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Archaeological Investigations at Pintwater Cave, Nevada, During the 1963-64 Field Season

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Pintwater Cave is a large, stratified, dry cave near Indian Springs, Nevada. As part of preliminary work conducted in 1963-64, surface artifacts on the cave floor were collected and a single test pit was dug without reaching noncultural deposits. A significant number of artifacts was recovered, but they have not been described until now. The collection is dominated by wooden dart and arrow shafts and fragmentary projectile points of the Elko series. Radiocarbon dates range from 9,300 to 3,000 B.P. Systematic multidisciplinary research by the Desert Research Institute at the cave may provide answers to several problems, including the as yet unresolved chronological and subsistence issues in southern Great Basin prehistory and the local effects of Holocene environmental fluctuations.

PINTWATER Cave was investigated by the Nevada State Museum in 1963-64, and this paper presents the first descriptions of the archaeological deposits and an analysis of the artifacts collected at that time. Pintwater Cave (26CK253; Fig. 1), one of the largest caves with archaeological deposits remaining in southern Nevada, may well be one of the most important Archaic sites in the region, containing stratified deposits, abundant artifacts (including lithics, bone, wood, and other perishables), and important paleoenvironmental information from dated packrat middens (Berger et al. 1965a; Berger et al. 1965b). Archaeological surveys of the nearby alluvial fans, steep drainages, and playas conducted in 1963-64 revealed at least nine additional archaeological sites, including small rockshelters, large lithic scatters, and a quarry.

The Desert Research Institute began a long-term program of archaeological and paleoenvironmental research in and around the cave in 1993. This research involves regional archaeological surveys, additional archaeological excavations, remote sensing, and collection of paleoecological data in the cave and adjacent valley floor (Buck and DuBarton 1994). As part of this research, materials collected almost 30 years ago were examined. The artifact collection, including field notes, photographs, and maps, was housed first in the Los Angeles County Museum of Natural History and later in the Southwest Museum. It is currently housed at the Desert Research Institute in Las Vegas. Other than preliminary cataloging conducted during or shortly after fieldwork, the artifacts were never studied in any detail. Until now, nothing has been published about the cave or its collection (a smaller collection made in 1968 by the Nevada State Museum will be discussed together with the 1963-64 collection). In this paper, the investigations conducted in 1963-64 are described, and descriptions and analyses of these artifacts are presented.

SITE DESCRIPTION

Pintwater Cave is approximately 35 m. wide, 70 m. deep, and 11 m. high, with a bed-

Fig. 1. Pintwater Cave is a large cave in limestone approximately 35 m. across at the dripline, 11 m. high, and about 70 m. deep. It is about 180 m. above the alluvial fan. Roof collapse is abundant, especially toward the rear of the cave.

rock lip rising approximately five or six meters at the entrance. Roof fall occupies a large percentage of the interior and slopes toward the ceiling at the rear of the cave. The cave floor and steep talus slope in front are littered with perishable artifacts and stone tools. The site is

at an elevation of 1,265 m. on the west side of the Pintwater Range, near Indian Springs, Nevada (Fig. 2). The highest point in the Pintwater Range is just above 2,100 m. The west side of the Pintwater Range, including Pintwater Cave, is located in Indian Springs Valley, just barely within the hydrographic Great Basin (Smith and Street-Perrott 1983). Three Lakes Valley, just east of the Pintwater Range, drains through Las Vegas Wash into the Colorado River Basin. The Pintwater Range, like the Sheep Range to the east, consists largely of dolomites and limestones of lower Paleozoic age (Longwell et al. 1965).

Although within the hydrographic Great Basin, vegetation around the cave is typical of Mojave Desert scrub communities (Beatley 1976; Brown et al. 1979). The cave itself is on a steep, rocky slope with a western exposure. Plants near the cave include a few Joshua trees (*Yucca brevifolia*), white bursage (*Ambrosia dumosa*), rabbitbrush (*Chrysothamnus nauseosus*), desert holly (*Atriplex hymenelytra*), Mormon tea (*Ephedra nevadensis*), green Mormon tea (*E. viridis*), and cheesebush (*Hymenoclea salsola*). The Pintwaters are now largely treeless, except in the extreme northern part, where scattered stands of pinyon and juniper are found. The alluvial fans in front of, and 180 m. lower than, the cave are dominated by white bursage and creosote bush (*Larrea divaricata*). Also common on the playa are shadscale (*Atriplex confertifolia*) and buckwheat (*Eriogonum inflatum*), with lesser amounts of blackbrush (*Coleogyne ramosissima*), hopsage (*Grayia spinosa*), dodder, rice grass (*Oryzopsis hymenoides*), and beavertail cactus (*Opuntia basilaris*).

Previous Research

After a brief visit to the cave in 1963 by Richard Shutler and C. Vance Haynes (Haynes, personal communication 1994), Mr. Herschel ("Hersch") C. Smith, a wealthy building contractor from Los Angeles and co-sponsor of the Tule Springs Project, mounted an expedition to excavate the cave (M. Lyneis, personal communication 1993). Apparently disappointed that the materials from Tule Springs were not as early as anticipated, Smith hoped Pintwater Cave would show evidence of human occupation dating to the Late Pleistocene. Between October 1963 and May 1964, a small team of archaeologists, directed first by Margaret Susia and later by Charles Rozaire, traveled on weekends from Los Angeles to conduct a regional survey and test the cave for cultural deposits. Due to increased bombing by the U. S. Air Force in the vicinity of the cave, worry about crew safety while moving large boulders inside the cave, and the approach of hot weather, work in the cave was terminated in June 1964.

The work that began in 1963 was intended to be just the beginning of a long-term effort at Pintwater Cave. To that end, a systematic control grid was established in the cave using a surveyor's level. A main datum was established at the mouth of the cave at the south end of the steep lip leading into the cave itself, with assigned coordinates of 0N/0E and an elevation of 0.00 ft. (Fig. 3). The baseline on the lip (the 0E line) was oriented 6° 20" east of true north and grid lines were established every five feet. Originally, at least two long trenches parallel to the cave lip were planned, separated by a 5-ft.-wide balk for stratigraphic control. These were to extend from 0N/55E and 0N/65E 65 ft. to the north wall of the cave. A 5-ft. square unit was planned at grid coordinates 30N/0E.

Ultimately only a single area was excavated (Fig. 4). This was a small test pit at coordinates 50N/60E (the "Susia test pit"), excavated about February 23, 1964. Two smaller areas close by, termed Pocket No. 1 and Pocket No. 2, were excavated at a later date by Rozaire. These "pockets" were large cracks and crevices between boulders filled with fine-grained sediment and artifacts. The fill in this area of

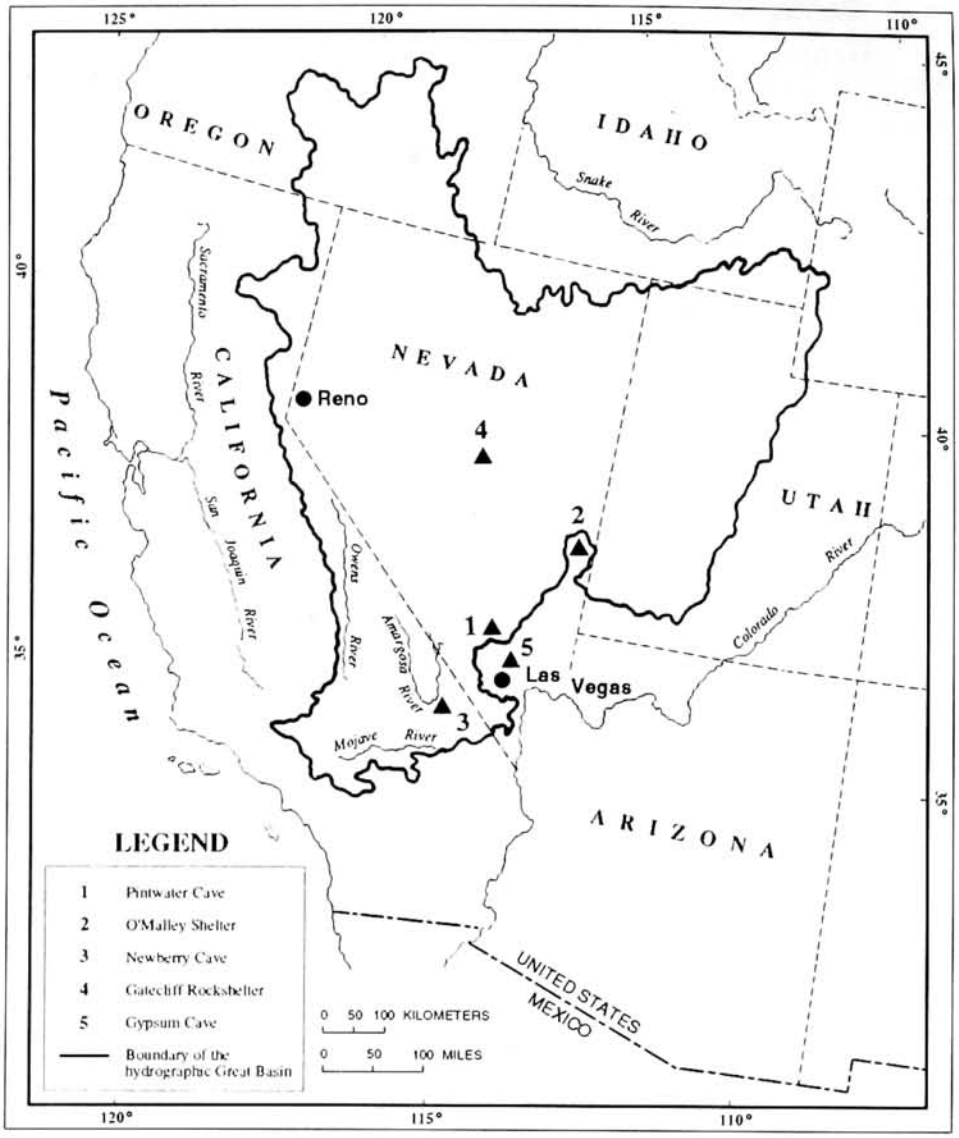

Fig. 2. Location of Pintwater Cave and other sites discussed in text (after Smith and Street-Perrott 1983).

excavation was described as a very fine-grained, brown alluvium. The excavations proceeded in 6-in. levels, with all flakes, bone, and possibly modified bone being saved. The work was done using a trowel, whisk broom, and dustpan. All materials were screened through 1/8-in. mesh.

All artifacts that were noted on the surface were collected. Artifacts recovered included projectile points, wooden arrow and dart shafts, other wooden objects, a large number of unmodified wood pieces, and animal bones. Also included in the collection are animal dung, packrat midden, and soil samples.

Stratigraphy

Only a single test pit was excavated in the cave during the 1963-64 season. Although two other small units were dug by Rozaire, the best descriptions of the deposits came from the Susia test pit. Rozaire (1964:1-2) described the stratigraphy of the test pit in his report to Herschel Smith in April 1964:

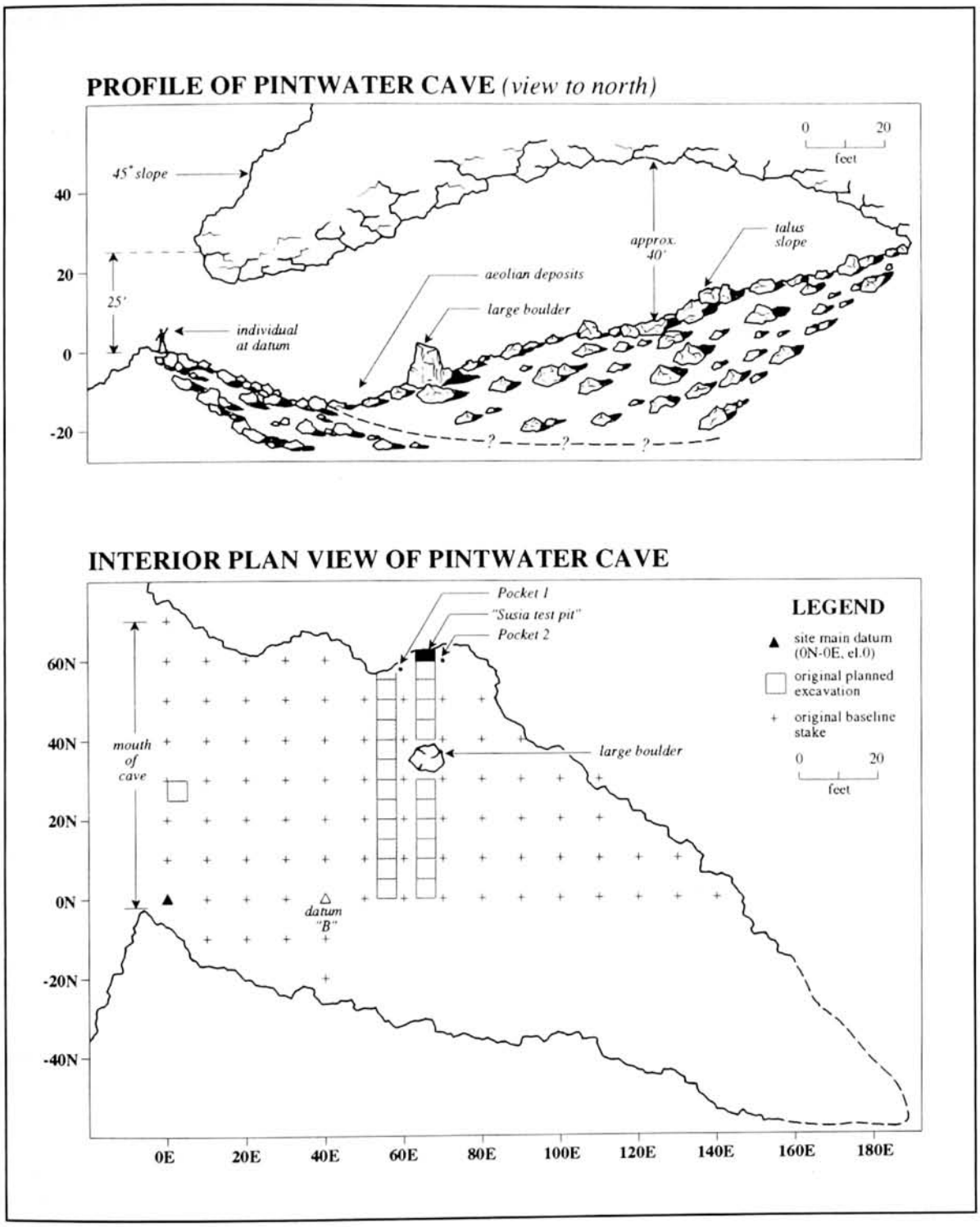

Fig. 3. Profile of Pintwater Cave and interior plan map of the floor.

> The east wall of the pit shows a smooth clear profile of soil composed of very fine compacted fluvial silts with thin lamellar strata showing up in cross section. The soil is moderately filled with small angular limestone cobbles; a large limestone boulder occupies the center of the pit and others of equal size occur at the margins.
>
> Along most of the north wall of the cave itself fine fluvial sediments are to be seen with occasional sump depressions where water has drained in and remained in puddles. Eolian sedimentation may have occurred occasionally but the water intrusions have compacted the deposits. The east wall of the test pit dug by Susia shows a strong and undisturbed stratigraphy and would seem to have promise for obtaining a good column of samples for pollen analyses.

During investigations in the cave in 1993, this marked stratigraphy in the still-exposed test pit wall (Fig. 4) was noted. The upper 30 cm. consisted of finely laminated light tan and white silts or clayey silts with almost no particles larger than sand-sized. In some cases, the laminations were less than a millimeter thick, and were regularly bedded. This sequence was underlain by a 10- to 15-cm. thick layer of fist-sized limestone angular cobbles and pebbles, inferred to be roof collapse, followed by another sequence of finely laminated silts. These fine-grained deposits appeared more like eolian deposition than a result of water, a supposition strongly supported by the recovery of usually perishable materials.

Roof fall in the form of large, angular boulders and talus covered a significant portion of the cave floor, creating a whole series of unstable depositional pockets that intergraded to varying degrees with one another (Rozaire 1964). Although Rozaire thought it would be difficult to find continuous layers of well-defined and bounded strata that could be correlated from different excavation units, the obvious stratification seen in the Susia test pit clearly showed there were at least some areas of well-defined stratigraphy, containing charcoal for dating and abundant stone and wood artifacts.

ARTIFACT DESCRIPTIONS

The bulk of the 1963-64 collection consists of wooden dart and arrow shaft pieces and stone projectile points. Lithic debitage is uncommon in the collection, implying either that little reduction occurred in the cave or that flaking debris was not systematically collected. Certain classes of artifacts are notable only by their absence or rarity; for example, no milling stone is present and only two fragments of brown ware pottery have been recorded in the cave. The discussion below concentrates on the two most abundant artifact classes: wooden dart and arrow shaft pieces and projectile points.

Dart and Arrow Shafts

Sites containing well-preserved wooden artifacts are relatively rare in the southern Great Basin and include Gypsum Cave (Harrington 1933) and Newberry Cave (Davis and Smith 1981). Such sites are more numerous in the eastern, central, and northern Great Basin (Loud and Harrington 1929; Jennings 1957; Heizer and Krieger 1959; Aikens 1970; Fowler et al. 1973; Thomas 1988; Elston and Budy 1990). Both compound and simple dart and arrow shafts are known from the western United States. The most common type in Great Basin assemblages is compound. Two- and three-piece compound dart and arrow shafts have been recognized (Harrington 1933; Dalley 1970). These consist of a hardwood foreshaft with a tapering proximal end that is inserted into a drilled socket on the distal end of a wooden or reed mainshaft. While reed provides a natural socket for this insertion, it may also be reamed to provide a close fit. A compound dart could have a cup drilled directly in the proximal end of the mainshaft or it might include a "butt" attached to the mainshaft using a socketing method. In either case, the drilled

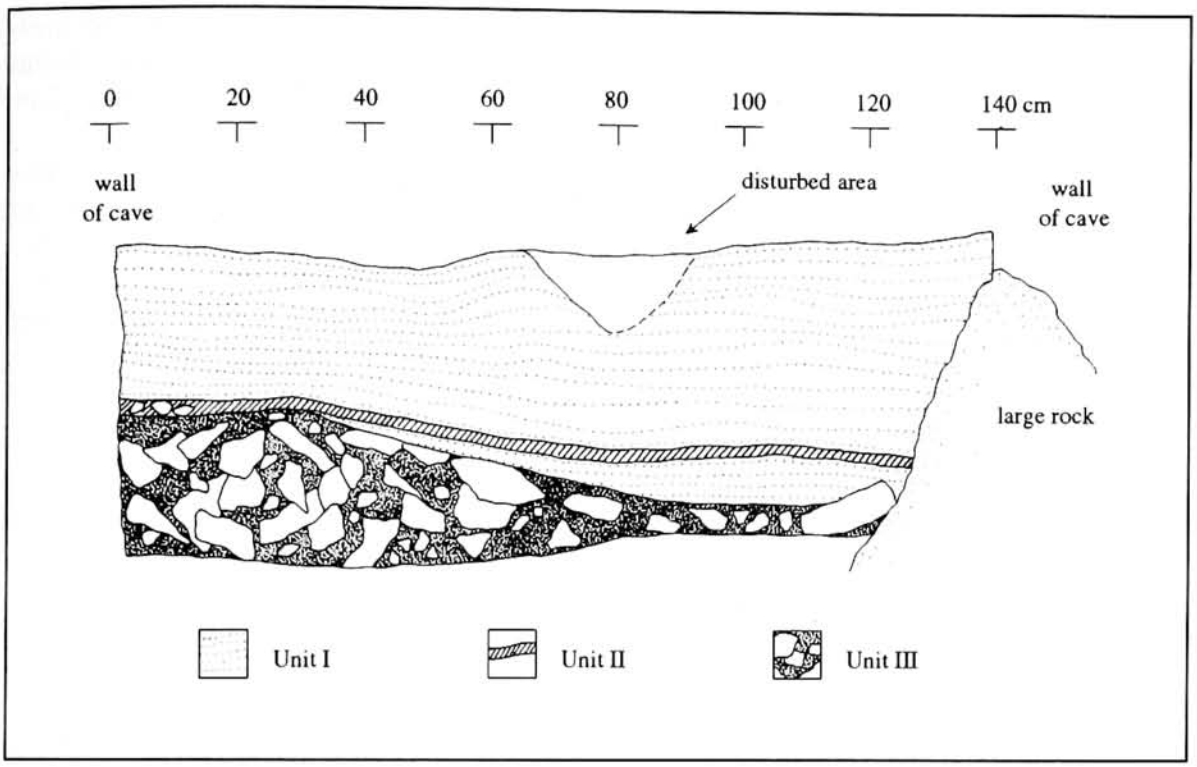

Fig. 4. A single main test pit was excavated in 1964. The stratigraphy of the east wall of the test pit was drawn after cleaning in 1993, and shows a sequence of fine silt laminations, inferred to be eolian deposits. Unit I: Fine sand and silt; very distinct laminations, usually less than 2 to 4 mm. thick; generally parallel-bedded, alternating brown/tan with white laminations; well-sorted, compact, friable. Unit II: Similar to Unit I, but with a scattered layer of desiccated brown sheep pellets (?); also abundant charcoal flecks. Unit III: Angular limestone cobbles up to about 15 cm. in a matrix of fine sand or silt; roof fall. This unit was underlain by another layer of finely laminated sands and silts (not shown in figure).

cup would engage the atlatl spur (Harrington 1933). Foreshafts are commonly made from greasewood (*Sarcobatus vermiculatus*), willow (*Salix exigua*), mesquite (*Prosopis* spp.), or arrowweed (*Pluchea sericea*), while mainshafts can be made from hardwoods or reeds such as *Phragmites australis*. Harrington (1933:93-98) described both hardwood and reed "butts" at Gypsum Cave.

Dart Shafts. At Pintwater Cave, compound dart components make up more than 82% of the identifiable shafts (Table 1). A total of 143 wood and reed dart fragments was recovered from the 1963-64 excavation season and the 1968 surface collection. Most of these were collected from the cave floor. An additional 60 specimens too fragmentary to assign to the dart or arrow category may also be dart components.

A total of 18 foreshafts has been recovered from Pintwater Cave, all made of wood. They are shaped at one end to a sharp or blunt point that could fit into a reed or wood mainshaft (Fig. 5). Numerous foreshafts are broken at the extremity opposite the tapered end where the point would have been. These breaks are in the form of lateral shredding of the wood, presumably a result of impact initiated at the location where the projectile point was hafted to the foreshaft. It should not be assumed that all darts were tipped with stone projectile points; some foreshafts may simply have been sharpened to a point and used for other purposes.

Table 1
NUMBERS OF SPECIMENS FROM PINTWATER CAVE THOUGHT TO BE DART OR ARROW SHAFT PIECES

	Hardwood	Reed	Both	Totals
DARTS[a]				
foreshafts	18	--	--	18
mainshafts	96	24	1	121
butts	3	1	--	4
Subtotal	117	25	1	143
ARROWS				
foreshafts	7	--	--	7
mainshafts	9	15	--	24
Subtotal	16	15	--	31
unidentified fragments	38	22	--	60
TOTAL	171	62	1	234

[a] Includes specimens recovered from the 1963-64 season and those collected in 1968 now at the Nevada State Museum. The determination of whether a specimen is a dart or arrow mainshaft was based largely on the diameter of the specimen. Approximately 82% of the identifiable specimens are darts or fragments of darts.

Most of the specimens exhibit diagonal grinding marks along the length of the tapered end. Harrington (1933:97) stated that these relatively pronounced marks were intentionally made on the pointed end so that it would fit tightly inside the mainshaft. One complete foreshaft is 19.2 cm. in length and 0.89 cm. in diameter, with adhesive on the pointed end and a V-shaped notch at the distal end for hafting a projectile point (Fig. 5a). Some pitch fragments are also retained in the notch cavity. Another foreshaft (Fig. 5b) appears to have been notched by burning; it bears a wide, U-shaped notch at one end that is charred as though a hot implement was applied to make the notch. One specimen (Fig. 5c) is unusual because it features a shouldered point rather than the gradually tapered shaping typical of other foreshafts in the collection. This specimen is also extremely thick, measuring 1.3 cm. in diameter. A similar specimen was recovered at Lovelock Cave (Loud and Harrington 1929:Plate 46b).

Both wood and reed mainshaft specimens are part of the Pintwater Cave dart assemblage; some of the more complete specimens are illustrated in Figure 6. A total of 121 mainshaft fragments was identified within the combined collections recovered in 1963-64 and 1968. Of these, 96 are hardwood, 24 are reed, and one is both hardwood and reed bound with sinew. Of the 60 indeterminate fragments, 38 are hardwood and 22 are reed. While no complete reed mainshafts were found in the cave, one *Phragmites australis* specimen (Fig. 6a) measures 26.1 cm. in length and is 1.16 cm. in diameter. As at Gypsum Cave (Harrington 1933), traces of green paint remain on the shaft. Because the reed is hollow, the foreshaft can be inserted easily with little modification. The cup is reamed out of the end of the reed and is kept from splitting by a natural joint or septum about 1 cm. below the butt. Harrington (1933:97) described a nearly identical specimen from Gypsum Cave. At many Great Basin sites, reed mainshafts which were part of compound darts were reinforced at the joint with sinew bindings. One specimen from Pintwater Cave illustrates this reinforcement method (Fig. 6b). While the foreshaft and the mainshaft are broken on either side of the reinforcement binding, the joint itself is intact and the two pieces remain attached. Many of the reed shaft fragments are longitudinally split at one end. These may have been split intentionally prior to insertion of a "butt" end or for fletching. Reed mainshafts were recovered at Leonard Rockshelter and at Gypsum Cave, where hundreds of specimens were found (Harrington 1933).

Large diameter pieces of wood in the Pintwater Cave collection that are broken at one or both ends appear to be wooden mainshaft or simple dart fragments (Fig. 6c). The largest of

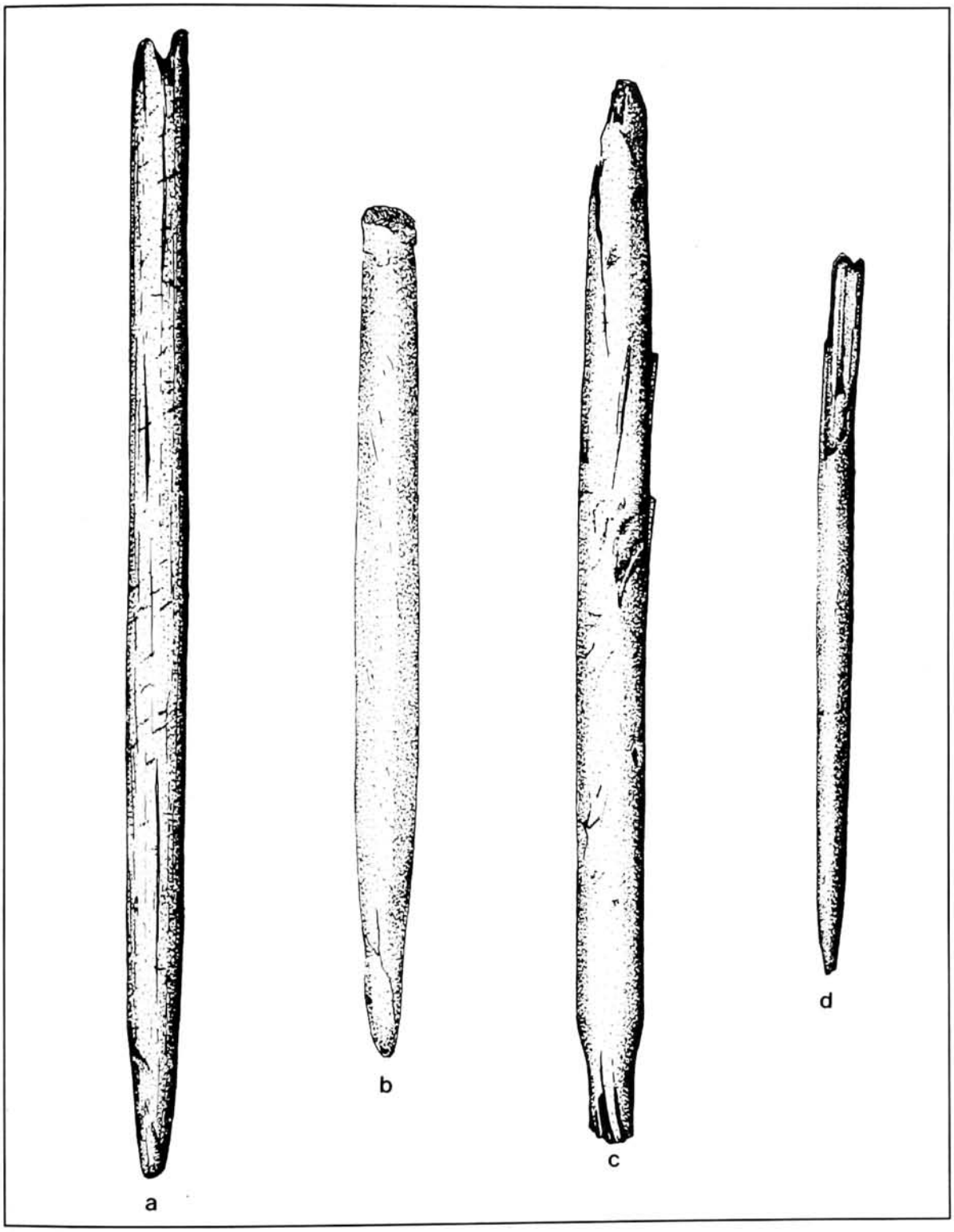

Fig. 5. Hardwood dart and arrow foreshafts: (a) complete dart foreshaft (length 19.2 cm.); (b) dart foreshaft fragment with tapered end; (c) shouldered dart foreshaft; (d) arrow foreshaft.

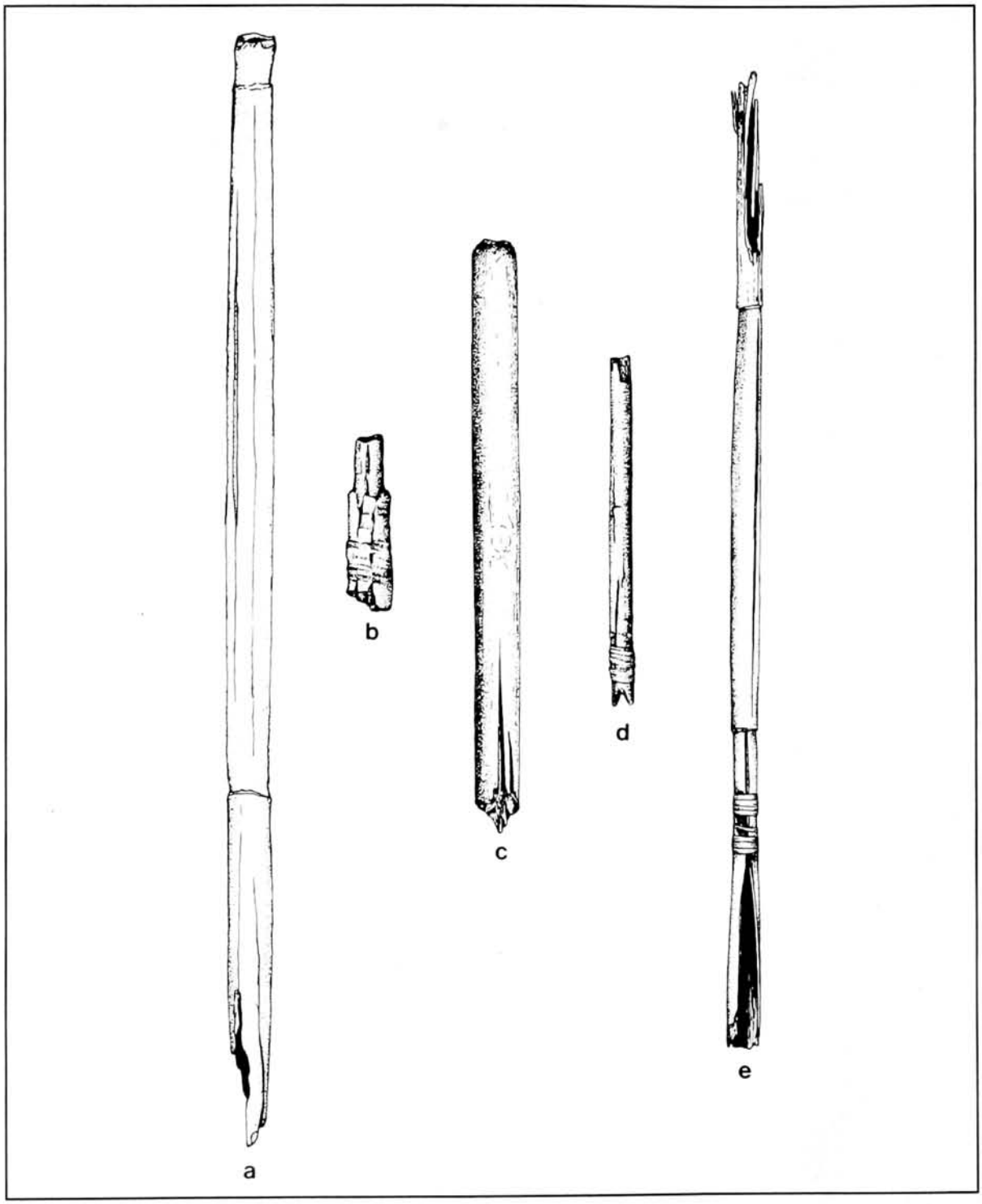

Fig. 6. Wood and reed mainshafts: (a) reed mainshaft with cup above joint and lateral splits at one end (length 26.1 cm.); (b) conjoined reed mainshaft and wooden foreshaft wrapped with sinew at the joint; (c) hardwood mainshaft fragment; (d) reinforced nock end of arrow shaft; (e) reed arrow shaft with sinew binding and feather fragment.

these fragments is 21.8 cm. long, blunt at one end and with a U-shaped notch at the other. It is broken along the longitudinal axis in a twisting manner. Simple wooden mainshafts, common at Hogup Cave (Dalley 1970), often have a cup at the proximal end that would engage the spur of the atlatl. None of the wood mainshaft specimens found at Pintwater Cave appear to have this cup, although reed mainshafts with drilled cups and multiple butt-end dart components with drilled cups are part of the assemblage. Proximal and distal mainshaft fragments were found in the 1968 artifact collection. Five hardwood distal fragments and one reed distal fragment were recovered, as well as three hardwood proximal fragments and three reed proximal fragments. One hardwood mainshaft features a conical socket at one end, which has been reamed out so that a foreshaft or butt could fit inside. On the exterior, diagonal striae extend 3.3 cm. from the end of the implement. Evidence for wrapping of the joint is also present; black wrapping marks overlie the diagonal striae along the entire length of the socket.

The reed mainshaft fragments recovered are generally very fragmentary. In one instance, three pieces of a reed mainshaft were reconstructed. This specimen features green paint and diagonal striae along most of its length. Many of the reed mainshaft fragments feature longitudinal breaks; these make precise measurement of the diameter unreliable. Descriptive statistics and cluster analyses were used to determine whether there was any clustering of the diameters specific to dart and arrow shafts. Diameters for both hardwood and reed mainshafts from the Southwest Museum and the Nevada State Museum collections were combined to produce a diameter range for all of the collections known to have been recovered from Pintwater Cave. Two discrete groups are obvious when foreshaft diameters are compared. Arrow foreshafts cluster in the range of 5.6 to 6.8 mm., while the dart foreshafts range from 9.3 to 11.7 mm. Discrete groups are not as obvious when mainshaft diameters are compared. A large number of specimens clusters in the 9.5 to 11.8 mm. range, while other mainshafts are either smaller or larger.

Researchers have described "butt-end" or "shaft nock" pieces that derive from both simple and compound darts (Harrington 1933; Heizer 1951; Dalley 1970; Davis and Smith 1981). These butts have a small hole or "cup" drilled in the proximal end to engage the atlatl spur. The specimens found at Pintwater Cave are of a much smaller diameter than any of the mainshaft pieces, suggesting that these were compound dart components.

Four items in the Pintwater collection can be identified as butt ends of darts similar to the types described by Harrington (1933:96-97). He described two types of butt ends from compound darts in the Gypsum Cave collection. One type is made of hardwood and features a tapering end to fit inside the mainshaft; the other type is made of reed and is larger than the mainshaft. The mainshaft would presumably have a tapering end which would fit inside the butt. Three of the Pintwater specimens appear to be of the first type. One was originally identified as a foreshaft, but because the arrows in this collection are all of two-piece manufacture (foreshaft and mainshaft with nock), and because it is coated with pitch, it is more likely part of a compound dart butt (Fig. 7a). Two fragmentary hardwood specimens are broken at one end and feature a drilled cup at the other (Figs. 7b, 7c). The two specimens measure 8.3 and 9.5 mm. in diameter respectively. A final specimen is made of reed which has been cut just above a joint and reinforced with sinew (Fig. 7d). This is identical to a specimen illustrated by Harrington (1933:Fig. 51).

Arrow Shafts. Thirty-one arrow components were recovered from Pintwater Cave (Table 1). As mentioned above, 60 hardwood

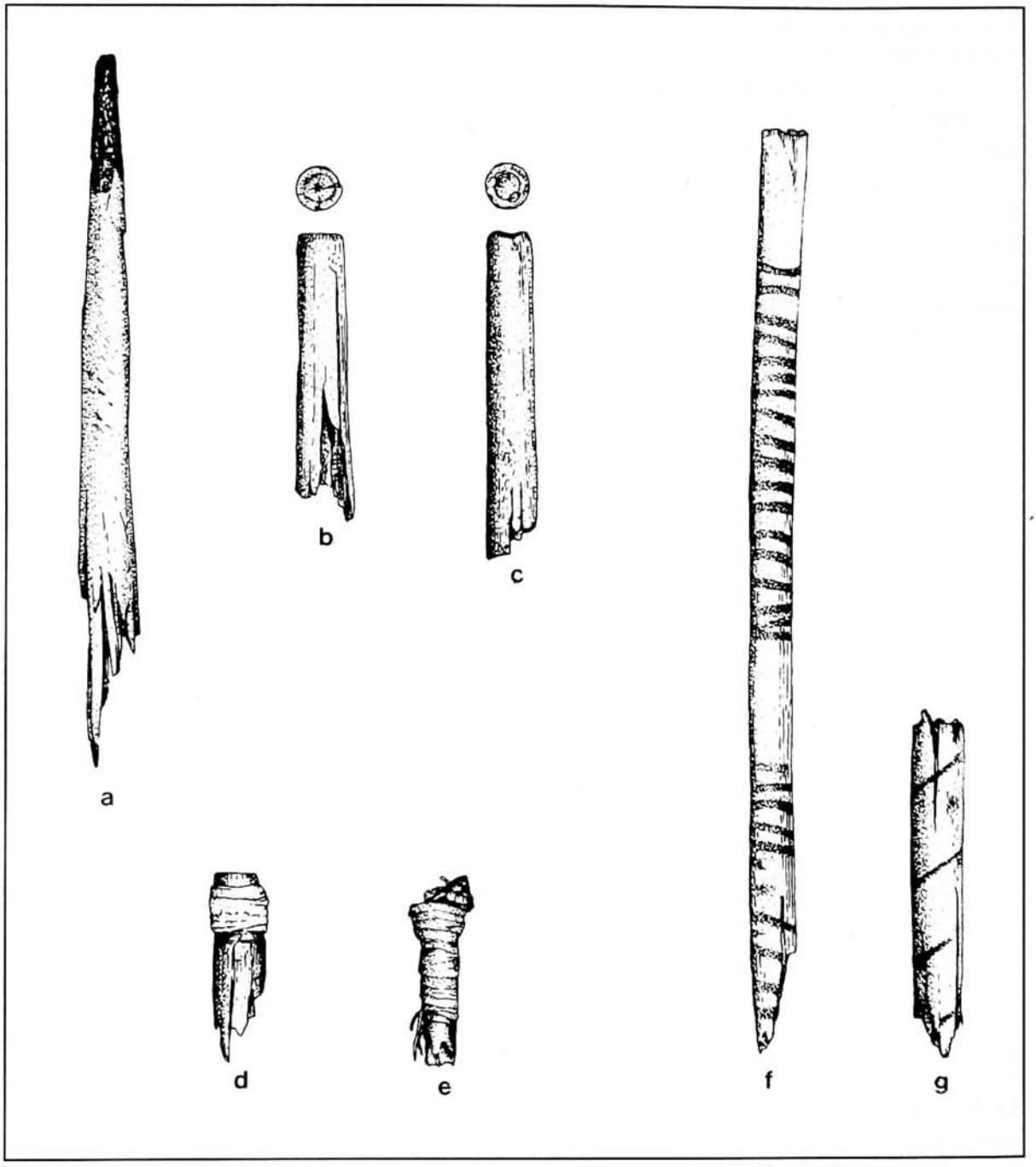

Fig. 7. Butts, joints, and decorative treatments: (a) tapered wooden shaft (Although this specimen is similar in form to dart foreshafts, pitch at the tapered end implies a different function. It may be the distal end of a butt, with the pitch-coated end tapered for insertion in a larger mainshaft.); (b), (c) hardwood "butts" with drilled cups; (d) reed "butt" above a joint and reinforced with sinew; (e) arrowshaft with point fragment; (f) reed mainshaft decorated with white paint and lashing (length 14.3 cm.); (g) wood mainshaft fragment decorated with spiral in red/brown.

and reed fragments that are too small to be identified reliably may be either dart or arrow components. However, the curvature of the cross sections suggests that many of these pieces are dart mainshaft fragments.

Seven items were classified as arrow foreshaft fragments. These are identical in construction and form to the previously described dart foreshafts and are differentiated from them only by their smaller diameter (e.g., Fig. 5d). All consist of a tapering section that would fit into the mainshaft section. The diagonal striae noted on some of the dart foreshafts were also seen on several of the arrow foreshaft specimens.

Twenty-four identifiable arrow mainshafts and numerous shaft fragments were found in the cave. Most of them appear to be parts of simple or two-piece compound arrows. Several specimens retain the nock end of the arrow. Two feature V-shaped notches made in a hardwood shaft; one is wrapped with sinew at the proximal end (Fig. 6d). This notch would have held the arrow onto the bowstring, and is called the "nock." Another has a square-cut notch and is wrapped with sinew to reinforce contact with the bow. One specimen still retains the proximal remnant of a small stone projectile point in a hardwood shaft (Fig. 7e). This is sealed with pitch and wrapped with sinew. Instead of a stone projectile point, another specimen exhibits a thin sliver of wood jammed into a V-shaped notch; the notch was then wrapped with sinew. This same specimen also features green painted designs in both longitudinal and horizontal lines along its length. Eleven reed mainshaft sections were also identified. One specimen has longitudinal splits for fletching and still retains a small fragment of feather lashed with sinew (Fig. 6e).

Decoration of Dart and Arrow Shafts. Many of the dart and arrow components are decorated with paint. Design elements cannot be recognized on most of the specimens, but it appears that both a reddish/brown and a lime green paint were used to decorate foreshafts and mainshafts. These colors are the same as those most commonly used at Gypsum Cave; intricately decorated shafts are illustrated on the frontispiece of Harrington's book (1933). The most common components in the Pintwater collection include large, solid applications, longitudinal lines, and horizontal lines encircling the body of the shaft. One specimen also documents the use of white paint; this reed mainshaft fragment shows the imprints of some kind of binding where white paint was applied afterward (Fig. 7f). While the binding no longer remains, the imprints are obvious because there is no paint remaining in the places where the shaft was wrapped. On some Pintwater Cave specimens, parallel bands of red can be recognized, while others appear to have been painted a solid green. One specimen is decorated with a spiral of red/brown paint (Fig. 7g).

Projectile Points

The second most abundant class of artifacts in the collection is projectile points (Figs. 8, 9). While projectile points are common at surface sites throughout the southern Great Basin, few sites have been found that contain projectile points in stratified, datable deposits. As a result, separate and often conflicting chronologies have been suggested for southern Nevada. Some researchers, emphasizing cultural similarities to prehistoric assemblages of the central and northern Great Basin, extend point styles and their concomitant chronology into the southern Great Basin (Reno et al. 1989). Others, seeing much more direct links with archaeological assemblages of southeastern California, use terminology and dating developed in that area (Warren and Crabtree 1986; Livingston and Nials 1990). The most recent tendency is to use central Nevada projectile point chronologies, especially those developed by Thomas (1981, 1988) and Thomas and Bierwirth (1983) for Monitor Valley, and extrapolate southward.

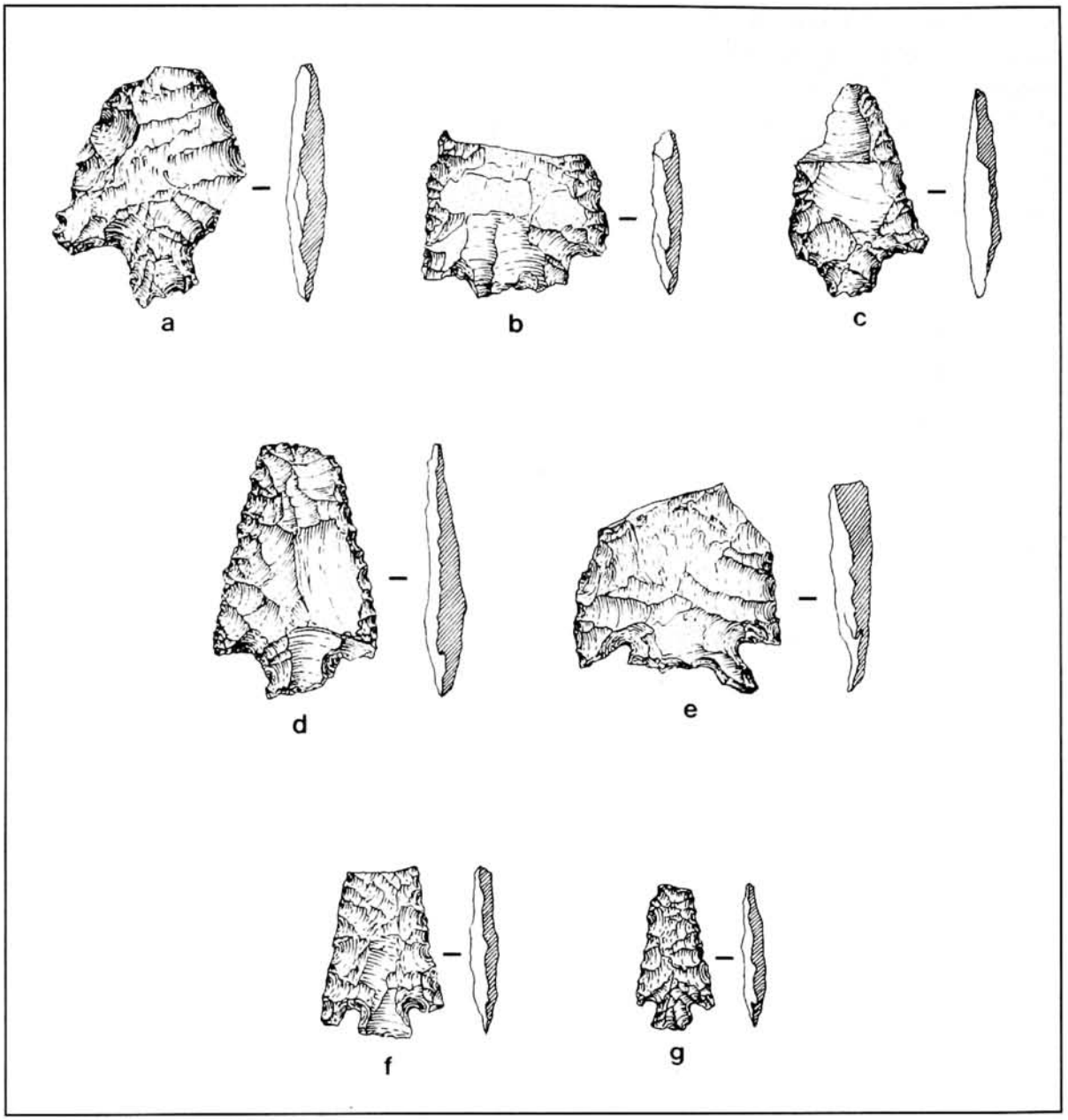

Fig. 8. Selected dart and arrow points: (a) Gatecliff series point with basal retouch across break; (b) Gypsum Cave point with retouch across the pitch; (c) Gypsum Cave point with impact break; (d) Gypsum Cave point with basal retouch across the break (length 3.8 cm.); (e) Elko Eared point with retouch across the pitch; (f), (g) Rosegate series points.

In the following section, the projectile points found at Pintwater Cave are described in terms of the culture-historical classes currently used by southern Nevada archaeologists. The time of appearance and duration of these point styles, however, vary considerably from region to region within the Great Basin, and associated ages in southern Nevada are imprecise. Part of this variation may be caused by differential temporal distributions of individual projectile

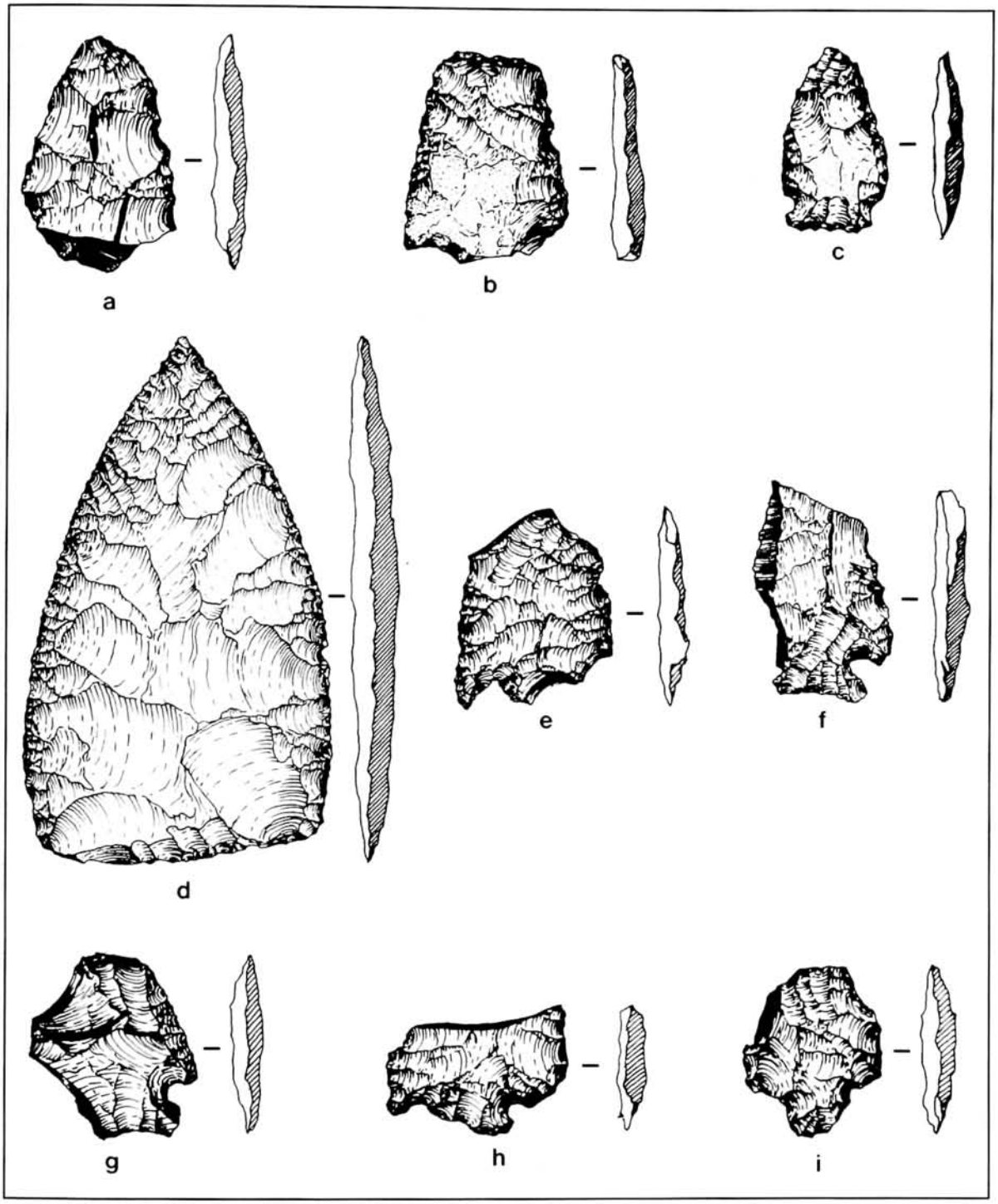

Fig. 9. Selected artifacts from the 1963-64 test pit and pockets: (a) Gypsum Cave point; (b) Gypsum Cave point with rework across the pitch; (c) small Elko Side-notched point with retouch across the pitch; (d) large biface (length 8.3 cm.); (e) Elko series point; (f) Elko Corner-notched point; (g) Elko series point; (h) Elko series point; (i) Gypsum Cave point. Items a-c are associated with a radiocarbon date of 3,255 ± 80 B.P. from Pocket No. 1; items d-i were found in the Susia test pit and are associated with a date of 3,400 ± 80 B.P.

point attributes, or clusters of attributes, rather that conventional point types (Beck and Jones MS). The appearance of some point styles in a given area may be correlated with local environmental changes due to Holocene climatic factors. However, in specific regions, the succession of point styles appears to be the same, and provides some measure of chronological control even if the precise time span has not been determined (see Bettinger et al. 1991).

Typology. A total of 74 dart and arrow points was recovered from the cave in 1963 and 1964 (Table 2). The points collected in 1968 and stored at the Nevada State Museum were not analyzed as part of this preliminary work. Of this total, 60 complete and fragmentary dart points and six arrow points were identified. The remaining eight points were not identifiable. Most of the points recovered from Pintwater Cave are types that have been dated to the Archaic: Elko, Gypsum Cave, and Humboldt series. Some incomplete specimens were identified as dart or arrow points because of their size and thickness, but could not be assigned a type because they were too fragmentary.

A total of 13 Gypsum Cave/Gatecliff series points, mostly contracting stem varieties, was found during the 1963-64 season (Figs. 8a-8d, 9a, 9b, 9i). Thomas and Bierwirth (1983:183) assigned time ranges from 5,000 to 3,300 years ago for this point style at Gatecliff Shelter in central Nevada. The Pintwater collection includes 17 Elko series points (Figs. 8e, 9c, 9e-h). The time range attributed to this style is quite variable, ranging from 3,765 to 1,250 B.P. depending upon the area in question (Lanning 1963; Clewlow et al. 1970; Davis and Smith 1981; Thomas and Bierwirth 1983; Hicks et al. 1991; Drollinger et al. 1992).

A single Humboldt series point was recovered during the 1963-64 excavations at Pintwater Cave. These unnotched, lanceolate, concave base points are often divided into large and small varieties (Thomas 1981). Chronologically, they can be correlated with Gypsum/Gatecliff and Elko series points (Warren and Crabtree 1986).

Of the six arrow points recovered at Pintwater Cave, four are identified as Rosegate Corner-notched types (Figs. 8f, 8g). This type dates from 1,940 to 390 B.P. in other parts of the Great Basin (Clewlow 1967; Clewlow and Wells 1980; Bettinger 1989).

Raw Material. The most common raw material for projectile point manufacture at Pintwater Cave is a light-colored chert that was probably quarried from alluvial fans at the base of the Pintwater Range below the cave. Surface collections indicate that quarrying and the production of large, late-stage bifaces occurred extensively around the playa margins and terraces. This material ranges from white to buff to brown in color. Only six specimens are obsidian, most so small that little can be said about them. Two are indeterminate dart point fragments, while the remaining four specimens could not be assigned to the arrow or dart category. The remaining raw material categories include one specimen each of agate, quartzite, and chalcedony.

Breaks and Rejuvenation. Two aspects of the Pintwater Cave projectile point collection are discussed here. The first is the nature and location of breaks found on the specimens; the second is the common occurrence of pitch adhering to many points.

Thirty-five of the points exhibit impact breaks (Ahler 1971:52), 12 exhibit a combination of impact and snap fractures, and 10 have snap fractures. Nine points are complete. Snap fractures can result from a variety of actions, including end shock, excessive bending, and "haft snap." Many of the points exhibit impact fractures at the distal end and haft snaps at the proximal portion. In at least eight specimens, part of the stem or portions of the tangs are broken off (e.g., Figs. 8a-e). These breaks are characteristic of points that have been broken

Table 2
PROJECTILE POINTS RECOVERED FROM PINTWATER CAVE DURING 1963-64[a]

	Material Type					
	chert	agate	obsidian	quartzite	chalcedony	Total
DART POINTS						
Elko Side-notched	1	--	--	--	--	1
Elko Corner-notched	3	--	--	--	--	3
Elko Eared	3	--	--	--	--	3
Elko series	10	--	--	--	--	10
Gypsum Cave/Gatecliff	13	--	--	--	--	13
Humboldt	--	--	--	1	--	1
Leaf-shaped	1	--	--	--	--	1
Indeterminate dart	25	--	2	--	1	28
TOTAL DART POINTS	56	--	2	1	1	60
ARROW POINTS						
Rose Spring Corner-notched	3	1	--	--	--	4
Indeterminate arrow	2	--	--	--	--	2
TOTAL ARROW POINTS	5	1	--	--	--	6
UNIDENTIFIABLE	4	--	4	--	--	8
TOTAL POINTS	65	1	6	1	1	74

[a] Of 66 identifiable projectile points, 60 (91%) are dart points; does not include a small number of points in the Nevada State Museum collection.

during use. Evidence indicates that at least some of the broken Pintwater Cave points were repaired so that they could be used again.

Of the 66 projectile points considered during the analysis, 19 exhibit evidence that they were rejuvenated. Typically, an impact break at the distal end is reworked to form a new tip and the point is rehafted for continued use. However, breaks to the haft element may also be reworked. At Pintwater Cave, the reworking of basal elements is apparent on those specimens that retain pitch used during the original hafting. Ten specimens retain pitch. Of the points that are broken at the stem or tang, eight have been reworked across the pitch, making new proximal forms (e.g., Figs. 8b, 8e, 9b, 9c). Several partially modified specimens appear to have begun their use cycle as Elko series points. Where part of the stem or a tang was broken during use, the point was reworked to form a contracting stem with square or sloping shoulders rather than the expanding stem and tangs typical of Elko points (Figs. 8a-d, 9b). In form, many of these specimens look like Gypsum Cave points, with the exception that the stem is sometimes slightly concave rather than convex. While it may be argued that reworking of haft elements obscures the chronological significance of projectile point types, in the case of the Pintwater Cave dart

points this does not seem to be the case. Reworking occurs on point styles which are essentially contemporaneous, and implies a common Middle Archaic technological pattern.

Large Biface

The final artifact considered here is a large, triangular biface that was recovered from the excavation unit (Fig. 9d). The biface is extremely well made; it is very thin in cross section and features skillful soft hammer percussion across both faces and pressure flaking along the margins. Microscopic examination at 100X did not reveal evidence that it had ever functioned as a tool. Slight crushing and grinding were evident along the margins, but this appears to be abrasion resulting from platform preparation.

FAUNAL REMAINS

Preservation is remarkably good in Pintwater Cave, and the floor of the cave is littered with owl pellets, bone, and wood fragments. The 1963-64 collection from Pintwater Cave includes a small collection of animal bones of uncertain provenience, although at least some specimens derive from the Susia test pit. A preliminary inspection by Stephanie Livingston in 1993 indicated that there are at least 128 identifiable specimens, including reptiles, birds, and mammals. The mammalian elements include bats, rabbits, rodents (kangaroo rats, packrats, mice, and unidentified rat), carnivores, and artiodactyls. There are more packrat (*Neotoma*) elements than any other, not surprising in a cave with abundant packrat middens. Of the artiodactyl elements, three are pronghorn (*Antilocapra americana*) and some may be desert bighorn sheep (*Ovis canadensis*). Four elements are from jackrabbit (*Lepus* sp.).

RADIOCARBON DATING

Ten radiocarbon assays have been obtained on materials from Pintwater Cave since 1963. Five assays from packrat midden samples from inside the cave (see Berger et al. 1965b), are between 16,300 B.P. and 14,870 B.P. Five other radiocarbon dates are associated with cultural materials from Pintwater Cave (Table 3).

A date of 3,255 ± 80 B.P. (UCLA-752, Berger et al. 1965a) was obtained on twigs from Pocket No. 1 at a depth of 3 to 6 in., excavated by Rozaire in 1964. This was an area about three feet square and ten inches deep filled with twigs, silty soil, artifacts, and small angular cobbles. Materials in this pocket included nine points or point fragments, two Gypsum Cave points (Figs. 9a, b), a small Elko Side-notched point (Fig. 9c), and six too fragmentary to classify. A sample of wood charcoal from the Susia test pit at a level of 18 to 24 in. below datum (collected during the 1963-64 season) was recently submitted for radiocarbon dating. The description in the catalog stated that this sample is "from central part of pit accompanying sample from the level collected from screen." A variety of lithic artifacts was recovered from the same level, including a large chert biface (Fig. 9d), four Elko series points (Figs. 9e-h), a Gypsum Cave point (Fig. 9i), and three indeterminate dart point fragments. The radiocarbon date associated with these points is 3,400 ± 80 B.P. (Beta-65254).

Rozaire (1964:2) reported that "a date of 6,500 B.P. was received on two shafts recovered from the surface of the rock fall," possibly near grid square 40N/50E. This date probably came from the Lamont-Doherty Geophysical Laboratory, but it apparently was never published (W. S. Broecker, personal communication 1994), and the sample number and standard deviation are unknown.

A date of 9,200 ± 200 B.P. (UCLA-553) was obtained on charcoal collected by Vance Haynes and Richard Shutler (Haynes 1965; R. Shutler, personal communication 1994) from a fire hearth found just below the surface of the

Table 3
RADIOCARBON DATES FROM PINTWATER CAVE ASSOCIATED WITH CULTURAL MATERIALS

Lab. No.	Age B.P.[a]	Material	Provenience	Reference
UCLA-752	3,255 ± 80	twigs	Pocket No.1, 3-6 in. below surface	Berger et al. 1965a
Beta-65254	3,400 ± 80	charcoal	Susia test pit, 18-24 in. below datum	this report
unknown	6,500[b]	dart shaft	surface, collected by Shutler in 1963	Rozaire 1964
UCLA-553	9,200 ± 200[c]	charcoal	near surface, collected by Haynes in 1963	this report
Beta-72675	9,300 ± 170[c]	charcoal	same area as UCLA-553	this report

[a] All dates are presented as conventional radiocarbon dates in years before present.
[b] The date of 6,500 without standard deviation is alluded to in correspondence filed with the collection. This correspondence indicates the date came from the Lamont-Doherty Geophysical Laboratory; however, the date was never published and now seems to be lost (W. S. Broecker, personal communication 1994).
[c] Haynes (1965) suggested that charcoal from this area was derived from (later) prehistoric burning of packrat midden found in the cave. The date of 9,300 ± 170 recently received on charcoal from the same feature and an examination of the feature itself suggest these two dates may reflect occupation in the cave at this early date; careful excavation and comparison of feature contents with packrat midden from the cave may resolve this question.

cave floor. The sample was collected from the base of the lip near the north wall, possibly near grid unit 40N/50E. "Basket-maker artifacts in the overlying silt and the fresh appearance of the hearth charcoal" led Haynes (1965:283) to conclude that the date was the result of later prehistoric burning of packrat midden from the cave. Examination of the same area in 1993 revealed a thick lens of charcoal, ash, and burned bone at this location, and careful troweling showed what appears to be a fire hearth covered by 10 to 20 cm. of fine silt. A small sample of charcoal and ash containing burned sheep pellets and small animal bone was collected from this area and returned a date of 9,300 ± 170 B.P. (Beta-72675).

DISCUSSION

Investigations undertaken 30 years ago resulted in one of the largest collections of perishable artifacts from southern Nevada. The large number of identifiable dart and arrow components provides the opportunity (through AMS dating) of directly dating the transition from dart to bow and arrow in this region. If the date of 6,500 years B.P. on the dart shaft is accepted, it is the earliest directly dated dart in the Great Basin.

The date of 9,200 ± 200 B.P. on a fire hearth has been attributed to later prehistoric burning of packrat midden from the cave (Haynes 1965). A sample of charcoal taken in 1993 from the same feature, which contains charcoal, ash, and abundant burned small mammal or bird bone, was dated at 9,300 ± 170 B.P. A careful examination of the contents of this feature and its stratigraphic context may help to determine whether the earliest use of the cave dates before 9,000 B.P., or whether the early dates are merely a result of later prehistoric burning of materials robbed from much older packrat middens.

More than 90% of the identifiable projectile points are inferred to be dart points. Although there are a few arrow points and shafts, the fact that dart components predominate and radiocarbon dates are all greater than 3,000 B.P. suggests that most of the materials from the cave date prior to this time. Some of the dart points appear to have been reworked from

earlier forms into Gypsum Cave points (Gatecliff Contracting Stem). This is indicated by the obvious flaking scars across preserved pitch on a number of specimens. In form, most of these reworked points appear to have started their use-lives as Elko series dart points and were broken, only later to be reworked into Gypsum Cave forms. This pattern has been repeated experimentally (Flenniken and Raymond 1986; Flenniken and Wilke 1989), and chronological studies tend to show that Gypsum Cave and Elko are coeval (Bettinger and Taylor 1974; Heizer and Hester 1978; Yohe 1992).

The single test pit excavated 30 years ago shows a dry, stratified deposit with excellent preservation of faunal remains and other perishable artifacts. Using ground penetrating radar, several areas of the cave appear to contain deposits at least 2 m. thick (Buck and DuBarton 1994). If so, continued research at the cave may provide much-needed chronological and subsistence information concerning the Archaic of southern Nevada.

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