The Excavation of Pulemelei Site 2002–2004

HELENE MARTINSSON-WALLIN, PAUL WALLIN and GEOFFREY CLARK

Abstract

This paper describes the results of archaeological excavations in the Pulemelei mound on Savai'i, thought to be the largest freestanding stone structure in Polynesia, in 2002-4. These excavations comprise the first large-scale archaeological investigation of a monumental complex in Samoa. We examine the chronology and function of the large mound and other structures.

Prior to our investigations, the Pulemelei mound and other prehistoric features in the Letolo plantation had been surveyed, and used to interpret Samoan demography and settlement patterns in the late prehistoric period (Jennings et al. 1982; Scott 1969; Green 2002; Asaua 2005). The extensive survey of prehistoric remains at Letolo plantation by Gregory Jackmond in 1977-1978 recorded more than 3000 features, including 1059 stone platforms, roads, along with stone fences and walkways, earth ovens and refuse piles (Jennings et al. 1982: 87-93, see Wallin, Martinsson-Wallin and Clark, this publication. Figure 1). The Pulemelei mound in traditional history had been suggested to be a tia seu lupe (pigeon snaring mound) and/or the residence of the chief Lilomaiava Nailevaiili, who is suggested by Krämer (1994:243) to have lived 25 generations ago (ca. 1650-1680AD). Previous researchers have noted: “four stone seats each with a conch shell” on top of the Pulemelei mound (Asaua 2005:82), and Scott (1969:82) reported the: “original informants suggestion that these [stone cairns] were receptacles or pedestals for large shell trumpets (foafoa)”. A local tradition records that the mound was the residence of gods and spirits (atua, aitu), who were called back to the mound each night by the sound of a shell trumpet (Pule’u’u Toluono Pene, Vailoa village, pers. comm. 2006). A fragmentary shell trumpet (Cassis shell) was found beneath stones on the upper platform during cleaning of the mound in 1965 (Figure 1). A spire of Triton shell was also found on the smaller North mound (Scott 1969:86). During Scott’s mapping (1969:80) ten stone cairns were found on top of the Pulemelei mound, but when the mound was re-mapped by us in 2002 about 40 cairns were recorded. The low cairns were removed during geophysical survey of the mound in 2004, but soon afterwards several cairns were set up. Workers from the local village who assisted in our investigations also brought shell trumpets to the Pulemelei mound.

Prior to our initial investigations in 2002, there was limited archaeological knowledge about the Pulemelei mound, particularly its age, function, and relationship with adjacent prehistoric structures. Our project also focused on understanding the social context out of which a mound building tradition emerged, and the cultural connections among the prehistoric societies in Fiji-West Polynesia. To investigate the origin and development of large mounds in Samoa archaeological excavation, remote sensing and detailed mapping were made at the Pulemelei mound during three field seasons from 2002 to 2004. The investigations had the following aims:

1. Determine the chronology and construction sequence of the Pulemelei mound and adjacent structures by archaeological investigation.
2. Examine the development and meaning of monumental architecture at the Letolo plantation, and contrast Samoan monuments with those from other parts of West Polynesia.
3. Provide archaeological fieldwork and cultural heritage training for Samoan and overseas students, particularly the management of monumental sites impacted by tourism.
In this paper we focus on the first of these aims by presenting and discussing basic information about the archaeological investigations made at the Pulemelei site.

**Mound building**

The trend toward mound building in Samoa is apparent among other islands in West Polynesia during 1100-1700AD (Davidson 1979: 95; Green 2002). Contact and interaction between islands in West Polynesia is suggested by prehistoric material remains, and is evident in ethnohistorical accounts and traditional history (Clark 2002; Barns and Hunt 2005). However, the material expression is not homogeneous and differences among the late prehistoric landscapes of West Polynesia reflect the contingent cultural and environmental context on each island, and the specific influence of external interaction among island groups (see Clark and Martinsson-Wallin, this publication).

In Samoa, large house mounds of stone and earth are found on Savai'i and 'Upolu, but are rare or absent in American Samoa (Buist 1969:39; Davidson 1974:225-7; Clark 1996:452). Results of archaeological excavation and examination of traditional history suggest that large mounds—like those at Vailele on 'Upolu—had a residential function, and may have been constructed as early as 1100AD, with continued use until ca. 1800AD (Green and Davidson 1974:219). It is also possible that Samoan mound building was influenced by intermarriage and war with Tonga (Kirch 1984:238-42). Jennings *et al.* (1982:92) suggest that the Pulemelei mound was built in the 17th century, as large mounds investigated at Mt Olo were likely to date to this period. Traditional records indicate that large mounds could have several functions including pigeon snaring, house foundations and ceremonial use (Scott 1969:87-90; Tamasese 2003, 2004). It has also been suggested that large Samoan mounds might be chiefly burial structures similar to the Tongan *langi*, but Davidson (1974:229-30) concluded that burials mainly occurred in shallow pits under, or, close to house foundations, and the raised mounds were residential units for high chiefs or were foundations for religious structures.

The Letolo site survey of prehistoric structures made by Jackson (1977-78) has been used previously to analyse the distribution of prehistoric remains, particularly stone mounds, in order to reconstruct the Samoan settlement pattern. Results showed that settlement at Letolo was similar to that reported at Mt Olo on 'Upolu and Sa'papaili on Savai'i, although being slightly larger in extent. According to Jennings *et al.* (1982:87-92) the Letolo settlement consisted of five village 'wards' (*pitonu'a*), each of which comprised a cluster of two-to-five large platforms near a primary walkway and 50-75 household units enclosed by walkways and fences.

**Site setting**

At Letolo plantation in Palauli district the large stepped mound known as Pulemelei is situated about 1.5 km inland from the coast at ca.100 m above sea level (Figure 2). It has the base dimensions of ca. 65 m by 60 m and a maximum above ground height of ca. 12 m. The plantation extends from the coast ca. 2.5 km inland to ca. 250 m above sea level (asl) on the south coast of Savai'i, and is bounded to the east by the Faleata River and on the west by the Seuagagogo River.

The Letolo plantation is owned by the Nelson extended family, and in the past has been a copra plantation. The land is currently used for cattle grazing, but there are plans to develop the area for tourism in the future. According to Vailoa village the freehold plantation land is considered to be village land, and there have been several disputes between the plantation owners and the *matai* of Vailoa over...
the years. Ownership of the Letolo plantation is the subject of a current court case. Since plantation activities ceased in the 1980s a thick growth of secondary tropical vegetation has covered most of the plantation, but the Pulemelei mound and the Afu Aau (Olemoe) waterfall on the property are two of the main tourist attractions on Savai’i, and these are cleared and managed periodically.

Archaeological investigations 2002–2004

The archaeological investigation of the Pulemelei mound involved collaboration between academics (Helene Martinsson-Wallin, Paul Wallin, Kon-Tiki Museum Research Institute and Geoffrey Clark, Australian National University) and Samoan land owners represented by the board of the Nelson Corporation. Fieldwork was carried out during September 13–October 10 2002, July 17–August 15 2003, and June 5-25 2004. Preliminary results from the excavations have been presented in several reports and papers (Wallin et al. 2002; Martinsson-Wallin 2003, 2005; Martinsson-Wallin et al. 2003, 2005). Additional excavation carried out at Letolo in March 2006 is reported elsewhere (Martinsson-Wallin et al. 2006).

The 2002 field season concentrated on clearing and mapping the Pulemelei mound, which was covered in a thick growth of tree and scrub vegetation, with several small test excavations made around the base of the mound. An area of ca. 20,000 m² was cleared of vegetation during investigations (Figure 3 a, b, c). In Scott’s (1969: 81) initial description of the Pulemelei mound made in 1965, he noted that its shape was essentially unaltered, with only a minor

Figure 3a: Pulemelei mound and surrounding features.
amount of stone collapse as a result of tree fall. Photos of the mound taken between 1965 and 2002 (in addition to photographs of the mound published by Green and Davidson (1969a), plus additional slides and photographs provided by Roger Neich, Peter Bellwood and Arne Skjølsvold) show that some parts of the mound have experienced substantial deterioration, particularly platform corners and wall sections of the base platform.

Description of the Pulemelei mound

The Pulemelei mound consists of a lower base platform on which was built at least two smaller platforms. Of the two smaller platforms the main structure is the top platform. Overall, the prominence of the base platform and top platform give the mound a stepped or two-tiered profile. Detailed mapping of the Pulemelei mound suggests it was constructed, however, in three distinct steps (Figure 4). The first step was the construction of the base platform with a level surface, and a higher wall on the south side than on the north side, due to the prevailing ground slope. A second step was then placed on the surface of the base platform, on top of which the third and final top platform was constructed. The base platform of the Pulemelei mound is 65 m along the east-west axis and 60 m along the north-south axis. The smaller top platform is 41 m along the east-west axis and 32 m along the north-south axis. The entire mound was made from natural volcanic stones that are locally abundant, and no worked stones were identified in the mound.

The stone rubble along the edges of the mound is extensive, but in some areas where ramps or supporting walls were constructed the original walls of the mound have been preserved. The foundation of the base platform was outlined by placing a line of tabular basalt slabs upright in a shallow trench dug into the ground surface (Figure 5). The rectangular foundation outline was then filled by stacking the basalt slabs horizontally on top of the foundation stones until the base platform reached a height of 3-4 m on the south side. As a result of dry stone construction, the platform walls have sides slightly angled away from the vertical.

Above the base platform the stones slope inward, but it could not be determined if there had been one or more additional steps, or if there was a single sloping surface from the base platform to the base of the top platform. Along the south side of the mound just below the top platform there was evidence of a small step, but a corresponding feature was not seen on the north side. The top platform consists of a rectangular area paved with small water-rolled stones, and likely represents the final construction event. On the east
and west side of the mound there are two sunken entranceways, which provide access to the top platform.

Extensive stone outfall caused by structure instability, tree growth and human activity is evident on all sides of the mound. The base platform originally had near vertical sides, but the second platform may have had slightly slanting sides. Due to subsequent wall collapse the sides of the base platform now appear to be steeply sloped. There has been relatively recent removal of stone from the mound to build fences on the east and northwest side of the structure (Figure 6). However, the entranceways on the east and west side of the mound, and the ramp on the south side, were probably constructed after the base platform was built, and indicate alteration of the Pulemelei mound in the past.

Other structures in the vicinity of Pulemelei mound

About 50 m to the north of the Pulemelei mound, and connected to it by a wall or raised walkway, is a smaller mound, we have called the ‘North mound’ (Figure 3a). The North mound is orientated north-south and has a base that is ca. 30 m long and 24 m wide. The top of the mound is ca. 20 m by 12 m, and the mound surface is uneven and appeared unpaved. During excavation, small water-rolled
stones were found close to the mound surface. Due to tree root growth and collapse the paved surface of the North mound has been extensively disturbed. This has not occurred to the same degree on the Pulemelei mound due to more frequent vegetation clearance of the top platform, and the greater height and distance of the mound from surrounding vegetation. On the south side the North mound is ca. 2.3 m high and on the north side it is ca. 0.5 m high. The height difference is due to the slope of the ground surface, which slopes down toward the south. There are several pits on top of the North mound that are probably caused by tree collapse. Just west of the mound there is a raised rim oven with an exterior diameter of ca. 12-13 m (Figure 3a).

There are additional 60 features around the Pulemelei mound that have been mapped and described. These features consist mainly of stone heaps, stone walls, large boulders and small platforms (Figure 3a). One of the stone heaps (F 12) was excavated in the 1960s (Scott 1969:82) and the trench could still be seen in 2004, and another stone heap (F 40) was excavated by us. The stone heaps were thought in the 1960s to mark graves, but no human remains or cultural material were found in excavations below the stone piles, and they most likely represent clearance of surface stones.

The east entrance to the Pulemelei mound is located in an area of level bedrock, with a pavement of smaller stones continuing 25 m eastward. The east pavement has an asymmetric edge, and with its concave sides somewhat resembles a star mound platform. However, stone scavenging for plantation fences may have altered the pavement shape. About 15 m to the east of this pavement is a walled road (fiia i ala). On Jackson's survey map the walled road continues upslope several hundred meters to the north, where his survey ended. Toward the northeast corner of the Pulemelei mound a modern stone fence connects to the mound, with another modern fence at the northwest corner, which continues westward some 60 m. Stones from the mound and nearby prehistoric structures have probably been used to build this fence.

The west entrance to the Pulemelei mound also has an irregularly shaped pavement, but there was insufficient time to fully clear and map it. At the southwest corner of the Pulemelei mound there is a wall or raised walkway, which continues some 60 m to the west. On the north side of Pulemelei is a wall/raised walkway ca. 1 m wide and 0.5 m high, which connects the base platform of Pulemelei with the North mound. This north wall/walkway is joined to another walkway that continues to the west side of the North mound for about 30 m. Midway between the North mound and the Pulemelei mound, and a few metres to the east of the connecting wall, is another pile of stones about 7-8 m in diameter. Near the end of the north wall/walkway is a cluster of large basalt boulders. Similar boulders are found along the north edge of the east pavement near the entrance to the Pulemelei mound. According to the Savai'i-based geologist, Warren Joplin, these large boulders have likely been moved from the riverbed. Such stones have probably been placed intentionally, and might have special significance. To the south of the Pulemelei mound is another pavement area, which was identified as a house platform by Scott (1969:80).

Excavations

Nine test pits, (each 1 m²) were initially excavated around the Pulemelei mound and the North mound in 2002. One test pit close to the Pulemelei mound had a buried earth oven, and single ceramic sherds were found in two test pits, indicating early human activity in the area (Wallin et al. 2002). A total of fourteen test pits and sixteen trenches have been excavated, with a total excavation area of 112 m² (Figure 3a).

Excavation showed that the thickness of the soil deposit varied around the Pulemelei mound, with outcrops of surface bedrock at the east entrance and to the northeast of the mound. At the west entrance the soil depth was over 1 m, but in general the soil around the Pulemelei mound was ca. 60 cm in depth. A natural volcanic outcrop to the south of the mound has probably experienced some levelling of the top soil and been used in the past as a house platform, although all of the postholes mapped by Scott (1969) could not be identified in our investigations.

There is a simple sediment stratigraphy around the mound (Figure 7). The surface layer was a brown-yellowish humus soil mixed with silty-clayish loam 5-10 cm thick. Under this was a dark brown-to-yellow brown silty-clayey loam, with some rounded water-rolled and natural volcanic stones. This layer varied in thickness from 20 to 30 cm and contained scattered charcoal, which was found in almost all excavations. Below this was a dark yellow-brown silty-clayey with natural stones. Near the bedrock the sediment contained more clay. The bedrock was generally found at ca. 60 cm below ground surface.

![Figure 7. Typical stratigraphy in the area (TP 4).](image-url)
Excavation at Pulemelei mound

To investigate the construction of the Pulemelei mound one test pit and six trenches were excavated next to the mound walls at various places around the base platform (TP 1, Trench 1, 2, 3, 4, 13, 16) (Figure 3 a). The excavation trenches revealed the foundation slabs and dry stone wall of the base platform on the south, west and north side of the mound (Figure 5). The foundation stones of tabular basalt were found in Trench 1, 2, and 13, and they varied in size ca. 70-100 cm in greatest length. On the east side of the mound, the volcanic outcrop was used as the wall foundation. One earth oven and scattered charcoal occurred at the foundation level, and two earth ovens were recorded at a depth below the foundation stones, but outside the mound perimeter. An earth oven was also identified under the base platform in Trench 13 (Figure 8 a, b).

Test pit 1 and Trench 1 excavated at the monument foundation level close to the south side of the base platform, uncovered an earth oven and some scattered charcoal. The earth oven is dated by sample (ANU-11891) and scattered charcoal by sample (Wk-13864) (Table 1). A charcoal concentration recovered close to the monument foundation level on the west side in Trench 2 is dated by sample (Wk-13865) (Table 1). An earth oven found in Trench 1 on the south side ca. 35 cm below the foundation level is dated by sample (Beta-172928) (Table 1), and charcoal samples from two earth ovens on the west side of the mound in Trench 3 and 13, also stratigraphically below the monument foundation level, and just outside and under the mound, are dated by two samples (Wk-13869) and (Wk-16640), respectively (Table 1). Trench 4, excavated on the south side of the mound, did not penetrate to the monument foundation stones due to possibility of wall collapse.

Trench 16 was excavated to investigate the construction of the top platform. The stratigraphic sequence disclosed a top layer ca. 10-15 cm thick of small water-smoothed stones ('illi'illi), with larger stones and a sparse and discontinuous deposit of silty-clay to a depth of ca. 60-80cm. At this depth the water-smoothed stones became more prevalent again and at ca. 1.0 m larger stones and silty-clay were again recorded. When clearing the mound of vegetation the roots of several large trees were removed from the top platform. In doing so, a charcoal concentration was found at 60 cm below the top platform. The sample (ANU 11890) (Table 1) was sandwiched between two stones and did not appear to be fragmented charcoal that had infiltrated from the platform surface (Figure 9).

Excavation of the Umu ti, and the North mound

Jackmond's survey map showed a large raised-rim oven to the west of the North mound. Trench 5 was opened to study the structure, which confirmed it was a large earth oven with a size and morphology consistent with an *umu ti* oven (Figure 10). The Trench 5 excavation was 2 x 2 m, and was...
Table 1. Radiocarbon dated samples from the excavations at Pulemelei site. All samples are charcoal.

<table>
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<tr>
<th>SITE</th>
<th>LAB. NO.</th>
<th>AGE B.P.</th>
<th>AGE (1 SIGMA)</th>
<th>AGE (2 SIGMA)</th>
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<td>SS-Le-1</td>
<td>Wk-13866</td>
<td>372±43 AD 1496-1521, 1536-1626</td>
<td>AD 1462-1637</td>
<td>AD 1449-1712, 1718-1813, 1836-1951</td>
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<td>SS-Le-1</td>
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<td>AD 1219-1391</td>
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<td>AD 1204-1092, 1099-1419</td>
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<td>AD 1046-1085, 1110-1272</td>
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<td>AD 1023-1162, 1170-1175</td>
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Excavation of the South 'house' pavement

The surface of the south terrace with a stone pavement (Figure 12) was paved with irregular volcanic rocks. Circular depressions on the stone pavement were identified as postholes by Scott (1969: 80), but only one possible posthole was verified during our excavation. Excavation of Trench 6, 7, 7b, 9, 12, 14 (Figure 3a) showed that beneath dark brown topsoil ca. 5 cm thick, there were a pavement

Figure 10. North-South (top) and East-West (bottom) sections of part of umu ti in trench 5.

ca. 20 cm thick consisting of two stone layers and containing stones ca. 10-15 cm in greatest length. Among the pavement stones were some water-smoothed pebbles 5-10 cm in size, which are typically used for paving house floors today. In Trench 7, the edge of a probable house foundation was found. The foundation edge consisted of eight stones that had been vertically placed in an east-west direction near the southern margin of the pavement (Figure 3a). A ‘thick’ ceramic sherd, fire-cracked stones mixed with charcoal and some water smoothed pebbles, as well as a few stone flakes were associated with this pavement. In Trench 9, a vertical slab and hole is interpreted as a posthole support. A charcoal concentration in the west-central part of Trench 6 has been dated (Wk-13867) (Table 1).

Figure 12. Platform south of Pulemelei with house pavement and earlier settlement activities. (Photo Helene Martinsson-Wallin)
The Pulemelei complex: mounds, house platform and umu tī

Taken together the mapping and excavation work provided new information about the age and construction of the Pulemelei mound. The base platform was outlined with vertical stone slabs and then built up by stacking stone slabs horizontally. The vertical foundation slabs in several of the excavation trenches had tilted outward from the weight of the structure, which suggests that the construction technique was unsuited for large structures (Figure 5). If additional platforms were added to the base platform, as seems likely, then the extra weight would have increased the pressure on the vertical foundation stones. Tilting of some vertical foundation stones caused wall collapse higher up the mound, and earthquakes, which are frequent in Samoa, tree growth, and human activity, have all contributed to structure deterioration.

The west entranceway (and probably the east entranceway) appears to have been late modifications to the Pulemelei mound. Excavation of the rubble edge along the base platform on the west side of the mound found water-smoothed pebbles (‘ili‘ili), similar to those used to pave the top platform. We estimate that the pebble surface was roughly level with the top of the base platform. In addition to results from the excavation, ground penetrating radar results (see Clark and de Biran this publication) also suggested the presence of a distinct layer below the top platform, and it is likely that the Pulemelei mound was constructed in several distinct episodes. The first was the building of a large level platform 3-4 m high on the south side that was paved on top with water-rounded pebbles. The presence of silty-clay with the pebbles probably reflects the inadvertent introduction of sediment from human activity. If so, there is likely to have been a reasonable hiatus between the construction of the base platform and the addition of the smaller overlying platforms. The base platform was higher on the south side and was almost level with the ground on the north side, a platform style similar to that of the North mound (Figure 4).

The excavation and radiocarbon result from the top platform suggests it was a subsequent addition to the mound. The squared shape may indicate a ceremonial function (see Clark and Martinsson-Wallin, this publication), but there was no evidence for postholes that might indicate a temple or god house. However, we acknowledge that given the amount of disturbance evidence of postholes may no longer be identifiable.

Early settlement

Evidence for settlement predating mound building was found to the south and west of the Pulemelei mound, as well as underneath it. The latter two areas were close to each other and they also had similar radiocarbon ages.

On the south side of the mound is a natural terrace with low house platform (see description above) (Figure 12). Beneath this platform the oldest settlement deposit was found, and it was investigated with several trenches (Trench 7, 7b, 10, 12, 14). Under the stone pavement there were at least one occupation layer, and possibly two. The dark charcoal-stained soil in Trench 7 suggested a pit or earth oven. Ceramic sherds as well as a stone cylindrical lug/foot/handle and two grinding stones were found at 30-55 cm depth. Scattered charcoal was present in the trench down to a depth of about 50-60 cm. Below -ca. 60 cm depth it was evident that the dark soil in the northwest part of the trench originated from a deeper earth oven, which had been disturbed at the top. Large pieces of charcoal were collected from the oven and a polished basalt chisel was also recovered. At a depth of 83 cm a piece of pottery was found inside the earth oven. At the base of the earth oven at 97-102 cm depth there were fire-cracked rocks (10-20 cm in diameter) and abundant charcoal.

Two charcoal samples associated with the earth oven, one from Trench 7 and one from Trench 9 (Wk-13868) and (Wk-15501) respectively has indicated a usage of this area going back at least 2000 years (Table 1, Figure 13). Only a small part of the earth oven was present in Trench 7, and it extended into Trench 9 and Trench 12, were there was also charcoal, fire-cracked stones and a few ceramic sherds. Since probably the major part of oven is to be found outside the excavated areas the true diametre of the oven could not be estimated but it seemed to be larger than 2 metres in diametre.

In Trench 14 the cultural layer below the pavement was thinner (ca. 20 cm) than that found in Trench 7, 9 and 12, and only a few ceramic sherds and basalt flakes were recovered. Trench 10 and Trench 11 (Figure 3 a) were excavated to understand the connection, if any, between the evidence for prehistoric activity near the south wall of the Pulemelei mound and that under the south pavement below the house foundation. A posthole and an earth oven were found in Trench 10; a charcoal sample from the oven has been dated (Wk-16642) (Table 1). In Trench 11 there was an abundance of scattered charcoal, but no identifiable features.

The excavations on the south side of the mound revealed human activity prior to the construction of the pavement and house foundation. The dates on the earth oven in Trench 7, 9 and 12, and presence of ceramic sherds point to the area being utilised for settlement 2000 years ago.

On the west side of the mound and under it there were prehistoric remains in Trench 3 and Trench 13 that predate construction of the base platform. Trench 13 revealed vertical foundation stones and under the base platform there were several ceramic sherds, and an earth oven or hearth was dated by sample (Wk-16640) (Table 1) (Figure 8 a, b). The remains all necessarily predate mound building, but probably date from different time periods. Vertical stones, possibly a destroyed house foundation, an earth oven dated by sample (Wk-13869) (Table 1), and a few sherds were found in Trench 3 outside the mound perimeters but below foundation level.

Some leveling of the ground surface below the base platform appears to have mixed remains from earlier activity, and most of the ceramic sherds, for instance, are interpreted as being in secondary deposition. For example,
there were only a few small sherds found in several earth ovens, dating to ca. 1000 BP. The radiocarbon dates from Trench 7 and Trench 9 indicate human activity at ca. 2000 BP. Ceramics, the basalt chisel, small grinding stone and part of a stone tool/handle are clearly associated with the early occupation.

Three earth ovens found between the south pavement and Pulemelei mound, and close to the west entrance, as well as from under the mound indicate a second phase of activity prior to mound building at ca. 1200-1000 BP. In most of the trenches there was a layer of scattered charcoal at about 40 cm depth, which may derive from clearing the ground of vegetation before construction of the base platform. We suggest that the initial construction of the base platform of Pulemelei dates to ca. 900-800 BP. A detailed discussion concerning the dating of the mound and its adjacent remains in relation to the chronology of Samoa prehistory is found in another article in this publication (see page 71).

**Artefactual remains**

The artefacts from the excavations at Pulemelei are sparse and consist primarily of stone tools and ceramic sherds, but nonetheless the assemblage represents the remains of Samoan material culture from some 2000 years of human occupation. The distribution of artefacts is shown in Table 2. The lithics have not been subjected to detailed petrological or chemical analysis, although a larger study including Samoan lithics from excavation and museum collections is planned in the future.

<table>
<thead>
<tr>
<th>Artefacts</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramics</td>
<td>137</td>
</tr>
<tr>
<td>Adzes</td>
<td>5</td>
</tr>
<tr>
<td>Chisel</td>
<td>1</td>
</tr>
<tr>
<td>Grinding Stones</td>
<td>4</td>
</tr>
<tr>
<td>Hammer stone</td>
<td>1</td>
</tr>
<tr>
<td>Cylindric tool/handle</td>
<td>2</td>
</tr>
<tr>
<td>Stone tools/scraper</td>
<td>4</td>
</tr>
<tr>
<td>Worked stones</td>
<td>3</td>
</tr>
<tr>
<td>Cores</td>
<td>2</td>
</tr>
<tr>
<td>Adze flakes</td>
<td>13</td>
</tr>
<tr>
<td>Flakes</td>
<td>47</td>
</tr>
</tbody>
</table>

Table 2. Artefacts found in the excavation.

**Lithics**

Two adzes (Figures 14 a, c), one adze perform (Figure 14 b), and a part of an adze (Figure 18 a), and two hammer stones (Figures 17 a, c) as well a few polished (Figure 18 f, i, g, k, e) and unpolished flakes are temporally associated with mound construction and use. The stone material is a dense fine-grained volcanic stone that has a light grey-green color. According to Leach and Green (1989: 323) most Samoan adzes were made in olivine basalt. The adzes and the preform found in excavations are probably contemporary with use of the Pulemelei mound. In typology the adzes are similar to Types VIII, IX and X (following the typology by Green and Davidson 1969b). The chronology of Samoan adze types is not entirely clear, but the most common is
Type I, which occurs through the entire prehistoric sequence (Hewitt 1980b: 136-7). However, Green (1974a: 253-67) suggests that adze Types II, IX/X and VI are late prehistoric forms. Type V is an early adze type associated with the Lapita settlement complex (Leach and Green 1989:326).

The lithics associated with the oldest settlement under the south pavement were in the vicinity of an earth oven dated to ca. 2000 BP (Figure 13 layer 3). They comprised a chisel (Figure 14 d), the end of a tool/handle (Figure 15 a), a small grinding stone (Figure 16 b). In the upper level of layer 3 were an elongated abrader (Figure 15 b), another part of a separate abrader (Figure 16 c), two basalt cores (Figures 18 l-m), a polished flake (Figure 18 c) and worked stones (Figures 16 a and 17 b,d,e). These might also belong to the earliest cultural deposit. Adze flakes found in association with trench 4 (Figure 18 b), trench10 (Figure 18 h) and trench 13 (Figure18 j) probably belong to the phase of site use dated to ca. 1150 BP that just preceded the construction of the base platform of Pulemelei.

Both the chisel and the flakes appear to have been made from the same type of fine-grained basalt as the adzes. The tool/handle with a round cross-section might be an abrader, or handle of a chisel or pestle. It is made of a dense fine-grained stone, light brown in colour, which is similar to the...
material used to make the small grinding stone. The tool-handle material also resembles that used to make an abrader which was excavated at Mouth Olo (artefact SU/A 17/111 in Auckland Museum). A scraper tool from Trench 14 is made in a dense fine-grained brown stone, another stone type. The end of a narrow abrading tool made in grey basalt and found in Trench 12, might derive from the same type of stone as some of the flakes. The type of abrading tool is similar to those from American Samoa (David Addison, pers. comm. 2005).

Ceramics

In the excavation there were two main areas with pot sherds. One was the cultural layer under the house pavement south of the Pulemelei mound (Trenches 6, 7, 7B, 9 and 12), where sherds occurred under the pavement between 20 cm and 1 m depth, close to the bedrock. The other area with pottery (Trenches 3 and 13) was close to the west entrance, and under the base platform. The distribution of the sherds in the two areas and the variation in thickness among the sherds are seen in Figure 19. In both areas it has been difficult to establish the connection between earth ovens, stone features, and the pottery, since sediment seems to have been mixed and moved around.

The sherds are highly fragmented with only a few rims and one base sherd recorded. However, most sherds were relatively thin with a medium-to-fine temper (less than or equal to 1 mm in diameter) (Figure 20). A few sherds may have a reddish-brown slip, and some have been fire damaged. The ceramics from Pulemelei, although highly fragmented, appear similar to plain ceramics from the Manono, and Jane's Camp, sites analysed by Holmer (1980: 104-16) and Smith (1976). The temper content is ca. 20%, and the composition of the temper indicates that it probably is locally made at the Pulemelei site (see below).

A multivariate statistical analysis of the Pulemelei sherds compared three variables (Table 3, Figure 21), and the results suggested that thin sherds tend to be more fragmented, and were found deeper in excavations than thick sherds. This fits well with the results of

Temper analysis

Two ceramic sherds (one from Trench 7b and one from Trench 3) were studied in thin section by William Dickinson (2005). According to his analysis both sherds have tempers of moderately-to-well sorted and sub-rounded to rounded stream sands, composed almost exclusively of basaltic fragments (polycrystalline with dominantly intergranular internal texture typical of olivine basalt). Microphenocrysts in the lithic fragments include olivine and less common clinopyroxene (augite). Rare monocristalline sand grains of clinopyroxene are also present, as are microlitic lithic fragments (plagioclase microlites set in nearly opaque tachylitic glass) probably derived from chilled lava surfaces or basaltic tephra. Rounded grains of yellowish-to-reddish and partly altered mafic glass from lava rinds or tephra particles also occur sparingly in one sherd. The consistently large size of temper grains (medium to coarse sand) indicates that temper sands were deliberately added by potters to sand-free clay bodies.

The grain aggregates are consistent with derivation from the alkalic olivine basalts of the Salani Volcanics (late Pleistocene to early Holocene) and Puapua Volcanics (late Holocene) exposed upstream in the hinterland of Pulemelei, with the latter source in the Savai'i uplands probably most likely as judged from petrographic descriptions (R.N. Brothers in Kear and Wood 1959).

The sherds are the first from Savai'i to be examined petrographically, and the tempers are distinct from those in sherds from other Samoan islands (Upolu, Tutuila, Ofu).
All Samoan tempers were derived alike from basaltic or associated trachytic source rocks, but the beach sands, colluvial debris, and crushed rock that served as temper in other Samoan sherd suites are unlike the stream sands used for Pulemelei temper. Natural alluvial temper in selected Ofu (Toaga) sherd (Kirch and Hunt 1993) is both texturally and compositionally distinct from the artificially added alluvial temper sand in Pulemelei sherd. Consequently, the Pulemelei sherd tempers are interpreted as indigenous to Savai'i, and are probably sands collected from channels or banks of one of the nearby stream courses (either Seuagagago Stream or Falata River), both of which tap Puapua Volcanics in their headwater reaches.

Table 3. Variables used in the correspondence analysis of the ceramic sherds.

<table>
<thead>
<tr>
<th>Variable group</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Depth</td>
<td>0-20 cm</td>
</tr>
<tr>
<td></td>
<td>21-40 cm</td>
</tr>
<tr>
<td></td>
<td>41-60 cm</td>
</tr>
<tr>
<td></td>
<td>61- cm</td>
</tr>
<tr>
<td>Sherd Area</td>
<td>1) 12-176 sq.mm</td>
</tr>
<tr>
<td></td>
<td>2) 177-539 sq.mm</td>
</tr>
<tr>
<td></td>
<td>3) 540-2500 sq.mm</td>
</tr>
<tr>
<td>Sherd Thickness</td>
<td>Thin. 4-5 mm</td>
</tr>
<tr>
<td></td>
<td>Medium. 6-7 mm</td>
</tr>
<tr>
<td></td>
<td>Thick. 8-12 mm</td>
</tr>
</tbody>
</table>

Figure 18. Lithics found in the excavation: a: part of an adze, b-k: flakes from polished adzes (j reused as a scraper), l-m: cores.
Archaeological assessment of the Pulemelei mound complex

The Pulemelei mound and surrounding prehistoric structures, including the umu ti and North mound, have a layout similar, in some respects, to the high-status settlement unit of Tulaga Fale at Mt Olo (Hewitt 1980a: 42-54). Tulaga Fale is a large, low platform (Platform 6) facing a walled walkway, and at the back of the platform there is a raised walkway connecting it to a smaller platform (Platform 7), which in turn is close to a large umu ti, called Ma'a ti. The large platform at Tulaga Fale is only 90 cm high, although it may have been slightly higher in the past. The Tulaga Fale platform was interpreted as the foundation for a community house (Hewitt 1980a: 50). Platform height is linked to high-status/special function activity, and the higher base platform of the Pulemelei mound suggests a different function from that of Tulaga Fale.

In addition to the parallels found between the Pulemelei structures and those of Tulaga Fale, there are also
similarities in some radiocarbon dates. Two dates from the umu ti (Ma'a ti) at Tulaga Fale had ages of 290 ± 55 BP (UGa 1988) and 440 ± 100 BP (UGa 1987), similar to the determination of 372 ± 43 BP (Wk 13866) on the large umu ti beside the North mound at Pulemelei. A charcoal date from a shallow oven/hearth under the Tulaga Fale platform gave a CRA of 1115 ± 75 BP (UGa-1985), almost identical to a dated earth oven found under the Pulemelei mound with a CRA of 1135 ± 34 BP (Wk-16640). However, at Pulemelei there is evidence for a longer history of human occupation, as well as a more complicated sequence of mound construction than was found at Tulaga Fale. Another large structure in the Letolo area subjected to a preliminary investigation was a defensive wall situated between the two river arms ca. 1.5 km upland of Pulemelei mound. The wall is called Pa Tonga and the preliminary investigations indicated an age of ca. 950 BP (Brandholt and Vuijsters 2004) (Figure 22).

The archaeological results suggest at least four distinct phases of human activity at the Pulemelei mound site, which are summarized below.

1. Early settlement phase: 1500BC–200AD

The early settlement is to be found on the south side of the Pulemelei mound on a soil-covered natural stone outcrop. Archaeological remains consist of earth ovens, plain pottery and stone tools. The remains are interpreted as likely to indicate a dispersed settlement pattern consisting of scattered households spread through the upper and lower reaches of the Letolo plantation.

2. Pre-mound phase: ca. 200–1000AD

From about 200–700AD there were no dated activities found in the excavations. Towards the second half of the so-called “Dark Age” (see Chapter 5) around ca. 700–1000AD, there was sparse evidence for prehistoric human activity. This consisted of a few basalt flakes and earth ovens on the south and west side of the mound, as well as one earth oven found under the base platform of Pulemelei. It is unclear if there was a genuine hiatus in settlement from 2000–1200 BP, or, as seems likely, the pattern of mobile, dispersed settlement continued in the area, but not in the locations sampled by our excavations.

3. Mound construction: 1100–1300AD

The first phase of mound construction began outlining the sides of the base platform by digging a shallow trench and positioning vertical slabs of local basalt in the trench. On top of the foundation stones the walls of the platform were built by stacking volcanic slabs on top of one another. Considering the large size of the base platform it was most likely a ceremonial venue, and might have been the foundation for a religious structure house or chiefly meeting place. The top of the base platform was probably paved with water-smoothed pebbles, and the presence of a clay and pebble deposit at a depth estimated to be level with the top of the base platform, indicates a period of mound use prior to additional platform construction.

4. Ceremonial efflorescence: 1400–1600AD

Intensification of ceremonial activity from 1400–1600AD is represented by the construction and use of a large earth oven (umu ti) near the North mound and the substantial addition of the top platforms to the base platform. These additions elevated the top of the Pulemelei mound 12 m above ground surface on the south side, rendering social activity on the mound top invisible to people at ground level. The east-west orientation of the two entrance stairways also indicates a ceremonial function, as do several other structures such as the ramp-like features on the south and north sides of the Pulemelei mound, surrounding stone pavements (east, south and west sides), and stone walls/walkways, one of which directly connects the North mound with Pulemelei. The top of the North mound is approximately level with the top of the Pulemelei mound, and unlike other areas, has a direct view of the top platform of Pulemelei from the North.

Figure 22. Part of the cleared Pa Tonga wall. (Photo Helene Martinsson-Wallin)
mound. Radiocarbon dates suggest that the top platform may have been built 100-200 years after the North mound (see Wallin, Martinsson-Wallin and Clark this publication).

The presence of several pavement zones at the base of the Pulemelei mound and distinct entrance points to the top platform all suggest that between 1400AD and 1600AD social space around the mound was segregated, and that an important function of the Pulemelei mound was to symbolically diminish these differences through the creation of a shared high-status space on the top platform. If so, the ceremonial activity at the Pulemelei mound during this phase might represent an attempt to forge new socio-political configurations. The pavements and structures round the mound perimeter could have been used to acknowledge and separate different groups, while activities carried out on the top platform would have emphasized collective behaviour and group integration. The coming together of the four Pule titles on Savai'i, mentioned in traditional history, might represent an event requiring the construction of a structured venue, like the Pulemelei complex, for high-status ceremonial-political action.

5. Complex abandonment: 1700-1800AD

The Pulemelei mound and associated structures, like those in other parts of Samoa, were abandoned in the late prehistoric/proto-historic period, marking a major shift in the settlement pattern (Green 2002). The shift is attributed to the effects of European contact that in tandem with indigenous cultural trajectories, we believe, caused significant change to the Samoan political system.

Acknowledgements

We would like to thank the Nelson Incorporated board members, Tui Atua Tupua Tupula Taisi Tamasese Efi and Mr Joe Annandale, Mr Retzlaff and the late Mr Moore, for permission to excavate and for good cooperation. Special thanks go to the two former for their very special interest and support at the site. We would also like to thank the Pulenu’u of Vailoa for permission to continue to carry out our work in 2004. We are also very grateful to our two foremen Ailupu Sclisifano and Latu Ageli and all the workers; Tuvale, Siaki, Fito, Sefo, Tuifaisina Iakopo, Taape, Fetauai Kesi, Mafao, Aso, Tanu, Vi, Lafanu, Vauali, Simi, Vaovao, Lafonga, Taitai, Avia, Alatina, Aiuli, Mr Tuifaisisina Pei, Fetavia, Simi, Sa, Lima, Mafao, Lafoga, Setefano, Pepe, Junior, Silvia, Kalepo, Kiki, Tauete, Talateeti, Tunoa Mataafa, Feuusio Simaka, Tuuanu Savar, Apelila Saer, Vavao Malu, Taitai Fono, Tuivale Mataaea, Kilisi Akekipa, Asiasiga, Siaki, Fito Fareni, Kalepo, Alatina, Sefo, Tuugasala, Lepa Lui, Simi, Avia, and Iakaopo.

The support and finances provided by the board at the Kon-Tiki Museum and the interest in the site by the late Dr Thor Heyerdahl have also been essential to the project.

The archaeological investigations 2002-2003 were under the leadership of Drs Paul Wallin, Helene Martinsson-Wallin, and Geoffrey Clark and the investigation in 2004 were directed by the latter two. Other participants in 2003 were: Drs Bjørnar Storfjell, Alfredo Narvaez, Suseela Storfjell, M A.Epi Suavo’a. In 2004 Dr Antoine de Biran (geophysist), Fil Kand and Olaf Winter (assistant in field) participated. Students were Elin Brødhold (University of Oslo 2003/2004), Tautala Asaua (University of Auckland 2003), Ilse Vuijsters (Götland University 2004).

References


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