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SCIENTIFIC SURVEY
OF
PORTO RICO and the VIRGIN ISLANDS

VOLUME XVIII—Part 4
Porto Rican Prehistory: Excavations in the Interior, South and East; Chronological Implications

Irving Rouse

Second and final part of a monograph awarded an A. Cressy Morrison Prize in Natural Science in 1948 by The New York Academy of Sciences

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This natural history survey of Porto Rico and the Virgin Islands, conducted by the New York Academy of Sciences, was established in 1913. Continuous publication of the results of this survey is made possible through contributions from the Department of Agriculture and Commerce of Porto Rico, and the University of Porto Rico.

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PREFACE

This is the second of a series of reports on archaeological research undertaken in Porto Rico during the summers of 1936, 1937, and 1938 as a part of the Caribbean Anthropological Program of the Yale Peabody Museum. The research was under the joint sponsorship of Yale University and the University of Porto Rico.

The first report* contained a general introduction to the work, a summary of the results obtained, and descriptions of the excavations on Mona Island as well as on the west and north coasts of Porto Rico itself (Figure 1). The present paper continues the accounts of excavations area by area and also discusses the chronological implications of this work. It is to be followed by other reports defining the elements of culture encountered and tracing their distribution.

As with the first report, I have not attempted to incorporate any developments since finally revising this paper in 1946. It is perhaps worth noting, however, that Ricardo E. Alegria, of the University of Porto Rico, subsequently excavated further in the sites of Capá (pp. 474–8 below) and Cañas (pp. 522–8). He has published an account of his work at the former site in American Antiquity (16: 348–352).

Yale University, 1952

Irving Rouse

* This series, Volume XVIII, Part 3.
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EXCAVATIONS IN THE MOUNTAINOUS INTERIOR

Setting

The entire mountainous interior of Porto Rico is discussed in this section. Roughly rectangular in shape, it measures some 150 kilometers from west to east and 40 kilometers from north to south (see folding map at end). Its size is approximately 6,000 square kilometers, over half that of the island as a whole. This makes it the largest of the Porto Rican areas, with a size four times that of the north-coast area, the next largest.

On all four sides, the mountainous area of the interior is bounded by the foothills which fringe the coastal plains. These approach the sea in several places, notably in the northeastern and southeastern corners of the island. Elsewhere, however, they are from 10 to 20 kilometers distant. In general, the mountainous interior is closer to the west and south coasts of the island than to the north and east coasts (folding map).

There are three mountain ranges. The Cordillera Central, running eastwards through the western and central parts of the island, is the largest and tallest of these. It reaches a maximum height of some 1200 meters near Jayuya in the center of the island. To the east, it forks. One branch, the Sierra de Luquillo, extends into the northeastern corner of the island, while the other branch, the Sierra de Cayey, turns southeast into the other corner. The tallest peak in this part of the island is El Yunque, just over 1000 meters high, near the eastern end of the Sierra de Luquillo.

The three mountain ranges form a Y-shaped divide, located some distance south of the central axis of the island. North of this divide, the land slopes gradually over a long distance, but to the south there is an abrupt descent. As a result, most of the interior drains northwards. North of the divide, the numerous small mountain streams merge into a few great rivers, but, to the south, they flow directly into the sea. The larger rivers have already been mentioned in connection with the areas previously discussed. They include the Río Grande de Arecibo, the Río Manatí, the Río de la Plata, and the Río Grande de Loíza, all of which flow northwards into the Atlantic Ocean (folding map).

Both north and south of the divide, the rivers and streams have dissected the terrain into a series of sharp ridges and narrow, steeply walled valleys. These make for difficult traveling, for one must either wind endlessly up and down the valleys through countless turns and branches or laboriously cross the ridges from valley to valley. It is not uncommon to have to climb 500 meters up or down a steep slope in order to reach an archaeological site.

Flat areas capable of supporting a large population are not common in the interior, and they occur only at irregular intervals. Most of them nestle deep in the valleys, where the rivers have been able to carve out narrow flood plains. Others are perched high above, where the mountain ridges broaden into small plateaus. Most lie north of the divide and, being far apart, are relatively isolated. The modern population of central Porto
Rico tends to concentrate in these flat areas, and they probably also served as foci for the aboriginal population. It was in them that we located most of the archaeological sites.

Except for their small size and relative isolation, the flat areas must have been well suited for Indian habitation. The soil is fertile and there are few outcrops of rock. Rain falls abundantly, and the mountains must have been heavily wooded during prehistoric times. Traces of a dense tropical forest of hardwood and palm trees are still to be found on the slopes of El Yunque in the Sierra de Luquillo, although elsewhere the mountains have long been deforested and even the hillsides are now under cultivation.*

A large number of sites have been located in the interior, but they are irregularly distributed. Most of them seem to be concentrated among the sources of the Rio Grande de Arecibo and the Rio Manati in the heart of the mountains (folding map). Elsewhere, we had difficulty in finding traces of Indian habitation.

At least four chieftainships, all of them apparently Taino, were in existence at the time of historic contact (Coll y Toste, 1907: 1, 45, 96-99). The drainage of the Rio Grande de Arecibo in the west-central part of the island, a part of which is still known by its Indian name of Utuado (formerly Otuao), was under the control of a chief named Guarionex (Figure 2:10). Another chief, Orocobix, ruled in the drainage of the Rio Manati at the geographical center of the island (Figure 2:11). His district was known at the time of historic contact as Jatibonico, but the greater part of it has

* These data on the geography and topography of the mountainous interior were obtained from Coll y Toste (1907: 18-27), Lobeck (1922), P.R.R.A. (1940), and Roberts (1942).
recently been given the name Orocovix (formerly Barros) after the chief himself. A third chief, Mabó, probably lived along the Río de la Plata in the east-central part of the island. His territory seems to have been called Guaynabo, a term now applied to a river and town near the north coast (Figure 2:12). The fourth chief, Caguax, controlled the valley of the Río Grande de Loiza further east (Figure 2:13). This happens to be the largest valley in the mountains, and it now contains the only interior city of any size, named Caguas after the Indian chief.

Ponce de León visited parts of the mountainous interior during his first voyage of exploration, when he was inspecting the places where the Indians obtained their gold (Neumann Gandía, 1896: 170-171). His is the only name mentioned in connection with the occupation of the interior. During the repartimientos of 1509-10, he obtained control of chiefs Caguax, Mabó, Orocovix, and their followers. It is said that he set up plantations in the territories of Caguax and Mabó, eventually selling the second of these to pay the expenses of the colonization of Porto Rico (P.R.R.A., 1940: 278; Coll y Taste, 1907: 267; Zayas y Alfonso, 1931, 2: 227).

The subsequent history of the Indians in the mountainous interior is better known than in the other areas. Both Caguax and Guarionex, chief of Otuao, apparently took part in the rebellion of 1511 against the system of repartimientos (Fewkes, 1907: 39; Brau, 1907: 156-157). Guarionex served as the leader of the 3,000 men who, as already noted, destroyed the Spanish town of Sotomayor on the west coast. Both chiefs probably also participated in the subsequent defeats at Coayuco on the south coast, near Aymaco on the west coast, and in the final battle of Yagueca, which took place on the west coast late in 1511. After this battle, Ponce de León offered to pardon the survivors who would lay down their arms. Caguax and another chief from the Otuao district, possibly Guarionex or a successor, did so. They and their followers received permission to return to their
homes in the mountains, apparently without being subject for the time being to a repartimiento. The other rebels, however, were forced into immediate slavery on the Spanish farms and in the mines (Herrera y Tordesillas, 1729, 1: 225-226; Brau, 1904: 40-43).

Caguax died soon after this and was replaced by his daughter, Bagaaname, baptized under the name of María. At a later repartimiento (1529), she and her subjects were claimed by two Spaniards, Antonio de Sedeño and Blas de Villasente, each of whom wished to use her subjects as laborers on his farm in Otuao. Their dispute was finally settled by assigning the Indians to the royal farm at Toa on the north coast, where María Bagaaname eventually married the king’s major domo.

The Otuao chief who submitted to the Spaniards was also baptized. He took the name of Don Alonso. He and his followers lived for many years in the mountains east of the modern town of Utuado, where a barrio still bears his name. There was a brief revolt in this district in 1514 in protest against the sending of 16 Indian leaders to Hispaniola, but Don Alonso does not seem to have taken part. Instead, he is said to have been of great assistance to the Spaniards in keeping the Indians quiet. When he died in 1521, he left behind a large quantity of gold, from which the sum of 4,000 pesos was paid to the king as an inheritance tax (Brau, 1907: 157, 301; Brau, 1904: 47).

Although the system of repartimientos was officially abandoned in 1544, some Indians were still being illegally retained by their masters in 1550. These included not only the natives of Porto Rico but also Caribs from the Lesser Antilles and Indians from other parts of the Americas who had been brought to Porto Rico as slaves. After they were set free, most of them moved into unoccupied parts of the interior, where they set up villages of their own (Abbad y Lasierra, 1866: 142; Fewkes, 1907: 25; Brau, 1907: 413). We possess only fragmentary information concerning these villages. One of them, called Antias, is mentioned in a document of 1582, which does not give its location (Zayas y Alfonso, 1931, 1: 43).* Two others, without names, are said to have been located in the western part of the Cordillera Central as late as 1710 or 1720 (Brau, 1894: 368). In 1774, Bishop Manuel Jiménez Pérez mentioned four Indian settlements in a report to the king: Casonay, Cumanacoa, Curuataquiche, and Guaira (Zayas y Alfonso, 1931, 1: 174, 229, 233; 2: 25). Presumably, these were also located in the western part of the Cordillera Central, for a district east of the town of Maricao in this area has acquired the name of Indiera, and many of its present inhabitants, although otherwise indistinguishable from the rest of the population, still have traces of Indian blood (Fewkes, 1907: 25).

The first Spanish settlement in the mountainous interior, that of Utuado, was founded in 1533 as a way station on the route between the capitol at San Juan and the other Spanish settlement near Añasco on the west coast. Others followed gradually, but they were small, and none of them received the status of a municipality until the eighteenth century. It was probably

* This document is contradicted by another of the same date, which states that no Indians remained except for a few in the Spanish settlements (Abbad y Lasierra, 1866: 112).
not until then that habitation by the Spaniards became widespread in
the mountainous interior (Brau, 1907: 391-392; Abbad y Lasierra, 1866:
295-296).

Archaeologists have paid special attention to the mountainous interior.
The list of those who have surveyed sites in this area includes A. L. Pinart
(1893) and Austin Stahl (1889: 181-182) in the 1880's; Cayetano Coll y
Fosie (1907: 19-20, 39-41) in the 1890's; J. Walter Fewkes (1907: 82-83)
in 1902-3; S. K. Lothrop (ms.), J. Alden Mason (1941: 264-269), Dr. J. L.
Montalvo Guenard (personal communication), and Herbert J. Spinden (per-
sonal communication) in the 1910's; Benigno Fernández García (personal
communication), Adolfo de Hostos (personal communication), and Pablo
Morales Cabrera (1932: 114-115) in the 1920's; and Froelich G. Rainey
(1940: 3) in 1934-35. These people have located an unusually large number
of sites.

The first excavation in the mountainous interior was made by Fewkes
in 1903 at the site of Salto Arriba near Utuado (Fewkes, 1903b: 112-116
and 1907: 82-83). Although not published in detail, this work has attracted
considerable interest because of the discovery of what Fewkes thought were
burial mounds. The specimens obtained are now at the United States

In 1914-15, an expedition from the New York Academy of Sciences
worked under the direction of Franz Boas at five sites near Utuado. Three
of these sites, the Cueva de Antonio and the ball courts of Cerro Hucco and
Capá, were excavated jointly by Mason (1919, 1941) and Robert T. Aitken
(1917, 1918). Simultaneously, Hermann K. Haebel (1917) dug the
Cueva de la Seiba and the ball court of Los Medinas in Barrio Rio Arriba
de Arecibo. At Mason's request, the present writer has made a study of the
specimens from these five sites, which are now at the American Museum
of Natural History in New York, and has been able to assign them all to
Rainey's Shell culture (Rouse, 1941a).

About 1930, Benigno Fernández García made a series of excavations at
the site of Toita near Cayey. Only a brief reference to this work has
appeared in print, but it is noteworthy because it demonstrates that the
ball courts of the interior were used for the habitation as well as for the
games and ceremonies (Morales Cabrera, 1932: 55).

In 1935, Rainey and Arturo Morales Carrion excavated briefly in four
ball courts near the town of Orocovis. Rainey has published only a pre-
liminary report on this work. His specimens are now at the University
of Porto Rico (Rainey, 1940: 97-104).

While in Porto Rico during the summers of 1936-38, the writer made a
survey of the mountainous interior and dug 23 test pits in 15 of the most
promising sites. The following is an account of these excavations.

_Callejones (Lares 2)_

There is a ball court on the farm of Fundador Pagan in Barrio Callejones
of the municipality of Lares, six kilometers northeast of the town of Lares
(see folding map at end). A number of people, including Lothrop (ms.: 9),
have visited this site. They have, the inhabitants say, removed from the
court wall several stones bearing pictographs. The owner himself
is reported to have found a stone collar and other artifacts near the south-
eastern corner of the court. The writer first examined this site on July 11,
1937, collecting several specimens from the surface. He returned on July
19, and excavated two test pits.

At the time of the writer's visit, the Callejones ball court was situated
in a coffee grove on a small plateau elevated 7.5 meters above an unnamed
tributary of the Río Canuy (figure 3). To the north, east, and south, the
land sloped downwards towards the stream, while to the west there was a
slight rise. A spring on the hillside 100 meters south of the site may have
supplied drinking water to the inhabitants.

Most Porto Rican ball courts are rectangular in shape, but this one, con-
forming to the contours of the plateau, is rhomboidal. It consists of a
level, flat area roughly 20 meters on a side. The two sides of the court, to
the east and west, are lined with walls of earth and stone. The two ends,
however, are open (figure 3). Little remains of the eastern wall except
some scattered round stones and a slight rise in the ground, which may
consist of material thrown up during the leveling of the court. The western
wall is better preserved. Here, the Indians apparently had to cut away
the hillside to a depth of two meters, and they terraced the resultant em-
bankment with two rows of stones. These two rows, standing one above
the other in a manner reminiscent of a grandstand, are both composed of
large thin slabs nearly two meters tall. They are set for half of their
length into the ground. None bears pictographs, but it is from among
these slabs that previous visitors to the site are said to have carried off
rock carvings.

On the northwestern side of the court, erosion has begun to eat away the
edge of the plateau. Apparently as a check upon this erosion, a crude wall
of small, river stones has been erected in this area; whether by the Indians
or by the modern inhabitants it is impossible to say. This wall recalls the
terraces at the site of Cerro Hueco, described below.

Potsherds are scattered over the surface of the ground to the north and
the east of the court. Since they are particularly common just outside the
northeastern and southeastern corners, we chose to excavate there (figure
3). One pit, composed of four two meter-square sections arranged in the
form of a square, was staked out to the northeast. In the first 25-centimeter
level of this pit, the soil consisted of rather dark clay, containing fragments
of limestone, both large and small, some charcoal, and a moderate amount
of potsherds. Below 25 centimeters, the soil became lighter and the frag-
ments of limestone more numerous and the only refuse encountered were
ten plain potsherds (which we discarded, according to our practice). These
seemed to disappear at the bottom of the second level, and accordingly, we
discontinued excavation at a depth of 50 centimeters.

Sherds had been rather scarce in the first pit. Therefore, we decided
to dig another, near the southeastern corner of the site (figure 3). The
soil here was so rocky that the men had difficulty excavating. In the first
15 centimeters, they encountered small amounts of charcoal, shells, animal bones, and potsherds in the dark brown clay. Below that depth, no refuse appeared, and excavation was therefore discontinued after the first 25-centimeter level had been completed.

Potsherds of the Capi style form the majority in all sections and levels at
Callejones. There are 106 of them from Pit 1, accompanied by five Ostiones sherds, and 44 from Pit 2, accompanied by one specimen of the Ostiones style. This makes it possible to treat the entire site, including the specimens collected on the surface, as a single unit.

Only 26 of the potsherds are from open bowls, as compared with 75 from constricted bowls and 55 which are unidentifiable. The associated artifacts include a fragment of a griddle, a stone celt, a celt-hammer, 24 flint chips, two broken stalactites, and one piece of coral. A fragment of charcoal and several land gastropods complete the collection.

This site may be dated in Period IVa, on the assumption that the mixture of Ostiones and Capá sherds which it yielded represents the end of a transition from the former style to the latter. The presence of a ball court suggests that the site was ceremonial. It probably also served as a place of habitation, for the same material was found in it as in the ordinary village sites. The large number of pieces of flint is a puzzling feature.

**Capá (Utuado 7)**

Mason’s and Aitken’s 1915 excavations at this site have made it the best known in the mountainous interior. The only other work there has been by the writer, who surveyed the site on July 15, 1938, purchasing a collection from the inhabitants, and returned the next day to excavate two pits. The following account is based partially on the reports by Mason (1917 and 1941)* and partially upon the writer’s observations.

The site, which is at present owned by Ramón Díaz Roman, is situated in Barrio Caguana, of the municipality of Utuado (see folding map at end). It lies between the Utuado-Lares highway (No. 17) and the Río Tanamá, about halfway from one town to the other. As Mason (1941: 212-213) has pointed out, this region is on the northern edge of the mountainous interior, near the limestone foothills which fringe the north coast area. The Río Tanamá flows northward from the site into the foothills, eventually joining the Río Grande de Arecibo near the north coast. It must have provided the Indians with an easy, although somewhat distant, access to the coast (folding map).

The site may also have recommended itself to the Indians because of its possibilities for defense. A flat, triangular plateau, it measures some 400 meters on a side and is elevated about 25 meters above the river. The land falls steeply on all sides, to the river on the west and into a pair of ravines on the north and south. Only to the east, where the apex of the triangle consists of a narrow neck between the two ravines, can one easily approach the plateau.†

The plateau slopes gently from east to west. Its soil, consisting of reddish brown clay overlaid by humus, is naturally fertile and free from stones. Mason and Aitken found it freshly abandoned after use as a coffee plantation. At the time of the present writer’s visit, it was a cane field.

When Mason and Aitken worked at Capá, the site contained the greatest

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* See also Loven (1935: 87-88), Rainey (1941: 114), and Rouse (1941a: 279-285).
† See the map in Mason (1941, Figure 2, opposite p. 210).
concentration of megalithic stonework yet discovered in the West Indies. The two archaeologists spent all of their time in clearing, mapping, and describing the stone structures. They obtained only a few artifacts, which have been described elsewhere (Rouse, 1941a: 279-285). In their time, the site was dominated by a great central plaza, nearly square in shape (Mason, 1941: 217-223; Figure 2, A). This was sunk into the ground where necessary to eliminate the slope of the plateau. On two sides, it was bounded by a walk paved with flat stones and seeds, on the third by igneous boulders, and on the fourth by a line of limestone slabs. Many of the slabs bore petroglyphs, consisting of human faces and “other designs.” Several had been drilled with circular holes. Around the edges of the plaza, Mason noted layers of charcoal, “evidently the result of a fire, possibly from the destruction of a bower or some other wooden structure...” (Mason, 1941: 218).

Seven ball courts were scattered irregularly around the plaza, with their long axes following the contours of the plateau (Mason, 1941: 223-233, 247-248, 252-260; Figure 2, B, E, H-L). Each had a rectangular shape and a level surface, formed by excavating on the uphill side. The earth removed by the Indians during this process was found piled around the edge of the courts in the form of embankments or mounds. The sides of each court were lined with stone slabs set on end and often capped with horizontal slabs. The ends of six courts were open and semicircular. The seventh had a rectangular and a semicircular end, each lined with paving stones and walls of slabs. As usual in such courts, the floors were free from refuse, but charcoal, small stones, pottery, probably of the Ostiones and Capá styles (the latter named after this site), a stone celt, and an anthropomorphic stone pendant were found around the edges. Just outside one court, the excavators encountered traces of house-posts and of stakes. A fire pit occurred at either end of another court. One is described as a depression 4.6 by 3.7 by 0.6 meters filled with ash, charcoal, burned stones, and potsherds and also containing traces of “small stakes driven into the earth.” Several other holes of problematical function were found alongside two of the courts, and, in addition, one petroglyph is mentioned.

A flat, oval space in the center of the plateau, just northwest of the main plaza, may have been a dance ground (Mason, 1941: 241-244, Figures 2-3). This space was higher than the rest of the site, and had probably been built up by the Indians with earth excavated from the adjacent courts and the plaza. On three sides it was enclosed in a ring of limestone slabs set on end. The fourth side was formed by the wall of the plaza. In its center, a large unworked boulder may have served as a seat or altar. Refuse was common in the fill beneath the ground. It consisted of charcoal, loose stones, potsherds probably of the Ostiones and Capá styles, stone celts, and “portions of a stone ‘collar.’” Beneath the fill, the excavators encountered a number of cylindrical shafts, which may or may not have resulted from the digging of posts. On the south side, a solid bed of charcoal perforated with post holes and underlaid by burnt clay may represent a house abandoned before the dance ground was built.
A low mound lay to the east of the dance ground (Mason, 1941: 248–249; Figure 2, G). Like the latter, it seemed to be composed of earth removed from the adjacent features during their construction. Its sides were gently sloping and its height was not much over a meter. The interior yielded no trace of a superstructure, but the excavators did obtain charcoal, potsherds, probably of the Ostiones and Capá styles, and stone chips. Beneath the mound, they located two shafts, one containing traces of a post and the other charcoal, potsherds, and stones.

House sites were encountered in the areas north and south of the dance ground (Mason, 1941: 233–241, 244–247; Figures 2–3). These areas were unmarked by walls and embankments, except where bordered by other structures. The areas contained large quantities of ash, charcoal, and loose stones, together with palm seeds, animal bones, and artifacts. These generally occurred in concentrations marked also by pavements of clay and seeds, by posts, by fire pits, by hearths of stone, and by refuse pits. The pavements and posts formed no definite patterns, but each probably was part of a house built on the surface. A large, oval depression, measuring 3.7 by 2.4 meters and having a depth of over 3 meters, may have been a subterranean house. A series of stone steps extended down one side into it. Potsherds, probably of the Ostiones and Capá styles, were numerous in the house areas and are said to have been more highly decorated than elsewhere. In addition, the excavators collected a stone celty, several stone balls, stone chips, three carved stone zemis (one representing a turtle), a limestone slab with a “cup-shaped depression on its under surface,” and a piece of coral. One Spanish potsherd and a fragment of iron were found relatively deep in the ground.

Two other structures at the site, unnamed by Mason, appear to the present writer to have been “roads” or streets, comparable to the one described below for the site of Palo Hincado (Mason, 1941: 249–252, 260; Figure 2, G, M; Figure 4). One consisted simply of two parallel lines of paving stones near the southeastern edge of the plateau, extending towards the ravine on that side of the site. Since the side of the ravine is not so steep here, this road may have served as an entrance and exit to the site. The other road comprised a long, narrow rectangle connecting the central structures of the site with the two lowest ball courts on the southwest. A stone stairway led down from the central structures to this road. The sides of the road were lined with stone slabs comparable to those of the ball courts. At its far end, another stairway or terrace led down into the lower ball courts. At this end, a raised pavement, supported on upright slabs and paved with horizontal stones, appeared in the middle of the road. Charcoal, carbonized seeds, and a fragment of a stone collar were found here.

At the time of Mason's and Aitken's work, then, the site of Capá contained 14 principal features: a central plaza, seven ball courts, a dance ground, a mound, two house areas, and two roads. Of the artifacts encountered, 23 Ostiones sherds, 84 Capá sherds (including one complete pot), an anthropomorphic stone pendant, a stone chip, two bone disks, and
two European potsherds are still preserved in the American Museum of Natural History in New York (Rouse, 1941a: 279*).

Only two of the features found by Mason and Aitken, the central plaza and the largest of the ball courts (northwest of the plaza), were visible at the time of the present writer’s visit. Apparently as a result of cultivation, the others had been reduced to scattered stones, which occurred at intervals throughout the plateau. None bore petroglyphs.

In order to avoid the areas excavated by Mason, we chose to dig our pits near the edge of the plateau south of the main plaza. This was just outside the cane field, which at that time covered most of the site, in an area cleared for use as a garden. Examination of the soil of the garden revealed potsherds of the Ostiones and Capá styles mixed with the humus in several concentrations which may represent house sites.

We located our first pit in one of the sherd concentrations at the northwestern corner of the garden, and later dug a second pit two meters further west. Both pits were composed of four two-meter square sections staked out in the form of a square. The first 25-centimeter level in each of them was composed of humus, containing a small number of potsherds but no traces of occupation. In the second level, the humus gave way to reddish brown clay, and potsherds gradually ceased to appear. Accordingly, excavation was discontinued at a depth of 50 centimeters in each pit.

It is difficult to identify the sherds, for they are few in number and have disintegrated badly. In Pit 1, the Ostiones style seems to be represented by four sherds and the Capá style by 53. In Pit 2, on the other hand, 25 of the sherds are of the Ostiones style and only nine are of the Capá. The two pits therefore comprise separate stylistic divisions.

In the Ostiones division (Pit 2), 11 of the sherds are from open bowls, eight are from constricted bowls, and 15 are unidentifiable. We also obtained two fragmentary griddles and two other lumps of clay from this division. The Capá division (Pit 1) yielded seven sherds from open bowls, 28 from constricted bowls, two from jars, and 23 which are unidentifiable as to type. The associated artifacts include three broken griddles, a clay lump, and a stone polisher. A number of unworked stones were also encountered in this division.

The material purchased and collected on the surface cannot be allocated to the divisions. Two sherds come from Ostiones open bowls, two from Ostiones vessels which are typologically unidentifiable, and two from Capá restricted bowls. In addition, we obtained two complete and three fragmentary celts of stone, a piece of a massive stone collar, and two sections of slender stone collars.

A continuous sequence is apparently represented in our excavations, Pit 2 dating from Period IIIb and Pit 1 from Period IVa. This is indicated not only by the mixture of Ostiones and Capá sherds in the two pits but also by the presence of four examples of incision among the Ostiones sherds. Since we found no European objects, it is unlikely that occupation continued

* In this report, read "Ostiones style" in place of "type B" and "Capá style" in place of "type C."
in the area of our pits until Period IVb. In the region of Mason's and Aitken's excavations, however, the deposit may have continued to accumulate during the latter period.

Mason is probably correct in concluding that Capa was "the ceremonial center of the people led by the chief Guarionex" (Mason, 1941: 264). The present writer disagrees, however, with his further conclusion that "the site had a ceremonial-religious purpose and was not a village" (Mason, 1919: 223). The material we collected at Capa is identical (as far as it goes) with that obtained from village sites. Our griddles, in particular, suggest that the site had a utilitarian as well as a ceremonial significance. It seems to us that the situation at Capa was probably similar to that in Hispaniola, where, according to the conquistadors, the ordinary villages were accompanied by multiple ball courts and dance grounds (Oviedo y Valdes, 1851, 1: 163).

Cerro Hueco (Utuado 14)

Three kilometers northeast of Capa are the burial cave of Antonio and the terraces of Cerro Hueco, at which Mason and Aitken also worked (Aitken, 1917: 227 and 1918: 307-309).* Like Capa, these two sites are in Barrio Caguana of the municipality of Utuado. They lie three kilometers east of the Rio Tanamá on land of a man named Antonio Cuevas (see folding map at each end). The town of Utuado is eight kilometers to the southeast.†

The present writer visited Cerro Hueco (which is sometimes used as a name for the cave as well as the terraces) on July 18, 1938. He found that the Cueva de Antonio had been completely cleared out but that the terraces were still well preserved. Accordingly, he returned the next day and dug a test pit alongside the terraces.

As one travels northeast from Capa towards Cerro Hueco, one leaves the igneous country characteristic of the mountainous interior and enters a limestone region composed, as in the north coast area, of countless small valleys and of steep-sided, dome-shaped hills, honeycombed with caves. The Cerro Hueco terraces lie at the bottom of one of these valleys, with the Cueva de Antonio in the hillside directly above it. Many of the surrounding valleys also contain traces of Indian occupation. In fact, the entire region from Capa to Cerro Hueco is practically one continuous series of sites (Morales Cabrera, 1932: 172, 258i).

The valley containing the terraces has an area of about 25 square kilometers. It is bowl-shaped and has a slight rise in the center, where a spring may have provided the Indians with drinking water (figure 4). The terraces lie at the northeastern end of the valley near the top of a 20 degree slope. The land on the upper side of the slope has been excavated to a depth of 60 centimeters and has been lined with a retaining wall of small, weathered, limestone boulders. On the other side, some 15 meters downhill, the land had been filled in, perhaps with the dirt excavated on the

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* See also Lothrop (ms.: 11); Lovén (1933: 124, 351); Mason (1941: 210-211, 265); Rauzy (1940: 115-116); and Rouse, (1941: 273-275, 286).
† Not, as Aitken (1915: 297) states, ten miles to the east.
1 Contrary to a statement in this report, none of the sites was observed to contain shell deposits.
upper side, and a second retaining wall, 1.2 meters high, has been set up to
hold the fill in place. The result is a flat terrace 36 meters long, lined on
either side with slightly curving walls and open at the ends (Figure 4).*

At the northern end of the lower retaining wall is a large rock, nearly
five meters in diameter (Figure 4). Beyond this rock, another retaining
wall extends for 21 meters to the end of the slope. This forms a second
terrace which, unlike the first one, is walled only on the downhill side.

In Mason's and Aitken's time, several other retaining walls were scattered
irregularly over the northeastern end of the valley, and, in addition, there
were two low mounds, one at the base of the central boulder and the other

at the far end of the second terrace (Aitken, 1918: 308, Figure 27). These
have since disappeared.

Mason and Aitken found the site covered with coffee shrubs, which made
it impossible to excavate anywhere except in the two mounds alongside the
terraces. The first mound, near Terrace 1, measured some 120 centimeters
long and 60 centimeters in height. It was found to be a heap of earth
containing only a few sherds and several pebbles. The second mound,
somewhat larger than the first, yielded nothing but earth. Several ad-
ditional sherds and pebbles were found in the crevices of the retaining walls,
and a stone hammer was picked up nearby. This hammer, 63 sherds
of the Capá style, and two fragments of griddles are now deposited in the
American Museum of Natural History (Aitken, 1918: 309, Figure 28;
Rouse, 1941a: 286†).

* For another plan of the site, see Aitken (1918: 308, Fig. 27). Aitken places the terrace on the downhill
side of the lower retaining wall, whereas the writer observed it on the uphill side.
† In the latter report, read "Capá style" in place of "type C."
The site was not under cultivation at the time of the present writer's visit, and it was possible to dig anywhere. Scattered potsherds were observed on the surfaces of both terraces and in the immediate neighborhood. They appeared most numerous at the base of the large boulder between the two terraces (Figure 4), where they were accompanied by snail shells. Accordingly, a square pit composed of four two-meter square sections was staked out in this area. The first 25-centimeter level yielded pebbles, shells, some charcoal, and a number of animal bones, mixed with the humus. In the next level, the soil changed to light brown loam and the deposit gradually disappeared. Excavation was therefore discontinued at a depth of 50 centimeters.

Two attempts were next made to dig pits in Terrace 1, but both were unsuccessful, since no remains were found. A fourth pit was dug at the bottom of the slope, but again without finding anything. We returned, therefore, to the first pit and extended it to the north and east, digging five more sections, each two meters square and 50 centimeters deep, with results similar to those originally obtained (Figure 4).

The Capa style predominates in the Cerro Hueco pit, being represented by 194 sherds, as compared with one Ostiones and 13 Santa Elena potsherds. Twenty-seven of the potsherds are from open bowls, 127 are from constricted bowls, three are from jars, and 51 are unidentifiable as to type. The associated artifacts include 13 fragmentary griddles, a possible lump of clay, two stone celts (one of them, a surface find), a stone side grinder (also a surface find), four stone hammers, a fossil animal, three stone chips, six quartz crystals, and a stone slab. One marine gastropod and a number of land pelecypods were also collected.

Since potsherds of the Capa style predominate in all collections and there are no European objects, the entire system of terraces can be dated in Period IVa. The significance of the Ostiones and Santa Elena sherds obtained by us is obscure, but, in view of the situation at Capa, it seems likely that the latter are the result of outside influence and that the former mark the end of a transition from the Period III style of this region.

In Aitken's reports and in all subsequent accounts, the terraces of Cerro Hueco are called "ball courts," apparently as a result of Aitken's belief that the term "ball court" is "applied generally in Porto Rico to the remains of prehistoric villages and settlements of all sorts" (Aitken, 1918: 307). This is not true. The term is ordinarily used only for structures like those at Capa which are likely to have served as ball grounds or ceremonial enclosures. The terraces at Cerro Hueco cannot be considered such structures, for their walls are too irregular and they seem to have served to retain the earth rather than to line courts. In particular, the lower walls are beneath surfaces of the terraces instead of above them, as in the ball courts. For these reasons, we have avoided using the term "ball court" in our account of Cerro Hueco.

Aitken himself (1918: 309) has suggested that the terraces were built for the practical purpose of serving as substructures for houses. Our failure to find artifacts in Terrace 1, however, is not consistent with this
theory. It may be that the terraces were erected for agricultural purposes and that the people lived alongside them, for example, in the area of our pit. The significance of the two mounds excavated by Mason and Aitken is not clear. The first one, which contained artifacts, may have been a refuse heap. On the other hand, both of these mounds may have been composed of material removed when leveling the terraces.

La Toje (Barranquitas 2)

This site is one of a number of ball courts in the rugged, mountainous section at the headwaters of the Río Manatí (see folding map at end). It lies some two kilometers north of Highway 15, about halfway between the towns of Barranquitas and Orocovis. The site belongs to Carlos Aya and is in Barrio Cañabon of the municipality of Barranquitas. Montalvo Guernard (personal communication) seems to have been the first to work there. He collected a slab marked with a petroglyph from the ball court. The writer surveyed at La Toje on August 22, 1938, and excavated a pair of test pits six days later.

The site is situated on a low ridge in the midst of a deep valley. It consists of a single, rectangular ball court measuring 21 by 17 meters. The long axis of the court extends roughly from north to south and is parallel to that of the ridge. To level the surface, the Indians seem to have taken earth from the center of the court and piled it in the form of a low embankment on either side. The present inhabitants say that both the sides and the ends were originally lined with stone slabs set on end. These have long since been removed, and the embankment has been reduced by cultivation. At present, the only traces of the walls are a group of rough, flat stone slabs, approximately one meter long and 30 centimeters wide, which are piled up on one side of the ridge. No petroglyphs were observed.

At the time of the writer's visits, the entire ridge was under cultivation. Charcoal and potsherds were observed not only on all sides of the ball court, but also within the enclosure, where they had probably been carried by the plow. A collection was made of this material, the specimens from around the ball court being kept separate from those obtained on the eastern and western slopes of the ridge. In addition, we dug two pits, the first just south of the court and the second just north. Each consisted of four two-meter square sections, arranged in the form of a square, and each was dug through two 25-centimeter levels. In both pits, the soil consisted of reddish brown clay, mixed in the first level with charcoal and a few artifacts. The second level in each pit was sterile.

The following is a stylistic classification of the potsherds obtained from La Toje:

<table>
<thead>
<tr>
<th>Style</th>
<th>Around ball court</th>
<th>East slope of ridge</th>
<th>West slope of ridge</th>
<th>Pit 1</th>
<th>Pit 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Elena style</td>
<td>46</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Capá style</td>
<td>28</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
It will be noted that only the material picked up around the ball court is numerous enough for stylistic identification. In the absence of better data we shall assume that the Santa Elena style, which predominates there, is also characteristic of the rest of the site. This makes it possible to treat the entire site as a unit.

From a typological standpoint, six of the sherds represent open bowls, 59 represent constricted bowls, and 19 are unidentifiable. Two fragmentary griddles, four broken and one complete celt of stone, four stone chips, a piece of yellow ocher, and several land gastropods complete the collection.

This material would seem to date from Period IIIb. Although the Santa Elena style is preponderant, there is evidently a trend towards the Capá. One may speculate that the site consisted of a central court surrounded by dwellings. In other words, it may have had a utilitarian as well as a ceremonial function.

La Vega (Orocovis 18)

This is another of the ball courts near the headwaters of the Río Manati. It is situated on the southern edge of the town of Orocovis, between Highway 10 and Río Orocovis and on the land of Sue. P. Guiterrez in Barrio Orocovis, of the municipality of the same name (see folding map at end). Lothrop (ms. 3) seems to have discovered this court. It has been excavated by Rainey and Morales Carrión (Rainey, 1940: 98-99). The present writer surveyed the site on August 28, 1938, and excavated a test pit the following day.

The court is situated on a gentle slope alongside the river, with its long axis running almost directly north and south. It consists of a rectangular depression, 40 meters long, 30 meters wide, and 60 centimeters deep. This may be natural, or it may have been excavated by the Indians. On each side of the depression is an embankment 50 centimeters high. The ends are open.* Originally, the inner side of each embankment seems to have been faced with stone slabs, but only a part of the downhill wall remained in position at the time of the writer's visit. It is composed of stones from the river, 60 centimeters long and 30 centimeters wide. None bear petroglyphs.

Rainey dug trenches and test pits across the court, through the bordering embankments, and in the surrounding soil, finding "a few scattered sherds in otherwise sterile soil." Some 14 meters south of the ball court, he also struck a fire pit, "which produced abundant charcoal, ashes, and potsherds, but no shell or bone refuse. This pit was shaped like an inverted cone and was 1.5 meters in diameter 25 centimeters below the surface, tapering down to a point at a depth of 1.5 meters" (Rainey, 1940: 99). Some 900 potsherds, a stone celt, and a segment of a stone collar were collected from the pit. From Rainey's brief description of the pottery, it would seem to be Ostiones in style.

At the time of the present writer's visit, the fields around the ball court were under cultivation, revealing a few bits of charcoal and of pottery, particularly just outside the eastern side and the southern end of the court.

* Rainey (1940: 99) states that the court is "surrounded" by embankments, but this does not agree with the present writer's observations.
A collection was made of the potsherds, and they were segregated according to the side of the court on which they occurred. In addition, a square test pit, divided into four two-meter square sections, was dug 14 meters east of the court. The soil in this pit consisted of brown clay, containing a few bits of charcoal and of pottery. This pit was carried to a depth of 85 centimeters, when difficulties with the owner of the site caused a cessation of the excavation. At that depth, no potsherds were appearing, but there were still traces of charcoal.

Two fire pits, comparable to that described by Rainey, were encountered in our excavation. Both consisted of irregular areas marked by concentrated charcoal, one in section A1 and the other in section B2. The former was 15 centimeters in diameter and extended from the surface to a depth of 80 centimeters. The latter had a diameter of 50 centimeters and extended from 20 to 50 centimeters beneath the surface. Potsherds were unusually common in both pits.

Stylistically, our pottery does not correspond to Rainey's description of his finds, for Santa Elena rather than Ostiones potsherds are preponderant in our collection. Altogether, we obtained 36 sherds of the Santa Elena style and only 17 of the Capa. The former predominated in all sections and levels of our pit except one, where the numbers involved seem too small to be significant. Eight of the sherds come from open bowls, 35 are from constricted bowls, and 10 are typologically unidentifiable. The only other artifacts are 19 fragments of griddles and 10 European potsherds.

The predominance of Santa Elena sherds dates our pit in Period IIIb, the few Capa sherds apparently representing the beginning of a transition to that Period IV style. The European sherds are probably intrusive. Except for one specimen in the top level of the pit, all come from a small area northwest of the pit which is not very far from a modern house. The discrepancy in style between the Indian sherds collected by Rainey and by us is more difficult to explain. It may be that, since Rainey was citing only the resemblances between his pottery and the Shell culture (which for him was characterized by the Ostiones style), he has given us a false picture of his material. On the other hand, he may have dug in an earlier part of the site than we did, collecting Ostiones sherds characteristic of Period IIIa. The presence of fire pits both in his excavations and in ours indicates that the site was used for habitation as well as for games and ceremonies.

La Zama (Jayuya 5)

This site, which is another ball court, is located in the mountains just north of the peak of Los Picachos, the highest in Porto Rico, halfway from that peak to the town of Jayuya (see folding map at end). The Rio Zama, an eastern tributary of the Rio Grande de Arecibo, passes just west of the site. The land belongs to Heronimo Reyes Delgado and is in Barrio Jayuya Abajo, of the municipality of Jayuya. Both Stahl (1889: 182) and Fewkes (1903: 457) mention a ball court in this region, but the only specific reference to the site is by Lothrop (ms.: 7), who visited it during his survey. The writer inspected the site on July 24, 1938, and dug two trenches and a test pit the following day.
Unlike the ball courts previously described, La Zama is situated on a hogback between two hills. The top of the hogback is long, narrow, and flat, and on either side the land slopes sharply into mountain valleys. The Rio Zama, in the valley to the west, is 25 meters below the level of the site. Alongside this river is a large boulder marked with a petroglyph of a human face (Figure 6, A), which may have some connection with the site.

Lothrop (ms.: 7) refers to two ball courts at La Zama. At the time of present writer's visit, there was only one. It consisted of a flat, rectangular area, measuring 64 by 21 meters, which seemed unexcavated and was without the embankments usually found around ball courts. The two long sides of the court, extending S 30° E parallel to the edges of the hogback, had originally been lined with flat stones set on end. Cultivation has reduced these walls to lengths of 42 and 7.5 meters, respectively. The walls are composed of flat river stones 1.0 to 1.5 meters high and 60 to 90 centimeters wide. None bears petroglyphs.

An occasional potsherd was observed on the surface among the coffee trees surrounding the ball court. These were most numerous just outside the eastern wall of the site, and accordingly two test trenches, each composed of two sections two meters square, were dug in that area. In both trenches, the first two 25-centimeter levels consisted of dark brown humus containing a few stones, traces of charcoal, and artifacts. Most of these traces of occupation occurred on the eastern side of each trench, at the base of the wall of the court. Near the bottom of the second level, the soil changed to light brown, hard-packed clay and, since this was sterile, we discontinued excavation at a depth of 50 centimeters.

An oblong pit was next laid out perpendicular to the court on the opposite side, where a clearing in the coffee trees made it possible to dig eight sections, each two meters square and 50 centimeters deep. This excavation produced the same result as in the previous trenches, except that potsherds were rarer and the clay sub-soil appeared at a depth of only 25 centimeters. Test digging in other places around the court failed to reveal any artifacts, and therefore the work was stopped.

Capá potsherds predominate in all sections and levels at La Zama. They number 28, as compared with one specimen of the Santa Elena style. Two of the potsherds are from open bowls, 20 are from constricted bowls, and seven are typologically unidentifiable. They are accompanied by eleven fragmentary griddles and nine stone chips.

The La Zama court may be dated in Period IVa. Since it yielded less traces of habitation than the courts previously described, it is not as likely to have served as a dwelling site. One might speculate that it was primarily a place of worship, possibly of a zemi represented by the petroglyph alongside the river beneath the court.

Palo Hincado (Barranquitas 1)

Some 4.6 kilometers west of the town of Barranquitas, Highway 15 cuts through the southern edge of an extensive system of embankments. These are on land of Ramón Ortiz in Barrio Palo Hincado, of the municip
pality of Barranquitas. They lie just north of an unnamed stream near the headwaters of the Rio de Manati (see folding map at end).

Palo Hincado is well known to the collectors of the island, a number of whom have visited it in an attempt to obtain petroglyphs. One of these petroglyphs now stands in the plaza at Barranquitas. De Hostos (personal communication), Lothrop (ms.: 2-3), and Rainey (personal communication) have surveyed the site, and the latter particularly recommended it. The writer surveyed Palo Hincado on September 25, 1936, and excavated a test pit the following day (Rouse, 1937: 184-185).

The site occupies a broad, flat area on a ridge at the base of a mountain peak. Most of this area was wooded at the time of the writer's visit, and therefore our map of it is only approximate (Figure 5). On three sides the area is bordered by gentle slopes which fall for five meters to the stream on the south and to a pair of tributaries on the east and west. To the north, the ridge becomes narrower and rises for 25 meters at a gradually increasing rate to within 20 meters of the top of the peak.

Palo Hincado is second only to Capá in the complexity of its structures. There are a central plaza, a ball court, and in addition three roads radiate from the plaza, two down off the ridge into the streams and the other up the ridge onto the mountainside (Figure 5).

The plaza is situated at the rear of the flat space on the lower end of the ridge. Measuring 72 by 52 meters, it is rectangular in shape, and its long axis extends from east to west parallel to the crosswise contours of the ridge. It has been lowered, apparently by excavation, on its northern side and its eastern end, and, in addition, a broad terrace or bench, from 6 to 12 meters wide, has been cut into the high ground on those two sides of the plaza. The earth thus removed seems to have been heaped up in the form of embankments 1.5 meters high at the ends of the enclosure and along the western half of its northern side, where the land is low. The southern side, however, is without earthworks except for a low mound near its western end (Figure 5).

Originally, all four sides of the plaza were probably lined with stone slabs. Most of these have disappeared, but enough remained at the time of the writer's visit to suggest their original location and composition. On the northern side and the eastern end of the plaza, there may have been two rows of stones, one upright and the other lying horizontally on the edge of each bench, as in some of the ball courts at Capá. The remaining two sides each seem to have been lined with only a single row of upright slabs. The row across the western end of the plaza was not directly against the embankment, as is usual in these structures. Instead, what remains of it stands some 17 meters inside the enclosure, at the end of the bench along the northern side of the plaza (Figure 5). None of the stones still present at the time of the writer's visit bore petroglyphs, with the exception of one drawing of a face which did not seem to be aboriginal.

The ball court is also on the ridge, 45 meters north of the plaza and five meters higher up the mountainside. Like the plaza, it is rectangular in shape and it extends across the ridge, having a length of 33 meters and a
width of 15. On its upper side, it has been excavated 60 centimeters. There is an embankment of the same height on the lower side. A similar embankment extends along the western end, but the eastern end is open. A few upright stone slabs, unmarked with petroglyphs, still line the embankments.

Road 1 extends northeast from the main stream to the southwestern corner of the ball court (Figure 5). Although perfectly straight, it becomes narrower as it climbs the ridge, from a width of 15 meters at the stream to only 6 meters at the ball court. On either side, it is lined with an embankment 173 meters long and 1.2 to 1.5 meters high. These are well preserved, except where crossed by the highway at the lower end and for a break three meters long in the middle of the western side. The floor of the road is U-shaped rather than flat. It ends in the area between the western end of the plaza and the row of stones inside the end. On the western side, its embankment joins that along the end of the plaza, but on the east it stops just short of the mound at the side of the plaza (Figure 5).

The second road is on the opposite flank of the ridge, extending from one of the tributary streams to the eastern end of the plaza (Figure 5). It is in two sections. The lower part, which is perpendicular to the stream, measures 37 by 5 meters and is lined with embankments 60 centimeters high on the left and twice that height on the right. Only the upper half of the left embankment remains, and part of this curves around to the right, blocking the road in its center. Whether it originally had this curve, or extended straight down the hillside to the stream, could not be determined.

The upper section of Road 2 is more regular. It consists of two straight walls of earth 82 meters long, 1.2 to 1.5 meters high, and 12 meters apart. These are perpendicular to the plaza and merge into its eastern embankment. Through a gap in the latter, one can pass from the road onto the bench at the end of the plaza and thence down into the plaza itself.

The third road begins at the middle of the bench on the northern side of the plaza where it has been excavated 1.2 meters to the level of the bench (Figure 5). From the bench, parallel banks of earth extend up the ridge to its very end on the mountainside. These embankments are well preserved. They vary in height from 30 centimeters to 3 meters and enclose a roadbed averaging 10 meters in width. Altogether, Road 3 has a length of 1133 meters, over three-quarters of a mile. It is open only on the ends and, although it passes close to the ball court, it is not attached to the court. In fact, the open end of the court faces away from the road (Figure 5).

The preservation of the roads is apparently due to the fact that the ridge has never been plowed. There has been some erosion, however, and it may be for this reason that the beds of the roads are concave rather than flat. No slabs were noted in any of them, in the form of either walls or pavements.

The owner of the site claimed to have found potsherds throughout the site, but never in large amounts. Because of the undergrowth, we observed no specimens on the surface, but noted a few in a charcoal pit dug by the owner just west of the plaza. Accordingly, we located our pit in this
section, digging four two-meter square sections in the form of a square (figure 5).

All three levels in our pit consisted of heavy brown clay, mottled with charcoal. The latter was also observed in a more concentrated form in two shapeless areas, each having a volume of about 25 cubic centimeters, which may have been small fire pits. Potsherds and other artifacts were scarce. By the bottom of the third level, they had almost completely died out, and therefore we ceased excavation at a depth of 80 centimeters, although charcoal was still appearing in the soil at that depth.

Table 1 gives the distribution according to style of the potsherds in the pit. Because of the scarcity of specimens, this table is not reliable. It suggests, however, that sections A2, B1, and B2 of level 3 form a Santa Elena division, and the rest of the pit, a Capá division.

From the Santa Elena division come three sherds of open bowls, three fragments of constricted bowls, two unidentifiable sherds, and a stone pestle. The Capá division has yielded 29 sherds from open bowls, 90 pieces of constricted bowls, 19 unidentifiable sherds, three fragmentary griddles, the butt of a stone cel, three possible polishers of stone, two stone balls, two stone chips, one piece of red ocher, and two fragments of yellow ocher. In addition, we obtained from the two top levels three specimens of brick, two of glass, two of iron, and 35 of Spanish pottery. Huita, cow, and pig also seem to be represented in the Capá division.

A small shell sample from the pit cannot be allocated to the divisions. It includes five coral fragments, part of a Strombus lip, 31 land gastropods, and five marine gastropods—the latter despite the position of this site in the center of the island.

The mixture of styles in our pit suggests a transition from the Santa Elena to the Capá style. The Santa Elena division can be placed in Period IIb and the lower levels of the Capá division, in Period IVa. The number and variety of European objects, most of which are from the top level (table 1), indicate that that level was deposited during Period IVb. In fact, Palo Hincado may have been the residence of chief Orocox, the historic ruler of the district of Jatibonicú. It corresponds well to the position usually given for his village (figure 2:11).

The extent and complexity of the earthworks mark Palo Hincado as an important ceremonial site. Roads 1 and 2 call to mind the roadway ob-
served by Columbus, as discussed in the first part of this report. They may have functioned in connection with the worship of streams, which seems to have been widespread in Porto Rico (Fewkes, 1903: 463). The long road up the mountainside is even more difficult to explain, for there is nothing at its upper end—not even rocks. One may speculate that it was connected with the worship of mountains.

**Pellejas (Adjuntas 1)**

Between Adjuntas and Utuado, Highway 6 follows the valley of the Río Grande de Arecibo, providing access to a series of ball courts and petroglyphs (see folding map at end). The writer had planned to excavate in the southernmost of these courts, just north of Adjuntas (Fewkes, 1907: 82; Lothrop, ms: 1), but this has passed from existence and it proved impossible to locate any remains. Attention was then turned to the next court, Pellejas, some nine kilometers further north (folding map). This one lay between the highway and the river on a farm of Pepe González in Barrio Pellejas of the municipality of Adjuntas. It had previously been visited by Montalvo Guenard, from whom the writer learned of it. We surveyed it and excavated a test pit on August 29, 1937.

The site of Pellejas is located on the floor of the valley just southeast of, and three meters above, the river. The site is under cultivation, and only the eastern corner of the court still remained at the time of the writer’s visit. This consisted of two rows of upright stones, forming an obtuse angle. Some of the stones were flat and extended 25 to 50 centimeters above the ground. The rest were found and almost level with the surface. One of the flat stones bore a pictograph, facing out from the court towards the river. This consisted of a human face, deeply incised and well defined (Figure 6, H). No excavations or embankments were observed.

Scattered potsherds lay on the surface throughout the area of the site, particularly at its northeastern and southwestern ends. A pit was staked out in the former area just outside the corner of the court. This consisted of four sections two meters square arranged in the form of a square. To a depth of 50 centimeters, it yielded dark brown loam, mixed with charcoal and other refuse. Then, the soil changed abruptly to sterile, light brown sand. Excavation was terminated at the bottom of the second level.

Potsherds of the Ostiones style predominate in all sections and levels from Pellejas. They number 65, in contrast to four Santa Elena sherds and 19 of the Capá style. Seventeen of the sherds are from open bowls, 46 are from constricted bowls, and 25 are typologically unidentifiable. The associated artifacts include three fragmentary griddles, part of a stone celt, a celt-hammer of stone, a stone side grinder, a stone polisher, and a stone chip. No specimens of bone or shell were encountered.

The Pellejas pit may be assigned to Period IIIa, for incision is not present on the dominant Ostiones potsherds. The Santa Elena and Capá sherds may have been introduced from another and later part of the site as a result of the extensive plowing. Presumably, this is another site with combined utilitarian and ceremonial significance.
Stahl (1889: 182) and Lothrop (ms.: 2) report a ball court between the towns of Barranquitas and Comerio. The site lies on the edge of the Porto Rican Reconstruction Administration's Finca Río Hondo in Barrio Quebrada Grande, of the municipality of Barranquitas (see folding map at end). It is about two kilometers south of the Río Hondo and twice that distance west southwest of Comerio. The writer surveyed the site on August 22, 1938, and excavated a test pit five days later.

The site occupies a small plateau on the mountainside high above the
A stream to the west of this plateau (the Quebrada Grande) may have provided the Indians with water. The ball court consists of a rectangular depression, measured 35 by 17 meters, near the outer edge of the plateau. Its long axis runs from east to west perpendicular to the stream. On three sides, the court has been excavated to a maximum depth of 1.2 meters to compensate for the slope of the plateau, and only the eastern end is open. There are no walls or embankments. If originally present, these have been destroyed by the intensive plowing to which the site has been subjected. Several of the inhabitants did remember removing stone slabs from the site.

Potsherds were more common and more widespread at Quebrada Grande than in most ball courts. They were observed in the plowed soil over the entire plateau, covering an area of a square kilometer. A collection was made of these sherds, and they were segregated according to the three fields into which the site is divided. In addition, we dug a pair of test pits 37 meters apart southwest of the ball court. Both consisted of four sections two meters square, arranged in the form of a square, and both were dug to a depth of 50 centimeters. In each, the top 15 centimeters of deposit consisted of dark brown clay, and there was reddish brown clay beneath. Charcoal and artifacts occurred to a depth of 25 centimeters in Pit 1 and 30 centimeters in Pit 2.

Potsherds of the Capá style predominate in all sections and levels at Quebrada Grande, and in all the surface collections. Accordingly, the entire site will be treated as a unit. We obtained 199 Capá sherds and 55 of the Santa Elena style. Twenty-nine of these specimens are from open bowls, 132 from constricted bowls, and 94 are typologically unidentifiable. They are accompanied by nine pieces of griddles, a clay figurine, a fragment from a possible stone adze, one broken and two complete celts of stone, a stone hammer, and two stone chips.

The entire site seems to date from Period IVa. The mixture of Santa Elena and Capá sherds probably marks a transition from the former to the latter style. There is abundant evidence of habitation as well as ceremonial activity.

Sabana (Orocovis 2)

This is one of the ball courts excavated by Rainey and Morales Carrión. They call it "Barrio Sabana, Court No. 2" (Rainey, 1940: 100-101). Lothrop (ms.: 3) also mentions the site. It is located on land of Francisco Meléndez in Barrio Sabana, of the municipality of Orocovis, some five kilometers southeast of the town of Orocovis and at the headwaters of the Río Manati (see folding map at end).

The Sabana ball court occupies the top of a small plateau, some 25 meters above an unnamed stream (Figure 7). It consists of a rectangular depression 90 meters long, 45 meters wide, and 60 centimeters deep, with its long axis running northeast parallel to the contours of the hill. Unlike the other ball courts, this one lies completely beneath the surface of the ground. It is drained by a narrow ditch extending from its northeastern corner to the hillside (Figure 7).
A cross section through the center of the court reveals that it is higher on its northeastern than on its southwestern side (Figure 8). The cross section also suggests that the earth removed from the enclosure was piled up along its sides, whence much of it seems since to have washed down into the court. Although the bottom of the court is now flat, its sides...
are sloping, and this may be due to erosion since the court was abandoned (figure 8).

No earthworks or stone walls were observed around the court, but several stone slabs buried in the sloping walls of the enclosure and piled outside may be from walls. These are river stones, 60 to 90 centimeters long and 30 to 60 centimeters wide. None bear petroglyphs, but the inhabitants state that several petroglyphs have been removed from the site by collectors.

Rainey (1940: 100-101) reports that “trenches and pits . . . cut through and around the court all produced scattered sherds which were not associated with other refuse of occupation. The potsherds, which were found at a depth never greater than 25 centimeters, were much more numerous than at the other three courts [dug by him], numbering approximately 2400.” Rainey’s description suggests that these sherds were primarily, if not entirely, of the Capí type.

At the time of the writer’s visit, the plateau on which the court is located was overgrown with grass, and no artifacts were visible. The slope north and west of the court was under cultivation, however, and here we were able to collect a number of specimens. We located our pit on the southwestern side of the court, near one of Rainey’s excavations (figure 7). Here, in the customary four two-meter square sections arranged in the form of a square, we encountered reddish brown clay mottled with charcoal and containing some potsherds and other artifacts. This deposit continued to a maximum depth of 65 centimeters, when the clay became sterile (figure 8). Excavation was therefore discontinued at a depth of 75 centimeters.

Two holes were observed in the refuse. One occurred at a depth of 35 centimeters in section A1, just beneath a fragment of conch shell. It consisted of a hollow space 9 centimeters in diameter and 31 centimeters deep. The soil for 7 to 10 inches around this hole was heavily impregnated with charcoal. The second hole, at about the same depth in Section B2, lacked the concentration of charcoal. It was 14 centimeters long, three centimeters in diameter, and inclined towards the ball court at an angle of 45 degrees. Both holes were cylindrical, and may have been the remains of posts.
There was one other unusual feature in the pit. Several large rocks appeared in section B1 at a depth of about 40 centimeters. These were not worked, and they did not seem to have been affected by fire. The soil around them contained no more charcoal than usual, and therefore it is unlikely that the rocks had served as a fireplace.

The majority of the potsherds obtained on the surface and in each part of the pit are of the Capá style, and consequently the entire collection will be considered as a unit. Altogether, the Capá sherds number 167, and there are also 19 sherds of the Santa Elena style. Thirteen of these specimens are from open bowls, 134 are from constricted bowls, and 39 are typologically unidentifiable. The associated artifacts include six fragmentary griddles, three complete stone celts and three broken ones, 28 stone chips, a quartz crystal, and one fragment of coral. We also collected one marine gastropod.

The presence of charcoal, of griddle sherds, of stone tools, and of a marine shell suggests that the site was used for habitation as well as for ceremonies. This is contrary to the opinion of Rainey (1940: 100–101), who, however, found no such remains.

Since Capá sherds appear to predominate in Rainey’s collection as well as ours and there are no European objects, it is probable that the entire site dates from Period IVa. The few Santa Elena sherds in our collection may represent the end of a transition from that style to the Capá.

Sallo Arriba (Utuado I)

About four kilometers south of the town of Utuado, the highway to Adjuntas (No. 10) passes through a large refuse deposit just to the west of the remains of one of the many ball courts in the upper part of the Río Grande de Arecibo (see folding map at end). This refuse deposit and ball court are on land of Salvador Vives in Barrio Salto Arriba, of the municipality of Utuado. Fewkes excavated here, and Lothrop also has examined the site (Fewkes, 1903a: 113, 114, 118, 125; Fewkes, 1907: 82, 83, 178, 184, Plate 77, c; Fewkes, 1922: 237; Lothrop, ms.: 14).* The writer surveyed it on August 29, 1937, and excavated a test pit on July 19 of the following year.

The site occupies a long, narrow plateau 70 meters east of the Río Grande and three meters above the river. A tributary flows along the northern edge of the plateau; to the east, the land rises into the mountains; and, to the south, there is another stream. Highway 10 runs from north to south through the middle of the plateau and a lesser road extends from the highway, bisecting the plateau transversely. At the time of the writer’s visits, the rest of the plateau was completely covered with sugar cane, houses, and sheds.

Fewkes has not recorded a description of the site, but he implies that its ball court was a rectangular area, slightly depressed beneath the surrounding plateau and bounded by a series of flat stones set on edge. He was told that a pillar stone (idol) had formerly stood on a raised platform on one

* See also Loven (1935: 88–90, 564) and Rainey (1907 113–114).
side of the enclosure. It was said to be about 120 centimeters high "and represented a female with head and bust well carved in relief" (Fewkes, 1903a: 462 and 1907: 178).

Several small mounds lay just south of the enclosure. Fewkes noted that the highway had cut through the edge of one of these mounds, "revealing, a few feet below the surface, a layer of soil containing fragments of pottery, a few broken celts, and the long bones of an adult." This discovery induced Fewkes "to extend a trench diametrically through the mound, parallel with the side of the enclosure. The depth of this trench, at the middle of the mound, was about nine feet. The excavation revealed that the mound rested on a hard gravel base, and was composed of soil so rich that some of it was carried away by the neighboring farmers for use as fertilizer. This earth was very moist and ill-adapted to the preservation of bones or other fibrous material. Nevertheless, we found ten skeletons of adults and infants, with mortuary objects so distributed as to indicate that they had been placed there as offerings. One of the best preserved of these skeletons was found in a sitting position, with the legs drawn to the chest, and with ceramic objects lying at one side. The frontal bones of the skulls were abnormally flattened . . ." (Fewkes, 1903a: 457 and 1907: 82-83).

Twenty-five of the potsherds obtained by Fewkes are still preserved in the United States National Museum, and all are Ostiones in style. One of the mortuary vessels, which is also Ostiones in style, has been illustrated by Fewkes (1907: 184, Plate 77, c; 1903b: 114; 1922: 237).* In addition to the broken celts, Fewkes also mentions a stone face and a bone cylinder from the mound (Fewkes, 1903a: 458; 1903b: 125, 118; 1907: 83).

On the eastern bank of the river just west of the site, there is a large boulder on which Fewkes observes "eight or nine" petroglyphs. These covered the entire upper face of the boulder, a flat surface about 4.5 meters above the base. They include carvings of human-like bodies and heads, of faces, and of geometric designs, several of which suggest the sun and the moon (Fewkes, 1903a: 444-447, Plate 45, 1-8; 1907: 151-153, Plate 60, pt. 1, a-h).† Presumably, they were made by the same people who built the court.

Our own work at Salto Arriba adds little to the descriptive details furnished by Fewkes. The ball court has long since been destroyed. According to the inhabitants, it was located on the inner side of the plateau, east of the highway and north of the side road. In a level area here, we observed several flat river stones which may have originally formed part of the walls of the enclosure. None bore petroglyphs.

The mounds, too, had been destroyed by the time of our visits. The inhabitants claimed that Fewkes's mound excavation had been made just beyond the northern end of the court, but this does not agree with Fewkes's statement that the mounds were to the south. The land just south of the

* The first of these references has been misquoted by Loven (1935: 546), who attributes to Salto Arriba the pot illustrated on Plate 77, a, instead of that on Plate 77, c. The former, which enclosed a necklace of stone and shell, is actually from a cave near Utuado.
† In his 1907 report, Fewkes erroneously attributes the petroglyph illustrated as Plate 60, pt. 1, a to a different site. This error has been repeated by Morales Cabrera, who also assigns the rest of the petroglyphs to the other site. See also Lothrop (ms: 11).
position of the ball court is unusually high. In part, the rise appears to be 
natural, but it is also partially due to the accumulation of refuse, perhaps 
from the mounds. Here, we observed potsherds in the banks along the 
side road to a depth of 75 centimeters. Other sherds were scattered through 
the cane fields over an area of several acres. They appeared to be more 
umerous east of the road in the vicinity of the ball court than to the west.

The writer also examined the petroglyphs on the bank of the Rio Grande 
west of the site. According to our observations, the rock is only half the 
size given by Fewkes (as quoted above) but bears about 20 petroglyphs—
twice the number counted by him.* Most of the additional carvings are 
of faces. Two are illustrated in figure 6 (B, C).

At the request of the owner of the site, who wished to avoid the destruc-
tion of sugar cane, we dug our test pit in a barnyard just southeast of the 
junction of the side road and the highway, in the same general area in which 
Fewkes is supposed to have worked. Here, we staked out four two-meter

| Table 2 |

**Distribution of Cuevas, Ostiones, Santa Elena, and Capá Sherds at Salto Arriba**

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>A2</th>
<th>B1</th>
<th>B2</th>
<th>Capá division</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2-4-0-7</td>
<td>1-3-1-5</td>
<td>2-12-1-1</td>
<td>7-17-0-0</td>
<td>Ostiones division</td>
</tr>
<tr>
<td>2</td>
<td>10-26-1-8</td>
<td>13-28-3-1</td>
<td>6-14-0-0</td>
<td>8-7-0-0</td>
<td>Cuevas division</td>
</tr>
<tr>
<td>3</td>
<td>9-28-4-0</td>
<td>16-2-0-0</td>
<td>5-2-0-0</td>
<td>1-0-0-0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4-7-1-4</td>
<td>7-3-0-0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Explanation of Table.* The vertical columns represent sections; the horizontal lines, levels. The number of potsherds of the Cuevas, Ostiones, Santa Elena, and Capá styles are given in succession. The lines mark the boundaries between the Cuevas, Ostiones, and Capá divisions.

square sections in the form of a square. Our first two levels consisted of 
hard packed, dark brown loam, containing bits of charcoal and a few small 
potsherds. In the next two levels, the soil was loose, sandy, and black in 
color. Both charcoal and potsherds were more common. The soil be-
came light brown in color toward the bottom of the fourth level and, since 
it seemed to be sterile, excavation was discontinued at a depth of 110 
centimeters.

Four styles are represented in the pit: Cuevas, Ostiones, Santa Elena, 
and Capá. As shown in Table 2, the numbers of examples of each are 
too small for reliable classification. Nevertheless, we shall assume that 
level 1 is a Capá division, that level 2, sections A1 and B1 of level 3, and 
section A1 of level 4 constitute an Ostiones division, and that the rest of 
the pit forms a Cuevas division.

Twenty of the sherds in the Ostiones division are from open bowls, 19 
are from constricted bowls, one is from a jar, and 12 are unidentifiable. 
One piece of a griddle was also found in this division. In the Ostiones 
division, we obtained 65 sherds from open bowls, 82 from constricted bowls, 
two from jars, and 55 which are unidentifiable. Ten fragments of griddles,

*According to Lothrop (ms.: 14), the petroglyphs number 50 or 60.
a clay disk, a discoidal stone bead, and two stone chips also come from this division. The Capá division yielded 15 sherds from open bowls, 14 from constricted bowls, 12 unidentifiable sherds, four fragments of griddles, a stone polisher, and a piece of tile. In addition, a stone bowl, a stone mortar, and a stone hammer were purchased from the inhabitants, and there is a stone end grinder from the site in Lothrop’s collection at the Harvard Peabody Museum.

Although the Salto Arriba pit was relatively shallow, three of our four periods seem to be represented there, Period II by the Cuevas division, Period III by the Ostiones division, and Period IV by the Capá division. The Cuevas division can be assigned to Period IIb, for only a single sherd is white painted; the Ostiones division to Period IIIa, since none of the Ostiones sherds are incised; and the Capá division to Period IVa, it being assumed that the piece of tile is intrusive. This leaves a gap between the deposition of the Ostiones and Capá divisions, corresponding to Period IIIb, during which time the Indians may have deposited their refuse in another part of the site.

It is believed that the few Santa Elena sherds are the result of influences from the east. The fact that, with one exception, they are confined to the Ostiones division may be significant for cross dating.

Fewkes did not consider the possibility that Salto Arriba might be a village site. Instead, he concluded that the ball court had been used for graves and for mortuary dances held in connection with the burials in the adjacent mounds (Fewkes, 1903a: 457-458; 1903b: 113; 1907: 82-83). This conclusion has led several subsequent writers to assert that burial mounds were erected by the Indians of Porto Rico (Gower, 1927: 13-14; Joyce, 1916: 206; Lovén, 1935: 88, 546-549). In the writer’s opinion, these assertions are incorrect. The data of Fewkes and of the writer both indicate that the mounds were piles of refuse. If they were closer to a coast, where shell fish were available, they would probably be shell heaps. Each may represent a different house site, as at Ostiones and the other shell midden sites dug by us. This being so, the skeletons in them can be attributed to the typical Antillean custom of burying in refuse. They bear no resemblance to the artificial burial mounds of the southeastern United States.

Our conclusion, then, is that Salto Arriba was a village site, accompanied by a ball court. The people probably lived in the area surrounding the court, buried their dead in the refuse deposited in that area, and conducted their games, dances, and ceremonies within the court (if not also at the petroglyphs on the bank of the river). The only unusual feature is that the inhabitants piled up their refuse instead of spreading it out as at the ball courts previously described. The mounds encountered elsewhere consist of earth removed from the court instead of refuse. They bear no resemblance to the artificial burial mounds of the southeastern United States.

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Sallos (Orocovis 4)

There is a ball court on the farm of Pedro Uvero in Barrio Saltos of the municipality of Orocovis, some four kilometers southeast of the town of Orocovis (see folding map at end). The Quebrada Mala, a source of the Río Manatí, passes a short distance to the west. Learning of the site from the inhabitants of the vicinity, the writer surveyed it on August 17, 1938, and excavated a pair of test pits three days later.

At the ball court of Saltos, one has the feeling of standing on top of the world, for the site is perched upon the summit of a narrow mountain ridge at an estimated height of 800 meters above sea level. On both sides of the court, the land falls sharply 60 meters down into valleys. At either end, the ridge narrows until there is scarcely room for two people to pass abreast.

Except for three meters on the western side and half that distance on the east, the ball court occupies the entire width of the plateau. Its shape, conforming to that of the plateau, is trapezoidal rather than rectangular, and its orientation is from north to south in the same direction as the ridge. In size, it is one of the smallest courts encountered in Porto Rico, measuring only 23 meters in length and 15 in maximum width.

The court consists of a level, flat area, produced by excavating to a depth of 60 to 90 centimeters at either end where the land is high. The sides are lined with embankments 30 to 60 centimeters high, which may consist of soil from the excavated areas. These embankments are apparently intended to complement the banks on the ends of the enclosure. No stones were observed, except for a slab-shaped river boulder completely buried in the soil at one edge of the site, nor was there a drainage ditch, as at Sabana.

When the writer visited the site, the ground was covered with sod and no refuse was observable. Two test pits were dug in the only available areas outside the enclosure, one at either end. Each consisted of the usual four sections two meters square arranged in the form of a square. Both were in heavy clay, dark brown for the first 15 centimeters, light brown for 15 centimeters more, and reddish brown below the latter depth. Specks of charcoal and an occasional artifact were encountered in the brown soil, but the reddish clay seemed to be sterile. Accordingly, excavation was discontinued at the bottom of the second 25-centimeter level in each pit.

Only Capá sherds were obtained from Saltos, and they number merely 12 specimens. Eleven of them are from constricted bowls. The other is typologically unidentifiable. One fragment of a griddle, the butt of a stone celt, a stone ball, two stone chips, and an unidentifiable fragment of bone, complete the collection.

This site certainly dates from Period IVa. In fact, it is the only place where the Capá style was completely isolated. Its court probably served for ceremonies rather than for ball games, the playing of which would have been difficult on the mountaintop. It cannot have been well suited to habitation either. Nevertheless, the contents of our pits do not differ essentially from those in dwelling sites. The animal bone, in particular, suggests that Indians may have lived at Saltos, if only temporarily.
There is another large village site, enclosing a ball court, on the east bank of the Río de la Plata, just across the river from the section of Highway 1 between Cayey and Aibonito (see folding map at end). The name of this site is Toita, and it is on Farm 9 of the Porto Rican Reconstruction Administration in Barrio Toita, of the municipality of Cidra. In recent excavations at this site, Fernández-García obtained potsherds, objects of polished stone, and a carved bone spatula (Morales Cabrera, 1932: 50, 142, 143, 172, 209, 210, 258). In addition, he encountered two adult burials and one of a child, one of the former being flexed and the latter having its forehead covered with a clay vessel. The writer surveyed the site on August 30, 1936, and excavated a test pit from September 4 to 6 of the same year (Rouse, 1936: 183-185).

At Toita, the Río de la Plata makes a deep bend, enclosing a broad, gently sloping plateau. The site lies on this plateau, some 1.5 meters above a narrow flood plain at the edge of the river. Formerly, the plateau was a tobacco plantation, but, at the time of the writer’s visit, the Porto Rican Reconstruction Administration was dividing it into a series of truck farms, each with its own dwelling.

Despite its distance inland, Toita may be considered a shell deposit. Charcoal, potsherds, a few animal bones, and shells were observed on the surface of the side of the plateau towards the river, covering an area some 190 meters long and 95 meters wide except for an open space in the center. This central space, measuring roughly 31 by 27 meters, contained 15 to 20 stones from the river, most of them flat. The inhabitants stated that, before the plateau was subjected to plowing, these stones had enclosed a ball court. They were not in a regular arrangement at the time of the writer’s visit, however, nor were any of them marked with petroglyphs. The supposed area of the ball court did not seem to be depressed. The only sign of its existence was the absence of refuse.

Our test pit, a square composed of four two-meter square sections, was laid out near the edge of the plateau in the southeastern part of the site, where the shells seemed to be thickest. Excavation here was carried through ten levels to a depth of 250 centimeters (Figure 9). The first 30 centimeters in sections A1 and A2 (towards the river) and the first 90 in sections B1 and B2 (away from the river) consisted of dark brown humus mixed, as on the surface, with shell refuse. Below those depths, the shell refuse occurred only in a tongue 35 centimeters wide which extended diagonally down from sections B1 and B2 to an average depth of 200 centimeters in sections A1 and A2. Near the top of this tongue, we encountered a horizontal lense of charcoal. At its bottom was a pit of the shell refuse 40 centimeters deep and one meter in diameter. Otherwise, this entire section of the excavation consisted of sandy, light brown loam containing some animal bones and artifacts. There were few shells in this deposit. The only possible indication of the presence of charcoal was a slight darkening of the soil above the layer of charcoal. So far as could be determined, the
light brown, sandy soil continued downwards indefinitely, but no artifacts were encountered below a depth of 225 centimeters.

It is difficult to interpret the stratigraphy of the Toita pit. One possibility is that there were four periods of deposition, a first in which the lower part of the shell-free deposit accumulated, a second in which the tongue
of shell came in, perhaps as the result of erosion down a hillside, a third in
which this hillside was filled up with the shell-free refuse, and a fourth
marked by the deposition of the horizontal layer of shell refuse at the top
of the excavation. The shell pit at the bottom of the excavation and the
lens of charcoal near the top may have been deliberately constructed.
Although no stones were present, the latter could have been a hearth.
The remnants of a child's burial appeared in section B2 of level 3. The
bones were badly disintegrated, and only fragments of the mandible, the
ribs, and the long bones could be recognized. There were no grave objects,
nor could the position of the bones be determined.
Five of our six styles are represented in the Toita pit, as follows:

<table>
<thead>
<tr>
<th>Level</th>
<th>Cuevas</th>
<th>Ostiones</th>
<th>Santa Elena</th>
<th>Cupá</th>
<th>Esperanza</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>90</td>
<td>29</td>
<td>7</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>63</td>
<td>9</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>92</td>
<td>20</td>
<td>1</td>
<td>12</td>
</tr>
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<td>8</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>74</td>
<td>19</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>84</td>
<td>21</td>
<td>1</td>
<td>1</td>
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<td>2</td>
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</tr>
<tr>
<td>8</td>
<td>0</td>
<td>39</td>
<td>17</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>15</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>14</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

As these figures indicate, the Ostiones style is the most common, followed
by the Esperanza style in the top two levels and by the Santa Elena in the
bottom eight. Ostiones potsherds predominate in all sections and levels
except three, where the numbers involved seem too small to be significant.
Consequently, the entire pit, together with a few specimens collected on the
surface, will be treated as a unit.

Two hundred and seventy-eight of the sherds are from open bowls, 391
are from constricted bowls, 16 are from jars, and 159 are typologically un-
identifiable. The associated artifacts include 69 griddle sherds, two clay
disks, a stone anvil, a chipped stone ax, the butt of a stone cel, part of a
chisel of stone, two stone hammers, two net sinkers of stone, three stone
polishers, a cylindrical stone bead, an anthropomorphic stone pendant, a
stone cylinder, two stone chips, three bone beads, a discoidal shell bead,
a flat shell pendant, a pendant-tinkler of shell, a miscellaneous piece of
worked shell, a blunted clam shell, a Strombus lip, a fractured shell tip, and
17 coral fragments. Fish, man, hutia, and turtle are represented among the
bones, and land gastropods, marine gastropods, and marine pectinids
among the shells. There are no European objects, with the possible ex-
ception of a cut mammal bone from the top level, which we have classed as
human.

All of the above material apparently dates from Period III. Although
the Ostiones sherds are not incised, the presence of so many examples of the
Santa Elena, Cupá, and Esperanza styles suggests that the material may
have been deposited during the latter half of the period. The great depth
of the deposit might seem to contradict this interpretation, but not if we
assume that a large part of the refuse has accumulated as the result of
erosion.
Unfortunately for the theory of erosion, we have been unable to make any correlation between the various styles and the strata in the pits, with the possible exception that the Cuevas sherds coincide very roughly with the tongue of shells which extends downwards from sections B1 and B2 into A1 and A2. These Cuevas sherds may have been washed in from another part of the site dating from Period IIIa or even from Period IIb.

The variety of other styles may be due to the position of the site on the edge of the areas of distribution of the Santa Elena and Capá styles to the northwest and of the Ostiones and Esperanza styles to the south and southeast. If our pit had extended from Period III into Period IV, it is likely that the Ostiones would have been succeeded as the dominant style by the Esperanza. In fact, that sequence may be present in another part of the site.

Toita provides one of the best examples of the combination of habitation with a ball court. As Morales Cabrera (1932: 50, 142, 143) has pointed out, there is little doubt that a village was located on the plateau. Probably it had a ball court or dance ground in the center of it. During the latter part of the existence of this village, its inhabitants must either have traveled widely or have had broad trading contacts, for the nearest source of the shells found at the site is Salinas on the south coast, 25 kilometers away through difficult country (folding map).

Vegas Arriba (Adjuntas 6)

On the second mountain ridge east of the town of Adjuntas are the remains of a ball court to which has been given the name of Vegas Arriba (see folding map at end). This site is owned by Pasqual Pithias. It is in Barrio Vegas Arriba of the municipality of Adjuntas. Montalvo Guendar had been there before the writer, who surveyed the site on July 11, 1938, and excavated five test pits on the same day.

The site lies on the western edge of a small plateau, from which the land falls sharply for 122 meters into the valley of a tributary of the Rio Grande de Arecibo. This is the greatest elevation in the vicinity. Its height above sea level is said to be 1,006 meters, or twice that of the surrounding towns. A nearby spring may have been used by the Indians as a source of drinking water.

At the time of the writer's visit, the land was covered with brush, through which it was possible definitely to trace only one side of the court. This consisted of an embankment 30 meters long and 60 centimeters high, the inside of which was lined with a series of upright stone slabs, each about 90 centimeters high and 60 centimeters wide. A natural bank 7.6 meters away from this structure and roughly parallel to it may have formed the other wall of the court, although only a single stone was imbedded in it. The direction of both walls was roughly from north to south at an angle to the edge of the plateau. Presumably, the ends of the court were open.

One of the stones in the built-up wall on the western side of the court was marked with petroglyphs (FIGURE 6, D, E). Facing in towards the center of the court were the head and shoulders of a human being. On the oppo-
site side, looking out over the embankment, was a drawing of the face of a man. As usual, the lines were wide and deeply carved. Their depth averaged four and their width ten millimeters.

No refuse was observed anywhere in the site. Nevertheless, five trenches were dug. The first, which consisted of four two-meter square sections, was situated on the edge of the plateau near the end of the western wall of the court. A second trench of the same size was excavated inside the first, closer to the wall. Then, a single section was laid out at the very base of the wall. Trench 4, composed of three sections, was located at the southern end of the court, with the two sections of Trench 5 nearby. All sections were dug 25 centimeters except the second and third sections in Trench 2, in which a slight rise necessitated extension of the depth to 50 centimeters. This carried all sections through a black layer of humus into light brown loam beneath. The only charcoal was observed at the surface, where it appeared to be intrusive. All trenches except the third one (at the base of the wall of the court), however, yielded potsherds and other artifacts in small numbers. These were in the humus. The subsoil seemed to be sterile.

Potsherds of the Capá style predominate in all sections and levels at Vega Arriba. There are 20 of them, accompanied by five sherds of the Santa Elena style. Two of the sherds are from open bowls, 17 are from constricted bowls, and six are typologically unidentifiable. Four pieces of griddles, two stone chips, and a fragment of petrified shell complete the collection.

All of this material apparently dates from Period IVa, with the Santa Elena sherds representing the end of a transition from Period III. If this site was ever inhabited, it must have been only for a short time, for its deposit is one of the shallowest encountered in Porto Rico. Because of its position on a mountaintop, it is not likely that it served as a ball court either. Instead, it may have been a dance ground.

**Villón (Coamo 1)**

The position of this site is ambiguous. Since it is in the southern foothills, it might have been included in the south-coast area. It lies closer to the mountains than to the coastal plain, however, and therefore it is considered part of the mountainous interior. On property of Julio Gonzales, it is in Barrio Cuyón of the municipality of Coamo, about six kilometers south southwest of the town of Aibonito (see folding map at end). Montalvo Guerard had collected petroglyphs at the site. The writer surveyed it on September 7, 1936, and excavated two test pits the following day (Rouse, 1936: 184-185).

From the standpoint of the Indians, Villón must have been well situated, for it is near the headwaters of three streams, one flowing north into the Río de la Plata in the vicinity of the site of Toita and the other two draining south into the Caribbean Sea at Sabinas and Santa Isabel, respectively (folding map). It may be by way of these rivers that the inhabitants of Toita obtained the shells observed by us at their site. The closest of them to Villón is the Río Cuyón, which flows just west of the site, eventually
joining the Río de Coamo and emptying into the Caribbean at the site of Cayito near Santa Isabel.

A creek joins the Río Cuyón at the site of Villón, enclosing a broad, flat-topped ridge elevated some 30 meters above the river (Figure 10). At the northern corner of the ridge, a slight, rocky elevation lies at the junction of the two streams. The southern corner is marked by a steep hill. Between them, where the land is relatively level, there is a plaza, two ball courts, and five shell heaps, all partially destroyed by cultivation. The site thus ranks with Capá and Palo Hincado as one of the most elaborate in Porto Rico.

The plaza occupies the center of the ridge (Figure 10). Square in shape, it has the same orientation as the ridge and its four corners are roughly in the cardinal directions. It consists of a level, flat area, measuring approximately 30 meters on a side. At the time of the writer’s visit, all four sides were lined with a low embankment 25 centimeters high, but there were no traces of excavation. Originally, the inhabitants said, the plaza had been completely surrounded by a wall of stone slabs.* A few of these were near the plaza. None bore petroglyphs.

The two ball courts lined the side of the ridge southwest of the central plaza and near the base of the hill at the southern corner of the ridge (Figure 10). All that remained of the first court was a line of upright stone slabs along the edge of the ridge. This wall was 23 meters long and had an average height of 50 centimeters. The inhabitants were unable to say whether it had formed the side or the end of the court. Two petroglyphs, both representing human faces, occurred on the inner side of the wall. One of them was removed by the writer and is now in the Yale Peabody Museum.

Enough remained of Ball Court 2 to indicate that it had been rectangular in shape (Figure 10). It measured 30 by 24 meters and extended S 55 W. Unlike the ball courts observed elsewhere, its long axis was perpendicular to the edge of the ridge and to the contours of the hillside. Except at the northeastern end, it was entirely surrounded by an embankment varying from 90 to 150 centimeters in height. On the eastern (uphill) side, this bank seemed to be the result of excavation, but elsewhere the earth had apparently been piled up. The inhabitants stated that Court 2 had never been lined with stones, and that its embankment was originally higher. A small mound 150 centimeters high lay just south of this court.

The five shell heaps were situated along the edges of the ridge, three of them northeast of the central plaza and two south and west (Figure 10). All were small and shallow. The largest measured 41 meters long, 8 meters wide, and only 30 centimeters in height. They all appeared to consist of black humus containing charcoal, a few animal bones, and moderate amounts of shells and artifacts. Four specimens were collected from their surface: a sherd from an Esperanza constricted bowl, a stone peg, and two pieces of water worn shell.

According to the inhabitants, several human bones have been found on the elevation at the northern corner of the ridge, where a house is now

* They also claimed that the plaza used to be circular in shape.
located (Figure 10). This part of the site was not under cultivation at the time of the writer's visit, and it was impossible to observe the nature of its soil.

Two test pits were dug at Villón, one in the middle shell heap northeast of the plaza and the other in the midden west of the plaza (Figure 10).

![Plan of the site at Villón](image)
Both consisted of four two-meter square sections arranged in the form of a square, and both were excavated to a depth of 50 centimeters. The first 30 centimeters contained a deposit like that observed on the surface, with the addition of a small amount of ash in Pit 2. Below 30 centimeters in each pit, we encountered sterile, light brown clay, which in Pit 1 was quite stony.

Pit 1 is characterized by the Boca Chica style, of which 70 examples were obtained. These specimens predominate in all sections and levels. They are accompanied by two Ostiones, 32 Santa Elena, one Capá, and 38 Esperanza potsherds. Two of the sherds may be from bottles, 24 are from open bowls, 97 are from constricted bowls, and 21 are typologically unidentifiable. The associated artifacts include 12 pieces of griddles, two stone polishers, a stone sharpener, eight stone chips, a *Strombus* lip, and a plain shell tip. Bird, man, and hutia are represented among the bones and land gastropods, marine gastropods, and marine pelecypods among the shells.

Pit 2 is characterized not by the Boca Chica but by the Ostiones and Santa

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Distribution of Ostiones, Santa Elena, and Esperanza Potsherds in Pit 2 at Villón</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section</td>
<td>Villón 1</td>
</tr>
<tr>
<td>1</td>
<td>23-33:7</td>
</tr>
<tr>
<td>2</td>
<td>8-6:4</td>
</tr>
</tbody>
</table>

*Explanation of Table.* The vertical columns represent sections; the horizontal lines represent levels. The number of potsherds of the Cuevas, Ostiones, Santa Elena, and Capá styles are given in succession. The line marks the boundary between the Ostiones and Santa Elena divisions. No other styles are represented.

Elena styles. As shown in Table 3, potsherds of the Ostiones style predominate in section Z1 of level 1 and in all of level 2. The Santa Elena sherds predominate in the rest of the pit. Specimens of the Esperanza style form a minority in both divisions.

From the Ostiones division of Pit 2 come 17 sherds from open bowls, 29 from constricted bowls, and seven which are typologically unidentifiable. These are accompanied by four broken griddles, three stone chips, two pieces of coral, and bones of the hutia. The Santa Elena division yielded 45 sherds from open bowls, 75 from constricted bowls, and 18 which are unidentifiable, as well as four pieces of griddles, three stone chips, a *Strombus* lip, and several hutia bones. The shell sample cannot be separated according to division. It consists of land gastropods, marine gastropods, and marine pelecypods.

It will be apparent that the two pits form a chronological sequence, Pit 2 dating from Period III and Pit 1 from the first half of Period IV. Only one of the Ostiones potsherds in Pit 2 is incised, and therefore that division probably falls into Period IIIa. This being so, it seems logical to place the Santa Elena division in Period IIIb as follows: Period IVa—Pit 1 (Boca Chica); Period IIIb—Santa Elena division, Pit 2; Period IIIa—Ostiones division, Pit 2.
As shown below, the sequence of Ostiones and Santa Elena styles also occurs in the sites of the south-coast area adjacent to Villón. The Boca Chica pottery is another link with the south coast, for the only other place on the main island of Porto Rico where we found that style was at Cayito, near the mouth of the Río Coamo (folding map). These facts confirm our suggestion that the Indians of Toita, as well as of Villón, obtained their sea shells via the Cuyón and Coamo rivers.

The presence of the Esperanza style as a minority trait at Villón recalls the situation at Toita. Although Villón is further west, it is likely to have been subjected to the same influence from the eastern part of the south-coast area to which we have attributed the Esperanza sherds found at Toita.

The shell heaps at Villón recall the "mounds" at Salto Arriba, except that they are much smaller. Both appear to be the result of habitation and again, therefore, we must restate our belief that the Indians lived at sites like this one. Even though the plaza was a place for ceremonies and dances and the courts were used for games, the rest of the site probably constituted an Indian village.

**Other Sites**

Five sites which were dug by previous investigators were not also excavated by us. The following is a brief summary of the findings at these sites.

**Antonio (Utuado 13).** This cave in the hillside above the terraces of Cerro Hueco has already been mentioned in connection with our excavations at the latter site (figure 4). Like the latter, it is on land of Antonio Cuevas in Barrio Caguana, of the municipality of Utuado (see folding map at end). It, too, is sometimes called Cerro Hueco, although the term "Cueva de Antonio" which we use here is more common. It was excavated by Aitken and Mason in 1915. Reports on it have been published by the former (1917, 1918) and by the present writer (1941a: 273-275).*

Unlike the sites excavated by us, the Cueva de Antonio appears to have been used exclusively for burial purposes. In it, Aitken and Mason encountered 20 burials, 18 of them single and the other two each consisting of an adult and a child.† All, except four which had been disturbed by subsequent burial, were flexed. The one skull described is said to have been brachycephalic and undeformed.

No grave objects were found with the burials, but a few broken artifacts appeared in the floor of the cave. These include 12 potsherds, only three of which have any recognizable attributes of shape and decoration. In terms of the classifications used in the present paper, all three of these sherds are Capá in style. Two come from open bowls and the third is from a constricted bowl. Accompanying them were two flint chips, a European potsherd, and a glass bead.

In a previous discussion of the cave (Rouse, 1941a: 293), the writer assigned it to Period III, at the same time placing the nearby terraces of Cerro Hueco in Period IV. Our reanalysis in terms of the present sequence

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* See also Loven (1935: 124), Mason (1941: 257, 258), and Rainey (1940: 115-116).
† This makes 22 individuals, not, as stated by Rainey (1940: 115), 39.
of styles indicates that the cave, like the terraces, dates from Period IVa. Thus, it seems likely that both the cave and the terraces were used by the same people. The two European specimens are assumed to be intrusive, for none has been found in the terraces.

*Iledefonso* (Orocovis 8). Among the ball courts in the municipality of Orocovis is one some two kilometers north east of the site of Sabana where we dug (folding map). Montalvo Guenard visited this court about 1930 and removed several stones bearing petroglyphs. In 1935, it was excavated by Arturo Morales Carrión under the supervision of Froelich G. Rainey (Rainey, 1940: 100). The writer visited it in 1938, but because of the scarcity of remains decided not to excavate.

Rainey refers to the site in his report as “Barrio Sabana, Court No. 1.” In accordance with the procedure followed in this paper, we have renamed it after the owner, Juan Iledefonso. It consists of a rectangular, flat area lacking embankments or excavations of any kind. As reported by Rainey (1940: 100): “Many of the stones which outlined the structure within the memory of the natives of the barrio, remain piled up in the vicinity of the court, but its original size and form can no longer by determined. . . . Test pits and trenches dug in and around the remains of the structure disclosed scattered sherds to a depth not greater than 50 centimeters, but no shells, bones, charcoal, or other culture refuse was found.”

The specimens obtained at the site, consisting of 120 potsherds and part of a stone celt, are now at the University of Porto Rico, where they have been unavailable for study. Rainey’s description of the sherds suggests that they are of the Santa Elena style. If so, the site belongs in Period IIIb and is earlier than the other ball court Rainey excavated in Barrio Sabana.

La Seiba. In 1915, Hermann K. Haeberlin excavated the Cueva de la Seiba in the municipality of Utuado (Haeberlin, 1917: 220–238). There is some doubt as to the exact position of this site, for Haeberlin located it only in reference to the site of Los Medinos, and, as explained below in the discussion of the latter site, the writer was unable to find either of them. It is known that La Seiba is on the Hacienda Jobo, 1.6 kilometers west of Los Medinos. For the reasons stated below, we assume that both sites lie within Barrio Río Abajo and that they are about five kilometers north of the town of Utuado (folding map).

La Seiba is one of many deep caves which occur throughout the limestone country north of Utuado. A number of human faces are carved on its walls. At the time of Haeberlin’s work, its floor was covered with a thick deposit of refuse averaging approximately one meter in depth (Haeberlin, 1917: 221–223, Figure 13). Large numbers of land gastropods, as well as the bones of birds, crabs, hutias, and turtles were found in the refuse.

The collection from the site, which is now at the American Museum of Natural History, contains 380 potsherds of the Ostiones style, and four of the Capá (Rouse, 1941a: 275–276, Pl. 16†). They are accompanied by 18

* See also Lovén (1935: 102, 121, 122, 178, 253, 255, 400), Mason (1941: 330), Rainey (1940: 115), and Rouse (1941a: 275–279). In place of “Ceiba” in Rainey’s report, read “Seiba.”
† In this report, read “Ostiones style” in place of “type B.”
griddle sherds, two stone hammers, a flat shell pendant, and a coral rasp. According to the catalogue of the collection, there should also be a fragment of a stone celt, which the writer was unable to find.

Since none of the Ostiones sherds is incised, the site probably dates from Period IIIa. The four Capá sherds may be intrusive, or they may represent the beginning of a trend towards that style.

Los Medinas. Although Haeberlin, who also excavated this site in 1915, gives its location in great detail, the writer has been unable to find it. It is said to be on the Hacienda Jobo, belonging to Blas Gau, in Barrio Río Arriba de Arecibo on the road to Barrio Santa Rosa, "several miles" northwest of the town of Utuado (Haeberlin, 1917: 214 ff.).* No Hacienda Jobo appears on the maps available to the writer, however, nor is the Barrio Río Arriba in the position indicated. (It lies ten kilometers to the northeast of Utuado and has no direct connection by road with Barrio Santa Rosa.) A more likely location for the site is in Barrio Río Abajo of the municipality of Utuado, five kilometers north of the town of the same name and, as stated by Haeberlin, near a brook called Los Medinas, which flows into the Río Grande de Arecibo from the west (folding map).

Los Medinas consisted at the time of Haeberlin's work of a single, rectangular ball court, depressed slightly and lined on the sides with stone slabs (Haeberlin, 1917: 215-216, Figure 10). Both ends were open. Near the side of one of them was a low mound of earth flanked by a smaller depression. Nothing was found in the mound, but a number of artifacts were scattered over the original surface of the court.

As preserved in the American Museum of Natural History, the artifacts consist of 116 Capá sherds, a fragment of a griddle, a stone hammer, and a stone ball. The museum catalogue also lists 100 additional sherds and three stone celts, which the writer was unable to find (Rouse, 1941a: 287†). At the Museum of the American Indian, an end grinder of stone, two fragments of slender stone collars, and a miscellaneous worked piece of stone, all of which are marked simply "ballground near Jobo," may also be from Los Medinas.

Since all of the potsherds studied by the writer are of the Capá style and there are no European objects, the site can be dated in Period IVa. It is one of the few stylistically pure sites known from that period.

Pellejas (Orocovis 23). There is a pair of ball courts on land of Ezequiel Guiterrez in Barrio Pellejas, of the municipality of Orocovis (folding map). Rainey and Morales Carrón dug test trenches across these courts in 1935, and they were surveyed by the writer in 1938 (Rainey, 1940: 99-100).‡

The two courts lie on a terrace about 30 meters below the top of a mountain. Both consist of rectangular depressions, one being lined with "embankments and rows of oblong stones along both sides and one end." The other "is marked by a low embankment on three sides; there are no stones" (Rainey, 1940: 99-100). Near the first court is a small mound of earth.

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* See also Løvøen (1935: 87, 93, 278, 281), Mason (1941: 210, 266), Rainey (1940: 114-115), and Rouse (1941a: 385-386).
† In place of "type C" in this discussion, read "Capá style."
‡ Read "Pellejas" in place of "Pelleja" in this report.
The only traces of refuse found in the site were about 500 small potsherds. As in the case of the site of Iledefonso, these sherds are now at the University of Porto Rico, where they have been unavailable to the writer. It is impossible to tell from Rainey's description whether they are of the Ostiones or Santa Elena style. In either case, the site would fall into Period IIIb, for there are said to be a number of examples of incision.

Conclusions

Although we dug more sites in the mountainous interior than in any other part of Porto Rico, we were unable to cover the area thoroughly. As indicated on the folding map, no sites worth excavating were discovered in the extreme western or eastern parts of the area. This is to be regretted, as it was in the west that the Indians survived longest, and we had hoped to locate a recent site there. In the east, the valley of the Río Grande de Loiza is the largest in the mountainous interior. A dense aboriginal population must have existed in this valley, particularly in the vicinity of the modern city of Caguas, but we were unable to find any traces of refuse there. It may be that most of the sites have been destroyed, for the valley is a center of the modern population.

In the rest of the interior, our efforts met with more success. None of the pits dates from Period I or Period IIa, but it is unlikely that the Indians penetrated the relatively inaccessible mountainous terrain until after that time. As shown in Table 4, Period IIb is represented at one site, Period IIIa at three, Period IIIb at six, Period IVa at eleven, and Period IVb at one.

Three sites are important stratigraphically. At Salto Arriba, Period IIb refuse was overlaid by Period IIIa material and the latter in turn by specimens dating from Period IVa (Table 4). Villón yielded specimens from Period IIIa beneath a deposit dating from Period IIIb. At Palo Hincado, refuse of Period IIb lay beneath material from Period IVa, which in turn was under refuse from Period IVb. Surprisingly, however, the deepest site of Toíta was unstratified.

Correlations with the historic sources are possible at Capa and Palo Hincado. The former is likely to have been the residence of chief Guarionex and the latter of Orocobix (Figure 2: 10, 11).

No foreign trade sherds were encountered in the mountainous interior, but the variety of local styles is greater than in the areas previously discussed. In fact, each of the Porto Rican styles is predominant in at least one of the pits excavated. Four different stylistic sequences can be distinguished, as follows:

<table>
<thead>
<tr>
<th>West Central Part</th>
<th>East Central Part</th>
<th>Site of Villón</th>
<th>Site of Toíta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period IVb:</td>
<td>Capa (?)</td>
<td>Capa</td>
<td></td>
</tr>
<tr>
<td>Period IVa:</td>
<td>Capa</td>
<td>Capa</td>
<td></td>
</tr>
<tr>
<td>Period IIIb:</td>
<td>Ostiones</td>
<td>Santa Elena</td>
<td>Boca Chica</td>
</tr>
<tr>
<td>Period IIIa:</td>
<td>Ostiones</td>
<td>Santa Elena</td>
<td></td>
</tr>
<tr>
<td>Period IIb:</td>
<td>Ostiones</td>
<td></td>
<td>Osteones</td>
</tr>
<tr>
<td>Period IIa:</td>
<td>Cueva</td>
<td></td>
<td></td>
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<tr>
<td>Period I:</td>
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The first of these sequences, which is similar to that on the west coast, appears to be characteristic of the west central part of the interior, including particularly the sites in the drainage of the Río Grande de Arecibo. The

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Chronology of the Pits in the Mountainous Interior</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td>La Vega</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Period IV</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>1-2</td>
</tr>
<tr>
<td>Period III</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
</tr>
<tr>
<td>a</td>
<td></td>
</tr>
</tbody>
</table>

| |  |  |  |  |  |  |  |  |  |  |  |
| Period IV |  |  |  |  |  |  |  |  |  |  |  |
| b |  |  |  |  |  |  |  |  |  |  |  |
| a |  |  |  |  |  |  |  |  |  |  |  |

| Period III |  |  |  |  |  |  |  |  |  |  |  |
| b |  |  |  |  |  |  |  |  |  |  |  |
| a | 1-2 | 1-3 | 1 | 1-2 | 1 | 1-2 | 1 (Y1, Y2, Z2) |

| Period II |  |  |  |  |  |  |  |  |  |  |  |
| b |  |  |  |  |  |  |  |  |  |  |  |
| a |  |  |  |  |  |  |  |  |  |  |  |

*Explanation of Table.* The pits are listed across the top of this table and the periods along the side. The Arabic numerals refer to the successive 25-centimeter levels in each pit; the letters and numbers in parentheses, to the horizontal sections within each level, (For clarification of the relationships between sections and levels, see Tables 1 to 3.)

The second sequence occurs in all except two of the sites in the east central part of the area, comprising the drainages of the Río Manatí and the Río de la Plata. The remaining sequences are present in the other two sites, both of which are on the southern edge of the area, where they have probably been subject to varying degrees of influence from the central and eastern parts of the south coast area. The entire Villón sequence is represented in the pits dug at that site. At Toita, however, the Ostiones style predomin-
nates throughout our pit, and we have had to infer the dominance of the Cuevas and the Esperanza styles in other sections of the site.

It is perhaps worth noting that both Salto Arriba and Toita, the only two sites of which the Cuevas style seems characteristic, are located in the largest river valleys in their respective parts of the area, the Río Grande de Arecibo and the Río de la Plata, where the original inhabitants of the interior are likely to have settled. With the possible exception of these two sites, occupation of the mountainous area of the interior seems to have been limited to the latter half of the time scale.
EXCAVATIONS ON THE SOUTH COAST

Setting

This is a long, narrow region, comprising all of the lowlands of the main island which drain into the Caribbean Sea (see folding map at end). It contains some 140 kilometers of shore line, together with the coastal plains and the lower half of the foothills, extending inland for an average distance of 10 kilometers. In size, its 1,400 square kilometers make it the third largest of our areas.

The southern edge of the area, along the Caribbean Sea, is relatively straight (folding map). Its northern boundary, on the other hand, has the shape of an arc. Beginning in the west on Cabo Rojo, this boundary swings gradually inwards along the line of the foothills to a maximum distance inland of 18 kilometers near Villalba and then, reversing itself, moves outwards until it reaches the shore at Cabo Mala Pascua just west of Maunabo.

The western third of the south-coast area, from Guánica almost to the city of Ponce, is plateau country, strongly dissected by the many small rivers which drain the southern slopes of the mountains. The rest of the area, from Ponce eastwards to the city of Guayama and beyond, consists of a single, great alluvial plain, merging gradually into the foothills of the north. It is the flattest part of the island, for there are no hills, swampy areas are few, and the small streams have had little effect upon the topography. The plain is extremely fertile, and today it is agriculturally the most productive part of the island. Along the coast, many small bays provide shelter for fishing.

The winds are an important factor in the environment of the south-coast area. Since they blow prevailingly from the northeast, they cross the mountains and precipitate their moisture before reaching the southern plains. The result is that the southern part of the island is dry, and most of its streams flow only intermittently. At present, irrigation is necessary for the growth of sugar cane in the area. This dryness must have been a handicap to the Indians, although in compensation it may have caused a thinning of the tropical forests. In addition, the direction of the winds make the south coast a lee shore, which the Indians probably found favorable for deep sea fishing.

On the whole, the south-coast area was probably capable of supporting a large Indian population. Many sites have, in fact, been located in the area, particularly in the region around Santa Isabel and Salinas near the middle of the coastal plain (Lothrop, ms.: 12-13). As already noted, this region ranks with the hilly country in the southern part of the west-coast area as a center of Indian remains. Other sites are scattered throughout the rest of the area, usually along the courses of its many streams.

So far as is known, the south coast was entirely Taino at the time of historic contact. Agüeybana, the leading chief of the island, lived in the area. His village of Guaynila (Guaybanda) is said to have been located in the upper

*These data on the geography and topography of the mountainous interior were obtained from Lobeck, (1922), Ober (1899: 11-43), P.R.R.A. (1940: 314-324), and Roberts (1942).
part of the valley of the river of the same name (now called the Guayanilla, figure 2: 14; Coll y Toste, 1907: 1, 96, 196, 197, 251, 252).* The other chiefs of the island deferred to Agiieybana, but whether he had formal authority over them is now known. His own territory apparently included the entire western half of the south-coast area. In the east was another chief, Guamani, whose name is still used for the river upon which he lived, near the present city of Guayama (figure 2: 16; Coll y Toste, 1907: 1, 96, 244).

In view of the large number of sites in the central part of the south-coast area, it is surprising that no chief is known for that section. A chief called Abey (or Yavey) is mentioned in a document of 1519, but the location of his domain is not given. Since a tributary of the Río de la Lapa near Salinas in the central part of the south coast has the same name, we assume that Abey was chief of that area (figure 2: 15; Torres de Mendoza, 1880, 34: 391, 443; Zayas y Alfonso, 1931, 1: 5).†

Columbus sailed along the south coast of Porto Rico during his second voyage, but he did not land, nor does he mention observing any Indian settlements (de Hostos, 1937: 118-120). The first landing was made by Ponce de León in the territory of chief Agiieybana on August 12, 1508 (Torres de Mendoza, 1880, 34: 483).‡ He was received hospitably and, following the Indian custom, he exchanged names with Agiieybana and his relatives. As already noted, the chief took the Spaniards into the mountains and showed them the island’s sources of gold. Then Ponce went back to Hispaniola to report to the Spanish officials, leaving some of his men in the care of Agiieybana. Upon his return, he stopped to pick up these men before going to found the settlement of Caparra on the north coast (Gomara, 1749: 34; Las Casas, 1927, 2: 291; Neumann Gandía, 1896: 169-170).

About this time, the village of Agiieybana was destroyed in a raid by the Carib. The chief himself died and was succeeded by his brother, Guaybaná, often called Agiieybana II. This man, with 300 of his followers, was assigned in the repartimiento of 1509 to Cristóbal de Sotomayor, who also took the chief’s sister as his concubine (Morales Cabrera, 1932: 260; Zayas y Alfonso, 1931, 1: 17-19).§ As already noted, Sotomayor settled first at Guánica. Leaving his Indians on a plantation there, he moved later to a site near Anasco where the mosquitoes were less troublesome and more gold was available. At this place, he founded the town which bore his name. Simultaneously, Abey and Guamani, the other chiefs in the south-coast area, became the property of Ponce de León, the latter subsequently being transferred by order of the king to Juan Cerón (Brau, 1907: 121–122; Zayas y Alfonso, 1931, 1: 5, 2: 32).

Guaybaná led the rebellion of 1511 against the system of repartimientos. The ariete, or ceremonial dance at which the Indians prepared for this rebellion, probably took place on the banks of the Río Coayuco (now the Yauco) within the chieftainship of Guayabaná. Sotomayor and several of

* For another version of the location of this town, see Brau (1904: 35-37).
† Coll y Toste, whose version of the chieftainships see otherwise following, does not mention this man.
‡ For another version of the landing place, see Brau (1907: 106-107).
§ For variations upon this account, see Bachiller y Morales (1883: 190-191) and Brau (1904: 21-25).
his companions passed near this place soon afterwards on their way from the farms at Guánica to the settlement near Añasco, and all but one of them were killed by Guayabana and his followers (Castellanos, 1874: 55-56; Las Casas, 1927, 2: 323-325). Later, Ponce de León avenged their death by defeating more than 5,000 of the Indians in a second battle in the same valley of Coayuco, catching them by surprise just after they had celebrated another arrieto. Guayabana himself survived that defeat but he is believed to have died in the subsequent battle of Aymaco on the west coast (Herrera y Tordesillas, 1729, 1: 226; Oviedo y Valdés, 1851, 1: 479-480). It is said that he was assisted at the end by Carib from the Lesser Antilles (Castellanos, 1874: 58, 61-63).

It is not known whether Abey and Guamani, the other chiefs in the south-coast area, also took part in the rebellion of 1511. The Spaniards established several plantations on the land of Guamani near the present city of Guayama. Other farms grew up on the banks of the Río Guayanilla near Guánica, where Miguel del Toro, a lieutenant of Ponce, founded the town of San Germán in 1512 (Laet, 1630: 4; López de Velasco, 1894: 126, 129).*

Throughout the sixteenth century, the Spanish colonists suffered heavily from attacks by the Carib and by French pirates. The town of San Germán was plundered and burned several times, finally being moved in 1570 to its present, less exposed position in the southern part of the west-coast area. The attacks also caused the abandonment of the plantations near Guayama. Their inhabitants may have shifted to the vicinities of Coamo and Juana Díaz, for we hear of farms there in 1582. The town of Coamo itself dates back to 1580, but the other municipalities in the area did not develop until the eighteenth and nineteenth centuries (Latorre, 1919: 39, 41; P.R.R.A., 1940: 45, 316-323, 388; Zayas y Alfonso, 1931, 1: 204-205, 2: 16, 72, 301).

Archaeologically, the south-coast area has probably been more thoroughly surveyed than any other part of Porto Rico. The work of Montalvo Guenard and of Lothrop is particularly important in this respect. During the past three decades, the former has been to practically all of the sites of any importance in the area, and the latter also examined a large number of them, particularly around Salinas, Santa Isabel, and Guayama, during his three field trips in the years 1915 and 1916 (Montalvo Guenard, 1933: 383-389; Lothrop, ms.). Lesser surveys have been undertaken by Padre Nazario (1893: 137-139, 159-162) in the 1880's; by Fewkes (1907: 86-87) in 1904; by Britton (1930: 167), Mason (1941: 269-270), R. S. Prescott (Lothrop, ms.: 12), and Spinden (personal communication) in the 1910's; and by Rainey (1940: 112, 113) in 1934.

The first excavation in Porto Rico took place on the south coast about 1875, when a Dr. Souquet dug the larger part of a shell heap at the site of Cayito near Santa Isabel (Rainey, 1940: 112-113). Augustín Navarette and Fewkes also made collections at this site, the latter's being now at the United States National Museum.

In 1915, Lothrop dug at the shell heap of Esperanza near Salinas and, in

* For another version of the founding of San Germán, see de Hostos (1938: 162).
1916, at La Florida southwest of Santa Isabel (Lothrop, ms.: 12-13; also his field catalogue at the Harvard Peabody Museum). His collections from these sites, which are now in the Harvard Peabody Museum, contain the most complete series extant of potsherds of the Santa Elena and Esperanza styles. They would be well worth detailed study and publication.

In 1916, Herbert J. Spinden (personal communication) excavated the site of Carmen in Salinas. The material obtained, which is also unpublished, is at the American Museum of Natural History in New York. Unlike the other early collections, it offers the possibility of chronological study, for Spinden dug according to level (although not according to section).

In 1923, Adolfo de Hostos (personal communication) dug in a ball court at Minas near Juana Díaz. The results of his work have not been published, nor have we been able to study the specimens, since they are in Porto Rico.

The only other known excavations in the south-coast area are those of Rainey at the sites of Cañas and Collores, which have already been discussed. It was at Cañas that Rainey, assisted by Montalvo Guenard, first obtained in stratigraphical sequence his Crab and Shell cultures, characterized by our Cuevas and Ostiones pottery (Rainey, 1940: 7-62*). The unpublished Collores material, also at the Yale Peabody Museum, has a similar composition.

The present writer made a survey of the sites in the south-coast area during 1936-38 and excavated nine test pits in eight of the sites. Together with four pits dug by Rainey in the sites of Cañas and Collores, these are discussed in the following pages.

**Abra (Guanica 1)**

There is a village site in front of the cemetery of the town of Guanica (see folding map at end). This site, which is variously known as "Abra," "El Cementerio," and "Los Indios," is on land belonging to the municipality of Guanica in the barrio of Cañas, 1.4 kilometers northwest of the town of Guanica. Montalvo Guenard (1933: 388) and Rainey (field notes in the Yale Peabody Museum) had previously collected specimens there. The writer surveyed the site on August 7, 1937, and excavated a test pit on the 20th and 21st of that month.

The site is situated at the base of the Peñón de Abra, a steep rocky hill just back of the Bahía de Guanica (folding map). On the landward side of the hill, it overlooks the Cañón de los Negros, the stream which connects the Laguna de Guanica with the bay. This is a strategic and unusually favorable location, for not only is the Bahía de Guanica the most completely landlocked bay in Porto Rico but also the Laguna de Guanica lies at the eastern end of the valley of the Río Boquerón, providing easy access to the cluster of sites in the southern part of the west-coast area (folding map). Although relatively dry, this region is enormously fertile and is today occupied by the largest sugar company in Porto Rico.

The site consists of five shell middens varying in height from 1.0 to 1.5 meters (Figure 11). Three of these middens lie in a row part of the way.

* In this report, read "Cañas" in place of "Cañas."
up the gradual slope at the base of the hill, and the other two are at the bottom of the slope. The midden directly in front of the cemetery bears traces of excavation by a previous investigator. In addition, all five of the middens have been partially cut by the roads in front of the cemetery, revealing concentrated deposits of shells, ash, bones, and potsherds varying
in depth from 1.0 to 1.5 meters. An area of several acres around the midden is also covered with a scattering of refuse.

The deepest midden, in which there were the traces of previous work, was chosen for excavation. An area four meters square and divided into four two-meter square sections, was staked out on the undisturbed part of this midden and six 25-centimeter levels were dug. They revealed a homogeneous deposit composed of finely textured brown loam, ash and charcoal, many shells, and moderate amounts of bones and artifacts. The loam gave way at a depth of 125 to 135 centimeters to brown clay, only the top 10 centimeters of which contained refuse. There were many large stones in the clay beneath the refuse.

Scattered human bones were found in several parts of the excavation. These include an adult’s long bone in level 1, section B2; the ribs of a baby, together with an adult’s clavicle and scapula, in level 4, section A1; and a baby’s ribs, fragments of its skull, and parts of its leg bones in sections A1 and A2 of level 5. The positions of the latter were typical. They were irregularly distributed over an area three meters in diameter.

In addition, one regular burial was encountered at the very bottom of the shell deposit in section B1. Examination of the wall of the trench at this point revealed that the sterile clay beneath the deposit had been removed to a depth of 14 centimeters in preparation for the burial. Since only the edge of it came within the area of our pit, it was left undisturbed. The arrangement of the bones is not known.

Potsherds of the Ostiones style predominate in all sections and levels at Abra, and also in the surface collection made by Rainey. There are 1,548 of them, as compared with 6 Cuevas sherds and 1 Santa Elena, the only other styles represented. Consequently all the material from the site will be treated as a unit.

Typologically, 421 of the sherds are from open bowls, 550 are from constricted bowls, one is a fragment of a miniature bowl, 20 come from jars, and 574 cannot be identified. The associated artifacts include 53 pieces of griddles, two clay disks, a stone Celt, five hammers of stone, a stone polisher, eleven stone chips, an anvil-grinder of bone, two bone awls, three bone picks, the bit of a plain bone spatula, half of a plain bone tube, a miscellaneous piece of worked bone, three fragmentary cells of shell, a piece of a Celt-blank, a part of a lip-hammer of shell, a flat shell pendant, a miscellaneous piece of worked shell, four Strombus shell tips, two Cassis shell plates, four Strombus shell plates, seven plain shell tips, 35 fractured shell tips, four coral rasps, and 64 other pieces of coral. In addition to humans, bird, crab, fish, hutia, manatee, and turtle are represented among the bones. The shells include land and marine gastropods and marine pelecypods.

Incision is rare at this site. There are only two possible examples in level 1, one in level 2, and one in level 4. This suggests that our pit dates from the first half of Period III, when the absence of incision was characteristic of the Ostiones style. The Cuevas sherds may be survivals from an earlier period, and the Santa Elena specimen, a trade object.
Buenos Aires (Coamo 3)

There is a large village site at the southern edge of the present town of Coamo (see folding map at end). The name of this site is Buenos Aires and it is in Barrio Palmarejo of the municipality of Coamo. Montalvo Guenard (personal communication) has collected numerous potsherds and stone celts here, and he reports that a skeleton was encountered during street repairs in 1930. It was in his company that the writer first visited the site on July 10, 1938. Two test pits were dug later, on August 12 of the same year.

The site of Buenos Aires occupies the southeastern corner of a broad plateau, which is elevated some 10 meters above the Río de Coamo. The northern third of the site is within the town but the rest of it consisted, at the time of the writer's visit, of a plowed field. The site comprises a single continuous deposit covering an area of some four acres to a depth of 75 centimeters.

Examination of the surface of the site suggested an arbitrary division of the deposit into three parts: (1) the northern third, which is within the town of Coamo; (2) the central section, occupying the northern half of the field outside the town itself; and (3) the southern third, which comprises the other half of the plowed field. It will be convenient to discuss the surface finds and the excavated material in terms of these three divisions.

Northern Section. This is the part of the site in which, according to Montalvo Guenard, a burial had been encountered. Shells were numerous here, and many potsherds were also observed on top of the brown, loamy soil, particularly in the streets. The sherds were predominantly thick, red, and unpainted. They were so fragmentary that no other attributes could be distinguished. The inhabitants offered for sale two bat-head lugs said to have been found in this part of the site, one of which seemed to be Ostiones in style and the other Lesser Antillean. We purchased these, and also secured a part of a stone adze, ten stone celts, three celt-hammers of stone, and a stone hammer, all of which were also said to have been found within the limits of the town. No excavation was possible in this part of the site because it was so well built up.

Central Section. As we moved southwards beyond the limits of the town, shells became less common, but there were still an appreciable number in the central part of the site. Shards were also common. They appeared to be thinner and better made than within the town. We collected two examples of the Ostiones style, both of them from open bowls. In addition, we picked up from the surface of this part of the site a fragment of a stone adze, a chipped stone ax, three celts of stone, two celt-hammers, a stone cylinder, and two celts of shell.

A pit four meters square and divided into four two-meter square sections was staked out in this part of the site and was dug through three 25-centimeter levels. The first two layers contained a deposit like that observed on the surface, with the addition of ash and a few animal bones. At a depth of 30 centimeters, the ash and shells began to decrease in frequency; below
50 centimeters, they were completely absent. Bones and artifacts continued to appear for 10 centimeters more, and then the light brown loam became completely sterile.

The entire collection from Pit 1 can be grouped within a single Ostiones division, for that style was predominant everywhere. We obtained 797 examples, in addition to 5 sherds of the Cuevas style which were limited to the bottom level, and 13 of the Santa Elena, all of which are from the top level. One hundred and fifty-three of these potsherds are from open bowls, 344 are from constricted bowls, eight are fragments of jars, and 311 are typologically unidentifiable. The associated artifacts include 21 pieces of griddles, a clay earplug, a disk of clay, a fragment of a Celt or some other highly polished stone artifact, a stone chip, two quartz crystals, a water-worn shell fragment, a coral rasp, two pieces of worked shell, and two other pieces of worked shell, a shell saucer, three shell celts, one shell chisel, a fragmentary chisel-blank of shell, two miscellaneous pieces of worked shell, two shell nodes, a water-worn shell fragment, a coral rasp, two other pieces of coral, and eight Spanish potsherds (which are probably intrusive). Bird, crab, fish, hutia, man, manatee, and turtle are represented among the animal bones, and land gastropods, marine gastropods, and marine pelecypods among the shells.

Pit 1, if not the entire central section of the site, can be assigned to Period III. Since there are only three examples of incision, and two of these are doubtful, the pit probably falls in the first half of the period. The limitation of the Cuevas style to the bottom level and of the Santa Elena style to the top level suggests a trend from the former towards the latter within the area of our pit—a suggestion which is consistent with the Ostiones-Santa Elena sequence already described for the site of Villón further up the drainage of the Río de Coamo. The existence of many sea shells at both Buenos Aires and Villón is another indication of relationship between the two sites. As already noted, these were probably brought from Cayito at the mouth of the Río de Coamo (folding map).

Southern Section. Shells were rarer in the southern half of the field outside the town, and, in general, the sherds seemed to be thinner and better made. In this part of the site, we picked up 16 pieces of Cuevas pottery and another which seemed to be Lesser Antillean in style. One of the former was decorated with white paint. Seven of these sherds are from open bowls, two are from constricted bowls, one is from a jar, and seven are typologically unidentifiable. In addition, we collected from the surface two fragmentary stone adzes, part of a stone chisel, and a sherd of Spanish pottery.

A second pit, having the same dimensions as the first, was excavated near the center of this part of the site. The brown loam encountered here was not tinged with ash as in Pit 1, nor were there as many shells. Bones and artifacts, however, were relatively common. The shells ceased to appear at a depth of 50 centimeters, but the bones and artifacts continued to 70 centimeters, below which the loam was sterile.

As shown in table 5, Pit 2 is divisible stylistically into two parts, Ostiones pottery being predominant in level 1 and in section C1 of level 2, while Cuevas pottery is characteristic of the rest of the pit. As in Pit 1, potsherds of the Santa Elena style are also present. They are limited to the top level, however, and therefore fall entirely within the Ostiones division.
From a typological standpoint, 88 of the sherds in the Cuevas division are from open bowls, 43 are from constricted bowls, four are from jars, and 76 are unidentifiable. Nine fragments of griddles were the only other artifacts obtained from this division. Bird, crab, fish, hutia, man, and turtle have been identified among the animal bones, and land gastropods and land and marine pelecypods among the shells.

The collection from the Ostiones division includes 136 potsherds from open bowls, 148 from constricted bowls, eight from jars, and 200 which are typologically unidentifiable. These are accompanied by seven pieces of griddles, a stone chip, a fragment of a shell celt and another of a chisel of shell, a Strombus shell lip, a shell node, three fractured shell tips, a coral rasp, three other pieces of coral, and a fragment of glass. Crab, fish, hutia, and turtle are represented among the bones, and land gastropods and land and marine pelecypods among the shells. The crab remains were less common in this division than in the Cuevas. In fact, they showed a steady decrease in frequency from the top to the bottom of the site.

**Table 5**

<table>
<thead>
<tr>
<th>Division</th>
<th>C1</th>
<th>C2</th>
<th>D1</th>
<th>D2</th>
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</thead>
<tbody>
<tr>
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<td>17.13.0</td>
<td>57.5.0</td>
<td>56.0.0</td>
</tr>
<tr>
<td>Ostiones division</td>
<td>9.112.1</td>
<td>5.68.6</td>
<td>10.70.4</td>
<td>20.80.4</td>
</tr>
</tbody>
</table>

_Explanation of Table._ The vertical columns represent sections; the horizontal lines, levels. The number of potsherds of the Cuevas, Ostiones, and Santa Elena styles are given in succession. The line marks the boundary between the Cuevas and Ostiones divisions.

The Cuevas division of Pit 2 apparently dates from the second half of Period II, for white painting is absent, and the Ostiones division from Period IIIa, since incision, too, is lacking. This provides a continuous sequence. As in Pit 1, the presence of Santa Elena pottery in the top level suggests the beginning of a trend towards that style.

_General._ We have seen that Pit 2, in the southern part of the site, dates from Periods IIb and IIIa, and that Pit 1, in the central section, can also be assigned to Period IIIa. No pit having been dug in the northern part of the site, that area cannot be dated. The tendency, however, seems to have been for the inhabitants of the site to move from south to north, and therefore it is likely that the northern section was the most recent, dating from Period IIIb or possibly even Period IVa. The thickness and lack of paint on the specimens observed in that area are both attributes of Santa Elena pottery. Moreover, as we have seen, there is some stratigraphical evidence of a trend in that direction. A change in the northern part of the site from the Ostiones to the Santa Elena style, as at Villón, is therefore within the bounds of possibility.
Cañas (Ponce 2)

Cañas is the principal site excavated by Rainey and the place where he discovered his Crab-Shell sequence (Rainey, 1935:12-13 and 1940:7-62*). It lies on the east bank of the Río Cañas just above its fork with the Río Pastillas, and forms part of Colonia Miramar of the Guánica Central in Barrio Cañas of the municipality of Ponce (see folding map at end). The Caribbean Sea is three kilometers to the south, and the city of Ponce is two kilometers to the east.

The existence of the site has been known for some time. Lothrop (ms.: 10) collected a stone edge-grinder there. As already noted, Montalvo Guenard (1935:90) obtained there the first sherds of white-on-red pottery (our Cuevas style) found in Porto Rico. He assisted Rainey in his excavation and was also present at the time of the writer’s survey on September 15, 1936 (Rouse, 1937:181, 184, 185).

The site, covering several acres of the fertile coastal plain, is cut in two by a dirt road. To the east of this road, in a cane field which was under cultivation at the time of the present writer’s visit, the ground is strewn with a shallow deposit of refuse. To the west, in an unplowed stretch of land between the road and the Río Cañas, a number of large shell middens lie in the midst of another shallow deposit of refuse. As at Buenos Aires, it will be convenient to discuss these two parts of the site separately.

Eastern Section. According to Rainey, this section of the site is known as the “sitio de caracoles” or “place of shells.” For many years, people have been taking “objects of prehistoric manufacture from this field as each year of cultivation uncovered more of the refuse deposit. At the present time, marine shells are scattered over an area of several acres. In sections where the shells are thickest, low mounds can be seen, suggesting that the refuse was originally deposited in mounds of considerable size which have been reduced and leveled off during the last four centuries of constant cultivation” (Rainey, 1940:7).

The refuse in this part of the site consists “essentially of marine shells and potsherds,” with the addition of a few artifacts of other kinds (Rainey, 1940:7). It was here that Montalvo Guenard made the original discovery of potsherds of the Cuevas style. Both Rainey and the writer have also collected from this part of the site. Unfortunately, Rainey failed to distinguish in the cataloguing of his material between the specimens known to have been collected here and those without a definite allocation. As a result, it seems advisable to treat his collection separately from the writer’s specimens, all of which were personally found in the eastern section of the site.

Rainey’s collection includes 15 sherds of the Cuevas style, nine of the Ostiones, and one which appears to be Lesser Antillean. Nine of these specimens are from open bowls, four are from constricted bowls, and 12 are typologically unidentifiable. They are accompanied by two broken stone adzes, three fragmentary celts of stone, three cell-hammers of stone, a stone hammer, two shell celts, four celt-blanks of shell, a shell pendant-tinkler, a miscellaneous piece of worked shell, and two water-worn fragments of shell.

* In place of “Cañas” in these reports, read “Cañas” (Gannett, 1901:20).
The writer obtained 15 sherds of the Cuevas style and one of the Ostiones, ten of them from open bowls, one from a constricted bowl, and five from unidentifiable vessels. A fragment of a stone adze and a celt-hammer of stone complete this collection. There are no bones in either collection, nor did the writer observe any in the freshly plowed soil, despite the fact that he was particularly looking for crab remains.

It will be apparent that, despite the difference in the method of collection, the specimens obtained by Rainey and by the writer are essentially similar. In both cases, Cuevas pottery predominates, and in both cases it is white painted, there being four such sherds in each collection. These facts suggest that the eastern section of the site, or at least a part of it, dates from Period IIA.

This is a surprising conclusion, for the eastern part of the site is a shell deposit and Rainey categorically disassociates his Crab culture (marked by our Cuevas pottery of Period II) from the remains of shells. Rainey does not discuss the collection from the eastern part of the site in his publications,* and he fails to provide an explanation for this association of Cuevas pottery with shells. A possible reason is that the potsherds have become mixed through plowing with the shells of a later deposit. This does not seem likely, however, for it should be accompanied by a greater amount of Ostiones pottery than is indicated by our collection. In the opinion of the writer, the shells were deposited in this part of the site at the same time as the Cuevas potsherds.

Western Section: General. Both Rainey and the writer found the half of the site west of the road overgrown with brush and trees, which made it difficult to observe the number and location of the middens. Both of us, therefore, confined our observations to the largest group of middens, which is shown on the map (Figure 12). These are four in number, arranged in the form of an “L,” and they seem to constitute a unit, since they are connected by lesser deposits. The largest of them, Midden A, lies on the bank of the river and has been partially cut away by the water. It has a height of two meters, while the other middens vary from 1.0 to 2.5 meters. On the surface, all of them consist of brown loam containing large numbers of marine shells and potsherds of the Ostiones style.

Neither Rainey nor the writer collected any specimens from the surface of this part of the site. Rainey’s surface collection, however, includes one specimen from a test excavation in Midden B which is perhaps worth mentioning because it was not published by him. It is a bar-shaped pendant of stone.

Except for test trenches in Middens B and C, from which we possess no material except the pendant, Rainey’s digging was entirely confined to Midden A, where two large excavations were made (Figure 12). Excavation 1, situated in the northeastern half of the midden, consisted of 38 sections two meters square and varying from 25 to 225 centimeters in depth. It yielded a homogeneous deposit of “sand, blackened earth, ash, charcoal, and bone refuse” mixed with marine shells, potsherds of the Ostiones style, and other

* Unless a reference to “Red and white painted sherds ... found along an irrigation ditch in a field about 5 kilometers from mound A” applies to this part of the site (Rainey, 1940: 14).
Plan of the site of Cahas (after Rainey).
artifacts. "Near the surface, usually to a depth of approximately 25 centimeters, there was a greater amount of humus, and the shells were broken into smaller pieces, but below this most shells were intact and the soil intermixed was loose and powdery... In limited sections there were concentrations of one or two types of marine shells, earth, or ash and charcoal, but no well-defined strata and no distinct fire pits or hearths." In the western half of the excavation, however, the upper levels of the deposit contained primarily large marine shells and the lower levels were characterized by small marine shells. No other differences were noted between these two groups of levels (Rainey, 1940:8-11, field notes in the Yale Peabody Museum).

Excavation 2 was situated alongside the river in the southwestern half of Midden A (Figure 12). It consisted of 72 sections and was dug to a maximum depth of nine 25-centimeter levels. In its upper levels, it comprised an extension of the deposit encountered in Excavation 1: marine shells, loose sandy soil tinted grey with ash, charcoal, bones, potsherds of the Ostiones style, and other artifacts. In the lower levels, however, the shells were replaced by crab remains and the Ostiones pottery by sherds of the Cuevas style. In addition, the lower stratum was more tightly packed, the soil was yellow rather than grey, there were smaller amounts of ash and charcoal, and the associated artifacts also differed in several respects. Only in animal bones were the two deposits completely identical (Rainey, 1935:12-13 and 1940: 11-12).

In the southwestern half of Midden A, then, the same shell layer which had occurred alone in the northeastern part of the midden was underlaid by a crab stratum. The latter was sharply distinct and it showed no mixture with the former. In fact, the crab stratum is said to have been sterile at its top. Rainey tells us that it varied in thickness from 40 to 60 centimeters (the shell layer had a maximum depth of 200 centimeters), and he provides a cross section through the two of them (Rainey, 1940: 13). Unfortunately, this section is not detailed enough to reveal the shape of the line of juncture between the two strata. It cannot be determined, for example, whether the crab stratum consisted of one or of several smaller middens within the larger accumulation, and whether it had been eroded with gulleys, as at the site of Las Cucharas in the west-coast area. We can conclude only that the crab stratum was deposited before the shell, and that it was much less extensive.

The only structural remains encountered in Midden A were a series of possible post holes in the shell refuse of Excavation 1 and a similar hole in the crab stratum of Excavation 2. According to Rainey, the former consisted of "cylindrical cavities approximately the size of fence post holes... No alignment of such cavities was found which might have indicated the size and shape of house structures. One of the cavities, globular in shape and 75 centimeters in depth, may indicate a disintegrated storage basket" (Rainey, 1940:10, 12, 190).

Seventeen burials were found in the shell refuse of Midden A, and seven in the crab stratum. None was associated with mortuary objects. In regard to the burials in the shell layer, Rainey notes that "Some of the bones
probably represent secondary burial of skeletons after the flesh had been removed while others are certainly primary burials of the entire body. In most of these primary burials the bones were interred in a flexed position either on the left side, the right side, or upon the back. At least one, however, was placed on the back in an extended position, and some may have been deposited in a sitting posture. As for the burials in the crab stratum, it was possible in only three cases to determine their nature, but in these cases it was clear that the interments were primary and that the bodies had been placed in an extended position, two lying on the face and one lying on the back” (Rainey, 1940: 10, 12, 190).

Two groups of four sections, one in Excavation 1 and the other in Excavation 2, were chosen by the present writer for detailed study (Figure 12). While not in the highest parts of the midden, these groups of sections are the ones best represented in the collections now at the Yale Peabody Museum.* They will be called, respectively, “Pit 1” and “Pit 2.”

Western Section: Pit 1. The first pit, consisting of sections H1, H2, I1, and I2, was situated at the northeastern end of Midden A (Figure 12). Its depth was apparently 175 centimeters. It contained a homogeneous deposit of shell refuse, as well as two child burials, about which it is known only that one was primary (Rainey, 1940: 190).

The collection at the Yale Peabody Museum includes 233 potsherds from Pit 1, all but four of which conform to the Ostiones style. Of these four sherds, three are Cuevas and come from the bottom two levels, while the other is Santa Elena and was found in the second level from the top. Typologically, 53 of the sherds are from open bowls, 127 are from constricted bowls, two are fragments of jars, and 58 cannot be identified. They are accompanied by 15 pieces of griddles, a hammer of stone, a stone polisher, two possible fragments of bone picks, half of a shell celt, two chisel-blanks of shell, and two Cassis lips. There are no unworked bones or shells in the collection.

It will be apparent that Pit 1 falls entirely within Period III. Both halves of the period are represented, IIIa by levels 2-7, from which there are only two incised sherds (they occur in levels 2 and 3, respectively) and Period IIIb, by level 1, which has yielded three examples of incision. The Cuevas sherds obtained in the lower half of this pit may have survived from Period II. The Santa Elena specimen is probably a trade object.

Western Section: Pit 2. The second pit, comprising sections E1, E2, F1, and F2, was situated on the bank of the Rio Cañas at the southwestern end of Midden A. It had been dug through both the shell and the crab layers to a depth of 150 centimeters. No burials were encountered in this pit.

Table 6 gives the distribution according to style of the potsherds from Pit 2 which were available for study. It will be noted that the pit is divisible into two parts, levels 1 and 2 and sections E2 and F2 of level 3 forming an Ostiones division, while the rest of the pit constitutes a Cuevas division.

* As already noted, Rainey brought to the United States only the better potsherds from Cañas, leaving the majority of the specimens at the University of Puerto Rico for deposition in the anthropological museum planned for that university. Apparently as a result, many of the units of section and level are not represented in the Yale collection.
Presumably, these two divisions coincide respectively with the shell and crab strata.

In the collection from the Cuevas division, 32 of the sherds are from open bowls, five are from constricted bowls, and eight are typologically unidentifiable. The associated artifacts include three fragments of griddles, an unworked nodule of flint, a chisel-blank of shell, and a piece of coral. Bird, crab, fish, hutia, and turtle are also represented.

The Ostiones division has yielded 20 sherds from open bowls, 37 from constricted bowls, four from jars, and 17 which are typologically unidentifiable. In addition, there are three fragments of griddles, part of a possible ax-hammer of stone, a stone celt, a shell celt, parts of two celt-blanks of shell, a broken shell chisel-blank, a lip-hammer of shell, and a Stroumbus lip. No unworked bones or shells are included in the collection from this division.

The Cuevas division can be assigned to Period IIa, for six of the sherds are white painted, and the Ostiones division to Period IIIb, for there are

Table 6

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**Explanation of Table.** The vertical columns represent sections; the horizontal lines levels. The number of potsherds of the Cuevas and Ostiones styles are given in succession. The line marks the boundary between the Cuevas and Ostiones divisions.

seven examples of incision. This leaves a gap corresponding to Periods IIb and IIIa, during which the sterile soil at the top of the crab stratum may have accumulated. Presumably, the presence of Ostiones sherds in the Cuevas stratum, and vice versa, is due to the failure of Raineys artifical levels to coincide exactly with the crab-shell stratigraphy. It must be noted, however, that three Cuevas sherds were found in the level of section E2 above the one in which the dividing line between the crab and shell layers probably fell (Table 6). Whether these sherds represent a survival from Period II, or are the result of a narrow upward projection of the crab stratum into the shell, cannot be determined.

**General.** In a previous publication (Rouse, 1937: 185), the writer suggested that the half of the site of Cañas along the river was the first to be settled, that the inhabitants subsequently moved east to the part of the site now on the opposite side of the road, and that they finally returned to the western section where the middens are situated. The datings reached in the present paper do not entirely support this hypothesis. As we have seen, both the lower stratum in Pit 2 and the deposit on the other side of the road probably date from Period IIa, the lower part of Pit 1 from Period IIIa, and
the upper levels in Pits 1 and 2 from Period Illb. Deposits from Period IIb, however, are lacking. In other words, a widespread early occupation seems to have been followed by a period during which the parts of the site excavated by us were not in use and, later still, by a more limited occupation.

There are several ways of explaining the absence from our collections of material dating from Period IIb. Rainey (1940:60-61, 107-109, 182-183) suggests that Porto Rico was uninhabited during this time, which lies between the supposed periods of migration of his Crab and Shell people from South America. This hypothesis must be discarded, however, for many deposits dating from Period IIb have now been identified, one of the best being at the site of Colores dug by Rainey himself but not studied by him. A more likely explanation is that the inhabitants moved to a neighboring site during the intervening period. Alternatively, they may have remained at Cañas, depositing their refuse on another midden, as seems to have been done at the site of Monserrate on the north coast. Further excavation is needed at Cañas and in the vicinity to test these two possibilities.

**Carmen (Salinas I)**

The most important site in the municipality of Salinas, "if not in Porto Rico," is that of Esperanza, which was dug by Lothrop (ms.: 12) in 1915. The writer had intended to excavate at Esperanza but, because it was planted in sugar cane, he was unable to obtain permission. The site of Carmen, some five kilometers to the west, was chosen as a substitute.

Carmen lies on the east bank of the Río Salinas, about 300 meters from the point where that river flows into the Bahía de Rincon (see folding map at end). It forms part of Colonia Carmen of the Central Aguirre Sugar Company and is in Barrio Aguirre of the municipality of Salinas. The town of Salinas is one kilometer to the northeast.

The nature of the previous work at the site is obscured by an error of Fewkes, who (as explained below, p. 530) placed the site of Cayito in the municipality of Salinas rather than Santa Isabel (Fewkes, 1907:86). Since Carmen occupies roughly the same position in respect to Salinas that Cayito does to Santa Isabel, Lothrop (ms.: 12) hesitantly concluded that the two were the same, and attributed the work at Cayito to Carmen. It has been necessary, therefore, to eliminate Lothrop's data concerning Cayito from the following discussion.

Fewkes himself apparently never visited Carmen, but in 1904 he purchased a small collection there, consisting largely of Ostiones potsherds (Fewkes, 1904:172 and 1907:117, 119, 183, Plate 77). In 1915-16, Lothrop obtained at the site additional material characterized by the Ostiones and Santa Elena styles (Lothrop, ms.: 12). In 1916, too, Spinden dug at Carmen, obtaining a mixture of Ostiones and Santa Elena sherds in his upper levels but only Ostiones specimens in the lower part of the excavation.* The writer surveyed the site and excavated a test pit on September 17-18, 1936 (Rouse, 1937:184).

*The above statements are based upon a cursory survey of Spinden's collection, which is now in the American Museum of Natural History. See also Rainey (1940:113), where it is erroneously stated that Spinden worked at La Florida in Santa Isabel instead of at Carmen.
The Carmen deposit, consisting of shell refuse, covers several acres of the coastal plain on the east bank of the Rio Salinas. Originally, there were probably several middens, but successive plowings have reduced these until, at the time of the writer’s visit, only a single shell heap, which was apparently too steep to be plowed, lay in the midst of the sugar cane. Measuring some 80 meters long, only six meters wide, and 1.5 meters high, this heap had been badly pitted by previous investigators, and it was difficult to find a place to dig.

Four sections two meters square were eventually staked out on the northern end of the heap, where the refuse seemed to be the least disturbed, and these sections were dug through seven 25-centimeter levels. For the first three levels, the deposit was similar to that on the surface, consisting of dark brown loam, ash, shells, bones, and broken artifacts. In the fourth level, the soil became light brown and sandy, the shells decreased in number, and there seemed to be more remains of crab. The other artifacts, however, continued as before, until sterile soil, consisting of the same sandy loam, was reached at an average depth of 140 centimeters.

A human skull cap and several long bones were encountered in level 3. These were in a group, and it is assumed that they constituted a secondary burial. No artifacts were found in association with them.

Ostiones potsherds, of which there are 1,370 examples, predominated in all sections and levels at Carmen. Ten Cuevas sherds, 68 Santa Elena, and one Esperanza were also obtained. The Cuevas specimens occurred in all levels except one, but the Santa Elena specimens were limited to the top two levels, there being 3 in level 2 and 65 in level 1. The Esperanza sherd was also found in the top level.

Typologically, 506 of the sherds are from open bowls, 558 are from constricted bowls, one is a miniature bowl, 21 are fragments of jars, and 350 are from unidentifiable vessels. We also obtained 56 pieces of griddles, two clay disks, a stone hammer, five bone picks, a point of bone, a miscellaneous worked piece of bone, a dish-blank of shell, a shell saucer, a blunted clam shell, three Cassis lips, two Strombus lips, a fractured shell tip, a water-worn piece of shell, and 47 coral fragments. Bones were unusually plentiful at this site. They include bird, crab, fish, hutia, manatee, and turtle. Marine gastropods and pelecypods are represented among the shells.

The writer purchased a small collection of pottery lugs at Carmen, which may be considered in connection with the specimens previously obtained by Fewkes and Lothrop, since all three are poorly allocated. Altogether, the three collections contain two Cuevas, 28 Ostiones, 11 Santa Elena, and two Boca Chica sherds, as well as a complete vessel of the Esperanza style and a possible trade sherd from the Lesser Antilles. A stone celt, a stone hammer, a stone polisher, three large stone three-pointers, and a flat shell pendant are also included, although it is not certain whether the three-pointers are from the site itself or from its vicinity.

It will be apparent that there is a close correspondence between the material excavated and purchased by us and that obtained by the previous
workers, both of which indicate that Carmen was inhabited during Period III and that it contains a trend from the Ostiones towards the Santa Elena style. So far as our pit is concerned, it may be suggested that the bottom four levels, none of which has yielded more than two examples of incision, date from Period IIIa and that the top two levels, which contain, respectively, three and eleven incised sherds, were deposited during Period IIIb. The Cuevas specimens probably constitute a survival from Period II, and the Esperanza sherd may have been plowed in from a later part of the site.

Cayito (Santa Isabel I)

On Punta Cayito, two kilometers west-southwest of the town of Santa Isabel, is a large shell deposit (see folding map at end). Lying largely on public domain, this site is at the western end of the Playa of Santa Isabel and a short distance east of the mouth of the Rio Coamo. The name of its barrio is Playa, and its municipality is Santa Isabel.

The nature of the previous work at this site is again obscured by Fewkes's error in locating Cayito in the municipality of Salinas rather than Santa Isabel, thereby making it appear that Carmen and Cayito are the same site (Fewkes, 1907: 86-87; Lothrop, ms.: 12). No place name of Cayito has come to light in Salinas. Moreover, the site of Cayito, as described by Fewkes, is on the shore and is partially covered with houses, conditions which are present at the site under discussion, but not, as we have seen, at Carmen in Salinas. Finally, the potsherds collected by Fewkes at Cayito and deposited by him in the United States National Museum, are predominantly of the Boca Chica style, which is characteristic of the present site but has never been found, so far as is known, at Carmen. For these reasons, and in spite of the fact that Fewkes, having visited Cayito, was in a position to locate it accurately, we shall attribute his remarks to the present site.*

According to Fewkes (1907: 86), Dr. Souquet was the first to work at Cayito, excavating "the larger part" of the shell deposit about 1875 and obtaining 600 pottery lugs, which he carried to Europe. The place was again visited in the 1890's by Augustin Navarette and Zeno Gandia, who collected potsherds from the shell heap and found parts of a human skeleton in the vicinity. Fewkes (1907: 86) was at the site in 1904, and he also obtained sherds which, as we have seen, are largely of the Boca Chica style. Lothrop, too, collected mainly examples of the Boca Chica style when he surveyed the site in 1916-17 (Lothrop, ms.: 13). Other probable visitors were Montalvo Guenard (1933: 383) and Morales Cabrera (1932: 172).

In 1934, Rainey visited Cayito and also the site of La Florida, some 500 meters inland. Although he discusses both sites in his published report (Rainey, 1940: 112-113), he mentions only his visit to La Florida, ascribing to that site the pottery lugs which, according to his field notes, he purchased at Cayito.† Rainey notes that these lugs have resemblances with the Dominican Republic, thereby implicitly recognizing that they are of the Boca Chica style, which is more characteristic of the Dominican Republic than

* This error of Fewkes was originally noted by Rainey (1940: 86), who explains it by implying that Salinas and Santa Isabel formed a single unit at the time of Fewkes's visit. On the contrary, the two had been constituted separate municipalities fifty years before (P.R.R.A., 1940: 319).
† The field notes are in the Yale Peabody Museum.
of Porto Rico. Our survey of the sites of Cayito and La Florida was made in the company of Montalvo Guenard on September 16, 1936. Choosing the former for excavation, we dug a test pit there two days later (Rouse, 1937: 184).

At the time of the writer's visit, the modern village of Playa covered the entire site, making it impossible to determine the extent and contours of the refuse. Potsherds and shells were scattered over some six acres of the flat coastal plain, but the only thick deposits appeared to be on the point of Cayito itself. In a cut made by the sea on the south side of this point, the deposit was 60 centimeters deep. The site is bordered on the west by a sheltered beach and on the south by a ditch or stream. The mouth of the Rio Coamo is across a small bay from these.*

No separate middens could be distinguished at the site. We located our pit, the usual square divided into four sections two meters square, in a back-

![Figure 13. Burials at Cayito (A) and Diego Hernandez (B).](image)

yard within the village, where the shells appeared to be most numerous and there were less signs of disturbance. The pit was dug through three 25-centimeter levels, yielding brown loam without traces of ash. Pieces of charcoal, shells, bones, and artifacts were relatively common in the first level, but gradually decreased in number until, at the bottom of the third level, the soil became sterile.

A pile of human bones, consisting of four pairs of tibias and fibulas, numerous tarsals, metatarsals, and phalanges, two fragments of a mandible, and several pieces of ribs, were encountered in level 2 (Figure 13, A). It is assumed that these bones represent a secondary burial of parts of two or more individuals. There were no grave objects.

All 265 potsherds excavated at Cayito are of the Boca Chica style. Forty-three of them come from open bowls, 177 are from constricted bowls, one appears to be part of a bottle, and 44 are unidentifiable. Our collection also includes 17 fragments of griddles, part of a disk of clay, a stone cylinder, a disk of bone, a bone peg, four blunted clam shells, and nine fragments of

* Previous writers seem to have confused the ditch with the river. The site does not, as they say it does, extend to the river ( Fewkes, 1907: 80; Rainey, 1940: 112).
coral. Bird, crab, fish, hutia, man, manatee, and turtle are represented among the animal bones, and, in addition, a number of cow, pig, and unidentifiable mammal bones were found in the upper two levels. The shells consist of marine gastropods and pelecypods.

Supplementing the excavated material are the specimens collected on the surface by Fewkes, Lothrop, and Rainey. These include 13 Ostiones sherds, four Santa Elena, 95 Boca Chica, two Capi, and one Esperanza. In addition, Lothrop obtained a stone celt and two stone polishers.

The Boca Chica sherds place our pit in Period IV. Level 3 definitely belongs in the first half of that period, since it yielded no foreign objects. The position of levels 1 and 2, from which we obtained the bones of European mammals, is doubtful. The absence of Spanish sherds, the lack of a reference in the sources to Cayito, and the proximity of the modern settlement, all suggest that the bones are intrusive. On the other hand, it must be noted that the bones are as bleached as the rest of the animal remains, that several have been cut for the extraction of marrow, as is common in the Indian sites, and that many are below the depth to which modern artifacts usually penetrate. Since they were spread through three of the four sections into which the pit was divided, it does not seem likely that they could have been buried. For these reasons, we hesitantly assign levels 1 and 2 to Period IVb.

Collores (Juana Diaz 1)

This is the site of Rainey’s first excavation in Porto Rico and of the only part of his work about which he has not published a report. Located in the foothills 1.6 kilometers west northwest of the town of Juana Diaz, it is in almost the exact center of the south-coast area (see folding map at end). The name “Collores” comes from a road which runs across the southeastern edge of the site and up the valley of the Rio Guayo toward the barrio of Collores eight kilometers to the north (Figure 14). The site is known locally as Caracoles, and it is in Barrio Jacaguas of the municipality of Juana Diaz, forming part of the Colonia Ponceña of Sucesores Serales y Compañía. Accompanied by Montalvo Guenard, the writer surveyed the site on September 15, 1936. The following account is based upon the observations made then and upon Rainey’s field notes and collections, which are now at the Yale Peabody Museum.*

Like Buenos Aires, Collores is situated in the foothills north of the coastal plain. Its shell refuse covers about half an acre of gently sloping cane land on a terrace overlooking the flood plain of the Rio Guayo (Figure 14). Although this land has been plowed many times, two large middenS, each 50 centimeters high, can still be distinguished along the edge of the plateau. The larger of them, Midden A, is cut through its center by an old road bed and through its lower end by the present Camino Collores, in both of which the refuse has been exposed to an apparent depth of one meter. Midden B, further north, is intact. Charcoal, shells, animal bones, and potsherds, * Although the site has not previously been mentioned in print, its name was used in a preliminary paper (Rouse, 1940) to refer to the style here called Ostiones.
probably of the Ostiones style, were observed in the black loam of both middens.

Rainey worked only in Midden A, making one excavation in the area between the two roads and another just north of the old road bed (Figure 14). Excavation 1, a trench which extended from one road to the other, was com-

Figure 14. Plan of the site of Collores (after Rainey).

ROUSE: PORTO RICAN PREHISTORY
posed of two sections each two meters square. Excavation 2 was L-shaped and contained seven sections of similar size. Both excavations were dug to the bottom of the refuse, six 25-centimeter levels deep in the case of Excavation 1 and eight levels deep in Excavation 2.

Excavation 1. In the first two levels of the first excavation, the deposit "was hard packed and potsherds were smashed to pieces by plowing." This is the only comment in Rainey's field notes concerning the nature of the deposit encountered there.

Rainey's collection from Excavation 1 includes 178 potsherds, 15 of which have been disregarded because they are completely plain. Twenty of the remaining sherds are of the Cuevas style, 111 are of the Ostiones, and 32 are of the Santa Elena. These three styles are evenly distributed throughout the excavation, with the Ostiones sherds predominating in all sections except one, where the numbers involved are too small to be significant.

Sixty-seven of the potsherds are from open bowls, 55 are from constricted bowls, six are fragments of jars, and 35 are typologically unidentifiable. They are accompanied by 14 pieces of griddles, two broken celts of stone, a stone polisher, a flint chip, a stone slab, a bone bead, a bone peg, a water-worn piece of shell, and numerous fish bones.

The mixture of styles in this excavation is unusual. It suggests that the deposit may have been disturbed, either by erosion or, as is more likely, by the throwing up of soil in connection with the making of the roads. Subject to this qualification, the deposit can be dated in the latter part of Period III on the basis of the predominance of Ostiones sherds and the presence of 17 incised specimens, constituting at least five per cent of the potsherds in each level.

Excavation 2. Rainey notes the existence of five strata in this excavation (figure 15). The upper 60 to 100 centimeters of deposit consisted of black loam, apparently containing shells, bones, and artifacts comparable to those observed on the surface. A lens of ashes some three meters long and 10 centimeters deep was situated in the middle of this deposit.

In sections A1, A2, and A3, and again in sections D1 and E1, the black loam was underlaid by yellow clay. In the A sections, this clay varied in thickness from 10 to 50 centimeters. Its bottom ten centimeters were in part sterile, but the rest contained some shells and a few potsherds. In sections D1 and E1, the clay stratum was only 10 centimeters thick and it is said to have been heavily impregnated with charcoal.

A well-defined layer of "red culture material" appeared next in the excavation. It occupied the bottom 40 to 130 centimeters of the deposit. Although Rainey does not describe the composition of this stratum, he implies that it consisted of hard clay, shells, and other refuse. It was underlaid at a depth of two meters by hard yellow clay, which was entirely sterile.
Two burials were encountered in the lowest, "red culture" layer (Figure 15). The first, which lay at a depth of 150 centimeters in section D1, consisted of an adult female skeleton lying flexed on its left side. Little more than a meter away, and at a slightly lower depth, were the remains of a baby, too badly disintegrated to determine the position of the body. Rainey notes that the layer of charcoal above these burials was undisturbed, demonstrating that they were not intrusive from the upper parts of the deposit.

The number of potsherds collected from Excavation 2 is given in Table 7 according to section, level, and style. Upon the basis of this table, the collection has been separated into two parts, a Cuevas division, consisting of the material from Sections C1 to E1 in levels 4 to 6 and sections B1 to E1 in levels 7 to 8, and an Ostiones division, comprising the material from the rest of the excavation. It will be noted that a third style, the Santa Elena, is represented by sherds from the upper part of the Ostiones division.

As may be seen by comparing Table 7 with Figure 15, the Cuevas division falls entirely within the "red culture" layer. In sections A1, A2, and A3, however, the latter is included within the Ostiones division. In other words, the stylistic divisions do not coincide with the stratigraphy, a fact which is consistent with Rainey's observation (in his field notes) that "no distinction could be noted in [the] material from low and high [layers]. . . ."
Both of the burials fit in the Cuevas division. Of the potsherds in this division, 193 are from open bowls, 118 are from constricted bowls, eight are fragments of jars, and 80 are typologically unidentifiable. The associated artifacts include 28 pieces of griddles, four disks of clay, three stone celts, one celt-hammer of stone, two stone hammers, two shell chisels, a chisel-blank of shell, a shell chisel-hammer, a flat shell pendant, a shell disk, a cone of shell, and a piece of water-worn shell. In addition, there are bird, crab, fish, human, hutia, manatee, and turtle bones.

From the Ostiones division come the "fire pits," lenses of ash, and layer of charcoal described above. The pottery in this division consists of 246 sherds from open bowls, 372 fragments of constricted bowls, eight parts of jars, and 181 unidentifiable sherds. These are accompanied by 47 pieces of griddles, 14 clay disks, two stone celts, two celt-hammers of stone, five stone hammers, a stone polisher, a stone cylinder, one miscellaneous piece of worked stone, a fragment of stalactite, two stone slabs, a bone awl, a possible head of bone, the tip of a bone spatula, half of a dish of shell, a shell cell, two celt-blanks of shell, a shell chisel, a chisel-blank of shell, two shell disks, a Cactus lip, and a shell node. One of Rainey's workmen found the torso of a European figurine in section A2 of level 4. So far as could be determined it was not intrusive. Bones of all of the animals listed above for the Cuevas division occur also in this one. An iguana bone and several marine pelecypods complete the collection.

Since only two examples of white painting are present (both in level 7), the Cuevas division can be assigned to Period IIb. Levels 6-8 of the Ostiones division probably date from Period IIIa, and levels 1-5 from Period IIIb, the two containing, respectively, two and 30 incised sherds. These datings place all except two of the Santa Elena sherds in Period IIIb and suggest the presence of a trend towards the Santa Elena style during that period.

As may be seen by comparing Table 7 with Figure 15, all of Rainey's "red culture" stratum falls into Period IIb and IIIa on the basis of the above
datings, and his black and yellow strata fit into Period IIIb, thereby suggesting a logical explanation for the difference between the two. It is possible that the red layer was deposited in situ, and that the rest of the material eroded down the hillside at a later date—perhaps even during historic times, if we are to accept the evidence of the European figurine. On the other hand, the "fire pits," lenses of ash, and layer of charcoal are more likely to have resulted directly from Indian action than from erosion.

**General.** We have found that the Cuevas division of Excavation 2 dates from Period IIb, the lower part of its Ostiones division from Period IIIa, the upper part of its Ostiones division from Period IIb, and all of Excavation 1 also from Period IIIb. In terms of our theory of erosion, this suggests that refuse was deposited on the upper (northwestern) half of Midden A during Periods IIIb, IIIa, and IIIb, and that the most recent part of this refuse subsequently washed down the hillside to form the lower (southeastern) half of the midden. If the hypothesis of primary accumulation be accepted instead, the datings indicate that the Indians gradually shifted in depositing their refuse from the northwestern to the southeastern end of the midden. What took place in the other midden, B, cannot be determined without excavation.

**Diego Hernandez (Yauco) 1**

In his field notes, Rainey records a visit to a ball court of Mattel in the hills about 7 kilometers northwest of the town of Yauco, and the purchase there of a collection which includes one Ostiones and 18 Capá sherds. The present writer had intended to excavate at that site, but, not being able to locate it, he worked instead at a somewhat similar place five kilometers east southeast. This substitute site is named Diego Hernandez, and it lies on the farm of a Señora Torres four kilometers north of the town of Yauco in Barrio Diego Hernandez, municipality of Yauco (see folding map at end). Highway 16 and the Río Yauco pass west of the site at distances of 500 and 200 meters, respectively.

Diego Hernández is reputedly the richest site for stone objects in Porto Rico, and it has been visited many times by people seeking the greenish stone beads and pendants which are plowed out of its soil during the cultivation of sugar cane. There are, however, no reports of excavation. The writer was taken to the site by Montalvo Guenard on August 17, 1937, and returned on the ninth and the tenth of that month for the digging of a test pit.

As at Mattel, foothills rather than the coastal plain provide the setting for this site. Occupying the whole of a low, flat hilltop, it is oval in shape, some two acres in area, and elevated nearly ten meters above the river and a tributary stream which flows by on the east. In its soil, which consists of heavy brown clay, were observed charcoal, bones, and a scattering of shells and potsherds. These were rare at the center of the hilltop, suggesting that a ball court may have existed there before the site was plowed. None of the inhabitants, however, could recall the removal of stone slabs from the area.
The usual test pit, four meters square and divided into four sections, was laid out on the western side of the site, where the shells appeared thickest and the most stone objects were said to have been found. In the first 25-centimeter level, this pit yielded the same kind of deposit previously observed on the surface. In the second level, the refuse gradually died out, and the soil became lighter. Accordingly, excavation was terminated at the bottom of that level.

An adult burial was found in the upper half of level 2 (Figure 13, B). The body had been flexed and laid on the left side at an angle of 20 degrees from the horizontal, with the head only a short distance beneath the surface. The skull appeared to have been destroyed by the plow, all that was found of it being an area of pulverized bones. There were no grave objects.

Specimens were purchased from the workers at the site to supplement the excavated material. Since both collections are stylistically the same, they will be treated as a unit. All 235 of the potsherds are Ostiones in style, 99 of constricted bowls, three of jars, and 97 of unidentifiable vessels. In addition, there are four pieces of griddles, two stone celts, two hammers of stone, two discoidal stone beads (one of which is only partially worked), an ear plug of stone, a stone three-pointer, a stone cylinder, a stone disk, a chip of stone, a bone disk, a shell rectangle, a miscellaneous piece of worked shell, a Cassis lip, two Strombus lips, and six pieces of coral. The animal bones, which are particularly numerous, include bird, crab, fish, hutia, manatee, and turtle. Among the shells are land and marine gastropods and marine pelecypods.

Since only one of the Ostiones sherds is incised, our collection can be dated in Period IIIa. The abundance of stone artifacts suggests that the inhabitants of the site may have specialized in stonework, resembling in this respect the occupants of Las Mesas in the west-coast area. Following Montalvo Guenard (personal communication), it had been thought possible that Diego Hernández was a residence of Agüeybana, the chief of southwestern Porto Rico. Our dating, however, does not allow this possibility. Mattei, the site from which Rainey collected Capá sherds of Period IV, is more likely to have been the village of Agüeybana.

**Jobos (Guayama 3)**

In the modern village of Jobos, 1.3 kilometers northeast of the bay of the same name, five small shell heaps are distributed irregularly over the flat coastal plain (see folding map at end). Since these heaps are an average distance of 100 meters from each other, it is assumed that they represent separate sites. Surveying them on September 18, 1936, the writer observed several Indian sherds on the surface of one heap but concluded that the rest were without pottery. To test this conclusion, a pit was dug in the central heap on the following day (Rouse, 1937: 182, 184). The excavated heap, which will be called Jobos, was chosen because it was the most clearly defined and did not appear to have been cultivated. It lies beneath the house and in the yard of Philippe Rivera, some 50 meters north of Highway 3. Like the neighboring sites, it is in Barrio Jobos of the municipality of Guayama (folding map).
Roughly circular in shape, the heap has a diameter of 15 meters and a maximum height of 50 centimeters. It is composed of black loam, which is much darker in color than the surrounding soil. A search of the surface revealed large quantities of charcoal and shells but no artifacts or bones of any kind.

Four two-meter square sections arranged in the form of a square were laid out in the center of the heap and were dug through two 25-centimeter levels. The first level contained much charcoal and many shells, as on the surface, several bones and possible artifacts also being found in the black loam. At a depth of from 15 to 34 centimeters, this deposit gave way to very hard, light colored clay, which was sterile.

The collection from Jobos consists of two possible grinders of stone, a number of partially burned twigs, three pieces of brick, three Spanish potsherds, a dog bone, land and marine gastropods, and marine pelecypods. Very small clam shells are particularly numerous at this site.

Like the non-pottery site of Coroso previously described, Jobos is of dubious significance. It is situated too far from the shore to be a place where shells were gathered. On the other hand, there are no clear evidences of habitation. The modern people have no recollection of forming the heap, although they may have dropped on it the Spanish objects and the bone listed above. Moreover, the shells are as well bleached as in Indian sites, and the heap has an appearance of antiquity. The presence of Indian pottery in one of the neighboring heaps suggests that this one, too, is prehistoric. It will be tentatively assigned to Period I, pending further work at the nonceramic sites.

Papayos (Lajas 10)

The small modern settlement of Papayos is situated on the south coast of Porto Rico between La Parguera and Montalva in Barrio Parguera, of the municipality of Lajas (see folding map at end). The writer visited this village on August 11, 1937, and located 18 hitherto unreported shell heaps, all apparently without pottery, along the mud flats northwest of a small bay. The following day, a test trench was dug in one of these heaps, which will be called Papayos.

The shell heaps occupy slight rises of land at the edge of an extensive mud flat. None of them is on the flat itself or on the high ground behind, where the present houses are located. The heap chosen for excavation is near the center of the group, being sheltered from the sea by a large hill but easily accessible to the bay some 350 meters southwest. The road through Papayos lies directly behind this heap. In fact, it may have cut into it, as there are some shells on the high ground on the opposite site of the road from the heap. At present, however, the heap is only 14 meters in diameter and measures 73 centimeters above the floor of the surrounding mud flat. Upon its surface, it consists of greyish brown soil mixed with small fragments of shell and differing greatly from the dark brown earth of the mud flats.

In order to avoid a fence which bisects the shell heap, it was necessary to dig the four two-meter square sections in the form of a trench rather than a square. It was also necessary to locate the trench somewhat north of the
deepest part of the deposit. All sections were dug through two levels to a depth of 50 centimeters. Sections A1 and A2 contained relatively few shells and those extended only to a depth of 20 centimeters. Sections A3 and A4, however, yielded large numbers of shells down to a depth of over 30 centimeters, before giving way to the sterile dark brown soil of the mud flats. A number of pieces of charcoal were encountered among the shells, and ash also seemed to be present, but there were no animal bones. A few pebbles and field stones had apparently reached the mud flat through human agency, in addition to several crude artifacts of stone and shell.

The specimens excavated at Papayos include eleven stone chips, a stone slab, a blunted clam shell, a plain shell tip, a fractured shell tip, and two pieces of coral. Marine gastropods and pelecypods were also collected. In addition, we encountered an iron bolt and a European potsherd, which are assumed to be intrusive. The bolt was near the surface and the potsherd, although in the second level, was close to a fence post, where it may have been deposited during the digging of the post hole.

The absence of Indian potsherds and of traces of agriculture in the Papayos pit suggests a dating in Period I. As in the case of the non-pottery sites at Coroso and Papayos, there is an alternative possibility that the site was a place where the later Indian or Spanish populations gathered shells. Further excavation must be undertaken before this possibility can be eliminated.

**Pitahaya (Arroyo 1)**

The easternmost site in the south-coast area is Pitahaya, a large shell heap four kilometers north of the town of Arroyo on land of the Central Lafayette in Barrio Pitahaya, of the municipality of Arroyo (see folding map at end). This heap, which is on the west bank of the Rio Arroyo opposite the village of Pitahalla, had previously been explored by Montalvo Guenard (personal communication). Learning of it from him, the writer surveyed it on September 23, 1936, and excavated a pit the same day (Rouse, 1937: 184).

A flat hilltop eight to ten meters high, the site is bordered on the southeast by a river and on the east and north by a tributary. At the time of the writer's visit, the hilltop was covered with grass, and only a few scattered shells could be observed on the surface. Judging from these shells, which were observed only on the northern half of the hilltop, the site consists of a single, circular deposit about 100 meters in diameter. It is bisected by a road, on the banks of which shells can be observed to an average depth of 50 centimeters.

Our pit, a square divided into four sections two meters on a side, was located just west of the road in the south central part of the site, where the deposit appeared to be deepest. In it, we encountered heavy brown clay containing shells, charcoal, and artifacts. These were rare in the first and third 25-centimeter levels, but, in the second, they occurred in large numbers. Midway through level 3, the refuse gave way to sterile clay, and excavation was therefore discontinued at the bottom of that level.

Potsherds of the Santa Elena style predominate in all sections and levels
at Pitahaya. They number 337 and are accompanied by 13 Ostiones and 65 Esperanza sherds. The former are limited to the bottom two levels, while the latter occur in the following amounts from levels 3 to 1: 2, 18, and 45.

From a typological standpoint, 118 of the sherds are parts of open bowls, 223 are from constricted bowls, two are fragments of jars, and 70 are from unidentified vessels. The associated artifacts include 22 pieces of griddles, a clay smoother, a clay disk, a chip from a stone Celt, a Celt-hammer of stone, two stone hammers, six net sinkers of stone, a stone polisher, a quartz crystal, a stone slab, two bone disks, a chisel-blank of shell, a shell rectangle, four Cassis lips, twelve Strombus lips, three shell nodes, a Cassis plate, two Strombus plates, a plain shell tip, a fractured shell tip, three water-worn pieces of shell, and 51 pieces of coral. Bird, fish, hutia, and manatee are represented among the bones and marine gastropods and pelecypods among the shells.

This site certainly dates from Period III and, in view of the presence of an appreciable number of Esperanza sherds, probably from Sub-period IIIb. The Ostiones sherds may be trade objects from further west. The Esperanza specimens, on the other hand, probably represent the beginning of a trend towards that style.

Other Sites

No discussion of south-coast archaeology would be complete without some mention of Lothrop's excavations at Esperanza and La Florida. In the number of artifacts collected, Lothrop's work at these two sites is equivalent to that of Rainey at Cañas and Colores. Stylistically and chronologically, Lothrop's sites are important because they complement Rainey's, apparently extending his Cañas sequence to historic times.*

Esperanza (Salinas 2). This site, which is sometimes also called "Salich," is on the Hacienda Esperanza of the Central Aguirre Sugar Company in Barrio Aguirre, of the municipality of Salinas (see folding map at end). Lothrop dug here in 1915 (Lothrop, ms.: 12; field notes in the Harvard Peabody Museum). As already noted, we were unable to obtain permission to excavate and worked instead at Carmen.

Esperanza consists of one large shell heap with several smaller middens along its southern and western edges. According to Lothrop (ms.: 12): "The [main] heap is irregularly shaped and has two depressions in the deposit of shells which were once apparently courts surrounded by houses. One of these probably contained a dance ground which was destroyed a few years ago when grading for irrigation. Several stones similar to those found in dance grounds may still be seen nearby. . . . A skeleton was found in one of [the smaller heaps] a few years ago."

Lothrop's collection in the Harvard Peabody Museum contains not only the material excavated by him but also specimens obtained during plowing by R. S. Prescott. The only distinction made in the catalogue is between

* Rainey does not discuss Lothrop's excavations in his summary of the previous work in Porto Rico (Rainey, 1940: 111-120).
objects from the Esperanza and Salich fields. No significant differences having been noted between the two, we shall treat the entire collection as a unit.

The Ostiones, Santa Elena, and Esperanza styles, which are represented respectively by 105, 342, and 111 sherds, seem to be the most characteristic of the site. They are accompanied by one Cuevas, 90 Boca Chica, and one Capá sherds.

Typologically, 167 of the sherds are from open bowls, 354 are from constricted bowls, four are from jars, and 125 are unidentifiable. The associated artifacts include 48 pieces of griddles, a discoidal clay stamp, eleven disks of clay, one lump of clay, a stone anvil, part of a stone bowl, six stone pestles, a stone adze, three ground stone axes, an ax-hammer of stone, 36 stone celts, 38 celt-hammers of stone, two stone chisels, four edge grinders of stone, seven end grinders, two side grinders, fourteen stone hammers, five net sinkers of stone, three stone polishers, two fragments of stone elbows, five massive stone collars (three broken, one complete, and one partially made), seven sections from slender stone collars, a stone face, two fragments of stone seats, three large stone three-pointers, one small stone three-pointer, a stone ball, a miscellaneous worked piece of stone, a fossil animal, a quartz crystal, a bone anvil, the point of a bone pick, a bone face, twelve shell celts, eight celt-blanks of shell, a shell chisel, a shell chisel-blank, a shell rectangle, a miscellaneous worked piece of shell, a Cassis lip, a water-worn fragment of shell, a piece of coral, and a nugget of copper.

From a chronological standpoint, this collection seems to be late. The Ostiones sherds are heavily incised, and it is quite possible that they represent a minority style present during Period IIIb, when the Santa Elena pottery was probably dominant. It may be further speculated that the site was also inhabited during Period IVa and was then characterized by the Esperanza style, with the Boca Chica forming an appreciable minority. Despite the absence of European pottery, the copper nugget suggests the possibility of an historic occupation.

La Florida (Santa Isabel 2). This site, which is also called "Indios," is on Hacienda Florida of the Central Aguirre Sugar Company in Barrio Playa, of the municipality of Santa Isabel, only a short distance inland from the site of Cayito which was worked by us (folding map). Lothrop (ms.: 13, field notes) excavated here in 1915, and, in addition, it has been surveyed by Montalvo Guenard (1933: 384), Rainey (1940: 113), and the writer.*

The site consists of a very large shell heap, covering some ten acres. At the time of Lothrop's work, part of it had "been removed to make an embankment for the railroad. A great many objects have been found in this site in the past but it still continues to yield many specimens whenever it is plowed" (Lothrop, ms.: 13).

As in the case of Esperanza, the catalogue of the Harvard Peabody Museum makes no distinction between the specimens which Lothrop excavated and those which he collected on the surface. Accordingly, the entire collection will be treated as a unit. It is characterized by the Santa Elena and

* The statement in Rainey's report that Spinden also excavated at the site is apparently not true. Spinden worked instead at Carmen in Salinas.
Boca Chica styles, there being 93 examples of the former and 133 of the latter. In addition, the Cuevas style is represented by one sherd, the O- stiones by 23, and the Capá by 24.

From a typological standpoint, three of the sherds are from bottles, 77 are from open bowls, 131 are from constricted bowls, and 63 are unidentifiable. The associated artifacts include thirteen fragments of girdles, two discoidal clay stamps, a disk of clay, twelve stone celts, a net sinker of stone, four stone polishers, two possible fragments of slender stone collars, a celt-blank of shell, a flat shell pendant, two Cassis lips, five pieces of water-worn shell, and a sherd of Spanish pottery. To these may be added three fragmentary celts and a celt-hammer of stone which were collected by Rainey when he visited the site (Rainey, 1940: 113*).

As at Esperanza, the Ostiones sherds are heavily incised, and they suggest occupation during the Period IIIb, when the Santa Elena style may have been dominant at the site. This occupation is likely to have persisted into Period IVa, at which time the Boca Chica style was probably the most popular, as at the neighboring site of Cayito. The secondary style during Period IVa would then be the Capá, with the Esperanza style, which is so characteristic of the site of Esperanza, entirely absent. The European sherd may indicate an historic date as well. On the other hand it may have been deposited by the modern inhabitants of the workmen's quarters, which are near the site.

Conclusions

Even without excavation at Lothrop's sites of Esperanza and La Florida, we covered the south coast fairly well. So many sites are known in the area that it was possible to dig in all parts, east as well as west, and in the foothills as well as on the coastal plains (see folding map at end). Chronologically, too, our pits seem to provide adequate coverage. As shown in Table 8, all parts of the time scale are represented. Period I by two pits, Period IIa by one, Period IIb by two, Period IIIa by eight, Period IIIb by five, Period IVa by one, and Period IVb also by one.

From the standpoint of stratigraphy, the excavations were not so successful. The Period I deposits were not in stratigraphical sequence. Refuse from Period II underlay that of Period III in three pits, that of Period IIIa occurred beneath that of Period IIIb in three pits, and that of Period IVa underlay that of IVb in one pit (Table 8). In addition, the presence of sterile soil between the crab and shell strata in Pit 2 at Cañas confirms the existence of a gap in the deposition at that place, corresponding to our Periods IIIb and IIIa.

It has not proved possible definitely to correlate any of our pits with the historic sources. To be sure, we have assigned the upper part of the Cayito deposit to the historic period (IVb), but there is no reference in the sources to a settlement in that vicinity. It is to be regretted that the site of Mattel was not located for excavation, since it is likely to have been the ball court where Guaybana organized the rebellion against the Spaniards. The site

* As already noted, the potsherds attributed in this report to La Florida are instead from Cayito.
of El Cucharal near Guayanilla might also have repaid excavation. According to Nazario y Causel (1893: 137–139), it is the place where Agüeybana received Ponce de León during the latter’s first trip to Porto Rico.

Four supposed Indian trade sherds are present in our collections, two from Buenos Aires, one from Cañas, and one from Carmen. All four appear to be Lesser Antillean in origin. Since these sherds were purchased from

<table>
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<th>Period IV</th>
<th>Area</th>
<th>Buenos Aires 1</th>
<th>Buenos Aires 2</th>
<th>Cañas 1</th>
<th>Cañas 2</th>
<th>Cayey</th>
<th>Cañon 1</th>
<th>Cañon 2</th>
<th>Diego Bernaldez</th>
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<th>3(E2, F2)</th>
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<td></td>
<td>4-6(C1-E1)</td>
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<td>a</td>
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**Explanation of Table.** The pits are listed across the top of this table and the periods along the side. The Arabic numbers refer to the successive 25-centimeter levels in each pit; the letters and numbers in parentheses to the horizontal sections within each level. (For clarification of the relationships between the sections and levels, see Tables 5 to 7.)

natives, they are chronologically unreliable, but they seem to date, respectively, from Periods IIIb, IIa, IIb, and IIIb. The first three sherds can be correlated with the Cedros style in Trinidad and the fourth with the Palo Seco style (Rouse, 1947). The first does not provide the proper correlation, since the Cedros style is supposed to date from Period IIa rather than IIIb, but the remaining three confirm our findings elsewhere in Porto Rico.

Like the north coast and the mountainous interior, the south-coast area is stylistically heterogeneous. All of our local styles occur there and, while the evidence is unsatisfactory in many respects, it seems likely that there
are at least three sequences, as follows:

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<th>Eastern Part</th>
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<td>Period IVb:</td>
<td>Capá (?)</td>
<td>Boca Chica</td>
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<tr>
<td>Period IV:</td>
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The first of these sequences is well illustrated by our excavations in the western part of the area, except that, because of the failure to locate the site of Mattei, we did not dig a pit containing predominantly sherds of the Capá style. In addition to our pits in the central part of the area, we have had to use Lothrop’s material from La Florida as the basis for the second sequence. The third sequence, similarly, is based upon the collection obtained by Lothrop at Esperanza, as well as upon our excavations at Jobos and Pitahaya. It is perhaps worth noting that the above table gives only the dominant styles. To have added those present in a minority during Periods IIIb and IVa would have produced an even more complicated picture.
EXCAVATIONS ON THE EAST COAST

Setting

This section is concerned with the eastern part of the main island of Porto Rico and includes all of the lowlands draining into Vieques Passage (see folding map at end). The region covered is approximately 55 kilometers long and has an average width of eight kilometers. It is the smallest in size of all the areas on the main island, measuring only 400 square kilometers.

The shape of the area is irregular. On the east, the coastline is strongly indented, while on the west the boundary with the rest of the island, twists and turns through the central part of the foothills, following the outlines of the river valleys (folding map). The area extends from Cabo Mala Pascua on the south to Cabo San Juan on the north.

Topographically, the area can be divided into three parts. On the south are the relatively small but fertile valleys of the Rios Maunabo and Guayanés, separated from each other by the Pandura range of hills (folding map). Although most of the shoreline in this region is steep and barren, sheltered beaches at the mouths of the two rivers may have served the Indians as a means of approach to the valleys.

Moving north from the Guayanés valley, one crosses another range of hills and enters a great central section of fertile plains and of low, rolling foothills (folding map). This section is drained by a number of rivers, of which the Humacao and the Blanco are the largest. Its shoreline is low, and it is fringed on the east with marshy land and with beaches. On the west, only a low divide separates the Humacao and Blanco valleys from that of Caguas in the mountainous interior, providing the easiest access to the interior anywhere on the island.

In contrast to this central section of lowlands, the northern part of the east-coast area is relatively rugged. Here, the foothills of the Sierra de Luquillo extend down almost to the coast, the only extensive plain being that of the Río Fajardo in the north (folding map). The region is fertile and, like the rest of the east-coast area, is provided with a moderate amount of rainfall. One of the best natural harbors in Porto Rico, the Ensenada Honda, is located in this region just opposite the island of Vieques. In aboriginal times, as today, this harbor may have served as the main port for boats going to Vieques.

A number of small islands lie just off the central and northern parts of the east coast (folding map). These help to shelter parts of the shore line. They were apparently used by the Indians as places of habitation, for most of the known refuse sites are located on them. It is possible that they served as fishing stations.*

At the time of historic contact, the east coast was apparently inhabited by Taino Indians and had not come under the control of the Carib. This is indicated by the presence of strong chieftainships, which the Carib did not

*The above information concerning the geography, topography, and climate of the east coast is taken from Lobeck (1922), Ober (1899: 11-42), P.R.R.A. (1940: 310-316), and Roberts (1942).
have, by the peaceable manner in which the east-coast natives, contrary to
Carib custom, received the Spaniards, and by the fact that during the colo-
nial period the natives suffered as much as the Spaniards from Carib raids.
According to Martyr, the Carib had an agreement with the local Indians
permitting them to secure wood for their canoes on the east coast of Porto
Rico, but they had not settled in the area (Martyr d’Anghera, 1912, 1: 259).*
Contrary to this conclusion, Fewkes (1907: 28) has suggested “that the
inhabitants of eastern Porto Rico when discovered were partially Carib,...”
Noting that there is no statement to this effect in the historical sources,
bases his opinion on the existence of place names “of Carib deriva-
tion.” The present writer is not competent to judge Fewkes’s derivation
of place names, but it may be noted that the only term cited is Guarabo,
which actually appears in the sources as the name of a river in the realm of
Urayoan, an admitted Taino chief who lived on the west coast of the
island (Oviedo, 1851, 1: 479).†

From the historical records, it can be deduced that each of the natural
regions on the east coast constituted a chieftainship (Coll y Toste, 1907: 1,
96, 236, 237, 248, 250, 266, 267). An Indian variously named Guaraca,
Guaraca del Guayaney, and Guayaney is said to have ruled the southern
part of the Río Guayanés (FIGURE 2: 17). The central chief, called Huma-
cao or Macao, probably lived along the river and in the vicinity of the
modern city which still bears his name (FIGURE 2: 18). In the north, a third
chief, called Yukibo or Luquillo by Coll y Toste and Daguao by other writers,
may have had his village of Daguao in the present barrio of the same name,
which is part of the municipality of Ceiba (FIGURE 2: 19).
Ponce de León and his followers were the first Spaniards to visit the east
coast when, in 1508, they were taken by Agüeybana into the valley of the
Río Mantuabón (now the Mauábo) during their tour of the island’s sources
of gold. In the repartimientos of 1509, Ponce reserved for himself this area
and its inhabitants, including the chief Guaraca. From it, he probably
obtained much of the money later used to finance his trips to Florida (Torres
de Mendoza, 1880, 34: 406, 409).

The other two chiefs, with their followers, apparently escaped the repartimien-
tos, nor did they, so far as is known, take part in the rebellion of 1511.
Their land remained unmolested by the Spaniards until 1514 when, by
order of the viceroy Diego Colón, a group of colonists founded a settlement
on the Río Daguao near Ensenada Honda. This settlement, called Santiago
del Daguao, was soon destroyed by Carib from the Lesser Antilles, but its
name has survived in reference to a small island off shore where one of our
excavations took place (Oviedo y Valdés, 1851, 1: 486-487).

Neither of the local chiefs, Humacao or Yukibo-Daguao, opposed the
formation of the settlement of Santiago. When, however, Ponce de León
impressed ten of the followers of Humacao into a fleet which he sent to
Guadeloupe to punish the Carib for their attack, the two chiefs rose in re-
volt, burning their villages, taking to the mountains, and engaging in
several skirmishes before they agreed to peace. Yukibo, the chief of Daguao,
particularly distinguished himself in these skirmishes, and, as a result, the Sierra de Luquillo in the northeastern corner of the island has been named after him (Coll y Toste, 1907: 236, 237, 266).*

With the coming of peace in the Sierra de Luquillo, the Spaniards were able to explore its mineral potentialities and, in 1515, they discovered a vein of gold, from which it is said that metal worth 25,000 pesos was taken during the first two months alone. It is probable that the Indians of Daguao served as the laborers on this project, although no specific statement to that effect has been found in the sources (Brau, 1907: 266).

Other mines and farms were set up in the district of Humacao and they too were staffed with Indian labor. Both they and the Daguao establishments were attacked by the Carib, the former in 1520 and the latter in 1530. These raids resulted in the death of a number of Spaniards, Indians, and, in the case of the settlements at Daguao, also of several Negro slaves, who had been introduced by 1530 to supplement the Indian workers. It is said that the Carib carried off 25 of the Negroes and Indians in order to eat them, as was their custom (Abbad y Lasierra, 1866: 149-151).

The attacks of the Carib apparently prevented any permanent Spanish settlement during the early colonial period. In a report of 1574, we hear that a sugar factory had been founded along either the Rio Humacao or the Guayanes, but that this establishment, too, had been wrecked by the Carib, leaving the east coast unpopulated (López de Velasco, 1894: 131). Fajardo, the first of the modern towns, was not set up until 1774, with the rest of them following soon afterward (P.R.R.A., 1940: 310-316).

From an archaeological standpoint, the east-coast area has been badly neglected. No excavations had been undertaken prior to the work of the present writer, and there had been only three attempts at survey, by Pinart (1893) in the 1880's, Lothrop (ms.: 4-6) in the 1910's, and Montalvo Guenard (personal communication) in the 1920's. Since none of these men had devoted much effort to the area, few sites were known when the writer began his work. Only three of those visited seemed to be worth excavating. The four pits dug in these three sites are discussed on the following pages.

Ensenada Honda (Ceiba 2)

On the western side of the harbor of Ensenada Honda is a long, narrow inlet known locally as the Caño de los Indios because of the traces of Indian occupation which have been found there (see folding map at end). This inlet, which is in Barrio Guayacán of the municipality of Ceiba, is lined with mangrove swamps. A village site lies on a small island at its mouth, two groups of petroglyphs face each other across the inlet 800 meters from the mouth, and a kilometer further on near the back of the inlet are three small camp sites. Pinart (1983?) had previously visited the northern group of petroglyphs, but to the writer’s knowledge the rest of the sites were unknown. The writer surveyed the village site, which will be called Ensenada

* For other versions of the revolt, based on the assumption that Yukibo and Daguao were separate chiefs, see Brau (1907: 232-235) and Bruno y Callo in Abbad y Lasierra (1866: 16, 137).

† Quoted in Mallery (1893: 137), which in turn is cited in Fewkes (1907: 119), Fewkes (1903a: 442), and Lothrop (ms: 4).
Honda, on September 12, 1936, and excavated two test pits there on the same day (Rouse, 1937:184-185).

The islet bearing the village site is part of the public domain and is situated at the edge of the mangrove swamp on the southern side of the inlet (folding map). Shaped like a tear-drop in reverse, it consists at its outer (eastern) end of a small hill 15 meters high, in its center of a low, flat field, and at its inner end of a sandspit (Figure 16). The hill and the field were overgrown with grass at the time of the writer’s visit and were without shade trees. No spring was found from which the Indians could have obtained drinking water. Nevertheless, the location at the mouth of the inlet must have been ideal for a fishing population, and the sandspit probably facilitated landings.

Both the hill and the field beneath it were almost entirely covered with shells and with other traces of Indian occupation. The deposit appeared to be quite shallow and to lack middens or ceremonial structures. Presumably, the hill and the field were simply places of habitation.

From the sandspit, the two groups of petroglyphs (Ceiba 4 and 3) were visible to the west and northwest respectively, and it is likely that they had some connection with the village site. Both were situated on piles of rocks, the southern group just off the shore of a second small island and the northern one on the edge of the mangrove swamp across the inlet. The southern group, which was on a vertical surface facing the village site, consisted of a single representation of a human face with six lines radiating from the chin (Figure 6, G). The northern group, also on a vertical surface but looking out over the inlet in the direction south southwest, was composed
of two heavily conventionalized human figures and part of a third (figure 6, F). In both groups, the lines were only lightly engraved, but the surrounding surfaces had become so dark from weathering that the drawings were unusually distinct. The island adjacent to the southern petroglyphs was apparently without refuse.

At the village site, the greatest concentrations of refuse were noted on either side of the hill, and accordingly we dug our pits on those slopes (figure 16). Each pit consisted of the usual four sections two meters square and arranged in the form of a square, and each was dug through two 25-centimeter levels. In both, the shell deposit, appearing to coincide with the dark brown humus, was only 25 centimeters deep and was underlaid with lighter brown loam, mixed with stones in the case of Pit 2.

Potsherds of the Santa Elena style form the majority in all sections and levels at Ensenada Honda. There are 175 of them from Pit 1, accompanied by 23 Cuevas and 17 Esperanza sherds. In Pit 2, they number 219, and are accompanied by eight Cuevas and 30 Esperanza sherds. The surface collection consists respectively of four, one, and one sherds of these three styles. In view of the proportional similarity of the figures, the entire site will be treated as a single stylistic unit.

From a typological standpoint, 146 of the sherds are from open bowls, 234 are from constricted bowls, one is a miniature bowl, and the remaining 106 are unidentifiable. The associated artifacts include 34 fragments of griddles, a figurine of clay, four clay disks, two stone hammers, a stone polisher, a stone chip, a bone pick, two pieces of a plain bone spatula, two broken dish-blanks of shell, three shell celts, a part of a celt-blank of shell, a shell chisel, a longitudinal shell bead, a cylindrical shell pendant, a fractured shell tip, a piece of water-worn shell, and eleven coral fragments. Bird, fish, hutia, manatee, and turtle are represented among the bones, and land and marine gastropods and marine pelecypods among the shells.

The Santa Elena sherds date this site in Period IIIb, with the Esperanza specimens suggesting a trend towards that Period IV style. The Cuevas pottery, which lacks white paint, might be considered a survival from Period IIIb. This being so, however, one would expect also to find at the site some Ostiones sherds dating from Period IIIa. The absence of these sherds is inconsistent with our sequence.

Playa Blanca (Ceiba 1)

The three camp sites which lie near the inner end of the Caño de los Indios are all on the main island north of the inlet and are separated from open water by one of the mangrove swamps (see folding map at end). The district in which they are located is known as Playa Blanca and it forms part of Colonia Esperanza of the Fajardo Sugar Company. Two of the sites are small shell heaps apparently (with the exception of one sherd) without pottery. The third is a pottery deposit, in which very few shells were observed. Having surveyed these sites on September 10 and 11, 1936, the writer dug a trench in the more westerly shell heap on the latter day (Rouse, 1937: 182).
The excavated site, which will be called Playa Blanca, is on the edge of the swamp. Very few shells appeared on the surface and, were it not for the accident that a road had been cut through the southern edge, the site would probably not have been noticed. Its exact boundary could not be determined, but it was probably a single, circular heap some ten meters in diameter and 50 centimeters high.

A trench consisting of four sections each two meters square was laid out between the road and a bordering fence, and was dug through two 25-centimeter levels. In sharp contrast to the light brown clay of the surrounding soil, this trench contained black loam streaked with ash. Shells were more tightly packed than in any of the other sites excavated in Porto Rico, but there were few bones and artifacts. The deposit died out at an average depth of 40 centimeters, giving way to clayey soil like that in the surrounding fields.

One Indian potsherd, which is both stylistically and typologically unidentifiable, was encountered in the top level near the surface. The only other possible artifacts are a stone chip, four blunted clam shells, three shell nodes, four plain shell tips, seven fractured shell tips, and two pieces of coral. In addition, we obtained crab, fish, hutia, and manatee bones and collected land and marine gastropods and marine pelecypods.

The virtual absence of pottery and of traces of agriculture at Playa Blanca is particularly striking because of the presence nearby of a ceramic deposit. As in the case of the non-pottery sites on the south and west coasts, we can make a tentative dating in Period I, subject to further work in these small shell heaps.

Santiago (Humacao I)

About 400 meters off the Humacao beach and almost directly opposite Vieques Island, there is a small island known as the Cayo de Santiago (see folding map at end). This island, which is in Barrio Puente de Santiago, of the municipality of Humacao, has been leased by the School of Tropical Medicine of the University of Puerto Rico as a laboratory of primate psychology. At the time of the writer’s visit on August 1, 1938, no apes had yet been brought to the island, and it was still possible to obtain permission to excavate. A single test pit was dug the following day in the hitherto unreported site on the island.

The Cayo de Santiago consists of two hills separated by a flat sandy area covered with palm trees. There is no spring, and drinking water has to be brought from Porto Rico proper. Nevertheless, a medium-sized shell heap, 50 meters in diameter and 75 centimeters deep, is situated in the middle of the palm grove, with traces of occupation clearly evident on the surface.

Our pit, in this case a rectangle consisting of six sections each two meters square, was laid out in the center of the shell heap. In it, the soil consisted of dark brown sandy loam mixed with shells, bones, and artifacts. Shells were common only in the first 25-centimeter level, but the bones and artifacts continued to appear in numbers to an average depth of 70 centimeters, where the loam changed to coarse grey sand and water began to
Excavation was terminated at the bottom of the third level.

Potsherds of the Santa Elena style predominated in all sections and levels at Santiago. We obtained 587 of them (including one surface find), as well as 28 Cuevas, 43 Ostiones, 63 Esperanza, and one Lesser Antillean sherd. Two hundred and thirteen of the sherds are from open bowls, 312 are from constricted bowls, and 168 are typologically unidentifiable. They are accompanied by 39 fragments of griddles, six clay disks, a petaloid stone celts, part of a bone pick, a piece of a dish blank of shell, two shell celts, seven shell-blanks of shell, two chisel-blanks of shell, a shell lip-hammer, a shell blade, 19 Cassis lips, 11 Strombus lips, two shell nodes, two Cassis plates, three Strombus plates, six fractured shell tips, nine water-worn pieces of shell, and 22 coral fragments. Fish and manatee have been identified among the bones and marine gastropods and pelecypods among the shells.

Like Ensenada Honda, this site can be dated in Period IIIb, and it contains evidence of a trend towards the Esperanza style of Period IVa. The Cuevas and Ostiones sherds are possibly survivals from earlier periods and the Lesser Antillean sherd, a trade object.

**Conclusions**

Our coverage of the east coast area is the poorest of any part of Porto Rico. From a geographical standpoint, we were able to locate sites worth excavating in only two of the three principal topographic divisions of the area, and even in those two—the central and the northern—the sites are not well spaced (see folding map at end). Chronologically, our pits exemplify only two of the four main periods, I and III, with the material from the latter limited to the second half of the period (Table 9).
Perhaps largely because of the shallowness of our pits, we obtained no stratigraphic sequences, nor have we been able, in the absence of pits dating from Period IV, to make correlations with the historic period. Lothrop (ms.: 4) has reported a shell heap at Corcho in Barrio Daguao of the municipality of Ceiba which may have been the place of residence of the chief Yukibo, but, unfortunately, we were unable to find the site.

A single foreign trade sherd of Lesser Antillean origin was obtained in our pit at Santiago. This sherd appears to correlate with either the Cedros or the early Palo Seco style in Trinidad, a correlation which is not consistent with its Period IIIb date in Porto Rico (Rouse, 1947). The sherd is very heavily worn, however, as if it had been preserved in some family for generations, and this may account for its late date in Porto Rico.

As for local stylistic trends, we may suggest the following sequence: Period IV—Esperanza (?); Period IIIb—Santa Elena; Period IIIa—Ostiones (?); Period II—Cuevas (?); Period I—no pottery. This sequence is consistent with those in the easternmost sites of the mountainous interior and of the south coast, but it can only be considered tentative until sites in which the Cuevas, Ostiones, and Esperanza styles predominate are located on the east coast.
EXCAVATIONS ON VIEQUES ISLAND

Setting

The small islands of Vieques and Culebra, both of which lie off the east coast of Porto Rico and are within its jurisdiction, remain to be discussed. No data on Culebra are available, for the writer did not visit it and he has been unable to find ethnological or archaeological references to it. Accordingly, the following discussion will deal entirely with Vieques.

Vieques Island, called Bieque or Boyqui in the early sources, is situated some 12 kilometers southeast of Ensenada Honda, the nearest point on the main island of Porto Rico, and is 32 kilometers southwest of St. Thomas, the closest of the Virgin Islands (Figure 1). It forms the southern boundary of a partially enclosed body of water known as Vieques Sound, on the northern edge of which are the Cordillera Reefs and Culebra Island, 15 to 20 kilometers away (see folding map at end). On the west, Vieques Island is separated from Porto Rico proper by the relatively shallow passage of Vieques. To the northeast, the Virgin Passage lies between Vieques and St. Thomas. To the southeast, an arm of the Caribbean Sea separates it from St. Croix.

Except for St. Croix, Vieques is the largest island between Porto Rico and the Leeward Group in the Lesser Antilles (Figure 1). Even so, it is less than 34 kilometers long and 10 kilometers wide, its area of approximately 148 square kilometers being only one-third that of the east coast region, the smallest in Porto Rico proper.

A chain of low hills, rarely more than 100 meters high, extends from west to east almost the entire length of the island. Since this chain is somewhat north of the main axis of the island, most of the flat land lies to the south. The south coast is also the most indented and is the best sheltered from the prevailing northeastern winds. As a result, one might expect to find the majority of the Indian sites there, and in fact, nine of the twelve sites located by us were south of the divide.

The island is quite dry, but it is by no means barren. Until recently, the hills were covered with forests, but these have been removed and most of the land is now under cultivation or is used for pasture. Mangrove swamps still fringe the shore in many places, and there are a number of sandy beaches which may have served the Indians as landing places.*

Vieques is the one part of Porto Rico for which the sources are known to provide a specific statement of ethnic history. According to Bishop Alessandro Geraldini, who visited the island in 1522, “haec insula olim culta a piis et bonis gentibus erat. mox Anthropophagi earn cepere, et omni cive in crudeli convivio eorum devorato ad longa tempora tenuere, et postremo metu Hispanorum eam deseruere” (Geraldini, 1631:191 and 1893:297).

From this, it would appear that the island was originally inhabited by a pious and agricultural people—the Arawak—and was seized at a later date by cannibals—presumably the Carib. Other sources specifically apply the

*These data on the geography, topography, and climate of Vieques Island were obtained from Lobeck (1922: 373-374), Ober (1899: 20-21), P.R.R.A. (1940: 8, 371-377), and Roberts (1942: 3-4, 225).
latter name to the Indians of historic times, also stating that the inhabitants were raiders and traveled in pirogues—the Carib form of canoe (Castellanos, 1874: 66–68; Herrera y Tordesillas, 1729, 1: 281–282; Oviedo y Valdés, 1851, 1: 484).

Since the Carib do not seem to have settled in Porto Rico proper, we may conclude that Vieques was the farthest point reached by them in their conquest of the Lesser Antilles from the Arawak. From their history elsewhere, it is inferred that they arrived on the island no more than a generation before the discovery of America (Loven, 1935: 51–57; Brinton, 1871: 435–436). In early colonial times, the chief was a man named Cacimar. He appears to have had control over the entire island. The location of his village is not known (Herrera y Tordesillas, 1729, 1: 282; Oviedo y Valdés, 1851, 1: 484).

Columbus discovered Vieques while sailing from the Virgin Islands to Porto Rico during his second voyage in 1493. Passing along its southern side, he did not land, nor did he, so far as is known, observe traces of Indian occupation. He was so impressed with the verdure of the island that he named it "Gratiosa," after the mother of a friend, the Bishop Geraldini mentioned above (Geraldini, 1893: 296–297; Morison, 1942, 2: 88–89).

We do not hear of the island again until 1513 or 1514, when Cacimar met his death in a raid on the Spanish settlement at the mouth of the Río Grande de Loíza. His brother, Yaureibo, succeeded to the chieftainship and, in reprisal, conducted another raid on the settlement, causing the death of the local chieftainess, Loíza, and her Spanish husband, Juan Mexía, as already noted. Yaureibo was less successful in a subsequent attack, although his party did kill Becerrillo, a famous dog whom the Spaniards had brought to Hispaniola to help fight the Indians (Castellanos, 1874: 66–68; Herrera y Tordesillas, 1: 281). Aroused by these attacks, Cristóbal de Mendoza, then the governor of Porto Rico, led an expedition to Vieques Island in 1514, killing Yaureibo and many of his followers and taking others to Porto Rico for service as slaves (Oviedo y Valdés, 1851, 1: 484).

Mendoza's expedition put an end to permanent occupation of Vieques by the Carib. It is believed that the few Indians who survived took refuge among their compatriots in the Lesser Antilles, whence the raids on Porto Rico continued. When Bishop Geraldini visited Vieques in 1522 in order to inspect the island which had been named after his mother, he found it unoccupied. Later, it became overrun with wild cattle, and the Spaniards used it as a hunting preserve until the danger of Carib raids caused the authorities in San Juan to prohibit access to the island (Brau, 1904: 49; Geraldini, 1893: 297, 299; Latorre, 1919: 60).

While seizing control of the Lesser Antilles from the Carib in the seventeenth century, the British and French became interested in Vieques. In 1647, John Pinard took possession of the island on behalf of the British, holding it until the Porto Ricans forced him out. Soon a French expedition also had to be dispossessed. In 1718 and in 1753, the Porto Ricans again

* For somewhat different interpretations of these sources, see Brau (1907: 215–220) and Van Middeldyk (1930: 279–280).
ousted British colonials. Spain constructed a fort on Puerto Real on the south coast in 1816-17. The first permanent settlers arrived about that time and, as a free port, the island was frequented by British and French from the Virgin Islands. Isabel II, the principal town, came into existence in 1843. Twelve years later, Vieques officially became part of Porto Rico (Abbad y Lasiera, 1866: 229-230; P.R.R.A., 1940: 372, 375, 376).

So far as is known, the writer was the first to undertake archaeological research on Vieques. Montalvo Guenard (1933: 357, 386) had previously published brief references to two sites, however, one of which he considered to be Carib. In addition, Lovén (1933: 278, Plate 9, 1) had illustrated a pottery lug of the Esperanza style in the Danish National Museum, noting its similarity to Porto Rican ceramics and implying that it was made by the Arawakan predecessors of the Carib.* During a week spent on the island in 1938, the writer visited the two sites mentioned by Montalvo Guenard, located ten others, and excavated in four of them. The following is an account of the excavations.

Caña Honda (Vieques 10)

Along an eight-kilometer stretch of the south coast east of Puerto Real, the writer located five sites, each consisting of one or two small shell heaps (see folding map at end). One of these sites contained Indian pottery, one had European sherds, and the other three appeared to be entirely lacking in ceramics. On July 31, 1938, a test pit was dug in the central non-pottery site, which is on land of the Eastern Sugar Associates in Barrio Puerto Real, of the municipality of Vieques.

The site dug is situated at the top of a slight rise between two mud flats, 70 meters northwest of the Puerto Mosquito (folding map). It consists of a single shell heap 39 meters long, eight meters wide, and about 25 centimeters deep, lying in the middle of an otherwise empty pasture. The usual test pit, four meters square and divided into four two-meter square sections, was laid out near the southern end of the heap, where the shells appeared to be most numerous, and was dug through two 25-centimeter levels. In the first level, we encountered dark brown humus, tinged with ash and containing large amounts of shell. This gave way at a depth of 15 to 30 centimeters to sterile yellow sand. Rocks were common in parts of both strata. There was no sign of charcoal or of bones.

The only possible artifacts were a stone hammer, a Strombus lip, two nodes of shell, five plain shell tips, eight fractured shell tips, and two pieces of coral. The shells included marine gastropods and pelecypods.

If a genuine place of habitation, the site probably dates from Period I. Its difference from the neighboring Indian and Spanish shell heaps which contain pottery, is marked. In particular, the shells in it are more bleached than at the Spanish site. Since the factors causing bleaching appear to be the same at both sites, Caña Honda is almost certainly older than the Spanish heap. In fact, we doubt that there has been enough time during the rela-

* As noted below, there is also a small collection from Vieques in the American Museum of Natural History in New York.
tively short period of Spanish habitation of Vieques for the amount of bleaching present at Caña Honda. While it is not likely that the heap is Spanish, however, there still remains the possibility of its production by the ceramic Indians at a time, as during shell gathering, when they may have left their pottery elsewhere.

*Esperanza (Vieques 3)*

Also on the south coast of the island are a group of three shell heaps at the site of the former Central Esperanza, now used only for loading lighters with sugar cane for shipment to Porto Rico (see folding map at end). These shell heaps, which belong to the Eastern Sugar Associates, are in Barrio Puerto Real of the municipality of Vieques. Our workmen reported that a stone collar* and several burials had been found in them during the construction of the central's railroad. In addition, the lug pictured by Loven (1935, Plate 9, 1) and a small collection of Vieques pottery which is now at the American Museum of Natural History may come from the site, for they are of the Esperanza style, which we have named after the place.† The writer surveyed it on July 29, 1938, and excavated a test pit there on the following day.

Esperanza should not be confused with the shell heaps of the same name on the south coast of Porto Rico proper, where Lothrop excavated (folding map). Although somewhat similar in content, the two sites differ considerably in appearance. All three of the Vieques middens are relatively large, and they are arranged haphazardly instead of around a court or plaza (Figure 17). They lie along the sandy shore of the Puerto Real in what may have originally been a palm grove but is now a railroad yard. Twelve meters is their maximum diameter and 30 centimeters is their greatest depth. They appear to consist almost entirely of earth, shells, and potsherds. We collected one example of the Esperanza style, unidentifiable type, from the surface.

The central heap, situated in the space between two railroad lines, was chosen for excavation (Figure 17). There were two houses on this heap, and we obtained permission to dig in the garden behind one of them. Four sections two meters square and arranged in the form of a square were staked out in the garden and were dug through two 25-centimeter levels. In the first level, we encountered charcoal, bones, many shells, and a considerable number of artifacts mixed with the dark brown loam. This deposit extended to a depth of 30 centimeters, where it gave way to sterile sand.

Fifteen sherds of the Santa Elena style, one of the Capá, and 332 of the Esperanza comprise the ceramic collection from our pit. Seventy-one of these sherds are from open bowls, 191 are from constricted bowls, one is part of a miniature bowl, and 85 are typologically unidentifiable. They are accompanied by 12 griddle sherds, a clay smoother, part of a spindle whorl.

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* The writer cannot recall whether, at the time he recorded this information, he was aware that the same word is used in Spanish for "collar" and "necklace." It is possible that the workmen were referring to a necklace of stone beads.

† Loven's lug and 20 of the sherds in the American Museum of Natural History conform to the Esperanza style. Also in the American Museum collection are four sherds of the Santa Elena style and four clay disks.
of clay, four fragmentary disks of clay, a stone chip, the bit of a shell celt, a celt-blank of shell, a chisel-blank of shell, a shell net sinker, a shell trumpet, a shell disk, three fractured shell tips, two water-worn pieces of shell, two coral rasps, and four other pieces of coral. Bird, fish, hutia, and turtle have been identified among the animal bones, and marine gastropods and pelecypods among the shells.

The site apparently dates from Period IVa, with the few Santa Elena sherds representing a survival from Period IIIb. The inhabitants were obviously Arawak rather than Carib, for all of our material is similar to that obtained in Porto Rico proper. As Lovén has implied in his discussion of the sherd which we think is from Esperanza (Lovén, 1935: 278), we seem to be dealing here with the period just before the arrival of the Carib.

**La Mina (Vieques 4)**

Some 500 meters north of the site of Esperanza, there is another group of three shell heaps on the La Mina property of the Eastern Sugar Associates, also in Barrio Puerto Real of the municipality of Vieques (see folding map at end). Highway 69 and a small stream, which may have served as the source of drinking water for both La Mina and Esperanza, pass just to the west. Two side roads run through the site itself. The writer first visited the place on July 29, 1938, returning two days later to excavate a test pit.

The three middens lie side by side on the level coastal plain. The largest one, which is in the center, has apparently resulted from the coalescence of three or four smaller heaps. It has a maximum width of nearly 60 meters and a depth of 50 centimeters. In contrast, the smallest of the middens is
only 12 meters in diameter and 25 centimeters deep. Shells and pottery are visible on the surfaces of all three.

Although formerly a cane field, the site is now a pasture and permission to excavate was therefore easy to obtain. A pit four meters square, composed of the usual four two-meter square sections, was laid out in the middle of the largest heap and was dug through two 25-centimeter levels. In the top level, the dark brown humus was spotted with ash, and it also contained large numbers of shells and artifacts. Bones, however, were rare. This deposit gradually gave way in the second level to sandy, sterile light brown soil.

Potsherds of the Santa Elena style predominated in the pit. They number 216, and are accompanied by two examples of the Ostiones style. Sixty-three of the sherds are from open bowls, 78 are from constricted bowls, one is part of a miniature bowl, and the remaining 76 are typologically unidentifiable. The associated artifacts include nine fragments of griddles, an anthropomorphic stone pendant, a possible fragment of a bone pick, two shell celts, a celt-blank of shell, a shell trumpet, two coral rasps, and a plain piece of coral. We also obtained crab, fish, hutia, and iguana bones; marine gastropods; and marine pelecypods.

The prevalence of Santa Elena pottery places this site in Period IIIb. The Ostiones sherds are probably a survival from the preceding sub-period. Although we obtained no Esperanza sherds, it is possible that La Mina was the predecessor of the site of Esperanza, and that the inhabitants of the former place moved to the latter at the beginning of Period IV.

Martineau (Vieques 2)

The final excavation was made on the opposite side of the island, almost due north of Esperanza and La Mina (see folding map at end). It lies 50 meters above sea level on a hill overlooking Vieques Sound, and is about 300 meters inland from the Punta Martineau, after which it has been named. Previously a cane field, it now forms part of the Barrancon Resettlement Farm of the Puerto Rican Reconstruction Administration, located in Barrio Florida of the municipality of Vieques.

The discoverer of the site is said to be Marcial Santana, a native of Vieques (Montalvo Guenard, 1933: 357*). The inhabitants had previously dug a small pit there, finding many animal bones, shells, and artifacts, including a sherd from an Esperanza constricted bowl and five fragments of stone celts, which they gave to us. The writer surveyed the place on Friday, July 20, and excavated a test pit on the same day.

There are two shell heaps at Martineau, a smaller one on top of the hill, and another, some 55 meters long and 15 meters wide, just beneath the crest. They are alongside a dry stream bed which, in the days when the island was forested, may have provided drinking water for the inhabitants. In a road cut through the smaller midden and a pit in the larger one, we observed ash, shells, bones, and potsherds to a depth of 75 centimeters.

Our own pit, a four-meter square divided into four sections, was staked

* In place of "Martino" in this report, read "Martineau."
out in the larger midden alongside the pit previously made by the inhabitants, and was dug through four 25-centimeter levels. It revealed a succession of strata inclined downwards from north to south, apparently in the direction of the original slope of the hillside. The top stratum, varying in depth from 25 to 70 centimeters, consisted of dark brown loam mixed with large amounts of ash, shells, and artifacts, as well as more animal bones than were observed in any other site in Porto Rico. The middle layer, 10 to 25 centimeters thick, contained few shells, but there were pieces of charcoal, a few animal bones, and some artifacts in the brown loam. Beneath this layer, at a depth ranging from 48 to 80 centimeters, we encountered sterile yellow clay.

Several boulders, unworked and irregular in shape, appeared in the top stratum on the north side of the pit. These must have been present at the time of Indian habitation, but there was no evidence that they had been used in any fashion. A number of small, unworked stones were also encountered on the opposite side of the pit near the bottom of the deposit.

Santa Elena potsherds, of which there were 1,144, predominated in all sections and levels. We also obtained 12 Ostiones and 13 Santa Elena sherds. Although the former occurred in all levels, the latter were limited to the top of the heap, one sherd coming from level 2 and the other 12 from level 1.

Typologically, 347 of the sherds are from open bowls, 503 are from constricted bowls, eight are fragments of jars, and 316 are unidentifiable. Accompanying them are 90 fragments of griddles, part of a clay figurine, a disk of clay, five fragmentary stone celts, a celt-hammer of stone, two stone hammers, two fragments of red ocher, a bone anvil-grinder, a bone awl, two possible fragments of bone picks, two shell celts, two celts-blanks of shell, a shell chisel, part of a pendant tinkler of shell, a blunted clam shell, a Cassis lip, a Strombus plate, a fractured shell tip, three pieces of water-worn shell, and ten corald fragments. Bird, crab, fish, hutia, manatee,
and turtle are represented among the bones. Land gastropods, marine gastropods, and marine pelecypods are among the shells.

This site apparently dates from Period IIIb and is contemporaneous with La Mina. The Ostiones sherds may be survivals from Period IIIa. The Esperanza specimens almost certainly represent a trend towards that Period IV style. As at Esperanza and La Mina, all of the remains can be attributed to the Arawak. Again, therefore, we seem to be dealing with a period before the Carib arrived in Vieques.

**Conclusions**

Since the four sites just discussed are all in the middle of the island, they do not provide an adequate geographic coverage (see folding map at end). We surveyed several sites further west but did not excavate because none of them seemed to be particularly distinctive. At the eastern end of the island, no sites were located, although they probably exist, since that section is the closest to Culebra and St. Thomas, with which the Vieques Indians were undoubtedly in close contact during prehistoric times (Figure 1).

Chronologically, too, the coverage of our pits is inadequate. As shown in Table 10, we obtained material dating only from Periods I, IIIb, and IVa. It is possible that, because of the island's small size in comparison with Porto Rico proper, it was uninhabited during Periods Ia, IIb, and IIIa, but this does not seem likely, since sites dating from those periods exist on even smaller islands in the Virgin group.*

Only one site, Martineau, was deep enough for stratigraphical study. In it, we obtained evidence of a trend from the Santa Elena towards the Esperanza style. We have not been able to correlate the sites with any of the historic data, for they all appear to be pre-Carib.

It was a disappointment that we did not find any traces of the Carib in the excavations. In part, this may be due to the fact that we worked mainly on the southern side of the island. As already noted, Columbus apparently observed no signs of occupation when he sailed along the south coast. This suggests that the Carib may have concentrated on the northern side of the island. We would have liked to excavate in the Saleme site on the north coast, which Montalvo Guenard (1933: 357, 386) has attributed to the Carib,† but this site, being in the town of Isabel II, is almost completely destroyed.

One possible trade sherd of the Capa style appeared in our excavation at Esperanza. This sherd permits synchronization of Period IV on Vieques Island with that on Porto Rico proper. In connection with the local styles, we suggest the following sequence: Period IVa—Esperanza; Period IIIb—Santa Elena; Period IIIa—Ostiones (?); Period II—Cuevas (?); Period I—no pottery.

The existence of separate periods characterized by the Cuevas and Ostiones styles is postulated only on the basis of analogies in the Virgin Islands and Porto Rico proper. The rest of the sequence, however, is well illustrated by our pits. It will be noted that this sequence, if correct, is identical with that which is believed to exist on the east coast of Porto Rico proper.

* In particular, the Coral Bay and Little Cruz Bay sites on St. John (Hatt, 1924: 11; Rouse, 1948: 312).
† In this site, V. Reyes Fitzpatrick, a Viequan school teacher, is said to have found a "Carib grave."
CHRONOLOGICAL IMPLICATIONS

Validity of the Periods

The evidence presented in the foregoing pages indicates the existence in Porto Rico of four periods. Although, as shown in Table 11, these periods vary in content from place to place, they appear to be well defined. The first is characterized by an absence of pottery. Following it is a period of which the Cuevas style is diagnostic, white paint being common during the first half of the period but virtually absent during the second. The third period, too, can be divided into two halves, the first characterized by Ostiones pottery without incision and the second by Ostiones pottery with incision, by Santa Elena pottery, or by both. The Boca Chica, Capá, or Esperanza styles, occurring side by side in some cases, are diagnostic of Period IV. They are accompanied in the second half of the period by European objects. In addition, the Santa Elena style seems to have survived into the first half of the fourth period at one site on the north coast.

This reconstruction of the periods suffers to some extent from limitations in the amount of data which we were able to obtain. The first period is the least certain, since there are few, if any, artifacts in the sites assigned to it. The earlier part of the ceramic sequence on the east coast and Vieques Island is also doubtful, because of our failure to locate sites in those areas dating from Periods IIa, IIb, and IIIa. It is possible, for example, that the Santa Elena style was present in the eastern areas during Period IIIa as well as IIIb, although this does not seem consistent either with the situation in central Porto Rico or with that in the Virgin Islands. Another weak spot is Period IVa on the west coast, for which we also failed to excavate sites. It is not impossible that the Ostiones style persisted longer on the west coast than elsewhere, in which case some of the deposits which we have assigned to Period IIIb may belong instead in Period IVa. Period IVb, finally, is well defined only on Mona Island and in the central part of Porto Rico proper, those being the only places where we succeeded in excavating historic sites.

Except for these weak spots, the periods seem to be well founded in fact. The facts, however, are no more reliable than the methods used to interpret them: stratigraphical analysis wherever possible and, failing that, seriation of the deposits. The degree of reliance placed upon each of these approaches has been summarized in the tables accompanying the conclusions about each area and, therefore, will not be discussed here.

In connection with the seriation, we have been able to correlate a number of the sites with statements in the historic sources. As a further check upon the validity of the sequence, we have examined the relationships of all known trade sherds to the chronologies in their presumed places of origin, both elsewhere in Porto Rico and in other parts of the West Indies. As noted in the conclusions about the various areas, these trade sherds, with few exceptions, confirm the local Porto Rican sequence.

From a conceptual standpoint, the sequence is based upon the assumption
<table>
<thead>
<tr>
<th>Period IV</th>
<th>Mona Island</th>
<th>West coast</th>
<th>North coast, mountainous interior, and south coast</th>
<th>Eastern third</th>
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<tr>
<td></td>
<td></td>
<td>Western third</td>
<td>Central third</td>
<td>Eastern third</td>
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<tr>
<td></td>
<td></td>
<td>Boca Chica (with European objects)</td>
<td>Capá (with European objects)</td>
<td>Boca Chica or Capá (with European objects)</td>
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<td></td>
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<td>Boca Chica, Capá, or Santa Elena (without European objects)</td>
<td>Esperanza (with European objects)</td>
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<td>a</td>
<td>Boca Chica (without European objects)</td>
<td>Capá (without European objects)</td>
<td>Capá or Esperanza (without European objects)</td>
<td>Esperanza (without European objects)</td>
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<th>North coast, mountainous interior, and south coast</th>
<th>Eastern third</th>
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<tr>
<td></td>
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<td>Ostiones (with incision)</td>
<td>Ostiones (with incision) or Santa Elena</td>
<td>Santa Elena</td>
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<th>North coast, mountainous interior, and south coast</th>
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<td>Cuevas (without white paint)</td>
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<td>Cuevas (with white paint)</td>
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<table>
<thead>
<tr>
<th>Period I</th>
<th>Mona Island</th>
<th>West coast</th>
<th>North coast, mountainous interior, and south coast</th>
<th>Eastern third</th>
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<td>no pottery (?)</td>
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that the styles did not overlap from period to period. Both the presence of the Santa Elena style on the north coast during Period IVa and the possible survival of the Ostiones style on the west coast during the same period are considered exceptions. There are undoubtedly others. For example, some of the Ostiones sites in the mountainous interior which lack incision may belong in Period IIIb rather than IIIa. Our method of dating, however, is not precise enough to detect further cases.

Duration of the Periods

Assuming that the periods are reasonably well founded, not only in fact but also methodologically and conceptually, we will proceed to consider their duration. Although a calendar, dendrochronology, or other exact

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<th>Table 12 Duration of the Periods</th>
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<td>Period IV</td>
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<tr>
<td>Period I</td>
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Explanation of Table. This table is concerned with the number of pits, not sites. Fractions of levels are counted as whole ones, and levels which may belong in either of the periods are arbitrarily divided between them.

method of dating is lacking, some idea of the length of the periods may be obtained by examining the depths of the deposits assigned to each. For this purpose, we have compiled in Table 12 the number of pits assigned to each period, the total number of levels in each, and the average number of levels per pit.

The validity of Table 12 as an indicator of time depends upon two factors: (1) the rates at which the Indians deposited their refuse and (2) the extent to which they moved from place to place. If the refuse accumulated at the same rate in all the pits, and if they were all utilized throughout the periods or sub-periods to which they have been assigned, then Table 12 provides an accurate measure of the relative length of the periods. This is not likely, but it is hoped that the number of pits is great enough to eliminate the effects of differences in the rate of accumulation. As for the movements from site to site (and from one part of a site to another), we can only hope that they were relatively as common in all periods, so that they cancel each other's effects. This is probably not true of the first period, when the Indians are
believed to have been hunters and fishermen, but it may be true of the three agricultural periods which follow.

Assuming that it is true, we may use the average depths of deposit as the basis for estimating the relative lengths of the periods (Table 12). The subdivisions of Period II and III appear to have lasted longer than those of Period IV, and possibly also than Period I. Period IVb seems to have been the shortest, while, if Table 12 is correct, Period IIa had the greatest duration.

An estimate may also be made of the absolute length of the periods. According to the sources previously quoted, the Indians at Sardinero on Mona Island first came under the control of the Spaniards in 1508, continuing in contact with them until 1584, soon after which they became extinct. This means that Period IVb lasted for at least 76 years on Mona Island.

On the main island, the period was apparently shorter. We have seen that the first repartimiento, or distribution of the Indians among the Spaniards, took place in 1509 and that the system was not abolished until 1544. This gives a duration of 35 years for Period IVb, upon the assumption that, before 1509, the Indians had little or no opportunity to obtain trade goods and that, after 1544, they moved to less accessible places to avoid the Spaniards.

The average duration in the five historic pits of Period IVb is 51.4 years. Applying this figure to the average depth of deposit during the period, we estimate that it took, in round numbers, 40 years for the accumulation of one level of deposit. Assuming that this rate holds true for all the periods, we obtain the figures shown in the last two columns of Table 12. It is estimated that the periods varied in length from 48 years for IVb to 160 for IIa. The entire sequence would then have lasted for 735 years, beginning in 849 A.D. and ending with the apparent abandonment of Mona Island in 1584.

A partial check on the dates is made possible by the evidence in the sources that the Carib arrived on Vieques Island only about a generation before the Spaniards. Period IVa was apparently more than half over when this took place, for Esperanza, the latest Arawak site on Vieques, dates from that period. Allowing 30 years for the one generation of Carib occupation and 48 years for the deposition of the 30 centimeters of deposit at Esperanza, we obtain a total of 78 years for Period IVa, which agrees well with the previous estimate of 72 years for that period.

At 40 years per level, the rate of deposition is .006 meters per year. It is perhaps worth mentioning that this is only half of the rate calculated for the eastern part of Cuba (Rouse, 1942: 151-152), for it will give some idea of the possible margin of error in our figures.

To summarize, if our figures are correct, Porto Rico was first settled about 850 A.D. by the preceramic people of Period I. Agriculture and pottery came into use about 930 A.D., when the second period began. Periods III and IV started about 1200 and 1440, respectively. During the first half of the latter period—about 1480—the Carib arrived on Vieques Island. We place the beginning of historic times—Period IVb—at 1509,
when the first repartimiento took place. Except on Mona Island, the historic period is ended in 1544 with the abolition of the repartimientos, which made it possible for the Indians to move away from the Spanish settlements. The site on Mona Island is known to have been inhabited until 1584 and there were Indians in the more remote parts of Porto Rico for several centuries thereafter.

Population Movements

The datings presented in the foregoing sections also make it possible to draw several conclusions about population movements. For this purpose, we have compiled in Table 13 the numbers of sites in each area which we have been able, on the basis of our excavations and those of the previous workers, to place in each period.

If the sites had been selected at random, Table 13 would provide an accurate record of the distribution of the Indian population from area to area and from period to period. Unfortunately, our sites, upon which the table is primarily based, were selected more rationally. As explained in the section on field procedures, we chose to excavate at the places which seemed to be the most representative of the archaeology, either culturally or from the standpoint of distribution. At best, therefore, our sites constitute a "purposive" sample, and their value for population study depends upon the judgment of the writer in selecting them (Smith and Duncan, 1945: 256). By basing the selection on a thorough site survey, we have attempted to compensate for this weakness, but we have not eliminated it.

Table 13 would be more convincing if we were able to add to it the sites
surveyed but not excavated. Unfortunately, as already noted, it proved possible to date only a few of the surveyed sites, and the collections from these are so small that they seem better omitted. We can only state it as our opinion, unsupported by reliable evidence, that table 13 is representative of the conditions encountered during the survey.

The table also suffers from the fact that relatively little archaeological work has been done on Mona Island, the east coast of Porto Rico, and Vieques Island. So few sites are known from these areas that our possibilities of choice were limited.

The table is likewise subject to the deficiencies we have noted above in connection with the definition of the periods. If it should be true, for example, that the Ostiones style survived into Period IVa on the west coast area, the table is biased against that period.

Another weakness is that the table does not provide any indication of the relative length of the periods. Since Period IIa, for example, was apparently twice as long as Period IVa, a great proportion of its sites may have been occupied successively rather than simultaneously. If so, the figures should be biased against Period IVa.

Perhaps the greatest weakness of table 13 for population study is that it presents only the number of sites, without taking into account variations in size. This, too, is unavoidable, for, even if we were able to calculate and to compare the cubic content of the refuse in each site, we could still not be sure that all of it had been deposited during the period or periods to which the site has been assigned. It is certain only that the sites dating from Period I are smaller than those of the later periods. In addition, the writer is under the impression that the Period IV sites average smaller than those of Periods II and III. If so, the figures in tables 11 and 12 are biased in favor of Periods I and IV.

Taking into consideration all of these possible biases, we think it probable that the population during Period I was relatively smaller in comparison with the rest of the periods than is indicated on table 13. Otherwise, the biases should tend to cancel each other's effect.

In this belief, we shall attempt to reconstruct the history of the aboriginal population on the basis of the table. If, as is by no means certain, the Indians arrived in Porto Rico during Period I, they apparently settled only in the most favorable and the more easily accessible parts of the west coast, the south coast, and Vieques Island. During Period IIa, they seem to have spread throughout the rest of the coastal areas, excepting only Mona Island. (Although we located no sites from Period IIa on the east coast or on Vieques Island, we assume that they exist.) Then, in Period IIb, the Indians began to penetrate the mountainous interior, settling in the larger river valleys which were the most easily accessible. Period IIIa shows no further expansion of settlement, but in Period IIIb the people apparently spread into the rest of the mountainous interior. Finally, during Period IVa, they seem to have occupied Mona Island for the first time.

Utilizing the conclusions concerning the styles and cultures which were
summarized in the first of these reports* and which will be discussed more fully in subsequent ones, we may fill in some of the details of this picture. The preceramic (Coroso) Indians of Period I—if they existed at all—were probably hunters and fishermen, like the Ciboney Indians of Hispaniola and Cuba. They can be assumed to have entered Porto Rico from Hispaniola, settling only in the parts of the coastal area in which conditions were best suited to their mode of life.

From Period IIa on, the Indians were probably Arawak rather than Ciboney. They apparently entered Porto Rico from the Lesser Antilles, introducing pottery of the Cuevas style and the practice of agriculture. With the assistance of the latter, they were able to spread into areas like the north coast, which were not suitable to the economy of their predecessors. On the other hand, perhaps because of their adaptation to maritime life in the smaller islands of the Lesser Antilles, they failed to penetrate any distance into the mountainous interior.

There is some indication that the immigration of the agricultural Indians into Porto Rico ceased during Period IIb, the shift at the close of that period from the Cuevas to the Ostiones style of pottery being a local, rather than an intrusive, development. At the same time, however, some movement seems to have taken place from Porto Rico to Hispaniola. By draining off the surplus population in Porto Rico, this movement may have further delayed penetration of the mountainous interior, thereby providing an explanation for the restriction, noted above, of the Period IIb and IIIa sites to the larger river valleys.

During Period IIIb, the shift of population from Porto Rico to Hispaniola apparently gave way to a second movement of Arawak Indians from the Virgin Islands to Porto Rico, which was in turn responsible for the appearance of the Santa Elena style in the eastern part of the island. This movement seems further to have caused an expansion of the population in Porto Rico, permitting occupation of the major part of the mountainous interior, as is noted above. In this connection, it is perhaps worth mentioning that the Santa Elena style is more widespread in the mountainous interior of Porto Rico than in the coastal areas, a fact which suggests that the newcomers moved primarily into the unsettled areas of the interior, possibly by way of the broad valleys at the eastern end of the island which provide the easiest access, instead of attempting to conquer the coastal areas from the previous Ostiones inhabitants.

At the beginning of Period IVa, the Ostiones people seem to have developed the Capá style and the Santa Elena people, the Esperanza. At the same time, the Boca Chica style made its appearance, presumably as the result of a migration from Hispaniola. That is, Mona Island and the site of Cayito on the south coast were probably settled by Boca Chica people from Hispaniola rather than by Porto Rican Indians. Somewhat later, but still within Period IVa, the Carib seized Vieques, while during the Period IVb the Spaniards took over the whole country.

*This series. Volume XVIII, Part 1.
One other event should be mentioned for its possible correlation with the population changes—the shift during Period IIIb from the earlier Ignieri culture of the Arawak to the later Taino. It is believed that this shift was a local development, not directly connected with the population changes. As will be shown in the subsequent report, the local Ostiones people, rather than the intrusive Santa Elena, seem to have been primarily responsible for it.

The totals in Table 13 provide a check upon the foregoing conclusions. They indicate that the population of Porto Rico increased markedly during the first part of the sequence. In fact, judging from our figures and taking into consideration the fact that the Period I sites are less than half the size of the later ones, we think it probable that the population doubled during Period I, again during Period IIa, and once again in Period IIb. According to Table 13, the rate of increase declined during Period IIIa, and then rose sharply again during Period IIIb. Finally, the table indicates an absolute decrease in the population during Periods IVa and IVb.

Although these figures are inconclusive, they tend to confirm our reconstruction. The sharp rise in the population during Periods I, IIa, and IIb, coincides with the time when we believe the Indians were moving into Porto Rico. The fall in the rate of increase between Periods IIb and IIIa was to be expected if a movement to Hispaniola took place about that time. The sharp rise during Period IIIb can be attributed to the assumed migration from the Virgin Islands, and the decline during Period IVb to the actions of the Spaniards.

Only the decrease in population during Period IVa clashes with our reconstruction, for we have been led to assume that movements from Hispaniola caused an increase during that period. The observed decrease seems too great to be ascribed to chance. Moreover, it cannot be attributed to the biases listed above. As we have seen, the biases tend to cancel each other. It is possible that the population of Porto Rico had reached its optimum during Period IIIb and had then begun to fall off of its own accord. This, however, could hardly have caused such a strong reversal of the trend.

The arrival of the Carib may have caused this change. As we have seen, the Carib conquered the Lesser Antilles, probably at the beginning of Period IVa, and seized Vieques Island during the middle of that period. According to the early sources, they raided Porto Rico constantly, carrying away "many people" (Jane, 1930: 38-40). When Columbus visited Guadeloupe, nine Arawak, whom the Carib had obtained in raids on Porto Rico, took refuge on his ships (F. Columbus, 1732: 527-528). Such raids must have been a constant drain on the population of Porto Rico.

In this connection, it may be significant that Table 13 indicates a shift in the population during Period IVa from the coastal areas to the interior. Although a majority of the sites assigned to the previous periods lie on the coast, most of those placed in Period IVa are situated in the interior. As partial confirmation of this shift, we may note (1) the failure of Columbus and his companions to mention observing traces of Indian occupation while
sailing along the southern shore of Porto Rico, and (2) the apparent tendency for the historic chiefs to locate their villages in the interior or on the north coast, which was protected from raids by the scarcity of good landing places (Figure 2).

Geographic and cultural factors probably had something to do with the shift from the coast to the interior. The latter is larger than all of the coastal areas combined and therefore, despite its ruggedness, probably provided an outlet for surplus population. This would be particularly true if, as time went by, the Indians came to place more emphasis on agriculture and less on sea food. Nevertheless, so great a proportion of the population would probably not have left the coastal areas, with their advantages of easy communication, more level land, and opportunities for fishing, unless impelled by some outside factor.

The Carib may have supplied this factor. It is possible that the coastal Indians moved into the interior in order to avoid Carib raids, just as the Spanish inhabitants of San Germán did several centuries later. Lacking fortifications with which to protect their villages, the local Indians may have preferred to conceal themselves in the mountainous terrain of the interior.

According to the sources, Porto Rico was heavily populated at the time of historic contact (López de Velasco, 1890: 127-128; Oviedo y Valdés, 1851, 1: 478-479). Estimates of the population range from 16,000 by Brau (1904: 305-319) to 600,000 by Abbad y Lasierra (1866: 280). Accepting the former estimate, we have a density of 1.8 people per square kilometer, which is relatively high as compared, for example, with the density of 1.3 in Hispaniola, 0.1 in Cuba as a whole, and 1.6 in the Maníabón district of Cuba. During Period IIIb in Porto Rico, when the population seems to have been larger and more widespread, the density may have been even greater, although it probably never reached the figure of 5.4 people per square kilometer which has been estimated, probably with exaggeration, for Jamaica.

In summary, our reconstruction assumes that Porto Rico was settled during Period 1 by Ciboney Indians from Hispaniola, whose sites we find only in the most favorable places for fishing along the west, east, and south coasts and on Vieques Island. At the beginning of Period IIa, Arawak Indians moved in from the Lesser Antilles, probably occupying all of the coastal areas. Multiplying rapidly, they began during Period IIb to penetrate the larger mountain valleys of the interior. This movement was apparently checked, and the rate of population increase was slowed, towards the close of Period IIb and in IIIa, by emigration from Porto Rico into Hispaniola, resulting in the first Arawak occupation of the latter island. During Period

* Having examined all known accounts of Columbus's second voyage, we can find no reference to Indian occupation before the arrival at Boquerón on the west coast. For a list of these sources, see Merinon (1939: 9-13).

† See the introduction to the discussion of our west coast excavations, this series, Volume XVIII, Part 3.

‡ The latter is apparently based upon an estimate of Las Casas, which we have been unable to find.

§ The third two figures are based upon the number of archaeological sites (Rouse, 1948: 522, 523). The third has been calculated from Ober's estimate of the total population of Jamaica (Ober, 1895: 280-281).
This emigration ceased, and in its place another emigration of Arawak from the Virgin Islands caused the population to increase to a peak density of possibly 2.5 people per square kilometer. It was at this time that the Indians spread into the greater part of the mountainous interior. At the beginning of Period IVa, groups of Arawak from Hispaniola settled on Mona Island and at Cayito on the south coast of Porto Rico. Soon afterwards, the Carib seized Vieques Island and began to raid the Arawak on the main island of Porto Rico, causing a sharp decline in the population to its historic density of approximately 1.8 people per square kilometer and forcing many of the people to move into the interior in order to escape being killed or carried off by the raiders. The coming of the Spaniards during Period IVb merely accelerated the previous rate of decrease.

**Processes of Population Change**

While the reconstruction of population changes just presented is not, and probably never will be, proven, it is perhaps well enough founded on fact to be used to test the theories about the peopling of the West Indies which have been developed by previous writers. In so doing, we shall confine ourselves to the Arawak, since the presence of the Ciboney on Porto Rico is uncertain and the manner of the Carib migration is well known from the historic sources.

Since the time of Brinton (1871), it has been generally agreed that the Arawak moved into the West Indies from the mainland of South America. Opinion as to the manner in which they immigrated, however, differs. Fewkes (1922:268) assumes the existence of two migrations, first of cave dwellers and then of Arawak living in the open, with the latter driving the former into the less favorable terrain on the peripheries of the Greater Antilles.* Lovén (1935:24-26, 42-51), on the other hand, postulates a single mass migration of all the Arawak with the exception of one small group, the Ciguayo, who may have come directly from South America to the Dominican Republic at a later date. Rainey, as we have seen, adheres to the theory of a double migration, suggesting that a second group of Arawak Indians replaced the first group in some undetermined manner (Rainey, 1935: 13; 1940: 107, 108, 182, 183).†

Our reconstruction supports Lovén’s hypothesis of a single mass migration rather than the dual theory of Fewkes and Rainey. We have found no evidence in Porto Rico of a second great movement from South America following the arrival of the first Arawak, but only of minor shifts to and from the neighboring islands.

In the other two regions of the Antilles where extensive historical work has been done, Haiti and Cuba, the results also support Lovén’s theory. In the former country, there is no indication of any large immigration of

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*Since Fewkes is not explicit, his remarks are difficult to comprehend. For another interpretation, see Rainey (1940:180).
†Rainey himself correlated only his later group with the Arawak. We have added the identification of the earlier group for the sake of comparison with Fewkes and Lovén.
Arawak after their first arrival (Rouse, 1939: 134–137). On the latter island, the only known movement was a local one, whereby Arawak from Haiti settled the eastern tip of Cuba about 50 years before the conquest (Harrington, 1921, 2:413; Rouse, 1942: 164).

It is possible that both Fewkes and Rainey were influenced in their conceptions of the Arawak migrations by the manner in which the Carib and the Spaniards moved into the Antilles. Being warlike peoples and accustomed to travel long distances by boat, both the Carib and the Spaniards were able to seize entire islands with little difficulty, subjugating or exterminating the previous Arawak occupants. The latter, on the other hand, were relatively peaceable, and it is difficult to imagine one group of them being able suddenly to take over whole islands from another group. Moreover, while the Arawak did engage in trading voyages, they apparently lacked the cultural equipment for moving their families over long distances (Jane, 1930: 40–41; Martyr d’Angiera, 1912, 1: 76–77). It is not likely that they could have reached so many of the islands as quickly as the Carib and the Spanish. Furthermore, the conditions which they faced upon arriving in the Antilles probably did not require them to do so. Except for a few Ciboney Indians in the Greater Antilles, who must have been easily swept aside, the Arawak had no previous population with which to contend. Enough resources must have been available upon each island reached so that they need not have moved on with the speed of either the Carib or the Spanish.

For these reasons, and in view of the situation in Porto Rico, Haiti, and Cuba, we believe that the process of Arawak migration differed from that of the Carib and the Spaniards. We suggest that the Arawak peopled the Antilles gradually by means of a continuous series of short waves. Moving from South America, they probably settled first in the most favorable terrain, perhaps in Trinidad. As they outgrew this terrain, some of them moved on to the next island in order to obtain better land than that still available around the original settlements. By slowly repeating this process, they may have reached all of the islands of the Antilles before completely occupying any one of them. Then, as the population increased further, it became necessary to move into the less favorable terrain. This probably led to some readjustments, as on Porto Rico, with the people of the thickly settled islands moving to the neighboring places, where more land was available. It is supposed, however, that distant movements were few, both because of the abundance of nearby land and on account of the lack of cultural equipment for extensive migrations. It is suggested that the population of each island remained substantially the same as long as the Arawak inhabited it.

Judging from the situation in Porto Rico, we believe that the readjustments of population were relatively peaceable, the newcomers settling down among the residents without too much friction. Some of the Indians may have been pushed aside into the less favorable terrain, but we doubt the existence of mass conquest or assimilation in the manner of the Carib and Spaniards.
We do not mean to imply, however, that no cultural change took place during the course of the process. On the contrary, because of the slowness of the migration and the consequent opportunities for diffusion and invention, one would expect the Arawak to have arrived in the more remote parts of the Antilles with a very different culture than that with which they started. The change from the Ignerí to the Taíno culture, which has been briefly discussed in the first of these reports,* is a case in point. It is hoped that the entire process will eventually be tested by excavation in other parts of the Antilles.

* This series, Volume XVIII, Part 3.
BIBLIOGRAPHY

ABBAD Y LASIERRA, I. 1866. Historia geografica, civil y natural de la isla de San Juan Bautista de Puerto-Rico. Nueva edicion, anotada en la parte estadistica y economica por Jose Julian de Acosta y Calbo. San Juan.


BRAU, S. 1907. La colonizacion de Puerto Rico. San Juan.


COEL Y TOSTE, C. 1907. Prehistoria de Puerto-Rico. San Juan.


COSCULLUELA, J. A. 1922. La prehistoria de Cuba. Habana.


Herrera Fritot, R. & C. L. Youmans. 1946. La Caleta, joya arqueológica antillana. La Habana.


Irving, W. 1850-51. The Life and Voyages of Christopher Columbus, to which are added those of his Companions. 3 vols. New York.

Jane, C. 1930. Select documents illustrating the four voyages of Columbus, including those contained in R. H. Major’s Select Letters of Christopher Columbus. 1. Works issued by the Hakluyt Society, second series 65. London.


MONTALVO GUERRA, J. R. 1933. Rectificaciones históricas, el descubrimiento de Boriquén. Ponce.


Torres de Mendoza, L. (editor). 1880. Coleccion de documentos ineditos relativos al descubrimiento, conquista y organizaci6n de las antiguas posesiones españolas de América y Oceanía, sacados de los archivos del reino. 34. Madrid.


Zayas y Alfonso, A. 1931. Lexicografía antillana, diccionario de voces usadas por los aborígenes de las Antillas Mayores y de algunas de las Menores y consideraciones acerca de su significado y de su formación. Segunda edición, corregida y aumentada. 2 vols. Habana.
(Folding map.) Porto Rico, showing the topographic areas and the locations of the sites excavated.
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