

THE *PĀNĀNĀ* OR ‘SIGHTING WALL’ AT HANAMAULOA, KAHIKINUI, MAUI: ARCHAEOLOGICAL INVESTIGATION OF A POSSIBLE NAVIGATIONAL MONUMENT

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The place where Kiopaa stands is the north, or *koolau*; the side of the earth in the direction of the ‘cross-of-stars’ is called the south, or *kona*. This is the old compass [*ke panana kahiko*] by which Hawaiians marked the position of places on land by the positions of the sun, the moon, and the important stars indicated. (Kepelino 1932: 80-81).

INTRODUCTION: THE *PĀNĀNĀ* OR ‘SIGHTING WALL’ OF HANAMAULOA (P.V. Kirch)

In the still-chilly morning of 10 February 1997, I was introduced to the late Rev. Kavika Ka‘alakea, then minister of the Hawaiian Congregational Church, at the ruins of the 1830s Catholic Church at Kahikinui (St. Ynez), Maui.¹ We were both attending a blessing of the stone walled enclosure said to have been the house reserved for the visiting priest during the mid-19th century. As we had arrived early and had some time to pass before all the participants assembled, the Rev. and I began chatting about the surrounding Kahikinui landscape, so visible from this prominent vantage point.² He asked whether we had seen a particular, uniquely shaped and constructed stone wall at a place he called Hanamauloa.³ After verifying that Hanamauloa referred to a broad fan-shaped slope emanating from the base of a massive ‘*a‘ā* lava flow to the east of the bay I knew as Niniali‘i, I replied that I had indeed seen that wall. It had attracted my attention during my first of many visits to this remote area of the coast, accessed by a narrow and extremely rough jeep track. The wall, 8.75 m long, 1.5 m high, and with a carefully constructed rectangular notch taken out of the middle (Fig. 1), was unlike any other Hawaiian stone construction I had seen previously. Moreover, sighting along the wall’s plane of symmetry aligns the notch with a similarly well-constructed cairn (*ahu*) about 65 m seaward (to the south). Upon reflection, after walking around the site and spending some time mapping and photographing it, it seemed that



Figure 1: View of the notched wall or *pānānā* at Hanamauloa; the *ahu* is visible at the shoreline, standing up against the backdrop of the ocean. Photo by P.V. Kirch.

the notched wall together with the *ahu* could plausibly have functioned as a kind of orientation marker.

Rev. Ka‘alakea went on to emphasise the importance of this place in his demeanour and bearing, straightening up his back and gesturing towards the soaring ridgeline of Haleakalā. He recounted that it was in Kahikinui that people first arrived from Kahiki (Tahiti). There was no name to this place before, he said, and the new arrivals “awakened the land” (*e ala ka ‘āina*), calling it Kahikinui (literally ‘Great Kahiki’ or ‘Great Tahiti’). The notched wall, he said, pointed out the sea path back to Kahiki, the ancestral homeland. He called the wall a *pānānā*, emphasising in pidgin English: “You *nānā*, see, go Kahiki.”

I was familiar with the words *pā* and *nānā* in his speech, these being the Hawaiian word for ‘wall’ or ‘enclosure’, a term that can be reconstructed to

Proto-Polynesian language (Kirch and Green 2001: 193-94 and Table 7.7), and the word for ‘look’ or ‘see’ (Pukui and Elbert 1986). The compound term *pānānā*, however, was unknown to me. Rev. Ka‘alakea made it clear that it could be glossed, in one sense at least, as a wall from which one would ‘look, sight, take a bearing’. This he expressed by unmistakable hand movements, delineating a line moving away from his eyes towards the horizon. Thus *pānānā* could, it seemed, be glossed as a ‘sighting wall’ or a wall which aided or was involved in some way in taking a sight line or viewing some other phenomenon from the perspective of a fixed orientation.

Later, upon consulting the definitive *Hawaiian Dictionary* (Pukui and Elbert 1986: 313-14), I was fascinated to find an entry for the compound word *pānānā* with the gloss “compass; pilot; to row here and there irregularly”. Turning to Andrew’s 1865 dictionary, the first published dictionary of the Hawaiian language, I also found the term, with this entry: “PA-NA-NA, s. [substantive noun]. *Pa* and *nana*, to look. A compass, especially a mariner’s compass. 2. A pilot; one who directs the sailing of a vessel; he mea kuhikuhi holomoku” (Andrews 1865: 456).

It seemed a curious thing that Native Hawaiians, upon being introduced to Western seafaring and voyaging concepts in the late 18th and early 19th centuries, would call the mariner’s compass by a term meaning ‘sighting wall’. Unless—and here the hypothesis presented itself—the Hawaiians already had an indigenous tradition of walls constructed expressly as sighting devices to provide orientations for cardinal or other directions, and transferred that term to the Western magnetic compass. Consulting 19th century Hawaiian texts on astronomical knowledge, I found the term *pānānā* also used, as in Kepelino’s notes on the sun, quoted at the beginning of this article, in which he refers to “ke panana kahiko a Hawaii”, ‘the old Hawaiian compass’ (Kepelino 1932: 80-81).

But why a ‘sighting wall’, a *pānānā*, at Hanamauloa, the southernmost part of Maui Island’s coastline? Hanamauloa lies within the ancient district (*moku*) of Kahikinui, literally “Great Tahiti”, arguably named after Tahiti Nui in the Society Islands (Fig. 2). A plan view of Maui Island with its larger and smaller twin volcanoes linked by a low-lying isthmus closely resembles the shape of Tahiti. That early Polynesian voyagers from central eastern Polynesia saw this resemblance and transferred the name Tahiti Nui to this part of Maui seems highly probable. But there is yet a closer link between Kahikinui and the ancestral homeland of Kahiki (Tahiti), one encoded in the *mo‘olelo* or oral history of Mo‘ikeha and La‘amaikahiki, famed voyaging chiefs of the late 14th or early 15th centuries (Cartwright 1929, 1933; Fornander 1916-1920, 1996; Kirch 2010, 2012). Mo‘ikeha, along with his brother ‘Olopana and his brother’s wife Lu‘ukia, made a voyage

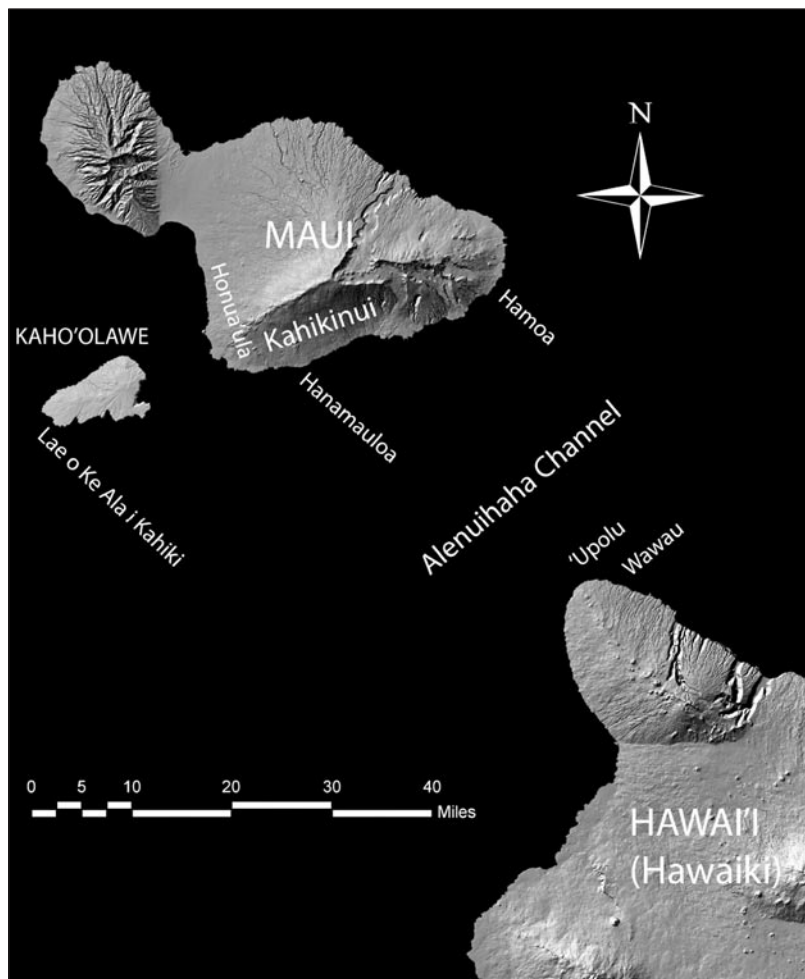


Figure 2: Map of Maui, Kahoʻolawe, and the northern part of Hawaiʻi Island. The *pānānā* is located just above the “H” in Hanamauloa. Various place names relating to the ancestral Polynesian homeland are also indicated.

from Hawai‘i to Kahiki, and dwelt for a time in the land of Moa‘ulanuiākea (Fornander 1916-1920). Before returning to Hawai‘i, Mo‘ikeha fathered a son by a chiefly Tahitian woman. Many years later, Mo‘ikeha dispatched another son, Kila, to sail from Kaua‘i to Kahiki to fetch the now grown son La‘a, and bring him back to Hawai‘i. Kila found La‘a in Moa‘ulanuiākea, and returned to Kaua‘i, after which La‘a became known as La‘amaikahiki (La‘a from Kahiki). La‘amaikahiki stayed for a time with his father on Kaua‘i, but eventually desired to return to Kahiki. Before doing so, he sailed to Maui, and as the tradition recounts:

Laamaikahiki lived in Kauai for a time, when he moved over to Kahikinui in Maui. This place was named in honor of Laamaikahiki. As the place was too windy, Laamaikahiki left it and sailed for the west coast of the island of Kahoolawe, where he lived until he finally left for Tahiti. It is said that because Laamaikahiki lived on Kahoolawe, and set sail from that island, this was the reason why the ocean to the west of Kahoolawe is called “the road to Tahiti.” (Fornander 1916-1920 [IV]: 128)

Is it possible that the *pānānā* at Hanamauloa, Kahikinui, is in some way related to La‘amaikahiki and his return voyage to Kahiki? The hypothesis is certainly intriguing. The possibility that this part of Maui and adjacent Kaho‘olawe Island played a key role in long-distance voyaging between Hawai‘i and Tahiti has been made all the more plausible in light of the recent claim by Collerson and Weisler (2007) that a stone adze collected by Kenneth P. Emory in the Tuamotu Islands was manufactured from basalt geochemically matched with a source on the point of Kaho‘olawe known as Ka Lae o Ke Ala i Kahiki (“The Road to Tahiti”).

Since my discussion with the Rev. Ka‘alakea in 1997, I have investigated and mapped the *pānānā* in detail. Together with my archaeoastronomer colleague Clive Ruggles, we have made two field trips to precisely determine the orientation and possible relationship of the *pānānā* to key astronomical phenomena, especially the Southern Cross. In the remainder of this paper we present the results of an archaeological investigation of the *pānānā* at Hanamauloa, and advance the possible interpretation of the site as an orientation marker. This interpretation is given in the context of a wider consideration of Kahikinui within the “remembered landscape” of Polynesian voyaging. In addition, we are joined by geochronologist Warren Sharp, who has assisted us in dating branch coral associated with the site, giving a possible age of construction or use of the *pānānā*.

HANAMAULOA AND THE KAHIKINUI LANDSCAPE

Hanamauloa is one of the most remote and difficult places to access anywhere along Maui's extensive southern coastline. The high waves and treacherous surf of the 'Alenuihāhā Channel—which crash against sheer lava cliffs punctuated occasionally by tiny boulder beaches—prevent a boat landing in all but rare calm days. Thus to visit the site one must navigate one of the worst four-wheel tracks in Kahikinui, a torturous hour-long trip during which the driver constantly fears a broken axle.⁴ One descends through rough 'a'ā and *pāhoehoe* lava flows dating to about 13,000 years ago (the Alena volcanic flows), sparsely covered at the higher elevations with indigenous dryland shrubs such as *a'ali'i* (*Dodonaea viscosa*) and the endemic *wiliwili* (*Erythrina sandwicensis*) tree. Near the coast the vegetation is limited almost exclusively to wiry grass.

Hanamauloa consists of a gently sloping alluvial fan, the outwash deposited by several small gullies that track inland up to the base of the Luala'ilua Hills cinder cones. The fan is made up of coarse cinder and ash washed down these gullies during the periodic *kona*, or southerly, storms which soak the southern flanks of Haleakalā in the winter months. The alluvial fan forms a shallow veneer over older 'a'ā lava flows which outcrop here and there, especially at the coast.

Arriving in the vicinity of the *pānānā*, one is struck by the spectacular landscape panoramas in every direction. To the southwest the island of Kaho'olawe—from whence La'amaikahiki sailed home to Tahiti—rises up prominently out of the choppy seas. In the west, the long broad slope of Haleakalā is broken by the cinder cones of Pu'u Pīmoe and Pu'u Hōkūkano. Turning clockwise and looking inland, the Luala'ilua Hills cinder cones loom prominently, while in the farther distance the summit ridgeline of Haleakalā is unobstructed (when not veiled by the usual midday cloud inversion layer). To the east the great mountain slopes down to the sea. And to the southeast, across the 'Alenuihāhā Channel, lies Hawai'i Island, whose towering volcanic summits of Mauna Kea and Mauna Loa, along with less prominent Hualālai are all visible in clear weather. Directly south is the unbroken horizon. Every time that we have visited the *pānānā*, these unparalleled view-sheds have awed us; we cannot escape the conclusion that the builders of this unique notched wall chose this location precisely because of the remarkable, unobstructed vistas.

Another fragment of Hawaiian oral tradition alludes to the possible importance of Hanamauloa in the early period of Polynesian settlement of the archipelago. Samuel Kamakau penned the following passage in a discussion of "the coming of the gods":

According to the *mo'olelo* of Kāne and Kanaloa [two of the great gods of ancient Hawai'i], they were perhaps the first who kept gods ('*o laua paha na kahu akua mua*) to come to *Hawai'i nei*, and because of their *mana* they were called gods. Kaho'olawe was first named Kanaloa for his having first come there by way of Ke-ala-i-kahiki [the road to Tahiti]. From Kaho'olawe the two went to Kahikinui, Maui, where they opened up the fishpond of Kanaloa at Lua-la'i-lua, and from there the water of Kou at Kaupō. (Kamakau 1991: 112)

Luala'ilua in this passage can only refer to Hanamauloa, where facing inland one looks up directly at those great cinder cones. Moreover, it is entirely likely that the "waters" referred to were seasonal streamflow in the small gulches which created the alluvial fan at Hanamauloa.⁵ This is the only area along this arid coast where there is any evidence of possible former water flow. Although it is but a fragment, this tradition does suggest some particular importance for Hanamauloa and Kahikinui during the initial period of Polynesian discovery and exploration of the islands.

Finally, from a strictly geographical point of view, it may be significant that the *pānānā* at Hanamauloa lies directly inland of the exact place on the gently curving shoreline of southeast Maui where the island reaches its southernmost extremity (Universal Transverse Mercator [zone 4] 78109E, 227829N). If one wanted to construct a monument in some way associated with a southerly direction or orientation, this would be the ideal location.

THE PĀNĀNĀ COMPLEX AT HANAMAULOA

The *pānānā* is part of a complex of several stone structures and other archaeological features at Hanamauloa, as can be seen in Figure 3. Figure 4 is a map of the complex based on a plane table and alidade survey by Kirch made in 1997.

Feature LUA-27, The Pānānā Wall.

The notched wall designated LUA-27 is 8.75 m long and 1.52 m wide at the base, and stands 1.5 m high above the ground surface. It is oriented east-west but skewed slightly with an azimuth of 4.1°. The wall is built of 'a'ā cobbles and small boulders, carefully stacked so that the wall faces have a slight batter or slope. The skill used in its construction is evident; the wall is one of the most expertly constructed that we have seen in many years of survey work in Kahikinui. The notch is located at the mid point of the wall, and is 55 cm wide.

Careful searching around the wall revealed no signs of midden, lithics or any other cultural materials. The base stones appear to sit directly on the ashy ground surface. Unfortunately, the lack of any cultural materials means that there is no way to date the wall directly.



Figure 3. Aerial view of the Hanamauloa complex from the seaward side. The LUA-29 *heiau* is visible in the foreground, while the *pānānā* can be seen in the near distance.

Feature LUA-28A, Ahu and LUA-28B, Upright Slab.

About 65 m south of LUA-27 is a stone cairn, or *ahu*, situated near the low cliff that drops off to the rocky tidal flat below. This *ahu* is constructed in the same style as the notched wall, with carefully positioned ‘a‘ā cobbles and small boulders, and also exhibiting some degree of batter to its sides. The *ahu* has a base diameter of 1.25 m and a height of 1.05 m.

About 18 m northeast of the *ahu* is a large slab of *pāhoehoe* lava, about 1 m across, which appears to have been artificially set upright in the rubble of the lava flow surface. The slab leans on its side at about 45 degrees, but may originally have been set up vertically.

Feature LUA-29, Notched Heiau.

A first view of the site plan (Fig. 4) suggests that LUA-29 is a typical notched *heiau*, with the notch in the northwest corner, and an opening on the south. (The term “notched” in reference to *heiau* was first coined by Winslow Walker [MS.] to refer to six-sided enclosures, a very common temple form

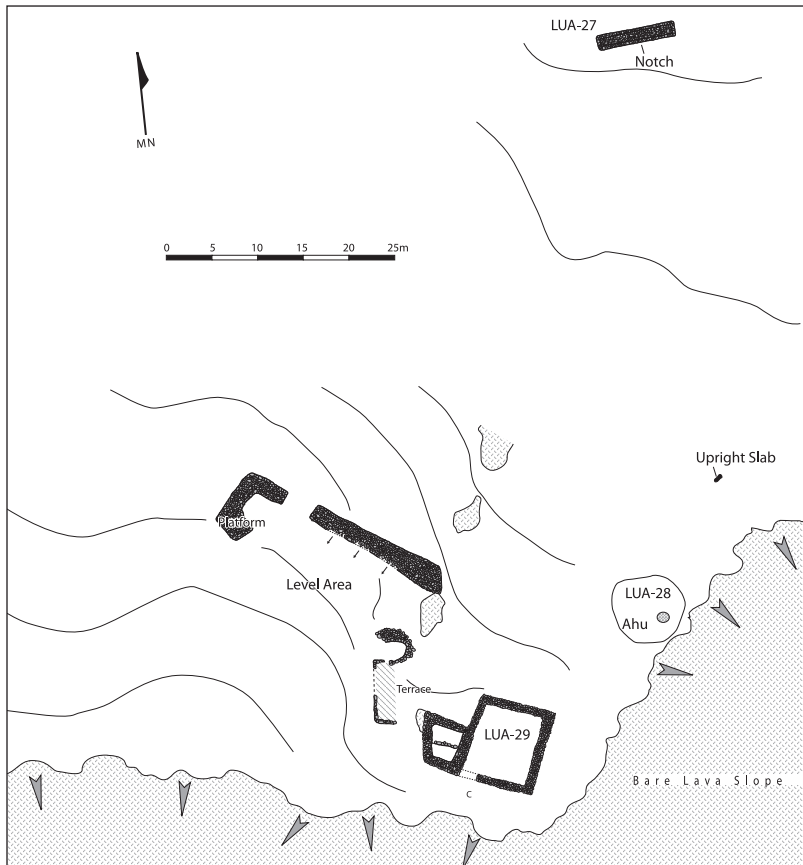


Figure 4. Map of the Hanamauloa complex.

on Maui.) The maximum external dimensions are 14 m east-west and 9.5 m north-south. A more detailed inspection, however, reveals crucial differences between this and most notched *heiau*, because LUA-29 was constructed in two distinct phases. The smaller room or enclosure on the west does not open onto the main court in the eastern enclosure, as would be the case in most notched *heiau*. This is because the western enclosure is actually a *ko'a* or fishing shrine which seems to have existed as a free-standing structure before the construction of the larger eastern enclosure.

Taken by itself, the smaller western enclosure is a classic *ko 'a*, in size and architectural details. Like other *ko 'a* along the Kahikinui coast, its interior is subdivided into two small courts, with the inland or northern court elevated, the two being separated by a single-course stone facing. The seaward court is paved with small *'ili 'ili* (waterworn pebbles), and littered with branch coral and water-worn coral pieces. Several larger water-worn basalt cobbles sit on the upper court along with several entire coral heads; a cluster of *Porites* corals sits on the north wall. A curious architectural detail is the extension of the northwest corner of the *ko 'a* enclosure into a distinct "canoe-prow" point.

The larger eastern enclosure is defined by core-filled walls 1 to 1.5 m thick and about 1 to 1.25 m high. Close examination of the contact of the enclosure's west wall with that of the *ko 'a* strongly suggests that the eastern enclosure was added to and abutted against the *ko 'a*. The south wall of the eastern enclosure has an opening which seems to be a formal entryway. The interior courtyard defined by the eastern enclosure is covered with scattered branch coral and *'ili 'ili*. On the exterior of the north wall, there is also a concentration of branch coral pieces. There are also branch corals at various places on top of the enclosure walls.

Other Features

Immediately northwest of the LUA-29 *heiau* is a low terrace, with a partly collapsed retaining wall on the west side, built into the gentle lava slope. To the north of the terrace there is a small C-shaped structure, open to the west, with a rear wall up to 1.4 m high. Both the terrace and the C-shape look out over a broad flat area, defined on the north by a thick, stacked stone wall 16 m long and 1.5 to 2 m wide. After a gap which may be a formal entryway, the wall continues to the west forming another C-shape structure. This wall and the C-shape appear to bound the flat, level area, which may have been an assembly or seating area for persons witnessing ceremonies taking place at the LUA-29 *heiau*. Such flat assembly areas have been noted on the western sides of other *heiau* in Kahikinui District.

About 66 m west of the LUA-29 *heiau* we noted several grinding depressions in the *pāhoehoe* lava surface. One other feature of note is a single petroglyph, some 130 m northwest of LUA-27. The petroglyph, pecked into the *pāhoehoe* lava, is an anthropomorph 23 cm high with wing-like arms and long lateral extensions for feet. The wing-like arms suggest that it might be a bird-man figure. A search of the area did not reveal any additional petroglyphs.

RADIOMETRIC DATING OF BRANCH CORALS FROM THE PĀNĀNĀ COMPLEX

One aspect of ancient ritual practice at temples (*heiau*) and fishing shrines (*ko'a*) in Kahikinui, as elsewhere in the islands, involved the placing of entire coral heads, or more frequently branches removed from such coral heads, on the altars and walls of these structures. Coral branches were also deposited within the wall fill of religious structures during construction. The species of coral used was typically the branching coral, *Pocillopora meandrina*. Examination of these branch coral specimens on temple sites and fishing shrines in Kahikinui demonstrates that these corals were usually collected from the ocean as living specimens, as their surfaces display a lack of wear or rounding which would have been present if they were collected from beach deposits. Kirch and Sharp (2005) applied high-precision U-Th isotopic dating to selected branch corals from Kahikinui ritual sites, showing that this method could be used to produce a highly accurate chronology of *heiau*. This work has recently been expanded with a larger sample of branch corals from ritual sites throughout Kahikinui district, including samples from sites LUA-28 and -29 (Kirch, Sharp and Mertz in prep.). Methods used to date the branch corals from Hanamauloa are similar to those reported by Kirch and Sharp (2005); here we provide U-Th dates, corrected for ^{230}Th from detritus, with error ranges reported at two standard deviations. Full details of these dates will be published elsewhere (Kirch *et al.*, in prep.).

Unfortunately, a careful search in the vicinity of LUA-27 did not reveal any branch coral specimens. However, three coral branches were observed on the bare lava rock surface in the vicinity of LUA-28, all within a 3 m radius of the *ahu*. All three specimens exhibited substantial weathering on their upper sides because of long exposure to the elements, while their lower sides retained the fresh, sharp verrucae typical of *Pocillopora* corals. The lack of any rounding or wear indicates that the three corals had been collected live and purposefully placed around the *ahu* as offerings of some kind. Specimen LUA-28-CS-2, a branch with intact tips, yielded a U-Th date of AD 1444 \pm 4 years. Of course, this coral does not *directly* date the LUA-28 *ahu*. Most likely, the *ahu* was pre-existing since the corals appear to have been placed around the cairn; thus, the date likely provides a minimal age for the *ahu* itself, and by inference, for the *pānānā* wall.

Kirch and Sharp also collected seven samples of branch coral from LUA-29, the notched *heiau*, and dated three of these (Kirch *et al.* in prep.). Sample LUA-29-CS-1 was embedded within the wall stones at the southwest corner of the western enclosure or *ko'a*, and presumably placed there during construction. It yielded a date of AD 1615 \pm 3 years. LUA-29-CS-4 is a small branch tip which was tightly embedded in the wall at the junction of

the northeast corner of the *ko'a* with the abutted eastern enclosure, and is presumed to have been placed there when the eastern enclosure was added. This sample yielded a date of AD 1658 \pm 2 years. The third dated sample, LUA-29-CS-6, is a branch tip that was embedded in the eastern wall of the eastern enclosure; it had to be "excavated" out by removing some wall stones and clearly was a part of the original wall construction. This sample yielded a date of AD 1660 \pm 2 years, which is indistinguishable from that of CS-4.

The U-Th branch coral dates from LUA-29 are all from samples that were architecturally integrated and should therefore date wall construction. The date of AD 1612-1618 from the *ko'a* indicates that this fishing shrine was constructed some 170 years or more after the construction of the LUA-28 *ahu* (and presumably, the *pānānā* itself). Some 45 years after the initial construction of the *ko'a*, the eastern enclosure was added, in c. AD 1656-1662, transforming this into a classic notched *heiau*.

VIEWSHEDS AND ORIENTATIONS OF THE *PĀNĀNĀ* COMPLEX

Ruggles and Kirch visited the LUA-27, -28, and -29 complex together on 23 March 2003 in order to determine the main structural orientations and their potential significance in relation to the visible topography and prominent asterisms. To this purpose we carried out a Total Station survey using methods well tried and tested in archaeoastronomy (Ruggles 1999a: 164-71), including the accurate determination of true north by timed observations of the sun.⁶ On this occasion the instrument was stationed close to the *pānānā*; we returned with the same instrument on 5 November 2011 to examine the nearby *heiau* more closely and to reaffirm our earlier results.

As we have already remarked, from the complex there are open vistas in all directions. To the east and south (azimuth 81° to 253°) there is a clear view out to sea, with the mountains of Hawai'i Island visible to the southeast when conditions are clear, most typically in the early morning (Mauna Kea summit az 134°, Mauna Loa summit az 149°). The island of Kaho'olawe is visible to the west (az 253° to 270°). Inland, the ground slopes steadily up towards the summit of Haleakalā, whose ridge forms the northern horizon, reaching its maximum altitude (12.5°) just east of due north (az 3.8°). The prominent isolated cinder cone of Pu'u Pīmo'e (538 m), 7.8 km away at ⁷7400 ²²8128 (az 293°), appears on the horizon to the west-northwest. Pu'u Hōkūkano (446 m), a somewhat closer, and redder, cone 3.9 km away at ⁷7834 ²²8086 (az 312°), is visible further uphill to the right; this forms a second prominent horizon feature as viewed from the *pānānā* but from the *heiau* it drops below a more distant horizon.

The *pānānā* is not orientated exactly east-west but skewed clockwise by 4.1 degrees, so that the perpendicular direction, as viewed through the notch

in the *pānānā*, has an azimuth of $4.1^\circ/184.1^\circ$. While this aligns almost exactly to the highest point of Haleakalā to the north (Fig. 5), the opposite direction, out to sea, may well have been the more significant. Although there is a flat sea horizon in this direction, sighting through the notch affords a clear view of the periodic appearance just above the horizon of one of the most spectacular asterisms in the Hawaiian sky: the Southern Cross (α , β , γ and δ Cru), together with the Pointers, Rigil Kantaurus and Hadar (α and β Cen). Figure 6 shows this view through the notch with Southern Cross directly above the upright slab, as it would have been visible in AD 1444.

Within the field of view, in the foreground, are two constructed features that would have stood out prominently with the sea behind them. The first is the stone pillar of the *ahu* (LUA-28A), at azimuth 192.7° from the notch, which continues to stand out prominently today. The second is the upright *pāhoehoe* slab, now leaning, at azimuth 185.1° . Even though they do not cut the sea horizon they seem to frame the stretch of that horizon from c. 185° to 193° and to emphasise that the focus of attention is not upon the exact south point but a span of horizon a few degrees to the west of south.

This might seem surprising if the sighting mechanism had anything to do with the Southern Cross and Pointers, since all stars passing low across the southern horizon reach their point of culmination, and hence will be at their clearest, as they cross the meridian due south of the observer. Neither does this stretch of horizon represent the setting point, since up to around AD 1600 all six stars set at azimuths westwards of 200° . The direction perpendicular to the wall, and that of the upright slab that (to an accuracy of a degree) marks this direction, does, however, indicate the position where the kite-shape of the Southern Cross appears at its most upright, with the highest of the four stars approximately directly above the lowest (Fig. 6). This effect is independent of the date, since the effect of precession is simply to shift the stars downwards as the centuries progress. As the stars proceed westwards on a given night, they reach a point where the Southern Cross is neatly framed between the upright and the *ahu* before they continue to move westwards and eventually sink and disappear owing to atmospheric extinction as they approach to the horizon.

The time of appearance of these stars depends upon the time of year: in December they rise just before dawn but the sky lightens before they reach culmination. From January to June they can be seen passing across the south progressively earlier in the night and by July they are already setting by the time the sky gets dark after sunset. For the remainder of the year they are invisible.

If the southern horizon, out to sea, was the focus of the *pānānā*, what of the *heiau*? Its principal orientation, as judged from the most intact segments of the longer walls, is $33.4^\circ/213.4^\circ$, which suggests a different purpose from

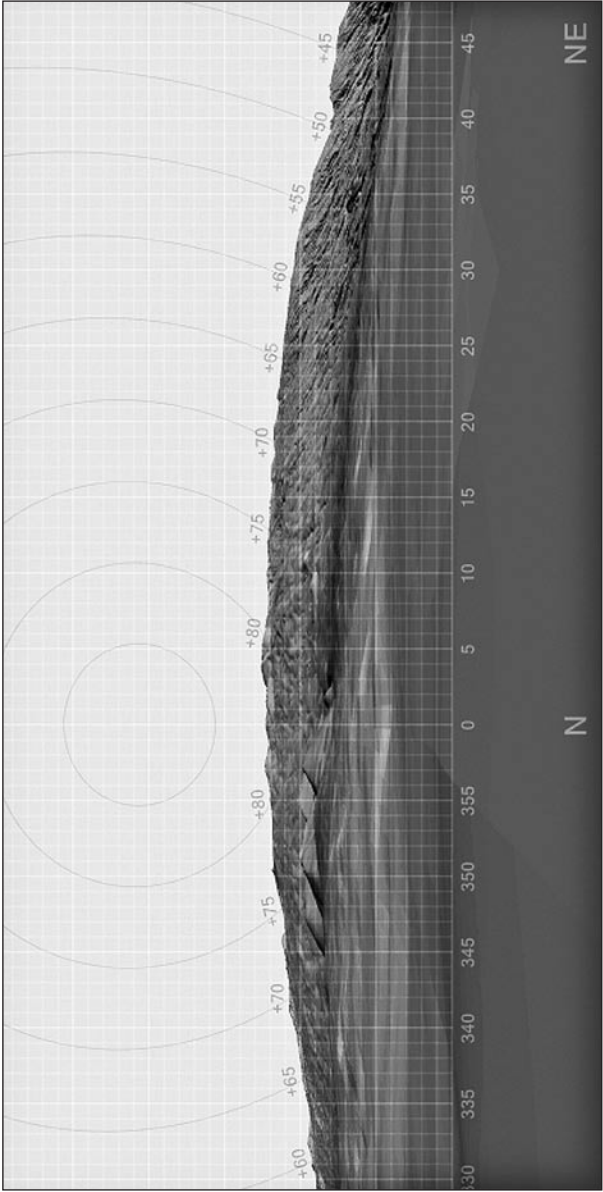


Figure 5. Digital elevation view of the ridgeline of Haleakalā as seen from the position of the *pānānā*.

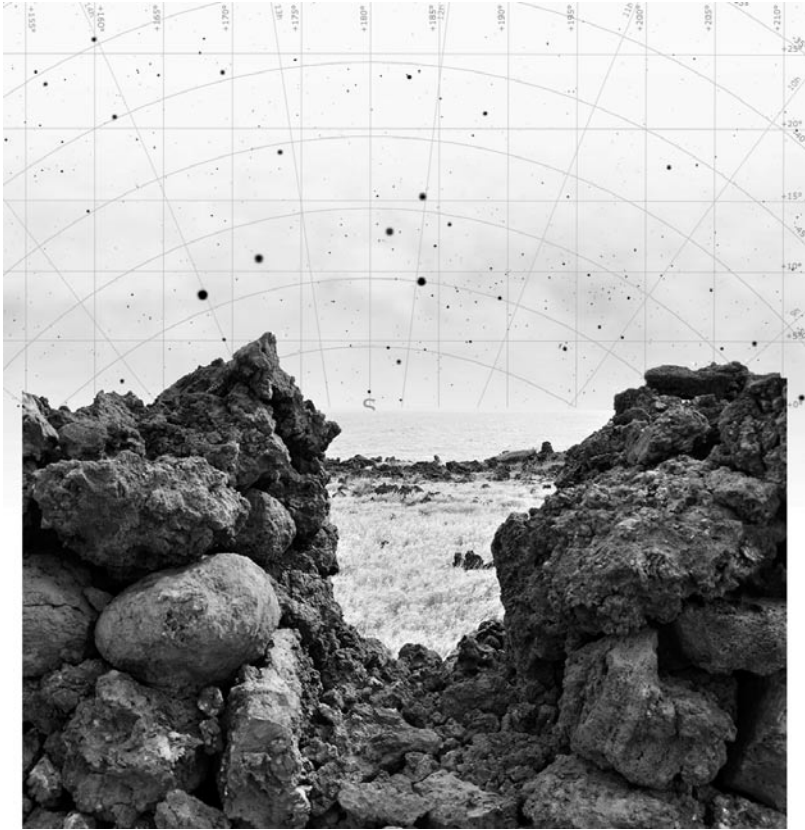


Figure 6. The view southwards through the notch in the *pānānā* wall, with the *pāhoehoe* slab to the left and the *ahu* to the right, superimposed upon a Stellarium reconstruction of the sky at 4:15 am local time on 21 January AD 1444 (Gregorian calendar).

that of the *pānānā*. The orientation of the adjacent walls is less well defined but (as is typical) is not quite perpendicular to this. Consistent wall segment orientations suggest that the intended direction was between $120^{\circ}/300^{\circ}$ and $121^{\circ}/301^{\circ}$. In the west-northwesterly direction this is mid-way between the two cinder cones already mentioned, the prominent Pu‘u Pīmoe at 293° and the less prominent Pu‘u Hōkūkano at 312° .

It is interesting that the second of these cinder cones apparently has a star name (*Hōkūkano*, literally 'proud star' or 'erect star'), but it is not one that is listed in any of the historical sources (see Johnson, Mahelona and Ruggles, in prep.). While the bright star Deneb (α Cyg) would have set directly into this hill between AD 1000 and AD 1600,⁷ there is no independent evidence to attest that this is anything but coincidental. More interesting, perhaps, is that the more prominent cinder cone visible lower down the slope, Pu'u Pīmoe, coincides with the setting point of the Pleiades (Makali'i). Viewed from the *heiau*, the cluster would have set partly into the hill from about AD 1210 onwards, wholly into the hill from about AD 1350 onwards, and directly into the peak between c. AD 1630 and 1790 (Fig. 7). (As viewed from the *pānānā*, the respective dates are AD 1040, 1190, and 1470–1620.)⁸ Pu'u Pīmoe also coincides with the setting position of the June solstice sun, both as seen from the *heiau* (from which the left limb of the setting sun would just touch the top of the hill on the way down) and the wall (from which the sun would set into the lower part of the right-hand slope of the hill).⁹ While we cannot be certain at this point, the pivotal significance of the Pleiades in the ancestral Polynesian ritual cycle (Kirch and Green 2001: 260–73) and the evident importance of solar solstice observations at least in some parts of Polynesia, given recent evidence from Mangareva (Kirch 2004), as well as fragments of evidence from the Hawaiian Islands themselves (Beckwith 1940: 119, Ruggles 1999b), all suggest that the Pu'u Pīmoe cinder cone and its visual linkage to the Pleiades and/or solstitial sun may well have had significance for those who chose to construct the *pānānā*, *heiau* and associated structures at this particular spot.

TOPONYMY AND THE REMEMBERED LANDSCAPE

There is yet one additional set of evidence that we can adduce to the effect that Hanamauloa, and indeed the Kahikinui District in general, held a privileged place in the remembered history of early Polynesian voyaging to Hawai'i. As is well known, the Polynesians had a tradition of transferring the names of important islands or places in their ancestral homelands to newly discovered islands and locales. This is the case with the toponym Kahikinui itself, which we have already noted is a transference of the name Tahiti Nui. Of course, the classic case of toponymic transfer is that of Hawai'i Island, visible across the 'Alenuihāhā Channel from Kahikinui, Hawai'i being a variant of Hawaiki, the ancestral homeland itself (Kirch and Green 2001).

Yet there are several more place names that surround Kahikinui and Hanamauloa—names that index locations visible from the site or bounding it geographically—which all hark back to important ancestral lands. These names are shown on Figure 2, and we briefly describe their significance here:

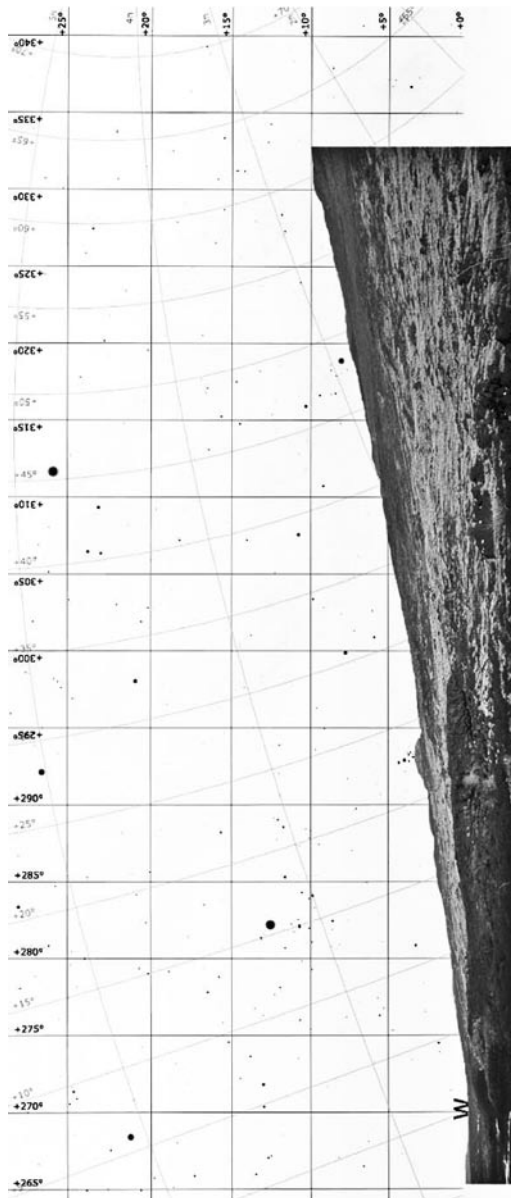


Figure 7. The west-northwestern horizon between azimuths of approximately 268° and 318°, viewed along the southern wall of the *heiau*, showing the prominent cinder cones Pu'u Pimoe in the centre and Pu'u Hōkūkano (right). The view is superimposed upon a Stellarium reconstruction of the sky at 05:16 local time on 2 December AD 1600, with the star cluster Pleiades setting directly into Pu'u Pimoe.

Honua‘ula, literally translating as ‘red land’: The place name Honua‘ula occurs at least six times in the Hawaiian archipelago (Pukui, Elbert and Mookini 1974: 51). On Maui, it is the name of the district (*moku*) adjoining Kahikinui on the west. It is also the proper name of a particularly sacred *heiau* in Waipi‘o Valley, Hawai‘i, seat of the Hawai‘i royal line. Moreover, the name is arguably a very ancient one within Polynesia, with connections to Hawaiiki, the ancestral homeland. Honua‘ula is the Hawaiian cognate for Fijian Vanuakula, which Geraghty (1993: 363) believes to be a synonym of Burotu or Pulotu, another name for the Polynesian homeland. Geraghty cites several sources listing Polynesian variants of this ancient name (Enua-kura in the Cook Islands, Fenua Ura in Tahiti, and Henua Ura in the Tuamotu Islands, for example).

Hāmoa. This is, of course, the Hawaiian variant of the old Polynesian place name Ha‘amoā, indicating the Samoan archipelago. It applies to a bay and former village site in Hāna District, to the east of Kahikinui.

‘Upolu. Applied to the northern point of Hawai‘i Island, across the ‘Alenuihāhā Channel from Kahikinui. This is also the name of one of the two largest islands in the Samoan archipelago. It can be traced back to the Proto Polynesian name *Kupolu, as noted by Pukui *et al.* (1974: 249, Table 1).

Wawau. This name applied to a land section near the ancient *heiau* of Mo‘okini, at ‘Upolu Point on Hawai‘i Island. It, too, is an ancient name also reconstructable to Proto Polynesian (*Vava‘u), and is the name of the northern cluster of islands in the Tongan archipelago (Gifford 1923: 255). Vava‘u was also an older name for Ra‘iatea in the Society archipelago (Pukui *et al.* 1974: 229, 249, Table 1).

Ke Ala i Kahiki, literally, ‘the road to foreign lands, to Kahiki’. This name applies to the ocean beyond the southwestern point of Kaho‘olawe Island. The point itself is called Lae-o-Ke-Ala-i-Kahiki (Pukui *et al.* 1974: 101).

In short, standing at the Hanamauloa *pānānā*, in whatever direction one gazes, that landscape is indexed by an ancient place name. To the east you look towards Hāmoa; across the ‘Alenuihāhā Channel looms Hawai‘i (Hawaiki) with both ‘Upolu and Wawau near its tip; and, to the west is Honua‘ula (Fenuakula, another name for the Polynesian homeland). It seems to us to be more than coincidence that this place in Kahikinui is uniquely surrounded by such a rich toponymic history, a kind of geospatial encoding of ancestral homelands.

* * *

The notched wall and associated *ahu* and upright at Hanamauloa, Maui—said to have been a *pānānā* or ‘sighting wall’ by the late Rev. Kawika Ka‘alakea—is a unique archaeological structure within the Hawaiian Islands. We know

of no other site similar to this anywhere in the archipelago, or for that matter, elsewhere in Polynesia. We have argued that the feature was constructed so that its notch precisely frames the stars of the Southern Cross, with the vertical limb of Crux at 90° to the horizon when it is exactly positioned above the upright slab visible through the notch (Fig. 6).

The Southern Cross, known to the Hawaiians as *Newe* (or *Newa*), was a navigational marker to Kahiki, the ancestral homeland to the south. Makemson (1941: 20), drawing upon Hawaiian oral traditions of the famed navigator Kamahualele (who guided the voyaging chiefs Mo'ikeha and Kila, see Fornander 1916-1920), wrote: "On the return trip from the Hawaiian to the Society Islands the course appears to have been directed south or a little east of south by the stars of the Southern Cross." Similarly, Buck (1938: 255) wrote:

In sailing south from Ke Ala-i-Kahiki, the course was maintained by keeping the North Star (Hokupa [Hōkūpā or Hōkūpa'a]) directly astern. When the Navel-of-Space (Piko-o-Wakea) was reached, the North Star sank into the sea behind but the star *Newe* [Southern Cross] was taken as the southern guide and the constellation of Humu was overhead.¹⁰

Given the importance of the Southern Cross in Hawaiian voyaging traditions, the fact that the *pānānā* marks the direction where it stands upright in the southern sky seems more than coincidental. But the case for the Hanamauloa *pānānā* being a monument to ancient voyaging to and/or from Kahiki is further strengthened by the fragments of oral tradition that have come down to us. Most important is the link between the famous voyaging chief La'amaikahiki and Kahikinui District, as quoted earlier in our article. That La'amaikahiki lived for a time in the land of "Great Tahiti" before his departure for Kahiki (from Ke Ala-i-Kahiki on nearby Kaho'olawe) increases the probability that the *pānānā* was connected to La'amaikahiki. Could it have been built by La'amaikahiki himself, as a reminder to those he left behind of the voyaging route back to the ancient homeland? Or might the *pānānā* have been built later, in memory of La'amaikahiki?

When was the *pānānā* at Hanamauloa constructed? It is impossible to date the notched wall or the associated *ahu* and upright directly. However, the date of AD 1444 ± 4 years on branch coral placed adjacent to the *ahu* suggests that these features are at least that old, if not somewhat older. La'amaikahiki was the son of Mo'ikeha, who himself was one of the grandsons of Māweke, an important founding chief of the O'ahu ruling line (Fornander 1996). Using a 20-year interval for the reigns of Hawaiian ruling chiefs (Stokes 1933), the reign of Maweke is estimated to have been between AD 1310 and 1330

(Kirch 2010, Table 3.1). This puts Mo'ikeha at approximately AD 1350-1370. Mo'ikeha was, however, an old man by the time that his son Kila was sent on the mission to fetch La'amaikahiki from Kahiki (Fornander 1916-1920); it is likely then, that La'amaikahiki's stay in the Hawaiian Islands occurred at the very end of the 14th century, and could even have overlapped into the opening years of the 15th century. This gets us remarkably close to our U-Th dated branch coral at AD 1444.

The other archaeological features at the Hanamauloa complex we know to have been constructed considerably later. In terms of the genealogical chronology of Maui ruling chiefs (*ali'i nui*), the initial *ko'a* at LUA-29 was probably constructed during the reign of Kamalālāwalu, while the eastern enclosure would have been added to form the notched *heiau* during the reign of Kalanikaumakaōwakea (Kirch 2010, Table 3.1). The *heiau* seems to have had a completely different function from that of the *pānānā*, although its location near the notched wall may have been in some manner a recognition of the importance of that monument. The orientation of the *heiau*, towards the prominent cinder cone of Pu'u Pīmoe in Honua'ula—which is also the setting position of the Pleiades—suggests that the *heiau* was related to the annual rites of the Makahiki, whose timing was determined by observation of that star cluster (Valeri 1985).

In sum, the *pānānā* or 'sighting wall' at Hanamauloa on the southern tip of Maui Island in Kahikinui district is unique within the known corpus of Hawaiian archaeological structures. Ethnographic evidence from the late Rev. Ka'alakea combined with our own archaeoastronomical observations strongly support the case for the notched wall having been a navigational monument associated with observation of the Southern Cross, *Newe* in Hawaiian. *Newe* is reputed to have been used as a navigational guide in traditional voyages from Hawai'i to Kahiki. Oral tradition also links the Kahikinui area with La'amaikahiki, raising the possibility that the *pānānā* might have either been constructed by, or in memory of, this famous voyaging chief. Regardless of who built the *pānānā*, it stands as a monument to a fascinating period of long-distance voyaging in Eastern Polynesia.

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supportive of our research over the years and we extend our *mahalo nui loa* to them. Sharp thanks Regina Mertz for help in developing improved methods for U-Th dating of corals. Finally, Kirch thanks the late Rev. Kawika Kaʻalakea for sharing his knowledge regarding the *pānānā* at Hanamauloa.

NOTES

1. The Rev. Kavika Kaʻalakea (1919-1998) was born and raised in the district of Kaupō, to the east of Kahikinui. He was raised as a *punahele* child of his grandmother, from whom he gained much knowledge of this southeastern part of Maui Island.
2. The site of St. Ynez church is on a knoll at about 1,250 feet elevation, a place evidently called Puʻu Aniʻani and said by some local informants to have been the site of a stone temple platform (*heiau*) destroyed to construct the stone-and-mortar walls of the church. From the knoll one has a superb view of the slopes descending to the rocky, wind and surf-attacked coastline, from as far east as Nuʻu Bay and to the west past Alena towards Hanamauloa. This vast coastal zone, dotted with ancient Hawaiian house sites but today barren of a single habitation and mostly treeless, helps to inspire a certain sense—as told to me by a number of Native Hawaiian friends and informants—that the area is inhabited by *ʻuhane*, or spirits of the dead. The Rev. Kaʻalakea mentioned this during our conversation, and said that during his experience of visiting Kahikinui while growing up in adjacent Kaupō he had heard the *ʻuhane* whistling to him.
3. Hanamauloa does not appear in the Pukui *et al.* (1974) compilation of Hawaiian place names, and it is not a name in common use today among the fishermen and others who occasionally visit the area. However, the name does appear on one of the earliest maps of Maui, the 1838 “Kalama” map engraved at the missionary press at Lahainaluna (Forbes 2012: 150-51). The prefix Hana- is a very common form in Hawaiian coastal names, deriving from an old Polynesian term meaning ‘bay’ or ‘place’ (Pukui *et al.* 1974: 245-46). Hanamauloa might be loosely glossed as ‘The Endless Bay’.
4. The Hanamauloa *pānānā* is located within lands controlled by the State of Hawaiʻi Department of Hawaiian Home Lands. Access is strictly prohibited without written permission from the DHHL.
5. When the uplands of Kahikinui formerly had a more substantial vegetation cover, especially before 19th century cattle ranching, it is conceivable that the smaller watercourses descending down the slopes to Hanamauloa had seasonal, if not year-round, water flow.
6. In both surveys we used a Leica TCR705 Total Station loaned by the School of Archaeology and Ancient History at University of Leicester.
7. Viewed from the *heiau*, the summit of Hōkūkano appears at $az=313.5^\circ$, $alt=+6.5^\circ$, yielding a declination of $+42.9^\circ$, while the visible feet of the slopes on each side yield declinations ca. 0.7° greater and lower respectively. Thus a star with

- declination between about +42.2° and +43.6° would set directly into the hill. The declination of Deneb was +42.0° in AD 1000 increasing to +43.9° by AD 1600.
8. Viewed from the *heiau*, the summit of Pu'u Pīmoe appears at az=293.5°, alt=+3.9°, yielding a declination of +23.3°, while the visible feet of the slopes on each side yield +21.7° and +24.5° respectively. Thus a star with declination between +21.7° and +24.5° would set directly into the hill, and one with declination close to +23.3° would set directly into the summit. The Pleiades cluster spanned +21.15° to 21.65° in AD 1200, +21.9° to +22.4° in AD 1400, +22.6° to +23.1° in AD 1600, and +23.3° to +23.8° in AD 1800. From the *pānānā* the declination of the summit is +22.7°, and the whole hill spans a declination range from +21.1° to +23.9°.
 9. Around AD 1200 the disk of the June solstice sun spanned declinations from +23.3° to +23.8°; by AD 1800 this range had altered slightly to +23.2° to +23.7°.
 10. Humu is identified by Makemson (1941: 212) as the star Altair.

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ABSTRACT

A unique stone monument consisting of a notched, linear wall and associated features, situated at Hanamauloa in Kahikinui District, Maui Island, is interpreted as a probable pre-contact navigational structure. Ethnographic testimony refers to the structure as a *pānānā* or 'sighting wall'. Archaeological investigation revealed that the wall and associated cairn and upright are positioned so that the notch precisely frames the stars of the Southern Cross when the constellation is exactly positioned above the upright slab visible through the notch. In Hawaiian traditions, the Southern Cross is known as a guiding star to Kahiki, the ancestral homeland. Precise Uranium-series dating of branch coral associated with the cairn suggests an age of $\text{AD } 1444 \pm 4$ for

construction and/or use of the site. The broader geographical context of the monument is also discussed, including a suite of place names referring to ancestral Polynesian lands. Finally, it is suggested that the *pānānā* may relate to an important figure in Hawaiian oral traditions, the voyaging chief La‘amaikahiki.

Keywords: Archaeoastronomy, Polynesian navigation, Hawaiian astronomy, Polynesian voyaging, La‘amaikahiki