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Ethnographic and Archaeological Investigations in the Southwest Islands of Palau

ROSALIND L. HUNTER-ANDERSON

Micronesian Archaeological Research Services
P.O. Box 22303 GMF, Guam 96921 U.S.A.

Abstract—Ethnographic and archaeological field work was conducted in 1992 at Tobi, Merir, Pulo Anna, Sonsorol, and Fana. At Tobi, documentation included profiling a wave-cut exposure of a ritual area mound near the landing on the western side of the island and retrieving a soil sample from the base of the mound for radiocarbon dating; locating and describing seventeen earth-oven refuse mounds and excavating a shovel trench into one of them, from which a charcoal sample was retrieved for radiocarbon dating; photographing artifacts observed on the ground surface and in private collections; recording information on traditional resource use at Tobi and nearby Helen Reef; and interviewing older Tobians living in Koror regarding traditional practices. A paleosediment core was taken at an inland taro patch.

At Merir, the surface features on the large residential mound near the landing on the west side of the island were sketched in plan and information recorded about the mound's former uses; a shovel trench was excavated into the south flank of the mound, and a paleosediment core was taken at a small taro patch inland of the mound. Artifacts from the surface at the beach were photographed. At Pulo Anna, a shovel trench was excavated into a residential mound and charcoal samples collected for radiocarbon dating and a paleosediment core was taken at the margin of the large inland salt water pond. At Sonsorol, a chiefly meeting house site was mapped and probed; charcoal from the probe was collected for radiocarbon dating; Japanese World War II defensive features were observed and photographed; and historical information about Sonsorol and Fana was obtained. At Fana, several shovel probes were excavated in a midden area at the southern end of the island; soil from the base of one shovel probe was retrieved for radiocarbon dating; a Palauan pottery sherd was found at the base of this trench.

Information obtained in the field was compared with and interpreted in light of German and Japanese ethnographic reports from the early part of the 20th century. Our radiocarbon dating results indicate that the Southwest Islands cultures were established at least three hundred years ago and possibly as early as one thousand years before the present; more excavations are needed to establish the occupational sequence at each island.

A better understanding of coastal geomorphological processes and their relation to weather and currents in the Southwest Islands is also needed. Considering aged individuals' observations along with historical records, geomorphological, and archaeological data, can result in plausible reconstructions of the islands' past environmental states. This information is crucial to sound planning for the management of the natural and cultural resources of these small islands.

Introduction

In June 1992, I took part in a "Rapid Ecological Assessment" of the Southwest Islands of Palau; for a summary of the project results, see Maragos et al. 1994. My part in the project included ethnographic and archaeological investigations at five raised coral islands: Tobi, Merir, Sonsorol, Pulo Anna, and Fana (Fig. 1). The sand bar at Helen Atoll is too recently formed to have archaeological deposits and was not visited by me, although other members of the expedition spent several days there. My archaeological field work included a foot survey to locate historic/prehistoric sites and features, limited test excavations to obtain radiocarbon dating samples, and paleosediment coring in old taro patches, also to obtain dating samples. Approximately two weeks of field time were devoted to documenting the nature and condition of archaeological remains and seeking ethnographic and historical information about the archaeological features encountered. I spent seven days at Tobi; my field time at the other islands varied from over three days to a few hours. Prior to my study, the only source of information on the archaeology of the Southwest Islands was Osborne's (1966) report of brief visits in 1953 to Tobi, Merir, Pulo Anna, and Sonsorol. Earlier ethnographic accounts, mainly about Tobi but also containing some information on the other islands: Eilers (1935, 1936); Hasebe (1928); Someki (1938); Motoda (1939) and post-war ethnographic studies (Black 1977; Johannes and Black 1981), were consulted as well. As a research effort, the present work integrates the available archaeological, paleo-environmental, historical, and ethnographic information about these little-known islands in western Micronesia.

Aims and Methods

The primary aim of this study was to determine the general nature and condition of prehistoric cultural remains in the Southwest Islands. Most of the historic features relate to the phosphate mining operations begun in the late 1930s or to military operations in the 1940s. An underwater archaeological survey for historical objects such as sunken ships was not undertaken.

A specific fieldwork objective was to re-locate the archaeological features recorded by Osborne (1966) during his 1953 reconnaissance, assess their condition, and learn more about them from on-site interviews. Using Osborne's account

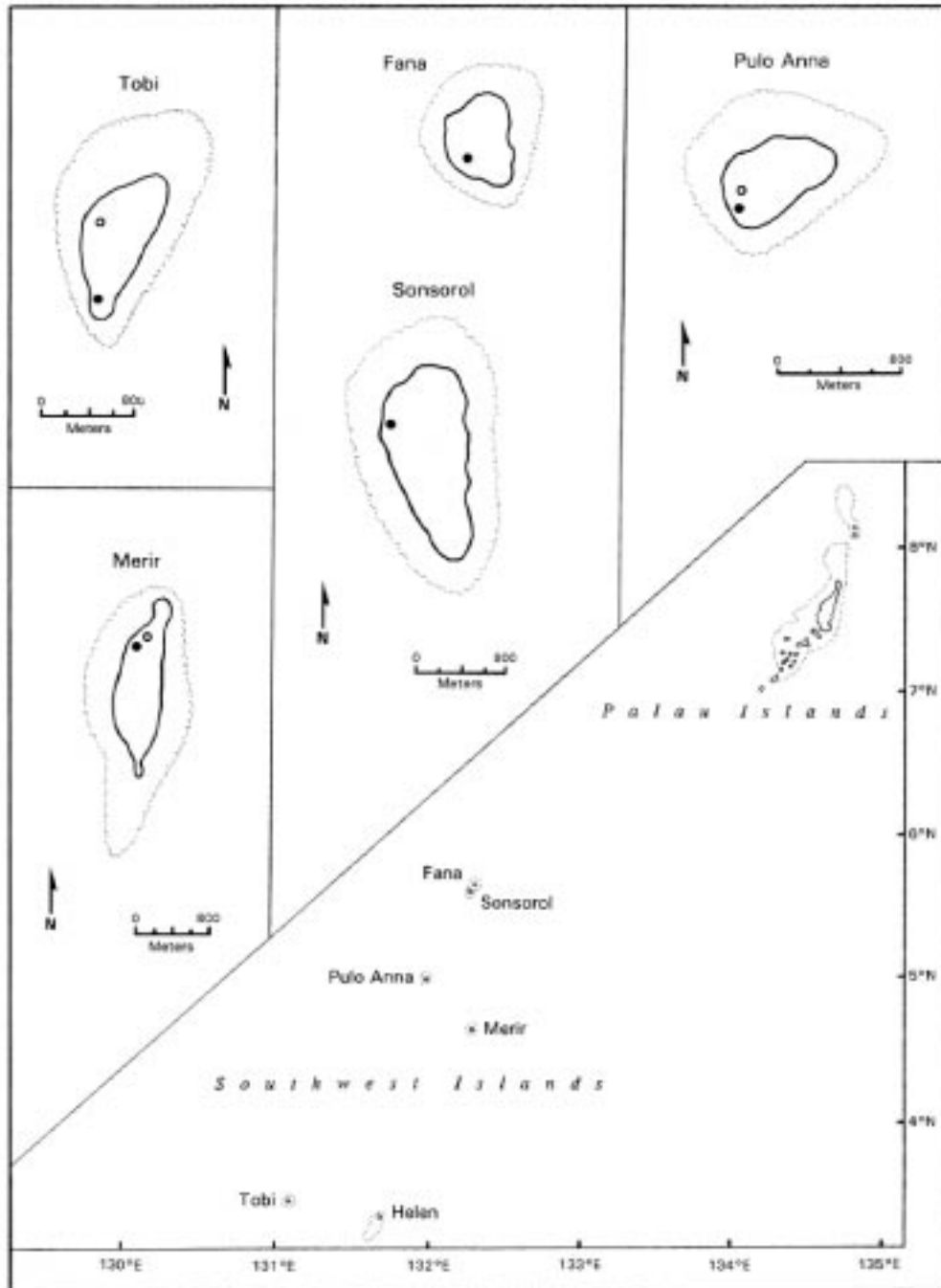


Figure 1. Map of Palau, Southwest Islands; filled circle = hand excavation, open circle = coring site.

as a guide, which included sketch maps, photographs, and narrative descriptions, I visited these features in the company of island residents, who were able in some cases to provide additional or fuller interpretations. In addition to searching for Osborne's sites, I surveyed the coastal and interior areas of the islands, as feasible given the time constraints, in the company of local residents whenever possible. The least well-covered island was Merir, which had forbidding numbers of mosquitoes beginning just a few meters inland from the beach, and a large interior swamp in which ground surface visibility was nil due to thick vegetation and standing water. Fana also was not well-surveyed due to poor weather, which shortened the already-limited field time toward the end of the expedition. The most extensive coverage was of Tobi, where I was able to spend several days as the guest of the Andrew family. At Tobi the land use zonation was clear and the vegetation relatively open and/or had a high canopy. Local residents helped find archaeological features of interest and provided interpretations of them in terms of traditional cultural practices.

A third objective was to obtain information about when the islands were first occupied. One method by which this problem was pursued was to extract cores from taro patch sediments using a small-diameter hand-driven peat sampler and to radiocarbon date the basal soil from the cores. The presumption was that the date of the basal soils would approximate the date that people began to convert the natural swampy depressions into taro patches. In retrospect I am not convinced this was warranted; see the discussion below. Another method used to gain information about early settlement in each island was to hand-trench kitchen refuse mounds and collect charcoal dating samples from the base of the trenches. A similar tactic was used at a chiefly meeting house site, where a small stratigraphic excavation unit was placed in the earthen floor.

Results

OSBORNE'S SITES

Osborne visited Tobi, Merir, Pulo Anna, and Sonsorol but not Helen or Fana, traveling aboard a government field trip ship that was collecting copra and delivering supplies. He spent, at most, several hours at each of the islands. He located two archaeological sites at Sonsorol and one at Merir. At Tobi, where the stop was longer, Osborne toured the large interior taro patch area, noting the many rock-faced mounds and a "rock tower." Elsewhere on the island he observed several "house mounds." In northwest Tobi, he found a limestone pillar, which he thought was a house post (Osborne 1966:Fig. 12b).

At Tobi, we learned the rock tower was a World War II Japanese defensive structure, and the rock-faced mounds within the central taro patch were retaining walls built to stabilize the spoil dug when the taro patch was created. These mounds are called *puh-puh* by the Tobians; the same term is applied to the dirt mounds (up to several meters high) that form a high berm that surrounds most of the taro patch. Some of Osborne's "house mounds" may have been piles of earth-



Figure 2. Limestone pillar, possibly an old house post, Tobi.

oven refuse (*bonum* in Tobian) which occur in abandoned residential areas and sometimes are the only surface signs of previous habitation.

The Tobians recognize natural hills with the term *suh*. According to Mr. Andrew, such a hill, now covered with phosphate rocks, is located behind his canoe house in the central part of the present village. He stated that people used to live on this *suh*.

I found the limestone pillar seen by Osborne in the northwest part of the village, at a place called Fareburah (compare locality 50 listed as *fari bugh* in Eilers [1936:53]). According to Mr. Andrew, the stone was dug from the island's interior and may be an old canoe house post (Figure 2). It measures 1.7 m long. Five encircling grooves about 20 cm apart are visible along the tapering length of the pillar, which is flattened at the narrower end. The grooves may have been made by ropes used to pull it. Stone house posts have been documented ethnographically in the central Carolines, at Fais (Krämer 1937:Sketch 176), as well as in the Gilberts (Hockings 1989, 1997).

At Sonsorol, it was learned that, of the two sites which Osborne found, Sonsorol 1 (on the west side of the island just north of the present village) may have been the chiefly meeting house site called Faremau. Osborne walked around the Sonsorol 1 site "several times and found no objects". Perhaps he searched only the sandy, grassy area adjacent to the shore and therefore missed the prehistoric cultural deposits and upright stone alignments which are farther inland. These alignments are said to be related to Faremau's function as a chiefly meeting

place. The Faremau locality may be that depicted in a photograph in Eilers (1935:Plate 8).

An indistinct series of scattered corals in a sandy locality near the beach on the east side of the island may be Osborne's Sonsorol 2 site. However, no stone pavements or walks were visible in this area, in contrast with Osborne's description of an extensive zone of "stone walks and platforms". Perhaps these features have sunk beneath the ground, leaving only a few scattered remnants. No sub-surface excavations were conducted in the area for lack of time, so this possibility could not be explored. Just south of this area and a few meters inland of the strand are several World War II Japanese defensive features in good condition: piled coral walls that form long, sinuous tunnels and two concrete gun emplacements.

At Merir, a large, high mound on the southwest side of the island clearly was the same as that noted by Osborne. It represents the primary occupation site of the island. The mound no longer supports any traditional thatch-roof structures, and the short stone house posts illustrated by Osborne are no longer present. A wood and tin house, a modern water catchment, and a tin radio shack were the only features in use on the mound. Some small concrete water catchments built during the Japanese occupation remain on the northwestern portion of the mound.

Conversations with Merir resident, Mr. Andres Antonio, revealed that the mound space was once partitioned into traditional use areas, such as a shark-eating area, a menstrual seclusion area, a childbirth and infant burial area, and places for chiefly and non-chiefly residences. Mr. Antonio's family reside in the wood and tin structure on the mound. According to Mr. Antonio, the Japanese had built a bomb shelter at the site but he stated that the islanders had fled to the east side of the island during Allied air raids.

At Pulo Anna, no archaeological sites were reported by Osborne; however, he later learned by correspondence with Dr. R. K. McKnight, the former Trust Territory Anthropologist in Palau, that in 1962 there was a mound 14-15 feet high at the southwest edge of the island (McKnight cited in Osborne 1966:49). According to McKnight, "island historians" had said that seventeen generations ago, the village extended along the crest of this mound. McKnight further reported that there were a "God's House" south of the mound and some canoe houses and a menstrual seclusion/birth house on the mound. I observed what is probably this mound, which is elongate in plan and roughly parallels the shore. It supports none of the structures referred to by McKnight. Ethnohistoric information about former uses of the mound area was provided by local residents, and excavations were conducted at one locality which appeared to be part of an earth-oven refuse mound.

I conducted additional archaeological investigations at some of the sites recorded by Osborne. These are described briefly below, along with additional sites and features found during the present project, listed island by island.

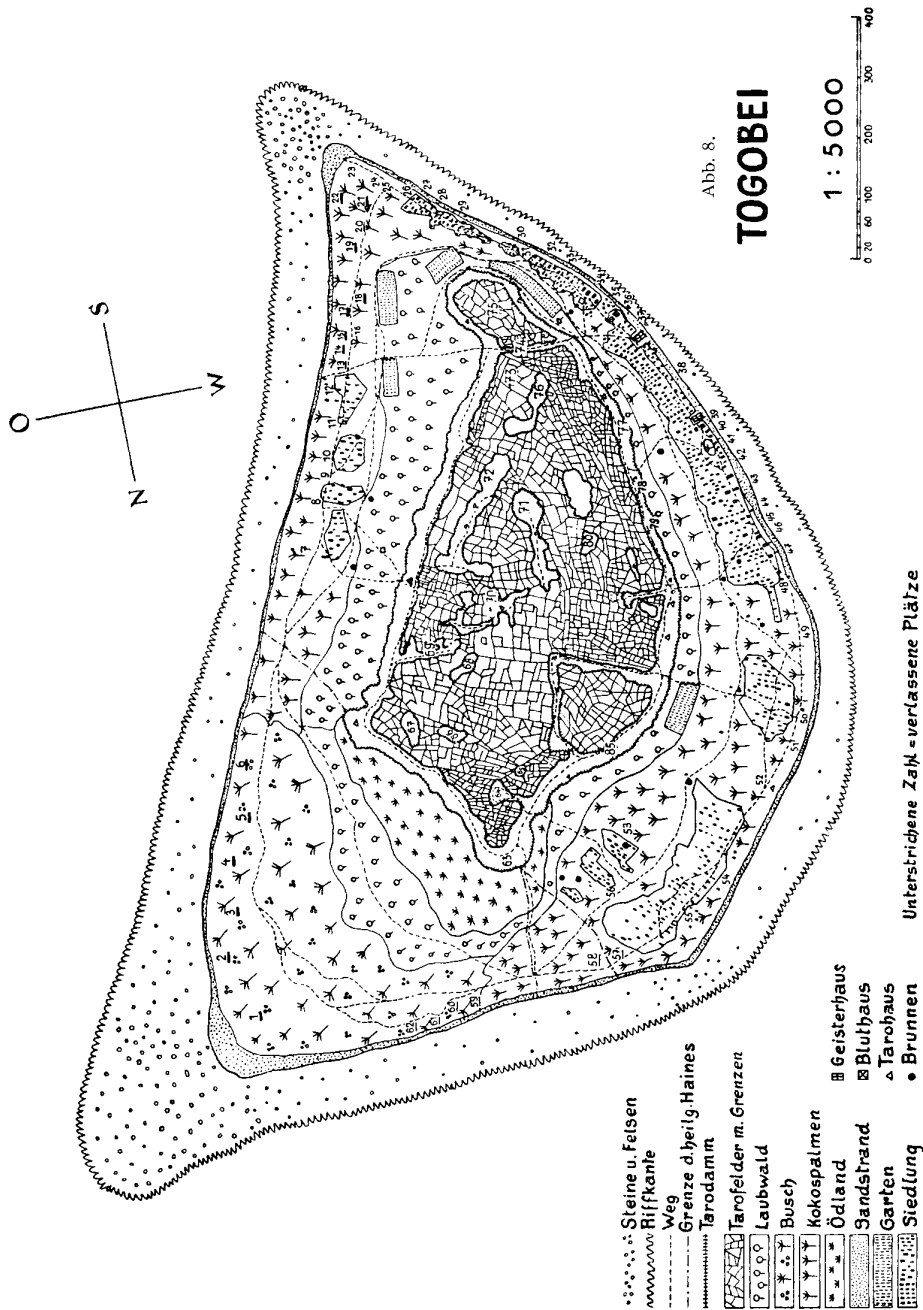


Figure 3. Hambruch's map of Tobi made in 1909 (after Eilers 1936: Sketch 8).

TOBI (HATOHOBEL)

Survey

At the time of my survey, Tobi was nearly empty of people, most having moved to Palau for school or to be near the hospital. There were twenty-seven residents. Abandoned wood and thatch structures could be seen throughout the occupied village area, which is on the west (lee) side of the island. A map produced by Hambruch during the Südsee-Expedition in 1909 depicts land use at Tobi when the population was close to 1,000 persons, showing various agricultural areas as well as residential zones (Fig. 3). In the latter are many small, specialized structures devoted to different domestic and ritual activities, such as family houses, taro-cooking houses, turtle-cooking houses, fish-cooking houses, resting houses, canoe houses, spirit houses, etc.; see the legend-list of house-types in Eilers (1936:50) which corresponds to Sketches 9 and 10. Stone-lined wells were dispersed among the residences, within the forest belt between the residential zones and the interior taro patch, and inside the taro patch itself. Seaward of the residential structures were the numerous canoe houses which protected ocean-going craft used in fishing and inter-island travel. The prevailing winds at Tobi are northeasterly for much of the year, and the western side of the island was favored for settlement in part because of its protected landing places; however, the eastern side of the island was also used for canoe-launching during the monsoon, when westerlies are dominant. At the time of the Südsee-Expedition, the settlements on the southeastern side of the island contained several canoe houses; for details see Eilers (1936:Sketch 9). Now canoe houses are only found on the west coast.

A prominent mound on the island's west side is shown on Hambruch's map and in Sketch 10 in Eilers (1936:51), where birth and menstrual-seclusion houses and a children's cemetery were located. Apparently, this is the same mound, called in Tobian *ypur* (the word refers to its menstrual seclusion function [D. Rubinstein, pers. comm. 1999]). At the time of Hambruch's mapping work, the beach in this area was 10-15 meters wide, and other nearby structures were built as close to the shore and even slightly seaward of the mound. The *ypur*, whose traditional place names are Mower ("toward the beach") and Repeiy ("Lepei" in Eilers [1936:48]), is a high, wave-cut earthen mound on the west coast of Tobi immediately south of the present boat landing. Now there is an abandoned medical dispensary building and a concrete water catchment near the western (seaward) edge of the mound. A small rock-and-concrete monument commemorating the traditional nature of the site has been placed just seaward and north of the dispensary.

The *ypur* has two important cultural-historical aspects: in oral accounts this elevated area was used for residence by Tobi's first occupants, when it was the only habitable portion of the island and had the only large tree. According to these accounts, in late prehistoric and early historic times, the *ypur* location was used by women in menstrual seclusion or who were giving birth. Eilers (1936) describes menstrual/childbirth structures in some detail and records this area as *materi maripar* and *materi feri gasafa* (Eilers 1936:48).



Figure 4. Drawing of the children's cemetery at *ypur*, Tobi (after Eilers 1936:Sketch 21).

Tobian residents stated that the women's area was just seaward of the present dispensary building. If so, a large portion of it has been lost to the sea during this century. The *ypur* also contained two burial grounds, one for still-born infants and the other for very young children not old enough for adult burial treatment. The young children's burial area is south of the dispensary. It is depicted on Hambruch's maps in Eilers (1936), in Sketches 9 and 10, and in a drawing by E. Krämer reproduced here (Eilers 1936:Sketch 21) (Fig. 4).

During interviews on Tobi and in Koror, other ethno-historical details were recorded regarding the *ypur* and nearby areas. For example, ornaments such as necklaces and bracelets made from tiny *Conus* shell beads and small bracelets of *Trochus* shell were buried with baby girls and that lures and fish hooks were buried with boys. These are the kinds of items that have been eroding out of the western face of the mound, along with child and infant bone fragments. Südsee-Expedition ethnographers reported seeing wooden bowls, necklaces, and flat, tortoise shell arm bands in the infant burial area (Eilers 1936:103).

Several meters to the north of the *ypur* mound is a chiefly area called Feruhéh, where public announcements were made; part of it now lies under a large pile of phosphate rocks, and the extreme western part of the area has been



Figure 5. Carved wood tray (*Calophyllum inophyllum*) with artifacts collected from *ypur* area by the Andrew family, Tobi.

removed by the waves. Seaward and just south of Ferhuhéh was the chief's house, where ornaments were stored; this area, called Ferepangahi, has completely eroded away. To the north the land is called Peytamor, or Fareihtamor, the term *tamor* signifying that it was used as a chiefly meeting place.

Tobi residents stated that wave damage from high tides during storms over the last 30 years or so has radically diminished the seaward portion of the *ypur* mound by at least 20 feet. The channel that was blasted through the reef flat by the Japanese to enable phosphate to be loaded on ships is partially filled with wave-transported sediments scoured from this side of the island. Apparently the channel creates strong lateral currents which continue to erode the shoreline on either side of the channel. It is evident that this process has eaten away the west face of the *ypur* mound.

Wave erosion and slumping of the seaward face of the mound over the years have resulted in the loss of numerous bone and shell artifacts (mainly fish hooks and beads) and human infant bones. Some of the artifacts have been retrieved from below the eroding west face of the mound and are being kept by local residents. The shell and bone artifacts are very fragile and easily broken. Figure 5 shows part of one family's artifact collection from the mound area.

As part of the archaeological documentation of the *ypur* mound, the 43 meter-long seaward face was profiled, and a radiocarbon dating sample of dark, carbon-rich soil was taken from the base of the mound at 154 cm below the surface. The dark deposit appeared to consist of earth-oven refuse, although no

charcoal was observed in it. The sample (Beta 54790) yielded a ^{13}C adjusted age of 230 ± 80 years before present (B.P., i.e., before A.D. 1950).

At the base of the mound is a light tan-white beach sand, which may represent the beach surface prior to the build-up of the mound. The present mound surface is undulating and slumps toward the west (seaward) in several places. Some areas have been disturbed by recent excavations and by coconut tree roots. The cultural deposits range from 30 cm to 160 cm in thickness. An unusual find during the profiling was a small cluster of prehistoric pottery sherds, probably of Palauan origin. The sherds lay in the upper portion of the mound near the dispensary, associated with pieces of bottle glass, metal, and marine food shells.

Other archaeological features investigated at Tobi were the heaps of spent earth-oven rocks and carbon-rich soil, *bonum* in Tobian (*bon* = "soil from it", *um* = "cooking place"), distributed throughout the former residential areas. *Bonum* mounds were not reported by Eilers (1936), although a variety of domestic structures, including several types of cooking houses, are depicted in Hambruch's sketch-maps of Tobian settlement areas. According to Mr. Andrew, while each Tobian family used to have its own cooking houses and earth-ovens, several families living in the same area would dump their *bonum* refuse in the same place. Some of these refuse mounds appear to have two high points, one at each end, possibly indicating that refuse was dumped from households located near each side of the mound.

A total of 17 *bonum* mounds was documented during a survey of the island's perimeter. This total probably represents the majority, although some may have been hidden by vegetation and therefore were not recorded. It is likely that many of these features were destroyed during the phosphate mining operations which took place during the early part of this century. I observed *bonum* mounds throughout the perimeter of the island except in the far north, an area of storm rubble adjacent to a cemetery. *Bonum* mounds occur within a band of sandy land about 50-75 m wide, seaward to inland, which corresponds generally to the settlement areas depicted on Hambruch's map of Tobi produced when the island was more densely occupied in the early part of this century (Fig. 3). Wave erosion on the southwest end of the island has exposed a *bonum* lens at a locality called Ruhuryachareymwoh.

The Appendix lists the *bonum* mound localities by place name and presents their gross dimensions and other descriptive comments. Mound 2, at Rugurtowamoch (Figure 6), is covered in vegetation typical of some of the larger *bonum* mounds. Mound 14 is on land called Heringemoh, apparently the historic site (called *garingemog* by Eilers 1936:90) of the German flag-raising on 12 April 1901.

While surveying former settlement areas, at Ruhurerimar (Mounds 5 and 6, see Appendix), I observed a gravel pavement feature along with pit depressions formerly used to store cooked Malay apples (*Eugenia malaccensis*). In Tobian the cooked apples are *buho* while the raw apple and the tree is referred to as *fariap*



Figure 6. *bonum* Mound 2 at Rugurtowamoch, Tobi; note mature trees.

(see Appendix for other details). Near Mound 3, at the beach, was the half-buried remains of a World War II Japanese concrete structure. Apparently currents have been depositing sand in this area since the war; the source of the sand was not determined.

Excavations

Mound 3, located at the south end of the island at a place called Ranirohie, was trenched from the low outside edge of the mound inward toward the higher center (Figure 7). This locality may be what was referred to in Eilers (1936:52) as an abandoned village called *ranirogi*. Cultural material was exposed in the trench walls in two layers, an upper black sandy deposit with glass and metal debris, and a lower earth-oven refuse deposit with charcoal with bits of burned coral in a dark, carbon-rich sandy soil. The two layers extended from the surface to a maximum depth of 102 cm. The east wall of the trench was profiled, and a charcoal sample for radiocarbon dating was obtained at 90-94 cm below the surface in the earth-oven refuse deposit. After laboratory treatment this sample (Beta 54791) was found to contain a very small amount of carbon, 0.5 g, and so was given extended counting time. It yielded a ^{13}C adjusted age of 210 ± 70 years B.P.

Paleosediment Coring

After several failed attempts to find taro patch soil of any depth in the central taro growing area, a more suitable coring site in a small taro patch, called Farihatsetsih, was located in the northern part of the interior. In Eilers (1936:54), this area is recorded as *fari gezazy*. The taro patch (*bor*) is presently planted to

Cyrtosperma chamissonis (*buroh*), which reflects an older agricultural pattern. In Tobi's actively cultivated taro patch area closer to the village, *Colocasia esculenta* (*wot*) is more common, and *Cyrtosperma chamissonis* is planted only along some of the plot borders.

The corer was driven to a maximum depth of 47 cm below the surface. A bulk soil sample (Beta 54792) from the lowest 15 cm of the core was radiocarbon dated to a ^{13}C adjusted age of 250 ± 50 years B.P.

Tobi's Japanese era remains are prominent in the western portion of the island. According to Motoda (1939), the phosphate mining company office, residence, storehouse, and drying room were completed in 1937; the remnant concrete foundations of these structures can be seen in the present village, and some parts of them have been salvaged for modern uses. Several concrete water cisterns remain from this period. Another Japanese feature is the concrete remains of a communications station built upon a hill called Metahong in the island interior. None of these features was mapped or otherwise documented in the present survey.

The phosphate mining destroyed a large portion of the island's central taro patch, and the present school has been built in this area. The total amount of phosphate on Tobi was estimated to be 200,000 tons, and a portion of the taro patch, 460,000 sq. ft., was set aside for food for the Tobians. This was thought to be enough to supply 140% of the food requirements for 150 local residents (Motoda [1939:20] reported 170 at the time of his visit). At the time of Motoda's tour, some



Figure 7. Digging the trench at *bonum* Mound 3, Ranirohie, Tobi.

adults recalled helping with the hard work of creating the taro patch. Thus at least some taro patch construction took place early in this century, perhaps to increase the growing area. Such an expansion effort would coincide with the highest population density recorded for Tobi by outside observers; see Black (1977). However, Motoda noted the large trees growing atop the spoil-mounds, and he speculated that taro patch construction had begun several hundred years prior to his visit. Our basal date of the core from Farihatsetsih appears to confirm this and may indicate that the northern part of the taro patch was created first.

HELEN REEF (HOTSARI HIE)

Our investigations regarding Helen Reef were confined to obtaining oral accounts of its use by Tobians. The Tobian name for Helen Reef is *Hotsari hie* ("reef of large *Tridacna* clams"). Traditionally Helen was visited to collect the clams for food and raw material for making the heavy tools for which *Tridacna gigas* was preferred. According to our informants on Tobi, individuals used to sail to Helen Reef to procure *Tridacna* and return once a suitable quantity had been collected and processed. All portions of the clams were used; the muscle meat was dried and the softer tissues were consumed fresh. The shells provided strong, hard material for the large gouge adze (*wor*) such as we saw at Tobi. This type of adze was hafted on a strong wood handle; some were hafted in a swiveling bed (*tererifung*). The gouge adze was used on Tobi to hollow out tree trunks for canoes. *Tridacna gigas* gouge adzes and other adze types are illustrated in Eilers (1936:197) and by Osborne (1979:Fig. 223). Food pounders (*far*) were also made from *T. gigas*.

Motoda (1939) visited Helen in 1937, observing that the western side of the island at Helen was being eroded and sand was being deposited on the eastern side, with the overall effect being to shift the island as a whole toward the north-east (Motoda 1939:23). This erosion process was removing the sandy substrate from a small building built on Helen Island by the Nanyo Boeki Company (who were there to dry sea slugs), so that the structure was about to fall into the sea. Motoda measured the island at 240 meters long and 90 meters wide at high tide. The boatswain on Motoda's ship commented that three months prior to their visit, the island had stretched far to the south and had large trees growing on it, but that during this interval the island had been reduced by two thirds and the trees had disappeared.

This anecdotal evidence suggests extremely active island formation and deformation processes at Helen Reef at that time, but also implies that there have been periods of stability of sufficient duration to allow large trees to become established. It is obvious that such a place would make an unsuitable settlement site and therefore the traditional uses of Helen Reef by Tobians—for temporary visits to exploit its resources and return to Tobi—represents a reasonable and ecologically sound subsistence pattern. These facts can also serve as a warning against implementing any permanent building schemes at Helen.

MERIR (MEILIELI)

Survey

At Merir there is a large and high mound (part of the place called Meteriharingamahoh) on the west side of the island, noted and photographed by Osborne. Like Tobi's western mound, it is being lost to the sea. Since this island was not mined for phosphate and no artificial channel was blasted through the reef flat, the present erosion seems to be due entirely to natural forces that have come into play after the 1950s; corroborating this inference, Osborne mentions no erosion taking place during his visit. As at Tobi, the western settlement mound overlooks the boat landing, which is only usable by small craft during high tide.

Noted by Osborne, who speculated they were man-made, are a series of low, narrow, parallel ramps (ca. 1.5 m wide) of cemented coral rubble, which project ca. 55 cm above the high tide level. These features lie perpendicular to the shore at the island's landing area (Figure 8). Close inspection revealed a few intact *Porites* coral heads that had died in place within the cemented rubble. That these corals were once alive in this area suggests a former higher sea stand.

Mr. Antonio stated that the mound has receded at least 20 ft from the action of the waves over the last two decades. He recalled that when he was a boy (he was 59 in 1992), there was a wide beach in front of the mound, and that the shoreline was lined with canoe houses. The present beach is too narrow to support canoe houses. Where the mound slopes to the south, there is a small, flat area



Figure 8. Raised reef ramp, Merir; view is west.



Figure 9. Boat house-shelter, Merir.

overlooking the beach, on which stands a small boat house/shelter (Figure 9) on land called Farimweripahoh (“under the shark house”). Eilers (1935:356) states that at Merir, eating shark was forbidden as the fish was considered sacred.

In contrast to Tobi, no infant bones, beads, or fish hooks were observed eroding from the mound onto the beach. This may be due to the siting of birth/menstrual seclusion houses farther inland. Tree roots and other vegetation and slumping of the soil have obscured the face of the mound, and my short field time on the island did not permit a systematic documentation by shoveling and profiling of the exposed western face. A few *Tridacna* lures and *Tridacna* shells from which lures had been cut (Fig. 10) were seen on the beach in the vicinity of the mound but these could have derived from tool-making activities at canoe houses on the strand and have not necessarily been eroded from the mound.

According to Mr. Antonio, several structures were once built on top and on the sides of the mound. He listed their traditional uses, such as residence, menstrual seclusion, infant burial, and shark eating in a designated area, and he described other customs and practices. For example, in disposing of household waste the custom was to throw it into the sea, except for turtle bones, which were discarded near the houses. The belief was that if the bones were thrown into the sea, the turtles would not come to shore to lay eggs.

A plan of the area was made, showing the present and former location of various structures according to Mr. Antonio. In Eilers (1935:Sketch 155), there are



Figure 10. *Tridacna* valve cut when a lure was made from it (r); two *Tridacna* adze fragments (l), found on beach at Merir by mound.

two drawings of the Merir settlement made from memory by former residents then living in Palau. One shows the settlement divided by a pathway into north and south portions, with three canoe landing places (the central one for everyone and the two on either side for the women), two menstrual seclusion houses (*yapiriem*), and various domestic structures. Another sketch shows two divisions separated by chiefly residences. The only structure seen by the Südsee-Expedition was an abandoned community house.

Mr. Antonio provided the following details of Merir's history and prehistory. At the turn of the century, well over 900 people lived on Merir, and the houses were very close together on the mound. A severe typhoon struck the island in 1902, causing mass starvation; only three canoes were able to leave for a safe haven in Sonsorol (many later went to Koror), and one other canoe containing a 3-person family sailed to the Philippines. All the others died and the island was never fully repopulated, although by the Japanese era (which began in 1914) some people had returned. The typhoons of the early 1900s struck Tobi and Pulo Anna as well as Merir, indicating an unusual period of tropical cyclones not normally associated with islands located so far south. In 1906 Guam and Saipan also were struck; Guam's typhoon was the strongest since 1855 (Eilers 1936:32; Weir 1983); and Ulithi was hit severely in 1907 (Lessa 1950:24).

According to Mr. Antonio, prior to World War II, a Japanese man lived and worked at Merir; his occupation was smoking fish, which product was sent to

Japan. During the war, about 1,500 Japanese soldiers were stationed at Merir. In 1945, the soldiers were repatriated by the U.S. military. The island's native population remained small, and the older residents died and were buried in the southern part of the mound. In 1992 only five people (Mr. Antonio and his children) resided on the island.

According to Mr. Antonio, Eauripik was the home island of the man (named Daukepit) who first discovered Merir. He showed me some *Cassia* shell lip fragments, which were found eroding from the base of the mound. Mr. Antonio calls them the "memory of Daukepit" and believes they prove that Daukepit discovered Merir (compare Eilers [1935:347]).

Excavations

In the lower part of the south end of the mound, in an area called Imweribungtohhoh, a shovel-trench was excavated into a sloping *bonum* deposit that proved to be about 72 cm thick. At the bottom of this deposit, which contained several whitish-grey ash lenses, burned coral gravel, charcoal, and turtle bones (*Chelonia mydas*), was a layer of unburned coral gravel and sand. Several turtle bones were observed along the contact between the *bonum* deposit and the unburned gravels. The gravel layer may represent the first construction layer of the mound, which is said to have been deliberately built. In this location at the south side of the mound, however, the gravel layer may not have been occupied until later. Two charcoal samples were taken from the walls of the trench, one from 102-104 cm below the surface, and one from 80-70 cm below the surface. The deeper sample (Beta 54785) was radiocarbon dated; it yielded a ^{13}C adjusted age of 60 ± 60 years B.P. This seems to indicate that cooking and food refuse disposal in this part of the mound began relatively recently. Other parts of the mound, closer to its center, may be older.

Northeast of the mound and inland, just north of the cross-island path, are two Japanese-built stone-lined wells and a Japanese memorial to their war dead. The northwest coast and the northern tip of the island were searched for signs of a burial area and stone wall, respectively, mentioned and depicted in Eilers (1935:Sketch 155); neither was found. This part of the island experiences strong winds, and perhaps from a history of severe weather, there is thick coral rubble strewn from the reef flat inland for tens of meters. This process may have created the numerous low coral stone mounds and depressions that were encountered in the northern area; at any rate their appearance was nothing like the features in Eilers' account, and no cultural material was observed on or near them.

Paleosediment Coring

The taro patches of Merir are concentrated in the northern part of the island, as the ground water is too salty for taro plants in the south. After several unsuccessful (and highly unpleasant, due to the mosquitoes) attempts to find sediments with adequate depth, a place called Fasohwur was cored. This is a small taro patch (planted exclusively to *Cyrtosperma chamissonis*) north of the cross-island path. From three separate drives to 60-62 cm below the surface, all placed within a one square meter area, a combined bulk soil sample (from the lowest 10 cm in each

drive) was obtained for radiocarbon dating. This sample (Beta 54786) yielded a ^{13}C adjusted age of $1,100 \pm 60$ years B.P.

Without the corroboration of a similar date from one or more domestic features, it is not certain whether this date reflects the initiation of taro cultivation at the site and therefore the beginning of permanent human settlement of Merir. While it could indicate that human occupation began at Merir by a millennium ago, it may only indicate the date of formation of a natural swampy depression in this part of the island. Since the only other date obtained was quite recent (within the last 120 years), the timing of initial human settlement on Merir is uncertain. More excavations and dating of deposits in the central portion of the mound could help clarify this situation.

PULO ANNA (PUR)

Survey

Pulo Anna's main residential area is located at the southwestern end of the island. This is also the area referred to by McKnight as having been the site of the ancient village of Pulo Anna (McKnight cited in Osborne 1966:49). In 1992, people were building and had just built, new houses on the mound. According to a 65-year-old woman who had lived on the island as a child, there used to be several traditional structures on the mound, as reported by McKnight. She indicated that two *ypur* (menstrual seclusion/childbirth areas) had been used, one at the north end and one at the south end of the mound.

Excavations

A trench was excavated on the south slope of the mound at a place called Fariyaul. The top of the mound was 4.25 m above the ground level on the shore side. In the upper portion of the trench was a *bonum* deposit, extending from the surface down to 70 cm below surface (cmbs), where a 35-39 cm thick layer of coral gravels occurred. Another *bonum* deposit was exposed beneath the gravel layer. The second *bonum* layer was, like the first, 70 cm thick. It was underlain by beach gravels and presumably marks the beginning of the mound occupation. Charcoal samples were taken from each of the *bonum* layers. The upper layer sample (Beta 54787) came from 70 cmbs and yielded a ^{13}C adjusted age of 130 ± 50 years B.P. The lower layer sample (Beta 54788) came from 102-104 cmbs and yielded a ^{13}C adjusted age of 290 ± 80 years B.P. This sample contained a very small amount of carbon, 0.5 g and was given extended counting time. Turtle bones, fish bones, mainly vertebrae, and marine mollusks were present in both layers.

Paleosediment Coring

The interior of Pulo Anna is formed by a shallow salt-water pond with numerous large logs which are visible above the water surface when the tide is low. According to one informant, giant swamp taro (*Cyrtosperma chamissonis*) formerly was grown around the edges of the pond but this practice ceased after the island was abandoned after the typhoon of 1902. We selected an area on the west side of the pond, which may have once been planted to taro but is now being invaded by mangroves. The corer reached a maximum depth of 175 cmbs. The

soil in the core was of uniform texture, a very spongy, dark brown organic mass until the last 7 cm, where more grit was present and the color was slightly darker brown. This material was not radiocarbon dated.

SONSOROL (SONGOSOR)

Survey

On Sonsorol the prehistoric record of human occupation was seriously disturbed during the early-to-mid-20th century. One source of disturbance was the Japanese-era phosphate mining of the island's interior and the construction of raised road beds and railways and other features, such as warehouses and loading docks. The north-south pathway on the western side of the island, passing through the present village, is an old railroad bed with some of the steel rails still in place. The railroad bed was built up from the former ground surface using nearby soil, apparently taken from *bonum* mounds, remnants of which still occur on both sides of the path. These features are very disturbed and shallow. The other source of disturbance is the U.S. military, who used the island at the end of the war. At that time the Sonsorolese were removed to Angaur (personal communication, Gov. Flavian, 1992).

I learned that Osborne's Site 1, the grassy area on the northwest side of the island, was the chiefly meeting house site called Faremau. This site has been deliberately kept free of large trees by periodic clearing. Some of the large limestone elements of a roughly circular perimeter-wall were visible once vines had been removed, and one carved phosphate-stone human-like head was seen lying by the portion of the curved rock alignment nearest the pathway (Figs. 11, 12).

Excavations

A shovel-probe (40 cm in diameter) was placed in the Faremau site about 25 meters inland from the shore, where a large cross has been implanted in concrete

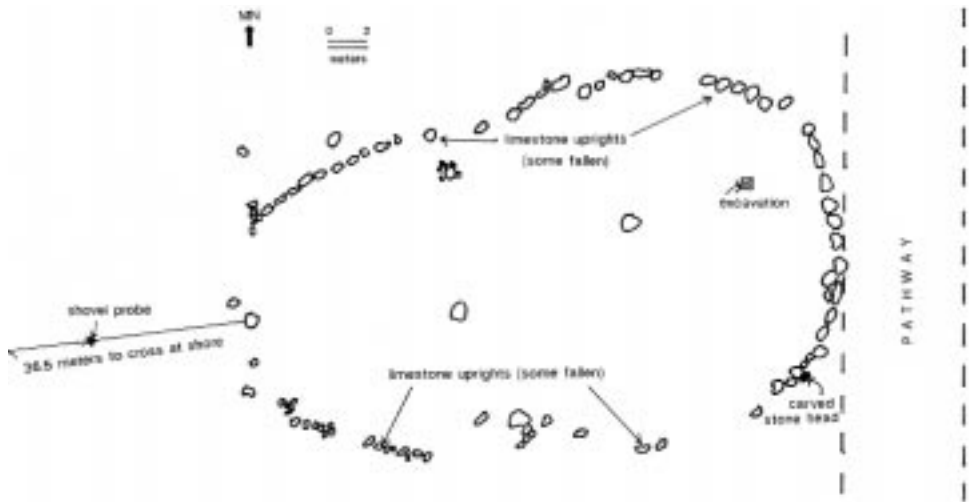


Figure 11. Plan of Faremau, Sonsorol.



Figure 12. Carved head of phosphate rock, Sonsorol.

to commemorate the conversion of the first Christian chief of the island. From the surface to a depth of 30 cm was grey sand containing only late historic materials such as glass fragments, pieces of tar paper roofing, and one turtle bone. Beneath the grey sand layer, a layer of light tan sand extended to the bottom of the probe at 80 cm below the surface, becoming coarser the last 25 cm. Occasional pieces of coral 15-20 cm in diameter occurred in this matrix, which was culturally sterile.

A second shovel-probe, located farther inland within the curved perimeter-wall of rocks, was excavated to 102 cm below the surface. The stratigraphy of the probe was as follows. The upper 40 cm comprised a thick coral gravel layer. Below this, between 40 and 70 cm below the surface, there was a layer of tan sand. At the very top of the tan sand where it contacted the bottom of the gravel layer was a concentration of fish and turtle bones, charcoal, and dark sand mixed with small burned bits of coral; from 70 to 102 cm below the surface was a layer of coarse, cream-colored sand. Between 40 and 70 cm below the surface, in the tan sand, four worked turtle bones (narrow spatulate forms) were found (Figure 13); unworked turtle and pelagic fish bones, mainly vertebrae, were seen throughout this layer.

Charcoal for radiocarbon dating was obtained from the top of the tan sand layer at 40-42 cmbs. This sample (Beta 54789) yielded a ^{13}C adjusted age of 110 ± 60 years B.P. The date may indicate the time of occupation of an old beach surface represented by the tan sand, prior to the emplacement of the coral gravels that formed the floor of the structure. A turtle bone from 79 cmbs was submitted for



Figure 13. Turtle bone spatula fragments, from shovel probe at Faremau, Sonsorol.

radiocarbon but was deemed too small for conventional dating and the price of accelerator mass spectrometry on this specimen was prohibitive.

On the east side of the island where Osborne said he found Site 2, a search yielded no evidence of the “disturbed stone walks and platforms”. There were a few unnatural-looking rock associations and one short stone alignment, but no prehistoric artifacts were observed in the area. About 20 meters inland and more or less parallel to the present pathway leading toward the beach, remnants of hand cart rails from phosphate mining activities were seen. Several meters south of the putative Site 2, and slightly inland, was an extensive complex of World War II fortifications, probably Japanese: elevated walkways, tunnels and gun emplacements (Figure 14). These features are in excellent condition.

No interior taro patch exists on Sonsorol. The earlier excavation and removal of phosphate from the island’s interior created some deep holes in which the groundwater is exposed but people do not grow taro in them, having traditionally relied upon dryland taro, *Alocasia macrorrhiza*, and tree crops, including breadfruit. Nearby Fana has also been a source of food, a kind of garden island for Sonsorol. Sonsorol’s lack of an interior taro patch may be due to the depth to ground water, which is several feet from the present ground surface.

FANA

Survey

Fana is not presently inhabited but was earlier in this century and probably



Figure 14. Coral rock, metal rail, and concrete fortification, Sonsorol.

also prehistorically. There is no interior taro patch on the island. In 1992 several structures recently had been built near the beach on the southwest side of the island. An extensive cultural deposit of relatively shallow depth exists in this area; it is dark grey-to-black and contains much marine shell. A *Conus* bead, a *Tridacna* adze fragment and an andesite pounder fragment were seen on the surface (Figure 15). As was noted at Tobi, the usual source of hard volcanic rocks which could be fashioned into tools was the soil embedded in the roots of large drift logs.

In the western portion of the midden zone are a few short alignments of coral heads, possibly marking old house sites. Oral history was collected regarding the island from interviews conducted with Mr. Salvatore, who built the new structures and resides on Sonsorol. He said that the people first came to Fana and then moved to Sonsorol. Fana has two sacred areas, Farepado and Farebos. Mr. Salvatore did not know of any *ypur* on Fana. A portion of a traditional pathway running southeastward and parallel to the shore in the vicinity of the new structures is marked by upright slabs on either side.

Excavations

Three shovel tests and several probes were dug at Fana. Shovel Test 1 was located in Farepado and yielded no cultural material, but the upper 2-3 cm was dark sand, and below this and extending for about 50 cm was a dark gray sand with burned bits of coral, possibly a *bonum* deposit underlain by culturally sterile, tan-grading-to-white, increasingly coarse, sand. Three other probes, not designated by number here, were placed in various locations where the surface soil



Figure 15. *Tridacna* adze fragment, *Conus* bead, andesite pounder fragment, found on surface of midden area, Fana.

was a dark sand indicating former occupancy. None of these yielded cultural material. One of the probes was located in a sacred area called Wayreng. In this probe, below a thin layer of coral gravel, a dark brown sand layer extended to 40 cm, underlain by culturally sterile, tan sand which extended to the base of the probe at 50 cm below the surface.

Shovel Test 2 was dug at Farebos, a site mainly covered by one of the new structures. The test was under the roof of the seaward-facing side of the structure. The upper layer was a fine, loose gray sand with occasional pieces of coral 20-30 cm in diameter. This layer extended to 35 cm below the surface. In the lower half of this layer, a few fish bones and a piece of wood charcoal were found. From 35-65 cm below the surface, the soil was a dark black sand with a few pieces of burned coral. A light tan sand underlay the black sand, extending to 85 cm, the bottom of the test. No artifacts were found in any of the layers.

Shovel Test 3 (see Fig. 16), was located several tens of meters to the south-east and farther inland of the other tests and probes. This area appeared to be a *bonum* deposit on the relatively high ground just seaward of where the ground slopes down, toward the center of the island. The upper layer was 55 cm thick and consisted of a black sand with burned bits of coral. From 55-79 cm below the surface there was a tan sand, and from 79-102 cm below the surface, there was another dark black sandy layer with bits of burned coral, several kinds of marine food

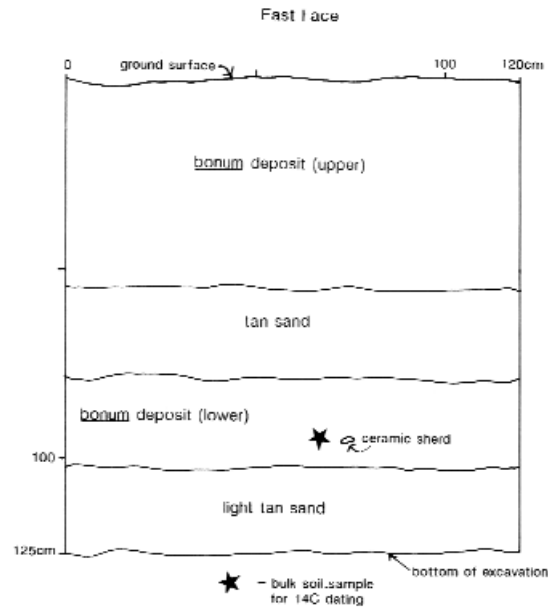


Figure 16. Stratigraphy of Shovel Test 3, East face, Fana.

shells, and turtle (*Chelonia mydas*) bones. From 102 to 125 cm, the base of the test, was a light tan sand with coral gravel. At 95 cm below the surface, in the layer with the marine shells and turtle bones, was a large ceramic rim sherd that closely resembles prehistoric Palauan pottery. No charcoal was seen in the test. A bulk soil sample for radiocarbon dating was taken from the east side of the excavation, at 95–100 cmbs. This sample (Beta 54784) yielded a ^{13}C adjusted age of $101.4 \pm 0.7\%$. Because this date is so recent despite the depth of the sample, another sample (Beta 59470), a *Spondylus* shell from 80–100 cmbs, was submitted for radiocarbon dating. The result was 870 ± 70 B.P. using a reservoir correction of 140 ± 45 . Because of the large uncertainty in dating specimens younger than 300 years and in applying an appropriate correction for old carbon (which tends to be incorporated into marine shell), the bulk soil date and the shell date from Fana are not as disparate as they may appear. A larger correction factor would result in a younger date, bringing the shell more in line with the bulk soil date, which Tamers (pers. comm. 1993) advises, is best stated as “less than 300 BP.”

POST-EXPEDITION INVESTIGATIONS IN PALAU

After the expedition ship's return to Malakal Harbor on June 19, 1992, I compared the pottery from Tobi and Fana with some of the sherds in the government's prehistoric pottery collections from Babeldaob, as well as with the Palau pottery illustrations in Osborne's monographs (Osborne 1966, 1979). From these comparisons it is almost certain that the sherds found on Tobi and Fana during the Southwest Islands Expedition are of Palauan origin.



Figure 17. Carved human image of phosphate rock, from Tobi north of *ypur*, at Palau National Museum, Koror.

On June 20, 1992, Mr. Stephen Patris of Tobi and I visited the Palau National Museum to examine a carved stone effigy about which we had collected some ethnohistoric information on Tobi and learned about from other sources, particularly Dr. Peter Black (pers. comm. 1992), who had brought this object to Palau from Tobi in 1968. I was kindly permitted to photograph the stone head in the Museum's front yard. It is made of brown phosphate rock and stands about 36 cm tall (Figure 17). It is depicted in Osborne (1979:Fig. 222).

On June 20, 1992, Mr. Patris and I visited with Tobian elders in Koror and asked them about traditional customs and oral history related to our field investigations. The results of these interviews have been incorporated into the above discussions.

POST-EXPEDITION ARCHIVAL RESEARCH

Archival sources at the Micronesian Area Research Center (MARC), Univ. of Guam, were reviewed prior to writing this report. Key documents consulted include Eilers' (1935, 1936) ethnographic reports on Tobi, Pulo Anna, Merir, and Sonsorol, which present the results of the German Südsee-Expedition, 1908-1910, which included these islands, and synthesize pertinent material from earlier works. I was fortunate to have an English translation of Eilers (1936) kindly provided by Dr. Peter Black. English translations of Hasebe (1928) and Seidel (1905) on microfilm at MARC were reviewed. Two Japanese articles in English transla-

tion, Motoda (1939) and Someki (1938) have been abstracted in Sinoto (1988). They report field observations on the cultures of the Southwest Islands during the pre-war period; unfortunately only Motoda (1939) is available at MARC and Someki (1938) could not be consulted for this report.

Conclusions

Prior to the present study very little was known of the archaeology of the Southwest Islands of Palau; the only source was the reconnaissance surveys by Osborne in the 1950s at Tobi, Merir, Pulo Anna, and Sonsorol (but not Fana). In general, Osborne's results were corroborated by this project. Due to slightly longer field time at each island and access to Fana, I found additional kinds and numbers of sites. Combined with the interviews conducted in the field and in Koror, more comprehensive interpretations of traditional sites and features have been possible.

The radiocarbon dates obtained from various locales indicate the time depth of the Carolinian-derived culture in the Southwest Islands. According to these dates, this culture is at least 300 years old at Pulo Anna and Tobi and could range as far back as one millennium on Merir. The one date obtained from Sonsorol was not older than about 150 years, and Fana's dates indicate no greater antiquity than c. 300 years. The Sonsorol sample was from a chiefly meeting house floor feature but does not necessarily represent the oldest occupation of the island. Other, earlier sites may still exist but due to the extensive disturbance of the island on the western side, finding them would require concerted effort (and luck). No definite conclusions about the chronological order of settlement in the islands can be drawn from present limited data, and more archaeological investigations are needed. Future archaeological work aimed at filling in the settlement picture would most effectively be done in conjunction with ethnological and linguistic studies.

As to the general character and condition of the archaeological record visible from the surface, it is extensive and complex in all the Southwest Islands. The variety of sites and features, mainly in the coastal settlement areas on the western and southwestern sides of the islands, as well as the large number of introduced and naturalized cultigens, reflect permanent, long-term human occupation, complex social organization, and the use of many managed habitats that supported a horticultural and fishing way of life. While the cultural similarities among the islands would seem to derive from a common origin in the Carolines, much of the inter-island variability in cultural practices, and therefore also in the kinds of archaeological features seen on the islands, appears to have been conditioned by differences in island size, shape, geomorphological and phytogeographic features, proximity to other islands, and individual island histories, especially during the 20th century. Historic connections between Sonsorol and Indonesia include long-term residence by Sonsorolese families in Mapia Island under contract with Captain David O'Keefe to produce copra (pers. comm. Gov. Flavian, 1992). A prehistory of contacts between the islands of Indonesia and Tobi, and possibly

other islands in the Southwest group, is indicated by linguistics, oral history and marriage patterns, as well as physical characteristics of the people. Coordinated ethnological, linguistic and physical anthropological studies are necessary to delineate these relationships.

The indigenous cultures of the Southwest Islands were first systematically recorded by German ethnographers in the early part of the 20th century; much of this work and descriptions of previous historic contacts as well are summarized in Eilers (1935, 1936). The ethnographic information is most comprehensive and detailed for Tobi. The fine partitioning of village space found at Tobi during the Südsee-Expedition appears to be similar although even more complex than that recorded by the Expedition at Fais and Sorol (compare maps in Damm 1938, Krämer 1937).

The Japanese phosphate mining operations, which took place after the German administration of Micronesia but before World War II, destroyed a considerable portion of the interior taro garden area and much of the native settlement on Tobi's western side was altered due to construction of concrete foundations. The archaeological record in other parts of the island is generally intact and stands as strong evidence of the Tobians' successful adaptation to the conditions of their small island. The Tobi population at the turn of the last century must have been well over 1,000 persons since in 1909 there were 1,100 (and these were the survivors of a food shortage begun after the devastating typhoon of 1904), considering the fact that this number was given by the Südsee-Expedition and at that time there were numerous abandoned village areas. Since Tobi's land area is just under 1/4 sq. mi. (60 ha.), its peak population had been the most dense ever recorded in Micronesia, ca. 4,000 per sq. mi. (see Alkire 1978:Table 1).

A significant factor permitting such a large population may have been the large acreage of taro gardens (approximately 450,000 sq. meters, estimated by Hambruch, in Eilers [1936:39]). It should also be noted that a "sand flat with wretched ferns, apparently once a taro field but now gone to waste...a poor dry area with little plant growth" was observed in the northern part of the island (Eilers 1936:38). In Fig. 3 it is labeled "Odland" (wasteland) and is not far from an abandoned settlement. In 1909 traces of stone boundaries of small taro plots were noted; on Fig. 3 this area is shown outside and north of the high dirt wall surrounding the large central taro patch and may represent a cultivated area used prior to the construction of the taro patch enclosure-wall. If so, perhaps storm over-wash and destruction had prompted the construction of the wall.

The channel through Tobi's reef platform, which was created in the 1930s to permit the loading of phosphate rocks onto small boats, apparently contributed to the erosional damage to the island's western coastline and archaeological deposits in this area. According to local residents, strong lateral currents, possibly created or amplified by the channel, have been eroding the seaward face of the large *ypur* mound, which is perhaps the most important site in Tobian tradition. At the rate of erosion taking place now, there will be nothing left in a few years, and if sea level rise accelerates, so will the erosional rate.

Postwar building of houses and government buildings and, lately, population decline, have each contributed further to the erasure and neglect of Tobi's cultural remains. Traditionally important artifacts that are no longer made and used, such as carved wooden bowls, *Tridacna* shell adzes and pounders, shell, turtle bone, and wood fish hooks, and shell beads and bracelets, are not properly curated, and are thus subject to deterioration and loss. Many of these items lie about the island at abandoned sites. As long as these areas are not disturbed, some of these neglected artifacts will not suffer but others, such as the wood objects and the smaller, more fragile pieces of shell and bone, will break and/or rot away.

In the other Southwest Islands, as at Tobi, the western or lee side is preferred for settlement because it affords protection from prevailing eastern winds. It is at these locales that archaeologically important residential mounds were observed. The lack of a mound on Sonsorol may be due to 20th century disturbances of the western side of the island—from phosphate mining operations and from World War II and postwar military uses and modern construction. The relative nearness of Sonsorol to the more northerly islands in the Palau archipelago historically has meant more frequent intercourse with the outside world via Palau, including the introduction of foreign building styles and other influences. The lack of a residential mound on Fana is provocative; it could indicate that this island was used differently from the others because of its close proximity to Sonsorol. Fana was not adequately surveyed during the project, and other archaeological features unique to the island may be present.

From these preliminary investigations it is apparent that a complex stratigraphy is likely to exist in each large residential mound, at Tobi, Merir, and Pulo Anna. At Tobi, the western face of the *ypur* was profiled and in spite of disturbances and recent erosion, different kinds of deposits were discerned, and oral history indicates this should be the case. At Merir, the large mound was not profiled but considering its size it should be at least as stratigraphically complex as the one at Tobi, a surmise corroborated by what Osborne described and by oral accounts. My excavations at the southern end of the Merir mound indicated recent usage of this area for refuse disposal, especially turtle bones, which could have been cooked nearby at the beach. At Pulo Anna, the portion of the elongate residential mound near the landing was destroyed during machine-clearing by the U.S. military after the war but a large portion of the mound still exists to the south.

At Sonsorol, the phosphate mining operations, including construction of several rail lines across the island, destroyed much of the prehistoric archaeological record and ruined much of the interior for subsistence agriculture, which traditionally was a mix of tree farming (mainly bananas, breadfruit and coconut) and taro. No high mound was observed here but it may have been destroyed by the Japanese. However, without an interior swampy depression that could be converted to a taro patch, the island may not have been able to support as dense a population as once existed at Tobi and Merir, and this may have affected the rate of accumulation of residential deposits. Small, shallow *bonum* features occur seaward of the present village; excavation in this area could yield information regard-

ing the island's occupational sequence. Fana's evident lack of a high residential mound, along with its extensive and relatively shallow cultural deposits on the southern end, hint at a different use-history than the larger islands. Time and weather cut short our investigations on Fana, and it is possible that deeper deposits will be found there. However, to gain a better understanding of the archaeology of Fana, the island should be studied together with Sonsorol.

Of interest to historians are the extensive stone tunnels and gun emplacements on the eastern side of Sonsorol and the remnants of the narrow-gauge railways used to transport mined phosphate rocks from the center of the island to loading stations on the coast. Tobi also contains numerous Japanese era features, and Merir has Japanese pre-war and World War II features as well. An historical study of these features would properly include the experiences of the Southwest Islanders who were affected in many ways by the successive colonial occupations of the 20th century.

It is clear that a better understanding of coastal geomorphological processes and their relation to weather and currents in the Southwest Islands is needed. Rising sea levels from ocean thermal expansion over the last few decades may be an important factor in the erosion that is taking place (Nunn 1990). An often overlooked source of information about short-phase climatic oscillations is the memory of the islanders themselves. Small landholders dependent upon local resources are often astute environmental observers and understand well inter-relationships among easily observed natural processes and their effects upon human practices, and vice versa. Aged individuals represent a wealth of such information, especially when their observations are considered along with historical records, geomorphological, and archaeological data. By tracing past events and the observations of previous island conditions through interviews with older island residents, tentative reconstructions of the islands' past environmental states can be formulated. This detective work has the potential to provide insights into past cultural patterns and to assist in realistic planning for the future.

Acknowledgments

Assisting with interviews and archaeological field work were Stephen Patris, a member of the Expedition and native Tobian; local residents of each island; and Johnny Felix of Tobi, who traveled with the Expedition from Tobi to Palau. On Tobi, I was graciously hosted by Isauro Andrew and his wife, Rose.

Oral history and ethnographic information were obtained during informal interviews with island residents and visitors, such as the Lt. Governor of Tobi State, Mr. Emilio, and the Governor of Sonsorol State, Mr. Flavian, as the opportunities arose. Interviews with older Tobians residing in Palau were conducted on June 20, 1992, after the Expedition had returned to Koror. Mr. Patris was present at these interviews and accompanied the author to the Palau Museum to inspect the collections from the Southwest Islands. We were ably assisted by the Museum staff and by personnel from the Historic Preservation Office.

Before and after the Expedition, Dr. Peter Black, George Mason University, provided additional information and personal and professional insights which enhanced my understanding and appreciation of the cultures of the Southwest Islands of Palau, particularly Tobi. Good counsel and information regarding life on Tobi was provided by Mr. Justin Andrew. Recent discussions with Dr. Donald Rubinstein, Univ. of Guam, regarding the cultural connections between the Southwest Islands of Palau and Fais Island in the Western Carolines, have been instructive. Finally, I thank Dr. Dirk Spenneman, Charles Sturt Univ., who assisted with the German documents at the Micronesian Area Research Center library. Stephen Vaughn drafted Figure 1.

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Appendix

Place Names, Gross Mound Dimensions, and Comments upon the Localities of *bonum* Mounds on Tobi.

#	NAME	LENGTH (m)	WIDTH (m)	HEIGHT (m)
1.	Pupunumurmahaow	29.7, E-W	18.9, N-S	2.1
	This mound's long axis is perpendicular to the shore. The western edge of the mound is approximately 38 m from the dispensary building.			
2.	Rugurtowamoch	11.9, E-W	10.9, N-S	1.1
	This mound is slightly oval, located on the western side of the island. In the center of the mound is a large depression, said to be a storage pit for "apples" (<i>buho</i> ; <i>Eugenia malaccensis</i> , Malay Apple) presumably after it had been abandoned. Pieces of concrete, scavenged from Japanese foundations on the island, are lying about; these had been used as weights to seal the preserved fruits. The pit's dimensions are 2.8 m by 3.1 m by 33 cm deep.			
3.	Ranirohie	11.7, NE-SW	11.5, NW-SE	0.78
	The mound's edges are indistinct, and the length given may be slightly over-long. The mound is located inland of the southwestern tip of the island, where the concrete foundation of a small Japanese coastal lookout is now half-buried in the sand. A shovel-trench was excavated in the mound, and a ¹⁴ C date was obtained from charcoal at the base of the <i>bonum</i> deposit, A.D. 1670-1810.			
4.	Matarehasuh	6.3, E-W	6.0, N-S	0.60
	This mound is on the eastern side of the island, very close to the shore (about 20 m from the high			

tide line), on the sea side of the path that runs parallel to the shore here near a very large *Calophyllum inophyllum* tree (*savang* in Tobian) growing at the shore.

5. Ruhurerimar 12.0, E-W 10.5, N-S 0.85

There are two *bonum* mounds in the area, which is on the eastern side of the island. In the vicinity there are also an apple storage pit-depression and a large "gravel spread" which is probably a former house site. The *bonum* mounds (#5 and #6) are located on the sea side of the path while the gravel spread and storage pit are on the inland side. The gravel area is elevated about 10-15 cm from the surrounding ground surface and measures 5.3 m by 5.8 m. It has two large coral rocks at the two seaward (eastern) corners and there is a short linear extension of gravel (ca. 2 m by 2 m) from the center of the eastern side toward the path, possibly marking the entry. The storage pit is ca. 12 m from the southwestern corner of the gravel spread.

6. Ruhurerimar 5.3, E-W 4.0, N-S 0.61
NAME LENGTH (m) WIDTH (m) HEIGHT (m)

7. Farmeisusur 11.5, E-W 9.0, N-S 0.82

Neisosperma oppositifolia (*mohw* in Tobian) trees are abundant in this area.

8. Farmeisusur 7.2, N-S 7.0, E-W 0.72

This mound was the northernmost seen on this side of the island, at about halfway along the east coast. It is opposite a young *Calophyllum inophyllum* tree that extends over the shore.

9. Siyarabao 14.9, E-W 12.0, N-S 0.52

This mound is located within the contemporary village on the west side of the island.

10. Fateberih 9.0, E-W 8.5, N-S 0.51

The mound is located on the west side of the island, about halfway along the west coast. The mound and surrounding area are covered with *Zoizia* grass. The mound is on the inland side of the coastal path. There is an old oval-shaped well just inland of the mound. The well has a rock lining and measures 3.0 m by 2.2 m; it is filled with coconut fronds and nuts and was in use in the 1940s and 1950s. It is reported to have been built prior to the coming of the Japanese. The water was used for drinking.

11. Wanimahat 7.0, N-S 6.3, E-W 0.38

The mound is on the sea side of the coastal path on the northwestern side of the island.

12. Farikir 8.3, E-W 6.2, N-S 0.72

The mound is obscured by dense vegetation. It is located on the northwestern side of the island.

13. Farikir 13.0, N-S 12.0, E-W 0.57

There is an area of dark soil adjacent to the mound on its south side. This area is about 120 m by 8 m and protrudes about 10cm above the ground in some places. It may represent the beginning of another *bonum* mound or is a low midden deposit. These features are in the northwestern part of the island near the coastal path.

14. Heringemoh 9.6, N-S 9.5, E-W 0.43

There is an area of dark soil adjacent to this mound as well, measuring about 30 m by 40 m and 10-15 cm above the ground surface. There are pieces of glass and metal on the surface of the mound and on the midden area. These features are in the northwestern part of the island near the coastal path.

15. Metehnochureyi 13.0, N-S 11.0, E-W 0.52



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| 16. | Metehnochureyi | 8.5, E-W | 6.5, N-S | 0.38 |
| 17. | Metehnochureyi | 6.4, N-S | 6.4, E-W | 0.38 |

Mounds 15, 16, and 17 occur on the northeastern tip of the island, on the inland side of the path. They are 13.5 m and 6.0 m apart, respectively. Mound 15 is the northernmost mound; Mound 16 is between Mound 15 and Mound 17. Mound 17's highest point is farther inland than the other two. Inland of the three-mound complex is an extensive area of large corals, which appear to be old weight-rocks for storage pits. This area is 30 m long and 15 m wide, with the long axis of the distribution parallel to the shore. It is shaded by large banyans (*Ficus prolixa*, *hirio* in Tobian) and *Neisosperma oppositifolia* trees. While the majority is strewn about, some of the corals form circles and semi-circles, which vary between 70 cm and 80 cm in diameter. Most of the rocks measure from 20 cm by 20 cm by 30 cm to 40 cm by 30 cm by 30 cm; a few are smaller.

