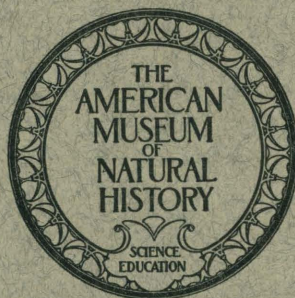


ANTHROPOLOGICAL PAPERS
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY

VOLUME XXXVIII, PART IV

EXCAVATIONS IN NORTHERN CHILE

BY JUNIUS B. BIRD



BY ORDER OF THE TRUSTEES
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY
NEW YORK CITY
1943

THE AMERICAN MUSEUM OF NATURAL HISTORY

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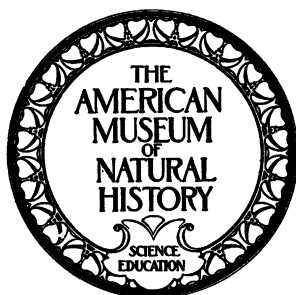
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The publication of this paper has been made possible through the generous aid of the Institute of Andean Research. A list of publications for the Institute, of which this is No. 4 in the series, appears on page 317.

EXCAVATIONS IN NORTHERN CHILE

BY JUNIUS B. BIRD

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INTRODUCTION

The excavations here reported were sponsored and financed by the Institute of Andean Research, as one unit in its larger program in South America and Mexico, carried on under the auspices of the Office of the Co-ordinator of Inter-American Affairs and under the direction of Doctor Duncan Strong. As originally projected, the plan was to make stratigraphic studies in well separated areas from the southern Peruvian boundary as far south as Concepcion, in Chile, covering a distance of some thirteen hundred miles. When, however, it became apparent that sampling the ancient middens yielded only a meager amount of study material, this plan was necessarily somewhat modified. To secure dependable conclusions it was deemed advisable, therefore, to make more comprehensive tests at each site than anticipated; consequently, the actual field-work was confined to the area between the Peruvian border and Coquimbo.

The termination of the work in the field leaves one under great obligation to a great many individuals, public officials and private citizens, whose spontaneous kindness, good will, and helpfulness on numerous occasions did much to make it possible to carry on the project. No expression of our appreciation of the assistance thus rendered seems sufficiently adequate.

We are particularly indebted to Director Ricardo Latcham, of the Museo Nacional de Historia Natural of Chile, whose many years' study of Chilean archaeology make him an authority on that subject. He not only gave us his official blessing and advice, but devoted much time and effort on our behalf during a period of severe illness. In addition, he provided room in the Museo Nacional for study and storage of our collection. If, in the subsequent discussion of our observations and data, we differ with some of his conclusions, we do so reluctantly and not in a spirit of criticism.

We are likewise indebted to Doctor Aureliano Oyarzun, Director del Museo Histórico Nacional de Chile, who gave us

every facility to examine and photograph specimens in his collections. To the Jefe of the Seccion Prehistorica of this museum, Señor Leopoldo Pizarro, we also wish to express our thanks for his interest and help.

We had hoped that during the course of the field-work we might secure the services of some Chilean students of archaeology, to give them an opportunity to observe the methods and objectives of this type of study. None were available, but we were fortunate in securing as assistant Señor Hugo Yávar V., a graduate of the Vergel Agricultural School at Angol. He joined us at the beginning of the work at Arica and continued throughout the entire time. Although not a student of anthropology, his natural inclination and ability contributed a great deal toward the successful conclusion of the program.

For a period of six and a half months we also employed Señorita Grete Mostny, Doctor of Philology, of the Museo Nacional de Historia Natural. Not only did she willingly share the dust and discomforts of the excavations, but attended to routine reference work and reviewed the literature on Chilean ceramics.

The author wishes to express his appreciation also to Miss Bella Weitzner who has done the editing and final preparation of this report, a thankless task entailing more than the usual difficulties.

He is also under great obligation to his wife, Margaret McKelvy Bird, whose cheerful and efficient attention to the details of this work has meant more than words can express.

As a rule, archaeological reports are so strictly impersonal that all comments on the field-work which do not deal directly with the subject are omitted. This is unfortunate, especially where subsequent work may be undertaken in the same area. In variance, then, with the usual procedure, we include a brief synopsis of our itinerary and such information as may be helpful to anyone planning similar work in the same region.

Throughout northern Chile the winter months are the most satisfactory for dig-

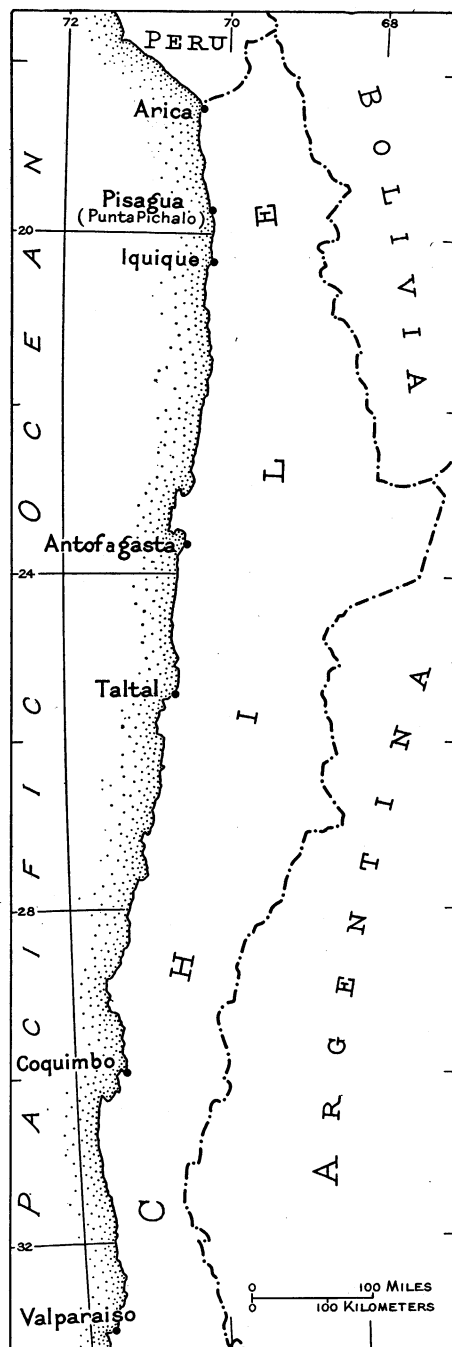


Fig. 1. Map of Northern Half of Chile showing Location of Places mentioned in the Text.

ging. We were fortunate to be able to start in July (1941). Arriving at Arica on the nineteenth, we began excavating on the twenty-second. Altogether, we spent sixty-five days at Arica (Fig. 1). Part of this time was used in preparation for the trip south by car. We built a small trailer to carry equipment and tools, made tents, and gathered a camping outfit. Excavations along this coast would be very severely handicapped without a car or truck. At many places one has no alternative but to camp. The present roads, of which the main north-south sections form a part of the Pan-American highway, are well planned and graded, though most of them are not yet surfaced.

We set up our first camp on Punta Pichalo, about seventy-five miles south of Arica, remaining there for a month and a half. Since Pisagua, the nearest settlement, is no longer a shipping point for nitrates and may ultimately be abandoned, it has become difficult to secure provisions, fuel, and labor.

The second camp, at Alto Molle, just south of Iquique, was made principally to organize the notes and data from Pichalo. Ten days there allowed time to check the local midden refuse, though no real excavation was made.

Ten days were spent at Antofagasta examining the shore about Antofagasta Bay out to Punta Jorge. A midden, suitable for excavation, was found near this point in Caleta Abtao. We did not dig there, as it would have been necessary not only to maintain a camp for all the workmen but to bring supplies and water by boat from Antofagasta.

On the north side of the same peninsula the well protected shore along Mejillones Bay was also examined, but as this is entirely sandy beach for a distance of twelve miles or more and fresh water is lacking, the Indians have never camped there for a sufficient time to create a midden. As this is the largest well protected bay in northern Chile one might expect to find some evidence of former population.

Taltal, four hundred and seventy miles in a straight line south from Arica, was our next objective. Again it was ad-

visible to set up camp, and a month and a half was spent there. Following this, we moved directly to Coquimbo, camping at the east side of Herradura Bay. A month in this area, checking various sites from Punta Teatinos to Lengua de Vaca, brought the field-work to a close.

At each of the principal sites examined, sufficient time was taken to make a fairly complete record of, and report on, the material recovered. With some uncertainty as to the time of arrival of the collections in Santiago, and with a fixed time limit for a final manuscript, this seemed the best policy.

The excavation technique was the same for each site. When possible, narrow trenches were cut to expose four sides of a block of midden refuse which was then sifted, layer by layer, following the most obvious strata lines. The layers removed generally averaged twenty-five centimeters in thickness, with a minimum of ten centimeters. Where a single layer increased to over forty centimeters in thickness, the thickest part was subdivided into two or three layers. As an aid to the workmen, the débris to be removed from each level was marked with short pegs driven into the refuse along the strata lines.

The refuse was sifted on a quarter-inch screen sifter set at an angle of about forty degrees against a pier or abutment placed wherever the refuse could most easily be brought by wheelbarrow. A sifter measuring one by two meters was found adequate for the type of dry refuse encountered.

The system is necessarily slow, though it enables one to secure nearly maximum accuracy of results with an untrained crew. The time taken to sort the débris from the sifter sets the pace for the work and limits the number of men who can be

profitably employed. In working a really large portion of a midden of this type, two or three such sifters could be used without danger of increased error, provided the men were reasonably careful and the foreman adequately trained.

In addition to the usual assortment of trowels, whisk brooms, brushes, etc., the following equipment was carried:

For surveying: one eighteen by twenty-four-inch plane table fitted to mount on a heavy camera tripod; one sight alidade; one Brunton compass with swivel mount; one aneroid for altitudes up to three thousand feet and graded to ten-foot intervals; one thirty-meter steel tape, and several two-meter spring tapes.

For photography: one nine by twelve centimeter metal case Voightlander, for which panatomic cut film was provided. A Leica, with a wide angle accessory lens, was used for color films, though ordinary film was carried. In addition to these, an ordinary sixteen-millimeter magazine load ciné Kodak was included. This had an accessory three-inch telephoto lens, but a wide angle lens would have been far more useful. Tropically packed color film was shipped for processing as rapidly as possible following exposure, though delays up to two months seemed to do no damage. Cut film, stored in a moisture proof chest with silicagel, was carried without damage after exposure for the full period of field-work.

The tents used were simple home-made affairs without waterproofing or insect netting. Severe mildewing of the canvas was noted at Taltal, although no rain fell.

Altogether, the equipment proved perfectly adequate. Any additions to this would be purely a matter of personal preference.

CLIMATE AND TOPOGRAPHY

EFFECT ON LIFE IN NORTHERN CHILE

As everyone knows, it is impossible to form an accurate conception of human history without a knowledge of the physical geography of the world. The more closely one follows the course of human development, the more fully one realizes the importance of studying the details of the setting. Historians, faced with the difficult task of condensing a vast amount of data, all too frequently have little space left for the interpretation of history in terms of environment. Archaeologists, on the other hand, working as a rule with extremely meager data, cannot afford to neglect any branch of knowledge which will help to interpret their finds correctly. This is especially true when dealing with extensive areas and pre-agricultural populations. It will be understood then, why it is necessary to discuss in some detail the physical structure, the climate, and other factors which influence life along the coast of Chile, particularly the northern section. First, however, a few remarks to clarify our ideas of the country in general.

Many people, even the Chileans themselves, are inclined to think of Chile as a small country. One might jokingly agree if one takes an end or crosswise view of it, but certainly we cannot picture its vast length in that light. More specifically, although Chile has an estimated average width of only one hundred miles, its length is equal to the distance between the southernmost tip of Mexico and the northern border of the United States. Such a narrow strip of land, lying between the sea and the nearby mountain crests, would seem an ideal subject for generalization, more so than most geographic areas. Actually, it is as difficult to generalize about Chile as it is of any other region in the world.

The frequently repeated statement that Chile is divided into three major areas, the northern desert, generally considered as the portion lying between latitudes eighteen degrees to thirty degrees thirty minutes south, the central or farming area, and the southern rain forests is acceptable

within certain limitations. When, however, one attempts to define the boundaries of these divisions, it becomes apparent that this generalization is comparable to saying that the spectrum has three primary colors. More exactly, in Chile one observes a gradual transition from the arid desert of the extreme north to the excessively wet forests of the extreme south. Persons familiar with the corresponding latitudes of North America will find the contrasts of climate most clearly reflected in the plant life. The four hundred miles of Northern Chile which lie within the tropics have neither a truly tropical climate nor vegetation. One may see banana plants in Santiago, but it must be remembered that they mature successfully only some eleven hundred miles further north at a latitude corresponding to that of the Island of Jamaica. Semi-tropical plants are distributed through a much wider band of latitudes than in North America, while the difference between the geographical limits for the growing of citrus fruits and the ripening of grains is much narrower.

Another noteworthy contrast is the fact that the limit of commercial agriculture is set not by a zone of low temperature, but by one of too abundant rainfall; an area where the ground is constantly sodden and hours of sunshine unusually few. This again is a statement which must be used with caution for there are families living over seven hundred miles south of this limit, not far from Cape Horn, who grow most of their own vegetables.

A consideration of these data shows that we can truly say that temperate conditions prevail in the entire country.

All this may seem totally irrelevant to the subject in hand. Nevertheless, it indicates a few of the fundamental differences and difficulties we encounter in the effort to form a general picture of the geography of Chile as a whole. Not so far afield, however, is the basic explanation for the primary control of the zones mentioned. From Cape Horn to Arica cli-

matic conditions are largely determined by the proximity to the sea, the effect of prevailing winds, and the ocean currents.

Along the section of coast under consideration flows the famous though scientifically little known Humboldt current. Bringing cold water from the south, it is another of nature's huge air conditioning units, completely controlling the climate of northern Chile and much of Peru. Because the prevailing winds cross it and in so doing lose most of their moisture, northern Chile is the most barren desert in the world. Statistics for Arica record an "average annual rainfall" of three one hundredths of an inch. At Coquimbo, the southern end of the section with which we are concerned, 4.9 inches are recorded. Unqualified, these figures are misleading, for in much of the area there is no annual rainfall. The rainfall is not an annual feature but a phenomenon dependent on the rather regular fluctuation cycles of the Humboldt current.

At Arica the hillsides are bare and barren, unscarred by geologically recent surface drainage. At Pisagua the same type of hillsides are scarred only by the erosion of a rain which fell in 1940, evidence of an unusual effect of the latest fluctuation of the Humboldt current, possibly without parallel for the last several thousand years. At Iquique, forty miles further south, the run-off from the same rains followed previously cut channels and one can find very rare patches of transient vegetation. Such plant life is not necessarily due to this slightly increased precipitation, as it is limited to spots where the low lying clouds and fogs strike the hillsides in greatest concentration. At such places there is a condensation of moisture on the surface rather than actual precipitation. This also explains the somewhat more abundant vegetation observable on sections of the hillsides some two hundred miles to the south, as one nears Antofagasta.

Still further south, just north of Taltal, this *loma* flora, as it is commonly called, is abundant enough to cover the coastal mountain slopes completely. Sufficient condensation occurs so that the large columnar desert cacti will, at times, be

covered with a growth of lichens of a type commonly associated with the vegetation of wet cool regions. A very slight amount of grass grows near some of the hilltops and as there are enough other suitable types of plant life grazing animals can survive here.

South of Taltal there is little change, except for a widening of the coastal vegetation belt. Gradually the importance of moisture from condensation decreases as the rainfall increases. Near Coquimbo a rather uncertain annual precipitation is sufficient in some years to produce wheat on unirrigated ground and to maintain a mixed ground cover of shrubs and grass.

Most of the coast between Arica and Coquimbo consists of steep cliffs and mountain sides rising from the water's edge. Viewing it from the air, one is impressed by the long even stretches, unbroken, except at infrequent intervals, by bays or promontories. Sandy beaches and sections with low foreshores constitute a much smaller portion of the total shore line than do the rocky areas.

Elevations along the crest of the escarpments near the water vary gradually from section to section. Starting with an altitude less than two hundred meters near Arica, the average height of the slopes to the south increases to between six hundred meters and nine hundred meters just north of Iquique. Between Antofagasta and Taltal six hundred to twelve hundred meters are recorded, with mountains twice as high, just back of the coastal escarpment.

Between the coast and the base of the Cordillera the land maintains more or less the same elevations as the coastal cliffs. This gigantic, shelf-like formation varies in width to a maximum of nearly one hundred and fifty miles and at irregular intervals is intersected by narrow, steep-sided valleys. These have been cut by drainage coming either directly from the Cordillera or indirectly by way of ancient lake basins where the mountain water was first trapped in depressions on the surface of the coastal shelf. Today, with no rainfall along their courses, they are completely dependent for water on seepage

from the high mountain flanks. Hence the greatest water flow occurs in the summer months, with the melting of ice and snow in the Cordillera. Where sufficient water is available and the valley bottoms are wide enough to make irrigation possible the ground will produce crops the year round. Unfortunately, only a few valleys are of sufficient size to be of importance agriculturally. The others provide only tiny strips of land which can be utilized, offering a bare subsistence to the inhabitants. There are neither historical records nor other evidence to show the extent of native irrigation, but it is presumed that it did not exceed the area cultivated now. If more than the present acreage was formerly under cultivation some traces of the ditch systems would have survived, for everything outside the influence of the present irrigation remains unchanged. A possible exception may be found in the valleys with very little water where, by painstaking care, small sections could have been made productive. In these there is evidence in some places that recent valley bottom washing has destroyed shallow deposits of soil which could have been utilized. In no place near the coast have small hillside terraces been used although the valley structure is sometimes suitable for their construction. Perhaps all available water was needed for bottom land.

It is difficult to visualize the area as it might have been when man first came to it. Geologists concerned with the nitrate deposits of the desert are in general agreement that the area as a whole has undergone little or no change for a much longer time than the earliest possible human occupation. No study of the valley systems has yet been made to learn what changes may have occurred in recent and late Pleistocene time. At most, we can assume a somewhat greater water flow, with more vegetation in the valley bottoms than at present. The possibility of any vegetation outside of these valleys depends entirely on fluctuating extensions of the *loma* flora zone, a subject on which there is no information.

In any case, it seems probable that native game in the general coastal area

north of Antofagasta was confined to the valley bottoms, even under the most favorable prevailing conditions. Restricted in this way, the larger species of game, such as guanaco, would have almost no chance of survival once a hunting people appeared. In other words, north of the area where grazing animals can today depend on the *loma* flora for food, i.e., from Paposa and Taltal southward near the coast, a non-agricultural population would have no permanent source of food, except the sea. Near Taltal and to the south the same people could have combined coastal life with the pursuit of land animals, and might perhaps even have existed completely independent of the sea. This difference in food dependence provides a basic distinction of areas which must be kept in mind by anyone interested in the early coastal people of northern Chile.

In the northernmost section of the country, the distribution of the fundamental necessities, water, food, and fuel, has held the population to a much more restricted way of life than is usual. Thus one may assume that the middens in this section provide an unusually accurate record of occupation up to the introduction of agriculture. A check on their location shows that the preferred habitation sites were those nearest the food supply. Water and fuel would be carried apparently as great a distance as five miles. To understand the choice of campsites then, one must understand the local problems of food gathering. The staple foods were shellfish and fish, supplemented by birds, sea lions, and porpoises. The shellfish used were principally those species found along the rocky portions of the shore. With a small tide fall¹ and with sand and gravel beaches exposed to the fairly constant and often heavy surf running in from the southwest and west, such species as clams could not be gathered regularly enough to be important in the food economy. Thus the middens are located near rocky portions of the shore rather than along the beaches, with the important

¹ Tide Fall	Arica	Pisagua	Paposa
Spring Range	3.1 feet	5.0 feet	4.9 feet
Mean Range	2.5 feet	3.8 feet	3.8 feet

ones concentrated at the rare promontories and irregularities in coast line which offer some protection from the surf. These spots are also best for hand line fishing, in the past one of the most important means of taking fish, not because the fish are more abundant, but because the risk of losing the line is less.

Except in those valleys with vegetation near their mouths, the only fuel available is the thick stemmed *huiro* kelp, which grows abundantly on the rocks below low water mark and in shoal water where the ground is rocky. A certain amount breaks off in rough weather and drifts ashore, so that at some places considerable quantities accumulate which must be dried for several weeks before it can be burned. It is difficult to estimate the importance of this fuel for it is not impossible that the size of the population at some sites was controlled by the amount available.

In the southern area, from Paposa and Taltal to Coquimbo, the gathering of sea-food is subject to the same controlling factors as in the north. Fuel, however, is not primarily kelp, but includes quite a variety of shrubs, plants, and cacti, available in many places. Water can also be found more frequently in the form of springs and ground water. As the sea is

no longer the sole source of food, this means that as one works southward there is less likelihood of finding a large concentration of refuse at any one spot.

Along much of the coast of both the desert and semi-desert areas the introduction of agriculture could not have provided sufficient food to change the mode of life based on natural products but probably provided enough to modify it. Farming in sections like the vicinity of Taltal could support only a small population, certainly fewer than could live by hunting and fishing. In fact, it is probable that, with the exception of the Elqui Valley near Coquimbo, this is true of the entire coast as far north as Arica, for the amount of arable land is extremely limited. Under the circumstances, one would expect to find a blending of the primitive coastal culture with that associated with agriculture and, in places unsuited for farming, a rather late survival of the older way of life. This indeed appears to have been the case.

In describing the separate sites worked some of the preceding remarks may be repeated; if so, it is merely with the intention of emphasizing their application to the particular place under discussion.

EXCAVATIONS IN THE VICINITY OF ARICA

Arica is situated at the apex of that angle in the western coast of South America which is such a conspicuous feature of the continental outline (Fig. 2). On one side the coast trends slightly west of south for over half the length of the continent, while on the other it runs northwesterly for most of the length of Peru. This is mentioned not merely to emphasize the location of Arica but because it has a real bearing on the local prehistory. To the south, wherever there is a slight point of land or break in the coast line, some protection from the prevailing west to southwest wind and sea can be found. Northwest from Arica, however, the shore for a considerable distance is exposed to the constant and direct force of heavy seas. For the most part, this latter section is low and sandy, while to the south, high land is close to the shore, much of which is rocky. In other words, as one travels south, Arica marks the beginning of a section of coast which, from the standpoint of primitive coastal folk, offered more favorable habitation sites than the adjacent section to the north, a contrast which may perchance apply as far to the northwest as the Paracas peninsula.

Another important geographical feature

at Arica is the Azapa Valley leading back into the interior. In this, at the present time, are twelve hundred hectares of cultivated land, all of it irrigated with subterranean water, except in the rare times of flood. We do not know how much of this land could have been made productive by native methods, but assuredly the present acreage is far greater than in pre-Columbian days. This may also apply to the Lluta Valley, a few kilometers north of Arica, where there is flowing water the year round, and two thousand hectares of land are cultivated. The climate, which permits sowing at any time of the year, compensates somewhat for the limited area available for farming. Seasonal difference in the weather at Arica is limited to a five-month cloudy period, beginning in June, during which, in the mornings, the sky is almost constantly shut out with low clouds. With remarkable regularity, the clouds clear away, so that the afternoons are nearly always sunny. The temperature fluctuation associated with this seasonal change is not sufficient to affect the sowing of crops. The highest mean maximum monthly temperature recorded is 77° F.; minimum, 54° F.

LOWER AZAPA VALLEY

Across the mouth of the Azapa Valley, over to the Lluta River and beyond, is a sweeping sand and gravel beach, backed by gently rising valley bottom fill. Nowhere near this beach nor in the valley bottom is there any trace of midden refuse; apparently the only camp of any size, actually within the lower valley, occupied part of the present site of the municipality of Arica. This is a logical location, protected as it is by the famous Morro, a rocky headland which bounds the southwest side of the town. Formerly, there was a fresh-water spring about where the Hotel Pacifico now stands, while shellfish were available along the rocks at the base of the Morro. In spite of grading and paving, shell refuse can still be seen.

According to local accounts, many mummies were washed out of the adjacent slopes of the Morro when the town was flooded by a tidal wave in 1868. Construction work on this same slope still brings occasional burials to light.

Further east, above the area flooded in 1868, at the southern end of Calle General Lagos, where that street ends against the base of the Morro hill, is a rather interesting burial mound. As it is thinly covered with wind-blown sand, its margins are not clearly visible. Apparently it is about twenty-five meters long by fifteen meters wide and is irregular in outline. Its crest is not more than two meters above its southern, or uphill, side. On the northern face, where cut back for the construction of

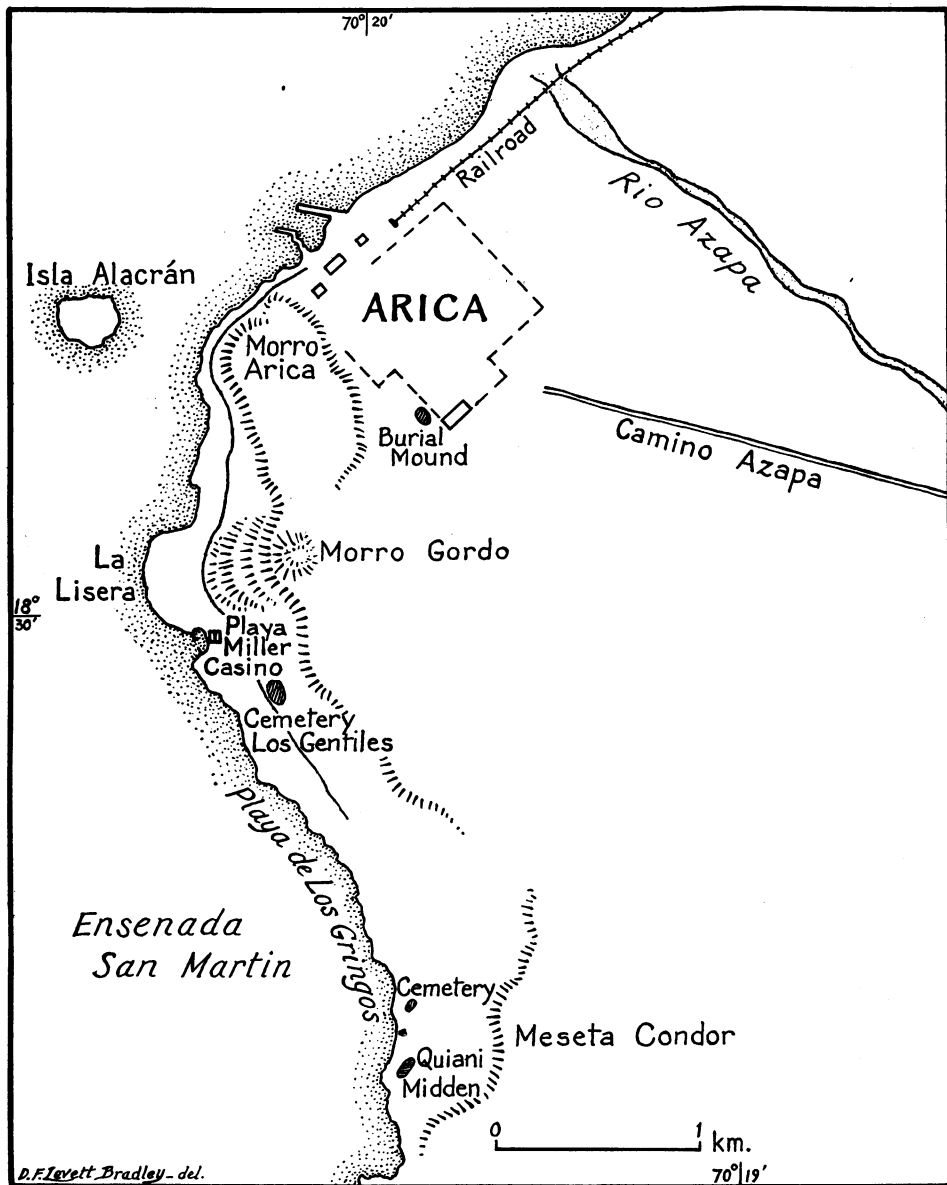


Fig. 2. Map of Arica showing Location of Playa Miller, Quiani, and Playa de los Gringos.

a concrete wall, the structure indicates a maximum thickness of four meters. As a burial mound it is of unusual interest in that it consists almost entirely of large reeds and twined reed matting. Interment was simple. From time to time the bodies, either fully extended or flexed, were placed on its surface and covered with reeds. At present, portions of several bodies are exposed in the section opened by the construction work. Also visible are several pieces of unworked, waterworn wood, riddled with marine worm holes, and scattered bunches of a shrub, known locally as *callacas*, loosely dumped among the matting with no obvious relationship to the burials.

According to the men who built the wall, the burials seldom had grave goods, an exception being a small, extremely crude cooking pot, fifteen centimeters high, of reddish clay, with two vertical handles below a low, flaring rim. Occasionally well-made coiled baskets are found. One example seen, nineteen centimeters wide by nine centimeters high, has such fine coils that ten of them measure only two centimeters across. The outer surface of this basket has been waterproofed with gum or grease. The interior has three rows of a simple step design produced by using black wrapping strands. Scraps of extremely coarse woolen cloth with black warp-stripe margin were found among the reeds.

One body, lying at the surface of the mound, was examined. Resting on its right side, face to north, knees to chest, forearms crossed under thighs, it was loosely wrapped in very coarse yellow and brown woolen cloth, in poor preservation. About the loins was a scrap of finer, but also very poorly preserved, brown, blue, and natural wool, warp-stripe cloth. Back of the head was placed a shallow, tightly coiled basket, twenty-two centimeters in diameter and eight centimeters high, containing a second coiled basket about half the size, a small bit of cloth containing red paint, a small *loco* shell smeared with red paint, a small *choro* mussel shell; and a U-shaped bundle of thin, rush-like plant stems, the ends weathered off, as

they stuck outside the basket and protruded above the ground. Back of the knees was a shallow, coiled basket, the same type as the others, twenty-five centimeters in diameter, seven centimeters high, with concave bottom. Inside the basket was another U-shaped bundle of fine twigs or plant stems; a sharp llama bone awl or broken harpoon point, and a short piece of rounded wood, four centimeters long and two and a half centimeters in diameter. Near this second basket was a small scrap of twined matting made of vegetable fiber cord.

Between fourteen and fifteen kilometers up the valley from Arica, is a barren flat, slightly higher than the rest of the valley bottom. On the southern side of this area is a small hill about sixty meters high, on the north slope of which are various figures made of stones loosely piled together. The principal one, that of a man with arms outstretched, is twenty-one meters long. On its right is a small human figure in a similar position. Over the head of the larger figure is a hat-like marking, outside of which, and more or less concentric with it, is an incomplete semicircular row of half round markings (see Fig. 3a). On flat ground out from the base of the hill, directly below these figures, are eight small, rounded heaps of stone forming a row thirty-eight meters long, at right angles to the long axis of the main figure. Parallel to this, thirty meters to the north, is a second row of stone piles, forty meters long. This outer row is far enough from the base of the hill so that the figures can be easily seen. Closer than this, one is too much in the line of the slope to distinguish details. There is no evidence of people having lived nearby.

To the northwest, at a distance of about a kilometer, is a small rounded hill with a fortification wall or narrow terrace about two-thirds of the way up its sides, encircling all except the steepest portion of the hill slope. Nearby, and even on part of the old fortification, are small, oblong pits dug and used in 1879 during the war between Chile and Peru.

About two-thirds of a kilometer further



a



b

Fig. 3. Stone Figures on Hillside, Azapa Valley, and View of Playa Miller, Arica. Dashed line follows approximate limit of midden.

to the northwest on bare level ground are the remains of a rectangular structure about thirty by forty-five meters. The broken down walls are a mixture of adobe and cobblestones and in their present condition reveal no trace of door or gateway. The interior of this enclosure is covered with small pebbles, among which about thirty-five sherds were found. None had designs; four had a plain red slip; the others, of coarse, reddish-brown ware, were badly weathered. Apparently this

has been a corral and the small stones in the interior are the natural concentration after wind erosion of a much-used surface.

About a kilometer and a half to the east, where the valley road comes up on to this slightly higher ground, a heap of pebbles and cobblestones about a meter and a half high, seems to be a travelers' offertory cairn. This is the first point from which the sea is clearly visible as one descends the valley. From here, one also has a good view of the stone figures on the hillside.

ALACRÁN ISLAND

Alacrán, a small, low guano-covered island, lies about five hundred meters off the Morro. Some years ago a number of burials were found here in midden refuse. With one was a quantity of turquoise and shell beads and among the latter were some made from the thick red *Spondylus* shells which were brought from the Colombian

Coast. In central Peru these were prized for the manufacture of ornaments, but there is no previous record of their having been brought this far south.

There is only slight possibility of securing additional material on this island for most of the midden has been destroyed during the removal of guano.

PLAYA MILLER CASINO (LA LISERA)

One and a half kilometers from the old Arica mole, following the road southward around the outer face of the Morro, a sloping projection of land extends outward from the base of the hill (Fig. 3b). Locally, this point is called La Lisera, although some maps use this name only in connection with the *caleta* on its north side. On its southern half is a considerable accumulation of midden refuse covering about one half an acre and extending as far as the eastern side of the small cove known as Playa Miller.¹ Along the shore, except for the cove, is a low strip of rock, largely awash at high water. Inside of this a strip of sand rises to the slightly higher ground on which the midden lies. Much of this area, measuring about three hundred meters in length, has only a shallow accumulation. Its bulk rests on the base of the hill slope rising to the Morro Gordo headland, where it is almost

impossible to make an estimate of thickness. Doubtless the maximum thickness is over three meters, measuring in at right angles from the dip of the surface.

Much of the midden has been disturbed by grading, road work, and construction, as well as considerable test pitting by people hunting burials. In 1941 the municipality of Arica erected a swimming casino at the center of Playa Miller. To secure fill for grading around this structure and to make a parking place for automobiles, part of the adjacent midden was cut away. A thirty-meter section, up to two meters in height, remained intact along the eastern side, so permission was secured from the municipality to widen the parking place by a meter and a half for a distance of ten meters. As the strata of this portion, back from the exposed face, were fairly horizontal, it appeared to be possible to separate them accurately for sifting, without trenching the inner side. The débris was removed and sifted layer by layer, following the most obvious stratification (Fig. 4).

¹ This cove is marked Playa Miller on the Arica Municipal maps. On Chilean Hydrographic Office charts it is designated Quiani, a name applied by local fishermen to a section of shore three kilometers further south.

The bulk of this refuse consists of shells and fine dusty earth, mixed with cornhusks and cobs, scraps of reeds, bits of cloth, and potsherds; in fact everything that the people left behind, even to dried excrement. Near the middle, one portion up to sixty centimeters in thickness, has a large percentage of manure in which are many fly pupae cases. This quite obviously is llama dung. Sherds were found to a depth of two meters on an average.

potsherds were recovered, but no complete vessels. Only about twelve per cent of these were painted, with another six per cent consisting of diagnostic sherds of unpainted ware. Table 1 (pp. 194-198) shows the distribution of the principal forms and the elements of the designs occurring on these sherds.

One is impressed with the uniformity and limited number of types from top to bottom of the midden. In use through-

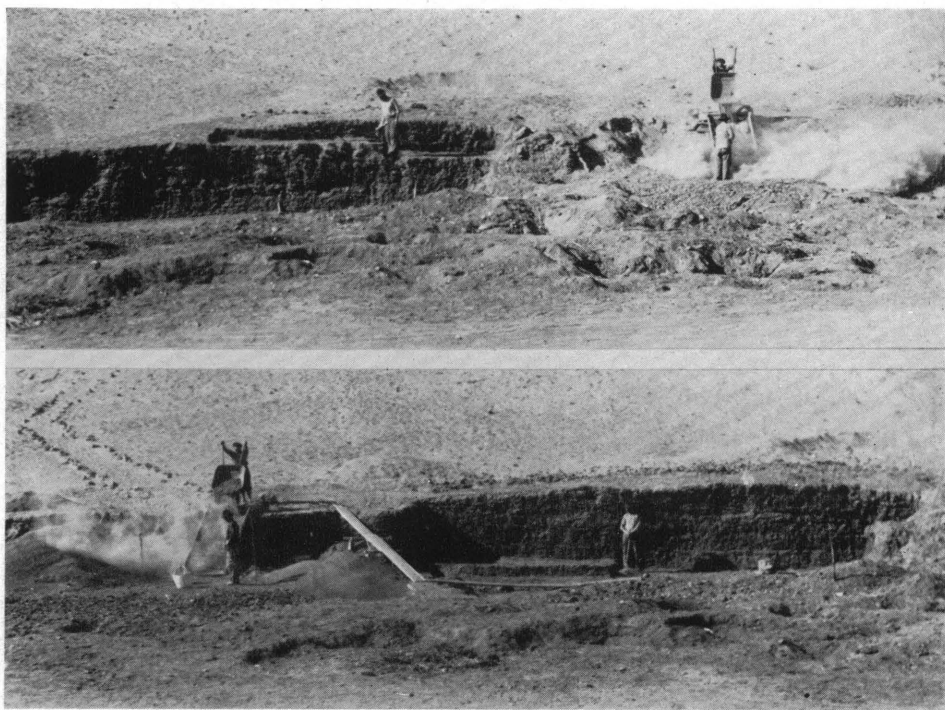


Fig. 4. Excavation at Playa Miller showing Two Stages in the Removal of the Deposit. Top, removing Layer B; bottom, removing Layer G.

Below this, the occupational débris is mixed with an increasing amount of sand, and toward the bottom, at 3.67 meters, becomes little more than thin streaks of fish bones. It rests on clean sand, the surface of which is 1.58 meters above high water mark (Fig. 5).

POTTERY

From the upper thirty cubic meters of refuse sifted, over twenty-two thousand

out, were large water jars with conical bottoms, two vertical loop handles, and narrow flaring mouths. Similar complete jars in the collections of the Museo Historico Nacional and the Museo Nacional de Historia Natural in Santiago range in height from thirty to forty centimeters. On the basis of decoration they fall into two divisions: one, red with a creamy white slip with figures in black, or black and red (Fig. 6d, e; see also Fig. 10p);

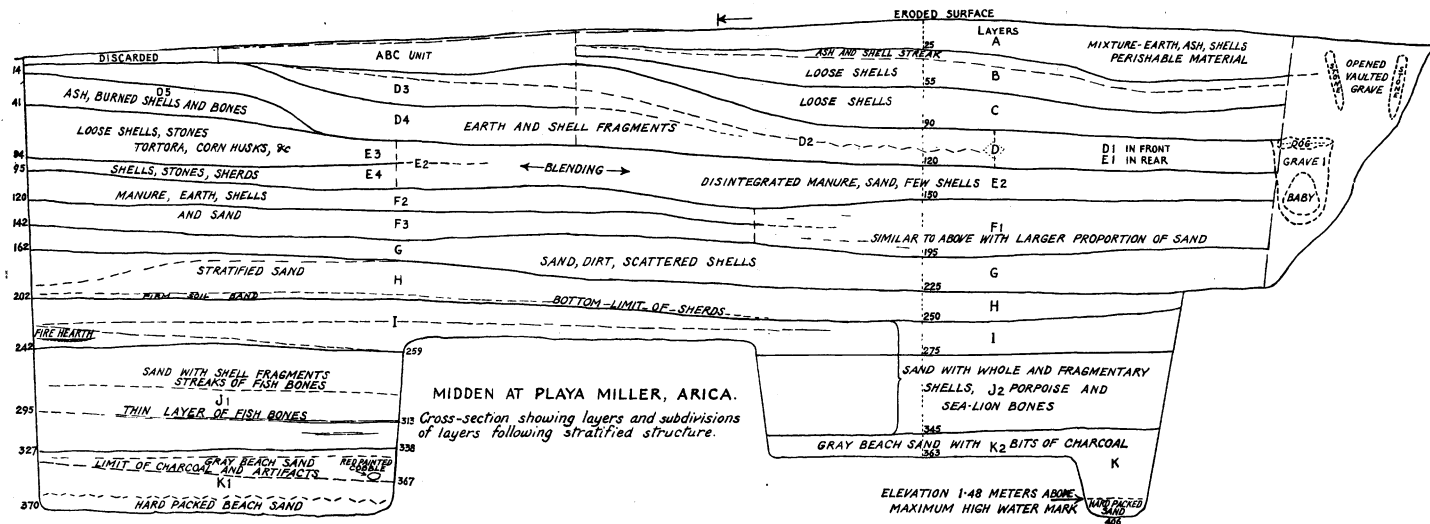


Fig. 5. Cross-section of Midden, Playa Miller.

TABLE 1
POTTERY ANALYSIS, PLAYA MILLER MIDDEN

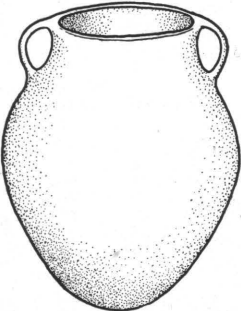


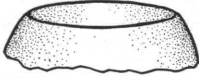





COOKING POTS FLAT VERTICAL HANDLES		A	B	C	D	E	F2	F3	G	H	TOTAL
  	—	3	1	1	3	4		1			13
	—	3	2	7	4	3	1	2	1		25
	—		2	1	3	2					8
Handle fragments, flat in section	—	13	19	17	45	66	9	10	7	2	200
RIM SHERDS											
From forms indicated above	—	130	98	79	179	275	46	33	45	29	1044
 Inclining rim	—	1	2	10	13	3					30
 Projections on rim	—	2	2	1		5					10
 Decorative raised ring	—		1			1					2
 Small lugs on shoulder	—	1		3		3			1		8
BOTTOM SHERDS											
 Flat bases	—	3			14	19	3	1	3	2	51
 Rounded bases	—										
UNPAINTED BODY SHERDS	—	2261	1680	1494	3155	6655	795	500	568	222	18,526

TABLE 1 (Continued)
POTTERY ANALYSIS, PLAYA MILLER MIDDEN




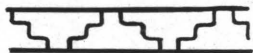



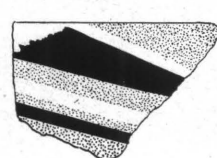


BOWLS		A	B	C	D	E	F 2	F 3	G	H	TOTAL
 FLAT AND ROUND BOTTOMS											
RIMS: 											
PLAIN, WITHOUT SLIP ——— DECORATION INSIDE RIM: Black lines—straight or wavy 		16	8	3	12	20	3	4	7		76
 rim 		2	3	1	4	3					13
			1	1	4						6
					1	2					3
INDETERMINATE DESIGNS: In black inside bowl ——— In black and red inside bowl ———					3	3	1	2			9
			1			1	2				5
RED SLIP { Inside and out ——— Inside only ——— Inside, with miniature handle, above rim 		2			1					2	5
				1	7	7	1	4	1		31
					1	1					2
BLACK ON RED INSIDE BOWL 									1		1
BLACK AND WHITE ON RED INSIDE 									1		1
WHITE SLIP INSIDE AND OUT WITH RED AND BLACK SCROLL DESIGN INSIDE 							1		2		3
SIMILAR ANGULAR SCROLLS 				2							2

TABLE 1 (Continued)
POTTERY ANALYSIS, PLAYA MILLER MIDDEN






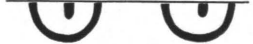






BOWLS		A	B	C	D	E	F 2	F 3	G	H	TOTAL
BOWLS WITH BEVELED LIP											
	Plain, no decoration	3		1	2	4					10
	Black line decoration on inner face of bevel										
				2	3	1					7
					3	4					7
					1						1
						1					1
BOWLS WITH ANGULAR OUTLINE AND FLAT BOTTOM											
	Plain		2			6					8
	Painted inside, black and red; design uncertain			1	2	4					7
							1				1
KEROS											
	BLACK ON PALE ORANGE-BUFF WARE					1					1
	SMOOTH RED WARE Half-round ring at center						2				2
	Figure on rim, flat raised band outside	1			1						2

TABLE 1 (Continued)
POTTERY ANALYSIS, PLAYA MILLER MIDDEN

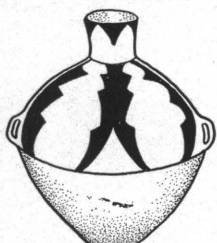
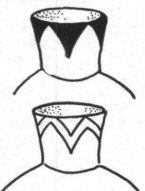
















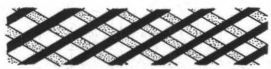


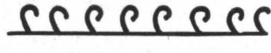





WATER JARS		A	B	C	D	E	F2	F3	G	H	TOTAL
  BLACK AND RED ON WHITE SLIP Handle fragments of preceding			3	1	4	3	3	6	7	1	32
			3				1				4
		2	1	1	2	13	3	5	4	2	37
		1	5	1	5	1					16
			5	2	8	7	1		1		27
  BLACK, RED AND WHITE NO SLIP Handle fragments of preceding		23	11	11	26	45	1				125
	 Ears in relief		1								1
		4	3	3	7	6					25
PITCHERS											
   DESIGNS IN BLACK, RED AND WHITE. BOTTOMS FLAT											
DECORATION INSIDE LIP		7	2	4	6						20
											
		1	5	4	6	15					31
	Unclassified	1	2	6	3	6					18
OUTSIDE NECK		1			1						2

TABLE 1 (Continued)
POTTERY ANALYSIS, PLAYA MILLER MIDDEN

PITCHERS		A	B	C	D	E	F 2	F 3	G	H	TOTAL
 INTERLOCKED SCROLL RED AND BLACK  (Other examples of this figure) (See bowls)							1	1	2		4
 BLACK ON WHITE SLIP 									1		1
Sherds with same figure; pitchers?		1				1	1				5
DESIGN ELEMENTS ON PITCHERS AND UNSLIPPED WATER JARS											
 Cross hatched red and black											
											
											
											
											
											
											
											
											
TOTAL PAINTED SHERDS		294	256	277	537	936	91	65	90	31	2,735
TOTAL UNPAINTED SHERDS		2430	1812	1603	3426	7051	857	552	631	255	19,921
(Including cooking pots)		2724	2068	1880	3963	7987	948	617	721	286	22,656

The letters designate successive strata with A starting at the surface and H, the lowest successive pottery-bearing stratum. The total includes a count of sherds from that portion of the midden where A, B, C were removed as a unit.

(Where figures in the total vary from the numbers given in the strata columns, the indicated pattern of distribution would in no case be altered.)



Fig. 6. a-j (10630, 10741, 10609, 2412, 10560, 2413, 2413, 10618, 10613, 10687, Museo de Historia Nacional, Santiago). Principal Types of Decorated Water Jars and Pitchers from Tacna. a-e, Red and black-on-white slip; f-j, Red, black, and white on reddish or buffware. f, g, Opposite sides of the same jar.

the other, without the slip and with black and red designs on the natural, dull terra cotta of the clay (Fig. 6f, g). The white slipped pottery occurs throughout the midden, continuously from the bottom to the surface, and is not superseded by the unslipped variety which first appears commonly in Layer E, continuing to the surface.

The only consistent feature in the decoration on the slipped water jars is the black triangular markings pointing down from the rim. In a rare variant these triangles are indicated by two parallel lines (Fig. 6e). Body decoration is carried down to just below the handles, usually in four panels repeating the same combination of lines, spirals, concentric circles and solid color units, but reversing the combination of colors.

This particular white slip, which was applied in very liquid form, seems to have approached the discovery of a true glaze. A number of sherds at various levels have small, glassy, greenish bubbles on the surface where the slip has fused in firing.

The slipless terra cotta water jars have either the same solid black figures beneath the rim as those with the slip or a modification in which the space between the triangles is somewhat rounded. A single example with this marking has what appears to be an ear modeled in vertical relief with a small hole to indicate the ear opening. This came from Layer B. The body decoration of these differs considerably from the ones with the white slip. The sherds have similar design elements as present in the example from the Santiago collections (Fig. 6f, g), although it is not positive that the complete designs are duplicated at this site. The diagonal bands drawn from the shoulders above the handles and meeting at the center of the sides seem a characteristic feature. Judging from the specimens in Santiago the opposite sides of these jars do not always have the same pattern.

Occurring with about the same frequency as sherds of the unslipped terra cotta water jars are fragments of well-made carefully finished pitchers. The range in form among these is indicated by

three specimens from the Museo Historico Nacional de Chile collection shown in Fig. 6h, i, j. Some are proportionately wider in relation to their height. All have flat bottoms. They are common from the surface down to the bottom of Layer E, and have the same range as the unslipped water jars, with two body sherds below this level which may belong to them. All are of a reddish or orange buffware, with fine grit tempering. Designs are intricate and well executed, in dark terra cotta red, white, and black. Portions of the natural orange colored clay surface show through in parts of the designs, though in many sherds it is almost completely hidden. Many, though not all, have the interior of the lip decorated as shown in Table 1 (p. 197). A check of the distribution of design elements shows no marked change though one, the cross-hatched red and black lines, is limited in distribution to Layers A, B, C, and D.

The only other important group of painted sherds is that from small, rounded, shallow bowls. They are of the same ware as the pitchers, but generally the surface has not been finished with equal care. They are surprisingly lacking in other Arica collections gathered from the tombs, but appear common in the refuse. On these, decoration is almost entirely limited to the lip. On the inner side of the lip some have a narrow inclined bevel on which either straight or zigzag lines are painted in black. Others have a solid red slip over the entire inner surface while the outside was left plain and rather rough (Table 1, p. 195).

Two sherds from small, very shallow, rounded bowls or dishes finished like those just mentioned, have decorative loop handles placed lengthwise with, and projecting up from the rim. In both, the rims and handles are the same thickness as the body of the bowl (Table 1, p. 196).

One of the few indicated differences in this series is the presence at the bottom of the pottery-using period of the midden of a few rim sherds from small, rounded, high-sided bowls with a slight outward flare below the rim. Those with white slip, inside and out, are decorated inside in dull

red and black; those with red slip inside have white and black decoration over this slip. Unfortunately, none of these sherds is large enough to identify the designs positively and no record of complete bowls is available for comparison. A nearly complete specimen from Arica may be seen in the Museo de Concepcion, Chile. Apparently the design consists of solid triangular areas of color with interlocking scrolls from adjacent corners, similar to the design element shown in Table 1 (p. 195). This design also appears on the outer surface of a few other sherds from the same layers (F, G, and H). One of these may be from a pitcher with slightly inclining sides rising from a flat base. The application of this design is shown on three specimens from the Museo Nacional de Chile collections (Fig. 6a, b, c). Their forms have not been positively identified in the bottom pottery strata (F, G, and H), but it is worth noting that the only handle with a small projection on top of it (Table 1, p. 194), found in the entire Playa Miller series, comes from Layer F.

The remaining sherds, other than those from cooking utensils, are all from rare or exotic forms. Sixteen sherds, scattered through nearly the full depth of pottery-bearing layers, are from a previously unreported type of bowl. Viewed from above, the rim is squared or rectangular in outline, with rounded corners and curving sides. Measurements cannot be determined, although a height of about ten centimeters is suggested. The base is flat; the sides flaring, with an inward curve; the rim plain. Half of the fragments have neither slip nor decoration, while the others are painted only on the inside in black and red. Designs cannot be determined from the material at hand.

From Layer E2 (Table 1, p. 196), about three-fifths of the distance from the surface to the bottom of the pottery-bearing refuse, came the base of a Tiahuanaco type kero. Broken off too short to determine the decoration, nonetheless, it shows rather poorly executed black lines on an orange-buff surface. All that can be said, is that it does not belong to the classic Tiahuanaco period.

From Layers A and D2 are kero fragments of a dark red, well-smoothed, unpainted ware, both showing a raised, flat band around the outside (Table 1, p. 196). One of these has, on and above the rim, the upper half of a human figure, arms akimbo (Fig. 8c). The kero form, with flat encircling band and figure on the rim, is most frequently seen carved from wood in collections from northern Chile. Another unpainted kero sherd from Layer D has a narrow, rounded, encircling band.

Cooking Pots. Sherds from cooking pots are nearly all from wide-mouthed, round-bottomed vessels, generally slightly constricted below the rim. A few have a low, flaring lip. Handles are all vertical, rectangular or curved in cross-section. In those vessels with low, flaring rims the handles are flush with, or slightly above the lip, and join the shoulder or body of the pot. Of these there are thirteen examples. The pots with a shallower curvature below the rim have handles set within this curve without making contact between rim and shoulder. Six other vertical loop handles are from the sides of full-bellied pots, placed at about their maximum diameter. In addition, there are two hundred handle fragments which might belong to any of the three forms mentioned.

Decorative features are almost completely lacking on cooking utensils. Vertical, half-round lug projections occur on eight examples. One sherd from a vertical-sided vessel has a small, raised, ring adornment just below the rim. Seven rim sherds from wide-mouthed bowls have two small pointed projections set close together above the rim.

As the present report was prepared under field conditions without access to specimens from adjacent areas, and without the recent literature on work in Bolivia and Peru, it was impossible to determine the relation of the Arica sherd series to Peruvian and Bolivian pottery. It was possible only to check it against the ceramic chronology for northern Chile, as determined by Uhle and Latcham.¹ This

¹ Latcham, 1928a.

chronology was proposed after studies of grave material and in its briefest form is as follows:—

The introduction of ceramics is credited to the Tiahuanaco people who brought in the kero and associated forms. The designs indicated by Latcham are angular, and appear to be local rather than directly derived from those found at Tiahuanaco, although examples of both the classic and decadent period have been found in Chile.¹ Subsequently, the Atacameñians developed their own distinctive ware. Said to be especially characteristic of this are the large slipped water jars like those shown in Fig. 6. With them are round-bodied, flat-based pitchers with handles round in cross-section and frequently with small projections on top. Designs are rather angular in black-on-white, occasionally alternating black and red-on-white, and rarely black-on-red. Among the associated unpainted pieces the asymmetric *pato* or *zapato* cooking pots are also said to be an Atacameñian trait.²

This ware, they believe, was then subjected to the influence of a Peruvian culture centering about Ica and the Chincha Valley. The Chilean examples, classified as typical Chincha ware, are large water jars shaped like those of the Atacameñians. These have low flaring rims, with intricate polychrome decoration, and no trace of the solid black pendent triangles at the rims. Included with these are bowls with well-rounded sides and inward curving plain rims, with and without small, offset flat bases and another form with curved slanting sides and a flat base. The latter are decorated both inside and out with thin, irregularly spaced zigzag, straight and spiral lines and small representations of birds and llamas. The former are decorated outside with a broad band below the rim on which a narrow, two-color zigzag line is applied.

There is no claim for a strictly Chincha period in Chile, merely one of Chincha influence.³ In the north this is specified as

the Chincha-Atacameñian period in which there is a blending of the two cultures. During this period the forms of the Atacameñian ware continue in use with slight modification, but the decoration is attributed to the Chincha. Chincha bowls are not mentioned as a feature of the blended ceramic group.⁴ The Chincha-Atacameñian period is believed to have continued until the time of the Inca invasion, and was followed by the introduction of the distinctive Inca ware which underwent little or no change in the interval before the arrival of Europeans.

A comparison of this sequence with the sherd series of the Playa Miller midden raises various questions. The Tiahuanaco period as such is not represented; the only Tiahuanaco features occur as isolated pieces after pottery appears. Typical Atacameñian ware, as defined by Latcham, is abundant in one of its most characteristic forms, the large water jar with designs executed in black-on-white and black and red-on-white. This is proportionately most common at the bottom of the midden but continues through to the surface, presumably to Inca times. Contemporaneous with it in Layers F and G is the design element (Table 1, p. 197) which Latcham designates as a Chincha-Atacameñian feature.⁵ This element then disappears with the arrival of the intricate decoration attributed to Chincha influence. With the latter, flat handled pitchers lacking the small projection are an important associated form.

Conspicuous by their absence from the entire series are the small, asymmetrical *pato* cooking pots considered a feature of both Atacameñian and Chincha-Atacameñian periods,⁶ as these have been described. Likewise lacking are any fragments of the polished blackware which has been reported from all over northern Chile as an element of all periods.⁷

Obviously, it is impossible to confirm or disprove the postulated sequence for northern Chile with this sherd series. If, as

¹ Latcham, 1928a, Chilean Tiahuanaco period, 71 to 82.

² Latcham, 1928a, Atacameñian Period, 97, Chap. 7, Figs. 58, 65, 68, 75.

³ Latcham, 1928a, Chincha ware, 131, Pl. X, Figs. 1, 3, 4, 6a, 6b, 12; Pl. XII, Fig. 2.

⁴ Latcham, 1928, Chincha-Atacameñian Period, 107, 123-133; Pl. II, Fig. 5; Pl. III; Pl. X, Fig. 8; Pl. XI; Pl. XII.

⁵ Latcham, 1936, 609, Figs. 1d, 2.

⁶ Latcham, 1938, 226, 239.

⁷ Latcham, 1938, 244-247.

might be suggested, it marks only the Chinchá-Atacameñan period then it has, at least, demonstrated that the blending of the two was a protracted process which failed to change the form and decoration of one of the most characteristic pure "Atacameñan" features. If, by chance, this sherd series does represent the entire period in which decorated pottery was used, then it will be necessary either to modify the former ideas on sequence or to omit Arica from the areas where they are applied.

TEXTILES AND BASKETRY

The articles found in association with the sherd series, and from the period preceding it, are listed in Table 2. Unfortunately, perishable material is completely lacking below the limit of pottery, probably because this point in the midden is in close proximity to the level of moisture in the sand at times when spring tides coincide with heavy surf.

Textiles. Most abundant, next to sherds, throughout the pottery period, are scraps of textiles. At the time of writing, these have not yet been cleaned and prepared for examination. Accordingly, the present remarks are tentative and subject to revision. The principal fiber used was wool, presumably from either the llama or alpaca, as the evidence of their presence is abundant. Only two pieces are of cotton. Subsequent checking may reveal others, as cotton in the form of bolls and bunches which still retain the seeds was found to be contemporaneous with the oldest cloth scraps. In approximately the lower half of the pottery period only one fragment of cloth with dyed yarn was found in association with the oldest pottery. It has stripes of warp designs in natural shades of wool separated by a solid red section. Bits of blue yarn have been used along the edge where the warp threads are finished off. From the surface, down to and including Layer E, the fragments found show that red, yellow, green, and blue dyes were used in addition to the natural wool shades which ranged from dirty white to dark brown. These are used in both plain warp stripe cloth and in those with warp stripe designs, the

most intricate type of weaving present. No examples of dyed cloth were found.

No attempt has been made to determine the original form of any of the scraps except for those readily identifiable. These are the small square or rectangular kerchiefs with binding threads brought together at the corners and braided into a short tassel. All have plain warp stripes and are very similar to those now made and used on the Bolivian Altiplano and in Peru. The warp stripe pieces bearing simple designs are from coca bags, and represent the most intricate type of weaving present in this midden.

Belting is rare, being limited to four scraps from the upper three layers. All are woven. In one piece which may be a carrying strap or cinch the warp strands are brought together and braided into a rope. A piece of what seems to be crocheted work, found in Layer A, consists of ring units knotted together where they touch each other, with the intervening areas left open.

From the same layer there is a fragment of a knotted wool cord bag, made in the technique known as "coil without foundation." It consists of a coil of successive half-hitch knots, the loop of each hitch passing through the adjacent knot of the preceding coil. These knots are drawn tight with the result that a solid firm fabric is achieved. In making these bags an awl or bodkin must have been used.

Cords and Rope. Pieces of cord and rope are quite abundant throughout most of the pottery period. The most common examples are twisted, using both two and three strands. In braiding, three to eleven strands are used and a pleasing effect is produced by combining light and dark wool. Cotton seems to have been preferred for fish line, and the spindle with rectangular wood or whalebone whorl, associated with male burials, may have been used in its manufacture. Although only a few bits of fish line were found, their distribution demonstrates its use throughout the pottery period. Braided and twisted sinew and human hair cord occur, but are not abundant. More plentiful

TABLE 2
EXCAVATION AT PLAYA MILLER
DISTRIBUTIONAL ANALYSIS

	A-C	D1-D5	E1-E4	F1-H2	I-K
Stones					
Cobblestone choppers and rough core-like tools similar to:					
Taltal Group I-1,3,5	—	1	2	1	2
Taltal Group II-1	1	—	—	—	1
Taltal Group II-4	—	—	—	1	—
Taltal Group III-1	—	—	—	—	1
Taltal Group III-3	1	—	1	—	3
Flakes: teshoa, nicked edge	1	—	—	1	—
basalt, or coarse stone	16	6	40	79	82
basalt, worn edges	1	1	—	3	—
chalcedony	25	13	34	58	30
chalcedony, nicked edges	3	—	—	7	—
Sidescrapers: single edge	4	2	3	2	—
two edges	—	—	—	—	2
Blanks or rejects	1	3	2	3	—
Points: stemmed and barbed, harpoon	2	—	2	1	—
triangular, concave base	—	—	1	—	—
triangular, three unequal sides	—	—	1	1	—
Hammerstone, pebble	—	—	—	—	1
Bolas without groove, strap attached	—	1	—	—	—
Bolas, grooved long axis, egg-shaped	2	—	2	—	—
Pebbles: grooved long axis	3	—	2	—	—
notched long axis	—	—	1	—	—
unworked, cord attached	1	—	—	—	—
irregular, cord attached	2	2	—	1	—
Fishing Gear					
Weight: projection for tying cord	3	1	—	—	—
Sinkers: stone, cigar-shaped, round or oval in section	2	1	—	4	—
stone, cigar-shaped, flat edge	3	—	4	—	—
stone, cigar-shaped, unfinished	—	—	1	1	—
Fishhooks, copper	—	—	—	2	—
Bone fish harpoon (?)	1	—	—	—	—
Bone					
Chipping tools	5	—	1	—	—
Awls	—	—	1	1	—
Weaving daggers	1	—	—	2	—
Handle of spoon	1	—	—	—	—
Worked scraps	5	—	1	2	—
Top-like objects, whalebone	1	—	—	—	—
Wood					
Top-like objects, without stem	3	—	—	—	—
Top-like objects, with stem	2	—	—	—	—
Spoon fragments	—	—	2	1	—
Wood fragments	23	6	4	4	—
Ball	1	—	—	—	—
Shaft, fragment, fish harpoon	—	1	—	—	—
Leather					
Cover for wooden box	—	1	—	—	—
Sandals	4	5	—	—	—
Thongs	25	6	3	—	—
Soft, tanned	1	—	—	—	—
Thorns					
Needles	2	1	—	1	—
Unworked	2	—	—	1	—

TABLE 2 (*Continued*)

	A-C	D1-D5	E1-E4	F1-H2	I-K
Miscellaneous					
Spindle whorls: stone	2	—	1	1	—
bone, rectangular	2	—	—	—	—
wood	1	—	—	—	—
pottery	—	—	1	—	—
Pottery disc: unfinished whorls (?)	6	1	5	2	—
Composite comb: with splints	6	—	3	—	—
without splints	—	1	—	—	—
Bladder bags	2	—	—	—	—
Toy balsas	2	—	—	—	—
Copper fragments	2	—	—	13	—
Red paint	2	—	—	1	—
Bird bone tube	1	—	—	—	—
Bird bone tube, flute or whistle	—	1	—	—	—
Flat bone pendants	—	1	—	—	—
Shell beads	—	—	—	—	1
Cornhusk packages	4	1	—	—	—
Sherds					
Totals (see separate analysis)	7292	3963	7987	3414	—
Textiles					
Plain cloth, woolen	118	64	35	110	—
Plain cloth, cotton	1	1	—	—	—
Warp stripe, natural wool shades	10	5	3	—	—
Warp stripe, red, green, blue, yellow	16	7	3	—	—
Warp stripe, designs	2	2	—	3	—
Belts, plain, woven	1	—	—	—	—
Belts, warp design	3	—	—	—	—
Crochet work	1	—	—	—	—
Slings, woven centers	2	—	2	2	—
Knotted bags	—	—	—	1	—
Netting	1	—	—	—	—
Cords and Ropes					
Wool, twisted	86	53	22	19	—
Cotton, twisted	8	6	1	—	—
Human hair, twisted	18	11	7	2	—
Sinew	2	3	—	—	—
Wool, braided	45	20	14	4	—
Hair, braided	4	—	1	1	—
Plant fiber, twisted	27	19	4	1	—
Objects of Plant Fiber					
Carrying straps, sewed with human hair	6	5	—	—	—
Matting, twined	12	15	11	—	—
Pouch, of matting	1	—	1	—	—
Woven reed strap	1	—	—	—	—
Basketry					
Coiled baskets, oval	3	—	—	—	—
Coiled baskets, round	2	2	3	1	—
Basketry technique hat	1	—	—	—	—
Plant Remains					
Corncobs	48	12	15	7	—
Parts corn plants	3	5	1	1	—
Beans	8	2	1	1	—
Cotton	—	2	1	2	—
<i>Pachai</i> pods	2	—	1	—	—
Calabash, bowl fragments, plain	103	21	16	10	—
Calabash, bowl fragments, decorated	3	—	—	1	—
Cane joints	16	2	2	—	—
Animal Remains					
Dog skull or jaws	1	1	1	—	—
Cat	—	—	2	1	—

are cords and ropes of rush or reed; these, too, are both braided and twisted.

Matting. Matting was of reeds and rush; most of it with twining strands widely spaced (Fig. 7c). This technique is used in both coarse rush and rather fine reed matting, with no intermediate size. The strands used for twining are here all of

so that the strands between these two points lie flat and parallel. They are held in this position by sewing human hair cord back and forth through the middle of the rope.

Basketry. Basketry is limited to one technique with three forms: round and oval baskets and flat mats or platters

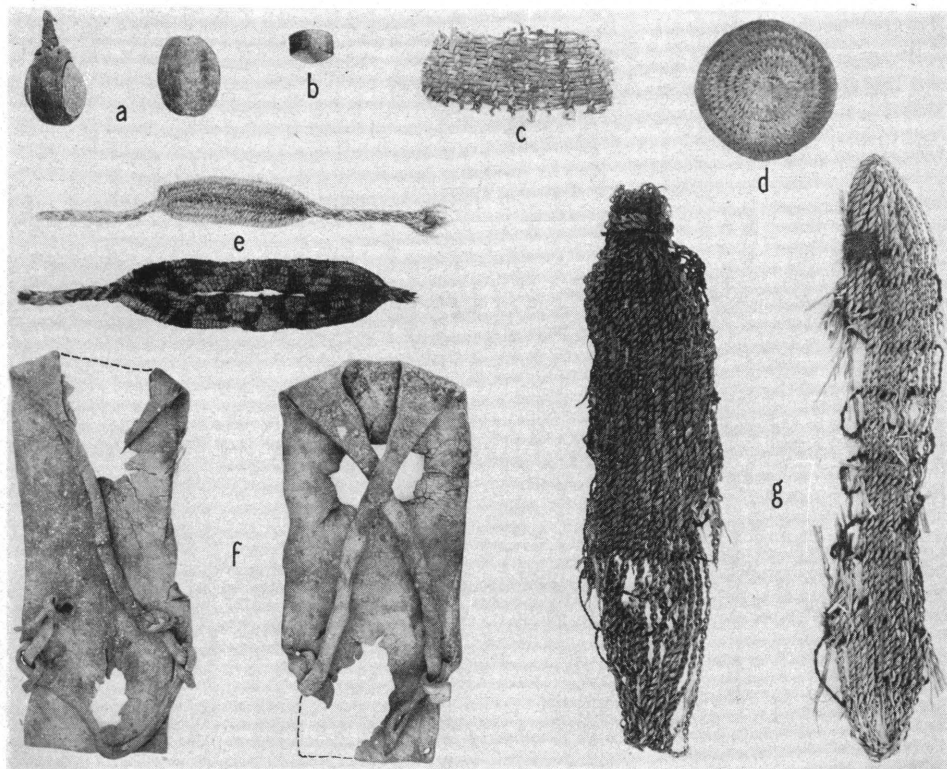


Fig. 7. Miscellaneous Artifacts from Playa Miller Midden. a, Bolas weights; the specimen at the left is a waterworn pebble with a leather strap sewn in place; b, Wooden top-like object, stemless; c, Fine rush matting; d, Coiled basketry platter; e, Throwing slings, central portions; f, Sandals; g, Carrying straps.

plant fiber. In addition to the examples of twined matting there are two woven fragments.

Carrying Straps. The same sewing technique is used to make carrying straps (Fig. 7g). These are made by first coiling a length of two-strand plant fiber heavy cord or small rope using four or five turns. Opposite sides of the coil are then extended

(Fig. 7d). All have foundation coils, with each turn of the wrapping element passing through a portion of the foundation coil directly beneath it. None of the fragments found bears any designs. This same technique is found in a fragment of a hat (?) from Layer A in which the coils are of hair and the wrapping strands of wool.

Weaving Daggers. Two questionable

fragments of weaving daggers (Fig. 8d) made of llama bones with sharp, tapering points from Layer G1 seem to have been similar to a complete specimen found in nearby, disturbed refuse. It is practically identical with those in use today in the Bolivian Altiplano.

Spindle Whorls. Spindle whorls (Fig. 8e, f) are clearly divisible into two groups: rectangular flat ones of whalebone and flat discs made of wood or stone, or chipped

millimeters long, lashed with grass between two small twigs, four centimeters long. The mounting is so casually prepared that it is probably a provisional tool, used once and discarded.

MISCELLANEOUS

Combs. All the combs are composite, with teeth made of thin strips of cane and all are double edged (Fig. 8h). A single example has the teeth bound together only

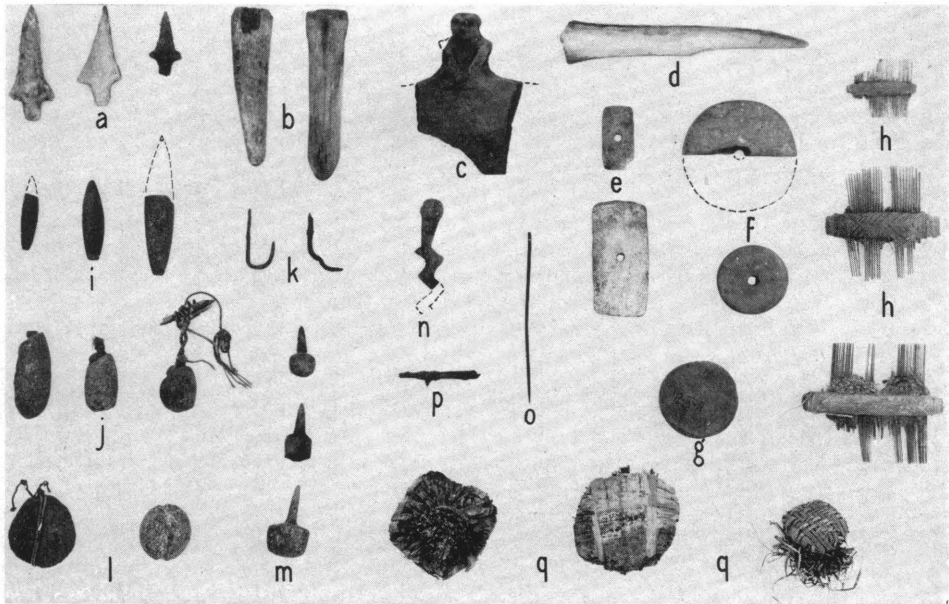


Fig. 8. Miscellaneous Artifacts from Playa Miller Midden. a, Stone harpoon points; b, Llama bone chipping tools; c, Modeled figure on rim sherd of kero; d, Weaving dagger; e, Whalebone spindle whorls; f, Spindle whorls of wood and stone; g, Pottery disc, possibly an unfinished whorl; h, Composite combs; i, Cigar-shaped fish line sinkers; j, Weights with cords tied to projecting knobs; k, Copper fishhooks; l, Waterworn pebbles, one with leather strap sewn in place, the second notched on long axis; m, Top-like objects, the upper one of whalebone, the two lower of wood; n, Handle of bone spoon or spatula; o, Thorn needle; p, Drill for needle eyes (?); q, Cornhusk packages, at left, top view, at center and right, bottom view.

and ground potsherds. None is decorated. When these occur in graves the rectangular whorls are associated with male burials, the round ones with females.

Needles. All the needles found are of thorn, with drilled holes (Fig. 8o). One example has a well-made hole about one-half millimeter in diameter. A tool, perhaps used for drilling the eyes, is shown in Fig. 8p. It consists of a very small, thin, sharply pointed, chalcedony flake, six

with cord lacing; the others are reinforced with half-round cane splints on either side of the teeth, with the cord lashing forming a chevron pattern outside of these. Scattered through the refuse, as indicated in Table 2, were joints cut from lengths of a variety of cane, probably scraps left after the mid-sections of the cane had been removed for the manufacture of combs (Fig. 8h).

Sandals. The sandals are of untanned

leather cut to the same pattern, roughly rectangular, slightly wider beneath the toes, with two tapering straps doubled back from each forward corner, crossing the instep and tied to strips cut from each side of the heel. A shorter strap, also attached to these, passed around the rear of the heel (Fig. 7f).

Beads and Ornaments. All but non-existent in the midden, beads and other ornaments are also generally lacking in the pottery period graves. The small single bead from Layer G1, appears to be made of red *Spondylus* shell, like some of the beads from Alacrán Island. If the identification is correct, this offers evidence of surprisingly early contact, even though it may be indirect, with the trading system which brought these shells down into Peru from Colombia.

A single bone pendant, a flat rectangular object, is about four centimeters long by two centimeters wide, and has a small perforation at the center of one end.

Corn-leaf Packages. Five corn-leaf packages (Fig. 8q) from Layers B, C, and D5 are previously unreported objects. They are made of several layers of leaves so folded and bent that one side presents a round flat surface, while on the opposite side the ends are brought together and tied into a bunch at the center. They range from 3.5 to five centimeters in diameter. The smallest shown (Fig. 8q) has the outer layer of the flat side slit into ribbons and interwoven with thin strips of reed which are also doubled back and tied on the opposite side. There is no obvious explanation for their purpose.

Leather. A piece of tanned leather from Layer C might well be the envy of any modern tanner. When found it was still soft, pliable, and strong in spite of having lain in the ground at least four centuries. Untanned leather thongs, on the other hand, are extremely hard and brittle, and are inclined to turn into a gluey substance after exposure to the moisture of the air. Shellac was found to be a successful preservative for these. Acetone as a solvent should not be used.

Leather Box Cover. Fairly common items in collections made in the interior

of northern Chile are small, cylindrical containers or boxes of wood or bone for storing paints. These usually have cap-like leather covers. Although no such containers were found a single cover appears in Layer D5.¹

Bladder Bags or Pouches. The two bags found are small animal bladders. There is nothing to suggest their use.

Spoons. The objects classified as spoons are unsatisfactory specimens, as those of wood are no more than portions of the bowls; that of whalebone is merely a fragment of a flat handle cut in the form of a zigzag (Fig. 8n).

Top-like Objects. Fig. 8m shows three top-like objects which are unidentifiable as to use. Of the five specimens found, four are of wood, and one of whalebone. The lengths range between three and five centimeters. Fig. 7b is made of wood, has no stem, and is apparently intended for the same obscure purpose as the others. In tombs, four or five of these are usually found together in small, open mesh cord pouches.

Toy Balsas. In Layer A was found what appears to be a toy balsa made of four corncobs bound together. A smaller model from near the same level is made of one long and two short sections of twigs lashed together, like the model balsas frequently found in the tombs.

Mortars. No mortars were removed from the excavated portion of the midden, but some had been found during the work on the Casino. There seem to be two distinct types, one with broad shallow hollows for grinding corn, others with a small conical hollow, sometimes as deep as it is wide. The latter at Quiani occur in pre-agricultural refuse.

Calabash Bowls. These appear with the first pottery, but are relatively abundant only in the upper strata, Layers A, B, and C. Of a total of 155 fragments only four are decorated with burned line designs. One of these occurred well down in Layer F1, the others near the surface in Layer A. As far as can be determined all have been cut in half lengthwise. The use of calabash containers in northern Chile and

¹ Latham, 1938, 143-147, Fig. 45.

their decoration has been described at length by Latcham.¹

HUNTING AND FISHING GEAR

Slings. Although only five examples of slings (Fig. 7e) were recovered, their distribution indicates that they were in use throughout the pottery period. All are of wool, with woven centers and round, braided cords made from the warp strands of the center piece, and have loop finger grips.

Bolas. All the bolas (Figs. 7a and 8l) found here are small, egg-shaped, and elliptical in form, grooved on the long axis, and probably intended for bird hunting. One example from Layer D1 retains the leather cover, a flat strap folded about the weight and sewed at one end. The twisted sinew was secured to this and did not encircle the stone (Fig. 7a).

Bows and Arrows. Nothing was found in the excavation to prove the presence of bows and arrows, but some grave goods, to be described later (p. 212), show that they were known at least during the latter part of the pottery period.

Harpoons. The only evidence of the use of harpoons is found in the stone points which were fitted to them. These are of one pattern: thick with protruding barbs and a tapered stem (Fig. 8a). Complete harpoon forepieces and a case for them from a burial near Playa de los Gringos are shown in Fig. 15. It will be noted that these harpoon forepieces lack the bone side barbs which are found at Pisagua and Taltal and at Quiani.

Fishhooks. Only a single fishhook (Fig. 8k) was found. It is of copper with a straight shank and no barb. According to the workmen who had opened the tombs in the adjacent refuse, these were fairly common and all were of this form.

Sinkers. Sinkers are of two types, cigar-shaped and shorter, thicker ones which at one end have a bevelled cut around a small projecting knob. A short loop of heavy cord is secured to this knob by a fine cord lashing. With this system the weight could be quickly attached to or

removed from the fish line (Fig. 8j). The examples found range from two and a half to five centimeters in length.

The cigar-shaped form has two variations. One, oval in cross-section, has one edge ground flat the entire length. At each end a fine groove is cut into the stone on all except the flat edge of the circumference. Apparently one end has been intentionally left wider than the other (Fig. 8i). Complete specimens have two lines lying against the flat edge and bound to each end of the weight with thread. A little above and below the weight the two lines are twisted into a single cord; the hand line is tied to one of these, the hook to the other. These weights range in length from four and a half to eight and a half centimeters.

The other type of cigar-shaped sinker lacks the flattened edge and is either round or oval in section. In some, small grooves completely encircle the tips; in others, the grooves are cut part way around. A few have no grooves at all. These minor differences occur in the same levels and seem to have no particular significance.

Fish Line. As already mentioned, all the fish line seems to have been of cotton. It is an unusually well-made, hard-spun, two-strand cord, as uniformly even as a modern machine-made product.

CHIPPED STONE ARTIFACTS

Rough Chopping Tools or Cores. A few roughly made percussion flaked artifacts occur both in the pottery and pre-pottery periods. To simplify the problem of dealing with these objects, a group classification was worked out for the Taltal collection, where they occur in greatest abundance. To avoid unnecessary repetition we list the artifacts found here under the categories of classification used for the same type of objects at Taltal. For data on these see p. 286.

Group I-1, Layers D, E2, J (1 specimen each)

Group II-1, Layer A (1 specimen)

Group III-4, Layers E2, G2 (1 specimen each)

¹ Latcham, 1938, 168-176, Figs. 59-66.

It will be noted that they are scattered from the surface to the bottom of the midden and that they are accompanied by unworked flakes of the same coarse materials, presumably scrap from their manufacture. Comparing these with the chalcedony flakes we find that the ratio of coarse stone to chalcedony, in the pottery period, is 10 to 9.26 and in the pre-pottery refuse, 10 to 3.9. At Taltal in pre-pottery refuse, the same comparison shows a 10 to 8.36 ratio. Comparing rough tools to flakes of the same material we have: Arica pottery period, 1 to 17; Arica pre-pottery period, 1 to 11.7; Taltal pre-pottery, 1 to 95.7.

This indicates that at the Arica Playa Miller site the frequency of rough stone tools or core-like objects to the balance of the chipped stonework is fully as high or perhaps a little higher than at Taltal. This has not been noted before by other observers because stone artifacts in the pottery period refuse, with its high percentage of perishable material, are rarer per cubic unit of refuse than in most of the pre-pottery levels.

Scrapers. Unilaterally chipped tools of fine textured stone, principally chalcedony, are all sidescrapers. These mainly have a single edge and, as is usual with such scrapers, display no particular group characteristic, being made from whatever flake happened to be at hand. The edges range from slightly concave to slightly convex.

Points and Blades. Harpoon points have already been referred to under hunting gear (p. 209). In addition to these the only well-made specimen found was a fragment of a broad triangular blade with a slightly concave base and curved sides. Two were fragmentary, roughly made, chalcedony blades, originally about 4.5 and four centimeters long, approximately triangular in outline, with sides of unequal length. Lacking good specimens for comparison, it is not certain that these represent a type.

Chipping Tools. The examples from Levels A, B, and C are all of llama or guanaco bone from eight to ten centimeters long, with blunt points (Fig. 8b). From Layer E we have a single example

cut from sea lion rib bone, 11.5 centimeters long, with a small rounded point.

ANIMAL AND PLANT REMAINS

Shellfish. The proportions of the remains of various kinds of shellfish vary slightly in the different strata, the same species occurring from top to bottom of the midden. Perhaps most abundant is the purple whelk, a snail found on rocks at intermittent localities on the Chilean coast as far south as Otway Sound. The others, in their order of abundance, are as follows:—

Choro mussels, a species found only below low water mark, in depths of about two fathoms and over, where they are usually secured by diving.

Small ribbed mussels, a species found on the rocks between high and low water mark.

Concholepas, known throughout Chile as *locos*; these live on the rocks at low water level and below.

Fissurella, known locally as *lapas*, which live in the same situation as the *locos*.

Hard clams, of two species, which live here in the sandy beaches and are frequently washed out by heavy surf.

Chiton, known locally as *aplas'adores*, which live in association with the *lapas* and *locos*.

Sea urchins or *erizos*, which can be gathered in tidal pools and in shallow water.

Various other species are present, but are not sufficiently numerous to have been important as food. One variety of clam, roughly triangular in shape and about eight centimeters long, is common on the beaches today, but was not observed in the midden. Perhaps these are a recent arrival in this area.

Fish. Fish bones, including some shark, occur throughout the midden, but not as abundantly as one might expect. The species present have not been identified.

Squid. Dried squid eyes appear quite commonly throughout the pottery period. Today, pieces of the large squid are used as fish bait, but not as food. There is no known use for the eyes. Curiously, none

at all were seen in the Quiani and Punta Pichalo middens.

Corn. The cobs found are nearly all small, ranging in length from five to twelve centimeters. Complete ears from the pottery period burials in this refuse show both the popcorn and ordinary type kernels, apparently reddish colored varieties.

Although no cobs were found with the oldest sherds in Layer H, the excavation in the Quiani midden shows that corn followed directly after the pre-pottery period, so the lack of direct association with the first pottery at Playa Miller must be accidental.

Beans. The few beans found have the same distribution as corn. With one exception, they are dark reddish brown in color and are about eight millimeters long. The one exception is mottled with light colored spots, and came from Level C.

Cotton. The figures used in the analysis record (Table 2) to indicate the presence of cotton refer to clusters of seeds with a certain amount of fiber adhering to them. If we include the records of cotton cord and cotton cloth, it is apparent that cotton was known throughout the pottery period and was used mainly in the manufacture of fish line.

Pachai (Inga) Pods. These large pods with edible fibrous lining are here limited to fragmentary pieces: two in Layer A and one in Layer E2. They are no longer cultivated in the vicinity of Arica, but are referred to by Frezier as growing at Ilo, 130 kilometers northwest of Arica.¹

Sea Turtles. A few fragments of carapaces are scattered through the refuse, suggesting that turtles were an occasional item of food.

Sea Mammals. Sea lion bones are not very common, which is surprising, since harpoons for taking them were a regular part of the equipment of the people. A few porpoise bones occur in Levels ABC.

Land Mammals. Although the presence of llamas is indicated for the entire pottery period, only three llama bones were found, all in Layer A. Seven jaw bones from a

species of small cat were scattered throughout different levels.

Dogs. At least two types of dog were present in the pottery period; one, about the size of an Airedale with straight, smooth hair, colored light tan with black spots, was found in Layer D. The jaw from a much smaller variety, perhaps not much larger than a Pekinese, had a scrap of white fur adhering to it. Cuts on this suggest that the animal had been skinned. Four other jaw bones between the surface and Layer F may be either dog or fox. Perhaps the presence of dogs at this camp had some relation to the scarcity of bones in the refuse.

Birds. Bird bones occur from top to bottom of the midden, but have not been identified. Presumably they are the same sea and shore birds as are now abundant in this area: cormorants, pelicans, and gulls.

BURIALS

In clearing the parking space on the north side of the new Casino, possibly fifteen burials had been uncovered by the municipal workmen. Most of these were in rectangular vaults, the largest about 1.25 by seventy-five centimeters with sides fifty to seventy centimeters high, made of flat stone slabs set upright or of rounded beach stones laid with mud mortar. Flat slabs were also used as covers and the joints were caulked with mud. In at least two burials the vaults were covered with a layer of large reeds, over which was spread a coating of mud.

Most of the contents of these graves had been broken, discarded, or sold before we arrived. From the material examined and from the accounts of the workmen, we judge that they were apparently all very much alike and yielded the same types of objects. No tomb was reported with more than one body. All the bodies were in a sitting position, with the knees against the chest, and wrapped or sewn in cloth. The number of articles placed with them varies from burial to burial, but followed a fixed pattern.

In constructing a pier for our sifter one

¹ Frezier, 1713.

of these graves was found. The body, that of a baby, was sewn in cloth and placed directly in the midden refuse without a vault (Fig. 9f, e). The overlying midden had been shifted, so it was impossible to determine from what level the grave had been cut. The surrounding refuse belonged to the lower half of the pottery period.

The articles encountered are shown in Figs. 9 and 10. Directly above the body was a three-piece wooden balsa model (Fig. 10k) the center log 41.5 centimeters long and 4.5 centimeters in diameter, with side logs twenty-five centimeters long and four centimeters in diameter, so that the maximum width across the deck is 12.5 centimeters. The three pieces are cut flat on their upper surface and are faired away on the under side of the ends to reduce the resistance of the water. In this model they are bound together with woolen cord, while others from similar graves have rawhide thong lashings. Notches are cut in the outer edge at both ends of the side pieces to take these lashings. Characteristic of all the models are transverse stripes of red paint on the upper or deck surface. The double-bladed paddle for this lay in front of the body. Like all paddles in graves of this type, the blades are flat or slightly concave on one surface and have two beveled faces on the opposite side. Like the balsa, it is painted with transverse red stripes (Fig. 10g).

Against the right shoulder and side was a small, nicely made sack of warp-stripe woolen cloth (Fig. 9b) in natural wool shades containing about a kilo of corn flour. Over the right shoulder lay a miniature bow; six arrows, with thorn tips and two feathers on each; a spindle with a rectangular wooden whorl; a harpoon forepiece with a stone point; a miniature fish harpoon with a copper point and line attached; and what is apparently a miniature seal harpoon shaft with a small socket at the forward end. In front of the body was a miniature water jar, fifteen centimeters high, with black and red designs on a creamy white slip (Fig. 10p); a miniature kero form cup eight centimeters high, with a vertical lug above the rim, finished

with a red slip on which are poorly executed black lines; two small, nearly spherical jars, eight centimeters high, with very narrow openings. These are unpainted and are a pinkish-brown ware. A third example was found inside of the body wrappings. With the jars outside the wrappings was a miniature coiled basket, 8.5 centimeters in diameter and 3.5 centimeters high, containing a small netted cord pouch in which were three fish lines. One was attached to a small cigar-shaped sinker, flattened along one edge, with a copper fishhook suspended below it. The other two fish lines lack weights, but have copper hooks attached. All three may have been especially made for the burial, as the line is no heavier than coarse thread and the weights and hooks are almost too small to have been of practical use. With the lines were four crudely made top-like objects of wood painted red. Loose in the bottom of the basket was a tiny lump of unworked silver. Beneath the body lay a loosely made reed mat thirty-six by twenty-six centimeters, with widely spaced twined cross strands (Fig. 9c). Between the folds of this mat was a thin sheet of copper, irregular in outline. Below the mat, tied in a bunch, were the ends of five human hair tresses. A sixth strand of human hair was tucked beneath the cords tied about the mummy wrapping. Tucked down by the left shoulder, was a square warp-stripe kerchief forty-three by thirty-six centimeters, red, tan, black, and dark purple with tassels at the corner (Fig. 9a). Inside the single layer of plain woolen cloth which covered the body, in front of the knees, was a bag containing coca leaves, and a small lump of ash or lime. This bag measures twenty-two centimeters long, twenty-four centimeters across the mouth, and twenty-six across the bottom. The greater width at the bottom appears to have been intentionally made rather than the result of stretching. Other bags from similar burials had the same feature. This specimen is shown in Fig. 9d. The warp-stripe design visible is identical on the opposite face. The solid color stripes between the design areas are red, while the warp threads in the designs are red, tan,



Fig. 9. Burial 2, Playa Miller, and Accompanying Textiles. a, Kerchief; b, Bag of cornmeal; c, Twined matting; d, Coca bag; e, Mummy bundle showing cord lacing; f, Body in position, with associated grave goods.

white, and a faded dark purple. The colors are not arranged or used to emphasize any particular part of the figures, but run irregularly through them. The material has been woven in one piece,

were several handfuls of corn kernels.

Although this mummy bundle was not unwrapped, the interior was examined from the bottom where the wrappings had decayed. The head was not removed, so the age is un-

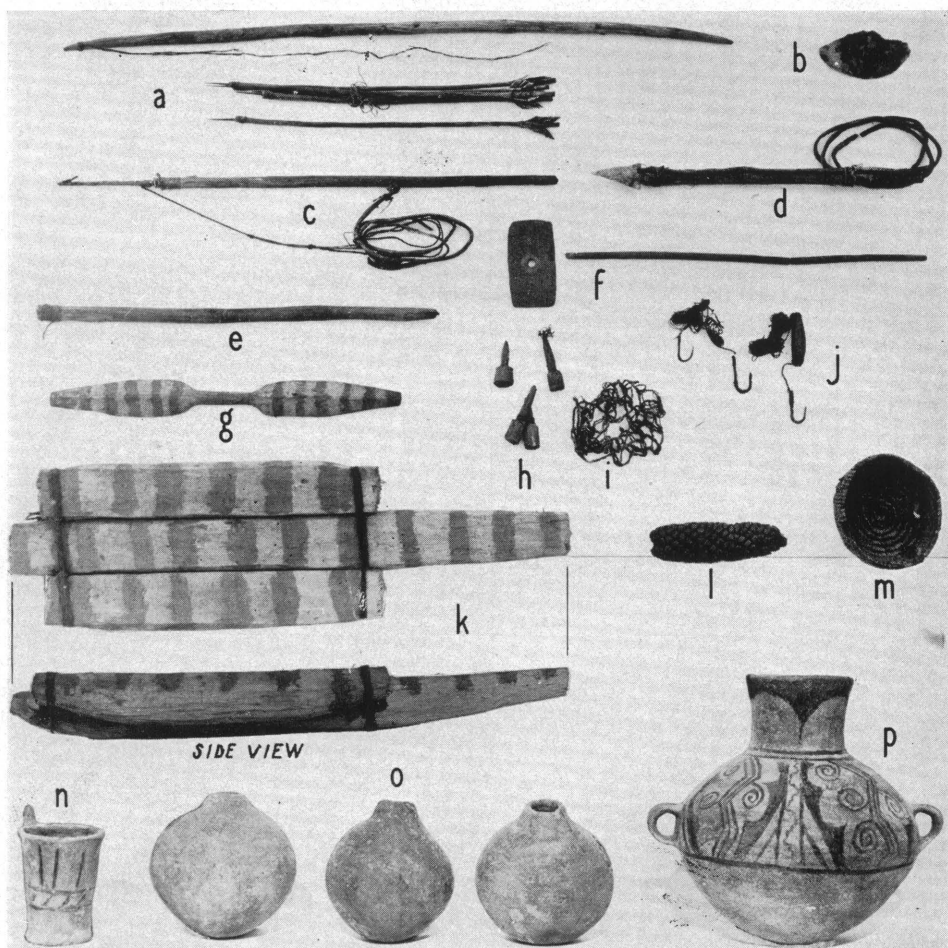


Fig. 10. Miscellaneous Associated Artifacts in Miniature, Burial 2, Playa Miller. a, Bow and arrows; b, Sheet copper; c, Fish harpoon with copper point; d, Sealing harpoon forepiece, with stone point; e, Harpoon shaft; f, Spindle shaft and whorl; g, Paddle; h, Wooden top-like objects; i, Netted cord pouch in which wooden top-like objects were found; j, Fish lines with copper hooks and weight; k, Wooden balsa, top and side views; l, Ear of corn; m, Coiled basket; n, Pottery cup; o, Spherical pottery containers; p, Water jar, black and red-on-white. Length of k, 45 cms.

folded and sewn up the sides. Also inside of the mummy bundle were four ears of corn, while scattered among the objects in front of it, as though thrown in just before the grave was filled with earth,

certain, although the size suggests an infant of less than one year. The height, as wrapped, is thirty-five centimeters.

It was noted that the miniature objects from these tombs are not in relative scale;

that certain items, specifically the spindle whorls, the wooden top-like objects, the textiles, and the sealing harpoon forepieces are generally full-sized. Such examples of harpoon forepieces as were found in the graves are rather crudely made, suggesting that they have been prepared especially for the burials. Graves of adults sometimes yield harpoon shafts of sufficient thickness so that the conical sockets at the forward ends are large enough to take the full sized harpoon forepiece. The lengths, however, are totally inadequate for practical use. Obviously these are prepared especially for the graves. This, the author believes, accounts for the presence in collections from Arica of what have been considered full-sized harpoons, in spite of the fact that they have insufficient weight and length. Because of their thickness they have not been recognized as models.

This assortment of grave goods seems to be typical of the vaulted burials. Characteristic are the miniature objects and models. Some full-sized pieces like the spindle and harpoon forepiece are used, but the other items suggest rather rigid and well-established burial customs.

Curious are the little spherical jars with small openings which are common in the graves. These have no large counterparts and, as far as our observations go, do not appear among the sherds from the midden, except for one questionable fragment.

A second baby burial was found just beyond the end of the main excavation. This had been made when the surface was at the level of the bottom of Layer D, so that it and the associated objects are contemporaneous with the remains from that level. A pit eighty centimeters deep by forty centimeters in diameter had been dug, but as in the one just described, no vault had been made. In the bottom were placed a wooden spoon, a miniature water jar, a gourd container, and a small rectangular mat of sections of reed thirty-three centimeters long, held together by four twined cross strands. The body in a squatting position rested on these objects. It had been placed inside a large plain woolen shirt which covered the head and

was bunched under the feet. A heavy rush rope was tied about the ankles and neck and laced back and forth about the body. The total height, as prepared, is thirty-one centimeters. On its lap were two scraps of brown woolen cloth on one of which was the body of a small puppy, apparently dark brown in color, except for the cheeks which were yellowish white. Adhering to the portion of the baby's head covering and partially over the puppy was a caked substance resembling dried meal, as though a liquid batter had been prepared and poured into the grave.

This body has not been completely unwrapped, but was examined through the bottom of the shirt. A small plain undecorated wool bag of meal rests on the lap; beside it was a small bottle or pitcher ten centimeters high, with a narrow spout and a single vertical handle between rim and shoulder. On the side of the spout, opposite the handle, a human face is modeled in high relief, a large hooked nose, slits for eyes and mouth, protruding ears, small holes for the ear openings and a prominent pointed chin. The forehead and the back side of the head are painted a brownish black. This paint is continued downward in a stripe on each shoulder, perhaps representing hair. Completely encircling the middle is a band consisting of two narrow brownish black lines with vertical zigzag lines between them. Below this is another band of red and above it, on what might be considered the chest, shoulder, and cheeks of the figure, is more of the red (Fig. 11b).

The miniature water jar which was found outside the body is 9.5 centimeters high, brownware, painted with the usual black rim decoration running down to four points. From the shoulders above the two vertical handles, a band composed of small adjoining triangles runs down to the center of each side. The area outside of this is painted red down to the level of the bottoms of the handles and is outlined in black (Fig. 11a).

At the top of this grave, seemingly placed there intentionally, lay the body of a dog. Its head had been broken off during the construction of a vaulted tomb

at a later period when the surface was approximately at its present level. The hole for this had overlapped the lower burial slightly so that the dog's head was exposed and removed. This last mentioned grave had long since been opened

and the contents taken out. Lest this give the impression that the vaulted tombs are a late feature, it must be mentioned that one was exposed by the Casino workmen not far away, at about the level of the bottom of the dog and baby grave.

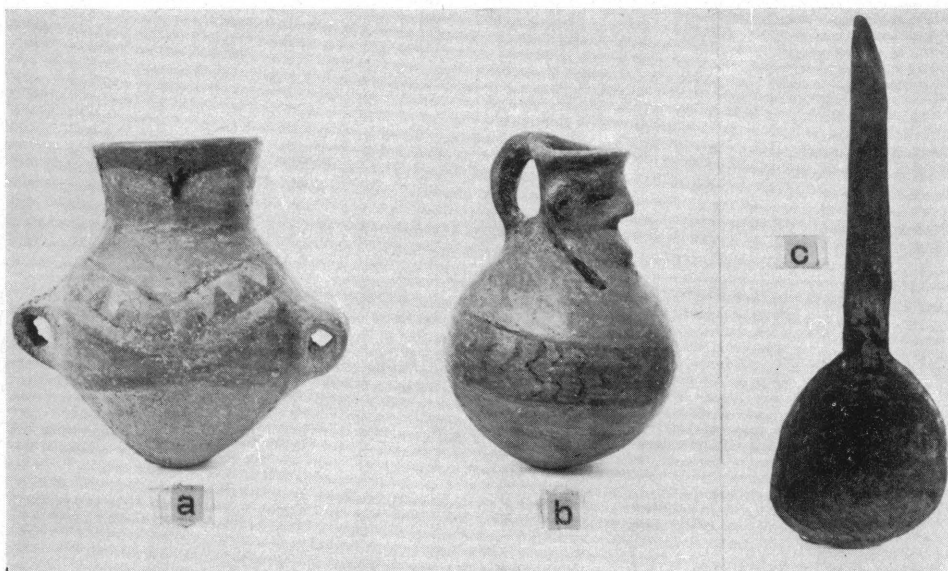


Fig. 11. Miniature Water Jar and Pitcher and Wooden Spoon from Infant Grave (No. 1), Playa Miller.

LOS GENTILES CEMETERY

About three hundred meters south of the Casino, on the sandy slope of the hill above Playa Brava, is a cemetery which has yielded much of the material previously collected at Arica. An area, a hundred meters long by about fifty wide, extending from just back of the beach up the slope to an elevation of around thirty meters has been completely dug over. With the exception of a few burials uncovered during the construction of a road along the beach no digging has been done here for many years.

The late Charles W. Mead, in an unpublished manuscript in The American Museum of Natural History, in which he describes the collections from northern Chile, has reviewed the known records of

work at Arica. According to him the first published account of this cemetery was written by Mr. John H. Blake.¹

In 1836 Mr. Blake found that

....a great number of the graves had been opened and despoiled of their contents, but many remained intact. Some of the graves were marked by small circular mounds of pebbles and shells, others by circles of rounded stones; but the greater number only by slight depressions in the soil. All bear marks of fires having been kindled over them.

Mr. Blake thus describes these graves:—In form they are all circular, but vary in size from three to five feet in diameter, and

¹ Blake, 1878.

from four to five feet in depth. Some of them are walled with water worn stones, laid up loosely, and all have linings of coarse flag mats.

He found all the bodies, excepting those of infants, in a sitting position, knees elevated, the arms crossed over the breast, and generally seated upon flat stones, under which many of the articles buried with them were placed. All the wrappings of the bodies were of wool.

In 1894 the same cemetery was visited by Mr. A. F. Bandelier for one day while awaiting a boat at Arica. He reported that the graves were completely disturbed, but that textiles, entire garments, and other objects had been discarded and lay scattered over the surface. In the short time at his disposal, Bandelier gathered a selection of this material now in the collections of this Museum. Before leaving Arica he purchased four unwrapped mummies from Caleta Vitor, thirty kilometers south of Arica which will be referred to later. In 1917 Skottsberg secured material from eight graves which he examined and additional material from previously opened ones. Skottsberg's publication¹ marks the first time in the history of Chilean archaeology in which the associated items are carefully described grave by grave. The same publication includes a good summary of Uhle's conclusions on North Chilean chronology.

As our primary objective was to examine the midden refuse, no attempt was made to locate burials in this cemetery. Such specimens, principally textiles, as lay on the surface were examined and those that were not in too bad condition were saved. Among these were several small coca bags and bag fragments which had been woven in one piece, showing warp-stripe designs on one side of the bag and plain warp-stripes on the other. The few sherds ob-

served were so badly split by the crystallization of salts as to be valueless for identification.

One very poorly preserved object noted, significant in the light of later observations, was a basket with a frame or foundation made of three sticks lashed together at their centers and bent to U shape. The intersection of the sticks, which radiate at sixty degrees from each other, forms the center of the basket bottom. The triangular intervening spaces are filled in with cord made of twisted reeds, which is wrapped horizontally around the outside, spiraling up from the bottom and held in position by a single turn or half hitch at all the places where it comes in contact with the sticks. Subsequent work at Pichalo proves these baskets to be a late feature. Latcham² publishes specimens collected by him at Quillagua. He has described them as pack baskets and is undoubtedly right in so doing for they sometimes occur with carrying straps attached. The rims of the examples he found are irregular in outline, averaging about fifty centimeters in one direction by twenty to thirty centimeters in the other. Whether this is their original form or whether it is a later distortion due to the force exerted by whichever happens to be the strongest stick, is not quite clear. Their size, according to examples seen in different collections, varies considerably. This may be due to the fact that most of the existing collections are from late burials in which miniature objects occur, a supposition borne out by the absence of small examples from the Pichalo midden refuse.³ Crudely made examples of this form of container were in use in recent years among the Yahgan Indians of Tierra del Fuego for dipping up sardines when these fish are driven into unusually compact schools by the sea lions.⁴

PLAYA DE LOS GRINGOS CEMETERY

About two kilometers further south, is another, much smaller cemetery, which had also previously been worked. There are no prominent landmarks in its vicinity

to orient its position, but the pitted surface resulting from the digging which has been

² Latcham 1938, 216, 217, Figs. 79 and 80.

³ See Graves 1 and 6, Playa de los Gringos Cemetery (pp. 219 and 229).

⁴ Lothrop, 1928, 160, Fig. 89.

¹ Skottsberg, 1924.

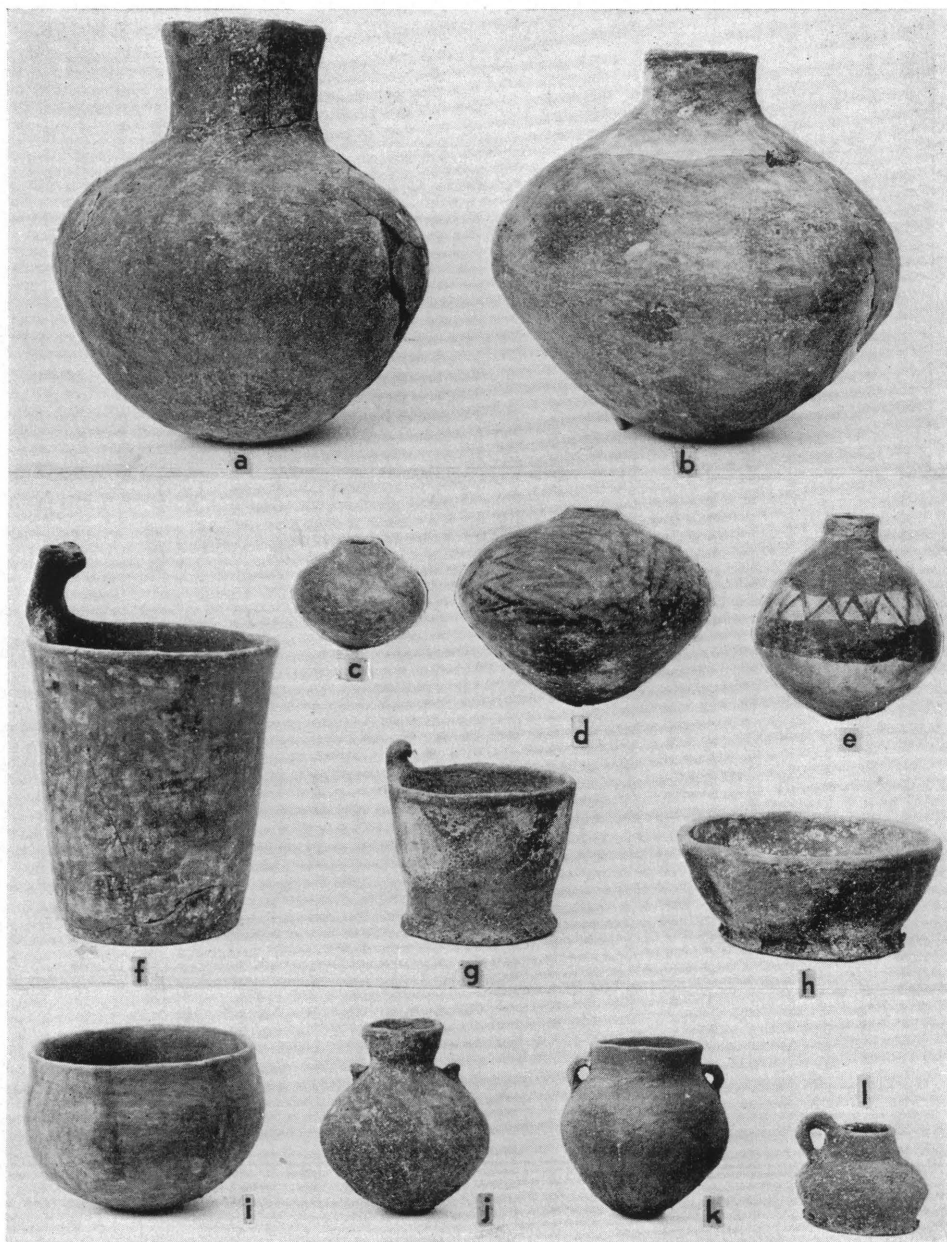


Fig. 12. Grave Pottery from Playa de los Gringos. a, Coarse ware water jar, Grave 7; b, Coarse ware water jar, Grave 2; c, Roughly spherical container, coarse ware, Grave 1; d, Roughly spherical container, with red and black lines, Grave 2; e, Red-on-cream roughly spherical container, Grave 3; f, Kero-like cup, coarse ware, Grave 7; g, Kero-like cup, coarse ware, Grave 2; h, Coarse ware bowl, Grave 2; i, Coarse ware bowl, false burial; j, Miniature jar, coarse ware, Grave 1; k, Miniature cooking pot, coarse ware, Grave 4; l, Miniature pitcher, coarse ware, Grave 1.

done will serve to locate it for many years. It lies between three and five meters above high water mark, some fifty meters back from the shore. Seven graves, of which five had previously been opened, were examined. All were in the compact sand and gravel without any vault structures or fixed orientation of bodies and lay within a few meters of each other. The objects found demonstrate that the people who made them are culturally very close to those responsible for the refuse of the pottery-using period at Playa Miller. Hunting and fishing equipment seems to be identical, as are certain designs in the textiles. The ceramics, however, reveal differences, as certain forms from the graves, namely, unpainted water jars without handles, flat-bottomed narrow-mouthed pitchers, and horizontal handles from bowls, are completely lacking in the sherd series. This may well mean that these graves were made when the portion of midden examined was no longer occupied.

In referring to the colors in the textiles yellow will be mentioned. This, it is believed, is not a dye, but is merely a selected natural wool shade, as are most, if not all, the variations of tan and brown.¹

GRAVE 1

The first grave examined, an undisturbed child burial, was 1.40 centimeters below the surface. The body, in a seated posture, was completely covered with a piece of plain, tan colored woolen cloth, the ends tied below the feet with a piece of *titora* rope. Over this, with the wrapped head protruding through the neck opening, was a dark brown, woolen poncho

¹ For cleaning textiles collected near the coast, i.e., those lying in contact with dirt containing salt from the evaporation of sea water, it was found that soaking in several changes of lukewarm water for as much as twelve hours was necessary. Soap and commercial cleaning fluids are of no help in removing either dirt or stains. Most effective for softening and removing incrustations of animal matter is diluted household ammonia. Fragile pieces should be laid on a wire screen and either dipped in a container or subjected to gentle flow from a rubber tube. They can be dried on the same screen, so handling is minimized. After drying they can be ironed without damage. Not only are the fabrics made easier to study and more attractive for exhibition, but it is believed that their chance of preservation is increased. Only in very rare instances is there any evidence that the dyes run or fade, but this seems to be checked by the addition of alum to the first soaking water.

which folded under the feet. The following articles were placed in the grave with the body, seemingly in no definite order:—

Textiles. 1 sack of corn flour, twenty-four centimeters by twenty centimeters, of natural color, warp-stripe woolen cloth

3 ragged scraps of woolen cloth

1 seven-strand twisted, black woolen cord, 1.75 meters long

Ceramics. 1 miniature water jar, plain redware, ten centimeters high, with two vertical loop handles at the sides

1 miniature, flat-based, straight mouthed bottle or pitcher, five centimeters high, with a vertical loop handle, plain redware (Fig. 12l).

Of questionable association with this burial are two other pottery vessels, one, the small roughly spherical form 4.5 centimeters high, by 5.5 centimeters in diameter, with a small opening 1.1 centimeters across (Fig. 12c). This is of reddish ware with faint black line decoration. The other, unpainted, is a poor copy of a water jar, 8.5 centimeters high, without handles, but with two small pointed lugs on the shoulder at each side of the spout (Fig. 12j).

Miscellaneous. One crossed-stick basket, fifteen centimeters high by fourteen wide, contained a few kernels of corn. It is so poorly made that it was presumably intended merely for the burial, and may be a model. As the sticks are broken where they are bent, the illustration (Fig. 13g) shows it as seen from above the mouth. A short brace has been inserted to hold it open for photographing. Untwisted rush was used for the horizontal strands. Two of the side panels show a twilled weave; one has four twined vertical strands while the others are not reinforced.

1 flat piece of coiled basketry, seven centimeters in diameter

1 mat, twenty-two centimeters square, made of twigs, bound together by four twined cross strands of rush, folded in the middle and tied at one corner

2 spindles, nineteen centimeters long, with plain, cylindrical pottery whorls, 2.5 centimeters high by 1.25 centimeters wide

5 rounded sticks, painted red, roughly tapered at either end, varying in length from thirteen to thirty-five centimeters

GRAVE 2

The head of the mummy was 1.68 centimeters below the surface; the body in a

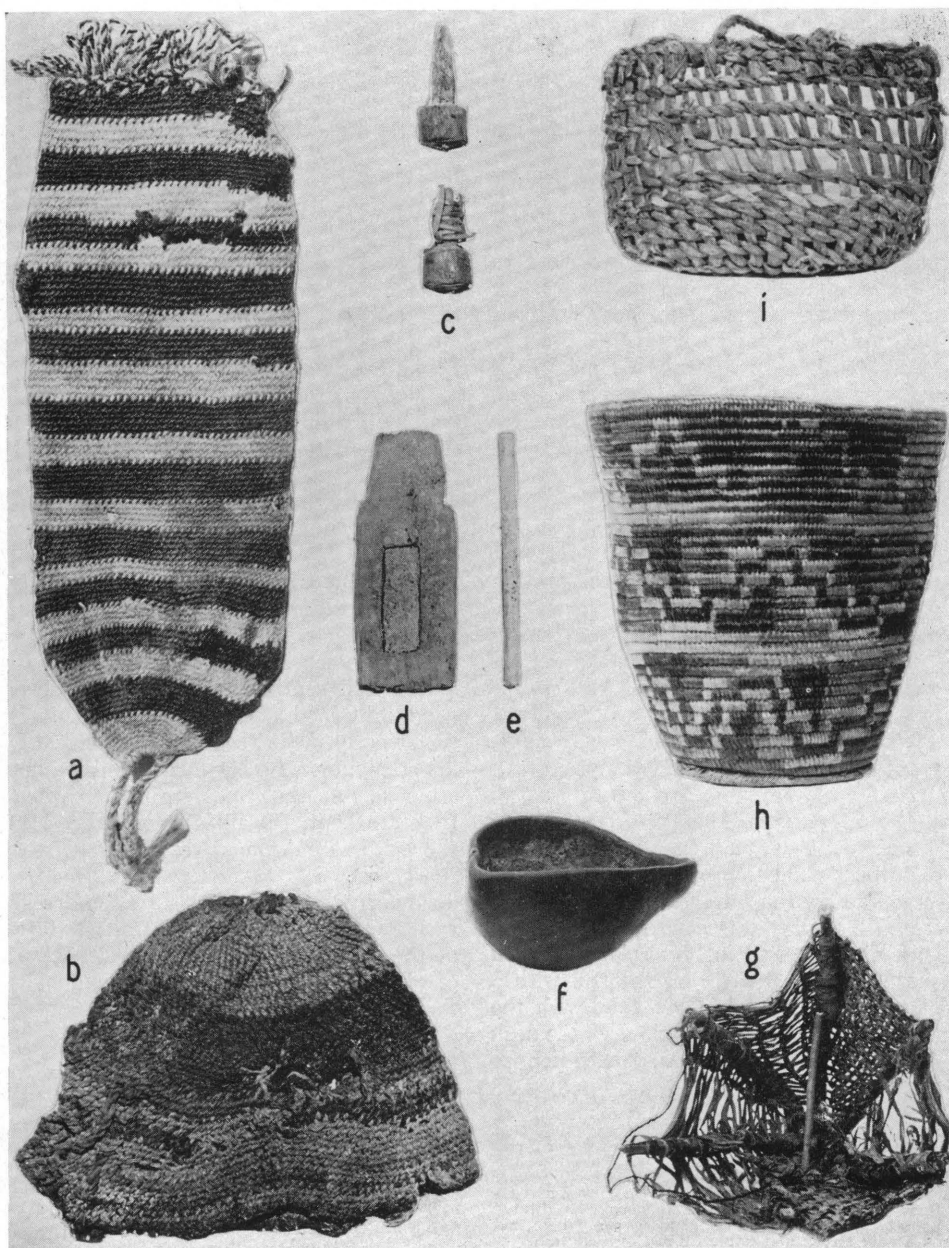


Fig. 13. Miscellaneous Artifacts from Playa de los Gringos Graves. a, Knotted cord bag, Grave 3; b, Knotted cord cap, Grave 7; c, Wooden top-like objects; d, Rough model of snuff tray; e, Bird bone snuff tube (c, d, e, found inside of a, Grave 3); f, Calabash container, Grave 6; g, Miniature crossed-stick pack basket, Grave 6; h, Coiled basket, Grave 3; i, Twined basket, Grave 6. Length of a, 38.5 cms.



Fig. 14. Textiles from Playa de los Gringos Graves. a, b, Coca bags, Grave 3; c, Meal bag, Grave 6; d, Meal bag, Grave 7; e, Kerchief, Grave 5; f, Coca bag, Grave 2.

seated position, leaning slightly backward with arms crossed in front of the chest and the knees straight out in front. It was wrapped in dark brown wool cloth, in poor preservation; sex and age undetermined, except that we believe it was a young individual. The hair is poorly preserved, but enough remains to show that it was dressed in the same fashion as on the body in Grave 3. Various small braids from the side of the head are bound together at the back, while short separate braids hang from the temples and nape of the neck. This form of coiffure was noted on adult male bodies, and as the equipment of this grave corresponds to that supplied to men, this individual may be presumed to have been a male. The teeth indicate an age of around thirteen or fourteen years. On its lap lay a basketry harpoon forepiece quiver with seven forepieces in place and an eighth lying loose beside it. Also on the lap was a small, shallow, flat-bottomed bowl covered with a large sherd, part of a plain undecorated water jar without handles. As all of the other pieces of this jar were in the grave it must have been broken at the time of the burial. At the left side of the body was a similar water jar, and three of the small, spherical, narrow-mouthed pottery containers. With them were a model wooden balsa, a double-bladed paddle, a harpoon handle, a woolen cord sling, and what appears to be a model bow. In front of the body was a large sack of cornmeal and a small square mat of twigs. Near the right ankle, a similar meal sack contained a few coca (?) leaves. Behind the body were twenty ears of corn of a dark red variety with the outer husks turned back and twisted into two-strand cords which were used to tie them together. With these were two coca bags. Back of the right shoulder was a lump of red paint and on top of the shoulder six miniature reed arrows with wooden tips. At the bottom of the grave, slightly below the body, was a small kero-like cup in which were many flies and pupae cases. Obviously this vessel contained some food to which the flies were attracted and on which they had deposited eggs before it was placed in the ground. These hatched and

matured, but the adults could not escape and have remained in excellent preservation. These are almost entirely *Sarcophaga* which feed on meat or fish, with a few *Muscidae* among them.

The only item on the body, other than the coarse plain cloth wrapping, was a long rectangular pouch tied about the hips. The description of the various articles follows:—

Textiles. The bag tied about the hips is shown in Fig. 14f. It is eighty centimeters long, by twenty-five centimeters high, with an opening fifteen centimeters long in the center of the upper edge. At the upper corners are short cord loops to which is tied a longer cord which passed around the body. This bag was woven on a loom at least fifty centimeters wide, in a single strip which was folded and sewn together. The inner or back face has twenty-eight horizontal warp stripes in natural wool shades of brown and tan. The outer face has three bands of warp design in red and yellow, each divided into nine rectangular units. These stripes of warp design are separated and bordered by solid red stripes. This pouch contained several handfuls of small leaves which were not identified.

The meal bags both have vertical warp stripes of dark and light wool. One measures thirty-one centimeters in length by twenty-one in width; the other is thirty-six by twenty-six centimeters.

The bag placed with the ears of corn is finely woven and has narrow vertical stripes of yellow, red, blue, brown, black, and white, three of which have a simple checkered warp design. The edges are sewn together and bound with brown and white thread. It is twenty-two centimeters long by 15.5 centimeters wide. This is shown in Fig. 14d. A fourth bag, not as finely woven as the preceding, has warp stripes using red, green, purple, tan, brown, black, and white threads. It is twenty centimeters wide and eighteen centimeters long.

Ceramics. One of the two unpainted water jars is shown in Fig. 12b. It is seventeen centimeters high, 17.5 wide, with a narrow flaring spout seven centi-

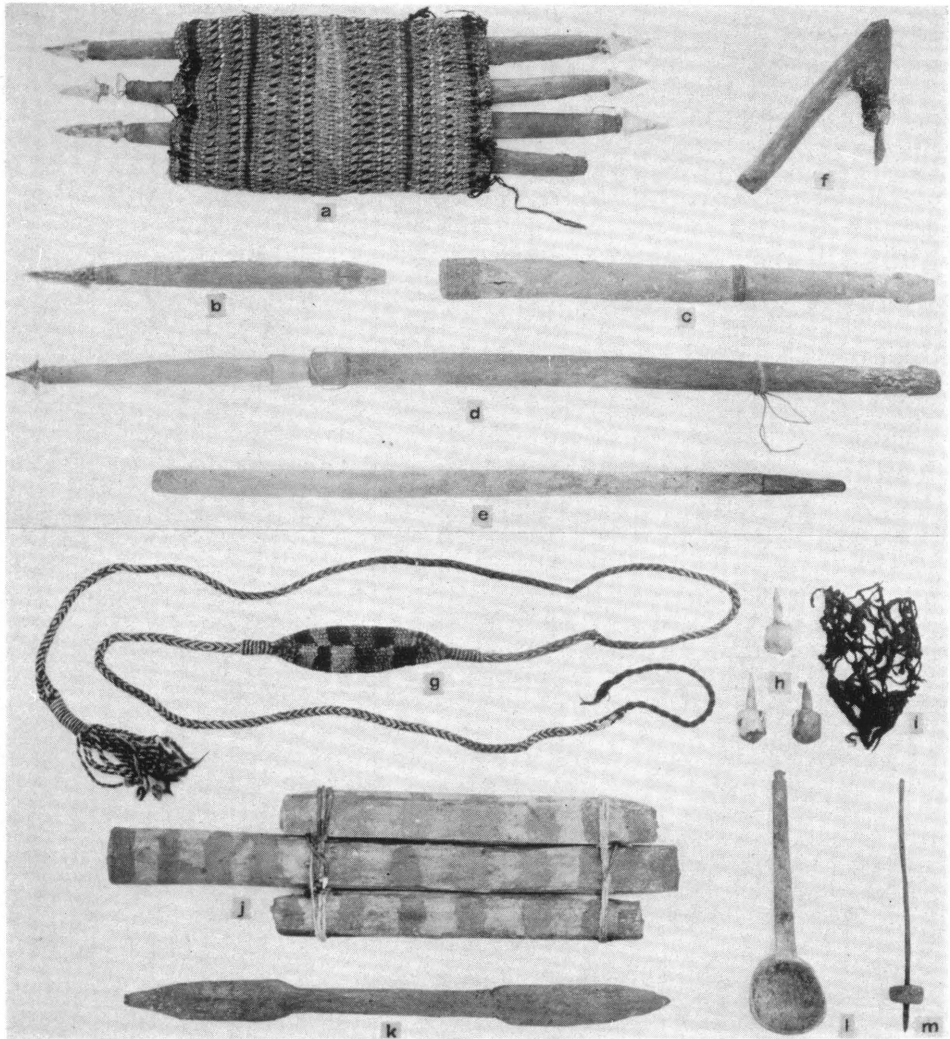


Fig. 15. Miscellaneous Artifacts from Playa de los Gringos Graves. a, b, Harpoon forepiece quivers, Grave 2; c, Shaft, miniature, Grave 2; d, Miniature harpoon forepiece, Grave 3; e, Fish harpoon shaft, Grave 3; f, Model adze, Grave 3; g, Sling, Grave 6; h, Wooden top-like objects, Grave 2; i, Netted cord pouch for top-like objects, Grave 2; j, Miniature balsa, Grave 2; k, Miniature paddle, Grave 2; l, Wooden spoon, Grave 3; m, Spindle, Grave 7.

meters across the mouth. The second jar, after restoration, is eighteen centimeters high, by eighteen centimeters in diameter, of exactly the same form as the one illustrated. Both are of reddish ware, with irregular gray and brownish areas, and rather rough surfaces.

Of roughly spherical containers, the most carefully made example is shown in Fig. 12d. It is nine centimeters high, eleven centimeters in diameter, with an opening 1.5 centimeters in diameter. It has a smooth, pinkish surface with irregular black and red lines. The other two are roughly finished and are unpainted. One of these is 5.5 centimeters high, 7.5 centimeters in diameter, with an opening one centimeter wide. The other is nine centimeters high, ten centimeters in diameter, with an opening 1.3 centimeters across.

Fig. 12g illustrates a kero-like cup with a very rough surface, a flaring flat base and a pointed projection rising above the rim. It is 8.5 centimeters high, by eight centimeters across the mouth.

The shallow, roughly finished, unpainted bowl shown in Fig. 12h has a slightly flaring, flat base, although the inside of the container is rounded. It is five centimeters high with a maximum diameter of eleven centimeters.

Model Balsa Raft. Forty-one centimeters long, with side pieces twenty-seven centimeters long and the width across the deck eleven centimeters, this model balsa raft (Fig. 15j), was originally bound together with rawhide thongs, fitted into notches cut in the outer edges of the side logs. The deck surface is cut flat and painted with red stripes. The under surface of the logs is faired away, fore and aft, to reduce the water resistance. The double-bladed paddle with this model is forty centimeters long. The central portion of the handle is round. The blades, triangular in section, are cut slightly concave on the face. It is painted red (Fig. 15k).

Harpoon Forepiece Quiver. This is made of rush and measures 23.5 centimeters by fourteen wide (Fig. 15a). Although it had only seven forepieces in it, secured by temporary stitching with wool thread, it

has room inside for an eighth. The interior of the quiver is divided into two compartments, separated by a partition woven of the same rush used for the rest of the case. The lateral strands are secured at their centers to this partition. Twining elements bind these firmly together, except where open-work areas are formed by crossing adjacent lateral strands. Strands of red and green wool yarn are interwoven about the middle of each half of the case. Red and dark brown wool yarn is similarly employed at the ends.

Harpoon Forepieces. The forepieces with the quiver are all roughly made, suggesting that they may have been prepared especially for the burial. They vary in length from 22.5 centimeters to 19.5 centimeters, including the stone points. Four have off-set conical bases which prevent the harpoon line from slipping off; three lack this feature and have no alternative means of preventing the line from slipping. They are painted red and have fine cord whipping outside of the sockets for the stone points. These latter are the same type found in the pottery-bearing debris at Playa Miller. An eighth harpoon forepiece, found outside the quiver, is identical with those with offset conical bases just described (Fig. 15b).

Sealing Harpoon Shaft. Obviously a model even though its diameter may be the same as a full-sized specimen, this sealing harpoon handle is thirty-six centimeters long, by three centimeters maximum diameter (Fig. 15c). The forward end has a conical socket for the forepiece and is whipped outside of this with cotton fish line. Several turns of similar cord are secured about the shaft back of the middle. The rear end tapers to a flattened portion which is left wider than the adjacent shaft, apparently a definite feature of the sealing harpoon handles, but not found on the fish harpoon shafts.

Bow and Arrow. The miniature bow, 33.5 centimeters long, by 1.8 centimeters in diameter, is roughly round in cross-section, slightly curved, and tapering at each end. The six miniature arrows are of reed, with thorns set in the ends for points. Originally they were feathered, as marks of

the feather lashings remain. None has nocks. The best-preserved specimen is thirty centimeters long.

Slings. The sling in this burial is 1.22 centimeters long, of twisted woolen cord, with a slit finger grip and a solid woven center piece.

Wooden Top-like Objects. The three wooden top-like objects (Fig. 15h, i) in the small netted cord pouch are roughly cut, in contrast to the well-smoothed examples found in the Playa Miller refuse. All three are smeared with red paint.

Rectangular Mat of Twigs. This mat is thirty by twenty-two centimeters wide. The twigs of which it is made are held together by four cross strands of a single plant fiber cord which are twined back and forth across the warps.

GRAVE 3

This grave had been opened years ago and was very much disturbed. The body had been torn apart and the accompanying objects scattered and broken, making it impossible to determine their original position or to say positively whether all the specimens belonged to this grave. The head is that of a young adult male with wisdom teeth formed, but not yet erupted. The teeth show little wear. The hair is parted from front to back over the crown of the head, and on each side is made up into ten or eleven short, three-strand braids which are brought together at the base of the neck, tied into a bunch, and bound with woolen cord. Hairs growing at the nape of the neck are made into a separate braid, twenty-seven centimeters long, which hung down beneath the joined ends of the side braids. At each temple is a separate braid, the end folded and bound with woolen cord just below the level of the chin. On the chin is a rather dense beard of straight hair, four centimeters long.

Textiles. All the coca bags found in this grave are woven in one long strip, folded, and sewed at the sides. The warp threads, lying close together, form the surface and hide the weft. None of the bags has suspension loops at the corners, but

they do have short attached cords to tie their mouths closed.

The broad band of warp design down the center of the bag shown in Fig. 14a has the same geometric pattern as on the bag from Grave 2 at Playa Miller. In both bags groups of warp threads of different colors, red, purple, blue, brown, appear irregularly throughout the design. The field of the design is formed by yellowish-white threads. Bordering the central panel are solid red bands, then narrow stripes of warp design, again using threads of different colors without relation to the design. Between these and the sides of the bags are solid red stripes. One side edge is bound with alternating green and purple threads, the other with green and red. Both faces of the bag show the same design. Measurements: width at bottom, twenty-four centimeters; width at mouth, nineteen centimeters; height, 19.5 centimeters.

Like the preceding, the bag illustrated in Fig. 14b, has a warp design section in the center using black, purple, red, brown, and whitish threads. The design is a repetition of a double-headed figure, but what it represents is not clear. The solid color stripes bordering the center of the design are dark purple. The outer warp design stripes differ slightly on opposite faces of the bag. On one, the design is broken into three sections; on the opposite, it is continuous from top to bottom. The central area of warp design is the same on both faces of the bag, but is broken at the bottom edge by a row of white threads. The sides of the bag have a few red warp threads, but the edges are not bound as on the bag illustrated in Fig. 14a. Measurements: width at top, twenty-six centimeters, width at bottom, twenty-nine centimeters; height, twenty-three centimeters.

Both bags have dark brown weft threads. The increased width at the bottom does not appear to be entirely the result of stretching. If intentional, it may have been produced by increasing the tension of the weft toward the ends of the piece as it was woven.

Another bag in this series has plain warp

stripes using red, green, brown, tan, and white threads. Width, ten centimeters, top and bottom; height, seventeen centimeters. A fourth bag also has a warp-stripe design produced in red and natural color wool; width uniformly, twenty-one centimeters; height, fifteen centimeters. In the fifth bag the warp stripe is in natural wool shades. Width, eight centimeters; height, nine centimeters.

Another type of bag found in this grave is more coarsely woven than the coca bags. These have been designated as meal bags because they were used for this purpose in the graves. Dyed yarns were seldom used for these, but one example in this grave has warp stripes composed of red, as well as the natural wool brown and tan. It is twenty-three centimeters wide by twenty-one centimeters high. The second meal bag with dark brown and tan warp stripes has a narrow checkered warp design down the center. Width, twenty-five centimeters; length, forty-five centimeters.

These two bags had been opened and their contents spilled. Three other bags of meal had not been disturbed. One, with narrow red and blue warp stripes on a tan field, is twenty-seven centimeters wide, by sixteen high. Another, duplicating the bag with brown and tan warp stripes and checkered design in the center, is nineteen centimeters wide by twenty-seven long. A third bag with light tan and dark brown warp stripes is sixteen centimeters wide by seventeen centimeters long.

Knotted cord bags (Fig. 13a) are the same type as those first referred to in the section on the Playa Miller midden. Both have horizontal bands where light and dark brown wool cord have been used alternately. In both, the first row of knots at the bottom are secured to the central portion of a short heavy cord, the ends of which hang free and are tied together. At their openings are a series of cord loops through which drawstrings were passed for closing the bags. One, when laid flat, measures thirty-one centimeters long by seventeen wide; the other is twenty-nine centimeters long by seventeen wide. One

was empty; the other contained objects described below and shown in Fig. 13.

Model Snuff Tray and Tube. Very crudely made of soft wood is a model snuff tray (Fig. 13d, e), eleven centimeters long, four centimeters wide. It has smears of red paint on both sides. Comparing this specimen with normal-sized snuff trays leaves no reason to doubt that it was made especially for the grave. With it was a small tube, 11.5 centimeters long, cut from the wing bone of a bird.

Wooden Top-like Objects. Two wooden top-like objects are crudely whittled from wood and smeared with red paint. One has a strip of rush wound about the stem (Fig. 13c), the only instance in which this was noted among the various examples of these objects seen at Arica.

Ceramics. Among the pottery objects found in this grave is a roughly spherical container (Fig. 12e), unusual in that it has a short vertical spout. It is finished more carefully than others from this cemetery and has a pinkish-yellow slip applied to its upper half. Over this is dark red paint except for a narrow horizontal area marked with a black zigzag line which encircles the container. Height, nine centimeters; diameter, 8.5 centimeters.

A second example is much more carelessly made and lacks the low spout. It appears to have had the same slip and decoration as the preceding. Height, nine centimeters; diameter, ten centimeters; opening, 1.2 centimeters.

A kero-like cup duplicates in form the one from Grave 2, shown in Fig. 12g. It is unpainted and has a very rough surface. The base is perfectly flat and flares out slightly. A short, pointed lug rises vertically from the rim. Height, eleven centimeters; width across the mouth, ten centimeters.

Calabash Containers. Like all the calabash containers seen at Arica, the one found in Grave 3 has been cut lengthwise. It is nineteen centimeters long by eighteen centimeters wide and undecorated.

Coiled Basket. Many baskets of this flower pot form (Fig. 13h) have been collected by Uhle and others, but only one example was encountered by us. Decora-

tion is achieved by the use of light and dark brown sewing strands. The base is flat and an offset coil at its margin serves as a support. Height, 14.5 centimeters; width, fourteen centimeters.

Model Balsa. The two side pieces of the model balsa are thirty-six centimeters long, by nine centimeters wide, and six centimeters thick, and resemble in all details those of the smaller models. The deck surface is cut flat and is painted with red stripes. On the outer and bottom surfaces at each end deeply cut grooves serve to hold the lashings.

Double-Bladed Paddle. The one double-bladed paddle found is only thirty-eight centimeters long. This is far from proportionate to the scale of the balsa. The handle is oval in section; its pointed blades are roughly triangular in section. The handle is painted red; the blades have encircling red stripes.

Sealing Harpoon Shaft. As in the sealing harpoon shaft (Fig. 15c) from Grave 2, the conical socket in its forward end will take a full-sized harpoon forepiece. However, its length of forty-six centimeters precludes its practical use. The forward end is whipped with cord to strengthen the socket. Two thirds of the distance toward the rear end are also several turns of the same kind of cord about the shaft. As on the specimen from Grave 2, the rear end of the shaft is tapered and flattened, with the tip left wider than the adjacent portion.

Harpoon Forepiece. The six examples of harpoon forepieces from Grave 3 range in length from twenty-five to twenty-eight centimeters. All of them have offset conical bases, are rather poorly finished, and are painted red. Five of the forepieces retain the same type of stone points as were found in Grave 2. With them was found an apparently unfinished forepiece cut to the diameter of the offset bases and tapering to a point at the forward end. Very little additional cutting would be necessary to make a forepiece from this.

Fish Harpoon Shaft. This fish harpoon shaft (Fig. 15e) differs in some details from the sealing harpoon handles. The maximum diameter, two centimeters, is near

its middle; the rear end is uniformly tapered and lacks the short, wider part at the tip. It is also without any lashing in the rear portion. The forward end, which has a fine cord whipping, has a small conical socket retaining what appears to be the butt end of a small wooden forepiece.

Model Adze. This model adze (Fig. 15f) is made from a forked limb. The handle is only seventeen centimeters long and forms an angle of thirty-five degrees with the portion to which the blade is attached. The blade is a flat sheet of copper five centimeters long by three centimeters wide, lashed with rawhide to a flattened seat. Copper bladed adzes seem to have been fairly common in northern Chile, as the museums in Santiago have a number of excellent full-sized examples.

Wooden Spoon. A wooden spoon (Fig. 15l) in this burial is twenty centimeters long, with a tapering handle, flat on top and rounded underneath.

Composite Comb. A rather poorly made example of the double-edged type of comb, made of cane, has a lot of matted hair in one side, indicating it was not made especially for the burial.

Mat. The largest mat seen in any of the graves was found in Grave 3. It is forty-four centimeters long, by forty centimeters wide, and is made of twigs bound together by six twined cross strands of plant fiber.

Spindle. A spindle found is thirty-three centimeters long, with rectangular wooden whorl, seven by 4.5 centimeters.

Plant Remains. In addition to the unidentified leaves and the cornmeal the pouches contain five narrow, pointed tubers,¹ 5.5 centimeters to 8.5 centimeters long, by about one centimeter thick at their centers. These, and a small ear of corn with pointed kernels, were packed in with the meal.

GRAVE 4

In Grave 4 we uncovered a child burial which had apparently been previously opened. The body lay on its back about twenty-five centimeters below the surface.

¹ It has not been possible as yet to have these identified.

The arms had been folded on the chest with the knees drawn up against them and were tied in this position with a throwing sling. An examination of the skull shows the molars erupted, but not worn. One lower molar has a large caries and an abscessed root. The hair arrangement appears to have duplicated that on the head in Grave 3, but is in poor preservation. The body had been wrapped in very ragged scraps of woolen cloth, then folded in a rectangular piece of coarse rush matting which was then tied at the ends. Beneath the body was a little kelp; above it, half of a calabash and a wooden spoon, and within fifty centimeters, two miniature pottery vessels and a kerchief. These articles are described below.

Kerchief. The kerchief measured forty-one by thirty-four centimeters. Its selva-ge was bordered with red, green, yellow, and black warp stripes with the rest white, tan, brown, and black stripes among which are a few red and green threads.

Sling. This has a braided woolen cord with a slit finger grip and solid woven center. Total length, 1.50 meters.

Calabash Container. Like all other such calabash containers this example has been cut lengthwise. It is undecorated and measures thirteen by fifteen centimeters.

Ceramics. A roughly made undecorated spherical pottery container is five centimeters high and 5.5 centimeters in diameter and with an opening 1.5 centimeters wide.

A miniature cooking pot (Fig. 12k), also roughly made and undecorated, has two vertical loop handles connecting the side of the neck with the shoulder. Height, eight centimeters, width of mouth, five centimeters.

Wooden Spoon. A wooden spoon duplicates that in Fig. 15l from Grave 3, with the handle flat on top and rounded underneath.

GRAVE 5

Another child burial, the body eighty centimeters below the surface, lay on its right side, with knees to chest. The head had been wrapped first in a ragged scrap of woolen cloth, then in a plain woolen poncho shirt. Another shirt had been

slipped down over this and the body and the bottom edge bunched beneath the feet and tied. Outside of this, woolen cord had been tied forming a net with even, square mesh. In the grave were four woolen kerchiefs, another shirt, a *loco* shell, and a corn-cob, all apparently tossed in. In the sand, just above the body, was about a shovelful of dark humus, a type of soil not found in the immediate vicinity of this cemetery. The Arica Valley is the nearest spot where this could have been secured. The men who opened the first two graves reported having seen more of this soil, but had not noticed its exact relationship to the burials.

The head appears to have been artificially deformed, as it is elongated beyond the normal proportions. The premolars were just erupting at the time of death. The hair is made into five short braids at each side, the ends tied together at the back of the neck.

Kerchiefs. One of four kerchiefs in this grave has dark brown and tan warp stripes and has one selvage edge bound with red, white, green, and purple yarn. The ends of the warp are embroidered with centimeter-wide bands of dark brown yarn with a continuous row of white diamond-shaped markings. It is fifty-five centimeters wide by forty-six long.

A smaller kerchief, thirty-eight centimeters wide by thirty-five long, has red, green, and purple warp stripes at the sides. Across the rest of it are light tan warp stripes, alternating with narrow ones of red and green. All the edges are bound with red, green, white, and purple yarn.

A third kerchief is forty-seven centimeters wide by forty-two long. At the sides are red, black, tan, and purple warp stripes. Between these are four areas with tan, red, purple, and brown stripes separated by narrower units of red, green, tan, and purple stripes in the center of which are narrow warp designs in black and white. The selvage is unbound. The warp ends are embroidered, with the same threads used to form tassels at the corners.

At the sides of the fourth kerchief in this series (Fig. 14e) are red, tan, purple, and black warp stripes. The central area

is divided into four units of purple, green, maroon, and tan stripes. Between these are three bands of warp designs, each of which is divided into eight units, with both geometric figures and representations of birds and animals. It is forty-six centimeters wide by forty-eight long.

Shirts. The shirt which covered the body is of dark brown wool, sixty-five centimeters long by fifty-five wide. It was woven in one piece and sewed up at the sides, except for slits sixteen centimeters long at the upper corners. Another slit is left in the center for the head.

The shirt wrapped about the head is of light tan wool and is made in the same manner as the preceding. It is fifty-two centimeters wide by forty-seven long, with slits twelve centimeters long for the arms, and a twenty-four centimeter opening for the head.

GRAVE 6

Grave 6 had also been opened previously and the contents disturbed. About one meter below the surface was the body of a small baby which lay face down, wrapped in plain woolen cloth. At the bottom of the grave, two meters below the surface, was the body of a young adult with the wrappings torn open, prepared in the same manner as that in Grave 5. The head is that of a male with the wisdom teeth incompletely erupted. The other teeth are worn. The hair is arranged like that on the individual in Grave 3, differing in that the side braids are interbraided at the back with the ends bound with red cord. There are also the single braid at the nape of the neck and the short braids from the temples with ends bound with red cord.

In the disturbed sand of the grave the items described below were found.

Textiles. Three coca bags were found in Grave 6. One is like that described from Grave 2 at Playa Miller and has an identical warp design in three stripes on both sides. These are separated and bordered by solid red stripes with brown at the outer edges. Length, seventeen centimeters; width at mouth, seventeen centimeters; at bottom, twenty-one centimeters.

Another coca bag, similar to the one from Grave 7 (Fig. 14d), has broad, bright red, and narrow blue warp stripes and three stripes of warp design consisting of small rectangles of blue and yellow. Height, twenty-one centimeters; width, twenty-two centimeters.

The third bag from Grave 6 has warp stripes consisting of three broad bands of dull green separated by two of yellowish wool in which are narrow red, green, and black stripes. Height, twenty-one centimeters; width, eighteen centimeters.

The three meal bags are all of natural shades of tan and dark wool with narrow stripes of checkered warp design. Lengths are 18.5, thirty-one and thirty centimeters; widths, eighteen, twenty-one and twenty-three centimeters. The smallest of these is shown in Fig. 14c.

A single kerchief of plain gray wool is very badly worn and is of interest in that it is the only example observed which is not decorated with warp stripes.

A brown wool shirt was woven in two strips and sewed up the middle. Width, ninety centimeters; length, seventy-six centimeters.

The two shirts used as outer wrapping for the body are of interest because they both show the manufacture of pieces of cloth in which the width has been intentionally changed during the process of weaving. One is of plain dark brown wool with narrow red warp stripes at each margin. Like other shirts described, it has been woven in one piece, folded, and sewed together along the selvage edges, leaving arm slits. The length is ninety centimeters; the width across the shoulders measures 204 centimeters, but across the bottom only ninety-five centimeters. Before the method of manufacture can be accurately explained, a complete count of the warp threads should be made at both top and bottom. A ten-centimeter section along the bottom has fifty-six warp threads while a corresponding space at the top has forty. This would indicate that additional warp threads which do not run the full length of the piece, have been inserted.

The second shirt is also of plain dark

brown wool without warp-stripe margins: the length is 130 centimeters; the width at top 190 centimeters, at the bottom 102 centimeters.

Skottsberg publishes a diagram of another of these shirts (1924, Fig. 19).

Several scraps of decorated cloth were found: two have warp stripes in red, blue, and green; a third has a portion of warp design.

Associated with the infant in the upper part of the grave is a piece of heavy cord-netting in which the cords run in pairs, one centimeter apart, bounding squares 2.5 centimeters on a side.

Ceramics. A rim and shoulder section of a cooking pot has a straight rim with flat vertical handles joining the side of the rim and the shoulder. The mouth is eleven centimeters in diameter. In all probability this cooking pot had the form of the miniature example shown in Fig. 12.

Another large sherd is from a pot or bowl which must have been about fifteen centimeters high by about fifteen across the mouth, which is slightly less than the maximum diameter of the vessel. Its chief interest lies in the flat horizontal handle on the side about halfway between the rim and bottom, the only example of this type of handle seen at Arica. The rim is rounded at the top and is the same thickness as the rest of the piece.

Calabash Containers. Both calabash containers found are undecorated and are cut lengthwise. The largest is eleven by 10.5 centimeters and is shown in Fig. 13f.

Open Mesh Basket. Open mesh baskets of the type shown in Fig. 13i are seldom seen in collections from the north of Chile. Similar baskets, however, are still occasionally made on Chiloé Island. The bottom is nearly flat, the sides vertical: diameter, twelve centimeters; height, ten centimeters. Strands of fine rush, crossing at the center of the bottom, are united by twined strands of the same rush which spiral about the center. The handle is of twisted rush.

Sling. Fig. 15g illustrates the most carefully made sling found by us at Arica. It is 1.75 meters long, with round braided cords of light and dark wool and a slit

finger grip beyond which the cords used in the braid are made into a tassel. The central portion is woven in one piece with alternating light and dark squares.

Harpoon Forepiece. The harpoon forepiece, 23 centimeters long, from Grave 6, differs in no way from those with offset conical bases which have been previously described. The stone point is missing, but its socket is the same as on the other specimens. A portion of rawhide thong remains where it was tied, just forward of the base.

Model Harpoon Shaft. The forepiece just mentioned was set in the end of a handle, thirty-eight centimeters long, made from a section of the stalk of a large *equisetum* plant. This is whipped with cotton cord outside the socket and has several turns of the same type of cord ten centimeters forward of the rear end. An attempt has been made to carve the flattened expanded tip seen on examples of wood.

Double-Bladed Paddle. In form like others already described, the paddle from Grave 6 is twenty-seven centimeters long, with a round handle. The blades are slightly concave on the face and triangular in section. It is painted with transverse red stripes.

Spindles. Two spindles were found in Grave 6: one is the type with a rectangular whorl and is thirty-seven centimeters long. The second spindle is broken, but retains a cylindrical wooden whorl, two centimeters high by three in diameter.

GRAVE 7

Grave 7 had also been previously opened and the body removed. Only a few vertebrae remained at the bottom of the grave, 1.50 meters below the surface. Slightly above and to one side the undisturbed body of an infant lay on its back with arms folded on the chest and knees drawn up against them. It had been placed inside an old, darned shirt with another piece of cloth laid over this. On its chest was a small, unpainted spherical jar and an ear of corn. Beside it, was a section of unworked branch with the bark still on it, and a small crossed-stick basket.

Crossed-Stick Basket. In extremely poor preservation, the crossed-stick basket is similar to that described from Grave 1. Although it is slightly larger, it is probably a miniature made especially for the burial.

Coiled Basket. A small shallow basket, twelve centimeters wide by two centimeters deep, is similar to the one from Grave 2, Playa Miller (Fig. 10m).

Textiles. Of the three coca bags found in the disturbed sand only one warrants description. It has four red warp stripes separated by bands of warp design composed of rectangles alternately blue and yellow.

Knotted Cord Cap. A knotted cord cap (Fig. 13b) was made with the same technique as the cord bags found in Grave 3, but the workmanship is inferior. Similar hats appear fairly commonly in collections from the north of Chile, but this is the only one encountered in our work at Arica.

Ceramics. A water jar in this grave (Fig. 12a) duplicates those from Grave 2 in form, material, and finish. Height, nineteen centimeters; diameter, sixteen centimeters.

In contrast to two other kero-like cups found in this cemetery, the example found in this grave is much more carefully finished (Fig. 12f). It is of a reddish ware, with a fairly smooth, unpainted surface. The end of the projection above the rim is modeled into a crude representation of a head, with slit incisions indicating eyes and mouth. Height, eighteen centimeters.

In addition to the roughly spherical container found with the infant, two others in this grave are crudely finished and unpainted. Two are the same size, eight centimeters in diameter with openings 1.5 centimeters across; the other is slightly larger.

Miscellaneous. We may add to the objects described a double-edged composite comb, parts of a balsa model, a miniature bow, and several ears of corn, all very poorly preserved.

FALSE BURIAL

At a depth of fifty centimeters was found what appeared to be the grave of an infant. The burial bundle was of sufficient

size to contain a small baby; beside this were two small bags of meal, two ears of corn, a cornhusk containing white paint, a small piece of llama (?) hide with fur inside, the broken end of a llama (?) leg bone with the marrow cavity plugged with a bit of folded reed, and a hematite bolas weight.

On examination the bundle was found to consist of a coarse woolen shirt, eighty-two by fifty-six centimeters, made of two strips of plain cloth sewed together lengthwise, which covered a carefully prepared package tied with heavy cotton fish line. This was made up of a portion of a plain woolen shirt folded about a strange assortment of items. At one end was a small round-bottomed reddish-brownware bowl 10.5 centimeters in diameter, by 7.5 high, ornamented with perpendicular red stripes running down on to the sides from the rim (Fig. 12i). With it were the following:—

One small undecorated calabash container.

Two ears of popcorn.

A coca bag, containing a small fragment of unworked bone and two pieces of prepared ash like that chewed with coca.

A small netted cord pouch, conical in form like the netted containers in which the top-like objects occur.

A sling, 1.26 meters long, with round braided cords of two shades of wool, solid woven center and loop finger grip.

A rectangular piece of soft brown fur, nine by sixteen centimeters. Three short bright red woolen cords were tied on one end and on the other end three, blue.

A little cotton wool wound with heavy three-strand cotton cord.

Human hair, consisting of several short braids, one of which is still attached to a circular bit of scalp, three centimeters across, with cut edges. The hair is all fine and short and is probably from a young child. It is heavily infested with lice eggs and a few dried adult lice were secured.

In addition to meal, one of the bags outside the bundle contained one ear of corn with pointed reddish kernels, eight very small dried potatoes, and sixty-seven dark red beans. The other bag had meal, a few kernels of corn, forty-six of the same kind of beans, and seven dried potatoes. In-

cidentally, these were the only potatoes found in the course of the field-work.

Without historical or ethnological data it is of course impossible to interpret this find. We can be certain only that it is related in some way to a particular individual, as indicated by the portion of the scalp.

The bolas weight is somewhat cylindrical in form, with straight, ungrooved sides and rounded ends. About the middle is a raw-hide strap the two ends of which are laced together and stick out from the weight. A slit has been cut in them for securing the thong or cord.

EXCAVATIONS AT QUIANI

South from the Arica Morro headland, the coast line curves east and south, with the high ground back of it making a slightly wider curve. This higher ground swings out to meet the beach about three kilometers south of Playa Miller. Beyond this point the sea breaks against the base of a precipitous, rocky formation, a little more than one hundred fifty meters in elevation and increasing in height to the south. Along this for about twenty-five kilometers there are no beaches nor satisfactory camping places. Seemingly of little use, it is nevertheless, an excellent area for shellfish, and is the source of most of the present supply for the people of Arica.

The camping place nearest to this potential food supply lies just north of the intersection of the high land and the beach.¹ Here a steep slope flattens out at an elevation of around eighteen meters, forming a barranca just back of and parallel with the beach. At some remote time in the past a flow of water from the interior poured down over the high formation and cut a deep drainage channel through the barranca to the sea. Considerable midden refuse is scattered over the hill slope, on both sides of this channel, with the greatest concentration along the seaward edge of the barranca. Under present conditions it is difficult to understand why anyone would camp there. Windswept, and with no fresh water available, it has little to recommend it. Perhaps water was formerly secured from a well or spring in the bottom of the gully, but there is no evidence of such a water supply. Another drawback is the scarcity of fuel. The

only fuel available is the seaweed which washes ashore and dries on the beaches. At present a considerable quantity has accumulated, but we cannot be certain whether this would meet the needs of a permanent or even a semi-permanent population.

This section of the shore or beach is known locally as Quiani, so this name has been applied to the site. Most of its surface is wind eroded so the shell refuse is exposed and is being very gradually cut away, leaving stone flakes and artifacts in greater concentration at the surface than they occur in the midden below. Everything found on the surface, including the flakes, was gathered together and examined and has been included in the analysis of specimens from the excavation (Table 3). Conspicuous among this material are the cobblestone choppers, with rough unilateral flaking. These are mainly of a greenish-gray porphyry. None of the flakes of this material shows any evidence of use or working. Of a considerable quantity of whitish chert and chalcedony, which is also present, the bulk is of unworked flakes. Simple, single and double-edged sidescrapers are plentiful. Notably lacking among these surface finds, with two questionable exceptions, are end-scrapers of any type. Spear or harpoon points of a simple, thick, double-ended type are found, but are nearly always broken.

In addition to the chipped and flaked stone items, there is little else; a few small mortars, fragments of rounded lava bowls or mortars, and some ground-stone fish line sinkers round out the list. A single weathered potsherd was seen, but the results of the digging demonstrate that the absence of pottery on the surface is not

¹ A plane table plan of this location is on file with the field notes in this Museum and in the Museo Nacional de Historia Natural in Santiago.

due to the effect of weathering, which could, under the conditions existing here, completely destroy them.

The surface of the main portion of the refuse, although wind eroded, is unevenly pitted with small hollows and depressions. In appearance it is similar to middens accumulated by people living in pit shelters, or where it has been the custom to dump shell waste around the sides of huts, such as is observable in the extreme south of Chile.

Our first move was to cut a small test pit at the bottom of one of the hollows to learn whether the deposit was deep enough to warrant excavation. Since it continued below a meter and a half, a test trench was cut to expose the strata. This was twelve meters long and was at right angles to the edge of the barranca, where there seemed the greatest probability of finding nearly horizontal structure. A block ten meters long and a meter and a half wide was removed from the south side of the trench and sifted by layers according to the structure, exactly as at the Playa Miller excavation. Its removal revealed a sharp dip in the structure toward the south, indicating that the bulk of the older material lay on the opposite side of the trench. Accordingly a three-meter square portion of débris was removed, yielding a limited, but more accurate chronological series of artifacts down to a depth of two meters. Beneath the oldest material is a layer of

fine gravel and sand, twenty centimeters thick, which has eroded down from the surrounding hillside. This covers clean water-deposited beach sand at an elevation of about sixteen meters above the present high water mark. Altogether, about fifty cubic meters of refuse was passed through the sifter. This has probably yielded a true sample of the contents of the midden, although to secure a really representative collection, about twice that quantity should be removed.

The distribution of specimens is shown in Table 3. In using this analysis it must be remembered that the lettering of the layers in the two sections does not mean that they are contemporaneous. Layers A, B, C, D, and part of E in Section I are the same age as the upper ten centimeters in Layer A. In Section II, part of Section I, Layer E is coincident with Section II, Layer C, and the bulk of Section I, Layer F, is the same age as Section II, Layer D. This regrettable confusion results from the unexpected structural variations which were encountered. The irregularities in the strata are such that an object lying less than five centimeters from the surface at one point may be contemporaneous with another lying under a meter and a half of refuse not far away from it. It is strongly recommended that for any future work at this site a long, narrow block of refuse, not more than two meters wide, be exposed on four sides before sifting is started.

TABLE 3
EXCAVATIONS AT QUIANI

		DISTRIBUTIONAL ANALYSIS							
		S*	Section I			Section II			
			A-C2	D1-E3	F	A	B-C	D-F	G1-G3
Stone									
Rough chopping tools									
Oval cobblestones, unilateral flaking									
1. One end (Taltal, Group I-1)	31	1	11	14		2	7	5	7
2. Sides and end (Taltal, Group I-2)	9	—	—	1		—	1	—	—
3. Longest axis (Taltal, Group I-3)	26	—	3	7		1	4	5	5
4. Entire margin (Taltal, Group I-5)	12	2	2	1		—	—	2	—
5. Two faces (Taltal, Group III-4)	7	—	—	—		—	—	—	—
6. Broken or poor examples of 1, 2, 3	—	—	22	13		6	12	3	—
Large teshoa flakes, unilateral flaking, duplicating 1, 2, 3		10	—	3	—	—	1	1	—
Teshoa flakes used as hammers		—	—	2	1	—	1	—	—
Angular, two striking platforms (Taltal, Group II-4)		—	—	—	—	—	—	—	—

TABLE 3 (Continued)

Stone (Continued)	S*	Section I			Section II			
		A-C2	D1-E3	F	A	B-C	D-F	G1-G3
Oval cobblestone, bilateral flaking on:								
1. One margin	1	—	—	—	—	—	—	1
2. Entire margin	—	—	1	—	—	—	—	—
Flakes, unworked, from preceding	—	29	46	34	20	25	67	23
Flakes, unworked, chalcedony	1191	22	33	56	69	51	272	119
Flakes, chalcedony, nicked edges	12	1	18	—	5	—	4	2
Spalls	—	1	—	—	—	3	—	—
Sidescrapers: single edge	193	5	19	3	3	14	12	7
two edges	17	—	1	1	—	—	1	—
two edges reversed	14	—	—	1	—	—	1	1
two edges acute angle	23	—	—	—	—	1	3	3
two edges 80-90° angle	4	—	1	—	—	—	—	—
two edges indeterminate frags.	15	—	—	—	—	—	—	—
Endsrapers	—	—	1	—	1	—	—	—
Flake knives	7	—	—	—	—	—	—	—
Blanks or rejects	38	1	3	—	1	—	5	5
Points: lanceolate, large	1	—	—	—	—	—	—	1
lanceolate, chipped one side	7	—	—	—	—	—	—	—
double-ended, narrow	107	—	6	2	—	—	3	6
double-ended, broad	—	—	1	—	—	—	—	—
double-ended, unfinished	48	—	1	—	—	3	—	1
slight stem, no barbs	—	—	—	—	—	—	—	1
tapered stem, slight barbs	1	—	1	—	—	—	—	—
triangular, convex base	3	—	2	—	—	—	—	—
triangular, angular, concave base	1	—	—	—	—	—	—	—
arrow, small, triangular	15	—	—	—	—	—	—	—
indeterminate fragments	22	—	—	—	3	—	2	1
Knife, oval	—	—	—	—	—	—	—	1
Hammerstones	2	2	6	3	2	2	—	—
Hammerstones, pitted	—	—	1	—	—	—	—	—
Mano	2	1	—	—	—	—	—	1
Mortars: conical hollow	7	1	—	—	—	—	1	—
rounded hollow	3	—	—	—	—	—	—	—
small, shallow hollow	—	—	4	1	—	1	1	—
Bowls, fragmentary	34	1	10	2	—	3	—	1
Bolas, grooved long axis:								
elliptical, small	—	—	2	—	2	—	—	—
egg shape, hollow on top	—	—	1	—	—	—	—	—
pebbles, oval, small	—	2	—	—	—	1	—	—
Bolas, grooved short axis:								
oval, small	—	—	8	—	—	—	—	—
oval, small, hollow on top	—	—	—	—	—	—	2	—
pebbles, oval, small	—	—	5	—	—	1	—	—
pebbles, oval, large	—	—	—	—	—	—	1	—
oval, large, flat ends	—	—	—	5	—	—	—	—
oval, large, flat ends, hollow on top	—	—	1	—	—	—	—	—
Bolas, questionable, no groove:								
egg shape	—	—	—	2	—	—	—	—
oval, large, cord attached short axis	—	—	5	2	—	5	1	—
pebble, hollow on side	—	—	—	—	—	—	1	—
Fishing Gear								
Sinkers: cigar-shaped stone, no groove	—	—	1	—	—	—	—	—
cigar-shaped stone, no groove, fragments	—	—	—	—	—	2	—	—
cigar-shaped stone, groove at ends, fragments	—	2	1	—	1	1	—	—
cigar-shaped stone, notches at end	—	1	—	—	—	—	—	—
cigar-shaped stone, unfinished	—	—	2	—	—	2	—	—
Composite sinker-hook: weight	—	—	—	—	—	—	—	2

TABLE 3 (Continued)

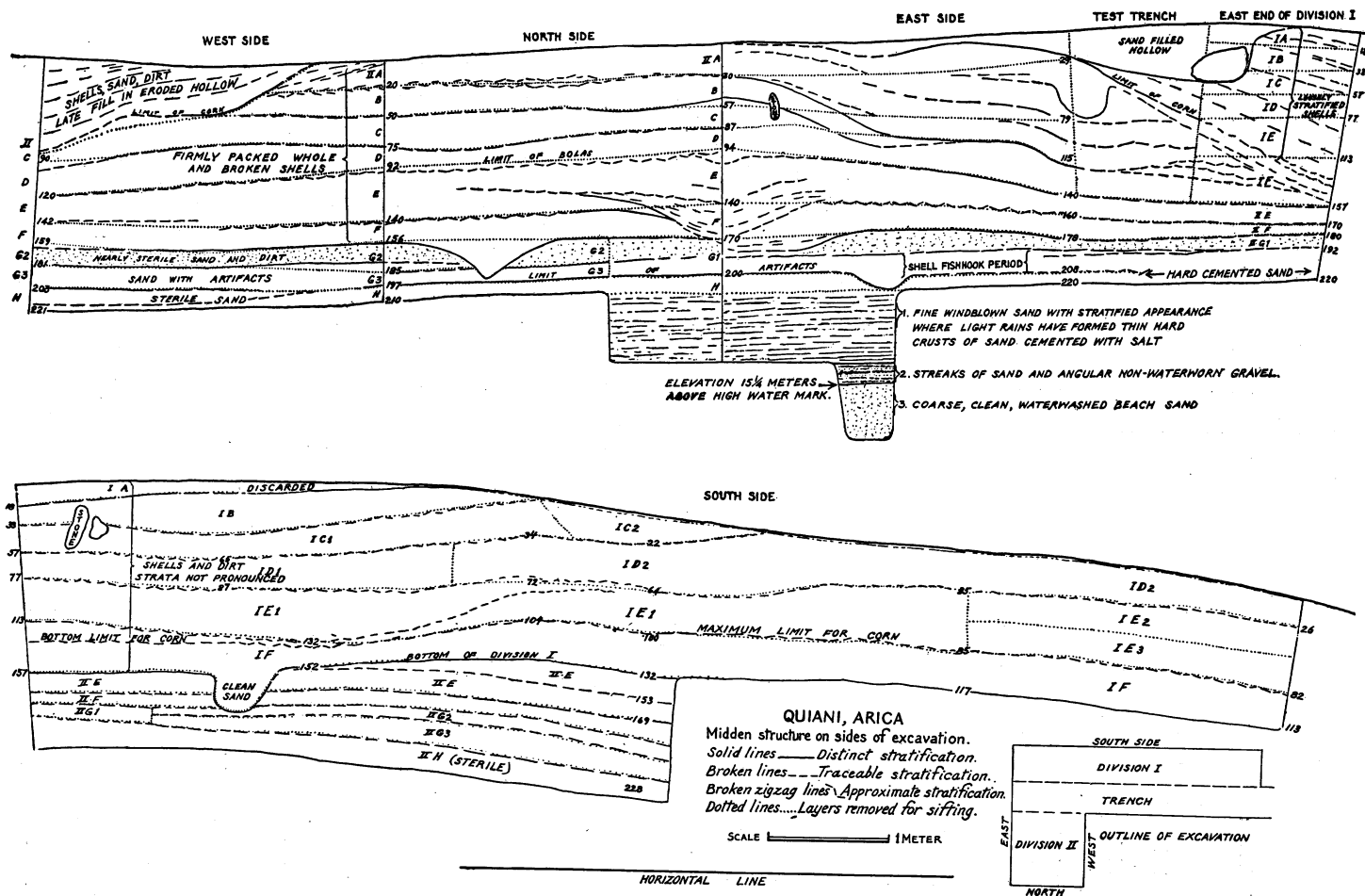
	S*	Section I			Section II			
		A-C2	D1-E3	F	A	B-C	D-F	G1-G3
Fishhooks: thorn	—	—	3	—	1	1	—	—
shell	—	—	—	—	—	—	—	10
shell, unfinished	—	—	—	—	—	—	—	1
shell, scraps	—	—	—	—	—	—	—	1
Squid hook barb	—	—	—	—	—	1	—	—
Bone								
Fish harpoon points	—	—	6	—	—	3	2	—
Dart points, fish spine	—	—	—	—	—	—	1	—
Barbed points	—	—	—	—	—	1	—	—
Chipping tools, guanaco bone	—	—	—	—	—	—	—	1
Awls	—	—	1	—	—	—	—	2
Worked fragments	—	—	—	—	—	—	—	2
Ornaments								
Beads, bird bone	—	1	—	—	—	—	—	—
Beads, shell	5	—	—	—	—	—	1	1
Turquoise, flat fragment	1	—	—	—	—	—	—	—
Leather								
Thong, fragment	—	—	1	—	—	—	—	—
Wood								
Shaft, fragment	—	1	—	—	—	—	—	—
Knife handle	—	1	—	—	—	—	—	—
Worked fragments	—	—	2	—	—	—	—	—
Unworked fragments	—	5	17	15	3	32	3	2
Thorn								
Unworked	—	3	17	—	—	3	1	—
Sherds								
Plain	1	—	—	—	—	—	—	—
Redware, white and black paint	—	1	—	—	—	—	—	—
Textiles								
Plain cloth	—	1	—	—	—	—	—	—
Knotted bag	—	—	1	—	—	—	—	—
Matting of rush and reed	—	1	1	—	—	—	1	1
Cords and Ropes								
Wool, twisted, two-ply	—	5	4	—	—	1	1	—
Wool, twisted, three-ply	—	1	—	—	—	—	—	—
Wool, braided	—	—	1	—	—	—	—	—
Plant fiber, twisted, two-ply	—	3	—	—	—	—	1	—
Plant fiber, twisted, three-ply	—	—	4	—	—	—	—	—
Plant Remains								
Corncobs	—	5	27	4	19	—	—	—
Cotton bolls	—	—	1	—	—	—	—	—
Gourd fragments	—	1	—	—	—	—	—	—
Miscellaneous								
Choro mussel shell, serrated margin	—	—	1	—	—	—	—	—
Mussel shell, red paint inside	—	—	1	—	—	—	—	—

* S means surface finds.

In composition this midden is somewhat more compact and consolidated and has a much smaller admixture of perishable material than that at Playa Miller Casino. The upper three fifths consists approximately of half shell and half sandy dirt and ash. The proportion of sand increases below this and there is less occupational débris. Plant remains disappear

in the upper half of Section II, Layer G, practically at the bottom of the excavation.

The shells present consist mainly of *loco* and *choro* mussels, with the *loco* predominant. The other forms, in order of their abundance, are: small ribbed mussel, purple whelk, and *lapa*. Other species are rare. Sea urchin shells are present throughout, but not in bulk. At about



the middle of the deposit was a lot of the non-edible portion of the *piure* (Tunicad). A few *jaiwa* crabs were noted in Section I, Layer A. Fish and bird bones were scattered throughout, with no noticeable concentration at any particular level. Sea lion bones were very rare, while porpoise bones were slightly more abundant. A single fragment of turtle shell was noted. No land mammal bones other than those used for artifacts were encountered.

CHIPPED STONE ARTIFACTS

Rough Chopping Tools. This term is used for lack of a better one, without any certainty that it is entirely appropriate. It is applied to a group of roughly made percussion flaked stone artifacts. They are made of flattened oval cobblestones, usually of fine-textured gray or greenish-gray porphyry. In length they vary between four and sixteen centimeters; in width from five to twelve centimeters; in thickness, from one to seven centimeters. Perhaps it would be more significant, for comparative work, to use the average weights of these objects, and it is unfortunate that such data cannot be included here.

An examination of a considerable number of these choppers shows that the differences between them fall within a certain limited range of forms. These have been briefly listed in Table 3, and will be more fully explained below. It must be emphasized and remembered that the divisions are not clear-cut but that one form merges into another, which may well mean that we are treating accidental variations rather than intentional forms.

The bulk of the choppers are unilaterally flaked, producing edges which are generally so irregular and blunt as to make one question their classification as tools. The angle between the face of the cobble and the portion exposed by removal of the flakes ranges between forty-five and ninety degrees, with the majority about seventy-five degrees. The appearance of these edges immediately suggests that they are cores, but three good reasons refute this. First, no artifacts made from flakes of this material are present here,

nor do any of the flakes show wear or use. Second, the direction from which the flakes are removed consistently produces smaller flakes than could be secured from the cobbles used. Third, better quality stone for flake tools was available in this area and was used at the same time.

In the analysis (Table 3) the following designations have been used:—

Flaking on One End Only (Taltal, Group I-1). Among these, very few are proportionately much longer than wide, the average length being only slightly more than the width (Fig. 17a). At the bottom of the midden was an example of this form ground slightly concave on the beveled edge (Fig. 19b). It is the only example among the many found with such grinding or wear. As the curvature conforms to the outer surface of an average-sized bowl, it might have been used for smoothing one of these bowls.

Flaking on Long Axis (Taltal, Group I-3). Continuous use or flaking of artifacts constituting the first series results in examples in which the flaked edge is coincident with the long axis (Fig. 17b). In some, it is clear that the flakes have been intentionally struck from one of the long edges of an oval cobblestone (Fig. 17c).

Flaking from End and Sides (Taltal, Group I-2). In the preceding examples the edges are generally slightly convex. In some cases their curvature is pronounced. Extreme examples are flaked for more than half the length of their margins. These have been listed apart under this heading. In over half of the artifacts so grouped this extended flaking has resulted in the complete removal of the waterworn surface from one side of the specimen (Fig. 17d).

Flaking along Entire Margin (Taltal, Group I-5). Under this category are placed examples from the preceding group where the flaking has been continued along the entire margin. In all cases, the original waterworn surface of the cobble remains only on the face against which the blows were struck. These are all small and give the impression of being unrelated to the first two groups (Fig. 17e).

Flaking on Two Faces (Taltal, Group III-4). This is a rather ambiguous des-

ignation. It is used for specimens which are residual portions of thicker-than-average cobbles, which show flakes removed by blows struck against both faces (Fig. 17f).

Duplicating the first three divisions are artifacts made from large thick teshoa or primary flakes struck from large cobbles (Fig. 17g). These naturally have the original waterworn surface only on one side, but as the edges are identical with

Bilateral Flaking. As indicated in Table 3, only three examples of cobblestones with bilateral flaking were found. These are crudely made and would serve the same purpose as those with unilateral flaking (Fig. 17h).

Surface Specimens. As the different forms of rough choppers were selected at random from a total of three hundred, the balance having been left at the site, the proportions as given in Table 3 under sur-

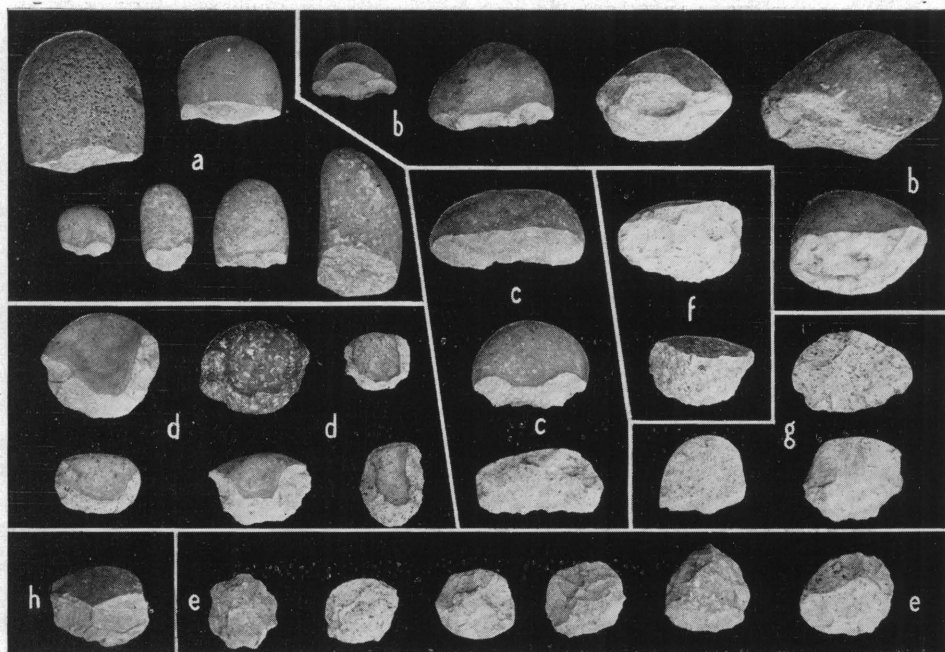


Fig. 17. Rough Stone Tools showing Range in Size and Variation of Form, Quiani. a, Flaked across one end; b, c, Flaked on long axis; d, Flaking on end and sides; e, Flaking on entire circumference; f, Flaking from opposite faces of cobble; g, Made from large flakes; h, Crude bilateral flaking on edge.

those previously mentioned they were presumably also used for the same purpose.

Angular Tool, Two Striking Platforms. In this classification, we have a single specimen made from a section of angular cobble having two flat, smooth surfaces, from each of which coarse flakes have been struck off. Except that the flat surfaces are naturally formed, this artifact duplicates those which, on the Taltal analysis, have been classed as Group II-4.

face (S) should not be taken as significant.

Sidescrapers. Next to the rough chopping tools in abundance are ordinary sidescrapers. As at Playa Miller, they are of chalcedony and similar stone, as are all the projectile points, generally with a single percussion chipped edge and with no particular group characteristics. The usual variants were observed: a few with two edges, sometimes chipped from the same side of the flake, sometimes with the flak-

ing from opposite sides. In some cases these two sharpened edges meet, forming angles ranging irregularly from sharp acute to around ninety degrees. Three examples from Section II, Layer D, and Section II, Layer G, are very close to what we have called small keeled sidescrapers at Pisagua and Taltal. These have two

rarity of this tool here in a hunting and fishing culture is interesting (Fig. 18t).

Flake Knives. These flake knives are no more than thin irregular chalcedony flakes, with one edge sharpened by bilateral chipping. There is no uniformity in size or outline.

Projectile Points and Knife Blades. The

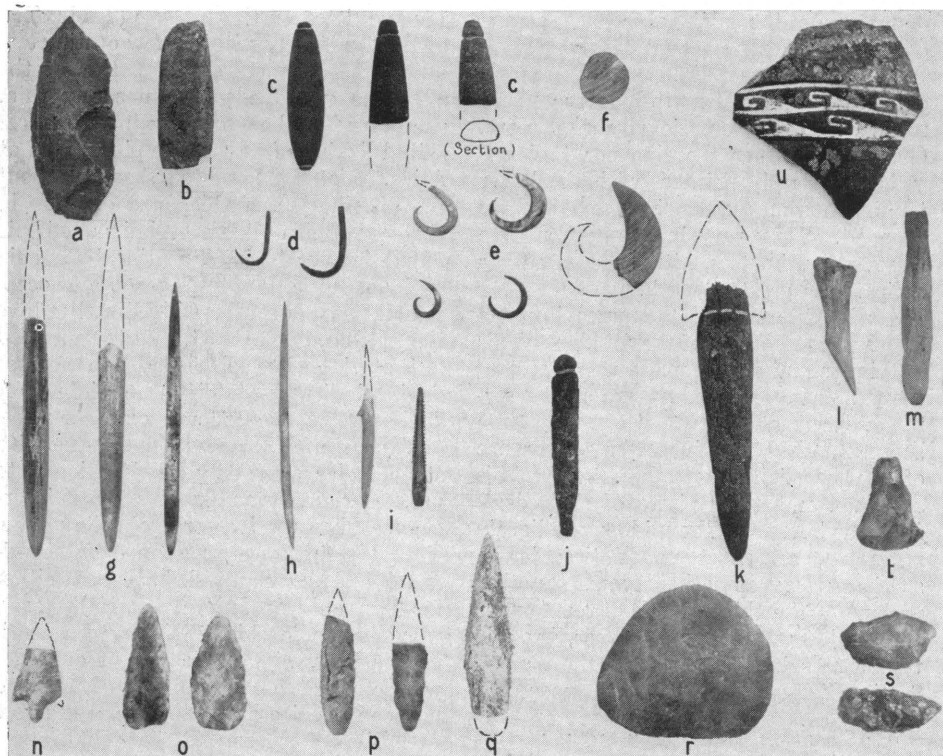


Fig. 18. Miscellaneous Artifacts from all Levels at Quiani. a, Flaked blank for sinker; b, Second stage in making sinker with pecked surface; c, Finished and broken sinkers; d, Thorn fishhooks; e, Shell fishhooks showing range in size; f, Shell disc, cut in preparation for making a hook; g, Bone fish harpoon points; h, Bone barb for squid hook; i, Bone and fish spine points, uncertain use; j, Whalebone weight for composite sinker hook; k, Wooden knife handle; l, Awl; m, Chipping tool; n, Stemmed and barbed point; o, Roughly triangular points; p, Double-ended points; q, Double-ended point, with sides of butt smoothed; r, Knife; s, Double-edged sidescrapers; t, Endscraper; u, Sherd (white portion of design retouched).

very roughly convex edges nearly joining at each end of the tool (Fig. 18s).

Endscrapers. Of the two endscrapers, the one from Section I, Layer E3, is perhaps questionable, as it might be classed as a double-edged sidescraper. The one from Section II, Layer A, however, leaves no doubt as to its classification. The

small number of projectile points and knife blades in the midden is disappointing. Less than five per cent are perfect. In spite of these drawbacks the evidence is sufficient to form certain conclusions. Exact duplicates of the thick, barbed harpoon points of the Playa Miller pottery period are absent. Only two stemmed

examples are present, both with tapered stems and slight barbs, and both thinner and somewhat different from those just mentioned. The specimen from the excavation (Fig. 18n) duplicates a type which is characteristic of the later pre-pottery refuse at Pichalo. Is its association here with evidence of agriculture accidental?

The predominant form, both in the midden and on the surface, is the narrow, double-ended type characterized by a general thickness (Fig. 18p). In many cases this is equivalent to half the maximum width, and occasionally even more. Generally, neither the tips nor the butt ends are sharply pointed, with the latter tending, in some of the points, to be slightly rounded. They vary in length from five to seven centimeters, with some fragments indicating a greater length.

A slight variant of the preceding was found at the bottom of the midden. This is thinner and better made than most of these points. The edges are finely serrated, except at the butt, where they have been smoothed off, giving the appearance of a very slight stem (Fig. 18q). This specimen and other pieces of chalcedony from the bottom of the midden are lightly patinated, an effect not noticeable on specimens from any other layers. Another variant of the thick double-ended form is the single example of a thinner, broader type shown in Fig. 18p from the part of Section I, Layer D, which was exposed at the surface.

Triangular forms are limited in the midden to rough examples (Fig. 18o). The same form is present, but rare, among surface finds, while a considerably smaller variety, which may well be for use on arrows, was found only on the surface. These last are consistently of the same size, with bases which vary from straight to rounded. They are relatively abundant.

Another triangular type which is a common feature of the surface collections in the vicinity of Cobija and Taltal, also appears here among the surface specimens. This type has an angular concave base, one corner of which is sometimes extended to form a spur or barb, while the two sides

consistently have a slightly different curvature. Mounted specimens are always attached to harpoon forepieces. As this triangular type occurs here only as an isolated example among the surface finds, it is impossible to place it chronologically. Obviously, it is not a common element of either the pre-pottery or pottery periods.

Knives. The specimen shown in Fig. 18r and listed on the analysis (Table 3) as an oval knife, lay within a few centimeters of the oldest traces of occupation at the site. Its entire edge is unusually thin, sharp, and well made, showing the most skilful flaking of any of the pieces seen at Arica. Nothing has been reported about the distribution of this form of knife in northern Chile. A very similar knife is found frequently in Argentine Patagonia as far south as Puerto Deseado and occasionally further south. Only slightly above the bottom, in Layer G, was the rounded butt of a large lanceolate blade. Its coarse flaking indicates that it is unfinished. A similar fragment was found on the surface.

Hafted Knives. As is often the case with stone blades, some defy classification as to use. Certain forms have been used interchangeably as knives or projectile points. Thus the first ones mentioned under triangular blades may well have been either for harpoons or knives, especially as a wooden handle (Fig. 18k) thirteen centimeters long, with blade slot at one end, was found at nearly the same level, and harpoon forepieces with the same slots were found in the graves. Similar handles and harpoons with triangular blades have been collected at Cobija and at other places in northern Chile.

Chipping Tools. The only chipping tool (Fig. 18m) secured is of guanaco or vicuña bone 8.5 centimeters long, with a blunt point similar to the examples found at Playa Miller.

HUNTING AND FISHING GEAR

Bolas. The bolas was an important weapon at this site, but was not used by the earliest inhabitants, as it occurs only after about one third of the present midden had accumulated. The majority of the weights are small and light; sizes still used

today for bird hunting along the Desaguadero River, which drains Lake Titicaca. The simplest weights are naturally formed, smooth oval pebbles, about four or five centimeters long, with a narrow groove pecked into the surface lengthwise about the long axis (Fig. 19e). Others of about the same size, made from a variety of stones, have been shaped by pecking. These tend to be slightly more elliptical than the naturally shaped ones and have a deeper groove (Fig. 19d). Considerably smaller, but about the same weight, is a single example made of galena (Fig. 19f). Two bolas, vaguely a flattened egg shape, grooved along the long axis, have a slightly flattened or hollow place at the narrow end to make a better fit for the knot or splice joining the rope to the strap which encircles the stone (Fig. 19l). Certain Patagonian bolas weights have a similar hollow on top for the rope knot, but none combining both the encircling groove and the rope knot have been reported from that area. Others, made either from naturally formed pebbles or worked to shape, four to five centimeters long, are grooved about the middle of the short axis (Fig. 19g, h, i). Some of these also have a hollow or flat place at one point along this groove (Fig. 19k). Larger weights, similar in shape to the preceding, but with flattened ends, measure up to eight centimeters in length by four centimeters in width. One of these also has a knot hollow (Fig. 19j). It is difficult to suggest how these larger weights were used in this area. If prepared like the old Patagonian fighting *bola*, a single weight on a thong or rope, they would be adequate for killing sea lions either on land or after they have been harpooned. If any of these weights are ever found here joined with one or two others, it will be considered good evidence that either guanaco or one of the related species was available back in the valleys.

In addition to the weights mentioned, we found a number of others usually artificially shaped, but with no encircling groove. Several of these retained scraps or vestiges of vegetable fiber cords around their short diameters (Fig. 19m).

Harpoons. Evidence of the use of har-

poons is limited entirely to the stone points and the forepieces which have already been described. None of the bone barbs which are attached to the forepieces were found.

Dart Point. This term is used, with reservations, for a small point six centimeters long made from the spine of a sting ray (Fig. 18i). Along each edge is a row of small sawtooth spines. The thick end is faced off with a flat bevel for splicing to a shaft.

Fish Harpoon Points. Fish harpoon points (Fig. 18g) are a type common in the collections from the coast of northern Chile. Made from guanaco or vicuña leg bones, those found at this site range in length from ten to perhaps eighteen centimeters in length. All are slender and have sharp tips and slightly tapered rounded butts. When completely preserved two short barbs of thorns are lashed to the tip with fine cord. Usually there is a slightly flattened platform prepared for the thorns to rest on. A short distance from the rear end they are bound with several turns of cord, which serves both to secure the harpoon line and to prevent the point from wedging too tightly into the socket at the forward end of the shaft.

Somewhat similar to the preceding is a fragment of a bone with a slight barb carved on one side (Fig. 18i). Its use is uncertain.

Fishhooks. Fishhooks are of two distinct types (Fig. 18d, e), one made of thorn, the other of the *choro* mussel shell. Those of thorn have straight shanks with a fine groove cut in the outer surface near the top. The hooks cut from *choro* shell have a slightly curved shank and incurving tip. Neither of these have barbs. Marks on one shell specimen show that the fish line was secured to the shank by a whipping of cord. Thorn hooks are rather consistent in size, while the largest shell hook is almost four times the size of the smallest. Shell hooks occur only at the bottom of the midden, with the later debris yielding only ones of thorn.

Fish Line Sinkers. As at Playa Miller fish line sinkers are all of stone, pecked and ground to a cigar shape, usually oval in cross-section, with grooves or notches

at the ends (Fig. 18a-c). Not present here are sinkers ground flat along one edge or those with a projection cut on a bevel. The number found is too limited to determine whether the use of complete or partial grooves and notches at the ends have any chronological significance. What is significant, however, is the fact that these sinkers first appear together with the thorn hooks and are not found in association with those of shell.

lashed to their lower end. In Layer G2 was another example of whalebone, 8.2 centimeters long, with a deep groove nearly encircling the thicker end, and a hollow at the opposite end where the hook was lashed (Fig. 18j). The only complete composite sinker-hook, with a barb and original lashing, that has been recorded is one which Uhle found at Arica and illustrates (Plate XI, Fig. 4).¹ Another excellent example from Arica is in

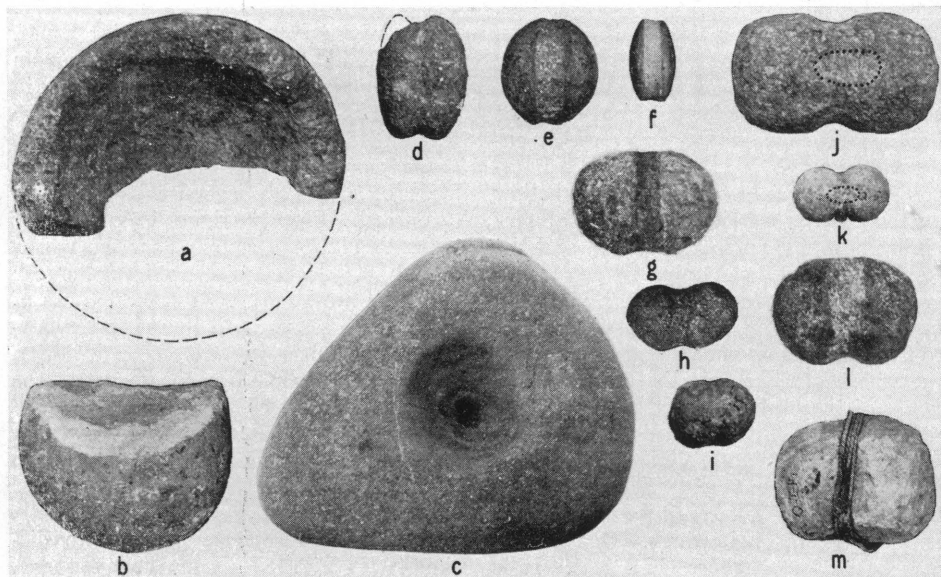


Fig. 19. Bolas and Other Stone Artifacts, Quiani. a, Lava bowl; b, Rough chopper, possibly used for smoothing outside of stone bowls; c, Mortar with conical hollow; d, Bolas (weight ?) pecked to shape and grooved on long axis; e, Bolas weight, naturally shaped pebble, grooved on long axis; f, Bolas weight of hematite, pecked and grooved to shape; g-i, Bolas weights grooved on short axis; j-k, Bolas weights with flattened place on top (indicated by dotted lines), k retains portion of plant fiber thong; l, Bolas weight, side view of flattened type with hollow on top; m, Bolas weight (?) of soft pinkish stone retaining plant fiber cord. Diameter of a, 13 cms., c is reduced to half the scale of other specimens.

Composite Sinker Hooks. In association with the shell fishhooks was a tapered fragment of whalebone with five encircling grooves which, by comparison with specimens from further south, proves to be a part of a composite hook. These are somewhat the size and form of the cigar-shaped sinkers, but differ radically in that they have a curved barb of bone or shell

the collection of the Museum of the American Indian, Heye Foundation; the tip of the barb is broken, but the lashing is still sound. The cord used is of fine two-strand plant fiber. A few feathers are visible beneath the lashing, and apparently were used as padding and not as a lure. A

¹ Uhle, 1922.

fragment of cord in the groove at the top is also of plant fiber and is our only clue for the type of fish line used with these hooks.

Squid Hook Barb. In the collection gathered by Uhle from Arica and Pisagua cemeteries are several examples of hooks suitable for jigging squid, at least, that is the explanation offered by local fishermen who today use unbaited, weighted hooks

to fifteen centimeters long, set equidistant at an angle of about twenty-five degrees with the central shaft. To the same end a stone weight, like a poorly finished line sinker, is lashed. A single example in the Uhle Collection has four copper barbs with a wooden shaft, while one from Arica in this Museum is entirely of copper with three barbs secured by lashing.

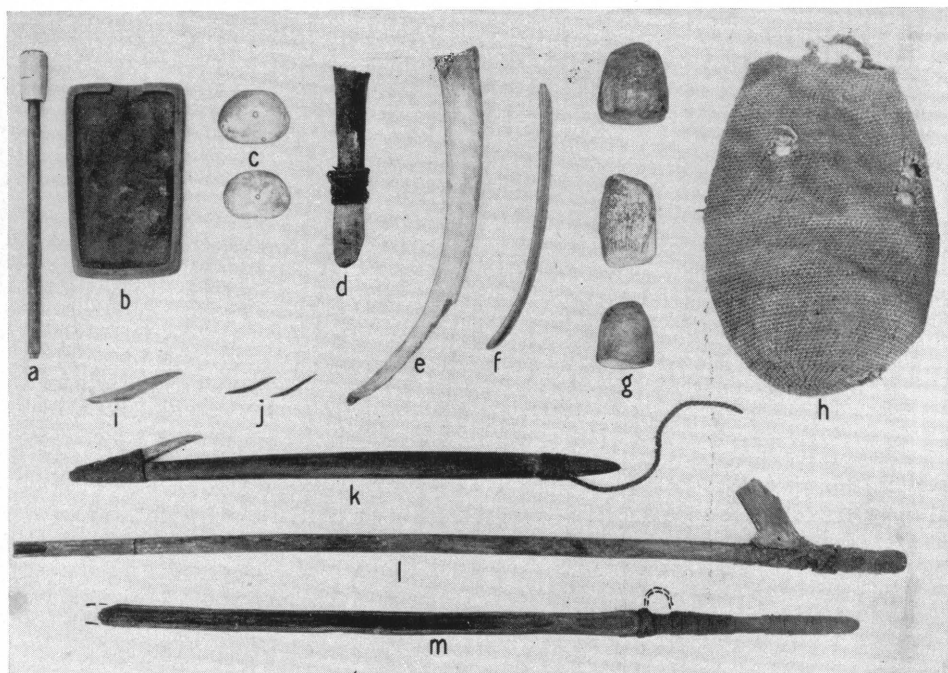


Fig. 20. Miscellaneous Grave Artifacts from Quiani. a, Snuff tube; b, Snuff tablet; c, Clam shell discs, neck ornaments, Grave 1; d, Sea lion rib chipping tool with lashing for plant fiber handle, Grave 10; e, Sea lion rib roughly prepared for manufacture of chipping tool, Grave 9; f, Chipping tool made from inner side of sea lion rib, Grave 9; g, Whalebone mallets for fine percussion flaking, Grave 9; h, Knotted cord bag which contained e, f, and g, Grave 9; i, Barb for harpoon forepiece, Grave 10; j, Thorn barbs for fish harpoon forepiece, Grave 9; k, Harpoon forepiece, Grave 9; l, Throwing stick with bone thumb rest, Grave 10; m, Throwing stick, leather loop indicated by broken lines, Grave 1.

for that purpose. The squid, called *jibia*, are about 85 centimeters long and are not caught for food, but as bait for *congrío* and other fish. The old hooks are generally made with a wooden central shaft twenty or more centimeters long, to one end of which the hand line is tied. At the other end are lashed three or four slender, sharply pointed, straight bone barbs, five

At Quiani the presence of the squid hook or jigger is indicated by two of the bone barbs. One of guanaco (?) bone, eleven centimeters long by five millimeters in diameter, found in Layer II-B, tapers to a sharp point at both ends (Fig. 18h). What was undoubtedly the lower end has two slight bevels near the tip where it was seated against the shaft. The

second example, seven centimeters long, was found in the test trench, but without accurate position data. These objects resemble somewhat the smallest examples of the bone fish harpoon points, but should not be confused with them.

MISCELLANEOUS

Stone Bowls. A total of seventeen fragments of stone bowls was found distributed from top to bottom of the midden, and thirty-four other fragments were scattered on the surface. Except for one of granitic rock all are made of black lava (Fig. 19a). Probably about twenty centimeters in average diameter, with height under twelve centimeters, they range in thickness from 1.5 to three centimeters. They are somewhat spherical, the bottoms less curved than the sides. A complete specimen was secured at Punta Pichalo and is shown in Fig. 25. There are several reasons for doubting that these are mortars. Not only are the walls sometimes so thin as to have little strength, but in some cases they are so curved that the inside diameter is greater than the width of the mouth. If used as mortars, elongated pestles would be required and these have not come to light. Also, true mortars are found with them. As none of these bowls were fire-blackened, it is difficult to suggest their use. Obviously, they were not manufactured at this site as no scrap occurs here, nor are there any outcrops of lava in this vicinity.

Mortars. A number of pieces for which we lack a better explanation have been classed as small mortars. These are of the same lava, with slight hollows on one face. Sometimes they were made from pieces of stone bowls, but no attempt has been made to shape them to any fixed pattern or size. True mortars with conical hollows occur, identical with those seen at Playa Miller. As a good example was found below the level of the distribution of corn, the explanation of their use must lie in the pre-agricultural pattern of life. As the principal item of food was shellfish, and as several species are quite tough, it is suggested that they may have been pounded in these mortars (Fig. 19c).

Manos. A few small, oval cobblestones

show slight wear on their sides from use as manos and, as most had traces of red paint, it is assumed that they were principally used to grind paint.

Hammerstones. Hammerstones have no group characteristics either in size or shape. Some may have been used as pestles with the conical hollow mortars, but most of them show hard usage, such as they might receive in making or dressing the rough chopping tools.

Awls. Among the bone objects are two awls of guanaco or vicuña bone, one with a short, strong point (Fig. 18l); the other incomplete, with a sharp delicate point.

Ornaments. The only ornaments recovered from the excavation were a single bird bone bead, four centimeters long, from near the surface, and two small perforated shell beads in the older material. The shell beads listed for the surface match those just mentioned, but were found on the eastern part of the site, where burials are weathering out, and are not necessarily the same age as most of the surface finds.

Sherds. The only sherd (Fig. 18u) found in the refuse came from a portion of Section I, Layer B, which rose to the surface, so that its actual depth was at most only a few centimeters. It is a redware, bearing a double band of interlocking black and white scrolls suggesting the interlocked scrolls on the oldest pottery at Playa Miller. (It was necessary to re-touch the white for photographing.) The only sherd found on the surface was too poorly preserved to show whether it had been decorated.

Textiles. A single small scrap of plain woolen cloth was secured in the excavation. The absence of other pieces cannot be attributed to poor preservation, as woolen cords and other perishable items occur in much older levels. A little below the level of the cloth was a piece of the same type of tightly knotted bag as described in the Playa Miller section (p. 203).

Matting. The four pieces seen are of rush or reed twined with plant fiber cord.

Plant Remains. Apart from a slight amount of rush, plant remains are limited principally to the corncobs listed, all of which were saved. They are all from

TABLE 4
BURIALS, QUIANI, ARICA

Burial No.	1	2	3	4	5	6	7	8	9	10	11	12
Sex	M	F?	?	F	M?	M	?	M	M	M	M?	F
Body extended, lying face down				x								
Body extended, lying on back	x	x	x									
Body flexed					x	x	x	x	x	x	x	x
Reed matting	x	x	x	x								
Rush matting					x	x	x	x	x	x	x	x
Guanaco ? robe											x	x
Birdskin robe		x			x	x						
Face painted red					x							
Hair cut short	x											
Hair tied in bunch behind					x							
Hair tied in bunch on top										x		
Cord of hair about head	x											
Cord of wool about head					x							
Cord of wool about waist							x		x	x	x	
Cord of hair about waist	x		x									
Plant fiber about waist												x
Pubic covering, twined wool cords							x		x	x	x	
Pubic covering, plant fiber												x
Woolen cords used	?	x		x	x	x	x		x	x	x	
Artificially mummified baby		x										
Grave previously opened					x			x?		x	x	x
Grave exposed by erosion	x	x	x				x	x	x			x
Grave goods lacking		x	x					x			x?	x
Throwing sticks (atlatl)	x									x		
Spear	x											
Harpoon forepiece, blade slot, plain butt					x				x			
Whalebone mallets for percussion flaking									x			
Chipping tool, thin <i>lobo</i> rib									x			
Chipping tool, thick <i>lobo</i> rib										x		
Knotted bag, wool cord, loose mesh				x					x			
Knotted bag, wool cord, tight mesh					x				x			
Coiled basket					x							
Beads, shell							x					
Beads, lapis lazuli										x		
Shell ornaments	x											

small ears and may well be the first cultivated in this area. It is hoped that this, and similar material from the other mid-dens, can be studied in detail later.

Cotton bolls with seeds were found several times between the surface and the level of the first appearance of corn, and one boll was found slightly below that limit.

BURIALS

Twelve burials were found at this site. Of these, ten had either been partially exposed and destroyed or had previously been opened. Those exposed by erosion provide evidence that this has been a very slow process, for the bones are weathered off flush with the surface. Several skulls were seen with portions cut away by the effects of exposure as cleanly as though done with

a saw, while the parts just beneath the surface were unaffected and retained skin and hair. This does not result from natural sand-blasting, but is a process of disintegration in which the bone turns to a fine white powder.

Four of the twelve burials, Nos. 1, 2, 3, and 4 (Table 4), were extended, and are distinguishable from the others on the basis of this position and other features. All four rest on and are covered with *tatora* or reed matting made in a simple twined technique using twisted *tatora* for the twining element. As additional wrapping one skeleton had a birdskin robe sewn with sinew. Grave goods were present only in Burial 1. A simple spear thrower lay on the chest with the tip near the right ear. A single spear lay along the right arm with the tip at the left side of the

head. The hair was a tangled mat, roughly cut, from twelve to fifteen centimeters in length. Clothing, except for the birdskin robe and a piece of sea lion skin, was practically non-existent. Body No. 1, a male, had four turns of hair cord about the head, a string with two concave shell discs around the neck, and a single turn of twisted hair cord around the waist. Apparently the latter supported a small leather pubic covering, but that was all. In stature this individual measured 154 centimeters. Body No. 4, an adult female, measured 151 centimeters in stature and had neither grave goods, ornaments, nor strings.

Lying beside the right shoulder of this last burial, No. 2, was the artificially mummified body of a baby, rather poorly preserved. This lay face down, wrapped in birdskin, with the feather side out. Under this covering, woolen cord had been wound about the body. Beneath the cord more birdskins were visible, also with the feathers out; under this a layer of leather was sewn tightly to the body. The wrappings have not been removed, but it is probable that the body was prepared like the one now in the museum of the Instituto Tecnico of Arica. This has the leather cut and sewn so that the legs, arms, and trunk are separately encased. The face was covered with a thin coating of clay and painted a dull red.

These carefully prepared baby mummies have been described by various people.¹ In all cases the viscera and brains appear to have been removed; the legs, arms, and body reinforced by sticks inserted under the skin or in the flesh; the faces coated with thin clay and painted; a wig of long human hair fastened over the head; and generally the sewn leather casing. One of these baby mummies was broken into fragments during the blasting out of guano at Punta Pichalo. This mummy lacked the leather casing, but had the same type of modeled clay face. Thin sticks had been forced in through the flesh along the bones of the legs and arms to hold them rigid and prevent breakage. Another stick passed up

along the spine and into the skull, which was packed full of bits of thin leather or gut. The specimen was too badly damaged to determine how the brain had been removed and the packing substituted. A sixth stick was forced crosswise through the shoulders. The clay over the face had been painted at various times, sometimes red, sometimes green. Long strands of human hair had been tied over the top of the head.

One cannot help but wonder what motive inspired this type of embalming. The various coats of paint on the Pichalo mummy suggest that the body was not interred immediately following death, but was kept and redecorated from time to time. Nothing is known as to the distribution of this practice, other than that no burials of this type have been found south of Pichalo.

The remaining burials, although very poorly preserved, provide other data. All are flexed, usually with knees near the chest, and lie on either side with no more attempt at orientation than with the extended burials. They rest on coarse rush matting folded or bunched over the body. The matting is made like that of *totor*, but the twining strands are more widely spaced. Bird and guanaco (?) skin robes are also used for wrapping, but not in all cases. About a bushel of twigs and leaves of the *callacas* shrub lay with one body at the end of the grave. With these people the custom of burying objects and equipment seems to have been more fixed. Two, perhaps three, bodies had harpoon forepieces with them; another, a spear thrower of different pattern from that with Burial 1. Finished and unfinished bone chipping tools, knotted woolen cord bags and, in one or two burials, coiled basketry, were present.

In all but one instance, where the lower portions of the bodies of males remained intact, they wore loin cloths of woolen cords twined with fine thread in the same technique as the rush *totor* matting. These were held in place in front and back, tucked under several turns of multiple-strand woolen cord around the waist. An extra loin cloth of this type in Grave 10,

¹ Uhle, 1922; Skottsberg, 1924, Fig. 20.

somewhat better preserved than usual, is about ninety centimeters long by eighteen centimeters wide. Its ends are finished by substituting heavier cords for the twining thread and weaving a narrow border, leaving the ends of the warp free as a fringe. In this group one body, identified as a female, had a hank of untwisted plant fiber about the waist with some more of the same material as a loin cloth.

The hair of this female was ragged and unkempt like that of the individuals in the extended burials. That of Burial 10, a male, was in a bunch above the crown, held together with a cord lashing. The hair of No. 5, another male, was more elaborately dressed, being gathered at the nape of the neck and bound by many turns of woolen cord, which was carried forward about the head from the base of the bun, giving a turban-like effect.

Some of the objects found with the burials deserve more detailed description than that already given.

Throwing Sticks. The throwing stick (Fig. 20m) from Grave 1 must have been at least forty-eight centimeters long originally. A short portion of the tip, to which the contact point was attached, has weathered off, but the rest is well preserved. Cut from a rather hard piece of wood it has a V-shaped groove along the upper surface, except for the handle, while the back is half-round. The handle, fourteen centimeters long and round in section, is whipped with sinew, except for a short space in the middle. In addition to improving the grip, this lashing holds a single leather loop in place as a grip for the right forefinger. This loop was hard and well preserved when found, but soon began to soften. Once this disintegration had started it could not be checked with either cellulose acetate or shellac, so the throwing stick now lacks the loop.

The spear from the same grave has lost the tip, which lay at the surface of the hill slope and had weathered away. Without this, it measures 158 centimeters long. It is made of a reed-like wood, slightly thicker at the forward end, where the diameter is 1.5 centimeters, with a slight hollow in the

rear end to take the contact point. No feathers were attached to it.

The throwing stick from the flexed burial, No. 10, shown in Fig. 20l, is 55.5 centimeters long. It is round in cross-section, varying in diameter from one to 1.3 centimeters, except at the tip where a concave slot was cut for a hook. The latter was not in the grave nor in the surrounding soil. The handle is reinforced and a good grip is provided by a fine cord whipping, over which are the lashings which hold the bone finger rest in place. When found, it was extremely fragile and could not have been saved without preservatives.

Harpoon Forepieces. The best preserved harpoon forepiece (Fig. 20k) is from Grave 9. It was held in the left hand of the mummy with the attached three-part, hard-twisted woolen harpoon line passed five times around the waist of the body and six times around the palm of the hand holding the forepiece. It is a cylindrical piece of wood, thirty-six centimeters long, tapering to a blunt point at each end. The forward end, like that of the others found in these burials, has a slot for a triangular blade. This was held in place by a cement or rosin which also covers a cord whipping binding a bone barb to the shaft immediately behind the blade. At the rear end is a short lashing which secures the harpoon line to the forepiece. This line was too poorly preserved to save, but must have been at least 4.5 meters long.

Knotted Bags. The same grave, No. 9, yielded a knotted woolen cord cylindrical bag, twenty-one centimeters high by ten centimeters wide, with a rounded bottom and a slightly narrowed mouth (Fig. 20h). It is made of a series of tightly interlocked half hitches, like the fragment found in Level A at Playa Miller and the scrap in Section I, Layer D2, at the midden here. Bags of this type apparently vary in size and form; pieces of one found in Grave No. 6 indicate a maximum circumference of about eighty centimeters and a height of perhaps sixty centimeters. Inside of the first bag mentioned was a smaller one in too delicate a condition to be unfolded. This is loosely knotted and differs from the

others in that the sides of the adjoining hitches are intertwined, preventing the cord from slipping. With it was a short piece of heavy woolen cord and two thorn fish harpoon point barbs, three centimeters long, which were wound in fine cord (Fig. 20j).

Chipping Tools. Inside of the first knotted bag from Grave 9 were three whalebone mallets (Fig. 20g), all well-rounded and smoothed at one end and flat at the other. These flat surfaces are roughened and scratched, and their edges are fractured. Such markings could only have been produced by using these mallets for fine direct percussion flaking. They range in length between four and 5.5 centimeters and in diameter between three and 4.5 centimeters. Similar objects, collected at Punta Molle, were examined in the collection of Mr. Ancker Nielsen of Iquique. With the three mallets from Quiani was a light-weight pressure flaking tool, eighteen centimeters long, made from the inner side of a sea lion (?) rib bone (Fig. 20f). In the same bag with the stone-working tools were also one large unworked tooth from a bull sea lion and two small fragments of guanaco (?) bone, one of which has been cut by sawing. With the same burial were the upper portions of two sea lion rib bones, twenty-two and twenty-three centimeters long. Though roughly pointed, these bones show no evidence of use and may be unfinished chipping tools (Fig. 20e).

With Grave 10 was the blunt-pointed chipping tool thirteen centimeters long (Fig. 20d) made from the upper portion of a sea lion rib bone. Adhering to it was a piece of woolen cord which had been wound around some kind of padding, now completely disintegrated.

Beads and Ornaments. Burial 7, almost completely destroyed by erosion, yielded a few small rounded shell beads. Those recorded under surface finds came from the surface of the slope below this grave, and may have weathered out of it. The lapis lazuli beads from Burial 10 are short, tubular, and drilled from both ends. The ornaments in Grave 1 are oval, concave discs made of smoothed clam shell, and

were worn on a short string on either side of the throat (Fig. 20c).

Snuff Tray and Tube. In 1940 one of our workmen found the remains of an eroded grave on the northern slope of the gully which intersects this site. He could give no information as to the type of burial, and he found nothing with it. Overlooked, however, as they were hidden in folds of guanaco (?) skin, were the plain, rectangular snuff tablet and bone snuff tube shown in Fig. 20a, b.

CONCLUSIONS

It is obvious that at Quiani we have the camp of a pre-pottery people, dating perhaps from the first settlement of the Arica area, continuously occupied until after the introduction of agriculture, and apparently abandoned before the use of pottery or true weaving became common. These earliest inhabitants were hunters and fishermen capable of making excellent pressure flaked stone artifacts. Except for an oval shaped knife, the forms of the stone artifacts found continued in use until the introduction of agriculture. The only distinctive artifacts were the *choro* mussel shell fish-hooks and perhaps the composite sinker-hook.

Following the relatively short period during which these two items are present there was a period during which nothing of importance was left or lost on the portion of the site excavated. Above this, appearing simultaneously, are bolas weights, cigar-shaped stone fish line sinkers, thorn fishhooks, bone fish harpoons with thorn barbs, perhaps the use of wool for cord, and knotted cord bags, all items not observed in the earlier debris. These continued in use for some time. Nothing new appeared until the introduction of corn, gourds, and cotton. The latter perhaps precedes the corn and may have been a wild species. Pottery was not found in direct association with the first evidence of agriculture and its presence is indicated only by a single painted sherd, in Section I, Layer B. True weaving is likewise a feature of only the latest debris and again a single scrap provides the evidence. The only other item of possible significance

during the agricultural period is a small knife handle with blade slot across one end.

That a certain continuity of culture has persisted throughout is demonstrated by a few artifacts which occur in all parts of the midden. Most abundant are crude percussion flaked stone tools of unknown use. Fragments of black lava bowls and such universally known artifacts as simple side-scrapers are similarly distributed.

Surface material here, because of erosion and irregular midden structure, cannot be depended on for chronology, but does include a small triangular stone point, perhaps for arrows, and a larger lanceolate point with flaking limited mainly to one face. Both of these items are lacking from the excavation.

Evidence of the pre-pottery period was also present at the Playa Miller (La Lisera) midden, though failure to find characteristic objects prevents reaching any definite conclusions as to its exact relationship with the Quiani midden. It is presumed that the objects found correspond with the latter part of the midden at Quiani, for there is no sterile zone to demonstrate a break in occupation at a place where natural processes were contributing to the accumulation.

The Playa Miller midden is important in that it continues the sequence into the pottery-using period. In this, the first ceramics have fully developed designs and forms, some of which continue in use until the final abandonment of that portion of the midden. Such variations as occur and their possible significance have already been discussed (p. 201).

With the appearance of painted pottery, there is a marked, though not complete, break in the cultural pattern. Textiles are abundant and show certain changes in the course of time, but the use of knotted cord bags continues. Coiled basketry, absent possibly by chance from the Quiani excavation, is present here. In the hunting equipment, bolas continue in use and slings are a new addition. Grave finds indicate the use of bows and arrows here, and spears and spear throwers at Quiani. Harpoons with detachable forepieces are used, but they are fitted with stone points of a

new pattern, and lack the bone side barbs.

For fishing gear, the same type of cigar-shaped line sinker continues in use for some time, then was finally modified by being ground flat along one side; also a new type appears. With the arrival of pottery copper hooks seemingly replace those of thorn. Bone fish harpoons are lacking. However, a miniature example in one of the graves indicates that the fish harpoons were still in use, but with copper instead of bone points. This idea is supported by collections from Arica in the Santiago museums where fish harpoon points of copper duplicate the form of the bone points. With these the barbs were made separately in the size and shape of those of thorn, then lashed fast in the same manner.

Sandals, composite combs, spoons, plant fiber carrying straps, beans, dogs, and the domesticated llama indicate the character of the break with the old way of life, while one of the oldest cultural elements, the crude percussion flaked stone objects, continues in use.

It is suspected that the Playa Miller excavation fails to bridge completely the gap between the prehistoric and historic. One indication of this is the lack of crossed-stick baskets, present in nearby cemeteries and shown at Pichalo to be an important late item. Also, there is no evidence of Inca influence on the ceramics, although there is little reason to expect this as only a single Inca sherd, a bird saucer handle, was found, and that among the surface finds.

Exact correlation of material from the graves with that from the midden was secured only at Playa Miller. The Quiani graves had too few items in common with the midden to establish their relationship to it. The extended burials may well be the oldest ones found, but there is no proof that they belong to the earliest period of occupation. Perhaps the most significant point is that in spite of the greater care in the preparation of the graves and in providing for the dead in later times it is only in the older burials that artificial mummification was practised and then only with infants.

No attempt will be made to estimate the duration of the different periods, simply

because no accurate means of doing so was discovered. Nor is it possible to suggest comparative periods of time for them as the character of the debris varied too much, and too many other factors are involved.

Further work will undoubtedly demonstrate that a number of culture elements

have been missed, especially in the agricultural refuse at Quiani, and that certain phases of the local occupation are not represented. To check this it will be necessary to move at least twice, perhaps three times, the volume of debris as was examined during these excavations.

CALETA VITOR

Caleta Vitor, at the mouth of the narrow, steep-sided Vitor or Chaca Valley, thirty kilometers south of Arica, was not visited, but midden refuse was noted near the shore when flying over the area. The ground most suitable for camping is limited in extent, so a single excavation probably would yield a complete record of occupation. Persons looking for mummies have dug here in the past, but the material collected has been scattered and no records were kept.

A mummy from this site, purchased by Adolph Bandelier in 1894 and now in this Museum, provides an unusual opportunity to date rather closely the survival of items of native costume and manufacture. No complete list of associated objects has been found, nor is there any description of the grave. The body, that of a mature man, was in a "seated posture." Folded against his chest was a printed paper, a Proclamation of Indulgences, signed by the Licentiate Pedro de Valarde, dated 1578. Other items of possible European manufacture are ten small brass pins, similar to modern straight pins but with heads like small round beads, and a brass thimble in a small cloth pouch. The cloth does not appear to be of native manufacture. It is of wool, with a short nap, bright red on both sides. Contrary to the usual Indian use of textiles the pouch is made of two pieces, cut to shape and sewed together, with a narrow strip of blue cloth in the seam. To this is added a somewhat narrower neck in the old technique of the knotted cord bags.

The collection also contains a small, thick, square pin cushion covered with yellow silk and edged with twined tinsel cords individually wound with thin, narrow, gilded copper strips. It is packed with a dark, mealy substance which has

been partially eaten by insects. Eight small iron needles and two brass pins are thrust into it. As the pins duplicate those already described it is assumed that the pin cushion was probably with the same burial.

Recorded as found in the wrappings of the body is a small, cast copper ear spoon of native manufacture. It resembles the ear spoons frequently seen in collections of metal objects from the central Peruvian coast, but was made after the Conquest, for on the top of the handle is the figure of a bearded man mounted on a horse or burro.

Several other articles are strictly of native manufacture. One, a short string of *Spondylus* shell beads must have come from the north, for the species is unknown here. Another is a hammered copper disc, ten centimeters in diameter, suspended on a hair cord about the neck. The margin of the disc is bordered with a row of small, slight humps, hammered in from the back. Set in a recess in the center is a perforated disc of *choro* mussel shell, two centimeters across. On the lap was a white chert or chalcedony knife, seventeen centimeters long, similar to the largest lanceolate blade from Taltal, shown in Fig. 44, but with the sides of the butt slightly reduced and of somewhat inferior workmanship. A piece of woolen cloth tightly bound with hair cord serves as a handle.

Three textiles were wrapped with this body. A rectangular closely woven wool shirt, very worn and poorly darned, is unlike any others found or seen by us in that the threads used to produce the narrow warp stripes are made from two strands of different colored wool, one set, black and white, the other, light and dark tan. The second piece is a finely woven rectangular

cloth, ninety-three by one hundred and thirty-two centimeters, with twenty-four centimeter wide borders of narrow black, white, brown and red warp stripes along two sides. The center is of natural color dark brown wool. The edges are reinforced or embroidered with yarn of the same colors as the warp threads, with the stitches running lengthwise to the edge.

The third piece, a well-made, eighteen-centimeter square coca bag, contains coca leaves, a bit of lime, and a kernel of parched corn. Bright red and blue warp stripes predominate, with a yellowish yarn used for warp designs consisting of interlocked "S" figures. The sides and top edges are whipped with red, blue, and yellow yarn, so arranged that the outer margin appears braided. Both the design and the manner of binding the edges distinguish this bag from all others found by us at Arica. Even more distinctive is a flat, woven strap, seventy-two centimeters long by two centimeters wide, sewed fast to each upper corner of the bag. The technique is similar to that employed in the manufacture of double cloth, with opposite faces of the strap formed of separate combinations of warp and weft threads. Red, white, and tan yarn is used, with the combinations of colors alternating on opposite sides. True double cloth is unknown archaeologically from northern Chile, yet straps of this type are made today by the Araucanians in the south.

On the head of this mummy was a hat shaped like a Turkish fez, or more exactly, like a common flower pot. Feathers from pelicans and parrots spread from a small round hole in the center of the top and droop down on all sides to the level of the brim. It is made like the coiled basketry of this area with heavy llama or human hair cord used for the coil or foundation. The sewing encircles the individual turns only on the inside while on the outer surface it spans two of them. Black, white, red, khaki, and tan yarn are used to produce the same design as shown on the one illustrated by Latcham.¹

No attempt has been made to record the

distribution of these hats. Latcham's two specimens came from Quillagua on the Rio Loa. Another in this Museum is from Pica, inland from Iquique. A fifth, recorded by Blake, is from Arica. A few others in private collections are all said to be from northern Chile. One might expect them to have been found in southern Peru, but the only evidence of their presence is found in representations on a pair of matched jars from a site in the Rio Grande Valley north of Palpa, some 680 kilometers northwest of Arica. The jars, in the form of human heads, about two-thirds natural size, are of polished redware with the decoration on the hat painted in black. The small opening in the center of the top of the hat and another somewhat off center in the base are not suitable for filling or emptying the jars. They differ in both form and decoration from the well known pottery types of the same region.

A second mummy from Caleta Vitor, a child of nine or ten years, had with it two coca bags with suspension straps similar to the one described. European contact is shown by a string of forty-four blue glass beads which, with the bags, may suffice to show that this and the first mummy described can be dated at the same or nearly the same time. On a string tied about the head were nine chipped stone points of uniform workmanship duplicating those used on harpoon forepieces during the period of painted pottery at Arica. A tenth was found in the left hand of the mummy.

The significance of these finds is obvious. So little information is available in historical records that all such data are important. In this instance there remains the question whether the artifacts were typical of this locality at the time of burial or whether they should be attributed to transients. One fact can be noted. There is no record of a settlement by Europeans in Caleta Vitor which might account for the presence of Indians from another region, nor was it ever a port for shipping minerals. With no data to the contrary then the burials are more likely to be those of permanent residents. Further support for this idea is provided by the two other

¹ Latcham, 1938, Fig. 81.

mummies secured, a young adult female and another adult male, both lacking evidence of white contact, yet accompanied by the same or similar artifacts. Even more conclusive is the fact that the type of hat with the first mummy has been found at scattered localities over at least 350 kilometers of northern Chile. Thus it seems only reasonable to assume that these burials relate to the local culture of the period, obviously after the year 1578. This would further demonstrate that the local culture, as determined from the artifacts in the upper portion of the Playa Miller midden and from the graves there and at Playa de los Gringos did not survive unaltered into historic times. The more or less superficial changes noted, other than the possession of imported articles,

are of native origin. Designs have altered, but the quality of textiles is maintained and is even improved by the addition of the double cloth technique. It is not improbable that the latter reached the Araucanians in post-Conquest times by way of this region. Conservative survivals from the local equipment of earlier times are the stone harpoon points, though their presence and that of the stone knife do not necessarily prove that they were still in use.

In addition to the articles described and discussed this little collection contains a number of other artifacts which probably pertain to these late burials yet cannot be positively identified for lack of records. It is a pity that they were found at a time when their real importance was not recognized.

EXCAVATIONS AT PUNTA PICHALO, PISAGUA

Punta Pichalo, about one hundred thirteen kilometers south of Arica, is one of the few pronounced points of land along the north Chilean coast, projecting at right angles to the general trend of the shore line for a distance of about three and a half kilometers (Fig. 21). The northern side of this point therefore provides one of the best protected sections of shore for a considerable distance. It was this protection which was the incentive for the construction of the port of Pisagua, formerly an important shipping place for nitrate. With the decline in this industry, Pisagua has been virtually abandoned in favor of Iquique which, though less protected, is a better location for a town, and has the benefit of traffic from such of the nitrate mines as are still operating.

Back from Pisagua, or more truly, beginning at the water's edge, the land rises very abruptly three hundred thirty-five meters to a beach, behind which the rise continues for four hundred fifty meters more to the general level of the adjacent coastal plateau. The point of Pichalo is formed by a sharp-crested granitic spur or ridge extending at about the elevation of the lower beach formation. It is exceedingly rough, with such precipitous sides that nowhere on the point is there any good camping place at, or near, water level. Except for two small places at the bottom of crevasses in the rock, where gravel and cobblestones have accumulated, there are no beaches along the point. Accordingly, the former inhabitants had to camp on areas which ordinarily would be considered unsuitable for habitation. Along the north side of the point, midden refuse is widely scattered, some of it on slopes of twenty-five degrees, where it must have been necessary to make small hollows in the hillside in order to camp.

Formerly, large deposits of refuse lay near the end of the point, mainly on its northern half. Much of this has been removed in order to uncover the so-called "fossil" guano deposits. In recent years, it was also found worth while to sift the debris, as the dust from it contains valu-

able fertilizer chemicals and is worth adding to the guano. This guano industry, started before 1879 by the Peruvians, has been carried on intermittently ever since, and was in operation at the time of our visit by a company headed by Señor Alfredo Lacourt, by grant of the Chilean government. We are indebted to this gentleman and his associates for kind and helpful cooperation in our work.

In view of the fact that the nearest water supply is about eight and a half kilometers distant in the Caleta Pisagua Vieja, the presence of extensive refuse on the point is interesting. Perhaps, in former times, a spring was available, but there is nothing to indicate such a possibility now. In addition to the probable difficulty of securing water, fuel must have been a problem, as only kelp is available, and with no open beaches, not much of this washes ashore.

The largest, most compact, and least disturbed of the midden deposits extant lies on the north side of the point, at an elevation of thirty-eight meters, not far east of the small wharf from which the guano is loaded (Figs. 22, 23a). This midden was selected for study as the guano company had already cut test pits and had started sifting the debris along its western edges. Although it did not reach the bottom, this work showed that it was more than three meters deep through the main portion. Taking advantage of the company's excavation—a cut about fourteen meters long—a nine-meter section was selected where the strata were most uniform and showed the least amount of dipping. This was trimmed straight and vertical. By cutting shallow trenches in from, and parallel to, this face an undisturbed block of refuse, 8.5 by four meters was exposed on three sides. Following the most distinct lines of stratification, this block was divided, when possible, into levels about thirty centimeters thick, although the thickness naturally varies with the strata (Fig. 24). These were removed singly, and sifted, using the same quarter inch mesh as at Arica. As these strata were

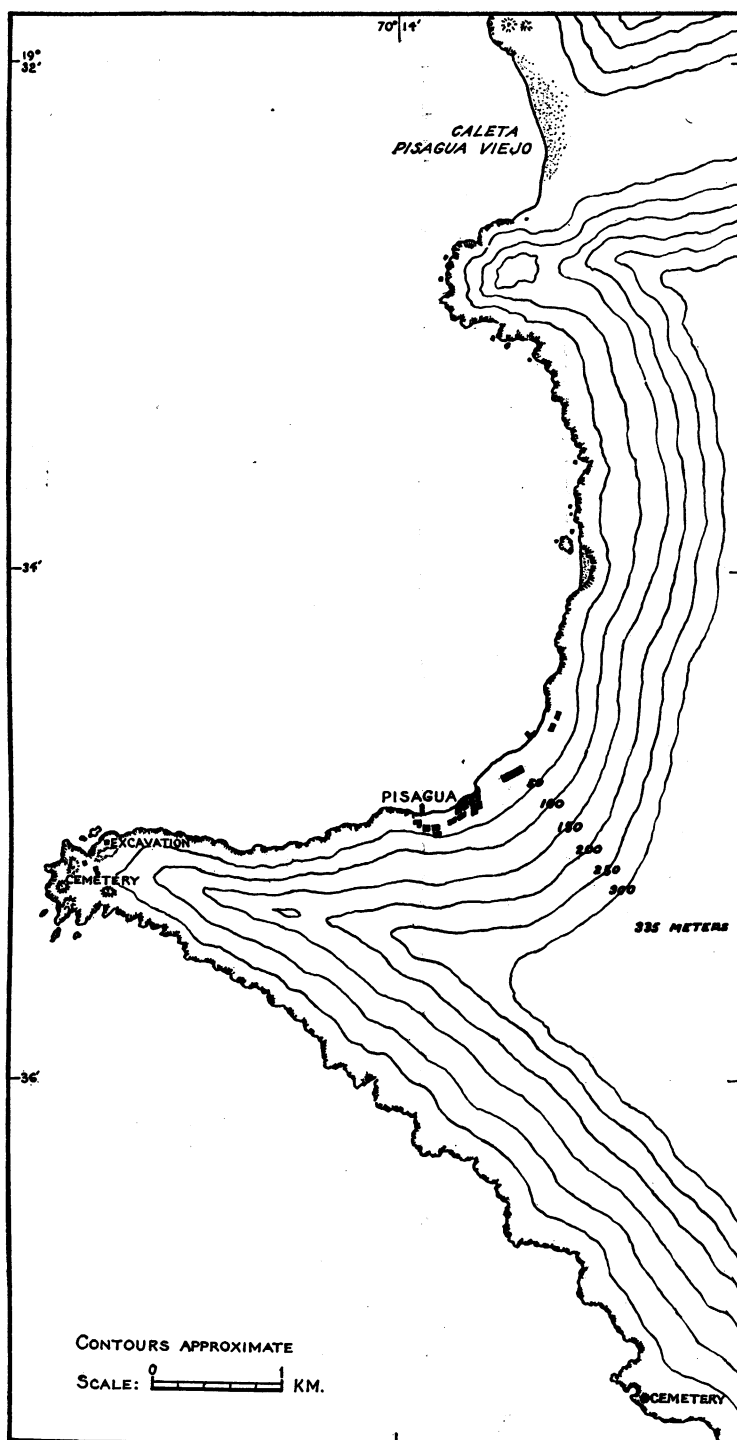


Fig. 21. Map of Punta Pichalo and Environs. South of the Point, the shore line is approximate.

removed, the trench bottom was lowered to expose the structure further down. After the removal of the first meter from the main block, the trench was extended to expose the fourth side, which eliminated the possibility of specimens being dislodged from the walls of the excavation

separated into fifteen levels, was found to range between four and five meters (Fig. 23).

The midden is surprisingly uniform in composition. It is generally brownish in color, with streaks of ash. It is a mixture of broken shells, fish bones, fine dirt, and

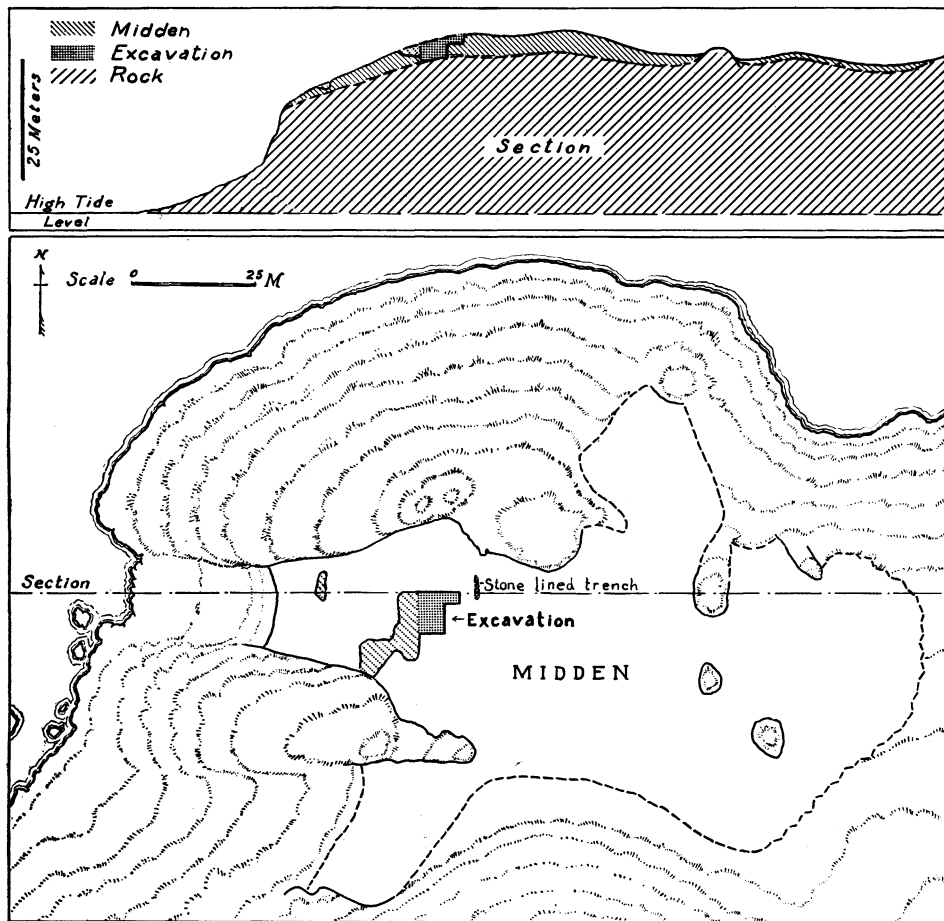


Fig. 22. Groundplan and Section of Midden at Pichalo.

and appearing on the sifter with remains of an earlier period. As a further precaution, the surface of each new layer was carefully cleaned. Therefore we believe that there is only a very slight possibility of error in the series of artifacts recovered. The total midden thickness, which was

dust in such proportions that slightly more than half the volume passed through the quarter inch mesh of the sifter. Animal and bird bones, though present, form a negligible portion of its bulk. It is so compact that vertical walls five meters high stand without crumbling. Some of

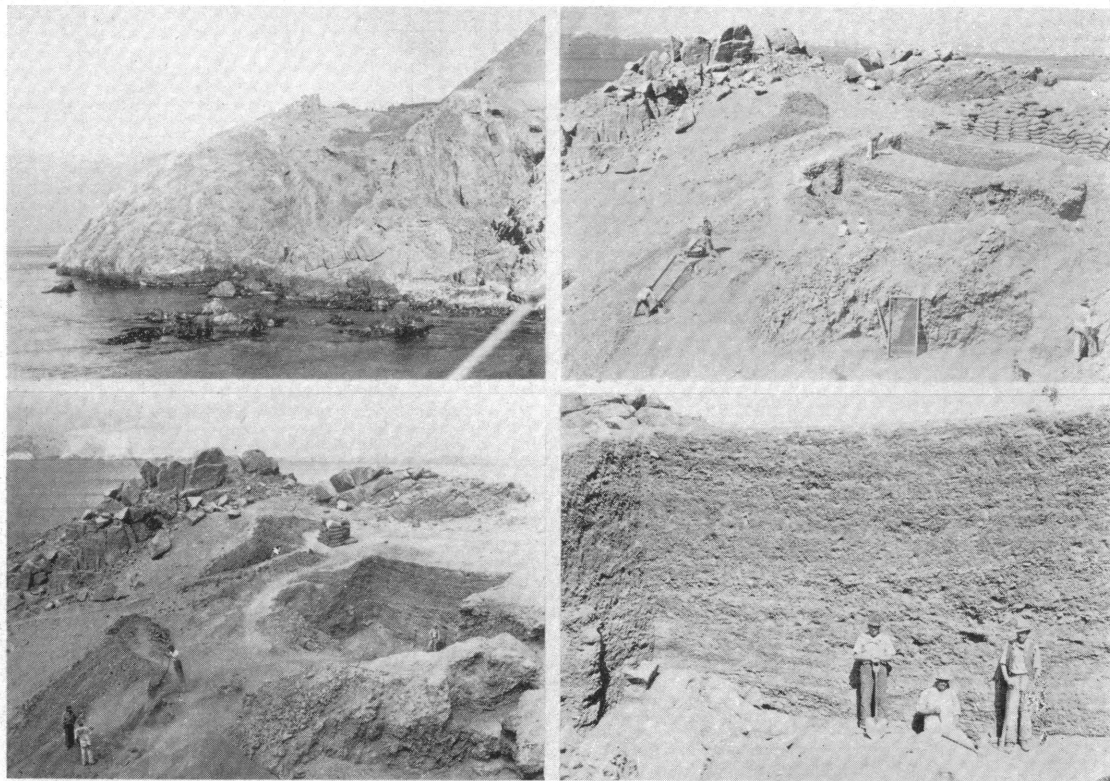


Fig. 23. Midden and Excavation at Punta Pichalo. Upper left, Promontory on north side of Punta Pichalo, midden located on level area; upper right, Excavation after removal of Layer B (sacks contain dust from midden to be used in the preparation of fertilizer); lower left, Excavation with main block of refuse completely removed; lower right, Rear wall of excavation, bottom of midden flush with surface on which men are standing, man in center standing in pit chiseled into substructure.

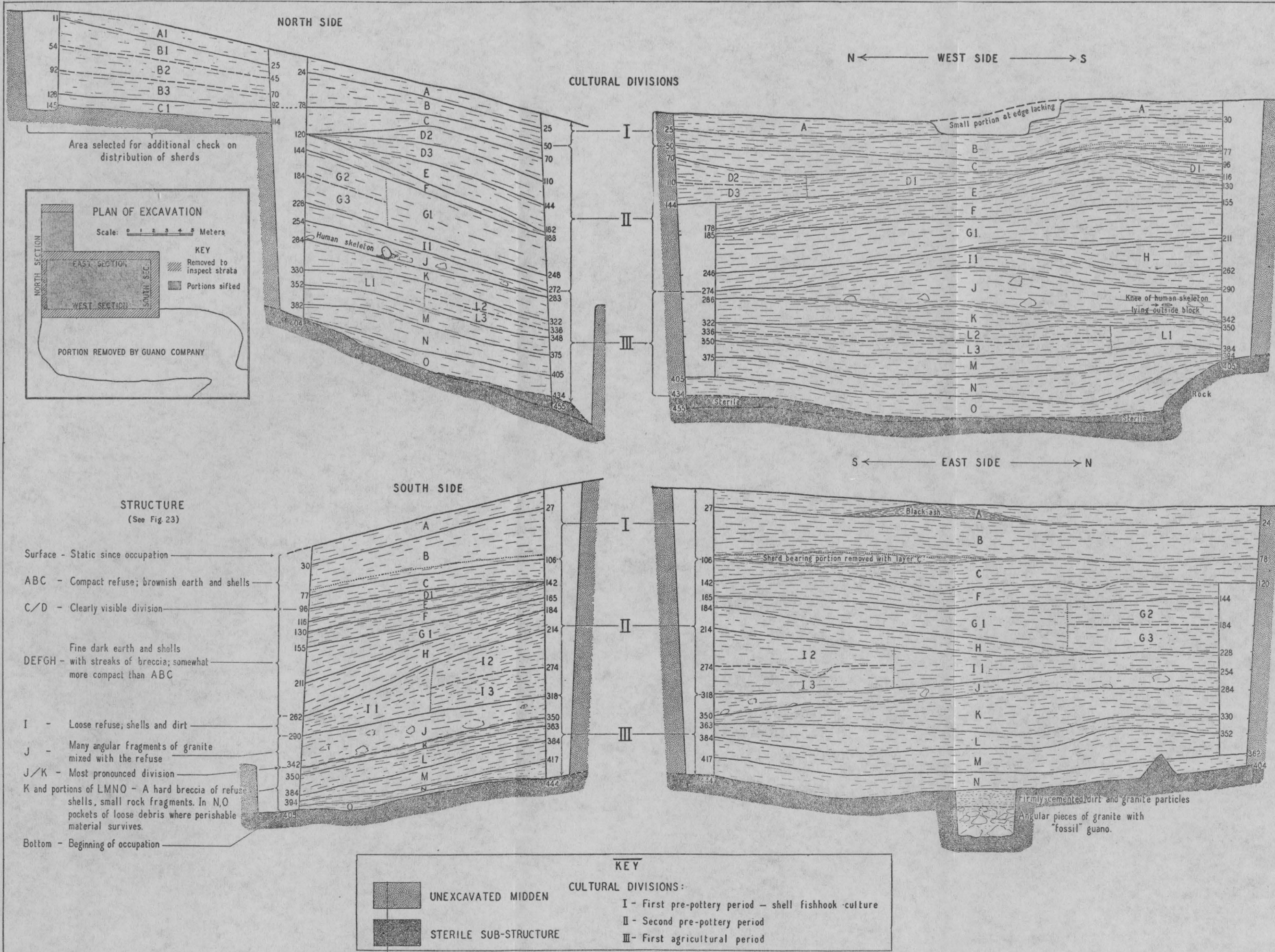


Fig. 24. Structure and Plan of Test Block, as exposed on Four Faces, Punta Pichalo.

the lower levels were so consolidated that they had to be split with wedges and crushed with mauls before they could be sifted; though drastic, this yielded enough specimens to justify the method. Underlying the oldest material was a layer of cement-hard sand, dirt, and stone fragments, and beneath this, compact reddish "fossil" guano mixed with stones. On completion of the main block, an additional cut, 2.50 by three meters, was made in the rear wall, where the upper layers expanded in thickness, so that these might be further subdivided and examined. This provided an additional check on the exact limit of pottery, textiles, and basketry (Fig. 24).

Imbedded in the surface of the midden, three meters beyond the excavation, was an oblong shallow trench approximately 4.5 meters long by sixty centimeters wide by thirty centimeters deep, the sides formed by small vertical stone slabs. The *débris* in it, which had slipped in where some stones had fallen, was sifted, but this examination failed to indicate its purpose and did not show whether it had been made in recent years or during the native occupation. Structurally there was nothing to mark the original bottom nor were there any signs of fire or use.

A much smaller excavation was made in another refuse deposit on the point about one hundred fifty meters south of the Company office. Most of this refuse had already been sifted by the guano company, but a small segment remained undisturbed. In appearance it showed a marked contrast with that of the first midden. It was composed largely of pure kelp ash, gray-black, with a small percentage of broken shells. The portion examined at one side of the area of maximum accumulation was about 2.5 meters thick and rested on top of the same type of brownish refuse as was removed from the first excavation. It

was found that this black refuse is culturally distinct from the brown refuse, and presumably marks the last period of occupation. Thus we have secured a sequence down through a total depth varying from 7.5 to eight meters.

In addition to the excavations in the middens, thirty-nine burials were opened. These were mainly in a cemetery on the base of a hill slope about one hundred fifty meters south of the main excavation. As at Arica, some had been previously opened or were exposed by erosion. Fifteen others were found on a small promontory about four kilometers to the east toward the old shipping port of Junin. Nearly all of them seem to be related to a single short period of the total occupation, so they serve only to amplify our knowledge of that period.

Further comparative material was gathered from the midden refuse which had been sifted by the guano workers. This was particularly helpful as a good proportion of it was from the black refuse where our excavated series was small.

We believe that a sufficient quantity of material was secured from the midden to insure the accuracy of our conclusions. When plotted on the original analysis, with forty separate strata, on the basis of the artifacts present, the material fell into four major cultural divisions into which the original analysis has been condensed (Table 5). In following the stratification across a lens-shaped structure a portion of the overlying pottery-bearing *débris* was included with C. This naturally resulted in a mixture of objects from the pottery and non-pottery periods. The C1 division, which is strictly pre-pottery, was made as a further test of the limit of pottery distribution and avoided this error. To prevent confusion the articles found in C have not been included in the final analysis.

ARTIFACTS

Rough Choppers. Similar roughly flaked tools (Fig. 25a-h) as were found at Arica are concentrated here in pre-pottery *débris*, with only one later example. The same variations noted among those found at

Arica also recur here. It will be observed, and the small number of basalt flakes bear this out, that rough choppers are proportionately fewer here in relation to the total number of chipped stone artifacts.

Sidescrapers. Sidescrapers, principally of the single-edged type, have the same variation as recorded at Arica, with three exceptions, from the black refuse (Fig. 27k). These are unusually small and narrow, with two edges. One, from a curved prismatic

long by five millimeters wide and two millimeters thick. With all three the curving sides result in pointed ends, but it appears that the side edges, not the points, were utilized. Large double-edged sidescrapers are shown in Figs. 27j, 32g, 34e, f.

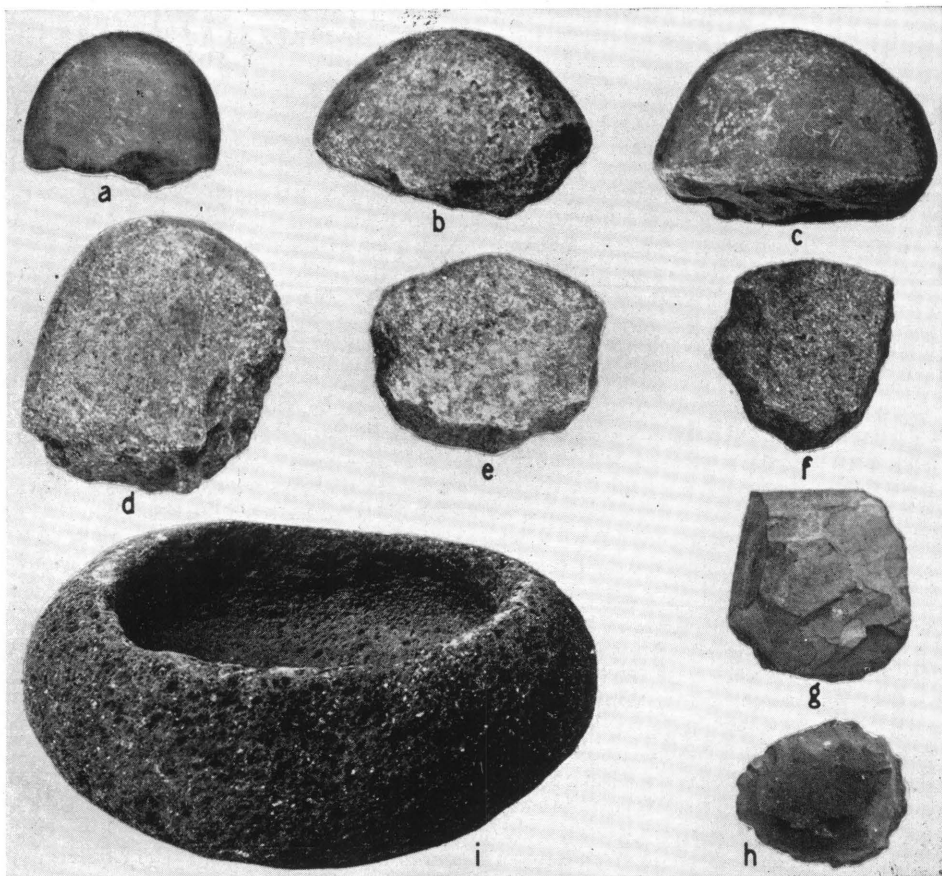


Fig. 25. Rough Stone Tools and Lava Bowl from Punta Pichalo. a, Flaked on end, Layer L2; b, Flaked, long axis, Layer K; c, Flaked, long axis, Layer G1; d, Flaked on end and side, made from a large section of cobble, Layer O; e, Flaked on end and sides, made from section of large cobble, Layer H; f, Flaked on end and sides, also from large section of cobble, Layer J; g, Flaked on end and sides, Layer B; h, Flaked entire circumference, Layer J; i, Lava bowl, position uncertain.

flake, is thirty-two millimeters long by five millimeters wide and three millimeters thick, and is flaked along each side. The other two have reversed edges, chipped from opposite faces of the flake. The complete scraper measures sixteen millimeters

Endscrapers. The two endscrapers listed are both questionable (Fig. 34g). Both are from the shell fishhook period in which period at Taltal these items are fairly common (p. 294).

Flake Knives. Made of ordinary flakes

without regard to form, flake knives have one edge sharpened with bilateral chipping (Fig. 32f). They are recorded only in the two pre-pottery divisions.

Blanks. Blanks are generally small, roughly flaked, suitable for the manufacture of the associated points and blades. Practically all are broken.

Projectile and Knife Points. Clear trends in the types of projectile and knife points used are apparent. The main type in the early pre-pottery layers is *double-ended*, corresponding to the predominant type at Quiani, generally narrow and thick, with some broader and thinner examples (Figs. 30d, 32c, 34b). A stemmed and barbed type of point, probably for arrows,¹ is concentrated in the later pre-pottery layers, the two questionable examples listed for the earlier layer coming from the nearest subdivision, Layer J (Fig. 32a). These show considerable individual variation, but are generally light, with curving sides, have pointed barbs which never extend back as far as the stem, and stems which have either parallel or tapering sides. Lengths vary from twenty-eight to forty millimeters. A single example of this type from the Quiani excavation was in Section I, Layer D2, a post-agriculture level (Fig. 18m).

With the stemmed points just mentioned, but appearing slightly later in the midden, are triangular blades or points (Figs. 27d, 30b, 32d, 34c). These become the predominant form in the pottery period and continue up through the black refuse. The majority have concave bases of varying curvature. Lengths vary from fourteen to sixty-five millimeters; widths from thirteen to thirty-five millimeters. With such a range in size this form was probably used for more than one purpose. The only exact parallel from Arica is in the pottery period at Playa Miller.

The remaining triangular points might be considered variants of the concave base pattern, except that they are concentrated in the later pre-pottery period. The small number of these points found vary too

much to ascertain their characteristics. If anything, they are thicker than those with concave bases. At Quiani, two examples occur in the early agricultural period.

The late type, stemmed and barbed, is a thick, heavy harpoon point (Fig. 27c). It occurs throughout the black refuse and is absent in the other levels. Although only three examples lay in the section of the midden tested, others were found by the guano workers, who agree that it does not exist in the older débris. These points are fifty to fifty-three millimeters long, twenty-four to thirty-three millimeters wide, with tapered rounded stems, ten to thirteen millimeters wide. They differ from the late harpoon points of Playa Miller, Arica, only in that the latter are more crudely made and have concave instead of straight edges, a minor but significant variation.

The stemmed points with no barbs, at least in the main excavation, are perhaps variants of the double-ended examples which have had to be trimmed or narrowed at the butt to fit an old shaft (Fig. 34c, 32b, 34a).

The broad stemmed knife, from very near the bottom of the midden, is a doubtful specimen as it is incomplete (Fig. 34d). The blade is round at the tip with a maximum width of forty millimeters, while what may be part of a stem is thirty millimeters across.

Drills. At the top of the black refuse was a single small flake trimmed to a tapered point with unilateral chipping (Fig. 27l). Whether or not this is a drill, is uncertain. The other drills are either straight-sided and approximately the same width from end to end, or are roughed out of old points (Fig. 30e).

Mortars. The single mortar recorded came from Layer A and duplicates those with conical hollows seen at Arica.

Stone Bowls. The fragments of stone bowls found are, like the Arica specimens, of black lava. Another piece, not recorded in the analysis, was found just below the black refuse. A perfect specimen, found by one of the guano workers, is shown in Fig. 25.

Saws. In Layer M, near the bottom,

¹ This must not be taken as evidence that the bow was used as they may have been for arrows or darts to be used with throwing sticks.

was a thin, flat fragment of fine sandstone, the edge beveled on both sides and smoothed from use as a saw (Fig. 34h). Similar objects are abundant in the Taltal middens.

Whetstones. From Layer II came two incomplete objects of fine-grained sandstone which may be whetstones. One, originally little more than forty millimeters long, is ten millimeters wide by five millimeters thick, rectangular in sec-

FISHING GEAR

Stone Sinkers. The cigar-shaped stone sinkers of both the pottery and last non-pottery divisions are similar to those of the Quiani midden. With one questionable exception in Layer A, the flattened edge variety from the late Arica refuse is lacking. One of the two fragments in the black refuse is round in section, the other oval, with no flattening. Those listed for

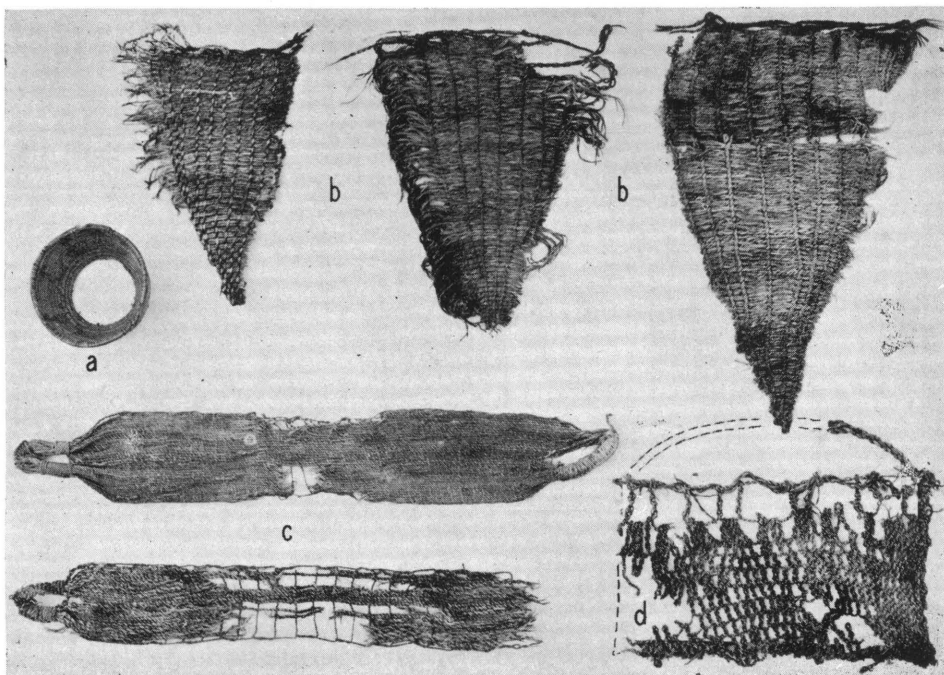


Fig. 26. Basketry and Textiles from Black Refuse, Punta Pichalo. a, Small coiled basket from disturbed black refuse; b, Panels from pack baskets with crossed-stick foundation, plant fiber and hair cord, two outside from disturbed refuse, center from Level 4; c, Sewed plant fiber carrying straps for use with pack baskets, upper, from disturbed refuse, lower, from Level 2; d, Flat rectangular knotted pouch, disturbed refuse. Length of complete carrying strap, 53 cms.

tion and tapered at the end. The other, of about the same width and thickness, tapers to a point (Fig. 32h).

Bolas. These are all grouped in Layers G, H, and I (Fig. 33p, q). The egg-shaped bolas are twenty-two and thirty-two millimeters long. The oval ones, grooved on the short axis, are from naturally shaped stones, forty-eight and fifty-one millimeters long by thirty-four millimeters in diameter.

the bottom division, Layers J to O, are fragments and are also classifiable as parts of sinker-hook weights. Unfinished examples of these weights include roughly chipped blanks as the initial manufacturing step (Figs. 30f, 33a) which was followed by fine pecking, and lastly, by grinding (Figs. 30f, 33a).

Composite Sinker-Hook Weights. A perfect composite sinker-hook weight of stone from Layer II is forty millimeters long and

flattened oval in section (Fig. 33c). At the upper end a groove is cut along three-quarters of the circumference, skipping one of the sides. At the lower end a similar groove completely encircles the tip, and just above it, on one edge, is a small hollow for the barb. Three notches in the opposite edge serve to keep the barb lashing from slipping.

Near the bottom, in Layer N, was found

There are neither grooves nor notches for the barb lashing.

The remaining examples are fragmentary; two are of *choro* shell and one of whalebone (Fig. 34i, j).

Composite Sinker-Hook Barbs. Since we have no complete composite hooks for comparison, it is impossible to state what variations occur among the barbs.

The two best examples of these hooks

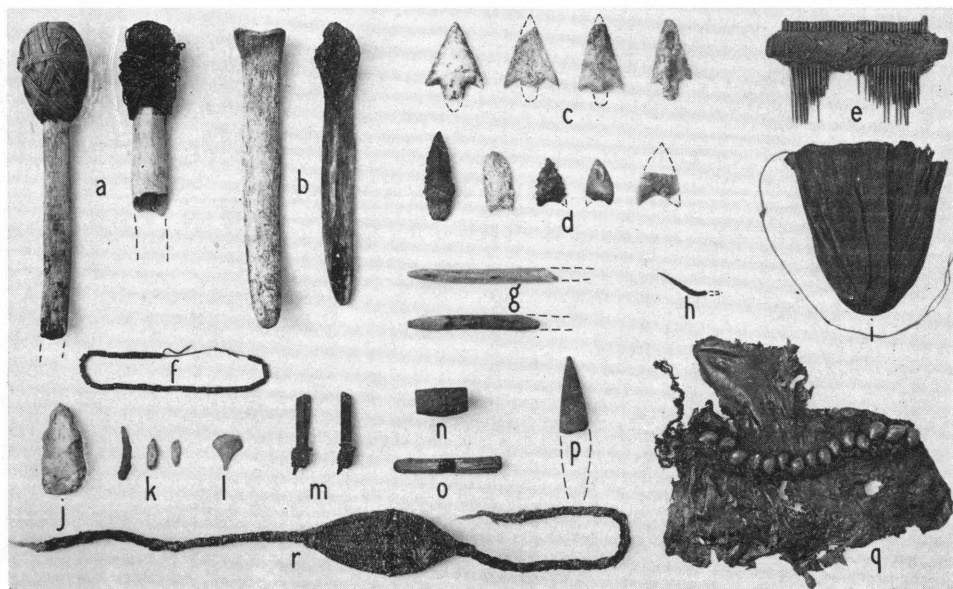


Fig. 27. Miscellaneous Artifacts from Black Refuse, Punta Pichalo. a, Chipping tool (?) handles with padding of plant fiber, from Levels 6, 8; b, Chipping tools, without padding, made of sea lion bones, from Level 3; c, Late type harpoon points, from disturbed refuse and Levels 6, 9, 1; d, Additional forms of points from Levels 9, 8, 2, 5, 9; e, Single-edge composite comb, Level 4; f, String of beads cut from small cane, from disturbed refuse; g, Fish harpoon forepieces, Levels 6, 4; h, Fish harpoon thorn barb, Level 2; i, Pouch of guanaco scrotum, Level 7; j, Double-edged side scraper, Level 3; k, Small double-edged stone sidescrapers, Levels 1, 2; l, Small drill-like stone tool, Level 1; m, Carving or graving tools, Levels 4, 5; n, Cylindrical wooden object, Level 9; o, Part of firedrill also used as drill hearth, disturbed refuse; p, Broken cigar-shaped sinker, Level 10; q, Fragment of water bag with snails used in knob lacing of seam, Level 3; r, Central portion of sling, disturbed refuse. Length of b, at left, 16.5 cms.

another complete weight made of whalebone (Fig. 34i). This is ten centimeters long, rectangular in section, slightly larger at the upper end. Like the smaller weight described, the groove for the line at the top is cut into only three sides. At the lower end there is only the hollow for the barb, which in this case is cut at an angle, indicating that the barb projected from the face, which is not grooved at the top.

are from Layer N, and even these are broken (Fig. 34n, o). They are curved, tapering, pointed pieces of bone, over five centimeters long, and rounded in section. One has a slight notch near the thick end obviously intended to prevent the binding from slipping.

Listed under the same heading, but from levels above the uppermost distribution for the composite sinker-hook weights, are

several somewhat similar bone objects. About the same size, they differ in that a small barb or prong is carved in the inner edge of the curve. Until some of these last are found with their original mountings their exact application is questionable (Figs. 29g, 33f).

Fishhooks. The same sequence of fishhooks as found at Arica is, in its general form, present here; *choro* shell hooks at the bottom of the midden are completely replaced by thorn hooks associated with cigar-shaped stone weights, and ultimately by copper hooks. The sequence varies in that some thorn hooks occur in association with those of shell, and later, in addition to the thorn hooks, there are a few chipped from stone. None of bone, like those

found. Examples in other collections from Pichalo are around twenty-five millimeters wide, measuring from the outer side of the shank to the outside of the point. Chipped into a barbless semicircle, the width and thickness are uniformly about equal, ranging from six to eight millimeters. The shank is short, expanding at the end, from one and a half times to twice its width. The expanded end of the shank is either chipped off on a single bevel, dipping toward the hooked point, or on two bevels producing a blunt point (Figs. 30j, 33f).

The copper hook was made by bending one end of a short, thin, pointed rod of copper into a semicircle. The shank is straight with a slight twist at the tip (Fig. 30i); it has no barb.

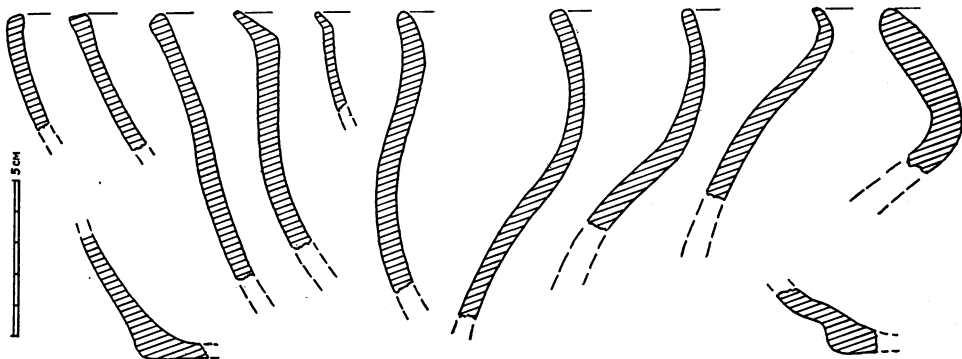


Fig. 28. Pottery Rim Sections from Black Refuse, Punta Pichalo.

which have been collected in the Taltal section, were found.

The shell hooks follow the Arica pattern (Fig. 34m). They are short, pointed, with curved shanks and in-curving points. A single example (Fig. 34l) has slight serrations on the outer edge of the shank to keep the binding from slipping. The smallest measure ten millimeters across, the largest rarely more than thirty millimeters. The thorn hooks associated with the shell hooks tend to be slightly more closed than the subsequent ones. These have the same straight shanks as the Arica specimens with a slight notch, or notches, on the outer edge near the top (Figs. 30k, 33e, 34r). No perfect examples of the chipped stone hooks were

Squid Hooks. The objects referred to by this term are described in the Arica section, page 243. A complete example from a Pichalo grave differs from those mentioned in that the three barbs are of thorn instead of bone or copper. A blunt-ended cigar-shaped stone weight is firmly bound, end to end, to the central shaft.

From the midden the most easily identified parts of the squid hooks are the shafts. All are of wood with three slots for the barbs near the lower ends (Figs. 29j, 33o) and originally may have been ten or twelve centimeters long.

The barbs are less easily identified, as there is considerable variation among them. Generally those of bone range in length from five to seven centimeters, are round

in section, and sometimes have a slightly flattened bevel on the lower end (Figs. 29i, 33n). Those made of thorn have this last feature, but are naturally thinner (Fig. 29h). Due to the difficulty of positively identifying the thorn barbs an accurate count was impossible, so they are not included in Table 5.

Fish Harpoons. Bone fish harpoon points similar to those found at Arica, after the disappearance of the shell fishhooks, also occur here. The two questionable fragments listed for the bottom, or shell fishhook division, were from the top of Level J. Like the Arica specimens they are of guanaco bone, oval in section, with a flattened place at the side of the tip where thorn barbs were fastened. Nearly all found are fragmentary. Unbroken examples generally range between twelve and sixteen centimeters in length. Some examples from Layers A and F vary in that the entire tip is beveled off to receive the barbs (Figs. 27g, 29a, 33l).

Fish Harpoon Barbs. Two small section of thorns, sharply pointed at each end, averaging about three centimeters long, were lashed at the tips of the fish harpoons as barbs (Figs. 27h, 29b). Curiously, these are found almost entirely in the pottery period refuse.

Harpoon Barbs. Bone barbs for sea lion and porpoise harpoon forepieces vary in form in the several divisions (Figs. 29c,

33m, 34p). Associated with the shell fishhooks is a small type of barb duplicating those in the Taltal middens. Approximately thirty-three millimeters long, the portion in contact with the forepiece shaft has a slightly convex under surface. The curved projecting portion is round in section and sharply pointed. In the later debris this projecting portion is modified, and as a rule it is larger. The most distinctive barbs have broad flat bases to fit against the forepiece, and curving prongs which are semicircular in cross-section. The flat side forms the under surface of the barb.

Associated with these are other harpoon barbs, straight along their outer edge, the projecting ends round in cross-section and sharply pointed, the part fitting the forepiece smoothed to a flat bevel.

Barbs (?), Pointed at Each End. Among the items of uncertain use are a group of sharply pointed bone objects limited in their distribution almost exclusively to Layer B. Round in cross-section, they range in length from five to seven centimeters, averaging 0.5 centimeter in diameter. They taper to sharp points at each end, one end somewhat more abruptly than the other. Rarely, the shorter tapered ends are slightly flattened on one side, as though they had been lashed to a shaft. Much thinner objects of thorn, pointed at each end may have served the same purpose (Fig. 29e, f).

MISCELLANEOUS

Chipping Tools. Chipping tools are of two types, which seem to have some chronological significance (Figs. 27a, b, 30a; 33h, 34v). The tools of vicuña or guanaco leg bone sections are like the Arica specimens, with the same range in size. They occur from the lower levels (J) up into the bottom of the pottery-using period (B2).

When perfectly preserved the tools of lobo or sea lion rib bones have the upper end of the bone padded with a round wad of rush or plant fiber secured with plant fiber cord. They are usually about sixteen centimeters long, are made of a complete section of the bone, and have a short blunt

point. The single specimen listed for the lower levels (N) is a questionable example consisting of only the tip end which does not exactly duplicate the wear on the others.

Awls. In view of the importance of coiled baskets, of a type requiring awls as weaving tools, it is surprising that only one awl occurred in association with them. Possibly large thorns were used for this purpose. The specimen from Layer F referred to as a bodkin is a slender cylindrical bone object, 7.5 centimeters long with sharp, tapered point and rounded butt. As it has no perforation it may be incorrectly classified.

Ornaments. Only a very limited variety and number of ornaments are present (Figs. 29l, m, n; 33j). Short sections of bird bones, with and without incised encircling lines, are limited in their distribution to the pottery-bearing division. With them was a single tube rolled from a flat piece of copper. A string of similar short

Firedrill Hearths. All the hearths found are sections of round sticks seven to twelve millimeters in diameter (Figs. 27o, 29u, 33i). Judging from the sockets, drills of about the same diameter have been used. The sockets have neither side notches nor other cuts to catch the hot, powdered wood. Tinder must have been placed under and

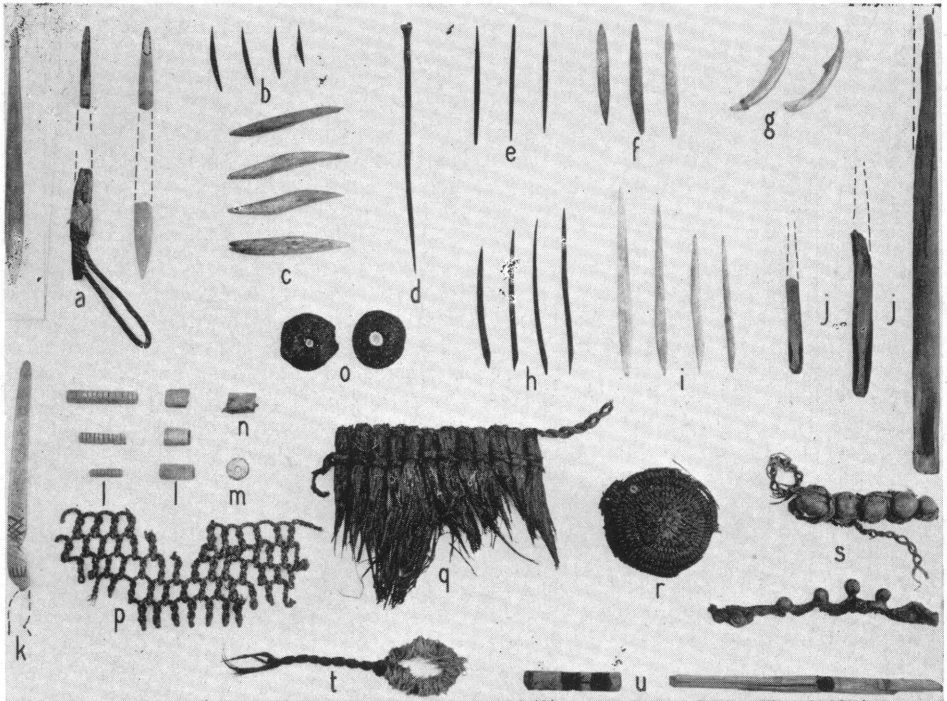


Fig. 29. Miscellaneous Artifacts associated with Pottery, Layers A-B, Main Excavation, Punta Pichalo. a, Bone fish harpoon forepieces, one retains loop for attaching to harpoon line; b, Thorn barbs for attaching to fish harpoon forepieces; c, Bone barbs for sealing harpoon, three are seen side view, one from above; d, Large unworked thorn; e, f, g, Thorn and bone barbs or hooks of uncertain application; h, Thorn barbs for squid hooks; i, Bone barbs for squid hooks; j, Wooden central portions of squid hooks; k, Handle of bone spoon or spatula; l, Tubular bird bone beads; m, Flat shell bead; n, Strip of copper rolled into tubular bead; o, Spindle whorls made from potsherds; p, Fragment of plant fiber cord bag; q, End fragment of woman's pubic covering of plant fiber; r, Fragment of coiled basket; s, Sections of seams of water bags showing knob lacing, one viewed vertically, the other in profile; t, Loop finger grip of throwing sling; u, Firedrill hearths. Length of a, 11 cms.

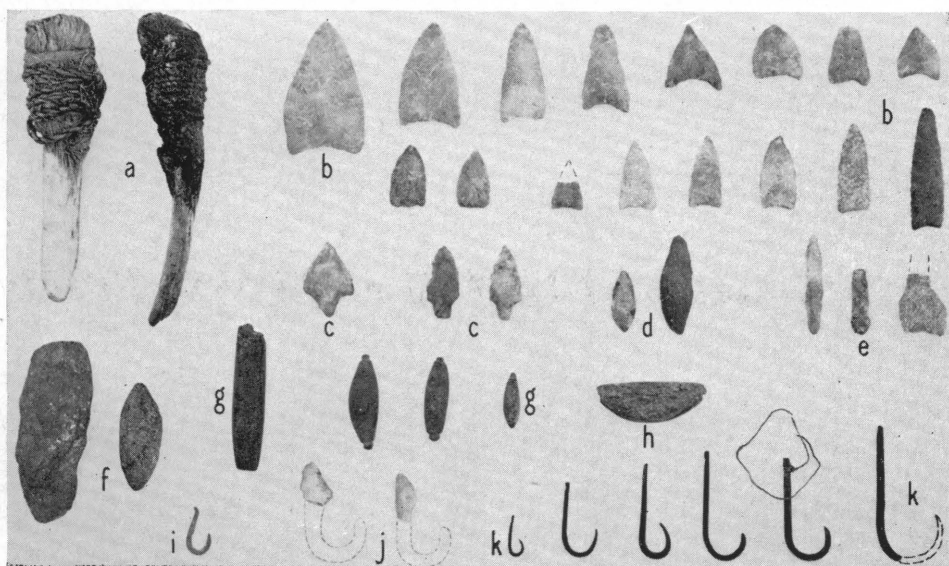
sections of cane lay on the surface of the black refuse (Fig. 27f). The only items with an indicated distribution through a considerable period of time are the small round shell beads. The figures given for these in Table 5 are misleading, for a complete string imbedded in a lump of red paint was found in Layer H.

against the sides of the hearth stick, for the powder would accumulate at both sides if the drill were held vertically during rotation.

Thorns. Important articles in the local economy, especially in the pottery-using period of the main midden, are the large thorns of an unidentified cactus (Fig.

29d). Various complete, unworked examples measure around thirteen centimeters in length. No cacti with thorns of this size were seen by us along or near the entire coast. Several persons spoke of a variety with large thorns growing in along the Cordillera, but the species and habitat were not determined. They were used principally for fishhooks and fish harpoon barbs and less frequently as needles. Unworked thorns are sometimes seen among grave finds in use as pins.

The oldest group, the sherds from the brown refuse, contains the most distinctive pieces. These are from flaring-sided shallow bowls of a brownish, grit-tempered ware with red slip. The rims are two to four times as thick as the body sherds, the increase formed by a gracefully rounded bulge on the outer side, at the edge. The angles of the side walls have a fairly wide range of variation from the sketch shown in Fig. 31. Some must have been considerably deeper in proportion to their



* Fig. 30. Miscellaneous Artifacts associated with Pottery, Layers A-B, Main Excavation, Punta Pichalo. a, Chipping tools of sea lion ribs, padded with plant fiber, two views of identical specimens; b, Triangular points showing range and size; c, Stemmed forms, the only ones in this layer; d, Double-ended points; e, Drills; f, Unfinished sinkers; g, Fishline sinkers; h, Weight, unknown use; i, Copper fishhook; j, Chipped stone fishhooks, broken at shank; k, Thorn fishhooks showing range in size. Length of a, first chipping tool, 13 cms.

The figure given in the analysis for the number of thorns in the upper division of the main excavation is considerably smaller than it should be as many in Layer A were not saved.

Pottery. The sherd series secured from the two Pichalo excavations, though small, is an additional means of distinguishing between the periods marked by the Black Refuse and the A-B layers of the brown refuse. It is even more significant when compared to the Arica series.

width, with the average perhaps three times as wide as deep. No sherds of this type occur in the Black Refuse nor in the Arica series. Moreover, there are no data on the occurrence of this form in Chile, nor are there any close parallels reported for southern Peru or Bolivia. Blackware, represented by only three small sherds, is likewise a peculiarity of this same period. Two of these are rim sherds (Fig. 31), but are too small to identify the forms positively without comparative material.

TABLE 5
EXCAVATION AT PICALO
DISTRIBUTIONAL ANALYSIS

	Black Refuse	A to B3	Main Excavation C1 to I3	J to O
Stone				
Rough choppers	—	1	12	14
Rough scrapers, basalt	—	—	—	11
Flakes, unworked, basalt	—	—	18	63
Flakes, unworked, chalcedony	127	1457	723	1228
Flakes, chalcedony, nicked edges	23	50	107	105
Sidescrapers: single edge	6	16	77	98
two edges	1	1	4	45
two edges, reversed	—	3	2	—
two edges, acute angle	—	1	1	—
double-pointed	—	—	—	3
narrow, two edges	3	1	2	1
Endsrapers	—	—	—	2
Flake knives	—	—	16	8
Blanks	3	42	100	88
Broad-stemmed knife	—	—	—	1
Points: double ended	—	2	21	49
rounded base	—	1	7	2
stemmed and barbed	—	1	33	2
stemmed, no barbs	1	2	2	3
late type, stemmed and barbed	3	—	—	—
triangular, straight base	—	—	6	—
triangular, concave base	5	41	30	1
triangular, convex base	—	—	7	—
indeterminate fragments	11	30	70	49
Drills	1	5	1	—
Hammerstones	—	—	2	2
Mano	—	1	1	—
Mortars, conical hollow	—	1	—	—
Bowls or mortars	—	—	2	3
Saws	—	—	—	1
Whetstones	—	—	1	—
Worked stone, use unknown	—	—	2	—
Bolas: grooved long axis, egg-shaped	—	—	2	—
grooved short axis	—	—	3	—
Pebbles: bolas-like, grooved	—	—	2	—
slight notch or band	—	—	—	2
cord attached	—	3	—	—
Fishing Gear				
Sinkers, cigar-shaped: stone	2	8	16	1
stone, unfinished	—	15	20	2
pottery	—	1	—	—
shell	—	—	—	1
Composite sinker-hooks: weights	—	—	1	3
Composite sinker-hooks: barbs	—	2	7	5
Fishhooks: stone, chipped	—	3	1	—
shell	—	—	—	205
shell, unfinished	—	—	—	10
shell scraps	—	—	—	3
thorn	—	168	38	32
copper	—	1	—	—
Squid hook shafts	—	3	1	—
Squid hook barbs	1	32	3	—
Fish harpoons, bone	—	30	11	2
Fish harpoons, barbs, thorn	—	56	1	—
Bone				
Harpoon barbs	—	10	5	6
Barbed point	—	—	1	—

TABLE 5 (*Continued*)

	Black Refuse	Main Excavation		
		A to B3	C1 to I3	J to O
Chipping tools, <i>lobo</i> bone	1	—	—	—
<i>lobo</i> rib	1	1	—	1
<i>lobo</i> rib, rush handle	2	2	—	—
guanaco bone	—	1	2	1
Thin, flat tool, <i>lobo</i> rib	—	3	—	—
Awls and bodkins	—	1	1	—
Spoon handle	—	1	—	—
Objects fragmentary, use uncertain	—	16	20	4
Ornaments				
Beads: bird bone, plain	—	6	1	—
bird bone, incised	—	7	—	—
shell	—	2	1	—
cane, short sections	1	—	—	—
Leather				
Thongs	5	—	1	—
Pouch, small	1	1	—	—
Fur scraps	—	2	—	—
Wood				
Firedrill hearths	1	2	1	—
Worked fragments	—	32	1	—
Unworked fragments	—	50	—	6
Thorn				
Whole and fragmentary	26	685	29	46
Needles	—	3	1	—
Sherds				
Plain black and brownish ware	449	762	—	—
Polished blackware	—	3	—	—
Redware	44	18	—	—
Red slip	—	22	—	—
Trace of black paint	2	—	—	—
Bowl: plain flaring rim, thick	1	10	—	—
plain rounded	1	4	—	—
flaring lip	2	—	—	—
spherical, round opening	1	—	—	—
Cooking pots: vertical collar rim	4	—	—	—
flaring collar rim	39	32	—	—
rim fragment, straight	—	—	—	—
sides, wide mouth	4	—	—	—
Handle fragment	—	1	—	—
Bottom fragments: flaring sides	2	—	—	—
flat base	1	2	—	—
Crack lacing	—	3	—	—
Textiles				
Plain cloth	42	22	—	—
Plain cloth, embroidered various colors	3	—	—	—
Warp or weft stripe	2	5	—	—
Belts, woven	—	2	—	—
Belts, flat, braided	1	—	—	—
Slings	1	2	—	—
Knotted bags, tight, single twisted mesh	1	3	—	—
Knotted bags, loose, double twisted mesh	1	32	—	—
Cords and Ropes				
Wool, twisted	44	183	5	—
Cotton, twisted	3	30	—	—
Plant fiber: twisted	90	805	13	—
braided	1	41	1	—
and wool	—	2	—	—
Human hair, twisted	10	50	—	—

TABLE 5 (Continued)

	Black Refuse	A to B3	Main Excavation	
			C1 to I3	J to O
Strips of fur, twined	—	1	—	—
Huio, braided	2	—	—	—
Objects of Plant Fiber				
Carrying straps	3	—	—	—
Matting	2	4	—	—
Pubic covering, untwisted	—	24	2	—
Basketry				
Coiled baskets	—	40	—	—
Crossed-stick pack baskets	9	—	—	—
Miscellaneous				
Water bags, rush knob tying	1	15	—	—
Water bags, snail knob tying	1	—	—	—
Pottery spindle whorls	—	6	—	—
Composite comb, single edge	1	—	—	—
Carving tool, tooth lashed to wood handle	2	—	—	—
Feather fan	—	1	—	—
Human hair, bunches	—	2	—	—
Copper ore	—	4	—	—
Plant Remains				
Corn	2	—	—	—
Cotton fiber	1	—	—	—
Calabash fragments	—	32	—	—
Cane fragments	—	13	—	—

The remainder of the sherds from the brown refuse are mainly from cooking pots, which show considerable variation in shape, but nearly all have rounded shoulders and slightly flaring rims. The majority are of a black to brown grit-tempered ware, their color perhaps the result of use; the balance are red.

This same type of slipless plainware occurs in the Black Refuse. Two sherds have black smears which might be paint, but certainly are not parts of distinct de-

signs. The forms vary (Fig. 28). High-sided bowls or wide-mouthed pots, probably with flat bases, are fire-blackened on the outside. Four examples have nearly vertical sides, while others have constricted flaring rims.

It is difficult to show the relationship of these two periods on the basis of the pottery alone. From the evidence it appears that the ceramics of the Black Refuse are not derived from the earlier material, but are perhaps the product of a

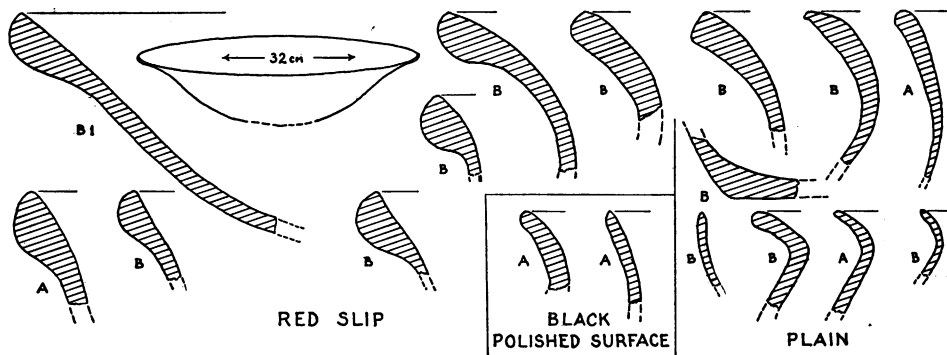


Fig. 31. Sherd Sections, Layers A-B, Main Excavation, Punta Pichalo. Letters indicate specific layers.

new influence. The closest parallels in the two periods are the flat base fragments of the bowls or pots (Figs. 28 and 31).

Textiles. Textiles first appear as plain woolen cloth simultaneously with pottery in the brown refuse. Just beneath the surface in Layer A were five fragments of warp or weft-striped material in natural wool colors. At the same level, but in the trench cut to expose the strata, was a scrap of coarse interlocking tapestry with a simple checkerboard pattern. Natural shades of light and dark wool alternate with squares of dull red. Along the sides of the squares the weft threads interlock between the warp threads which are

Practically all of those with loose mesh are made of plant fiber cord. Two examples from the Black Refuse are from about the middle of that accumulation. The most complete of these is a flat, rectangular bag, twenty-eight centimeters long by eighteen centimeters high (Figs. 26d, 29p).

Cords and Ropes. As the analysis shows (Table 5), cords and ropes were very abundant in the upper levels of the midden. Their rarity in the lower portions is partially, though not entirely, due to decomposition. The following classification is based on an examination of several lots of these cords selected at random, to give some indication of the construction:—

Twisted Cords and Rope

Fiber	Layers	Two-ply	Three-ply	Two Two-ply	Three Two-ply	Two Three-ply	Multiple
Wool	A, B, C	97	8	20			13
Cotton	A, B, C	2	13			1	1
Plant Fiber	B, C	482	10	4	1		
Human Hair	B	7	8	8			

grouped in pairs and are much coarser than the weft.

In the Black Refuse, red, green, and blue dyed yarn is used in warp or weft-stripe cloth, with some examples of warp-stripe designs. With them are examples of simple embroidery consisting of narrow stripes six or seven millimeters wide. On one face of the cloth these show as compact, short, parallel threads running square across the stripes. On the opposite face, these turn in from the edge of the stripe at an angle of about forty-five degrees with the result that a chevron effect is produced. The same simple embroidery occurs at Paracas, Peru, on some of the textiles and as an edging for a fringe on more elaborately embroidered pieces.

Cotton first appears with pottery and seems to have been used entirely in the manufacture of hard-twisted fish line. It should be mentioned that none of the textiles have been cleaned or thoroughly examined at this time, so our comments and descriptions are subject to revision.

Bags, Coiled without Foundation. The two types of knotted bags described at Arica are also found here. In the brown refuse they are concentrated in Layer B.

Carrying Straps. A sewed-cord carrying strap (Fig. 26c) similar to that described in the Playa Miller section is found here in the Black Refuse. Although only three pieces were excavated, the type is obviously abundant, for the guano workers have found many pieces in sifting the same deposit. These differ from the Arica specimens in being more carefully made. The plant fiber cords are finer, and wool cord instead of hair is used for sewing them together. In the Arica example the hair cord passes squarely across the strap through the plant fiber cords, then follows the edge of the strap to where it doubles back across, as can be seen in Fig. 7g. This means that the sewing cord serves only to hold the others together. In the Pichalo specimens the sewing cord doubles back along the edge of the strap and is looped about the preceding cross turn before advancing forward to the next point where it enters the larger cords. This is a better arrangement, as the sewing cords thus share part of the longitudinal strain.

A crossed-stick basket found by Uhle at Pichalo and now in the Museo de Etnología y Arqueología in Santiago, has one of these

Black Refuse type straps attached to it.

Slings. Slings are rare and those found occurred only in association with pottery. In the Black Refuse, but without exact position data, were two slings duplicating those seen at Arica. Both are woven of wool cord, one with a solid center (Fig. 27r), the other slit lengthwise. The cords are round, multiple strand braid. Two finger loops (Fig. 29t) in the earlier brown

proof that this form of covering was consistently used by women. In the midden, scraps of these were found, principally in the pottery division of the main excavation; but two pieces in Layers G and H are significant, since they show that these pubic coverings were also used in pre-pottery, pre-textile times. They were generally made by looping the long untwisted fiber over one or two strands of twisted plant

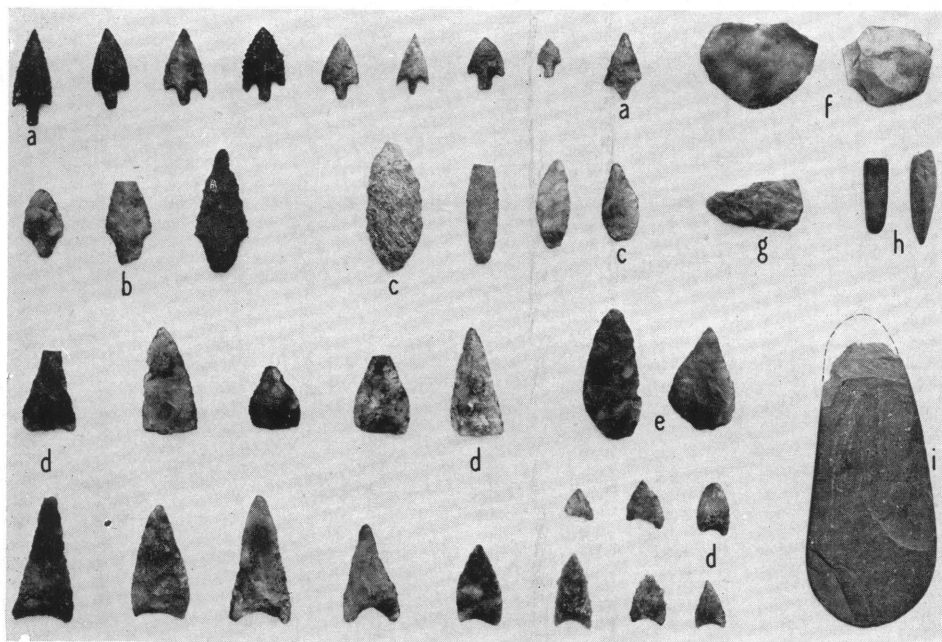


Fig. 32. Stone Artifacts from Pre-Pottery Layers C-I3, Main Excavation, Punta Pichalo. a, Stemmed and barbed points, left to right, Layers G1, D2, F, F, F, G1, F, E, G2; b, Stemmed points, no barbs, Layers G3, I1, I3; c, Double-ended points, Layers I1, G1, I3, E; d, Triangular points, showing range in size and form (note corner of base forming spur on small points), Layers D2, G1, F, G1, F, F, E, F, F, G1, C1; e, Knife points, irregularly rounded bases, Layers F, E-G; f, Flake knives, bilaterally chipped edges, Layer F; g, Double-edged sidescraper, Layer G1; h, Whetstones (?), Layer I1; i, Flat slate object of unknown use, Layer J. Length of i, 14.5 cms.

refuse serve as the only evidence of their presence. Both are of twisted human hair cord crudely whipped with wool cord.

Matting. The scraps of rush matting found are made, like the Arica specimens, with twisted plant fiber cord twining elements.

Pubic Coverings. Among the flexed burials at Arica was that of a woman with a pubic covering of untwisted plant fiber. Further grave finds at Pichalo furnished

fiber cord, spreading it evenly for a space of as much as thirty centimeters. To prevent it from slipping, a twining element was passed through the untwisted fiber as closely as possible to the cord. The free ends of the fiber were then folded and united by other twining elements. In the only complete example found, a single cord is twined through the fiber and its ends are tied to the braided bunches of the same fiber which served as a belt and

probably hung as a free tassel behind. The free end of the covering, after passing between the legs, was tucked under the belt at the back. The fiber used has not been identified.

Coiled Baskets. Scraps of coiled baskets of exactly the same technique as described among the Playa Miller finds are again found only in association with textiles

are another feature of that period. Although only nine fragments were taken from the excavation, many others have been removed by the guano workers.

The portions of these most frequently found are the triangular panels from between the sticks (Fig. 26b). The horizontal strands are almost entirely of plant fiber while the twined vertical strands may

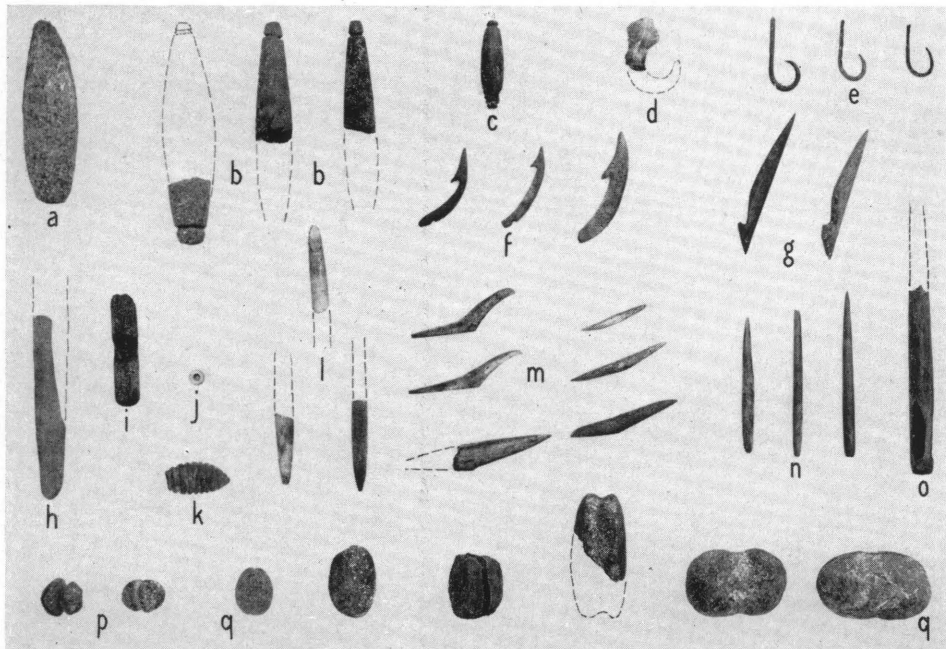


Fig. 33. Stone, Bone, and Thorn from Pre-Pottery Layers C-I3, Main Excavation, Punta Pichalo. a, Unfinished sinker, Layer F; b, Fish line sinkers, Layers H, F-G, G2; c, Composite sinker hook weight of stone, Layer I2; d, Chipped stone fishhook, Layer F; e, Thorn fishhooks, Layer E; f, g, Bone barbs of uncertain use, Layers H, G1, I2, F, G1; h, Chipping tool of guanaco (?) bone, Layer G1; i, Firedrill hearth, Layer C1; j, Stone bead, Layer F; k, Stone object of unknown use, grooved on both sides, Layer I1; l, Fragments of bone fish harpoon forepieces, Layers F, F, F-G; m, Two types of bone barbs for sea lion harpoon forepieces, Layers D1, F, E, G1, F, G2; n, Bone barbs for squid hooks, Layers D3, F, G1; o, Wooden central shaft of squid hook, Layer D3; p, Bolas-like stone weights, Layers G3, E; q, Bolas weights, second from left of galena, finished without groove, third has cord set with red cement, Layers I1, I1, H, G1, H, I. Length of a, 9 cms.

and pottery (Figs. 26a, 29r). In the Pichalo burials of this period broad, shallow, flat-bottomed baskets or trays are the most common form. The two largest baskets from the graves are incomplete and are about ninety centimeters in diameter by thirty or more deep.

Crossed-Stick Pack Baskets. Pack baskets are found only in the Black Refuse and

be either the same material or, more frequently, wool or human hair cord.

Water Bags. Fragments of parchment-like skin or gut water bags reveal an ingenious method of making a water-tight seam. With the skin wet and pliable, the two margins were placed together, then round balls or pellets of plant fiber, up to one centimeter in diameter, were pressed

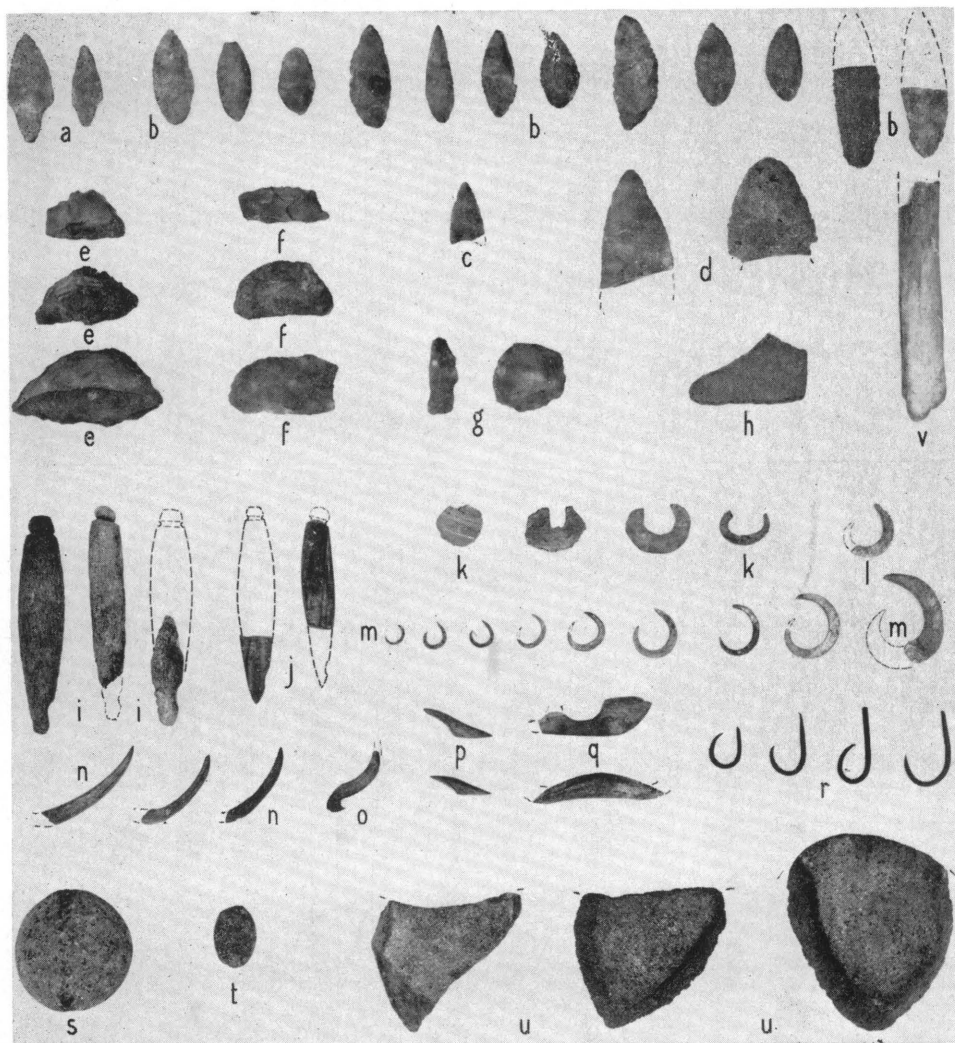


Fig. 34. Miscellaneous Artifacts from the Oldest Coastal Culture, the Pre-Pottery Shell Fish-hook Period, Layers J-O, Main Excavation, Punta Pichalo. a, Stemmed points, no barbs, Layer J; b, Double-ended points, Layers J, J, J, K, K, K, K, L1, L2, N, O; c, Triangular point, Layer L2; d, Knives (?), one at right with stem, Layer N; e, Double-edged sidescrapers, thick, with pointed ends, Layers L3, M, J; f, Double-edged sidescrapers from thin flakes, Layers J, M, L2; g, End-scraper (?), Layers K, L1; h, Stone saw, Layer M; i, Composite sinker hook weights of whale-bone, Layers N, K, J; j, Composite sinker hook weights of choro mussel shell, Layer J; k, Stages in the manufacture of shell hooks, one shows saw cuts made with a stone saw (h), Layers L1, M, M, L1; l, Shell hook notched on outer edge of shank, Layer K; m, Choro mussel shell hooks, showing range of size, Layers M, L2, L1, L1, M, M, L1, M, L1; n, Composite sinker hook barbs of bone, Layers K, N, N; o, Bone barb, Layer O; p, Barbs for sea lion harpoon forepieces, Layer K; q, Bone objects of unknown use, Layer N; r, Thorn hooks, with shanks of two examples at left broken off, Layers L1, K, K, L1; s, Naturally shaped pebble with incomplete pecked groove, Layer K; t, Heavy stone bolas weight, without groove, Layer K; u, Fragments of stone bowls, two of lava, one of fine-textured stone, Layers K, J, K; v, Chipping tool of sea lion rib, Layer N; Length of a, 5 cms.

into the double layer of skin near the edge. A row of protruding knobs was thus formed on the opposite face, and these were bound and laced with plant fiber cord (Fig. 29s). In one instance, a bag found in the Black Refuse, small marine snail shells were substituted for the balls, but the principle is the same (Fig. 27q). Another fragment from disturbed ground had small pebbles used in the same way.

Pottery Spindle Whorls. The only whorls found are discs made from sherds (Fig. 29o). Apparently the rectangular whale-bone type seen at Arica was unknown here.

Composite Combs. The single composite comb found has the same cord lashing and side splints as the Arica examples, but is not as finely made and has teeth on one side only. Another difference is that the teeth appear to have been split from a

dark hard wood instead of cane. They are also cut to a taper, while those of cane are of uniform thickness. Uhle collected seven identical specimens at Pichalo, so these single edged combs may form a distinct type with some chronological significance (Fig. 27e).

Carving Tools. Two carving tools from the Black Refuse have handles of round sticks five millimeters in diameter and of uncertain length (Fig. 27m). The blades are small teeth, apparently from the fish known locally as the *peje perro*, lashed firmly with cord. It may be presumptuous to class these as carving tools, but similar implements occur at widely scattered localities in the Americas.

Feather Fan (?). An incomplete specimen has quills tied in such a manner that the feathers spread out fanwise.

PLANT REMAINS

Corn. Only two corncobs were found, both in the latest debris. Though corn was not unknown in the pottery period as defined for the main excavation, it is assumed that this site was too far from where corn was grown to justify carrying the cobs.

Cotton. Cotton cords and bits of cotton

boll with seeds attached first appear with pottery.

Calabash. The fragments of gourds are all in the first pottery division. None were incised. It may be that their absence in the later refuse was accidental, but none were seen.

FAUNAL REMAINS

The same species of shellfish as listed for Arica occur here in much the same proportions. Less frequent are such species as the hard clams, obviously because of the absence of beaches in the immediate vicinity. Fish bones were noticeably more abundant than at Arica, but are not more plentiful in one level than another. Some swordfish bones were noted. Sea lions and

porpoise were practically the only mammals taken. Guanaco (?) bone artifacts show that these animals were secured, but the absence of other bones suggests they were not eaten here. No evidence of dogs or other domesticated animals was found. Bird bones were scattered throughout, but the species have not been identified.

BURIALS

It has been impossible to prepare the grave finds for study in time for inclusion with this report. However, a few comments are in order. In the main excavation three skeletons were found in Layer J, at the close of the shell fishhook period.

There was no evidence that graves had been cut in the ground to hold them, as in two cases the overlying structure was unbroken. In the third burial, the overburden had been removed before the skeleton was observed. None was ac-



Fig. 35. Burials at Punta Pichalo. The tops of the stakes were just below the surface.

accompanied by any grave goods. All the skeletons were extended and lacked the fleshy parts, although in one instance the hair remained. In one, most of the right hand bones had disappeared before the skeleton had been covered. At least five similar burials, without accompanying artifacts, were found in the lower portions of this midden by guano workers. Whether or not they were contemporaneous with those described is uncertain.

Two more skeletons without artifacts were found in the cemetery south of the main excavation. Placed in the same grave, it was clear that one of them had decomposed to the point where it was falling apart at the time of the burial.

All of the remaining burials, a total of thirty-nine, counting those previously disturbed, have certain features in common. They are flexed, without regard to orientation, and in at least seventeen cases are marked by upright posts (Fig. 35). All were buried with baskets and in some instances, especially the infants, they were placed inside of them. Usually, a covering of rush matting is folded beneath the body, but otherwise there is no attempt at wrapping. Textiles, usually square, sleeveless shirts, are a common feature. The list of other grave goods varies from burial to burial, showing no fixed pattern. Only in one instance was pottery found: a single flaring-sided bowl of plain unslipped reddish ware.

The use of stakes for marking graves has not been previously reported in northern Chile. All found were weathered off just below the surface and have no evidence of carved or painted decoration. Algarobo was used exclusively, generally pieces between ten and fifteen centimeters in diameter.

A similar grave marker is now in the possession of Señor Rafael Cruz, of Santiago, who kindly allowed us to examine it. It was found by Señor Anival Echeverría in a cemetery located, I believe, in the Calama-Chiu Chiu area, nearly four hundred kilometers south of Punta Pichalo. The portion saved was cut from the upper end of a post of *pimiento* wood, nineteen centimeters in diameter. At the top it is cut in the form of two superimposed, inverted truncated cones, representing a head covering for the face carved just below. This is simply executed with a minimum of cutting leaving a straight brow line, a narrow rectangular nose, and a full rounded outline for the lower part of the face. Black paint is used to indicate hair hanging to a point at the back of the neck, a short mark at each side suggests the little braids hanging from the temples on some of the mummies seen at Arica. The areas on each side of the nose are divided into units of concentric squares of red, black, and yellow, while the rest of the face is solid red with no mark to indicate the mouth.

This of course does not prove that the stakes at Punta Pichalo were ever decorated, but does suggest that possibility. The use of carved wooden grave markers among the Araucanians in historic times may be a survival of a North Chilean custom.

Comparing the artifacts from the graves with those found in the middens shows that the few exceptions to the general pattern are probably contemporaneous with the Black Refuse. The remainder, in spite of the lack of ceramics, are contemporaneous with the pottery-using period in the main excavation.

CONCLUSIONS

The extensive digging for guano at Pichalo during the past few years has left so many open cuts and exposures that our task was greatly simplified. We can be reasonably positive that no appreciable early traces of occupation lie hidden beneath the "fossil" guano or accumulation

of soil. It is also fairly obvious that some years, though not necessarily many, elapsed between the formation of the guano deposit and the beginning of permanent occupation. The earliest occupational remains are culturally identical with the oldest found at Arica. Here the refuse

left by the earliest inhabitants constitutes an approximate third of the volume of the midden where the main excavation was made. A sufficient number of artifacts was recovered from it to confirm and amplify the Arica observations, namely:—

1. Shell fishhooks are so characteristic a feature that we can justifiably refer to this first pre-pottery division as the shell fishhook period, even though thorn hooks occur simultaneously.

2. Composite sinker-hooks are also present throughout and are not accompanied by the cigar-shaped sinkers.

3. Harpoons with detachable forepieces fitted with bone barbs and stone points were used.

4. Stone bowls, rough chopping tools, and the double-ended form of projectile points are elements of this first culture which survive into subsequent periods.

We note a marked decrease in the frequency of the rough chopping tools. This has no obvious explanation, unless suitable stones were not obtainable here and would probably have had to be brought from as distant a locality as the Pisagua Vieja Valley. Also, rough chopping tools do not carry over into the pottery-making periods, as at Arica.

Another observation paralleled at Quiani, is that there appears to be a slight gap between the close of the shell fishhook period and the appearance of the characteristic artifacts of the subsequent division. This is not observable in the condensed distributional analysis (Table 5), but may be noted on the layer-by-layer record where Layer I, with an average thickness of about thirty centimeters, lacks some of the artifacts occurring in the layers above and below. Such an occupational index as stone flakes, however, continues in an uninterrupted sequence.

From the top of Layer I up to the appearance of pottery and associated items a second division contains the same type of artifacts as occurs following the shell hook period at Arica. Omitting the earlier items which carry over, these are: the cigar-shaped sinkers used with thorn hooks; bolas weights; bone fish harpoons; and triangular chipped stone blades. Appear-

ing slightly earlier, exactly at the close of the shell hook period, are narrow-stemmed stone points for shafts no heavier than arrows, which continued in use until the introduction of pottery. Lacking a better term, this division will be referred to as the second pre-pottery period.

The introduction of pottery marks another clear-cut cultural change, as it was accompanied by weaving, coiled baskets, and evidence of agriculture in the vicinity. The triangular chipped stone points become predominant, while the old double-ended and the stemmed-barbed variety disappear. It is during this period that the basket burials were made. Uhle, on the strength of these graves lacking pottery, postulated a pre-pottery, basket-maker group, an understandable error as far as Pichalo is concerned.

Carried over into this pottery period from the second pre-pottery period, in addition to the triangular points, were the fish harpoons, the cigar-shaped sinkers, knotted cord bags, and the plant fiber pubic coverings for women. Bolas, which at Arica continued into the pottery period, fail to do so here; perhaps because this point is not a place where they would be much of an asset.

New, in addition to the objects already mentioned, are stone drills, knob tying for water bag seams, cotton cord, spindle whorls, gourds, slings, and ultimately, copper fishhooks. Grave finds demonstrate that throwing sticks continued to be used in this period until after copper was utilized. From the graves we also learn that snuff trays and tubes had been introduced.

A second pottery period follows. We have called it the Black Refuse period because of the appearance of the *débris*. It is considered distinct because of the simultaneous occurrence of: dyed yarns used in warp or weft-stripe cloth with woven designs, carrying straps, composite combs, a new-pattern stone point for harpoons, very small specialized stone tools, carving tools with teeth for blades, and perhaps most conspicuous, baskets with crossed-stick foundations.

Continued from the first pottery period

are: triangular stone blades, drills, cigar-shaped stone sinkers, rush handled chipping tools, the firedrill, and rush matting. On the basis of the pottery alone, the sherds secured reflect the other changes, the most obvious being the bowls with flaring sides and thickened rims and the polished blackware both of which do not occur in the second pottery period.

A comparison of the Arica and the two Pichalo pottery divisions reveals several marked similarities and differences (see p. 310), but their significance is not clear. The late pottery period of Pisagua and the Playa Miller midden have the following elements in common: slings with heavy braided cords, thick harpoon points of similar pattern, carrying straps, and dyed yarns used in warp-stripe designs. Composite combs might be included here, though the Arica combs are consistently double-edged in contrast to the single-edged form from the Black Refuse. These are all late items, as at neither place do they occur in the older *débris*. We concluded at Arica that the crossed-stick baskets must be later than the Playa Miller *débris*. Does that imply that the slings, composite combs, etc., are older and more widely distributed elements in the ad-

jacent areas than the pack baskets? What is the significance of the remains we find only at Playa Miller: painted pottery, sandals, rectangular bone spindle whorls, top-like objects, sinkers with flat edges, others with projecting knobs, bows and arrows, dogs? These too, are locally late items as they are lacking in the older *débris*. Why should the crossed-stick baskets, which appear to be post-painted pottery at Arica, be so abundant with unpainted pottery at Pichalo, and yet clearly are not an old element? Does the fact that only older parallels exist between the Playa Miller midden and the first pottery level at Pichalo imply that the unpainted pottery of Pichalo is older? Obviously, we do not yet have enough data to answer these questions with much certainty.

It may be that most of the agricultural *débris* at Quiani is contemporaneous with the first pottery period at Pichalo and our failure to find sherds and coiled baskets there is accidental. This suggestion is supported by some of the Quiani burials. The second pottery period at Pichalo then might be considered as a forerunner of the painted pottery at Playa Miller, though possibly contemporaneous with it for a while.

EXCAVATIONS AT TALTAL

Taltal, at latitude $25^{\circ} 24'$ South, lies at the southern end of Nuestra Señora Bay, a slight recession in the coast line twenty-six and a half kilometers wide. The shore, for a few kilometers in the vicinity of the town, is fairly well protected from the prevailing wind, more so than the coast to the south and the rest of the bay to the north. Most of the shore is rocky and irregular,

As remarked in the comments on the northern coast (p. 184), the section immediately to the north of Taltal marks the beginning of a permanent *loma* flora zone in which a surprising variety of unique and botanically interesting plants grow. This vegetation covers the hills and slopes sufficiently to change their color completely and, in contrast to the stark barrenness of

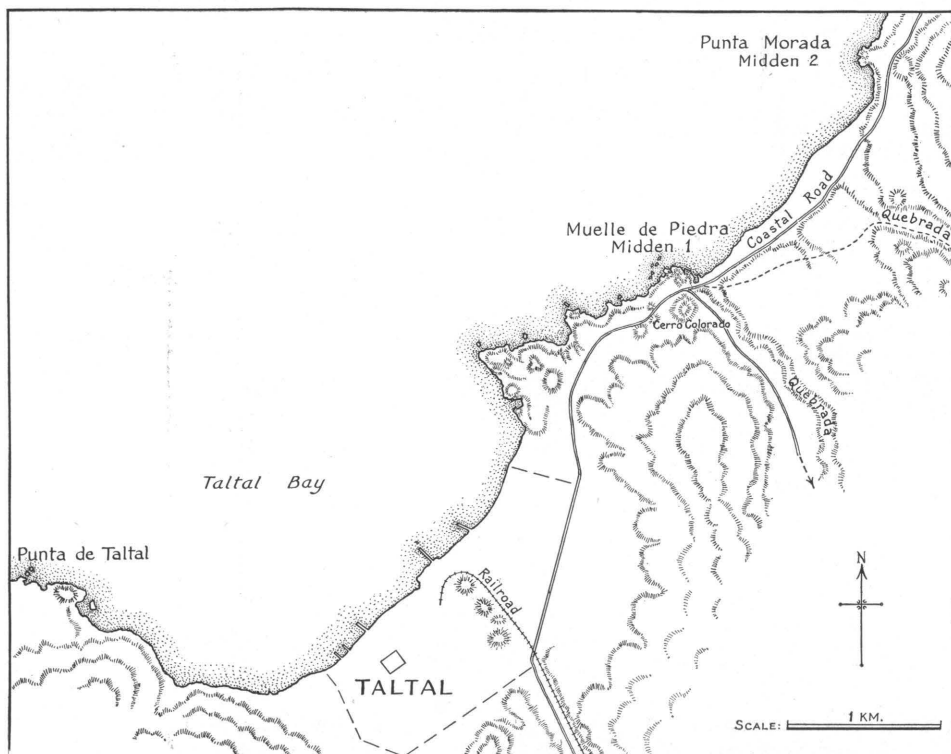


Fig. 36. Map of Taltal and Vicinity showing Shore Line and Location of the Middens at Muelle de Piedra and Punta Morada. Courtesy of Mr. William Pollock.

with short sections of sand and gravel beaches (Fig. 36). Behind the shore the land rises steeply four to five hundred meters to rounded rocky hills. There are no valleys comparable to the large deep ones in the north. Instead, there are a number of much smaller valleys cut mainly by surface drainage from the land near the coast; none of these has sufficient water to permit more than a minute amount of farming.

the desert coast at Pisagua, seems luxuriant. Most conspicuous is a large cactus which grows higher than the rest of the shrubs and plants and dots the hillsides at all elevations. Several species of the shrubs provide excellent fuel, so primitive people who lived here were not dependent entirely on kelp. This, together with the fact that guanaco are available, means that life here was not focused so closely on the sea and its products.



Fig. 37. Taltal Sites and First Excavation.

Much has already been written about Taltal and the artifacts found in the vicinity. The most recent publications,¹ those of Señor R. E. Latcham, give excellent summaries of the previous work so it is necessary to do no more than review this very briefly.

Beginning in 1914, Señor Augusto Capdeville, then stationed in Taltal in charge of the customs house, became interested in the local artifacts, and started collecting. He it was who first noted the abundance of very crudely made tool-like objects of coarse stone.²

Comparing them with European paleolithic artifacts, he noted some resemblances and concluded that there had been a period of similar culture development at Taltal. Moreover, he reported that the more primitive artifacts occurred only in the lower portions of the middens. These claims had a rather varied reception, but did arouse interest in the local archaeology.

Accordingly, Professor Max Uhle, in 1916, visited Taltal and spent several weeks in the vicinity.³ He was handicapped by lack of transportation and assistance and was therefore unable to carry out the work he would have liked. At Cerro Colorado, northeast of Taltal, the scene of Capdeville's most intensive digging, he opened a number of test holes and a trench. From these he learned that Capdeville's estimate of the thickness of the deposit, five meters, was incorrect, as he found the maximum thickness to be slightly over three meters. More important was his observation that tools of the so-called paleolithic forms were not confined to the lower levels, as Capdeville had claimed, but were generally distributed throughout, in association with finely made, pressure flaked chaledony objects. These latter were reported as more abundant in the upper portions of the midden and appeared to be absent only at the ex-

treme bottom. Nowhere did he observe a layer of sterile material.

In 1924 Director Latcham, accompanied by Capdeville, visited the sites in the vicinity of Taltal. In his report⁴ he speaks of the midden deposit at Cerro Colorado as divided into two by a sterile layer of fine, wind-blown sand a meter thick. This, he believed, was formed in a period during which the site was unoccupied, and marked a cultural division. Below this sterile layer he found no pressure flaked stonework in association with the coarser objects. Above it, he found only vestiges of the crude stonework, while finely made pressure flaked chaledony objects were abundant. This gave a picture somewhat different from Uhle's observations and tended to support Capdeville's earlier claims, renewing the old theory of marked changes in cultural development at Taltal.

Our work at Taltal consisted of an excavation in each of the two major deposits of midden refuse (Fig. 37). The first was at Punta del Hueso Parado on a shoulder or extension of the Cerro Colorado, three kilometers north of Taltal. Locally this site is better known as the Playa Muelle de Piedra, the same one examined by Latcham and Uhle. The second site was on Punta Morada, about two kilometers further along the shore.

As shown on the map (Fig. 38), the Cerro Colorado midden is concentrated on the crest of the rocky promontory, beside a small, well-protected sandy beach. Although the surrounding ground is free from vegetation, portions of the margin of the deposit are rather difficult to determine. Away from the crest of the accumulation, the thickness decreases rapidly and becomes no more than a thin surface scattering of shell. Only a very small portion of the deposit has had a depth of over two meters, certainly not more than one sixth of the area indicated on the map. The present surface has been very much pitted and disturbed by former digging, only small portions remaining unchanged. The most promising of these undisturbed areas lay on the southern slope, just east of the sec-

¹ Latcham, 1939, 1941.

² We are indebted to Mr. Lester G. Zeihen, of Chuquicamata, Chile, for identifying this stone which has previously been referred to only as black silicate. He writes: "A study of thin and fragmental sections indicates it to be a basalt with a rather unusual amount of hematite included in the interstices among plagioclase feldspars and bordering partially altered olivine crystals."

³ Uhle, 1916.

⁴ Latcham, 1939, 5; 1941

tion where Uhle had cut a trench. The inner end of this old trench was cleared and extended slightly further into the mound, exposing a ten-meter section of midden refuse. The maximum thickness at the inner end of this trench was 1.75 meters, measuring perpendicularly from the plane of the surface. A block 4.5 meters long by 3.5 meters wide was then exposed by trenches on the remaining three sides. Portions of the upper part of this had been slightly disturbed and eroded and all such pockets and material were removed sepa-

In the block exposed, the stratigraphic lines were very uniform and quite easily followed. In composition, the approximate upper third had proportionately more shell than the lower portions. A rough estimate of the débris coming down the sifter would be about sixty-five per cent of fine dirt to thirty-five per cent shell and stone fragments for the upper portion of the midden, and about an eighty to twenty ratio for the lower sections. Fish bones were plentiful throughout, occurring sometimes in quite solid streaks. The com-

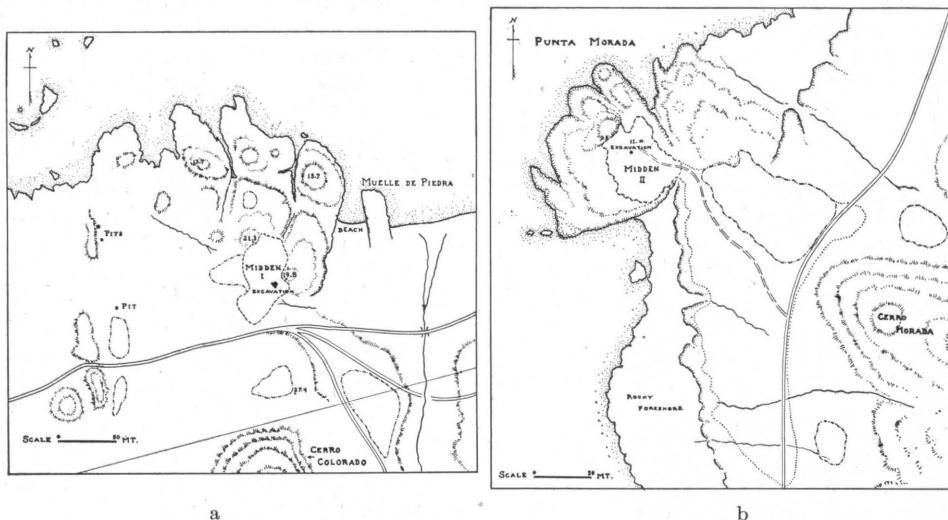


Fig. 38. Maps of Cerro Colorado and Punta Morada. a, Punta Hueso Parado showing Midden I, Muelle de Piedra and Cerro Colorado. The dash line indicates the maximum extent of the refuse. The dash-dot lines enclose the areas intensively dug over by collectors, where burials have been removed, and which might be referred to as cemeteries. The figures are elevations in meters; b, Punta Morada. The main portion of the midden is outlined by dash lines, the intensively worked burial areas by dash-dot lines, and the maximum extent of thinly scattered shell refuse by dotted lines.

rately, leaving only absolutely undisturbed, unmixed refuse (Figs. 37, 39).

Nowhere on the exposed faces could we positively identify the strata referred to by Uhle and Latham. The general appearance from top to bottom is rather uniformly that of dark brown earth with lighter bands and streaks. The whole is mottled and speckled with lumps and particles of a whitish, powdery substance, due to some chemical action. Compared with the Pisagua midden this débris is far less compact and unless walls are cut at an angle, they will slip.

monest species of shell throughout were *concholepas* (*locos*) and *fissurella* (*lapas*) with various others present in considerably smaller numbers. Part of the midden accumulation is due to the crumbling of the brittle reddish knobs of rock which rise slightly above some parts of it. Apparently the fine brown earth mixed with the shells and bones is wind-borne and has accumulated slowly, as fragments of rock and shell were added and provided protection and foothold for it.

As with other middens examined, the portion selected was completely sifted. In

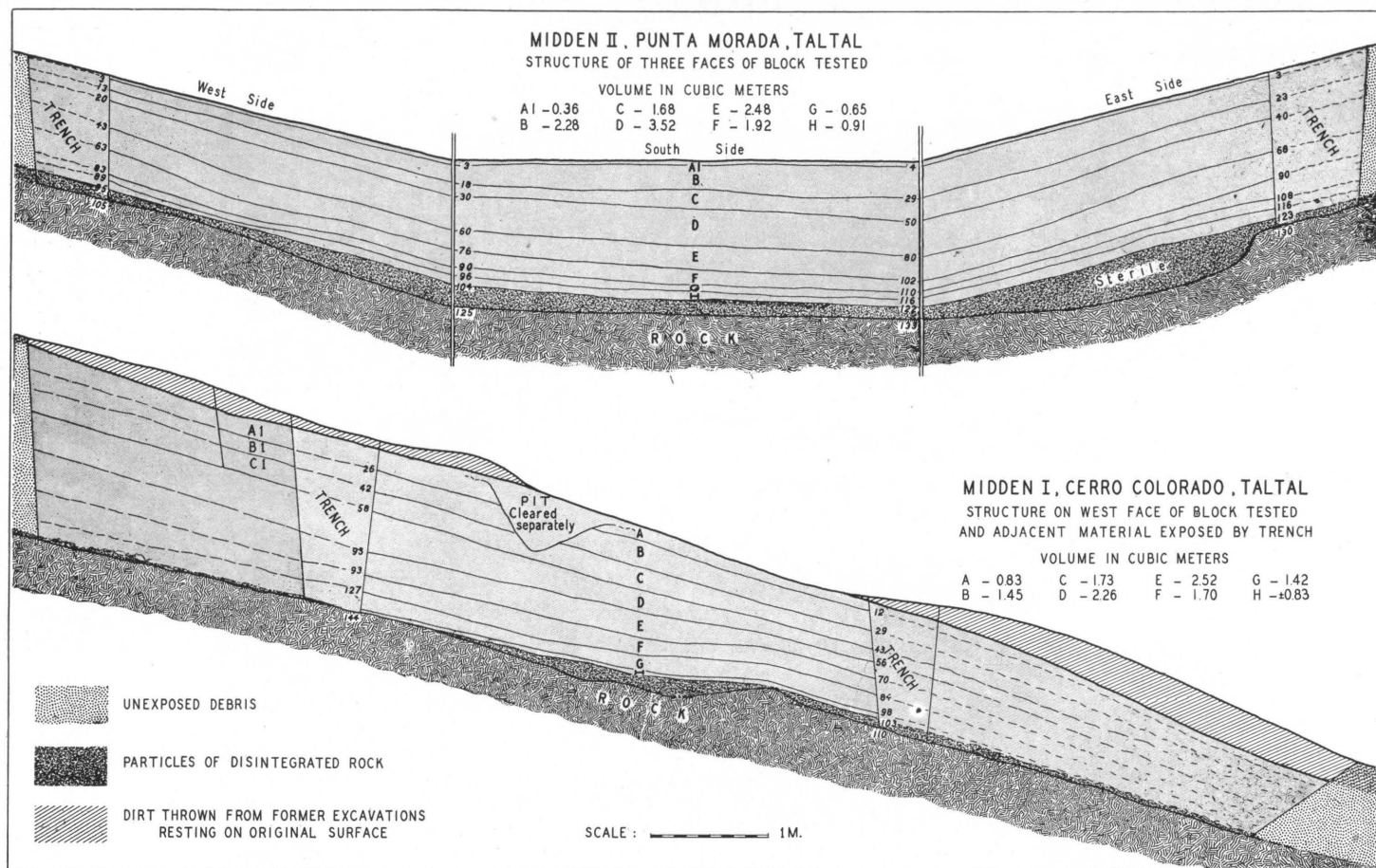


Fig. 39. Cross-section of the Taltal Middens.

TABLE 6
EXCAVATIONS AT TALTAL

		SPECIMENS OF BASALT																	
		Midden I								Midden II									
	S	A	B	C	D	E	F	G	H	S	A ₁	A ₂	B	C	D	E	F	G	H
Crude Tools or Cores																			
Group I: Similar to Arica specimens; oval cobblestones with unilateral flaking on:—																			
1. One end	2	—	1	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—
2. Sides and end	8	—	—	—	—	—	—	—	—	5	—	—	—	3	—	—	—	—	—
3. One side of longest axis	19	—	1	2	—	—	—	—	—	22	—	—	—	1	—	—	1	1	—
4. Along two sides	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	1	—	—
5. Entire margin	7	—	—	—	—	—	—	—	—	8	—	—	—	—	—	—	—	—	—
6. Opposite faces	—	—	—	—	—	—	—	—	—	5	—	—	—	—	—	—	—	—	—
7. Large teshoa flakes	8	1	—	—	—	—	1	—	—	4	—	—	1	2	—	4	4	—	—
Group II: Core-like specimens, prepared striking platforms, with unilateral flaking on:—																			
1. Entire margin, duplicating I-5	12	1	3	3	—	—	—	—	—	14	—	—	1	1	—	1	2	—	—
2. More than half of margin	46	1	1	2	—	1	—	—	—	29	—	1	—	—	—	—	4	—	—
3. Portion of margin only	135	2	1	7	—	1	1	—	—	60	—	1	5	4	2	—	11	3	—
4. From two striking platforms	24	—	—	1	2	—	1	—	—	14	—	—	1	—	1	1	—	—	—
Intermediate between II and III																			
1. One edge unilateral opposite side bilateral flaking	27	1	1	1	1	—	1	—	—	13	—	—	—	1	1	—	—	—	—

Group III: Objects with crude bilateral flaking on:—																			
1. Entire margin	15	—	—	—	—	—	—	—	—	8	—	—	—	—	1	—	—	—	—
2. Similar to 1, generally thicker, roughly made	100	—	1	14	2	9	5	1	—	30	—	—	—	2	1	7	8	3	—
3. Similar to 1 and 2, with only one side of margin worked	59	1	—	3	—	1	3	2	—	30	—	—	—	—	—	—	1	—	—
4. Similar to 3, retaining portion of original cobble surface	33	—	3	2	—	—	—	—	—	19	—	—	—	—	1	—	1	—	—
Group IV: Uncertain classification, crude pieces resembling both II and III:—																			
	136	—	1	2	1	2	—	—	—	70	—	—	—	1	—	6	4	—	4
Flakes and Flake Tools																			
Group V:																			
1. Coarse unilateral chipping; doubtful sidescrapers	10	1	3	4	1	4	3	1	—	5	—	—	1	3	4	8	17	2	—
2. Finer unilateral chipping, possible sidescrapers	17	1	—	3	—	—	—	2	—	4	1	—	1	2	4	3	4	—	—
3. Nicked on margin	17	4	3	12	3	4	3	2	—	12	1	1	3	2	10	10	23	2	—
4. Edges worn from use, no chipping	—	1	3	4	—	5	2	—	—	—	—	—	3	11	3	11	19	2	—
5. Unworked flakes	—	883	878	860	852	1080	500	156	18	—	232	430	2238	2150	2000	3064	2609	305	45
6. Unworked spalls	—	—	4	29	50	9	25	19	7	—	—	—	4	16	—	16	32	—	—
Pressure Flaked Objects																			
Group VI:																			
1. Knife or blank	—	—	—	—	—	—	—	—	—	—	1	—	1	2	1	1	—	—	—
2. Finished knife or blade	1	—	—	—	—	—	—	—	—	—	—	—	1	1	3	2	—	1	—

dividing the test block into layers, the first two divisions, between Layers A and B, and B and C, were taken arbitrarily, following the stratification. The division between Layers C and D followed the clear-cut easily traceable line where the increase in shell content began. The divisions between the other four layers followed the most easily traceable lines of stratification. Nowhere in the portion of the midden exposed by us was there any evidence of a sterile band, and there seems to be no reason to assume that this protected slope should lack such an accumulation if it is a characteristic feature elsewhere in the midden. Apparently the sand observed by Latham is a localized feature. The refuse rests on a sterile mixture of disintegrated rock and dirt of varying thickness, depending on the shape of the underlying rock. Undisturbed portions of the surface seem to have been fairly static since the abandonment of the site, with no obvious accumulation and probably a slight weathering.

At Punta Morada, although shell is

scattered over a much more extensive area, the volume of refuse is probably less than at Cerro Colorado. It is concentrated only on the crest of the outer portion of the point, the top being about twenty meters above the water. Fortunately, much less digging had been done at Punta Morada and most of it had been confined to an area which apparently yielded burials (Fig. 38). A block similar in size to the one at Cerro Colorado was exposed by trenches on four sides and sifted layer by layer. Here the maximum thickness was only 1.52 meters (Fig. 39). In appearance and composition it was nearly identical with that already described. As will be seen in Table 6, the yield of artifacts and flakes was considerably higher than at Cerro Colorado. Culturally there appears to be no difference, except that at Punta Morada a somewhat more complete series of artifacts was recovered. Presumably both accumulations represent about the same interval of time. For these reasons, we will discuss the material from both places as a unit.

COARSE STONEWORK

The most puzzling feature of the archaeology of Taltal is the great abundance of coarse stonework which was made and used coincidentally with good pressure flaking. This has been the subject of much discussion and controversy, as previously mentioned. Great quantities have previously been collected, and from this mass of material such pieces as resembled European paleolithic implements have been selected. Little attempt was made to analyze a representative series to determine which forms are specific types and which may be variants or discards.

As shown in our stratigraphic distribution (Table 6) this coarse stonework occurs in varying proportions throughout the middens. Whether or not it was used here in post-pottery times cannot be demonstrated, as the amount of debris accumulated since the introduction of pottery is too shallow. In any event, the objects and fragments of basalt occur com-

monly on the surface, not only of the much-disturbed middens, but on undisturbed ground almost anywhere in the adjacent area. As the actual number of specimens found in the middens, apart from unworked flakes, is small, we will consider first the result of some general surface collecting. In doing so we must remember that a great deal of surface material has been gathered, principally by local inhabitants who were concerned mainly with finding points and knife blades to sell to collectors like Señors Capdeville and Thommen. It is fairly certain that much of the black stone material has been ignored; that the bulk of the pieces collected in this fashion were those with greatest appeal to the imagination. This may explain the presence in the Museo Nacional de Historia Natural in Santiago, and in the small Thommen Collection in this Museum of a number of long objects with sharp, pick-like points, both single and double ended, forms which

certainly are not common, as we failed to secure a single good example (Fig. 40).

Fifteen of these objects with sharp points, among the many thousand pieces of basalt in the Capdeville Collection, are presumably the specimens which first gave rise to the idea that a paleolithic-like culture had existed at Taltal, though with them are grouped the bulk of the basalt pieces. As mentioned in the discussion of the coarse stonework, the sharply pointed objects failed to appear in our own collection.

and delicate. This is curious as the material is brittle and easily nicked.

In considering surface material we must remember that as so much earth has been turned over, the objects lying on the surface today are not necessarily representative of the last centuries of native occupation, but are far more likely to be a cross-section of nearly the whole period of occupation. In our favor, on the other hand, as it offers some assurance that we are not dealing solely with culled over material, is the fact that in the last few years, es-

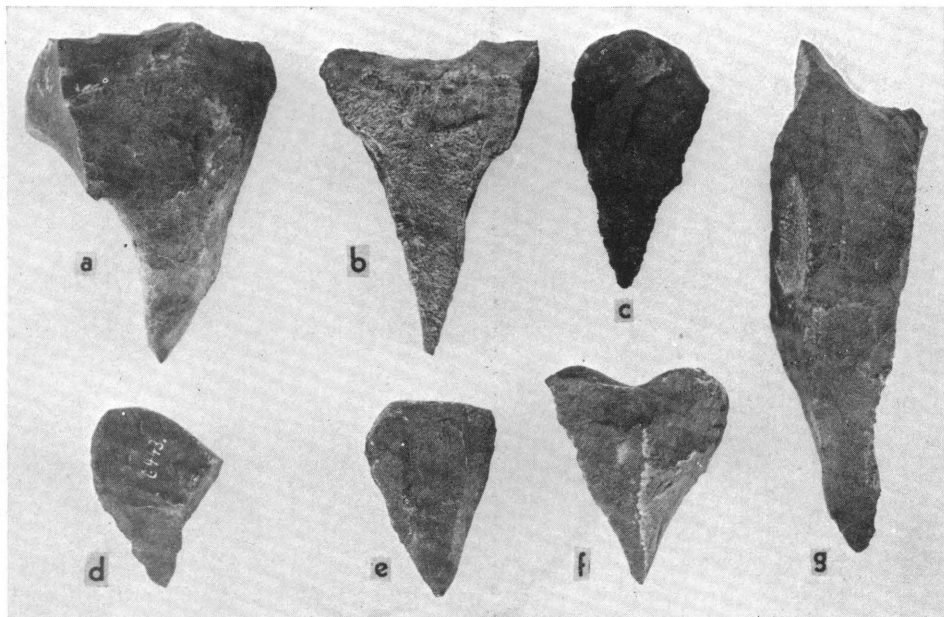


Fig. 40 (a-g, 7498, 7497, 6446, 6443, 6476, 7498, 7496, Capdeville Collection, Museo Nacional de Historia Natural, Santiago). Pointed Rough Stone Tools, Taltal. a, b, f, g, Puerto Oliva, 12 kilometers north northeast of Taltal; c, e, Cerro Colorado Midden; d, Cerro Colorado Midden, "near center of deposit at depth of 1.5 meters." Length of a, 16 cms.

In all cases they are made from large angular fragments resulting from the initial fracturing of larger pieces of material. The secondary flaking has not given them their outline. With one exception this secondary work is unilateral flaking from planes or surfaces produced by the primary fractures. Generally the sharpness of the points is not due to the secondary flaking and none show any nicking, wear or battering on the points, even when these are thin

pecially in 1940, there have been unusually heavy rains to expose new specimens.

The first lot of this material was collected on and near the Punta Morada midden. A large gunny sack was completely filled with worked and unworked specimens, gathered at random, without any attempt at selection, and, incidentally, without exhausting the exposed supply. The same system was used at Cerro Colorado and on the nearby terrace formation, where at

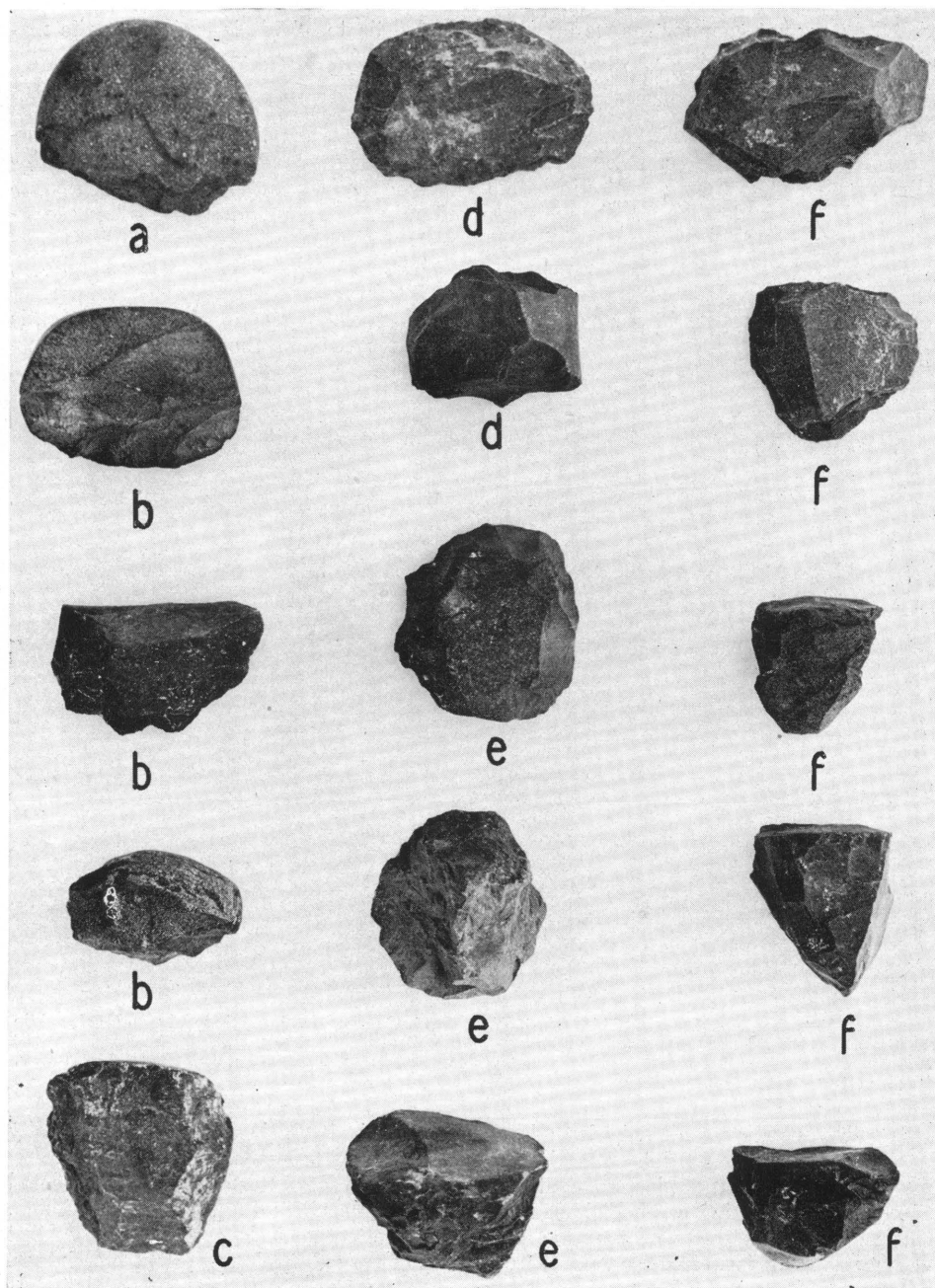


Fig. 41. Coarse Percussion Flaked Stone Tools, Punta Morada. a, Oval cobble flaked across end, Group I-1; b, Oval cobbles, flaked along one side, Group I-3; c, Oval cobble, flaked sides and end, Group I-2; d, Oval cobbles, flaked on two side margins, Group I-4; e, Oval cobbles, flaked on entire margin, Group I-5 (one shown in profile); f, Core-like objects, flaked on entire margin, resembling e, Group II-1 (three shown in profile). Height of a, 7.5 cms.

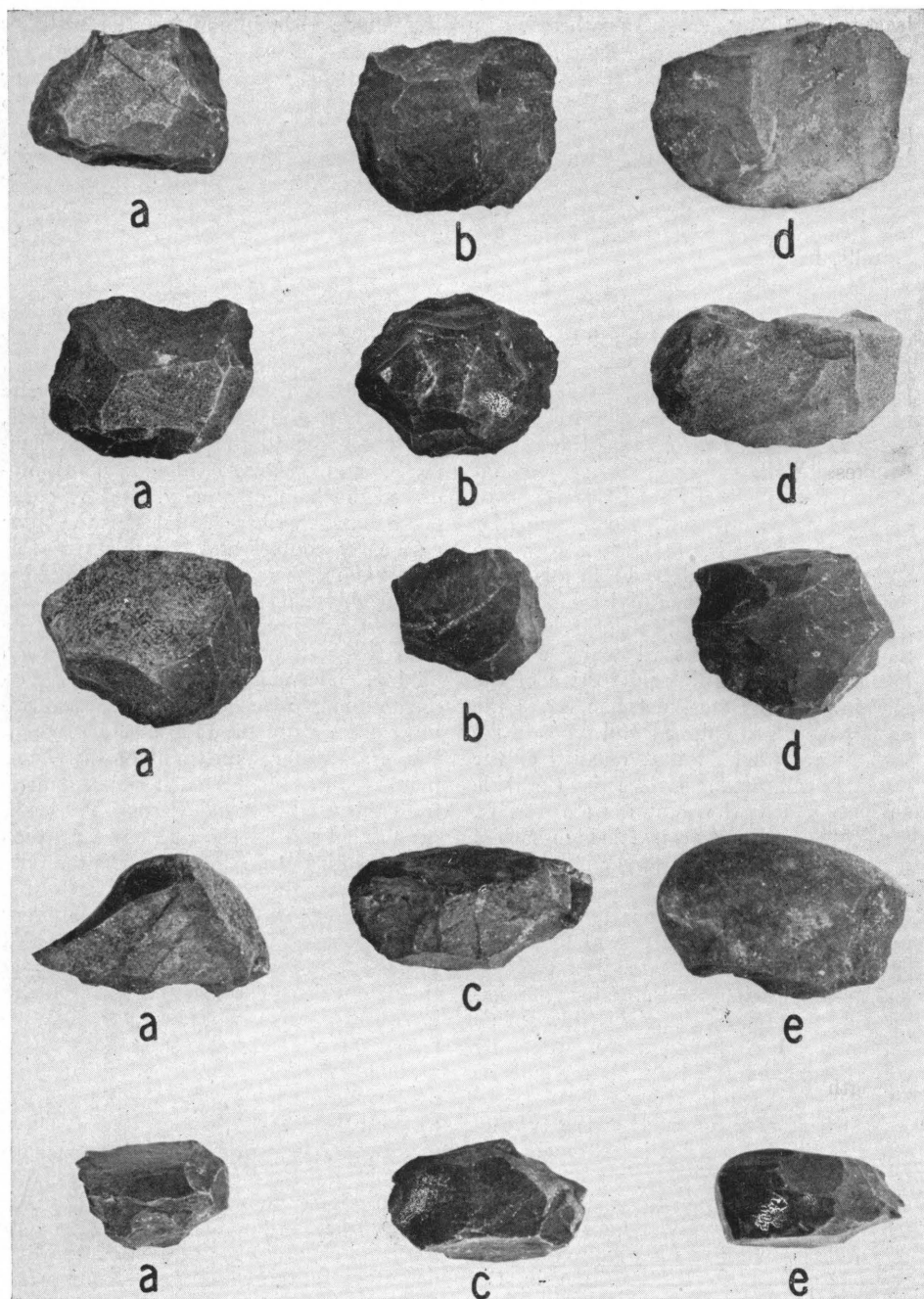


Fig. 42. Coarse Percussion Flaked Stone Tools, Punta Morada. a, Core-like objects, flaked on one side only, Group II-3 (one in profile); b, Tools with very rough bilateral flaking on entire margin, showing average range in size, Group III-1, 2; c, Objects with very rough bilateral flaking along approximately half of margins, Group III-3 (one in profile); d, Tools flaked on less than half of margin, Group III-4; e, Very rough bilateral flaked cobblestones, with original surface on one side, Group III-5 (one in profile). Same scale as Fig. 41.

least twice this quantity was gathered. In sorting these, unworked flakes, rough spalls, fragments, and broken examples of larger tools were discarded. We kept no record of the discarded material, as we have a sufficient quantity, with position data, from the excavation. The balance was divided and grouped into series showing common characteristics or group features.

Conspicuously rare are tools made from flakes. We do have a series of coarse percussion-flaked objects which can be divided into three main groups. The simplest of these, Group I (Fig. 41a-e), duplicates the rough chopping tools in the Arica and Pisagua collections. As at the Arica-Quiani site, these subdivide into several related forms. The simplest is the oval cobblestone with a beveled edge made by unilateral percussion flaking, across one end or side (Fig. 41a, b). From this form, without clear-cut lines of division, we have a proportionately smaller number of examples with the unilateral flaking extending along an increasing proportion of the margin. In the most extreme forms the entire margin is chipped and when thick cobbles are used all that remains of the original waterworn surface is the side against which the blows were struck. Some of these objects resemble high-backed discoidal scrapers; the larger ones, cores. Separating these specimens for analysis is obviously difficult; but it is apparent that in this series the majority tend to have a slightly convex edge extending the full length of the long axis, giving the impression that more than half of the original cobble has been flaked away. In many cases the angle formed by the face and the chipped edge is almost ninety degrees.

Also it is noteworthy that the type of stone available at Arica is extremely rare here and is used for only some of the specimens in this first group. Apparently this is through necessity and not choice, for no cobblestones of this hard green or gray porphyry seem to be available in the vicinity.

In the second series, also with unilateral flaking, the edges of the forms just mentioned are duplicated; the basis of dis-

tinction is that in making the artifacts constituting this second group, the first step was the removal of a large flake or spall from the cobblestone selected (Group II, Figs. 41 and 42a). This is identical with the common procedure in stone flake industries where cores with a prepared striking platform are used. Most of the subsequent flaking is done by striking against this generally flat surface. The result is that the tools in this group seldom retain any original weathered or waterworn surface. It may well be that this difference in technique is due to the use of the basalt, a softer and far more brittle stone than the porphyry. Its surface, when exposed to the effects of air, sunshine, and changing humidity, disintegrated much more rapidly, becoming discolored and weathered. Perhaps the outer surface of cobbles and fragments of this basalt is not as suitable for a working edge as a freshly exposed section.

The third group consists of tools made with rough, irregular, bilateral percussion flaking. The most carefully made implements tend to be oval in outline, resembling ordinary blanks, the initial stage in the manufacture of many knives and points. However, as such objects made from this kind of stone are rare here, that cannot have been the purpose for which the majority were intended. Also, only a small percentage can be considered well made (Group III-1), the bulk having very irregular edges and outlines (Group II-2, Fig. 42b). Many are nearly as thick as they are wide. They resemble cores found in other parts of the world, from which flakes were removed by striking from various directions. Some vary from the oval outline and are roughly pointed at one or both ends, but none duplicate the sharply pointed specimens in the Thommen Collection. We have subdivided the group, taking the best examples with completely flaked margins as the standard form, which may be a mistake, as they are definitely in the minority. Others have the irregular bilateral flaking only on one margin (Group III-3, 4, Fig. 42c, d), and among these, some retain a fair portion of the original cobble surface (Group III-5,

Fig. 42e, f). These latter can be matched with specimens from the extreme south of Chile made by both inland and coastal peoples.

In sorting this third group we noted many examples where the edge achieved is very similar to the edges of those in our second class, produced by unilateral flaking. In many cases it is difficult, on a preliminary examination, to decide whether they

description for the excavated artifacts. Their distribution is shown in Table 6.

After classifying a lot of this material in the categories mentioned, the general impression might be that we are dealing with a flake industry and that the bulk of these objects are cores and rejects. When, however, we examine the great quantity of basalt flakes from the excavation, the number showing any possible signs of use

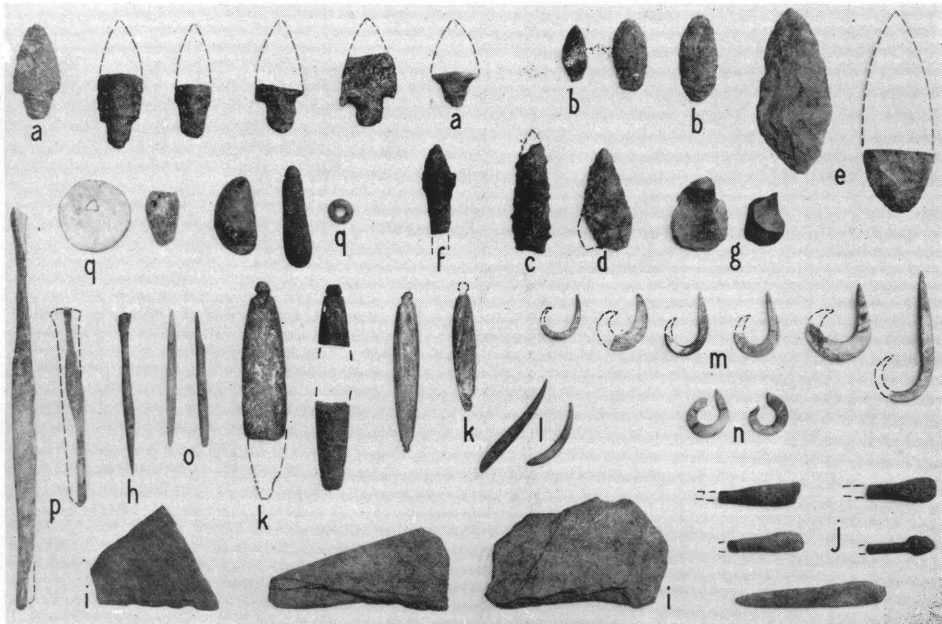


Fig. 43. Miscellaneous Artifacts from Various Levels, Midden I, Cerro Colorado. a, Variations of stemmed points, Levels A, B, D, D, E, G; b, Double-ended points, Levels E, A, C; c, Triangular point, Level A; d, Variant of triangular point, Level B; e, Lanceolate points or knives, Levels B, A; f, Drill, Layer B; g, Endscrapers, Level D; h, Awl, Level C; i, Stone saws, Levels B, G, G; j, Stone files, the upper four, worn and broken, Levels E, F, D, F, C; k, Composite sinker hook weights of bone, stone, and shell, Levels D, B, C, C, B; l, Composite sinker-hook barbs, Levels E, B; m, Shell fishhooks, Levels F, G, A, D, D, C; n, Shell fishhooks, unfinished, showing cutting by sawing and filing, Levels E, C; o, Bone fish harpoon forepieces, small late variants of the larger form, top and side views, from a test pit in material of same age as Level A; p, Guanaco bone chip-ping tools, Level C; q, Shell and stone ornaments, Levels E, F.

should be classed with the unilateral or bilateral sets. Accordingly, we have lumped them together as indeterminate examples.

A comparison of the surface material with that recovered from the excavations shows that our surface series includes all the forms found in the midden. The classifications are applicable to both groups, eliminating the necessity of a separate

or any further working is so small as to be almost negligible (Table 6, Group V). The percentage of these flakes which may have been utilized (Group V-2, 4) is far smaller than among those of chalcedony, for the latter is the common material for projectile points and small tools. In both middens a certain number of unworked basalt flakes with edges, or portions of edges, show varying degrees of smoothing

TABLE 7
EXCAVATIONS AT TALTAL
DISTRIBUTIONAL ANALYSIS

	Midden I								Midden II								
	A	B	C	D	E	F	G	H	A ₁	A ₂	B	C	D	E	F	G	H
Stone																	
Chalcedony flakes, unworked	1100	930	266	431	480	227	331	20	303	600	2305	1290	2132	2350	2246	162	215
Chalcedony flakes, nicked edges	16	12	3	5	11	7	9	—	4	11	78	31	49	28	40	9	2
Sidescrapers: single edge	13	18	6	10	20	13	3	1	3	17	46	23	23	16	32	2	—
two edges	1	1	2	1	5	2	3	—	1	3	6	7	3	6	18	—	—
two edges, reversed	—	1	1	—	2	1	—	—	—	1	1	—	—	—	2	—	—
two edges, narrow, keeled	—	—	—	2	1	—	—	—	—	1	3	—	—	—	—	—	—
two edges, large, keeled	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Endscrapers: hafted, large	2	—	—	—	—	—	—	—	2	—	2	—	4	2	2	—	—
hafted, small	1	2	—	—	—	—	—	—	2	—	12	9	4	8	9	—	—
Flake knives	5	—	—	—	2	—	—	—	—	—	6	3	2	3	1	—	—
Blanks and unfinished	13	14	14	19	18	7	—	—	5	11	33	36	43	21	42	5	1
Points: or knives, lanceolate	5	3	—	—	—	—	—	—	—	—	4	—	1	—	—	—	—
double ended	—	2	1	—	1	—	—	—	3	2	14	7	23	13	—	—	—
similar above, concave base	—	—	—	—	—	—	—	—	—	—	1	1	1	2	2	—	—
narrow, slight stem	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
squarish stem	—	—	—	1	—	—	—	—	—	—	—	—	—	—	5	—	—
rounded, tapered stem, no barb	5	2	—	1	1	—	1	—	2	3	4	1	2	1	—	—	—
stemmed and barbed, large	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
arrow, stemmed and barbed	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—	—	—
arrow, triangular, straight base	—	—	—	—	—	—	—	—	—	2	16	4	—	—	—	—	—
arrow, triangular, thick, straight base	—	—	—	—	—	—	—	—	—	—	—	—	3	1	—	—	—
triangular, concave base	—	1	—	—	—	—	—	—	—	—	7	—	—	—	—	—	—
triangular, variant	—	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
indeterminate fragments	17	10	3	2	—	3	6	—	1	9	32	14	33	21	10	1	—
Drills	—	2	—	—	—	—	—	—	—	—	4	—	2	—	—	—	—
Hammerstones, cobblestones	—	1	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—
Mortar, flat	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bowls	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
Saws	—	5	2	10	8	8	12	1	3	—	5	7	12	30	36	4	—

due to wear. Among these we have recognized no conformity in shape, size, or type of edge. With a lens, one can occasionally see on the worn surface, fine scratches which run lengthwise to the edge. These flakes, at least, have been used like saws or knives and not as scrapers. As we have found very simply prepared stone saws with the same type of wear in all layers, it is probable that some of the unworked flakes have also been used as sawing tools for the same purpose. In any event, after an examination of the flakes, we are forced to conclude that, although some were used with or without further preparation, the core-like objects are truly definite tools and were the primary objective and the flakes are a by-product.

Reconsidering these, we must first admit the impossibility of demonstrating positively which of the roughly flaked tools conform to the pattern the makers had in mind and which are rejects. Very few show the effects of wear or use along the margins. The edges of only three of the Cerro Colorado surface finds are smoothed as though they had been used as scraping tools. A few are somewhat battered, but these are generally coarse, heavy specimens, lacking a possible cutting or scraping

edge, and suitable for little else than hammerstones. In the middens of Tierra del Fuego where many whalebone objects occur, one finds unfinished whalebone pieces with the surface pecked by such roughly made stone choppers as are found with them. As previously mentioned, the Fuegian and some of the Taltal specimens duplicate each other, but at Taltal the proportion of choppers to the total number of specimens is considerably higher, and the amount of whalebone used is far less than in the south, so their use is not confined to working whalebone. As in Arica, we are forced to admit that we have no sound explanation of their use. We do, however, feel justified in offering the suggestion that the Taltal specimens listed in Groups II, III, and IV were intended for the same purpose as the coarse stone objects classed as Group I and occurring throughout Chile and even in North America.¹ We also believe that their distribution in the middens disproves the theory that they can be attributed to any one specific period. Also, they do not represent a primitive stage of technical development, since they are accompanied throughout the middens by objects showing a more advanced method of manufacture.

FINE STONEWORK

The more finely finished chipped stone artifacts are made in both percussion and pressure techniques. With the exception of a few basalt knives or blades (Table 7) all are made of fine-grained siliceous stone, principally chalcedony. Its source is said to be on the pampa somewhere inland from Taltal where a great quantity of flakes and rejects are reported. That much of the final finish of the objects was done at the midden sites is demonstrated by the quantity of flakes found at all levels in the excavations.

The range in forms, their number, and distribution are recorded in the analysis (Table 7). It must be remembered that the majority of these specimens are broken; that when the original forms of the fragments cannot be accurately identified they

are grouped as indeterminate. For convenience, they will be described in the order of their listing in Table 7.

Flakes, with Nicked Edges. The simplest tools found are unworked flakes with edges slightly nicked as a result, in most cases, of their use for cutting. There is no uniformity in size or shape among them.

Sidescrapers. Sidescrapers occur rather uniformly throughout the middens and, as usual, are principally of the single-edged form. The variants follow the usual patterns (Table 7). Only the double-edged keeled variety are illustrated (Fig. 44h).

Endscrapers. For the first time in the course of this work endscrapers (Figs. 43g,

¹ Toulouse, 1941, 263, Pl. 21. Some examples have been gathered at Angol, Isla de la Mocha, and along the coast near Valparaíso.

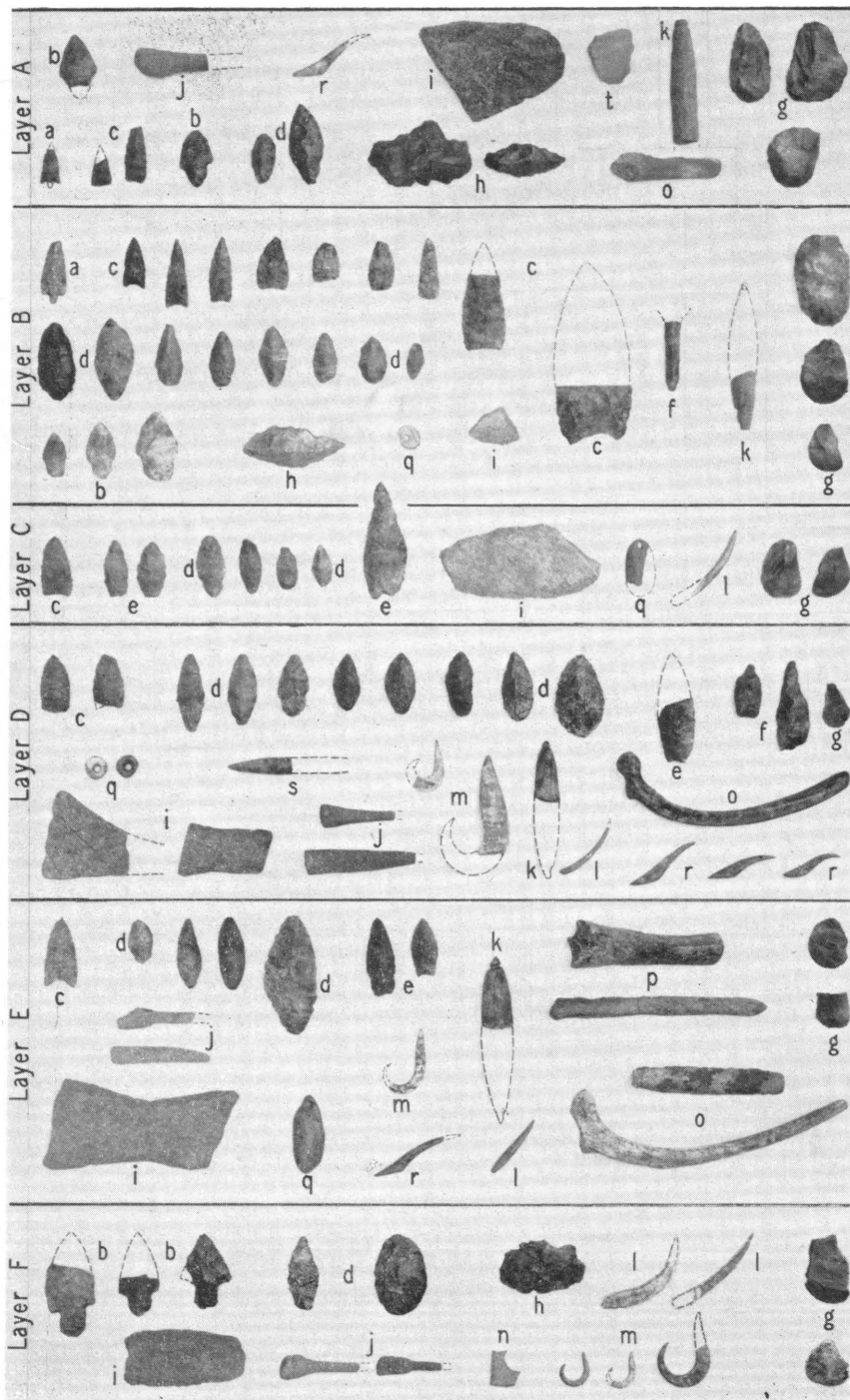


Fig. 44. Miscellaneous Artifacts from Successive Levels, Midden II, Punta Morada. a, Stemmed and barbed arrowpoints; b, Larger stemmed points; c, Triangular points showing range in size and form; d, Double-ended points; e, Double-ended points with short concave or straight bases; f, Drills; g, Endscrapers, hafted type; h, Narrow double-edged sidescrapers, keeled variety; i, Stone saws; j, Stone files; k, Composite sinker-hook weights; l, Composite sinker-hook barbs; m, Shell fishhooks; n, Fragment of unfinished shell hook showing cutting by sawing and filing on the curved margin; o, Chipping tools made of sea lion bones; p, Guanaco bone shipping tools; q, Beads and ornaments; r, Bone barbs for harpoon forepieces; s, Bone fish harpoon forepiece; t, Plainware sherd. The specimens in Layers G and H were too fragmentary to photograph.

44g) appear frequently enough to be considered a standard part of the regular equipment. They are listed as large and small, not because there is much difference in size, but because the smaller ones conform to the size range of the small hafted scrapers of southern Chile, and could be mounted in similar handles, while the others are slightly too big for this type of hafting.

Flake Knives. Flake knives are only ordinary thin flakes with edges, bilaterally chipped, duplicating ones seen further north.

Projectile and Knife Points. The most abundant points are of the double-ended variety, pointed at each end (Figs. 43b, 44d). These are generally proportionately broader and thinner than those at Quiani, Arica. Most of them range in length between two and 4.5 centimeters. Frequently the basal ends are poorly finished and reveal that they have been worked from prismatic flakes struck from cores with prepared striking platforms. Obviously, the usual practice in shaping these points has been to use the thicker end of the flake for the rear or base, and often a portion of the original striking platform surface remains. This was also noted on points of the same form from the northern middens.

The bulk of the remaining points listed are variants or closely related to the double-ended forms. Occasionally the rear end is slightly concave apparently resulting from an attempt to reduce its thickness rather than a desire to achieve a definite pattern (Fig. 44e). With the thick portion of the flake remaining at the rear of the point it is probably in some cases easier to thin it by pressure directly against the end rather than at an angle from the sides. In others, the rear end has been thinned by secondary, lateral chipping, giving the effect of a tapering, rounded stem (Fig. 44b). These grade, with so little apparent distinction, into forms which are almost twice as wide across the blade as across the widest part of the stem that they are grouped together in the analysis (Table 7).

Not very different are a few points re-

ferred to as squarish stemmed. In these the sides of the stems are parallel, the bases rounded. Again, there is no clear-cut pattern. A single point has slight recurving barbs and although this is listed separately, it is doubtful if it represents a type.

Distinct, however, are the three stemmed specimens from Midden II, all from the pottery-yielding, topmost layers (Fig. 44a). These, obviously for arrows, are small, light and thin, with small, short, straight-sided or slightly tapered stems, three and four millimeters wide.

Also constituting a separate group are the triangular forms (Figs. 43c, 44c): small thin points with straight and concave bases, found mainly in the pottery-bearing strata, with some appearing somewhat earlier. Others with the same outline and similar size are older, but are characteristically thicker. That these last are also projectile points is shown by the type of fractures on the tip.

Objects which are obviously knives are noticeably lacking. The one good fragment (Fig. 43e), a large lanceolate form, was in the top layer of Midden I. The other fragments so listed are poorly made, perhaps unfinished.

Unfortunately, except for the lanceolate form just mentioned, these excavations did not yield any of the skilfully made large thin blades of varying forms for which Taltal is famous. These rank with the best chipped stonework produced in America. Many outstanding examples are in the Museo Nacional de Historia Natural in Santiago, but little or no information is recorded as to associated artifacts, even when they were recovered from graves (Fig. 45). One might infer that they are a very late feature, if not post-pottery, at least very close to it. In the comment on a post-Columbian burial from Caleta Vitor, south of Arica (p. 250), a large stone knife with cloth handle is mentioned. This blade is like some of the Taltal forms, though not of unusual workmanship. Naturally it does not prove that these were made at such a late date.

All the fragments of bilaterally flaked blades of basalt were tips, and unless the

originals were pointed at each end it is impossible to state their form. These range in width between two and three centimeters. Their rather coarse flaking can be attributed directly to the character of the material.

Drills. Except for two questionable specimens, the drills are all from the later refuse (Figs. 43f, 44f). All were fragmentary and show no fixed pattern.

them from the more battered of the roughly broken stone artifacts.

Stone Bowls. Stone bowls like those first noted at Arica occur here. Two fragments, well spaced in the refuse, indicate that these were known during most of the time these middens were accumulating. The presence of only two other fragments among the surface finds suggests that they were never very common.

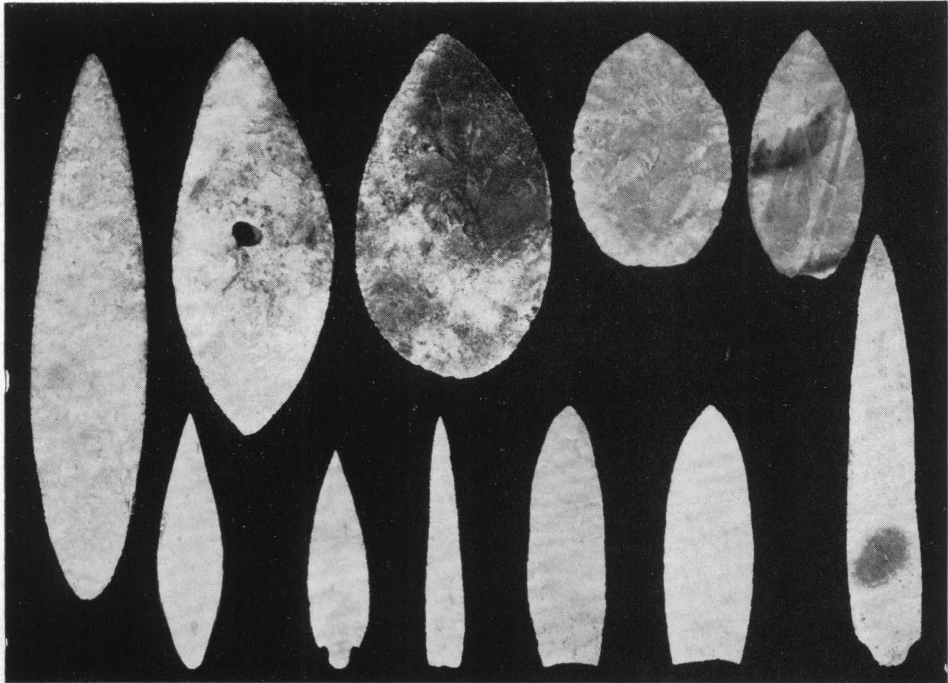


Fig. 45. (11918, 7473, 7472, 9820, 8714, 8953, 12010, 11920, 7256, 8822, no no., Museo Nacional de Historia Natural, Santiago.) Examples of Finely Made Stone Artifacts from Taltal Graves. Upper row, second blade, "Cementerio de los Vaso Negros," third blade, "Cementerio de cemeterio," the remainder from Taltal; lower row, fourth point, "Cementerio de los Vaso Negros," the remainder from Taltal. Length of first blade, upper row, 28 cms., thickness, 7.5 mms.; thickness of third blade, upper row, 7 mms.

Hammerstones. In view of the large quantity of stonework, there are surprisingly few hammerstones. Those listed (Table 7) are of cobblestones and somewhat misrepresent the situation, as there were various lumps and fragments of basalt which have also been used as hammers. The latter were not listed because of the difficulty of clearly distinguishing

Stone Saws. Distinctive of the Taltal middens is the abundance of thin, flat pieces of sandstone which have been used as saws (Figs. 43i, 44i). They range in thickness generally between three and five millimeters, but have no definite form. The edges are sometimes slightly convex in outline, but far more often are concave. Complete specimens are roughly twice as

long as wide, the long edges are those which have been most often used. Triangular examples sometimes show wear on all edges. The first step in preparing the edges has been to thin them slightly. Occasionally this has been achieved by coarse bilateral flaking, probably by percussion; wear from use did the rest. With well-worn edges, the angle between the two faces or bevels of the edge ranges from thirty to forty-five degrees, with the apex rounded off.

It will be noted that these stone saws are most abundant toward the bottom of the midden and practically drop out of use at the top. Comparing this distribution

with that of other objects gives no clue to their purpose. The nearest parallel is the distribution of the fishhook sharpeners. Actual trial shows that the stone saws are suitable for cutting shell and bone, and as the marks produced duplicate those seen on shell fragments this may well have been their purpose (Figs. 43n, 44n). If used for cutting stone the edges would have become more blunted or rounded, and probably fewer would have concave profiles. One thing is certain; they were not used in deep cutting as the wear does not extend up the sides.

FISHING GEAR

After working at Arica and Pisagua one is immediately impressed with the lack of the cigar-shaped sinkers at Taltal. Instead, we find the composite sinker-hooks associated with the *choro* shell fishhooks as in the lower strata at both the northern sites.

Composite Sinker-Hooks. Distributed unevenly, their greatest concentration is just before the appearance of pottery (Figs. 43k, 44k). Here, in addition to stone and whalebone weights, the thick portion along the straight margin of the *choro* mussel shell was used. This automatically limits the size of the weights. Thus shell weights almost never exceed 8.5 centimeters in length, while those of stone and bone may be sixteen centimeters.¹ These weights all have a single incomplete groove around the upper end and several notches or partial grooves at the lower end to carry the lashings of the barb which rests in a hollow.

Composite Sinker-Hook Barbs. The few fragments of composite sinker-hook barbs found, vary in size and shape as well as in material. All are curved and may be either round or flattened in section (Figs. 43l, 44l).

Shell Fishhooks. The complete specimens differ somewhat from those of Arica and Pisagua in that the shanks are uni-

formly straighter and frequently longer. As at Pisagua only a single example with serrations on the outer edge of the shank was found, this time near the bottom (Layer F). Although only a small number were found, it is clear that they were in use throughout the occupation (Figs. 43n, 44n). Whether or not thorn hooks were used simultaneously cannot be proved or disproved because of the absence of perishable material.

Fishhook Sharpening Tools. Other distinctive tools of the Taltal midden are the stone files for sharpening and smoothing the inner surfaces of the hooks. At least that is the one plausible explanation of their shape and wear. Made of a schist-like stone they have been pecked and ground so that they are rounded or oval in section, tapering to a blunt end. The shortest perfect specimen measures four centimeters in length; the largest, if unbroken, might have been eight centimeters. Continued use results in a residual mid-portion, oval in section, with sides more nearly parallel than the object had when new. In worn examples the portion used as a finger grip retains its original size, while just beyond the stone may be worn to one third its original diameter. Lines of wear run lengthwise (Figs. 43j, 44j).

The greatest objection to accepting the suggested explanation of their use is their absence at Pichalo. With over two hundred hook fragments, no sharpening tools

¹ These measurements were taken from perfect specimens in other collections. All found in these excavations were broken.

were found, while at Taltal we found nearly as many of the stone tools as shell fishhooks. Even though decomposition has undoubtedly lowered the yield of shell hooks at Taltal this difference is still difficult to explain.

Fish Harpoons. The objects labeled as fish harpoons in Layers D and E of Midden II are fragments resembling fish harpoons seen to the north. None have the flattened place for seating the barbs, however. The fish harpoon from Layer A1 in the same midden has this flattened tip, but differs in that the bone is round in section back of it.

Test pits in the shallow, sherd-bearing portions of Midden I showed these small rounded-in-section fish harpoons to be a late feature associated with pottery (Fig.

43o). There are many examples of these in the Taltal collections in the Santiago museums. It is clear that this is a distinct variation from those seen at Pichalo, Arica, and the fragmentary examples in Layers D and E of Midden 2 at Taltal (Fig. 44s). Lengths vary from six to fourteen centimeters, with the small ones abundant.

Harpoon Barbs. Completely absent in Midden I, a sufficient number of harpoon barbs (Fig. 44r) was found in Midden II to show that they date back, if not to the beginning of the occupation, at least to early times. This is the only type found in association with shell fishhooks in the north. The spur on each barb is round in section; the portion intended to fit against the forepiece is slightly curved.

MISCELLANEOUS

Chipping Tools. Chipping tools (Figs. 43p, 44p) of guanaco leg bones are like those seen at Arica and Pichalo. Here the length varies from eight to eleven centimeters. The points are blunt or sharp, probably depending on whether or not they had been sharpened immediately before they were lost.

Tools of small unidentified rib bones, perhaps from female sea lions, with blunt, rounded ends had nearly the same distribution (Fig. 44o). The wear on these is not conclusive, so perhaps it is incorrect to class them as chipping tools. Certainly they should not be confused with the *lobo* rib (male) chipping tools of Arica and Pichalo.

Ornaments. In addition to the ordinary shell beads, ornaments found in the midden

consist of a few stone beads and several simple pendants, naturally shaped small stones with a hole or groove for a suspension cord (Figs. 43q, 44q).

Sherds. The few sherds, all found within a few centimeters of the surface, are body sherds of cooking pots and tell little. They are important, however, in that they prove that both middens were occupied up to and some time after the introduction of ceramics without any visible break in the sequence.

Cord. A single fragment of woollen cord only emphasizes the extent to which perishable material has disappeared. Its location in Midden I, Layer B, suggests a late date for whatever perishable material this site has yielded.

CONCLUSIONS

The tests made at Cerro Colorado and at Punta Morada show a cultural history for this section, which up to the introduction of pottery was more stable than at either Arica or Pichalo, with equipment corresponding to that found at the bottom of the middens at both places, plus an additional item, the small stone file, and the common occurrence of sandstone cutting or sewing tools. No other new elements occur

before the introduction of pottery, at about which time small fish harpoons, round in section, and stone arrowpoints appear.

It is not necessary to elaborate further our discussion of the coarse percussion flaked stonework. It is sufficient to note that no trace of a strictly percussion technique period was found.

Comparison of the yield from these two excavations, with collections previously

gathered, especially where surface finds are well represented, shows that the middens lack apparently common items. Among these may be mentioned oval whetstones, perforated at one end and with slightly beveled faces; bone harpoon barbs with a square tenon or projection carved on the portion in contact with the shaft of the forepiece; chipped stone blades eccentrically triangular with an elongated corner or spur for use on harpoons; and large, beautifully flaked lanceolate-shaped stone knives.

Seemingly, all these were late introductions used long enough to become common near the surface, but not long enough to

appear under an appreciable amount of debris. Other less common items like bone fishhooks, of the same pattern as those of shell, may either be late arrivals, or else are so rare as to have failed to appear in the sections excavated.

It has been suggested that these sites were abandoned before the introduction of pottery. That cannot be strictly true, but may be so if the suggestion is restricted to decorated pottery. In view of the local conditions and terrain it is doubtful whether more than a very small population could ever have supported itself by agriculture. It is not surprising, therefore, that occupational material of the coastal-agricultural people is rare.

COQUIMBO AND LA SERENA

The Elqui Valley, with La Serena as the old commercial center and Coquimbo as its seaport, as has been mentioned, marks the northern limit on the Chilean coast for the production of crops on un-irrigated ground. Actually, nearly all farming is carried on only with irrigation. It is not clear whether or not this was the practice when the first Europeans arrived as the historical records are extremely meager. Our knowledge of the native inhabitants is drawn principally from archaeological evidence.

Various sites in the valley and adjacent areas have yielded burials with distinctively decorated ware to which has been applied the geographical name, Diaguita. Examples of this ware have been found in Chile, as far north as Caldera and as far south as the Rio Choapa, with the focal point in the Elqui Valley. Basically, the same culture extends over the mountains into Argentina, but whether it developed there or in Chile remains to be seen. Obviously, it existed at the beginning of the historic period, for ceramics are found showing a blend of Inca and Diaguita art and it is known that the Inca invasion was too late and too short to replace or materially alter local styles.

Because the Diaguita ware is attractive and the tombs fairly common and easy to locate, large collections have been made. Interest in the local archaeology has been focused on this culture and little or no attention devoted to the possibility of gathering older material. That the area does have remains of at least one other culture was demonstrated by the work of Señor Francisco Cornely.¹ In 1938 he discovered several tombs yielding a hitherto unknown type of well-made, smooth gray-brown ware distinctive in form from the Diaguita. It is associated with beautifully made stone labrets and T-shaped pipes, neither of which occur in Diaguita graves. In both cultures copper was used for ornaments and tools. Both seemed to have depended primarily on farming for food and, although house ruins are lacking,

the size and distribution of the cemeteries suggest that the people lived in small scattered communities or family groups.

In view of the previous work, in the short time available our own efforts in this area were devoted entirely to a search for sites which might yield chronological data. It was hoped that in or near the Elqui Valley mouth we could locate a coastal site with both pre-agricultural and later material, but nothing really satisfactory was seen.

At Punta Teatinos, a rocky promontory at the northern side of the Elqui Valley, several Diaguita graves have been uncovered.² For a considerable distance along the southern side of the point shell refuse is scattered. As part of this lies along the crest of a barranca and on sloping ground, the appearance of an extensive midden is created. Closer examination reveals that most of it is only a few centimeters thick. This increases slightly on the area in front of the row of small houses which constitutes the present settlement. Maximum thickness probably does not exceed the scant meter and a half revealed by a test pit on the crest of the thickest portion which covers a very small section at an elevation of about eight meters.

This pit, measuring 1.10 by 1.65 meters, yielded 1067 sherds, but little else. According to the field classification, sixteen have red slip, eight are painted black, red, and white, typical Diaguita ware, but in fragments too small to reveal design. One is a smooth gray-brown ware, the type discovered by Cornely. The remainder of the sherds are from cooking pots. This material is divided into eight lots, representing the divisions selected for sifting and these show the slipped and painted pieces scattered from top to bottom and the single gray-brown sherd located about two thirds of the way down to the bottom.

About all we can learn from this is that the Teatinos shell refuse is largely, if not entirely, the product of the Diaguita occupation; that as no pre-pottery refuse was seen beneath it, the chance of securing older material is slight.

¹ Cornely, 1940.

² Mostny, 1941.

Across the small tidal estuary and stream at the south side of Punta Teatinos is an exposed sandy beach curving across the mouth of the valley, eighteen kilometers, nearly to Coquimbo. This is backed in part by a strip of low sand dunes covered with grass and low bushes. Concentric with the beach are various strand ridges increasing in elevation in proportion to their distance from the water, evidence of recent land rise. These continue inland to higher marine terrace formations, marking more ancient tectonic movements. Between the strand ridges are small ponds and low strips of fertile land, part of which can be cultivated without irrigation. The portions of this area examined had numerous, though very thinly scattered traces of occupation, generally confined to the ridges and dunes. Several explanations may be offered, but the most important is that camps or huts can be made almost anywhere with no reason for continuous or consecutive use of any one spot.

In view of the predominance of Diaguita ware in local collections, one might expect sherds of this ware to be fairly common, but in this coastal zone they are actually quite rare. Far more common are fragments of the smooth gray-brown pottery which ranges in some instances to black and is here frequently decorated with fine incised lines. In an unsuccessful attempt to recover a sufficient number of sherds to reconstruct some of the designs, the surface of a small dune, not far south of Punta Teatinos was sifted. Three hundred and forty-eight sherds were secured, of which nineteen are incised, seventy-eight are smoothed or polished, and only one, found on the surface, had the red paint or slip of Diaguita ware. With these, were five rough chopping stones similar to Group II, Taltal classification. It was obvious from the position of the assorted shell fragments and stone flakes that the surface of this particular dune had not altered appreciably since it had been lived on. As there was nothing to distinguish it from the neighboring dunes we can assume that the inland portion of the dune area has been fairly stable since that time.

Slightly more than a kilometer to the

south, beyond the limits of Coquimbo, is the most protected small bay in northern Chile. Known as Herradura de Guayacan, it is slightly over two kilometers in diameter with an entrance about one half a kilometer across. The shore about the entrance is rocky, while on the east side of the bay it is low and sandy, with a few dunes bordering the beach. On the south it is backed by a marine terrace thirteen meters high on its outer edge. Two small brooks draining the land to the southeast intersect a portion of this, but as the present running water is mainly overflow or seepage from a modern irrigation system there is no certainty that these furnished a dependable water supply in the past. As fish and shellfish are available it would seem an unusually favorable location for a coastal fishing population, especially if balsas or rafts were used; yet, no important shell-heaps are extant at present. It may be that there was refuse where the village of Guayacan and the smelter slag dumps now are, though no evidence of any was seen. A small shell deposit does exist on the promontory at the north side of the entrance. This is scattered irregularly over a slope beginning just back of a small beach known as the Playa Blanca up to an elevation of slightly over six meters. This and the immediately adjacent area have been so thoroughly test pitted in recent years by persons seeking a treasure reputedly left by Drake that little of the shell refuse remains undisturbed. The pits show that sixty-five centimeters is the maximum thickness, that the structure is quite uniform, and that its bulk consists of *loco* shells. A careful search failed to produce a single artifact or even stone flakes so it does not appear to have been a habitation site, but rather a place where the *loco* gatherers may have discarded the shells to lighten their loads.

The only other shell deposits are to be seen among the dunes along the eastern shore. Here recent excessive cutting of bushes for fuel and over-grazing have started the dunes moving. Small shallow patches of shells, generally marking the location of temporary single family camps, lie exposed or are being exposed. These

consist almost entirely of *machas*, a thin-shelled, triangularly shaped clam which lives in the adjacent beach between high and low water mark. Shells of this species observed in middens become brittle with age so it is worth noting that in these piles they are firm and hard like fresh examples. This condition cannot be due entirely to the situation, but must bear some relation to their age.

Artifacts were too scattered and irregularly distributed to record them in units, so all have been grouped together. Of

hausting the available supply. They occurred generally over the site, with as many as six associated with one small patch of shells, sometimes with pottery, sometimes without. Some lying with shells were weathering out very close to the present beach at an elevation of less than one meter above high water mark. The significance of this observation will be explained later. In length these objects range between thirteen and twenty centimeters and in weight from 332 to 1730 grams. The range in outline is covered by

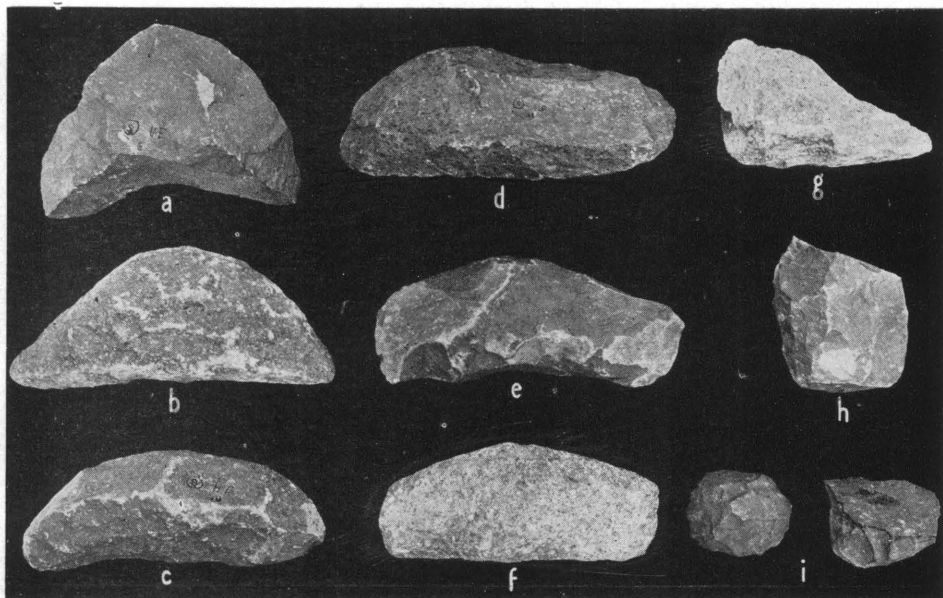


Fig. 46. Coarse Percussion Flaked Stone Objects from Herradura-Guayacan Bay, Coquimbo. a-f, Objects roughly pointed at each end, showing range in form, f has slight groove at center made by pecking; g, Artifact roughly pointed on one end, but presumably for same purpose as a-f; h, Core-like object flaked from two planes; i, Core-like objects flaked on entire circumference, two views.

the forty-six sherds seen five were painted Diaguita ware, two polished blackware, and the balance undecorated cooking pot fragments. Lying, in some cases with the sherds, were twelve rough percussion flaked tools belonging to Groups I to IV (Taltal Classification). (See Fig. 46h, i.)

Most abundant was another type of roughly flaked object, pointed at each end (Fig. 46a to f), resembling certain specimens from Taltal (Fig. 39g). One hundred and forty-four were collected without ex-

the selection shown in Fig. 46. Several types of stone are represented, but the majority are either granite, diabase, or diorite. As might be expected with these materials the flaking is crude and irregular and in a few cases projections were reduced by battering or pecking. One (Fig. 46f) has a very slight groove pecked part way about the center, apparently an attempt to prepare it for attaching either to a cord or handle.

Three similar objects which seem to be

variants of the preceding group are flaked to a point at one end only. One of these is shown in Fig. 46g. They duplicate the pointed objects from Taltal (Fig. 40), except for the more ragged flaking and somewhat blunter points due to the nature of the stone used. Whether these and the double-ended artifacts served the same purpose as those from Taltal remains to be seen.

An examination of the entire series fails to show any evidence of wear or characteristic breakage from use. Why so many should be concentrated at this site is a mystery. It was not a workshop. Although twelve battered hammerstones were found with them, flakes of the materials used were relatively rare or absent. The location of the site and the refuse implies that the activities here centered about shellfish gathering and perhaps fishing. As digging tools for the *machas*, they would be clumsy and ineffectual and if so used should show wear. As weights for some type of nets or fish lines they differ from all recognized forms and moreover seem far heavier than necessary.

Failing to locate any important concentration of refuse in this area attention was devoted to a location where natural agencies had resulted in such a rapid accumulation of soil that the limited evidence of occupation was well expanded. This was near the southerly end of the Herradura Bay beach, just inside the entrance to a little valley, the northernmost of the two which drain the area southeast of the bay. Here, just inside the boundary of the property of Señor J. J. MacCaullif, who very kindly permitted us to examine the site, was a small sloping area where dust and sand, carried by westerly winds, had settled. This was augmented by additional dirt and stone fragments and, near the bottom, with a little clay and sand left by flood water washing down from the higher ground directly above. Drainage from the modern irrigation of fields above the slope has cut deep gulleys, carrying away much of the fill, but leaving an isolated block of it intact. Streaks of shells, broken stones, and small fire hearths are visible in the face of this block to a depth

of 3.18 meters. A section of this, measuring two by three meters, was separated into fourteen levels following the strata which were sifted.

The yield was meager, thirty sherds, of which two were painted Diaguita ware and one, slightly older, with fine incised decoration, occurred at a depth of 95 centimeters, a few rough "chopping" tools lying both with and below the sherds, a few triangular projectile points, worked bone fragments, a mano, and various stone flakes. The large rough tools found on the dune area were not represented. All told it amounts to little and, though the presence of a non-pottery using people is suggested, clear connection with the sequence seen at Taltal and northward is lacking. The significant fact, however, is that the oldest fire hearth rested on a clean, water-laid marine sand, containing modern marine shells. Its surface is now 5.17 meters above maximum high water mark. If any appreciable time had elapsed between its formation and the making of the first campfire such a period should have been visible as a sterile stratum. Lacking this, we can assume that there has been a local land uplift of 5.17 meters since the first use of the site. If this is so then the camps among the dunes which rest on land of lower elevation cannot possibly yield any artifacts belonging to the oldest occupation. As already mentioned some of the refuse there lies below an elevation of one meter, so the rough stone objects with it must have been used at a relatively late date.

About five kilometers south of Herradura Bay is a small rocky promontory known locally as Punta Tacho. It is almost an island, as a steep cut, through which the surf breaks at high tides, separates it from the mainland. In places the sides overhang deep water and elsewhere are so steep as to make access difficult. Its crest is thirty-five meters above the water and below this the rock is very broken and fissured. The largest bit of level ground is in one of these cracks, about fourteen meters long with the width varying irregularly from two to five meters.

One would not normally expect such a location to have been used for habitation,

especially as there is a better situation within a hundred meters on the mainland which has been occupied. This latter location has a small deposit of shell refuse with a maximum thickness of about one meter. A few painted sherds with Diaguita designs are scattered over the surface and may occur with the plain sherds which were mixed with the shells.

Perhaps the promontory served as a refuge; at any rate, sherds were far more plentiful there in the cracks and pockets among the rocks. As the fissure referred to was not subject to erosion the tangled growth of bushes and plants in it was removed. Most of the floor had already been disturbed either by treasure hunters or persons seeking Diaguita burials. Where undisturbed, Diaguita sherds lay on the surface of the soft dark humus and were abundant down to an average depth of fifteen centimeters and a maximum of thirty where the top layer expanded. With them were shell fragments, mainly *locos*, and weathered bits of granite. Shell refuse continued to a depth of fifty to fifty-five centimeters, but yielded absolutely no artifacts. The entire accumulation was sifted, using various arbitrarily selected levels.

Over thirty-six hundred sherds were recovered in this crevice alone, but almost no other artifacts. About thirty-eight per cent of them are painted or have the same slip as the painted ware. Less than two per cent are smoothed or polished gray-brown to blackware and of these less than half have fine incised line decoration. A few of the latter have had a white powder rubbed into the incisions after firing. The remainder of the series are cooking vessels.

A check of the types from different horizontal divisions of the sherd-bearing portion shows no positive sequence. Incised sherds and pieces of the same ware were scattered from near the surface to the bottom of the pottery-bearing layer with most in the lower half. Painted designs, mainly those considered "classic" Diaguita, likewise fail to demonstrate any chronological change. This, however, does not justify the apparently obvious conclusion that the "classic" Diaguita and the incised ware

are contemporaneous. The situation is such that a few sherds might have slipped down from above. Also the soft humus and dirt in which the sherds lie is so shallow, that even the growth and decay of shrubs and cacti could disturb the original distribution. Significant, too, is the abundance of sherds on the uneroded surface, showing that the formation of humus and the accumulation of bits of weathered granite in a period of at least three hundred years is negligible. This means that some mixing of older and later sherds must have occurred. Thus the material found has positive significance only as it relates to the geographical distribution of types and perhaps to their relative proportions.

Beyond Punta Tacho none of the coast was examined, except for a hurried visit to Punta Tongoy, about thirty kilometers to the south. This seems an ideal location, yet only superficial refuse was noted. To the south and west of the point, for about twelve kilometers, the shore of Tongoy Bay is sand and gravel beach. At its juncture with the high rocky ground which runs out to form Lengua de Vaca is a small accumulation of midden refuse which might be worth investigating. It has been opened by people seeking Diaguita graves, but most of it is undisturbed. The open pits show that it consists mainly of *loco* shells from the adjacent rocky shore and is over a meter thick in places. Diaguita sherds occur well down and with them are fragments of large, straight-sided urns with flaring rims. The only point in mentioning this site, at this time, is that various examples of the rough chopping tools of the more common forms listed under Group I (see Table 6) were clearly associated with the Diaguita sherds in the walls of the pits, as well as on the surface.

Directly south of Tongoy Bay, perhaps two kilometers from the beach, are the main buildings of Estancia Tangue, the most northerly important sheep farm on the coast of Chile. Indicative of the local climatic conditions and vegetation, is the necessity generally of shifting the animals to higher mountain pasture during the summer months. Though most of the land may become parched in summer very

limited areas in the small valley bottoms remain moist or have water available for irrigation. These have been utilized to some extent by the Indians as shown by habitation sites on the vega near the farm buildings. Several small low hummocks, varying in outline and size, resemble natural irregularities in the surface. They may perhaps mark such irregularities, but a test pit in one shows only habitation refuse consisting principally of sherds and dirt. The sherds, typically Diaguita, were found to a depth, probably maximum for the most obvious hummock, of 1.65 meters. With them, from top to bottom, were more fragments of the large urns first seen at the site near Lengua de Vaca. They are a very coarse redware up to three centimeters thick, with angular designs painted in red, white, and black, apparently after firing. Judging from fragments, the diameter in one case may

have been a full meter, with the mouth as wide as the body. As far as I know, these have not been found in the burials and hence have not been reported.

We were unable to devote the time necessary for a more thorough examination of this site. A preliminary check of the sherd series reveals no marked change in the distribution of design or forms. It is clear that several large series could be secured here, if sufficient care is taken in their excavation, the relationship of the known variations of Diaguita designs and forms might be established.

The foregoing remarks on our investigations in the Diaguita area are not intended as a complete report. When the sherd series is available for examination it can be more fully described. The present comments will at least serve to indicate the possibilities along the coast of this region.

CONCLUSION

The present report covers the main excavations at Arica, Punta Pichalo near Pisagua, Taltal, and a smaller one near Coquimbo, and provides data on the stratigraphy present at each of these locations. As the results of the work at the individual sites have been summarized in each section it is necessary here to add only a few comments on the general relationships. It must be remembered that we are dealing specifically with life along the coast and what occurred there will not necessarily apply to the interior, though we can expect certain parallels.

As stated at the beginning of this report, the coast of northern Chile is distinctly divisible into two regions of about equal size. In the north a non-agricultural people was dependent on the sea for their food. In the southern area seafood was supplemented by land game. As the amount of arable land in both of these areas is strictly limited, the introduction of agriculture, although it marked a cultural break, did not completely replace the former food sources.

At Arica three major periods were defined, one with pottery, two pre-pottery. The oldest period, represented by a thin accumulation at the bottom of a pre-pottery midden, has been designated the "shell fishhook" period for one of its distinctive artifacts. It closes with the disappearance of these hooks and other items. The second period begins with the simultaneous appearance of several new items and continues until the beginning of agriculture. In one midden the very first evidence of agriculture, consisting of cotton, corn, and calabash, is not accompanied by ceramics, basketry, or textiles. Whether this is accidental or justifies a claim for a very short non-pottery agricultural period is not clear.

Painted ware, the oldest pottery, probably marks the arrival of a new group of people, for various other culture elements occur for the first time coincidental with it. The large sherd series secured fails to corroborate the previously expressed ideas on ceramic sequence for this region, but

does reveal some changes in the course of time. Designs and forms which have been described as Chinchá-Atacameñian occur in sequence, but mixed throughout with what has been considered pure Atacameñian ware. The only evidence of influence from the Tiahuanaco culture of the highlands was the rare presence of sherds foreign to the general ceramic pattern at Arica. Contrary to previous ideas, these occur long after the use of pottery was established. It is interesting to note that Inca influence was likewise of minor importance. A few Incaic vessels have been taken from graves at Arica, but they are absent among the excavated sherds. Apparently, in spite of its proximity to the highlands, this district had only slight contact with the cultures which developed there. This may be due to the difficulty of travel combined with the relative unimportance of the Arica district, with its limited possibilities for land development and the absence of other advantages.

At Punta Pichalo, Pisagua, four periods were determined. The first two, covering the interval from the beginning of permanent occupation to the use of agriculture, correspond with the two earliest periods at Arica, the oldest constituting perhaps a third of the volume of the midden. The two later periods have only unpainted pottery. The similarities and distinctions between these and the Arica pottery period are outlined in the table on page 310. Painted vessels of the same types as those found at Arica have been collected here from graves, but the presence of the people who made them cannot be demonstrated in the existing middens. Perhaps Pichalo was situated at too great a distance from good arable land, for the contents of the Playa Miller midden and graves imply that the people there were more dependent on agriculture, the llama, and perhaps the alpaca than were the farming fishermen of Pichalo. Although positive stratigraphic proof is lacking it is probable that the first pottery period at Pichalo antedates the arrival of painted ware at Arica and the sherds in it may represent the oldest types

in this region. The most characteristic pieces, the shallow, red slipped bowls with thickened rims have not been duplicated elsewhere, though the oldest red slipped ware at Ancon and Supe in Peru makes an interesting comparison. Both are accompanied by some polished blackware, coiled basketry, simple weaving, twined rush matting, and a combined coastal fishing and agricultural economy. How close the parallels are and what the distinctions may be remain to be seen.

The Pichalo excavations demonstrate that sewed coiled basketry was not in use before pottery, as has been previously supposed. Nor is there anything to support the suggestion from the Quiani midden that agriculture was practised for a short time before weaving, coiled basketry, and pottery were known. All three are found here, contemporaneous with the first evidence of agriculture. In the cemeteries, where all the previous excavations were made, many graves with textiles, basketry, and farm products had no pottery, a fact which was naturally interpreted to mean that these people did not use pottery. Perhaps a basket-making, non-pottery using farming population existed somewhere in northern Chile, but that was certainly not true at Pichalo.

These two northern sites exemplify the culture differences which may appear on the coast within a relatively short distance. To the south, previous collecting has indicated a strong cultural uniformity, in spite of the insular nature of the communities. Many of the items found at Arica and Pichalo recur without any modification at well separated localities, so the stratigraphic tests at Taltal provide a means of checking on distribution over a considerable distance. Actually the middens at Taltal consist almost entirely of

refuse of the shell fishhook period with sherds confined to a very shallow layer at the top. The artifacts of the shell hook culture differ somewhat from the related material in the north: the pattern of the hooks is slightly modified, squarish stemmed projectile or knife points accompany the usual type of point in the oldest refuse, a small stone tool, classed as a file, is common, and many more small hafted end-scrapers were used. This culture probably survived at Taltal long after it had been replaced in the north, for several of the artifacts of a later date are here incorporated with it in later times. These, the bone fish harpoon, two forms of projectile points and perhaps bolas, are not accompanied by the plain cigar-shaped sinker which was used with thorn hooks as a substitute for both the composite and shell hooks. The absence of this sinker, not only in our own but in the much larger collections made previously, implies that none of the three periods identifiable at Pichalo, following the use of shell hooks, were known at Taltal. Pottery like that found in the upper débris at Playa Miller, Arica, is known at Taltal from rare grave finds, but the absence of the characteristic harpoon points and sinkers which belong with it shows that this culture was not established at Taltal. We can conclude, therefore, that this pottery reached Taltal only by trade.

We found no evidence of a period with only paleolithic type implements. All rough percussion flaked artifacts are contemporaneous with more advanced methods of working stone and with slight variation are distributed the entire length of Chile. Clearly the makers of the shell fishhooks were the people who started the permanent occupation of the north Chilean coast.

COMPARISON WITH OTHER AREAS

The existence of parallels with or direct connections between the coastal cultures of northern and southern Chile has been suggested.¹ This is a logical assumption,

so it is surprising to find such marked differences throughout the known periods of occupation of both areas. It is clear that no direct relationship exists. This is emphasized when we contrast the oldest and most widespread coastal cultures in

¹ Cooper, 1942, 22.

both areas: the shell knife culture of the south and the shell fishhook culture of the north. The following are outstanding features of the former: the use of the mussel shell knife and the whalebone harpoon point and the complete lack of both fishhooks and pressure-flaked stone artifacts. These are sufficient to show the basic differences between the two areas. The only artifacts common to both are the rough percussion-flaked tools, which are too widely scattered geographically and chronologically to be very significant. The great common denominator of the two cultures is their dependence on food from the sea.

The recognition of two such distinct old coastal cultures focuses attention on the problem of their relative age and the extent of contact. The first step is to define the geographical limits of each, but the meager evidence now at hand serves only as a clue. Although remains of the shell fishhook culture are concentrated along the upper six hundred miles of Chilean coast three isolated finds suggest that it extended far to the south. A stone weight for a composite sinker hook and two of the same type of points as accompany them in the north were found in small shell deposits near Llole, south of Valparaiso.¹ A perfect example of the lava bowl, now in the Museo del Colegio de San Pedro Nolasco in Santiago, was found at Tiltal, on the railway between Santiago and Valparaiso. In a large shellmound on Capera Guapi Island, next to Isla Maillen near Puerto Montt, our own work in 1935 yielded two examples of what we have referred to here as stone files. They were associated with a lanceolate-form blade or point quite similar to those recovered with the same objects in the north. These few finds do not prove that the shell fishhook culture extended down through central Chile as far as Puerto Montt, but do suggest that possibility.

No large ancient shell deposits have been reported between Taltal and Puerto Montt, so additional evidence in central Chile may be difficult to secure. In the Puerto Montt

district, however, there are large and numerous middens.² These have never been adequately studied and the extreme scarcity of artifacts in them offers little inducement for investigation. Our own limited observations showed some large deposits lacking pressure-flaked artifacts, with lanceolate stone points confined to later débris. It was concluded that the older portions of the middens belonged to the shell knife culture. This was traced down the coast to the islands near Cape Horn. In the discussion it was suggested that the Puerto Montt-Chiloé Island section was a favorable setting for the development of the shell knife culture, and as yet there is no reason to alter this opinion.

If the shell fishhook culture as we know it in the north had really become established in this same section, such items as the composite hook weights and the stone bowls should have appeared. For years, many of the middens have been "mined" for shells to be burned for lime, offering ample opportunity for collecting the most obvious artifacts. Due to the moisture present, such shells as that of the large *choro* mussel have in many instances disintegrated, so that specimens of the shell hooks might easily be missed. If at all common the stone weights, however, should have appeared. Private collections contain only the lanceolate-form stone blades and, occasionally, drills. It is a pity that the Chilean government has permitted the destruction of these sites without an effort to record their contents, but it is not yet too late to determine their history.

The later periods in the north and extreme south show no connections, except for the occurrence of the cross-stick basket technique among the Yahgan. As these later periods are geographically more restricted there is even less chance of establishing any direct relationship between them.

Another area obviously important to consider is the interior of northern Chile, or at least those portions which have been inhabited. All the material so far yielded

¹ Oyarzun, 1910, Figs. 2, 5.

² Bird, 1938, 253.

MAJOR CULTURE ELEMENTS FROM THREE POTTERY-BEARING HORIZONS			
	Pichalo I*	Pichalo II*	Arica*
Agriculture:			
Corn, Cotton, Calabash	x	x	x
Beans	?	?	x
Llamas	?	?	x
Copper	x	x	x
Textiles	x	x	x
Rush matting	x	x	x
Knotted bags	x	x	x
Coiled baskets	x	x	x
Triangular knife or projectile points	x	x	x
Slings	x	x	x
Pottery:			
Plainware	x	x	x
Painted ware			x
Red slipped, thick rimmed bowls	x		
Polished blackware	x		
Throwing sticks	x		
Bone squid hook barbs	x		
Extensive use of thorns	x		
Pack baskets, crossed-stick foundation		x	
Simple embroidery		x	
Carving (?) tools with teeth as blades		x	
Minute stone tools		x	
Composite combs, single edge		x	
Composite combs, double edge			x
Sandals			x
Top-like objects			x
Rectangular spindle whorls			x
Warp designs in textiles			x
Balsas of three logs			x
Double-bladed paddles			x
Dogs			x
Sinkers, knob projection			x
Sinkers, cigar-shaped, edge flat			x
Bolas			x
Bows and arrows		??	x
Thick stemmed and barbed harpoon points		x	x
Carrying straps		x	x
Dyed yarns		x	x
Warp stripes		x	x
Water bags, knob tied seams	x	x	
Sinkers, cigar-shaped	x	x	

* Pichalo I refers to Layers A and B, main excavation; Pichalo II refers to the chronologically later "Black Refuse"; Arica, to the pottery division at Playa Miller.

by this region dates from the introduction of agriculture, and as might be expected, duplicates the coastal finds from the same period. True coastal sites may not yield agricultural tools, and fishing gear is seldom found far inland, but otherwise there is little difference. The very nature and structure of the region must have fixed the pattern of agricultural expansion, so that any spread north or south was secondary to the occupation of the trans-

verse valleys. Such differences as may be noted are more apparent when the sites lie north or south of each other than when situated east or west, a contrast to the earlier coastal cultures. The population generally was distributed in small, scattered, and isolated communities, minimizing the fusion and evolution of cultures. Such settings breed conservatism, so that local distinctions are more apt to show the variety of the population sources than the

centers of local developments. This is probably the explanation for the varied material in some collections and may over-stress the presence of a culture like the

Tiahuanacan without considering its relation to the whole. It also accounts for the great difficulty in determining the chronology during the agricultural period.

AGE

At present it is practically impossible to gauge the elapsed time since the first human occupation. The data secured fail to provide any scale for even an approximate estimate. We can only be sure that such accumulations as those examined at Punta Pichalo, where the population must necessarily have been small, represent a long occupation. That this occupation may total several thousand years is not inconceivable.

It had been hoped that sufficient material could be secured to apply the tree-ring dating method in this area. Wood sections are available in those graves marked with posts and from large wooden objects in others, but the tree species represented, the *algarrobo* and *pimiento* (*Schinus molle*), are apparently unsuitable for this technique.

COASTAL UPLIFT

Care was taken to note such data as might bear on the question of recent coastal uplift as this is sometimes a key to relative age or helps in correlations. Though inconclusive, the observations made suggest a fairly stable shore line since the beginning of occupation, with perhaps a new upward movement starting somewhat prior to the introduction of agriculture.

Marine terraces of varying ages are found along the entire coast of Chile and a summary of the recorded information has already appeared.¹ This naturally includes far older formations than are necessary to consider when we are dealing only with the time in which human occupation is involved. He gives some idea of the extent and abundance of the evidence of the coastal uplift which has occurred since remote times. Many of the formations referred to by Feruglio are easily recognized as one flies along this coast.

Some of the most regular and clear-cut of the low-level terrace and strand formations are visible in the Coquimbo-Serena area and on the peninsula between Antofagasta Bay and Mejillones. The latter location unfortunately will yield little or no evidence of human occupation, but at Coquimbo careful collecting and study may ultimately indicate the changes which have occurred since the appearance of different cultures in that section.

From the air one is impressed by the recurrence of the pronounced recent wave cutting to be seen repeatedly along the edges of various formations from at least Taltal to Arica. On part of the shore in Taltal and Antofagasta bays this is still an active process, due perhaps to the location and nature of the formations. Elsewhere a slight uplift has placed the base of the most recent wave-cut cliffs and barrancas above the reach of the surf. The impression received is that in recent times the northern coast of Chile has passed through a static or near static period, sufficiently long to leave this widespread and pronounced evidence. No measurements were taken of the difference in elevation of the present water level and the barranca bases. Certainly it does not anywhere appear to be more than a few meters. As none of the older refuse occurs in this narrow zone it would seem that the coast was first settled during the more stable period. In the course of future studies particular care should be taken to record all elevation and structural data on such refuse and burials as may occur at or near water level.

The present work yielded only miscellaneous information from which to draw our conclusions. At Quiani, Arica, the time interval between an uplift of sixteen meters and the first occupation is marked by a twenty-centimeter layer of sand and

¹ Feruglio, 1933, 243-245.

disintegrated rock. This is considerably less than the amount of the same material from the same sources which has built up on this part of the site since occupation.

The oldest evidence of the presence of people observed at Playa Miller rested on clean water-laid beach sand now a meter and a half above the action of the waves. For a while, almost until the introduction of painted pottery, this location was used only slightly. It cannot be demonstrated that the slight early utilization of the site was due to the proximity to water level. It is clear, however, that men were present at the time this spot was first available and may well have occupied a higher portion of the same site earlier. It also shows that not more than a meter and a half of uplift has occurred since the latter part of the pre-pottery period.

At Punta Pichalo, Pisagua, the extensive excavations made for the removal of the "fossil" guano provided an unusual opportunity to check the sub-strata for early evidence of human occupation. Following the rise of the outer portion of the point above sea level, guano, presumably left by birds, accumulated irregularly on the uneven surface. The richest portions of this deposit were removed years ago and there are no records of its thickness or quantity. Today only the less productive areas remain unworked. On these it would be misleading to give any figure for the average thickness of the guano as it occurs in pockets or irregular streaks. Moreover, it is visually almost indistinguishable from the surrounding dirt and may sometimes be mixed with sand and grit which make exact measurements difficult. Above it the overburden consists of disintegrated granite, rock fragments, and powdery dirt, the thickness of the total varying according to the topography.¹ At the base of the rocky hillsides it may be four or five meters thick; further

from the slopes two or more meters thickness is common. It is significant that all the occupational refuse seen occurs in or on some portions of this overburden and none was observed directly on or mixed with the guano. The evidence of the workmen also supports this as they deny ever having seen isolated artifacts imbedded in the guano, though occasionally objects may occur near it.² Therefore, it would appear reasonable to conclude that most, if not all, the "fossil" guano was deposited prior to the beginning of permanent human habitation. If this is true then the maximum coastal uplift since that time must be limited to the zone between the present water level and the lowest level at which the "fossil" guano occurs. It was not clear at Pichalo where this lowest level may be, but an estimate places it between ten and fifteen meters above high water mark. This is not a limit imposed by structure or present day wave action because the rocks nearer the water and at a lower level are well coated with fresh guano deposited in modern times.

At the location of the main excavation at Pichalo the oldest refuse is separated from the "fossil" guano by twenty to twenty-eight centimeters of disintegrated rock and small rock fragments firmly cemented together with brownish dirt which may contain a slight percentage of guano or guano dust. From a purely visual estimate of the material passed and rejected by the sifter, it appears that a sufficient amount of this fragmentary and disintegrated rock occurs throughout the midden, to form by itself a layer several times as thick as the sub-strata had it been deposited unmixed with refuse. This can be interpreted to indicate that the interval between the disappearance of the main source of the guano and the

¹ The exact composition of this overburden and the explanation of its formation would provide the basis for an interesting study. With the prevailing winds from the sea droplets of water are carried inland from the surf and as these evaporate minute particles of salt settle to the surface. With no rain to redissolve and wash this away the amount of salt so deposited must, through the centuries, account for an appreciable percentage of the volume of that part of the accumulation which is not the result of rock disintegration.

² Shortly before our arrival one man who had years of experience found three white chalcedony points, the type designated as double-ended, beneath otherwise sterile overburden "at the level of the guano." From their position he believed them to be the oldest artifacts he had ever seen. The specimens have a slight brownish patination, a feature noted only on the oldest pieces of the same material from our excavations. Another point of the same material and form but lacking data as to its position in relation to the guano, has a chocolate brown patina, nearly a millimeter thick. This is mentioned only because nothing similar was seen on any of the many thousand excavated pieces of this stone at the various sites visited.

occupation of this particular spot was far less than the time which has elapsed since.

Toward Junin from Pichalo where some burials were located is a small land-locked cove ringed by recently formed wave-cut barrancas. The cove provides good fishing as well as kelp for fuel, is unusually suitable for small rafts or balsas, and is readily accessible. The inner portion of the beach is now slightly above the maximum influence of the waves and provides an excellent location for a camp. That it has been utilized is shown by shallow pottery-bearing refuse, but the quantity is negligible compared with the total midden deposit found not far away at higher levels. Although the absence of pre-pottery refuse on the low campsite is not conclusive proof that the location was unsuitable in those times, it might have that interpretation. If possible, this site should be carefully investigated in the future as the present examination was only superficial.

At Taltal, at an elevation of fourteen meters in Midden I, sufficient time had elapsed between emergence of the underlying structure and the beginning of occupation to allow the accumulation of up to thirty-five centimeters of small particles of disintegrated rock in the irregularities of a sloping rock surface. At Midden II the same interval, at an elevation of sixteen meters, is marked by seven to twenty centimeters of similar material, also on a sloping surface. Only in the vicinity of Midden I is there a suitable area for camping at a lower level. Test pits here brought to light only late refuse identifiable as contemporaneous with Layer A in Midden I and Layers A and B in Midden II. This refuse rested on a marine beach formation two to three meters above high water. Although the artifact-bearing stratum only amounted to thirty to forty-five centimeters much of it was naturally deposited sand and rock fragments. If much time had elapsed between emergence and occupation the interval should be indicated by a sterile layer.

Near Coquimbo, along Herradura Bay, at an elevation of five meters seventeen centimeters above the present high water mark, evidence of occupation, apparently pre-pottery, was found resting on clean water-laid beach sand containing marine shells. This spot has been constantly receiving wind-borne sand and dirt, plus some fill by gravity and drainage, resulting in an accumulation of more than three meters of overburden. In other words as there is no sterile fill between the water-laid sand and the first signs of occupation it is reasonable to assume that when first used the surface was at or near maximum high water level, implying a minimum coastal uplift of around five meters during the period under discussion.

At another site at the entrance to Herradura Bay non-pottery shell refuse rests on brown soil, at an elevation of around six meters. As the soil is not a marine formation, the site was obviously not used as early as it might have been. Unfortunately neither of these locations yielded artifacts which would serve to correlate them with the pre-pottery horizons of the northern sites.

The preceding observations are neither impressive nor particularly satisfactory, yet they do permit some conclusions. Since the arrival of the shell fishhook culture on the north Chilean coast, which may have taken place in a period of static or near static conditions, land rise certainly has been less than fifteen meters. It does not seem presumptuous to suggest that it may have been well under ten meters though anything older than already found cannot be expected to appear at less than the fifteen meter level. The only positive measurements, and these not clearly correlated with the cultural sequence, nor in any way, with each other, are a meter and a half at Arica and five meters at Coquimbo. From all of this we can assume that the entire record of coastal occupation, as marked by refuse deposits, should have survived or at least have not been damaged or destroyed by the sea.

CLIMATE, FLORA, AND FAUNA IN THE PAST

The question has been raised as to whether or not there has been any important climatic change or fluctuation during the period of human occupation. As has been pointed out by Bowman¹ the retreat of the glaciers to higher elevations shifted the zone of precipitation and vegetation. Obviously the former conditions must have resulted in greater drainage discharge at the coast, but no study has been made to determine what other effects were produced there. It is not inconceivable that people may have been present in that period for they reached southern Chile well in advance of the recession of a large glacial lake.² However, nothing found in the present work serves to relate human and late glacial history.

From the structural evidence it is clear that considerably different climatic conditions have at some time prevailed on the coast. At Quiani, Arica, the gully intersecting the site was cut by a small stream draining only the area directly adjacent to the coastal escarpment. At first it appeared that the use and final abandonment of this location might have been related to the presence and disappearance of sub-surface water in this gully, but no proof was secured. Only sub-surface water was considered as two clues indicate that no major change in precipitation has occurred since the arrival of the shell fish-hook culture. One of these was noted in the sterile sandy dirt beneath the oldest débris which is laminated with a series of thin hard crusts, the result of successive very light rains sufficient barely to moisten the surface of the ground. So much salt is present in the soil here that after the sur-

face has been moistened it dries hard enough to endure until more sand, dust, and salt have accumulated. During the period of excavation one of these "rains" fell and the result was identical with what might be called a typical pre-occupation rain. As similar crusts can be found immediately below the present surface this pattern of precipitation has apparently continued for a long time. Of course, to be positive that the frequency has remained constant it would be necessary to study sections of similar formations where the build-up has been constant and uninfluenced by human occupation during a comparable period of time. This was not done.

The composition of the refuse also indicates that there has been no marked change in precipitation during occupation. Apart from the introduction of the llama, the dog (?), and agriculture there is no apparent change in the distribution of the few land mammal remains nor in the utilization of the plant life.

Until the faunal remains have been carefully checked, it is perhaps premature to claim that all species present are identical with living forms. However, that is my impression with the only possible exceptions of a few fragmentary scraps of bone from Taltal which have not yet been identified.

Some changes in vegetation have probably taken place in the valley bottoms. The use of algarrobo posts at Pichalo might mean that these were available on the Pisagua Viejo Valley bottom where there are none today. Even if that were so, it would be difficult to prove that their disappearance was not just the result of careless cutting, burning, agriculture, or grazing.

¹ Bowman, 1924, 315.

² Bird, 1938, 264, 273, Fig. 29.

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