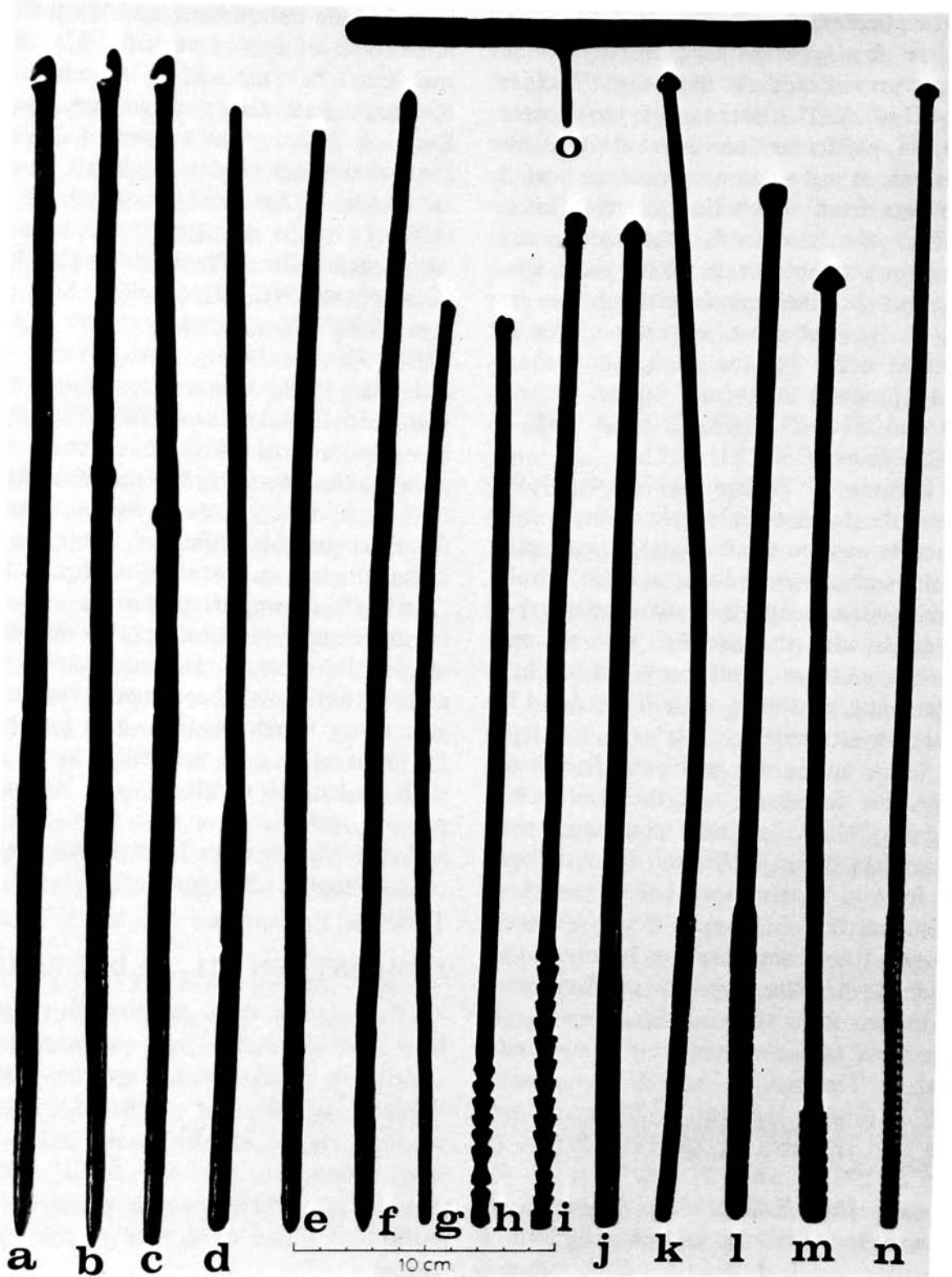


Fig. 8. Atlatl dart foreshafts from a cave on the northeastern shore of Winnemucca Lake; *a-m*, various types of hardwood foreshafts without stone points; *o*, hardwood tool of unknown use found in association with the darts.

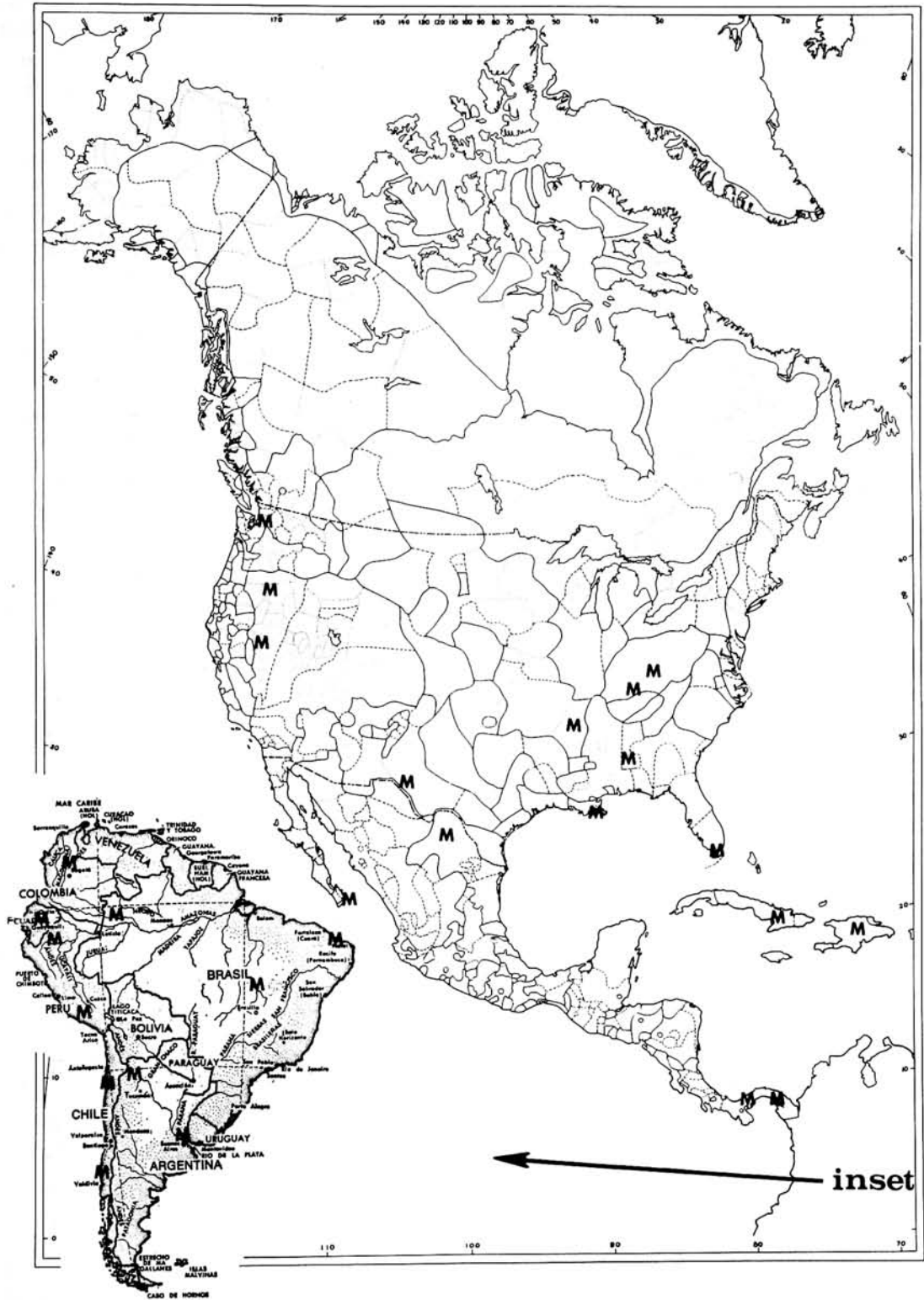


Fig. 9. Distribution of the "male" type of atlatl in North and South America. The "male" type is the only type present in South America (after Metraux 1949:229-263). The "M" symbol indicates an area rather than a single occurrence in most cases.

Table 3
 DIMENSIONS OF ATLATL FORESHAFTS,
 "NC" CAVE, AND A CACHE FROM
 A LAKE WINNEMUCCA CAVE

"NC" Cave	Length (cm.)	Diameter (cm.)	Weight (g.)	Illustration
Hafted foreshaft	19.7	0.6	6.2	Fig. 2 d-e
	16.5	0.5		Fig. 2 f
	21.0	0.5		Fig. 2 g
	18.2	0.6		Fig. 2 h
	21.0	0.5		Fig. 2 i
	13.5	0.4		Fig. 2 j
Winnemucca Cave Cache	Length (cm.)	Diameter (cm.)	Weight (g.)	Illustration
Perforated tip	44.6	0.9		Fig. 8 a
Perforated tip	44.7	1.1		Fig. 8 b
Perforated tip	44.5	1.1		Fig. 8 c
Pointed tip	42.3	1.0		Fig. 8 d
Squared-off tip	41.5	0.9		Fig. 8 e
Pointed tip	43.0	0.8		Fig. 8 f
Pointed tip	36.0	0.6		Fig. 8 g
Broken tip	34.8	0.8		Fig. 8 h
Bunt tip	38.2	0.9		Fig. 8 i
Pointed bunt	37.8	0.9		Fig. 8 j
Pointed bunt	43.2	0.9		Fig. 8 k
Bunt tip	38.8	0.7		Fig. 8 l
Pointed tip	35.8	1.0		Fig. 8 m
Pointed tip	42.7	1.1		Fig. 8 n

Europe (W. Massey 1961:87). In the western portion of North America north of Mexico only five "male" atlatls have been recovered, although a sixth specimen, a "two purpose" atlatl from Winnemucca Lake (Harrington 1959:60; Mildner 1974:10) clearly is a "male" type, and has been misclassified as a "mixed" type. The latter has a dorsal groove, but the groove obviously was intended for weight attachment, rather than dart placement. The five other known "male" types come from the mouth of the Skagit River in the state of Washington (H. Taylor and Caldwell 1954: 279-280), two from Roaring Springs Cave in Oregon (Cressman, Williams, and Kreiger 1940:8), one from another Lake Winnemucca Cave, Nv-Wa-197 (Hester 1974b: 1-36), and one from Hidden Cave, Nevada. The latter is represented by the distal end of a one-piece type with the hook, or spur, carved

from the shaft, and standing up from it. In this regard, the Hidden Cave specimen more closely resembles the Roaring Springs Cave specimens than other Nevada "male" types. The Great Basin distribution of atlatl types is shown in Fig. 10.

Two localities in Mexico (Figs. 9-10) where "male" atlatls predominate are Cerro Cuevoso on the southeastern tip of Baja California, Mexico, (W. Massey 1961: 81-93) and the Cuatro Ciénegas region of Coahuila, Mexico, (W. Taylor 1966: 59-94). Elsewhere in that country the "mixed" type was the only form found from the Tarascans on the west coast to the Huastec on the northeastern gulf coast and south to the Chorti, just south and east of the Yucatan peninsula (Fig. 9). Driver and Massey (1957:354) show the ethnological use of spearthrowers for the Tarahumara and the Acaxee, and use of the "mixed" type for all groups roughly south of the 20th parallel.

The "mixed" type of which the "NC" Cave atlatl is one, as indicated previously, was the principal weapon of warfare among Aztec warriors, as well as the armies of the Incas of Peru and the Chibchas of Colombia (Driver and Massey 1957:356). The "mixed" type, of course, is the dominant type found in the Southwest extending from the Trans-Pecos region of Texas to the Kayenta region of Arizona, as well as all subareas of the Great Basin (Fig. 10). The "female" type as indicated on the distribution map (Fig. 10) seems to have a somewhat more restricted distribution, having been found so far only in Nevada and Utah caves. In the Great Basin, the five female atlatl types may well be derived from or related to the more common mixed type, but this, of course, is speculation.

CONCLUSION

Although the artifact and ecofact inventory from "NC" Cave is quite small, totaling 69 specimens, the items in it are of sufficient

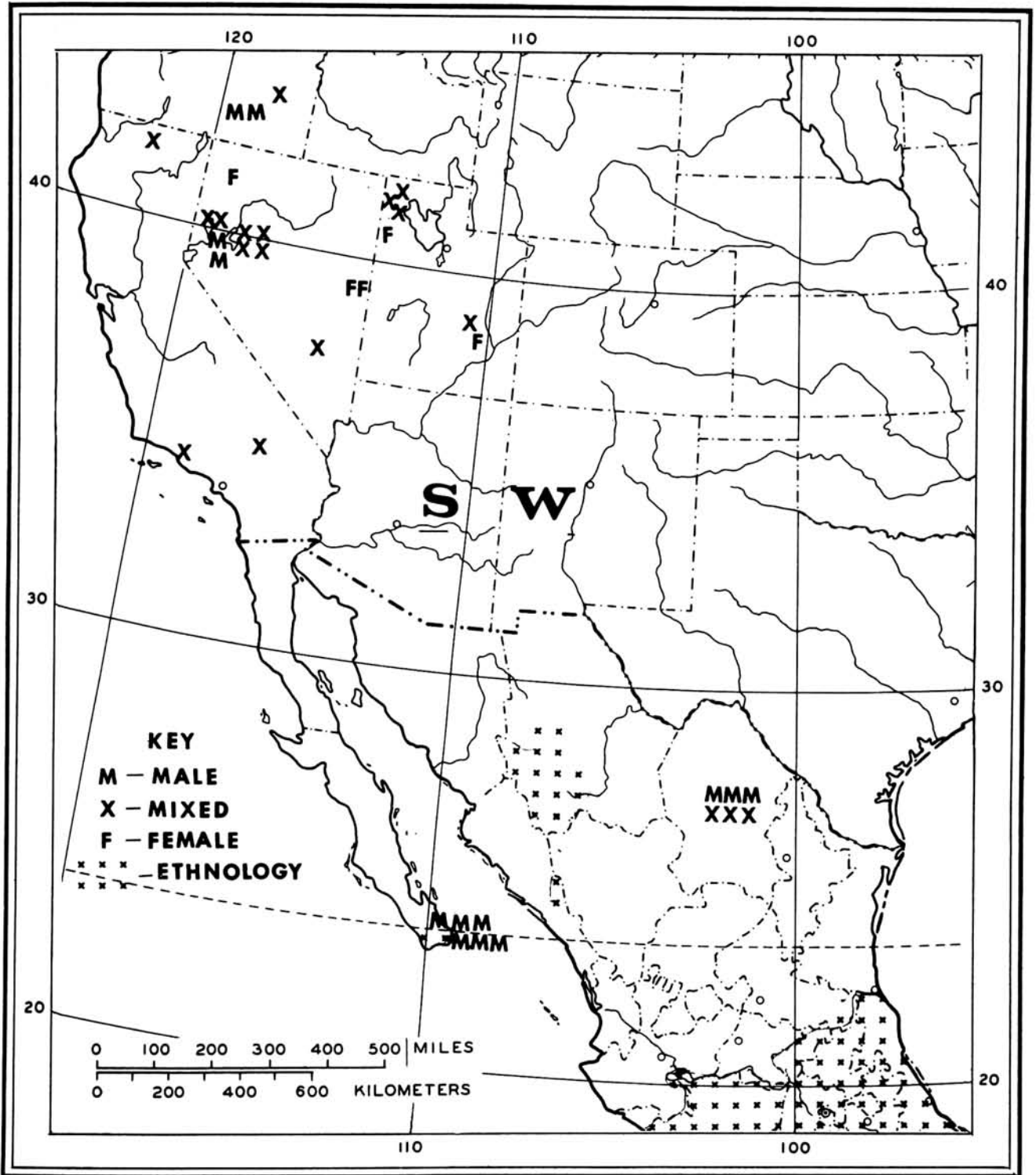


Fig. 10. Distribution of three types of atlatls in western North America. Southwestern culture area distribution is not shown, but the area is demarcated as is the ethnographic use area in Mesoamerica.

importance to warrant this preliminary study. Another Nevada occurrence of a "mixed" type of atlatl together with hafted and unhafted foreshafts with unusually small diameters has been recorded. The atlatl itself is clearly related to Basketmaker II style spearthrowers although the weight is located in an unusual position on the dorsal surface of the body.

On the basis of limited cross-dating of several "index" artifact types, Elko Corner-notched projectile points, the "mixed" type of atlatl, the scissors snare parts, the Promontory peg, and the yucca-fiber, two-warp wick-erwork sandal, an age estimate of ca. A.D. 400 \pm 500 is suggested for the retrieved portion of the cave's contents.

The artifacts and ecofacts from "NC" Cave may well be related to the Pahrnatag style of rock art first recorded and characterized by Heizer and Hester (1974:9) as "... disguised hunters with atlatls." These hunter figures quite commonly are associated with bighorn sheep in Lincoln County, and tangible evidence for such hunting activity has been described in this report. Since the "NC" Cave site is located in Lincoln County where the Pahrnatag style of rock art is abundant, a direct correlation between the hunter figures and the cave's contents is possible, particularly as the suggested dates for the rock-art style (300 B.C. to A.D. 500) are coeval with the age estimate given for "NC" Cave. Of course, such a conclusion is tenuous, at best.

"NC" Cave atlatl foreshaft diameters average less than half the size of previously studied atlatl foreshaft diameters reported in a study by Thomas (1978). When these new data were combined with data on 14 additional dart foreshafts from a Winnemucca Lake cache, the conclusion was reached that available data are still inadequate to make meaningful statements about unhafted points and their functions based on neck widths or other spurious quantitative measures manipulated through discriminant analysis.

A paper such as this, based on a collection of prehistoric artifacts removed from their matrix without proper contextual controls presents an object lesson of sorts. Even the worst kind of new field data may be salvaged and be made to yield fresh insights into such questions as morphological variations of weapon types in the Great Basin, presumed cultural successions or variations within a geographic region, and estimates of temporal duration of those cultures. While the extremely tentative nature of such interpretations should be underscored, the recovery of fresh field data may be at least as important an activity as laboratory manipulation of existing data sets.

REFERENCES

- Aikens, C. Melvin
1966 Virgin-Kayenta Cultural Relationships. University of Utah Anthropological Papers No. 79.
1970 Hogup Cave. University of Utah Anthropological Papers No. 93.
1972 Surface Archaeology of Southwestern Washoe County, Nevada: The G. W. Smith Collection. Reno: University of Nevada Desert Research Institute Publications in the Social Sciences No. 9.
- Aveleyra, A. L., M. Maldonado-Koerdell, and P. Martinez del Rio
1956 Cueva de la Candelaria, Volumen I. Mexico: Memorias del Instituto Nacional de Antropología e Historia Col. 5. Mexico, D.F.
- Bettinger, Robert L.
1976 Flat Iron Ridge Site. In: Prehistoric Piñon Ecotone Settlements of the Upper Reese River Valley, Central Nevada, by David Hurst Thomas and Robert L. Bettinger. New York: American Museum of Natural History Anthropological Papers 53(3):313-327.
- Billings, W. D.
1945 Nevada Trees. Reno: Agricultural Extension Service Bulletin No. 94.
- Bluhm, Elaine
1952 Clothing and Textiles. In: Mogollon Cultural Continuity and Change: The Stratigraphic

- Analysis of Tularosa and Cordove Caves, by Paul S. Martin, John B. Rinaldo, Elaine Bluhm, Hugh C. Cutler, and Roger Grange, Jr. Chicago: Chicago Natural History Museum, Fieldiana: Anthropology No. 40: 231-330.
- Bradley, W. Glen, and James E. Deacon
1967 The Biotic Communities of Southern Nevada. In: Pleistocene Studies in Southern Nevada, H. M. Wormington and Dorothy Ellis, eds. Carson City: Nevada State Museum Anthropological Papers No. 13.
- Busby, Colin I.
1979 The Prehistory and Human Ecology of Garden and Coal Valleys: A Contribution to the Prehistory of Southeastern Nevada. Berkeley: University of California Archaeological Research Facility Contributions No. 39.
- Butler, B. Robert, and Douglas Osborne
1959 Archaeological Evidence for the Use of Atlatl Weights in the Northwest. *American Antiquity* 25(2):215-224.
- Corliss, David W.
1972 Neck Width of Projectile Points: An Index of Culture Continuity and Change. Pocatello: Idaho State University Museum Occasional Papers No. 29.
1980 Arrowpoint or Dart Point: An Uninteresting Answer to a Tiresome Question. *American Antiquity* 45(2):351-352.
- Crabtree, Don E.
1972 An Introduction to Flintworking. Pocatello: Idaho State University Museum Occasional Papers No. 28.
- Cressman, Luther S.
1944 New Information on South Central Oregon Atlatls. Los Angeles: Southwest Museum Master Key 18(6):169-179.
- Cressman, L. S., Howell Williams, and Alex D. Krieger
1940 Early Man in Oregon: Archaeological Studies in the Northern Great Basin. Eugene: University of Oregon Monographs, Studies in Anthropology No. 3.
- Cressman, L. S., F. C. Baker, H. P. Hansen, P. S. Conger, and R. F. Heizer
1942 Archaeological Researches in the Northern Great Basin. Carnegie Institution of Washington Publications No. 538.
- Dalley, Gardiner F.
1976 Swallow Shelter and Associated Sites. University of Utah Anthropological Papers No. 96.
- Driver, Harold E., and William C. Massey
1957 Comparative Studies of North American Indians. Philadelphia: Transactions of the American Philosophical Society 47(2): 165-456 (new series).
- Echlin, Donald R., Philip J. Wilke, and Lawrence E. Dawson
1981 Ord Shelter. *Journal of California and Great Basin Anthropology* 3(1):49-68.
- Fenenga, Franklin, and Joe Ben Wheat
1939 An Atlatl from the Baylor Rock Shelter, Culberson County, Texas. *American Antiquity* 5:221-223.
- Fowler, Don D., David B. Madsen, and Eugene M. Hattori
1973 Prehistory of Southeastern Nevada. Reno: University of Nevada Desert Research Institute Publications in the Social Sciences No. 6.
- Grange, Roger, Jr.
1952 Wooden Artifacts. In: Mogollon Cultural Continuity and Change: The Stratigraphic Analysis of Tularosa and Cordova Caves, by Paul S. Martin, John B. Rinaldo, Elaine Bluhm, Hugh C. Cutler, and Roger Grange, Jr. Chicago: Chicago Natural History Museum, Fieldiana: Anthropology No. 40: 331-450.
- Grant, Campbell
1979 The Spear-thrower from 15,000 Years Ago to the Present. *Pacific Coast Archaeological Society Quarterly* 15(1):1-17.
- Green, James P.
1975 McKean and Little Lake Technology: A Problem in Projectile Point Typology in the Great Basin of North America. In: *Lithic Technology: Making and Using Stone Tools*, Earl H. Swanson, Jr., ed., pp. 159-171. The Hague: Mouton.
- Guernsey, S. J.
1931 Explorations in Northeastern Arizona. Report on the Archaeological Field Work of 1920-23. Cambridge: Papers of the Peabody Museum of American Archaeology and Ethnology 12(1).

- Guernsey, S. J., and A. V. Kidder
1921 Basket-Maker Caves of Northeastern Arizona. Cambridge: Papers of the Peabody Museum of American Ethnology and Archaeology 8(2).
- Gunnerson, James H.
1962 Unusual Artifacts from Castle Valley, Central Utah. University of Utah Anthropological Papers No. 60:67-91.
- Harrington, M. R.
1959 A Two-Purpose Atlatl. Los Angeles: Southwest Museum Masterkey 33(2):60.
- Hatoff, Brian W., and David Hurst Thomas
1976 Mateo's Ridge Site. In: Prehistoric Piñon Ecotone Settlements of the Upper Reese River Valley, Central Nevada, by David Hurst Thomas and Robert Bettinger. New York: American Museum of Natural History Anthropological Papers No. 53:265-312.
- Hattori, Eugene Mitsuru
1981 Archaeology of the Falcon Hill Sites, Winnemucca Lake, Nevada. Ph.D dissertation, Washington State University, Pullman.
- Haury, Emil W.
1945 Painted Cave, Northeastern Arizona. Dagoon: Amerind Foundation Publication No. 3.
- Heizer, Robert F., and Thomas R. Hester
1974 Two Petroglyph Sites in Lincoln County, Nevada. Berkeley: University of California Archaeological Research Facility Contributions No. 20:1-52.
1978 Great Basin Projectile Points: Forms and Chronology. Socorro: Ballena Press Publications in Archaeology, Ethnology and History No. 10.
- Hester, Thomas R.
1974a Supplementary Notes on a Great Basin Atlatl. In: Great Basin Atlatl Studies, by T. R. Hester, M. P. Mildner, and L. Spencer. Ramona: Ballena Press Publications in Archaeology, Ethnology and History No. 2: 29-31.
1974b Archaeological Materials from Site NV-Wa-197, Western Nevada: Atlatl and Animal Skin Pouches. Berkeley: University of California Archaeological Research Facility Contributions No. 21:1-36.
- Hester, T. R., M. P. Mildner, and L. Spencer
1974 Great Basin Atlatl Studies. Ramona: Ballena Press Publications in Archaeology, Ethnology, and History No. 2.
- Holmer, Richard N.
1980a Projectile Points. In: Sudden Shelter, by Jesse D. Jennings, Alan R. Schroedl, and Richard N. Holmer. University of Utah Anthropological Papers No. 103:63-108.
1980b Chipped Stone Projectile Points. In: Cowboy Cave, by Jesse D. Jennings. University of Utah Anthropological Papers No. 104: 31-48.
- Houghton, John G., Clarence M. Sakamoto, and Richard O. Gifford
1975 Nevada's Weather and Climate. Reno: Nevada Bureau of Mines and Geology Special Publications No. 2.
- Hubbs, Carl L., and Robert R. Miller
1948 The Great Basin with Emphasis on Glacial and Postglacial Times. I. The Zoological Evidence. University of Utah Bulletin No. 38(20):18-167.
- Janetski, Joel C.
1979 Implications of Snare Bundles in the Great Basin and Southwest. Journal of California and Great Basin Anthropology 1(2): 306-321.
1980 Wood and Reed Artifacts. In: Cowboy Cave, by Jesse D. Jennings. University of Utah Anthropological Papers No. 104:75-95.
- Jennings, Jesse D.
1957 Danger Cave. University of Utah Anthropological Papers No. 27.
1980 Cowboy Cave. University of Utah Anthropological Papers No. 104.
- Jennings, Jesse D., Alan R. Schroedl, and Richard N. Holmer
1980 Sudden Shelter. University of Utah Anthropological Papers No. 103.
- Kidder, A. V., and S. J. Guernsey
1919 Archaeological Explorations in Northeastern Arizona. Washington, D.C.: Bureau of American Ethnology Bulletin No. 65.
- Knudson, Ruthann
1979 The Humboldt River Project's Lithic Analysis Design: Partitive Analytical Decisions and Holistic Behavioral Inferences. In: Archaeo-

- logical Investigations near Lovelock, Nevada: The Lovelock Bypass Sites, by Mary K. Rusco and Andrew Jensen, pp. A-1 to A-22. Carson City: Nevada State Museum Archaeological Services, Reports.
- Krause, F.
1902 Schleudervorrichtungen für Wurfwaffen. *Internationale Archiv für Ethnographie* 15(4,S): 121-151.
1905 Sling Contrivances for Projectile Weapons. Washington, D.C.: Smithsonian Institution Annual Report for 1904, pp. 619-638.
- Layton, Thomas Nutter
1970 High Rock Archaeology: An Interpretation of the Prehistory of the Northwestern Great Basin. Ph.D. dissertation, Harvard University, Cambridge.
- Layton, Thomas N., and David Hurst Thomas
1979 The Archaeology of Silent Snake Springs, Humboldt County, Nevada. New York: American Museum of Natural History Anthropological Papers No. 55(3): 251-269.
- Lindsay, Alexander J., *et al.*
1968 Survey and Excavations North and East of Navajo Mountain, Utah, 1959-1962. Flagstaff: Museum of Northern Arizona Bulletin No. 45. (Glen Canyon Series No. 8.)
- Loud, L. L., and M. R. Harrington
1929 Lovelock Cave. Berkeley: University of California Publications in American Archaeology and Ethnology 25(1).
- Madsen, David B.
1981 The Emperor's New Clothes. *American Antiquity* 46(3):637-640.
- Massey, L. G.
1972 Tabla and Atlatl: Two Unusual Wooden Artifacts from Baja California. *Pacific Coast Archaeological Society Quarterly* 8(1): 25-34.
- Massey, William C.
1961 The Survival of the Dart-Thrower on the Peninsula of Baja California. *Southwestern Journal of Anthropology* 17(1):81-92.
- McQuivey, Robert P.
1979 The Desert Bighorn Sheep of Nevada. Reno: Nevada Department of Wildlife Biological Bulletin No. 6.
- Metraux, Alfred
1949 Weapons. In: *Handbook of the South American Indians*, Julian H. Steward, ed. Washington, D.C.: Bureau of American Ethnology Bulletin No. 143(5):229-263.
- Mildner, Michael P.
1974 Descriptive and Distributional Notes on Atlatls and Atlatl Weights in the Great Basin. In: *Great Basin Atlatl Studies*, by T. R. Hester, M. P. Mildner, and L. Spencer. Ramona: Ballena Press Publications in Archaeology, Ethnology and History No. 2:7-27.
- Nusbaum, Jesse L.
1922 A Basket-Maker Cave in Kane County, Utah. (With Notes on the Artifacts by A. V. Kidder and S. J. Guernsey.) New York: Heye Foundation Museum of the American Indian, Indian Notes and Monographs, Miscellaneous No. 29.
- O'Connell, J. F.
1967 Elko-Eared/Elko Corner-notched Projectile Points as Time Markers in the Great Basin. Berkeley: University of California Archaeological Survey Reports No. 70:129-140.
- Shutler, Richard, Jr.
1962 Lost City Pueblo Grande de Nevada. Carson City: Nevada State Museum Anthropological Papers No. 5.
- Smith, Gerald A.
1963 Archaeological Survey of the Mojave River Area and Adjacent Regions. San Bernardino: San Bernardino County Museum Association.
- Taylor, Herbert C., Jr., and Warren Caldwell
1954 Carved Atlatl from Northwest Coast. *American Antiquity* 7:279-280.
- Taylor, Walter W.
1966 Archaic Cultures Adjacent to the Northeastern Frontiers of Mesoamerica. In: *Archaeological Frontiers and External Connections*, Gordon F. Ekholm and Gordon R. Willey, eds. Washington, D.C.: *Handbook of Middle American Indians* Vol. 4:59-94.
- Thomas, David Hurst
1970 Archaeology's Operational Imperative: Great Basin Projectile Points as a Test Case. Los Angeles: University of California Archaeological Survey Annual Report No. 12:27-60.

- 1978 Arrowheads and Atlatl Darts: How the Stones Got the Shaft. *American Antiquity* 43(3):461-472.
- 1981a God's Truth in Great Basin Archaeology. *American Antiquity* 46(3):644-648.
- 1981b How to Classify Projectile Points from Monitor Valley, Nevada. *Journal of California and Great Basin Anthropology* 3(1):7-43.
- Thomas, David Hurst, Alan Leventhal, and Leonard Williams
 1976 Additional Pinon Ecotone Settlements of the Reese River Valley. In: *Prehistoric Pinon Ecotone Settlements of the Upper Reese River Valley, Central Nevada*, by David Hurst Thomas and Robert Bettinger. New York: American Museum of Natural History Anthropological Papers No. 53(3):328-365.
- Tschanz, C. M., and E. H. Pampeyan
 1970 *Geology and Mineral Deposits of Lincoln County, Nevada*. Reno: Nevada Bureau of Mines Bulletin No. 73.
- Tucker, Gordon C.
 1980 Quantitative Affirmation of Intuitive Typology. Pocatello: Idaho Museum of Natural History Miscellaneous Papers in Regional Anthropology, Tebiwa, No. 22.
- Turner, Thomas Hal
 1978 *Mule Springs Rockshelter: Its Archaeological and Ecological Interpretation Within the Southern Great Basin*. M.A. thesis, University of Nevada, Las Vegas.
- Wheeler, S. M.
 1973 *The Archaeology of Etna Cave, Lincoln County, Nevada*. Reno: University of Nevada Desert Research Institute Publications in the Social Sciences No. 7:1-56.
- Woodbury, Richard B., and Ezra B. W. Zubrow
 1979 *Agricultural Beginnings, 2000 B.C.-A.D. 500*. In: *Handbook of North American Indians, Vol. 9: Southwest*. Alfonso Ortiz, ed., pp. 43-60. Washington, D.C.: Smithsonian Institution.
- Wylie, Henry G.
 1974 Promontory Pegs as Elements of Great Basin Subsistence Technology. *Tebiwa* 16(2):46-55.

