

SEA TURTLES - MANGAREVA

G.H. BALAZS

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# What Happens When the Phosphate Is Gone?

## Natives of Nauru Enjoy Tax-Free Life

By David Shapiro  
Gannett News Service

NAURU—The Republic of Nauru is the kind of country you read about in fairy tales.

Set in the mid-Pacific, about 25 miles south of the equator, Nauru is a speck of an island only 3 1/4 miles long and 2 1/4 miles wide. On a Sunday drive, you can circumnavigate the entire nation in less than 15 minutes.

The 4,000 natives of Nauru lead easy lives. The government hires outside workers to do most of the labor, while providing Nauruans with low-cost housing, cheap consumer goods and free health care, education and electricity. And remarkably, the government delivers the goodies without taxing its citizens.

Nauru's secret is phosphate, a powdery substance that is prized as a fertilizer. The island contains 300 million tons of the stuff in deposits as deep as 80 feet. Some 2 million tons a year are shipped to farmers in Australia and New Zealand at prices as high as \$75 a ton.

Nauru's phosphate is the gift of seabirds that dropped tons of guano onto a bare coral reef thousands of years ago. The enormous pile of bird droppings formed into one of the purest grades of phosphate in the world.

The paved highway that circles Nauru teems with foreign cars and motorcycles, which share the road with the pigs and chickens that have free run of the island. Stereos play in most houses.

Nauruans are famous for their parties, which are called in honor of almost anything. For physical activity, many of them lasso the giant frigate birds that fly over the island, one of the most impressive athletic feats performed anywhere.

Nauruans can also go to the movie theater or listen to their national radio station, where disc jockeys speaking in the Nauruan language play American country music and Australian news programs.

Nauru has a \$5 million civic center built to host major conferences. The government also built a hotel, the Meneh, to house visitors. Nevertheless, Nauru is stingy with visas and discourages tourism. Most visitors are transient passengers waiting for Air Nauru flights to other points. Outsiders cannot live on Nauru unless they are officially employed, and cannot own land or businesses.

The wild card in Nauru is its youth — the first generation born into the phosphate money. Many seem to be wondering if there isn't more to life than living on a 3 1/4 mile island with little to do beyond throwing rocks at the beer cans that have piled up

along Nauru's coastline.

The search for excitement is evident everywhere. Young Nauruans have taken up motorcycle racing on the access road to the phosphate works, a practice said to provide good business for the local hospital. The young will have a big say in a widely discussed topic in the Pacific: Nauru's future.

There has been some talk on Nauru of moving to another island when the phosphate runs out. Australia has offered two islands, but most older Nauruans reject the idea. "Nobody lives in the interior of the island anyway," one man argued. "This is our home. Why should we move?"

Many hope that the airline, shipping line and other business ventures will make Nauru a thriving Pacific transportation center by the time the phosphate is gone.

But one leader in Guam said, "I don't see that happening. I think they'll eventually disperse to Australia, Guam, Hawaii and other population centers in the Pacific."

"They're good politicians, but not business people," one Marshallese businessman said of the Nauruans. "They do things that don't make sense, like they're only showing off their money. If they don't play smart, they're going to be the sorriest people in the world 20 years from now."



Hammer DeRoburt

one detractor. "He puts on a lot of airs for a guy who's running a three-mile island that's made out of bird—"

Nauru's phosphate is mined in an operation similar to strip coal mines. The phosphate is loaded by mechanical shovels, then taken by unit trains to a refining plant. Since Nauru has no harbor, giant cantilevers are used to load the phosphate on ships that dock beyond a narrow reef.

Section

B

### Honolulu Star-Bulletin

Friday, June 13, 1980

Phosphate has made the 12-year-old nation not only the tiniest free republic on earth, but one of the wealthiest. Its per capita income of \$40,000 a year rivals Arab oil states.

Nauru has its own airline, Air Nauru, which flies an all-jet Boeing fleet of two 727s and two 737s. Taking advantage of Nauru's location — halfway between Honolulu and Sydney — Air Nauru connects once-isolated Pacific islands with major cities in Australia and Asia.

Nauru owns a shipping line with five vessels. The country has built a 53-story office building in Melbourne, an eight-story building on Saipan and a hotel on Majuro. Poorer neighbors are all ears when Nauru officials arrive aboard Air Nauru jets to talk deals.

The investments are more than playthings for Nauru's leaders, as there is a catch to their riches: Phosphate ships are literally carting the island away. In about 20 years, little will be left of Nauru but useless coral heads. The investment will be the Nauruans' only hope of continued prosperity.

The driving force in Nauru is President Hammer DeRoburt, 37, a genuine political hero of the World War II era.

Nauruans still speak English with an Australian clip, spend Australian currency, drink Australian beer and man their bureaucracy with Australians. But now the Aussies are employees of Nauru rather than its rulers.

More than half the phosphate money goes to the government. About a third goes to the Phosphate Royalties Trust, which makes investments to provide for Nauruans after the phosphate runs out. The rest goes to landowners.

With big money at stake, DeRoburt has not ruled without opposition. He was voted out of office in 1976 by a group of young legislators, but returned a year later when the new government failed to pass a budget.

DeRoburt is treated like royalty. His home is away from the coast on a guarded road that is closed to other Nauruans. He rides in a limousine and spends so much time on off-island business that a penthouse was built into the building in Melbourne for his use.

Aides do much bowing and scraping in his presence, referring to the president as "excellency." Gripped

When an area is mined out, only bare coral heads as high as 80 feet remain, creating a surreal landscape that has been compared to the surface of the moon. In 20 years, this will be Nauru.

Despite the money, life on Nauru remains slow and easy, which is partly a function of environment. Nauru's hot and muggy climate does not invite serious work. And when you live on a tiny island, the ability to spend long periods of time doing nothing is a definite virtue.

Nauruans live along a narrow strip around the coast of the island amid palms, mango trees and other lush tropical foliage. The \$40,000 per capita income is misleading, since all Nauruans do not share phosphate royalties. Direct payments go only to landowners, who can make \$500,000 in a few months when their property is mined.

But life is not bad for those who do not own land. Besides having their necessities provided by the government, they can earn good incomes through white-collar jobs in government or business.



Nauru's champion lassoer, James Delnedo, with a much revered frigate.

Los Angeles Times photo

# A bird in the hand's worth all that effort

By CHARLES HILLINGER

Los Angeles Times Service

NAURU — Lassoing wild frigate birds in flight is the national sport of this tiny Pacific island 26 miles south of the equator — the world's smallest and richest republic.

Powerful fliers with wings up to 7½ feet long, the frigates are also known as man-of-war birds because of their piratical habits — robbing other birds of fish.

Lassoing them as they fly over the island — a seemingly impossible feat — is an age-old competitive sport for the Nauruans. It's one of several outdoor activities on Nauru, which has a population of 4,000.

Islanders like James Deinedo, 20, of Anibare Bay, hurl a nylon line 50 to 100 feet into the air to snare frigates as they soar overhead. The line has a noose and is weighted with a stone.

Zingo! The wild bird is lassoed and reeled in.

Deireygea Deinedo, 50, and his son, James, are the lasso champions on the 3.5-by-2.5-mile island.

Frigates are sacred on Nauru and appear on its coat of arms. A painting of a huge frigate adorns the side of each of the nation's four police cars.

Nauruans enjoy eating some birds. After dark, islanders gather along the shore with long poles equipped with giant nets. They catch noddy birds and barbecue them for late-night snacks.

But no one ever eats a frigate. They are so revered that some islanders tame them and tether them to bamboo racks along the 12-mile shoreline. The captured birds are pampered by their owners; and their diet is hand-fed flying fish.

The frigates are not native to Nauru. They never nest here. In fact, the wild frigates are led here by tamed birds.

Frigates fly in from the Marshall Islands, 600 miles to the north, or from the Gilbert Islands, 200 to 300 miles to the east. Possessing a larger wing

span in proportion to weight than any other bird, the frigates are powerful fliers.

After frigates have been in captivity for several weeks, Nauruans set them free. The tame frigates fly back to their islands of origin and return weeks later leading wild man-of-war birds.

Tame frigates return to the same bamboo perches they left on Nauru. As the tame birds descend to their perches, the wild frigates fly low over the island — and that's when the lassos fly.

Also big among Nauruans: ocean fishing. They hook-line and spear fish in coastal waters that are among the strangest on earth — filled with huge coral cones that jut up.

Nauruans, whose favorite food is raw fish, make their catches inside and beyond the reef that girds the island.

In the interior there's a small freshwater lagoon, called Buada. It is divided into sections by coconut fronds secured together, and each section belongs to a family.

Families catch the fry of the ibija fish in the ocean and keep them in shells filled with seawater. As the seawater evaporates, fresh water is poured in.

After several days young ibija fish are released in Buada Lagoon, where they thrive. When they mature, Nauruans catch and eat them.

Nauruans have plenty of time to lasso frigate birds, net noddies, and fish in the sea or Buada Lagoon.

They have lots of time and money because millions of birds over the years deposited guano 25 to 80 feet deep over much of the island.

Mined as phosphate, it has made the Nauruans the richest people on earth — a sports-minded people with athletic activities unknown to the rest of the world.

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## Archaeology of Mangareva and Neighboring Atolls

By KENNETH P. EMORY  
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### INTRODUCTION

While in the Mangareva Islands from September 12 to November 5, 1934, serving with the Mangarevan Expedition of Bernice P. Bishop Museum (21, pp. 33-67)<sup>1</sup> and assisting Dr. Peter H. Buck, I had an opportunity to study archaeological sites in the group and to make a reconnaissance survey of the stone structures on Temoe atoll, 25 miles southeast of the Mangareva Islands. On the return journey from Mangareva to Tahiti, I landed on four of the atolls west of Mangareva to search for remains of ancient occupation. The purpose of the following pages is to record what I have learned about the archaeological remains of Mangareva, Temoe, and these neighboring atolls to the west (fig. 1). For Mangareva this work supplements Peter H. Buck's "Ethnology of Mangareva" (5), through which one may obtain an excellent insight into the function of the remains which we saw.

I am indebted to Monsieur William Tonton, in 1934 the Administrator of Mangareva, for graciously facilitating my work, and to Captain Emile Brisson, Assistant Administrator, and his wife Madame Elva Brisson, for taking me into their home and helping me in every possible way. It is a pleasure also to acknowledge the assistance of Mr. Stephen Garwood, an American of long residence in Mangareva, who accompanied me on most of my excursions and whose familiarity with the islands and keen eye are responsible for much that was found. I shall be justly envied for having been in the company of Peter H. Buck during my stay at Mangareva. To him I owe much for his understanding and kindly help. I am grateful to Father Paul Mazé, resident Catholic missionary in the eastern Tuamotus, for invaluable data on the atolls Tematangi, Tureia, and Vanavana, west of Mangareva.

After my experience in investigating ancient stone work in the Society Islands and the Tuamotus, where ancient ruins abound, the complete disappearance of all important structures in the Mangarevan group was most discouraging. The destruction is accounted for by the immense amount of stone required for the great cathedral at Rikitea and the numerous stone buildings set up in the first days of the missionary régime. Fortunately, the stone structures left by the ancient Mangarevan inhabitants of Temoe stand almost intact.

<sup>1</sup> Numbers in parentheses refer to Literature Cited, p. 75.

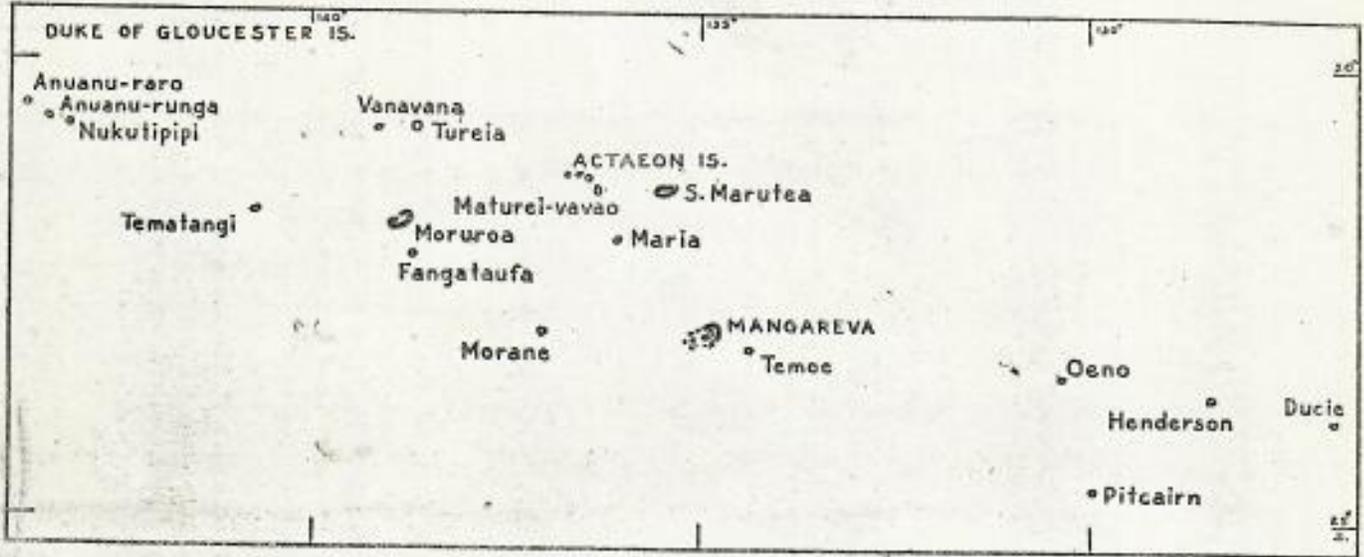


FIGURE 1.—Map of Mangareva and neighboring islands in southeastern Polynesia.

see Mangareva chart

The 15 scattered and uninhabited atolls which lie to the north and west of Mangareva, and south of the main part of the Tuamotu Archipelago (south of 20° South Latitude) were in the path of Mangarevans who set out on rafts or in canoes before the prevailing winds when forced to quit their home (fig. 1). Laval (24, p. 251) says of one of these, South Marutea: "In the past it was occupied for one finds upon it house pavements of the same type as those of Mangareva." Landing upon the eastern end of this atoll in 1934 (21, p. 64), we recorded ruins similar to those in Mangareva as well as several maraes typical of the central Tuamotuan maraes, objective evidence of the prehistoric occupation of the southeastern fringe of the Tuamotu Archipelago by both Mangarevans and Tuamotuans. Since I have already described the ruins in the main Tuamotuan group (15), it seems advisable to include in the present work the data we now have concerning the uninhabited atolls which lie between Mangareva and the main Tuamotus. The atolls to the west of Mangareva are still largely unexplored and offer possibilities for interesting discoveries. In the hope of stimulating their investigation I have brought together all data bearing on their former occupation which I have been able to gather.

Of the three widely separated coral islands—Oeno, Henderson, and Ducie—lying east of Temoe and north of Pitcairn, members of the Mangarevan Expedition landed on Oeno, an atoll, and Henderson, a raised coral island. They discovered no traces of early Polynesian occupation (21, p. 44) and none has been reported from Ducie Island. Bishop Museum has a small, blue-gray, tangleless basalt adz (5984)<sup>2</sup> from Oeno, found on the atoll by one of the crew of the *Wildwave*, which was wrecked there in 1858. (See 14, fig. 17, p. 131, for description of this adz.) It has points in common with one adz in the Bishop Museum Pitcairn collection (L.2181), but this adz is not at all typical of Pitcairn and may have come into the Pitcairn collection by mistake. The Oeno adz is much more similar to the Mangarevan adzes than to the Pitcairn adzes in Bishop Museum; hence, it was probably left on Oeno by Mangarevan refugees.

#### ARCHAEOLOGICAL FEATURES OF MANGAREVA

##### MARAE

Beechey and Moerenhout, the only two Europeans who landed on the Mangareva Islands (fig. 5) in native times and who left accounts of their observations, missed the important maraes completely. Marae Te Kehika, the chief marae of the group, was located in a grove of trees on an isolated spot behind the village of Rikitea. Marae Te Hau-o-te-vehi, the priests' marae at Rikitea, was on the shore and must have been quite inconspicuous to have remained unobserved.

Image houses, seen by Beechey and Moerenhout, were supposed by them to be the maraes. However, the term marae was evidently not applied by the

<sup>2</sup> Throughout this paper, catalog numbers refer to specimens in Bishop Museum collections.

Mangarevans to the houses where an image of a god was installed and daily food offerings left. It referred to the open places of public worship consecrated to the god Tu and called *marae vai-kai* (such as *marae Te Kehika*); to less important places dedicated to deified spirits of the dead and called *marae mota'u*; and to little heaps of branch coral (*puerero*) and lump coral (*putoka*) set up to the gods of illness and called *marae viriga* (24, p. 337; 5, p. 455).

The missionaries say a *marae* was marked by a "heap of stones" (20, p. 116) and that the large ones were made of stone and the small ones (*marae viriga*) of coral only (20, p. 56), but they scarcely mention the shape and construction of the *marae*. In 1840 Lesson (26, p. 67) noted here and there "piles of coral stones which must have served for *marais* before the introduction of Christianity." What he saw were undoubtedly the ruins of *marae* which had been destroyed to obtain material for paved roads and new stone buildings.

At the site of *marae Ruanuku* in Gatavake district on the island of Mangareva (fig. 7) we found embedded in place the bases of four large limestone slabs, evidently part of the outer and inner facings of a platform which lay parallel to and a hundred yards from the shore. On the inland side are patches of pavement (fig. 2). These remains indicate a platform 20 feet wide and some 60 feet long with a paved court 20 or more feet wide, adjoining the inland face.

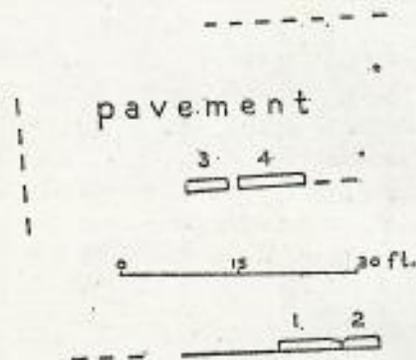


FIGURE 2.—Site of *marae Ruanuku* at Gatavake, Mangareva: 1-2, bases of limestone slabs, 2 feet thick, set on edge and abutting each other; 3-4, bases of limestone slabs, 1 foot thick, forming line parallel to slabs 1-2 and 20 feet inland from them; patches of pavement on inland side of slabs 3-4 extend outward from slabs for about 21 feet and over an extent of 60 feet.

The largest structure on Temoe, called the *marae* of Toa-maora by our informant Utato Mamatui, is a platform 21 feet wide and 58 feet long. It lies along the crest of the shingle beach, and its seaward face is partly undermined by wave action. It has an unenclosed court on the inland side (figs. 3, 4). The platform is faced with a first course of limestone slabs set on edge (pl. 4, B; fig. 4). The level ground of the coral gravel court extends 30 feet from

the face of the platform. In the construction of the foundation, in size, and situation, it corresponds to marae Ruanaku at Gatavake, so far as the original appearance of that marae is indicated by its scant remains.

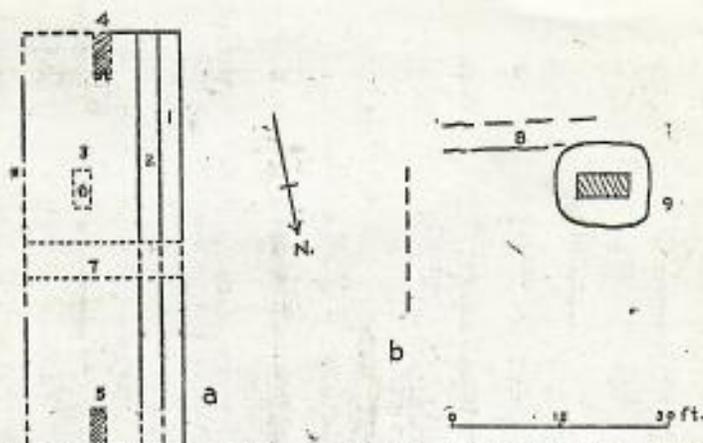


FIGURE 3.—Plan of marae of Toa-maora at Tutapu, Temoe; *a*, platform 58 feet long, 20 feet wide, and 8 feet high, with two steps on inland face; first step (1) 3.5 feet high, 3.5 feet wide; second step (2) 2 feet high, 3 feet wide; top of platform (3) 2.5 feet higher than second step (2), 15 to 17 feet wide; 4, slab-lined vault at ground level, 2.5 feet wide, 6 feet long, 2 feet high; 5, slab-lined vault at ground level 2.5 feet wide, 5 feet long, 2 feet 4 inches high; 6, exposed slab-lined vault in top of platform 2 feet wide, 7 or more feet long, containing fragments of human bone; 7, gap in top of platform, about 6 feet wide, revealing solid interior of rubble, made by removal of stones, probably by the Routledge Expedition in 1921 (39, p. 455). *b*, court space of smooth, level ground extending 30 feet in front of platform; 8, smoothed pathway through rough coral ground; 9, rectangular pit 3.5 feet wide, 6 feet long, 3 feet deep, surrounded by a rude stone enclosure 1 foot high, 52 feet from inland face of platform.

The Temoe structure has two high steps across the court face. That the marae of Mangareva were stepped seems likely from the account in the French dictionary (20, p. 93) of the dedication of priests of the god Tu at marae Te Kehika. Here it is stated that those to be initiated as priests of Tu, following the high priest, "mounted the great heap of stones, where only the priests were allowed." Without steps it would be difficult to "mount" the marae of Toa-maora at Temoe.

As the marae of Toa-maora and Tota, the largest structures on Temoe, had burials in small vaults in the top, one might argue that they were simply places of burial, like some of the cairns in the vicinity. But the marae of Tota and the rectangular, stepped platforms nearby were pointed out to Seurat (41, p. 483) before 1903, as marae, and certain features substantiate this identification. The rectangular pit at the outer edge of the court at the marae of Toa-maora is suggestive of the refuse pits of other Polynesian marae. In two marae, the open vaults at ground level are larger and much more carefully constructed than the vaults containing burials, and were standing open in

formed of flat, unworked slabs of limestone and coral from 6 inches to 1.5 feet wide, closely fitted. Some of the slabs are quite irregular (pl. 3, B). The boundaries of some pavements are lined with stones placed on edge to form a low curb. The boundary of the pavement before the front of a house floor was generally marked in this way.

#### STONE TABLES

At three of the large house sites on Temoe we saw stone tables (*'ata kai*) such as Beechey (3, vol. 1, p. 177) noted in front of Mangarevan dwellings. The table tops were roughly broken square slabs of limestone, averaging 3 feet wide, 4 feet long, and 10 inches thick and propped a foot and a half from the ground on four small stones placed several inches in from the borders. One stood on each of two *paepae*, 3 feet in front of the space occupied by the house (figs. 13, b, 4; 22, c). On the *paepae* of Toamaora at Tutapu (fig. 17), on which two houses faced, three tables stood along the front of the largest house.

#### PAVED TRAILS

In the Mangarevan group, wide trails which connect one bay with another are paved over sloping or swampy land. That such paved trails or roads were present in ancient times seems to be attested by the following remarks of Lesson (26, p. 59): "We set out on the main road which encircles the island. This route had been established by the natives before the arrival of the Europeans who have only contributed to partial restorations." The paving of these trails consists of large, flat-topped basalt stones, with an occasional one of coral or limestone, fitted closely together over a width of from 3 to 6 feet.

On Temoe Island, paths have been laid out by placing flat-topped stones or slabs over the rough coral ground. These differ from the stepping-stone paths of the Tuamotus in that the stones are contiguous, not spaced. One path leading from the *paepae* of Toa-maora at Tutapu has a double row of slabs neatly fitted.

#### FORTIFICATIONS

The native history mentions fortifications built by Te Ma-ruku in the time of Pokau, 12 generations before 1900. Laval (24, p. 127) says, "These fortifications consisted of walls made with large stones laid up without cement. At our arrival, we saw only the debris of them. They did not suggest fortifications of the importance of those of Rapa. . . ."

The stone wall which stretched across the front of the chief's dwelling and the chief's assembly house, just within the caves, served as a defense in an attack. As a defense work it was termed a *pa-'akai'u* (24, p. 242).

## AGRICULTURAL TERRACES AND EXCAVATIONS

At a few places where the ground is muddy or where there is sufficient water to flood the ground occasionally by means of ditches, taro terraces have been constructed, faced with stones roughly laid up. Apparently little taro was raised in ancient times, and much of the present development may be due to the influence of Rapa natives, from whom the Mangarevans have borrowed at least one taro variety (*matuku*) now grown. The patches are small and irregular because suitable land for taro cultivation is scarce.

At Gatawake and Kirimiro on the island of Mangareva, excavations in the sand of the coastal plain reach down a few inches into the water table and are identical with the *maite* of the Tuamotus. Since many Tuamotuans, particularly from Reao where taro is extensively grown in *maite*, live at Mangareva, I believe the practice has been introduced recently from the Tuamotus. The absence of *maite* on Temoe is significant.

On the slopes of Mount Duff, in places where the land is too dry for taro and in other places where it is occasionally damp enough for dry-land taro, there are some terraces (pl. 1, B) clearly intended for cultivation, probably for arrowroot (*pia*), sweet potato (*kumara*) or the turmeric plant (*rega*). A few small patches of ground on the southern plateau of Mount Mokoto are enclosed by stone walls, probably intended to keep out goats.

## FISH WEIRS

In the shallow water off the beach at the eastern end of the coastal plain of Ganoha are the ruins of six or more fish runs, called *pa ika* (fish enclosures), or *pa re'e* (*re'e* being a kind of fish taken through these runs). Each run consists of two lines of basalt rocks 30 to 50 feet long, converging toward the shore to form a funnel-shaped lane. The fish approaching the shore at high tide were guided by fishermen through the lane and into a net held at the narrow opening at the landward end. Laval (24, p. 257) calls stone weirs *pa-toka* (coral enclosures), indicating that they were sometimes built of coral.

## FISHPONDS

The great rectangular fishpond off the king's residence at Rikitea was erected in modern times but is now neglected. Besides this we saw only two fishponds in the group; one, a small semi-circular enclosure of basalt stones extending about 25 feet from the shore at Atiaoha on the island of Mangareva; the other, a stone enclosure of about the same size in shallow water a few feet from the beach at Tokani Bay, Akamaru. I was told that the latter was built for turtles.

## PREHISTORIC REMAINS

In 1838, a missionary (19) wrote about an old wall on Mangareva Island which was supposed to have been built by a race preceding the historic inhabitants:

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At Tokani, the small coastal plain on the south shore around a deeply curved bay, are the remains of a turtle enclosure about 15 feet in diameter, built with large stones in the shallow water near the beach at the head of the bay. A number of old pavements may be seen on the land about the bay, and at Oheha, the southern part of the bay, are the ruins of a large, low platform, thought by some to have been a marae (fig. 11). This platform lies on level ground a hundred yards from the shore, with its long axis parallel to the shore. It is faced with a single course of unworked basalt stones and paved over much of its extent by flat stones. A low mound of earth and rubble at one side indicates that it had a wing. Behind this *paepae* is a large, low terrace, probably a house site (fig. 11, d).

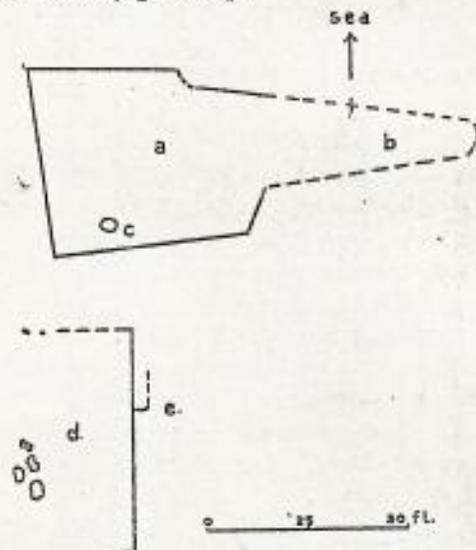


FIGURE 11.—Platform at Oheha, Tokani, Akamaru Island: a, platform 1 to 2 feet high, paved with large, flat stones; b, low, rough mound of earth and stones and scattered bits of fan coral; c, large, flat stone, probably a seat; d, terrace 56 feet long, 30 feet wide, 1.5 feet high, with boulders along rear; e, small terrace 1 foot high.

The east end of Tokani is bordered by a low, rocky ridge which runs out in a long promontory. At the beginning of the promontory, beside a *paepae* occupied by a board house, I saw the skull of a child tucked away in a recess at the base of the bluff. Going to the point, we passed several large bluff shelters. These, however, contained no burial or artifacts.

The eastern side of Akamaru is barren and steep, with the bases of the bluffs swept by waves coming in from the open ocean. High up on the slopes of Pu-magore, the eastern peak of the mountain range, are some ancient taro terraces in a ravine named Tamanuhiva, fed by a spring.

The west coast of Akamaru has a series of coves about which are taro terraces under cultivation. There are also some ancient house sites. At the

base of the bluffs at the northwest point at Te Ana-o-matega, are some recesses which had been used for the disposition of the dead.

#### MAKAPU ISLET

Makapu Islet, off the southern tip of Akamaru, was a burial ground. On the spacious, ancient, wave-cut benches of the northern side, protected from the sea and under overhanging bluffs, were laid the bodies or bones of the dead. During high seas, with the wind from the north, waves must occasionally reach these shelves and the rain must beat in under the overhang of the bluffs. On two benches only fragmentary bones were seen and one skull, partly buried in the deep dust. But for some scraps of sennit and bits of rotted tapa, the floors are barren. Wild goats have been on this tiny island for years, using these caves as shelters, and trampling bones to fragments fine enough to be blown away by the wind.

#### MAKAROA ISLAND

We landed at the cove on the north side, near the east end of Makaroa and explored all accessible parts of the island. At the base of the bluffs around the cove were some fishermen's shelters, and along the coast to the west were three or four shelters formed by the overhang of the bluff where waves had cut a bench. Shells scattered over the floors which were cleared of stones, are evidence of human occupation.

The only sand beach on the island is near the west end on the north side. Back of it, on sandy-level land, are patches of pavement. At the crest of the beach is the grave of a person who drowned on the island in 1931. It is marked by two upright slabs 1 foot high and 3.5 feet apart. No human bones were seen on the island.

Most of the trees on the island are pandanus, but there are many *miro*, some coconuts, and hibiscus ('*ou*) bushes growing at the sandy beach. White terns (*kotake*) are abundant, but there are few other birds.

The islet of Motu Teiko, off the north point, seems to have no overhanging bluffs suitable for shelters.

#### KAMAKA ISLAND

Kamaka, the largest of the three southern islands of the Mangareva group, which are small and without fresh water, is noted as a burial ground. In niches at the base of the bluffs around the two adjacent white sandy beaches of the north coast, lie a great many bones and bone fragments, but no intact crania. The sands of the beaches are strewn with bone fragments, and at one spot we observed a much decayed skeleton which had lain in a slab-lined chamber, exposed and disrupted by the shifting of the sands. At the crest of each beach we saw a house pavement, and at the east beach Garwood picked up a stone adz and a large pearl-shell fishhook. To one side of the pavement