THE ARCHEOLOGY OF MITCHELL CAVERNS

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Pottery Collections from Mitchell Caverns and Surrounding Areas
Suzanne Griset

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INTRODUCTION

On the east slope of the Providence Mountains, near the southern end of the range, and located in the eastern Mojave Desert, San Bernardino County, California, are several limestone caves: the Mitchell Caverns. Two of these caverns are quite extensive and provided shelter and storage space for prehistoric people. Archeological excavations were conducted here in 1934, 1958, and 1968; a third, smaller cave was tested in 1934. The resulting collection contains a wide assortment of perishable and non-perishable artifacts. No previous comprehensive analysis of the collection has been completed, and that is the purpose of this report.

Mitchell Caverns are located 32 km northwest of the town of Essex, and 84 km northwest of Needles, California, at an elevation of 1,341 m. It has been designated site SBr-117 by the California Archeological Site Survey.

The Chemehuevi Indians, a division of the Southern Paiute, occupied the Providence Mountains region in the historic era. The diverse vegetation of these mountain ranges provided a comparatively good subsistence for these desert hunter-gatherers. At and above the elevation of the caverns, the slopes provided pinyon nuts and, in some areas, acorns. Agave was available also, and several species of cactus provided fruit, juice, and seeds. Abundant yucca stands offered edible flowers, fruit, seeds, and also fibers for textile goods. Numerous springs, some perennial, dot the area, and in some cases allowed the farming of small garden plots.

Although the historic period in this region began in 1776, with the arrival of explorer Francisco Garces, the first Euroamerican known to reside on the property was Jack Mitchell, who filed mining claims in 1929 and moved to the site in 1934. During the next few years, he and his wife, Ida, built a home and outbuildings, worked the mines, and created a tourist attraction providing cave tours, cabins, and meals.

In 1956, the property was obtained by the State, which opened it to the public as a park in 1959 (California Department of Parks and Recreation n.d.: 12, 15). It is now known as the Mitchell Caverns Natural Preserve, a part of the Providence Mountains State Recreation Area.

In 1934, the first archeological expedition to the caverns was conducted by Richard Van Valkenburgh and Malcolm Farmer, under the direction of Arthur Woodward of the Los Angeles County Museum of Natural History. Excavation units were dug in Tecopa Cave, El Pakiva Cave, and Medicine Cave. Preliminary surveys of the area were conducted, as was ethnographic work with local Indian people. An extensive collection of

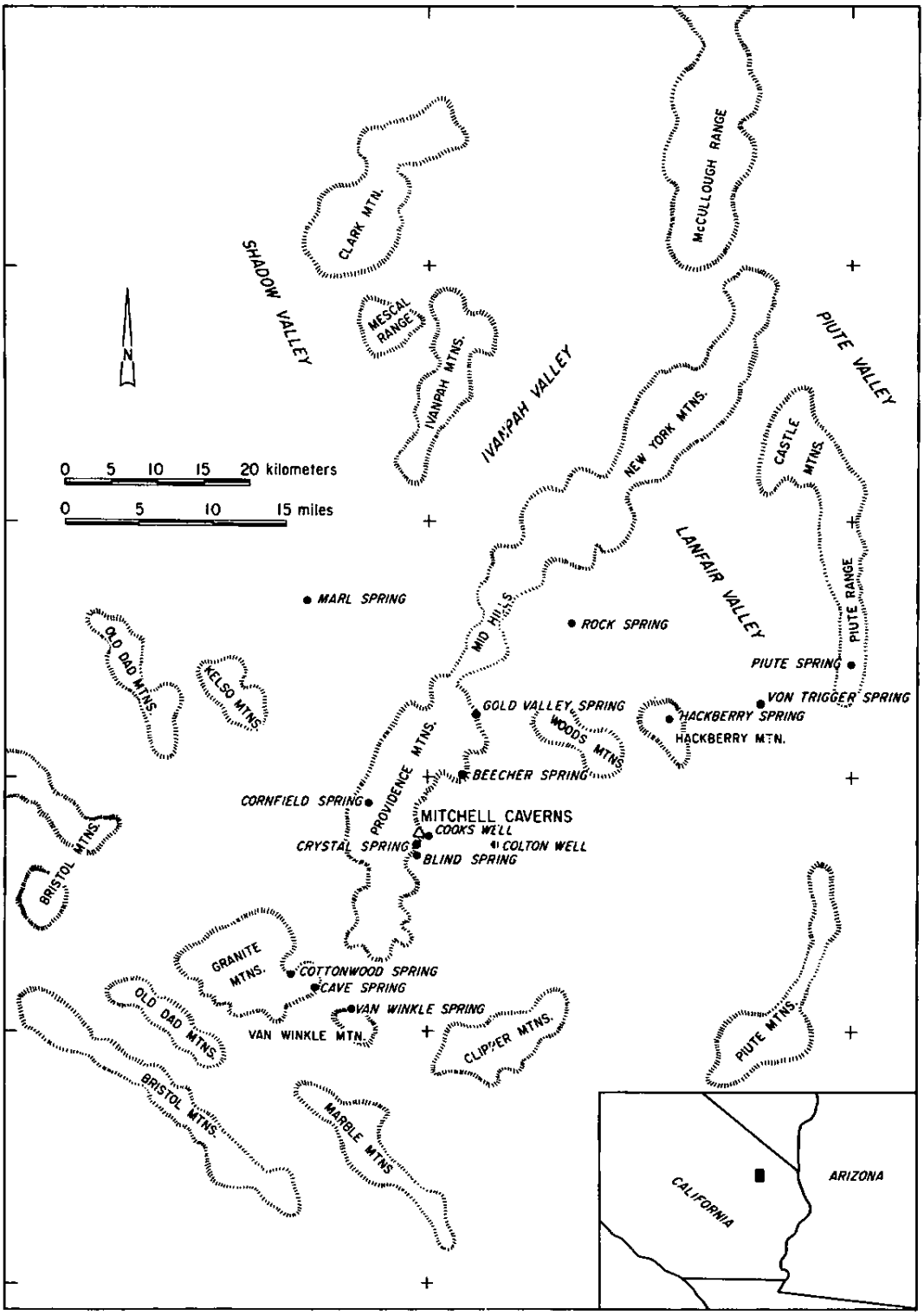

Figure 1. Location of Mitchell Caverns.

artifacts was recovered, catalogued, and filed at the Los Angeles County Museum of Natural History. At some point the collection was transferred to the State Indian Museum, in Sacramento, where it was recatalogued. Most specimens were returned to the caverns for display and storage.

In 1958, Jack Smith of the University of California Archaeological Survey, conducted surveys and test excavations in the area. This project resulted in a small collection now housed at the Lowie Museum of Anthropology, Berkeley.

A final excavation by Louis Payen, then an archeologist for the California Department of Parks and Recreation, took place in El Pakiva Cave in 1968, prior to construction to modify the entrance and widen the passageway. Artifacts and other cultural materials were found associated with aboriginal storage areas. This collection was catalogued and housed at the Cultural Resource Management Unit, California Department of Parks and Recreation, Sacramento.

The combined collections, numbering 295 specimens, contain a large proportion of textile artifacts, including two seed beaters, only a few of which are known from archeological contexts. One nearly complete winnowing tray, many basketry fragments, sandals, and cordage comprise the remainder of the textiles and modified plant material. Other artifacts include three chuckwalla hooks, projectile points, hafted and unhafted knives, fire drill hearths, arrowshaft straighteners, ground sherd disks and other pottery, wood forceps, bone awls, a bone needle, and a scapula grass cutter.

For this study, artifacts from the 1934 and 1968 excavations were loaned by the California Department of Parks and Recreation. Ceramics collected in 1968, housed at Lowie Museum, Berkeley, as well as the remaining ceramic artifacts, were analyzed by Griset (this volume). Results of a previous study of the basketry by Martin Baumhobb (n.d.) were kindly made available to the author. Lawrence Dawson, Lowie Museum, Berkeley, also appraised the basketry and provided helpful comments. Robert Yohe, University of California, Riverside, undertook the study of faunal remains. Obsidian sourcing was conducted at the Department of Geology, University of California, Davis, and three ^{14}C dates on basketry specimens were run by the University of California, Riverside, Radiocarbon Laboratory.

Field notes and manuscripts from the archeological fieldwork were obtained where available, and Malcolm Farmer and Louis Payen helped to resolve questions concerning their respective research. The accumulation of data hopefully will add to the knowledge of culture history of the eastern Mojave Desert.

Both the English and metric systems of weights and measurement have been used in this report. Measurements recorded previously according to the English system were retained. For the present study, the metric system was used.

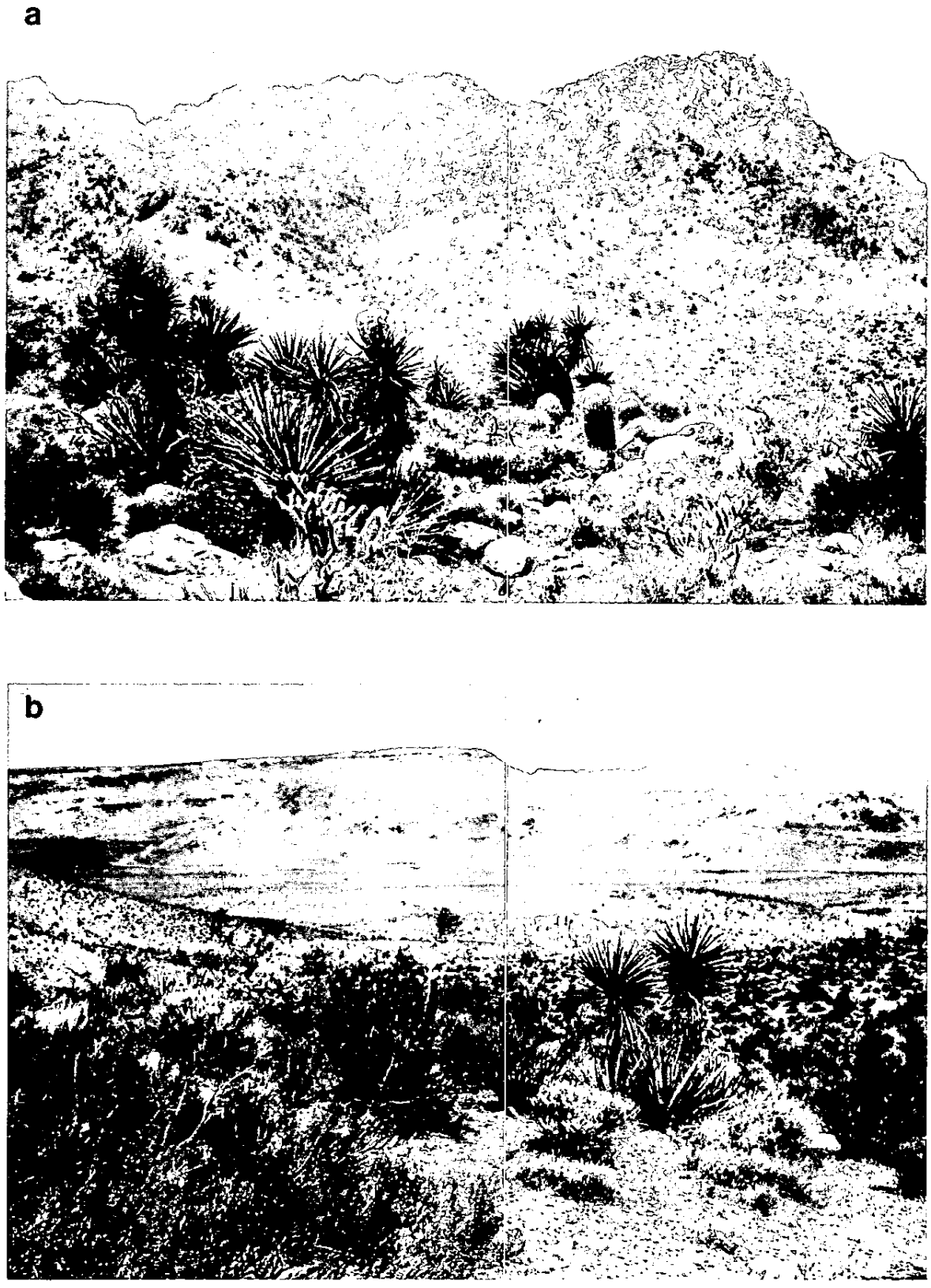

Figure 2. Views of the Mitchell Caverns vicinity: a) view of the Providence Mountains from east of the caverns; b) view from the caverns toward the east.

ENVIRONMENT

Physiography and Geology

The Providence Mountains lie in the Basin and Range physiographic province, which is characterized climatically by low annual precipitation, low humidity, broad daily temperature ranges, relatively high year-round temperatures, and occasional strong seasonal winds (Thompson 1929:69). Topographically, the Basin and Range province is composed of isolated, north-south trending mountain ranges separated by desert basins that are generally flat and possess interior drainage (Fenneman 1931:326).

The Providence Mountain Range also includes the Mid Hills and New York Mountains. The Granite Mountains are a separate range approximately 4 km southwest of the Providence Mountains.

Both the New York and Providence Mountains include high peaks. Mt. Edgar, the highest in the range at 2,174 m, is about 4.8 km north-northwest of the caverns. It is composed of limestone, as are the slopes at the caverns. Fountain Peak, 1 km south of Mt. Edgar and 2,133 m high, is composed of reddish rhyolite, a volcanic rock younger than the limestone (Norris 1981:3).

These ranges in the Basin area were thought to have formed originally in the Jurassic and Cretaceous periods when extensive land areas were raised. In the Miocene, thick deposits of marine sediments that had been accumulating for millions of years were folded and faulted and were intruded by molten volcanic rock (Norris 1981:10). Volcanism again was extensive in mid-Tertiary times, and block faulting occurred which is still ongoing (Hunt 1967:489). Erosion of the older rocks and faulting resulted in the present topography (Norris 1981:11).

Many of the steep, high ridges are etched with deep ravines. Erosion has carried deposits of sediments to the lower valleys and has created alluvial fans along the mountain bases.

The caves are thought to have formed in two stages. After the Miocene lava flow, the groundwater level was high. Fissures in the limestone dissolved and caves and tunnels were formed. Subsequently, the water level lowered and seepage and dripping water created stalactites and stalagmites (Norris 1981:12-13). Today the dripstone formation is nearly inactive, although some water enters the caves during heavy rains.

The Colorado River is located 76 km to the east. The Mojave River, flowing from the San Bernardino Mountains to the north and northeast, has a seasonal flow, and flows underground over much of its course. During wet years it can flow continuously above ground, ending in Soda Lake. Afton Canyon is approximately 78 km northwest of the caverns, but is often the closest point on the river to have fresh water above ground.

In the highest mountains there are a few large permanent springs (Thompson 1929:93) and many that are semipermanent. Hall (1976:76, 77) recorded well over 100 springs or seeps located along the Granite, Providence, Mid Hills, and New York Mountains; most tend to occur within the 1,213-1,820 m elevation.

Climate

The dominating factor in weather conditions for the eastern Mojave Desert in California is the semipermanent high pressure zone of the north Pacific Ocean. During the summer, the zone moves north, and storms are deflected in this direction. California seldom receives summer precipitation from Pacific storms. Occasional tropical storms move northward from the Gulfs of Mexico or California, bringing scattered, locally heavy thundershowers over the deserts and mountains (Ruffner 1980:63).

In winter, the high pressure zone moves to the south, permitting storms to move into the area. At the same time, precipitation is lowered by the rain shadow effect caused by the mountain ranges to the west and south (Sierra Nevada, San Bernardino, Little San Bernardino, Tehachapi). Most available precipitation falls on the western slopes of these mountains and very little passes on to the Mojave Desert. The rain shadow effect also occurs in the Providence and other desert ranges, which results in higher slopes of these mountains receiving the majority of the rainfall (Hall 1976:73, 74).

In the eastern Mojave Desert, annual precipitation is 10 to 20 cm in the lower regions and 40 to 50 cm in the higher regions. The daily temperature range is a possible 14°C in winter and 50°C in summer (Fowler 1966:19).

Precipitation records taken at Mitchell Caverns Natural Preserve from 1957 to 1978 show a mean annual precipitation of 18.6 cm. Most rainfall occurred in the months of February, with a mean of 2.9 cm, and August, with a mean of 2.7 cm (Stein and Warrick 1979:12).

Vegetation

The Providence Mountain Range and surrounding area contain several plant communities in which vegetation, landforms, elevation, and available water vary. Those communities are Creosote Bush Scrub, Yucca Woodland, Juniper-Pinyon Woodland, Desert Riparian, and Desert Springs. Descriptions of the various plant communities have been adapted from Barbour and Major (1977), Bradley and Deacon (1967), Johnson, Bryant, and Miller (1948), Munz (1974), and Munz and Keck (1949).

Creosote Bush Scrub

This plant community occurs in the lower, well-drained, sandy flat areas and upland slopes up to 1,500 m in elevation (Barbour and Major 1977:837). Local and regional differences occur but creosote bush (*Larrea tridentata*) is the dominant plant and often grows in association

with burro bush (Ambrosia dumosa). This community and the yucca community widely intergrade in most areas and Mohave yucca (Yucca schidigera), fleshy-fruited yucca (Yucca baccata), and Joshua tree (Yucca brevifolia) occur here also although more sparsely. In Gold Valley, 19 km northeast of the caverns, plants in this community include desert cassia (Cassia armata), cheese bush (Hymenoclea salsola), bladder sage (Salazaria mexicana), turpentine broom (Thamnosa montana), Mormon tea (Ephedra nevadensis), and buckwheat (Eriogonum fasciculatum) (Barbour and Major 1977:846).

Yucca Woodland

Joshua trees, Mohave yucca, and fleshy-fruited yucca are the most conspicuous plants within the approximate elevations of 1,000 to 1,600 m (Johnson, Bryant, and Miller 1948:232). Terrain in this plant community is usually gently sloping and includes the alluvial fans at the mouths of desert washes. Joshua trees do not grow in the yucca belt south and east of the Providence Mountains and in other nearby areas (Johnson, Bryant, and Miller 1948:232). Beavertail cactus (Opuntia basilaris), pencil cactus (Opuntia ramosissima), jumping cholla (Opuntia bigelovii), mound cactus (Cereus mojavensis), needlegrass (Stipa speciosa), and galleta grass (Hilaria rigida) grow in abundance. Johnson, Bryant, and Miller (1948:232) observed that this of all the area's plant communities contains the densest growth of grass. Mormon tea, Menodora spinescens, bladder sage, and goldenbush (Haplopappus spp.) are among the shrubs found here.

Figure 3. Yucca and Pinyon-Juniper Woodlands southwest of the caverns.

Pinyon-Juniper Woodland

Above ca. 1,500 m, Utah juniper (Juniperus osteosperma) and singleleaf pinyon (Pinus monophylla) grow in open stands with intervening shrubs. In the Providence, New York, Mid Hills, and Clark Mountains, juniper tends to grow on lower slopes, alluvial fans and mesas, while pinyon is found on the higher and steeper slopes (Barbour and Major 1977:811). Important shrubs are sagebrush (Artemesia tridentata), antelope bush or bitterbrush (Purshia glandulosa), rabbit brush (Chrysothamnus nauseosus), and Menodora spinescens, Mormon tea.

Desert Riparian

This is a transzonal community occurring within the Yucca Woodland and Creosote Bush Scrub communities, where desert washes carry runoff from the mountains. The following trees commonly occur in and along washes: mesquite (Prosopis juliflora, P. pubescens), cat claw (Acacia greggii), and desert willow (Chilopsis linearis). Shrubs include cheese weed, match weed (Gutierrezia spp.), bladder sage, and goldenbush.

Desert Springs and Marshes

Many springs exist in the Providence area, most of them along the bases of mountains. Trees associated with these wet areas are willows (Salix spp.), mesquite, and cottonwood (Populus fremontii). Other plants found in this environment include sedges (Carex spp.), rushes (Juncus spp.), common tule (Scirpus acutus), iodine bush (Allenrolfea occidentalis), ink weed (Suaeda torreyana), common reed (Phragmites australis), and cattail (Typha spp.).

Fauna

Reptiles, mammals, and birds are well represented in the Providence Mountains area. In a survey of vertebrates, Johnson, Bryant, and Miller (1948) found 67 species of native birds, 28 of reptiles, and 38 of mammals. Some species are restricted to particular habitats, but most can be found in several or all of the plant communities, although they might be more abundant in some than others. The following list of wildlife has been compiled from Johnson, Bryant, and Miller (1948) and Jaeger and Smith (1966).

Some of the birds frequently seen are Gambel's quail (Lophortyx gambelii), cactus wren (Heleodytes brunneicapilus), red-tailed hawk (Buteo jamaicencis), roadrunner (Geococcyx californianus), pinon jay (Gymnorhinus cyanocephala), ladder-backed woodpecker (Dendrocopos scalaris), loggerhead shrike (Lanius ludovicianus), and great horned owl (Bubo virginianus).

Rodents and other small mammals constitute the larger part of the mammal population. The list includes California ground squirrel (Citellus beecheyi), rock squirrel (Citellus variegatus), white-tailed antelope ground squirrel (Citellus leucurus), southern pocket gopher (Thomomys bottae), pinon mouse (Peromyscus truei), canyon mouse (Peromyscus crinitus), grasshopper mouse (Onychomys torridus), pocket

mouse (Perognathus longimembris), Panamint chipmunk (Eutamias panamintinus), Merriam kangaroo rat (Dipodomys merriami), desert wood rat (Neotoma lepida), western pipistrel (Pipistrellus hesperus), black-tailed jackrabbit (Lepus californicus), desert cottontail (Sylvilagus auduboni), badger (Taxidea taxus), kit fox (Vulpes macrotis), bobcat (Lynx rufus), coyote (Canis latrans), desert bighorn sheep (Ovis canadensis nelsoni), and mule deer (Odocoileus hemionus). In aboriginal times, the mule deer population, probably an extension of the herd from the Charleston Peak area in Nevada, is thought to have been sparse. The herd has been built up in recent times from deer introduced from other areas of Southern California (Longhurst, Leopold, and Dasmann 1952:50, 51).

Among the reptile species encountered here are the desert tortoise (Gopherus agassizi), desert banded gecko (Coleonyx variegatus), desert iguana (Dipsosaurus dorsalis), chuckwalla (Sauromalus obesus), desert sideblotched lizard (Uta stansburiana), desert horned lizard (Phyrnosoma platyrhinos), southwestern speckled rattlesnake (Crotalus mitchelli), Mojave desert sidewinder (Crotalus cerastes), Mojave rattlesnake (Crotalus scutulatus), common kingsnake (Lampropeltis getulus), and desert rosy boa (Lichanura trivirgata).

REGIONAL HISTORY

The Providence Mountains region played an important part in the history of Southern California and of nearby states. Located between the Colorado and Mojave Rivers, the area and its many springs provided a necessary link to San Bernardino and Los Angeles to the west, Prescott, Santa Fe, and Albuquerque to the east, and Salt Lake City to the northeast, as well as many points in between. Nearby travel and trade routes were used by Indians, Spaniards, fur trappers, surveyors, builders of roads and railroads, settlers, and, with ensuing Indian hostilities, the military. Although no historic accounts concerning the caverns are known before the Mitchells took over ownership, the regional history provides background information for this area.

Francisco Garces, a Spanish missionary, was the first non-Indian known to have travelled in the vicinity. At Mission San Xavier del Bac, near Tucson, he joined Juan Bautista de Anza who was bound for San Francisco Bay in 1776 (Coues 1900:xiv). At a Yuma Indian village on the lower Colorado River, Garces separated from de Anza and set off up the Colorado to the Mohave Indian villages, then across the Mojave Desert to San Gabriel Mission, and eventually back to the Yuma village. He was looking for Indian populations for possible religious conversion, and for a practical trade route between New Mexico and California. In his diary, he wrote of the Mohave villages and of meeting the Chemehuevi west of these settlements and near the Providence Mountains (Coues 1900:219; Euler 1966:37).

Another Spanish expedition, under Lt. Gabriel Moraga, travelled down the Mojave River in 1819. The purpose of the expedition was to locate the Mohave villages, whose people had been stealing cattle and generally causing unrest among the missionized Indians in the Los Angeles Basin. Moraga was unable to continue farther than one day's journey beyond Soda Lake (Casebier 1976:284).

Fur trapper Jedediah Smith, the first American to reach California overland, visited the Mohave villages and passed over the Mohave Indian Trail in 1826 (Euler 1966:39). This trail led from the Mohave villages to the west end of Soda Lake via two routes. One crossed the Providence Range through the Mid Hills, from Rock Spring on the east to Marl Spring on the west. The other crossed at Foshay Pass (Casebier 1975), a few kilometers southwest of the caverns. On a repeat trip a year later, Smith's group was attacked by Mohaves and ten of his men were killed.

During the years 1827 to 1830, other beaver trapping expeditions reached the Colorado River at the Mohave villages. Hostile incidents with the Indians were not uncommon, as many fur trappers crossed the desert on the Mohave Indian Trail (Casebier 1976:285).

From 1830 to 1840, travellers also arrived from the northeast via the Old Spanish Trail, which brought settlers and traders from Santa Fe to Utah, then southwest to the Mohave Indian Trail and California (Casebier 1976:286).

Various American exploration and survey parties passed this way between 1840 and 1857, some investigating routes for the construction of roads and railroads. In 1854, Lt. Amiel Whipple led a large party through much of the eastern Mojave. From 1855 to 1857, the General Land Office conducted surveys of the new state, setting up township lines. Construction of the first wagon and mail road was begun in 1857, with Edward F. Beale in charge. Beale's project attracted national attention since it included testing camels in this harsh desert terrain. The first emigrant trains to use the completed road were attacked by Mohaves. These incidents and later attacks on the mail deliveries resulted in the establishment of army troops in the region (Casebier 1976:290-292).

Fort Mohave was set up along the Colorado River at Beale's crossing in 1859, at a site almost directly east of the caverns. It was in operation until 1890. The Mohave Road, which followed the same route as the Mohave Indian Trail, was used to send supplies to the fort and also was important in transporting goods to Prescott, then the capitol of Arizona (Casebier 1976:293, 294).

In the 1860s, mining operations began in the eastern Mojave. The civilian population grew and bad relations with the Chemehuevi worsened. Their traditional sources of food and water, and their land, were fast disappearing. They were ill-treated by the whites, and poverty forced them to beg from wagon trains (Casebier 1976). The Indians continued to attack small groups of travellers, and the whites continued to kill in retribution. Another army post, Camp Cady, was established east of Barstow and operated until 1871. Army relay posts were established at Soda Springs, Rock Spring, and Paiute Creek, providing escort riders to protect the Arizona Overland Mail. After 1870, fighting ceased, and Indians began working at nearby mines and ranches (Casebier 1976:299).

Silver, lead, gold, and copper mines were operated sporadically beginning in 1863 and continuing through the 1950s. The completion of the Southern Pacific Railroad in 1883 aided in the transportation of

goods to and from the area. The Bonanza King lead and silver mine, located 5 km north of the caverns, was the area's most successful. Discovered in 1883, it operated on and off until 1920. At one time the mining company was reported to have employed 75 to 100 Indians to gather pinyon and juniper wood from the Providence Mountains to fire the boiler (Bailey 1902:73; Farmer n.d.; Miller and Miller 1976:50).

The nearby mining towns of Providence, and Vanderbilt in the New York Mountains, grew and prospered as long as the mines were profitable, for about ten years.

The Vulcan Iron Mine, located in Foshay Pass just southwest of the caverns, was in operation from 1942 until 1947 (Wright 1953:100). The C and K Mine, 2 km north of the caverns, was worked from the 1880s until recent times (Wright 1953:103). Jack Mitchell worked four mining claims (Billy Boy 1, 2, 3, and 4) in the area of the caverns, as well as four claims to the Mexican Mine, just north of the caverns. The Billy Boy claims were worked until 1954, but the mine was unproductive (Wright, et al. 1953:110).

Cattle ranching was another successful industry in the eastern Mojave. The Rock Springs Land and Cattle Company was in operation from 1894 until 1927 (Casebier 1976:318). Today, cattle ranching is still an active industry.

Lanfair Valley, east of the Mid Hills, became a popular place to homestead beginning in 1910. Many tried their luck at dry farming, with some initial success, but a succession of dry years in the 1920s caused homesteads to fail. Another influx of residents appeared during the Depression, when those homes previously abandoned were taken over by squatters, who attempted to survive by living off the land and mining for gold and silver (Casebier 1976:320, 323).

ETHNOGRAPHY

The region about the Providence Mountains was inhabited in late prehistoric times by the Chemehuevi Indians, Southern Paiute people whose language belongs to the Numic branch of the Uto-Aztecan language family. The Chemehuevi spoke a Shoshonean dialect similar to that spoken by the Ute to the Northeast and Kawaiisu to the southwest. The Southern Paiute inhabited the area north and west of the Colorado River, which included southern Utah, northern Arizona, southern Nevada, and a portion of California in the eastern Mojave Desert (Kelly 1934). Kelly (1934:548) stated, "the Southern Paiute and Chemehuevi merge so inextricably in language and culture that any separation of the two would be highly artificial." Kroeber (1925:593) used the name Chemehuevi to distinguish the Southern Paiute in California from those in neighboring states.

Francisco Garces, in 1776, was the first to write of these people, and noted Chemehuevi rancherias in the Providence Mountains area (Euler 1966:37; Coues 1900). Exact territorial boundaries are unknown. They were recorded by Kelly (1934) as being bounded on the north by the Spring and Black Mountains, on the west by the Old Dad and Iron Mountains, on the south by the Ironwood Mountains (now the McCoy Mountains), and on the east by the Colorado River, except for a strip inhabited by the Mohave tribe. Chemehuevi territory changed somewhat during the historic period, and many settled on the east side of the Colorado, on Cottonwood Island (since disappeared, but located 9 km north of David Dam), and in Chemehuevi Valley (Kroeber 1925:593). The Halchidhoma and Kohuana had been there previously, and were driven off by the Mohave and Yuma. In 1867, the Mohave fought with the Chemehuevi, who fled westward; some returned later to the river (Kroeber 1925:594, 595).

The Chemehuevi were nomadic hunters and gatherers who sometimes supplemented their diet with garden plots near desert springs. Plant foods were mainly gathered and processed by women, and hunting activities, consisting of stalking, shooting, trapping, and sometimes driving game, were mainly the work of men. Daily activities took place in small family groups constantly moving to take advantage of seasonal ripening of plant foods. Few plants grew densely enough to encourage group harvesting.

While the families were nomadic and lived apart for much of the year, they would sometimes join to hunt or harvest plant foods collectively. In the Providence area, rabbit drives were held, with many people herding the animals into large nets. The harvest of pine nuts and agave was also a communal activity. During these occasions, festivals were held which could include ceremonies, visiting, gambling and other games, and storytelling.

Winter brought several families together who relied mainly on stored food. A good winter camp would provide a staple such as pine nuts, water, wood to burn, and relatively warm weather (Steward 1938:232). The caverns provided all of these and included shelter as well. Caves and rock shelters often served as winter homes, and others were constructed with wooden frames and covered with branches and bark. Winter groups were not always composed of the same people from year to year, and

families did not always follow the same seasonal round, which was dependent on the state of resources. This prevented the formation of localized lineages and clans, and there was little socio-political structure or cohesiveness beyond the family. According to Laird (1976:8), the Chemehuevi considered themselves as subdivided into three geographical groups: the Northerners, Tantitsiwi, who lived along the northern Colorado River above Ft. Mohave; the Southerners, Tantiwaitsiwi, who lived along the River below Ft. Mohave; and the Desert People, Tiiraniwiwi, who lived in the eastern Mojave Desert.

The vegetation in the Providence area provided a variety of foods. Many seeds which ripened in summer and early fall were harvested with seed beaters and conical burden baskets, parched with coals, winnowed in basketry trays, and ground with metates and manos. Foods were cooked in baskets (by dropping in heated stones), or in ceramic pots, or were roasted. Some of the seeds gathered were Indian rice grass (Oryzopsis sp.), lamb's quarters (Chenopodium sp.), pigweed (Amaranthus sp.), needlegrass (Stipa speciosa), sunflower (Helianthus sp.), and saltbush (Atriplex sp.) (Kelly 1964; Manners 1974).

Pine nuts, gathered in the fall, were roasted, shelled, and ground into meal. Acorns, also a fall crop, were shelled and roasted in ashes. Yucca fruits were gathered in summer and fall, roasted, seeded, and dried. In the spring, yucca stalks were harvested and roasted. Agave was available all year, but was mainly gathered in winter and spring when other foods were scarce. The plants were cut off at the base and leaf ends were removed, leaving a central head. These were roasted in stone-covered pits. When cooked, the agave was either eaten, or pounded into sheets to be dried and stored, or ground into flour. In the spring, the stalks were roasted. Various cactus species and mesquite were important food plants. Cactus fruits, seeds, fleshy leaves, and blossoms were utilized. The mesquite, available at lower elevations, yielded blossoms and green and mature pods which were harvested from spring through early autumn (Bean and Saubel 1972; Steward 1938; Kelly 1964, n.d.a, n.d.b; Manners 1974).

Seeds and other dried plant parts were stored in caches for winter use. These were often buried or hidden in caves and rock shelters.

In addition to being food sources, plants provided fiber for basketry, cordage, mats, and some clothing. Animals provided skins and fur for clothing and blankets, and bones for tools. Footgear was made of rawhide and yucca. Red pigment was used for decoration as well as for sunscreen (Kelly 1964:66).

That some Chemehuevi practiced horticulture is well documented, and their diet was supplemented by the addition of a limited amount of cultivated plants. Garden plots were planted adjacent to the most reliable springs. Steward (1938:183) suggested that the northwestern limit of aboriginal horticulture was Pahrump Valley and Ash Meadows, where corn, squash, beans, and sunflowers were grown.

When Lt. Whipple led his expedition through the area en route to Soda Lake, in 1854, both he and the artist accompanying him, Baldwin Mollhausen, reported evidence of wheat and corn growing in the vicinity of Paiute Creek (Foreman 1941:250; Mollhausen 1858:287).

In 1860, Lt. Milton Carr, an army scout, described a spring in the area of Soda Springs and the Providence Mountains. This large spring with a stream running for a mile and a half may have been Cornfield Spring. He wrote that the Indians had cleared away the rocks and brush and had planted pumpkins and watermelons, and "The vines look very well and will produce good crops. The Indians have run small ditches around the garden by means of which they can irrigate it thoroughly" (Carr, in Casebier 1972:33).

A good part of the Southern Paiute diet consisted of small rodents and other small mammals. Mice, gophers, woodrats, kangaroo rats, chipmunks, and ground squirrels were often captured in snares, and rodents, rabbits, and chuckwallas were taken with the use of hooked and crooked sticks. Jackrabbits were also captured in drives. Tortoises were eaten and their carapaces used for containers. Quail, doves, and other birds were trapped or hunted. In this region, mountain sheep were hunted and were an important dietary element, but did not constitute a major portion of the diet.

The Chemehuevi hunting bow was made of willow and backed with sinew (Laird 1976). The cane arrows had hardwood foreshafts and stone projectile points (Stewart 1967:19).

The Chemehuevi and their Southern Paiute neighbors made full use of their seemingly austere environment. Material goods associated with such a lifestyle are not many, yet the caverns have preserved evidence of various tools and utensils used by these early inhabitants in their daily activities.

DESRIPTION OF CAVERNS

The caverns are located on the eastern slope of the Providence Mountain Range at the transition between steep limestone crags and outcrops and the smoother but steeply sloping terrain of the mountain shoulders. Here, where the yucca and pinyon-juniper woodlands join, pinyon trees begin just at the cavern elevation. Mohave yucca are abundant below the caverns, and the vegetation there also includes barrel cactus (Echinocactus), cholla, creosote bush, Mormon tea, and paper bag bush (Salazeria).

The caverns actually consist of a group of caves including Medicine Cave, Tecopa Cave, and El Pakiva Cave. Another, Winding Stair Cave, from which no archeological finds have been reported, is a deep, vertical shaft located northwest of the park headquarters.

Tecopa Cave and El Pakiva Cave maintain a constant temperature of 16° to 18°C (California Dept. Parks and Recreation, n.d.). The caves are dry, except for some dripping which occurs during heavy rainfall, and water has entered the caverns during storms.

Archeological excavations have taken place twice in Tecopa Cave and three times in El Pakiva Cave. Medicine Cave, the southernmost of the caverns, was excavated in 1934.

Tecopa Cave

The original entrance, a small opening facing east, was blocked by rocks when discovered by Jack Mitchell (Farmer 1936:102). This entrance opens immediately into a large chamber, 44.5 m long and 12 m wide with a ceiling 18 m high. A narrow passageway extends to the north another 20 m (Fig. 4). This cave contains a variety of limestone drip formations.

Two changes have been made in the cave in modern times. Another entrance was created at the north end by Mitchell, and a tunnel that connects the passageway to the south passageway of El Pakiva was constructed by the Department of Parks and Recreation in 1968.

Little cultural material was recovered in Tecopa Cave by archeologists but evidence of previous digging was observed. Farmer (n.d.) reported an excavated pit in the central portion of the cavern. Smith (n.d.) also reported the remains of a large pit with other irregular holes scattered about the surface and back-dirt piles, old shovels, buckets, and screen fragments.

El Pakiva Cave

This cavern is located approximately 151 m north and west of the original entrance to Tecopa. It has two north-facing entrances, adjacent and parallel to each other (Figs. 5, 6). The west entrance is a wide, deep shelter with smoke-blackened ceilings and a floor that once contained a fill of blackened midden (Farmer n.d.). This wide opening funnels into a narrow passageway, the interior of which was once nearly closed (Louis Payen, personal communication, 1984), and opens into a large chamber 42 m long. The east entrance, partially blocked by fallen boulders, also opens into this chamber, beyond which another narrow passageway extends another 46 m. Today, a man-made tunnel connects this passage to the northernmost passage of Tecopa Cave. El Pakiva Cave also contains a variety of dripstone formations. All archeological specimens with proveniences in El Pakiva Cave have come from the two entrance passages.

Medicine Cave

Medicine Cave is approximately 800 m south of Tecopa Cave. The chamber is 15 ft long, narrowing gradually from a 5-ft wide opening to about 3 ft wide at the back wall (Farmer n.d.). Several artifacts were recovered from this cave by Farmer, including pottery sherds, basketry and cordage fragments, and modified sticks, possibly from traps. Farmer (1936:104) reported a broken pottery bowl that had been recovered here by other archeologists from the Los Angeles County Museum.

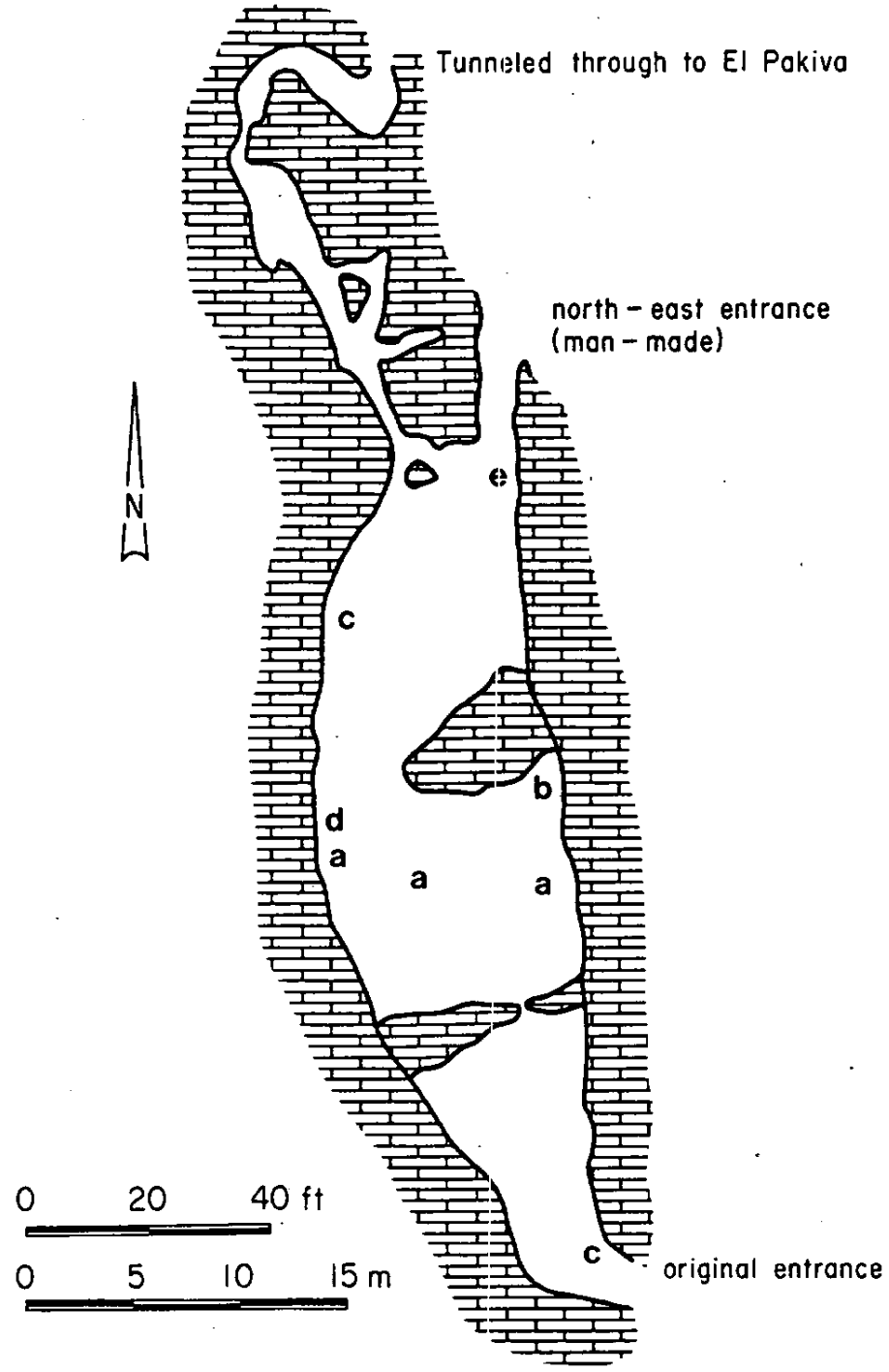

Figure 4. Plan view of Tecopa Cave showing approximate location of finds: a) area excavated by Farmer; b) location of seed beaters recovered by Mitchell and rat nest midden investigated by Farmer; c) area excavated by Smith; d) location of ground sloth remains recovered by Smith; e) location of surface sherds recovered by Smith.

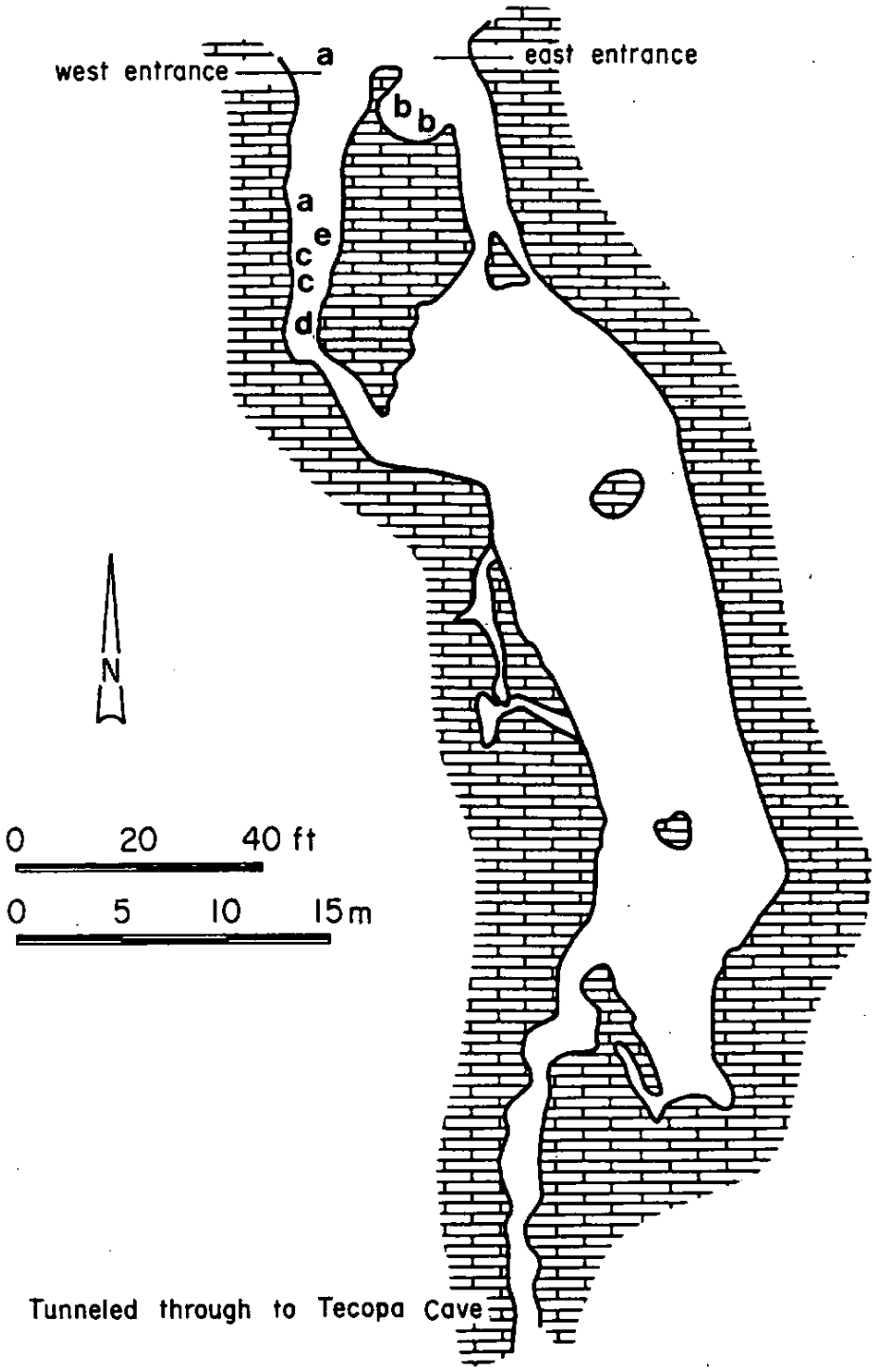

Figure 5. Plan view of El Pakiva Cave showing approximate location of finds: a) area excavated by Farmer; b) area excavated by Smith; c) area excavated by Payen; d) location of scapula grass-cutter recovered by Payen; e) location of human mandible recovered by a park employee.

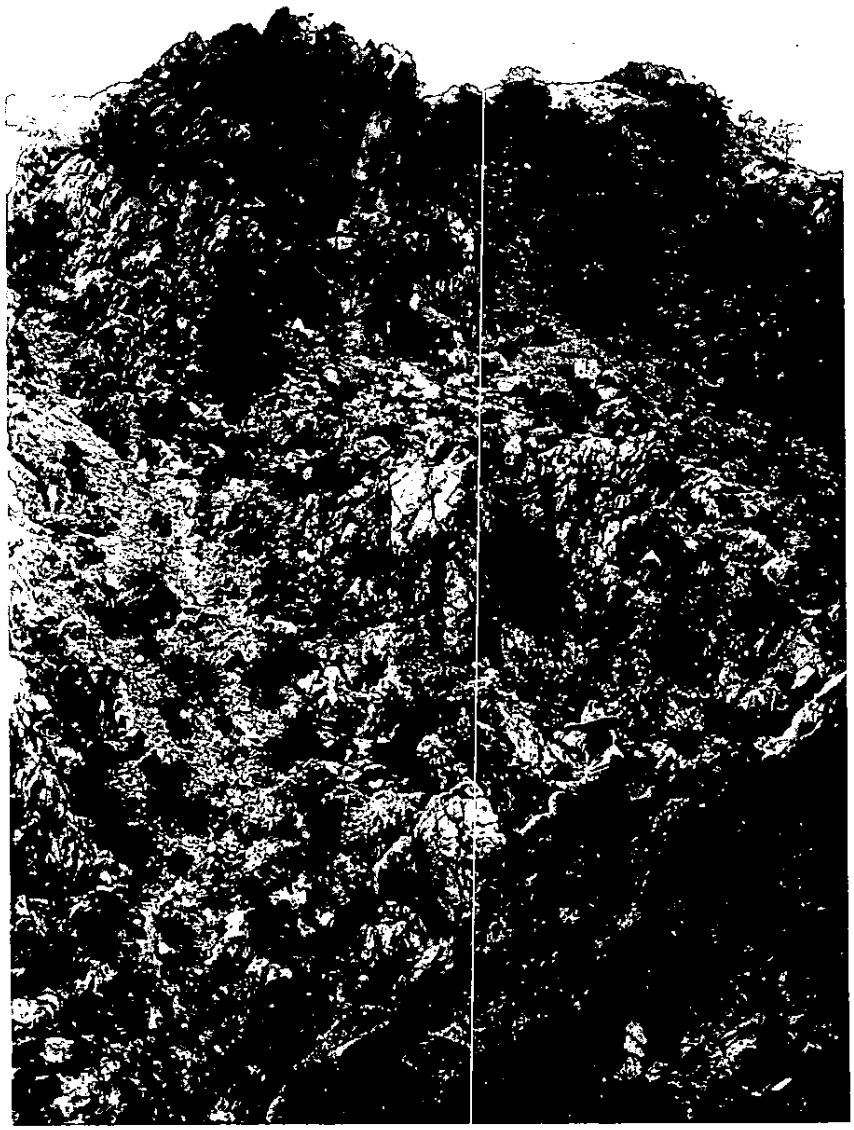

Figure 6. Portals to El Pakiva Cave before modifications, 1934.

HISTORY OF ARCHEOLOGICAL RESEARCH AT MITCHELL CAVERNS

Los Angeles County Museum of Natural History

Four mining claims for the property on which the caverns are located were obtained by Jack Mitchell in 1929, and in 1934 he moved to the site (Mitchell 1964). Periodic excursions into the caverns which had yielded evidence of aboriginal inhabitants led Mitchell to contact archeologists at the Los Angeles County Museum.

In November 1934, archeological studies were begun under the direction of Arthur Woodward, Curator of History at the Los Angeles County Museum of Natural History. Richard Van Valkenburgh was in charge of field work, assisted by Malcolm F. Farmer. Units were dug in Tecopa Cave, El Pakiva Cave, and Medicine Cave.

Three test units were made in the floor of Tecopa Cave and dug to depths of 9 ft, 3 ft, and 2 ft (Fig. 4a), but produced no cultural materials. A woodrat nest midway along the east wall yielded some artifacts (Fig. 4b). Mitchell had found two seed beaters on the surface of the nest, Farmer (n.d.) reported finding potsherds, small bones, and yucca fiber in it. This nest deposit could not be completely examined because of dust-laden air and a shortage of time (Farmer n.d.).

The work in El Pakiva was more productive. Two units were excavated in the west entrance, one at the opening and the other approximately 25 ft within the interior, along the west wall (Fig. 5a). The area near the entrance yielded yucca leaves, basketry fragments, potsherds, cordage, a knife, two arrow points, knotted and unknotted yucca fiber, modified and unmodified bone, sticks, and grass. The depth of this cultural fill was 2.5 ft. The interior unit was observed to have been composed of three strata. The first contained yucca leaves, basketry fragments, potsherds, knotted and unknotted yucca fiber, flakes, knife blades, cordage, bone, and grass. Between this stratum and the next was a densely compacted floor level. The next layer contained similar cultural material as the one preceding, and Farmer (n.d.) noted the presence of fewer potsherds. Two projectile points were found which Farmer depicted in field notes as being Elko in style, and noted that they were of different style than those points found on the surface at nearby sites. This layer contained two depressions lined with grass, apparent cache pits and lining, and the wall of the cave formed part of one side of each pit. The depressions were 12 inches deep, with one measuring 1-by-2 ft, and the other 14 inches in diameter.

The third layer contained yucca fiber and leaves and unmodified sticks, apparently the bottom of the cache pit.

Other artifacts Farmer (n.d.) recorded finding were two red rock crystals, tanned animal skin tied with yucca fiber, four other pieces of tanned animal skin, and a knife.

In Medicine Cave, the archeologists found a crooked stick, cordage, a chipped stone tool, and modified sticks. Prior to the excavation, Arthur Woodward and Mitchell reportedly found part of a ceramic bowl and modified sticks said to be parts of traps (Farmer 1936:104).

University of California

In 1958, the Archaeological Survey of the University of California, Berkeley, conducted area surveys and test excavations in the caverns to determine to what extent archeological material remained in the caves.

Tecopa Cave at this time showed the effects of extensive digging. Jack Smith, who headed the field work, put in two test units, both 5-by-5 ft, one 5 ft deep and the other 3 ft deep. He also dug several small exploratory units in undisturbed deposits along the cave walls. Excavation was carried out in 6-inch levels to a depth of 3 ft, using 1/4-inch screens, and the remainder was carefully troweled (Smith n.d.) (Fig. 4c). No cultural remains were found in these test pits, but at a depth of 57 inches, unmodified bones of a ground sloth (Nothrotheriops shastense) were recovered (Fig. 4d).

Near the south entrance, eleven small potsherds were found in the first level, along with a few burned bone fragments. Along the east wall near the north entrance, eleven potsherds were found on the surface (Fig. 4e).

Smith excavated two locations in the east entrance to El Pakiva Cave, in two small alcoves located behind huge boulders. At the alcove nearest the entrance, small mammal bones and potsherds were found on the surface, and a few more potsherds were found within the uppermost 3 inches. A few pine cones and nuts and yucca fragments were also found. This unit was dug down to 30 inches. The second alcove produced burned bone fragments and a small pestle-like basalt fragment (Fig. 5b).

No indication of aboriginal activity was found in the interior of the cave. This was the only excavation to report archeological materials in the east entrance to El Pakiva Cave.

California Department of Parks and Recreation

In 1968, Louis A. Payen, archeologist for the California Department of Parks and Recreation, conducted a salvage excavation in El Pakiva Cave prior to the construction of a new entranceway. Information pertaining to this excavation was taken from Payen's field notes.

One of the areas excavated began 10 m from the entrance where there is a low, one-boulder-high wall across the cave floor. From the entrance to this wall the floor of the passage, which extends straight back, is flat. It is most likely at this section that Van Valkenburgh and Farmer excavated. The origin of the wall, made from angular breakdown rocks from the cavern, is not known, but similar features have been recorded in cave and rock shelter sites and some were known to have been constructed by aboriginal people (Cressman 1942).

The area behind the wall contained a loose dust and rock deposit. One area of loose stones was apparently placed on the surface of a cache pit that was excavated there. Yucca fiber and pot sherds were found in the 0-15 cm level. The cache pit was lined first with flat, angular rocks, then with sagebrush and flat grass (Stipa speciosa) bundles. It contained 27 pine cones, each placed point up. More grass and several bone and yucca fragments covered the pit (Fig. 5c).

The other area excavated was an alcove behind the primary passage, 15 m from the entrance. Another cache pit was found there, lined with grass bundles and other vegetation, and containing a ball of ground red ocher with a leather bag fragment and yucca and juniper fibers.

These two storage areas also yielded basketry and cordage fragments, unmodified bone, modified wood, and stone knife blades. A scapula bone tool was recovered from rat nest material deeper inside the passage (Fig. 5d).

Regional Archeological Research

Field work conducted at Mitchell Caverns constitutes a good portion of work done in the Providence area. The following is a brief summary of other archeological research that has taken place.

Southcott Cave, 5 km northeast of Mitchell Caverns, was excavated by Christopher Donnan in 1962. Among items recovered were two fire drill hearths, nondiagnostic lithics, ceramics, and two basketry fragments (Sutton, Donnan and Jenkins 1987).

A. E. Elsasser, in 1958, led an excavation at Rustler Rock Shelter, 6.8 km northeast of the caverns. A variety of ceramic types were found, along with grinding stones, hammerstones, one stone pipe, incised slate, 18 projectile point types, large crude blades, and core and flake scrapers. From this assemblage, Davis (1962) proposed a Providence complex of Western Upland Patayan beginning about A.D. 800 and extending to A.D. 1700.

Donnan (1964), in an attempt to establish a cultural sequence for the Providence area, concluded that Southcott Cave and Rustler Rock Shelter both contained a nonceramic Yuman Horizon followed by a Yuman Horizon in which ceramics occur.

True, Davis, and Sterud (1966) conducted surveys of the Providence region and found scrapers, bifaces, knives, and scraper planes similar to Lake Mojave materials from 28 sites. Tentative conclusions from these findings were that artifacts appeared to be Yuman and not Shoshonean "although it is not always possible to distinguish their pottery in the Southern California area" (True, Davis, and Sterud 1966:269).

Surveys and salvage excavations were conducted by Desautels and McCurdy (1969) along a roadway in Wild Horse Canyon, 14 km northeast of the caverns. They recorded 22 sites and for one of those excavated they suggested a preceramic horizon.

Several other sites have been recorded in the region. Findings have been reported as flake and sherd scatters, stone circles, petroglyphs, metates, midden, projectile points, and mescal roasting pits. Three sites within 1 km of the caverns reportedly contained sherd and flake scatters, house rings, mescal roasting pits, manos, metates, and projectile points. Another site consisting of midden at least 1.5 m deep was located in an eroding gulley approximately 0.5 km northwest of the caverns.

Attempts have been made to establish a cultural sequence for the Providence Mountains region with the scant data available. Lyneis (1982:174), in a summary of archeological research for the area, concluded, "Too few well-stratified deposits have been excavated to establish an independent, chronometrically calibrated sequence for the region." Rector (1983) similarly expressed the problem of insufficient and conflicting data pertaining to cultural periods in the Mojave Desert.

Warren (1984) summarized some areas of agreed-upon chronology in the Lower Colorado River region. It is accepted that there is one major cultural unit that extended along the Colorado River and into adjacent areas. This unit has been given three separate names, Yuman, Patayan, and Hakataya. It has been divided into two areal divisions, Upland Patayan and Lowland Patayan by Harner (1958). Rogers (1945) and Harner (1958) agreed on a three-division sequence for the Colorado River area. Rogers (1945) has called his sequence Yuman I (A.D. 800-1050), Yuman II (A.D. 1050-1450), and Yuman III (A.D. 1450-nineteenth century). Harner's divisions, with similar time spans, are Bouse I, Bouse II, and Moon Mountain (Harner 1958).

Projectile point styles have been used as the basis for establishing temporal sequences for the Mojave Desert and Great Basin. As new research is reported and old chronologies reworked, some of the sequences remain controversial.

A discussion of point chronology for those types in the Mitchell Caverns can be found in the section on flaked stone. Two early manifestations not discussed there which occur in the Mojave Desert are the Lake Mojave and Pinto complexes. Lake Mojave is the earliest agreed-upon complex. Sites are located on the terraces of extinct Lake Mojave, now the Soda Lake basin. This occupation has been dated between 10,000 and 8,000 B.P. (Moratto 1984:97). Rogers (1939) was first to identify crude scrapers, choppers, perforators, crescents, bifacial knives, and points as belonging to this terminal Pleistocene culture. For the Pinto complex, first described from the eastern Joshua Tree National Monument (Campbell and Campbell 1935), dates are controversial. The assemblage consists of narrow-shouldered points with concave bases, leaf-shaped knives, drills, scrapers, choppers, hammerstones, and some milling stones. Dates for this complex range from 2000 B.C. to 5000 B.C. (Warren 1984:414).

FLAKED STONE ARTIFACTS

The collection contains 48 specimens of whole and fragmentary flaked stone tools. These are projectile points, knives, one drill, perforators, flake scraping tools, and two problematic hand tools.

Projectile Points

Nineteen specimens are diagnostic projectile points, assignable to chronologically significant types (see Hester and Heizer 1973; Heizer and Hester 1978; Bettinger and Taylor 1974). Two are morphologically characteristic but are not known to have a regional or chronological significance. Five are pieces of flaked stone tools too fragmentary for classification. Those points or point fragments that are identifiable are classified as: Desert Side-notched, Cottonwood Triangular, Eastgate Contracting Stem, Gypsum Cave, Elko Eared, and Elko Corner-notched.

Proveniences are unknown for all but two Elko points. Measurements are given in Table 1.

Desert Side-notched

Number of specimens: 4
Material: obsidian (2), rose quartz (1), white quartz (1)

These are small, triangular points with small side notches near the base, and date from approximately A.D. 1300 into historic times (Heizer and Hester 1978:164, 165). They are one of the most widespread points in North America (Heizer and Baumhoff 1961:128). Those from Mitchell Caverns have no recorded provenience but they are thought to have come from the surface close to the caverns. All four have concave bases (Fig. 7a-d). The obsidian points are curved in profile, and were made by pressure flaking of thin, curved flakes. The obsidian was sourced (see section on obsidian sourcing) and was determined to have a chemical composition similar to that of small pebbles of obsidian that occur in the nearby Hackberry Mountains.

Cottonwood Triangular

Number of specimens: 7
Material: basalt (1), white chalcedony (3), pink chalcedony (2), brown chert (1)

These points are small, thin, lightweight, unnotched, and triangular, with no stems (Fig. 7e-k). Dates for this series begin about A.D. 1000 at Oro Grande (Rector, Swenson, & Wilke 1983) and extend into historic times (Bettinger and Taylor 1974:20). At Oro Grande, time-sensitive points were almost exclusively of the Cottonwood series, and dates were obtained by six radiocarbon age determinations on charcoal samples from hearths. Of the seven points of this type in the Mitchell Caverns collection, six are concave-based with concave lateral edges. One is straight-based with convex edges. All are fragmentary. No proveniences are known, but they are thought to have been surface-collected from the surrounding area.

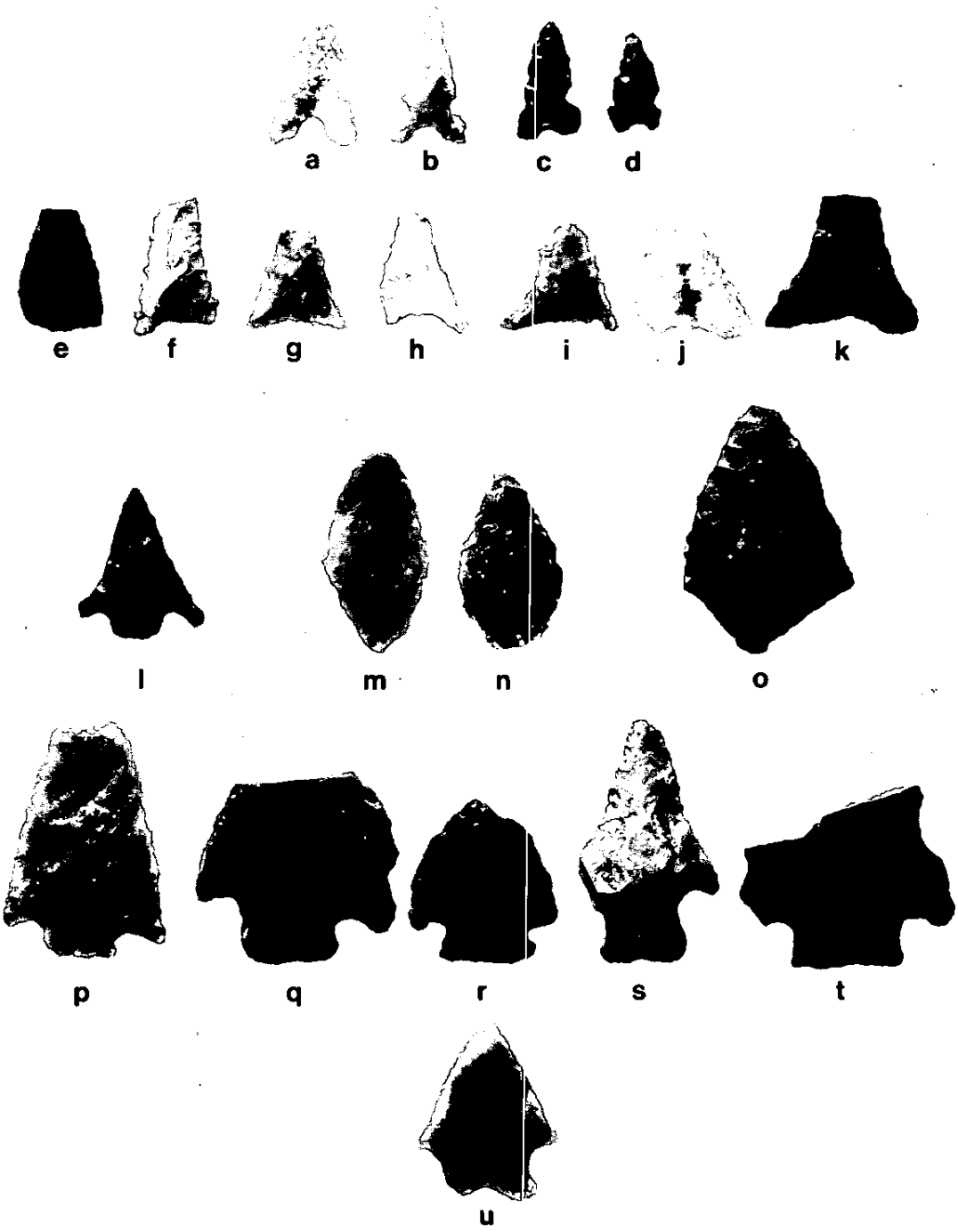

Figure 7. Projectile points: a-d) Desert Side-notched; e-k) Cottonwood Triangular; l) Eastgate; m-n) Untyped; o) Gypsum Cave; p-t) Elko Corner-notched; u) Elko Eared. All actual size.

Eastgate Contracting Stem

Number of specimens: 1
Material: red jasper

Eastgate points are small, lightweight, with triangular bodies, downward-sloping shoulders, and barbs that are usually squared. This type was first described by Heizer and Baumhoff (1961) at Wagon Jack Shelter, Nevada. Thomas (1931) proposed that Rose Spring and Eastgate points should be combined, and placed them in his Rosegate series. Components with Rose Spring and Eastgate points begin at A.D. 650 and extend to A.D. 1300 (Bettinger and Taylor 1974:19).

Heizer and Hester (1978:163) proposed that the onset of the Eastgate type, along with Rose Spring, may be associated with the introduction of the bow and arrow, since they are smaller and lighter in weight than are previous forms. The single Eastgate point from this collection has squared barbs, the stem is contracting toward the base, and the lateral edges are concave (Fig. 71). Provenience is unknown.

Gypsum Cave

Number of specimens: 1
Material: yellow chert

These triangular points with short, contracting stems were first described by Harrington (1933) from Gypsum Cave, Nevada. Harrington also described them as being lozenge- or diamond-shaped. Since then, Gypsum Cave points have been found and described in many other sites in the southern and western Great Basin, including several sites in the Mojave Desert. Rogers (1939:55) described specimens from the north-central Mojave Desert, and others were found at the Rose Spring site in Inyo County, California (Lanning 1963), Death Valley (Hunt 1960), South Fork Shelter, Nevada (Heizer, Baumhoff, and Clewlow 1968), and Newberry Cave, San Bernardino County, California (Davis and Smith 1981).

The description of Gypsum Cave dart points and that of Elko Contracting Stem points has been found to be similar (Thomas 1981:22, 23). Thomas (1981) placed these points in his Gatecliff Contracting Stem type. At Newberry Cave, Gypsum Cave and Elko series points were dated to 1500 B.C. (Davis and Smith 1981:98). Bettinger and Taylor (1974:18) found the range of occurrence of Gypsum and Elko points to be similar in inland and Southern California, and placed them in the Newberry chronological period which they dated from 1200 B.C. to A.D. 600.

The single Gypsum Cave specimen from the caverns is very broad compared to length, and, on the base, the downward-sloping sides contract inward to form a point (Fig. 7o). It has no recorded provenience, although a "Gypsum" point was recorded as found in El Pakiva by park employees.

Elko Series

Of these large, triangular, stemmed points, three types are recognized in this series: Elko Contracting Stem, Elko Eared, and Elko Corner-notched. Elko points are widely distributed in the West (Heizer and Hester 1978:159; Davis 1964; Hunt 1960; Rogers 1939; Lanning 1963). Radiocarbon dates for the Elko series indicate a time span from 2000 B.C. to A.D. 1080 (Heizer and Hester 1978:159). Thomas (1981) supported much earlier dates in the Western Basin, at least as early as 5000 B.C. to A.D. 500.

In the Mitchell Caverns collection there are six Elko points, one Elko Eared and five Elko Corner-notched. One of each type are the only points for which some provenience is determined. Points of these shapes and sizes were recorded by Farmer (n.d.) as coming from layer two approximately 25 ft in the interior of El Pakiva Cave (depth unknown). Farmer (1936:106) indicated that those points found on surface sites were different from those found subsurface in the cave.

Elko Eared

Number of specimens: 1
Material: tan chert

Elko Eared points are distinguished by their two basal ears projecting diagonally, separated by a basal notch or concavity. Heizer and Baumhoff (1961:128) described variations in this type ranging from large, triangular points with large projecting ears, to stemmed, corner-notched eared points which seem to be similar to the Elko Corner-notched type.

The Elko Eared specimen from the collection is relatively small, carefully pressure flaked, and the lateral edges are almost straight. A concave base separates the ears (Fig. 7u).

Elko Corner-notched

Number of specimens: 5
Material: red quartzite (1), red jasper (1), yellow chert (2), grey chert (1)

These points are long and heavy, with sloping shoulders and stems that widen toward the base. Heizer and Baumhoff (1961:128) felt that this type was a variation of the Elko Eared, and the two forms do grade into one another.

Two of the Corner-notched points from this collection, although fragmentary, are crude in form and have asymmetrical lateral edges. Of the other three specimens, one has laterally concave edges, one has convex edges, and the edges on the other are straight. All five are straight-based, with four of the stems expanding toward the basal end, and one, with straight edges, also has a fairly straight stem (Fig. 7p-t).

TABLE 1

Attributes of Diagnostic Points

Fig. 7	Projectile Point Type	L	W	Th	Wt	Material	Cat. No.	Provenience
a	Desert Side-notched	2.0	1.4*	.2	.5*	Rose quartz	P-259-291	Unknown
b	Desert Side-notched	2.1	1.2	.2	.4	White quartz	290	"
c	Desert Side-notched	1.7	1.0	.3	.3	Obsidian	294	"
d	Desert Side-notched	1.4	.9	.3	.2	Obsidian	293	"
e	Cottonwood Triangular	1.8*	1.2*	.3	1.0*	Basalt	156	"
f	Cottonwood Triangular	2.0*	1.3*	.2	.8*	White chalcedony	150	"
g	Cottonwood Triangular	.5*	.5	.2	.6*	Pink chalcedony	148	"
h	Cottonwood Triangular	2.2	1.2*	.3	1.0*	White chalcedony	158	"
i	Cottonwood Triangular	1.7	1.9*	.2	1.6*	Pink chalcedony	157	"
j	Cottonwood Triangular	2.4	.2*	.2	1.4*	White chalcedony	151	"
k	Cottonwood Triangular	2.0*	2.3	.3	1.8*	Brown chert	162	"
l	Eastgate Contracting Stem	2.3	2.0	.4	1.2	Red jasper	292	"
m	Lozenge-shaped (untyped)	3.0	1.7	.6	3.5	Grey chert	154	"
n	Lozenge-shaped (untyped)	2.6	1.6	.7	3.2	Rose quartz	281	"
o	Gypsum Cave	3.8	2.6	.8	7.4	Yellow chert	147	"
p	Elko Corner-notched	3.8*	2.5	.6	5.9*	Yellow chert	278	"
q	Elko Corner-notched	2.9*	3.1	.6	6.9*	Red quartzite	276	"
r	Elko Corner-notched	2.6	2.3	.4	2.8	Red jasper	280	El Pakiva
s	Elko Corner-notched	3.7	2.3*	.7	4.9*	Yellow chert	277	Unknown
t	Elko Corner-notched	2.5*	3.2	.5	5.3*	Grey chert	155	"
u	Elko Eared	2.7	2.1	.4	2.8*	Tan chert	149	El Pakiva

* = incomplete measurement

Untyped Specimens

Number of specimens: 2
Material: rose quartz (1), grey chert (1)

The following two points have a morphologically characteristic shape but are not known to have a regional or chronological significance. These have no known provenience (Fig. 7m-n). They are fairly thick lozenge-shaped points, with the edges and ends somewhat rounded and not sharp. Similar stubby points were recovered from the Sayles site in Cajon Pass, San Bernardino County (Kowta 1969). Kowta (1969:35) placed the Sayles assemblage in the period from 1000 B.C. to A.D. 1000, and related it to the Topanga Complex of that same period. These dates were based on comparisons with other dated complexes.

Untypeable Specimens

Number of specimens: 5
Material: chert (2), basalt (1), jasper (2)

This group of fragments having no typeable characteristics consist of two point tips, three midsections, and one basal section. No proveniences are known for these specimens.

Bifaces

There are five triangular knives, one stemmed triangular knife, two oval knives, one irregular biface, two leaf-shaped bifaces, and two miscellaneous bifaces in this category. Five bifacial knife fragments are included in the collection, and one is embedded in a handle. Measurements are listed in Table 2.

Triangular Bifaces

Number of specimens: 6
Distribution: unknown (5), El Pakiva interior (1)
Material: grey chalcedony (1), red jasper (3), obsidian (1), unidentified (1)

Of this group, two have concave bases, three have straight bases, and one is stemmed. All are carefully shaped by pressure flaking and have fine, sharp edges. One, of red jasper, is hafted to a somewhat unusual handle (Fig. 15a). The specimen shown in Figure 8c shows almost iridescent multicolored yellow and red hues which suggests thermal treating. It was collected in the interior of El Pakiva Cave, on the surface of a rat nest. The specimen in Figure 9d has been fire-affected after manufacture and is pot-lidded and fractured, with a white, porcelain-like color under its blackened surface. The largest of the bifaces (Fig. 8a) shows excellent workmanship and has very sharp edges along its entire perimeter. Its glossy luster is indicative of thermal treating. An attempt was made to source the obsidian from the stemmed specimen (Fig. 9c), but the chemical composition could not be matched.

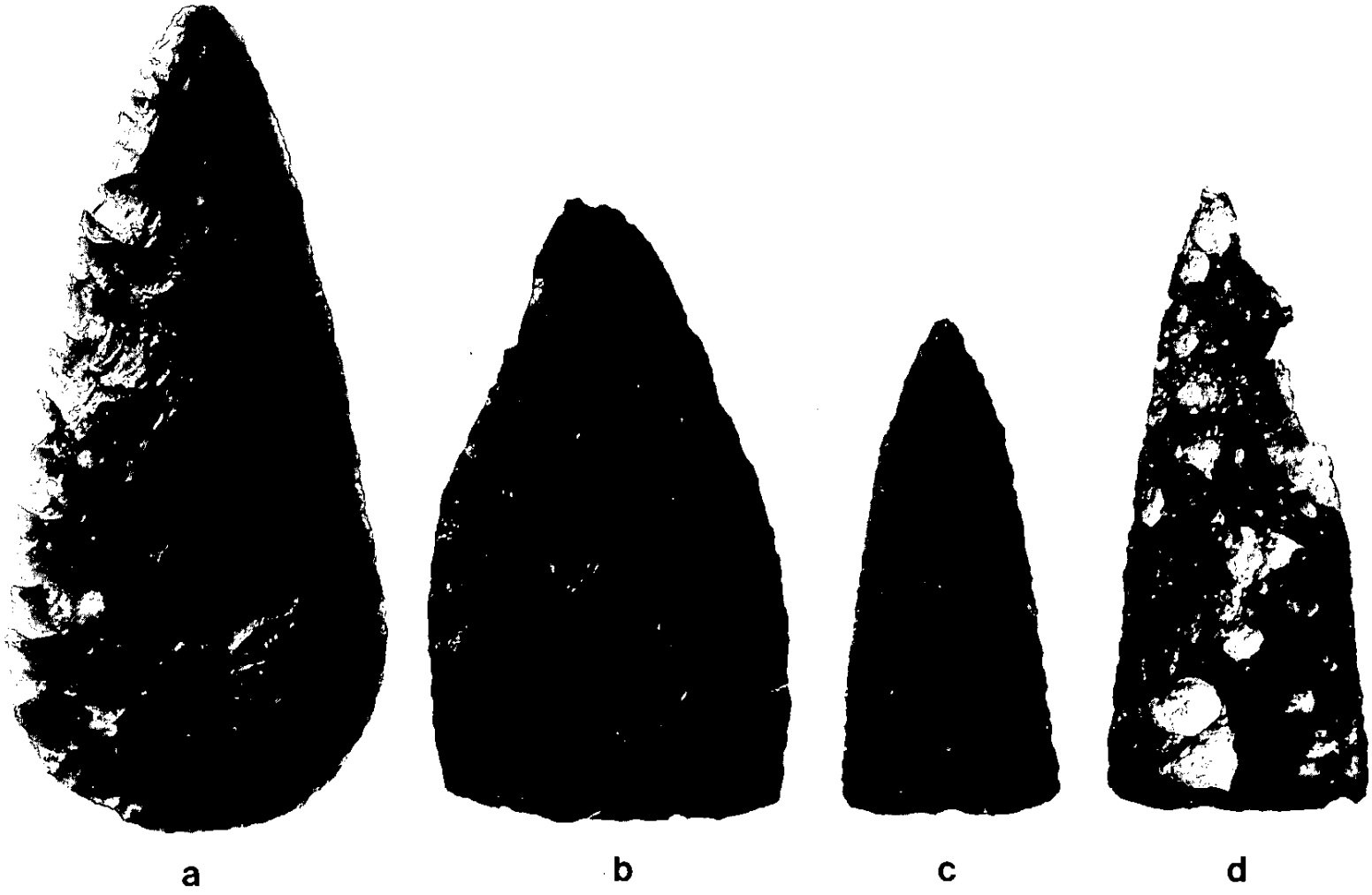

Figure 8. Triangular bifaces. Actual size.

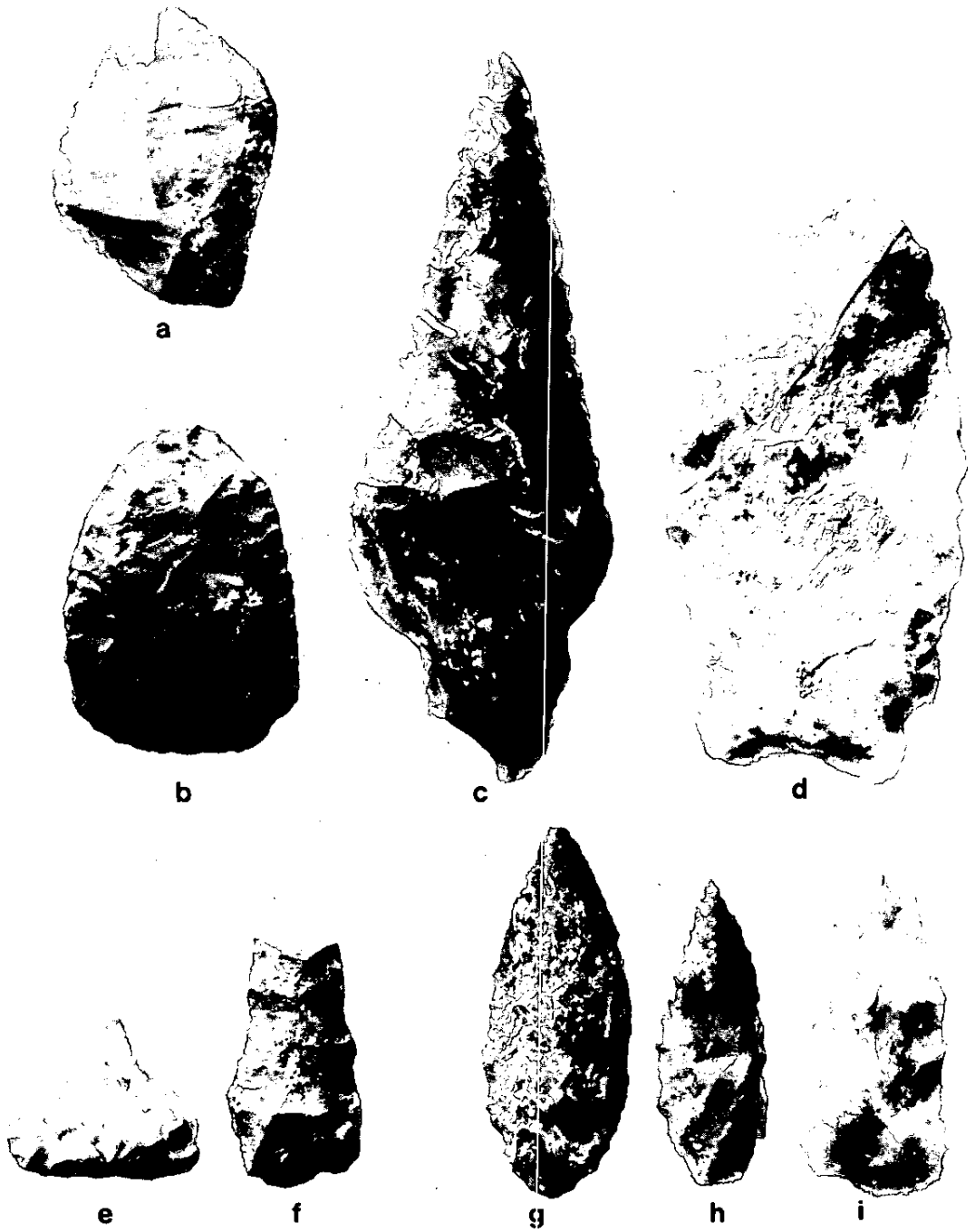

Figure 9. Flaked stone tools: a) Miscellaneous biface; b) Oval biface; c) Stemmed triangular biface; d) Oval biface; e) Perforator; f) Drill; g-h) Leaf-shaped bifaces; i) Irregular biface. All actual size.

Oval Bifaces

Number of specimens: 2
Distribution: unknown (2)
Material: yellow jasper (1), rose chalcedony (1)

The specimen in Figure 9b is finely shaped like the triangular blades. It has a convex base, with one side straight and the other curved. The edges are finely pressure flaked around the entire perimeter and appear modified from use. The other specimen (Fig. 9d) has a concave, fish-tail shaped base, and is a more roughly-constructed tool with uneven edges. The chalcedony material has sedimentaceous inclusions.

Irregular Bifaces

Number of specimens: 1
Distribution: unknown
Material: grey chalcedony

All surfaces of this bifacial tool are irregular, but its cutting edges are sharp (Fig. 9i).

Leaf-shaped Bifaces

Number of specimens: 2
Distribution: El Pakiva (1), unknown (1)
Material: Yellow jasper (1), unidentified (1)

The specimen shown in Figure 9g is a dark grey material with quartz veins. The tool has been carefully shaped considering the flaking properties of the material, and the edges are sharp. The smaller biface (Fig. 9h) has serrated edges except for the base and basal edges.

Miscellaneous Bifaces

Number of specimens: 2
Distribution: unknown
Material: brown-yellow jasper (1), obsidian (1)

The jasper tool is shaped like the central and basal portion of a concave-based knife (Fig. 9a). The base is the bifacial, pressure-flaked cutting edge (shown on upper left). From this blade end, the tool thickens and is 1 cm thick at the opposite end, where it permits a comfortable hand-hold. There is also a sharp bifacial edge along one side.

The obsidian biface is a thick-centered tool of unknown function, 4.9 cm long, with a triangular outline. It is pressure flaked on all sides.

Unifaces

Number of specimens: 2
Distribution: El Pakiva interior (2)
Material: Red jasper (2)
Measurements: 4.7-by-2.7-by-0.4 cm; 4.6-by-3.3-by-0.7 cm

These are oval, round, or rectangular scraping tools which are characteristically unifacially flaked with flat or nearly flat basal surfaces (Jesperson 1983:40).

TABLE 7

Bifaces

Fig.	Description	L	W	Th	Wt	Material	Cat. No.	Provenience
8a	Triangular	12.6	6.0	1.1	81.5	Grey chalcedony	P-259-274	Unknown
8b	Triangular	9.8	5.5	.9	57.0	Red jasper	273	"
8c	Triangular	7.6	3.3	.5	11.5	Red jasper	78	El Pakiva
8d	Triangular	9.5	4.0	.6	19.7*	Unidentified	245	"
17a	Triangular	8.3	3.6	.7	51.6*	Red jasper	269	Unknown
9c	Stemmed triangular	11.0	4.0	1.5	39.0	Obsidian	164	"
9b	Oval	5.0	3.6	.5	12.7	Yellow jasper	275	"
9d	Oval	9.0	4.4	.9	44.3	Rose chalcedony	165	"
9i	Irregular	5.0	2.3	.5	7.2	Grey chalcedony	146	"
9g	Leaf-shaped	5.7	2.2	.5	6.6	Unidentified	244	El Pakiva
9h	Leaf-shaped	4.7	1.7	.5	4.0	Yellow jasper	279	"
9a	Miscellaneous	33.4	3.8	1.0	14.0	Brown-yellow jasper	144	"
--	Miscellaneous	4.9	2.0	1.1	9.9	Obsidian	159	Unknown

* = incomplete measurement

* = includes handle

One specimen is a convex-shaped flake that has been pressure flaked all around its perimeter creating sharp edges. The top surface has also been shaped. The other, somewhat rectangular in shape, has one edge modified from use, but is otherwise unmodified.

Drilling and Perforating Tools

Three specimens are included in this category following Jesperson (1983:42). Drills, of which there is one, are here considered to be larger than perforators and capable of penetrating wood and stone. The two perforators are lighter in weight and better for use on materials such as leather and plant fibers.

Drills

Number of specimens: 1
Distribution: unknown
Material: grey rhyolite
Dimensions: 3.8-by-2.0-by-0.8 cm; 7.2 gm (fragmentary)
This specimen (Fig. 9f) has a thick, wide bit and is broken at the tip. Its surfaces and edges are crudely flaked.

Perforators

Number of specimens: 2
Distribution: unknown (2)
Material: tan chalcedony (1), brown-yellow chert (1)
Dimensions: 2.1-by-0.7-by-0.3 cm (fragmentary); 2.5-by-2.8-by-0.6 cm (fragmentary)

The specimen shown in Figure 9e has a wide bit that tapers to a narrow tip, now broken. This tool is finely pressure flaked along the edges and surfaces. The area along the shoulders is smoothed due to use. The other specimen, not shown, is a tip end of a perforator.

Problematic Flaked Stone Tools

Number of specimens: 2
Distribution: Medicine Cave (1), unknown (1)
Material: quartzite (2)
Dimensions: 13-by-6.5-by-2.2 cm; 7.5-by-5.5-by-1.9 cm (fragmentary)

Two naturally smoothed, oval cobbles have been flaked along the edges, possibly to form hand grips. The slightly convex surfaces of the stones are smooth but not ground, and the edges have not been battered (Fig. 10).

These artifacts were catalogued by Farmer as anvils used in pottery manufacture. Smooth stones were held against the interior wall of the pot and the outside wall was patted with a wooden paddle. Kroeber described two anvils he obtained while studying pottery-making among the Mohave along the Colorado River (Kroeber and Harner 1955:3). These "waterworn stones" were somewhat three-cornered, about 90-95 mm long, 43 mm thick, had one flat side and one convex. Campbell (1931:86) described two stones that informants called pottery-smoothing tools. They are smooth on one side, are chipped along the edges, and are 3-3.5 in in diameter, round.

These artifacts found at Mitchell Caverns differ from the others described above, being oval instead of round, and not as thick as those described by Kroeber. They can be held with fingertips and could have been used as pottery anvils if the curve of the vessel accommodated their shape (Suzanne Griset, personal communication, 1984).

Debitage

The Mitchell Caverns collection contains few debitage specimens. An unknown number of flakes were collected in the 1934 excavation in the El Pakiva Cave entrance, but they are no longer with the collection and no descriptions are available. All the debitage known has been found in El Pakiva. The 1968 excavation recovered one small obsidian flake (determined to have the same chemical composition as obsidian from the Coso Mountains), one chert core, and three chert flakes, one large and two small. They were all found in and around the cache pits in the interior of the west passage to El Pakiva Cave.

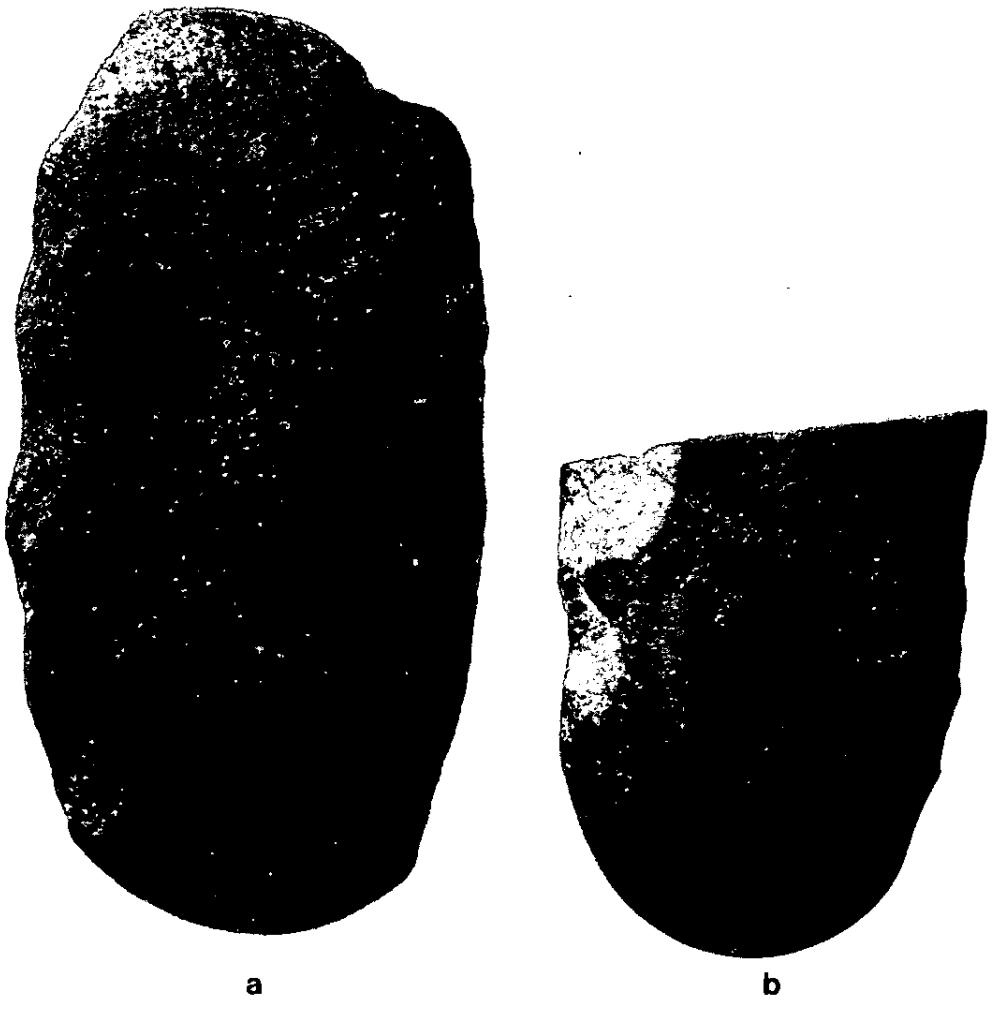

Figure 10. Problematic flaked stone tools. Actual size.

Obsidian Sourcing

Sourcing of the five obsidian specimens was conducted at the Department of Geology, University of California, Davis. Results were obtained for three of the samples. A small flake, found near the cache pits in the interior of El Pakiva Cave, was determined to have come from the Coso Mountains, 267 km from the caverns. Two Desert Side-notched points, provenience unknown but thought to have come from the surface in the immediate area, were sourced from the Hackberry Mountains area. The Hackberry Mountains source is a widespread geologic bed of perlite of apparent late Miocene age that occurs about 20 km northeast of the caverns. Small "Apache tears" of obsidian occur as resistant kernels eroding from the perlite (P. J. Wilke, personal communication, 1985).

Sources for the two obsidian bifaces could not be determined.

GROUND STONE AND MISCELLANEOUS STONE ARTIFACTS

The ground stone assemblage consists of one mano, one steatite pipe, two steatite arrow straighteners, one basalt pestle-like fragment, and one ball of ground red ocher. Several manos and metates were recorded by Farmer (n.d.) as being collected in the area, but none were collected inside the caverns, and only one mano, provenience undetermined, remains in the collection. Farmer (n.d.) reported that fragments of "well-formed metates of volcanic rock" were found in sites in the area.

Mano

The bifacial mano measures 11.6-by-9.6 cm, is 3.5 cm thick, and is made of granite (Fig. 11a). The sides as well as the grinding surfaces are fairly flat, and the grinding surfaces are smooth. Evidence of pecking is apparent.

Pipe

The light-colored steatite pipe measures 10.5 cm long, is 1.5 cm wide at the small end, and 2.5 cm wide at the large end (Fig. 11d). There are darker stains around the exteriors of either end and along its length for about one-fourth its diameter. At the larger end, the hole is drilled conically to widen it. Through the remainder of the pipe, the hole is straight and 1 cm in diameter. The pipe was found by Farmer in a rock shelter located in cliffs behind what was then the Dominguez Ranch, approximately 6 km northeast of the caverns.

Pestle-Like Fragment

A grey, vesicular basalt fragment was found by Smith in the most interior alcove of the east passage of El Pakiva Cave, at a depth of 6 inches. It is 6 cm long, 1.3 cm wide at the narrow end, and 2.3 cm at the wider end. This pestle-like fragment is cone-shaped with rounded ends. A fragment is broken off the wide end and the fractured edges appear to be ground, as does the entire surface.

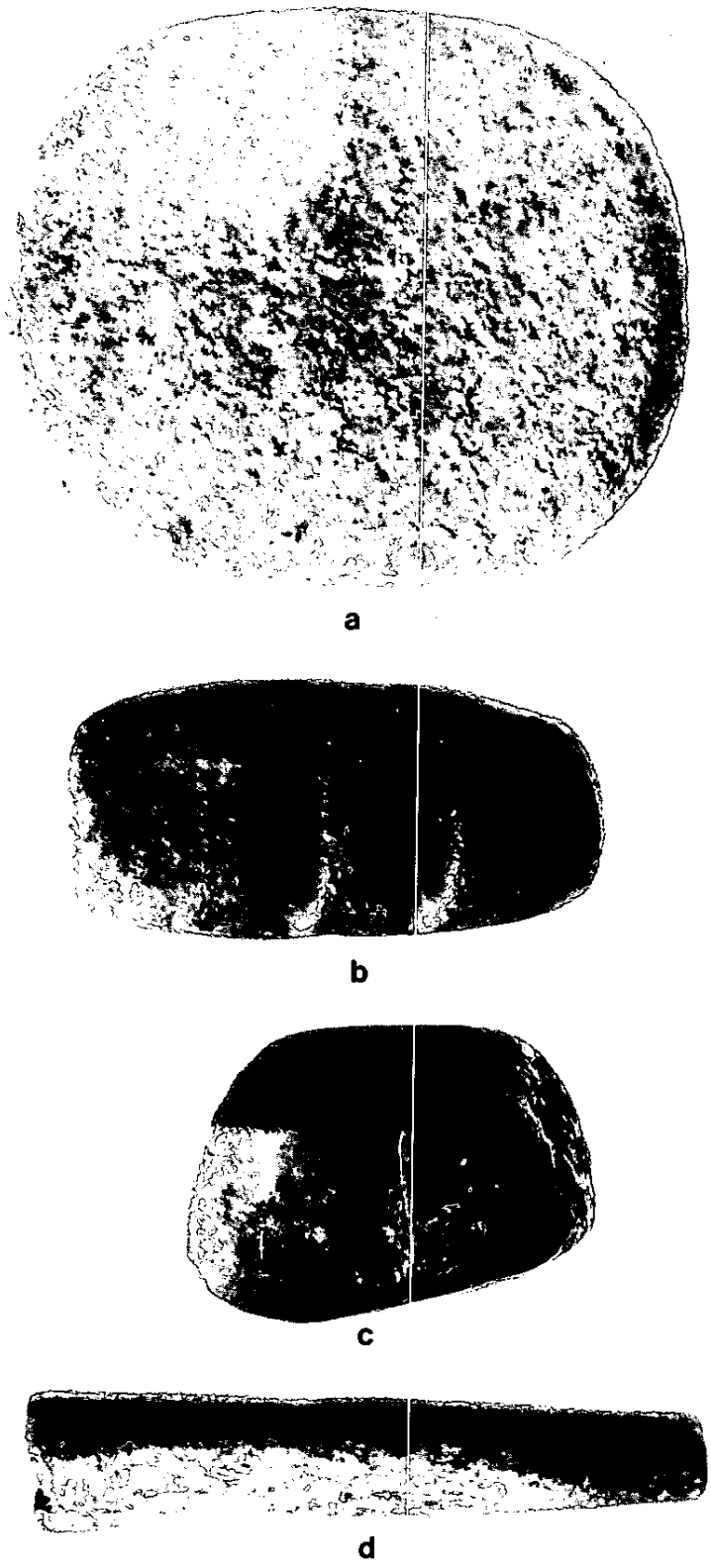

Figure 11. Ground stone tools: a) Mano; b-c) Arrow straighteners; d) Pipe. Pipe is 10.5 cm long.

Arrow Straighteners

These steatite tools are both black (Figs. 11b-c). One has two grooves, is smooth, and oval in shape. Its dimensions are 9.0-by-4.1-by-2.7 cm. The other has one groove through and perpendicular to one corner, and measures 5.0-by-7.0-by-3.0 cm. This specimen is quasi-rectangular, having one rounded and three sharp corners. Provenience is unknown for either specimen.

Ground Ocher

A large (110 cm diameter) ball of ground red ocher, collected from a cache pit in El Pakiva Cave, was associated with a small fragment of ocher-stained leather assumed to have been a leather bag. Also found with the leather were yucca and juniper fibers (Fig. 16a.)

Ocher is available in its natural state as hematite or iron oxide at the site of the Vulcan Mine, approximately 4 km southwest of the caverns near Foshay Pass (Norris and Webb 1976).

Red ocher was sometimes made by heating the natural stone in pits and then grinding it (Heizer and Treganza 1944:309). Kelly (n.d.b:23) reported that ocher was ground, mixed with water, and soaked. It was mixed with grease from deer or mountain sheep, then applied as body or face decoration, and as a preventative to sunburn or chapping (Kelly 1964:66).

Miscellaneous Stone

Two specimens of ruby silver were collected on the surface of El Pakiva by Farmer. These were catalogued but are now missing. Ruby silver is the common name of both pyrargyrite (silver antimony sulfide) and proustite (silver arsenic sulfide) (Pough 1960:114) which are dark red rock crystals that have been found at silver mines in California and Nevada (Chesterman 1978:384-386). Silver was mined near the caverns, and the crystals could have been obtained locally.

The use of the rock crystals as charmstones was an important and widespread manifestation of aboriginal religious practices in North America. Levi (1978:43, 44) described such crystals as being of quartz or tourmaline, clear or of various colors. Southern Diegueno shamans and those from Baja California favored colored crystals (Levi 1978:44).

MODIFIED WOOD

A collection of wood apparently modified in some way by human activity contains finely crafted pieces such as chuckwalla hooks, as well as sticks with little modification. Also included here are fire drill hearths, forceps, crooked sticks, knife handles, a yucca awl, and cane fragments.

Chuckwalla Hooks

Number of specimens: 3
Distribution: unknown
Material: ironwood (Olneya tesota)
Dimensions: Length: 89.6, 82.5, 72.6 cm. Diameter below hook: 5 mm, 5 mm, 8 mm

The longest of the three hooks (Figs. 12a-b, 13b) is 89.6 cm long. The stick is smoothed but the surface is irregular, and it is straight except for a slight angle at the hook end. It is flattened laterally along its entire length and the end opposite the hook tapers to a blunt point. The rounded hook end is covered with a brownish adhesive. A fragment of bone barb carved from a mammalian long bone splinter protrudes from the adhesive, and under it, visible where it has flaked off, sinew strips are wrapped which hold the bone barb in place. There is a heavy grime coating beginning about 14 cm from the hooked end and extending 28 cm up the handle. This area is the center of gravity where it is evenly balanced when hand-carried.

Similar to the specimen just described, is a slightly shorter (82.5 cm) specimen which has no hook remaining (Figs. 12c, 13c). This stick also has a smoothed but irregular surface, and is straight except for a gentle curve at the hook end. This curved area is flattened laterally, but the remainder of the stick is round, and the opposite end tapers to a blunt point. There is a fire-blackened area about 25 cm from the pointed end. On the hook end, a 2.2 cm notch is cut, and traces of dark-colored pitch are in the notch, and above and below it. Strips of sinew are wrapped around the notch. The pitch residue indicates that this entire end was once completely coated.

On the third specimen (Figs. 12d, 13a), the wooden hook is formed by the joining of two branches, and is all one piece. The stick has been smoothed and the surface is more irregular than the other specimens but appears to be the same wood. The hook has been carved to a dull point, and is 5 cm long. The stick is flattened laterally from the hook end for two-thirds of its length, then it tapers somewhat and the opposite end is bluntly rounded. A small, rodent-gnawed notch is present near the handle end. The handle is moderately coated with grime.

Historic documentation exists from eastern California, southern Utah and Nevada, and western Arizona for the use of hunting crooks or hooks which were used in hunting rabbits, rodents, lizards, and possibly snakes and amphibians (McKennan 1935a:67; Mohr 1951:145-148; Powell 1875; Fremont 1845). From these descriptions, and the specialized design of the chuckwalla hook, it is evident that at least two types of hooked implements were used. The lightweight construction and fragile hook end of the chuckwalla hook could not have been used for tearing up rat nests and animal burrows.

In his diary, Francisco Garces, the first Spaniard to travel through the Providence region, wrote that the Chemehuevi he met were all carrying "a crook besides their weapons" (Coues 1900:225). Other observations were made by George Brewerton, who traveled with Kit Carson, and by John C. Fremont. "Some of the parties which I have been mentioning brought lizards with them into our camp, and ate them raw, or with no further preparation than jerking off the reptile's tail. To obtain this description of food more readily, many of them carried with their arms a sort of hooked stick not unlike a long cane, which they used in capturing them" (Brewerton 1930:79). Fremont (1845:267, 268) reported: "Many of these Indians had long sticks, hooked at the end, which they used in hauling out lizards, and other small animals, from their holes. During the day they occasionally roasted and ate lizards at our fires" (recorded at the Muddy River, east of Las Vegas).

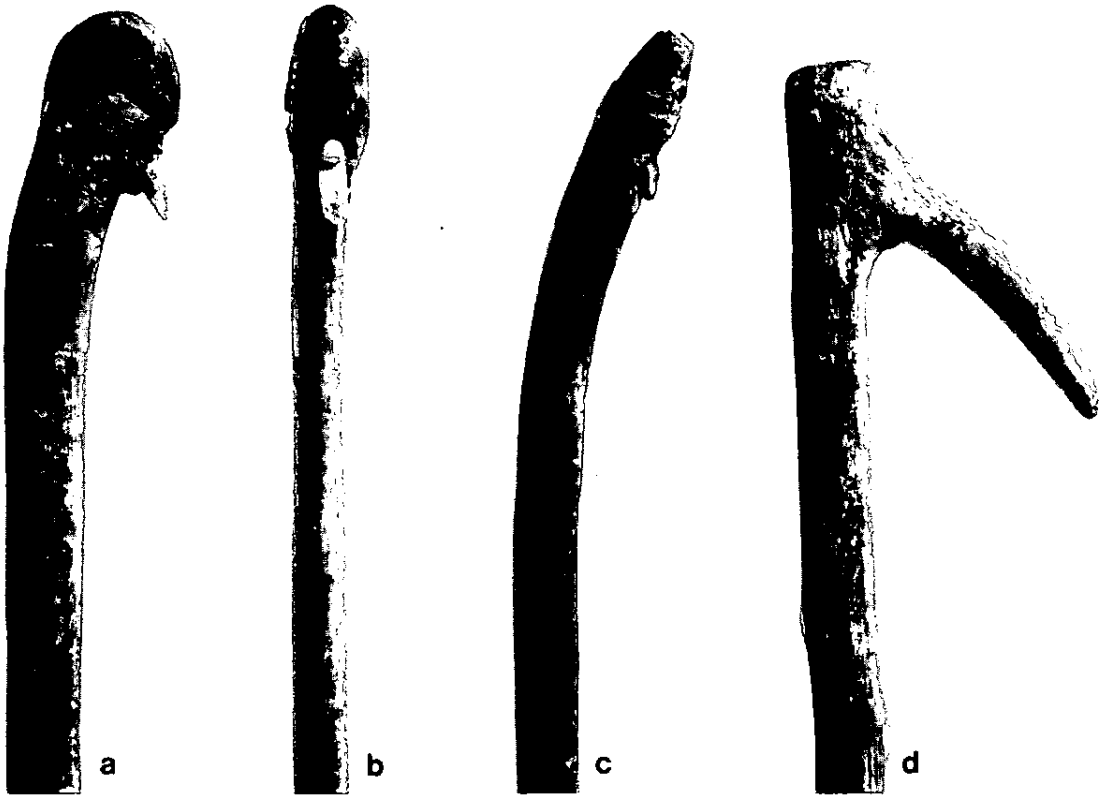

Figure 12. Chuckwalla hooks: a-b) Specimen with attached bone hook, side and front views; c) Specimen missing inserted hook; d) Single piece specimen.

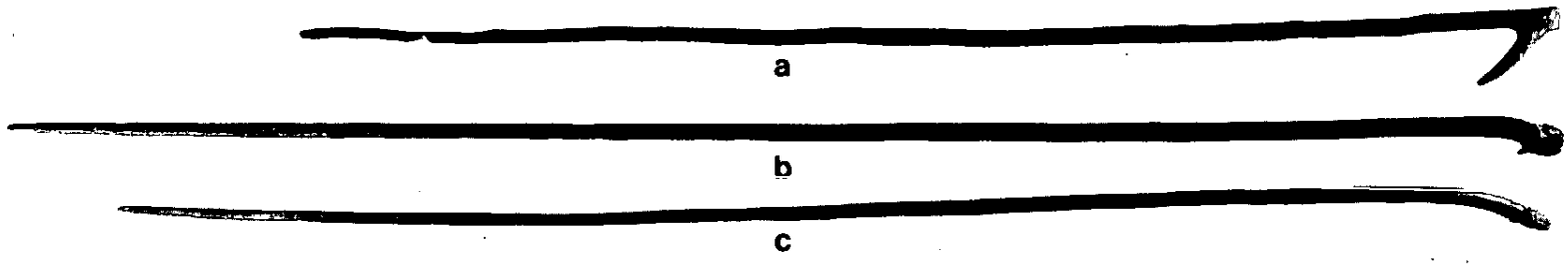

Figure 13. Chuckwalla hooks. Lower specimen (c) is 72.6 cm long.

Whether these descriptions are of chuckwalla hooks or of a more cane-like hunting crook is uncertain. While several descriptions indicate the stick being similar to a cane (Brewerton 1930:79; Powell 1875), McKennan's brief accounts seem to refer to a more specialized tool for chuckwalla: "The Chuckwalla were cornered in rocks and removed by hand or with a forked stick" (McKennan 1935a:64), and "The Chuckwalla stick was long with a hook at one end" (McKennan 1935a:68).

The following two paragraphs from Powell's manuscript indicate he noted the use of both a rabbit crook and lizard hook:

> Clubs, javelins, sling stones, and arrows were formerly used by the Indians in the hunt, but all these articles except the bow and arrow are now superceded by fire arms. They still use a small stick like a cane with a curved handle for the purpose of pulling rabbits from their burroughs...
>
> Lizards are used for food in seasons of scarcity. They are killed by throwing stones or clubs at them, or are shot with arrows. Many are caught with hooks which are used to pull them from the crevices and rocks (Fowler and Fowler 1971:48).

In a photo taken by John Hillers during one of the Powell expeditions, a Southern Paiute man is shown holding two chuckwalla hooks (Steward 1939:Pl. 5d;
Fowler and Matley 1979:179). The description of another similar tool collected by Powell indicated the hook was an iron nail (Fowler and Matley 1979:84), but those in the photo resemble the two hafted specimens from Mitchell Caverns.

The chuckwalla (Sauromalus obesus) is a rock-dwelling herbivorous lizard, and creosote bush is one of its staple foods. The animals bask in the sun, but when disturbed, hide in rock crevices. They may be gently probed out with a slender stick, but if agitated, distend themselves with air and are very difficult to remove (Stebbins 1966:95).

The range of this lizard extends from Death Valley through Imperial Valley, along the eastern Baja California coast including the Gulf islands, throughout north and southwest Arizona, along the northwest coast of Mexico, and in southernmost Utah and Nevada (Stebbins 1966:71; Shaw 1943:270). In most of these areas, chuckwalla hooks have either been found archeologically or ethnographic documentation exists for them. Specimens have been recovered from Death Valley (Wallace 1978) and Twentynine Palms (Campbell 1931), and a hooked stick with similarities to these was recovered in Imperial County (Reinman, True, and Warren 1960). A specimen with a wooden hook was collected by Kroeber in northwestern Arizona, exact location unknown (McGuire 1983:32). It may have been specially constructed for Kroeber in 1929 (letter from Stewart L. Peckham, Acting Associate Director, Museum of New Mexico, Santa Fe, 1984). The use of chuckwalla hooks continued on into historic times, and specimens have been found made of wire (Wallace 1978:111) and with hooks made of iron nails (Fowler and Matley 1979:79).

The design of the bone-barbed tool fits in with the scenario of the capture of chuckwallas. The areas where the tools have been collected or described coincide with the range of these reptiles, and the tools are not known outside the range. The long, slender pointed handle could easily have been inserted into rock crevices where the reptiles would have been guided to a more maneuverable position. The design of the slightly-curved and laterally-flattened end with the sharp bone hook also would have served for insertion into tight crevices and penetration of the reptile's skin, perhaps deflating it and allowing the animal to be removed. The wooden hook, although not as sharp, may also have served to pull the animal from its hiding place. Also, these tools most likely were designed specially for the capture of chuckwallas rather than rodents, because the chuckwalla range corresponds with locations where tools have been found or recorded, while rodents are not similarly restricted to these areas.

Crooked Sticks

Number of specimens: 2
Distribution: Medicine Cave (1), unknown (1)
Material: unknown woody dicot
Dimensions: 47.5-by-1.5 cm; 34.7-by-1.7 cm (lengths measured from tip, around crook, to tip)

Neither specimen has any bark remaining. One specimen (Fig. 14c) is fire-blackened at the curved end, and the tip is rounded. The opposite, straight end is broken. The stick is coated overall with grime, and the wood, although smoothed, is irregular. This specimen was found by Farmer in Medicine Cave.

The other, shorter specimen (Fig. 14d) has been cut on the straight end. The curved end is fire-blackened and the tip of the crook end is rounded. Another charred area is present on the curve, and there is a 1.3 cm wide notch in the burned area. Another notch begins 4 cm from the burn and was apparently caused by rodents. Grime occurs irregularly on the surface and appears to have been removed in places by rodents. The wood is straight and even with no irregularities.

Crooked sticks used by Southern Paiutes, Walapai, Yavapai, and other desert groups have been well-documented in historic and ethnographic reports (McKennan 1935a; Corbusier 1886; Brewerton 1930; Gifford 1936). These reports describe crooks as rodent hunting implements and, in the Pueblo area, as ceremonial sticks (Mohr 1951:148-150). McKennan (1935a:67), Corbusier (1886:328), and Mohr (1951:145-148) describe the use of the hunting crook to rip up rodent tunnels and nests and capture the animals. Also documented is the use of a pointed stick as a skewer to twist into the rodent fur and pull the animals from their burrows (Drucker 1937). Often the crooked stick was pointed at the straight end.

Figure 14. Wooden tools: a-b) Fire drill hearths; c-d) Crooked sticks; e) Problematic tool; f) Forceps. Forceps are 56.2 cm long.

Mohr (1951:145) described the hunting crook as "a branch bent into the shape of a walking cane or crook" with a length of 2-1/2 to 8 ft, but usually of 5 ft or less. The crook was most likely formed by applying heat and moisture, which may account for the burned areas on the curved end of the Mitchell Caverns specimens.

Archeological specimens of crooked sticks are numerous in Pueblo III sites in Arizona and New Mexico, and many are considered to have had ceremonial functions because of their similarity to specimens used in Pueblo ceremonies (Mohr 1951:148, 149). Laird (1976:31) described the poro, "a rod shaped like a shepherd's crook," as being the Chemehuevi shaman's implement of power.

Brewerton (1930) pictured a desert Indian, who was seen in 1848 on the Old Spanish Trail near the California-Nevada border, holding a crook and a lizard. The chuckwalla hook, rodent hook, rodent skewer, or hunting crook were all used for capture of small rodents, rabbits, or lizards.

An archeological specimen was found in Lead Spring Cave, San Bernardino County, in the central Mojave Desert (Mohr 1951). It measured 59.7 cm long, and its curve had more of an arc than the Mitchell Cavern specimens. The Lead Spring Cave site contained Elko and Shoshonean materials (Mohr 1951:159).

Long sticks with definite crooks were also used for gathering pine cones and mesquite pods (Drucker 1937). Kelly (1964:45) reported that roots were dug by women using a "serviceberry stick (poru) having a handle crooked like a cane." Also, a special kind of hooked stick was used for digging particular types of corms.

The specimens from the caverns do not have a pronounced, definite hook. The specimen with the cut handle is far shorter than those described as rodent crooks, and the other's original length is unknown. The actual function of these sticks is unknown. Their heavy coating of grime indicates they were often handled.

Fire Drill Hearths

Number of specimens: 2
Distribution: unknown
Material: unidentified woody dicot
Dimensions: 37.2-by-1.7-by-0.6 cm; 15.8-by-1.4-by-0.8 cm

One hearth appears to be complete (Fig. 14b), the other is broken where a drill hole has penetrated the wood (Fig. 14a). The complete specimen is scored lengthwise on the drilling surface, from the drilled end to 12 cm from the opposite end, about three-fourths of its length. The edges of the holes are charred and an opening leads from them to the edges of the hearths. The wood is fairly light in weight.

Forceps

Number of specimens: 1
Distribution: El Pakiva Cave interior
Material: unidentified monocot
Dimensions: 56.2 cm long, 2.4 cm wide at exterior of folded end, 1.7 cm wide each handle

The forceps are constructed from a split branch or stalk of fibrous wood. This half of the stalk is then bent in two places, near the center, about 2.5 cm apart, with the flat surface inside (Fig. 14f). A grime-coated area begins 3 cm from the folded end and extends to 21 cm from the handle end.

Forceps of this type are described by MeKeel (1935:50) as tongs for picking tuna cactus and as stirrers for food. Kelly (1934:24) also described the mush stirrer as a piece of wood bent double on itself, tong-like, which was used also to fish out morsels such as meat from the mush. Gifford (1936:221, 279) recorded tongs being used for handling spiny cactus fruits, and also to stir boiling foods.

Knife Handles

Number of specimens: 3
Distribution: El Pakiva (2), unknown (1)
Material: ironwood (Olneya tesota) (1), unidentified hard woody dicot (1), unidentified soft woody dicot (1)
Dimensions: 11.0-by-3.5 cm; 15.5-by-2.4 cm; 17-by-3.3 cm

The ironwood specimen measures 11.0-by-3.5 cm, and is 1.1 cm thick at the proximal end and 0.6 cm at the distal end (Fig. 15a). It is made of flattened and smoothed ironwood, and is split at the site of blade insertion. The proximal end is carved in a slight fishtail pattern. A biconically drilled hole is 1.7 cm from the proximal edge. The red jasper blade is fastened in place with modern glue, and dark-colored adhesive is also embedded in the split. Provenience is unknown.

The hardwood handle (Fig. 15b) measures 15.5-by-2.4 cm. The 2.4 cm-wide proximal end is split about 1.5 cm deep for insertion of a blade. From there, it gradually tapers to a point at the distal end. It is oval in circumference. Dark-colored adhesive is packed in and around the split. Carving marks are visible in the wood but the handle is moderately smooth and symmetrical. It was found in the interior of El Pakiva Cave in a rat nest midden.

The third handle (Fig. 15c), oval in circumference, is made of soft wood and measures 17.4-by-3.3 cm. The handle is split at one end, in which a chert blade fragment is embedded with adhesive. A large cleft in the proximal end tapers to a narrow split at the distal end. The adhesive is of two colors, dark brown and amber. The handle is grime-covered, with the heavier deposit in the center. This specimen was found in El Pakiva Cave, exact provenience unknown.

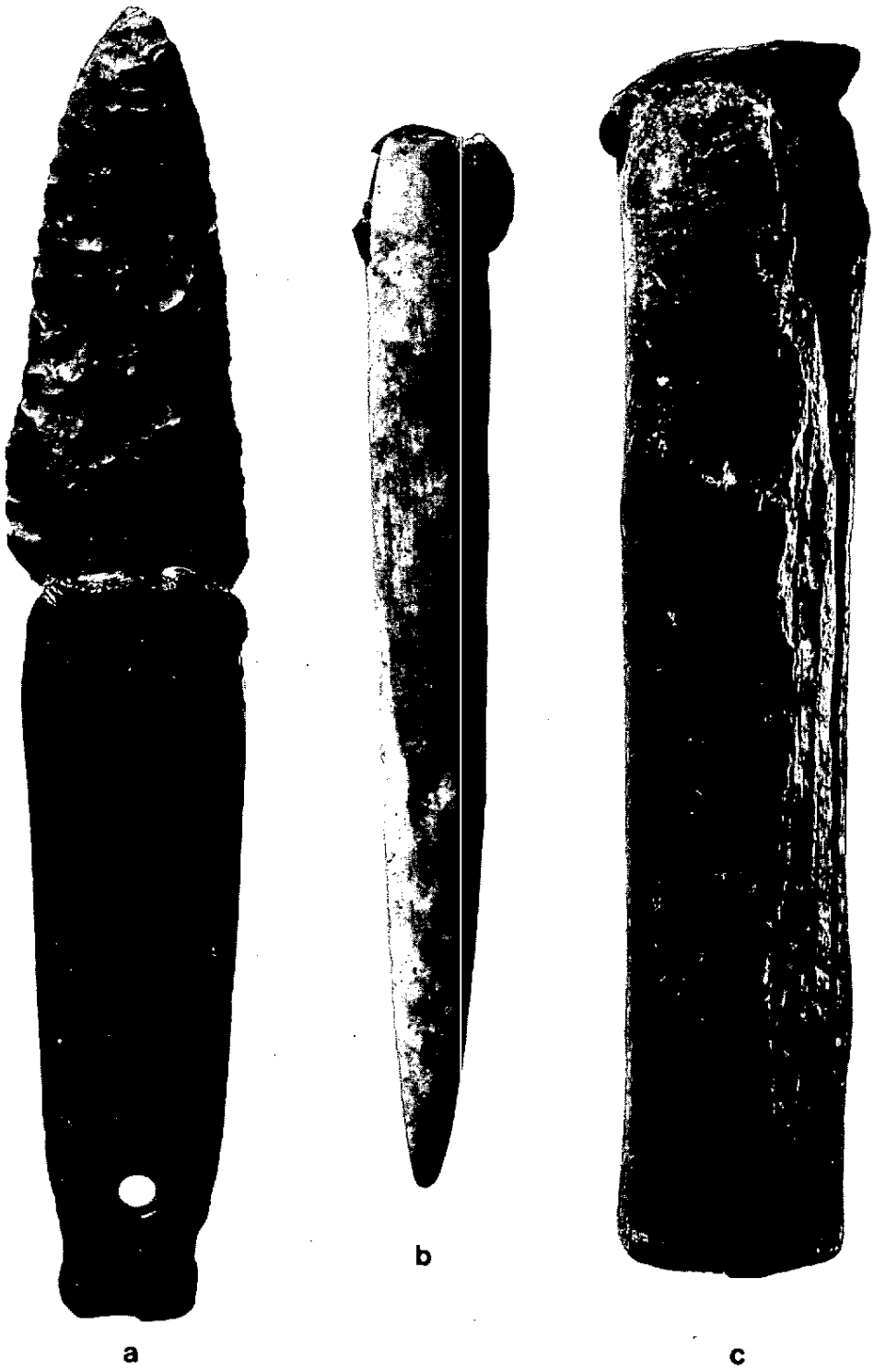

Figure 15. Hafted knives. Actual size.

Hafted knives collected by Powell in 1875 are similar to the largest specimen (Fig. 15a). The other round handle differs in having a pointed distal end. The flat specimen is dissimilar to any archeological or ethnological specimens noted. Ironwood was used by the Chemehuevi for knife handles, and was also traded to Southern Paiute people to the north (Kelly n.d. b:26, 55). A wooden "wand" collected by Campbell (1931:75) is a similarly carved dark-colored hardwood specimen described as ironwood or mountain mahogany.

Yucca Awl

Number of specimens: 1
Distribution: El Pakiva Cave, interior, in or around cache pit, 20-30 cm
Material: Yucca sp.
Dimensions: 7.7-by-6.0-by-0.5 cm

This is the rolled spine of a yucca leaf tip (Fig. 16c). The edges have been carved to form a usable point. The opposite end has been evenly cut. An additional specimen with yucca leaf fibers still attached which was used to mend a basket is also illustrated (Fig. 37).

Cane Fragments

Number of specimens: 12
Distribution: El Pakiva Cave (9), unknown (3)
Material: Phragmites australis
Dimensions: 3.6-by-0.9 cm to 21.6-by-0.8 cm

Four specimens are splinters of cane, eight are cylinders. Three cylinders (Figs. 16d-g) and two splinters have cut ends.

Short Cylinders

Two cylinders each have one cut end. One measures 3.8-by-0.8 cm, and has no node; half of it is charred. The other specimen measures 4.2-by-0.9 cm, has one node with septum intact, and is completely charred. The third short cylinder, 5.0-by-0.9 cm, has one node, septum intact, both ends broken, and is uncharred.

Medium-Length Cylinders

These two specimens are 9.0-by-0.7 cm and 10.3-by-1.0 cm. They each have broken ends, one node, septum intact, and one is burned at one extreme end.

Long Cylinders

One cylinder is carefully cut on one end (Fig. 16g). It measures 21-by-1.1 cm, and has a thick wall, making it the sturdiest specimen. It has two nodes and the septums are intact. It is charred at one extreme end, and the cylinder has a slight bend at one node.

Another specimen measures 17-by-0.7 cm. On one end, one-half of the diameter is flattened and this end seems to be evenly broken, possibly the result of repeated bending. It has one node.

Figure 16. Miscellaneous artifacts: a) Yucca and juniper fibers, with associated leather bag; b) Wrapped metal; c) Yucca awl; d) Modified wood; e-g) Cane cylinders. Metal: 8.5 cm long.

The third long cylinder is 21.6-by-0.8 cm, has one node, and is broken off at both ends. One end is charred, and there, at the node, it may have been cut diagonally on one side.

Discussion

Phragmites grows around springs and other wet areas. It was commonly used for arrowshafts and dart shafts, and is often found archeologically in dry caves (Davis and Smith 1983; Aikens 1970). Cane was also used for cigarettes (Cosgrove 1947:121, 122), and Kelly (n.d. a:47) recorded that cane cigarettes were smoked during the day, and stone pipes, through which the coals were visible, were smoked at night. Cane gambling pieces have also been recorded (Kelly 1964; Kelly n.d. a:122). Watson (1969:33) described cane stalks that had been tied together and used as torches in Kentucky caves. In replicative experiments, cane was found to be the best torch material when compared to dry weed stalks, dry grass, and dry twigs (Watson 1969:34).

The function of these cane fragments in the Mitchell Caverns collection is unknown. One short specimen with no node and one end charred could have been used as a cigarette, but others have septums intact. From caves in western New Mexico, Martin, Rinaldo, and Bluhm (1954:202, 203) discuss cane cigarettes both with and without pierced septums that were filled with split cane and tobacco. The long specimen best suited for use as an arrowshaft has been neither straightened nor smoothed. Most of the specimens are charred, which introduces the possibility of their use as torch material.

Miscellaneous Modified Wood

Two specimens of modified wood with unknown function are included here. They are discussed separately due to their morphological differences.

Problematic Wood Artifact

Distribution: El Pakiva Cave interior, rat nest midden
Material: unidentified wood
Dimensions: 37.5 cm long, 2.4 cm wide at broken end, 0.9 cm wide at opposite end

This broken artifact graduates in diameter and the unbroken end is a rounded point (Fig. 14e). The wide end is broken and charred. Except for 8 cm at the rounded end, the remainder is somewhat flat. One side of this fragment is covered with flaking black paint.

Modified Wood Fragment

Number of specimens: 1
Distribution: El Pakiva interior, rat nest midden, 0-20 cm
Material: unidentified
Dimensions: 3.1-by-0.6-by-0.3 cm

This is a small flattened piece of wood (Fig. 16d), lenticular in cross section. One end is rounded and tapered, the other is broken. Its function is unknown.

Modified Sticks

Number of specimens: 11
Distribution: Medicine Cave (11)
Material: unidentified
Dimensions: 7.0 to 18.6 cm long, average length 14.9 cm, 0.6 to 1.1 cm diameter

Nine specimens are cut on one end and broken on the other, while one is cut on both ends (Fig. 17). Some cuts were made with a sharp object cutting downward and to the end of the stick, leaving a slight protrusion

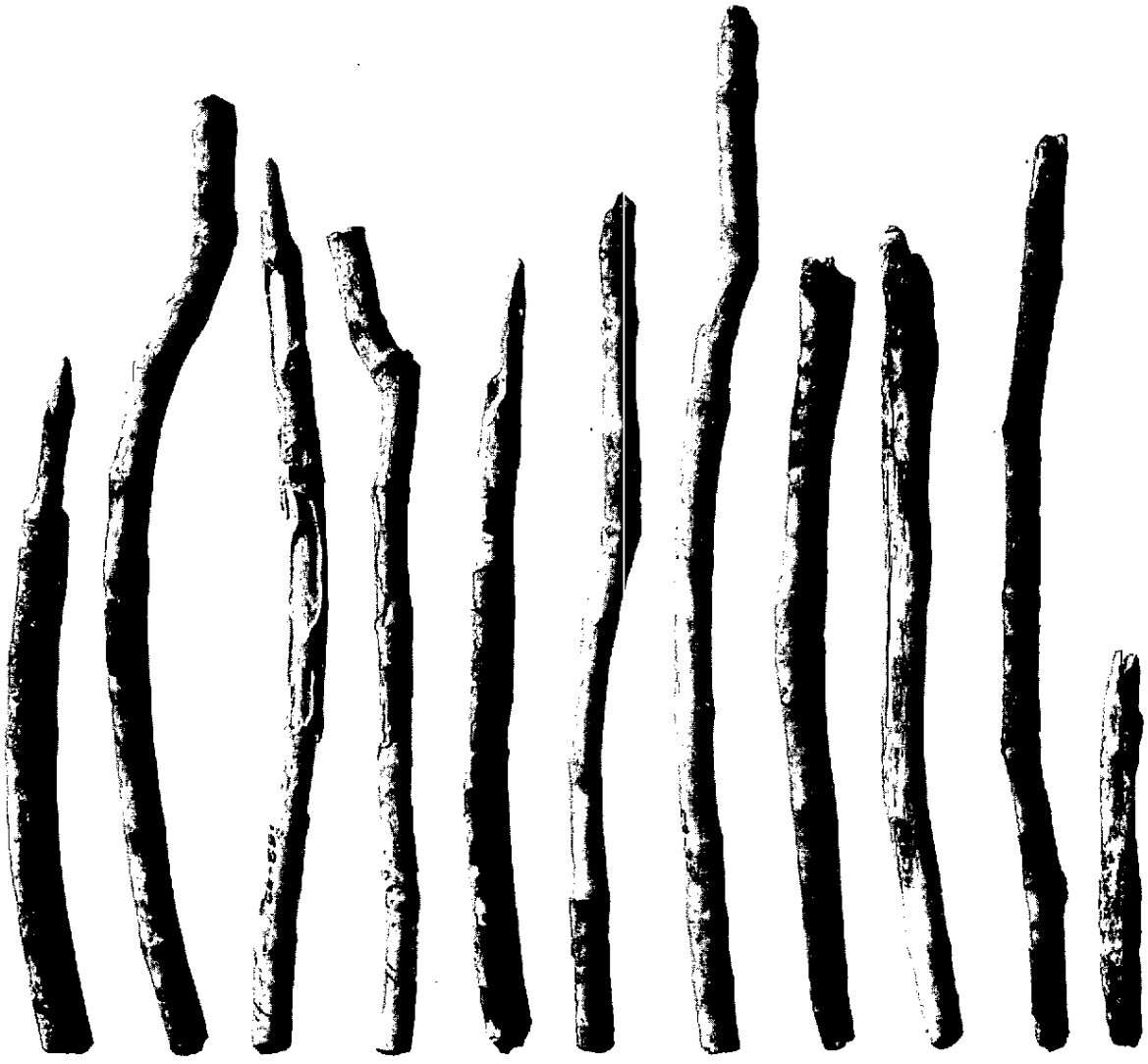

Figure 17. Modified sticks. Specimen on right is 7 cm long.

at the end. Some cuts are straight. The end of one specimen is cut straight into the stick around the entire circumference 1 mm deep, then broken off.

Two sticks have no bark remaining and appear to have been smoothed and shaped. Others with some bark may have been partially cleaned. Bark seems to be flaking off naturally on some specimens. Whittling marks occur near the cut ends of two sticks.

Insect gnawing is evident on several specimens. Those sticks with pointed ends appear to have been shaped by insects eating away parts of the wood to form the irregular point.

Farmer (1936:106) reported finding "greasewood" sticks at Medicine Cave. Two of them had a two-ply cord wrapping at one end, and one cord had a small knot at the opposite end. These were thought to be parts of traps.

In their present state, none of the modified sticks in the collection has wrapping, nor do any possess scoring near the ends for the purpose of lashing.

At Ord Shelter, approximately 30 km southwest of the caverns, bundles of snares were recovered which were made from similar sticks (Echlin, Wilke, and Dawson 1981). Sticks from both large and small snares were longer than those from Mitchell Caverns, averaging 35 cm and 21 cm long, respectively. Both large and small sticks were scored on one end, unlike those from the caverns. Of the trigger sticks recovered at Ord Shelter, lengths were between 7.4 and 10.1 cm, the bark was left on, and ends were not scored.

HAFTING ADHESIVE

Various sources have recorded the Chemehuevi and Southern Paiute usage of creosote pitch as an adhesive to haft blades and arrowpoints and to patch containers (Fowler and Matley 1979:69; Van Valkenburgh 1976:12; Kelly n.d. a:70, n.d. b:25).

Creosote bush (Larrea tridentata) is host plant to a species of lac scale insect, Tachardiella larreae, most frequently found in the area bordering the Colorado River in California and Arizona, and also in other areas of the Colorado and Mojave Deserts (Essig 1958:286, 287). This insect is found in clumps along stems of creosote bush and secretes a reddish resinous material. Use of this substance as an adhesive by aboriginals was mentioned by Jaeger (1933:50) and Essig (1958:287). It is believed that the dark reddish-brown adhesive that is used to haft the chuckwalla hooks and the stone knife blades is lac from this insect.

MODIFIED BONE

Nineteen modified bone artifacts comprise six morphological categories, including a miscellaneous category for which use has not been determined. The other categories are those of awls, flakers, needles, tubes, and scapula grass cutters.

Seven specimens were made from artiodactyl metapodials, and two whose identifying characteristics have been removed are included as probable artiodactyl metapodials. Of these, seven fit the description of awls, and one is a finely-worked flattened specimen of unknown function. Two awls and one flaker are from artiodactyl metatarsals, and there is one split artiodactyl metacarpal. Other identifiable specimens are two jackrabbit tibia tubes, one carnivore femur with cut end, and one bighorn sheep scapula grass cutter.

Most of the bone artifacts were not collected with recorded provenience in relation to other artifacts or features. Three were excavated in or near rat nest material which was also near caches in the interior at El Pakiva Cave, west passage. Proveniences and collectors are unknown for nine specimens.

Seven were collected by park employees, one underneath a rock and one in rat nest midden in El Pakiva Cave. Five were found in dirt removed during construction in widening the west entranceway to El Pakiva Cave. This is the same area that was excavated in the midden in 1934. Artifacts found there were the bone needle, three awls, and a split metacarpal.

Awls

Number of specimens: 11
Distribution: El Pakiva, 6; unknown, 5
Material: artiodactyl metapodial, 8; artiodactyl metatarsal, 2; unknown, 1
Dimensions: length, 9 to 19.6 cm

Awls can be classified according to use, type of bone, and style of manufacture (cf. Kidder 1932; Gifford 1940). The classification of the tool group as awls, according to Kidder (1932:203), refers to all tools with points sharp enough to be used for perforating hides or for making coiled basketry.

Ten of the awls are made from mammal leg bones, specifically artiodactyl (one bone remains unidentified). Ten specimens belong in Kidder's subgroup 'b', in which the head of the bone is unworked except by original splitting (Fig. 18c-e). One (Fig. 21a) belongs to the subgroup 'c', in which the head of the bone is partly worked down.

Although all of the specimens are incomplete and some are missing the functional end, identifications were made because of close similarities to other complete tools. Three specimens, although broken at the tapering end (Fig. 19a-c), resemble many awls found in western North America (Jennings, Schroedl, and Holmes 1980; Kidder 1932). Similar artifacts with blunt points are called 'pins' or 'daggers' by Gifford (1940), who noted that they differ only slightly from awls and some may have been so used. One specimen (Fig. 18b) is thinner and longer than the others, and the point is broken. A similar, complete awl was described by Martin et al. (1952:187) in their report on Tularosa and Cordova Caves, New Mexico.

Flakers

Number of specimens: 1
Distribution: unknown
Material: artiodactyl metatarsal
Dimensions: length, 8.7 cm

Flakers have blunt, rounded ends, solid bodies, and many are short. They once may have been used as awls (Gifford 1940:170). The caverns specimen (Fig. 20c) has been shaped and rounded at the end. Many transverse scratch marks are evident on the convex side.

Bone Needles

Number of specimens: 1
Distribution: El Pakiva Cave, west entrance, exact provenience unknown
Material: mammal long bone splinter
Dimensions: length, 6.8 cm

This specimen (Fig. 18a) has been shaped and polished and has a sharp point. It is flattened except for the pointed end, which is circular, and has transverse scratch marks across both flat surfaces. The round eye is biconically drilled. When viewed from the narrow aspect, it tapers at both ends. It was found by a park employee near the entrance to El Pakiva Cave in the same area that Farmer excavated in 1934.

Bone Tubes

Number of specimens: 2
Distribution: El Pakiva Cave interior, west passage, surface rat nest
material, 1; unknown, 1
Material: Jackrabbit (Lepus californicus) tibia, 2
Dimensions: 6-by-0.7 cm; 6-by-0.8 cm

These bone pieces are cut and polished on both ends (Figs. 20d-e). Similar bone tubes thought to be beads are present in many areas of California (Gifford 1940; Schenck and Dawson 1929). Specimens were also described by Kidder (1932) at Pecos and Martin, et al. (1952) from Tularosa and Cordova Caves. Aikens (1970) found specimens strung on rawhide and cordage at Hogup Cave, Utah.

Scapula Grass Cutter

Number of specimens: 1
Distribution: El Pakiva interior, west passage, rat nest
Material: Mountain sheep (Ovis canadensis) left scapula
Dimensions: length, 22.5 cm; width, large end, 4.1 cm, small end, 3.3 cm

To make this tool, the supraspinous border and spinous process have been removed, leaving the infraspinous border, neck, and glenoid fossa (Fig. 20a). Pieces of tendon remain attached. It is polished at the serrated edge and along the sides.

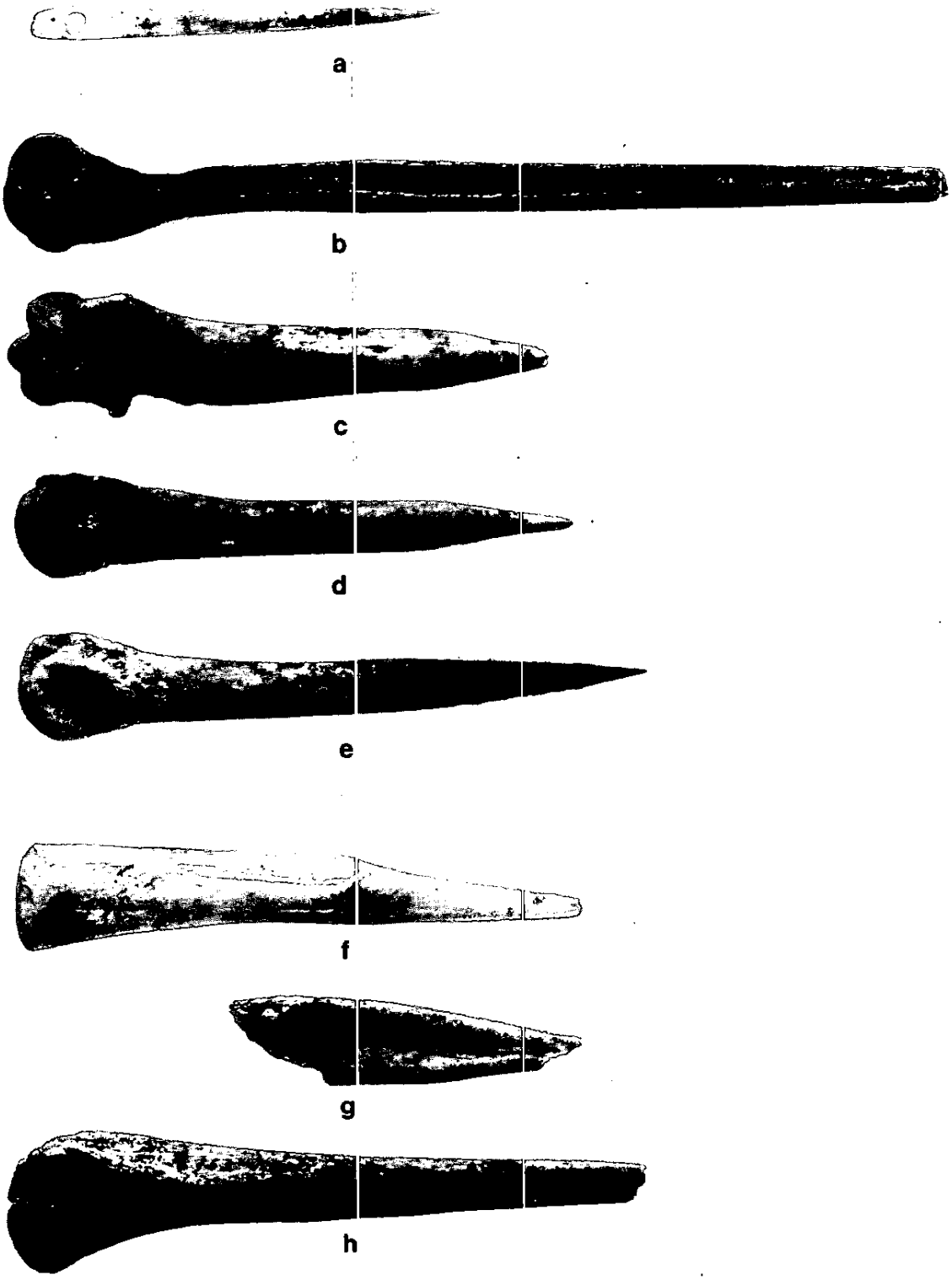

Figure 18. Bone tools: a) Needle; b-h) Awls. Needle is 6.8 cm long.

Figure 19. Bone tools: a-c) Awls; d) Split mammal leg bone. Specimen d is 15.5 cm long.

Figure 20. Bone artifacts: a) Scapula tool; b) Split leg bone; c) Flaker; d-e) Bone tubes. Bone tubes are 6 cm long.

Scapula tools have a wide geographical range and many suggested uses. Gifford (1940) reported they were thought to be fleshers, and also suggested their use as bark shredders and scrapers. At Thorne Cave, Utah, Day (1964) called the tool a scapula seed header, and described the surfaces of serrations and sides as smooth and glossy, characteristics which would support the use of gathering dry grass seeds. Five specimens were found at Humboldt Cave (Heizer and Krieger 1956). Heizer and Krieger (1956) summarized locations where these tools have been found in the Great Basin, the Southwest, and California. They considered it an old tool with wide spatial and temporal distribution and that its physical characteristics, silica sheen, and polished surfaces support the supposed function of grass cutters.

Miscellaneous

Number of specimens: 3
Distribution: El Pakiva interior, west passage, 1; unknown, 2
Material: artiodactyl metacarpal, 1; probable artiodactyl metapodial, 1; carnivore femur, 1
Dimensions: length, 15.5 cm; 9.1 cm; 11 cm

Split Mammal Leg Bone Fragment

This flattened artifact has been polished and ground to a thickness of 3 cm (Fig. 20b). The distal end is blunt and rounded, and the proximal end appears to be broken. Notches are cut along the edges of the proximal end, and may have extended along the entire length but, if so, have worn off from use. Use of this artifact has not been determined, but Aikens (1970:87, Fig. 47d) pictured a deer antler flaker that is similar in outline and has notched edges, but whose dimensions are not evident.

Split Mammal Leg Bone

This specimen is split and smoothed, but the bone exterior is left rounded (Fig. 19d). Many scratch marks are on the concave side and also on the exposed bone wall. The ends are unworked. Gifford (1940:172) described a similar artifact which he called a split cannon bone, as perhaps a beaming tool for hide dressing, or an unfinished tool. Heizer and Krieger (1956:18) referred to similar cannon bones as unfinished awls. Kelly (n.d.a:62) reported the Chemehuevi used cannon bone from the foreleg of deer or mountain sheep to scrape hides.

Cut Carnivore Femur

The distal end of this carnivore femur has been cut off (Fig. 21b), but otherwise the bone is unmodified.

Bone tubes of various sizes and types are prevalent throughout California and the Great Basin, and this specimen may have been used in the production of tubes or beads.

Loud and Harrington (1929:38, Pl. 13d) described two cut coyote femurs similar in size to this specimen. These had been broken at the proximal end, creating an opening. A segment of twine through both bone openings connected the two, which were joined by another length of twine which was wrapped around a stick. This was inferred to be a charm or rattle.

UNMODIFIED BONE

Most of the unmodified bone was recovered from the 1958 and 1968 excavations. A few specimens were found in the interior of El Pakiva Cave, west passage, in soil removed during widening of the passage. In 1934, it was recorded that bones of small animals and birds were found in the midden area at the entrance to El Pakiva Cave, bones were found around the cache pits, and a turtle shell was found, location unspecified. If these bones were collected, they have since been lost.

The faunal specimens from 1958 were identified at the Lowie Museum of Anthropology, University of California, Berkeley. Those from 1968 and miscellaneous finds were identified by Robert Yohe, University of California, Riverside.

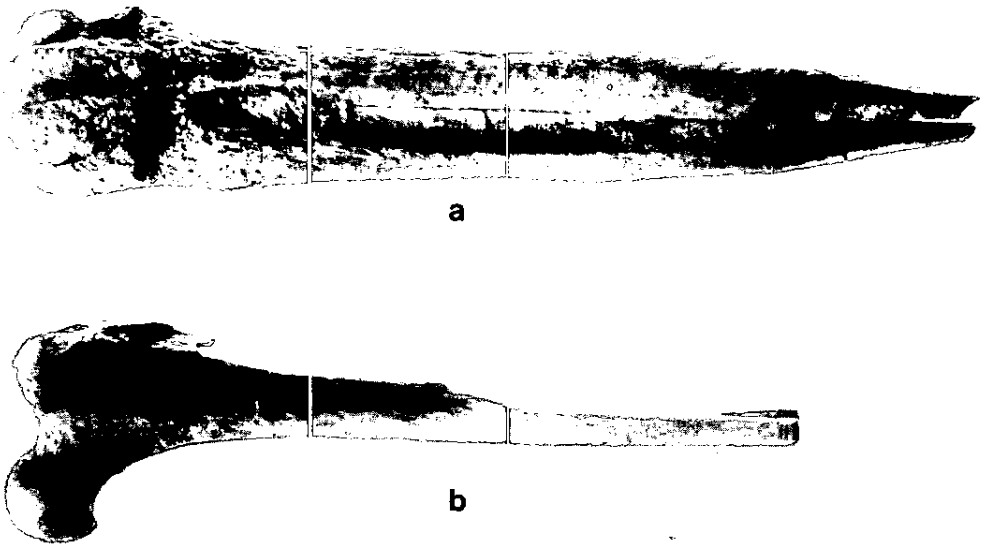

Figure 21. Bone artifacts: a) Awl; b) Cut carnivore femur. Actual size.

Both caverns yielded Rancholabrean fauna, but not in association with archeological material. Most specimens are located at the Los Angeles County Museum of Natural History, where they were identified. The ground sloth bone fragments are at the Lowie Museum.

One human mandible was recovered in soil removed during construction in El Pakiva Cave.

Tecopa Cave

Sixteen identifiable bones, including remains of jackrabbit (Lepus californicus), desert tortoise (Gopherus agassizi), as well as unidentified fragments, most of them burned, were found near the south entrance, from 0 to 6 inches in depth (Table 3).

El Pakiva Cave

A total of 658 identifiable bones were recovered from El Pakiva Cave. Two test units in the east passage yielded specimens of jackrabbit, desert tortoise, mountain sheep (Ovis canadensis), bobcat (Lynx rufus), marmot (Marmota sp.), small rodents, and unidentified fragments.

The west passage bones were identified as jackrabbit, desert tortoise, mountain sheep, marmot, woodrat (Neotoma sp.), cottontail (Sylvilagus auduboni), Colubridae, Artiodactyla, Aves, Scuridae, Thomomys sp., small rodent, hare or rabbit, and large mammal. Table 3 lists numbers of specimens and proveniences.

Discussion

No unmodified faunal remains were excavated from standard excavation units by stratigraphic levels in living areas. They are from test units that indicated some presence of cultural material, excavated cache pit areas, and rat nest midden. Other specimens were salvaged from soil removed during construction and have no provenience. Remains recovered under these conditions will not reveal subsistence changes that might have occurred over a period of time. The species that are present and the numbers of specimens per species will provide useful information.

From Table 3 it can be seen that the largest number of remains are from blacktailed jackrabbit. If these are added to those of desert cottontail and those identified only as hare or rabbit, they amount to 80% of total remains recovered. If the categories of artiodactyl, mountain sheep, and large mammal remains are combined, these make up 9% of the total remains, the second highest total. The category with the next highest total is desert tortoise, which amounts to .04% of the total.

It is known that the Southern Paiutes ate large amounts of rodents and other small mammals, such as woodrats and kangaroo rats, yet few bones of these animals were recovered. Similarly, few bird bones and no

chuckwalla or other lizard remains occur in the collection. That these species are poorly represented or lacking is most likely a result of investigators having used 1/4-inch screens in the excavations.

Of the species that are fairly well represented, only the desert tortoise is seasonally available. It was most likely captured in spring and summer. Mountain sheep and both species of rabbits are available year-round.

Cottontail and jackrabbit were hunted with bow and arrow, snares or traps, pointed or hooked sticks to pull them from burrows, or they were driven into large nets. The jackrabbit was more easily driven, and this may be the reason for the greater numbers of their remains in the collection. Fragments of nets similar to those used to capture rabbits were recovered from the caverns. Tortoises were easily captured by hand. Mountain sheep were hunted with bow and arrow.

Of interest is the presence of two marmot bones, since these rodents are not present in the area today.

Human Mandible

One human mandible was recovered in soil removed from the interior passage of El Pakiva Cave by a park employee. Cultural materials found in the same area were: an unmodified mountain sheep scapula, two pottery sherds, two bone awls, two bifaces, an abalone shell, a bone needle, and acorn fragments. Exact proveniences for all of these specimens are unknown and it is unclear if any were associated with the human remains.

The mandible was from a juvenile, 8 or 9 years old. The bigonial breadth is 71.9 mm; symphyseal height is 22.3 mm. The teeth are in good condition.

Rancholabrean Fauna

Smith, in Tecopa Cave, recovered fragments of a radius and an ulna of the Shasta ground sloth, Nothrotherium shastense, at a depth of 57 in. Additionally, a small collection of faunal material was recovered at the time of construction of the El Pakiva passage. As described by the investigators, mineralized bone is often found embedded in the limestone of the caverns. Bones of the following mammals have been identified:

Lepus sp.
Lepus californicus
Rodentia
Sciuridae
Marmota sp.
Citellus sp.
Peromyscus sp.
Neotoma sp.
Mustelidae
Spilogale sp.
Felis sp.
Lynx sp.
Equus sp.
Camelops sp.
Nothrotherium shastense

TABLE 3

Locations and Numbers of Unmodified Faunal Remains

Common Name	Scientific Name	TECOPA CAVE	EL PAKIVA CAVE: East Entrance	EL PAKIVA CAVE: Rock-lined Pit 0-15 cm	EL PAKIVA CAVE: Rock-lined Pit 15-30 cm	EL PAKIVA CAVE: --Wood Rat Nest- Adjacent Ash	EL PAKIVA CAVE: --Wood Rat Nest- 0-20 cm	EL PAKIVA CAVE: Other Interior	TOTAL
Colubrid snake	Colubridae				1				1
Desert tortoise	Gopherus agassizi	6	9		1	2	7	4	29
Birds	Aves				2		1		3
Hares and rabbits	Leporidae			26	19	6	50		101
Blacktailed jackrabbit	Lepus californicus	10	111	12	23	49	211		416
Desert cottontail	Sylvilagus auduboni			2	8	4	21		35
Small rodents	Rodentia		4		4	1			6
Wood rats	Neotoma sp.			3	4		5		12
Pocket gopher	Thomomys sp.					1			1
Squirrels	Sciuridae				1				1
Marmot	Marmota sp.		1				1		2
Bobcat	Lynx rufus		3						3
Large mammals	Mammalia			11	12	4	8		35
Artiodactyls	Artiodactyla				4		3	2	9
Mountain sheep	Ovis canadensis		2		1	1	7	9	20
	TOTAL	16	130	54	77	68	314	15	674

MODIFIED PLANT FIBERS

Included here are cordage, basketry, and sandals. Knots and prepared cordage materials are also discussed.

It is difficult to distinguish between yucca and agave fibers by visual analysis even with high-power magnification (cf. Bell and King 1944). Mohave yucca (Yucca schidigera), having long, wide leaves, is an ideal fiber source, and its abundance in the Providence area would seem to make it the choice source of fiber. The local agave (Agave utahensis and Agave deserti) have considerably shorter leaves (Munz 1974:864-865). The plant fiber specimens are identified as being either Yucca sp. or Agave sp., but it is believed that fibers constructed locally would be from Mohave yucca.

Cordage specimens were identified as juniper and Apocynum by comparison with other identified specimens.

Cordage

Untwisted and Twisted One-Ply Cordage

Number of specimens: 32
Distribution: El Pakiva interior, west passage, 26; unknown but likely El Pakiva, 6
Material: yucca (Yucca sp.) or agave (Agave sp.), 29; juniper (Juniperus osteosperma), 3
Length: 3 to 20 cm
Diameter: 1 mm to 2.5 cm

The untwisted and one-ply cordage is included together in one category because where no twist is apparent, the specimens are too short to tell if they once were twisted, and some may have been which enabled them to maintain their shape as cordage. Some specimens are partially twisted.

Twenty specimens are of coarse yucca or agave cordage with one or more square or overhand knots. Each square knot connects two sections of cordage (Figs. 22a-e). The diameters of these cordage fragments vary widely, from 0.1 cm to 2.5 cm, with varying degrees of compactness of fibers. Some of this cordage has been finely worked, with all connecting tissue removed and fibers separated, and in others the connecting tissue remains and fibers are clumped together. Knots seem to have aided preservation since few are unknotted specimens and fibers protruding from the knots are short and show evidence of gnawing.

One specimen (Fig. 22e) is of yucca or agave cordage sections knotted together with four square knots, possibly a remnant of a knotted bag. Another specimen of coarse cordage is broken in several sections, two pieces are united with two square knots, and other sections are looped together. The configuration of these cordage fragments is similar to the diagrammatic view of a tie on a plainweave sandal from Cowboy Cave, Utah (Hewitt 1980:60).

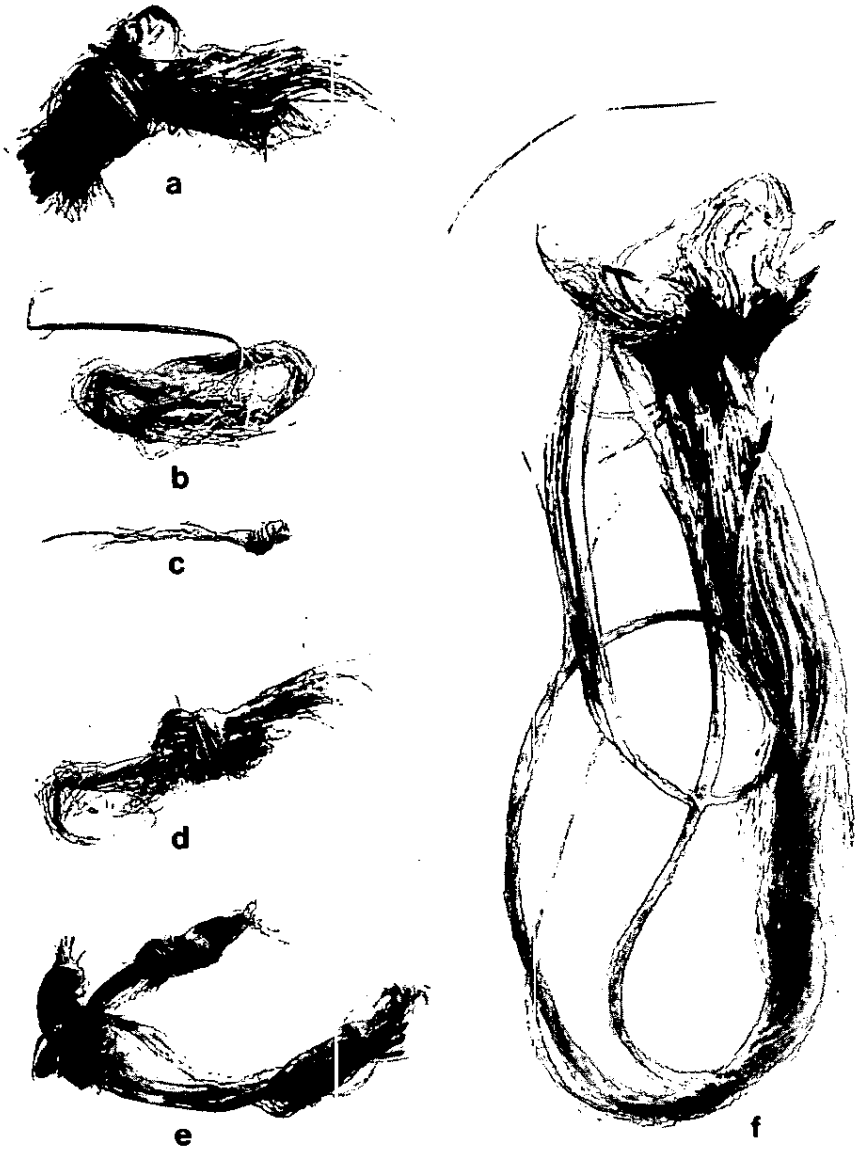

Figure 22. Yucca or agave cordage and fibers: a-e) Knotted cordage; f) Prepared yucca leaf fibers. Specimen a is 9 cm long.

Figure 23. Juniper bark cordage: a) Cordage bundle; b) Knotted fiber. Actual size.

One fragment of open twined basketry has been patched with a yucca leaf prepared as cordage with leaf-tip attached and used as a needle (Fig. 37). The fiber appears to have been sewn over and under to connect holes in the fragment, and two overhand knots have been tied, one just above the needle and the other at the opposite end.

Five specimens are unknotted one-ply S-twisted cordage, with lengths from 4 to 17 cm, and widths 0.2 and 0.3 cm.

Figure 23a is a bundle of juniper bark cordage fragments. The strands are loose and of uneven thicknesses and widths. Some areas are twisted and some are flat fiber strips 1.5 cm wide. The bundle is bound with a strand of twisted juniper fiber tied in an overhand knot.

Two loosely compacted cordage fragments, one yucca and one juniper, were found in association with an ocher-stained leather bag fragment (Fig. 16a) and a ball of ground red ocher. Fiber pads were found in leather bags with paint rock pigments and other objects in Cowboy Cave, Utah (Hull 1980:137-139).

One historic artifact, a rusted metal part (Fig. 16b), is wrapped with a strip of untwisted plant fiber of unknown material.

Stick figures may have been found by Mitchell but are not included in the collection. The only available description recorded them as "little sticks with the plant fiber wrapped around them. . ." (Mitchell 1964:158).

Two- and Three-Ply Cordage

Number of specimens: 17
Distribution: El Pakiva interior, west passage, 14; unknown, 3
Materials: Yucca (*Yucca* sp.) or agave (*Agave* sp.), 9; juniper (*Juniperus osteosperma*), 4; Indian hemp (*Apocynum* sp.), 4
Length: 3 to 24 cm; average, 14.9
Diameter: 1 mm to 3 mm; average, 1.8 mm

All of these specimens are two-ply except one which has three plies. Of five Z-twisted specimens, four are yucca or agave, and one, a net fragment, is *Apocynum*. The three-plied yucca or agave cordage, 3 mm in diameter and 6 cm long, is tightly twisted and very stiff (Fig. 24d). The three knotted specimens are lengths of soft, two-ply *Apocynum* cordage knotted together in sheetbend knots; they are fragments of netting (Figs. 25c, g-h). One is a mesh fragment of four sides and four knots. The mesh measures 3.5 cm (Fig. 25h).

Knots

Knots in this collection include square, sheetbend, and overhand. Hewitt (1980:66) noted that in Cowboy Cave, Utah, the sheetbend was the most common knot used for netting, and the square knot was used to join two cords together. The same is true for the limited knotted specimens in this collection.

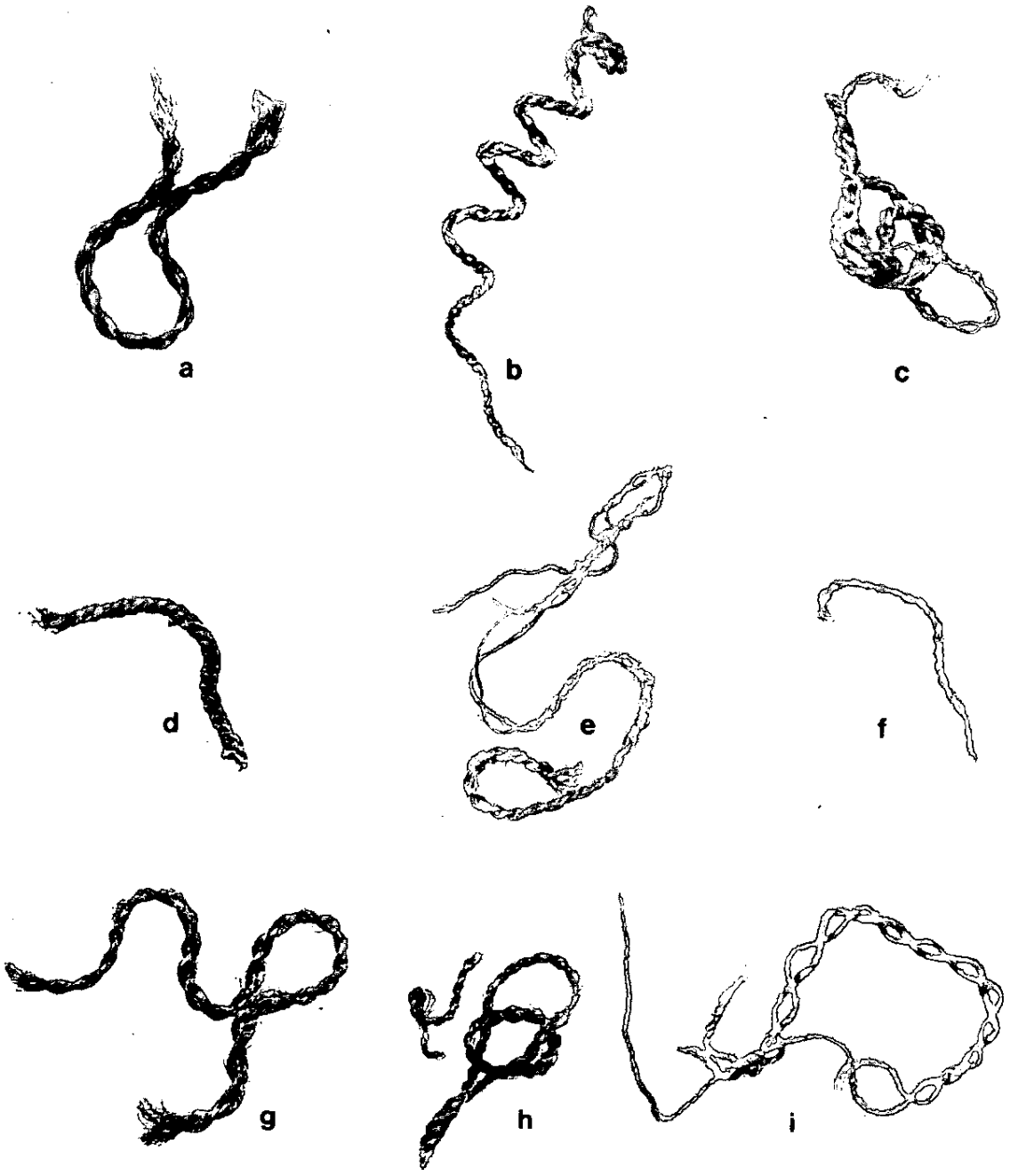

Figure 24. Yucca or agave plied cordage: a, f-h) Z-twist; b-e, i) S-twist. Slightly reduced.

Figure 25. Plied cordage: a-b, e-f) Juniper S-twist; c) Apocynum Z-twist; d, g-h) Apocynum S-twist. Slightly reduced.

There are 22 square knots and five overhand knots in the one-ply and untwisted cordage (Figs. 22a-d). The square knots range from 2.8-by-4.0 cm in the yucca or agave cordage, to 5.0-by-5.0 mm in juniper cordage (Fig. 23b). The seven sheetbend knots in the netting fragments are 3.0-by-5.0 mm.

Both overhand knots and square knots were used to tie off the fiber strips used in mending basketry.

Prepared Cordage Materials

Included here is an entire yucca leaf, 50 cm long, that has no connecting tissue except at the base, leaving the fibers exposed and separated (Fig. 22f).
Another specimen consists of a bundle of yucca fibers 53 cm long and 4.5 cm wide. Several leaves were used to form this bundle, which is of the same thickness overall.

Basketry

The basketry assemblage was analyzed previously in part by the late Martin Baunhoff prior to the inclusion of the specimens from the 1968 excavation. Baumhoff (n.d.) considered the fragments to have originally come from approximately 12 baskets.

The collection includes 30 identifiable fragments, one nearly complete winnowing tray, and two seed beaters. All of the basketry is twined except for two coiled fragments.

The two seed beaters were reported by Farmer (n.d.) to have been found in Tecopa Cave. Provenience of the winnowing tray is unknown. Most of the other specimens were found in El Pakiva Cave, and six with no provenience were most likely found there.

Seed Beaters

Number of specimens: 2
Distribution: Tecopa Cave
Material: Willow (*Salix* sp.)
Dimensions: 17-by-38 cm; 13.5-by-36 cm
Baumhoff (n.d.) described these specimens as being crude wickerwork, like that from the Southwest or that illustrated by Mason (1904:Pl. 219), and more crude than ethnographic specimens. Both twining and wickerwork are incorporated in the manufacture. The handle of one (Fig. 26a) has been tied with a fiber strip of more recent origin than the seed beater (Lawrence Dawson, personal communication, 1984). Baumhoff (n.d.) noted that the warps for the twining are the wefts of the wicker. Both specimens are asymmetrical and project toward the left when facing upward (Fig. 26). Lawrence Dawson (personal communication, 1984) considered them to be smaller than California ethnographic specimens and although not as small as those found in the Havasupai-Yavapai area, similar to them.

Figure 26. Seed beaters. Specimen on left is 38 cm long.

The food-gathering assemblage of seed beaters, winnowing trays, and burden baskets is often shown in photographs of the early historic Southern Paiute (Steward 1939; Euler 1966). Five seed beaters of similar construction but larger in size are shown from those collected by Powell in the Great Basin and Colorado River area from 1867-1880 in Fowler and Matley (1979:106).

Seed beaters found in archeological contexts are uncommon, and all appear to occur temporally late. They have been found near Twenty Nine Palms (Campbell 1931), Death Valley (Wallace and Taylor 1955), and the Coso Range (Palanqui 1974).

Bettinger and Baumhoff (1982:406) suggested that the twined seed beater and the twined, triangular winnowing tray are the hallmarks of the Numic seed harvesting complex, and are absent from the pre-Numic complex. None has been dated by radiocarbon. The Numic lifeway is thought to have existed in the Great Basin for about the past 1,000 years (Bettinger and Baumhoff 1982:490).

Samples from both Mitchell Cavern specimens are undergoing radiocarbon analysis.

Winnowing Tray

This specimen is a nearly complete oval tray of open, simple twining, S-stitch weft, measuring 50-by-36 cm. The rim is complete, but one-third of its twining is missing (Fig. 27). Baumhoff (n.d.) identified the material as willow (Salix sp.). He described the wefts as split peeled stems, 3 mm wide and less than 1 mm thick, running eight courses per 10 cm. The warps are whole peeled stems about 4 mm in diameter and running 20 courses per 10 cm.

A fragment of this basket was sent to the Radiocarbon Dating Laboratory at the University of California, Riverside, and it yielded an age of 480 $\pm$100 ^{14}C years B.P., indicating its use in the 14th to 16th century A.D. (UCR-1878). In preparing the sample, Dr. Louis Payen found it to be coated with urea, indicative of having been incorporated for some time in rat nest midden. Its dark color is due not to charring but to stains from rat urine.

A hole in the basket has been patched with a piece of split willow stem, which was wound back and forth twelve times across its width, and then this was used as a weft to twine the length of the hole, using the cross strips as warp (Baumhoff n.d.).

Round, coiled parching and winnowing trays are common in ethnographic and archeological literature (Euler 1966; Campbell 1931; Kroeber 1935; Fowler and Matley 1979), as are twined, triangular trays (Bettinger and Baumhoff 1982). No oval twined trays were available for comparison, but Baumhoff (n.d.) considered this tray and similar fragments common to Great Basin Shoshoneans during the historic period. This type of weave has been described from Oregon Caves (Cressman 1942) and ethnographically from the Shoshoni and Southern Paiute (Steward 1941; Stewart 1942).

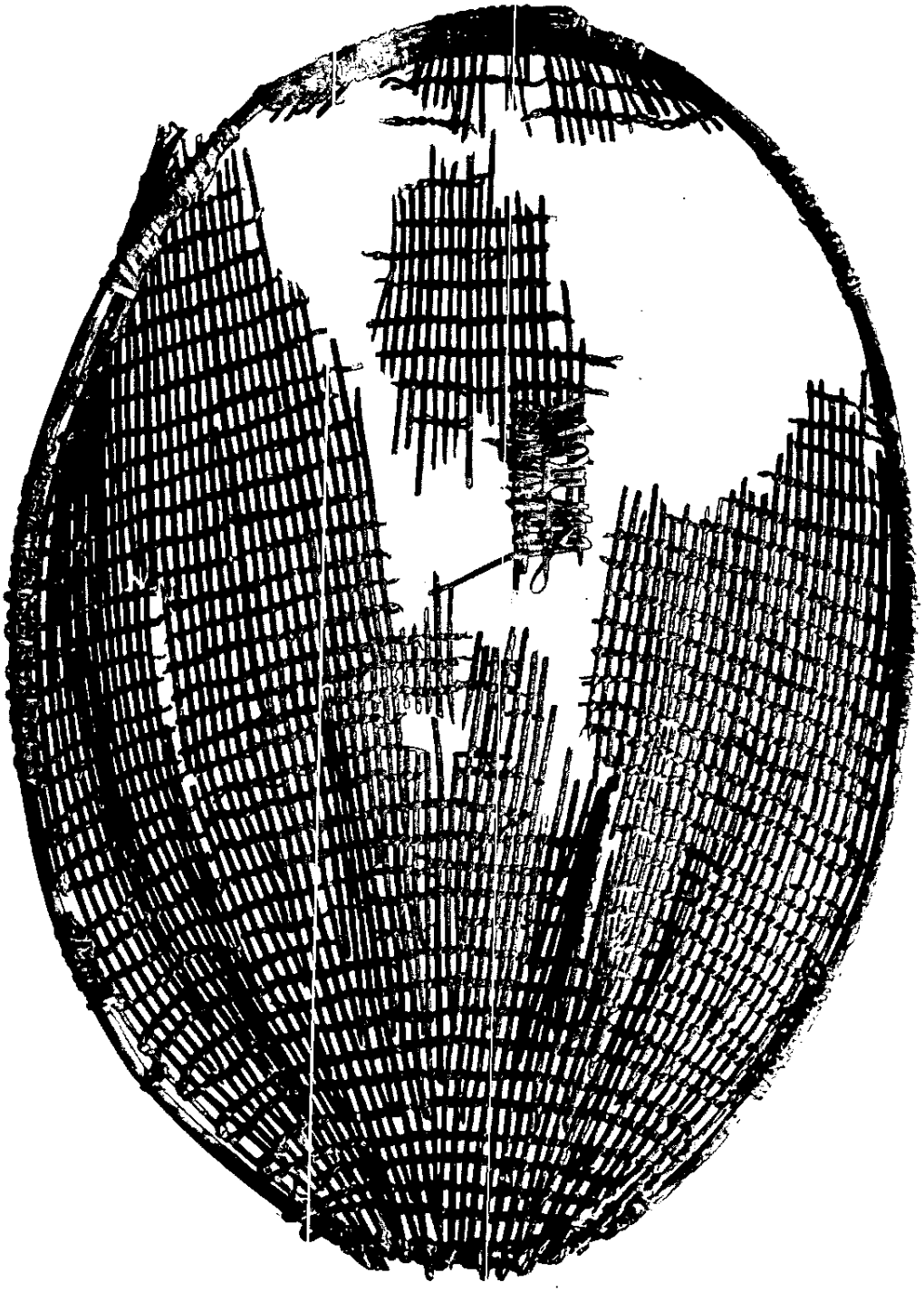

Figure 27. Winnowing tray. Specimen is 50 cm long.

Basketry Fragments

The following description of basketry type designations is adapted from Adovasio (1970, 1974). Subclasses of twined basketry are allocated on the basis of the number of warps held during each weft crossing, the tightness of weft packing during construction, and the direction of the stitch. Only two fragments of coiled basketry are included.

Close Diagonal Twined, S-Stitch Weft

Twelve fragments are of this type (Figs. 28, 29b-c, 30a-b, 31c-d). Baumhoff (n.d.) considered those pieces that were collected prior to 1968 as parts of one basket, an oval winnowing tray. The wefts are split willow stems 2 to 3 cm wide and less than 1 mm thick. There are 46 wefts per 10 cm. Baumhoff's (n.d.) description reads, "Occasional decorative strips are made by leaving the bark on the weft for two courses. Whether or not there was any regularity in the decoration could not be discerned."

The rim was a willow stick 6 to 8 mm in diameter, attached to the basket with a split willow stem in stitches 15 to 20 per 10 cm.

The triangular-shaped fragment shown in Figure 31b is the beginning of an unfinished winnowing basket (Lawrence Dawson, personal communication, 1984).

Open Diagonal Twined, S-Stitch Weft

Fifteen fragments are in this category (Figs. 29a, e-f, 30c-d, 32, 33, 34a, 35b, 36). Baumhoff (n.d.) considered the specimens in Figure 32 and Figure 35b as parts of a winnowing tray. These pieces have widely spaced wefts, ten courses per 10 cm, and are made of split and peeled willow stems.

The open diagonal twining, with wider spacing between wefts, appears to be a different pattern from that with closer spaced wefts since a larger space between warps and more of a triangular shape is created (Fig. 34). Baumhoff considered these specimens to be from one basket of unidentified plant material. The wefts are split unpeeled stems 4 mm wide and 1 mm thick, running three to four courses per 10 cm. Warps are of the same material, of irregular size, 3 to 5 mm in diameter, and run about 30 warps per 10 cm.

Coiled

Two coiled fragments are included in the collection. One (Fig. 29d) was analyzed by Baumhoff, along with another fragment now missing. Figure 31b is of another coiled specimen found later in El Pakiva Cave in rat nest midden.

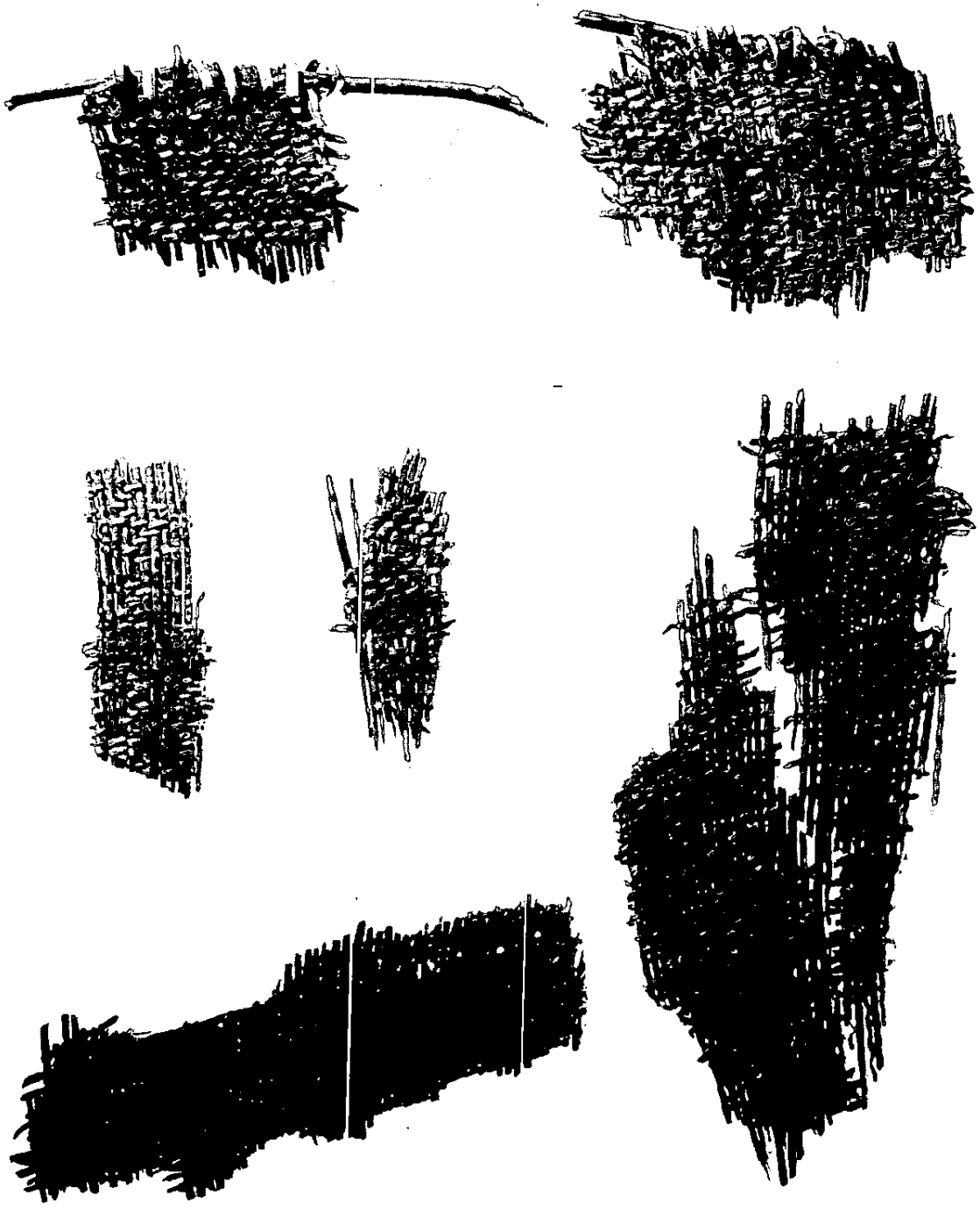

Figure 28. Basketry fragments, close diagonal twined. Specimen in center, left, is 12 cm long.

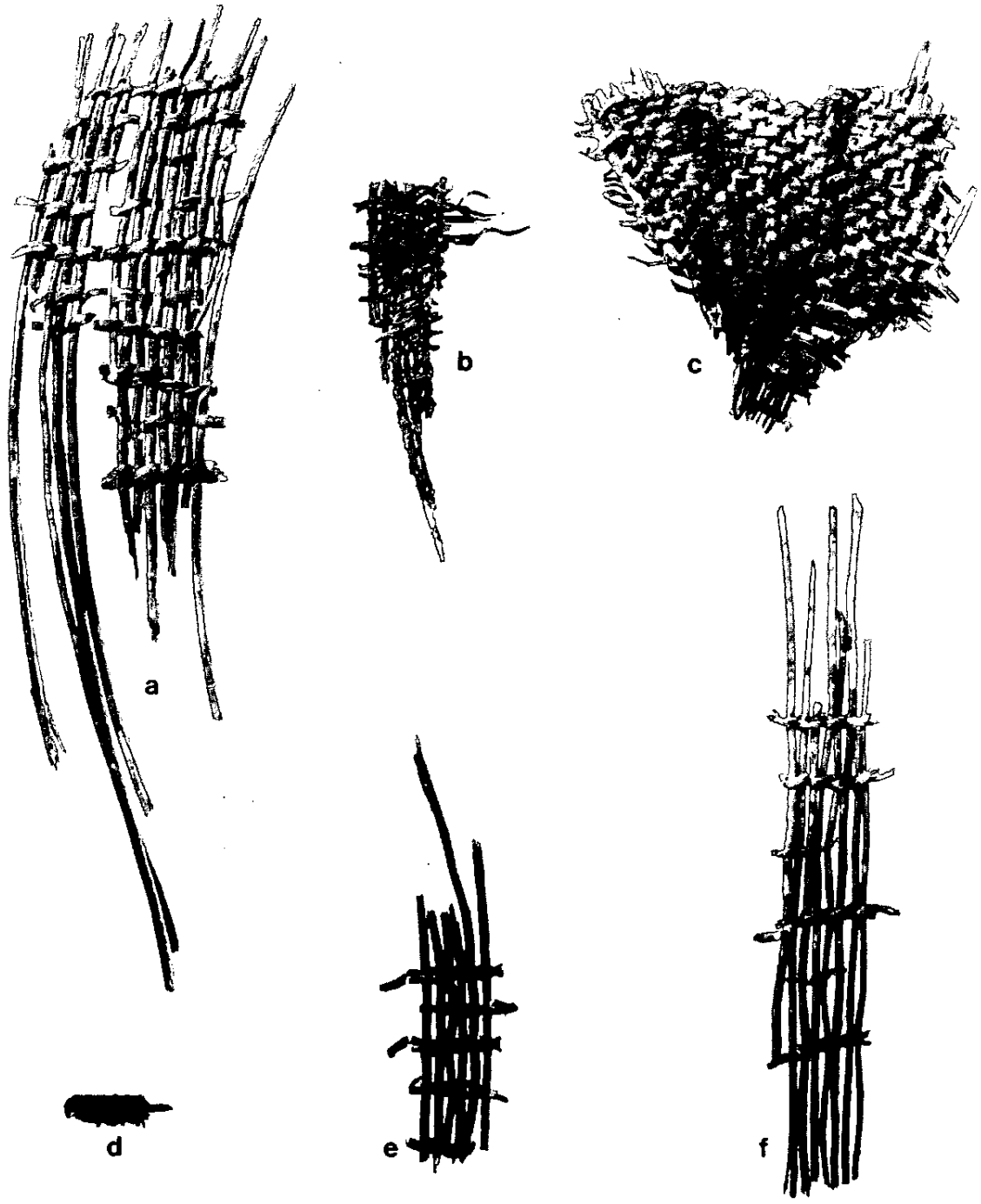

Figure 29. Basketry fragments: a, e-f) Open diagonal twined; b-c) Close diagonal twined; d) Coiled. Specimen f is 20.5 cm long.

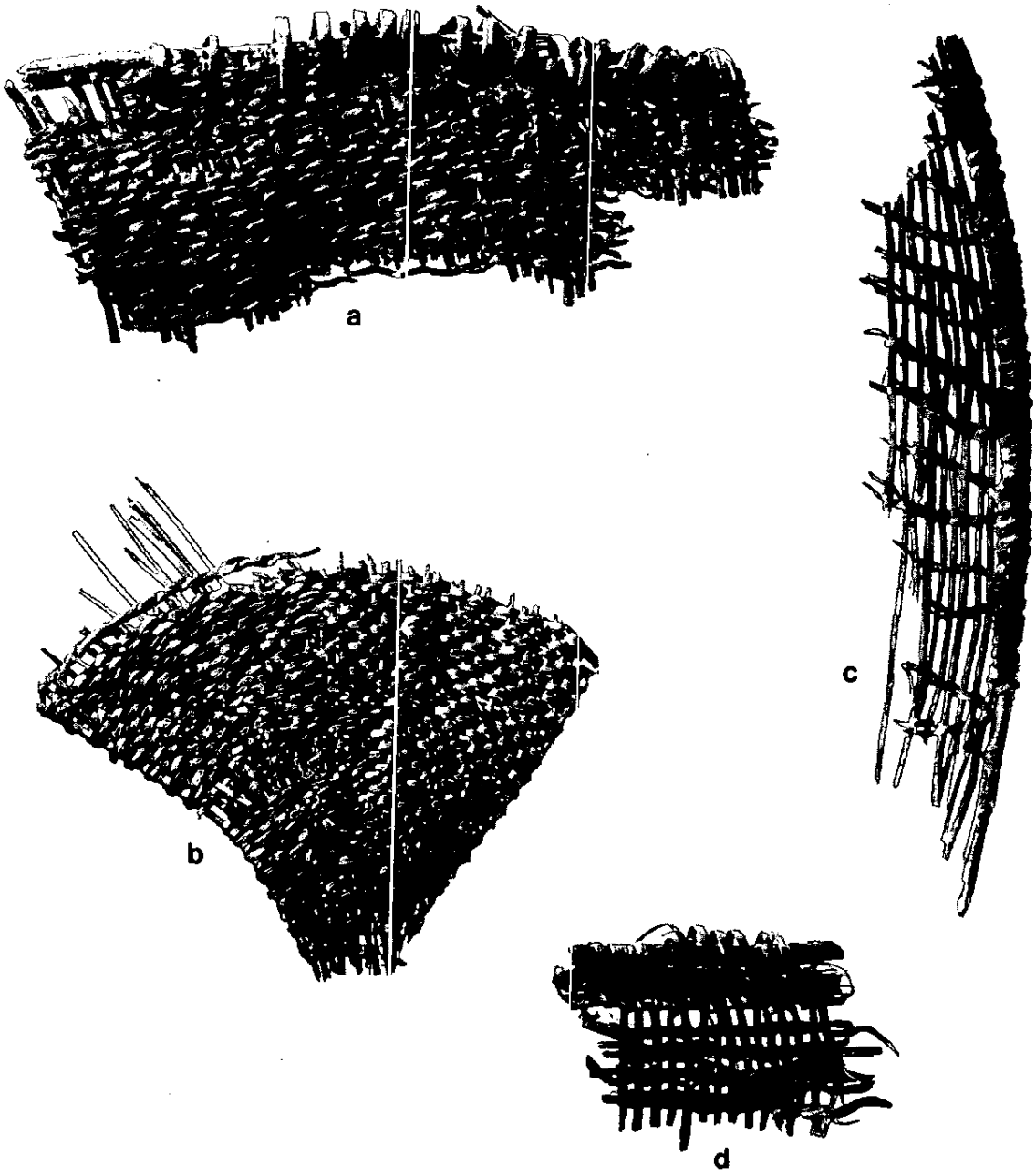

Figure 30. Basketry fragments: a-b) Close diagonal twined; c-d) Open diagonal twined. Specimen a is 21 cm long.

Figure 31. Prepared basketry material and basketry fragments: a) Coil of prepared basketry material; b) Coiled fragment; c) Closed diagonal twined fragment; d) Closed diagonal twined fragment with patch. Specimen d is 17.5 cm long.

Baumhoff (n.d.) described the coiled material as three-rod triangular foundation with stitches split on one side. One of the rods is heavy (5 mm diameter), and the other two are smaller (2 to 3 mm diameter).

Prepared Basketry Material

One coil of split stem was found in El Pakiva Cave in rat nest midden (Fig. 31a). Baumhoff (n.d.) described a large coil of several pieces of split willow stem that is no longer in the collection. This material was said to be the same as used for weft material in the basketry, and was 2 to 3 mm wide and less than 1 mm thick. The total length of the piece was about 20 ft. The specimen shown in Figure 31 is most likely a piece from that coil.

Rims

Two rim fragments were recovered. One (Fig. 34b) appears heavier than those on the winnowing tray and winnowing tray fragments. It is composed of a bundle of four sticks, the largest 9 mm in diameter while the smaller three are 4 to 5 mm in diameter. They are wound with split stems, most likely willow (Salix sp.).

The other specimen (Fig. 35c), in a more decomposed state, is a stick 8 mm in diameter bound to a bundle of two smaller sticks 3 to 4 mm in diameter.

The rim on the basket fragment shown in Figure 35b was made with two bundles of two sticks each. The sticks in one bundle are each wrapped separately, then attached to the other bundle. This second bundle is itself wrapped, and is then wrapped around the first row of basketry weft.

Basketry Mends

A few diagonal twined fragments do not possess their original rims but new ones that have been added later (Figs. 28a-b, 30a) (Lawrence Dawson, personal communication, 1984).

In one specimen (Figs. 36, 37), a hole has been mended with a yucca leaf tip and attached leaf fiber. The ends are tied with overhand knots and the leaf tip left in place.

The winnowing basket in Figure 27 has a hole that was patched with split willow stem (see the section describing the winnowing tray).

Another basketry fragment has a specially made patch sewed on (Fig. 31d). Patches were ordinarily made of fragments from torn specimens (Lawrence Dawson, personal communication, 1984).

Discussion

It may be useful to compare this basketry assemblage with that recovered from the Twenty Nine Palms area, located 105 km southwest (Campbell 1931). Two major differences are apparent.

Figure 32. Basketry fragments. Open diagonal twined. Specimen b is 23 cm long.

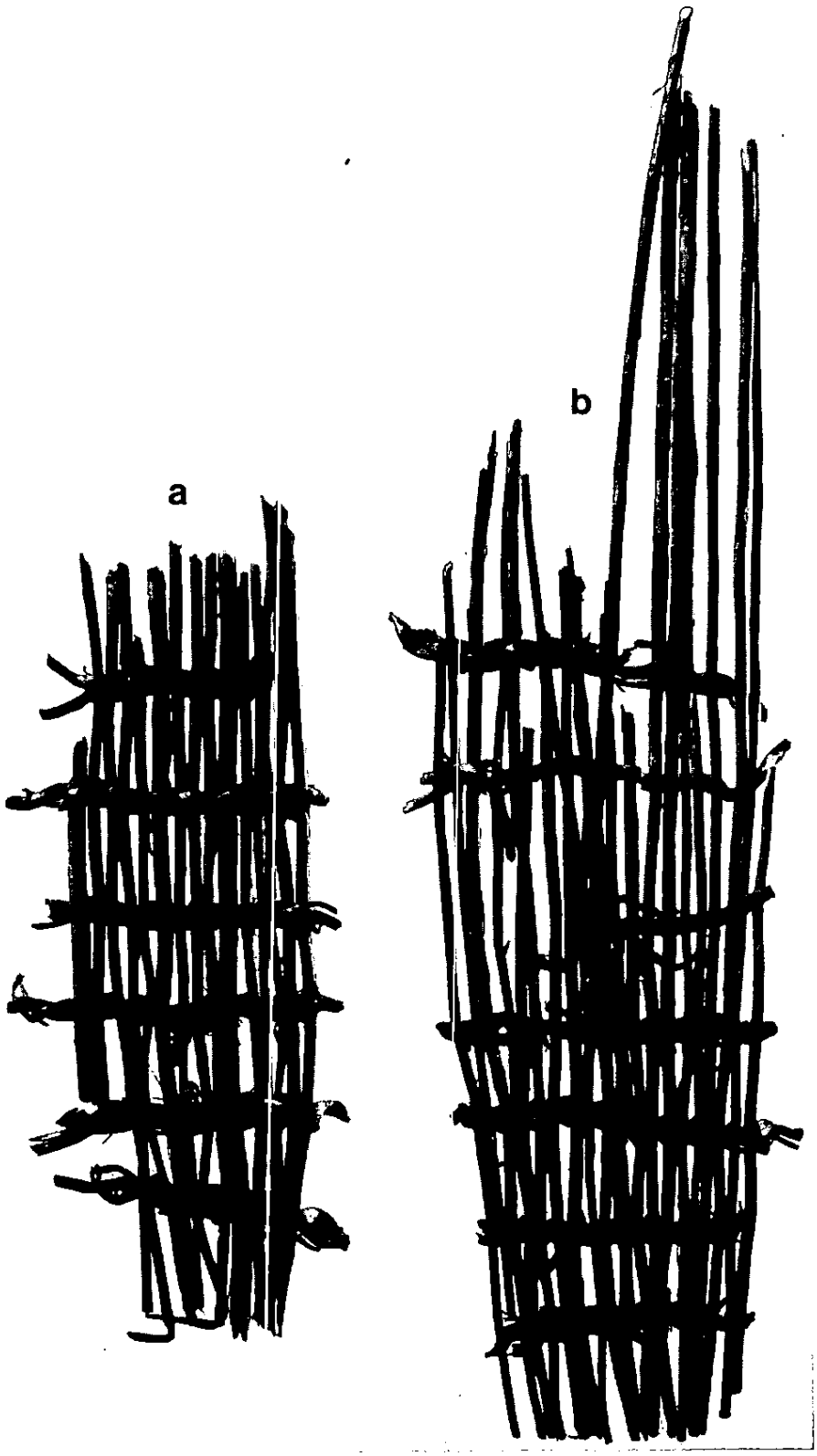

Figure 33. Basketry fragments. Open diagonal twined. Specimen a is 33 cm long.

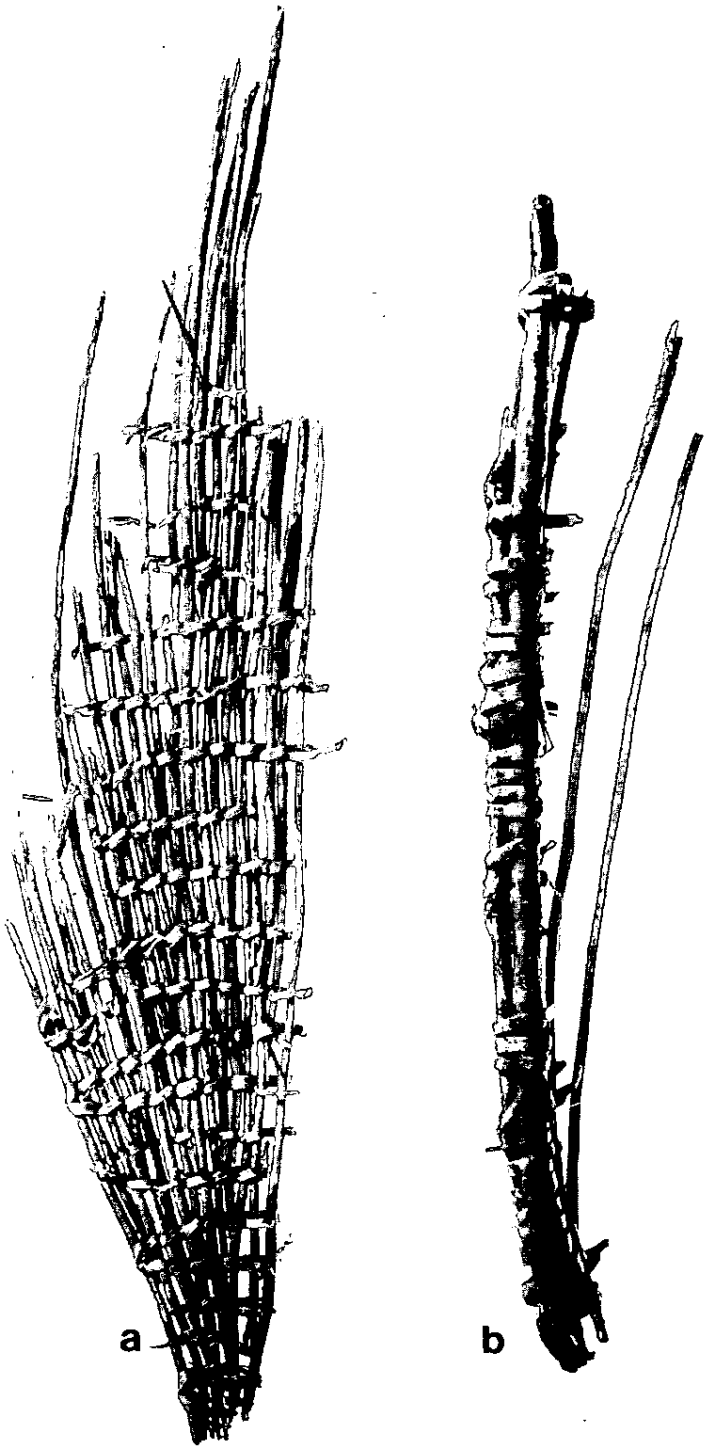

Figure 34. Basketry fragments: a) Open diagonal twined; b) Rim. Specimen b is 31.5 cm long.

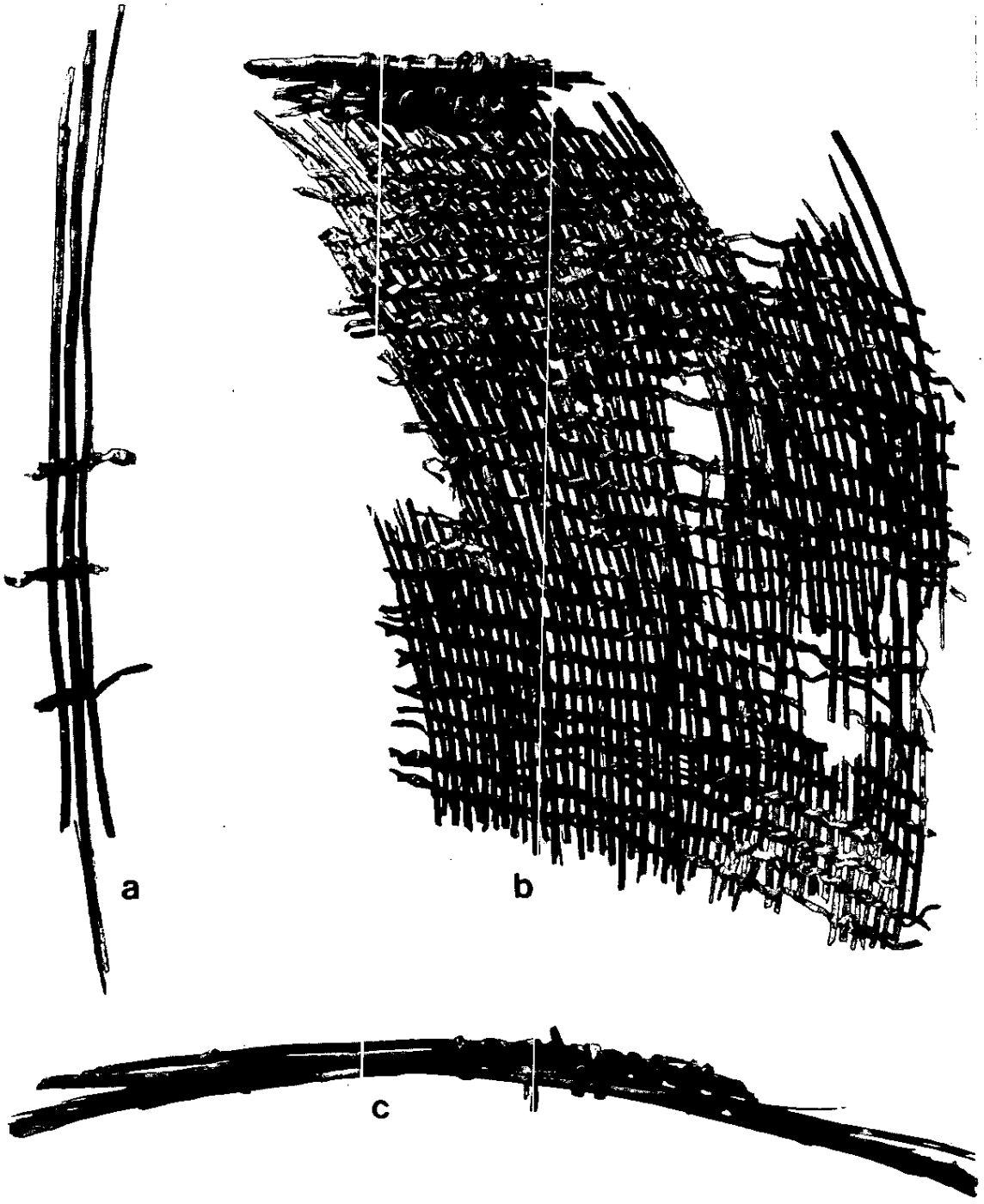

Figure 35. Basketry fragments: a-b) Open diagonal twined; c) Rim. Specimen b is 27.5 cm long.

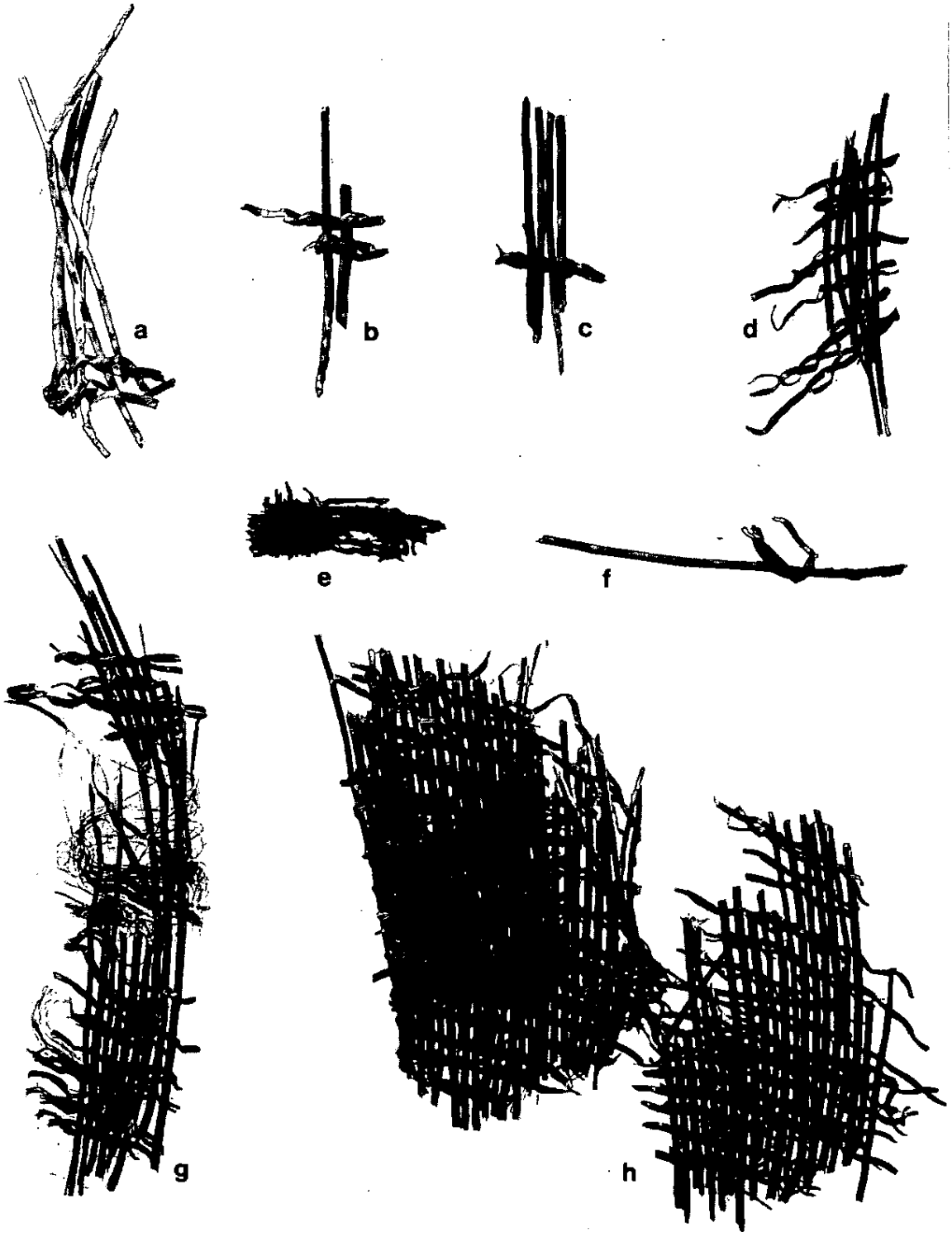

Figure 36. Basketry fragments. All open diagonal twined. Specimen c is 9.5 cm long.

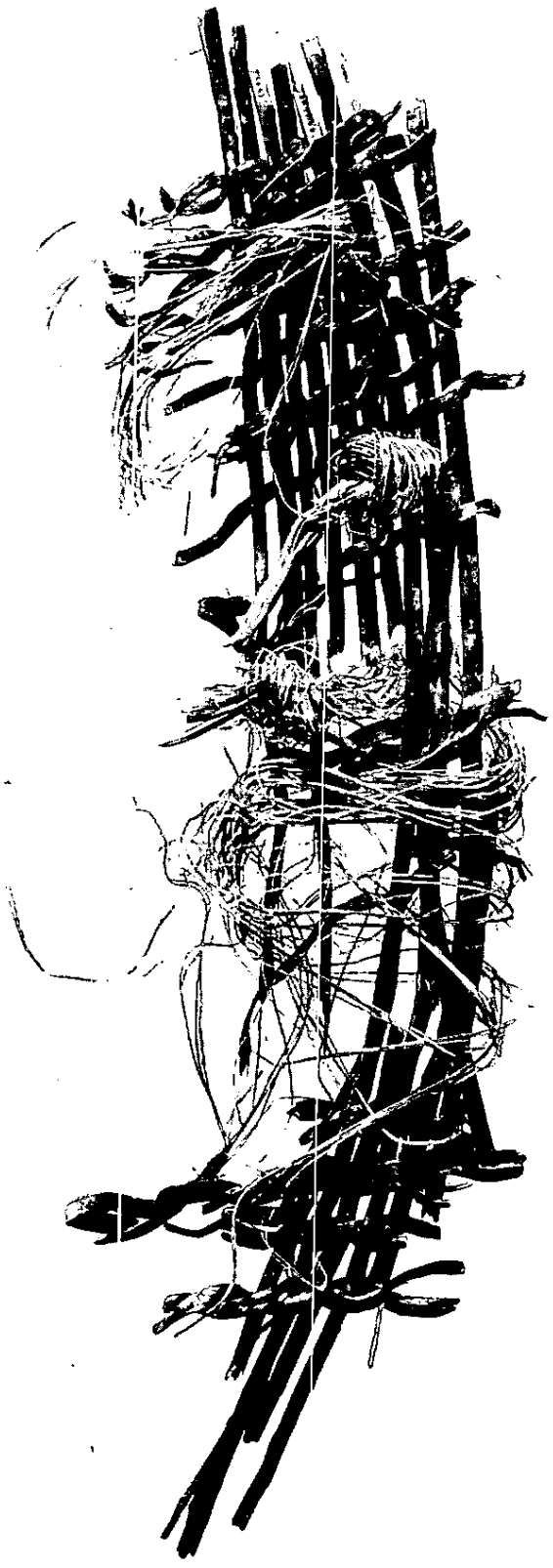

Figure 37. Open twined basketry fragment, yucca leaf mend. 25 cm long.

The three seed beaters from Twenty Nine Palms are unlike those from the caverns. Two are similar to the ethnographic Cahuilla specimen pictured by Kroeber (1925:695). The other is a finely-constructed wicker, paddle-shaped beater unlike any of the other specimens.

The basketry from Twenty Nine Palms is all coiled except for one twined specimen. This contrasts sharply with the Mitchell Cavern collection, which is twined except for two coiled fragments.

While the coiled basketry and seed beaters of Twenty Nine Palms are similar to ethnographic basketry techniques of the Cahuilla, Farmer (n.d.) noted that modern basketry of the Chemehuevi was coiled. Baumhoff (n.d.) noted that the Mitchell Caverns basketry assemblage belonged to the Great Basin Shoshonean tradition from the historic period.

It is evident that the Shoshonean inhabitants of both areas shared a similar technology, but their material culture indicates that cultural differences existed.

Sandals

Number of specimens: 3
Distribution: El Pakiva interior, west passage, 1; unknown, 2
Material: yucca (Yucca sp.) or agave (Agave sp.)

Dimensions: 25-by-4.5 cm; 9-by-9 cm; 22-by-6 cm

Of the three sandal fragments in the collection, one is from a two-warp wickerwork sandal made of shredded yucca or agave leaves (Fig. 38a). Only the weft remains. This type of sandal has been found in various sites in the Southwest. It is predominant in Mogollon sites in western New Mexico (Martin, et al. 1952:232-235) and was found in Ventana Cave, southern Arizona (Haury 1950:433), in northeastern Arizona (Kidder and Guernsey 1919:103), and in Etna Cave, southeastern Nevada (Wheeler 1973:18-21). In the Mojave Desert, a similar specimen made of willow and fragments were found at Newberry Cave (Davis and Smith 1981:71-73).

The earliest temporal placement of these sandals is unclear. Specimens are found in Newberry Cave, San Bernardino County, in deposits which largely cluster at about 1500 B.C. (Davis and Smith 1981:93). At western New Mexico sites, they occur from approximately 300 B.C. to A.D. 1000 (Martin, et al. 1952:262). In Etna Cave in southeastern Nevada, Wheeler (1973:21) found these sandals in association with atlatl dart points from the earliest deposits through Basketmaker III occupations.

The other two specimens are coiled, with both the coil and the weft made of yucca or agave fibers (Figs. 38b-c). Similar sandals pictured by Kroeber (1935:102, Fig. 9) are made of cliff rose (Cowania) bark bunches and yucca fiber. MeKeel and MacGregor (1935:107) reported such sandals made of yucca that were described by Walapai informants.

Figure 38. Sandal fragments: a) Two-warp wickerwork; b-c) Coiled. Specimen c is 23 cm long.

UNMODIFIED PLANT MATERIAL

All but one of the specimens of unmodified plant material came from the cache pits or their vicinity, or from cache pit lining. The occurrence of woodrat nests in this area presents the possibility that specimens may have been introduced by these animals. All seed specimens are known to have been used aboriginally as food.

Seed Specimens

Singleleaf Pinyon (Pinus monophylla)

Twenty-seven cones containing nuts were found in one cache pit in El Pakiva Cave. These had been placed pointed-end up in the grass-lined pit. Four cone fragments and approximately 50 nutshell fragments were found in and around the cache pit (Figs. 39d-e).

Singleleaf pinyon was an important food source prehistorically and historically in the Great Basin. Families came together for the harvest, which took place in the autumn. A long, hooked stick was used to pluck the cones from the trees, and they were also knocked to the ground. Cones were piled on brush, which was burned. After cooling, they were pounded open, and nuts were dried, threshed, and winnowed. Pine nuts were eaten fresh, or they were roasted in parching trays with coals. Cones or nuts were stored in cache pits such as that in El Pakiva Cave, or in skin bags (Mekeel 1935:54; Stewart 1942; Zigmond 1981). A photographic sequence showing the collection and processing of pine nuts by Northern Paiute Indians is given in Wheat (1967).

Canyon Oak (Quercus chrysolepis)

Thirteen fragments of caps and outer shells of acorns of this species (Fig. 39a) were collected in El Pakiva Cave and are thought to have come from the area of the west entranceway.

Acorns were harvested also in the autumn and were a food source that could be stored for winter use. Occurrence of Q. chrysolepis in the Providence Mountains region is fairly sparse and the crop is very irregular (Munz 1974:480) but when available could yield more than 150 pounds of acorn meat per tree (Bean and Saubel 1972:125).

According to Bean and Saubel (1972:127) of all the acorns, those of the canyon oak were the least bitter when eaten fresh. The Walapai, with a subsistence economy similar to that of the Southern Paiute, did not leach acorn meal (Mekeel 1935:48, 49).

Yucca sp.

Both fleshy-fruited yucca (Yucca baccata) and Mohave yucca (Yucca schidigera) are found in the vicinity of Mitchell Caverns, and were used for food aboriginally (Fig. 39b). The flowers and fruit were prepared in a number of ways. Bean and Saubel (1972:150-153) reported the fruits

Figure 39. Seeds: a) Quercus chrysolepis; b) Yucca sp.; c) Opuntia sp.; d-e) Pinus monophylla. Actual size.

could be eaten raw, but were usually roasted in hot coals. Fruits were also dried, cooked, and made into a drink (Bell and Castetter 1941:18, 22). Flowers were also eaten after being boiled and were dried for storage (Bean and Saubel 1972:150).

Opuntia sp.

Twenty-one seeds or seed fragments of Opuntia were recovered from the dried vegetation making up the cache pit lining (Fig. 39c). Six species of Opuntia are found in the vicinity of the caverns, and are known to have been used as food. Opuntia fruit was either eaten fresh or dried for storage (Bean & Saubel 1972:95). Opuntia seeds were dried, ground, and sometimes stored in skin bags (Mekeel 1935:50). Tongs used to pick Opuntia fruit are included in the collection (Fig. 14f).

Other Plant Remains

The linings of the cache pits excavated in El Pakiva Cave by Payen were composed mostly of desert needlegrass (Stipa speciosa), bark of singleleaf pinyon (Pinus monophylla), sagebrush (Artemisia tridentata), galleta grass (Hilaria rigida), and leaves and leaf bases of Mohave yucca (Yucca schidigera). Also present in small quantities were cactus (Opuntia sp. and Echinocereus sp.), buckwheat (Eriogonum sp.), and turpentine broom (Thamnosa montana).

Except for the seeds described previously, which could have constituted stored supplies, these plants are thought to have served solely as cache pit lining, or possibly were introduced by woodrats. Yucca leaves could have been stored for use in textile manufacture, but the specimens appeared unsuitable for such use.

LEATHER

Four rawhide pieces from the legs of artiodactyls and one leather bag fragment constitute this category. All were found in El Pakiva Cave.

A fringed piece of buckskin or sheepskin, now missing, was reported by Farmer (n.d.) to have been found nearby, most likely in a cave or shelter. Farmer (n.d.) also reported finding a piece of yucca fiber that "had a piece of some kind of tanned skin tied in it."

Rawhide

Number of specimens: 4
Distribution: El Pakiva, exact provenience unknown; Farmer (n.d.) reported that Mitchell had found these
Material: leg skins of artiodactyl
Dimensions: 26-by-10.5 cm; 26-by-9 cm; 24-by-9 cm (rolled); 24-by-9 cm (rolled)

Figure 40. Rawhide leg skins. Specimens are 26 cm long.

Figure 41. Rawhide leg skins. Specimens are 24 cm long.

These pieces are identical except that two are rolled and two are flat (Figs. 40, 41). They are taken from the lower legs of artiodactyls, probably mountain sheep. Two dewclaws are present on each specimen, and some hair remains on each.

These skins may have been intended for use as soles for sandals or moccasins. Aikens (1970:105) discussed the Fremont style moccasin which was described by Morss (1931), who wrote, "A remarkable feature of most of the moccasins is the use of strips from the foot of the sheep in the sole in such a way that the dewclaws project and serve as hobnails. . ."

Aikens (1970:105) reported 16 specimens from Hogup Cave similar to those described by Morss (1931), made of deer or pronghorn antelope skin. Dewclaws were often present on the sole, some situated on both sides of the ball of the foot. Since pronghorn do not have dewclaws (Schmidt and Gilbert 1978:105), these specimens were probably from deer or mountain sheep.

Kelly (n.d.) reported on two informants who told of making rawhide sandals from the foreleg skin of deer.

No similar specimens of rawhide sandal or moccasin blanks were found in a search of Great Basin, Southwest, and California archeological literature.

Leather Bag

This fragment of leather was found associated with a ball of ground red ocher (Fig. 16a). It is stained orange and is thought to have once been a bag in which the ocher was kept. The fragment and the ocher were found in a cache pit in the interior of El Pakiva Cave.

Paint rocks or pigments were often stored in buckskin or other leather bags (Kelly 1964:66; Hull 1980:137-139).

CERAMICS

The ceramic specimens recovered from Mitchell Caverns are reported by Griset (this volume).

SHELL

One modified and one unmodified marine mollusc specimen were recovered from the caverns. The former is an olivella (Olivella sp.) shell with the spire ground down (Fig. 42b). It measures 1.5-by-0.9 cm. Provenience is not known.

The other is a complete black abalone (Haliotis cracherodi) shell (Fig. 42a). It measures 9-by-7 cm. This was found in El Pakiva Cave, western passage interior, no exact provenience known.

Both shell types were used as jewelry. Olivella beads, of many different types, were used as necklaces throughout California and the Great Basin. Spire-ground beads were the most common bead found in 25 archeological sites ranging from the lower Humboldt Valley in western Nevada, to Honey Lake in northeast California (Bennyhoff and Heizer 1958:62). Chronologically, these beads were found to range from between 6,000 to 7,000 years B.P. to ethnographic times (Bennyhoff and Heizer 1958:63).

Kelly (n.d.b:20) reported the use of abalone shell among the Southern Paiute in earrings, pendants for necklaces, and nose pendants.

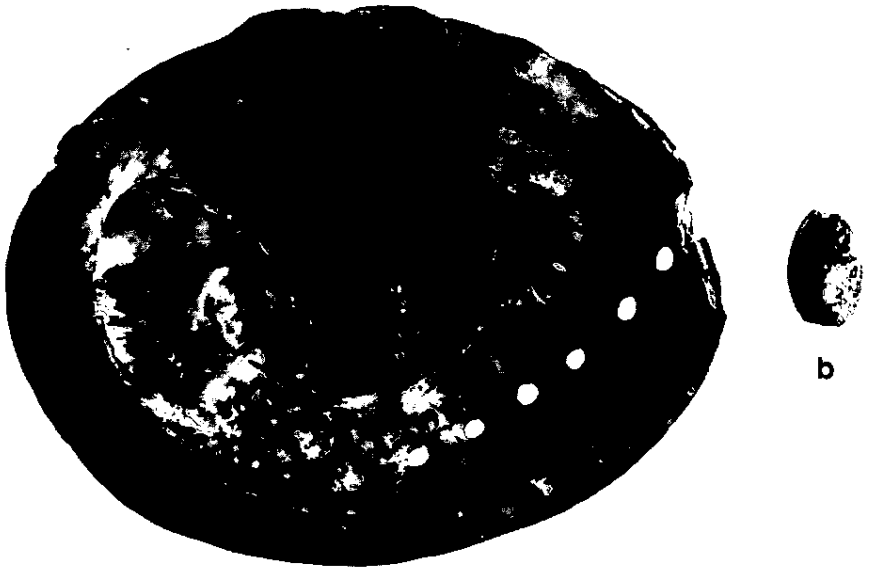

Figure 42. Shell: a) Abalone; b) Olivella bead. Actual size.

HISTORIC ITEMS

Four artifacts recovered from the caverns are items manufactured during the historic period, most likely dating from the late nineteenth to early twentieth centuries. They include a rubber-coated canvas fragment, a fragment of machine-woven cloth, a section of manila rope, and a piece of rusted metal hardware that has been wrapped with plant fiber. The wrapped metal specimen is thought to have been a result of Indian activity, while the other specimens could have been brought in by Caucasians or introduced by packrats.

Textiles

Of all the historic items, only the rubber-coated cloth has provenience information. It was recovered in the interior of the west passage of El Pakiva Cave in rat nest midden near the cache pits. This was also the only historic item recorded as found in any of the excavations. The largest fragment measures 4-by-5 cm and is similar to material from a canvas water hose.

A machine-women cloth fragment, 3.5-by-3.5 cm, was found in El Pakiva Cave under a rock, but on the ground surface, exact location unknown. In this area were also found a bone awl and two charred cane fragments.

The collection includes, with no known provenience, a section of machine-made manila rope, 100.8 cm long and 1 cm in diameter. It consists of two sets of four braided strands, sewn together with two-ply cotton string.

Metal

This specimen consists of two identical metal pieces that are interlocking, although loose, and can easily be separated (Fig. 16b). It is wrapped with a length of untwisted, flat plant fiber approximately 5 mm wide.

Its function as hardware could not be determined, nor is it known what function or purpose the fiber wrapping served.

In the mid-1800s, wagon roads first crossed the desert and mining activity began in the area in 1863. Several mines were worked in the Providence range for many years (King and Casebier 1976:303). This artifact could have been introduced with the mining and transportation machinery, or with the modern goods that were imported to the region. It serves as a time marker, indicating that aboriginal activity in the caverns continued in some way into the historic period.

CACHE PITS

Two cache pits were excavated by Payen in the 1968 salvage excavation prior to expanding and opening the western entrance to El Pakiva Cave. These were located approximately 12 m and 15 m from the cave's entrance. A rock wall approximately 170 cm long and of unknown height, but consisting of a row of boulders, was in front of the cache pits. In 1934, Farmer also excavated in this area and located two cache pits. The exact location is not known, but rough measurements indicate a location approximately 4.5 m in front of the anterior pit dug by Payen.

Cache Pit 1 (Payen)

This very well preserved pit was located 12 m from the entrance and 30 cm from the surface (Fig. 5c). Flattish angular rocks, ranging in size from 21 to 28 cm long and 7 to 21 cm wide, were laid compactly in a circular pattern, forming the walls of the pit. Sagebrush (Artemisia tridentata) clumps lined the rocks, and on top of this were laid flat bundles of grass (Stipa speciosa).
Also part of this lining were pine bark and slabs of yucca root. Lying on the grass were 27 pine cones (Pinus monophylla), still containing nuts, placed point up. These cones were covered with grass, several slabs of yucca root, and some bones. The fill in the depression at the surface of the pit was composed of small rocks and loose dust, with some fiber fragments. The diameter of the pit was 80-by-100 cm.

Cultural materials found in or in association with this cache pit were: two pot sherds, four strands yucca cordage, a net fragment, a chert core, a chert flake, two basketry fragments, a mountain sheep tooth, and a yucca awl.

Cache Pit 2 (Payen)

This pit was located approximately 1 m beyond Pit 1, along the west wall, and 30 cm from the surface. It was dug into yellow sand and dust of the cave floor, and had been covered by a rat nest layer. The pit, lined with grass bundles and a yucca root slab, was somewhat decomposed at the bottom. The diameter measured 60-by-90 cm.

Inside the pit was a large ball of ground red ocher (described above), along with two fragments of cordage, one yucca and one juniper, and a fragmentary leather bag, ocher-stained. Many other cultural materials were found nearby, but these seem to have been associated with rat nest deposit and not the cache pit itself.

Cache Pits 3 and 4 (Farmer)

Two depressions lined with grass bundles were found in the area excavated by Farmer in the interior of El Pakiva, along the west wall. One was oval-shaped and measured approximately 1-by-2 ft. The other was round and had a diameter of 14 in. It is unclear if all the cultural material obtained from this area was directly associated with the pit.

Material from this area included basketry fragments, pottery sherds, yucca cordage, flakes, knives, and bones. Sticks, yucca leaves, and grass bundles also were found.

Discussion

Meighan (1953) summarized locations within California, the Southwest, and the Great Basin in which slab- and grass-lined pits were noted ethnographically and archeologically. Steward (1941) recorded the use of grass- or bark-lined pits by the Death Valley Shoshone, Nevada Shoshone, and Northern Paiute groups (Meighan 1953:175). He also recorded slab-lined pits used by several Ute groups. Steward (1941:333) noted that hidden storage pits were preferred over above-ground storage because of the widespread practice of robbing caches.

Slab-lined storage pits are a Southwestern trait, and have been found in Basketmaker sites in Utah, Arizona, Texas, and Colorado (Meighan 1953:176). In California, almost all slab-lined pits have been found in the southern part. Sites where they have been found include: Coville Rock Shelter, Inyo County; Deep Springs Valley, Inyo County; Twenty Nine Palms, Mojave Desert; and Indian Hill Rock Shelter, Imperial County (Meighan 1953:175; Wallace and Taylor 1960; P. J. Wilke, personal communication, 1985).

Grass-lined pits are a Great Basin trait and are common in Nevada, where they occur at Lovelock Cave, Humboldt Cave, and Hidden Cave, and were found by Cressman in extreme northeastern California (Meighan 1953:176).

Having both grass-lined and slab-lined cache pits seems to reveal influences from both the Basin and the Southwest, which is reasonable in view of the cavern's proximity to both areas.

CHRONOLOGY

To understand the former occupants of an archeological site, their activities, and how one site relates to other sites in the region, the occupation must be dated. The chronological methods applicable to the Mitchell Caverns assemblage include radiocarbon dating, comparing diagnostic projectile points with others from dated sites, and comparing ceramic styles with similar styles from sites of known chronology. The entire assemblage can also be considered in relation to others.

The dating of the assemblage is hampered by the long time elapsed since the first excavation in 1934, along with the relatively primitive methods of excavation, curation, and storage of collected materials. Another factor is the relic hunting that occurred, leaving unknown the actual assemblage left by the former inhabitants. Many of the time-sensitive projectile points and ceramic specimens lack proveniences and cannot be placed in association with other artifacts or features or stratigraphic levels.

Three basketry samples were selected for radiocarbon analysis. One, the almost complete winnowing tray, yielded a ^{14}C age of 480 ±100 years B.P. (UCR-1878). This indicates manufacture of the specimen in the 14th to 16th century A.D. (cf. Klein, et al. 1982).

The dates for the other specimens, the two seed beaters, are forthcoming. Bettinger and Baumhoff (1982:406) considered seed beaters, along with triangular winnowing baskets, to be "hallmarks of the Numic seed harvesting complex." The Numics are thought to have spread from southeast California throughout the Great Basin within the last 1,000 years. Direct dates on the seed beaters may reveal when these people were here and may add to the understanding of the Numic spread.

Only two projectile points, considered to be time-sensitive artifacts, were known to have been recovered from inside the caverns. These are Elko points, found by Farmer in El Pakiva Cave, in the lower layer of midden. Elko points from the central Great Basin were dated from 1300 B.C. to A.D. 700 by Thomas (1981). Taking into consideration the entire assemblage and those from other sites in the region, and the chronology of those sites, it is suggested that occupation at the caverns took place at the later end of this period.

The single Gypsum Cave point has no known provenience. Field notes written by a park employee recorded the finding of a "Gypsum" point, with no other description, in rat nest midden from inside El Pakiva Cave. Gypsum Cave points, according to Bettinger and Taylor (1974), span the period 1200 B.C. to A.D. 600.

The Eastgate point also has no known provenience. Eastgate components begin at A.D. 650 and extend to A.D. 1300 (Bettinger and Taylor 1974). The two stubby untyped specimens, also without origins, may date during this period. They are similar to points from a southwestern San Bernardino County site thought to have been occupied from 1000 B.C. to A.D. 1000 (Kowta 1969). They are very distinct from the thin, triangular, and side-notched points of more recent time.

Griset (this volume) concluded that the dates for the ceramics known to have been found inside the caverns fall toward the end of the production of brownware and probably were historic.

The fiber-wrapped metal hardware specimen indicates the caverns were used at some time in the historic period. Two factors indicate that this utilization did not extend far into this period: one, the apparent native use of the item; and two, the fact that there was no real evidence of historic occupation. If the caverns were regularly used so recently, many items of refuse, such as bones from domestic animals, would be expected to occur.

The assemblage contains many artifacts that have been found throughout the Great Basin and have a time span going back thousands of years but also lasting until historic time. Some of these artifacts are milling stones, basketry (both twined and coiled), bone tools, olivella shell beads, scapula grass cutters, wooden-handled knives, fire drill hearths, and woven sandals (Jennings 1957; Heizer and Krieger 1956). It

is possible that direct dating of other Mitchell Caverns artifacts could result in earlier dates, but the midden did not have great depth and the caverns did not appear to have been occupied over such a vast time span. Given the available documentation for the assemblage, precise chronology beyond the dated basketry and historic artifact is not possible.

It is suggested that the Mitchell Caverns assemblage may have begun around A.D. 500 and extended to historic times. Occupation may have been more or less continuous, but on a seasonal basis, and may have included sporadic visits by travellers. Indications of two separate occupations in the El Pakiva Cave interior consisted of a hard-packed sterile floor layer between the two layers of midden, but no relative time period for this gap is available.

SUMMARY AND CONCLUSIONS

Within the last 50 years, three archeological excavations took place at Mitchell Caverns. These excavations yielded a variety of cultural materials that provide information on aboriginal activities there.

The material culture assemblage, taken as a whole, resembles assemblages from many other archeological components throughout the Great Basin. The Mitchell Caverns stand out among caves investigated archeologically in that they produced so many unique items. In this regard one can recognize the rawhide leg skins, the hafted knives, the quantity of ocher, the chuckwalla hooks, the forceps, and the seed beaters.

Evidence here, as elsewhere, indicates a hunting and gathering economy with emphasis on plant foods. Lifestyle was nomadic to take advantage of seasonal ripening of plant resources. There was a variety of vegetal foods at the caverns but continual harvesting would have required frequent moves. Apparently several groups joined in the fall to harvest pine nuts, and used the area as their winter campground. The presence of cactus, yucca, and agave in particular indicates that food sources were present here much of the year and the caverns served as a camp during other times of the year as well.

The caverns are situated near two trails that were used by both Mohave and Paiute Indians and could have been used as a stopover place by travellers. Another impetus for use of the area may have been the turquoise mines located 62 km northwest of the caverns. These mines are thought to have been worked by Pueblo Indians from southeastern Nevada as early as A.D. 500 or 600 (King and Casebier 1976:30). The Chemehuevi name for the Providence Mountains is said to mean "rock blue" or turquoise (King and Casebier 1976:30; Van Valkenburgh 1976:18) and may have originated from a relationship with the mine or mine workers.

Descriptions of the Southern Paiute in early historic times frequently recorded their use of lizards, rodents, and sometimes insects for food, indicating a way of life that made use of all possible resources. The addition of chuckwalla hooks to the assemblage indicates

a technological adaptation to hunting a particular prey that is not common to all Great Basin areas, but finds its closest documented parallel in Death Valley.

The use of the caverns for storage permitted excess foods to be saved for leaner times, most likely winter. It also made it possible for the wandering people, unable to transport many belongings, to keep them safe until a later time. Seasonally useful items such as the seed beaters and forceps could have been cached, and some could have been lost in the darkness of the caves.

Mountains, and caves which were situated along their slopes, held important roles in Basin cultures. Certain high peaks were considered sacred centers (Miller 1983:72), and certain caves were reported by the Chemehuevi to be sacred sites associated with hereditary songs and shamanistic songs and powers (Laird 1976:38-39). The Chemehuevi considered these caves to possess great power and mystery and to be inhabited by spirits.

Deep caves having main as well as branching chambers were considered important power sites. In some areas, graves were placed in sites already having some religious significance, such as caves, resulting in a concentration of power (Miller 1983).

The Chemehuevi considered certain songs to be hereditary and to convey rights to territory over certain geographical areas the songs portrayed. In the rites of singing the Salt Song, a person would enter a sacred cave and make offerings to it, which could be a piece of buckskin, moccasins, or tobacco. The offerings were made in exchange for a request, and the person making the request would remain in the cave all day (Laird 1976:38, 39). The Salt Song trail was said to pass by the east side of the Providence Mountains (Laird 1976: end paper of Chemehuevi Mythological and Hunting Song Territory).

Kelly (n.d.b) also recorded Chemehuevi knowledge of similar beliefs. The people went to a cave in Vegas Mountains, to talk to the mountain and "where they left presents such as a cane, or arrows."

The Walapai, a northwestern Arizona people having a similar culture, believed caves had spiritual powers and sang a Salt Song during which a round of visits was made to special caves (MacKennan 1935b:186).

Two caves, one in Arizona and one in Nevada, were mentioned by Chemehuevi as being sacred (Laird 1976). The most powerful peak in the southern and central Basin is said to be Charleston Peak, in the Spring Mountains, west of Las Vegas. A cave near there has been visited in recent times by Native Americans, who pray, leave offerings, and meditate (Miller 1983).

Many of the artifacts from Mitchell Caverns appear to be random finds made by Mitchell or various park employees. Some artifacts have been recorded as being taken from rat nests, and others apparently were found in the many extensive limestone niches and shelves inside the

caves. One find from a rock crevice in El Pakiva Cave was described as a Mohave yucca stalk containing "fire sticks" and a pipe, wrapped in yucca fiber matting (Anonymous 1968). These artifacts are not included in the collection. These and other items, which include chuckwalla hooks, knife blades and hafted knives, seed beaters, a winnowing basket, rawhide pieces, arrow straighteners, crooked sticks, all could have been left as offerings. This may explain why the objects were left in place and not taken by others. Two pieces of red rock crystal were found on the surface of El Pakiva Cave. Such specimens are known to be associated with sacred sites in Native American religion.

This explanation that the caverns may have been considered sacred fits in with Chemehuevi religious practices as recorded by ethnographers, although no informant has ever spoken of such use for the Mitchell Caverns. That some spiritual connotation existed for the Chemehuevi is certain since the name El Pakiva is from the Chemehuevi word Enelkevah, or Devil's House (Farmer n.d.).

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POTTERY COLLECTIONS FROM MITCHELL CAVERNS AND SURROUNDING AREA

Suzanne Griset

INTRODUCTION

The Mitchell Caverns area of the eastern Mojave Desert has produced a large collection of native artifacts, including an interesting array of pottery wares and vessel forms. The recovered ceramics include decorated bowls of red-on-buff and black-on-white, cooking pots of Tizon Brown and corrugated wares, as well as several ground sherd disks. These various pottery types and forms hint of influences from the Southwest and Colorado River areas, as well as a broad time span of occupation of the Mitchell Caverns area. Unfortunately, few of the sherds retain provenience data, and hence interpretations must be made with extreme caution.

Archeological excavations at Mitchell Caverns have occurred intermittently over a span of 34 years and have focused primarily on two of the four caverns: El Pakiva Cave and Tecopa Cave. Initial work was undertaken by Farmer and Van Valkenburg for the Los Angeles County Museum of Natural History in 1934. These materials were transferred to the California Department of Parks and Recreation after the caverns became a state park. Subsequent investigations were undertaken by Smith for the University of California, Berkeley, in 1958. In 1968, L. A. Payen conducted test excavations for the Department of Parks and Recreation in El Pakiva Cave. These excavations, and the assemblages they produced, have been summarized by Pinto (this volume).

Farmer's (1934) account of the earliest excavations made clear that the "Mitchell Caverns" material included potsherds excavated from both El Pakiva and Tecopa caverns, as well as items excavated from Medicine Cave Rock Shelter, one-half mile south of Tecopa. In addition, Farmer and Van Valkenburg surface collected sherds from campsites in the surrounding areas, though no locations were recorded for these sites. It is unclear whether the specimens Mitchell had privately collected during 1930-1934 were added to the Los Angeles County Museum's collection (Farmer 1934, 1936, 1984).

Since most of the specimens in the Parks' Mitchell Caverns collection are from a mixture of sites, it seemed prudent to examine pottery recovered by Smith in 1958 specifically from the Mitchell Caverns. This collection and the ten items collected by Payen in 1968 served as a control against which the earlier unprovenienced specimens could be compared.

The University of California collection also exhibited its share of discrepancies between the excavation report (Smith 1958), the catalog (UCLMA Acc. 449), and the sherds found in the collection drawers. These

problems have been reconciled sufficiently to enable some useful comparisons and comments on the pottery from the two caves at Mitchell Caverns (El Pakiva and Tecopa Caves) and from the surrounding area.

METHODS

Sherds in all of the collections were first checked for possible conjoins and any matches were glued. These specimens were then measured and examined for surface and core colors (Munsell 1971), surface treatment, composition (texture, kind, shape, size, and percentage of nonplastics), firing atmosphere, and indications of possible use or depositional history. Macroscopic examination was supplemented by use of a 30X binocular microscope equipped with a millimeter counting grid. Where feasible, rim sherds were compared to a rim gauge to estimate rim diameter within a range of 4 mm.

Vessel shapes were reconstructed from comparisons with ethnographic specimens from Southern California in museum collections, and from comparisons with vessel shapes reported by Rogers (1936), Campbell (1931), Kroeber (1955), Harner (1955), Washburn (1982), and Waters (1982a).

Preliminary typological sorting was restricted to ware designations: Tizon Brown and Lower Colorado Buff, and two Southwestern sherds, thought to be Anasazi pottery.

DESCRIPTION OF SAMPLE

A total of 161 sherds was examined: 70 from the Los Angeles County Museum collection, 81 from the University of California collection, and 10 from Parks and Recreation collections (Table 1).

In regard to the first of these collections, Farmer's (1984) field notes or original catalog numbers provide provenience for four of the specimens. The catalog number on a conically perforated ground disk indicates that it was collected from the surface of a campsite, as was the single rim sherd of a black-on-white bowl. Farmer's notes mention a single red-on-gray sherd found at one of the sites located on the "Dominguez property." This may be a bowl sherd which appears to be red-on-gray on one side, but is more properly classified as a red-on-buff.

The University of California collection derives from surface collections and one test pit in each cave. There is some confusion as to the actual number of sherds excavated. Smith (1958) lists 60 sherds from El Pakiva (55 Tizon Brown and five Lower Colorado Buff), and 22 from Tecopa (16 Tizon Brown and six Lower Colorado Buff). The catalog lists a total of 56 sherds from El Pakiva and 22 from Tecopa. The collection now contains 58 sherds from El Pakiva and 23 from Tecopa.

Smith's Test Pit 1 was located in the Eastern Alcove of El Pakiva. Of the 53 Tizon Brown sherds recovered, 29 appear to be from a single wide-mouth vessel, possibly a jar; nine sherds correspond in every manner to a wide-mouth Tizon jar rim fragment in the Los Angeles County Museum

collection; two sherds are part of a rounded base fragment; and 12 sherds are from one or two additional Tizon pots of undetermined shape. One of the surface collected sherds from El Pakiva conjoins with a Tizon Brown sherd that the catalog reports is from Tecopa's main chamber surface. This may indicate that the two caves were used concurrently, or that post-depositional traffic or cataloguing errors have produced an interesting quirk in the pattern. The five Lower Colorado Buff sherds are very small (less than 2 cm across) and thin (4.5 mm thick) with lustrous exteriors. Although four of these sherds are gray in color, they are buff ware.

The Tecopa sample consists of 13 Tizon Brown and 10 Lower Colorado Buff sherds. The latter sherds are very small (less than 1.5 cm diameter). Differences in surface and matrix suggest that the sherds comprise one Buff Ware pot fragment of undetermined shape, one buff ware base fragment, and one Tizon base fragment, and the remainder of the sherds are from an unknown number of Tizon pots, including the one sherd which conjoins with the sherd from El Pakiva.

The Parks and Recreation (1968) sample contains six sherds and one ground sherd disk recovered from two test pits in the Annex on the western side of El Pakiva Cavern, in the same general area excavated in 1934. The four Tizon Brown sherds from Test Pit 2 appear to derive from a single cooking pot. The two examples of Lower Colorado Buff, a basal fragment and a ground sherd disk, are described in detail in the discussion of reconstructed vessel forms.

RECONSTRUCTED VESSEL FORMS

Among the three collections, sufficient fragments were recovered to enable partial reconstructions of three ground sherd disks and nine vessels.

Ground Sherd Disks

All three disks were recovered from provenienced contexts: two from El Pakiva, and one from the surface of a campsite elsewhere in the vicinity. All were made from sherds of Lower Colorado Buff Ware.

The El Pakiva specimens include a perforated and an unperforated disk. The former, recovered from the Annex in 1934, is biconically drilled and centrally perforated, and was recorded at the time as a "Sherd of redware (faint red exterior wash, quartz sand temper) with countersunk, perforation in which remains of a 2-ply cord still fills" (Farmer 1934). Unfortunately, the cord has long since disappeared. Rather than a true red ware, the sherd is more properly a buff ware with a fugitive red wash, not a clay slip. Although fragmented, it has an estimated diameter of 4.2 cm, wall thickness of 6.0 mm, and slightly ground edges (Fig. 1a). There is a mineral scum on the interior surface of the disk. The core color is 2.5YR 5/4, and the matrix contains a mixture of crushed rock (quartz, feldspar, and hornblende), as well as ground sherd.

TABLE 1

Ceramics from Mitchell Caverns Collections

Reconstructed Form	Ware	Sherds	Provenience
	Los Angeles County Museum Collection		
Perforated disk	Lower Colorado Buff	2	El Pakiva Annex
Perforated disk	Lower Colorado Buff	2	Campsite
Bowl rim frags.	Lo. Colo. Red-on-Buff	8	---
Bowl sherd	Lo. Colo. Red-on-Buff	1	Dominguez site
Bowl sherd	Lo. Colo. Red-on-Buff	1	---
Jar rim frag.	Tizon Brown	14	---
Vessel body frag.	Tizon Brown	3	---
Jar rim	Tizon Brown	1	---
Cooking pot rim	Tizon Brown	4	---
Sherds	Tizon Brown	20	---
Jar? base	Tizon Brown	10	---
Bowl wall sherd	Black-on-White	1	Campsite
Cooking pot rim	Corrugated	3	---
TOTAL		70	
	University of California Collection		
Sherds	Tizon Brown	9	El Pakiva E. Alcove: surface
Sherds	Tizon Brown	44	El Pakiva E. Alcove: 0-6 in.
Sherds	Lower Colorado Buff	5	El Pakiva E. Alcove: 0-6 in.
Sherds	Tizon Brown	5	Tecopa, S. Entrance: 0-6 in.
Sherds	Lower Colorado Buff	6	Tecopa, S. Entrance: 0-6 in.
Sherds	Tizon Brown	6	Tecopa, N. Entrance: surface
Sherds	Lower Colorado Buff	2	Tecopa, N. Entrance: surface
Sherds	Tizon Brown	2	Tecopa, Main Chamber: surface
Sherds	Lower Colorado Buff	2	Tecopa, Main Chamber: surface
TOTAL		81	
	Parks and Recreation Collection		
?(heavily carbon'd)	Tizon Brown	2	El Pakiva. Test Pit 1
Cooking pot rim	Tizon Brown	4	El Pakiva. Test Pit 2
Unperforated disk	Lower Colorado Buff	1	El Pakiva. Test Pit
Base fragment	Lower Colorado Buff	1	El Pakiva: surface
Rim fragment	Tizon Brown	2	El Pakiva: surface
TOTAL		10	

The other disk from El Pakiva (Fig. 1b) was recovered in 1968 from a test pit, also in the Annex, at a depth of 0-20 cm. It is an unperforated fragment, made from the wall of a Lower Colorado Buff vessel, and has a diameter of 6.3 cm and thickness of 6.0 mm, with fire clouds and biotite visible on the exterior surface and carbon deposits and biotite visible on the interior surface. The core is sedimentary clay, with angular grains of quartz and feldspar, averaging less than 0.5 mm in size.

The third disk is much smaller than either of the previous specimens. It has an estimated diameter of 2.6 cm and wall thickness of 5.5 mm, and is well ground, with a 0.4 cm diameter conical perforation from the exterior of the sherd (Fig. 1c). The core is sedimentary clay with sub-rounded grains of quartz and feldspar accounting for 50% of the matrix. The grain size averages 0.75 mm. Farmer designated it as Parker Buff.

Ground sherds are found throughout Southern California and the greater Southwest. Ethnographies provide descriptions for some of their uses, and lacking these, many possibilities have been proferred (Oppelt 1984:1-6). Smith's (1955:33-34) Serrano informant speculated that ground sherds were used for gambling games. Sherds have also been glued as patches over cracked pots (e.g. Museum of Northern Arizona, Specimen 2741/L1 from San Diego County). A Chemehuevi use is recounted in the myth "How Coyote Went to War against Gila Monster":

> Gila Monster and Turtle instructed their people well. When a good year came, the women gathered seeds and stored them in large baskets capped with potsherds and sealed with greasewood gum.....Then the people dug a big hole and buried all the food they had prepared. They covered it well and made the surface of the ground look like it had not been disturbed. Afterwards the whole band went to roam around the county. Because it was such a good year, they could find food everywhere and could travel whereever they pleased (Laird 1976:168).

Payen catalogued the large disk from El Pakiva as a jar lid, but no traces of adhesive are visible on the specimen. Given the variety of shape, size, and presence or absence of perforations in these specimens, they probably served several functions.

Cooking Pots

This functional designation is assigned to rim fragments that are heavily carbonized and often contain sooted areas or carbon deposits that are characteristic of cooking over wood fires (Hally 1983). Three examples are present.

The largest of these fragments was recovered in 1934, but provenience is unknown. It is of Tizon Brown Ware, with a direct rim, restricted neck, and rounded everted lip. Rim diameter is estimated at 28 cm, rim thickness is 7 mm, and wall thickness is 6 mm. Exterior surface color is 5YR 2.5/1. It is soot-stained and two mend holes are

evident (Fig. 2d). Interior color is 10YR 3/3 and carbon deposits are present. Both interior and exterior surfaces are roughly smoothed. Core color is 5YR 6/4, texture is coarse, and the matrix is residual clay with 50% nonplastics consisting of semi-rounded quartz and feldspar grains averaging 0.5 mm.

A second fragment from the 1934 excavation -- again with no provenience -- is a corrugated rim sherd (Fig. 2e). It has an everted rim, restricted neck, and rounded everted lip. The fragment is too small for estimation of original vessel dimensions. The rim is 4 mm thick, and the wall is 5.5 mm thick. The exterior surface is corrugated, while the interior is roughly smoothed. Color of both surfaces and of the core is 10YR 2.5/1. The core is of medium texture with a sedimentary matrix, consisting of 50% nonplastics. The latter includes semi-rounded quartz grains averaging 0.5 mm in size. Both surfaces exhibit heavy carbon deposits. This sherd is identified as Tusayan Corrugated:

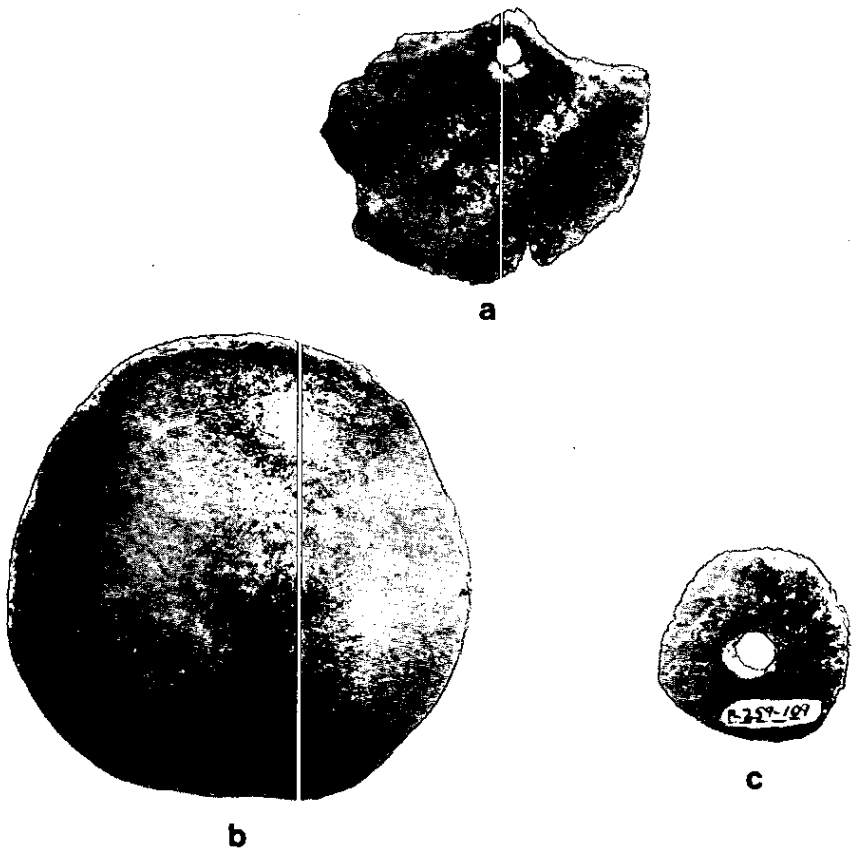

Figure 1. Lower Colorado Buff ground sherd disks. Actual size.

> The sherd has the appearance of being used over a fire for cooking purposes and for a considerable length of time. The outside surface shows considerable wear, polish, over the carbon sooting and the interior of the vessel has been carbon impregnated. The attributes of manufacture are those of Tusayan particularly the variety made early in the period of this technique of finish for the graywares. The jar is small, with a rather wide mouth. The corrugations are carried almost to the rim, an early technique, as is the character of the lip and rim (A. J. Lindsay, Arizona State Museum, personal communication).

The third specimen is of Tizon Brown Ware and was recovered from Test Pit 2 in El Pakiva Cave in 1968. Original rim diameter is estimated at 20 cm. Thickness of both rim and wall is 5 mm. Both exterior and interior surfaces are coarse and exhibit heavy soot deposits which obscure clay color. The core is coarse-textured residual clay with angular grains of quartz, feldspar, biotite, and muscovite (average size 0.5 mm) comprising 50% of the matrix.

Unfortunately, no base sherds can be matched with any of these rim fragments. Judging from the morphology of complete examples of both of these wares, it is likely that these wide-mouth cooking pots had rounded bases.

Brown Ware Vessels

Six lots of Tizon Brown sherds include sufficient rim fragments to permit conjectural reconstructions of three vessel rims. All are fairly consistent in rim morphology and size, but lack conjoined body or base sherds which would permit reconstruction of the entire vessel morphology or projections of vessel use. The rim diameter and configuration would suggest that these are large, wide-mouth jar forms. All have direct rims with rounded lips and no necks.

An unprovenienced specimen recovered in 1934 has a slightly recurved rim and an everted lip. Original rim diameter is estimated at 18 cm; rim and wall thickness are 8.0 mm and 5.5 mm, respectively. The exterior surface (color 5YR 5/4) exhibits fire clouds and wiping marks. Anvil marks and carbon deposits are evident on the interior surface (color 5YR 5/1). The core (color 5YR 5/1) is coarse residual clay with large (0.5-1.0 mm) angular grains of quartz, feldspar, and hornblende comprising more than 50% of the matrix. Mica and other nonplastics are visible on both surfaces, but no mica is apparent in the core.

A second vessel is represented by unprovenienced sherds recovered in 1934 and sherds from the El Pakiva Alcove recovered in 1958. Original dimension of the incurving rim is estimated at 20 cm. Thickness of rim and wall are 4.5 cm and 3.5 mm, respectively. Color of both surfaces and the core is 5YR 5/4. Mica is visible on both surfaces, which also exhibit fire clouds and wiping marks. A light carbon deposit is present on the interior surface. The core is coarse residual clay, with angular grains of feldspar, quartz, hornblende, and mica (average size 0.5 mm) comprising more than 50% of the matrix.

Figure 2. Ceramic fragments: a-d) Tizon Brown Ware sherds; e) Tusayan Corrugated sherd. Specimen d is 15 cm wide.

A third vessel -- again reconstructed from unprovenienced and El Pakiva Alcove sherds -- is similar in color and in rim shape and diameter to the preceding specimen, but has a thicker rim (6.0 mm) and wall (5.0 mm). Base thickness is 7.0 mm. Both surfaces exhibit wiping marks. The core is residual clay with small (less than 0.5 mm) angular grains of feldspar and quartz comprising 50% of the matrix.

In the second and third of these reconstructions, remarkable similarities in surface treatment and clay matrices suggest that unprovenienced sherds collected in 1934 derive from the same vessels from which the University of California excavation recovered provenienced fragments, 24 years later. Additionally, the morphology of the reconstructable brown ware vessel rims from all three collections is very homologous. The two brown ware cooking pots previously described differ from the vessels described here, only in that they contain heavy layers of carbon and could thus be given functional attributions.

Vessel Bases

Six base fragments were recovered. Five small fragments were recovered from the two caverns: one Tizon Brown and one Lower Colorado Buff from El Pakiva; two Tizon Brown and one Lower Colorado Buff from Tecopa. The largest base fragment is, unfortunately, unprovenienced.

The two Lower Colorado Buff bases both appear to be rounded. The specimen from El Pakiva was recovered from surface contexts in 1968. The base is 6.5-8.5 mm thick and the exterior surface exhibits fire clouds. The core is sedimentary clay containing sub-angular grains of quartz, feldspar, mica, and crushed rock comprising less than 50% of the matrix. The other specimen, surface collected in Tecopa cave in 1958, is thinner (5 mm), with exterior carbon and soot deposits and vugs on the interior surface. The core is sedimentary clay with grains of sub-angular quartz and feldspar.

The three Tizon Brown bases also appear to be rounded and vary in thickness from 5 to 10 mm. The example from the El Pakiva Alcove is comprised of sherds from the surface and from depths of 0-6 inches. Carbon deposits and extruding nonplastics are present on the exterior surface. Both soot and mineral deposits are present on the interior surface. The core is coarse residual clay with vugs. Angular grains of feldspar, quartz, and hornblende averaging 0.5 mm in size make up about 50% of the matrix.

The two Tizon Brown bases from Tecopa Cave were both recovered in 1958, one from the surface, the other at 0-6 inches in the northern test pit. The former specimen is 6-10 mm thick with soot and mineral deposits on the exterior, and carbon and mineral deposits on the interior, surface. The core is residual clay. The latter specimen is 5.0-7.5 mm thick, with carbon deposits and temper visible on the exterior surface. Soot and mineral deposits are present on the interior surface. The core is coarse residual clay with vugs. Angular grains of feldspar, quartz, and hornblende averaging 0.5 mm in size comprise about 50% of the matrix.

The unprovenienced base is clearly conical and is perhaps the most unusual of all the brown ware vessels (Fig. 3). The base suggests that this was a fairly large vessel: at 8 cm above the point of the base, the vessel diameter is already 24 cm, with no suggestion yet of an upturn in the outflaring walls. The wall thickness is surprisingly thin for such a large Brown Ware vessel: it averages 5.0 mm.

It appears this vessel was begun by molding the base in another receptacle. Circular indentations approximately 1.0 mm in diameter occur on the exterior of the vessel, just below the area where coils of clay were added to the molded portion to build up the vessel walls. These impressions were made in the plastic clay and never completely obliterated in the smoothing process. They are too circular to be impressions of basketry or woven material impressions, yet I am at a loss as to their explanation. Fragments of what appears to be a clay "stucco" layer begin just above the mold/coil juncture. Anvil marks are present on the interior of the pot, as well as deep scratches on both the interior and exterior surfaces.

The clay matrix is definitely that of a residual clay brown ware and contains the usual primary minerals of decomposing granite (angular quartz, feldspar, and hornblende), yet it is different from the mixture found in the other Brown Ware vessels in these collections. If a single sherd of this vessel was examined among a handful of Tizon Brown sherds, its color and matrix would fall within the range of variation for that ware. The profile of the conical base is evocative of the large food vessel illustrated by Rogers (1936:Pl. 9) for western groups of southern California. Anomalous, however, are the stucco finish, which is usually attributed to cooking pots, and the relatively thin walls and molded start.

Red-on-Buff Bowls

Two of the larger rim fragments from the 1934 collection derive from decorated buff ware bowls that are very similar to historic Mohave vessels.

Kroeber collected a wide variety of pottery vessels from Mohave living on both sides of the Colorado River in the Parker Reservation in 1900, 1902, 1904, and 1908. His first published description of this pottery appeared in 1925 with a more detailed description published with Harner in 1955. Mohave pots were made from clay and granitic temper dug from the banks of the Colorado River (Kroeber 1925:738; Kroeber 1955:1). Malcolm Rogers added the following details:

> Clay is and has been obtained for many years from the river bank at the base of the Parker Mesa. It is the same sedimentary type of clay which is used at Yuma and can be found almost anywhere along the margins of the broader parts of the Colorado River valley...

> At Parker the temper for cooking ware is a coarse white sandstone (sic) which crumbles easily. It is used in the ratio of two parts of sandstone to three parts of clay. Although clay is now screened, it was formerly concentrated on a flat basketry tray...Cooking ware was given a stucco-like finish, and a more prolonged firing than other ware. It was sundried for two days, and then placed in a pit-kiln late in the day, and fired all night. Other wares, which were made with a potsherd temper, were usually fired one at a time on the surface of the ground (Rogers 1936:36, 37).

Kroeber (1925:737) also thought the white tempering material was sandstone, but corrected the identification after consulting a geologist (Kroeber 1955:13).

Vessels were shaped using the coil/paddle/anvil technique. Decoration consisted of designs painted on both the interior and exterior surfaces, using yellow ocher (see Meyer 1955, for description of mineral composition), which was ground and mixed with water:

> Designs on vessels are named spider, rain, rainbow, fish backbone, melon markings, turtle, cottonwood leaf, coyote tooth, yellow-hammer belly, tattoo, and hotahpam, a style of face paint that crosses under the eye (Kroeber 1925:738).

Many of the bowls collected by Kroeber are identical in shape and decorated similarly to the 'Mitchell Caverns' specimens. In 1925, Kroeber called this shape "kayuka, an open bowl." In 1955, he said: "The generic Mohave name for pottery vessels seems to be kwa'Oki, the word for bowl." He went on to define kwa'Oki:

> Diameter about twice the height; neck concave, often strengthened with a lashing of mesquite bark; lip gently everted; principal design inside; outside design usually

Figure 3. Tizon Brown Ware base. Specimen is 24 cm in diameter.

> mere lines, stripes, rows of dots. H/D Height calculated as a percentage of Diameter down to 38 per cent, usually 45-61 per cent, in two cases 68 per cent - one of these has been cooked in (Kroeber 1955:8).

Rogers illustrated three bowl silhouettes for Mohave pottery: a small food (serving/mixing) bowl approximately 8.5 cm in height and 10 cm in diameter at the mouth; a larger food bowl ca. 14.5 cm high and 23 cm in diameter; and a cooking bowl ca. 27 cm high and 33 cm in diameter (Rogers 1936:Pl. 9). H/D ratios estimated for these three idealized forms from Rogers' illustrations are: 85%; 63%; and 84%. According to Rogers' schema, Kroeber's kwa'Oki are large food bowls.

The two 'Mitchell Caverns' specimens also fall within Rogers' large food bowl category. Neither fragment is provenienced. Both have slightly recurved rims and slightly restricted necks. The larger piece (Figs. 4b, 5b) is the most complete specimen in the 1934 collection. Despite fresh breaks and edges with old glue indicative of missing pieces, approximately one-third of the vessel remains. This includes portions of rim and basal curvature which enable reconstruction of shape and design, with a fair degree of confidence.

The shape is that of a classic kwa'Oki, with a recurved rim (Rim Type A) and a flat (Type 1) lip (Harner 1955:15). Mouth diameter is estimated at 26 cm, and vessel height at 17-20 cm. Its H/D ratio is thus 65%, which places it in the upper range of Kroeber's samples and close to Rogers' idealized large food bowl proportions. Rim and wall thickness are 6.5 mm and 5.0 mm, respectively.

Exterior surface color is 5YR 5/6 with fire clouds. The interior surface (color 2.5YR 5/6) is highly oxidized and could be described as red-on-orange in appearance. The core is coarse sedimentary clay and matches the color of the interior surface. Large (0.5-1.0 mm) semi-angular grains of feldspar comprise about 50% of the matrix.

This bowl is decorated with red (10R 3/4) designs on both surfaces. The interior design is very similar to that on several vessels collected and described by Kroeber:

> It consists of triple-line bars that branch at an acute angle; one fork soon ends, the second goes on and merges with a branch from another bar, and so on in a complex pattern extending over the entire inside. The forks - which are also junctions - each contain a small solid-filled triangle, into which the thin middle line of each bar runs...This pattern is complex and calls for skill in execution...This pattern is the most ambitious of Mohave design treatments (Kroeber 1955:3).

The linear portion is called ta-tsir-qa-(t)sirqa "face paint," and the dots are said to represent the belly of the yellow-hammer, red-shafted flicker, kukho' (Kroeber 1955:3, Pl. 1d).

The exterior surface of this vessel is also decorated though less oxidized than the interior. Kroeber felt that most Mohave potters concentrated on interior designs and used simple lines or dots for the exterior. The exterior of this specimen has an intricate linear interlocking rhomboidal pattern with curvilinear elements inside each rhomboid. Solid red paint fills the area where the rhomboids interconnect, and produces an hourglass shape of solid design. No similar example was collected by Kroeber.

The second red-on-buff vessel (Figs. 4a, 5a) is smaller, slightly incurving at the rim (Harner 1955:15, Rim Type C,) with a rounded, slightly everted, red-painted lip (Type 5). It, too, falls within the range of bowls collected by Kroeber from the Mohave. Its surfaces are less orange than those of the foregoing specimen (exterior 5YR 6/1; interior 10YR 6/2). The interior has a grayish cast, the exterior less so, and the core (color 10YR 6/1) is incompletely oxidized. However, vessels with coloring identical to this specimen are among the bowls collected by Kroeber. The coloration appears to be a result of the original firing process.

Mouth diameter of this bowl is estimated at 20 cm, but vessel height cannot be determined. Rim and wall are both 6 mm thick. Both surfaces are smoothed, and mineral deposits are evident on the exterior. The core is fine sedimentary clay containing mostly small (less than 0.25 mm, occasionally 1.0 mm) grains of semi-angular quartz, feldspar, and hornblende and ground sherds, comprising 30% of the matrix.

The red (2.5YR 5/4) interior design of this bowl has one complete and three fragmentary animal paw prints with variable numbers of "toes." The heel is rounded in one instance, and angular in three. Kroeber identifies this pattern as a raccoon hand (1955:7, Pl. 6a-b). The exterior design is also well executed and completely fills the side of the bowl up to the rim. It consists of solid red (2.5YR 4/4) rhomboids outlined with two red lines, and the third line is shared with interlocking rhomboids. The design is reminiscent though not identical to the interior design of a Mohave specimen depicted by Kroeber (1955:Pl. 2a). It is also similar to a pot collected by Kroeber in 1907 from Chemehuevis who had recently migrated to Cabezon in Riverside County (UCLMA 1-10955). Although the Chemehuevi pot is a wide-mouth jar, not a bowl, the design is similarly placed on the exterior of this vessel.

Given the similarity in Chemehuevi and Mohave pottery (Kroeber 1925; Rogers 1936; Laird 1976) and the rarity of complete Chemehuevi specimens for comparative purposes, it is difficult to attribute ethnic identity to either of these specimens. Typologically, both of these bowls fit Harner's (1955) description of Parker Red-on-buff, Fort Mohave variant. He notes that several vessel forms (cups, ring bases, and keels) are historic (post-Spanish contact) and thus are chronological markers. The antiquity of food bowl forms is less certain. Rogers (1945:Table 2, Fig. 2) ascribes Yuman III dating (which would provide a broad time frame of post A.D. 1500 to circa 1910) for these specimens.

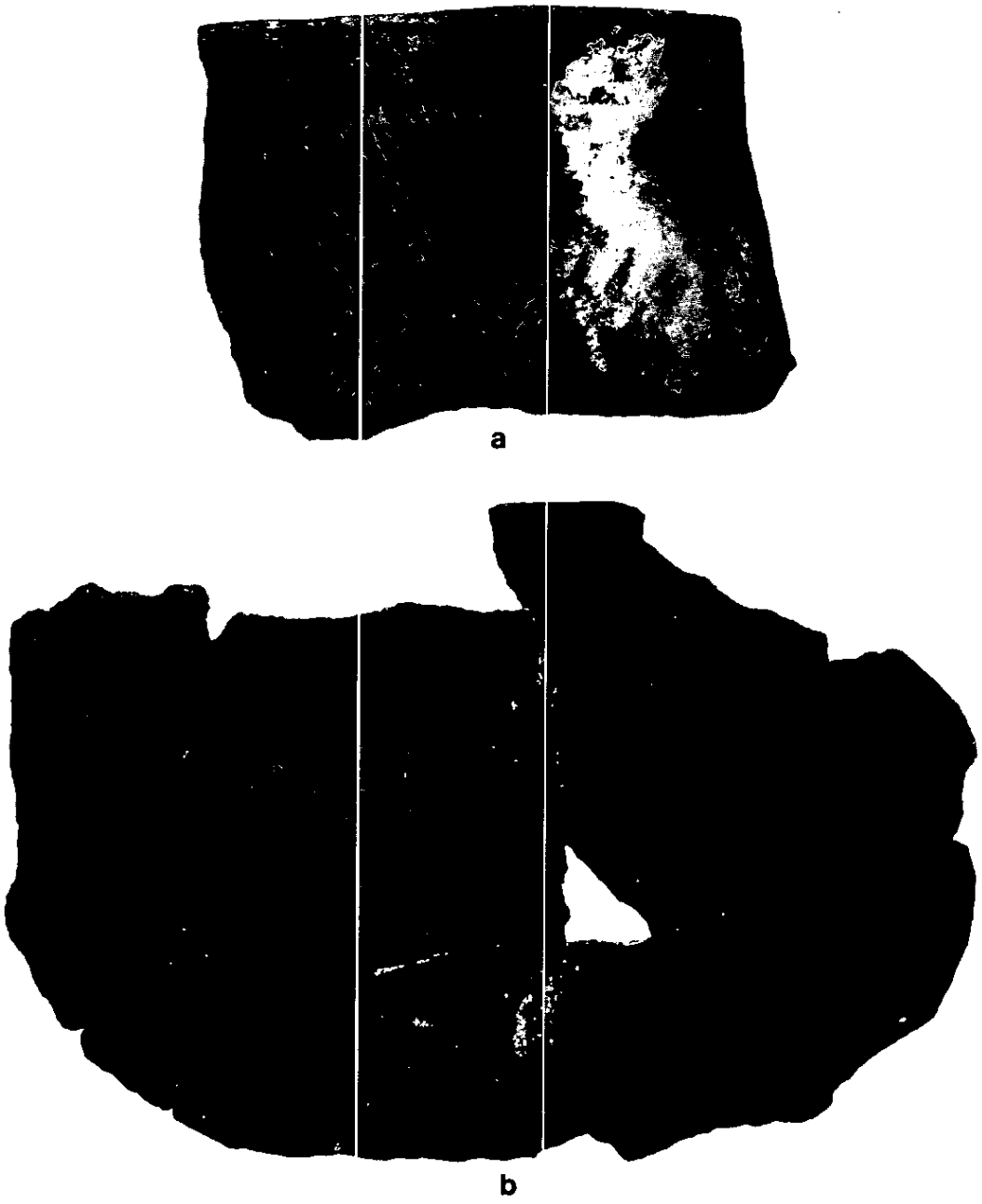

Figure 4. Lower Colorado red-on-buff bowl fragments, exterior view. Specimen a is 12 cm wide.

Figure 5. Lower Colorado red-on-buff bowl fragments, interior view. Specimen a is 12 cm wide.

Two additional red-on-buff sherds are present in the 1934 collection, each from a different vessel. One (Fig. 6c) may be the "red-on-gray" sherd Farmer (1934) reported finding at the Dominguez site. It is gray on the exterior surface, but oxidized in the core, and falls within the range of variation found on complete vessels of buff ware. The exterior surface of the other sherd is polished (Fig. 6b). Rogers (1945:Table 2) contends that burnishing is strictly a Yuman I trait (pre-A.D. 1000). The matrix of this sherd has been oxidized rather than reduced as would be expected in a true gray ware, and it falls within the mineral composition described for Parker Red-on-buff. The red-painted designs on each of these sherds consist of thick lines on the exterior surfaces of the sherds, but the specimens are too small to enable reconstruction of design or vessel form, and is identifiable as Sosi Black-on-white (A. J. Lindsay, Arizona State Museum, personal communication).

Black-on-White Bowl

A single black-on-white sherd was recovered from the surface of a campsite in the area surrounding the Mitchell Caverns (Farmer 1934). It is thinly slipped white on both surfaces, and has a single broad black line of organic paint on the polished interior surface (Fig. 6a). Wall thickness is 5 mm. The core is gray, finely textured sedimentary clay with 30-40% nonplastics which are rounded grains of quartz sand of less than .25 mm diameter. It is most likely a bowl or jar form.

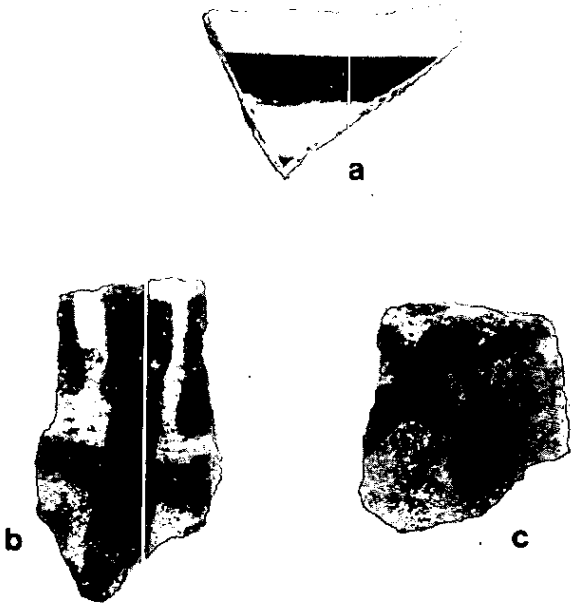

Figure 6. Miscellaneous ceramic specimens: a) Sosi Black-on-white sherd; b-c Lower Colorado Red-on-buff sherds. Actual size.

DISCUSSION: MITCHELL CAVERNS SAMPLE

Table 2 lists the provenienced sample of vessel forms and wares from the combined collections for Mitchell Caverns, including estimates of the minimum number of vessels represented. Sherds that differed in surface treatment and clay matrix from that of the reconstructed rim or base fragments are assumed to derive from different vessels. Though cognizant of the wide range of variation possible within a single vessel, I feel these estimates provide a rough gauge of the amount of pottery recovered from the two caverns during these excavations. Based on these calculations, several observations can be made regarding the provenienced pottery sample.

Decorated Wares

Only the 1934 collection produced any decorated or Southwestern pottery. This pattern may be due to surface gleaning of decorated potsherds during the 20-30 year interim between the 1934 and subsequent excavations, particularly after the caverns had been opened to the public. Alternatively, the pattern may reflect differential deposition and use of the caverns as compared to open campsites in the surrounding area. None of the Lower Colorado Buff sherds recovered from the two caverns in 1958 matched any of the four red-on-buff vessels in the 1934 collection.

At present, the fugitive red-washed ground sherd disk from El Pakiva is the only "decorated" sherd from the caverns. Although we are hampered by the lack of proveniences for all of the specimens in the 1934 collection, several lines of evidence suggest that the red-on-buff and corrugated sherds may not have been recovered from the caverns.

TABLE 2

Provenienced Ceramic Vessels from Mitchell Caverns

Provenience	Ware	Form	Collection 1934	1958	1968	Minimum No. of Vessels
El Pakiva	Tizon Brown	Rims	1	1		
		Bases	1	1		6 pots
		Pots		2		
	Lower Colorado Buff	Disks	1		1	2 pots
		Bases			1	2 disks
		Pots		1		
Tecopa	Tizon Brown	Bases		2		2 pots
	Lower Colorado Buff	Bases		1		2 pots
		Pots		1		

Farmer (1934) refers to having found "sherds of Chemehuevi pottery" in the fill of the rat nest in Tecopa Cave, though no artifacts were found in any of the three test pits in Tecopa. In contrast, El Pakiva Annex produced surface as well as subsurface pottery sherds in both test pits, but no information is provided as to what kind of sherds were recovered.

Farmer makes a general statement concerning the materials recovered from the excavations:

> All of the Indian material recovered from the excavations was according to all indications made by the Chemehuevi. However there is some doubt about certain fragments of the decorated pottery found on the campsites...(Farmer 1936:105).

He also makes the following observations concerning Chemehuevi pottery:

> The pottery of the Providence Mountain region is fairly well made and in some cases decorated. Some of the decorations shows a strong Mojave influence. The Mojave Indians lived on the Colorado river east of the Chemehuevi. No complete vessels were recovered but the broken fragments told all we wished to know. All the pottery seems to have been made by the paddle-anvil method...The Chemehuevi received the technique from the Mojave who in turn had received it from their Yuman brothers down the Colorado river (Farmer 1936:105).

Unfortunately, we must keep in mind that the Mitchell Caverns were not the only sites excavated in this area in 1934. The decorated sherds may have been recovered from any of the others. There is also the likelihood that the decorated vessels are Mohave pots rather than Chemehuevi.

One additional line of evidence is found in the 1958 and 1968 materials. Granted they were collected much later and were very small samples, yet no decorated sherds were recovered by either excavation. The buff sherds in the University of California collection are not similar in paste or surface to those of the 1934 collections.

Co-occurrence and Relative Importance of Wares

Tizon Brown co-occurs with Lower Colorado Buff in the caverns, but is numerically predominant. The 1958 collection is the only one of the three that contains a provenienced, excavated sample from both caverns. The 1968 excavations were limited to El Pakiva. Farmer (1934) mentions recovering "Chemehuevi" sherds from the rat nest on the surface of Tecopa, but not a single sherd was recovered subsurface.

The 1958 collection contained 66 Tizon Brown and 15 Lower Colorado Buff sherds, all collected from a depth of 0-6 inches in both caverns (Table 1). This ratio of nearly four Tizon sherds to each Lower Colorado Buff sherd is seemingly dramatic, yet misleading, since half of the Tizon sherds from El Pakiva derive from a single vessel.

If the Tizon Brown:Lower Colorado Buff ratio is calculated using the estimated number of vessels from both caverns (Table 2), the 1958 collection contains a 2:1 ratio. This ratio holds true for the provenienced sample from all three collections.

When these ratios are calculated for each cavern, an interesting quirk appears in this pattern of overall Tizon predominance. The estimated number of vessels in the 1958 collection from El Pakiva is four Tizon Brown to one Lower Colorado Buff. Tecopa, on the other hand, has two Tizon Brown and two Lower Colorado Buff, or a 1:1 ratio. Caution should be exercised in drawing any conclusions since this ratio is calculated on the basis of a total of 23 sherds, of which ten small sherds are Lower Colorado Buff.

Inter-Cave Comparisons

El Pakiva contained more pottery, and a wider variety of forms, than Tecopa. Bearing in mind the small sample size, the 1958 collection suggests differences in the amount of pottery from each cave, and in the distribution of wares and vessel forms. Despite the heavy vandalism which had occurred in El Pakiva by the time Smith excavated there, the sample is numerically greater from the single El Pakiva test pit, than that excavated from two Tecopa test pits, by a factor of approximately 2.5:1. In terms of estimated number of vessels, a far different pattern appears for the 1958 sample. An estimated five vessels are represented in the El Pakiva collection, and four vessels for Tecopa.

There is a difference in the kinds of vessels recovered from each of the caves. El Pakiva contained a cooking vessel and both a perforated and an unperforated disk. Five of the vessels were recovered from the eastern Alcove by Smith. Both disks, the cooking pot, and only one additional Tizon Brown rim were recovered from the western Annex. No potsherds can be attributed to the main chamber of El Pakiva.

Vessel forms are not reconstructible for Tecopa. One Tizon base was recovered from deep within the cave (Smith's north test pit); one buff fragment was found in the test pit at the original entrance to the cave; and the remaining two fragments were general surface finds.

The differences observed in the provenienced sample for the two caves correlate with Farmer's assessment that El Pakiva was an occasional residence, while Tecopa was a storage facility only. The roof of the western Annex of El Pakiva was heavily carbonized, as was the cooking pot fragment recovered from it. Unfortunately, no serving bowls could be reconstructed for either cavern, nor, oddly enough, were any small-mouthed olla rims recovered in any of these collections.

Ground Sherd Disks

All of the ground sherd disks are made from Lower Colorado Buff vessels, though none is similar to the other buff ware sherds recovered in 1958 or 1968. Each is unique and seems to have been brought to the cave in its finished form.

Unlike the disks and jar rims recovered from Southcott Cave (Sutton, Donnan, and Jenkins 1987), neither the disks nor the vessel rims retain any traces of adhesive suggestive of use as pot lids.

DISCUSSION: SAMPLE FROM SURROUNDING AREA

In addition to the Mitchell Caverns, the only other excavated sample from the Van Valkenburg/Farmer expedition of 1934 was collected from Medicine Cave rock shelter, one-half mile south of Tecopa. Farmer (1936:104) notes that Medicine Cave was investigated "some years previous" by Van Bergen and Woodward of the Los Angeles County Museum. They found on the floor (surface?) of the cave a broken pottery bowl containing mescal. It is unclear whether this bowl was ever catalogued as part of the 1934 collection. Mitchell also collected "some sherds" from Medicine Cave (Farmer 1984:6).

The 1934 excavations produced "pottery sherds, fragments of basketry, cordage, parts of traps and a pottery anvil" (Farmer 1936:104). Regrettably, we do not know whether the rock shelter pottery was similar to that found on the campsites or in the Mitchell Caverns. Farmer thought that the rock shelter was not inhabited, just used for storage purposes. Surface collections at Dominguez Rock Shelter included "a few sherds" and a "red on gray type," while materials collected on open sites included "Chemehuevi, Land Mohave, and River Mohave pottery..., also a fragment of black-on-white" (Farmer 1934:7).

It is thus noteworthy that in addition to Tizon Brown and Lower Colorado Buff Wares, decorated and exotic sherds were noted at the open campsites and rock shelters.

Rogers (n.d.b.:Site 171) also visited "open sites in the vicinity of Mitchell's Ranch, Providence Mts." some time in the 1920s or 1930s, and collected the following pottery types from the surface of these sites:

Aquarius Gray	Needles Red on Buff II, III
Aquarius Orange	Needles Stucco II
Colorado Beige II	Pyramid Gray
Colorado Red II	Pyramid Stucco
Deadman's Gray	Sandy Brown (Crucero Gray?)
Deadman's Fugitive Red	Ticopa Brown
Needles Buff I & II	

Many of these pottery types are of Rogers' own description and do not always conform to the type descriptions published by Colton (1939, 1958) or Schroeder (1958). The point stressed here is the diversity of pottery found on surface sites. Unfortunately, Rogers does not report collecting specimens from the Mitchell Caverns (Rogers n.d.b).

The only reference to a "bowl form" in these early records is the one reported from Medicine Cave. Although this is a "negative evidence" argument, it is noteworthy that all other mentions of pottery specify "sherds" or "pots." The black-on-white sherd from a campsite is also probably from a bowl.

A final inference is that pottery may have been locally produced. The "anvil" found at Medicine Cave rock shelter suggests that a potter stashed it there for future use. Local residual clay deposits would have to be compared to the clays found in the brown vessels in these collections to address this issue further.

CHRONOLOGICAL IMPLICATIONS, COMPARISONS WITH OTHER COLLECTIONS, AND GENERAL CONCLUSIONS

Potsherds have traditionally been used to establish relative dates for sites lacking any other means of dating deposits. The 1934 collection contains several sherds that could be so used, providing they had better provenience.

Both of the Southwestern sherds have been identified as Kayenta Anasazi wares (Sosi Black-on-white, Tusayan Corrugated) which date to the late Pueblo II/early Pueblo III transition, circa A.D. 1100-1200 (A. J. Lindsay, Arizona State Museum, personal communication; Colton 1958). These are later than the usual Puebloan sherds reported by Rogers (1945) for the Mohave. Rogers' speculated Puebloan occupation of the area is dated to the Basket Maker III period, because well-developed corrugated wares were lacking in his sample from the Mohave Sink.

Whether the two sherds in this sample are single curated sherds traded from distant places or the sole remnants of complete vessels since dispersed cannot be ascertained. Nor can we suggest how they were transported to the area. Without adequate provenience for either sherd, they cannot be used as time markers for the caverns.

The brown ware vessels pose an unresolved problem in the greater southern California desert area. Types are difficult to distinguish due to their residual clays which are macroscopically similar and burn a wide range of grays-browns to orange-reds. Most investigators suspect they are locally produced in the areas in which they are recovered, though this assertion is as yet unsubstantiated (Davis 1962; A. Hunt 1960; C. Hunt 1960; Rogers 1929, 1945; Jenkins, personal communication). They also appear to have been made by two distinct cultural groups - the Yumans and the Shoshoneans. Hence it is often difficult to distinguish one brown sherd from another. Rogers' early and extensive investigations led him to the following conclusion:

> Somewhere near the beginning of the period (Yuman II, A.D. 1000-1400) appeared the first of this series of brown types, which were later to proliferate but not from a common hearth. Most if not all of these types seem to have been made of residual clays and their distribution from the earliest times was divided by a band of typical gray and buff-burning sedimentary paste-types on the Colorado River. Because the pastes employed present a confusing

> similarity, very little headway has been made toward solving their origins, sequence, and peculiar overlapping distribution... From a few stratigraphic excavations of cave deposits marginal to the Mohave valley, I have learned that one or two of these brown types were contemporaries of Pyramid Gray and Topoc buff which are Yuman II types; also that some "browns" were made as late as historic time. These are such late contributions that only Walapai or Chemehuevi origins can be considered. Colton has named, described, and dated several of the "browns" and I have done the same, yet it is not at all certain that the names are not synonyms. Certainly their cultural affinity is as yet a guess (Rogers 1945:191-2).

Among Rogers' (n.d.a) unpublished draft pottery typologies, there is a description of a brown pottery type from the eastern Mohave, Ticopa Brown, which he ascribes to historic Chemehuevi manufacture. The final type description had undergone much revision and was originally called Halloran Brown by Rogers and described as Yuman II, then Yuman I, and finally historic Chemehuevi. The materials from the Mitchell Caverns collections fall well within this type description. King (1976) presents the bulk of Rogers' description of Ticopa Brown and discusses its relationship with Palomar and Crucero Brown types reported at other sites in this region.

As suggested by Rogers' work, dating Brown Wares in this area is difficult and chronologies vary according to researcher (Rogers 1945; Schroeder 1952; Harner 1957-1958; Davis 1962; Donnan 1964; Meister et al. 1966; Warren 1984; Jenkins 1985). Rogers suggests that Mohaves first made, as well as imported, brown and buff wares in the Mohave Desert after A.D. 1050. He suggests they moved to the Colorado River during an arid sequence around A.D. 1400, after which they made occasional collecting trips into the desert. The area was reoccupied sometime after A.D. 1770 by the Shoshonean Chemehuevi. Kroeber (1925), Van Valkenburg (1934; 1964), Rogers (1936), and Laird (1976) concur that the Chemehuevi learned pottery-making from the Mohave but continued to exchange Chemehuevi baskets for Mohave pots. Since Chemehuevi pots are so similar to Mohave, it is difficult to establish cultural identification for historic brown wares and buff wares in the Mohave Desert.

A pottery assemblage similar to Mitchell Caverns was recovered from Rustler Rock Shelter, 11 miles to the northeast (Davis 1962). It was composed of 59% buff, 39% brown, and 2% gray wares, with brown slightly predating the buff stratigraphically. Based on estimated cross dates from the ceramics recovered by Harner (1958) at the Bouse site, Davis (1962) proposed a three-stage Providence Complex in which brown ware appears as early as A.D. 800, buff ware after A.D. 1000, and stucco and red paint surface treatments after A.D. 1300.

Jenkins (1985:5) has examined distribution of brown and buff wares in the Fort Irwin project area and concluded that both are present by A.D. 1400 and persist until at least A.D. 1570.

In the 1958 sample from Mitchell Caverns, brown and buff sherds co-occurred in the top six inches of the deposit. The brown sherds were numerically predominant, though less so when considered as minimum number of vessels.

In summary, there is no way to establish a specific time frame for the provenienced pottery recovered from Mitchell Caverns beyond the A.D. 1000 - historic range suggested by Rogers (1945:191). None of the red-on-buff vessels can be documented as deriving from the caverns; they probably were recovered from other sites in the vicinity. Two of these resemble food bowls produced by the Mohave as late as 1900. Puebloan sherds were rare in the collection and were probably found only on open campsites. Both of the Kayenta Anasazi specimens in this sample appear to date later than the Basket Maker III sherds recovered by Rogers (1945) from the Mohave Sink.

Since no clay samples have been collected from the area around Mitchell Caverns, we cannot say whether any of the brown or buff pots in these collections were locally produced. The pottery anvil recovered from Medicine Cave rock shelter suggests that local production did occur, but the relative paucity of pottery leads us to believe that this was at most an occasional activity.

Pots appear to have been brought to the caverns, primarily for storage of foodstuffs or other materials, and for cooking meals in El Pakiva. Ground sherd disks were also brought to the caverns, for purposes as yet undetermined.

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