ARCHAEOLOGY OF THE ROSE SPRING SITE INY-372

BY

EDWARD P. LANNING

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PREFACE

THIS REPORT is based on the research of several persons. Mr. Harry Riddell discovered and test-pitted the Rose Spring site in January of 1951, depositing his collection in the Robert H. Lowie Museum of Anthropology. At his request, the University of California Archaeological Survey undertook more extensive excavations, under the supervision of Francis A. Riddell, in June of 1956. In 1958, Francis Riddell and Dr. Robert F. Heizer asked me to study the resulting collection under the auspices of the Archaeological Survey. The study was conducted during the late months of 1958 and was concluded, after a necessary interruption, in the spring of 1961.

My gratitude is due, first of all, to the Riddells for their generosity in allowing me to study their collections, and to Francis Riddell in particular for his helpful advice during the course of the analysis. Thanks are also due to Dr. R. F. Heizer, who made many valuable suggestions after reading the first draft of this report. He and Martin Baumhoff have generously provided me with information on their excavations at Eastgate, Nevada. I am also indebted to Gordon Grosscup, who permitted me to examine and comment on his collections and photos from the Carson Sink.

E.P.L.

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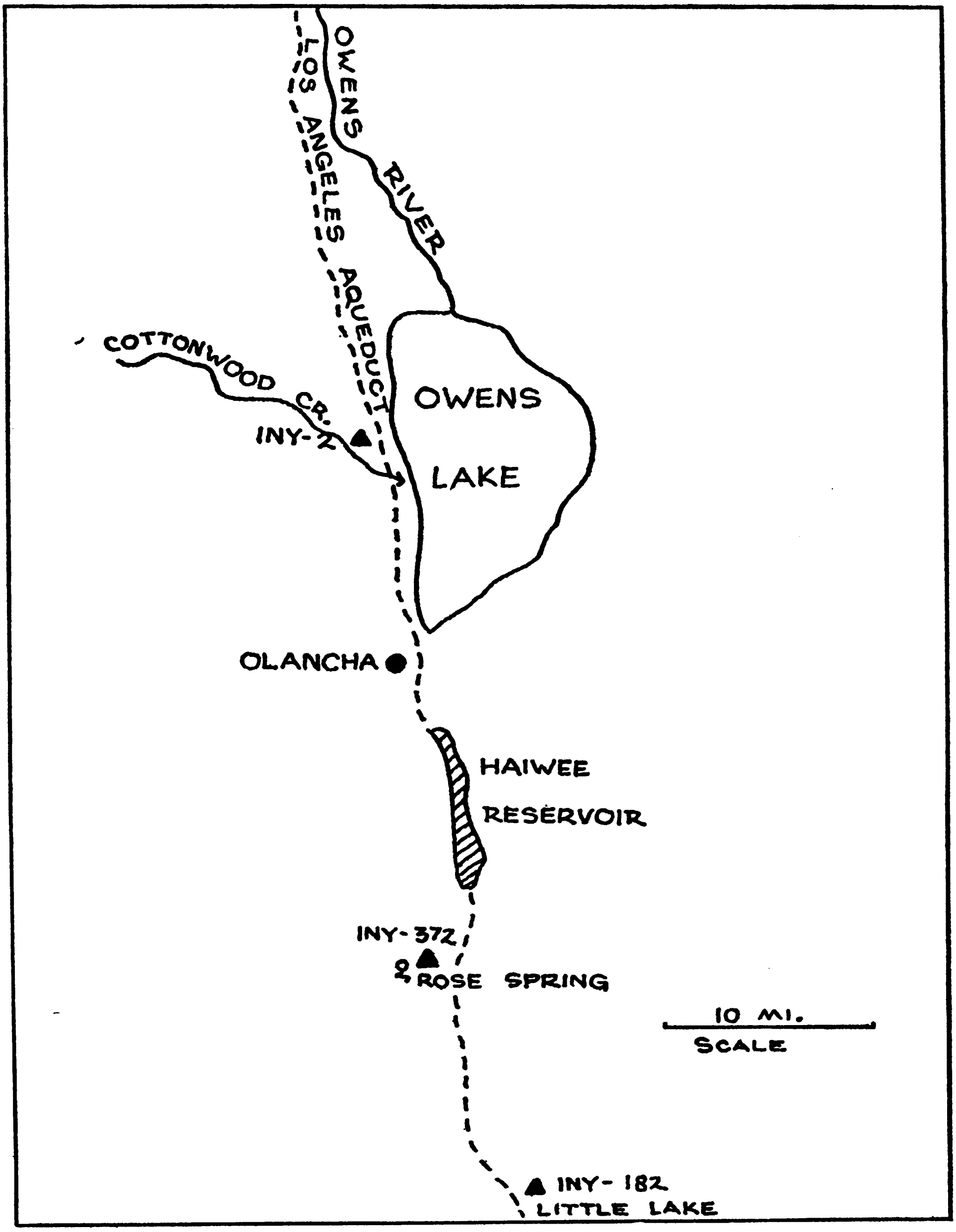

Map 1. The Owens Lake region, showing archaeological sites discussed.

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INTRODUCTION

THE REGION discussed in this report (map 1) lies in southwestern Inyo County, California. It is within and on the western edge of the Great Basin area of interior drainage. Rose Valley is a small, shallow declivity which lies between two of the saline lakes of the western Great Basin, Owens Lake to the north and Little Lake to the south. In Pleistocene times, the valley was part of an overflow channel of Owens Lake, carrying water to Little Lake during periods of excessive precipitation (Clements 1957). There is no river in the valley, which is watered only by a few springs located on fault lines along its eastern edge. The lakes are the salty remnants of larger Pleistocene lakes. Now as then, they have no outlet to the sea and are drained only by excessive evaporation.

To the west of the valley and the two lakes rise the eastern slopes of the Sierra Nevada, which bound the Great Basin on the west. To the east are the nearly contiguous Koso and Argus ranges, then Panamint Valley, the Panamint Range, and Death Valley. As usual in the Great Basin, both hills and valleys trend north-south. To the north of Owens Lake lies the long valley of the Owens River—the only river in this portion of the Great Basin. South of Little Lake is another piece of flat land, Indian Wells Valley.

CLIMATE AND VEGETATION

Steward's summary description of the climate and vegetation of the Great Basin (Steward 1938, pp. 10–17) is applicable to the Owens Lake–Rose Valley–Little Lake region. The yearly annual rainfall averages less than 5 inches in the flat lands, somewhat more on the higher slopes, but there is a great deal of variation of rainfall from year to year. The valley, and those parts of the lake shores which are not made up of salt flats, consist of sagebrush desert. At these lower altitudes, grasses grow only in the immediate vicinity of springs. The hill slopes on both sides of the valley bear scattered pinyon and juniper trees up to about 7000 feet altitude, where they give way to mountain mahogany.

Most of the scant rain falls in summer, which is nevertheless dry and hot, with temperatures often in the vicinity of 100° F. Winters are moderate at the lower altitudes, very cold on the higher slopes, where most of the Indian food plants grow. In the high Sierra to the west, the winters are bitter cold and the snowfall heavy.

ETHNOGRAPHIC BACKGROUND

The available ethnographic information on the Owens Lake region comes from Steward (1933, 1938). Little Lake, Rose Valley, and the southern shores of Owens Lake, together with the Koso Mountains and the land to the east of them, made up the Shoshone district of Kuhwiji, comprising four loosely interrelated villages. These villages were located at Olancha, south of Owens Lake, at Little Lake, at

Koso Hot Springs, and near Darwin on the east side of the Koso Range (Steward 1938, pp. 80–81). As usual in the Great Basin, the villages were occupied primarily during the winter. The individual families spent the rest of the year roaming from place to place within the district, gathering grass seeds, roots, pine nuts, and other plants as they came ripe.

In spite of the scarcity of food plants at the lower altitudes, Steward mentions a number of economic activities which took place in Rose Valley or around the two lakes. Antelope and ducks were hunted at Owens Lake and kutsavi larvae were gathered there. Large rabbit drives took place in summer at Owens Lake, in Rose Valley, and at Little Lake. Greens were gathered at Haiwee Springs, north of Rose Spring. Fishing was done in Rose Valley, and caterpillars of the Pandora moth were collected at Little Lake. The Koso Mountains were the principal source of plant food, but some people wandered as far as the Panamint Mountains and Death Valley to harvest particular plants. (*Ibid.*, pp. 81–83.)

Immediately to the north, in Owens Valley and around much of Owens Lake, lived the Northern Paiute. There apparently was a good deal of contact between the Paiute of Owens Lake and the Shoshone to the south, including, to some degree, free use of each other's territory. Steward mentions several examples of this contact, including intermarriage, Paiute gathering spots south of the lake, and joint use of Koso Hot Springs for medicinal purposes (Steward 1933, *passim*, especially Map 1, nos. 24 and 27). Available archaeological evidence suggests that there were no significant differences of material culture between Owens Valley and the lake region to the south of it, either in historic or prehistoric times.

The Owens Valley Paiute engaged in active trade with the Central California Indians to the west of the Sierra Nevada. Of the great number of products which they sent west, those significant for interpreting archaeology are mineral paint, obsidian, pottery vessels, clay pipes, pumice, and unfinished obsidian arrow points. In exchange, they received an equally large variety of goods. Those of interest here are shell beads including clam shell discs, glass beads, and steatite. Shell beads evidently were imported in substantial quantities. (*Ibid.*, pp. 257–258; Davis 1961, pp. 20–22.)

Nothing is known about Koso Shoshone trade. Steward mentions that the Saline Valley Shoshone traded salt to Owens Valley in exchange for shell beads and other goods, but specifies that there was little trade between Basin groups (Steward 1933, p. 257; 1938, p. 78; Davis 1961, p. 27). As we shall see, there is substantial archaeological evidence that the Rose Valley and Owens Lake Indians traded roughed-out obsidian artifacts for shell beads and steatite in both prehistoric and historic times. Such trade must have been to the west. Some of the shell beads originated on the southern coast of California, others on the central coast. At least in historic and protohistoric times, the Yokuts may have been the source of south coastal goods, while Central Californian objects may have come by way of Owens Valley.

Archaeological Investigations

Steward recorded observations on archaeological sites, especially petroglyphs, in Owens Valley and adjoining areas (Steward 1929, pp. 70–82; 1933, pp. 334–335). During the 1930's, Elizabeth and William H. Campbell surveyed archaeological sites at Owens Lake and Little Lake, but the results of their work there have never received more than brief mention in the literature (Campbell 1949; Antevs 1952, p. 28; Harrington 1957, p. 5).

Since 1946, Harry Riddell has been conducting exhaustive archaeological site surveys in the Owens Valley and the region south of Owens Lake. In 1950, he made test excavations at Iny-2, a protohistoric and historic Paiute village site in Cottonwood Creek on the west side of Owens Lake (H. S. Riddell 1951). The site is of particular interest here, because its occupation overlapped the end of the occupation at Rose Spring, Iny-372, bringing the archaeological sequence for the region down into historic times. Riddell has also excavated in several small rock-shelter sites, but the results of this work have not yet been published (Riddell and Riddell 1956; F. A. Riddell 1958, pp. 42, 45–46).

From 1948 to 1951, M. R. Harrington of the Southwest Museum conducted extensive excavations at the Stahl Site, an early village site just north of Little Lake. The main body of deposit at this site is rather earlier than the occupation at Iny-372. It is characterized by projectile points of Pinto Lake type, only a few of which occurred in the deepest levels at Iny-372. However, a cave in a lava dike at the site, excavated by S. M. Wheeler as part of Harrington's project at the site, produced a stratigraphic sequence which seems to parallel the whole sequence derived from the Stahl Site (Iny-182), Rose Spring (Iny-372), and Cottonwood Creek (Iny-2) (Harrington 1953, 1957).

Harrington has also reported on an obsidian quarry which may have been the principal source of raw material for chipped-stone artifacts at both Little Lake and Rose Spring (Harrington 1951), and on a midden site at Fossil Falls north of Little Lake (Harrington 1952).

Apparently the only other archaeological excavation which has been conducted in the Owens Lake-Little Lake region is that at Rose Spring, to be described in this report.

THE ROSE SPRING SITE, INY-372

NATURE OF THE SITE

FRANCIS RIDDELL'S description of the Rose Spring site and of his excavation there is included here as Appendix 1. The reader is referred to it for a description of the appearance of the site and of the midden deposit. The site, Iny-372 in the University of California Archaeological Survey numbering system, is an area of sandy refuse deposit covered with sagebrush, at the foot of a vertical cliff (pl. 1). Next to it, ca. 50 yds. S.W. is Rose Spring, which is still an active source of water. Situated as it is near the spring, the site may have been a permanent village, though it was more probably a camp occupied seasonally by several families over a long period of time. No house pits or other evidence of structures have been reported.

Available evidence indicates hunting and the manufacture of obsidian artifacts as the two principal economic activities carried on at Rose Spring. The most abundant objects in the refuse are obsidian projectile points, unfinished obsidian artifacts, retouched obsidian flakes, and vast quantities of chipping waste. Some of the unfinished obsidian objects, especially large percussion flaked blades, were probably made for export. Large numbers of shell beads were found in the site, and must have come from the west, which suggests trade in beads and obsidian as one important function of the Rose Spring site.

Milling stones are scarce at Iny-372, and seed grinding was probably carried on largely at camps in or near pine groves or seed-gathering grounds. Two bedrock mortars that are not far from the site were surely used by its occupants during late times, as indicated by the presence of a few cobble pestles in the upper layers of the deposit.

Other than the large quantity of chipped obsidian artifacts and chipping debris found at the site, the few milling stones, and some ornamental objects placed with burials, there is little to indicate the nature of the occupation of the site, or of the culture of its inhabitants. A few quartz crystals in the midden suggest shamanistic activities. The dead were buried in the midden, apparently at random rather than in concentrated cemeteries. Beyond this, no cultural reconstruction seems possible until we have a much larger sampling of burials, whose grave goods should considerably amplify our information about the local culture.

STRATIGRAPHY

The first archaeological excavations at Iny-372 were undertaken by Harry Riddell, who dug three test pits and excavated a burial in January 1951.[1] Francis Riddell's excavation in June 1956, is described in Appendix 1. Comments on some features of his excavation are appropriate here.

Probably the most significant features of the Rose Spring site are the great depth and physical stratification of the refuse deposit. Most archaeological sites in the region are shallow and essentially unstratified, if not entirely superficial. The fact that the midden at Rose Spring collected to a depth of 10 feet undoubtedly

[1] Though I do not know the exact location of these test pits, Francis Riddell informs me that they were near Trench I. In the tabulations of artifact depth distributions herein, all excavations are treated as a single unit.

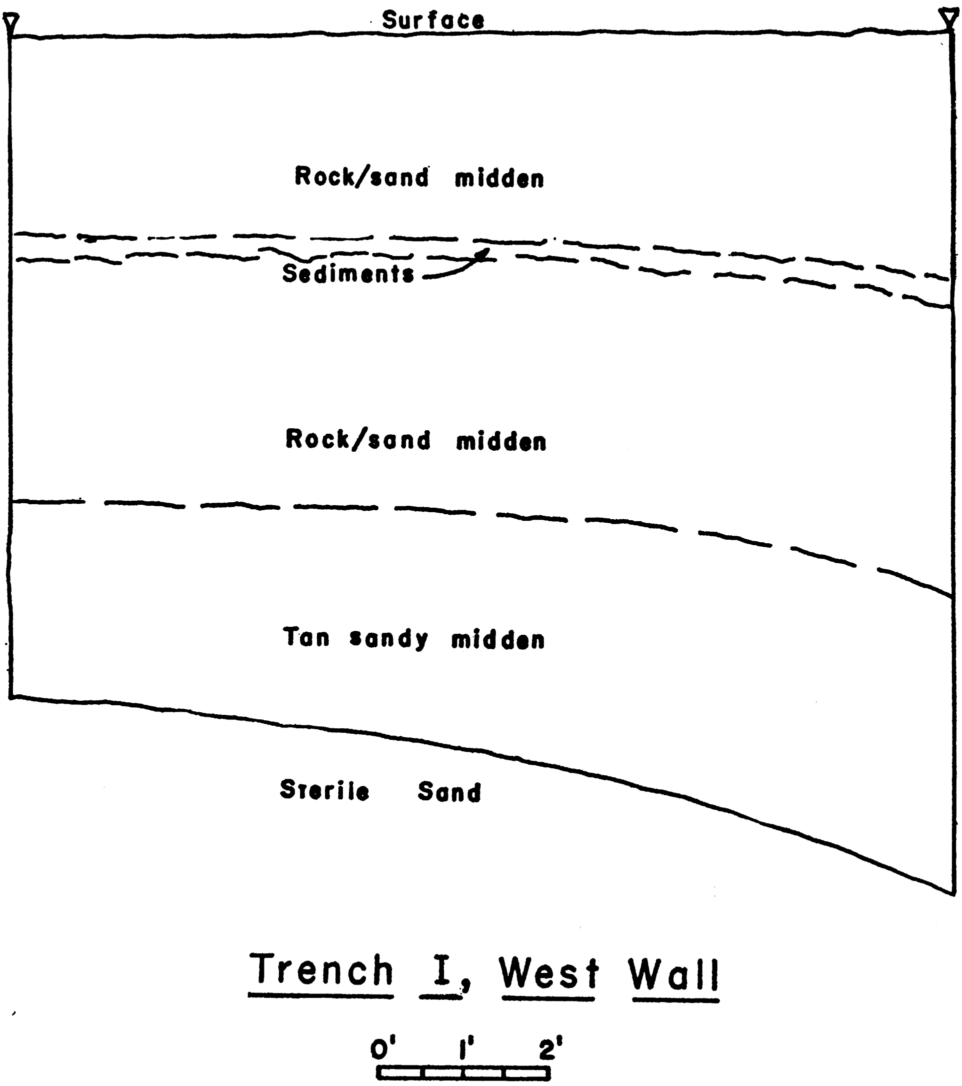


Fig. 1. Trench I, stratigraphic profile of west wall.

reflects its sheltered position under a cliff face, which could impede the action of both wind and water in sweeping the sand and fine refuse particles out of the site. In addition, such a depth of midden implies an intensive human occupation over a long period of time—an occupation which probably took the form of regular yearly camping by several families or a whole band for a period of several weeks.

The stratigraphy of the midden was so difficult to follow that Riddell conducted his excavation entirely by measured 12-inch levels. When the trench was dug, however, examination of its walls revealed the presence of three thick strata, the upper two separated by a thin layer of fine sediment which Riddell interprets as water laid, the third distinguished by its lighter color (fig. 1). By relating the excavated levels to the visible stratigraphy according to the depth of the levels, it is possible to attribute most of the excavated artifacts to one or another stratum, and thus to work out an archaeological sequence which takes account of the slope of the old surfaces.

Stratigraphically, there is considerable typological change in the artifact content of the midden. As we shall see, the depth distribution and stratigraphic attribution of projectile point types justifies the separation of the midden into four successive sections, each representing a somewhat different artifact assemblage. The uppermost assemblage, which includes native pottery, has been named after the Cottonwood Creek site (Iny-2) where it was first excavated. The three deeper and earlier assemblages, which lack pottery, are characterized by the dominance of obsidian projectile points with expanding stems, chipped-stone knives of triangular and leaf shapes, the use of the metate as the primary grinding tool, and the occasional occurrence of core tools. These preceramic assemblages are taken together under the name Rose Spring, and are distinguished from each other by the phase designations Early, Middle, and Late. The phases are related to the stratigraphy and the excavated levels as follows:

Cottonwood: upper stratum 1, 0–24″.
Late Rose Spring: lower stratum 1, 24–36″.
Middle Rose Spring: stratum 2, 36–60″, part of 60–72″.
Early Rose Spring: stratum 3, part of 60–72″, 72–120″.

The refuse at Iny-372 is not uniformly productive of human cultural remains. The portion of the midden lying next to the cliff face contains many more artifacts than the portion lying farther out. Stratum 1, on the whole, is very rich in artifacts, while stratum 2 and the upper portion of stratum 3 are poorer. Below 84″ depth, the artifact yield falls off to practically nothing, though the soil is stained by organic material and contains bits of charcoal and a few obsidian flakes down to a depth of 10 feet. The greater productivity of the deposit next to the cliff face indicates that the most sheltered portion of the site was the most intensively used, as is to be expected. The reduction of the artifact content in strata 2 and 3 evidently indicates a change in the nature of human activity at the site, rather than a more rapid build-up of the deposit during the earlier part of its occupation. A glance at table 1 will show that most kinds of artifacts are distributed evenly throughout the upper 84″ of the deposit, and that the increased artifact yield in stratum 1 is due largely to the introduction of pottery, which makes up more than one-third of the artifacts in the upper 24″ of midden, and to a sudden increase in the number of projectile points found. The latter phenomenon suggests that the site was used as a hunting camp during Late Rose Spring and Cottonwood times to a much greater degree than in the earlier phases of occupation.

The Indian occupation of Rose Spring evidently ended before the historic period. Several types of artifacts characteristic of the historic Cottonwood Creek site—for example, small leaf-shaped projectile points and stone pendants—are found on the surface at Iny-372, but not in the midden deposit. A few items of Caucasian manufacture were found in the upper few inches of the deposit, but these probably derive from the activities of white men when the site was used as a coach stop or, more recently, when it was partly bulldozed away during the construction of the Los Angeles aqueduct. These artifacts are nails, rifle shells, and a piece of broken crockery. If they had been used by the Indians, one would expect them to be accompanied by glass beads, which were the Shoshones' favorite import from their Caucasian neighbors.

In the analysis which follows, Harry Riddell's 1951 excavations are identified as Test Pits A, B, and C, and Francis Riddell's 1956 excavation is designated Trench I (2, *a*).

BURIALS

In all, five burials have been recorded from Iny-372, one from Harry Riddell's Test Pit A and four from Trench I. Two of these burials originated in stratum 1, one in stratum 2, and the remaining two probably in stratum 2.

Burial A.—Adult skeleton found at 66″ depth in Pit A. Loosely flexed, lying on back, head oriented east and bowed to face the sternum. A mano lay on the left femur. Between the right humerus and the rib cage were two chipped-stone knives, fragments of two or three bone tools, two pumice shaft smoothers, and several lumps of pitch. Five or six good-sized stones covered the burial. The depth suggests affiliation with stratum 2.

Burial 1.—Adult skeleton at 45″ in Trench I. Burial pit originated in stratum 1, cut through the tan sediment stratum into stratum 2. Tightly flexed on the back, head oriented south and facing up. A Desert Side-notched projectile point lay under the skull. (Pl. 2, *b.*)

Burial 2.—Adult skeleton at 60″ depth in Trench I, below and just east of Burial 1. Burial pit confused with that of Burial 1. Loosely flexed on the back, head oriented east and tilted over to lie on its left side. Two *Haliotis* ornaments lay under the neck. Scattered around the skeleton and probably associated with it were a number of projectile point and knife fragments and other obsidian artifacts, an *Olivella* shell bead, a mano, the tip of a stone pin or awl, and three stone tablet fragments. As will be seen, the association of artifact types is typical of stratum 2, so the burial probably originated below the tan sediment layer which separates strata 1 and 2. (Pl. 3, *a.*)

Burial 3.—Adult skeleton at a depth of 48″ in the east wall of Trench I. Burial pit originated at 24″ depth, in stratum 1. Skull, mandible, and first three cervical vertebrae were removed; the rest of the skeleton lay outside Trench I and was not excavated. (Pl. 3, *b.*)

Burial 4.—Child, about 12 years of age, at depth of 86″ in Trench I. Burial pit originated near the base of stratum 2, cut into stratum 3. Tightly flexed on the right side, head oriented north and on its right side, facing southeast. About 1000 *Haliotis* ring beads and a large projectile point were associated with the skeleton. The beads were fastened together in a shingled arrangement and laid over and under the body. Traces of carbonized thread and of an organic (?) adhesive indicate the methods used in arranging the beads. (Pl. 4 *a, b.*)

Though there are not enough excavated burials to determine the full range of position and orientation, these few suggest a preference for a dorsal flexed position. Both stratum-2 adults were loosely flexed and oriented east, while the stratum-1 adult was tightly flexed and oriented south. All four fully excavated burials were accompanied by artifacts.

ARTIFACTS

In the analysis and description which follow, primary emphasis is laid on the excavated material. Surface artifacts are included only when they are of types which do not occur in the excavated collection, or when the fact of their occurrence on the surface contributes to the understanding of the stratigraphic situation. As a matter of fact, most of the "surface" artifacts do not derive from the original surface of the site, but from the deposit disturbed by construction of the Los Angeles aqueduct and by the looting activities of local collectors. Thus, the "surface" collection represents the full time span of the occupation of the site, and "surface" occurrence of artifacts types can be given significance only when additional information is available.

Of primary importance in artifact analysis is the physical stratigraphy of the midden. Because this stratigraphy could not be clearly seen in advance, excavation was conducted by measured 12-inch levels. Most of the levels, however, either fell entirely within a single stratum, or contained so small a portion of a second that they can be considered unmixed. Of nine artifact-bearing levels (from surface to 108″), only two include large portions of more than one stratum: 24–36″, which contained most of the tan sediment layer, as well as parts of both strata 1 and 2; and 60–72″, which is a mixture of strata 2 and 3. Many artifacts in these levels can be assigned by inference to one of the included strata. Thus, for example, if an artifact from 60–72″ is of a type which otherwise occurs only below 72″, it can reasonably be assumed that the artifact comes from stratum 3, rather than from the overlying stratum 2.

Most of the artifacts in the collection are of chipped stone, and among these the projectile points are the most numerous and most useful as chronological indicators. Their utility derives from the fact that there is observable typological change throughout the deposit, and that the changes can be correlated with reasonable precision with the physical stratigraphy. Other useful time markers, such as knives and shell beads, are less abundant; still others, such as pottery, include single types which characterize the upper levels of the site, rather than multiple types marking various phases of the chronology.

In the classification of artifacts, emphasis has been placed on both chronological and distributional considerations; that is, an attempt has been made to sort out those types which—properly defined—mark limited periods of time as represented in the stratigraphy, or which serve to show historical connections with other areas. Some types are inherent in the material, in the sense that each such type is defined by a cluster of characteristics which always occur together with limited variability, and which do not intergrade with any other actually occurring cluster. In other types, such as the subdivision of the small, stemmed projectile points of the Rose Spring series, the distinctions are arbitrary, because the specimens vary continuously in a number of different characteristics.

Table 1 shows the depth distribution of the artifacts from all the excavations at Iny-372. The distribution of artifact types shows a few minor differences between Trench I and Test Pit A, but these differences are of little significance to the analysis, and they will be discussed at a later point. Burial artifacts are excluded from the table.

TABLE 1

DEPTH DISTRIBUTION OF ARTIFACTS

Artifacts*	0–12 (in.)	12–24 (in.)	24–36 (in.)	36–48 (in.)	48–60 (in.)	60–72 (in.)	72–84 (in.)	84–96 (in.)	96–108 (in.)
Potsherd	110	60	2	..	..	..	..	..	..
Pipe	3	..	..	..	..	..	..	..	..
Mano	3	1	..	..	1	2	2	..	..
Metate	..	1	1	..	..	..	3	..	..
Pestle	..	1	2	..	..	..	..	..	..
Abrading stone	2	2	..	..	1	1	..	..	..
Steatite bead	3	1	1	..	..	..	..	..	..
Projectile point	80	66	59	14	10	21	14	..	..
Knife	18	17	20	25	25	27	6	..	..
Blade fragment	1	3	3	2	8	13	2	1	..
Drill	3	9	3	2	1	3	1	1	..
Graver	2	2	1	..	1	..	1	..	..
Scraper	12	7	11	3	4	10	4	..	1
Core tool	..	..	1	..	1	..	1	..	1
Chipped oval	5	3	9	1	1	..	..	..	..
Core	3	2	6	..	3	4	3	..	..
Hammerstone	..	..	..	..	1	4	1	..	..
Bone tool	..	3	5	..	2	2	1	..	..
Bone bead	..	..	..	..	..	2	1	..	..
Shell bead	3	2	1	..	1	1	..	..	..
Miscellaneous	2	2	1	..	1	3	..	..	..
Totals	250	182	126	47	61	93	40	2	2

* Artifacts associated with burials are not included.

POTTERY

The 172 excavated potsherds are all of Owens Valley Brown Ware, as defined by Harry Riddell (1951, pp. 20–23). The only useful addition to his description is the observation that vessel interiors are sometimes scored in such a way as to suggest smoothing with a stiff-bristled brush, rather than with a scraping tool. In the Iny-372 sample, rims are simple rounded or interior beveled. All the rims seem to be vertical or flared, but the sherds are small and the rims so irregular that the angle of inclination is difficult to determine (fig. 2, *a–g*). Two rims from Trench I, 0–12″, are decorated with short incised dashes, the incisions having been made when the paste was soft (pl. 5, *j*). A third, from Trench I, 12–24″, has three shallow notches cut into the lip (pl. 5, *k*). Three identifiable base sherds are all flat and thick (fig. 2, *h*). One sherd has a biconically drilled hole, designed for crack-sewing. One sherd from Test Pit A, 12–18″, has one edge ground flat and is undoubtedly part of a larger artifact made from a broken pot.

A small roll of unfired clay from 0–12″ in Trench I is 12 mm. long and 9 mm. in diameter. It is probably part of a coil left over from the manufacture of a pottery vessel.

Potsherds are essentially limited to the upper 24″ of the deposit, or the upper 4/5 of stratum 1, where they occur more abundantly than any other kind of artifact.

Pipes

From 0–12″ in Trench I came fragments of two clay pipes, as well as one of pumice. All three are of the tapered tubular form that occurs at Iny-2 (H.S. Riddell 1951, p. 16), illustrated by Steward for the Owens Valley Paiute (Steward 1933, pl. 4). The clay fragments include one lip sherd, probably from a pipe like that shown in Steward's pl. 4*b* (1933), and one sherd from the side of a pipe bowl. The pumice pipe fragment, like those from Iny-2, is of the form shown in Steward's pl. 4*c* (1933). The original diameter of all three pipes was between 2.5 and 3.0 cm.

Grinding Tools

Under this heading are included not only milling tools, but also other artifacts whose function was to grind or abrade. Though often modified by pecking or grinding, these artifacts all derive their form primarily from having been used.

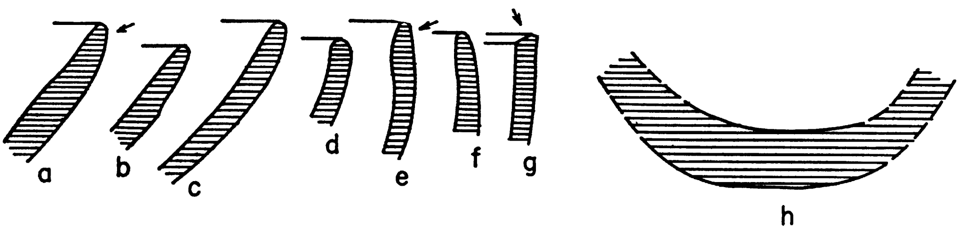


Fig. 2. Rim profiles and base form of Owens Valley Brown Ware Iny-372. *a.* 1–187919, 12–24.″ *b, d–e, g–h.* 1–187838, 0–12″. *c.* 1–187128,12–24″. *f.* 1–187147, 12–24″. Arrows indicate location of incised decoration.

Manos.—Manos occur in small numbers throughout the midden. Their scarcity, relative to the abundance of projectile points and of tools usable in skinning, butchering, and skin preparation, suggests that little seed gathering and grinding was done at Rose Spring, and that it was primarily a hunting camp and workshop. Grinding could, of course, have been done at the nearby bedrock mortar site, but the mortar was apparently in use only during late times, as no pestles occurred in strata 2 and 3.

Manos were made of a variety of granitic and porphyritic rocks and of quartzite. The classification follows Harrington (1957, pp. 43–44) in separating shaped and unshaped specimens. To this may be added a distinction based on cross section. No other feature (such as number of faces used, length-width proportions, or form of outline) shows any temporal significance in our small sample. Three types are recognized for Rose Spring:

1. Shaped manos, flat in cross section. Sides and ends are pecked or ground flat, which gives a characteristic subrectangular shape to most specimens, though a couple are ovoid and one is nearly circular. Most are bifacial, with flat or slighlty convex grinding surfaces. Most are short and broad, but one is nearly twice as long as it is wide. Lengths range 7.6–11.6 cm., widths 5.5–9.4 cm., thicknesses 2.1 to 5.2 cm. 13 specimens: 9 from the midden, 3 surface, 1 from Burial 2. (Pl. 11, *a–c.*)

2. Shaped manos, wedge-shaped in cross section. Edges are worked as in type 1, but the outline is less regular and the cross section tapers from one thick side to one thin side. Grinding surfaces are flat or convex. Two are bifacial, one unifacial. Lengths 9.5–10.4 cm., widths 7.8–9.0 cm., thicknesses 4.1–5.5 cm. on thick edge and 2.4–3.4 cm. on thin edge. 3 specimens, surface only. (Pl. 11, *d.*)

3. Unshaped manos. Cobbles modified only through use. One specimen is an irregular ovoid cobble 12.5 by 10.1 by 7.3 cm., the other a short, almost cylindrical cobble 6.8 by 5.4 by 4.9 cm. Both are unifacial, and have convex grinding surfaces. The smaller one was also used as a hammerstone, and is lightly battered at both ends. 2 specimens, surface only.

All the excavated specimens are of the flat, shaped type; types 2 and 3 occur only on the surface. At the historic site Iny-2, only 2 of 13 manos are shaped; the others are modified only through use, and often have wedge-shaped sections. At the early Little Lake site, unshaped manos predominate over shaped ones (Harrington 1957, pp. 43–44). The obvious conclusion is that there was a period when both types were in use (Little Lake), followed by a period when only shaped manos were used (Rose Spring), after which only unshaped manos were used and the wedge-shaped section became popular (Iny-2, historic). In fact, however, the nine excavated manos at Rose Spring make up a small sample, and some unshaped or wedge-shaped pieces might be present in a larger excavated sample. Even if not exclusive, however, the flat shaped variety predominates at Rose Spring and is of minor importance in earlier and later times.

Metates.—The five excavated metate fragments are all too incomplete to permit reconstruction of their major dimensions. They are fragments of flattish boulders with very shallow grinding surfaces. The boulders range in thickness from 6 to 20 cm., and the grinding surfaces vary from flat planes to shallow basins 1.5 or 2 cm. deep. Materials are coarse granitic rock and micaceous schist. Of the five specimens, three formed a small cache at a depth of 84″ in Trench I.

Pestles.—Three pestles from stratum 1 are simple unshaped cobbles, short and heavy, which have been modified only through use. They are of granitic rocks and basalt porphyry. Lengths are 12.4 and 12.3 cm., widths from 7.8 to 11.0 cm., thicknesses 6.2–7.0 cm. (Pl. 11, *e, f*). All three specimens, and all other definitely datable pestles from the Owens Lake region (one from the Stahl Site Cave and several from Iny-2) occur in relatively late contexts. No portable stone mortars are known from the region, so it seems that these pestles were used only with bedrock mortars, and that these came into use in relatively late times. Wooden mortars were in use in Owens Valley in recent historic times, but there are no known archaeological pestles with the chisel-like ends which result from use in wooden mortars.[2]

Grinding Slab.—This object, from 24–36″ in Trench I, is a flat piece of vesicular lava, 16.3 × 10.8 cm., 2 cm. thick, shaped by rough chipping of the edges all round. One surface shows a very shallow depression, acquired through use in grinding (pl. 11, *g*).

Abrading Stones.—Several small, flat sandstone objects have been rubbed smooth on one or both faces, indicating use as abraders. All are fragmentary. Three of them are thin, tabular pieces of sandstone, from 0.2 to 0.7 cm. thick, rubbed down on one face. One of these is the end of an elongate, rectangular piece with the end and one side ground to shape (pl. 5, *o*). Three abrading stones were made from chunks or pebbles of sandstone. They are more or less lenticular in cross section,

[2] Steward (1933, pp. 239–240) mentions only metates for Owens Valley, describes mortars from Death Valley. However, there are bedrock mortars in Owens Valley (H. S. Riddell 1951, p. 15), and a wooden mortar in the Robert H. Lowie Museum of Anthropology (1–211553) was collected by Lawrence Dawson from an Indian woman at Bishop. According to Dawson's informant, the wooden mortars were kept at pine nut gathering grounds north of Owens Valley, and used there by the people from Bishop.

with convex abraded surfaces on one or both faces. The edges are ground to shape and beveled (pl. 5, *m, n*). The more complete specimens of this type suggest an elongate, parallel-sided form with straight or rounded ends. The thickness of these three abraders ranges from 0.8 to 2.4 cm. The two types, tabular and lenticular-section, show no difference in depth distribution. There are two of each in stratum 1 (0–24″) and one of each in stratum 2 (48–60″ and 60–64″).

Shaft Smoothers.—Three grooved pumice objects are interpreted as smoothers for dart or arrow shafts. Two of these, found with Burial A, are elongate with ground edges and longitudinal grooves. One of them is single-grooved, and the other has a groove in each of two faces. One measures 10.1 x 2.6 x 2.1 cm.; the other, broken, was probably about the same length and measures 2.6 cm. wide and 1.5 cm. thick (pl. 5, *p, q*). A third shaft smoother from 60–66″ in Test Pit C, is a small pumice pebble 4.1 x 3.0 x 2.0 cm., with a single transverse groove (pl. 5, *r*).

Ground and Polished Stone Artifacts

Stone Beads.—The collection includes five steatite disc beads of the conically drilled type reported by H. Riddell from Iny-2 (H. S. Riddell 1951, pp. 16–17). Two are of gray steatite, two blue, one reddish yellow. The range of diameter is 0.8–0.95 cm.; thickness 0.3–0.45 cm.; perforation diameter 0.15–0.4 cm. These beads are limited to the 0–12″ level in Trench I, but come from 12–18″ and 30–36″ in Test Pit A (pl. 5, *i*).

A disc bead of micaceous schist, rather poorly made with an irregular outline and off-center perforation, comes from the surface. Its measurements are 1.1 cm. in diameter, 0.25 cm. thick, with a biconical perforation 0.3 and 0.4 cm. in diameter (pl. 5, *h*). A similar bead, of pumice, comes from 0–12″ in Trench I. Its diameter is 1.9 cm., thickness 0.45 cm. The perforation, which is simply punched through, is 0.2 cm. in diameter (pl. 5, *g*).

Stone Pendant.—Also resembling specimens from Iny-2 is a fragment of an elongate pendant of grayish green slate, 1.0 cm. wide and 0.2 cm. thick. The perforation, if it existed, must have been at the narrow end, which is missing. The piece is from the surface (pl. 5, *l*).

Stone Tablets.—Three fragments of stone tablets from Burial 2 are tabular pieces of slate 0.2–0.4 cm. in thickness. One includes part of a ground edge; another, probably from the same tablet, lacks all edges. The faces of both are unmodified, except that they are smeared with red ocher. The third, which also includes part of a ground edge, has naturally polished surfaces, on each of which may be seen several deep scratches which might be part of a lightly incised design.

Another fragment, from 60–64″ in Trench I, is a tabular piece of sandstone, 0.3–0.4 cm. thick, with partially obliterated incised designs on both faces. One face was ground smooth before incising, and is also smeared with red ocher; the other is unmodified except for the incisions (fig. 3).

Slate "Pencils."—From 48–60″ and 60–72″ in Trench I come two fragments of elongate objects of blue slate which suggest the slate "pencils" of the Central Valley of California (Lillard, Heizer, and Fenenga 1939, p. 381) (pl. 5, *e*).

Stone Pin.—With Burial 2 was the tip of a sharp-pointed object of soapstone, which could have been a pin, an awl, or possibly a gorge fishhook (pl. 5, *f*).

PROJECTILE POINTS

The collection from Iny-372 includes 319 complete and fragmentary projectile points, of which 275 come from the excavation of Trench I and Test Pits A–C. Thirty-five of the points are unfinished blanks. Obsidian was used almost to the exclusion of other materials. Ten points, or 3.1 per cent of the total, are of siliceous rock, probably chert, chalcedony, and jasper. One specimen is of a brown porphyry. The preference for obsidian is readily explained, since it is more easily chipped than other rocks and occurs locally in abundance. Harrington (1957, p. 75) mentions an obsidian quarry near Little Lake, and Steward (1933, p. 262) mentions several in and near Owens Valley, of which the nearest to Rose Spring is south of Big Pine.

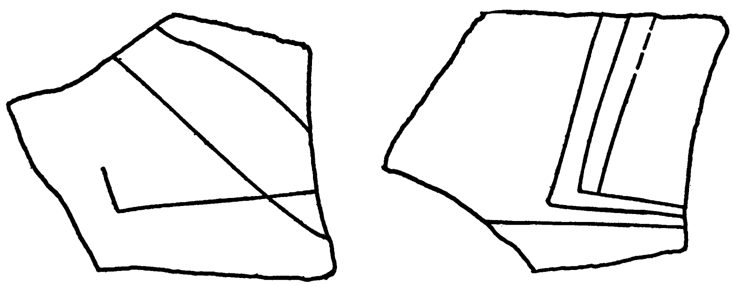


Fig. 3. Incised slate tablet. Fragment, 1–188133, 60–72."

When weighed, the projectile points from Iny-372 fall into two groups, one comprising those weighing between 0.3 and 2.9 grams and the other, between 4.5 and 9.8 grams. The only exceptions to this generalization are a unique specimen from the surface, which weighs 3.2 grams; one fragmentary member of the group of large points which might originally have weighed as little as 4.0 grams; and two very large lanceolate points from the surface, each of which must have weighed 12 grams or more when complete. The distinction between the two size groups is so complete that fragmentary points can be classified on sight as large (over 4.5 grams) or small (under 3.0 grams) with complete confidence.

This distinction between large and small projectile points is most significant stratigraphically. The large points are clustered between 60 and 84 inches depth and the small points are concentrated between 0 and 36 inches depth. More specifically, only large points can be attributed to stratum 3, both groups to stratum 2, and only small points to stratum 1, with the exception of two specimens from the 0–12" level which, as we shall see, are entirely out of their normal temporal context.

Fenenga (1953) has suggested that weight differences in projectile points represent functional differences, the light points being for arrows, the heavy ones for darts. The stratigraphic occurrence of these weight classes at Iny-372 supports this hypothesis and suggests a period when only darts were used (stratum 3), a period of transition after the introduction of the bow (stratum 2), and a period when the bow became the only significant projectile weapon (stratum 1).

Within each of these weight classes, the projectile points are divided into named types on the basis of form and workmanship. The type names are, for the most part, those currently in use by the University of California Archaeological Survey. The dimensions of the various types are summarized in table 2.

On the whole, the Iny-372 projectile points were chipped with competence but without great technical virtuosity. The Pinto points of stratum 3 were made by percussion flaking with, at most, a little pressure retouching along the edges. The rest of the large points and most of the small ones were first roughed out by percussion flaking, then brought to final form by extensive pressure flaking. Only the

TABLE 2

DIMENSIONS OF PROJECTILE POINTS

Type	Length (cm.)*		Width (cm.)*		Weight (gm.)*		Total
	Range	Av.	Range	Av.	Range	Av.	
Little Lake Series							
Shoulderless	3.0	...	2.0–2.45	2.2	4.5–6.0	5.25	2
Sloping-shoulders	...		2.5		...		1
Broad-leaf	4.3		2.8		9.85		1
Willow-leaf	4.8–5.4	5.1	1.5–2.2	1.8	5.05–9.8	7.4	5
Elko Series							
Corner-notched	4.75		2.4–3.4	2.9	5.2–7.05	6.1	8
Eared	...		3.0–3.9	3.4	7.5–8.5	8.0	6
Other Large Points							
Silver Lake	4.45		2.0		4.5		1
Gypsum Cave	4.7–5.0	4.9	2.2–2.9	2.5	5.0–8.0	6.8	4
Humboldt Concave-base	...		1.4–1.8	1.6	...		2
Large Triangular	4.75		2.4–2.7	2.5	4.0–5.0	4.5	7
Lanceolate	7.3		2.15		12.2		2
Rose Spring Series							
Side-notched	1.8–3.95	2.8	0.9–1.7	1.4	0.5–2.8	1.3	26
Corner-notched	1.8–4.0	2.8	1.2–1.9	1.6	0.5–2.3	1.2	55
Contracting-stem	1.6–3.0	2.4	1.2–1.8	1.4	0.45–1.6	0.95	19
Round-stem	2.15–3.8	3.0	1.2–1.5	1.35	0.9–1.8	1.35	4
Single-shouldered	3.0–3.1	3.05	1.5–1.6	1.45	1.3–1.5	1.4	2
Cottonwood Series							
Triangular	1.85–3.6	2.5	0.9–2.2	1.5	0.4–3.0	1.3	37
Leaf	2.5–2.7	2.6	1.0–1.45	1.2	0.7–0.8	0.75	2
Other Small Points							
Desert Side-notched	1.7–2.9	2.25	0.9–1.5	1.15	0.3–0.8	0.5	10
Eastgate Expanding-stem	3.6–5.3	4.45	2.0–2.1	2.05	1.9–2.9	2.4	2

* Based on measurements of complete dimensions and reconstruction of nearly complete measurements. Total specimens listed include unmeasured fragments.

small stemless points of the Cottonwood Series and the Desert Side-notched types give evidence of having been made entirely by pressure flaking. The only really finely flaked points, with narrow parallel pressure-flaking scars covering both faces, are the two large lanceolate points from the surface—presumably the earliest specimens in the collection—and two arrow points classified as Eastgate Expand ing-stem type and presumed to be trade pieces from Nevada.

In the descriptions which follow, the quantities listed for each type refer only to excavated specimens, except where otherwise indicated.

Little Lake Series.—Large, crude projectile points, thick and often asymmetrical, made by percussion flaking, only occasionally having slight pressure-flaked retouch. Both stemmed and nonstemmed forms occur. Blades are almost always leaf-shaped or irregular, always thick relative to their width. Of the various forms called "Pinto points" in the literature, this series includes only those which occur associated at Little Lake. The typology follows Harrington (1957, pp. 51–53, figs. 39, 41).

1. Pinto Shoulderless. Relatively short point, roughly leaf-shaped, with notched base. One specimen, obsidian (pl. 6, *c*).

2. Pinto Sloping-shoulders. Relatively short, with upsloping shoulders, large straight-sided stem, and notched base. The only specimen, of obsidian, is from the surface (pl. 6, *d*).

3. Broad-leaf. Relatively short, broad, irregular leaf-shaped point with irregularly convex base. One specimen, banded brown siliceous rock (agate?) (pl. 6, *h*).

4. Willow-leaf. Relatively long, narrow leaf-shaped point with convex or pointed base. Five specimens, obsidian (pl. 6, *g*).

The other Pinto forms which occur at Little Lake—Square-shouldered, Barbed-shouldered, and Single-shouldered—are not found in the Iny-372 collection, though they are common at other sites around Owens Lake.

Elko Series.—Large projectile points, stemmed, broad and flat, more carefully finished than those of the Little Lake Series. Often asymetrical, especially the stems. Probably all were formed by percussion flaking, but with extensive bifacial pressure retouch. The blades are characteristically straight-sided triangles, occasionally convex-sided, usually flat in section, and almost always broader relative to thickness than those of any other series. The typology follows Heizer and Baumhoff (Heizer *et al.*, 1961) though several of the specimens are proportionately broader than those from the type sites in Nevada.

1. Elko Corner-notched. Points with expanding stems and corner notches. Barbs vary from large and prominent to nonexistent, notches from deep and narrow to shallow and broad. Bases are straight or somewhat convex. There is some tendency for short-barbed specimens to be longer and narrower, long-barbed ones shorter and broader. The latter resemble Rogers' Amargosa I dart points (Rogers 1939, pl. 16) from the Mohave Desert. Seven specimens: 5 obsidian, 2 white siliceous (chert and chalcedony?). (Pl. 6, *i.*)

2. Elko Eared. Points with corner or side notches and markedly expanding stems bifurcated by means of a deep V-shaped notch in the base. Barbs usually not prominent. Four specimens, obsidian. (Pl. 6, *k.*)

3. Elko unclassified. Specimens obviously belonging to one or the other of the above types, but too incomplete to be classified. Three specimens, obsidian.

Two other Elko forms, Side-notched and Contracting-stem, do not occur at Rose Spring. Elko Side-notched points occur infrequently in Owens Valley, and Elko Contracting-stem points not at all.

Silver Lake type.—A large point, relatively well made, with a large, parallel-sided, round-based stem and triangular blade. Within the form range of Silver Lake points from Lake Mohave (Amsden 1937, p. 80) and Little Lake (Harrington 1957, p. 54). 1 specimen, obsidian (pl. 6, *b*).

Gypsum Cave type.—Large points, broad and flat, with squared shoulders or slight barbs and small pointed stems. In form, size, and workmanship, these points are entirely within the range of the type at Gypsum Cave (Harrington 1933, pp. 105–108). (Pl. 6, *f.*)

Humboldt Concave-base.—Elongate point, narrow and thick, with a thinned concave base. The name derives from the Humboldt Lake Bed, where this form is particularly common. Two specimens, obsidian, both fragmentary. (Pl. 6, *e.*)

Large triangular points.—Flat stemless points, rather neatly made, in the form of a broad isosceles triangle. In size, proportions, and workmanship, these points are related to those of the Elko Series. Six specimens: 5 obsidian, 1 a brown porphyry. (Pl. 6, *m.*)

Lanceolate points.—Very large, long, well-made points with narrow straight or concave bases, expanding forward along the blade. These points closely resemble the Angostura type (Suhm and Krieger 1954, p. 402 and Pl. 80), but lack basal edge grinding. They also resemble three points attributed by Grosscup to the anathermal deposit at Hidden Cave in the Carson Sink, though the latter are flatter and more carefully made (Grosscup 1956, p. 61). As we shall see, these two specimens are probably the earliest in the Rose Spring collection. Two specimens, obsidian, from the surface. (Pl. 6, *a.*)

Rose Spring Series.—Small, stemmed projectile points. Workmanship is about like that of the Elko Series, though a few lack pressure-flaked retouch. Some forms duplicate those of the larger Elko points, though the tendency is toward relatively longer and narrower blades. The blades range from convex-sided to concave-sided, bases are straight or convex. Occasional slight notches in the base are probably accidental. Edge serration is common.

1. Rose Spring Side-notched. Notches low on the sides, generally triangular blade with straight or convex sides. Twenty-five specimens, obsidian. (Pl. 7, *a.*)

2. Rose Spring Corner-notched. Barbed or straight-shouldered points with corner notches. Stem expands, but usually not markedly. Blade varies from convex-sided to concave-sided, the latter often with small flaring barbs. Forty-eight specimens, obsidian. (Pl. 7, *c.*)

3. Rose Spring Contracting-stem. Shoulder, often with slight barbs. The stem varies from pointed to straight sided with straight or rounded base. Blade varies from convex- to concave-sided, the latter often with small flaring barbs. Intergrades with Rose Spring Corner-notched but the separation, though arbitrary, has chronological significance. Eighteen specimens, obsidian. (Pl. 7, *e.*)

4. Aberrant form: round-stemmed. Points of Rose Spring size, dimensions, and workmanship, with more-or-less square shoulders and large round stems. Four specimens: 3 obsidian, 1 mottled orange chert. (Pl. 7, *b.*)

5. Aberrant form: single-shouldered. Small point with one squared shoulder, triangular or leaf-shaped blade, and broad rounded stem. These may be blanks for Rose Spring Contracting-stem points, but the two existing pieces are uniform and make a consistent type. Two specimens, obsidian. (Pl. 7, *d.*)

6. Rose Spring unclassified. Fragments of small stemmed points, too incomplete to be classified but probably all belonging to the three standard Rose Spring types. Six specimens, obsidian.

Cottonwood Series.—Small nonstemmed points, thin and delicate, usually very light weight. Normally made by pressure-flaking alone, though a few seem to have been shaped first by percussion. Serrate edges occur with some frequency.

1. Cottonwood Triangular. Straight-sided points, triangular in outline, often asymmetrical. Tend to be long relative to width, but a few are very short. Thirty specimens, obsidian. (Pl. 7, *g.*) There are four varieties of base form:

a. Straight base with round or angular corners. Fourteen specimens.
b. Concave base, often with small barbs at the corners. Eleven specimens.
c. Straight or convex base with a single small notch in the center. Two specimens.
d. Convex base. Three specimens.

2. Cottonwood Leaf-shape. Small convex-sided points with round bases, maximum width near the base. Two specimens, obsidian, both from the surface. This form is more common at Iny-2, where it also has a straight-based and a bipointed variety. (Pl. 7, *f*.)

Desert Side-notched.—Designation by Baumhoff and Byrne (1959). Small triangular points with notches high on the sides. Ten specimens, obsidian. (Pl. 6, *j*.) There are three varieties of base form:

1. Concave base, Baumhoff and Byrne's "General" subtype (*ibid.*, p. 37). Four specimens.
2. V-shaped base, also part of the "General" subtype. One specimen.
3. Notched base, "Sierra" subtype (*ibid.*, p. 38). Five specimens.

Eastgate Expanding-stem.—Points with flat triangular blades, squared stem, and long, broad barbs set off by two basal notches. These points are much more skilfully flaked than any others in the collection. Though they are within the weight range of the Rose Spring Series, one is longer than any Rose Spring point and both are broader. Two specimens, 1 obsidian, 1 probably chalcedony. (Pl. 6, *l*.) The type is defined by Heizer and Baumhoff from Nevada (Heizer *et al.* 1961). Neither this type nor its companion type, Eastgate Split-stem, occurs at all in Owens Valley or other Owens Lake sites, and there is every reason to believe that these two points are trade pieces from Nevada.

Stratigraphic Relationships.—The wider spatial relationships of the various projectile point types, and their precise positions in a generalized Owens Lake chronology, will be discussed in later sections of this report.

The interpretation of the stratigraphic sequence at Iny-372 depends in large part on the interpretation of projectile point type distributions, because these are fairly sensitive time markers and also abundant in the midden. The depth distribution of the various types in the excavated midden deposit is shown in table 3. On the whole, there is a good sample for the upper 36 inches of the deposit, but below this there are very few projectile points, and the interpretation of distributions in strata 2 and 3 must be regarded as tentative.

The projectile points from all of the excavations have been listed together in table 3. There are minor differences, however, in the distributions found in Test Pit A and in Trench I. In Pit A, the late Cottonwood Triangular type is relatively more abundant in the 0–12″ level than it is in Trench I. Also, the one Desert Side-notched point from 24–36″ is from Pit A, whereas this type is limited to 0–24″ in Trench I. Evidently the deposit of the latest phase was somewhat thicker in Test Pit A than in Trench I.

The Little Lake Series and Humboldt Concave Base points are limited to stratum 3 (72–84″ and two specimens from 60–72″). The Gypsum Cave, Elko Series, and large triangular points extend through strata 1 and 2. In stratum 2, these three groups are associated with the first specimens of the Rose Spring Side-notched and Rose Spring Corner-notched types. The 24–36″ level, largely made up of the base of stratum 1, contains almost exclusively points of the Rose Spring Series, though it produced a very few Cottonwood Triangular points, a single Elko unclassified specimen, and the two Eastgate Expanding-stem trade pieces. The Rose Spring Contracting-stem and aberrant round-stemmed and single-shouldered types first appear in this level and, like Cottonwood Triangular, are probably limited to stratum 1. Rose Spring Corner-notched points, the dominant type in the series, are most heavily concentrated in this level.

Above 24 inches, there is a mixture of all of the Rose Spring types and Cottonwood Triangular points, with the addition of the Desert Side-notched type, which is limited to 0–24″ in Trench I. Both Cottonwood Triangular and Desert Side-notched points increase in frequency to the top of the deposit. The 0–12″ level of Test Pit A contains almost exclusively Cottonwood Triangular points, and may represent a slightly later time than 0–12″ in Trench I.

TABLE 3

Depth Distribution of Projectile Point Types

Type	0–12 (in.)	12–24 (in.)	24–36 (in.)	36–48 (in.)	48–60 (in.)	60–72 (in.)	72–84 (in.)
Humboldt Concave-base	..	..	..	..	..	..	2
Little Lake Series	..	..	..	..	..	2	5
Large Triangular	..	..	..	..	1	3	1
Elko Series	..	..	1	1	2	4	3
Gypsum Cave	1	..	..	..	2	..	1
Silver Lake	1	..	..	..	..	..	..
Rose Spring Series:							
Side-notched	7	9	4	2	..	1	..
Corner-notched	9	14	17	3	1	3	..
Contracting-stem	5	5	8	..	..	..	..
Aberrant forms	1	1	4	..	..	..	..
Unclassified	1	1	2	..	..	..	..
Cottonwood Triangular	19	6	4	1	..	..	..
Eastgate Expanding-stem	..	..	2	..	..	..	..
Desert Side-notched	5	3	1	..	..	..	..
Unique form	1	..	..	..	..	..	..
Unfinished point	9	12	4	1	..	1	1
Unclassified fragment	21	15	12	6	4	7	1

Two projectile points are clearly out of place in the sequence, and both probably represent earlier points picked up and reused. One is a reworked Gypsum Cave point from Trench I, 0–12″; the other is a Silver Lake point from Pit A, 6–12″. The latter is somewhat weathered, which strengthens the possibility of its having been brought into the site, either as a curiosity or to be put to use.

In summary, the stratigraphic distributions of projectile point types can be used to define four successive phases at Iny-372. Other artifacts (such as pottery in the fourth phase) which can be used to expand the definition of the phases will be discussed in a later section. The phases, with their corresponding projectile point types, are the following:

4. Early Cottonwood phase: all Rose Spring types, Cottonwood Triangular, Desert Side-notched.

3. Late Rose Spring phase: all Rose Spring types, nearly exclusively; rare Cottonwood Triangular; rare Eastgate Expanding-stem as trade pieces.

2. Middle Rose Spring phase: Elko Series, Gypsum Cave, Large Triangular, Rose Spring Side-notched, Rose Spring Corner-notched.

1. Early Rose Spring phase: Little Lake Series, Humboldt Concave-base, Elko Series, Gypsum Cave, Large Triangular.

Knives

Relatively large stone artifacts with bifacially flaked cutting edges are here classed together as knives. Most of them are symmetrical and pointed, but are distinguished from projectile points in being much larger or thicker. Conceivably, some of them could have been used as spear points rather than as knives. Asymmetrical and nonpointed knives are readily distinguished from projectile points.

Unlike most artifacts at Iny-372, knives are relatively most abundant below 36″, and between 36″ and 72″ they are more numerous than projectile points. This need not indicate that they were used more in earlier times. As the site served as a workshop throughout all its occupation, and as the objects manufactured may have been intended for trade, the abundance of knife fragments may simply indicate that a brisk business in knives was being done during the earlier part of the occupation of the site.

The classification which follows is based on general features of form and technique. The quantities cited refer to excavated specimens only. Obsidian is the dominant material, as it was for projectile points, only 5 of 163 knives and knife fragments from the site being of nonobsidian materials. Only 48 per cent of the excavated fragments are complete enough to be classified, as follows:

1. Long, narrow, bipointed, with a marked median keel; percussion flaked only. All specimens are fragmentary. When complete, they probably ranged 10–15 cm. long, 2.5–4 cm. wide, 0.8–1.5 cm. maximum thickness. Seventeen specimens, obsidian. (Pl. 7, *h–l.*)
2. Broad, flat, triangular to leaf-shaped forms with straight or convex bases; usually neatly made with extensive pressure-flaked retouch, but occasionally made only with coarse percussion flaking. The latter specimens may be unfinished. With a larger sample, the type could profitably be subdivided by form, but the present sample is made up largely of basal fragments which cannot clearly be separated into leaf-shaped, parallel-sided, and triangular variants. Six complete specimens measure 7.1–14.8 cm. long, 3.1–4.4 cm. maximum width, 0.6–1.1 cm. thick. Twenty-three specimens: 19 obsidian, 4 siliceous (chert or chalcedony). (Pl. 8, *a–f.*)
3. Asymmetrical knives, generally broad and flat with a minimum of pressure-flaked retouch. Variable in size and shape. Nine specimens, obsidian. (Pl. 7, *m–q.*)
4. Elongate knives, thick and relatively narrow, with deeply notched base; symmetrical and carefully retouched by pressure flaking. Length varies considerably, from 4.9 cm. to probably around 15 cm.; width 2.6–3.3 cm.; thickness 0.7–1.1 cm. Fourteen specimens, obsidian. (Pl. 8, *g–l.*)
5. Unique knives, percussion flaked, of various forms, very thick relative to total size. One specimen from 0–12″ has two deep, square serrations on one edge which may be deliberate. Three specimens, obsidian. (Pl. 9, *d, e.*)

The depth distributions of these knife types in the midden section are sufficiently consistent to allow inferences as to their temporal relationships (table 4). Type 1 has the same vertical distribution as the Elko Series projectile points, extending through strata 2 and 3. Type 2 is found throughout the deposit, whereas type 3 seems to be limited to stratum 2. The distribution of type 4 follows that of the Rose Spring Series projectile points, through strata 1 and 2.

Large Blades

Fragments of large bifacially flaked blades occur throughout the midden. As usual, they are predominantly of obsidian, only 2 of 33 being of a rather coarse white siliceous rock. All of them are made by rather neat percussion flaking, without pressure-flaked retouch. The original dimensions of these specimens may have been around 20–30 cm. length, 5–8 cm. width, and 1.5–2.5 cm. maximum thickness (pl. 9, *a–c*). Presumably, these specimens represent the first step in the manufacture of large ceremonial blades, very likely for trade to the Central Valley of California.

These blade fragments are relatively most abundant in the lower levels of the midden, diminishing substantially in the upper levels—a situation which probably reflects changing trade relations, or at least a change in the function of the Rose Spring site.

TABLE 4

DEPTH DISTRIBUTION OF KNIFE TYPES

Depth (in.)	1	2	3	4	Unique
0–12	..	2	..	3	1
12–24	..	4	..	2	..
24–36	..	1	1	3	..
36–48	2	2	2	3	..
48–60	7	2	2	1	1
60–72	6	8	4	..	1
72–84	2	1	..	..	..

DRILLS

Chipped-stone drills, whole and fragmentary, occur in small quantities throughout the midden at Iny-372. One specimen is of white chert or chalcedony, the remainder of obsidian. Except on the smallest specimens, the bits tend to be very long and stout, and the edges are often blunted through use. All are bifacially worked by percussion flaking, either alone or followed by pressure flaking. Both the bases and the bits are retouched on both faces. Twelve excavated specimens are complete enough to be sorted into types, as follows:

1. Long tapered drills with simple convex bases. Percussion flaked with possible limited pressure-flaked retouch. Two specimens, obsidian. (Pl. 9, *f, g*.)

2. Small triangular drills with flaring corners, apparently retouched by pressure flaking. These drills resemble the Cottonwood Triangular points, but are thicker and heavier, and show typical drill wear along the edges. Three specimens, obsidian. (Pl. 9, *h, i*.)

3. Drills with long bits and well-shaped expanded bases, carefully retouched by pressure flaking on both faces of base and bit. No two bases are alike, but two pieces from 24–36″ differ from the rest in having notches. One has shallow side notches, the other is a reworked basal-notched knife of type 4. Four specimens: 3 obsidian, 1 chert or chalcedony. (Pl. 9, *j–l, s*.)

4. Drills with thick, crudely flaked, irregular expanded bases. One from 84–96″ is plano-convex in section through the base, whereas two from stratum 1 have biconvex sections. The bits are triangular in section, in contrast to the lenticular sections of the other drill bits from the site. (Pl. 9, *m, n*.)

The depth distribution of these types is shown in table 5. The samples of each type are very small, but do suggest some significant differences of depth distribution. The two specimens of type 1 are found in deep levels. In addition, drill type 1 seems related in form to the Willow Leaf points of stratum 3, and is the only one of these drill forms which occurs at the early Little Lake site (Harrington 1957, fig. 43a). The three specimens of drill type 2 at Iny-372 are all from 12–24″, where they are associated with Cottonwood Triangular points, which are so similar in form that they may have been the prototypes of the type 2 drill. Thus we may tentatively attribute drill type 1 to the earliest phase of occupation at the site and drill type 2 to the latest, whereas types 3 and 4 seem to have been in use throughout the occupation of the site.

TABLE 5
DEPTH DISTRIBUTION OF DRILL TYPES

Depth (in.)	1	2	3	4
0–12	..	..	..	1
12–24	..	3	1	1
24–36	..	..	2	..
36–48	..	..	..	..
48–60	1	..	..	..
60–72	..	..	1	..
72–84	1	..	..	..
84–96	..	..	..	1

GRAVERS

Small gravers, made on relatively thin flakes, are found infrequently in the midden at Iny-372. The material is obsidian; in one, gray chert. The graver points are short and carefully made by pressure flaking along the thin edge of the flake. The remainder of the flake generally shows little retouch. There are two forms of gravers, as follows:

1. Elongate, narrow flake with one end worked to a point by fine unifacial pressure flaking. The pressure-flake scars cover the face of the artifact at the pointed end. Three specimens, obsidian. (Pl. 9, *q*, *r*.)

2. Broader flake with a small point standing out from one side or end. The point is marked off by minute flake scars limited to the edge of the flake. These specimens could have been made quickly either by chipping back the thin edge of the flake with the fingernail or, more likely, by the technique of shearing or rubbing the edge (Barbieri 1937, p. 106). The flake scars do not differ from those produced when a thin-edge obsidian flake is used for cutting, and it is only the presence of clearly defined graver points which sets these flakes apart as deliberate artifacts. Four specimens: 3 obsidian, 1 chert. (Pl. 9, *o*, *p*.)

The depth distribution of these two types of gravers is shown in table 6. Each form is sparsely distributed through several levels, and the samples are too small to indicate significant differences in this respect.

SCRAPERS

Fifty-five artifacts, all of obsidian, have been classified as scrapers. All of them have relatively steep working edges reinforced by the removal of a row of small flakes. The remainder of the flake is usually not retouched. Scrapers with over-all retouch of one face are very rare. Three general classes of scrapers are recognized:

1. Shaped scrapers. Thick, neatly made artifacts with over-all retouch of one face. Two are elongate keeled side scrapers; one is a fragment of a flatter side scraper; and one is a subrec-

tangular artifact with the working edge around both sides and one end. Four specimens. (Pl. 10, *a.*)

2. Flake side scrapers. Thick flakes, often elongate and parallel sided, with steep scraper edges worked along one or both sides. The edges are usually straight, sometimes slightly convex. The flakes are not otherwise retouched. Fifteen specimens. (Pl. 10, *c.*)

3. Notched scrapers. Relatively thin flakes, unretouched except for chipped notches. The chipping simultaneously gives a concave scraping surface and strengthens the working edge by making it steeper. The flaking ranges from obviously deliberate pressure flaking to fine "nibbled" flaking of the sort found on type-2 gravers. Some of the latter specimens could have been notched simply by being used to scrape the nodes off a reed, or the bark off a stick. Most of these scrapers have either one notch or two notches set side by side. Surprisingly, this type makes up two-thirds of all the scrapers from the site, 36 specimens having been excavated. (Pl. 10, *b, d.*)

The depth distributions of these three types of scrapers are shown in table 7. Types 2 and 3 extend throughout the deposit, while the few shaped scrapers are from strata 2 and 3. There are no shaped scrapers from the later site Iny-2, so it is likely that scrapers of this type actually did go out of fashion before the end of the occupation of Iny-372.

TABLE 6

DEPTH DISTRIBUTION OF GRAVER TYPES

Depth (in.)	1	2
0–12	1	1
12–24	1	1
24–36	..	1
36–48	..	..
48–60	1	..
60–72	..	..
72–84	..	1

CORE TOOLS

Of the many cores from Iny-372, four seem to have been deliberately shaped as functional artifacts, rather than being simply exhausted sources of raw material for flakes. Two of the four specimens are of tougher materials than obsidian, again implying intent to use, and three have lightly battered edges. All four are bifacially worked by percussion flaking which shows a tendency toward hinge fractures. Two specimens, of obsidian and schist, are elongate and pointed, plano-convex in section, with steep sharp edges along both long sides (pl. 10, *e, f*). The other two, of obsidian and green quartzite (?), are nearly discoidal, lenticular in section, with cutting edges around three-quarters of the periphery (pl. 10, *h, i*). The latter two would probably qualify as small, neatly made choppers in the usual terminology of core-tool forms. The elongate pointed specimens are from stratum 3 (72–84″ and 96–108″), the discoidal forms from stratum 2 (24–36″ and 48–60″).

MISCELLANEOUS CHIPPED-STONE ARTIFACTS

Chipped ovals.—A number of thin obsidian flakes have been given oval shape by a "nibbling" retouch which results in a blunted edge all the way around. They are quite uniform in size and shape, and flat or only slightly curved, indicating deliberate selection of the flakes to be so shaped. The bulb of percussion is always present (pl. 5, *b*). These pieces suggest no obvious function. They may have been substitutes for bone gaming pieces, or perhaps specialized smoothers of some sort. The blunted edge would be inadequate for either cutting or scraping. They occur throughout strata 1 and 2, and are concentrated especially in the 24–36″ level. A similarly shaped specimen from Burial A retains the bulb of percussion, but has sharp, thin edges and shows fine pressure-flaked retouch, with paralled flake scars which cover most of the nonbulbar face (pl. 5, *a*).

Eccentrics.—Two fragments of small chipped obsidian objects come from 12–24″ in Trench I. One is thick and was apparently of dumbbell shape, while the

TABLE 7

Depth Distribution of Scraper Types

Depth (in.)	1	2	3
0–12	..	4	8
12–24	..	3	4
24–36	..	4	7
36–48	1	..	2
48–60	..	1	3
60–72	2	1	7
72–84	..	2	2
84–96	..	..	..
96–108	1	..	..

other is thin and may have been vaguely crescentic in form. Both specimens show bifacial pressure flaking (pl. 5, *c, d*).

Cores.—Nonfunctional cores are mostly of obsidian. One is of chalcedony and one of banded shale. Most of them are very small, indicating maximum utilization of raw material. Most of the cores are flat, with a marked center line, the flakes having been knocked off from both faces all round the periphery. Others are steeper with one flat surface against which the blows have been delivered. Still others are amorphous, with multiple striking platforms. The latter show larger flake scars than the other forms. The original form of the obsidian was both nodules and tabular pieces, and probably also large amorphous chunks broken off from outcrops.

Retouched and utilized flakes.—Primary flakes showing varying amounts of retouch are abundant throughout the midden. The retouch may be unifacial or bifacial, by percussion or pressure. Equally abundant are amorphous flakes with fine chipping-back along the edges, probably due to use for scraping and cutting. In hundreds of flakes the cause of the chipping—that is, whether use or deliberate retouch—cannot be decided. The vast bulk of the flakes are, of course, of obsidian.

Hammerstones

Of six excavated hammerstones, four are large chunks of white quartz, roughly shaped by the removal of a few large flakes, battered around the edges(pl. 10, *j*). The fifth is a large porphyritic cobble heavily battered at both ends, and the sixth is a roughly spherical nodule of quartz battered at several points on the surface (pl. 10, *g*). All these hammerstones were found between 48″ and 84″ depths, but this restricted depth distribution certainly does not reflect a limited period of use of hammerstones. The great quantity of percussion flaked obsidian throughout the site is adequate proof that hammerstones were constantly in use from the beginning to the end of the occupation here.

Artifacts of Bone

Tools.—Considering the large number of stone artifacts excavated at Iny-372, bone tools are surprisingly scarce in the midden. Thirteen specimens, 12 of them fragmentary, were excavated in Trench I, and two more accompanied Burial A. All are made of the long bones of large mammals, presumably deer or antelope, ground to shape and sometimes polished. The bases consist of the head of the bone, split but little worked down. Most of the specimens are midsections or bases which cannot be identified by function. The only complete bone tool is a sharp pointed cannon-bone awl, 9.7 cm. long, from 24–36″ depth (pl. 5, *v*). The point of another awl comes from the 60–72″ level (pl. 5, *w*). A slender specimen from 48–60″ has a blunt rounded tip which is flat in cross section, and may represent a fragment of a pressure flaker (pl. 5, *u*).

Beads.—From 60–72″ depth come two fragments of bird long bones, cut off to make tubular beads. One is 2.6 cm. long, the other is too incomplete to measure (pl. 5, *s*). A small rectangular bead of mammal bone from 72–84″ measures 7 × 6 mm., with a large perforation 3.5 mm. in diameter (pl. 5, *t*).

Artifacts of Shell

Beads.—Beads made from Pacific sea shells are fairly common at Rose Spring. Bennyhoff and Heizer (1958) have classified the beads from Trench I and thoroughly discussed their relationships. There is but little to add to their treatment of the subject. Several beads from the test pits and surface collection provide some additional information. The following is a listing of all of the shell beads in the combined collections from Iny-372. The classification and terminology are those used by Bennyhoff and Heizer (1958; see especially pp. 90–92 and Fig. 1), based on the Lillard-Heizer-Fenenga classification of Central California shell beads. The Lillard-Heizer-Fenenga numbers are appended where applicable. Number 11 below is a unique specimen which does not conform to any type.

1. Thin-lipped *Olivella* (3a1). Late Horizon Phase 2. Five specimens, 4 excavated. (Pl. 12, *c*.)
2. Split, punched *Olivella* (3a2). Three specimens, 1 excavated. All have the base cut off diagonally. Late Horizon Phase 1. (Pl. 12, *d*.)
3. Split, drilled, end-perforated *Olivella* (3b1). One specimen, surface. Middle Horizon. (Pl. 12, *e*).
4. Modified saddle *Olivella* (3b2). One specimen, surface. Middle Horizon. (Pl. 12, *f*.)
5. Saucer *Olivella* (3c). One specimen, Burial 2. Middle Horizon. (Pl. 12, *h*.)
6. Cupped *Olivella* (3e). One specimen, surface. Late Horizon Phase 1. (Pl. 12, *g*.)
7. Rough disc *Olivella*. One specimen, surface. Late Horizon Phase 2. (Pl. 12, *i*.)
8. Oval *Olivella*. One specimen, surface. Great Basin type contemporary with the Middle Horizon. (Pl. 12, *j*.)
9. Thin disc *Tivela*. Three specimens, 2 excavated. South coastal type. (Pl. 12, *k*.)
10. *Haliotis* ring, About 1000 specimens, most of them of *H. cracherodii,* the green-backed abalone, a few of *H. rufescens,* the red-backed species. Most were with Burial 4, and several

scattered through the refuse are almost certainly strays from the same burial. One from the surface. The type shows three variations: a smooth ring (pl. 12, *n*); one on which a point on the edge is scalloped through being cut from next to a siphonal opening (pl. 12, *m*); and one in which a siphonal opening serves as an auxiliary perforation in the side of the ring (pl. 12, *o*). Of the latter there are only four specimens; the first two variations are abundant. Middle Horizon.[3]

11. Small fragment apparently of a sea snail, drilled. Too scrappy for specific identification, but is definitely not *Olivella*. One specimen, excavated. (Pl. 12, *l*.)

Table 8 shows the depth distribution of shell beads from the midden.[4] Late Horizon Phase-2 beads (3a1 *Olivella*) occur from 0–24″, that is, associated with pottery, steatite beads, pipes, and a combination of Cottonwood Triangular and Rose Spring projectile points. Below this, associated with the almost pure Rose Spring projectile point assemblage of the 24–36″ level, is a Late Horizon Phase-1

TABLE 8

Depth Distribution of Shell Bead Types

Depth (in.)	Olivella		Drilled snail shell	Tivela disc
	3a1	3b1		
0–12	3	..	..	..
12–24	1	..	1	..
24–36	..	1	..	..
36–48	..	..	..	..
48–60	..	..	..	1
60–72	..	..	..	1

bead (3a2 *Olivella*). From 36–72″ come only thin *Tivela* discs of uncertain temporal affinity on the south coast of California. With Burial 2, however, was a Middle Horizon 3c *Olivella* bead, and with Burial 4 the Middle Horizon *Haliotis* ring beads. As these burials are attributable to stratum 2, the bead types date both the stratum and the *Tivela* disc beads found in it as contemporary with the Central California Middle Horizon.

Ornaments.—With Burial 2 were two ornaments of *Haliotis* shell. The species is not identifiable, since the backs have been completely ground off. One ornament is trapezoidal with rounded corners; it has three holes, one at each end and one on the side (pl. 12, *a*). The other is elongate, constricted at one end, with a hole at

[3] These *Haliotis* ring beads may be either south coastal or Central California pieces. They are known in quantity only from Burial 4 at Iny-372 and from a burial excavated by P. M. Jones on Santa Rosa Island (Jones 1956, Pl. 114d). In Central California, they are either *Haliotis* type-3 beads, a Middle Horizon diagnostic (Lillard, Heizer, and Fenenga 1939, p. 78), or C(1). ornaments. The latter type is highly varied in the diameter of the ornament and of the perforation, but ring beads like those from Iny-372 have been reported in Middle Horizon context from the Emeryville Shellmound on the San Francisco Coast (Beardsley 1954, p. 83 and table 12B, ornament type RC (1)) and the Delta Region (Cook and Elsasser 1956, p. 40). In fact, if the ring beads come from Central California, the prevalence of *Haliotis cracherodii* would be sufficient to date them to the Middle Horizon. On the south coast, their occurrence predates the latest periods, and may well be Middle Horizon contemporary.

[4] *Haliotis* ring beads have been omitted from table 8, because the specimens in the midden probably derive from Burial 4. Their distribution was as follows:

Depth (in.)	*Number*	*Depth (in.)*	*Number*
0–12	–	36–48	4
12–24	1	48–60	25
24–36	–	60–72	58

each end (pl. 12, *b*). Neither fits well in the Lillard-Heizer-Fenenga classification of Central California shell ornaments. Gifford describes several types of three-hole trapezoidal ornaments (Gifford 1947, pp. 26–27, 88–89) but the Iny-372 piece is not particularly similar to any of them. The constricted-end ornament resembles one illustrated by Gifford from Santa Cruz Island (site SCrI-138), his type AI2 (*ibid.*, pp. 41, 105). Both specimens from Iny-372 may be of south coastal origin.

UNMODIFIED MATERIALS

Quartz Crystals

A LARGE CRYSTAL of clear quartz, 3.2 cm. long, comes from Test Pit A, 0–6″. A very small quartz crystal, 1.4 cm. long, was found in Trench I, 72–84″. Fragments of two others come from 24–30″ in Pit A and 64–72″ in Trench I. These crystals have not been modified by human activity, but were presumably brought into the site for some purpose. They may have had a ritual function, as elsewhere in California.

Pigment

A small lump of powdered chalky white pigment comes from 72–80″ in Pit A. The only other evidence for the use of pigments is the powdered red ocher smeared on three fragments of stone tablets, two from Burial 2 and one from 60–64″ in Trench I.

Slate

A thin piece of tabular slate comes from the 6–12″ level of Test Pit A. It shows no sign of having been worked, but is likely to be part of a stone tablet like those associated with Burial 2, which are ground only around the edges.

Pumice

Small pebbles and chunks of pumice come from 0–12″ and 72–84″ in Trench I. They represent raw material for the manufacture of artifacts such as pipes, beads, and shaft straighteners. An unmodified pumice nodule from Trench I, 72–84″, has an unusual shape, and could have been brought to the site for use as a charmstone or amulet. There is, however, no direct evidence that charmstones were ever used at Rose Spring.

Shell

A few small fragments of fresh-water mussel shell were found in the upper levels of Trench I, from surface to 36 inches depth. A fresh-water snail shell comes from 36–48″ in Trench I. Shellfish seem to have been of little or no importance in the diet of the inhabitants of Iny-372.

Animal Bone

Grover S. Krantz's identifications and discussion of the unmodified animal bones from Iny-372 are presented in Appendix 2. Rabbits and mountain sheep made up the bulk of the meat diet of the inhabitants of Iny-372. The rabbits could be hunted locally, but the mountain sheep must have been hunted in the Sierra Nevada or the Koso Range and brought into the site as killed meat (cf. Steward 1938, pp. 82–83). Antelope, coyote, fox, birds, and the unidentified small rodents were probably all locally available, whereas the presence of occasional deer, squirrel, and chipmunk bones again implies hunting in the mountains. The sheep and horse bones in the 0–12″ level are probably associated with the use of the site by white men as a stagecoach stop. The presence of a single horse bone from 12–24″ depth is very likely due to mechanical mixture, but it is possible that it represents a horse brought by Indians traveling from the east—perhaps from Arizona—in the seventeenth or eighteenth century, before the arrival of white men and their trade goods in Inyo County.

BURIAL ASSOCIATIONS

THE ASSOCIATIONS of artifacts with Burials A, 2, and 4 are useful in checking the apparent contemporaneity of various artifact types in the midden section. The grave occurrences are as follows:

BURIAL A:

Knife type 2. Two specimens: 1 triangular, 1 leaf-shaped.
Elongate pumice shaft smoothers. Two specimens.
Bone tool bases. Two specimens.
Mano. One specimen (missing).

BURIAL 2:

Elko projectile points. Two specimens, 1 Corner-notched, 1 Eared.
Rose Spring projectile points. Five specimens: 2 Side-notched, 1 Corner-notched, 2 unclassified.
Large triangular projectile point. One specimen.
Knife type 4. Two specimens.
Notched scrapers. Three specimens.
Chipped oval with complete unifacial retouch. One specimen.
Cores. Two specimens.
Mano type 1. One specimen.
Slate tablet fragments. Three specimens representing at least 2 tablets.
Soapstone pin fragment. One specimen.
Olivella 3c saucer bead. One specimen.
Haliotis ornaments. Two specimens.

BURIAL 4:

Haliotis ring beads. Ca. 1000 specimens.
Elko Corner-notched projectile point. One specimen.

All three burials may be attributed to stratum 2: Burial 4 through field observation, Burial 2 because the combination of Elko and Rose Spring points occurs only in stratum 2, and Burial A because of its depth (66″). The grave lots validate the midden association of all the projectile point and knife types listed above, with each other and with mano type 1 and the chipped ovals. They also establish the presence of slate tablets and pumice shaft straighteners in stratum 2. Above all, they show the contemporaneity of Central California Middle Horizon bead types—*Olivella* 3c and *Haliotis* rings—with the artifact assemblage of stratum 2.

Of two burials originating in stratum 1, Burial 3 was left in the trench wall except for the skull, and Burial 1 was accompanied only by a Desert Side-notched projectile point with V-shaped base.

CHRONOLOGY OF THE OWENS LAKE-LITTLE LAKE REGION

Rose Spring

Stratigraphically, there is considerable typological change in the artifact content of the midden at Iny-372. The depth distribution of projectile points justifies the separation of the excavated deposit into four sections, and many other artifact types correlate with this division. The four definable periods are represented by the following subdivisions of the midden:

Stratum 1 (upper) : 0–24″.
Stratum 1 (lower) : 24–36″.
Stratum 2: 36–60″, 60–72″ (part).
Stratum 3: 60–72″ (part), 72–108″.

Stratum 3 is characterized by Little Lake Series and Humboldt Concave Base projectile points, and pointed plano-convex core tools. With stratum 2 it shares Elko Series, Gypsum Cave, and large triangular projectile points, knife type 1, shaped scrapers, and perhaps drill type 1. Stratum 2, including Burials A, 2, and 4, is distinguished primarily by its association of Elko Series points with Rose Spring Side-notched and Rose Spring Corner-notched points, and by the occurrence of Middle Horizon shell bead types. In addition, knife type 3 and the bifacial discoidal core tools may be limited to stratum 2, and all the examples of pumice shaft smoothers and incised and painted slate tablets come from burials or midden levels attributable to stratum 2. Other artifact types which first appear in stratum 2 continue on through stratum 1. They include notched-base knives (type 4), expanded base drills (type 3), chipped obsidian ovals, and small shaped sandstone abraders.

In lower stratum 1, the projectile point content is nearly pure Rose Spring, with a very few Cottonwood Triangular points and a couple of trade pieces from Nevada. The single *Olivella* bead (3b1) is a Late Horizon Phase-1 type. Rose Spring Contracting-stem projectile points, the aberrant Rose Spring point forms, Cottonwood Triangular points, cobble pestles, and steatite disc beads first appear here and all continue on into upper stratum 1. The two potsherds and one Desert Side-notched point from 24–36″ are probably intrusive into this level, since two of the three specimens come from Test Pit A, where the latest phase of occupation seems to have extended to a greater depth. The one steatite disc bead from 24–36″ is also from Test Pit A, but evidence from Iny-2 (discussed below) indicates that steatite disc beads were in fact made before pottery, and thus belong to the assemblage represented in lower stratum 1 at Rose Spring.

In upper stratum 1, 0–24″, a number of new artifact types appear which readily distinguish it from all the lower levels. These include pottery, clay and pumice pipes, Desert Side-notched points, type-2 drills, and Late Horizon Phase-2 shell beads. All the Rose Spring projectile point types continue, decreasing in relative frequency, and in 0–12″ they are about equal in number to Cottonwood Triangular points.

A number of artifact types occur throughout the midden, serving to tie together the various phases in a single tradition. These include flat triangular or leaf-shaped knives (type 2), flake side scrapers, notched scrapers, gravers with small pressure-flaked points, large bifacially flaked blades, flat manos with shaped edges, and unshaped metates with shallow grinding surfaces. The dominance of obsidian for chipped artifacts and the relatively careless use of pressure flaking—as contrasted to the finely controlled flaking found in neighboring areas—are also traditions which lasted throughout the occupation of the site.

Little Lake, Iny-182

Iny-182, the Little Lake or Stahl Site, is a large early habitation site at the south end of Rose Valley, 13½ miles south of Rose Spring. It was extensively excavated and thoroughly described by Harrington (1957). As at Iny-372, projectile points are among the most abundant artifact types. Pinto points dominate the assemblage. The Broad-leaf and Willow-leaf types of the Little Lake Series are present but scarce. Lake Mohave and Silver Lake points, and a short, square-stemmed form, occur in small quantities. Apparently these various types are fully contemporary, though the Lake Mohave, Silver Lake, and Pinto Barbed-shoulders types tend to be concentrated at lower levels than the others (Harrington 1957, Appendix II–E, G).

Metates abound, and both shaped and unshaped manos (types 1 and 3) occur. Harrington mentions large choppers and (core) scrapers reused as hammerstones, and illustrates one of these (*ibid.*, p. 47 and Fig. 38c). Large leaf-shaped knives of type 2 occur, and flake knives are common. The illustration suggests that (*ibid.*, Fig. 42d) some of the latter may be of Rose Spring knife type 1. Other artifacts of interest are a type-1 drill (*ibid.*, Fig. 43a), a series of chipped stone discs, and a series of serrated stone objects which Harrington interprets as saws and scrapers. Gravers closely resemble those from Iny-372 (*ibid.*, Fig. 46).

Later artifacts from the site come either from the uppermost levels or from a cave deposit, not from the main body of excavated early midden. They include shell and glass beads, pottery, pestles, arrowheads (Rose Spring Corner-notched, Cottonwood Triangular, and Desert Side-notched), an Elko Eared and a Gypsum Cave point, and a fine type-4 knife which Harrington identifies as a "Pinto spear-head" (*ibid.*, Fig. 40).

Cottonwood Creek, Iny-2

This late village site, excavated and reported by Harry Riddell (1951), lies near the western shore of Owens Lake, twenty-five miles northwest of Rose Spring. As Riddell's paper has few illustrations, his collection in the Robert H. Lowie Museum of Anthropology has been reviewed, and the following summary is based on this review as well as on his paper.[5] I have also taken the liberty of reclassifying the projectile points and manos, and of including photographs of some of the specimens (pl. 13, *j–n*). The classification of shell beads is that used by Bennyhoff and Heizer.

Riddell found the refuse at Iny-2 shallow and little productive of artifacts other than pottery and steatite beads. Perhaps the only significant feature of

[5] Since the publication of this paper (H. Riddell 1951), its author has made further surface collections at the site. My summary review is thus based on a larger collection than was available to Riddell at the time of publication.

cultural stratigraphy in his excavation is the fact that steatite beads extended down to the base of the deposit at 36″ depth, whereas pottery was found only in the upper 18″. The potsherds are all of Owens Valley Brown Ware, and the steatite beads are all of the same small, conically drilled form as at Iny-372.

The projectile points from Iny-2 come mostly from the surface of the site. Of seventy-two classifiable points and fragments, one-half belong to the Cottonwood Series and most of the remainder are of Desert Side-notched type. No point from the site weighs over 2 grams, and very few weigh over 1 gram. The excavated sample is too small to produce fruitful comparisons with the large surface sample, but the quantities of various types from the site as a whole are of sufficient interest to warrant listing:

Rose Spring Series (Side-notched, Corner-notched, and Contracting-stem). Twelve specimens. (Pl. 13, *m.*)

Cottonwood Triangular. Twenty-five specimens. Concave bases predominate, but notched, straight, and slightly convex bases occur infrequently. (Pl. 13, *k.*)

Cottonwood Leaf-shaped. Eleven specimens. All three base forms—bipointed, convex, and straight—are found. (Pl. 13, *l.*)

Desert Side-notched. Twenty-four specimens, mostly with concave bases, but a few with notched or V-shaped bases. (Pl. 13, *j.*)

These projectile points are made almost exclusively of obsidian, as at Rose Spring and Little Lake.

Knives of type 4 occur at Iny-2, together with flake scrapers, notched scrapers, and small gravers like those at Iny-372. Drills include type 2, and various specimens of a new type:

Drill, type 5. Relatively small drill with expanded, unretouched base. The bit tends to be short; the base is unmodified flake surface, with at most a little retouch near the bit. (Pl. 13, *n.*)

Cobble pestles occur, and bedrock mortars are associated with the site. There is a single metate fragment, and manos are common. Only 2 manos are of the flat shaped type characteristic of Iny-372 (type 1). The remaining 11 are unshaped and mostly unifacial, either thick (type 3) or wedge-shaped, a new type:

Mano, type 4. Unshaped mano, wedge-shaped in cross section. Cobbles modified only through use. The tapered section depends more on the selection of the cobble than on the degree or nature of use. Almost all are unifacial.

Pumice pipes like those from 0–12″ at Iny-372, and slate pendants like the one from the surface at Iny-372, are found in the Iny-2 collection. Bennyhoff and Heizer (1958, p. 73) have classified the shell beads from Iny-2. Most of them are *Olivella* 3a1, a late Horizon Phase-2 diagnostic. The remainder are all either Late Horizon types or types with dispersed or uncertain time spans. A single specimen each of the cupped *Olivella* and split, punched *Olivella* types (3e and 3a2) suggest that the site was occupied before the end of phase 1 of the Late Horizon in Central California—that is, at a time equivalent to lower stratum 1 at Rose Spring. However, the vast majority of artifacts from the site are certainly later, contemporary with and later than upper stratum 1 at Iny-372. Glass beads attest the continued occupation of Iny-2 during historic times.

Earlier Materials

There are no well-defined artifact assemblages from the Owens Lake region which can be dated earlier than the Little Lake site. Several sites in Owens Valley and around Owens Lake, however, have produced limited numbers of artifacts which probably belong to such an early age. Noteworthy among these are the two lanceolate Angostura-like points from Rose Spring. Wherever this form occurs in the Great Basin in a datable context, it can be attributed to the early Post-Pleistocene or possibly even to the end of the Pleistocene (see below, section on Comparisons, Hidden Cave and Danger Cave).

Harry Riddell's collections from a number of sites include a small number of projectile points much like those which occur at Lake Mohave and in an early assemblage in Death Valley (see below, Comparisons), together with short, broad point forms with side notches or large stems which seem to be closely related to them (pl. 13, *a-i*). Quantities of large step-flaked core tools occur at the same sites. All the sites show evidence of recurring occupation, producing materials of Little Lake, Rose Spring, and Cottonwood type as well as the Lake Mohave and related forms. Since a very similar assemblage is found in isolation in nearby Death Valley and further south at Lake Mohave, however, it is reasonable to assume that the forms mentioned above actually represent a separate period of time earlier than the occupation at the Little Lake site. The temporal placement of these materials is discussed in detail in Appendix 4.

General Sequence

In the summary which follows, the Little Lake, Rose Spring, and Cottonwood complexes are based on excavated materials. The definitions of the Lake Mohave-like assemblage and of Late Cottonwood are hypothetical, since these phases have not yet been isolated in the immediate vicinity of Owens Lake. They are nevertheless based on reasonably sound evidence. Only the Little Lake, Late Rose Spring, and Early Cottonwood phases are based on adequately large excavated samples. As a result of inadequate sampling of the other phases, some diagnostics which at present seem limited to one or two phases may actually have longer time spans.

I. *Lanceolate points* (hypothetical phase).—The early position given to the two narrow-based lanceolate points from Iny-372 is based on their resemblance to Angostura points and to lanceolate points in very early contexts at Hidden Cave, Nevada, and Danger Cave, Utah. The data are discussed in detail in Appendix 4. If the two specimens from Iny-372 are early, they may have been scraped by bulldozers out of the sand which underlies the midden. This possibility can only be checked by a deep cut in the sand. The flake scars on the specimens are fresh, so they are probably not old surface finds brought into the site by the Indians.

II. *Lake Mohave types* (tentative phase).—The Lake Mohave, Silver Lake, and related projectile point types discussed above, with the step-flaked core tools which accompany them, have no place in the well-defined sequence which begins with Little Lake and continues through into historic times. While a few projectile points of these types occur at Little Lake, they represent only a part of the range of form found at other sites. The bulk of the Lake Mohave-like materials should belong to an earlier period. Since the collection is small and not isolated from other materials, however, the cultural assemblage cannot be defined. Wallace found no grinding tools with the Lake Mohave assemblage in nearby Death Valley (Wallace 1958, p. 11), and only two manos are reported from Lake Mohave (Amsden 1937, p. 51). We may be dealing here with a nearly pure hunting complex.

III. *Little Lake.*—Represented by the whole of the Pinto assemblage at the Little Lake site, excluding the later materials from the Stahl Site cave and from the upper levels of the open deposit. Pinto points, chipped stone discs, and stone saws are diagnostic. Limited numbers of Lake Mohave and Silver Lake points occur, as well as large choppers, core scrapers, scraper-planes, and leaf-shaped knives. Broad Leaf and Willow Leaf points, and drill type-1 are also found. The metate occurs, together with shaped and unshaped manos (types 1 and 3). House floors and post hole patterns at Little Lake give evidence that permanent or semi-permanent villages existed at this time.

IV. *Early Rose Spring.*—Stratum 3 at Iny-372. There is a marked continuity of types from the Little Lake Complex, including leaf-shaped knives (types 1 and 2), Willow Leaf points, rare Pinto points, and type-1 drills. Only shaped manos are known in this phase, and core tools and shaped scrapers are now very rare. Humboldt Concave-base points seem to be limited to Early Rose Spring. New projectile point types include the Elko Series, Gypsum Cave, and large triangular forms. The occupation of the Fossil Falls site (Harrington 1952) apparently began at this time.

V. *Middle Rose Spring.*—The Elko, Gypsum Cave, and large triangular point types continue into this phase, together with type-1 manos and rare core tools and shaped scrapers. The phase is characterized by the occurrence of Middle Horizon shell bead types, pumice shaft smoothers, and slate tablets, and by the introduction of small projectile points of the Rose Spring Series, notched-base and asymmetric knives (types 3 and 4), fine expanding-base drills (type 3), and chipped ovals. The occurrence of Rose Spring point types almost certainly signals the introduction of the bow. Middle Rose Spring probably covers a good deal of time during which typological change occurred in the artifacts, but the artifact sample is so small that it must be treated as a single phase for the present. It is represented by the whole of stratum 2 at the Rose Spring site.

VI. *Late Rose Spring.*—This phase is defined by the large sample from lower stratum 1, 24–36″, at Iny-372. Dart points no longer occur. The projectile points are almost all of the Rose Spring Series, but include the first few Cottonwood Triangular points and a couple of Eastgate Expanding-stem points as trade pieces. Knife types 2 and 4 continue, as do drill type 3, chipped ovals, and mano type 1. Split, punched *Olivella* 3b1 beads occur. Cobble pestles and steatite disc beads are introduced and, of the Rose Spring Series points, the Contracting-stem and aberrant types make their first appearance. Core tools and shaped scrapers are no longer found.

VII. *Early Cottonwood.*—Represented by upper stratum 1 (0–24″) at Iny-372 and by part of the Cottonwood Creek (Iny-2) collection. A number of new artifact types, diagnostic of the two Cottonwood phases, are first introduced. These include

Owens Valley Brown Ware, clay and pumice pipes, thin-lipped *Olivella* 3a1 beads, and Desert Side-notched points. Drill type 2 seems to be limited to this phase. The phase is distinguished from the historic Late Cottonwood phase by the presence or continuation of stemmed projectile points (Rose Spring Series), knife type 2, drill type 3, chipped ovals, and mano type 1, none of which are found in Late Cottonwood.

VIII. *Late Cottonwood.*—Represented by part of the collection from Iny-2. Though not yet isolated in excavation, there is clear evidence that this phase existed as a distinct archaeological unit. Traits are assigned to it according to the following criteria:

1. Traits present at Iny-2 but not found in the midden at Iny-372 are assumed to be limited to Late Cottonwood.
2. Traits common at Iny-2 and found in upper stratum 1 at Iny-372 are taken as shared by Early and Late Cottonwood.
3. Traits common at Iny-372 but rare at Iny-2 are assumed to belong only to Early Cottonwood.
4. Traits mentioned or illustrated ethnographically are attributed to Late Cottonwood. Steward (1933) is the primary source. Perishable items, such as wooden mortars, are not discussed, because they cannot be compared to the nonperishable artifacts from the archaeological sites.

Pottery, pipes, shell beads of California Late Horizon Phase 2, Desert Side-notched points, Cottonwood Triangular points, knife type 4, cobble pestles, steatite disc beads, and metates all continue from the previous phase. Cottonwood Leaf-shaped points make their appearance, while stemmed points are no longer found. Unshaped manos (types 3 and 4) come into use, along with type-5 drills, slate pendants, large disc *Tivela* and small disc *Olivella* (3d) beads, and glass trade beads. Whether the phase is entirely historic, or whether some of these artifact types were introduced before the arrival of Europeans and/or European trade goods, remains to be decided by future research, especially the excavation of graves of this phase.

COMPARISONS

THIS SEQUENCE FOR Owens Lake can fruitfully be compared with sequences established in adjoining areas. It is noteworthy that the closest relationships are to the north and south, along the southern half of the California-Nevada border and in the Mohave Desert. Less closely related are the archaeological sequences of Western Nevada. With the Central Valley and the coast of California, specific relationships are mostly through trade pieces rather than through shared types and comparable sequences.

MOHAVE DESERT

For the Mohave Desert, most of the information useful for comparison is on early periods, in Campbell *et al.* (1935, 1937) and Rogers (1939). The specimens attributed to the hypothetical period II in the Owens Lake region all have close analogues in the Lake Mohave or "Playa" industry (Campbell *et al.* 1937; Rogers 1939, pp. 27–44). Rogers illustrates a large lanceolate point similar to those from Iny-372, found in surface association with this assemblage (*ibid.*, Pl. 9k). The Pinto Basin industry corresponds well with Little Lake, but includes a few stemmed points of other forms (Campbell *et al.* 1935, Pl. 14f–g; Rogers 1939, Pl. 13r–s). Since the associations are found at surface sites, the contemporaneity of these non-Little Lake forms with the Pinto points is not established. Rogers associates Gypsum Cave points with the Pinto industry, whereas they occupy a later temporal position in the Owens Lake region. However, Rogers reports five sites where Gypsum points occur without Pinto points, and refers to a case of stratigraphy where Pinto points were found from 2 to 4 feet below a midden stratum containing Gypsum Cave points (*ibid.*, pp. 47–48).

Rogers originally gave the name "Amargosa" to an industry which includes most of the diagnostic traits of Middle Rose Spring (*ibid.*, pp. 61–65), later changed the meaning of the term to include Pinto materials (Haury 1950, pp. 192–193). He also illustrates, under the name "Desert Mohave," projectile points related to the Cottonwood Series (*ibid.*, Pl. 18f–t). Rogers has offered no evidence to support his proposed chronology, which begins with "Playa" or Lake Mohave, then proceeds through Pinto, Amargosa (original meaning), and "Desert Mohave." The sequence, however, is closely paralleled at Owens Lake, and is certainly correct in its general outlines if not in detail. On the whole, the similarities between Mohave Desert and Owens Lake archaeology are far more impressive than the differences.

Death Valley

The most comprehensive information on Death Valley is to be found in reports by Wallace (1958) and Alice Hunt (1960). Wallace's brief summary outlines a sequence of four periods, which are increased to five in Hunt's full report. Death Valley I corresponds to Lake Mohave and to our hypothetical Complex II at Owens Lake (Wallace 1958, pp. 10–12; Hunt 1960, pp. 20–61, especially Fig. 5).

Death Valley II includes a range of chipped-stone artifacts typical of Little Lake and Early and Middle Rose Spring. Early Death Valley II, as defined by Hunt, includes Pinto, Elko, and Gypsum Cave type projectile points, and corresponds well with Early Rose Spring, but some of the sites could be of Little Lake age. Late Death Valley II is defined by a group of Elko Corner-notched points and stone mortars and pestles. If these specimens really represent a period of time separate from Early Death Valley II, they should be equivalent in time to Middle Rose Spring. The presence of stone mortars, particularly at this early date, is a striking difference from the Rose Spring sequence. (Hunt 1960, pp. 62–109, especially Figs. 22–24, 30; Wallace 1958, pp. 12–13). Wallace uses the name "Mesquite Flat" as an alternate term for "Death Valley II" (Wallace 1958, Table 1).

Death Valley III (Stone Mound Complex) resembles Late Rose Spring in that its projectile points are almost exclusively of the Rose Spring Series, with a very few Cottonwood Triangular points included in the assemblage, but it includes slate pendants, which in the Owens Lake region seem to be limited to the historic period. Since Death Valley III should be contemporary with Late Rose Spring, it is not clear whether this is a genuine difference of artifact inventory, or whether the pendants might actually occur earlier in the Owens Lake region than present evidence suggests. Shell beads associated with Death Valley III burials include limpet rings of south coastal California origin, and "saucer shaped *Olivella* beads." It is impossible to tell from Hunt's illustration whether the latter are of Central California type 3c (Hunt 1960, pp. 111–163, especially Figs. 40–41; 43; Wallace 1958, pp. 13–14).

Finally, Death Valley IV, representing the protohistoric and historic periods, corresponds in time to the Cottonwood Complex. Death Valley IV projectile points are entirely of the Cottonwood Triangular and Desert Side-notched types, suggesting a Late Cottonwood assemblage. Owens Valley Brown Ware is included in the variety of native pottery found in Death Valley at this time. Other artifacts are little drills of Late Cottonwood type, conical pottery pipes, stone pendants, steatite disc beads, and *Olivella* disc beads, at least some of which are type 3a1 thin-lipped. All of these artifact types indicate connections with the Cottonwood Complex, and some of them suggest specific affiliation with Late Cottonwood (Hunt 1960, pp. 163–288; Wallace 1958, pp. 14–15).

Panamint Mountains

The Panamint Mountains separate Death Valley from the Owens Lake region. The one excavated site here is the Coville Rockshelter, Iny-222 (Meighan 1953). The few diagnostic artifacts from this site (a Cottonwood Triangular point, a Rose Spring Corner-notched point, a couple of sherds of Owens Valley Brown Ware, and two fragments of incised slate tablets) suggest occupation toward the end of the Rose Spring period and the beginning of the Cottonwood period. The scarcity of projectile points and other chipped-stone artifacts at this and other Panamint Mountain sites (Lathrap and Meighan 1951), as well as at rockshelter sites tested by Harry Riddell in Owens Valley, suggests that hunting was not particularly associated with camping in caves and rockshelters in this area.

Mono County

The projectile points, manos, drills, and knives illustrated by Meighan from the area north of Owens Valley show most of the range of form known from the Owens Lake region (Meighan 1955). Considering the proximity of the two regions, and the fact that the illustrated specimens look exactly like those from Little Lake and Owens Lake, the Owens Lake sequence can probably be applied directly to Mono County. Meighan's materials represent all periods from Owens Lake Complex II through Late Cottonwood. The absence of pottery north of Chidago Canyon suggests that, in late times, central and northern Mono County was more affiliated with Yosemite Valley (Mariposa Complex) than with Owens Valley (Cottonwood Complex).

Vermilion Valley

Lathrap and Shutler (1955) have reported on an archaeological site in Vermilion Valley, Fresno County. The projectile points illustrated by them include Desert Side-notched, Cottonwood Triangular, Rose Spring Corner-notched, and Elko Eared. This material is apparently equivalent in time to the period from Middle Rose Spring to Late Cottonwood, but is probably affiliated with the Tamarack and Mariposa complexes of Yosemite Valley, rather than with the equivalent cultural assemblages at Owens Lake.

Yosemite Valley

From Yosemite Valley, Bennyhoff has described and named three cultural complexes which are very similar to Owens Valley assemblages (Bennyhoff 1956). The earliest is the Crane Flat Complex. If the term is limited to the types present in the excavation at Mrp-105, the type site, it fits best with Early Rose Spring, but has a stronger emphasis on Pinto points and lacks the Elko Series. Crane Flat may represent a period transitional between Little Lake and Early Rose Spring, or overlapping the end of one phase and the beginning of the next. Elko points do occur in Yosemite Valley (*ibid.*, Fig. 6k, m–n), where they are presumably contemporary with Middle Rose Spring.

The Tamarack Complex is related to Late Rose Spring, but the projectile points differ somewhat in form from those of the Rose Spring Series, being relatively shorter and broader on the average (*ibid.*, Fig. 2). The Mariposa Complex includes many of the diagnostic traits of the Cottonwood Complex, but lacks pottery and Cottonwood Leaf-shaped points and has few Cottonwood Triangular points.

Lake Tahoe Region

The archaeology of the southern Sierra Nevada (Vermilion and Yosemite valleys) is very closely related to that of the Owens Lake region. In contrast, the archaeological sequence of the northern Sierra Nevada, around Lake Tahoe, shows striking differences from the Owens Lake sequence and similarities are so few that crossdating is risky. Heizer and Elsasser (1953) and Elsasser (1960) have defined two cultural complexes for this region. The later complex, Kings Beach, includes Desert Side-notched points and a few Cottonwood Triangular and Rose Spring Series points, all made of obsidian and siliceous rocks. The bedrock mortar is also associated. Kings Beach is probably contemporary with Mariposa in Yosemite Valley and Cottonwood at Owens Lake.

The earlier Lake Tahoe assemblage, the Martis Complex, is defined by relatively large basalt projectile points, use of both the metate and portable mortar, and expanded-base drills. Martis projectile points are mostly of types which do not occur in the Owens Lake region and surrounding territory or in the western Nevada region to be discussed below. There are, however, a few Martis specimens which show similarity to Pinto, Elko, and Rose Spring types (Elsasser 1960, pp. 70–71). Elsasser discusses in detail the difficulties in relating the Martis Complex to other archaeological assemblages of the Sierra Nevada, and proposes a tentative cross-dating to Crane Flat and early Tamarack (*ibid.*, pp. 29–30, 69–71). This date is a very reasonable one. In terms of Owens Lake Chronology, I would suggest synchrony with the whole period from Little Lake through Middle Rose Spring, and possibly with Late Rose Spring as well.

West Central Nevada

The Lovelock Culture area of West Central Nevada has been extensively studied by archaeologists. Several cave and rockshelter sites have been excavated, and the University of California Archaeological Survey has made collections from numerous surface sites, of which the Humboldt Lake Bed (Ch-15) is the most important. Excavations at Lovelock Cave, Humboldt Cave, and Leonard Rockshelter have provided a long archaeological sequence, dating back to the beginning of the post-Pleistocene, for the Humboldt Lake region (Loud and Harrington 1929; Heizer 1951*b*, 1956; Heizer and Krieger 1956; Grosscup 1960). An equally long sequence from Hidden Cave and from surface sites in the Carson Sink region (Grosscup

1956) has not yet been published in detail. Recent cave excavations around Eastgate, Nevada, have produced still a third sequence (Heizer *et al.*, 1961). Grosscup, Heizer, and Baumhoff have all permitted me to examine their materials, and a reasonably precise cross-dating to the Owens Lake sequence is possible.

The earliest assemblages are those attributed to the Anathermal Period: Granite Point and Humboldt cultures of Humboldt Lake (Heizer 1951*b*, pp. 95–97), Fallon and Hidden Cave phases of the Carson Sink (Grosscup 1956, *passim*). As Heizer points out, the relations between these assemblages are unclear, because some (Humboldt and Hidden Cave) are small samples from cave deposits, while others (Granite Point and Fallon) are from specialized open sites (Heizer 1951*b*, p. 95). The Hidden Cave phase consists of only four obsidian projectile points from the deepest level at Hidden Cave; three of them are of the narrow-based lanceolate form tentatively attributed to Period I at Owens Lake. The few projectile points in the Fallon assemblage seem to be of Lake Mohave type. Grosscup suggests an earlier date for Fallon than for Hidden Cave (Grosscup 1956, p. 63). By analogy with the Owens Lake sequence, I would put Hidden Cave earlier, but there is little evidence for either arrangement.

For the Altithermal Period the archaeological evidence consists of only two projectile points from Hidden Cave (Grosscup 1956, p. 61) and a baby burial from Leonard Rockshelter (Heizer 1951*b*, p. 92). No comparison with the Owens Lake sequence is possible.

The Lovelock Culture, which is dated to the Medithermal Period, can be cross-dated to the entire Little Lake and Rose Spring periods at Owens Lake. This culture is well represented at all the major archaeological sites excavated in West Central Nevada. The basic sequence of Early, Transitional, and Late Lovelock is based on perishable materials and hence cannot be compared to the Owens Lake sequence. The projectile points from Lovelock Cave include Humboldt Concave-base (Loud and Harrington 1929, Pl. 56l); Elko Eared and Elko Corner-notched (*ibid.*, Pl. 56a–b, p–q); Rose Spring Corner-notched and Rose Spring Contracting-stem (*ibid.*, Pl. 56d, g, k); Cottonwood Triangular (*ibid.*, Pl. 56e); Eastgate Expanding-stem, a well-made, broad-barbed form native to the Lovelock region (*ibid.*, Pl. 56h); and a notched base form resembling Pinto Sloping Shoulders (*ibid.*, Pl. 56n).

At Humboldt Cave, which is dated to the Transitional and Late Lovelock Periods, the projectile points are mostly small and stemmed: Rose Spring Corner-notched and Contracting-stem (Heizer and Krieger 1956, Pl. 14a–e), Eastgate Expanding-stem (*ibid.*, Pl. 14f, i), and Eastgate Split-stem, a similar form with a small notch in the center of the base (*ibid.*, Pl. 14h, j–k). A few larger forms occur at Humboldt Cave, but they cannot be related to any Owens Lake types (*ibid.*, Pl. 14l–n).

The projectile points from the upper levels at Hidden Cave (Top Midden and 32″ Midden; see Grosscup 1956, p. 61) are mostly finely chipped Pinto-like forms, but a few Elko and Eastgate types in the uppermost midden suggest the intrusion of later materials equivalent in time to the Rose Spring Complex. Elko forms are fairly abundant in surface sites in the Carson Sink, which rules out the possibility that their rarity at Hidden Cave is a local peculiarity, and implies rather that the bulk of the Hidden Cave deposit is pre-Elko in time—presumably Early Lovelock in terms of the sequence of perishable materials.

Central California shell beads were traded to the Lovelock area, just as they were to Owens Lake. An important shell bead complex associated with Early Lovelock includes square abalone and *Olivella* beads, circular abalone shell ornaments, *Macoma* clam discs, and other forms. The associations of the beads and ornaments in Central California are with the Early Horizon and the earlier part of the Middle Horizon. Most of the forms are also found with the early Berkeley and Early Island complexes of the California coast (Bennyhoff and Heizer 1958, pp. 63–65). This bead complex almost certainly places Early Lovelock earlier in time than Middle Rose Spring with its purely Middle Horizon shell bead associations.

The Western Nevada archaeological sequence ends with the Dune Springs phase, an assemblage marked by the presence of Desert Side-notched points and small stemmed (Rose Spring and Eastgate) points. Dune Springs is closely comparable to the Cottonwood Complex of Owens Lake, and ends—as does Cottonwood—in the historic period.

Recent excavations by Heizer and Baumhoff at Wagon Jack Shelter in eastern Churchill County, Nevada, have produced a projectile point sequence which probably corresponds in time to the period from Middle Rose Spring through Early Cottonwood. The points excavated belong to the Elko, Eastgate, Rose Spring, and Cottonwood series and to the Desert Side-notched type. The Elko types were found in the deeper levels, the others all in the upper levels (Heizer *et al.,* 1961). One may suspect that the upper levels are somewhat compressed, actually covering a period of time equivalent to Late Rose Spring and Early Cottonwood.

In West Central Nevada, then, we find a sequence of projectile point types which corresponds well with that at Owens Lake, though there are local differences between the two sequences at all times. The earliest materials, especially the Hidden Cave and Fallon phases, have analogies in Complexes I and II at Owens Lake. The intermediate phases (Leonard and Carson) are represented by materials too scanty for comparison. The Lovelock Culture seems closely comparable, in its projectile point typology, to the Little Lake and Rose Spring complexes. The sequence of Lovelock point types seems to be, first, the finely made Pinto-like forms, then the Elko Series, followed by Eastgate and Rose Spring types. The lack of Lake Mohave forms in the first of these assemblages suggests that it may be contemporary only with the latter part of the Little Lake Complex, and perhaps with the beginning of Early Rose Spring as well. The second assemblage, made up of Elko points, is probably contemporary with the latter part of Early Rose Spring and with Middle Rose Spring, while the Eastgate and Rose Spring assemblage is equivalent to Late Rose Spring. Finally, the Dune Spring phase, which introduces Cottonwood Triangular and Desert Side-notched points, should be contemporary with Early Cottonwood, and the continuation of this assemblage into historic times is comparable to the Late Cottonwood phase of Owens Lake.

Lassen County

For the area around Honey Lake in Lassen County, northeastern California, Francis Riddell has worked out an archaeological sequence based on excavations at the sites of Karlo, Tommy Tucker Cave, and Amedee Cave (Fenenga and Riddell 1949; Riddell 1956*a*, 1956*b*, 1958, 1960). The projectile point typology in this region is very similar to that of the Lovelock Culture, and many special Lovelock artifact types occur, especially at the Karlo site. The earliest cultural assemblage, the Karlo Period, is characterized by finely made Pinto-like projectile points like those from Hidden Cave, and by square abalone and mussel shell beads of Central California Early Horizon type (Riddell 1960, especially pp. 86–88). The shell bead and ornament assemblage is the same as that found with Early Lovelock (Bennyhoff and Heizer 1958, pp. 63–64), while the projectile points match those from the presumably Early Lovelock assemblage from Hidden Cave. Riddell suggests that the Karlo Period was coeval with all of Early and Transitional Lovelock, which would place it in time with Little Lake and Early and Middle Rose Spring.

The "Late" Period in Lassen County, as represented at Karlo and Tommy Tucker Cave, is characterized principally by Rose Spring and Eastgate projectile point types, and also by some Elko forms (Riddell 1956*b*, Pl. I; Fenenga and Riddell 1949, Fig. 58). Riddell considers that the large points from Tommy Tucker Cave (i.e., the Elko points) were brought in from earlier sites, rather than made during the occupation of the cave. However, the presence of both Middle Horizon and Late Horizon shell beads at the site suggests that the occupation extended farther back in time than previously realized (Bennyhoff and Heizer 1958, p. 72), and that the Elko points were made by the first occupants of the cave.

Finally, the Amedee Period of Lassen County, when Desert Side-notched and Cottonwood Triangular points were in use, represents the same late protohistoric and historic period as Dune Springs in Nevada, Kings Beach in the Martis area, Mariposa in the southern Sierra Nevada, and Cottonwood in the Owens Lake region.

Danger Cave, Utah

The archaeological materials recently published by Jennings from Danger Cave in the eastern Great Basin are closely analogous to those so far reviewed from the western Basin. However, because of the distance from Owens Lake and the evident mixture in the deposit at Danger Cave, comparisons with the Owens Lake sequence are not particularly fruitful. We may note, however, that the only projectile point from the deepest level of the site, with radiocarbon dates of 8320 ± 650 B.C. to 9503 ± 600 B.C., is of the narrow-base lanceolate form found in the Hidden Cave phase and in the hypothetical Period I at Rose Spring (Jennings 1957, pp. 93, 109).

Central California

The archaeological sequence for the Central Valley of California has been formulated by Lillard, Heizer, and Fenenga (1939) and Heizer and Fenenga (1939); for the San Francisco and Marin coast, by Beardsley (1954). Additional information comes from Bennyhoff and Heizer (1958). The most prominent cross-ties with the Owens Lake region are found in the shell beads and ornaments traded from the coast to the Valley and thence to the Great Basin. As we have seen, these beads show the contemporaneity of Middle Rose Spring with the Middle

Horizon of Central California, Late Rose Spring with Phase 1 of the Late Horizon, and Early Cottonwood with Phase 2 of the Late Horizon. California shell beads at other Great Basin sites, such as Tommy Tucker Cave, provide additional evidence for cross-dating these sites to the Owens Lake sequence. In addition, the presence of Early Horizon beads and ornaments in the Karlo and Early Lovelock assemblages gives a reasonable cross date for the Little Lake Complex, which shares its basic projectile point forms with Karlo and Early Lovelock.

Other traits shared by Central California and the Owens Lake region are slate "pencils" (Early Rose Spring and Early and Middle Horizons), steatite disc beads (Late Rose Spring and Cottonwood, Late Horizon), and Desert Side-notched points (Cottonwood and Late Horizon Phase 2). In addition, small stemmed points resembling those of the Rose Spring Series occur throughout the Late Horizon in Central California.

A much older archaeological assemblage is the Farmington Complex, which consists of amorphous percussion-flaked artifacts from ancient river gravels in the foothill region east of the San Joaquin Valley (Treganza 1952; Treganza and Heizer 1953). The artifacts, which certainly do not represent the entire cultural inventory of their makers, are not comparable to anything in the Owens Lake Region. Heizer and Treganza date them to the Anathermal Period, but point out that they could be earlier (Treganza and Heizer 1953, p. 31).

Southern California Coast

Information about the southern coast of California derives from Olson (1930), Jones (1956), and Bennyhoff and Heizer (1958), and from study of Olson's Santa Barbara and Santa Cruz Island collections in the Robert H. Lowie Museum of Anthropology. The earliest definite connection is with Middle Rose Spring. The *Tivela* disc beads and *Haliotis* ring beads associated with this phase are probably of south coastal manufacture, and occur in the Santa Barbara area in prelate times.

While these types indicate early trade with the south coast, in Late Rose Spring and especially in Cottonwood times there was marked south coastal influence on artifacts of local manufacture. Cottonwood Triangular and Cottonwood Leaf-shaped projectile points are both nearly identical to common south coast types, though the coastal specimens are of chert rather than of obsidian. The triangular form, especially the concave-base variety, is limited to protohistoric and historic times on the south coast, where the points are all small like those from Owens Valley. The leaf-shaped points—which in the Santa Barbara area show all the variations known from Iny-2 and closely resemble them in length-width-thickness proportions—extend farther back in time and have a continuous range in size from very small arrow points to large dart points. Probably the smallest south coast specimens of this form are also protohistoric and historic in time. Steatite disc beads (Late Rose Spring and Cottonwood) were made virtually throughout the Santa Barbara sequence.

It is likely that neither trade nor typological influence between Owens Lake and the southern California coast was direct. Rather, they would have extended through the little-known Southern San Joaquin Valley, whose occupants would have received coastal objects and ideas and passed them on to the Sierra.

Cross-dating

Table 9 is an attempt to represent the temporal relations of the various cultural sequences reviewed above, as they appear in comparison with the Owens Lake sequence. Like all such comparative chronological charts, the one presented here is based partly on archaeological evidence and partly on guesswork. Future field work will prove or disprove the accuracy of the guesses. The chart may be compared with Bennyhoff's recent chronological chart for the Great Basin (Bennyhoff 1958, after p. 112). Where my correlations differ from Bennyhoff's, the differences are based partly on evidence not previously available, partly on differing interpretation of ambiguous evidence, and partly on the fact that I am looking at the area from the point of view of the Owens Lake sequence. At most of the points of difference, either chart may be right or both may be wrong.

The cross dates proposed in table 9 are based on three kinds of evidence: the presence of Central California shell beads and ornaments as trade objects in specific Great Basin cultural assemblages; similarity of artifact types, especially projectile points, in different assemblages; and, for the earlier periods, relative position in the time scale of post-Pleistocene climatic changes. The shell beads have already been discussed at some length. There are two important groups of them. The first is the complex of square *Olivella, Haliotis* and mussel shell beads and associated forms, which occurs in Early Lovelock, Karlo, the Early Horizon (some forms Middle Horizon) of Central California, and early assemblages on the San Francisco and Santa Barbara coasts. Bennyhoff dates the Basin representatives of this complex as coeval with the early Middle Horizon; I see them as extending back into Early Horizon times. The second group of shell beads is the series of Middle Horizon and Late Horizon types which are found at Rose Spring, Cottonwood Creek, and Tommy Tucker Cave. These beads provide precise cross dates for Middle and Late Rose Spring and the Cottonwood phases, as shown in table 9, and indicate the general time range of Tommy Tucker Cave relative to the Central California sequence.

The succession of projectile point types over much or all of the Western Great Basin appears to be strikingly regular, so much so that one may postulate a series of cultural "horizons" characterized by particular point types. The Pinto forms, typical of Little Lake, Pinto Basin, Crane Flat, Karlo, and Early Lovelock, are the earliest group of points known to occur over the entire Western Basin. They are followed by the Elko Series (Middle Rose Spring, Amargosa, Mesquite Flat, and presumably late Karlo and Transitional Lovelock), the Rose Spring and Eastgate Series (Late Rose Spring, Stone Mound, Tamarack, Tommy Tucker, and Late Lovelock), and finally the Desert Side-notched and Cottonwood Triangular types, which seem to be ubiquitous in the Great Basin and its western fringe areas in late prehistoric and historic times. Within each of these "horizons," the key point types occur in locally different cultural contexts, and evidently with some local differences of sequence. Certainly we may expect that each type was earlier in some part of its area of distribution than in others. The widely diffused point types are links between different local cultures, implying at least approximate contemporaneity, but they are not evidence of cultural homogeneity throughout the area.

TABLE 9

TENTATIVE CORRELATION OF WESTERN GREAT BASIN AND CALIFORNIA SEQUENCES

Climatic Stage	Date	Central California	Owens Lake	Mohave Desert	Death Valley	Yosemite Valley	Lake Tahoe	Lassen County	Western Nevada
		Late Horizon 2	Cotton-wood	"Desert Mohave"	DV IV	Mariposa	Kings Beach	Amedee	Dune Springs
	AD 1000	Late Horizon 1	Late Rose Spring		DV III	Tamarack		Tommy Tucker	Late Lovelock
	BC–AD		Middle Rose Spring	Amargosa	Late DV II		Martis		Trans. Lovelock
Medithermal	BC 1000	Middle Horizon	Early Rose Spring		Early DV II	Crane Flat		Karlo	Early Lovelock
	2000	Early Horizon	Little Lake	Pinto					
	3000								Carson
Altithermal	4000								Leonard
	5000		(Owens Lake II)*	Lake Mohave	DV I				Fallon
Anathermal	6000	Farmington							Humboldt
			(Owens Lake I)*						Hidden Cave
	7000								

* ( ) = tentative archaeological complex.

Previous to the Pinto "horizon," both the Lake Mohave–Silver Lake complex and the narrow-based lanceolate points of Hidden Cave type give promise that similar typological horizons will some day be defined for very early periods. For the present, however, these earlier manifestations are too scantily documented to permit such a formulation.

Until more secure information on the distribution of pre-Pinto artifact types is available, the cross-dating of these early assemblages must depend in large part on the evidence linking them to the sequence of post-Pleistocene climatic changes. This question is discussed in detail in Appendix 4. Of the various early assemblages shown in table 9, Humboldt and Hidden Cave seem firmly dated to the Anathermal Period and Carson and Leonard to the dry Altithermal Period, on the basis of evidence presented by their excavators and supported by radiocarbon dates. The precise placement of these assemblages within their respective periods depends on the radiocarbon dates, to be discussed below. Farmington is certainly old but, as its finders point out, there is room for choice as to its exact age (Treganza and Heizer 1953, p. 31). The hypothetical Complex I at Owens Lake is placed at what may be an excessively early date because its one known artifact type, the narrow-based lanceolate point, is so similar to Hidden Cave type points. The Lake Mohave complex, which includes the Fallon phase of Nevada and our hypothetical Complex II at Owens Lake, is generally attributed to the Anathermal Period (Antevs 1937; Grosscup 1956, p. 62). However, the component assemblages of this complex are without exception surface finds, and the evidence for such an early date cannot be considered conclusive. In fact, the only excavated Lake Mohave points in our entire area are from Little Lake, where they are associated with Pinto points in a demonstrably Medithermal context. Given the evidence that the Great Basin was habitable during the dry Altithermal Period (see Appendix 4), it is reasonable to assume that the Lake Mohave complex as a whole immediately preceded Little Lake. The position shown for it in table 9 represents a compromise between this view and Antevs' Anathermal dating.

Absolute Dating

The problem of the absolute age of the various periods in the Owens Lake sequence has been reserved until last, because it depends almost exclusively on the absolute dates for cultures in neighboring regions. Other than the paleoclimatological evidence mentioned above and discussed in Appendix 4, the evidence is of two sorts: the occurrence of glass beads and other European objects in very late sites, and radiocarbon dates. Although a few stray objects of non-Indian manufacture may have made their way into the Western Basin before the nineteenth century, it is to be doubted that glass beads arrived there in any quantity until well after 1800. Grosscup sets 1840 as the dividing line between the protohistoric and historic periods of the Carson Sink region, and this date may be a reasonable one for the entire western Great Basin (Grosscup 1956, p. 62).

Most of the year dates indicated in table 9 depend on the radiocarbon dates for Central California and Western Nevada, though there are a few useful radiocarbon dates for other regions shown on the table. Central California dates have been discussed by Heizer (1951*a*; 1958). His original guess dates of 2500 B.C.

for Early Horizon, 1500 B.C. for Middle Horizon, and 500 A.D. for Late Horizon Phase I, have turned out to be remarkably accurate in the light of the radiocarbon determinations. The Early Horizon is now seen to end about 2000 B.C. and the Middle Horizon some time between 300 and 500 A.D. (Heizer 1958, p. 7). Bennyhoff now dates the beginning of Phase II of the Late Horizon to 1500 A.D. (Baumhoff and Byrne 1959, p. 60). This estimate is fully borne out, and the dates for late Middle Horizon and Late Horizon Phase I substantiated, by several recent radiocarbon determinations published by the University of Michigan laboratory (Crane and Griffin 1959, p. 190, M-752; Crane and Griffin 1960, pp. 42–43, M-865, M-866, M-884, M-886).

Radiocarbon dates for Western Nevada have been listed and discussed by Heizer (1951*a*; 1956, p. 55) and Grosscup (1958; 1960, pp. 10–12). All the data on Nevada dates are recorded by Grosscup (1958, Table 1). In the Humboldt Lake region, the Humboldt Culture dates range from 5000 to 9000 B.C., the Leonard Culture around 3800 B.C. Combining radiocarbon dates for Lovelock Cave with a rate-of-deposit approach, Grosscup estimates 2000–1000 B.C. for Early Lovelock, 1000–1 B.C. for Transitional Lovelock, and 1 B.C. to 900 A.D. for Late Lovelock (Grosscup 1960, p. 12). The dates for Late Lovelock seem a bit early, but the others are certainly reasonable. Dates from other Lovelock Culture sites, including Humboldt Cave and Hidden Cave, agree with those from Lovelock Cave.

Other Nevada dates of interest here are two from Stuart Rockshelter in Clark County, both around 2000 B.C., for an assemblage said to include Pinto points (Harrington 1957, p. 72), and one from South Fork Shelter in Elko County. The latter determination, 1359 ± 100 B.C., is for a deposit which includes Elko Series points and a few Pinto-like forms (Heizer *et al.*, 1961). This date would fit early in the estimated time range for Early Rose Spring (table 9), which also includes both Elko and Pinto points. If the deeper levels of the South Fork site date much earlier than this, however, then we must conclude either that my estimated date for Early Rose Spring is too conservative, or that Elko points are substantially earlier in eastern Nevada than in Inyo County.

A date of 392 ± 150 B.C. from the Karlo site in Lassen County is considered to date the Transitional Lovelock culture at that site (Riddell 1960, p. 91). One may guess that its associations there are with Elko-like, rather than Pinto-like, projectile points.

Finally, though Utah is not shown in table 9, the radiocarbon dates from the deepest level at Danger Cave (Jennings 1957, pp. 93, 109) suggest that narrow-based lanceolate points of Hidden Cave and Owens Lake I type may be as old as 8000 or 9000 B.C.

As a final comment on absolute dating, we may note Baumhoff and Byrne's estimate of 1300 A.D. for the introduction of Desert Side-notched points to the Owens Valley region (Baumhoff and Byrne 1959, pp. 60–61). This estimate, based on the assumption of gradual diffusion of the Desert Side-notched form from the Southwest, places the beginning of the Cottonwood Complex somewhat earlier than the beginning of Phase II of the Late Horizon in Central California.

SUMMARY

INY-372 IS AN IMPORTANT aboriginal habitation site located beside an active spring south of Owens Lake in Inyo County. Excavations by Harry and Francis Riddell did not bring to light any evidence that it was a permanent village, but did uncover a stratified midden deposit which is strikingly deep for an open site in the Great Basin. Analysis of their collections shows that the site was an important hunting camp and workshop, where blades and other artifacts of obsidian were made for export to the west in exchange for shell beads and ornaments.

A stratigraphic analysis of the artifacts from Iny-372, combined with published and unpublished information on other sites in the Owens Lake-Little Lake region, has permitted the formulation of an archaeological sequence with estimated dates as follows:

Late Cottonwood	1840–1900 A.D.
Early Cottonwood	1300–1840 A.D.
Late Rose Spring	500–1300 A.D.
Middle Rose Spring	500 B.C.–500 A.D.
Early Rose Spring	1500–500 B.C.
Little Lake	3000–1500 B.C.
Hypothetical Complex II (Lake Mohave)	ca. 5000 B.C.
Hypothetical Complex I (lanceolate points)	ca. 7000 B.C.

An attempt has been made to cross-date this sequence to those of neighboring regions. The proposed cross dates are certainly not all accurate, but in general outline they are probably not too far from the truth. A comparison of the cross-dated sequences suggests that there is a high degree of regularity in the succession of projectile point types in the western Great Basin, with four distinct archaeological "horizons" represented by (1) Pinto, Pinto-like, and associated leaf-shaped points; (2) Elko points; (3) Rose Spring and Eastgate points; and (4) Desert Side-notched and Cottonwood Triangular points.

Appendix 1

REPORT ON THE TEST EXCAVATION OF THE ROSE SPRING SITE, INYO COUNTY, CALIFORNIA

BY

FRANCIS A. RIDDELL

For a period of eleven days (June 7 to 17, 1956) intensive test excavation was made at an aboriginal habitation site (Iny-372) located near Rose Spring in the SW 1/4 of the SW 1/4 of the NW 1/4 of Sec. 14, T. 21S., R. 37E., in Inyo County, California. The four-man crew of archaeologists included David Biernoff, Frank Clune, Fred Cross, and Jack Smith. The excavation was supervised by the author, Graduate Research Archaeologist I for the University of California Archaeological Survey. In addition the expedition was augmented by Harry S. Riddell, Jr., who was instrumental in making local arrangements for the excavation of this deep stratified desert site. Recognition is here given Mr. and Mrs. Riddell for their substantial aid as local residents and for the free time, labor, and food given the expedition by them. Water and other facilities were generously supplied by the personnel of the City of Los Angeles Haiwee Power Station. I wish to express here appreciation of all these kindnesses by the local inhabitants.

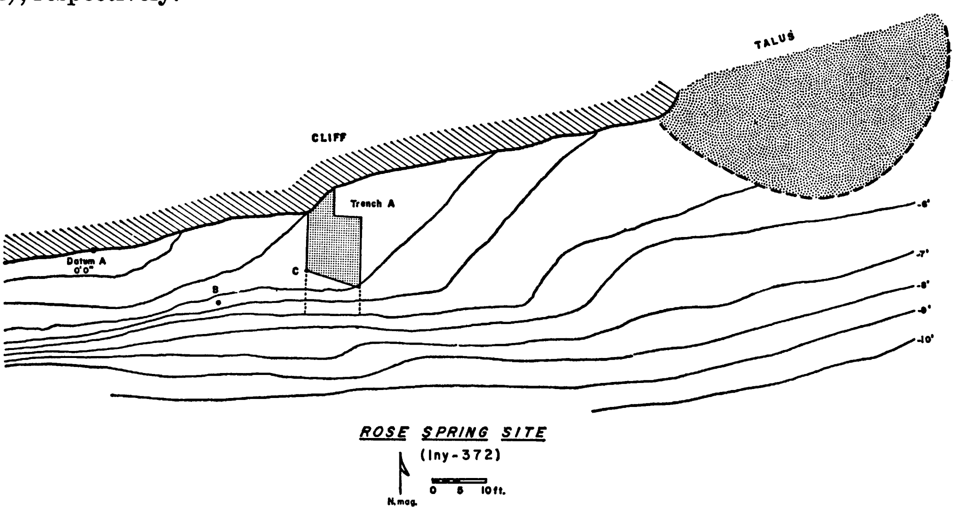
Permission for excavation upon federal property was obtained through the office of the Secretary of the Interior. The permit was issued to Dr. R. F. Heizer, Director, University of California Archaeological Survey, and was signed by Mr. D. Otis Beasley, Assistant Secretary of the Interior. The permit bears the date of March 1, 1956.

It was desirable to excavate the Rose Spring site because of its great depth as compared to other open, desert sites, and because it was recognized as a stratified site in which pottery is to be found only in the upper few inches of deposit. Digging of the site would seem to afford an excellent opportunity to determine the prehistoric cultural sequence for that region of the Great Basin. The work done there in the eleven-day period was successful in this respect.

A large portion of the site was destroyed when the Los Angeles aqueduct was constructed a short distance to the east in 1912–1913. Although a section of the site and some of the surrounding soil was used as fill, a segment of the site lying against a vertical stone cliff was left untouched by these construction activities. This remainder forms a bench, about 40 feet wide and several hundred feet long, which lies above the borrow pit. The steep contours on the accompanying site map (map 2) delimit the encroachment of the borrow activities upon the site.

Rose Spring, which is still semiactive, is one reason for the existence of the deep habitation site beside it, and for the mass of obsidian chips and implements to be found on the surface for several acres around the site. Local inhabitants state that the spring was also a stagecoach stop during the preautomobile period. Also, because of the water supply, the area has been of significance to stockmen. The Indians probably utilized the spring and site until, and possibly during, historic times. The recovery of projectile points and pottery types which occur in the historic period supports this possibility.

Local collectors have on occasion misused the site and have left several pits open. One of these was dug into the sloping face of the cut-bank on the south edge of the remaining site deposit. This pit was opened, cleared, and enlarged by the Archaeological Survey party to provide a vertical face for the trench which was subsequently dug by our crew. A permanent datum (A) was established on the head of an iron bolt driven into the cliff face a few inches above the surface. This point (upon the head of the bolt) was assigned an arbitrary elevation of 0.0′. All vertical and horizontal measurments have ultimate reference to this point, or datum. Subsidiary datum points (B and C) were established at the point of location of the surveying transit and at the southwest corner of the trench (Trench A), respectively.



Map. 2. Rose Spring site (Iny-372).

Since the physical stratification of the deposit was not fully determinable until after the excavation had been completed, it was decided that the deposit should be excavated in one-foot levels from the surface. The entire deposit removed (almost exclusively with shovels) was passed through a screen of ⅜-inch wire mesh. Trowels and brushes were used whenever features or burials were encountered.

As the deposit was screened by vertical one-foot intervals a change in artifact types and frequency as well as physical stratification of the site was observable. Pottery fragments of Owens Valley Brown Ware were of importance only in the first foot below the surface, although some pieces also were found in the 12-to-24-inch level. In the first two one-foot levels a considerable number of small, lightweight, "late" type obsidian arrowpoints were recovered; among these were a number of side-notched points commonly called "Shoshone" points [i.e., Desert Side-notched points]. Such points were used ethnographically in the region and are thus expectable in the top levels of the site mass. These "Shoshone" points are not found in any quantity below 12 inches and do not occur at all below 24 inches. The late period of occupation of the site is thus tentatively identified in the top 24 inches, or more exactly, in the deposit lying above the disturbed sediment stratum which appears at a depth from surface of about 30 inches (see profile sketch of west wall, fig. 1). Burials 1, 2, and 3 appear to have originated above the sediment stratum but were intrusive through it into the midden below. Burial 4 originated in the gray rock/sand midden which lies below the sediment stratum. This burial was partially intrusive into the lowest stratum of midden, which is tan colored and sandy in contrast to that lying above.

Physically the strata immediately above and below the sediment stratum are quite similar. They are gray rock/sand midden deposits containing great quantities of obsidian flakes. The base stratum has a considerably lighter concentration of obsidian flakes. All levels show heavy concentrations of charcoal, which often occurred in lumps easily picked from the screens. The sediment stratum evidently was formed when the site was flooded and covered with several inches of fine, tan silt. Subsequent occupation has considerably disturbed this water-laid deposit, but its position is clearly observable in profile.

Below the sediment stratum the artifactual yield dropped sharply as compared with the yield above it. This is probably one of the most significant, or at least most easily observable, features of this site. As depth is gained a subtle change may be detected in projectile point size and weight, and, to some extent, in type. The points become heavier, and leaf or lanceolate points appear.

Another significant feature of the site, other than the decrease in artifact yield with the increase of depth, is the extreme paucity of milling stones at any level. Several manos and metates only were recovered, and some of them were fragmentary. Already mentioned is the tremendous amount of chipping refuse throughout the deposit, and upon the surface in areas adjoining the site. The lack of milling implements and the occurrence of much chipping refuse suggests that the site functioned primarily as a manufacturing center. Supporting this suggestion is the recovery of fragments of large obsidian blade blanks and the lack of any quantity of artifacts usually associated with a site normally functioning as a village. It can be supposed from this evidence that quantities of obsidian were taken to the site so that the work of chipping out the desired product could be done where water was available in an otherwise arid region. The purpose of the mass production of obsidian implements at Rose Spring was, in all probability, for trade with other groups. Trade of blank obsidian blades was probably important to the San Joaquin Valley of California where obsidian was not so easily obtained locally. The great residue of both large and small chips from the deposit cannot be explained in terms of the small number of obsidian points found during the excavation of the site. The blank fragments recovered rather clearly attest to the fact that the Rose Spring site was a manufacturing center for obsidian blade blanks, and possibly for a variety of other blanks and cores which could be traded to other groups for items desired by the Rose Spring villagers.

On a bluff just south of the site is a large and extensive occupation area with only a surface deposit evident. Obsidian chips are profusely scattered over several acres and a granite boulder has 6 or 8 mortar pits in it. This surface site can probably be considered as an adjunct to the Rose Spring site, and it is possible that the bedrock mortar was utilized by the inhabitants of the deep, stratified site. This might partially account for the scarcity of food-grinding implements at the Rose Spring site.

Probably a high percentage of the obsidian flakes from Iny-372 was utilized as scrapers. It was common during the excavation to find flakes which had one or more use-retouched edges. The high incidence of such implements is certainly directly related to the mass of flakes at hand at any moment for use when such a tool was needed.

The specimens recovered during the excavation of the site are deposited in the Robert H. Lowie Museum of Anthropology, University of California, under the accession number UCAS 413.

APPENDIX 2

IDENTIFICATION OF ANIMAL BONES FROM INY-372

By

GROVER S. KRANTZ

MAMMAL BONES from Test Pits A–C and Trench I have been combined for convenience. These finds are divided into one-foot levels, the deepest level, which is least productive of bone, being from 7 to 8 feet. No bone was recovered below a depth of 8 feet.

Identification of the bones was made at the Robert H. Lowie Museum of Anthropology with the aid of the author's personal collection of North American mammal bones. Identification was based mostly on cranial bones. All postcranial remains were so fragmented as to make identification almost impossible.

The species identified are the following:

Rabbit (*Lepus californicus*)
Coyote (*Canis latrans*)
Grey fox (*Urocyon cinereoargenteus*)
Horse (*Equus caballus*)
Domestic sheep (*Ovis aries*)
Big horn or mountain sheep (*Ovis canadensis*)
Deer (*Odocoileus* sp.?)
Prong-horn antelope (*Antilocapra americana*)
Domestic dog (*Canis familiaris*)
Chipmunk (*Eutamias* sp. ?)
Squirrel (*Sciurus* sp.?)
Small native rodents, not specifically identified
A small mustelid, not specifically identified
Bird, unidentified

The entire deposit is relatively homogeneous. Rabbits, which make up over half of the identified individuals, predominate in all layers with no evident change in representation.

The upper two feet of deposit contain several shifts in animal types which may reflect influences indirectly from European societies. The clearest evidence of this is the presence of horse remains. Other changes can be seen in the following list, which gives minimum numbers of individuals of each species in each one-foot level.

0–12″
3 rabbits
1 coyote
1 grey fox
1 horse
2 sheep

12–24″
4 rabbits
2 mountain sheep
1 horse
1 coyote
1 deer
1 bird

24–36″
8 rabbits
4 small rodents
1 prong-horn antelope
1 mountain sheep
1 domestic dog
1 human, infant

36–48″
7 rabbits
3 small rodents
2 mountain sheep
1 small mustelid

48–60″
11 rabbits
3 small rodents
1 human

60–72″
11 rabbits
5 small rodents
1 prong-horn antelope
1 canid, dog or coyote
1 sheep, presumably mountain
1 human

72–84″
11 rabbits
6 small rodents
2 chipmunks
1 squirrel
1 mountain sheep
1 bird
1 human

84–96″
1 rabbit
1 prong-horn antelope

In addition to the horse, the upper two feet contain the only occurrences of fox, coyote, and deer. The native rodents are conspicuously absent from these layers, whereas they were the second most common mammals earlier. The sheep of the first layer are smaller than the earlier ones, and are probably domestic sheep.

The only clearly identifiable dog was a piece of the lower border of the mandible found in the third level (24″ to 36″). It compares favorably with other known American Indian dog skulls. Since the only positively identified coyotes are from higher levels, I am tempted to call the canid specimen from the sixth level a dog. It is impossible, however, to be certain about this.

The prong-horn antelope was identified only from fragments of upper molars. Its presence in three widely separated layers indicates that it was a constant part of the local fauna, though rarely taken. These specimens indicate a variety of antelope substantially larger than the modern ones, but are not different in any other way I could detect.

Postcranial bones of large mammals make up about nine tenths of the bone mass in all levels. Since mountain sheep are the most common of the identified large mammals, it can be concluded that about half the meat consumed was from these mountain sheep. Rabbit and antelope are the only other significant food animals.

Birds are conspicuously absent from the deposit. Only two bird bones were found, and these were not further identified.

The occurrence of two chipmunks and a squirrel in the seven-foot layer is strange. These two related forest dwellers are not found in any other layer. They were probably brought in from somewhere else, and were not part of the local fauna.

The small mustelid mentioned in the fourth level is also an isolated occurrence. The specimen is an upper canine with a damaged tip, so identification is virtually impossible. The animal was somewhere between a skunk and a fox in size.

The whole fauna indicates clearly an unchanging and quite arid environment. The only mammal well represented in the deposit which does not fit this picture well is the mountain sheep, and this was a major food animal, no doubt worth some effort to bring in.

Among the artiodactyl limb bones (antelope, sheep, or deer) there were a few, about one tenth of the total, which appeared to be much more weathered than the rest. This is not just one end of the range of variation of weathering, as there is a distinct hiatus between the two groups. I have no explanation to offer for this phenomenon.

Among the rabbit remains, lower jaws outnumbered other cranial fragments by about 5 to 1. Of the other parts of the cranium found most were upper jaws. It is tempting to conclude that the rabbit brains were eaten, including the relatively soft cranial bones.

Isolated human bones (only hands and feet) were found in several levels. These presumably strayed from burials.

APPENDIX 3

HUMAN SKELETAL REMAINS FROM INY-372

BY

KENNETH A. R. KENNEDY

THE SITE CONTAINS the skeletal remains of five individuals. The bones are fragmentary and their degree of preservation is poor. Three crania and one calvarium are acceptable for anthropometric analysis. Several of the long bones were restored and measured for the purpose of estimating stature (Trotter and Glesser 1952). The data are tabulated in the accompanying table (table A).

The crania of the two females are mesocephalic. The cranium of the male is not well enough preserved to permit an estimate of its cranial index, but from visual examination it appears to be strongly dolichocephalic. The vaults of the female skulls are orthocranial (9901) and hypsicranial (9899). Nasal indices are mesorrhinic (9900) and chamaerrhinic (9901). All three crania have hypsiconch orbits. The face of the one female measured is mesene (9901). The palate is leptostaphaline (9900, 9901). Stature is short for two females and slightly taller for the male.

The cranial shape is ovoid but two skulls (8904, 9899) have a torsional orientation along the bregma-lambda medial line which results in a bulging of the right parietal region. Since evidence of artificial deformation or pathology is absent, this may well be a postmortem condition. The degree of muscularity for both sexes is remarkably slight. Brow ridges are divided and the glabella is small, save for the large glabella of one of the females (9899). The frontal region is of medium height and the slope is moderate. Metopism is absent. One of the female skulls (9899) exhibits a low frontal crest extending from glabella to bregma. Postorbital constriction is small in the male and larger in the females. The breadth of the frontal region is medium. Elevations of the saggital, temporal, and occipital regions range from small to medium, those of the male being more pronounced for the occipital region only. The postcoronal depression is small for all crania. One of the female skulls (9901), however, has a pronounced flattening both here and in the lambdoid region; consequently, the area along the saggital suture from bregma to lambda is a continuous flat plane, a deformation perhaps induced by the individual's having borne burdens balanced on her head. For all crania the inion is small and bosses are never prominent. The malars are of medium size and have slight anterior and lateral projections. This lateral development is quite large, however, in one female skull (9899). The zygomatic processes are of little thickness for all crania. With the exception of the female skull with the pronounced glabella, the nasal depression is absent. Nasal root height is in the medium range. Nasal sills are sharp and subnasal grooves are absent. Midfacial prognathism is pronounced in the male and the height of his palate is unusually great. A high palate is also seen in the orthognathous female cranium (9901). Palatine tori for all crania are medium in size and assume the shape of a mound. Orbital form is square and orbital inclination is slight.

The size of the mandible for the three specimens shows great variability, that of the male being heavy and thick, but in actual measurement of smaller size than

TABLE A

MEASUREMENTS OF SKELETAL REMAINS FROM INY-372

Anthropometric Measurements	Catalogue No.			
	12-9900	12-8904	12-9899	12-9901
	Provenience			
	Burial 2	Burial A	Burial 1	Burial 3
	Sex			
	Male	Female	Female	Female
	Age			
	50-55	50-55	60-65	25-30
Glabella-occipital length	172*	....	168	176
Maximum width	....	135	132	134
Auricular height	....	....	117	105
Bizygomatic diameter	....	....	....	122
Menton-nasion height	118	....	....	....
Prosthion-nasion height	72	....	....	67
Nasal height	52	....	....	44
Nasal breadth	24	....	....	24
Orbital height	....	....	38	34
Orbital breadth	....	....	41	38
Internal palatal length	54	....	....	47
Internal palatal breadth	40	....	....	37
Mandibular length	66	....	94	84
Bicondylar width	114	....	127	125
Cranial index	....	....	78.5	76.1
Auricular index	....	....	69.6	59.6
Total facial index	....	....	....	....
Upper facial index	....	....	....	54.1
Nasal index	46.2	....	....	54.5
Orbital index	86.5	....	92.6	88.2
Internal palatal index	74.1	....	....	78.7
Mandibular index	57.8	....	74.0	67.2
Estimated stature	159 cm.	148 cm.	153 cm.	
[from] Long bones	Femur-412	Femur-381	Humerus-285	

* All measurements are expressed in millimeters except as indicated.

the female mandibles. The degree of chin projection for the male is greater than for the female and the form is bilateral whereas the form for the females is median and their total mandibular development is of high metric value. The male, in combination with his midfacial prognathism, shows a pronounced alveolar development of the mandible, a high mylo-hyoid ridge and large genial tubercles. The eversion of the gonial angles is slight for all the mandibles in the sample.

Eruption of the teeth is complete and there is little evidence of crowding. The degree of wear ranges from slight to medium, but even in the oldest female it is not excessive. Caries are low in frequency although abcess had advanced in one mandible (9899). Another specimen (9901) contains shovel-shaped incisors, but they are not present in the other individuals of the series. The male has an edge bite. Pyorrhea is absent.

With respect to individual morphology, these crania reveal a range of variability such as might be expected in a fairly homogeneous population. In brief, these variants are observable in the following forms: (1) a male (9900) with slight frontal, parietal, and occipital crest development, but with pronounced facial and alveolar prognathism, a high palate, and a robust mandible; (2) a female (8904) whose calvarium shows slight muscular development: (3) a female (9899) with a large glabella and medium-size brow ridges, a crest in the metopic region, some lateral projection of the malars, but smaller mandibular development; (4) a female (9901) with pronounced postcoronal and lambdoidal depressions, a low frontal height, broad nose, and high palate.

These crania are well within the morphological limits ascribed to skeletal material in the area of the Great Basin. I have compiled the metric data of this region as this is reported in the published literature and from examination of skeletons in the Robert H. Lowie Museum of Anthropology at the University of California in Berkeley (Kennedy 1959). Comparison of the sample of Iny-372 with the larger series in this compilation shows them to be compatible with metric data of other crania from southern Nevada and southeastern California. Great Basin skeletal material from California has been classified by Gifford (1951, p. 86) into two groups—a California type (Washo and Northern Paiute) and a western Mono type. The latter class is distinguished by having narrow heads, high faces, medium noses, and medium stature. The individuals from Rose Spring share these traits. The central area of the Great Basin that includes southern Nevada reveals a high percentage of dolichocephalic males within a population that is basically mesocephalic. This throws some light perhaps on the position of the dolichocephalic male from Iny-372. It is the view of Loud and Harrington that dolichocephaly is the older pattern in this area and that crossings with brachycephalics from California are of recent origin (Loud and Harrington 1929, p. 32). Boas makes a study of these brachycephalics in the neighboring Serrano and Coahuila territory (Boas 1895). In both stature and cranial criteria, they are distinct from the Nevada and Iny-372 material.

In summary, the four crania from Rose Spring, Iny-372, represent a morphological unit characteristic of this section of the Great Basin. This view is confirmed by comparison with other samples from southern Nevada and California and contrasted with Boas' "Mission Indians" farther south. Variables such as pronounced height of the palate, hypsiconch orbits, and the degree of the frontal development are traits which may be minor differences within a homogeneous population. If these are local genetic developments, their nature and extent can be ascertained only by metric studies of additional crania from the western Great Basin.

APPENDIX 4

PROBLEMS RELATING TO EARLY MAN

BECAUSE EARLY CULTURES in America are generally known only through their stone industries and are most readily identified by their projectile points, the "early man" problems with which we are concerned here are those relating to the identification, distribution, and dating of early projectile point types, or of types to which an early age has been attributed. In this paper we have dealt with four groups of projectile points of this sort: Pinto, Lake Mohave-Silver Lake, Gypsum Cave, and the narrow-based lanceolate form.

Pinto points and the associated leaf-shaped forms were first discovered in camp sites on the surface at the Pinto Basin. On the assumption that these surface camps were associated with a period of maximum rainfall which filled the old Pinto River, they were dated to shortly after the end of the Pleistocene (Campbell 1949; and Campbell *et al.* 1935, pp. 17–19, 30–31). Antevs evidently does not accept such an early date for the Pinto Basin site, but he relies on the same assumption in dating Pinto points collected by the Campbells on the surface at Owens Lake to the early Post-Pleistocene, 8,000–9,000 years ago (Antevs 1952, pp. 27–28).

The Pinto point assemblage at Little Lake is assigned by Harrington to the early Medithermal, 3,000–4,000 years ago, partly on the basis of positive evidence of a moister climate than the present (tree root-holes contemporary with the occupation of the site), partly because the excavated animal bones represent an entirely modern fauna (Harrington 1957, pp. 70–72). In support of this dating, he cites radiocarbon dates of 3,870 ± 250 and 4,050 ± 300 years ago for a Pinto deposit in the Stuart Rockshelter, Moapa, Nevada (*ibid.*, p. 72). Other cultural assemblages in the same time range, as evidenced both by a good series of radiocarbon dates and by association with a distinctive complex of shell beads traded from Central California, are Karlo and Early Lovelock. The dominant projectile point forms in these assemblages are certainly closely related to Pinto points, being very similar to them in form and size, if not in workmanship.

A still more recent age for Pinto points has been proposed by Rogers, who equates the Pinto industry of the Mohave Desert with Basket Maker I. Apart from the fact that such a comparison seems to be sheer fantasy, Rogers' proposed age of 800 B.C. to 200 A.D. would make the Pinto industry contemporary with the Elko and even the Rose Spring and Eastgate point types.

The range of proposed ages of Lake Mohave-Silver Lake points is much the same as that for Pinto points, but there is less positive evidence which can be used to assess the proposed dates. Limited numbers of Lake Mohave points were associated with the Pinto types at Little Lake, but all finds of pure Lake Mohave and related assemblages in the western Great Basin have been on the surface. Antevs dates the Lake Mohave site to the final stage of the Provo Pluvial at the end of the Pleistocene, 9,000 years ago or older (Antevs 1937; 1952, pp. 26–28), as usual on the assumption that the camp sites were occupied at a time of high lake levels. On the same assumption, he dates finds of Lake Mohave points at Owens Lake to the Altithermal (Antevs 1952, p. 28). On the basis of similar reasoning, the Lake

Mohave industry of Death Valley and the related Fallon phase of the Carson Sink have been attributed to the Anathermal period (Wallace 1958, p. 11; Grosscup 1956, p. 63).

Once again, Rogers' proposed date is much more recent: 1200–800 B.C. for the "Playa" (Lake Mohave) industry of the Mohave Desert (Rogers 1939, Pl. 21).

The range of dates attributed to projectile points of Gypsum Cave type is just as great. In Gypsum Cave, they occur in apparent association with sloth dung, with radiocarbon dates of 10,455 ± 340 and 8,527 ±250 years. Antevs regards these dates as too old, Aschmann considers them much too recent because of contamination of the sample, and Heizer points out that the association of man and extinct sloth in the cave can only really be established by running radiocarbon determinations on some of the wooden artifacts associated with the Gypsum Cave points (Harrington 1933, pp. 164–171; Heizer 1951*a*, pp. 23–24; Antevs 1952, p. 26; Aschmann 1958, p. 34).

Every other datable occurrence of Gypsum Cave points in our area suggests a much more recent time, probably this side of 2000 B.C. At Iny-372 the type is found in strata 2 and 3, Early and Middle Rose Spring. Bennyhoff illustrates a Gypsum Cave point from 18–36″ depth at Mrp-105, Crane Flat Complex (Bennyhoff 1956, Fig. 1b′). They occur in the Mesquite Flat or Death Valley II complex (Wallace 1958, Fig. 1k) in association with Pinto and Elko points, as at Rose Spring. Harrington reports one from the Stahl Site Cave, the occupation of which ranges from the Little Lake through the Cottonwood periods. Harrington interprets this specimen as a very early point, but there is no evidence of any pre-Pinto occupation of the cave (Harrington 1957, pp. 80–81). Finally, Rogers associates Gypsum Cave points with the Pinto industry, but reports five sites at which they occurred without Pinto points, and one case in which Pinto points occurred stratigraphically below a camp deposit with Gypsum Cave points (Rogers 1939, p. 47).

Antevs tentatively accepts both the terminal Pleistocene-Anathermal dates and the early Medithermal dates for all these point types, suggesting the coexistence of several different cultures in the California desert from 10,000 until 2,000 or 3,000 years ago (Antevs 1952, pp. 27, 29). I find such a situation inconceivable. If such different cultures were to continue unchanged, side by side in a single region for 8,000 years, it would imply no contact, no trade, no intermarriage, no leveling influence of any sort—in fact, a degree of self-imposed isolation unheard of in human history.

If these various cultural assemblages, each characterized by particular projectile point types, were not all contemporary with each other in the western Great Basin, then we must accept some of the proposed dates and reject others. Rogers' conservative dates can, of course, be discounted, because they would make the Lake Mohave and Pinto points contemporary with Elko and Rose Spring points, whereas all existing evidence shows that they were earlier. Beyond this, however, an unequivocal choice of dates can be made only for the Pinto assemblages.

As Heizer has pointed out, great antiquity attributed to surface finds in our area must be held suspect, because the association between the artifacts and the evidence for their antiquity is not completely demonstrable (Heizer 1950, p. 8). In every case where a Pinto point assemblage with its accompanying leaf-shaped point forms has been excavated in the western Great Basin, the evidence of radiocarbon dates, Central Californian shell beads, or associated fauna indicates a relatively recent date. Wherever the evidence is specific, it shows dates around 1000 or 2000 B.C.—that is, early Medithermal Period. The excavated and dated assemblages include not only Little Lake and Early Rose Spring, but also the closely related Karlo and Early Lovelock complexes and the Stuart Rockshelter. Against this mass of evidence for a recent age, the Anathermal dates attributed to the Pinto industry at the Pinto Basin and Owens Lake sites cannot stand. As Harrington has shown, the cultural assemblage at Little Lake is nearly identical to that at the Pinto Basin, and it is out of the question to assume that this culture persisted unchanged for 6,000 or 7,000 years (Harrington 1957, p. 70).

The Lake Mohave industry presents a different problem because, except for a few points of general Lake Mohave-Silver Lake type at Little Lake, all occurrences in the western Great Basin are surface sites. This in itself may provide a clue to the age of the industry. Present evidence suggests that the Lake Mohave culture is that of a hunting people who did little or no seed grinding and did not settle in permanent villages or frequently reoccupied camps. If this culture dates to the terminal Pleistocene or early Post-Pleistocene, then it is part of the general Paleo-Indian hunting complex exemplified by the Sandia, Clovis and Folsom cultures of the Southwest. Needless to say, not only projectile point typology but also the general artifact inventory is very different from that of the usual Paleo-Indian hunting industry. If Lake Mohave is more recent, it must be attributed to the dry Altithermal Period immediately preceding the Pinto industry. I favor the latter date, but cannot prove it.

Much depends on the question of whether the Great Basin was habitable during the Altithermal Period. Antevs, interpreting Great Basin data by analogy with the climatic sequence of northern Europe, maintains that the climate was significantly drier from 5000 to 2500 B.C., sufficiently so to prohibit human occupation of the Great Basin (Antevs 1953*a*, 1953*b*). Aschmann, on the other hand, points out that the habitability of the area would be controlled by local conditions, regardless of the climatic average, and especially that habitation patterns would be controlled by the caprices of springs, rather than by rainfall, just as they were in recent times (Aschmann 1958, especially p. 35). The evidence of Altithermal occupation of Leonard Rockshelter and Hidden Cave is particularly convincing.

Assuming that the Altithermal climate was, in fact, less favorable for human occupation than any other, one would expect people to adapt to scarcer food by roving more industriously in search of it. This is exactly the pattern suggested by the numerous small camp sites with Lake Mohave-Silver Lake points, and by the absence of village sites attributable to that culture.

Where Lake Mohave assemblages have been found on old beach lines or lake terraces or at overflow points, the location of the sites has been taken as evidence that they were occupied at a time of high lake levels. The assumption is that people always live on beaches, rather than above them. However, it is equally reasonable to assume a standard pattern of camping on high ground above the lake shores, either to avoid mosquitoes or to keep from frightening game away from the water. If the latter pattern prevailed, then the Lake Mohave sites were occupied at a time of low lake levels and dry climate.

In addition, the survival of Lake Mohave point types into the Medithermal Period implies that the Lake Mohave industries proper immediately preceded Little Lake. At present it is a matter of personal interpretation rather than sound evidence, but it seems to me unlikely that these types were made continuously from 7000 or 8000 B.C. until 2500 or 2000 B.C., without change of form or workmanship.

Gypsum Cave points present a still more difficult problem. They are clearly associated with Elko points in a late Pinto and post-Pinto context throughout the southern part of the western Great Basin. Yet they seem to be associated with Pleistocene sloths at Gypsum Cave, which is just outside the Great Basin proper in southeastern Nevada. It is possible that the seeming association at Gypsum Cave is fortuitous. The sloth remains may have got on top of the projectile points and other artifacts as a result of people's digging holes for one purpose or another during post-sloth times in the cave. It is also possible that our "Gypsum Cave type" actually consists of two projectile point types, historically unrelated to each other and separated in time by several thousand years, yet closely similar in form, size, and workmanship. Such a convergence is not at all impossible.

There does not seem to be any way of choosing between these possibilities on the basis of present evidence. One can only agree with Heizer (1951*a,* p. 24) that some of the sloth-associated wooden artifacts should be submitted to radiocarbon analysis. Regardless of their age in southeastern Nevada, however, Gypsum Cave points are clearly very recent in the western Great Basin, associated with Elko points and contemporary with the Middle Horizon of Central California.

There are no such contradictions in the dating of the narrow-based lanceolate points of Hidden Cave type. There have been scattered finds of these points in various places in the southern California desert and the Great Basin, including Lassen County (Francis A. Riddell, personal communication), Danger Cave in Utah (Jennings 1957, p. 109), Hidden Cave in west-central Nevada (Grosscup 1956, p. 61), and the Mohave Desert (Rogers 1939, Pls. 9k, 19g). The Danger Cave specimen derives from the basal layer, D–I, in association with a fireplace. Another fireplace on the same surface has a radiocarbon date of 10,270 ± 650 years. Other dates from level D–I range from 10,400 ± 700 to 11,453 ± 600 before present. The specimen seems firmly dated to the very end of the Provo Pluvial.

Grosscup attributes the Hidden Cave points (his Carson Phase) to the Anathermal deposit of the cave. One from the Mohave Desert was associated with Rogers' "Playa" (i.e., Lake Mohave) industry. The evidence, taken together, certainly suggests an early date for the type, and this is supported by its similarity to the Angostura type from the Great Plains. If the two specimens from Iny-372 derive from the sand underlying the midden, then a deep cut into the sand would provide an exceptional opportunity to check this early dating and to locate and define an associated culture complex.

Appendix 5

TEST EXCAVATION AT SITE INY-372 CONDUCTED IN 1961

BY

JAMES T. DAVIS

Prior to the publication of Lanning's analysis of the remains collected from site Iny-372, the Rose Spring site, the Director of the University of California Archaeological Survey, Professor Robert F. Heizer, felt that further test excavations might profitably be conducted in an attempt to determine whether or not there was in fact a very early period of occupation at the site as suggested by Lanning on the basis of the two "Angostura" type of lanceolate points whose true depth associations were unknown. This appendix reports the results of that excavation.

That these results were not fully rewarding is owing to a variety of adverse circumstances. Particularly unfortunate is the fact that the deposit has been extensively disturbed by continued depredation at the site by unknown persons whose efforts have robbed it of much scientific value during the five-year period between 1956 and 1961. Only a tiny fraction of the site remains intact. It would require extensive work by a large crew to clear away the surface debris in order to investigate the deep deposits whose artifact yield is very low but presumably important to the archaeology of the western United States.

Because we could not conduct excavations adjacent to Riddell's trench, we staked out a test trench, designated as trench "D," 5 feet in width and 15 feet in length, on a line 75 degrees east of north at a distance of 35 feet from the southeast corner of Riddell's trench to the southwest corner of trench D. Excavations were carried to a depth of 11 feet by 6-inch vertical levels. All midden deposit was passed through screens having a ⅜-inch mesh.

The topical sequence of organization in this appendix follows that of Lanning in the foregoing report.

STRATIGRAPHY

As Lanning points out, stratigraphic changes in this site are difficult to follow when excavation is by a vertical stripping technique; however, when a vertical face is presented, color changes are quite noticeable. I doubt, though, that one could excavate by stratigraphic levels with any certainty, even working on an exposed vertical face, because the deposit is composed chiefly of very fine noncompacted sand.

Some differences in the stratigraphic profiles revealed by Riddell's excavation and that reported upon here may be noted.

The upper 4 to 6 inches of deposit is typical organic humus, although expectedly not so rich as might be found in a moister climate.

From 6 to 30 inches, the midden is dark gray, ashy and charged with organic material typical of human habitation sites. Also, this stratum, II, contains a greater amount of rock debris from detrition of the cliff's face than does any other stratum.

The subsequent stratum, III, of fine, light, buff-colored sand is much thicker in trench D than in Riddell's trench I. At the north end of trench D, in pit D-3, this sand layer is from 16 to 18 inches thick. Toward the south, in pit D-2, it tapers from a thickness of 18 inches at the northern end of the pit to a thickness of 12 inches at the southern end. Finally, in pit D-1, it gradually disappears, and the dark midden of the upper stratum II is conformably joined to that of stratum IV.

Riddell attributes stratum III to deposition by water. However, since the sand is homogeneous and appears not to be "stratified" owing to sedimentation, I feel that this stratum could reasonably be due to aeolian deposition. I do not wish to press this point but merely submit it as an alternative possibility.

Stratum IV appears to be identical to stratum II, except that detritus from the cliff face is not so abundant as it is in the upper level.

Near the lower margin of stratum IV is a thin layer of compacted yellow clay. In profile it curves gently downward through pits D-1 and D-2, rising at the south end of pit D-1 and the north end of pit D-2. In pit D-3 it again starts a downward curve but terminates at a rock which had presumably fallen from the cliff's face. It is of course possible that this layer of clay was deposited through human agency, perhaps laid down as a house floor. Similar clay deposits may currently be found on the surface of depressions in the bed of the wash adjacent to the site on the south.

Underlying stratum IV, and subtly blending with it at a depth of about 70 inches, is stratum V which is characterized by a lighter color and the presence of small amounts of organic material in the form of ash and charcoal. Gradually the fine, tan sand of the upper part of this layer becomes more coarse and yellowish in color. Finally, at a depth of 11 feet, stratum V is composed of coarse yellow sand and fine gravel containing occasional small bits of charcoal and flakes of obsidian.

Excavations were not carried deeper because of the press of time and the possibility of a cave-in.

It is quite probable that important remains may be unearthed in this yellow gravelly-sand layer, particularly near the base of the cliff. Anyone anticipating such a project should be prepared for an extensive undertaking. Because of the character and depth of deposit, one should excavate a trench at least 15 feet wide at the surface and step it down to a width of at least 5 feet at the lower levels.

In spite of the obvious drawbacks to conducting excavations "blind" to physical stratigraphy, it is interesting to note the close correspondence between Lanning's "cultural strata" and the physical stratigraphic "breaks" noted by both Riddell and the present author.

ARTIFACTS

As Lanning notes, by far the greatest percentage of artifacts are of chipped stone, principally obsidian, and although slight differences in the occurrence of artifact types may be noted in the different areas of the site excavated, such "differences are of little significance to the analysis." It is perfectly obvious from a study of the various tables presented that real culture change, reflected through change in the physical form and types of artifacts recovered from the various levels, has occurred at this site through time. How much of a time span might be reflected at

TABLE B

Artifact	Depth Distribution of Artifacts (in inches)					
	0—12	12-24	24-36	36-48	48-60	60-72
Potsherd	7	5	1	..	..	..
Pipe	..	1	..	..	..	..
Mano	..	..	..	1	..	..
Steatite bead	3	..	..	..	..	..
Projectile point	1	6	5	2	2	1
Knife	1	1	5	9	9	3
Drill	1	..	..	1	..	..
Graver	..	2	..	..	..	..
Bone tool	..	..	..	1	2	..
Totals	13	15	11	14	13	4

the site, I am not prepared to estimate. Lanning's interpretations of the evidence appear to be reasonable and plausible. Whatever alternative possibilities I offer in the interpretation of the data are included under the appropriate heading.

In the following table (table B) are presented the same data, based upon the collections described in this appendix, as are offered by Lanning in his table 1.

POTTERY

Thirteen sherds of pottery, typable as Owens Valley Brown Ware, were collected from the excavations. Only one of the series is a rim sherd. (Fig. Ic.)

Several of the sherds fit together along the broken edges, which in this small sample allows a fairly accurate estimate of the actual number of whole pots represented in the collection (table C).

The majority of sherds, nine pieces, appear to be from rather shallow bowls. The four remaining fragments are too small to permit an appraisal of the shape of the parent vessel.

TABLE C

Depth Distribution of Potsherds and Number of Vessels Represented

(in inches)

Depth	No. of sherds	No. of pots
0– 6	4	3
6–12	3	2
12–18	4	1
18–24	1	1
24–30	..	..
30-36	1	1
Total	13	8

PIPE

A small curved fragment of unidentified stone which has been carefully smoothed on both the exterior and interior surfaces appears to have been a stone pipe. It was found in the 12–18 inch level and is 8 mm. thick.

GRINDING TOOLS

A single fragment of a bifacial mano of granite was excavated from the 36–42 inch level. It is representative of Lanning's type 2 and is the only specimen of this type recovered from below the surface of the site.

Numerous mano and metate fragments were noted among the debris scattered over the surface of the site.

GROUND AND POLISHED STONE ARTIFACTS

Stone Beads.—Three small disc beads of gray-green steatite were recovered from the upper 12 inches of deposit. Each is conically drilled and of uniform size. Measurements are: diameter, 8 mm.; thickness, 3 mm.; diameter of perforation, 2 mm.

Stone Tablets.—A single specimen of a thin, flat oval-shaped piece of black slate possesses what appear to be random narrow, shallow scratches, both hatched and crosshatched, on one naturally smoothed face. It was recovered from the 48–54 inch level in pit D-3. The intact edges of the artifact are ground smooth, and the reverse face of the object retains what seems to be evidence of a drilled perforation on the margin of the single broken edge near the narrow end. The specimen appears to be about three-fourths of its original size. Its measurements are: length, ca. 52 mm.; width, ca. 32 mm.; thickness, 1 mm. (Fig. I*e*.)

Slate "Pencil."—A complete specimen of an elongate, tapering, rod-shaped object of blue-green slate was recovered from the 42–48 inch level in pit D-1. It appears to be only roughly finished, although all edges have been somewhat smoothed through artificial means. The striations resulting from abrasion run both latitudinally and longitudinally. Measurements of the implement are: length, 13.2 cm.; "diameter" at upper end, 7 mm.; "midpoint diameter," 8–9 mm.; "diameter" near tip, 2 mm. (Fig. I*d*.)

PROJECTILE POINTS

All projectile points recovered are of black obsidian. Lanning's typological classifications have been retained, and the points listed here do not affect the ranges or average of measurements for each type presented by him in table 2. Nor do the present results affect his conclusions concerning the temporal sequence of large and small projectile points in the deposit (table D).

I have omitted tabulating unclassifiable fragments, all of which are of obsidian, because it seems a superflous task.

Three unique large points are described under an unclassified heading because I see no value in establishing three additional type designations on the basis of a single specimen for each type. Each of these unclassified examples is illustrated in figures I*a*, II*d*, *c*.

Elko Series.

2. Elko Eared. One fragmentary specimen recovered from the 66-to-72 inch level.

Unclassified Large Points.

1. Elongate leaf-shaped point, side-notched, straight base. It is a large fragment recovered from the 48-to-54 inch level (fig. II*c*).
2. Short, thick, broad, asymmetrical triangular point which is semishouldered or side-notched near its slightly concave base. It was found in the 54–60 inch level. Its measurements are: length, 3.9 cm.; width, 3.4 cm.; thickness, 7 mm.; weight, 6.8 gr. (fig. I*a*).
3. Elongate, relatively broad thick point with sloping shoulders and convex base. It was recovered from the 42-to-48-inch level. Its measurements are: length, ca. 4.7 cm.; width, 3.7 cm.; thickness, 7 mm.; weight, ca. 8.2 gr. (fig. II*d*).

TABLE D

DEPTH DISTRIBUTION OF PROJECTILE POINT TYPES

(in inches)

Type	0–12	12–24	24–36	36–48	48–60	60–72
Elko Series	..	..	..	..	..	1
Unclassified large	..	..	..	1	2	..
Rose Spring Series	..	..	..	..	..	..
Side-notched	1	1	1	..	..	..
Corner-notched	..	1	4	..	..	..
Contracting-stem	..	1	..	..	..	..
Cottonwood Series	..	..	..	..	..	..
Leaf-shaped	..	3	..	1	..	..

Rose Spring Series.

1. Rose Spring Side-notched. Three specimens, all recovered from depths above 36 inches.
2. Rose Spring Corner-notched. Six specimens, all recovered from depths above 36 inches.
3. Rose Spring Contrasting stem. One specimen, recovered from the 18–24-inch level.

Cottonwood Series.

2. Cottonwood Leaf Shape. Four specimens recovered, three from the 18–24-inch level and one from the 36–42-inch level. (See table D.)

KNIVES

Twenty-eight knives were recovered from the excavations. Eighteen of the specimens are probably Lanning's type 2 because even though few retain both ends, the blades lack the median keel which is characteristic of his type-1 bipointed knife.

In agreement with Lanning's data, type-2 knives occur vertically throughout the deposit, but those reported on here are concentrated between the depths of 36 and 54 inches (table E).

Seven examples of type-4 knives were collected from depths which range from 24 to 72 inches. Average measurements for these notched-base knives are: length, 7 cm.; width, 2.9 cm.; thickness, 7 mm.; weight, 13.1 gr.

A closely related type, based upon the finding of two examples, is here designated as type 4a. This type is somewhat shorter and relatively wider than type-4 knives and has a rounded concave base rather than a deeply notched base. Mea-

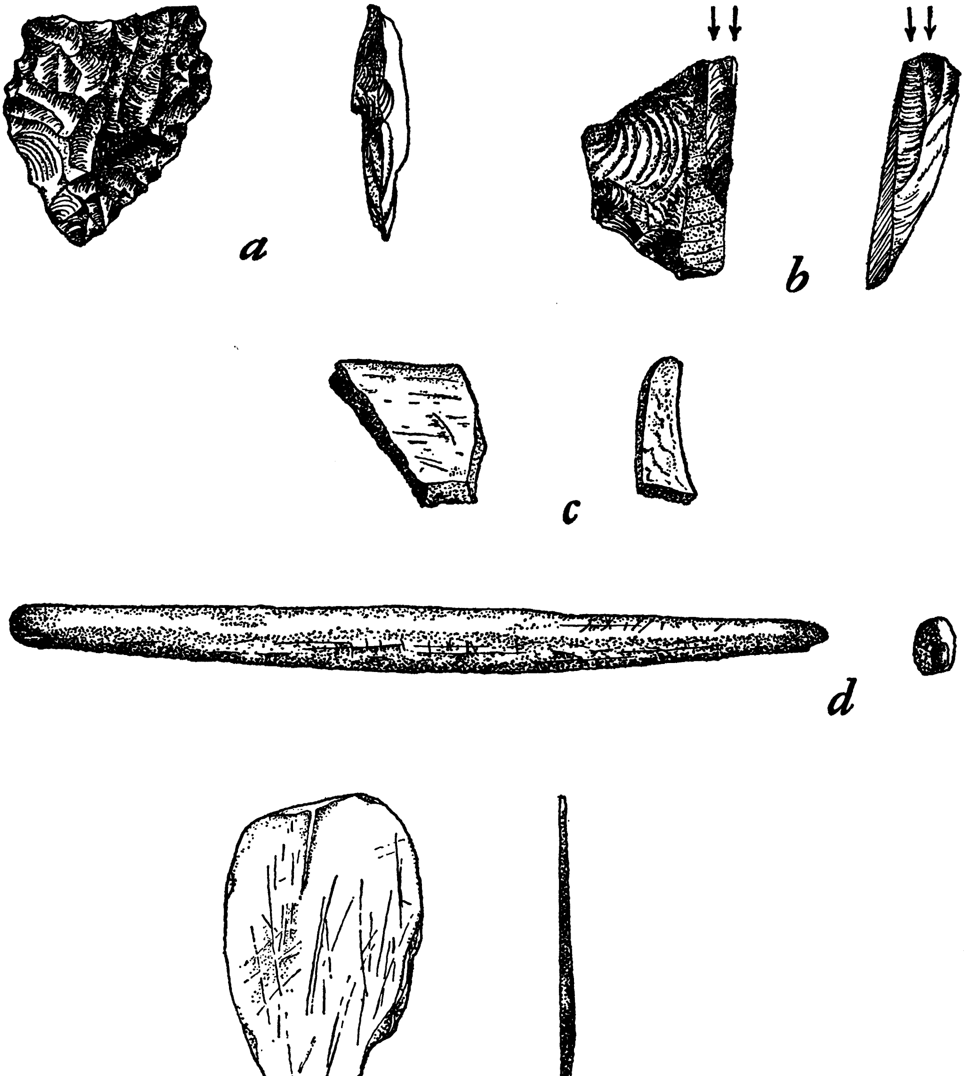


Fig. I. *a.* Asymmetrical triangular projectile point. *b. Bec-de-flute* burin. *c.* Rim sherd, Owens Valley Brown Ware. *d.* Slate "pencil." *e.* Slate tablet.

surements of the complete specimen are: length, 5.5 cm.; width, 3.3 cm.; thickness, 6 mm.; weight, 12.3 gr. (table E, fig. II*a*).

Another apparently related type, represented by a single basal fragment is designated as type 4b. It is parallel-sided with a slightly constricted concave base (table E, fig. II*b*).

All knives recorded are of black obsidian.

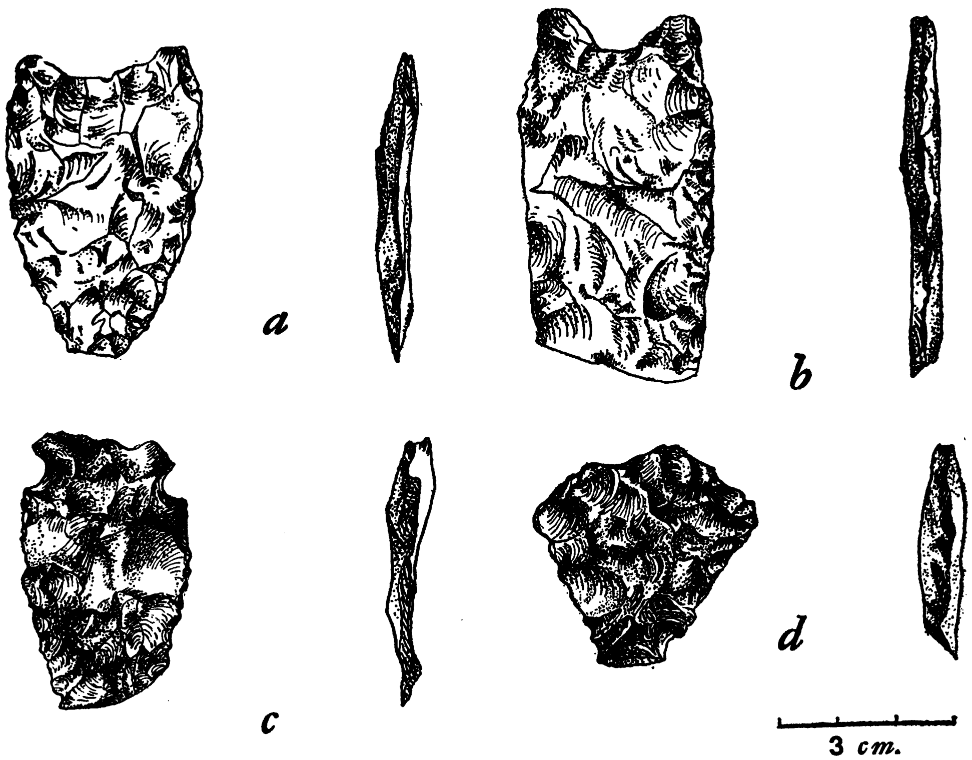


Fig. II. *a*. Obsidian knife, type 4a. *b*. Obsidian knife, type 4b. *c*. Elongate leaf-shaped projectile point. *d*. Elongate projectile point with sloping shoulders.

TABLE E

DEPTH DISTRIBUTION OF KNIFE TYPES

(in inches)

Depth	Type				Total
	2	4	4a	4b	
0– 6	1	..	..	..	1
6–12	..	..	..	..	..
12–18	1	..	..	..	1
18–24	..	..	..	..	..
24–30	1	1	1	..	3
30–36	1	1	..	..	2
36–42	4	..	..	..	4
42–48	4	1	..	..	5
48–54	4	2	1	1	8
54–60	..	1	..	..	1
60–66	1	..	..	..	1
66–72	1	1	..	..	2
Totals	18	7	2	1	28

DRILLS

Two finely flaked drill tips of black obsidian were found, a fine, delicately chipped one in the 6–12 inch level and a coarser, stouter one from the 36–42 inch level. Each exhibits wear marks along the edges.

GRAVERS

One specimen each of Lanning's types 1 and 2 gravers were recovered. Each is made from obsidian. The type-1 specimen is from the 18–24 inch level, and the type-2 example is from the 12–18 inch level.

SCRAPERS

A single example of a type-1 scraper (large, thick flake, over-all retouch on one face) was recovered from the 66–72 inch level. I find no consistently valid criteria for further segregating scrapers by "type" from Lanning's "retouched and utilized flakes." A great variety of obsidian flakes possessing some degree of retouching along one or more edges which could have been used for cutting or scraping purposes are very common throughout the midden. A total of 56 such implements was recovered. It is quite probable that many such tools were improvised on the spot to achieve some immediate task and discarded after having been used but once or twice.

Surprisingly, Lanning's type-3 scraper (thin flakes with chipped notches), which constitute ⅔ of all scrapers previously collected from the site, are totally lacking in the remains from trench D.

BURIN

A *bec-de-flute* burin of obsidian is shown in figure 1*b*. Burins are known in the Santa Barbara region along the coast where they are made of a tan flint, and in the Clear Lake area (Lake County), where they are made of obsidian.

ARTIFACTS OF BONE

Tools. Three bone awl fragments were excavated. Two are merely relatively sharp-pointed tips, and the other is a short, split cannon-base section with the head partly worked down. The tip of the latter, recovered from the 48–54 inch level, is lacking, but its original length is estimated to have been about 6.5 cm. The other two fragments were found in the 42–48 level and the 48–54 inch level.

HISTORIC MATERIALS

Although Lanning was unable to ascribe certainly any Caucasian remains at the site to either use or reuse by the aboriginal inhabitants, it must be noted that there was recovered from the 0–6 inch level of trench D a small piece of apparently purposely chipped bottle glass which may have been utilized as a scraping or cutting tool. The chipping scars present a pattern on one edge which, in my opinion, could not have occurred accidentally. It is obvious of course that the piece could have been made by an Indian visiting the location of the historic stagecoach stop long after the site had been abandoned as a temporary camping place by the aboriginal occupants; however, the possibility that it was in fact made by an aboriginal inhabitant of the site is not ruled out.

UNMODIFIED MATERIALS

Quartz Crystals

Contrary to the unmodified condition of the specimens of clear quartz crystal described by Lanning in the body of this report, the single example recovered during the excavations of 1961 shows considerable wear at the pointed end, achieved perhaps through use as a drill, and the surface of the faces at the tapered end retains a "crust" of red color, perhaps red ocher. The measurements of the crystals are: length, 22 mm.; "width," 11 mm.; "thickness," 9 mm.

ANIMAL BONE

No attempt has been made to identify the animal bones from the present collection. A total of 38 separate pieces was recovered, and in a few cases two or more fragments can definitely be ascribed to the same individual. Most are small fragments from relatively large mammals, presumably representing food remains. Thirty-four of the pieces were collected from depths between 36 and 54 inches, and none was found below the depth of 54 inches.

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Abbreviations

A Ant	American Antiquity
AJS–RS	American Journal of Science, Radiocarbon Supplement. Sterling Tower, Yale University, New Haven.
SAA–M	Memoirs of the Society for American Archaeology. Salt Lake City.
SWM–M	Southwest Museum, Masterkey. Los Angeles.
SWM–P	Southwest Museum, Papers. Los Angeles.
UC–AR	University of California, Anthropological Records. Berkeley and Los Angeles.
UC–PAAE	University of California, Publications in American Archaeology and Ethnology. Berkeley and Los Angeles.
UCAS–R	University of California Archaeological Survey, Reports. Berkeley.

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PLATES

PLATE 1

Excavation at Iny-372. General view of site, to north.

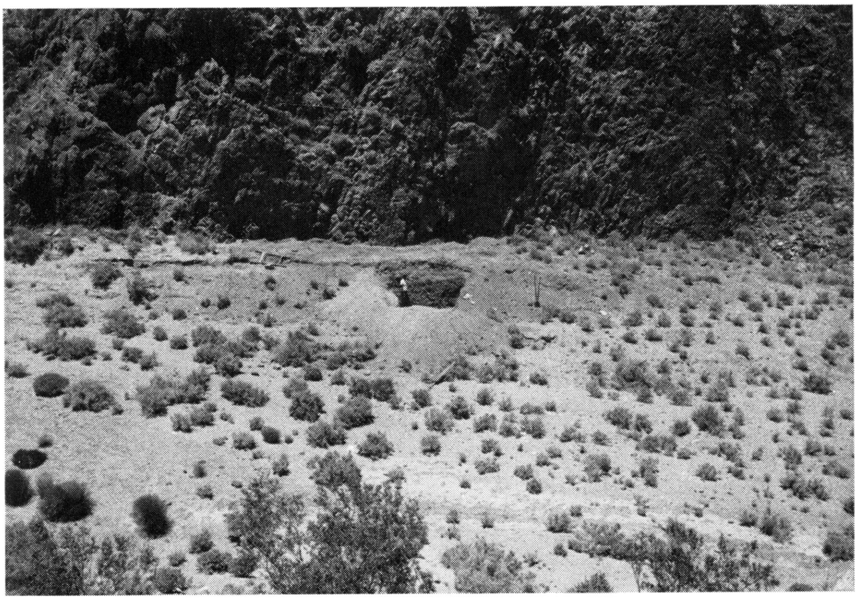


PLATE 2

a. View of Trench I, to north. *b*. Burial 1.

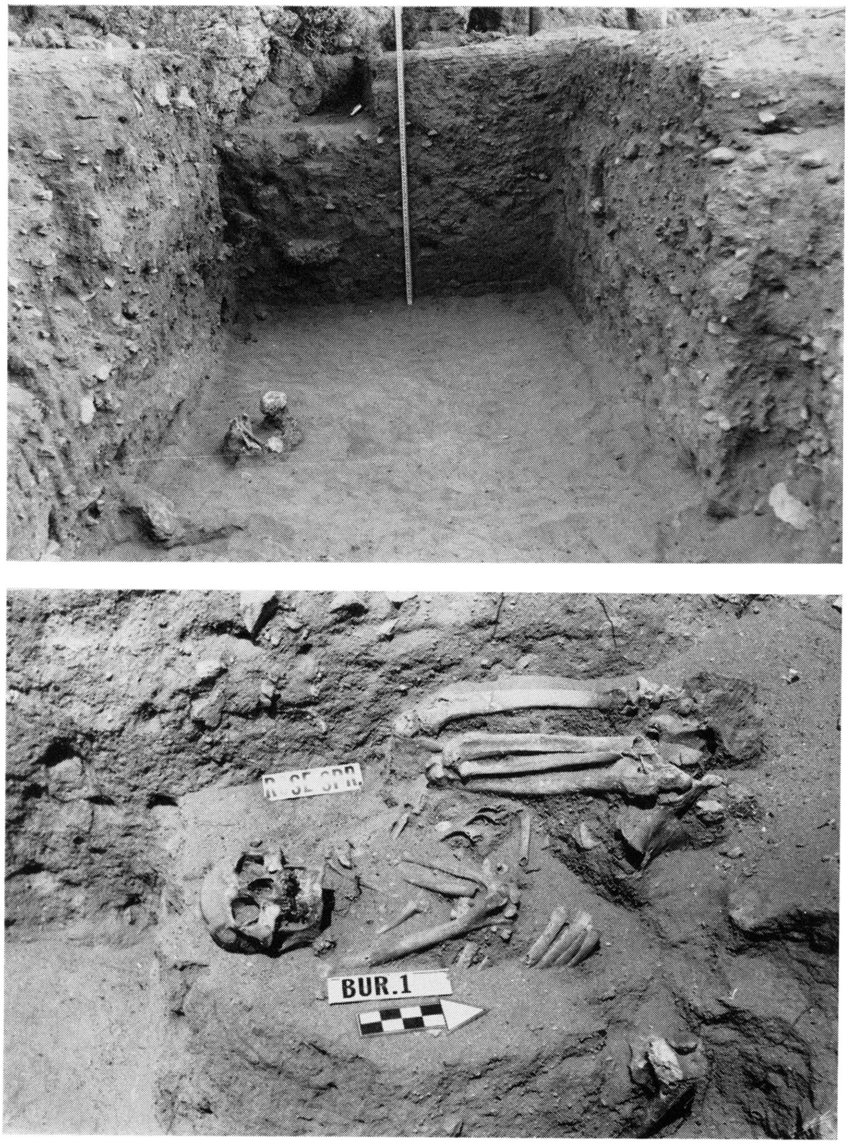
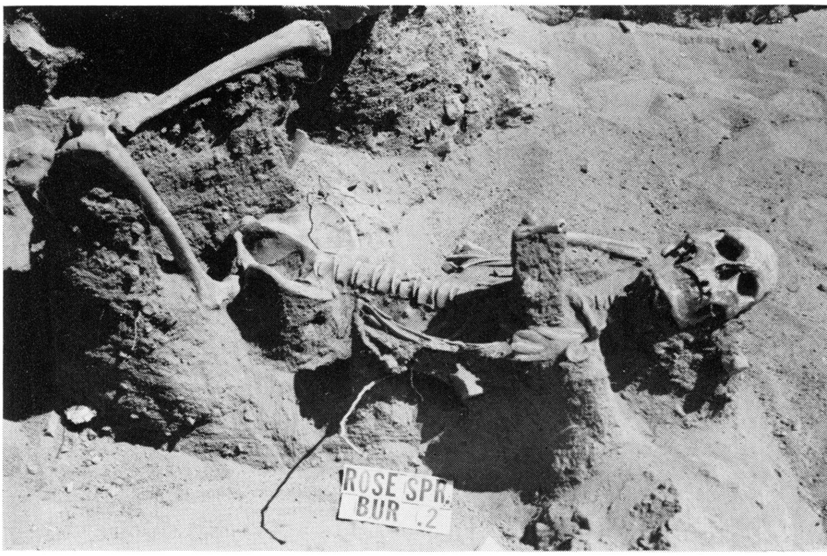


PLATE 3

a. Burial 2. *b*. Burial 3, skull exposed in side wall of Trench I.



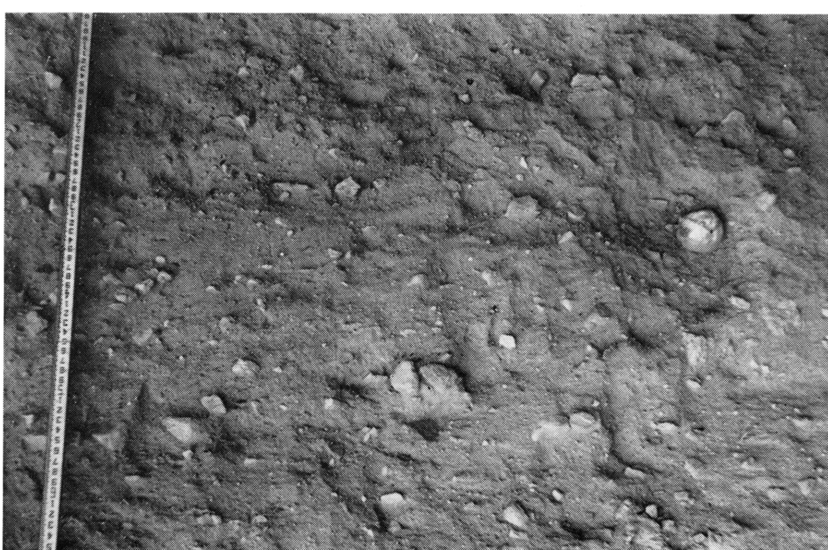


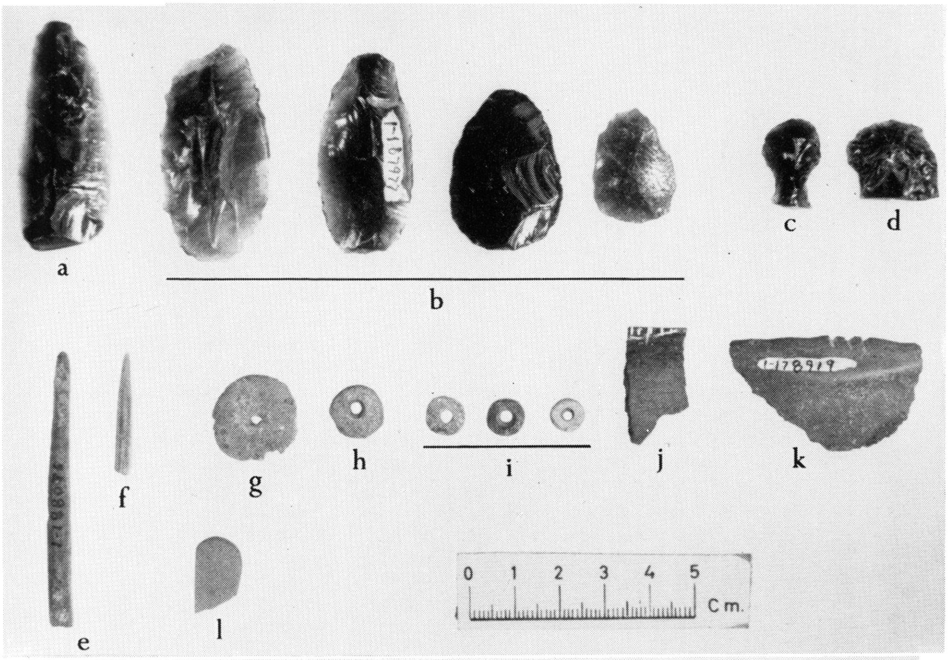
PLATE 4

a. Burial 4 before complete exposure. *b*. Burial 4 completely exposed.

PLATE 5

Artifacts from Iny-372.

a. Sharp-edged obsidian oval, 1–187304, Burial 2. *b.* Chipped obsidian ovals: 1–187975, 24–36″; 1–187977, 24–36″; 1–187995, 24–36″; 1–187917, 12–24″. *c.* Obsidian eccentric, 1–182351, 12–24″. *d.* Obsidian eccentric, 1–187915, 12–24″. *e.* Slate "pencil" fragment, 1–188076, 48–60″. *f.* Steatite pin fragment, 1–188203, Burial 2. *g.* Pumice disc bead, 1–187775, 0–12″. *h.* Micaceous schist bead, 1–186986, surface. *i.* Steatite disc beads, 1–187840, 0–12″. *j.* Owens Valley Brown Ware, 1–187838, 0–12″. *k.* Owens Valley Brown Ware, 1–187919, 12–24″. *l.* Stone pendant fragment, 1–186985, surface. *m.* Abrading stone fragment, 1–187924, 12–24″. *n.* Abrading stone fragment, 1–186997, surface. *o.* Abrading stone fragment, 1–188075, 48–60″. p. Pumice shaft smoother, 1–187309, Burial A. *q.* Pumice shaft smoother, 1–187308, Burial A. *r.* Pumice shaft smoother, 1–187287, 60–72″. *s.* Bird bone bead, 1–188118, 60–72″. *t.* Bone bead, 1–187294, 72–84″. *u.* Bone implement tip, 1–188076, 48–60″. *v.* Bone awl, 1–187999, 24–36″. *w.* Bone awl tip, 1–188123, 60–72″.



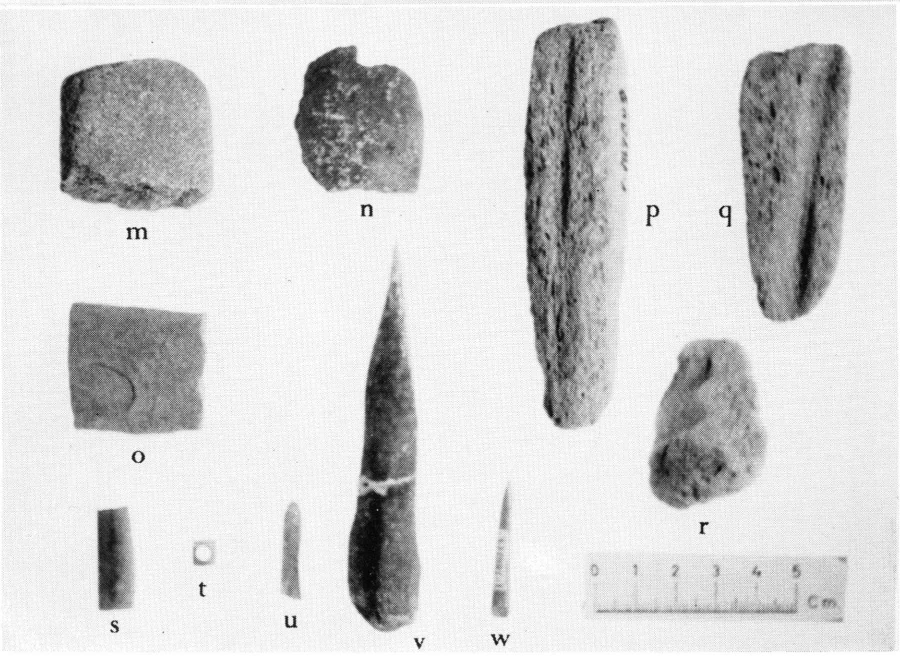


PLATE 6

Projectile points from Iny-372

a. Narrow-base lanceolate: 1–187044, surface; 1–187046, surface. *b.* Silver Lake Type, 1–187114, 0–12″. *c.* Pinto Shoulderless: 1–188165, 72–84″; 1–187056, surface. *d.* Pinto Sloping-shoulders, 1–187075, surface. *e.* Humboldt Concave-base: 1–188163, 72–84″; 1–188166, 72–84″. *f.* Gypsum Cave type: 1–188160, 72–84″; 1–188038, 48–60″; 1–188039, 48–60″. *g.* Willow-leaf: 1–188170, 72–84″; 1–188125, 60–72″; 1–188173, 72–84″. *h.* Broad-leaf, 1–188077, 60–72″. *i.* Elko Corner-notched: 1–188226, Burial 4; 1–188127, 60–72″; 1–187228, 60–72″. *j.* Desert Side-notched: 1–188200, Burial 1; 1–187798, 0–12″; 1–187793, 0–12″; 1–187885, 12–24″; 1–187796, 0–12″. *k.* Elko Eared: 1–188205, Burial 2; 1–188162, 72–84″; 1–188080, 60–72″. *l.* Eastgate Expanding-stem: 1–187932, 24–36″; 1–187946, 24–36″. *m.* Large triangular: 1–188139, 60–72″; 1–188080, 60–72″; 1–186966, 60–72″.

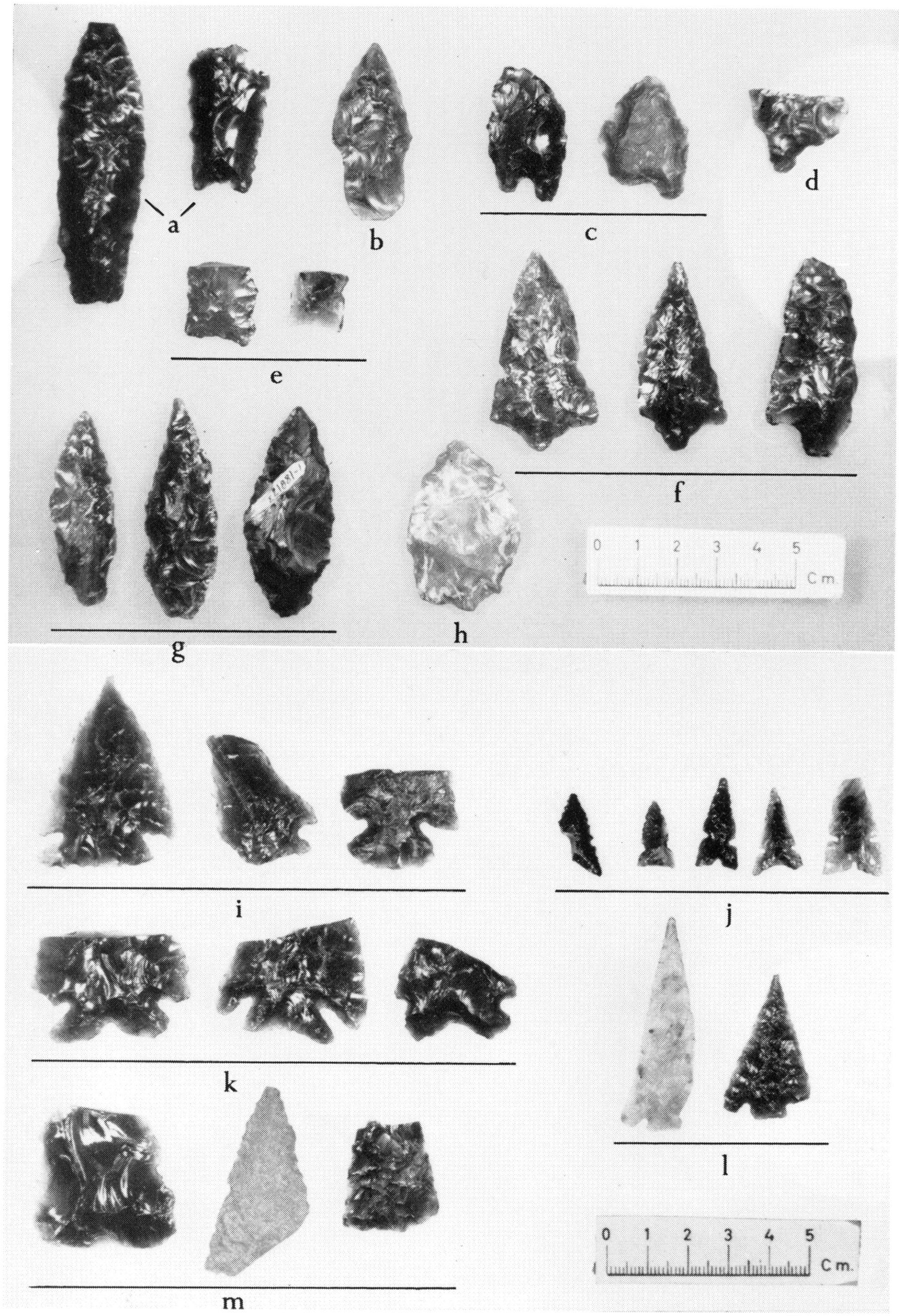


PLATE 7

Projectile points and knives from Iny-372

a. Rose Spring Side-notched: 1–188232, surface; 1–187860, 12–24″; 1–187953, 24–36″; 1–188005, 36–48″; 1–187778, 0–12″; 1–187790, 0–12″; 1–187779, 0–12″. *b*. Aberrant form, round stemmed: 1–187952, 24–36″; 1–187950, 24–36″; 1–187868, 12–24″. *c*. Rose Spring Corner-notched: 1–187065, surface; 1–187942, 24–36″; 1–187936, 24–36″; 1–187956, 24–36″; 1–187937, 24–36″; 1–187943, 24–36″; 1–187173, 24–36″. *d*. Aberrant form, single shouldered: 1–187931, 24–36″; 1–187808, 0–12″. *e*. Rose Spring Contracting-stem: 1–187934, 24–36″; 1–187939, 24–36″; 1–187853, 12–24″; 1–187141, 12–24″; 1–187787, 0–12″; 1–187876, 12–24″; 1–187940, 24–36″. *f*. Cottonwood Leaf-shaped: 1–188231, surface; 1–187055, surface. *g*. Cottonwood Triangular: 1–187117, 0–12″ 1–187121, 0–12″; 1–187152, 12–24″ 1–187069, surface, 1–187116, 0–12″; 1–187784, 0–12″. *h–l*. Knife type 1: *h* 1–188140, 60–72″; *i* 1–187216, 48–60″; *j*. 1–188060, 48–60″; *k*. 1–188144, 60–72″; *l*. 1–187282, 36–48″. *m–q*. Knife type 3: *m* 1–188061, 48–60″; *n* 1–188087, 60–72″; *o* 1–188029, 36–48″; *p* 1–188148, 60–72″; *q* 1–188107, 60–72″.

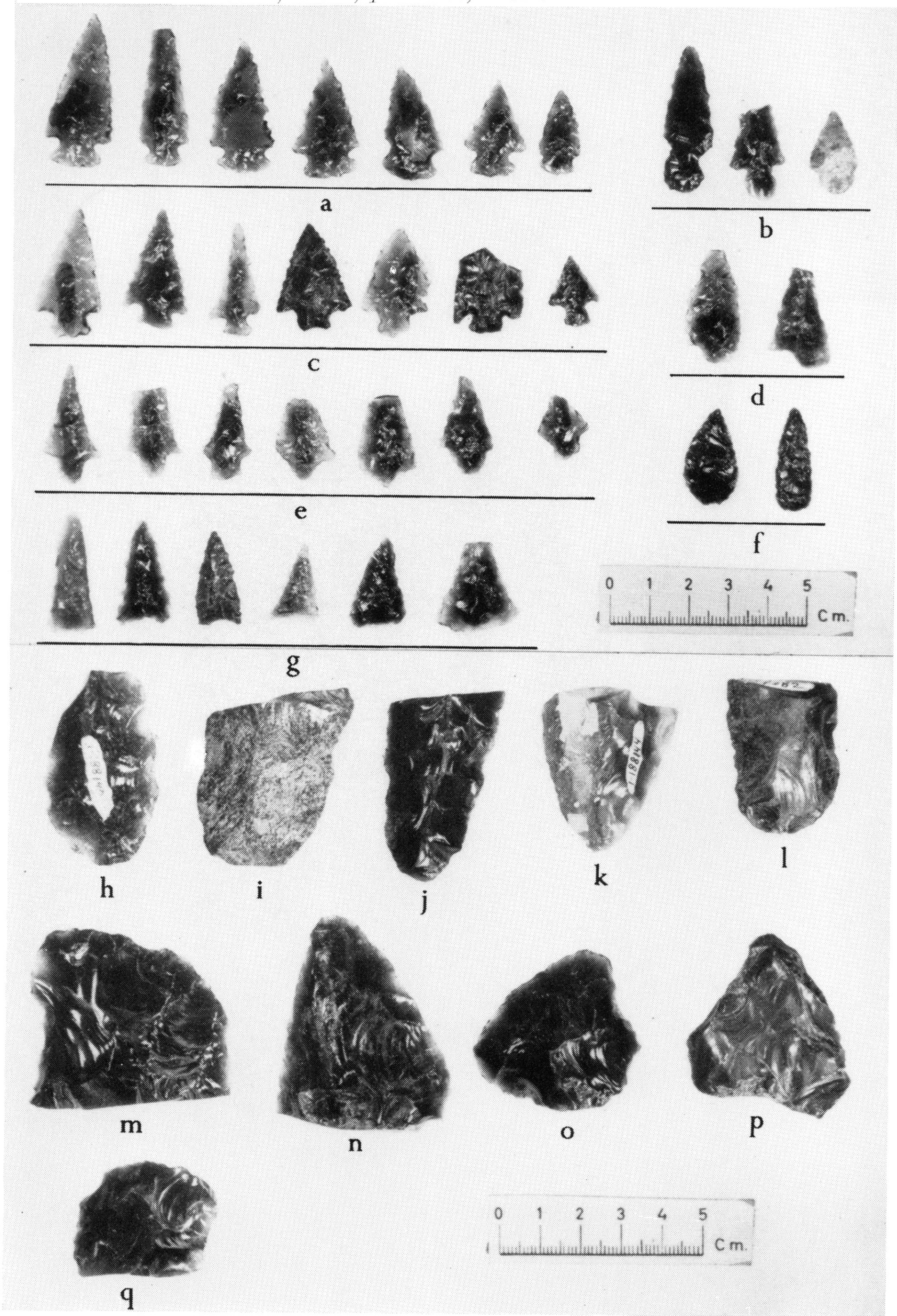


PLATE 8

Knives from Iny-372

a–f. Type 2: *a* 1–187904, 12–24″; *b* 1–187306, Burial A; *c* 1–187043, surface; *d* 1–187307, Burial A; *e* 1–188137, 0–12″; *f* 1–187905, 12–24″. *g–l*. Type 4: *g* 1–188045, 48–60″; *h* 1–188213, Burial 2; *i* 1–187851, 12–24″; *j* 1–187232, surface; *k* 1–187073, surface; *l* 1–187074, surface.

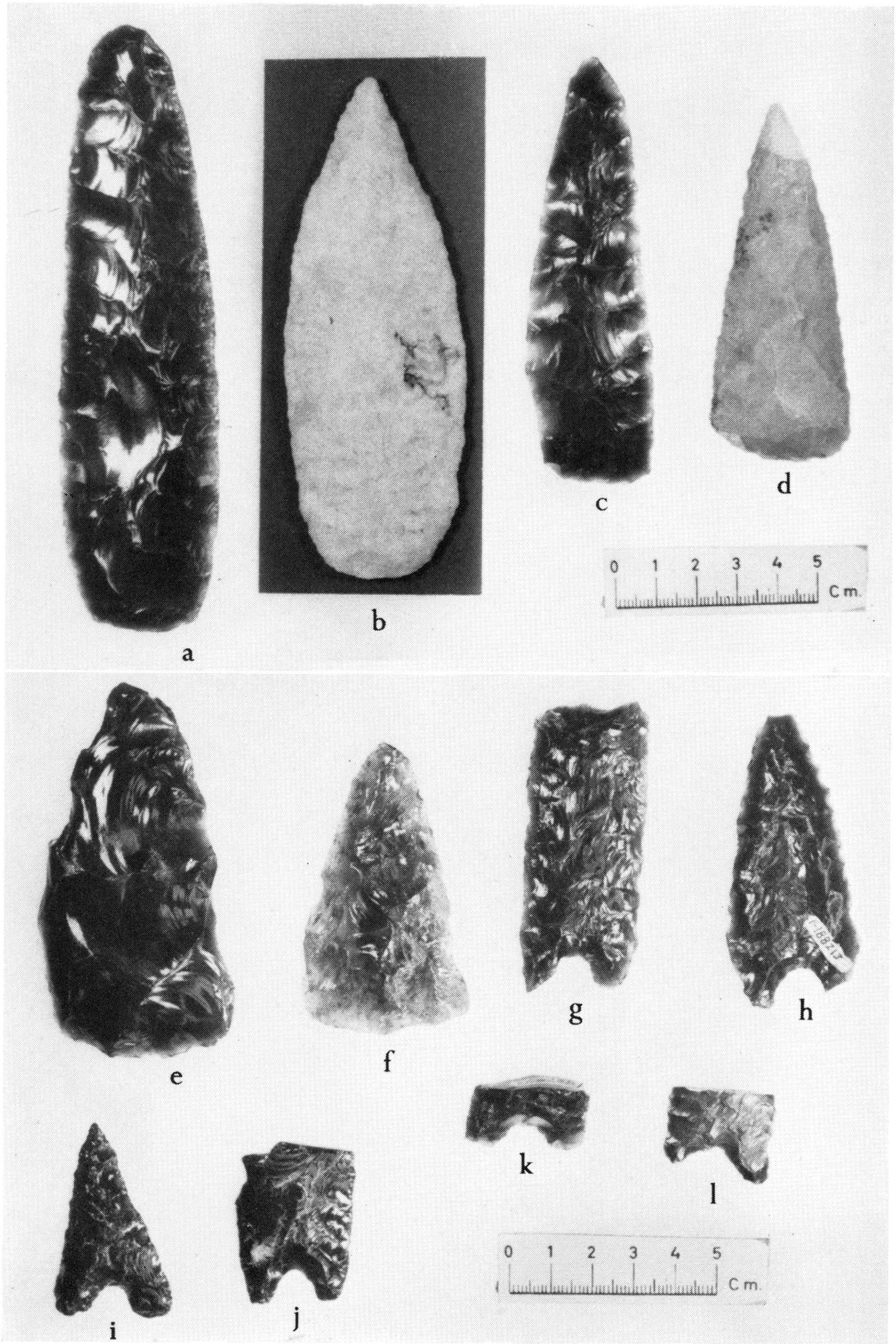


PLATE 9

Chipped stone artifacts from Iny-372

a. Blade fragment, 1–188108, 60–72″. *b.* Blade fragment, 1–188145, 60–72″. *c.* Blade fragment, 1–188188, 72–84″. *d.* Unique knife, 1–187831, 0–12″. *e.* Unique knife, 1–188138, 60–72″. *f.* Drill type 1, 1–188161, 72–84″. *g.* Drill type 1, 1–187215, 48–60″. *h.* Drill type 2, 1–187878, 12–24″. *i.* Drill type 2, 1–187884, 12–24″. *j.* Drill type 3, 1–187994, 24–36″. *k.* Drill type 3, 1–187042, surface. *l.* Drill type 3, 1–187292, 60–72″. *m.* Drill type 4, 1–187917, 12–24″. *n.* Drill type 4, 1–188189, 84–96″. *o.* Graver type 2, 1–188234, surface. *p.* Graver type 2, 1–187837, 0–12″. *q.* Graver type 1, 1–187974, 24–36″. *r.* Graver type 1, 1–187887, 12–24″. *s.* Drill type 3, 1–187183, 24–36″.

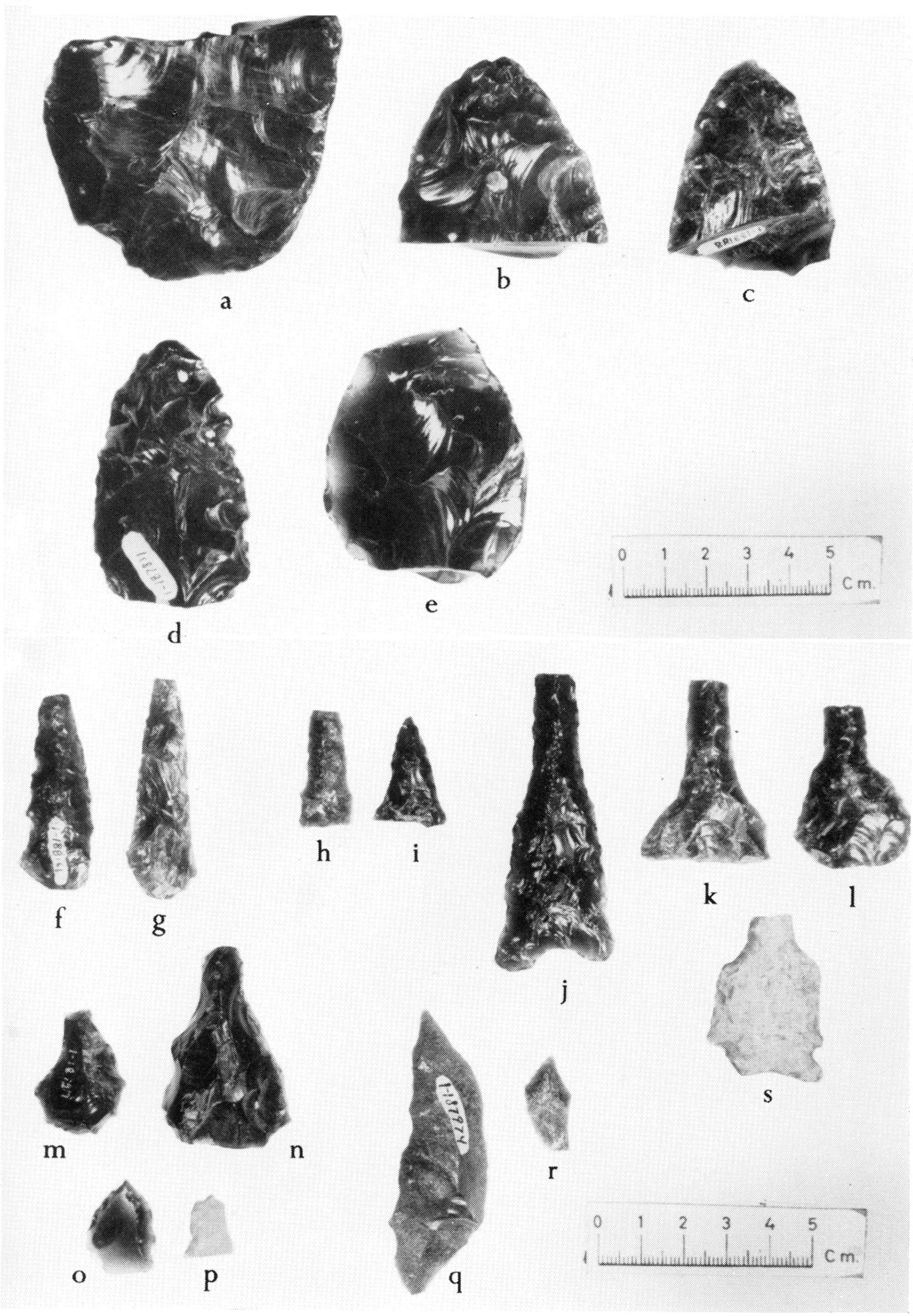


PLATE 10

Stone artifacts from Iny-372

a. Shaped scrapers: 1–188033, 36–48″; 1–188153, 60–72″; 1–188190, 96–108″. *b*. Notched scrapers: 1–187995, 24–36″; 1–188221, Burial 2. *c*. Flake side scrapers: 1–188249, surface; 1–187995, 24–36″; 1–187837, 0–12″; 1–187837, 0–12″. *d*. Notched scrapers: 1–187995, 24–36″; 1–188154, 60–72″. *e*. Core tool, 1–188169, 72–84″. *f*. Core tool, 1–188191, 96–108″. *g*. Quartz hammerstone, 1–187270, 60–72″. *h*. Core tool, 1–188067, 48–60″. *i*. Core tool, 1–187994, 24–36″. *j*. Quartz hammerstone, 1–188184, 72–84″.

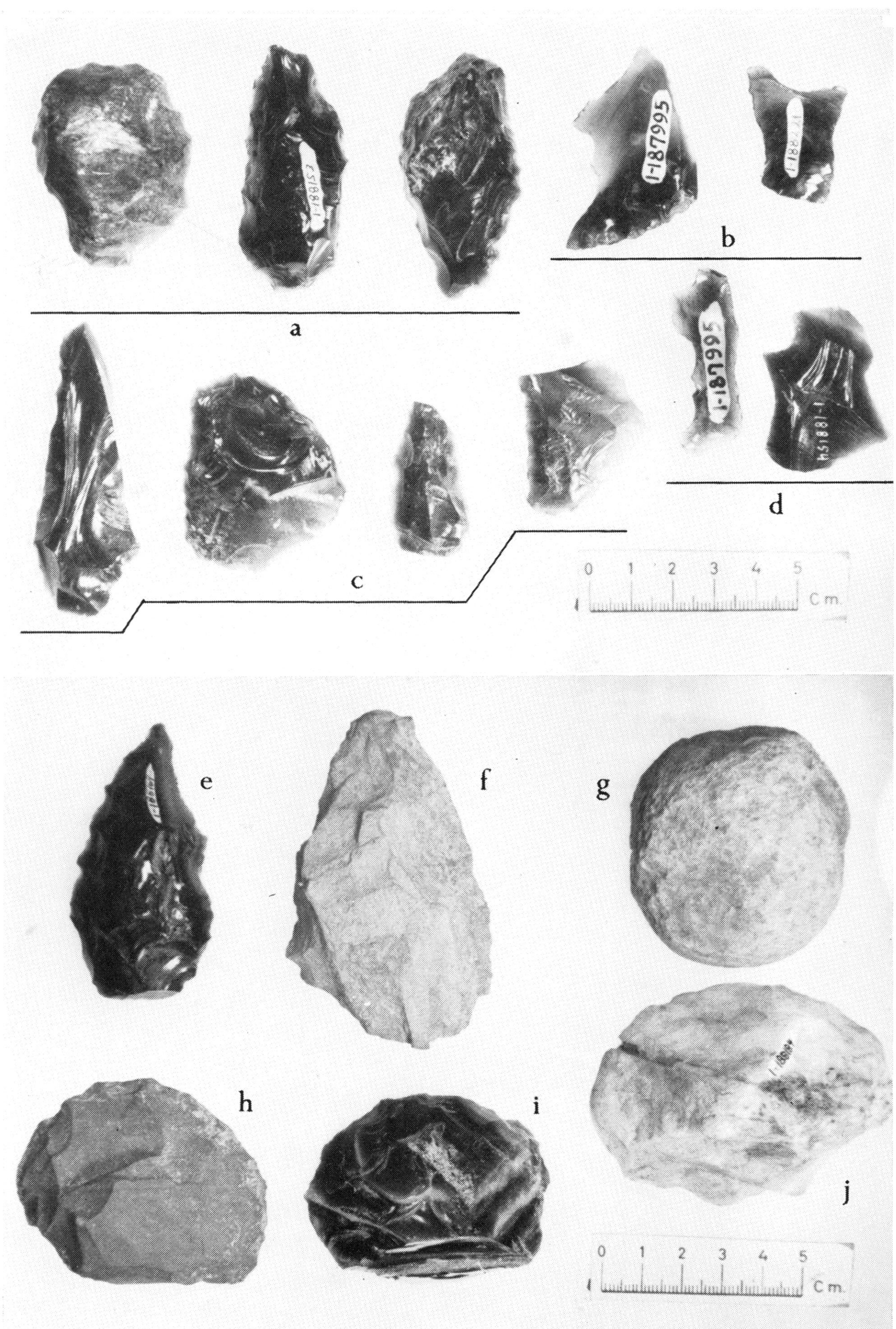


PLATE 11

Grinding tools from Iny-372

a. Mano type 1, 1–188201, Burial 2. *b*. Mano type 1, 1–187222, 60–72″. *c*. Mano type 1, 1–188072, 48–60″. *d*. Mano type 2, 1–188253, surface. *e*. Cobble pestle, 1–188003, 24–36″. *f*. Cobble pestle, 1–188002, 24–36″. *g*. Grinding slab, 1–188004, 24–36″.

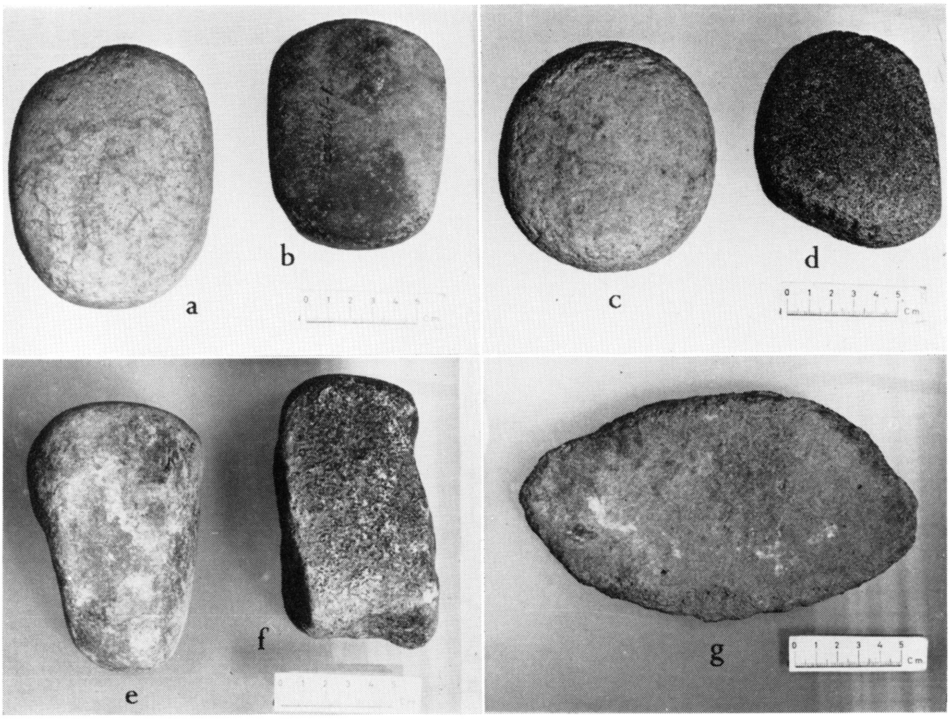


PLATE 12

Shell artifacts from Iny-372

a. *Haliotis* ornament, 1–188224, Burial 2. *b*. *Haliotis* ornament, 1–188225, Burial 2. *c*. *Olivella* 3a1 bead, 1–188250, surface. *d*. *Olivella* 3a2 bead, 1–187997, 24–36″. *e*. *Olivella* 3b1 bead, 1–186981, surface. *f*. *Olivella* 3b2 bead, 1–186984, surface. *g*. *Olivella* 3e bead, 1–186983, surface. *h*. *Olivella* 3c bead, 1–188204, Burial 2. *i*. Rough disc *Olivella* bead, 1–188250, surface. *j*. Oval *Olivella* bead, 1–186984, surface. *k*. Thin disc *Tivela* bead, 1–188073, 48–60″. *l*. Drilled snail shell bead, 1–187135, 12–24″. *m–o*. *Haliotis* ring beads: *m* 1–188035, 36–48″; *n* 1–188227, Burial 4; *o* 1–188227, Burial 4.

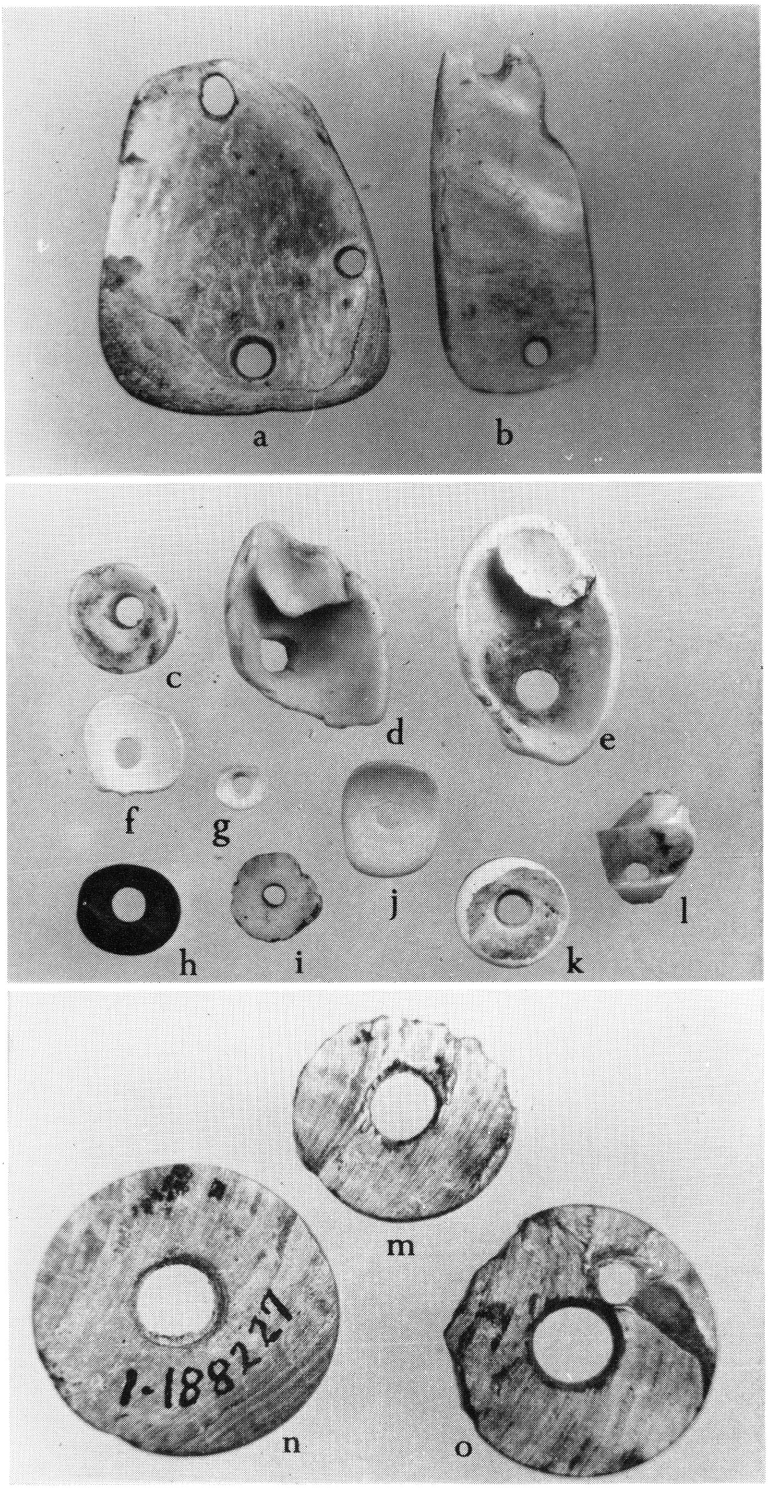


PLATE 13

Artifacts from various Owens Valley and Owens Lake sites

a–i. Lake Mohave, Silver Lake, and related projectile points from various sites: *a* 1–180698, Iny-70; *b* 1–177952, Iny-30; *c* 1–181982, Iny-99; *d* 1–176003, Iny-21; *e* 1–180606, Iny-69; *f* 1–176713, Iny-23; *g* 1–180812, Iny-74; *h* 1–181986, Iny-99; *i* 1–176512, Iny-22. *j–n*. Artifacts from Iny-2: *j* Desert Side-notched points, 1–202509, 1–202502, 1–202504, 1–202505, *k* Cottonwood Triangular points, 1–202493, 1–202488, number lost; *l* Cottonwood Leaf-shaped points, number lost, 1–202496, number lost; *m* Rose Spring Corner-notched point, 1–202513; *n* Drill type 5, 1–202519, 1–175001.