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– ARTICLE –

The Anomaly of Marquesan Ceramics: a Fifty Year Retrospective

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ABSTRACT

Fifty years ago pioneering archaeologist Robert Suggs reported a small number of pottery sherds from the Marquesas Islands. The first such finds in East Polynesia, at the time they were considered indicative of both a Marquesan homeland and local ceramic manufacture. In the intervening years, additional sherds have been recovered from three other Marquesan localities resulting in a total of 14 specimens. Prior petrographic studies demonstrate unambiguously that some derive from Fiji. Others have been interpreted historically as representative of an indigenous Marquesan ceramic industry. Here we bring together key petrographic analyses from Polynesia, recent chronological assessments of the Marquesan sequence, and insights from new field research to reassess the origins and chronology of Marquesan pottery. We suggest that there is little support for an indigenous Marquesan ceramic industry, and most likely all of the specimens are imports. With respect to the timing of ceramic arrivals, three hypotheses are explored: 1) with founding settlers, 2) as a component of long-distance exchange networks operating between the 12th to 16th centuries AD, or 3) as late prehistoric or historic imports. The preponderance of evidence points to the second alternative, although the other two cannot be completely discounted for the assemblage as a whole.

Keywords: pottery, ceramic temper, radiocarbon dating, long-distance exchange, Marquesas Islands

INTRODUCTION

It was with a great deal of excitement that Robert Suggs (1961) reported his discovery of pottery in the Marquesas Islands some fifty years ago, the first and only such finds in East Polynesia of potential indigenous origin. In his view, the handful of ceramic sherds radically changed 'the complexion of Polynesian prehistory' by opening comparisons with West Polynesia, and also Melanesia and Micronesia (Suggs 1961: 95). Even without the benefit of sophisticated petrographic analyses, Suggs developed a coherent argument for an exotic origin of at least some of the Marquesan specimens, and identified Fiji or Tonga as likely source areas. These and other discoveries also raised questions about the possibility of an East Polynesian ceramic industry. Had ceramics been produced early in the Marquesan sequence, but died out before people dispersed to other archipelagos? Could these sherds have been in secondary contexts, with production areas in as-yet-undiscovered localities (Green 1974: 246–7)? If Marquesan pottery postdates ceramic production in the supposed homeland of Samoa-Tonga, where did it originate (Dickinson 2006)?

On this 50th anniversary of the first publication of the Marquesan ceramic finds (Suggs 1961), we evaluate the Haʻatuatua assemblage along with specimens from other localities which have accumulated over the years. Our re-analysis initially stemmed from the combination of a new radiocarbon date and additional field work by Allen and team at a second pottery find spot of Suggs (1961), Hoʻoumi Beach. Subsequent consideration of the stratigraphic and chronological contexts of other Marquesan sherds, some recently revised, suggested that prior interpretations warranted revisiting. Of particular interest were two questions: Was there an indigenous Marquesan ceramic tradition? And when and how did exotic ceramics arrive in the islands?

DISTRIBUTION AND ARCHAEOLOGICAL CONTEXTS

The Marquesas consist of ten volcanic high islands clustered into two groups (Figure 1). At 380 km² and with a maximum elevation of 1224 m Nuku Hiva is the largest, while Hiva Oa is a close second at 320 km² and 1190 m elevation. Geologically, the Marquesan islands are volcanic and dominated by alkalic flows, although tholeiitic and transitional lavas also occur on some islands (Brousse *et al.* 1978). From an indigenous Marquesan perspective, the small island of Eiao, ~80 km north of Nuku Hiva, was particularly important as it was an exceptional source of high quality stone favoured for the production of adzes

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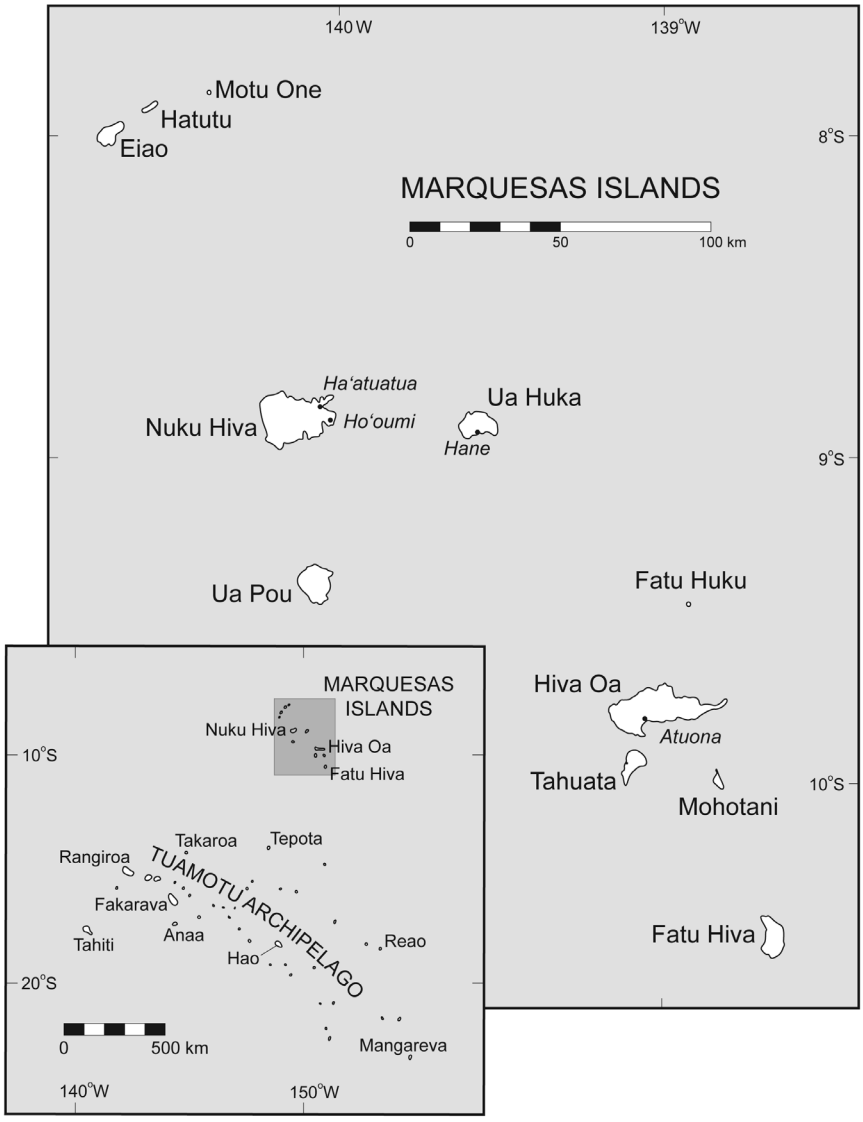

Figure 1. Map of Marquesas Islands with pottery sites identified.

and other flaked stone tools (Linton 1923; M. Charleux, in prep.). Recent studies indicate the archipelago was colonized no later than the mid-12th century AD (Anderson and Sinoto 2002) and probably two to three centuries earlier (Allen and McAlister 2010; see also below).

Fourteen ceramic sherds have been recovered from four Marquesan localities spread across three islands (Figure 1, Table 1). The specimens (Figure 2) are all undecorated, low fired and sand tempered. Some have similar surface treatments. However, they also exhibit some intriguing variation in temper with four recognizable petrographic variants (Dickinson 2006). Moreover, differences have been noted in the quality of the sherds, suggestive of variability in manufacturing (Suggs 1961; Sinoto 1968:115). The finds are reviewed below by locality, with special attention to their stratigraphic proveniences, chronological associations, and morphological and manufacturing attributes. One sigma radiocarbon age ranges are reported in the text to indicate the most likely age attributions, while two sigma age ranges are provided in Table 2.

HA'ATUATUA DUNE, NUKU HIVA ISLAND

Most sherds (n=9) come from the settlement site at Ha'atuatua Dune (Figure 1, Table 1). Five were excavated by Suggs (1961) and another four collected by Sinoto (1970); quite possibly they represent no more than four ceramic vessels (see Table 1). All derive from an area at the southern end of the beach. Suggs' sherds come from a locality known as Te'oho'au, which is referred to archaeologically as Location A. Although the deposit was only about 50 cm deep, Suggs (1961) uncovered numerous human burials (at least 50 individuals), two super-imposed structures, several fire pits and numerous other features, apparently

Table 1. *Details of ceramic specimens recovered from Marquesan sites.*

Original specimen no.	Island	Site	Sherd type	Sherd quality	Original reference	Temper Source[5]	Comments
85-1281[1]	Nuku Hiva	Ha'atuatua Dune, Location A, Unit 550–3	body	well fired	Suggs 1961	assumed to be Rewa Delta, Fiji	no petrographic analysis
85-1281a[2]	Nuku Hiva	Ha'atuatua Dune Location A, Unit 550–3	body	poorly fired	Suggs 1961	undetermined	no petrographic analysis
85-1271[1]	Nuku Hiva	Ha'atuatua Dune, Location A, Unit 558–560, posthole Y	rim	Well fired	Suggs 1961	Rewa Delta, Fiji	mineralogically complex sand
85-1471[2]	Nuku Hiva	Ha'atuatua Dune, Location A, Unit 715-1	body	poorly fired	Suggs 1961	undetermined	no petrographic analysis
85-1492	Nuku Hiva	Ha'atuatua Dune, Location A, Unit 731	body	good quality implied	Suggs 1961	undetermined	no petrographic analysis
85-1061	Nuku Hiva	Ho'oumi Beach, Cut 1, Unit 1061, Layer II	body	Low fired	Suggs 1961	undetermined	basaltic volcanic placer beach sand temper[5]
MN1-23a[3]	Nuku Hiva	Ha'atuatua Dune, Location M	no info	no info	Sinoto 1970	assumed to be Rewa Delta	no petrographic analysis
MN1-23b	Nuku Hiva	Ha'atuatua Dune, Location M	no info	no info	Sinoto 1970	Rewa Delta, Fiji	mineralogically complex sand
MN1-23c	Nuku Hiva	Ha'atuatua Dune, Location M	no info	no info	Sinoto 1970	Rewa Delta, Fiji	mineralogically complex sand
MN1-23d[3]	Nuku Hiva	Ha'atuatua Dune, Location M	no info	no info	Sinoto 1970	assumed to be Rewa Delta, Fiji	no petrographic analysis
MUH1-I86-21	Ua Huka	Hane Dune	rim	no info	Sinoto & Kellum 1965	undetermined	basaltic volcanic placer beach sand temper[5]
MUH1-I86-22[4]	Ua Huka	Hane Dune	rim	no info	Sinoto & Kellum 1965	undetermined	basaltic volcanic non-placer beach sand temper[5]
Sherd 4	Hiva Oa	Atuona Valley	body	low fired	Kirch *et al.* 1988	undetermined	basaltic volcanic alluvial sand temper[5]
Sherd 5	Hiva Oa	Atuona Valley	neck	low fired	Kirch *et al.* 1988	undetermined	basaltic volcanic alluvial sand temper[5]

1 From same vessel (Suggs 1961: 95–96)
2 From same vessel (Suggs 1961: 95–96)
3 These two sherds can be refitted (Dickinson *et al.* 1998: 123, Sinoto pers. comm. 2011) and all four of the Sinoto collection may be from the same vessel.
4 This specimen (see also Anderson *et al.* 1994, Table 5) is the same as MUH1-J86–22 in Dickinson (2006, Table 9) where a typographical error identifies the excavation unit as J86.
5 Petrographic details of source assignments are provided in Dickinson *et al.* (1998) and Dickinson (2006); three sherds that were not petrographically analysed were assigned to a Rewa Delta source on the basis of their associations with analysed specimens (see also footnote 3).

all within a single cultural layer. Most of the burials were associated with the upper part of the cultural deposit, but Suggs argued that three historic interments (Burials 32, 33 and 34) were intrusive. The upper structure consisted of an extensive gravel pavement and a small stone foundation or 'paved paepae' which Suggs interpreted as a 'dance floor or *tohua*'. This overlay an earlier set of postmolds which he considered evidence of pole and thatch structures. One postmold set was associated with a stone alignment and a basalt upright 'erected over the burial of a dismembered man', leading Suggs to suggest that it was a simple East Polynesian temple. The ceramic specimens were evidently recovered from this lower level, possibly in one of two north-south running trenches, which were 20 to 50 ft (6 to 15 m) west of the burial area (Suggs 1961: 62–63, and Figure 21 therein).

Figure 2. The ceramic sherd recovered by Robert Suggs from Ho'oumi Beach, Nuku Hiva Island. American Museum of Natural History (AMNH) catalogue number 85/1061. Photo is courtesy of the Division of Anthropology, AMNH.

Sinoto (1966, 1970) subsequently excavated at the northwest end of Location A. He also encountered post-contact burials but argued:

> On the basis of my observation of the stratification of the burial pit, the cross-sections of the test pits in the pavement, and the photographs taken by Suggs at the time he excavated it is obvious that these burials were not intrusive, but contemporary to the cultural layer of the Historic Period, and that the pavement was built about the time of European contact, if not after contact' (Sinoto 1970:105).

He observed two super-positioned structures, a pavement overlying a row of stones 'which were aligned exactly with Suggs' simple temple structure, but which were embedded in the cultural layer near the bottom, not in sterile sand' (Sinoto 1970:105–6).

A radiocarbon sample from a sand and charcoal lens at the bottom of the cultural layer dated to AD 1292–1400 (1σ) (Table 2, Figure 3). He further suggests that there was an earlier cultural deposit, which he describes as 'a thin, irregular, wind-deposited layer' (Sinoto 1970:106). The sherds recovered by Sinoto, however, were not from these excavations, but surface collected from an area south of Location A which Sinoto called Location M (Sinoto, pers. comm., 2011).

Ha'atuatua was again visited in 1992, 1993, and 1994 by Rolett and Conte (1995; Rolett *et al.* 1997). They excavated in the little-explored Central Dune, ~70 m to the west of Location A, where they identified an intensive cultural occupation (Layer C) overlying a 'diffuse cultural deposit [Layer D] lacking features and extending to a depth of around 1 m below Layer C' (Rolett and Conte 1995:210). In 1993, ten 1 m^2 units were excavated in Location A, followed by a 12 m^2 excavation in 1994 (Rolett *et al.* 1997). Rolett and Conte (1995) labelled Suggs' cultural deposit Layer B, while a lower cultural layer (which they argue Suggs did not identify) was designated Layer C. It is notable that no additional ceramic specimens were recovered during these extensive explorations (Rolett *et al.* 1997:139).

In a preliminary account, Rolett *et al.* (1997:140) suggest that Layers C and D of the Central Dune are comparable to Layers B and C of Location A. Three radiocarbon samples place the lower cultural layer (Layer C/D) between the 8th to 13th centuries AD; a fourth outlier suggests a 15th century AD age. Ages estimates for the upper cultural layer (Layer B/C) are less consistent. In the Central Dune the upper cultural layer (Layer C) is tightly dated to *c.* AD 1289–1427 (maximum 1σ range). In contrast, at Location A, four samples suggest that the upper cultural occupation (Layer B) extends from the early 15th century into the modern era, and a fifth sample with an exceptionally large error range (Sample I-17, 654) dates to AD 1300–1657 (1σ range) (see also Table 2, Figure 3).

In our view, the suggestion that Layers B/C of Location A in the Central Dune represent 'roughly the same time period' (Rolett *et al.* 1997:140) might be reconsidered. Although cultural activities in the two areas may be historically related, the dates suggest that human settlement shifted seaward over time, possibly following a prograding dune. Additionally, the broad age ranges from Layer B in Location A (spanning up to five hundred years), and the superimposed structures observed by Suggs and Sinoto, suggest to us that at least two occupation phases may be represented within Layer B of Location A. Given that Suggs recovered his sherds from the lower part of Layer B (and away from the burial area), we think it likely that they were associated with earlier rather than later cultural activities in Layer B, specifically those dated between the late 13th to early 17th centuries.

With respect to morphological attributes of the Ha'atuatua sherds, Suggs (1961:95–97, Plate 13b) observed that three were well made, but the other two less so. All were fairly small and ranged in thickness from 4 to 11 mm. He noted light wiping striations on some interior surfaces and burnished exteriors on both high (85-1281) and low (85-1471) quality sherds. 'High quality' sherd 85-1271 was a rim, possibly from a bowl or a 'constricted-neck vessel with a flaring, bowl-like rim' (Suggs 1961:96). The 'flattened, swelling rim', shallow groove along the inner lip, and burnished surface finish on specimen 85-1471, a 'poorly fired' specimen, suggested to Suggs (1961:97) affinities with Tongan ceramics as described by McKern (1929), while Green (1968:103 in Sinoto 1970) suggested subsequently that these morphological details were consistent with Samoan ceramics.

HANE DUNE, UA HUKA ISLAND

Another two sherds were recovered from the coastal site

Table 2. *Most reliable radiocarbon dates associated with Marquesan pottery.*

Site	Lab No.	Provenance	Material	$\delta^{13}C$ ‰	Conventional age BP	Calibrated AD age range (2σ)[1]	Original reference[2]	Allen *et al.* comments
Hane Dune	Wk-8594	Area B, Unit M94-40, Layer VI, below Paving 3	Pearl-shell	2.3 ± 0.2	1340 ± 50	982–1266	Anderson & Sinoto 2002: 250, Table 2	Indirect association
Hane Dune	Wk-8590	Area B, Unit M90, Layer VI, 220 cm	Unidentified wood charcoal	–25 ± 0.2	640 ± 130	1045–1616	Anderson & Sinoto 2002: 250, Table 2	Indirect association
Hane Dune	Wk-8595	Area B, square L96-24, Layer VI, below Paving 3	*Cassis* shell	1.9 ± 0.2	1240 ± 50	1055–1314	Anderson & Sinoto 2002: 250, Table 2	Indirect association
Ha'atuatua Dune, Location A	Gak-874 (MRC-120)	Ash and charcoal lens at base of main cultural layer, 45 cmbs	Unidentified wood charcoal	unknown	620 ± 90	1226–1444	Sinoto 1966: 303 and 1970: 106	sherds from lower part of this layer
Ha'atuatua Dune, Location A	I-17,654	Unit E437-N498, Layer B: 980–85 cmbd, hearth (Ftr 45)	Unidentified wood charcoal	–26.6	500 ± 110	1283–1636	Rolett *et al.* 1997, Table 8.1 plus Rolett 1998, Table 3.1	sherds from lower part of this layer
Ha'atuatua Dune, Location A	CAMS-8666	Unit BF371.5 (T-17) Layer B: 110–115 cmbs, isolated chunks	Unidentified wood charcoal	–24.3	490 ± 70	1297–1626	Rolett *et al.* 1997, Table 8.1 plus Rolett 1998, Table 3.1	sherds from lower part of this layer
Ha'atuatua Dune, Location A	I-17, 750	Unit E430-N496 (T-19), Layer B: 941–45 cmbd, earth oven (Ftr 27)	Unidentified wood charcoal	–25.9	390 ± 90	1325–1798	Rolett *et al.* 1997, Table 8.1 plus Rolett 1998, Table 3.1	sherds from lower part of this layer
Ha'atuatua Dune, Location A	I-17,657	Unit E424-N492 (T25), Layer B: 903 cmbd, hearth (Ftr 8)	Unidentified wood charcoal	–26.3	230 ± 90	1481–1954	Rolett *et al.* 1997, Table 8.1 plus Rolett 1998, Table 3.1	sherds from lower part of this layer
Ha'atuatua Dune, Location A	I-17,656	Unit E436-N492 (T-22), Layer B: 987–92 cmbd, hearth (Ftr 14)	Unidentified wood charcoal	–27.2	210 ± 90	1494–1954	Rolett *et al.* 1997, Table 8.1 plus Rolett 1998, Table 3.1	sherds from lower part of this layer
Ho'oumi Beach	Beta-296679	Unit 1061, Hearth 1, 15 inches bs	*Aleurites moluccana* nutshell	–20.2	130 ± 30	1675–1942	this paper	Direct association but pottery may have been in 2° position

1 Calibrated with OxCal 4.1 (Bronk Ramsey 2009). For marine samples the ΔR value of 45 ± 48 was used (Petchey *et al.* 2009) in conjunction with the Marine09 curve (Reimer *et al.* 2009). For terrestrial samples, the IntCal09 Northern Hemisphere atmospheric curve (Reimer *et al.* 2009) was used, following Petchey *et al.* (2009).

2 See individual references for full suite of dates, historical details, and original author interpretations.

of Hane Dune on Ua Huka Island (Sinoto 1966, 1970) (Figure 1, Table 1). These specimens derived from the earliest cultural stratum (VII) of excavation unit I-86, located on the west slope of the main mound in Area B (see also Anderson *et al.* 1994, Table 5). Sinoto argued that this basal cultural layer was not present in the main mound area and represented the earliest cultural activity at Hane.

Sinoto (1970: 108) also recovered other clay specimens from the Hane sand matrix:

> In a level immediately above the pottery-bearing layer, pieces of clay were discovered. Some were hunks and some were pieces that had been broken from vessels, but they were unlike the usual potsherds. Samples of

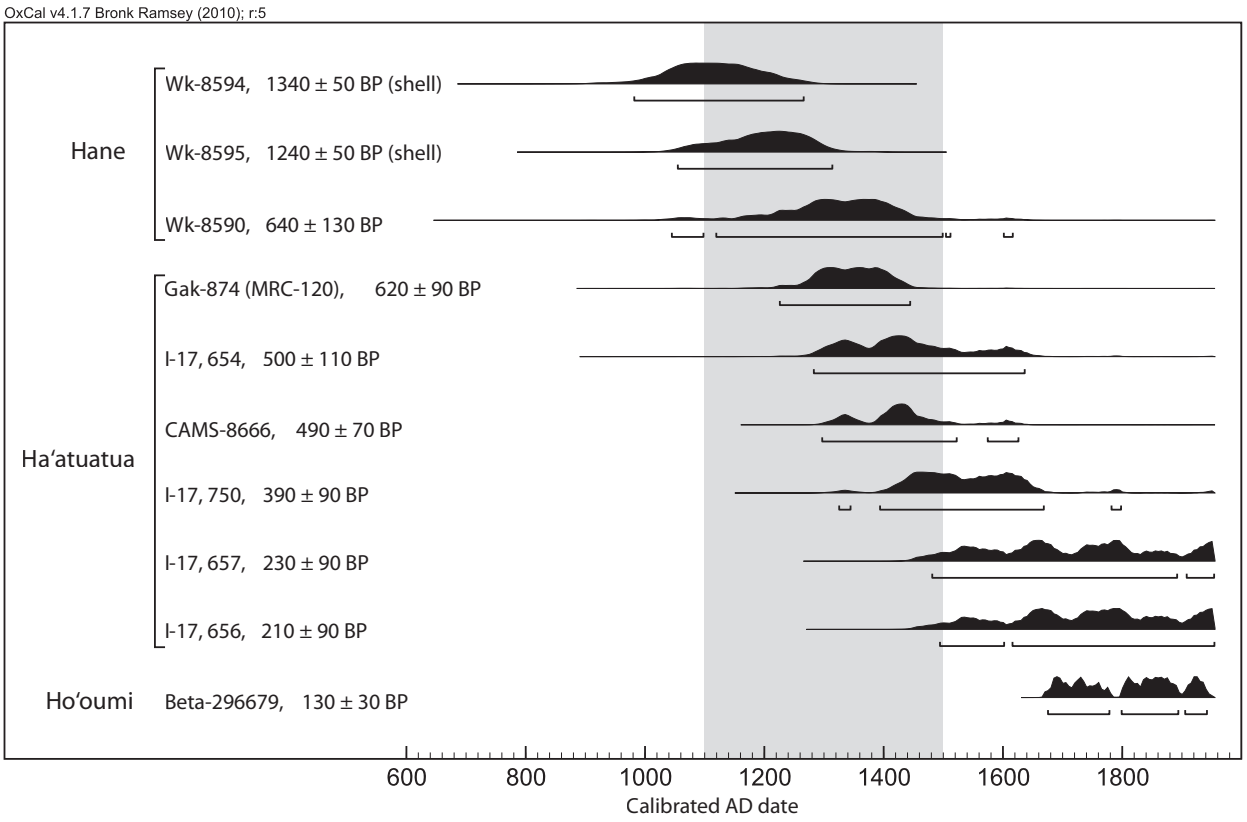

Figure 3. Plot of Table 2 radiocarbon determinations; the gray shading identifies the period when long-distance voyaging was particularly active in East Polynesia as discussed in text.

clay were identified as baked clay, which suggested local production, although there was no clue as to how they were baked.

Anderson *et al.* (1994:46) queried whether these clay specimens were archaeological but it seems from Sinoto's description that at least some are (e.g., those 'broken from vessels'). Anderson *et al.* (1994:46) also raise questions about the stratigraphic integrity of the sherds, suggesting that the western test pits represent 'an area of sand accumulation from the higher parts of the main mound and so the exact provenance of the sherds must remain uncertain.' More generally, they suggest that the activity represented in the basal layer of the western pits is probably contemporaneous with that of Layers V–VI in the main mound area.

A recent assessment of the Hane chronology is provided by Anderson and Sinoto (2002), who ran 10 new radiometric samples, five on unidentified wood charcoal and five on pearl-shell and *Cassis*. Although seven of these were from Area B, none were from Layer VII, whose status as a distinct stratigraphic layer is questioned by Anderson and Sinoto (2002:251). They conclude that the lower layers (V to VII) of Area B are 'not earlier than about A.D. 1000, according to the lower calibrated ranges of the new results, and if actually around the medians would be dated approximately A.D. 1100–1200' (see Table 2, Figure 3). New excavations and chronological analyses by Conte and Molle (pers. comm. 2011) are anticipated to further refine the Hane sequence. Based on the foregoing, the Hane pottery seems likely to date to the early Marquesan settlement period but not necessarily to initial colonisation.

Sinoto and Kellum (1965) originally considered the two small rim sherds to be from the same vessel. The petrographic analysis of Dickinson *et al.* (1998:121), however, indicates otherwise, as one is more fine-grained. Details of the specimens are limited but one sherd is described as a rim of ~2.5 mm thickness at the edge and 9.5 mm at 21 mm below the rim surface (Sinoto 1970:114).

HOʻOUMI BEACH, NUKU HIVA ISLAND

Suggs (1961) also recovered a single sherd from a coastal location in Hoʻoumi Valley (Figure 1, Table 1). Two cultural strata were represented at Site NH03, an upper one (Stratum II) considered to be contemporaneous with a 'megalithic *paepae*' or raised stone house foundation, and a lower one (Stratum I) associated with a 'paved *paepae*' or pavement. The Hoʻoumi sherd was found in the lower stratum of Unit 1061 (Suggs 1961:56) and Suggs' field map (on file at the American Museum of Natural History) depicts it as level with the pavement and adjacent to a hearth. Suggs (1961) dated the pottery-bearing layer by reference

to other diagnostic artefacts including four fishhook types, most of which were late jabbing forms.

Suggs (1961: 96) described the single ceramic specimen (85-1061, Figure 2) as a low-fired body sherd, noting that the interior was coated with a 'limey' concretion. According to his field notes, a fragment of 'brown clay' also was recovered in the unit adjacent to Unit 1061, beneath the 'house floor'. Unfortunately, this sample could not be located during Huebert's visit to the AMNH collections in 2011 (see below).

ATUONA VALLEY, HIVA OA ISLAND

In 1985 two sherds were recovered from an inland site in Atuona Valley, Hiva Oa Island by an amateur collector (Figure 1, Table 1). These were subsequently given to Edmundo Edwards of the *Departement Archeologie of the Centre Polynesian des Humaines of French Polynesia* and eventually passed to Kirch and colleagues (1988) for analysis. The original field context of the sherds is largely unknown, and there are no associated radiocarbon dates or other finds that might give an indication of the site's age.

Kirch *et al.* (1988) described the small sherds in considerable detail and made comparisons with previous finds from the northern Marquesas Islands and other Pacific assemblages. Several distinctive features were identified through morphological and metric analyses, SEM evaluation of the paste structure, and petrographic study. The sherds, measuring 28 × 52 mm and 27 × 43 mm, showed evidence of vessel preparation using a paddle and anvil technique. Thickness attributes suggested that one neck sherd was from a globular pot with a slightly restricted orifice and an everted rim. Prior to firing, the surfaces had been wiped and after firing they were burnished, as with some Haʻatuatua specimens. The temper consisted of alluvial sand, and relatively low firing was indicated. Overall, the anvil marks, surface treatments, thickness ranges, oxidized carbon cores, and use of sand temper in association with coarse pore clays were consistent with Polynesian plainware, although the specimens were suggested to be the product of indigenous Marquesan manufacture (Kirch *et al.* 1988), a reasonable conclusion given the evidence available at the time.

PETROGRAPHY OF MARQUESAN CERAMICS

Dickinson's petrographic analyses of both the Marquesan sherds and other Pacific ceramic assemblages have been pivotal to understanding the origins of the former (Dickinson 2006 and references therein). To date, eight Marquesan sherds have been fully analysed and two main temper groups identified (Table 3). Dickinson and Shutler (1974) suggested initially that three of the Haʻatuatua sherds (85-1271, MN1-23b, and MN1-23c) were from the Rewa Delta region of Fiji, some 5000 km to the west. An indigenous Marquesan derivation was considered implausible for these three sherds given that the sand temper had abundant monominerallic quartz grains and subordinate granitic rock fragments. A 1998 study of ceramic thin sections provided further evidence that the petrographically studied Haʻatuatua sherds were most likely from the Rewa Delta region.

Dickinson *et al.*(1998) also established that three other temper types were represented in sherds from Hoʻoumi, Hane, and Atuona: a placer sand, a non-placer sand, and an alluvial sand (Table 3). Placer sands are made from non-placer sands through the concentration of ferromagnesian grains of high specific gravity by water winnowing in stream channels or on beach faces; placer and non-placer sands of common derivation contain the same grain types in different relative proportions. The three closely related sand tempers from Hoʻoumi, Hane and Atuona are in many respects consistent with derivation from oceanic basalt sources, that is, areas east of the Andesite Line (but see discussion below). Hane sherd MUH1-186-21 and the single Hoʻoumi specimen share a placer sand temper (Table 3). This placer sand temper is found also in two of the Hane 'baked clay' samples (M90 and M92) (see above). A second Hane sherd (MUH1-186–22) contains a non-placer beach sand which is finer grained and a more feldspathic aggregate. The Atuona sherds are tempered with alluvial sands, in which there are considerably less placer concentrations of heavy minerals, and the dominant sand grains are basaltic volcanic rock fragments (Table 3). On petrographic grounds Dickinson *et al.* (1998) originally suggested that all three of these oceanic basaltic tempers were of indigenous Marquesan origin, although post-arc basalt tempers of Fiji are not markedly different petrographically (Dickinson 2006).

NEW EVIDENCE FROM HOʻOUMI BEACH

In early 2011, Huebert visited the American Museum of Natural History and secured a radiocarbon sample from Suggs' archived Hoʻoumi collections, as a preliminary to further investigations by Allen and team at this site. During his original field work, Suggs had opened five excavation areas at Hoʻoumi, all inland of a 'recent stone wall'. The lower stratum, where the sherd was recovered, was dominated by a ~30 by 10 ft (9 by 3 m) stone pavement, which Suggs referred to as a 'paved *paepae*' (Figure 4). While Suggs' field map shows the pottery in direct association with both the pavement and 'Hearth 1', his field notes raise the possibility that roots from a nearby palm may have disturbed the cultural deposit. Consequently, we are not entirely confident that the pottery was in found primary position. In particular, we think it likely that our radiocarbon sample (see below) dates the hearth and pavement, but not the pottery.

In nearby Unit 1060, a fragment of brown clay was located beneath the 'house floor', a presumed reference to the pavement. A hearth about 7.6 cm thick was also

Table 3. *Petrographic characteristics of Marquesan ceramic specimens.*

Temper Types	Recovery locality	Texture of sand temper	Dominant grain types	Subordinate grain types
Mineralogically complex sands				
85-1271	Ha'atuatua Dune	moderately sorted	quartz (26–34%), plagioclase (26–28%, K-feldspar (12–15%)	hornblende (2–8%), epidote (2–4%), pyroxene (1–2%), opaque iron oxides (1–2%)
MN1-23b	Ha'atuatua Dune	moderately sorted	as above	as above
MN1-23c	Ha'atuatua Dune	moderately sorted	as above	as above
Placer beach sand[1]				
85-1061	Ho'oumi Beach	well sorted; rounded to subrounded	ferromagnesian mineral grains: clinopyroxene (49–55%), opaque iron oxides (43–44%)	basaltic volcanic rock fragments (4–7%), plagioclase feldspar (2%)
MUH1-I86-21	Hane Dune	as above	as above	as above
M90 and M92	Hane Dune	well sorted	ferromagnesian mineral grains: clinopyroxene (48%), opaque iron oxides (46%)	basaltic volcanic rock fragments (4%), plagioclase feldspar (2%)
Non-placer beach sand[1]				
MUH1-I86-22	Hane Dune	well sorted; subrounded to subangular	plagioclase feldspar (45%) and ferromagnesian mineral grains (45%)	lithic fragments (10%), brown hornblende (1%)
Alluvial sand[1]				
Sherd 4	Atuona Valley interior	Poorly sorted; subangular to subrounded	lithic fragments (microlitic and microporphyritic)	clinopyroxene, plagioclase, opaques, minor brown hornblende
Sherd 5	Atuona Valley interior	as above	as above	as above

1 These temper types could be, but are not necessarily, consistent with an oceanic basalt derivation.

observed below the house floor and several large chunks of carbon collected (sample #1055). Huebert examined sample #1055 but no short-lived materials could be identified in hand, and our preference was for materials directly associated with the potsherd. The clay and hearth below the house floor are significant, however, as they indicate pre-pavement activities.

From Hearth 1 of Unit 1061, Huebert identified two specimens of *Aleurites moluccana* or candlenut shell, a short-lived taxon. A one centimetre fragment was halved and one part submitted to Beta Analytic for AMS analysis. Beta-296679 yielded a conventional radiocarbon age of 130 ± 30 BP, with a 1σ age range of AD 1683–1936 (see also Table 2). A pre-1800 age seems most likely given that Suggs does not report any associated historic materials.

In June 2011, Allen directed field work at Ho'oumi in an effort to identify early cultural activities at this locality. An attempt was made to relocate Suggs' original excavation area but this was not entirely successful. The immediate coastal plain, extending inland to about 40 meters from the high tide line, had been recently levelled by bulldozing. Despite these disturbances, two large traditional stone foundations remained on the coastal plain. Although neither is indicated on Suggs' Ho'oumi map (1961:56, Figure 16), they are outside his main study area and could have been in heavy vegetation at the time. Further difficulties arose because the area considered the most likely site of Suggs' excavations is now heavily vegetated and the landowners would not allow us entry.

Allen opened four trenches, each about 3 m long, across a 70 m expanse of the coastal flat in the previously bulldozed area. A mechanical digger was used and the sediments trowelled as they were removed. Several buckets of sediment were processed with ¼ inch (6.3 mm) screens. Although considerable disturbance was evident, intact sediments also were located. A 1 m^2 unit was opened off the edge of one trench and excavated with three-dimensional control. Ten litre sub-samples were subjected to flotation

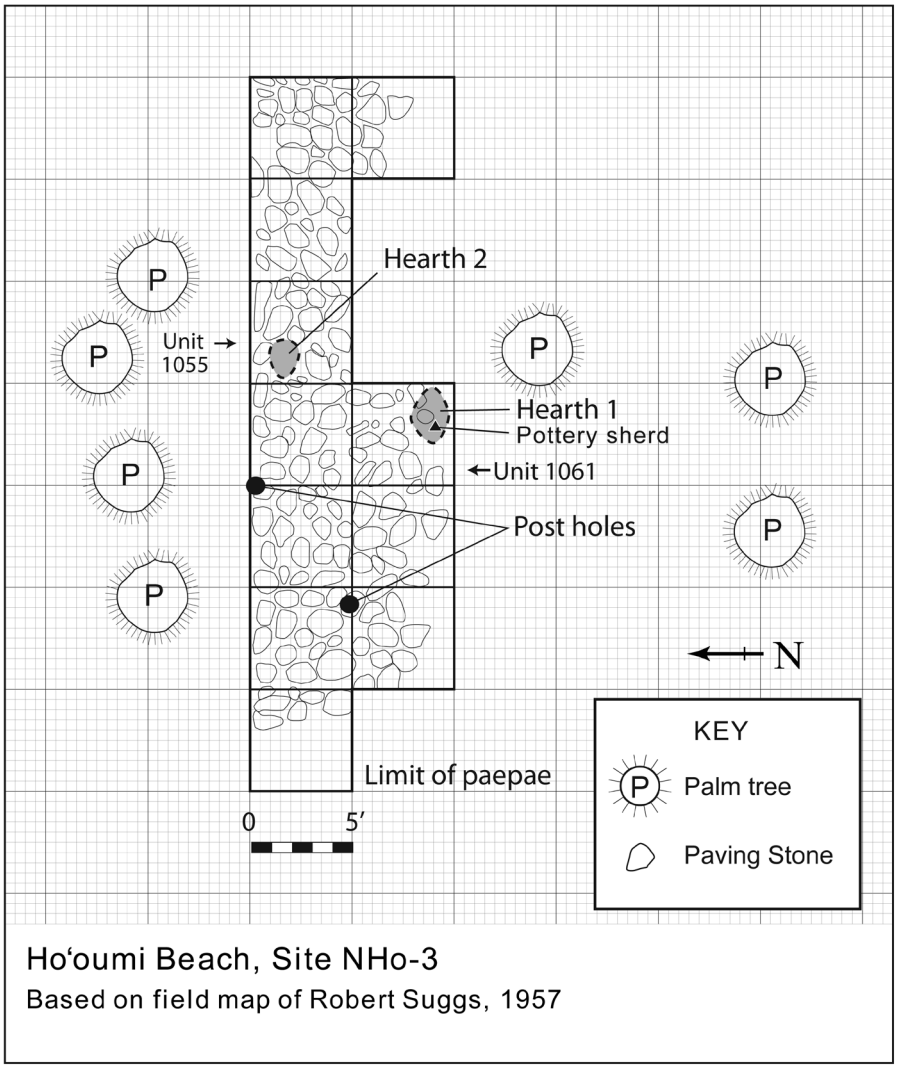

Figure 4. Robert Suggs' field map of a buried pavement in Cut 1, Site NHo3, Ho'oumi Beach showing the location of the recently dated sherd. The original field map was provided by the AMNH and drafted for this publication.

and the heavy fraction processed with 1/8 inch (3.2 mm) sieves, while the remainder was sieved with ¼ inch (6.3 mm) mesh. Profiles were drawn for at least one face of each trench and sediment samples secured. Although the site dates from the 13th century AD, no ceramics were located (Allen, in prep.).

DISCUSSION

For Suggs (1961: 95) the discovery of Marquesan ceramics was 'the most startling [find] of two seasons' fieldwork'. They pointed to a high island homeland, which he assumed was somewhere in West Polynesia, and also knowledge of ceramic technologies during the early period of Marquesan settlement. Dickinson and Shutler's (1974) subsequent temper studies, suggestive of indigenous Marquesan ceramic production, were equally exciting. Fifty years on from those initial discoveries, new information from the pottery find site of Hoʻoumi Beach, new chronometric analyses from several localities, and petrographic studies of tempers from across the Pacific region suggest that ideas about local ceramic production and Marquesan relations with other archipelagos require reconsideration.

Availability of Marquesan Clays

Although some have suggested that the lack of ceramics in East Polynesia might result from the absence of suitable clays, Suggs (1961) provides evidence to suggest otherwise. In 1843, Père Mathias Gracia reported that the bricks used in the French garrison at Taiohaʻe were made from Nuku Hiva clays (in Suggs 1961: 98). Clay also was discovered during Suggs' 1956 archaeological expedition in the banks of Uea Stream (southwest Nuku Hiva Island), formally tested for its ceramic qualities, and found to be suitable (Suggs 1961: 98). The indigenous Uea clay is described as

probably lateritic and with ~20% self temper, including quartz or feldspar crystals, hematite, limonite, magnetite, and pumice fragments. Suggs also cites German geologist Schurig (1930) as suggesting that clays suitable for pottery are widely distributed in the Pacific and the result of weathering, not underlying geology *per se*, a point with which Dickinson concurs.

Origin(s) of Marquesan Tempers

Petrographic studies unambiguously attribute three Haʻatuatua sherds to the Rewa Delta region of Fiji (85-1271, MN1-23b, MN1-23c) (Table 1). Another three (85-1281, MN1–23a and MN1-23d) also may be from the Rewa Delta if the assumption that they are from the same vessels holds. Rewa Delta pottery dating to this time period also has been found in the Lau Islands and the Haʻapai group of Tonga (Best 1984; Dickinson *et al.* 1998:128; Dickinson and Shutler 2000:245). Results from elsewhere indicate that Fijian pottery in general was circulating widely in the post-10th century AD period. For example, a small number of sherds sourced to Navatu on the northern coast of Viti Levu were recovered in Tuvalu, some 1000 km north of Fiji in association with a 'corrected radiocarbon date of AD 1080 ± 70' (on shell) (Dickinson *et al.* 1990). Best (1988) found a probable Fijian sherd 1462 km away in Tokelau dating to around AD 950, while more substantial ceramic transfers occurred between Sigatoka Valley and the Yasawa Islands from AD 950 (Bentley 2000). Once considered too late a time period for the Marquesan specimens, these post-10th century AD movements are now more in line with revised chronologies from at least some pottery-bearing sites (see below).

Small amounts of western Pacific ceramics have made their way into at least one other East Polynesian archipelago as well. Three sherds were recovered from the Anaiʻo site on Maʻuke Island in the southern Cook Islands and one from a *marae* (temple) on Atiu (Dickinson *et al.* 1998:130; Walter and Dickinson 1989). One Maʻuke sherd was extracted from a cultural layer dated between the mid-14th to mid-15th centuries AD, while the other two come from disturbed contexts. The Maʻuke sherds are characterised by pyroxene-rich (70–75%) placer sand tempers and are petrographically similar to ceramics made on Tongatapu. However, ceramic production in Tonga generally ceased around the first few centuries AD, and survived no later than AD 800 on Niuatoputapu (Kirch 1988), raising some unanswered questions about the sherd origins (Walter 1998). Anderson *et al.* (1994:47) propose the Maʻuke sherds arrived after colonization and suggest that this could be the case for the Fijian sherds from Haʻatuatua as well. The chronological association of the Atiu sherd is less certain but the mainly quartzose temper with sparse amounts of oxyhornblende, both as crystals within isolated granitic rock fragments and as separate grains, suggest it could be a Spanish ware (Dickinson *et al.* 1998).

The origins of three other Haʻatuatua sherds (85–1281a, 85-1471, and 85-1492) are more ambiguous. Dickinson *et al.* (1998:121) assumed these also were from the Rewa Delta but did not examine them directly. While this may be the case, Suggs (1961:97) opines that sherds 85-1281a and 85-1471 were poorly made and are likely to have been locally produced. The possibility that these specimens are from some other source warrants investigation, especially given that multiple sources were observed in the even smaller assemblage from Hane.

The five remaining sherds (85-1061, MUH1-186-21, MUH1-186-22, Sherd 4 and Sherd 5) with possible oceanic basalt tempers are also of uncertain attribution, although several possibilities can be excluded. In contrast to the Atiu sherd, those from Hoʻoumi, Hane, and Atuona have little in common with the Spanish ceramics carried by the Mendaña-Quiros expedition (Bedford *et al.* 2009:69–89; Dickinson and Green 1973; Dickinson and Green 1998:293–300), all of which vary considerably in temper type but share quartzose tempers. South America is not a potential place of origin, as there are no grounds to infer that any coastal locales in South America would yield oceanic basalt tempers. Similarly, Tonga is an unlikely source for the Marquesan sherds because no orthopyroxene (as opposed to clinopyroxene) is detectable in the Marquesan tempers, yet it is ubiquitous as 5–20% of total pyroxene in all Tongan tempers known from Tongatapu, Haʻapai, Vavaʻu, and Niuatoputapu (Dickinson 2006, Table 13E; Dickinson *et al.* 1996; Dye and Dickinson 1996). Notably, the Marquesan placer sand tempers are anomalously low in olivine relative to known oceanic basalt tempers from Pohnpei, Rotuma, Uvea (Wallis), and Samoa, and analogous backarc basalt tempers from Anuta and Tikopia in Vanuatu (Dickinson 2006:30–37, Figure 37; Dickinson 2007). For example, the ratio of pyroxene to olivine in the Marquesan sherd tempers is around 50:1, whereas that in Samoan tempers is less than 2:1 and can be as low as 1:4 (i.e., much more olivine than pyroxene).

Further, it is possible that the placer sand tempers found in one Hoʻoumi and one Hane sherd are not, in fact, oceanic basalt tempers from an intra-Pacific basin source (which could include the Marquesas), but rather are post-arc cover tempers from a region such as Fiji. More specifically, the Marquesan placer sand tempers are consistent with post-arc sands from areas of Fiji other than the Rewa Delta, having similarities with pyroxene-rich Fijian post-arc tempers from the north coast of Viti Levu and the northwest coast of Vanua Levu. Like the volcanic sand tempers in Marquesan sherds from Hane and Hoʻoumi, many Fijian post-arc tempers are composed predominantly of clinopyroxene, plagioclase, and opaque iron oxide grains in varying proportions, dependent upon the degree of placering of sand (Dickinson 2006, 2007).

The other possibility is that all or some of the remaining five sherds represent indigenous Marquesan manufacture (Dickinson 2006). The three temper types

where Marquesan origins cannot be conclusively excluded (placer beach, non-placer beach, and alluvial sands) could point to three distinct incidences of localised experimentation with Marquesan raw materials. The Atuona sherds are especially intriguing as the use of alluvial (rather than beach) sands is consistent with the environment where they were recovered (see also Kirch *et al.* 1988). The 'baked clay' samples from Hane also are suggestive, as some appear to represent raw materials rather than finished vessels and the two studied examples contain sand that is indistinguishable from the placer temper of sherd MUH1-186-21. However, given that these specimens are fired, and it is not entirely clear what they represent in formal terms (e.g., vessel fragments, decorations or simply fired clay lumps), they also could be imports.

Perhaps the strongest argument against local production is the small number of sherds (N=14). This led Green (1974) to suggest that all derive from secondary contexts and that primary areas of ceramic production would eventually be forthcoming. However, despite a considerable number of excavations throughout the archipelago over the last twenty-odd years, both in sites where sherds have previously been found and in new localities where deposits pre-date the 14th century AD, neither a primary pottery production site nor any additional sherds have been recovered (e.g., Allen 2004; Allen and McAlister 2010; Conte and Anderson 2003; Conte and Poupinet 2002; G. Molle, pers. comm. 2011; Rolett 1998; Rolett and Conte 1995). Moreover, no additional sherds have been found in well studied mid to late prehistoric contexts either (e.g., Addison 2006; Millerstrom 2001; Molle and Conte 2011; Ottino 2005). Although the possibility that some of the Marquesan sherds represent early experimentation with locally available resources cannot be discounted, the case for indigenous manufacture seems increasingly weak.

Chronological Associations

The chronology of the Marquesan sherds is unfortunately still rather messy. The localities of Hane, Ha'atuatua, and Hoʻoumi all have components that date to the early period of established Marquesan settlement (*sensu* Graves and Addison 1995), roughly between the 11th and 14th centuries AD and possibly earlier (Allen and McAlister 2010: 63). Stratigraphically, all of the materials from Haʻatuatua are *not* associated with earliest use of this locality, as Rolett *et al.* (1997; Rolett 1998; see also Sinoto 1970: 106) identify a lower cultural stratum which was not observed by Suggs (1961). Similarly, Allen's (in prep.) identification of 13th century cultural materials at Hoʻoumi (from a considerable depth) strongly suggests that the Hoʻoumi sherd was also deposited during the post-settlement period. Only at Hane can the pottery be unambiguously associated with first use of the area (Sinoto 1966).

The radiometric evidence in turn indicates a broad temporal span for the recovered sherds. The lowest cultural unit at Hane has been dated recently to before the 13th century AD (Table 2, Figure 3; Anderson and Sinoto 2002). At Haʻatuatua, the most recent dates (Rolett *et al.* 1997) suggest a post-14th century age for the sherds and we argue above that they most likely date between the 14th and 17th centuries AD. The only ceramic sherd with a directly associated radiocarbon determination is that from Hoʻoumi, where a post-16th century result was obtained and in this case, post-depositional disturbances may be an issue (see above).

Colonial or Post-Settlement Introductions

Fifty years ago, when precise radiocarbon chronologies were lacking, Suggs (1961) thought it likely that at least some of the Marquesan ceramics were part of the founding population's tool kit. More recent assessments (e.g., Dickinson 2006) have struggled with the problem of Marquesan settlement estimates dating to a period when likely West Polynesian source areas (i.e., Samoa and Tonga) had discontinued ceramic manufacture. New radiometric estimates tentatively place Marquesan colonisation between the 9th to 12th centuries AD (Allen and McAlister 2010; Rolett *et al.* 1997; Rolett and Conte 1995), a time when Fijian ceramics were widely circulating (Dickinson *et al.* 1998). Thus it is no longer necessary to tie human arrival in the Marquesas to ceramic production in Samoa and Tonga (see Dickinson 2006). West Polynesian islands which received Fijian ceramics during the post-10th century AD period, and in particular Rewa Delta and post-arc islands, might be closely scrutinised as potential source areas for Marquesan colonists. However, as outlined above, only at Hane can a case be made for the arrival of ceramics coincident with initial cultural activities.

The stratigraphic and radiometric associations of the Marquesan sherds suggest that most, if not all, post-date initial colonisation. An alternative hypothesis is that they are one component of the broad exchange networks now well recognised for the early period of East Polynesian settlement (e.g., Allen and Johnson 1997; Rolett 1996; Rolett *et al.* 1997; Walter 1998; Weisler 1998, 2008; Weisler and Sinton 1997). Several long-distance exchange networks have been identified for the region, but by far the most extensive of these originates in the Marquesas Islands and extends over a ~4000 km distance (Weisler 2008) (Figure 5). A crucial Marquesan resource was the high quality basalt of Eiao Island, which was ideal for the manufacture of flaked stone tools. Eiao Island stone was widely distributed within the Marquesas during the 12th to 14th centuries AD (Linton 1923; McAlister 2011; Rolett 1998). Eiao Island adzes have been found also in the Societies (1425 km to south west) (Weisler 1998) and on Mangareva (1750 km to the south) where language and artefact styles also point to significant interactions (Fischer 2001; Green and Weisler 2002; Weisler and Green 2001). Even further afield is the recovery of an Eiao stone adze in the Line

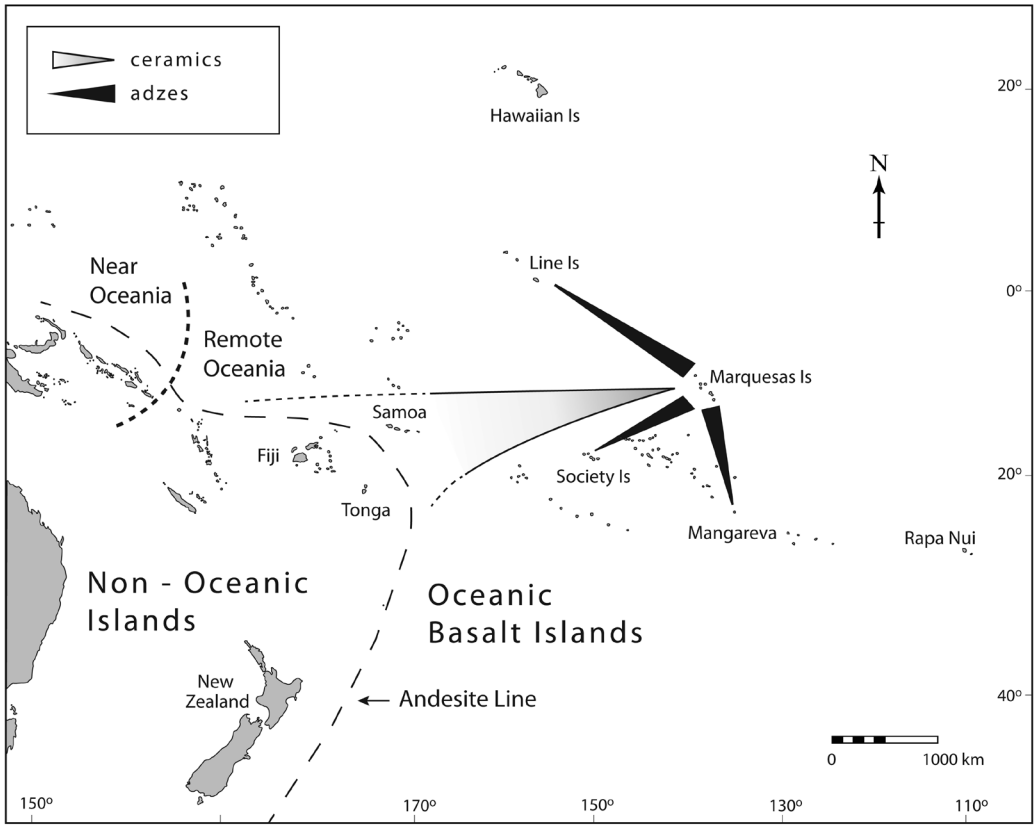

Figure 5. Pacific Map showing the Andesite Line which separates two major temper regions, and the currently known distribution of adzes made from Eiao Island basalt (adapted from Weisler 2008)

Islands, some 2400 km northwest of the archipelago (Di Piazza and Pearthree 2001). Moreover, oral traditions speak of Marquesans voyaging to Rarotonga in the southern Cooks, 2600 km to southwest, to acquire exotic bird feathers (Handy 1923).

Notably, this was also a period of active voyaging and exchange in West Polynesia. Between the 14th to the 17th centuries, fine-grained basalts from Samoan quarries were distributed to Fiji, Tonga, Tokelau, Tuvalu, the southern Cook Islands and elsewhere (Allen and Johnson 1997; Best *et al.* 1992; Clark *et al.* 1997; Leach 1993). From the 15th century AD, if not earlier, the Tongan maritime empire was extending its sphere of influence and becoming increasingly engaged in inter-archipelago expansionist warfare (Aswani and Graves 1998; Burley 1998). By the 15th to 16th centuries its influence extended not only to the northern outliers of West Polynesia, but also touched Niue and the southern Cook Islands. By late prehistory, canoes, barkcloth, whale teeth, red feathers, mats and pottery were among the prestige goods which accompanied royal marriages of political alliance (Kirch 1984). As a whole, these exchange links, along with those identified through the distribution of Eiao Island adzes (Figure 5), date between the 12th to 16th centuries AD. Given these connections, Marquesan acquisition of Fijian pottery, possibly through an intermediary archipelago, is quite plausible.

Finally, it is also possible that some Marquesan sherds represent post-17th century contact with areas to the west. This is an unlikely explanation for the Hane materials, unless both the sherds and 'baked clay' specimens were in secondary contexts. However, it is a possibility for the Ha'atuatua specimens, as the production of Rewa Delta ceramics continued into the historic period. Additionally, the newly reported Ho'oumi radiocarbon determination is consistent with this possibility.

CONCLUSIONS

Prior petrographic study, which demonstrated that at least some of the Marquesan ceramic specimens were produced in the Rewa Delta region of Fiji, finds continued support in this analysis. Other sherds once interpreted as indigenous are now considered more likely to be imports, although a Marquesan origin cannot be completely discounted on petrographic criteria alone. The strongest support for this revised interpretation is the very small number of sherds that have been recovered, despite over fifty years of field studies on multiple Marquesan islands, along with the failure to identify any sites of local ceramic production.

Current chronometric evidence places the Marquesan

sherds in a rather broad time interval. Nevertheless, the stratigraphic records of Haʻatuatua and Hoʻoumi argue against arrival with founding settlers, given the presence of deeper cultural layers at both of these sites and an absence of associated sherds in these stratigraphically early layers. A second hypothesis is that ceramic vessels arrived in late prehistory, or possibly even after European contact. The Hoʻoumi radiocarbon determination is consistent with this interpretation, as are some determinations from Haʻatuatua. However, this is well after the main period of East Polynesian voyaging and there is some evidence to suggest that deteriorating climate conditions after the 15th century AD discouraged open-sea travel (Bridgman 1983).

The hypothesis that most comfortably fits the available evidence is that ceramic vessels were acquired, probably indirectly, in the course of long-distance voyaging and exchange between the 12th to 16th centuries AD. This possibility was first entertained by Rolett (1996), and is now supported by other lines of evidence. In particular, the identification of adzes of high quality Eiao Island basalt thousands of kilometres from the source, identifies the Marquesas Islands as an important node in regional East Polynesian interaction spheres. This was a period when West Polynesians were engaged actively in inter-island travel and expansionist activities and the East-West Polynesian 'boundary' was relatively porous. When placed in this context, the Marquesan sherds are no longer anomalous but rather are part of a remarkable Polynesian-wide record of long-distance voyaging and interaction.

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