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Cover image: Double-petal form of *kaute*, Potaka Marae, Takitumu District, Rarotonga, southern Cook Islands. Photograph by Gerald McCormack.

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THE TRANSFER OF KŪMARA (*IPOMOEA BATATAS*) FROM EAST TO SOUTH POLYNESIA AND ITS DISPERSAL IN NEW ZEALAND

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ABSTRACT: Whether kūmara 'sweet potato' (*Ipomoea batatas*) arrived in South Polynesia with initial colonisation or later is discussed in the light of recent evidence from East Polynesia and by examination and statistical modelling of radiocarbon ages associated with kūmara arrival and dispersal in New Zealand. Largely unresolved difficulties in radiocarbon dating of horticultural sites preclude reaching a secure conclusion about the relative timing of kūmara introduction, but strong evidence emerges of delayed dispersal southward and inland of kūmara cultivation. In the short New Zealand chronology this may have been more significant than the date of arrival for the role of kūmara cultivation in economic and political change.

Keywords: kūmara (*Ipomoea batatas*), sweet potato dispersal, South Polynesia, Māori gardening, ^{14}C calibration models, New Zealand

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The Oceanic history of the arrival and dispersal of the South American sweet potato (*Ipomoea batatas*) or *kūmara* in Polynesia has been discussed since the mid-eighteenth century but never resolved satisfactorily (Ballard 2005). In fact, resolution seems further away than ever in uncertainty about whether kūmara reached Polynesia by natural or cultural agencies (e.g., Muñoz-Rodríguez *et al.* 2018) and, if the latter, whether by Amerindian seafaring or Polynesian return voyaging (Anderson *et al.* 2007; Green 2005). Leaving those matters aside, there is an equally unresolved issue about the history of kūmara within Polynesia, especially in Hawai'i, Rapa Nui (Easter Island) and New Zealand, which were not only the most remote islands where kūmara was cultivated but also the only island groups where it became "a food product of importance" (Dixon 1932: 49). How kūmara cultivation influenced the emergence of different societies at the vertices of the Polynesian triangle is a topic that has been explored in East Polynesia

(Kirch 2010; Vitousek *et al.* 2004) but not so much in New Zealand (Anderson 2016), where kūmara was even more the dominant crop but had less favourable growing conditions.

Of a small range of cultigens in New Zealand, taro (*Colocasia esculenta*), *uwhi* 'yam' (*Dioscorea alata*), *tī pore* (*Cordyline terminalis*) and *aute* 'paper mulberry' (*Broussonetia papyrifera*) could be grown in about 15 percent of the land area (without regard to elevation or soils), but kūmara, and to some degree *hue* 'bottle gourd' (*Lagenaria siceraria*), extended cultivation potential to about 45 percent of the area (Anderson 2014: 119). How far such potential could be realised depended *inter alia* upon when kūmara arrived and how rapidly cultivation expanded. In New Zealand, late arrival of kūmara had been advocated (Duff 1956: 6, 12–21, 253–54; Ferdon 1988; Green 1970 thought so initially) and also rebutted (see Barber 2004). By the late twentieth century it was accepted that all the introduced cultigens had been present since the beginning of colonisation (e.g., Anderson 2014: 82; Furey 2006: 6–16; Leach 1984).

That was also the accepted conclusion in East Polynesia until Hather and Kirch (1991) argued that kūmara arrived in central East Polynesia at AD 1000, which made it significantly later than proposed colonisation ages (Kirch 1986). The gap diminished as colonisation ages became progressively younger with critical analysis of radiocarbon chronologies (Anderson 1991, 1995), and then disappeared with ages of AD 1000–1200 for East Polynesia (Allen 2014; Anderson *et al.* 2019; DiNapoli *et al.* 2020) and AD 1230–1315 for South Polynesia (Schmid *et al.* 2018; Walter *et al.* 2017; Wilmshurst *et al.* 2011). However, new radiocarbon ages for East Polynesian kūmara suggest that its chronological *pas de deux* with the arrival of people might return to separation in East Polynesia, with important implications for South Polynesia (Anderson 2000).

In considering this problem we propose, on the basis of East Polynesian data, that kūmara might not have reached New Zealand until around AD 1400 and seek to test that hypothesis by analysis of radiocarbon ages, particularly from significant cases in historical and recent research. We review East and South Polynesian radiocarbon ages associated with kūmara in their archaeological contexts and on the capacity of samples to provide reliable ages, then model trends in the timing of kūmara cultivation in New Zealand, regionally and by coast and interior.

KŪMARA ARRIVAL IN EAST POLYNESIA

Human colonisation of central East Polynesia during the first millennium AD is thought to have involved cultivation of west Pacific cultigens until East Polynesian voyagers sailed to Ecuador, bringing back kūmara around AD 1000–1100, which then spread to Mangareva, Rapa Nui, Hawai'i and New

Zealand (Green 2005: 46–47, drawing substantially upon Buck 1954: 321–24). Green's model, "close to the last word" according to Yen (2005: 185), took its key radiocarbon data for kūmara arrival from Tangatatau rockshelter, Mangaia (Cook Islands). In the main excavation there, carbonised *Ipomoea batatas* occurred to level E30/11 of zone SZ-4A but was not radiocarbon dated. Instead, from level E30/13 below, largely unidentified charcoal was assayed (1σ) to AD 988–1115 (Beta-32826), and from F30/10 above, to AD 1409–1440 (Beta-32818). Charred kūmara tissue in excavation F10 was bracketed by charcoal ages of AD 1162–1280 (Beta-32828) and AD 1327–1428 (Beta-32829). The results were seen as "unequivocally establishing the presence of *Ipomoea batatas* in central eastern Polynesia by around AD 1000" (Hather and Kirch 1991: 892). Although that date was at the oldest error margin of the oldest age, from below the lowest kūmara occurrence, and unrepresentative of the assay range (Wallin 1999), it was said to be supported "by many additional, although not yet published ^{14}C ages" Green (2005: 50; they remain unpublished) and widely cited as "a crucial piece of new evidence that anchors all present reconstruction of prehistoric sweet potato transfer in Oceania" (Ballard 2005: 5).

In a new Tangatatau dataset (Kirch 2017), kūmara parenchyma from zone SZ-8 is dated AD 1463–1625 (UCIAMS-164896), and the age of kūmara in SZ-4 is estimated from Bayesian boundary estimates (HPD) for overlying SZ-5 (AD 1416–1483 and 1460–1492) and underlying SZ-3 (AD 1365–1405 and 1395–1446) which date the earliest kūmara to after AD 1400 (Kirch 2017: 82–86). Thorium isotope (^{230}Th) ages on coral abraders from SZ-3 and SZ-5 (Niespolo *et al.* 2019: 24) also indicate that SZ-4 is early fifteenth century.

At present, all Hawaiian samples date to the fifteenth century or later (Coil and Kirch 2005: 74; Ladefoged *et al.* 2005), with one exception. Carbonised plant tissue from Kohala trench 50, dated AD 1290–1430 (B-208143), has characteristics of *Ipomoea batatas* but cannot be distinguished from yam or an indigenous species of *Ipomoea* (Ladefoged *et al.* 2005: 368). Research at Kealakekua in the Kona field system indicates that agriculture began after AD 1400, with continuous cultural burning beginning about AD 1450 (McCoy *et al.* 2017), and that swiddening was underway in the Kohala system "certainly by AD 1400" (Ladefoged *et al.* 2020: 13). Kūmara starch grains in Kona soil samples dated "possibly as early as the fifteenth century AD" (Horrocks and Rechtman 2009: 1118). McCoy *et al.* (2017: Supplement) notes that one type of starch found at Kona could be either kūmara, giant taro or arrowroot, although it was assigned to kūmara on contextual evidence.

In Rapa Nui, unidentified charcoal from an earth oven, about which were found charred remains of kūmara and sugar cane, was radiocarbon dated to AD 1437–1619 (K-522) by Smith (1961). A charred kūmara, excavated

beside a *moai* 'megalithic statue' (specifically no. 156) at Rano Raraku, dated to AD 1458–1635 (Beta-447618; Sherwood *et al.* 2019). Eight samples containing kūmara starch grains from a garden at Te Niu were associated with ages of AD 1400 or younger, and two were older at AD 1214–1436 and AD 1286–1399 (Horrocks and Wozniak 2008: ^{14}C Lab unreported), while very degraded possible kūmara pollen was recovered beneath an *ahu* 'ritual structure' where obsidian dated to about AD 1450 (Cummings 1998). Kūmara starch in human dental calculus from Rapa Nui, however, is not clearly associated by Tromp and Dudgeon (2015) with the oldest dated calculus sample (RH 11: AD 1321–1412). Probable starch grains found on five shell tools in radiocarbon dated stratigraphy beginning AD 1200–1400 at Anaho Bay, Nuku Hiva (Marquesas), provide a stronger case (Allen and Ussher 2013: 2800).

There is nothing in these data to preclude kūmara having been taken on initial colonisation passages. However, neither do the data rule out the possibility of secondary introduction to Hawai'i and Rapa Nui a century or more later.

KŪMARA ARRIVAL IN SOUTH POLYNESIA

At the outset it is worth noting an independent source of comment on kūmara arrival: Māori tradition. Archdeacon Walsh (1902: 13) recorded a widespread understanding that "not finding the kumara on their first arrival in the country, the Maoris made an expedition back to their old home among the Pacific islands to secure a supply for cultivation". One account refers to an origin ancestor, Toikairakau (Toi the wood-eater, from his lack of cultivated foods), who was living at the mouth of the Whakatāne River when two travellers arrived from Hawaiki. They found his foraged food disagreeable and offered, instead, sweet paste from powdered kūmara (*kao*) they were carrying. The local people then sailed *Horouta* to Hawaiki to obtain kūmara plants (Turei 1912). Toikairakau is positioned between the thirteenth and fifteenth centuries in Bay of Plenty *whakapapa* 'genealogy' (Simmons 1976: 71–72, 100). Ngāti Awa, similarly apprised of kūmara, sailed to Hawaiki and returned with it to Whakatāne on the *Mataatua* canoe (Simmons 1976: 148–52), 16–17 generations before about 1850 (Best 1904: 131). The median length of whakapapa for *Mataatua* descent is 17 (range 12–21), i.e., about AD 1390 (Fenner 2005; Simmons 1976: 307). These data are late in the colonisation period of AD 1270–1430 estimated on canoe whakapapa (Anderson 2014: 63–64), implying kūmara introduction broadly around AD 1400.

The traditional transfer of kūmara differs from that of other Polynesian plants. In Bay of Plenty traditions, hue long preceded taro and kūmara (Best 1904: 130; 1925: 245), with taro arriving on the *Mataatua* and *Nukutere*, uwhi on the *Māhuhu* and aute on the *Ōtūrereao* and *Tainui* (Best 1925;

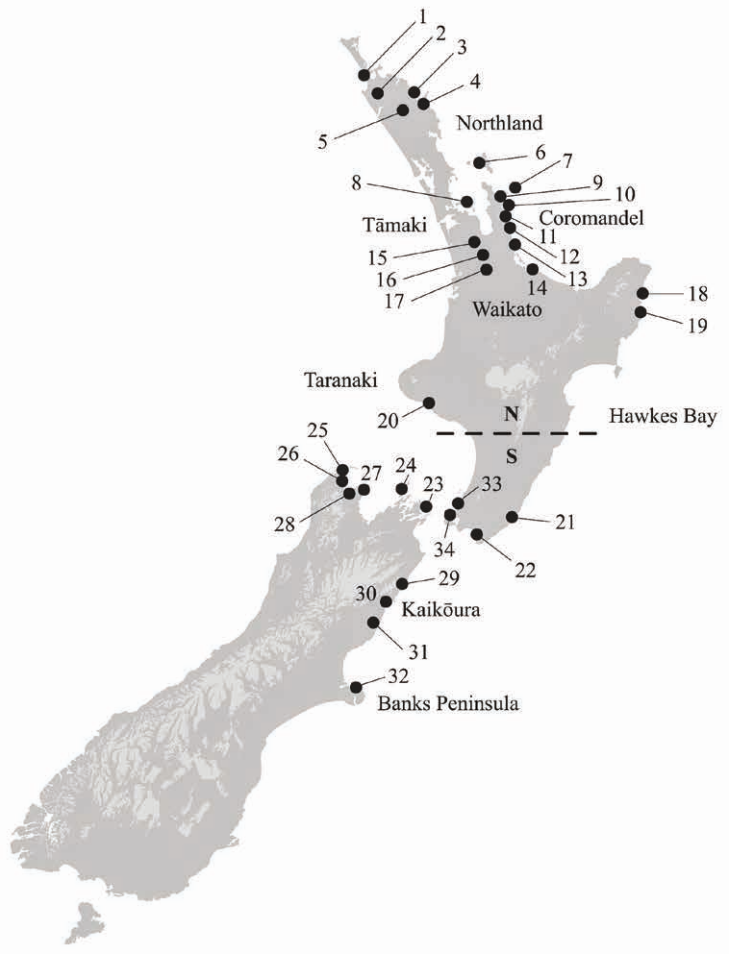

Figure 1. New Zealand places and archaeological sites referred to in the text (N = Northern, S = Southern) 1. Motutangi, 2. Awanui, 3. Rangihoua Bay, 4. Hahangarua, 5. Pouerua, 6. Harataonga, 7. Ahuahu, 8. Sunde, 9. Sarah's Gully, 10. Skipper's Ridge, 11. Cook's Beach, 12. Hahei, 13. Whangamatā, 14. Papamoa, 15. Taupiri, 16. Horotiu, 17. Kirikiriroa, 18. Anaura Bay, 19. Tolaga Bay, 20. Waverley, 21. Okoropunga, 22. Palliser Bay, 23. Cattleyard Flat, 24. Greville Harbour, 25. Triangle Flat, 26. Parapara, 27. Takapou, 28. Tata Beach, 29. Clarence River, 30. Avoca Point, 31. Pari Whakatau, 32. Panau, 33. Pauatahanui, 34. Makara.

Hiroa 1950: 51–63). In contrast, kūmara is said to have arrived on the *Aotea*, *Arawa*, *Horouta*, *Kurahaupō*, *Māhuhu*, *Māmari*, *Mataatua*, *Tainui* and *Tokomaru* canoes. Whether kūmara arrived on such a broad front is questionable, however, and for a good reason. Kūmara was a tapu plant: "The offspring of Rangi and Papa [was] first the Kumara, which came from the face of Heaven", as noted by Taylor (1855: 18). It embodied *mana* 'prestige, authority, power' and was embedded in ritual belief. Consequently, competing descendants refused to agree that their canoe had failed to bring the kūmara exclusively or before others. The acrimonious debate between Taranaki and East Coast authorities, recorded in the 1880s by John White, makes this very clear. Mohi Turei, for Ngāti Porou, proposed a compromise: "This is what I would say to you: you possess your *kumara*, and your own ancestor, and your *kumara*-cultivations; and I have my *kumara*, my ancestors, and my *kumara* cultivations" (White [1888] 2011: 5). It was not a context in which a later arrival of kūmara was likely to be conceded. Nevertheless, that idea was implicit in the contest and more generally.

Turning to the archaeological evidence, we have compiled a database of 118 ^{14}C radiocarbon dates that are older than, or overlap, AD 1400 and which have been associated with kūmara gardening. They are grouped into Northern (74) and Southern (44) regions divided approximately by a line from southern Hawkes Bay to Taranaki (Fig. 1). Cultivation of all or most cultigens was possible to the north, but kūmara was wholly dominant to the south, with hue a minor crop, and taro possibly reaching Golden Bay. Northern cultivation is likely to be older, but it cannot be assumed *ipso facto* as having been of kūmara, while kūmara can be assumed generally as the object of southern cultivation, but possibly younger because of adaptational issues (Leach 1984: 61). In the discussion of regional gardening chronology below, the ages have been calibrated from the conventional radiocarbon ages (CRA) and are reported at 68% probability to enhance visibility of differences between them. The 95% probability ranges are listed in Tables S1 and S2.

Northern Gardening

The subtropical Kermadecs and Norfolk Island are important to the South Polynesian kūmara narrative because they were colonised in the early fourteenth century from New Zealand (Anderson 2000). Excavations on Raoul Island have uncovered candlenut (*Aleurites moluccana*) but no other introduced plants (Johnson 1995: 56). Amongst plants recorded historically, taro, tī pore and several weeds, including *Oxalis corniculata*, might have been introduced prehistorically (Sykes 1977: 123, 152–56; cf. Prebble 2008), although Johnson (1995: 57–59) suggested that taro and tī pore arrived with nineteenth-century Polynesian settlers. *Ipomoea batatas*, grown historically on Raoul Island, seems to have been a whaling-era cultivar (Sykes 1977: 98).

Sedimentary coring on Norfolk Island indicated that *Cordyline* spp. was present before human occupation and that *Phormium tenax* (New Zealand flax), absent in the cores but recorded in the eighteenth century, had come with Polynesian colonists (McPhail *et al.* 2001: 133). Johann Forster, in 1774, recorded *Oxalis* and *Sonchus* spp., and a banana (*Musa* spp.) grove was seen by Europeans in AD 1788, but no other Polynesian cultigens were recorded historically or archaeologically (Anderson and White 2001). No evidence of pre-European occupation of Lord Howe Island has been recovered (Anderson 2003), and no kūmara cultivation has been recorded on the Chatham Islands. The evidence is thin, but it suggests that kūmara was not available for transfer from New Zealand when Māori migrants colonised Raoul and Norfolk Islands in the early fourteenth century, and therefore that it was not brought to New Zealand by the first Polynesian colonists.

Turning to mainland New Zealand, formative fieldwork in the 1950s brought Māori agriculture in the Coromandel to the forefront of archaeological concerns. Exposure of complex pit architecture, the proximity of the pits to settlement sites of Archaic East Polynesian provenance, and arguments for stratigraphic connections between the two encouraged confidence that kūmara gardening began with initial colonisation. Golson (1959: 45) put it like this: "We know that underground storage was normally reserved for *kumara* at the time the Europeans came to New Zealand and it is possible that the Archaic structures at Sarah's Gully were such *kumara* stores." The pit–kūmara association was strengthened by Yen's (1961) model for kūmara adaptation to New Zealand, and soon supported by radiocarbon ages from two sites in particular.

Storage Pit Ages. At the Sarah's Gully *pā* 'fortified site', bell-shaped pits were assigned to the first phase of occupation (Parker 1962). One is dated to AD 1280–1390 (NZ-1080) on an unidentified charcoal sample. Material of the same sample was examined recently by Wallace (2018) and discarded as unsuitable for radiocarbon dating. This leaves no reliable age for the first occupation at the site; four pit ages of sixteenth century or later refer to subsequent occupations of the pā. The Sarah's Gully settlement, midden and pā might be a single site established in the thirteenth century (Davidson 2018: 112), but the initial age of pit construction remains unknown.

At Skipper's Ridge, a large pit from the first occupation dates to AD 1180–1300 (NZ-1740). This charcoal sample (Davidson 1975) was identified as *Pseudopanax* spp., and on that basis was thought to have little inbuilt age. However, *Pseudopanax* contains species that can live for several hundred years, and the NZ-1740 sample was considered as the remains of a post or beam. On those grounds the date was rejected by Anderson (1991). Pits excavated further up Skipper's Ridge also varied in form but dated eighteenth century to modern, and Bellwood (1969:

204) argued that Parker's (1962) succession of pit types was weak and contradictory, concluding that "*kumara* storage pits have never been satisfactorily demonstrated to belong to the Archaic period". Charcoal dates on short-lived species from site T10/777 south of Skipper's Ridge (Gumbley and Hoffman 2007) are from a possible *umu* 'oven', AD 1460–1630 (Wk-37543); a probable bin pit, AD 1480–1630 (Wk-37544); and a bell-shaped pit (Wk-37547), AD 1500–1630 (Bickler 2014: 148).

Fire scoops above rectangular and oval pits at Hahei Beach produced radiocarbon ages (Table S1) reaching into the thirteenth century (Harsant 1984). As NZ-4950 (AD 1500–1800) and NZ-4951 (AD 1320–1460) were from the same fire scoop and, together with NZ-4952 (AD 1390–1460), were below the oldest age (NZ-4953, AD 1280–1400), vagaries of inbuilt age can be suspected. Tōtara (*Podocarpus totara*), kauri (*Agathis australis*), māhoe (*Melicytus ramiflorus*) and *Metrosideros* spp. were prominent in all samples. At nearby Cooks Beach, horticultural evidence is radiocarbon dated to AD 1500 and later (Maxwell *et al.* 2018), and on Ahuahu (Great Mercury Island) a series of pits of varying shape and size were radiocarbon dated (Wk-42270–42274) on five samples of *Coprosma* spp. charcoal to about AD 1350–1400 (Prebble *et al.* 2019: Table S3; see Table S1). As some *Coprosma* species can grow to 10–12 m with lifespans in decades, there is a possibility of some inbuilt age.

In the western Bay of Plenty, storage pits date fifteenth century and later (James-Lee 2014: Table 5.7), and Law (2008: 63) concluded that cultivation in the region dates no earlier than the fifteenth century. There are few relevant radiocarbon data further south, but extensive deforestation on the East Coast after about AD 1400 is thought related to horticultural activity (Jones 1988). Taranaki also had sustained deforestation occurring around AD 1500 with pā construction and gardening (Prickett 1983; Walton 2000: 14). In South Taranaki, charcoal including punga and fern from storage pits at site Q22/77 near Waverley (Walton 2000: 61) produced ages later than AD 1400 (Table S1).

Early archaeological assumptions about pits as kūmara storage features have been questioned by Helen Leach (1979b: 246; 1984: 58–59), who argued that pits were used to store both yam and kūmara, perhaps especially the former at first because of its longer period of seasonal dormancy in New Zealand (Leach 1984: 60). Pits were used also to store taro (Matthews 2002; Prebble *et al.* 2019), processed *Cordyline* stems, karaka berries and fern-root (Best 1916: 91, 107), amongst many other products that were unsuited to open-air storage and forbidden within houses. In addition, bell-shaped pits of a kind occurring in early Coromandel sites were built to store water or to catch rats and, "as they much resemble in form the smaller food-pits used for storage purposes, the one may well be mistaken for the other" (Best 1916: 86). We are not obliged to interpret pits as storage for kūmara.

Garden Soils and Planting Pit Ages. Identification of garden soils is seldom an exact science. Soil modification by adding gravel or other materials is scarce in the north and northeast of the North Island in areas which, on other grounds, had probably been gardened (Furey 2006: 47). Conversely, soils on alluvial fans or plains often contain natural layers or lenses of sand or gravel despite not being cultivated (Furey 2006: 68–69; Jones 1986; McFadgen 2003: 37). At Hahangarua Bay, Bay of Islands, radiocarbon ages as early as AD 800 (Groube 1967), and later about AD 1230, were obtained for layers 5 and 6 of a garden soil, recognised by its stratigraphic perturbation (Peters 1975: 178–79). The latter samples were on short lifespan material, now calibrated as AD 1400–1620 (ANU-543) and AD 1320–1420 (ANU-542), but Robinson *et al.* (2019: 52–53) observed that the samples could have incorporated charcoals from earlier natural fires before gardening began in the late fifteenth century. In any event, whether the gardening involved kūmara cultivation is unknown, and taro was grown historically in made soils (Groube 1967; Walton 1982).

The Sunde site, Motutapu Island, provided tephrochronological evidence of early garden soils and pits, possibly involving kūmara (Nichol 1988). The Rangitoto Ash that covered Motutapu Island erupted first at AD 1398 ± 7, and again at AD 1446 ± 5 (Lindsay *et al.* 2011). At the Sunde site, a shell sample beneath the ash dated AD 1210–1430 (NZ-6956A), and no cultigens were noted among leaf impressions in the base of the ash. Between ash layers there was evidence of digging and introduction of sand. A bin pit cut into the ash below a made soil (Nichol 1988: 371) dates AD 1480–1640 (NZ-6954). The data suggested gardening beginning in the fifteenth century.

That conclusion seems generally valid for substantial research on Māori horticulture, assumed as mainly kūmara cultivation, in the Tāmaki district (Furey 2006: 30). In Bulmer's (1994: 62–67) recalibration of the radiocarbon data, 20 of 23 (87%) age ranges on storage pits and garden walls from 14 sites were later than AD 1400, and the remaining three overlapped that date. In the Bay of Plenty, cultivation soils at Papamoa date AD 1400–1700 (Phillips 2016).

It could be expected that horticulture might have developed later in inland regions, and that seems to be so in the middle Waikato basin. Forest clearance on charcoal samples of short-lived taxa date to AD 1430–1630 (Wk-7928) at Kirikiriroa Stream (Gumbley and Hoffmann 2013) and at Horotiu (Wk-32467) to AD 1510–1660 (Campbell 2012: 41). Additional research on forest clearance and horticultural features in the Horotiu district has produced 13 radiocarbon ages (Table S1), all of them younger than AD 1400 and most suggesting sixteenth- or seventeenth-century activity (Gumbley and Hoffman 2013: 141–47). Similar evidence has come from the southern part of the Waikato Basin (Campbell *et al.* 2016). Overall, inland Waikato data suggest that settlement and gardening began in the sixteenth

century (Campbell and Harris 2011; Gumbley and Hoffmann 2013). The latest data (Gumbley, pers. comm., 7 July 2020) indicate gardening began close to the river at AD 1500–1650 and 2.5–3.0 km away from the river near Cambridge at AD 1650–1750.

Preserved Kūmara Ages. Carbonised kūmara were excavated from a rectangular raised-rim pit (pit O) at pā P5/228, Pouerua, inland Bay of Islands. Leahy and Nevin (1993: 44) argued that "the burning of the pit structure and the carbonising of the kūmara [was] a single event". Nine kūmara specimens were radiocarbon dated as effectively modern. Later excavations (Yen and Head 1993) produced an additional 28 radiocarbon dates on kūmara, 23 being modern. The remaining five kūmara samples came from a short stretch of drain on the pit floor (Table S1), but the ages are from AD 980–1280 (ANU-4753) to AD 1650–1950 (ANU-4736). The age spread was taken to imply "antiquity and continuity of the use of the pit for kūmara storage" (Yen and Head 1993: 63), and Sutton (1993: 99) combined the three oldest ages on kūmara to conclude that pit O was made AD 1257–1393. Conversely, the construction history of pit O appears late in the pā history, all the radiocarbon-dated kūmara came from the floor of the same pit and 34 of 37 radiocarbon ages (92%) do not suggest deposition before AD 1400. Later, Sutton *et al.* (2003: 198) conceded that the argument for a long period of kūmara storage in pit O "was promoted to support the widely varying radiocarbon results and was not based on archaeological evidence".

Kūmara Microfossil Ages. Microfossils of kūmara, particularly starch grains, have been identified, but comparative collections are largely from cultivated plants, and, given the potential variety of indigenous plant starches with overlapping granule morphology, starch identification remains problematic (Prebble *et al.* 2019: S4; Wilson *et al.* 2010). There are species of Convolvulaceae in New Zealand, the microfossils of which have yet to be characterised definitively, including native *Ipomoea cairica* and *Ipomoea pes-caprae* in the northern North Island. They may not produce much starch, but Horrocks (2004: 328) was unable to rule out *I. cairica* as the *Ipomoea* starch in sites at Rangihoua Bay (Bay of Islands) and Harataonga (Great Barrier Island). Kūmara xylem was identified in coprolites at the latter site (Horrocks *et al*. 2004: 155), and it is dated by association with short lifespan charcoal to AD 1420–1620 (NZA-12591). In wetland garden ditches at Motutangi there is *Ipomoea* starch, but while it is likely to be from kūmara, that conclusion "is complicated by the presence of ... *I. cairica*" (Horrocks and Barber 2005: 113). At Cooks Beach, starch grains, c.f. kūmara, were found on obsidian tools dated to the sixteenth century (Maxwell *et al.* 2018).

Radiocarbon ages put the lower layers (including bin and storage pits) of the Cabana site at Whangamatā into the fourteenth century (Table S1). In

2007, kūmara starch was identified in four samples (two being coprolites) and taro in three (Gumbley 2014: 138–44). In 2016, taro was identified in two coprolite samples but no kūmara (Gumbley and Laumea 2019: 103, 184–85). There is a potential case of fourteenth-century kūmara consumption, but coprolites only circumvent the issue of microfossil mobility (below) if they are taken from interior material (not mentioned in the reports). Fourier-transform infrared spectroscopy, which can identify degraded starch (Horrocks, Appendix in Gumbley and Laumea 2019) did not identify any as kūmara. Starch of kūmara and yam has been identified in association with garden features at Horotiu, and kūmara and taro at Taupiri, suggesting that gardening was diverse in the Waikato by the sixteenth century, if the microfossils are dated by the radiocarbon ages (Campbell 2012: 41).

Excavations in historical Māori gardens at Anaura Bay produced probable kūmara starch, but it was mixed with microfossils of *Pinus* sp. and white potato. Coring produced possible taro and yam microfossils but no kūmara tissue (Horrocks *et al.* 2008). Excavation of a coastal site at Cook's Cove, Tolaga Bay, disclosed microfossil remains of probable kūmara and taro in the lower occupation level (Phase II). In this (Horrocks *et al.* 2011; Walter *et al.* 2011: 10–13), Layer 5B samples date to AD 1320–1410 (Wk-23490) and AD 1430–1580 (Wk-23489), and Layer 5a samples to AD 1460–1630 (Wk-24847) and AD 1500–1630 (Wk-24846). Kūmara cultivation, therefore, might just have extended back to about AD 1400, but *Pinus* sp. pollen also occurred in Phase II deposits, and Horrocks *et al.* (2011: 248) noted that "pollen is deposited on the ground surface and carried downwards through the soil by percolating groundwater", and that the process is complicated by digging and other disturbance of sedimentary profiles.

Implicit concern about trans-stratigraphic mobility of microfossils is warranted. Sedimentary remixing brought horticultural microfossils into association with a mid-Holocene radiocarbon age at Rangihoua Bay (Horrocks *et al.* 2004: 154) and taro and kūmara starch into Pleistocene levels in cores from Motutangi and Awanui (Horrocks *et al.* 2007: 277). The porosity of many sediments to post-depositional redistribution of microfossils by gravity or groundwater, and the disruption of original microfossil deposition patterns by bioturbation and human activity, create significant uncertainty about associations of microfossils with stratigraphic order and chronology. Moreover, it is exceedingly difficult to radiocarbon date microfossils directly, and if continuing uncertainty about taxonomic specificity is added, as in *Ipomoea* (e.g., Horrocks *et al.* 2017), then it is apparent that there are fundamental difficulties still to resolve. Coring and excavations in dense, damp, fine-grained sediments which restrict microfossil mobility provides the most useful results, as at Ahuahu, although even there some down-core microfossil contamination was recorded (Prebble *et al.*

2019: S3: 9–10). At Ahuahu, taro pollen enters the record in two sequences, Tamewhera and Waitetoke, after AD 1425 and is not recorded later than AD 1500. At about that point it is replaced in one sequence by kūmara starch.

In summary, the problems of defining the age of Northern kūmara arrival are formidable, and many individual results considered here are open to debate. The pit ages at Ahuahu, if pits were for kūmara, and the basal ages at Cabana, if demonstrably associated with kūmara, might sustain a fourteenth-century age, but otherwise kūmara gardening does not seem clearly older than the fifteenth century.

Southern Gardening

The case for early Southern kūmara gardening was made emphatically by Helen Leach. Referring to Yen's (1974) hesitancy to declare kūmara a proven early introduction to New Zealand, she argued (Leach 1979b: 248) that gardening in Palliser Bay, "under circumstances which preclude other Polynesian cultigens except gourd, by communities bearing the stamp 'New Zealand East Polynesian' and at a time (from about the 12th century AD) close to the settlement of New Zealand, is as close to proof of Yen's contentions as may ever be obtained". The first point remains valid: for climatic reasons only kūmara could, and would, have been grown extensively as far south as Palliser Bay. The second, that gardening dated to the colonisation era, soon became debatable, and Anderson (1991: 788–92) proposed that the early Palliser Bay material culture seemed a better fit for the fourteenth century. Of 18 radiocarbon ages for the Palliser Bay gardens (B. Leach 1979; H. Leach 1979a), 11 are later than AD 1400 and 7 strongly overlap it (Table S2). All the radiocarbon ages were on unidentified charcoal samples. Twig charcoal had been chosen for some samples, but "it is difficult to distinguish between twigs and branches that have had the outer rings burnt off" (McFadgen 2003: 76). Gumbley (pers. comm., 7 July 2020) examined 160 Waikato radiocarbon ages on charcoal and found that 50% of those with twigs from podocarps or other large trees were comparatively too old.

Neither the sequence of beach ridges over which the gardens extended nor the type or stratigraphy of garden structures provided a means of relative dating against which the radiocarbon ages could be compared. McFadgen (2003: 78) used marine shell samples from three of the Palliser Bay garden sites to assess the plausibility of their charcoal ages. For the NZ-1311 site (AD 1290–1400), a calibrated shell age was AD 1470–1640 (Wk-7457), and for the other two sites the shell samples were also much younger. It is a small comparative sample and it is possible that the charcoal and shell samples had different contexts, but the shell ages suggest that part of the

Palliser Bay chronology on charcoal samples could be offset too early at a centennial scale. Okoropunga, another Wairarapa garden site, dated AD 1270–1390 (NZ-3116) on a charred and possibly old tōtara root (*Podocarpus totara*), but AD 1400–1460 (NZ-3115) on mainly *Coprosma* sp. charcoal. On the Wellington west coast, NZ-1877 (AD 1430–1610) dates a garden soil at Makara and NZ-1878 (AD 1460–1630) another at Pauatahanui (McFadgen 1997: 18–40).

Compounding potential old wood influences in unidentified charcoal samples are additional problems in radiocarbon dating of gardens, especially in the southern region. In New Zealand there was natural forest firing in drier areas throughout the late Pleistocene and Holocene and then massive deforestation by burning early in the colonising era, especially in eastern districts (McWethy *et al.* 2014). This activity pre-loaded soils with non-gardening charcoal which, by gardening, could become incorporated in archaeological contexts. The potential problem is less evident in humid northern regions, where forest firing and gardening began later and together (Newnham *et al.* 2018).

At the small scale of particular garden complexes, as well, where sediments and charcoal have idiosyncratic disturbance histories, determining the strength of a chronological association between a radiocarbon sample and a cultural event is difficult. It is recommended currently that dispersed charcoal in agricultural soils should be rejected for radiocarbon dating (Higham and Hogg 1997), and also unidentified charcoal because inbuilt age cannot be determined retrospectively. Marine shell has the advantage that, in most situations, the shell is likely to have been culturally collected and deposited, but as construction of garden features could easily incorporate midden that preceded the horticultural activity, the problem remains.

Research on garden features in Golden Bay yielded four ages on marine shell, for a midden directly above planting pits at Triangle Flat (Wk-17250, Wk-8052, Wk-9611 and Wk-11542), suggesting cultivation around the sixteenth century (Barber 2013: 47). There are similar ages on shell from garden soils at Parapara (NZ-4505, NZ4506), Takapou (Wk-24251) and Tata Beach (Wk-9607, Wk-9608), with a supporting short lifespan charcoal date from an associated pit (Wk-4912). In western Tasman Bay (Barber 2010: 78), shell ages NZ-7900 and Wk-2278 and an age on carbonised bark from the base of a borrow pit (Wk-1776) date fifteenth century and later (Table S2). Another borrow pit at Motueka dates AD 1180–1290 (NZ-3307), but it was on charcoal from the long-lived rimu, *Dacrydium cupressinum*. Barber's research and earlier results (Challis 1991: 129–34) describe a consistent district chronology indicating a fifteenth century or later advent of horticulture.

In the Marlborough Sounds, a soil layer at Greville Harbour (Wellman 1962: 62–63) is dated AD 1280–1400 (NZ-481) on unidentified charcoal from a buried log and AD 1030–1210 (NZ-482) on marine shell. There is no evidence that the ages refer to a garden. A shell date from a mound at Cattleyard Flat (NZ-4499) is AD 1490–1660. Stone rows and garden soils near Clarence River, Kaikōura, have been thought contemporary with shell middens there dating as early as the thirteenth century (Furey 2006: 92), but charcoal of mixed-age taxa from a made soil beneath a garden row (McFadgen 1980) dates AD 1460–1630 (NZ-3113) and a buried soil at the base of a borrow pit AD 1500–1640 (NZ 3397). At Avoca Point, Kaikōura, purported garden structures dated to the fifteenth–sixteenth centuries were later identified as natural features (McFadgen 1987). A post in a large rectangular pit at Pari Whakatau dated (NZ 133) AD 1500–1640 (Challis 1991: 134), and other rectangular pits are associated with post-AD 1500 pā or settlement sites throughout the Marlborough Sounds and along the Kaikōura coast (Law 1969).

Gardens and storage pits on and near Banks Peninsula, none of them radiocarbon dated, are associated with traditional pā sites occupied in the seventeenth or eighteenth centuries (Tau and Anderson 2008: 117). The Panau village site has a late pre-European settlement upon which some enigmatic garden lines had been constructed (Jacomb 2000). It is possible that they and other such features on Banks Peninsula are traces of nineteenth-century potato gardening (Challis 1995: 28) or for varieties of kūmara introduced in the early nineteenth century. In any event, kūmara cultivation was precarious in this district (Law 1969). Southern pits, oval or circular with raised rims, generally prove to be *umu tī* 'ovens for cooking *Cordyline australis*' (Fankhauser 1992).

CALIBRATION MODELS

Bayesian modelling is employed here to average out the impact of error sources, such as inbuilt age, and should produce more accurate age ranges than had been obtained earlier. As the modelling uses the same radiocarbon data used to produce the original CRA results, individual Bayesian results may not improve significantly upon the original calibrations, but the younger ends of their modelled age ranges are likely to be closer to the true age. Ideally, new radiocarbon measurement of the same samples, or of new samples, should be obtained to validate, or not, the individual dates and provide more precise age ranges. The value of the Bayesian models, however, lies in their identification of trends, and the objective here is to define trends in the distribution of ages between Northern and Southern groups, and between coastal and inland localities. The inland ages are marked with

an asterisk in Table S1. As aggregation of the dates refines the age ranges, conclusions using 95% probability are both statistically more robust and, in this instance, more useful than individual dates.

In origin, 14 of the Northern ^{14}C dates are marine and 60 terrestrial, with 33 of the latter on short-lived materials such as seeds, twigs or kūmara. Sixteen of the Southern ^{14}C dates are of marine origin and 28 on potentially long-lived terrestrial materials. Dates on marine and long-lived taxa are often not included in chronological assessments (e.g., Anderson *et al.* 2019; Wilmshurst *et al.* 2008) because they are less reliable or difficult to interpret. Yet, removing these material categories reduces the number of dates available for modelling and introduces sample selection and material biases that could skew chronologies (Blauuw *et al.* 2018; Hamilton and Krus 2018). A more objective method of chronological analysis is to include those materials and use Bayesian statistical methods that downweigh problematic samples, in line with overall model parameters.

Using the outlier methodology in OxCal, charcoal samples unidentified, or identified as having 10+ years of growth, are modelled using the Charcoal Outlier command (Bronk-Ramsey 2009). We have treated all charcoal samples as having inbuilt age unless the sample material was manifestly short-lived (a category also containing eggshell and terrestrial bone), and in those cases ^{14}C dates were tagged with the General T-type Outlier command. The dates can then be slightly too young or too old, without disproportionally effecting the overall model. Each material was assessed and assigned an outlier code (supplementary file available from authors). The Bayesian Sequence Analysis option in OxCal (Bronk-Ramsey 1995) was used to generate HPDs for the most likely age interval for initial evidence of kūmara gardening in each region. HPDs are constrained by prior information of association with kūmara gardening, within a single-phase Bayesian model suitable for unordered groups of ^{14}C dates that are unconstrained by stratigraphy (Bronk-Ramsey 2009).

The orthodox method for calibrating marine ^{14}C dates uses the marine calibration curve, Marine20 (Heaton *et al.* 2020), of global changes in average ^{14}C at the ocean surface. A ΔR (Delta R) offset to the calculation corrects for regional variation (Stuiver *et al.* 1986). Using pre-AD 1950 marine values (from http://calib.org and references therein), we have calculated a New Zealand ΔR value of -154 ± 38 ^{14}C years. The individual results of this method (global calibration curve with ΔR value of -154 ± 38) can be found in the Supplementary Information (Tables SI-1 and SI-2, http://thepolynesiansociety.org/Anderson_Petchey_SI.pdf), while the Bayesian modelled trends are presented in Table 1 and Figure 2B.

This method (i.e., Marine20 with regional ΔR offset) shows southern moa-hunting (the 2A sample consists of 112 South Island moa eggshell dates

taken collectively as a proxy age of early foraging; details from authors) as more or less contemporaneous with an early fourteenth century start for kūmara gardening in coastal Northern areas (2B), and the end of moa hunting coinciding with kūmara gardening beginning to move inland in the early fifteenth century AD (2B). In the Southern region, kūmara cultivation starts in the late fourteenth to mid fifteenth centuries (2B).

Table 1. HPD start boundary ages for the three Bayesian models (see text for details).[1]

Name	Calibrated boundary ages (AD)			
	68% prob.		95% prob.	
Moa hunting start	1300	1320	1290	1340
Moa hunting end	1400	1420	1390	1420
	Marine20 with −154 Δ*R*			
Kūmara start North	1300	1350	1280	1380
Kūmara start South	1360	1450	1280	...
Kūmara start North Coastal	1290	1340	1260	1370
Kūmara start North Inland	1400	1450	1350	1460
	South Pacific Marine calibration curve[2]			
Kūmara start North	1260	1310	1240	1320
Kūmara start South	1290	1390	1240	1440
Kūmara start North Coastal	1250	1300	1220	1310
Kūmara start North Inland	1390	1450	1330	1450
	Terrestrial dates only			
Kūmara start North	1300	1370	1280	1400
Kūmara start South	1220	1310	1180	1390
Kūmara start North Coastal	1270	1330	1220	1350
Kūmara start North Inland	1400	1450	1350	1460

[1] SHCal20 (Hogg *et al.* 2020) used for terrestrial samples in all cases.
[2] Following Petchey and Schmid (2020).

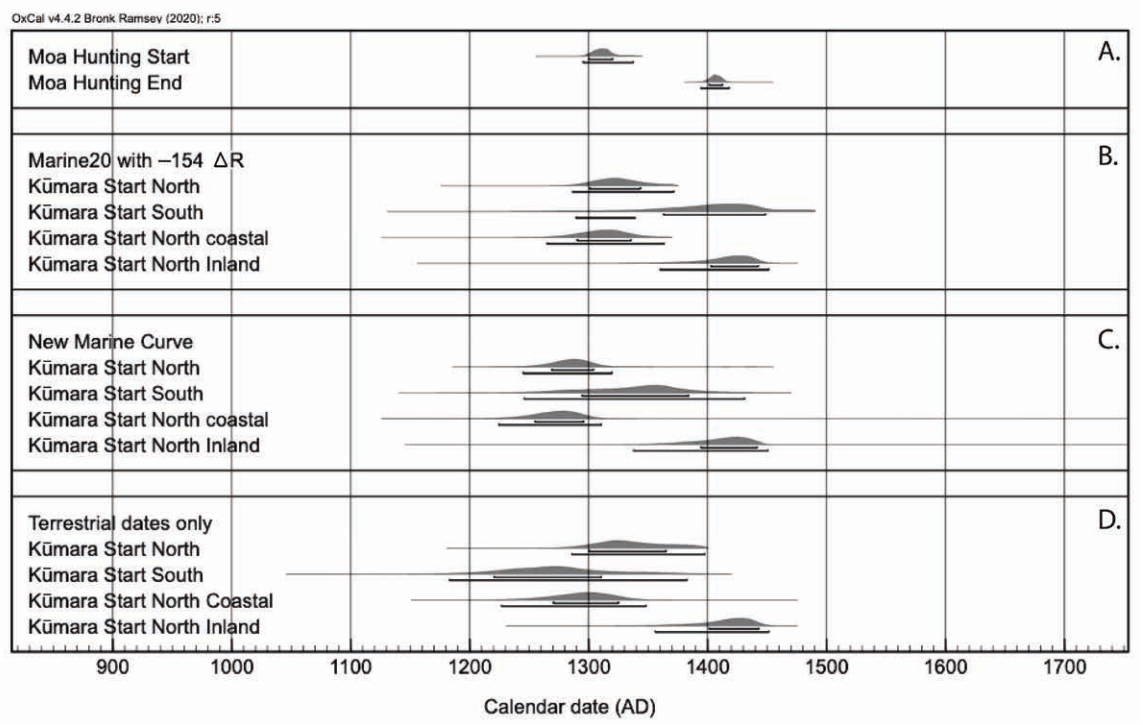

Figure 2. Comparison of HPD boundary ages for the start of kūmara gardening using different methodologies. A. Comparison of model boundary ages for moa hunting in the South Island; B. Start boundary ages using SHCal20 (Hogg *et al.* 2020) for terrestrial samples and Marine20 with a regional ΔR value of -154 ± 38 ^{14}C years applied for marine samples; C. Start boundary ages using SHCal20 and the newly developed South Pacific marine calibration curve (Petchey and Schmid 2020); D. Start boundary ages using terrestrial ^{14}C dates only.

Petchey and Schmid (2020) also identified temporal shifts in the marine reservoir around New Zealand that the global marine curve does not correct, notably a significant Δ*R* shift between 550 and ~600 cal BP. Although they calculated temporal Δ*R* corrections to adjust for this variation (see also Petchey 2020), these values are difficult to apply without a paired terrestrial ^{14}C result because the ^{14}C age of a shell living ~600 years ago will be similar to one living 300 to 400 years ago. To help in this problem, Petchey and Schmid (2020) developed a new regional calibration curve from published South Pacific marine ^{14}C ages, referred to here as the "South Pacific marine calibration curve". The individual calibrated results are graphed in Figures 3 and 4 (below) and details provided in the Supplementary Information (Tables SI-1 and SI-2). The overall modelled trends using this new calibration curve are provided in Table 1 and Figure 2C (above).

Figure 2C shows that the South Pacific marine curve makes start dates earlier overall, placing Northern kūmara cultivation just before the onset of Southern moa hunting, while Southern kūmara cultivation is entirely within the fourteenth century. The differences with 2B reflect the number of shell dates that overlap the significant marine reservoir shift noted by Petchey and Schmid (2020). The date of movement inland (2C) remains similar to 2B.

To assess whether one marine calibration method provided results more consistent with the terrestrial chronology than the other, we modelled only terrestrial materials (Figure 2D). As this reduced the number of dates to 28 for the South Island and 60 for the North Island, the precision of the calibrated results is less, and the model shows Southern kūmara cultivation starting earlier. As all but one (NZ-6496) of the Southern dates is on charcoal with inbuilt age while Northern dates mix short-lived and longer-lived materials, this result is improbable. If the Southern data are removed, then the modelled terrestrial results match the Marine20 calibration and still overlap at 68% probability with the South Pacific results; in other words, there is not much difference. Schmid *et al*. (2018) have demonstrated that the precision of HPDs within single-phase models depends not just on the number but also the distribution of dates. A higher percentage of late or early dates in models results in correspondingly older or younger age ranges, and a dominance of short-lived materials will result in a slightly younger age range because the end-member dates dominate the probability distributions.

* * *

For nearly 40 years the chronology of kūmara dispersal in East and South Polynesia has been linked to assertions that kūmara was radiocarbon dated to AD 1000 in Mangaia, and that this could stand as the arrival age for central East Polynesia, from which it was later extended to East and South Polynesia as a whole. Now that the particular age has been changed to AD 1400 we would be wise to avoid making the same loose inferences about East Polynesian prehistory from a single site and instead take the matter up explicitly for each

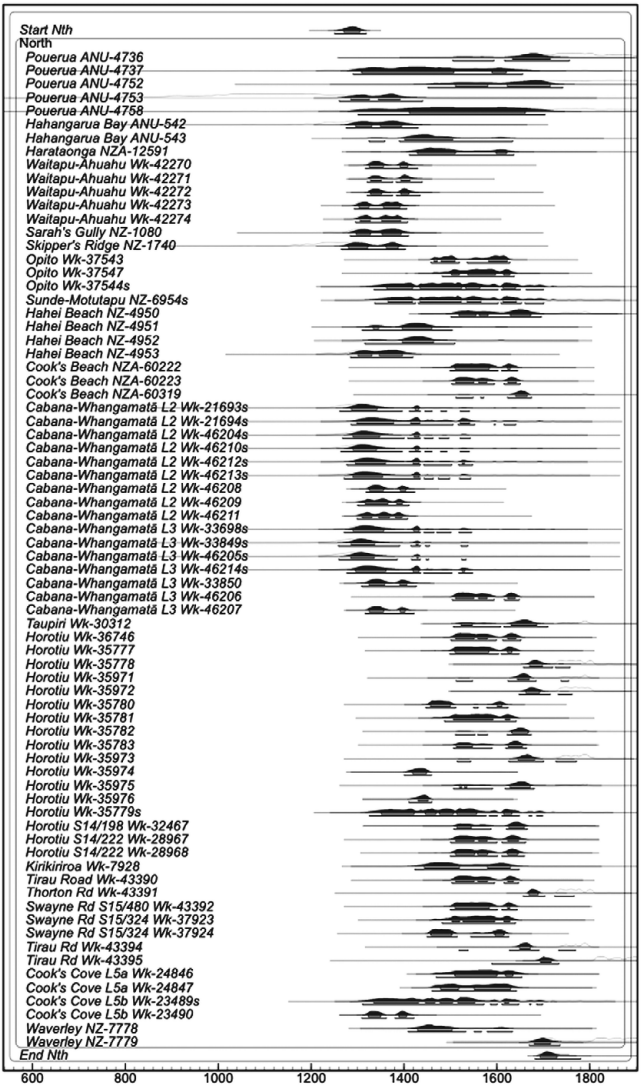

Figure 3. Calibrated results for kūmara cultivation in Northern sites using SHCal20 (Hogg *et al.* 2020) for terrestrial samples and the South Pacific marine calibration curve (Petchey and Schmid 2020) for marine samples. The outline distributions show the unmodelled calibrated ages for each sample. The black distributions show the age ranges when applying the Bayesian model constrained by the outlier parameters, as outlined in the text. Error margins of 68% and 95% are indicated by bars under each age distribution.

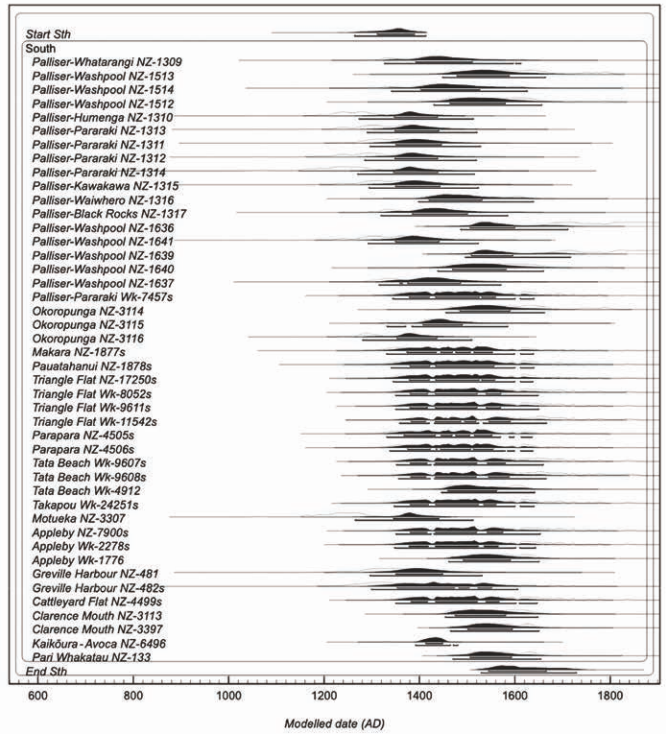

Figure 4. Calibrated results for kūmara cultivation in Southern sites using SHCal20 (Hogg *et al.* 2020) for terrestrial samples and the South Pacific marine calibration curve (Petchey and Schmid 2020) for marine samples. The outline distributions show the unmodelled calibrated ages for each sample. The black distributions show the age ranges when applying the Bayesian model constrained by the outlier parameters, as outlined in the text. Error margins of 68% and 95% are indicated by bars under each age distribution.

archipelago, especially for Hawai‘i, Rapa Nui and New Zealand, where the historical implications are particularly important. One question of primary significance is whether kūmara came first into the Marquesas or Rapa Nui with the arrival of Amerindians in the twelfth to fourteenth centuries (Ioannidis *et al.* 2020) on their own sailing rafts, as has long seemed more probable than otherwise (Anderson *et al.* 2007; Wallin 2020).

As for regional dispersal, there seems to be a case, currently at least, for hypothesising post-colonisation transfer of kūmara to Hawai‘i and Rapa Nui, if it did not arrive directly to the latter. While our first, exploratory, review of the New Zealand material suggested something similar, this has not emerged

from the full study. We have considered the timing of kūmara introduction and dispersal in New Zealand from both ends of the scale, one being the credentials of particular samples, ages and sites. This has confirmed a scarcity of directly dated kūmara tissue in the archaeological record and numerous charcoal samples in which the extent of inbuilt age is now indeterminable. Even radiocarbon samples on short-lived taxa can remain questionable, as in cases where ages in the mid- to late fourteenth century could have some decades of inbuilt age. Elsewhere, this level of error might be trivial, but in New Zealand's short chronology, where a century is a fifth of the total span, significant questions of timing are begged at a sub-centennial level.

To answer these questions, the identification of short-life-span taxa in charcoal samples might need to go beyond most of the shrubby taxa generally accepted within it to shorter-lived taxa again (cf. Gumbley *et al.* 2003: 20), such as leaves of *Phormium* and *Cordyline*, and tussock grasses. Such samples, however, are more readily displaced in archaeological sites and demand greater assurance of original associations. That is even more the case in identifying kūmara microfossils, given that they are highly susceptible to trans-stratigraphical mobility. The exclusively cultural origin of charcoal in gardens is uncertain, as are inferential links between kūmara and pits, stone lines or other structures. Gardens were not necessarily for kūmara, and nor were storage pits. These sources of difficulty readily facilitate critical review of nearly all the pre-AD 1400 ages. Nevertheless, some early age series from Coromandel might prove robust.

That appears to be so at the other end of the research scale, where the ages for kūmara cultivation are modelled in aggregate. Excluding the terrestrial test where relatively abundant old carbon in unidentified Southern charcoal samples is suspected, an initial colonisation–cultivation link is strong for the Northern coastal region in each model. Similarly, there is a consistently late inception of Northern inland (Figure SI-1) and Southern cultivation. The modelled data are, in origin, those formerly critiqued at the sample level, but it can be argued that the application of outlier models and new calibrations to groups of ages confers more validity to the trends than can be claimed by arguing from individual ages.

If the trends are accepted and we begin thinking about why they exist, subsistence imperatives in colonising New Zealand might have been involved. When the Māori population was small, perhaps not exceeding 10,000 by AD 1400, a substantial proportion of it was attracted to hunting and foraging in the Southern region. For small dispersed colonising groups elsewhere the effort of converting heavily forested ground into kūmara gardens, especially in Northern districts, could have been delayed in favour of cultivating taro in existing wetlands (Prebble *et al.* 2019). The notion that early Northern horticulture was mainly about taro, and to a lesser extent uwhi, has some history (Ferdon 1988; Groube 1967), and taro cultivation is evident in the oldest stratigraphy on Ahuahu (Prebble *et al.* 2019).

Yet, considering the options of kūmara introduction to New Zealand, the consequences of the two modes implied here might not have been remarkably different. Kūmara arriving early in the colonisation era could have been confined for the first century or so, perhaps by lack of consumer demand, adaptational processes or the dispersal limitations of other cultigens (which helped to ensure horticultural production continuity if one species failed), to the northern North Island, and possibly to a few actual or virtual islands of premium cultivation conditions (Barber 2020; Prebble *et al.* 2019). Alternatively, kūmara arrived later and began spreading with little delay toward its latitudinal and altitudinal limits, c.f. sweet potato in the Americas (Ferdon 1988) or New Guinea (Ballard 2005). Either way, the regional dispersal, which expanded by several times the range of kūmara cultivation, occurred at about the same time. It may have been less the arrival age of kūmara than its delayed regional dispersal, and the rise of what seems to have been plantation horticulture, that had the stronger influence on population growth, pā construction, internal migration and political change (Anderson 2016). Further research might then show that the history of kūmara cultivation in South Polynesia, which has intriguing parallels with Hawai‘i and Rapa Nui, was following a similar trajectory—in which surplus productivity was invested in reinforcing inherent political inequality, but in conditions of low population density and therefore later or more slowly. Time will tell.

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CARVED *KOMARI* (VULVA) STONES FROM RAPA NUI: MUSEUM OBJECTS, LEGACY DATA AND CONTEMPORARY LOCAL HISTORY

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ABSTRACT: The authors examine selected stone objects in the J.L. Young Collection, Bernice P. Bishop Museum, Honolulu. Two were named by Young "Maea Momoa" (ma'ea momoa; lit. 'stone for chickens'). One of the ma'ea momoa is a "pillow stone" (ŋarua) or basaltic beach cobble incised with komari (vulva motifs). The other is a "Bar of stone" lavishly embellished with similar motifs. Six other objects are said to be "fetish stones". A possible 'Orongo provenance for the incised "Bar of stone" is raised and tested, and toponymic and linguistic data are offered in support of a new interpretation of the origin of the hakatoro repe 'elongation of the clitoris' ritual and the function of one incised "fetish stone" in that process. This research calls attention to the traditional role of women in 'Orongo ceremonies and employs relatively obscure museum collection objects and their previously overlooked documentation, thus uniting multiple data strands to reveal new details of Rapanui ritual life.

Keywords: komari (vulva motifs), stone artefacts, 'Orongo ceremonies, gender-based rituals, J.L. Young Collection (Bishop Museum), Rapa Nui

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Our focus here is on one of several objects in the Bernice P. Bishop Museum sent on loan to Rapa Nui in November 2018 for a special exhibit at the Museo Antropológico Padre Sebastián Englert, Hanga Roa.[1] We address three questions: What is this apparently ancient object? What is its history? What new information does it add to our understanding of Rapanui ceremonies?[2] The object of interest is referred to as a "Bar of stone" in the J.L. Young Collection list. Young included it and eight other objects in this list, which accompanied the collection when it was sold to the Bishop Museum. The "Bar of stone" (i) and one of the "3 small fetish stones" (iii–v) are neither previously researched nor published but are central to this discussion. A 3D image of the "Bar of stone" is available at https://sketchfab.com/3d-models/stone-w-petroglyphs-ki-r-11167b131b0e4df78d46fd9a8180a923.

(i) "Bar of stone, Maea Momoa carving. Rapa Nui" (Figs 1a, 1b)
(ii) "Flat, rounded, stone, Maea Momoa. Rapa Nui" (Figs 2a, 2b)
(iii–v) "3 small fetish stones (one carved). Rapa Nui" (Fig. 3a–c)
(vi) "1 small stone amulet, carved fish head. Rapa Nui"
(vii–viii) "2 fetish stones. Rapa Nui"
(ix) "1 small black fetish stone. Rapa Nui"

Young includes the meaning of the descriptive Rapanui words quoted above as he understood them: "Maea Momoa. Phallic stones carved with conventional figures of the Vulva feminae used in the ceremony of Hakatoro Repe … Maea, stone; Momoa, offspring, descendants; called also Maea Ika, stone of the fish." According to Englert (1978: 178, 184, 198) *ma'ea mo moa* is literally translated as 'stone for chickens', and *komari* is 'vulva, pudenda' but also a class of motifs carved on bedrock, boulders (as petroglyphs; Lavachery 1939) or objects. We describe these nine objects, discuss the collector, summarise legacy archaeological data, offer newly collected local knowledge for ma'ea mo moa, hypothesise ritual uses for the "fetish stones" and assess the role of these types of objects in Rapanui rituals.

THE COLLECTOR

The collector of the "Bar of stone" was James Lyle Young (1849–1929), a well-known Pacific trader and eventually the managing director of Henderson and MacFarlane, Ltd., general merchants of Auckland, New Zealand (Kaeppler 2001: 309–10). Young was born in Londonderry (now Northern Ireland) and immigrated to Australia with his parents in the mid-1850s. In 1870 Young became associated for five years with a cotton plantation in Taveuni, Fiji. In April 1875 he embarked on a trading voyage from Fiji to Sāmoa via Futuna and Wallis, and in 1876 he sailed for the Marshall Islands. At Ebon Atoll he operated a trade station for Thomas Farrell of Auckland. Young was in Micronesia from 1877 to 1881.

It is claimed that J.L. Young made multiple sea voyages "including to Pitcairn and Easter Island" (Neich 2008: 331–32). However, we are unable to corroborate that Young ever visited Rapa Nui. Métraux (1940: 263–64), in referring to collections made in 1886 by Paymaster William J. Thomson of USS *Mohican*, says that Thomson was at Rapa Nui "a few years before Young's visit". Métraux probably assumed, based upon his collections research at Bishop Museum, that Young had visited Rapa Nui, and then Neich reiterated that assumption. It is certain that Young lived intermittently in Tahiti, where he married Mary Stringer in 1884 (that is, two years before the arrival at Rapa Nui of USS *Mohican*). Young (1904) says that he obtained information in Tahiti "from time to time during the past 18 years from natives of Rapa Nui".

Figure 1a (top). "Bar of stone, Maea Momoa" (B3592), 67 × 15 × 11 cm, J.L. Young Collection, Bernice P. Bishop Museum. Photo by Jesse W. Stephen, Bishop Museum Archives.
Figure 1b (bottom). "Bar of stone, Maea Momoa" (B3592), J.L. Young Collection, Bernice P. Bishop Museum. Drawing by Wendy All.

Figure 2a (top) and 2b (bottom). Front and back views of "Flat, rounded, stone, Maea Momoa", 26 cm long, known as a "pillow stone" (B4454), J.L. Young Collection, Bernice P. Bishop Museum. Photo by David Franzen, Bishop Museum Archives.

Young eventually sold most of his collection to Bishop Museum in 1920, but before that he loaned to the museum director the flat, rounded basaltic beach cobble (*poro*; B4454; Young catalogue [ii]) incised with vulva (komari) symbols and illustrated in the Director's Report for 1903 as part of a short article by Young entitled "Remarks on Phallic Stones from Rapa Nui". That article and the illustration were reproduced as an occasional paper of the Bishop Museum in 1904 (Van Tilburg 1994: 170, n16). Young (1903/1904) quotes in both articles unnamed Rapanui men who described ceremonies involving the much smaller pebbles they called "Atua Mangaro" (*atua* 'god or gods'; *maŋaro* lit. 'to tame or to break') (Fig. 3) as follows:

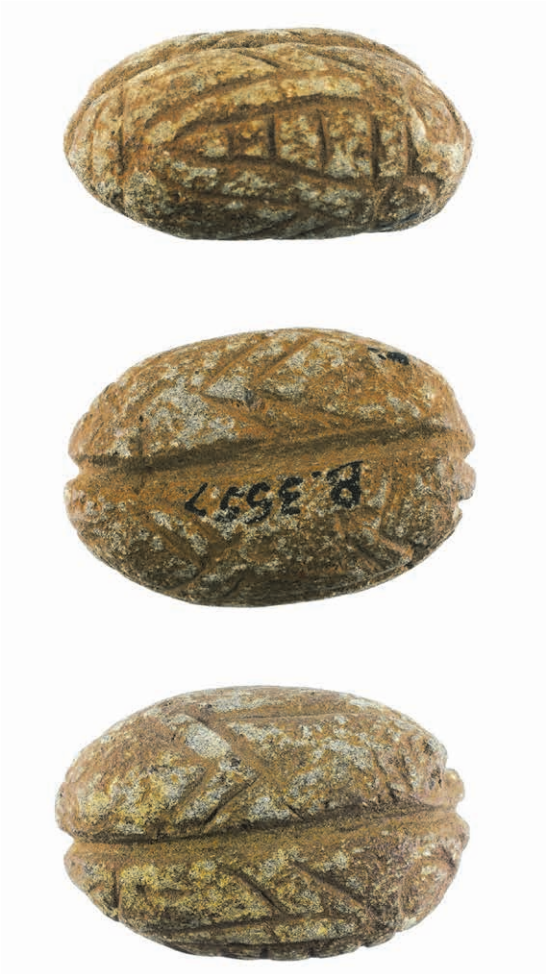

Figure 3. Three views of one of three small "fetish stones", weight range 15–19 g, (a. top) top view (B3557), incised and grooved for attached string; (b. middle) side view 1, with museum number (B3557) visible, showing continuity of groove for attached string; and (c. bottom) side view 2 (B3557), showing groove superimposed over and through design elements including angular/linear motif(s), a curvilinear motif and one or two anthropomorphised faces. J.L. Young Collection, Bernice P. Bishop Museum. Photo by Jesse W. Stephen, Bishop Museum Archives.

> It is said by some of the old [Rapanui] men, who until lately resided in Tahiti, that these stones were used in the ceremony of "hakatoro repe" (hakatoro=to cause to stretch, to elongate; repe=clitoris) also called by one old man "hakatoro matakaho" (matakaho=clitoris). This rite was practiced on girls shortly before they arrived at puberty. A similar rite was in use in the Marquesas Islands in former years. It is worthy of remark that at Ponape (Carolines) the labia minora was stretched until they were [more] projecting than the labia majora. No detailed account of the ceremony could be obtained, except that the operator, who was always an old man or "tuhunga" (priest or wise man) pinched the clitoris with finger and thumb, or between pieces of reed or bamboo, so as to make the end swell. Having thus enlarged the end of the organ so that a string could be fastened to it, he proceeded to put a noose of fine twine over the swelled end with a slip-knot, and fastened a small stone as a weight to the twine, which gradually elongated the clitoris until it was, in course of time, two or three inches long. Care had to be taken, said the narrators, to relax the noose occasionally, lest the end of the organ should drop off; in which case no one would want to take the girl to wife, she would be kopori (adhering together), also conveying the idea of deformity or being misshapen.
>
> It is said that the rite of hakatoro repe was ordained by Tane Harai, the father of Hoatumatua [Hotu Matu'a], who, before his son left the land of Marae Toehau,[3] said, "forget not the practice of hakatoro, for by that shall it be known whose sons ye are." (Young 1903/1904)

That is, hakatoro repe produced female identity markers socially required or recognised by high-status males when seeking marriage partners of similar status.

Englert (1978: 157, 245) gives *hakatoro* as 'to castigate' and, aptly enough, 'to punish or mortify the flesh', and *reperepe* as 'to stretch or extend below', with the specific example of extending the earlobe during ancient times; also, 'labios [labia] de la vulva'. In related meanings Du Feu (1996: 200) gives *tino* 'sex organs, female', *tataki* 'vagina' and *komari* 'vulva'. The term *matakaho* should probably be *matakao* (lit. 'uterus, womb'; Englert 1978: 193) and thus suggestively appropriate to the discussion here.

Routledge (1916; 1917; 1919: 256; 1920) declared that the large, incised beach cobbles such as one collected by Routledge (1919, 1920) and another obtained by Young (B4454; Figs 2a, 2b) and weighing 1.81–2.26 kg were "used as pillows" in the stone buildings of the ceremonial site of 'Orongo. She collected several and understood them to have magical abilities to cause dreams or visions and to ensure fertility, especially that of chickens. Ramírez-Aliaga (2016b) describes additional "pillow stones" (*ŋarua*) and concurs in their use.

Métraux (1940: 187–88, 263–64, 258 fig. 42e, f) presents a sketch of Bishop Museum B4454, identified as a "boulder" and one of several

"Good-luck objects" that also includes the "fetish stones" discussed here. He interprets the small beach pebbles as "line sinkers", which is unrealistic considering how light they are (14–19 g).

> Stones incised with designs of the vulva are common on the island and had no connection with the purported ceremony of the *hakatoro* (stretching of a girl's clitoris) suggested by Young. The stretching of the girl's clitoris (*repe*) was not a special rite, but a long process of deformation which lasted for years under the care of a girl's mother. (Métraux 1940: 264)

Métraux (1940: 104) is not saying that the rite of hakatoro repe did not take place; nor is he saying that priests were uninvolved. What he stresses is that it was a time-consuming practice carried out on children who were "probably of chiefly families" under the watchful eye of a female family member.

> According to one popular Easter Island tale, a girl in seclusion was daily washed (*hopu*), deloused (*aruke kutu*), combed (*hari hari*), stained (*akui*) with turmeric and red earth, and her clitoris was stretched (*haro matatuu*) so that it would be long and hanging. (Métraux 1940: 104)

> The "Maea momoa" in the [hakatoro repe] ceremonies were necessary adjuncts to the function, and without its presence the rite could not be performed. It was "taonga tuhunga"=the valued implement or amulet of the priest. It was also stated that each clan or "manga"=division or family of a tribe had a separate stone, called by the name of the ancestress, as the carved staves were, but identification of the stones as belonging to any one clan could not be obtained. Very few of the old men are left, and most are quite unreliable. (Young 1903/1904)

Métraux (1940: 104) related that "Easter Islanders pointed out to me two caves in Poike which were said to have been inhabited by *neru*, boys and girls who were separated according to sex and who were secluded by their parents in caves where they lived for years. They were probably of chiefly families and, as in Mangareva, were isolated in order to become white and stout and to manifest by their appearance the distinguished position of their families." He quotes the following song:

> You are secluded, O *neru*, in the cave.
> Hanging is the gourd with red ochre of the *neru*.
> You have been secluded for a long time, O *neru*. (Métraux 1940: 104)

Englert (1978: 207) names two caves in the Poike region of the island where neru children were isolated: Ana More Mata Puku (for boys) and Ana o Keke (for girls).

MA‘EA MOMOA (“BAR OF STONE”) IN THE BISHOP MUSEUM

The “Bar of stone” (B3592) collected by Young is shaped of yellow-brown basaltic stone uncharacteristic of the ‘Orongo area. Its measurements as determined by Bishop Museum are 67 × 15 × 11 cm.[4] It is rectangular and squared off with irregular, non-bevelled edges. The end portions are unfinished and porous, while the larger area of the central portion has been smoothed. It is on that portion that the nine iconographic motifs discussed here are incised. Four motifs (1–4) are described from the view we call “A” (Fig. 4a). Five motifs (5–9) are described from the reverse view we call “B” (Fig. 4b). Three motifs are larger, better carved and more complex, and one of them (“A” view; Motif 3) can be read from both views. Most such motifs are traditionally referred to as komari (vulva; vulvae).

There are two complex, anthropomorphised komari on this “Bar of stone” (“A” view; Motifs 1 and 3). Motif 1 includes a human arm and hand (Figs 5a, 5b). The hand has the correct number of digits and is curved and lying above (calling attention to) the genitalia (as in the flat, female woodcarvings known

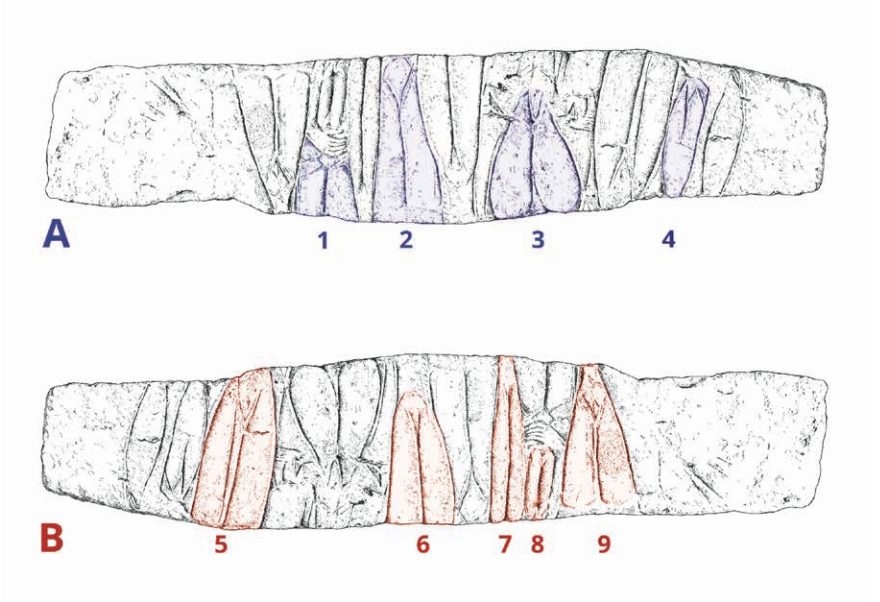

Figure 4. (a) Embellished “Bar of stone” (B3592), 67 cm long, “A” view, komari motifs 1–4. (b) “B” view, komari motifs 5–9. Drawings by Wendy All.

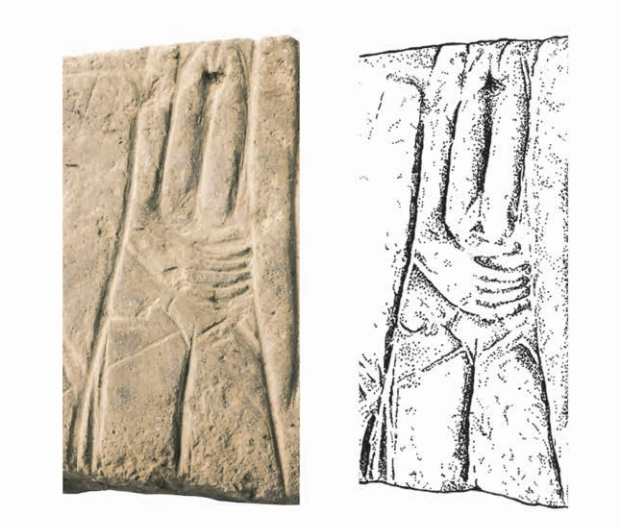

Figure 5. (a, left) "A" view, Motif 1 (B3592), detail on "Bar of stone" of low-relief human hand lying above indication of female genitalia and legs; above the hand, a high-relief komari. (b, right) "A" view, Motif 1 (B3592), detail on "Bar of stone". Drawing by Wendy All.

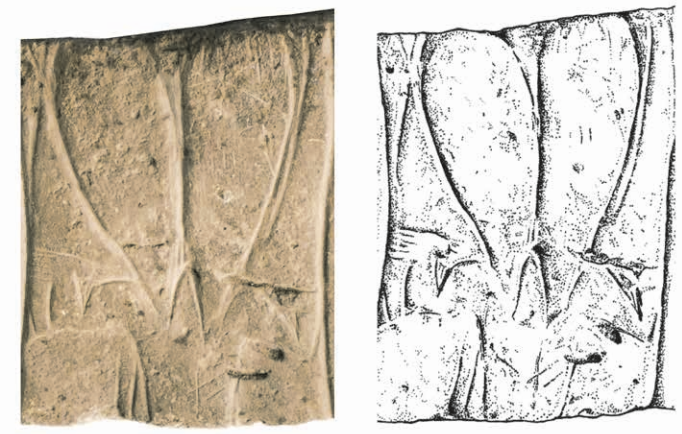

Figure 6. (a, left) "A" view, Motif 3 (B3592), detail of low-relief figure with splayed legs of a human or lizard (moko), incised indication of spine/ribs and enlarged labia. (b, right) "A" view, Motif 3 (B3592). Drawing by Wendy All.

as *moai papa* or *moai paa paa*). Motif 8 ("B" view) is a strikingly graphic komari, directly above the hand but not an attached part of it. Motif 3 ("A" view) depicts the lower torso and splayed legs of either a human male or, perhaps, a lizard (*moko*). However, the leg and foot are as in the *taŋata manu* 'birdman' petroglyphs. The figure has female genitalia with enlarged labia and, in this view, a tail/penis (Figs 6a, 6b). Both Motifs 1 and 3 are conventionalised but explicitly depict human sexual organs or acts we interpret as representing a ritual concern with procreation and fecundity.

The other motifs consist of Motif 2 ("B" view; in the middle), which is paired with another that is nearly the same but reversed ("B" view, Motif 6). Motifs 2–7 and 9 are all typical, highly stylised komari with enlarged labia and having a centrally placed, incised Y-shape that is a key part of rock art iconography, superimposed on portable objects and included in the complex dorsal designs that embellish some megalithic statues (*moai*). Vargas *et al*. (2006: fig. 4.47) report a beach cobble embellished with a motif nearly the same as Motif 3, "A" view on the "Bar of stone." It was found in the south coast survey in 1977 and was embedded in the pavement of a high-status, elliptical house (*hare paeŋa*; Site 7-556A; fig. 4.46).

The "Bar of Stone" and Rano Kau (Kao)

Significant or impressive natural Rapa Nui geographical features, including the volcano Kau (Kao), may be regarded linguistically as aniconic localities traditionally considered as mythic or supernatural places. The name of one of these places, the lake-filled volcano today known as Rano Kau, was rendered by ethnographers or mapmakers in the past as either Rano Kau or Rano Kao.

In 1868 Lieutenant Colin M. Dundas, RN, HMS *Topaze*, superimposed the label "Rano Kau (crater)" over the lake he depicted on his map of Rapa Nui. Another map, published in 1877 after the 1870 visit of the Chilean corvette *O'Higgins*, labelled the crater as "Ranokao". In 1886 Paymaster William J. Thomson (1891: 451), USS *Mohican*, understood that "Rana Kao" applied to the volcano, not to the lake. Routledge (1919: 252) rendered the name of the volcano or "western headland" as Rano Kao. Following her widely read book the name continued to be alternately rendered as either Rano Kau or Rano Kao, with Heyerdahl and Ferdon (1961) following her lead and using Rano Kao. Such confusion is not uncommon for the time, but it does encourage the question: What's in a name?

Kau is given by Englert (1978: 168) as "amplio, grande" ('wide, large'), a correct description of the volcanic crater Rano Kau. Englert (1978: 167) offers other meanings for *kau*, for example, "muévete nadando" (lit. 'move around swimming'). The importance of the lake is thus emphasised. He also gives *kau* "cundir plantas" (lit. "to spread plants"), specifically *kūmara* 'sweet potato'. This fits neatly with the importance of the volcano in settlement

legend, where it is given as the first landing spot (Barthel 1978; Métraux 1940; Routledge 1919). It also makes sense in terms of the probable early use of the inner region as a sheltered place to nurture transferred plant stock (Yen 1988).

The primary definition of *kao* is "costado; canto o borde", with *kaokao* (*kao kao*) a variant of it that means 'side or flank', 'steep', thin', 'almost perpendicular' or 'an escarpment' (Du Feu 1996; Englert 1978: 165, 168, 202). The secondary definition of *kao* is "los labios menores de la vulva" ('labia minor') (Englert 1978: 165, 202). Motu Kao Kao, one of three islets lying off the flank of Rano Kau (Kao) (McCoy 1976, 1978), fits both primary and secondary definitions. It is a steep pinnacle rising out of the sea, and Lieutenant Dundas called it "bird rock" on his map. Viewed from Rano Kau (Kao) it is graphically and strongly indicative of female anatomy, specifically labia minor. We suggest, therefore, persuasive links between conventional linguistic meanings, the physical landscape and female gender (fertility) symbolism.

We further suggest that the Rapanui use of *kau* and *kao* or *kao kao* for the geological and ceremonial locale defined by the volcano, the lake and the offshore islets is a deliberate reference that links those features conceptually as components of a mythic and supernatural landscape. The ethnographies do not make clear the precise time frame for the use of these place names. Linguistically, however, the emphasis is on fertility (of nature, especially kūmara) and fecundity. Graphic personalisation of the female genitalia is evident in the iconic petroglyphs of 'Orongo, and Routledge (1919) quite reasonably concluded that the komari (vulvae) was an identity marker created during ritual.[5]

The Kao Lineage Group

The Miru were the most highly ranked and most widely distributed of the Rapanui social groups (*mata* 'tribe'; Métraux 1914: 125; Routledge 1919). Hotu Matu'a, said to be the founding paramount chief and royal ancestor, was descended from the major god Tongaroa through "Ko Rongo-Rongo-a-Tangaroa" (Métraux 1940: 127). The title and estate of the paramount chief descended through the first-born son (*atariki*) of Hotu Matu'a. According to Rapanui consultant Victoria Rapahango the "Honga and the Te Kena claimed descent from two brothers of that name, sons of Tuu-ma-heke [Miru], the heir of Hotu Matu'a" (Métraux 1940: 93, 126).[6] Moreover, "the king was always a member of the Honga lineage". Female partners in family building were traditionally drawn by Honga males from the Te Kena line, founded by the second son, or the Ure-o-kao sub-lineage. The Te Kena and Ure-o-kao groups were branches of the same Miru tree, *tumu* or *tumu taina* (lit. 'trunk of a tree'; 'those who ascend the genealogical tree'; Englert 1978: 272).

All Miru as a group were known as *'ariki paka*, 'divine' or 'superior'. Those who held the highest rank within the lateral descent groups "exercised religious functions" (Englert 1978: 103). Sub-lineage heads formed a formidable advisory group (*hōnui*) to the 'ariki paka. This division of sacred (priestly) and secular (chiefly) rights and obligations is poorly understood, but there is no evidence that would cause one to doubt that the Miru are the only Rapanui kin group to establish and hold *'ariki* 'chiefly' titles. Protecting one's identity, and especially the order of descent within the Miru line, was therefore both a sacred duty and a political obligation. Thus, the Miru were admonished by the ancients to "forget not the practice of hakatoro, for by that shall it be known whose sons ye are" (Young 1903/1904).

A powerful Miru 'ariki named Tu'u ko Ihu "to whom most of the sacred rituals are attributed" is said to have arrived with the paramount chief or perhaps in a second canoe at or near the same time (Métraux 1940: 126). His son founded the Kao sub-lineage, and the Kao and Ure-o-kao are blended or interchangeable Miru sub-groups (Métraux 1940: 126–27). As the population grew Miru descendants expanded from the region of 'Anakena to Rano Kau (Kao) and eventually formed at least 13 sub-lineages. The Kao were so numerous that they "lived in the districts of Marama and Haumoana [lineages], near the village of Hanga-roa and the bay of Hanga-piko, and on the slopes of Rano-kao" (Métraux 1940: 126).

The "Bar of Stone" and 'Orongo

The ceremonial complex of 'Orongo is located on the southeastern outer rim of the volcano Rano Kau (Kao). Ferdon (1961) described three loci during his investigation of 'Orongo as Complexes A, B and C. Complex A (290 m above sea level) includes two structures, one of which is a small *ahu* 'ceremonial structure'. Complex B has 40 clustered, distinctive stone buildings and associated features. Complex C has eight linked stone buildings built upon embellished bedrock and surrounded by carved boulders having multiple petroglyphs. A single radiocarbon determination on unidentified wood charcoal from an excavation was interpreted by Ferdon as establishing abandonment of Complex A ca. AD 1420 (T-193; 540 ± 70 BP; 2 sigma). Recalibration arrived at a date range of ca. AD 1300–1617 (Robinson and Stevenson 2017). Further research on this chronology is underway.

The Complex B buildings all have entrances facing southwest, and many have shaped doorposts. Some doorposts are embellished with petroglyphs. Two objects of interest to this discussion are probably from 'Orongo. The first is a carved, egg-shaped, brownish basaltic boulder weighing 27.21 kg and having a colour and texture like that of Young's "Bar of stone". It was collected by the USS *Mohican* expedition in 1886 (128378; US National Museum of Natural History; Fig. 7). It is carved with komari and low-relief

Figure 7. Carved, egg-shaped basaltic boulder weighing 27.21 kg (128378). Collected by USS *Mohican* in 1886. Original location unstated but probably ‘Orongo. Note relationship of hands to komari and bird beaks shaped as komari. Photo courtesy United States National Museum of Natural History, Smithsonian Institution, Washington, D.C.

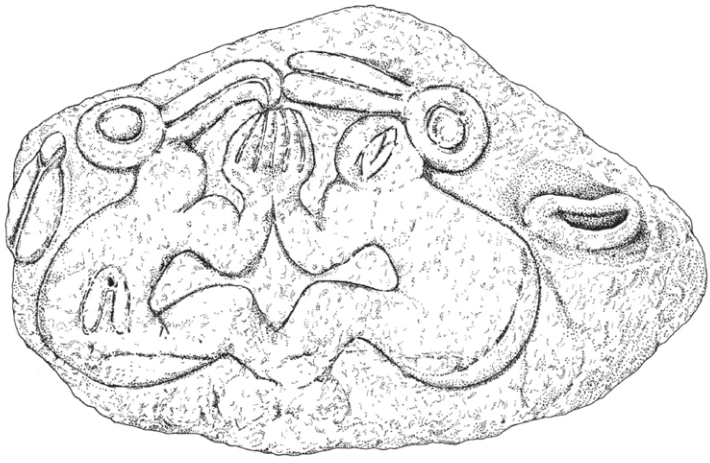

Figure 8. Carved side of basaltic boulder (05-2-70/64852) collected by A. Agassiz, Peabody Museum of Archaeology and Ethnology, Cambridge, Massachusetts. Drawing by Wendy All.

birdman motifs, including a distinct tableau of two birdmen and a komari that recalls Motif 1, "A" view, above. In technique and subject matter it is linked to carvings on the dorsal side of the famous moai known as Hoa Hakananai'a, removed in 1868 by the crew of HMS *Topaze*.

According to Routledge's consultant Gabriel Revahiva, Hoa Hakananai'a was found buried to its shoulders and facing inward in the building named Ko Tau Re Renga O Miru or "Taura renga" ('the red belt or cord of the Miru'; Van Tilburg 1992; 1994; 2006: 35, 64, n146 citing RGS/WKR 4/3/2). The precise original location of the egg-shaped boulder is unknown, but it appears to have been embedded upright in soil; hence, it likely came from one of the Complex B houses. Another, similar carved boulder was collected by American scientist Alexander Agassiz in 1904–1905 (Fig. 8).[7] It is carved on one side by opposing birdman and komari motifs, including one that is the visual counterpart of Motif 8 on Side B of the "Bar of stone".

'Orongo Complex C (280 m asl) is known as Mata Ngarahu (*mata ŋarahu*; lit. 'eye' but also 'kin group'; 'soot or sooty'). It is a cliff-side, basaltic outcrop on which multiple bas-relief and incised petroglyphs are carved. The outcrop supports carved and embellished boulders and an elliptical cluster of eight cave-like structures with entrances comparable to those in Complex B. Ritually, it is associated with chanters known as *taŋata roŋoroŋo* ('rongorongo men'; those who read ritual text carved in wood) and probably with the practice of tattoo.

Métraux (1940: 106), who builds upon Routledge's notion that komari petroglyphs at Complex C were identity markers, says that young girls went to 'Orongo where they were entrusted to specialist priests and "each girl stood upon a rock called papa-rona [*papa*, lit. 'flat rock or wood surface'; *rona*, lit. 'figure cut or carved in wood or stone'; Englert 1978: 220, 249], with legs spread open and two men below examined her vulva … Then they carved a rock with an image of the vulva." Routledge (1919: 263) explains it more decorously when she says, "It was the custom for women of the island to come up here and be immortalised by having one of these small figures ('Ko Mari') cut on the rock by a professional expert." The counts of komari petroglyph motifs at 'Orongo vary. The more recent inventory gives a total of 334 komari motifs (Lee 1992: 31, fig. 3.4).[8]

'Orongo Cave Annex (Routledge 19A)

Based upon the relationship we have established between female genitalia and the iconic depiction of komari to the practice of hakatoro repe, and on the linguistic and geographical association of all with Rano Kau (Kao) and the offshore islets and 'Orongo, we turned to Routledge's (RGS/WKR) fieldnotes in the Mana Expedition papers in the hope of establishing a contextual relationship between Young's embellished "Bar of stone" and

'Orongo. On Saturday 11 July Routledge (Diary Entry RGS 4/9) "went up to Orongo" with the expedition's surveyor, Lieutenant D.R. Ritchie, RN. He mapped buildings numbered 16 to 21, and Routledge described House 19 and Cave Annex 19A in her rough fieldnotes for that day.[9]

> No. 19. Condition: practically perfect. Passage 5′0″, outer end broken, inner end 1′8″ × 1′7½″, still perfect. Chamber: 14′0″ × 4′0″ × 4′0″. Construction typical throughout. Ends oval. Floor level with sill. A properly built hatch 9″ × 9″, opens into No. 20. Decoration: slabs opposite door have been painted, almost obliterated; on roof, birds red on white, a figure 8″ × 4″ which may be a mataa, and various other designs.
>
> No. 19A. Cave Annexe [*sic*] to No. 19. Condition: half of slabs forming roof have fallen in, large amount of earth worked in from above, floor very wet. Passage: 8′0″, outer end 1′8″ × 2′2″, is a concealed entrance behind a slab in No. 19, the inner end opens into the cave. Chamber (cave): circular 6′0″ in diam. × 5′0″ in height, hollowed out of natural rock and walled up in places. Roof formed of flat slabs.
>
> Decoration: lintel of door behind slab covered with ko mari [*sic*] figures; opposite door a painting on natural slate, red outlined in white, possibly a canoe under canvas. White patch on ceiling; Routledge 1920: 440–41.

Routledge's House 19 is now numbered 20 and assigned to Ko Te Kauki on the ReStudio (n.d. [2013]) digital map of the interiors and exteriors of 'Orongo buildings. The map was accomplished for the Rapa Nui National Park. Routledge's Annex 19A is ReStudio E20 R2.

There are 38 'Orongo buildings and one cave having some type of embellishment incorporated. Of these, 14 houses and the cave have komari motifs. The highest concentration of komari motifs was recorded in the buildings on each side of Routledge's House 19 (ReStudio 20), House 18 (ReStudio 19) and House 20 (ReStudio 21), and in House 40 (ReStudio 41) and House 41 (doorpost between ReStudio 44 and 45) in Complex C. There are komari on building exteriors in the Complex C courtyard and on boulders. These are not factored in with those counted for the houses and the motif count is incomplete.

Routledge's House 19 [20] and the others arranged around the same courtyard were photographed during the USS *Mohican* expedition that removed painted slabs from a nearby building (Fig. 9). Our original hypothesis was that the layout of Routledge's House 19 [20] and its small, hidden cave annex suggested confinement, privacy and secrecy of the type one might wish to have when pursuing hakatoro repe, especially if it was being practised under the noses of colonials and Christian priests. We speculated that Routledge's "lintel" was Young's "Bar of stone".

Figure 9. The entrance to Routledge's House 19 [20] is in the foreground at the far right in a photo taken during the USS *Mohican* expedition. NAA Photo Lot 76-26 (INV 04952800), courtesy of the US National Museum of Natural History, Smithsonian Institution.

In support of our hypothesis, which was based in part on the discoloration pattern of the "Bar of stone", is the probability that the "lintel" was not a load-bearing structural element but a fascia or decorative piece that could be removed without causing significant structural damage. Secondly, we know that if Routledge had removed it, she would have stored it temporarily at Mataveri with hundreds of other objects she collected. An unknown number of those objects was taken surreptitiously by Rapanui men, some of whom worked for Routledge, and later sold (Van Tilburg 2003, 2014). Perhaps, we thought, the lintel was one of them. Yet, as we show below, the chronology of collecting does not link the "Bar of stone" to Routledge's House 19 [20] or her Cave Annex 19A.

Chronology of Collecting

A chronology of the "five original Maea momoa" known to J.L. Young is sketched in his written record.

> One is in the U.S. National Museum, one in Santiago de Chile, and three in the possession of the writer—one of which is at present in the Bishop Museum. Of the two others, now in Auckland, one is somewhat similar in shape to

> that in the Bishop Museum: the other is a rectangular bar of hard stone 20 in. length by 4 in. square, all of one side being covered with the figure of the pudendum. The writer obtained the first stone in 1885 and the two others in 1887. (Young 1903/1904)

Thus, the "Bar of stone" we are discussing here was in Young's possession by 1885–1887 and therefore cannot be Routledge's "lintel of door behind slab covered with ko mari [*sic*] figures" which she saw in situ nearly two decades later. As we note above, it is unproven that Young ever visited Rapa Nui. So how did Young acquire the "Bar of stone" and the other objects on his list that we have associated with hakatoro repe?

It is well-established that, in the 1880s, Alexander Salmon, Jr. (Ari'i Pa'ea), was engaged in commercial selling of Rapanui artefacts as well as objects made for trade. For example, Henry Adams, of the American political dynasty, acquired Rapanui objects from the Queen of Tahiti, Arii Tamai, in 1881 (Kaeppler 1996). Presumably, she had acquired them from Ari'i Pa'ea. Lieutenant-Captain Wilhelm Geiseler (1995) of the German Imperial Navy also purchased objects from Ari'i Pa'ea and even advanced him funds to purchase a *kohau roŋoroŋo* 'staff or board with lines of carved symbols'. In 1886 Paymaster William J. Thomson got most of his ethnographic collection from Ari'i Pa'ea, including two kohau roŋoroŋo which may be the same ones paid for in advance by Geiseler. Therefore, we argue that Young acquired the "Bar of stone" in 1887 in Tahiti, and that Ari'i Pa'ea was the original collector or broker. It is not the "lintel" Routledge saw in her House19 [20]. Nor is it in any other of the 'Orongo buildings. Nor is it in any other museum collection known to us. During reconstruction of Complex B, Mulloy (1975:18) permanently closed Cave 19A as unsafe after only a perfunctory examination.

The 'Orongo ceremonial centre evolved from a single locale including at least one early ahu most likely incorporating one or perhaps two moai—possibly but not necessarily the basalt statue known as Hoa Hakananai'a—to become two clusters of stone buildings (Routledge 1919: 221, 257). The seminal ethnographic data for 'Orongo (Métraux 1940; Routledge 1919, 1920) were provided by male members of known families in a group known as the *korohu'a*, with Juan Tepano a Rano and his mother Veriamo a Huki a Parapara (Victoria) acting as primary consultants. We suggest that this ethnographical information and the toponymic and linguistic evidence presented above strongly supports our thesis that the original hakatoro repe rituals were controlled by the aristocratic Miru. Other kin groups eventually became involved as the taŋata manu competitions at 'Orongo expanded to their endpoint in 1867–1868.

DISCUSSION

We concur that "Maea momoa" (ma'ea momoa) or large basaltic beach cobbles embellished with komari (vulva) motifs and known as pillow stones (ŋarua) were used by temporary inhabitants of 'Orongo buildings. Their function is linked to the attainment of dreams or visions, and there is little reason to doubt that their probable association is with fecundity or fertility. We pointed out other, similarly embellished boulders and cobbles, one of which is localised to the pavement of a high-status, elliptical house on the island's south coast.

The smaller, inscribed and grooved carved pebble or "fetish stone" is of the type Young (above) said was the "valued implement or amulet of the priest" and "a necessary adjunct" to the proper functioning of the rite of hakatoro repe. He further states that such stones were held by families and reflected their status identity as a group. Young's information came from male elders in Tahiti, few of whom he found reliable. Nonetheless, he carefully catalogued the information they provided, which (as we show below) is compatible with contemporary local knowledge of the practice of hakatoro repe.

Although we have not established the original location of the "Bar of stone", the functional link between the "fetish stones", numerous komari rock art motifs and hakatoro repe as a ritual practice at 'Orongo is solid. Rano Kau (Kao) is highlighted in the oral histories of settlement, mentioned in the life and death of the founding ancestor, and tied to the aristocratic Miru. We propose linguistic and toponymic links between the Miru lineage(s) known as Kao and the variant place names recorded for Rano Kau (Kao) and Motu Kao Kao.

We suggest that the ritual of hakatoro repe was likely a secret practice original to the Miru primary line. The likely purpose was to identify suitable marriage partners within highly ranked women of a secondary Kao line. In this way hakatoro repe conforms to the ancient Polynesian concern of retaining and passing on sacred *mana* 'power' from one generation to another, particularly within a single, hereditarily elite group.

During the elaboration of the taŋata manu ceremonies that took place over time at 'Orongo all ritual practices evolved, and the original distinctions that established the Miru as special were appropriated by other groups. The original Miru practice, we suggest, was central to the taŋata manu institutional goal of identifying, through the komari rituals described by Routledge (1919: 263), the woman destined to become the exalted companion (neru) of the competitively triumphant "birdman". The result of their sacred union was a *poki manu* 'bird child' who, in turn, acquired status and gained privilege.

We have previously suggested that at least one young male observed by Western visitors in 1852 was a probable participant in ʻOrongo competitions (Kaeppler and Van Tilburg 2018: 9, figs 13a, 13b), and two or perhaps three of Routledge's (1919) 12 to 15 male consultants were as well. Veriamo, Juan Tepano's mother, participated in a coming-of-age ritual at ʻOrongo that was a later version of poki manu ceremonies and involved the statue Hoa Hakananaiʻa. Its removal to England in 1868 was facilitated by a Miru man named Torometi who colluded with missionaries and an exploitive French colonial, thus writing *finis* to ʻOrongo rituals. The relative abundance of information on male activities is contrasted to the more nuanced "living memory" of female consultants. The intimate information that females possessed was not collected by Routledge, although there is little doubt that most women of the time knew about hakatoro repe.

Contemporary Information

Information about hakatoro repe is still known among some Rapanui male and female persons. In December 2018 Kaeppler interviewed several individuals at Rapa Nui who gave important new information. They noted, for example, that the hakatoro repe tradition had two elements. First, the extended repe gave more desire to the woman and more pleasure to both women and men. Secondly, the extended repe was thought to produce more powerful children.

One person thought that a mother started the elongation when the girl was a baby, while another thought that it began at the age of 8 to 12 or at first menses. They agreed that this was done with the permission of a *tuhunga*, a male officiant who would eventually be looking at the girls so that one could become a neru companion for a taŋata manu. It was important that the neru be a virgin. At a specific, named place at Mata Ngarahu, ʻOrongo, the girl was examined to make sure she was, indeed, a virgin. A child of the subsequent union between a neru and a taŋata manu became a poki manu and wore the carved wood ornaments known as *tahonga* (Routledge 1919: 267, fig. 114), especially if the parents were Miru.

* * *

The ethnographical emphasis when recounting and interpreting ʻOrongo ceremonial activities is almost exclusively placed upon male leadership, male activities and male iconography or symbolism. Here we have endeavoured to refocus research attention by examining in detail what is currently known about a specific group of previously obscure, female-gender-related stone objects in the J.L. Young Collection of the Bishop Museum. In doing so, we hope to restore the cultural role and significance of females and, specifically,

their importance in the Rapanui belief system as evident in fertility and puberty ceremonies and a ritualised emphasis on procreation. We have called attention to museum collection timelines and to previously overlooked or inadequately researched documentation of key objects, thus throwing new light on the unexpected, intimate details of early Rapanui ritual.

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NOTES

1. We draw here upon an outline of preliminary research summarised by the authors at the Congreso de Migración y Navegación Polinesia organised by archaeologist Sonia Haoa Cardinali and the Mata Ki Te Rangi Foundation, Hanga Roa, Rapa Nui, November 2018. The exhibition in which the objects described herein were shown opened during that time at Museo Antropológico Padre Sebastián Englert (MAPSE; https://www.museorapanui.gob.cl/sitio/).
2. We follow the established orthographic convention in which Rapa Nui is the modern name of the island and Rapanui refers to the people and their language.
3. The toponym Marae Toehau, collected by J.L. Young in the 1800s in Tahiti, is important in that it is essentially the same as Marae-Toe-hau recorded by Thomson (1891: 523) in 1886 at Rapa Nui and said to be the ancestral land of Hotu Matu'a. Routledge (1919: 277) subsequently recorded "Marae Tohio", and Barthel (1978: 9) gives "Marae Tohia".
4. Measurements of the "Bar of stone" were taken at the Bishop Museum and differ slightly from those reported by Young; however, he was approximating from memory.
5. A komari parallel in woodcarvings is the Boy Austin figure (Van Tilburg 1994: 144, fig. 116). A figure from the Luigi Pigorini Museum (Heyerdahl 1975: pl. 90) and a *moai kavakava* 'carved wood male figure with protruding ribs' from the former Ratton collection (Métraux 1940: 250, fig. 37) display characteristics relevant to this komari discussion. However, following Kaeppler (1996, 2003), these and other Rapanui objects often have little available documentation. Some Nukuoro woodcarvings are of interest to this discussion (Kaeppler 2013).

6. According to four genealogical sources summarised by (Metraux 1940: 90–93), Tuu-ma-heke and Miru may be two separate individuals or two names for one individual as the first-born son of Hotu Matu‘a. Miru-a-Tuu-ma-heke appears in one source as lineage head and heir of the kingly title, but then Tuu-ma-heke disappears entirely from all versions of the royal genealogy. Miru survives as the primary descent line and name of the highest-ranked mata. Traditional explanations for this situation are that the two individuals were twin brothers and one of them (Tuu-ma-heke) died or returned to the home island.
7. It is speculated (Horley and Lee 2012) that the boulder collected by Agassiz (Fig. 8) is the one first seen in the wall of an ‘Orongo building by Geiseler in 1882 (Geiseler 1995: 41).
8. Koll (1991) inventoried 130 komari inside ‘Orongo houses. Further research will produce an accurate count and motif analysis of komari in the ‘Orongo buildings of Complex B and in the courtyard of Complex C, and those embellishing related objects having good provenance in museum collections worldwide.
9. There are six published versions of the numbering for building 19. It is Englert’s (1948: 181–91) No. 18; R-19 for Ferdon (1961; the R means Routledge, and he uses her numbers); Nos 31 and 32 for Mulloy (1975); Nos 20A and 20B for Ramírez-Aliaga (2016a); and E20 R1 and E20 R2 in the map by ReStudio. The Easter Island Statue Project uses Nos. 20 for the house and 53 for the cave. According to Mulloy (1975: 18) the interior of R-19 [20] had not physically changed since Routledge’s description. During restoration he walled off the entrance to Cave Annex 19A as unsafe.

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KAUTE: AN ENDEMIC EAST POLYNESIAN HIBISCUS?

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ABSTRACT: *Kaute* and its derivatives *koute, 'oute* and *'aute* are Polynesian names for a red-flowered *Hibiscus*. Since its first botanical collection on Tahiti by Banks and Solander (1769), this hibiscus has been referred to as *H. rosa-sinensis* L. and assumed to have been introduced by the bearers of the archaeological culture known as Lapita. Lapita people settled West Polynesia around 2800 BP and spoke a language derived from Proto-Oceanic, the common ancestor of almost all the Austronesian languages of Island Melanesia and Micronesia as well as Polynesia. However, whereas Proto-Oceanic names can be reconstructed for many plants found in East Polynesia, the term *kaute* cannot be attributed to Proto-Oceanic, the name likely being locally derived in East Polynesia from that of paper mulberry (*Broussonetia papyrifera* (L.) L'Hér. ex Vent.). On the basis of linguistic evidence, we contend that *kaute* was domesticated in a high island area of Central Eastern Polynesia and then dispersed in relatively recent pre-European times (ca. 500–700 BP) westwards through West Polynesia, to nearby islands such as the Fiji archipelago and Rotuma and to Polynesian Outliers in Papua New Guinea and the Solomon Islands. Dissemination occurred before the *-au-* sequence changed to *-ou-* and *k* sporadically changed to *'*, so that *kaute* rather than contemporary Marquesan *koute* and *'oute* was the term that was carried westward from the Marquesas. *Kaute* is here suggested to be an endemic East Polynesian species, different from *H. rosa-sinensis* L. Further field and genetic research is needed to definitively determine the phylogenetic relationships of *kaute* and a taxonomic description is required for formal recognition.

Keywords: red-flowered hibiscus, *Hibiscus rosa-sinensis*, *kaute*, plant translocations, Polynesian cognates, *Broussonetia*, Marquesas, East Polynesia

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In 1769 a double-petalled red-flowered hibiscus was collected by Joseph Banks and Daniel Solander—botanists on Lieutenant James Cook's HMS *Endeavour* voyage—on Tahiti, Society Islands, French Polynesia (BM013730470, British Natural History Museum; P06705205, Muséum national d'Histoire naturelle [MNHN]; US01299807, United States National Herbarium; Fig. 1). The single-petalled form of this same hibiscus, as indicated by its similar deltoid, coarsely and irregularly serrated leaves, was

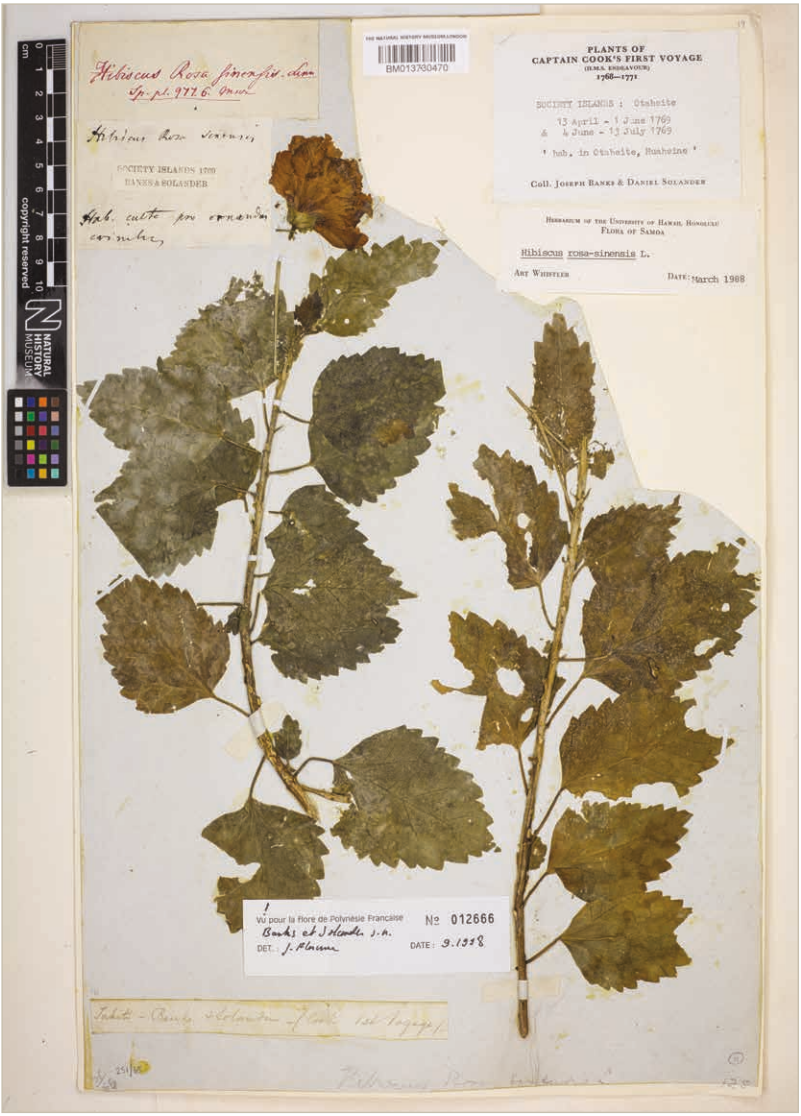

Figure 1. Botanical specimen of *kaute* (double-petalled form) collected by Joseph Banks and Daniel Solander on Tahiti, Society Islands, French Polynesia, in 1769 on Lieutenant James Cook's first voyage to the South Pacific Islands (BM013730470, British Natural History Museum, London).

also observed and illustrated by Cook's botanical artist, Sydney Parkinson (Endeavour Botanical Drawings SI1/11, https://www.nhm.ac.uk/discover/endeavour/single?id=2260, courtesy of Trustees of the Natural History Museum, London). The plant was observed in the previous year by Philibert Commerson, the botanist on French explorer Louis Antoine de Bougainville's voyage to Tahiti, but not botanically described. Its Tahitian name, *'aute*—in contemporary Tahitian—was written *aoute* by Bougainville (Lanyon-Orgill 1979: 243), who defined it as 'rose', and *aiowte* by Parkinson ([1773] 1973). We will henceforth use the name *kaute*, which would have been its earlier form, before the application of the regular Tahitian sound change *k* > *'* (Note: The glottal stop is represented by the symbol *'*).

In this earliest botanical collection of *kaute* on Tahiti and in subsequent collections, it was referred to as *Hibiscus rosa-sinensis* L.: a double-petalled, red-flowered hibiscus from cultivation in Asia (India, Sri Lanka and Indonesia) described by Linnaeus in 1753. However, even sterile dried specimens of *kaute* (from East and West Polynesia) are differentiated from *H. rosa-sinensis* on the basis of leaf shape and length : width ratio of the lamina, typically averaging 1.6–1.7 for *H. rosa-sinensis* as compared to 1.3–1.5 for *kaute* (Fig. 2), and by its near glabrous petioles and more

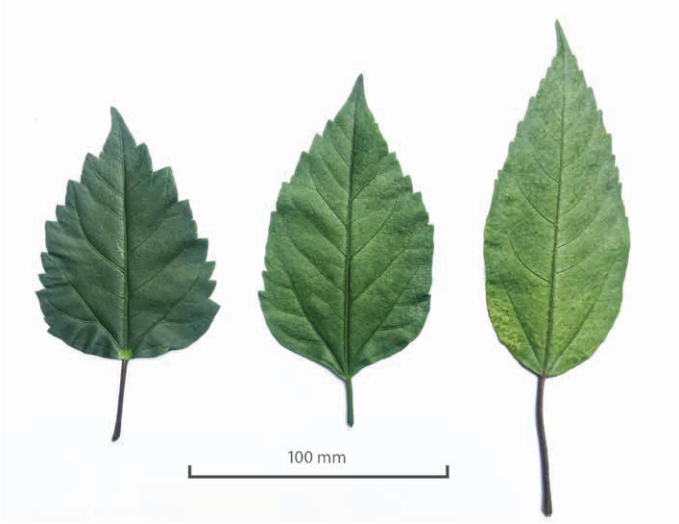

Figure 2. Leaf of typical *kaute* (left), *H. rosa-sinensis* (middle) and *H. cooperi* (right). The length : width ratio of the lamina typically averages 1.3–1.5 for *kaute*, 1.6–1.7 for *H. rosa-sinensis* and 2.1–2.7 for *H. cooperi*; differences in leaf serration are also apparent. Photo by Lex Thomson. Note: The recently reinstated Vanuatu species *H. cooperi* is included here as it has often been confused with *H. rosa-sinensis*.

coarsely serrated leaf margins. The calyx lobes are also narrower in *kaute* as compared to *H. rosa-sinensis*, viz. in *kaute* the triangular calyx lobes have a L:W at base ratio of ~1.1–1.3 for double flowers and ~1.5–1.7 for single flowers, whereas in *H. rosa-sinensis* these ratios are typically ~1.3–1.5 for double flowers and ~1.8–2.5 for single flowers. These data are based on hundreds of individual morphological measurements to be detailed in a separate manuscript: here we have only reported on the ratios of related morphological characteristics, which are far less susceptible to environmental variation.

Both floral forms of *kaute*, especially the single-petalled type (Fig. 3), have become increasingly scarce in the Pacific Islands, based on the observations of the first author and including in French Polynesia (Jean-François Butaud, pers. comm.), and are being rapidly displaced by "*H. rosa-sinensis*" hybrids, especially those involving *H. schizopetalus* (Dyer) Hook f. (including *H.* × *archeri* W.Watson), which are hardier in cultivation and readily propagated by branch cuttings.

Figure 3. Single-petalled form of *kaute*, ʻOhonua, ʻEua, Tonga (left; photo by Lex Thomson) and Apia, Samoa (right; photo by François Martel).

WAS *KAUTE* A LAPITA INTRODUCTION FROM SOUTHEAST ASIA?

Hibiscus plants with red flowers appear to have been cultivated prehistorically, under the name *kaute* or a derivative, through much of Polynesia including American Samoa, Cook Islands, French Polynesia, Niue, Samoa, Tonga, Wallis and Futuna and Polynesian Outlier islands in the Solomon Islands and Papua New Guinea as well as Fiji and Rotuma (see Table 1 for a listing of Polynesian names). Such red-flowered hibiscus entities, under the botanical name *H. rosa-sinensis*, have hitherto been considered an ancient introduction. Noted American botanist Elmer Merrill (1955: 342) described it as a "pre-Magellan, man-introduced ornamental species from the islands to the West", and subsequent botanists and researchers of *Hibiscus* have not questioned this assertion (e.g., Brown 1935; Florence 2004: 210–12; Gast 1980: 3; Sykes 2016: 696; Wagner and Lorence 2002; Whistler 1991: 54; 2000: 159; 2009: 130–32).

Kaute appears to have been accorded introduced status on the basis of its frequent presence in Polynesian village gardens, apparent failure to set viable seed and/or requirement for vegetative propagation, and absence from truly wild habitats—as opposed to trails, old garden sites and the like (Florence 2004: 210–11; Lepofsky 2003: 85; Whistler 2009: 130–32). However, Jouan (1865: 94) found *koute* (referred to as "*Hibiscus rosa-sinensis*") growing at the head of valleys on Nuku Hiva (Marquesas), far from any settlements, in very wild places: it was described as very rare and not truly naturalised. Furthermore, Nadeaud (1873: 67) reported that while *aute* ("*Hibiscus rosa-sinensis*") was cultivated by Polynesians, he found it growing in a wild state, in the middle of cliffs near the end of Pirae valley (Nahoata River) and elsewhere in the interior of Tahiti.

Kaute has been observed to set fruits in Tahuata, Marquesas (Fig. 4) and in other locations (MNHN specimens: P06705182, H. Jacquinot, Levuka, Fiji, 1838; P06705216, J. Lépine, Tahiti, 1847; P06736334, New Caledonia, pre-1860). Fruit set in *kaute* is far more common than in *H. rosa-sinensis* L. Indeed fruit set in *H. rosa-sinensis* is extremely rare: fruits and seeds of both single and double forms are not mentioned in the type description and other early references to the species except to state that it does not produce seed (e.g., Van Rheede 1679). Fruits were not observed on any images of preserved botanical specimens of *H. rosa-sinensis* inspected as part of this study (including >26 specimens from mainland Asia, >26 specimens from Indonesia, >34 specimens from Pacific Islands, >36 specimens from throughout the tropics and numerous living plants in the South Pacific Islands). Reports of *H. rosa-sinensis* freely naturalising along trails and in thickets and forest in Fiji (Smith 1981) are probably incorrect, referring to endemic Fiji *Hibiscus* species (Thomson and Braglia 2019: 85, 117–18).

Table 1. Names of red-flowered *Hibiscus* in Polynesian languages (and Rotuman).

Region/country	Island(s) (language)	Names	Assumed species	Source
EAST POLYNESIA				
Southern Cook Islands	Rarotonga	*kaute*, *kaute ʻenua*, *kaute kumu*	*kaute*	Buse 1996; Sykes 2016
Northern Cook Islands	Penrhyn	*kaute*, *kaute kula*	*kaute*	Shibata 2003
French Polynesia	Northern Marquesas	*koute*, *koute ʻenana*, *kōute*	*kaute*	Brown 1935; Butaud 2010a; Charpentier and François 2015
French Polynesia	Southern Marquesas	*koute*, *ʻoute*, *kōute*, *ʻōute*, *ʻoute ʻenata*	*kaute*	Butaud 2013; Charpentier and François 2015
French Polynesia	Society Islands	*ʻaute*, *ʻaute māʻohi*, *ʻaute ʻumuʻumu* (*flore pleno*)	*kaute*	Charpentier and François 2015; Jean-François Butaud, pers. comm.
French Polynesia	Tuamotu Islands	*ʻaute*, *kaute*	*kaute*	Butaud and Jacq 2009; Butaud 2009, 2010b; Charpentier and François 2015
French Polynesia	Austral Islands	*pareava*, *ūaʻa aute* (open flower)	*kaute*	Charpentier and François 2015; Jean-François Butaud, pers. comm.
French Polynesia	Gambier Islands	*koute*	*kaute*	Butaud 2010c; Charpentier and François 2015

Region/country	Island(s) (language)	Names	Assumed species	Source
WEST POLYNESIA				
Niue		*kaute* (pronounced *kause*)	*kaute*	Sperlich 1997; Whistler 2000; Randolph Thaman, pers. comm.
Rotuma (Fiji)		*kauta*	*kaute*	Inia *et al.* 1998
Sāmoa		*ʻaute*, *ʻaute Sāmoa*	*kaute*	Pratt 1911; University of Hawaiʻi at Mānoa n.d.; Whistler 2000
Tokelau		*aute*	*kaute*	Simona *et al.* 1986
Tonga		*kaute*, *kaute kula*	*kaute*	Churchward 1959
Tuvalu		*aute*, *losa*	*kaute*	Ranby 1980
Wallis and Futuna (ʻUvea)	East ʻUvea	*kaute*	*kaute*	Mayer 1976
Wallis and Futuna	East Futuna	*kaute*	*kaute*	Moyse-Faurie 1993
POLYNESIAN OUTLIERS				
PNG	Nuguria, near New Ireland (Nukeria)	*kaute*	*kaute*	Davletshin 2013 (see also Greenhill and Clark 2011)
PNG	Takuu, near Bougainville	*kaute*	*kaute*	Moyle 2011

– *Table 1 continued over page*

Region/country	Island(s) (language)	Names	Assumed species	Source
PNG	Nukumanu	*kaute*	*kaute*	Wycliffe Bible Translators 2013
New Caledonia	ʻUvea (Faga-uvea)	*bedrila*, *bedrilë*	*H. cooperi*	Hollyman 1987; Ozanne-Rivierre 1984
Solomon Is.	Luangiua/Ontong Java	*uke*	*kaute*	Salmond 1975
Solomon Is.	Sikaiana	*laakau ula*	?	Donner 2012
Solomon Is.	Tikopia	*kaute*	*kaute*	Firth 1985
Solomon Is.	Anuta	*kaute*	*kaute*	Yen and Gordon 1973
Solomon Is.	Taumako & Reef Is. (Aua, Matema, Nifiloli, Nupani, Nukapu, Pileni)	*vaeakula*	*kaute*	Basil Gua, pers. comm.
Solomon Is.	Rennell and Bellona	*mengo*, *kongomea*	*H. cooperi* (& *kaute*?)	Elbert 1975
Vanuatu	Emae (Fakamakata)	*papakalo*	*H. cooperi*	James Kaltong, pers. comm.
Vanuatu	Mele, near Efate (Mele-Fila)	*p̃aakala*	*H. cooperi*	Clark 1998
Vanuatu	Futuna	*pomea*, *mimwi*	*H. cooperi*	Capell 1984; Futuna cultural performers, pers. comm.
Vanuatu	Aniwa	*nandrap*	*H. cooperi*	Phyllis Kalimista, pers. comm.

Figure 4. Fruit set on *kaute* in Tahuata, Marquesas Islands, French Polynesia (left); dehisced fruit showing mature seed (right). Photographs by Jean-François Butaud.

There is an absence of linguistic evidence that might support *H. rosa-sinensis* being an original Lapita introduction to Polynesia. Whereas, for example, PPn[1] **fau* for *Hibiscus tiliaceus* L. comes from Proto-Oceanic (POc) **paRu* (Ross 2008: 138) and POc terms can be reconstructed for many other useful plants of Polynesia, there is no reconstructable POc term for "*H. rosa-sinensis*". Assuming that POc was spoken by the bearers of the early Lapita culture in the Bismarcks, then this probably means that *H. rosa-sinensis* did not occur in the Bismarck Archipelago in POc times, i.e., around 3,200 years ago (Malcolm Ross, pers. comm.). Similar plants clearly did occur in various parts of Oceania, but we believe that when the Polynesians settled East Polynesia, ca. 1050 BP (Niespolo *et al*. 2019; Sear *et al*. 2020), they had either lost knowledge of them or not come into contact with them due to their rarity in interior, high-elevation locations, and were forced to coin a new term for the hibiscus they discovered there. As illustrated with other newly discovered or introduced plants, such plants may have been named by either compounding or extension, since borrowing was not an option (Geraghty 2004), and in the case of *kaute*, we propose that the mechanism was extension. We further argue that this plant was then spread to many other Pacific islands, along with the name that was coined in East Polynesia.

SPREAD OF THE POLYNESIAN NAME *KAUTE*

There is linguistic evidence discussed below that the term *kaute* 'cultivated red-flowered hibiscus' is a recently borrowed term within a late prehistoric contact area stretching from Central East Polynesia to Central West Polynesia, Fiji and Rotuma and including Tikopia, Anuta and the Central Northern Outliers (Fig. 5).

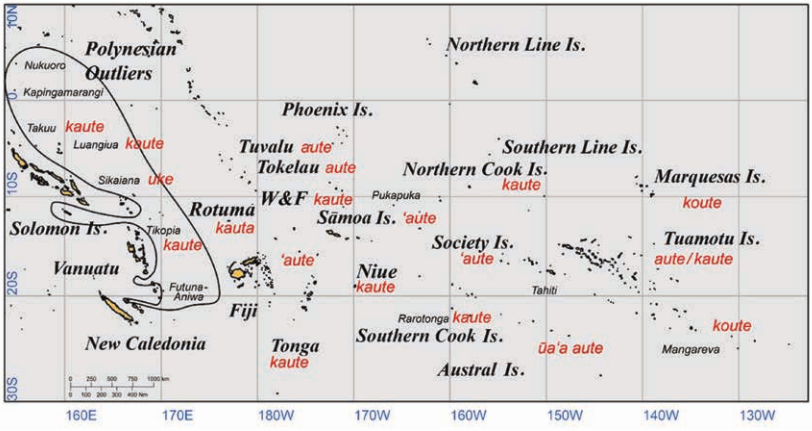

Figure 5. Distribution of reflexes of the term *kaute* 'cultivated red-flowered hibiscus'.

While the extent of reflexes of the term *kaute* could strictly speaking allow that term to be reconstructed to Proto-Polynesian, and even Proto-Central Pacific (Rotuman, East and West Fijian and Proto-Polynesian), there is distributional and linguistic evidence that it spread well after the initial Lapita settlement of Fiji and Central West Polynesia and after the settlement of the farthest reaches of East Polynesia and the Polynesian Outliers.

Distant Hawai'i, New Zealand and Rapa Nui Languages Lack a Kaute Cognate

Although *H. rosa-sinensis sens. lat.* is grown today in New Zealand, Hawai'i and Rapa Nui,[2] it was not found in those areas at initial European contact, nor is there a native plant species to which a cognate of *kaute* has been applied. This distribution suggests that the plant spread in East Polynesia after the settlement period and indeed after regular contact ceased between Central East Polynesia and those distant points of the Polynesian Triangle.

By way of contrast, other cultivated plant species of Polynesia—clearly present in the Proto-Polynesian period with terms reconstructed to Proto-Polynesian—have reflexes in at least one or two of those distant points and often all three. Such names are applied to similar plants when the original referent is lacking locally. For example, PPn **fau*[3] '*Hibiscus tiliaceus*'—a species of cultural importance—is reflected with regular sound change throughout tropical Polynesia. Its reflexes in the distant corners of the Triangle are Haw *hau* '*Hibiscus tiliaceus*'; Mao *whau*, *whau-ama*, *hau-ama*

'*Entelea arborescens* R.Br.' (lit. 'outrigger *whau*', a name consistent with its use for various sorts of floats parallel to the use of *H. tiliaceus* net floats and outriggers in Hawai'i (Handy and Handy 1972: 233), including outriggers in tropical Polynesia); Rpn *hauhau* '*Triumfetta semitriloba* Jacq.', which like *hau* in Hawai'i and *whau* in New Zealand was traditionally used for cordage.

Rapa Nui lacks a native hibiscus or similar plant that might have been referred to by the term *kaute*, but New Zealand has a native hibiscus, *H. richardsonii* Sweet ex Lindl., with a cream-coloured flower. Its Māori name, however, is *puarangi* (lit. 'sky flower' or 'heavenly flower'), which does not have cognates in any other Polynesian language.

Hibiscus australensis Fosberg is a rare hibiscus in section *Furcaria* from the Austral and Gambier Islands (French Polynesia) and Pitcairn Island (Butaud 2014; Fosberg 1966; McCormack 2007; Wilson 1993). The species is poorly known by local inhabitants and goes by names derived from two better-known local *Hibiscus* species, such as *'aute 'oviri* (lit. 'wild '*aute*') on Tubuai and *pugau ha'eha'a* (low or small *Hibiscus tiliaceus*). Other local names such as *fautia* and *hautia* likely refer to *Abelmoschus moschatus* and are more correctly spelt as *fauti'a/hauti'a* and *'auti'a* on Rapa (Jean-François Butaud, pers. comm.) parallel to the Tahitian cognate name of that plant, i.e., *fauti'a*, lit. 'upright *Hibiscus tiliaceus*' (Fare Vāna'a 2017).

Hawai'i has a generic term for hibiscus including the nine native species in section *Lilibiscus* (Huppman 2013), some of which have red flowers like *kaute*. None of their names is cognate with *kaute*, nor is there any term derivable from an earlier *kaute* in this sense in Hawaiian. The generic term for hibiscus, including cultivated varieties like *H. rosa-sinensis* introduced since European contact, is *pua aloalo*, which probably derives from PPn **walowalo* '*Premna* sp.', a tree with strikingly similar leaves to several Hawaiian *Hibiscus* spp. and yielding a soft wood used as a fire plough in parts of Polynesia.

Among indigenous wild Hawaiian hibiscus species are *koki'o ke'oke'o* '*Hibiscus arnottianus* A. Gray' and '*Hibiscus waimeae* A. Heller' (lit. white *koki'o*), both shrubs and trees with white flowers. Sharing the unique and obscure name *koki'o* is *koki'o 'ula'ula* '*Hibiscus clayi* O.Deg. & I.Deg.' (lit. red *koki'o*), a shrub with red flowers. Hawaiian *'akiohala*, *'akiahala*, *hau hele* and *hau hele wai* (lit. 'fresh water *hau hele*') are names for '*Hibiscus furcellatus* Desr.', a shrub growing in marshy areas and having pink flowers. The source of its first two names is unclear, but Hawaiian *hau hele* has cognates in other East Polynesian languages including Mqa *hau he'e* '*Hibiscus tiliaceus* subsp. *tiliaceus* cv. sterilis' and Mao *hou-here* '*Hoheria populnea* A.Cunn.', a tree whose inner bark was used for cordage. The terms in this cognate set are all derivable from PPn **fau* '*Hibiscus tiliaceus*' modified by PPn **sele* 'snare, tie up'. Haw *hau hele 'ula* (lit. 'red

hau hele') was also used for *koki'o 'ula'ula*. *Koki'o ke'oke'o* and *koki'o 'ula'ula* are reported to have been planted near homes in traditional times for their blossoms (Handy and Handy 1972: 233).

A further indigenous Hawaiian hibiscus is the yellow-flowered *ma'o hau hele* '*Hibiscus brackenridgei* A.Gray' (lit. '*hau hele*–like *ma'o*'). The *ma'o* 'Hawaiian cotton (*Gossypium tomentosum* Nutt. ex Seem.)' has yellow flowers and is in the same family as hibiscus, with cognates that are names of plants in both East and West Polynesia, including New Zealand, all likely derived from PPn **mako* '*Trichospermum richii* (A. Gray) Seem.' from Fiji and Sāmoa. Given that both the terms PEPn **fau* and PEPn **fau sele* were introduced into New Zealand and Hawai'i and the existence of *Hibiscus* species that could have been named with the term *kaute*—because of their morphology or colour—it is noteworthy that the term *kaute* has no reflexes in Hawaiian or Māori. The implication is that the red-flowered hibiscus *kaute* was unlikely to have been cultivated by the ancestors of the original settlers of New Zealand, Hawai'i or Rapa Nui.

Kaute Cognates Clustered among Outlier Languages with Close Connections to East Polynesian

The distribution of cognates of *kaute* in the Polynesian Outliers is similar to that in East Polynesia in that they cluster around a distinctive cultural area with a history of close interaction, an area that, as we shall see below, also has close connections to East Polynesia (Fig. 6). That area with regular reflexes of *kaute* is the Central Northern Outliers (CNO). Each of the four CNO languages—Takuu, Nukeria (on Nuguria Island), Nukumanu and Luangiua—reflect *kaute*: Tak *kaute* '*Hibiscus rosa-sinensis*', Nkr *kaute* 'hibiscus, a kind of flowering shrub', Nkm *kaute* 'flower' and Lua *uke* 'flower'.[4] The development of reflexes of *kaute* in Nukumanu and adjoining Luangiua to mean 'flower' provides some support for the antiquity of the term in those islands.[5]

The Polynesian Outlier languages most distant from the Central Northern Outliers—that is, the three located in Vanuatu (Emae; Ifira, spoken on Ifira island and nearby Mele settlement; and West Futunan, spoken on Futuna and Aniwa islands) and another in New Caledonia (West Uvean, spoken on 'Uvea Island)—all lack cognates for *kaute*, although all have terms for red-flowered hibiscus. Indeed, the red-flowered *Hibiscus cooperi* Veitch is native to Vanuatu and is assumed to have been cultivated by indigenous peoples of Vanuatu before the colonisation of small offshore islands and nearby coastal areas by Polynesians. If *kaute* had been part of the Polynesian language that those Polynesian colonists took with them, one could assume they would have applied that name to such local hibiscus, just as they applied Polynesian names to other culturally useful plants already in use by indigenous Austronesian-speaking peoples. Note that at least one, and

often several, of these Southern Outlier languages have directly inherited Polynesian cognates, rather than borrowings from nearby Melanesian languages, for PPn **kawa* '*Piper methysticum* G.Forst.', PPn **toro* 'sugar cane *Saccharum* spp.', PPn **tii* '*Cordyline fruticosa* (L.) A.Chev.', PPn **kofe* 'bamboo species'; PPn **nonu* '*Morinda citrifolia* L.' and other useful plants. However, their names for red-flowered hibiscus are totally unrelated to those in Polynesian Triangle languages.

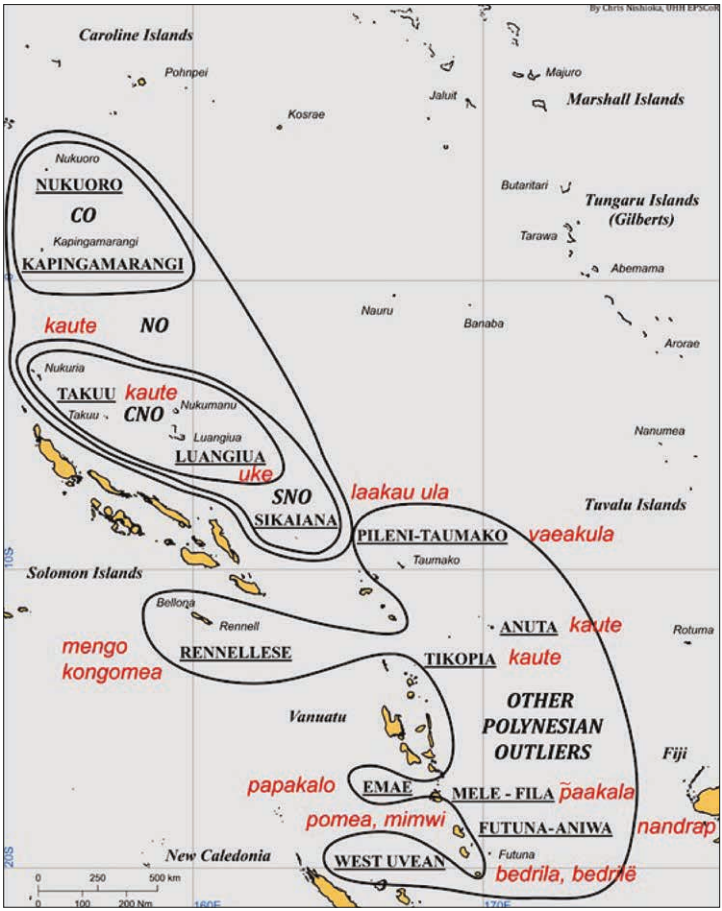

Figure 6. Distribution of Polynesian Outlier names for 'cultivated red-flowered hibiscus'.

Also lacking cognates of *kaute* are the languages of the Northern Outliers other than the CNO mentioned above. For the Caroline Outliers (CO) of Kapingamarangi and Nukuoro to the immediate north of the CNO, no cognates for *kaute* or other terms for red-flowered hibiscus are recorded in the standard dictionaries in spite of careful listing therein of other native and introduced plants with their Latin and indigenous names (Carroll and Soulik 1973; Lieber and Dikepa 1974). For Sikaiana, the Southern Northern Outlier (SNO), there is no cognate for *kaute*, and red hibiscus—used for decoration—is called *laakau ula* (Donner 2012: 157), lit. 'flame or red plant', a transparent and likely recent term.

That there are no cognates for *kaute* in the Northern Outliers (NO) other than in the CNO is unexpected: Northern Outlier languages are closely related and descend from a common ancestor under all proposed subgroupings (Howard 1981; Marck 2000; Pawley 1996; Wilson 2012, 2014, 2018). Furthermore, as will be explored in more detail below, there is evidence that the Northern Outliers form an exclusive subgroup with East Polynesian languages. If *kaute*/red-flowered hibiscus was an integral element of the ancestral cultures present in the Northern Outliers then the term *kaute* would be expected to be reflected more widely than just CNO.

Of the languages of the Southeast Solomons Outliers to the immediate south of Sikaiana, proposed as related closely to Northern Outlier languages (Wilson 2018), only those of Tikopia and Anuta (near Tikopia and culturally connected to it but linguistically distinct) have been recorded as having cognates of *kaute*, i.e., Tik *kaute* 'flowering hibiscus species'; Anu *kaute* '*Hibiscus rosa-sinensis*'. Tikopia has strong cultural ties to the Central Northern Outliers through seasonal voyages undertaken between these islands from ancient times into early contact times (Bayliss-Smith 2012: 119). The term *kaute* could have spread from Tikopia to the Central Northern Outliers. Tikopians knew of Pukapuka, an island on the border between East Polynesia and Central West Polynesia. The Pukapukan language has borrowings from Tikopia, the Central Northern Outliers and East Polynesia (Wilson 2014: 413–15), and Pukapuka would have been a way station on the transportation of *kaute* to the Outliers from East Polynesia. The name *kaute* may also have been introduced from West Polynesia to Tikopia, since Tongans have traditions of voyages to Tikopia (Gifford 1929: 14–15). Tikopians knew of Rotuma, Sāmoa, Pukapuka, 'Uvea and Tonga and had been visited by Tongans (Dillon 1829, vol. 2: 103, 112, 135; Firth 1961: 27, 61).

Vaeakula is the current term for red-flowered hibiscus in the Vaeakau-Taumako Outlier language spoken in the Reef and Duff Islands, lying between Sikaiana and Tikopia. Vaeakau-Taumako likely had considerable contact with CNO peoples as a waypoint on the annual voyage mentioned

above and may yet be found to have a *kaute* term, or it may have been lost. Well-documented Rennellese (Elbert 1975), the largest and most isolated of the Southeast Solomons Outlier languages, clearly does not have a *kaute* term for hibiscus or for any other meaning. Red-flowered hibiscus does grow on Rennell and adjoining Bellona, where a dialect of Rennellese is spoken. Rennellese has two terms for hibiscus species: *kogomea* 'red coral hibiscus' and *mego* '*Hibiscus rosa-sinensis*': those terms have cognates in other Polynesian languages, but the plants they refer to are not related to hibiscus. Rennellese *mego* reflects PPn **melo* 'red, brown', with cognate *mero* meaning 'red' in nearby and related Tikopian and Anutan, while the second morpheme of *kogomea* clearly reflects PPn **mea* 'reddish'. These Rennellese names therefore derive from the colour of the flower and were likely local innovative names for the plant.

THE TERM *KAUTE* OUTSIDE EAST POLYNESIA AND THE OUTLIERS

The distribution of the cognates of *kaute* is the primary evidence for *kaute* not being present in the language of the initial colonisers of East Polynesia and their early ancestors, who spoke various proto-languages beginning with Proto-Southeast Solomons Outlier-East Polynesian. There is also evidence that *kaute* is a relatively new word in the original far eastern Lapita settlement area of Fiji, Tonga and Sāmoa.

For Rotuman, the term *kauta* meets the criteria established by Biggs (1965) for identifying Polynesian borrowings. If Rotuman *kauta* were directly inherited from Proto-Oceanic, the Rotuman term corresponding to Polynesian *kaute* would be *'aufa* rather than *kauta*. There is also evidence that Tongan and Niuean *kaute* are also borrowings. In Tongan and Niuean antepenultimate **-au-* and **-aCu-* sequences normally change to *-ou-*, *-oCu-*, e.g., PPn **taume* 'spathe of coconut palm' > Ton, Niu *toume*; PPn **taura* 'rope' > Ton, Niu *toua*; PPn *fanua* > Ton, Niu *fonua*. The lack of this change indicates that the term *kaute* was introduced into Tongan and Niuean after that change had run its course. There are examples of East Polynesian terms other than *kaute* introduced into Niuean that also maintain antepenultimate **-aCu-* and **-au-*, e.g., PEPn **tafuqa* 'platform, foundation, base' borrowed into Niuean as *tafua* 'platform' and PEPn **rauka* 'got, obtained, able' borrowed into Niuean as *lauka* 'a comparative, better'.

For Fijian, there is evidence of an external source in the name *senicikobia* 'red-flowered hibiscus' (lit. 'flower of Cikobia') (Seemann [1862] 1973: 375, where it is misspelt *senicicobia*). Cikobia is an island distant from the main body of Fijian Islands, with traditional contacts with nearby Polynesian East Futuna. The distribution of another name, *'aute*, in Taveuni and much of eastern Vanualevu—places relatively close to West Polynesia and with traditional and historical contacts with Polynesia—is evidence for the

relatively recent introduction from Polynesia of the term, which has become generic for all species similar to *Hibiscus macverryi* Thomson and Braglia.

Tuvaluan and Tokelauan, both spoken on atolls, have the term *aute* for red-flowered hibiscus. This term is marked as a borrowing by the lack of an initial /*k*/, and likely derives from Sāmoan *ʻaute*, the source of many post-European-contact borrowings in those two languages (Jackson 2001: 9; Simona *et al*. 1986: ix). Red-flowered hibiscus often struggle to survive on low coral islands, suffering lime-induced iron chlorosis, and were unlikely to be cultivated to any extent on such islands in prehistoric times, except on well-watered, more fertile and uplifted islands.[6]

The replacement of PPn **k* in Sāmoan, Tahitian and Luangiua by a glottal stop (represented orthographically by ʻ) is likely a rather recent recurrent phenomenon, albeit prehistoric, since nearby closely related languages all reflect PPn **k* as /*k*/. Marquesan also replaces PPn **k* with /ʻ/ but only sporadically with a number of doublets, including Mqa *koute*, *ʻoute* 'red-flowered hibiscus', suggesting that the change PPn **k* > /ʻ/ in that language is also recent.

The change *-au-* > *-ou-* in Marquesan and Mangarevan is also considered recent and spread through contact between the two (Fischer 2001: 116–18). The same *-au-* > *-ou-* change does not occur in related Rapa Nui or in likely early borrowings from Marquesan or Mangarevan.[7] We therefore propose that initially the term for the red-flowered hibiscus in older forms of Marquesan and Mangarevan was *kaute*.

MOVEMENT WITHIN AND BEYOND EAST POLYNESIA'S CENTRE OF CONCENTRATION OF *KAUTE* TERMS

In reviewing the distribution of *kaute* terms with expected regular sound shifts, we see that they are most solidly spread among the high islands of Central East Polynesia but not found in distant Hawai'i, New Zealand and Rapa Nui. There is also evidence that they have some antiquity in the CNO and possibly Tikopia and nearby Anuta. There is linguistic and other data indicating that the term and plant only spread into Central West Polynesia, Fiji and Rotuma in more recent prehistoric times, that is, after New Zealand had been settled and regular contact between there and the rest of East Polynesia had ended, i.e., sometime after 1200 (Kirch 2017: 240). We therefore assume that the term developed in Central East Polynesia and spread from there.

A Central East Polynesian source of the term and the plant requires an explanation of how, where and when the term arose and how it spread within the context of the prehistory of East Polynesia. We turn now to the evidence that East Polynesia was settled from the CNO and that there remained connections between the CNO and East Polynesia for some time after that initial settlement.

For a considerable period it has been generally believed that East Polynesia was settled from Sāmoa or thereabouts (see Geraghty 2009: 446 and references therein), but with limited linguistic, ethnographic or archaeological evidence unambiguously linking the two areas. In discussing East Polynesian archaeology, Allen (2010: 152, 159–61), Kirch (2017: 202–3) and Sinoto (1983) have noted that its earliest material cultural assemblages are distinct from those found in Central West Polynesia. Among distinctive material culture features are short hand clubs and highly developed fishing technology. Those features along with other cultural features seen as distinctive of East Polynesia such as large anthropomorphic figures and wooden or stone food pounders (Kirch and Green 2001: 72) are also found in the CNO (Wilson 2018: 414–17). The linguistic evidence linking the two areas is particularly extensive, and for a considerable period, leading linguists such as Blust (2013: 729) and Pawley (1996: 406) have accepted the validity of an accumulation of data that the East Polynesian languages are most closely related to the languages of the CNO (Geraghty 2009; Wilson 1982, 1985, 2012, 2014, 2018). The findings of a comprehensive Polynesian genomic study by Hudjashov *et al.* (2018)—specifically their principal component analysis and phylogenetic reconstruction of the Polynesian mitochondrial DNA B4a1a1 subgroups and C2a1-P33 paternal lineages—are consistent with the linguistic evidence for the recent settlement of East Polynesia from Luangiua/Ontong Java (CNO). A linguistic tree illustrating that relationship with Proto-East Polynesian placed as a sister of Proto-Central Northern Outlier in the larger Polynesian subgroup is given in Figure 7.

Alternating wind patterns centred at roughly latitude 5°S and longitude 160°E (Montenegro *et al*. 2014: 246, 248, 251–53) are such that it is relatively straightforward to sail in an easterly direction and later on back during certain periods from the CNO which are located in that very area. When westerlies are blowing they move over the coral Phoenix and Line Islands and then on to the high volcanic Marquesas Islands with a return possible with a shift to more regular easterlies. We assume an initial colonisation history from the CNO with the resultant Proto-East Polynesian speakers inhabiting two widely distinct areas, both in terms of ecology and geographic clustering. One area consisted of the coral islands nearer to the CNO and the other a high-island Marquesas Islands group more geographically remote from the CNO. That settlement pattern is seen as resulting in Proto-East Polynesian splitting into two dialects, East Polynesian Proximal (PEPnP) and East Polynesian Distal (PEPnD), ultimately the source of two later separate subgroups. PEPn is seen as developing in contact with Proto-CNO, with contact greater with its Proximal dialect than with its Distal dialect. That the early East Polynesians living in the Marquesas did have contact with peoples to their west can

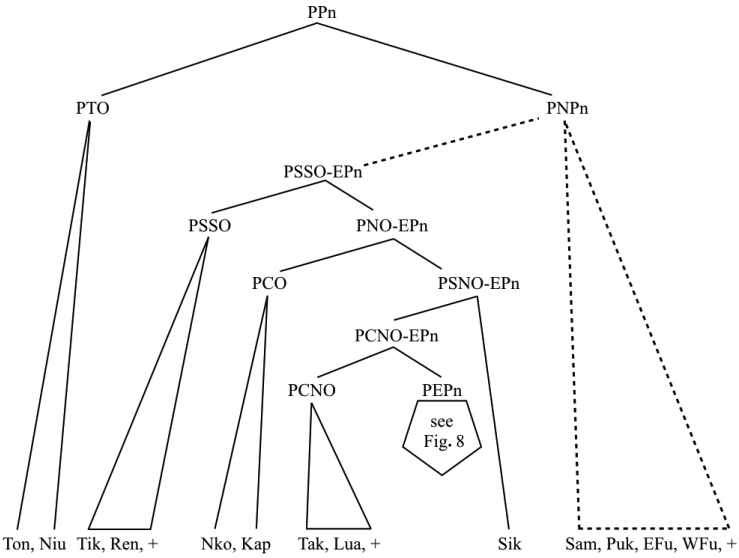

Figure 7. East Polynesian languages within the larger Polynesian subgroup (see note 1 for abbreviations).

be seen in Marquesan borrowings in Northern Outlier languages (Wilson 2012: 319–21) and in the pottery sherds found in the Marquesas that have been sourced to Fiji (Allen *et al*. 2012). That there was contact between Fiji and the Northern Outliers can be seen in Fijian borrowings in the Northern Outlier languages (Geraghty 1996; Wilson 2012: 323–24).

In addition, PEPnP had at least two subdialects spoken among the geographically scattered coral islands between the PEPnD Marquesas homeland and the CNO. One we label the Northern subdialect (PEPnP(N)) with a single descendant, Hawaiian. The other we label the Southern subdialect (PEPnP(S)); it is the same subgroup that Green (1966) labelled "Tahitic".[8] PEPnP(S) is seen as the ancestor of all East Polynesian languages spoken west of 142°W longitude, plus Tuamotuan, a language spoken in various dialects from 148°W to 136°W. PEPnD is proposed as the ancestor of Marquesan, which has remained in the original PEPnD homeland, and also Mangarevan, settled later from the Marquesas. Rapa Nui is seen as having been settled from Mangareva, and these two languages constitute a lower-order subgroup.

Figure 8 illustrates the subgrouping of East Polynesian used here with the addition of Proto-Central Northern Outlier-East Polynesian immediately

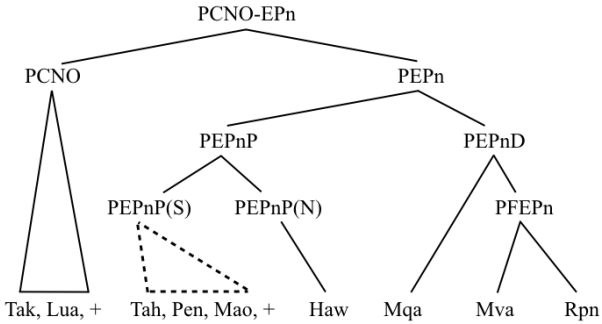

Figure 8. East Polynesian languages subgrouping within Central Northern Outlier-East Polynesian languages (PCNO-Epn; see note 1 for abbreviations).

above Proto-East Polynesian[9]; dotted lines under PEPnP(S) indicate that any further subgrouping under that node has been left indeterminate.

The Line and Phoenix Islands had been abandoned—sometime after 500–600 BP (see Anderson *et al*. 2000; Di Piazza and Pearthree 2001)—before the first European visits. Before that abandonment, it is likely that they remained a means of continued contact between East Polynesia and the CNO and other parts of West Polynesia, including as a stopover point for voyages to and from the Marquesas. The discovery in the Northern Line Islands of basalt from ʻEiao in the Marquesas Islands suggests the possibility of such movement, as does basalt from Sāmoa discovered in the Southern Phoenix Islands (Di Piazza and Pearthree 2001).

CULTIVATION, USE AND NAMING OF *KAUTE* HIBISCUS

Pacific Islands species in section *Lilibiscus* related to *kaute* produce viable fruits during cooler periods, with night temperatures less than 20–23°C. This would likely indicate that *kaute* originated in mid-high mountain areas on a volcanic island. The only islands with such mountains of considerable height in Central East Polynesia are in the Marquesas and Society Islands.[10] Furthermore that wild ancestor may have been quite rare (and/or in very rough terrain) or heavily exploited for its bark shortly after settlement, as one of the difficulties in determining the original source of *kaute* is the lack of any known true wild population anywhere. There is support for an origin for *kaute* both in the Marquesas and in Tahiti based on place names (Table 2). Among the 33 plant species listed as Polynesian introductions into the Marquesas (Dunn 2005; Wagner and Lorence 2002), "*H. rosa-sinensis*" (*koute ʻenana*/*ʻoute ʻenata*) is exceptional: each of the other 32 plant species

Table 2. Land names in the Marquesas and Tahiti that are likely derived from the local name for *kaute* hibiscus.

Island and archipelago	Land name	Possible spelling	Possible etymology
Hiva Oa, Marquesas	Fae-koute	Fa‘e-koute	House of hibiscus
Tahuata & Fatu Hiva, Marquesas	Teoute	Te-‘oute	The hibiscus
Fatu Hiva, Marquesas	Teavaoute	Te-ava-‘oute	Hibiscus pass (plant landmark*)
Tahiti, Society Is.	Teaute	Te-‘aute	The hibiscus
Tahiti, Society Is.	Teaute rahi	Te-‘aute rahi	Big hibiscus
Tahiti, Society Is.	Teaute iti	Te-‘aute iti	Small hibiscus
Tahiti, Society Is.	Arateaute	Ara-te-‘aute	Hibiscus trail (plant landmark)
Tahiti, Society Is.	Tepaaute	Te-pā-‘aute	Hibiscus fortification (plant landmark)
Tahiti, Society Is.	Tearaaute	Te-ara-‘aute	Hibiscus path (plant landmark)

* Plant landmarks are those place names considered likely to be derived from their association with the *kaute* hibiscus.

is either known in the wild in other tropical regions or has a well-documented and accepted domestication locus outside of East Polynesia, and/or has a name in POc or PPn.

Within the subgrouping in Figure 8, the lack of a *kaute* term for *Hibiscus* in New Zealand Māori provides some further support for the Marquesas as the source of *kaute* by eliminating other high islands of Central East Polynesia as the source of the plant and term. New Zealand Māori is an EPnP(S) language, like the languages of the high islands of the Society Islands, Austral Islands and Southern Cook Islands. There is innovative vocabulary shared between Māori and those languages, including plant terms, e.g., PEPnP(S) **poo-fatu* 'small tree or bush, *Sophora tomentosa* L.' with a variant **poo-futu*, cognate with Mao *pōhutu-kawa* '*Metrosideros excelsa* Sol. ex Gaertn.'. If *kaute* had been an early discovery and domesticate on one of the EPnP(S)-speaking high islands such as those of the Society Islands, it is likely that the name *kaute* would have been taken to New Zealand. Furthermore, because in our settlement and subgrouping hypothesis Hawai'i was likely settled directly from one of the coral islands near the equator—an area where *kaute* would not have been native or even easily grown—that hypothesis further explains how the term *kaute* would not have reached Hawai'i with its initial settlers.[11]

With the Marquesas as the likely high-island source of both the *kaute* plant and the term for it, the question arises as to how the plant came to be named. The term *kaute* is quite similar in its final four phonemes to East Polynesian terms for paper mulberry such as Mao *aute*, so we propose that, differences in form notwithstanding, the term for paper mulberry was expanded to include the red-flowered hibiscus. As we shall see later, East Polynesian terms for paper mulberry can be derived from PPn **kau-mafute* 'paper mulberry stick stripped of its bark', with the PEPnD subgroup especially rich in reflexes of **kau-mafute*. The diversity of derivations from **kau-mafute* within the PEPnD homeland, which is the Marquesas, is evidence that the Marquesas is where paper mulberry was first grown in East Polynesia.

Kaute shares morphological similarities with paper mulberry, notably its typically serrated, subcordate leaves (sometimes near-identical to paper mulberry), plant habit and strong, long-fibred bark. In using the hibiscus for its bark or fibre or when bringing the hibiscus into cultivation, the similarities to paper mulberry would have become more evident and the term for paper mulberry would have been applied to it, eventually changing to *kaute* through phonological changes described below. However, in order to name the *kaute* after the paper mulberry, the latter needed to be present in the Marquesas. Further, there needed to be a source and a means through which a distinct name for paper mulberry similar in sound to *kaute* could have developed.

Kaute and Paper Mulberry Terminology Development in the Marquesas. Polynesian paper mulberry is propagated asexually and could not have been naturally present in East Polynesia at initial settlement. The East Polynesian settlement proposal within the NO-EPn Hypothesis has the original settlers of East Polynesia deriving from a population living on the coral CNO.[12] Pre-contact voyaging between the CNO and Tikopia (Bayliss-Smith 2012: 117) would have provided a means for ancient CNO inhabitants to gain access to certain high-island products such as turmeric powder and paper mulberry bark cloth, as well as knowledge of high-island flora and fauna. Indeed there are names of some high-island tree species shared among the languages of the Southeast Solomons Outliers, East Polynesia and the CNO, but not those of Sāmoa and other Central West Polynesian islands (Wilson 2018: 407). Other possible sources of paper mulberry taken by early CNO inhabitants to East Polynesia are New Ireland and the Solomon Islands. Nuguria (Nukeria) is about 230 km from New Ireland, and Takuu is a similar distance from Bougainville. New Ireland, Bougainville and other nearby areas of Melanesia would provide access to distinctive cultivars of paper mulberry not found in Central West Polynesia. A comprehensive genetic study of *Broussonetia papyrifera* in Remote Oceania (Olivares *et al.* 2019) detected a surprisingly high level of genetic diversity in East Polynesia for a relatively recently introduced (< 1,000 years) asexually propagated crop. This included 40 genotypes exclusive to East Remote Oceania (ERO), greater diversity in ERO than West Remote Oceania (WRO) and considerable genetic structuring: we consider this data suggests that ERO's *Broussonetia* was highly unlikely to have been derived principally from WRO.

Given the agroecological conditions of the coral Phoenix and Line islands, we assume that paper mulberry was not grown by the early PEPnP speakers living there and that imported paper mulberry bark cloth would have been a rare prestige item. Possible evidence for the rarity of the bark cloth of paper mulberry for PEPnP speakers can be found in the PEPnP reflex of PPn **siapo* 'paper mulberry, paper mulberry bark cloth' that exists in the compound PEPnP **mata-siapo* 'first-born child' (possibly also meaning 'precious, prized' as does its reflex in EPnP Māori or 'chief' as does its reflex in Rarotongan). If East Polynesia had been settled from an area of northern Central West Polynesia such as Sāmoa, we would expect the term *siapo* to have been introduced with the paper mulberry plant, but as we shall see below, East Polynesian languages use other terms for paper mulberry.

The well-watered high-island Marquesas where PEPnD speakers resided are ideal for growing paper mulberry, and the plant is still cultivated there. We postulate that descendants of residents of the coralline Central Northern Outliers—who settled the Marquesas after first moving through the coral Phoenix and Line Islands—and the initial settlers of the Marquesas also

likely lacked paper mulberry and used other plants to make bark cloth, including banyan, PPn **qaoa* > Mqa *ao'a*; Nko *aoa*; Tah *aoa*; Tik *aoa*. A linguistic line of reasoning for such a history is Mqa *hiapo* 'young banyan from which tapa is made' and Mva *'iapo* 'name of a plant now extinct', providing a basis for reconstructing PEPnD **siapo* 'young banyan shoots used to make bark cloth', a term distinct from PEPnP **mata-siapo*, yet relatable to it through the idiom Mqa *epa hiapo* 'chief' (lit. swaddling clothes of young banyan').

It is quite possible that the initial Marquesan settlers used the inner bark of *kaute* in the manufacture of fibre as recorded in the Cook Islands (Eimke 2018). *Kaute*, and *Hibiscus tiliaceus*, are processed for their fibre by scraping off the outer bark and retting the wooden core with the inner bark attached in the sea or streams to produce a white, shiny, silky fibre: these "threads" can be used to sew together pieces of tapa (Tepu Kea (elder on Atiu/Cook Islands) and Andrea Eimke, pers. comm.). *Hibiscus rosa-sinensis*—a close relative of *kaute*—is suited to manufacture of paper (Channer 2013: 7–9), and in China the bark of *Hibiscus rosa-sinensis* and paper mulberry were reportedly used for the same purpose, that is, to make a form of tissue paper (Julien 1869: 149). However, Andrea Eimke (pers. comm.) considers it highly unlikely that traditional tapa techniques can be employed to make tapa from *kaute*. The inner bark of *Hibiscus tiliaceus* was reportedly employed in tapa manufacture in Hawai'i, but the three preferred genera for production of bark cloth were *Broussonetia*, *Ficus* and *Artocarpus* (Kamen-Kaye 1984: 76). A dark red or black dye obtained from *kaute* flowers was used to decorate tapa cloth in Polynesia (Setchell 1924), providing another association between *kaute* and *Broussonetia* tapa.

Eventually the highly valued paper mulberry did reach the Marquesas Islands, and a term developed for it, PEPnD **kau-mafute* 'paper mulberry'. Given the interaction sphere from the Central Northern Outliers with Tikopia and another postulated interaction sphere from the Central Northern Outliers on to the Phoenix, Line and Marquesas Islands, it is possible that the paper mulberry introduced to PEPnD speakers living in the Marquesas originated in Tikopia or other areas within relatively easy sailing reach from the Central Northern Outliers including the Solomons, New Ireland and other nearby areas of western Melanesia. Indeed our parsimonious interpretation of the genetic research on *Broussonetia papyrifera* undertaken by Olivares *et al*. (2019) is that the Eastern Polynesian material was introduced directly from near New Guinea.

There is linguistic evidence for introduction from Tikopia, or at least the source of the name from that area, in a cognate of PEPnD **kau-mafute* in Tik *kau-mafuta* 'tripod of poles as a filter stand for turmeric extraction', which in turn is likely a more recent derivation from PPn **kau-mafute* 'paper mulberry

stick stripped of its bark'. Table 3 illustrates how all East Polynesian terms for paper mulberry can be derived from PPn **kau-mafute*, most of them by loss of the morpheme **kau-* 'stick', followed by a variety of losses and/or changes in the first two consonants of the **-mafute* element. Because EPnD languages contain all the cognates needed to reconstruct **kau-mafute* 'paper mulberry' and EPnP cognates all follow a narrow pattern related to developments in Marquesan, it is likely that EPnP terms for 'paper mulberry' are the result of borrowing from early Marquesan. This is consistent with EPnP languages deriving from languages spoken originally on small coral islands where paper mulberry did not grow, and then obtaining the plant and its name as Polynesians spread out later to high islands like Tahiti, where paper mulberry could be cultivated.

Only in the case of Rpn *mahute* are consonant correspondences between contemporary languages and PPn regular in Table 3. Irregular consonant correspondences and consonant losses occur in other terms in various languages of East Polynesia. Beyond Rapa Nui, in all cases the phoneme **f* appears to have been lost or replaced with another consonant like **q* (glottal stop) or **h*, which was later regularly lost. The reflexes of the **m* are the most variable. In other East Polynesian terms where there are variable consonant correspondences of this sort, a PEPn **q* is sometimes indicated as an intermediate step, especially in initial position. We therefore assume that one of the terms derived from PEPnD **kau-mafute* 'paper mulberry' at an early period in East Polynesia was ***qaute* (or ***qaCute*, with another lost consonant (*C*) also possibly reflecting PPn **q* or **h*). The double asterisk indicates a stage intermediate between a proto-language and a contemporary language such as **m* > **q* > **s* > Mqa *h* in the derivation of Mqa *kou-hauti*. We also assume that the term ***qaute* and the plant were then borrowed into early EPnP languages with some irregularly reflecting the **q* with another consonant, i.e., Hawaiian /*w*/ and Rarotongan /ʻ/, ultimately through an earlier **s*.[14] As PPn **q* is eventually normally lost in all East Polynesian languages other than Rapa Nui, the spread of the term ***qaute* for paper mulberry must have occurred before that loss occurred in Hawaiian or Rarotongan.

The spread of ***qaute* as a borrowing from the Marquesas among early EPnP languages, possibly as early as PEPnP, is supported by the lack of any other terms descended from **kau-mafute* in any EPnP language. However, the term *mahute* 'paper mulberry' reached Rapa Nui as part of its linguistic inheritance of **kau-mafute* directly from high-island-Marquesas-resident PEPnD-speaker ancestors. The later developed term ***qaute*, which spread among EPnP languages, does not appear to have ever reached that isolated eastern island.

Table 3. East Polynesian terms for paper mulberry derived from PPn **kau-mafute*.

PPn	* k a u + m a f u t e	paper mulberry stick stripped of its bark
PEPnD	* k a u + m a f u t e	paper mulberry
EPnD terms		
Rapa Nui	- - - + m a h u t e	paper mulberry
Marquesan	k o u + h a - u t i	paper mulberry variety
Marquesan	- - - + - a - u t e	*tumu-aute* paper mulberry tree (*tumu* 'tree trunk' not shown to the left)[13]
Marquesan	- - - + - - - u t e	paper mulberry
Mangarevan	- - - + - e - u t e	paper mulberry
Mangarevan	- - - + - - - u t e	paper mulberry (small)
EPnP terms		
Tahitian, Māori	- - - + - a - u t e	paper mulberry
Hawaiian	- - - + w a - u k e	paper mulberry
Rarotongan	- - - + ʻ a - u t e	paper mulberry

During the period when ***qaute* 'paper mulberry' is assumed to have been spreading among EPnP speakers, the Marquesas shared through contact with Mangareva the closely related ***qaCute*. Eventually ***qaCute* developed into modern Mva *eute*, *ute* and Mqa *ute*. However, distinctively from Mangarevan and all other East Polynesian languages, Marquesan also retained other terms descended from PEPn **kau-mafute*, i.e., *tumu-aute* 'paper mulberry tree' (most closely cognate with PEPnP **qaute* and

likely from early Marquesan **tumu-a-qaute*) and *kou-hauti* 'type of paper mulberry', further evidence that the Marquesas was the original part of East Polynesia where paper mulberry was cultivated.[15]

We also propose that a variant pronunciation of ***qaute* or ***qaCute*, namely ***kaute*, developed in the early Marquesas and was increasingly used for the newly cultivated hibiscus species originating in the mountains of the Marquesas. While there is a possibility that the distinctive Polynesian hibiscus has an origin in the Society Islands and that the term *kaute* was innovated there, a Marquesan origin is more likely not only in view of the several cases in Marquesan where an initial PPn **q* irregularly becomes /*k*/ and /ʻ/ (Marck 2000: 70) but because none have been noted for Tahitian. An example with a three-vowel structure parallel to *kaute* is PPn **qarofa* 'greeting' > Mqa *kaʻoha*. Once the hibiscus had become widely cultivated in its homeland, the plant and its name *kaute* were then spread to EPnP-speaking high islands of Central East Polynesia as well as to Mangareva, but only after ***qaute* 'paper mulberry' had already spread among EPnP languages during an earlier period of more distant navigation.[16]

EVIDENCE FOR INTERACTION SPHERES THROUGH WHICH *KAUTE* LIKELY SPREAD

There is general agreement among archaeologists that East Polynesia was settled considerably later than Central West Polynesia and also quite rapidly (Kirch 2017: 198–203). The few early dates available from archaeological work in the Northern Outliers, e.g., AD 658–768 for Nukuoro (Kirch 2017: 161), are slightly earlier than the earliest dates of AD 900–1100 agreed upon as valid for the first settlement of East Polynesia (Kirch 2017: 200), thus allowing for the possibility of East Polynesia being settled from the Central Northern Outliers.

Archaeologists have also discovered early and widespread dissemination of basalt from the Marquesas into the Society Islands, Mangareva, the Austral Islands, the Southern Cook Islands and the Line Islands (Di Piazza and Pearthree 2001; Weisler *et al.* 2016). The earliest periods of dispersal of Marquesan basalt may have paralleled the spread of paper mulberry known by the term ***qaute* from the Marquesas among early EPnP speakers colonising new island groups including New Zealand and Hawaiʻi. Subsequent, although somewhat diminished, contact between peoples living in the Marquesas and elsewhere in Central East Polynesia—but not New Zealand and Hawaiʻi—likely carried the newly domesticated *kaute* hibiscus and its name throughout Central East Polynesia. As already noted, dissemination of that plant to other parts of East Polynesia would have occurred before the *-au-* sequence changed to *-ou-* in Marquesan and before Marquesan /*k*/ sporadically changed

to /ʻ/, making *kaute*, rather than contemporary Marquesan *koute* and *ʻoute*, the term carried to other parts of Polynesia.

Travel between the Marquesas (or Societies) and the Central Northern Outliers through the Line and Phoenix Islands would have provided a means for the dissemination of *kaute* (both the plant and its name) to those Outliers. Subsequently *kaute* could have been taken to Tikopia and nearby Anuta during the annual voyage that connected the two areas. Linguistic evidence for such contact between East Polynesia and the Northern Outliers and Tikopia has been identified (Wilson 2012: 318–21).

Archaeologists have discovered Sāmoan basalt in sites in the Cook Islands along with Marquesan basalt (Cochrane and Rieth 2016; Weisler *et al.* 2016). We interpret this as evidence for interisland movement and trade providing a means for *kaute* hibiscus to first reach the Southern Cook Islands from the Marquesas Islands and later to be taken to Sāmoa and Tonga. There is also supportive linguistic evidence for late contact between EPnP-speaking areas and West Polynesia in Niuean, a language spoken on an island that may have served as a way station between EPnP-speaking areas of East Polynesia and Central West Polynesia (Marck 2000: 112; Wilson 2014: 407).

From Central West Polynesia, the term and plant *kaute* spread to nearby Fiji and Rotuma, with the phonological markers indicating that its arrival was probably fairly recent in that area, that is, after PPn antepenultimate **-au-* became *-ou-* in Tongan and Niuean (Schmidt 2001: 215–17). Late prehistoric transport of Sāmoan basalt reached not only the Southern Cook Islands but also Tonga, East Fiji, Taumako in the Southeast Solomons Outliers and nearby Makira (San Cristobal) of the Solomon Islands as well as the coral island of Manra in the southern Phoenix Islands. This interaction sphere would have provided an alternative to direct movement from the Marquesas for the plant and term *kaute* to reach Tikopia and the Central Northern Outliers.

A third possible route for the movement of *kaute* from East Polynesia to Tikopia, the Central Northern Outliers and possibly Sāmoa as well is through Pukapuka in the Northern Cook Islands, the indigenous language of which has extensive borrowings from Tahitic (EPnP(S)) languages and also possible borrowings from Tikopian and Northern Outlier languages (Clark 1980; Wilson 2014: 413–15). The discovery of Sāmoan basalt in Pukapuka, and also in the Tokelau atolls lying between Pukapuka and Sāmoa (Cochrane and Rieth 2016), is further supportive of Pukapuka being part of an interaction sphere connecting East Polynesia, Sāmoa and Tikopia in the southeast Solomon Islands. The area over which Sāmoan basalt has been found closely approximates the area outside East Polynesia where *kaute* has been reported as a pre-European cultivated plant.

RELOCATING *KAUTE* IN THE WILD

Recently two palm species have been either described (*Pritchardia tahuatana* Butaud & Hodel) or recircumscribed (*Pelagodoxa henryana* Becc.) from the Marquesas, from cultivated individuals, both presumed extinct in the wild (Butaud and Hodel 2017; Hodel *et al.* 2019). It is possible that *kaute* also now only survives in cultivation, given its natural rarity and possible early overexploitation for bark, in addition to threats from invasive species (Meyer 2004; Russell *et al.* 2017) and climate change to montane ecosystems in French Polynesia (Pouteau *et al.* 2010). Based on ecological preferences of related Pacific *Lilibiscus* species, *kaute* more likely originates in mid-high elevations, i.e., ≥400 m. In the Marquesas, upland plant communities are in much better condition than those in low-mid elevations, and this especially applies to cliff-edge communities (Jean-François Butaud, pers. comm.). Whilst many of the rugged high-elevation habitats in the Marquesas have been botanically explored over the past three decades (David Lorence, pers. comm.), there remain peaks and cliffs which have yet to be studied (Jean-François Butaud, pers. comm.). A thorough exploration of botanically unexplored upland areas of the Marquesas, likely using unmanned aerial vehicles (drones), will be required before *kaute* can be declared extinct in the wild. Attention ought to be initially focused on islands and locations with names or cultural connections to *kaute*/*koute*, especially those islands with suitable, unexplored habitats such as on Hiva Oa (with *kaute*-related place names such as Faekouteeua and Faekoute) and Fatu Hiva (Teavaoute, Teoute, Outepoe).

* * *

The following is a chronological summary of events proposed in this paper:

1. *Ca. 2800 BP*. Lapita colonists settle in the western Pacific as far east as Tonga (Burley *et al*. 2015: 11) and likely become familiar with local species of red-flowered *Hibiscus*, including *H. cooperi* (in Vanuatu) and *H. macverryi* (in Fiji).
2. *Ca. 1200–850 BP*. West Polynesians begin to settle "Outliers"—islands to the west in geographical Micronesia and Melanesia. These settlers lose knowledge of any red-flowered hibiscus since they do not grow well on atolls. Note: The Carolinean outlier Nukuoro might have been settled as early as 1200 BP (Kirch 2017: 161), while the southeast Solomons high-island Outlier Tikopia was likely first settled by Polynesians in 850 BP (Kirch and Swift 2017: 333). Further archaeological research in the CNO is needed to clarify Polynesian settlement dates of these islands.

3. *Ca. 1050–785 BP*. East Polynesia is settled (Allen 2014: 3; Anderson *et al*. 2019: 1; Conte and Molle 2014: 135; Kirch 2017: 200; Niespolo *et al*. 2019: 21; Sear *et al*. 2020). Polynesians from the Northern Outliers voyage east, via the Phoenix and Line Islands, to the Marquesas, as proposed by Wilson (2012), where they encounter a red-flowered hibiscus growing wild in the mountains. They name it *kaute*, derived from the name for the paper mulberry, likely due to its use for making bark cloth/fibre and/or the similarity of leaves on mature specimens of both species.
4. *Ca. 700–500 BP*. The plant *kaute* and its name are deliberately introduced to Tahiti (where it may also be native) and nearby islands, thence to West Polynesia, and thence to Fiji and Rotuma. They are also introduced to four Outliers of PNG and the Solomon Islands. The introduction to Tikopia and Anuta, Outliers in the East Solomons, may have been via the more northerly Outliers, via Pukapuka or from Central West Polynesia.
5. *1769*. *Kaute* is discovered in Tahiti and described by Banks and Solander, who misidentified it as *Hibiscus rosa-sinensis*, contributing to the long accepted but erroneous belief that the plant originated in Southeast Asia, or elsewhere, and was taken into the Pacific by the Lapita settlers.

In sum, we argue that the Polynesian red-flowered hibiscus known as *kaute* was an endemic East Polynesian species, rather than *H. rosa-sinensis* L. We present historical, linguistic and distributional evidence that is supportive, and which points to an east-to-west dispersal in Polynesian times. Further field and genetic research is required to fully evaluate this model, and is already underway.

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NOTES

1. Language abbreviations, names and default sources, where relevant, are as follows: Anu Anuta (Yen and Gordon 1973), EFu East Futunan (Moyse-Faurie 1993), EUv East Uvean (Rensch 1984), Haw Hawaiian (Pukui and Elbert 1986), Lua Luangiua (Salmond 1975), Mao Māori (Williams 1975), Mqa Marquesan (Dordillon 1904), Mva Mangareva (Tregear 1899), Niu Niuean (Sperlich 1997), Nkm Nukumanu (Wycliffe Bible Translators 2013), Nkr Nukeria (Nuguria) (Davletshin 2013), PCNO Proto-Central Northern Outlier (Wilson 2012), Pen Penrhyn (Shibata 2003), PEO Proto-Eastern Oceanic (Geraghty 1983), PCP Proto-Central Pacific, PEPn Proto-East Polynesian (Wilson 1985), PEPnD Proto-East Polynesian Distal (Wilson forthcoming), PEPnP Proto-East Polynesian Proximal (Wilson forthcoming), PEPnP(N) Proto-East Polynesian Proximal Northern (Wilson forthcoming), PEPnP(S) Proto-East Polynesian Proximal Southern (Wilson forthcoming), PMP Proto-Malayo-Polynesian, PNO Proto-Northern Outlier (Wilson 1985, 2012), POc Proto-Oceanic (Ross, 2008), PPn Proto-Polynesian (Greenhill and Clark 2011), PSSO Proto-Southeast Solomon Outlier (Wilson forthcoming), Rar Rarotongan (Buse 1996), Ren Rennellese (Elbert 1975), Rot Rotuman (Inia *et al.* 1998), Rpn Rapa Nui (Englert 1978), Sam Sāmoan (Milner 1966), Sik Sikaiana (Donner 2012), Tah Tahitian (Atiu *et al*. 2019; Lemaître 1973), Tak Takuu (Moyle 2011), Tik Tikopian (Firth 1985), Tokelauan (Simona *et al*. 1986), Ton Tongan (Churchward 1959), Tua Tuamotuan (Stimson and Marshall 1964), Tuv Tuvaluan (Ranby 1980), WFu West Futunan (Capell 1984), WUv West Uvean (Hollyman 1987).
2. A *flore pleno* form of *H. rosa-sinensis sens. lat.* is present on Rapa Nui, but with no ancient reported name, and probably introduced from Tahiti in the nineteenth century (Jean-François Butaud, pers. comm.).
3. PPn **fau* is traceable through various proto-languages all the way back to Proto-Malayo-Polynesian through mostly regular sound changes: PMP **baru* '*H. tiliaceus*' > POc **paru* > PEO **vaRu* > PCP **vau* > PPn **fau.*

4. It is possible that the first syllable of *kaute* was reanalysed in Luangiua as an article or as a noun-forming prefix and thus deleted. Note for example PPn **renga* 'processed turmeric' > PSNO-EPn **renga*, **ka-renga* > Sik *ka-lena* 'turmeric powder', Lua *a-lenga* 'red dye'; PPn **talinga* 'ear' > Lua *kalinga*, *a-kalinga* 'ear'.
5. Another case where an iconic cultivated decorative floral species takes on the meaning of 'flower' is Tahitian and Rarotongan *tiare* 'flower' from PPn **tiale* '*Gardenia* sp.'. Note that Mao *tīare*, *tīere* 'scent' and Haw *kiele* 'gardenia' (generic term applied to native varieties allied *nānū*, *nā'ū*, *nā'ū'ū*) provide evidence for familiarity with gardenias at the settlement period of East Polynesia. Further support is found in cognates in the Southeast Solomon Outliers and Northern Outliers, e.g., Tik *tiare* '*Gardenia taitensis* DC.'; Lua *kiale* 'creeper, white flower'; and Tak *tiare* 'plant species whose leaves are used for personal decoration', allowing for reconstruction of the term **tiale* for a species of fragrant gardenia used for personal adornment at the PSSO-EPn, PNO-EPn and PCNO-EPn levels as well as PEPn **tiare*. PPn **pua* '*Fagraea berteroana* A.Gray ex Benth.' has also become a generic term for 'flower' in East Polynesia.
6. Botanists consider the hibiscus a modern introduction in most of the atolls in French Polynesia, except perhaps uplifted islands such as Makatea and Niau in the Tuamotus (Jean-François Butaud, pers. comm.). The Central Northern Outliers atolls and some raised coral islands are more suitable for hibiscus due to higher rainfall (e.g., Takuu with 2,926 mm annual rainfall, based on climate modelling from the WorldClim database) than that of other atolls, e.g., the Phoenix Islands atolls (Kiribati), with typically less than 1,000 mm annual rainfall.
7. Note the following examples illustrating the outcome *-ou-* from PPn **-au-* for Marquesan and Mangarevan but the retention of *-au-* in Rapa Nui: PPn **taura* 'rope, cord' > Mqa *tou'a*; Mva *toura* but Rpn *taura*; PEPnD **rau-qof/so* 'head hair' (replacing PPn **lau-qulu* 'head hair') > Mqa *'ouoho*; Mva *rouo'o* but Rpn *rau-'oho*. An example where the *-au-* > *-ou-* change is not found in likely early borrowings from Marquesan or Mangarevan is Haw *lauoho* 'head hair'. Another possible example is Rapa Nui *raupaka* 'taro leaves' cognate with Mqa *'oupa'a* 'taro leaves ready for cooking' or Mva *roupaka* 'food taken to fishermen to get fish', but also cognate with Mao *raupaka* 'taro leaves'.
8. Linguistic evidence connecting the two PEPnP dialects to dry coral-island homelands include vocabulary such as innovative PEPnP **maka-tea* 'raised coral' (their primary geological feature) and loss in the Southern subdialect of certain terms associated with standing fresh water.
9. Although not presently available in any publication, the East Polynesian subgrouping in Figure 8 has been in development by Wilson for some time. The relationships reflected in the lower-level subgrouping here called East Polynesian Distal has been proposed previously by Green (1999: 8) and Kieviet (2017: 1–2, 11). What is here called East Polynesian Proximal is referred to in Wilson (2010; 2014: 405, 408–9; 2018: 408) and is a re-analysis that returns Hawaiian to subgrouping with the Tahitic languages, as in Elbert (1953). Reference to the existence of the subgrouping in Figure 8 is in Wilson (2018: 419). A presentation by Walworth and Davletshin (2019) outlined a grouping quite similar to that in Figure 8 but proposed this as a set of contact-derived networks rather than as subgroups descended from a proto-language.

10. Rapa Island (in the Australs Group) also has a suitable climate for seed formation due to its elevation (up to 600 m) and more southerly latitude.
11. While archaeologists generally hold that Hawai‘i was settled from the Marquesas (Kirch 2017: 210–11), linguistically, Hawaiian shares more innovations with other PEPnP languages than with PEPnD Marquesan (Wilson 2014: 408–9, 431). A number of those linguistic features are distinctive of coralline island environments (see, e.g., note 9).
12. Paper mulberry is not normally present or very infrequently cultivated on coralline atolls (Hogbin 1940; Turbott 1949).
13. The *-a-* element in Mqa *tumu-a-ute* (Dordillon 1931: 430) is parallel to the *-a-* element in Mqa *tumu-a-‘ehi* ‘coconut tree’ and likely reflects PPn **-aa-*, a morpheme joining elements in compound words. This *-a-* does not occur after *tumu* ‘tree trunk’ with most Marquesan plant names, e.g., *tumu-mei* ‘breadfruit tree’, *tumu-meika* ‘banana plant’, and its retention in the cases of *tumu-a-‘ehi* and *tumu-a-ute* may reflect the existence of a dropped vowel /*e*/ or /*a*/. Note that cognates of Mqa *‘ehi* ‘coconut’, i.e., Mva *ere‘i* and Tua *erehi*, like the Mva *eute* cognate of Mqa *ute* ‘paper mulberry’ listed in Table 3, have an initial vowel /*e*/.
14. The history of irregular consonant correspondences involving the often-lost consonants PPn **q* and PPn **h* is a distinct topic in itself and not explored in detail here. Some discussion of irregular correspondences of PPn **q* and **h* in East Polynesian languages can be found in Marck (2000: 70–72), Wilson (2010: 302–3; 2018: 418–19) and Davletshin (2016: 365–66).
15. Marquesan retains both an *-au-* and *-eu-* sequence for terms for paper mulberry, indicating that the reason that Mva *eute*, *ute* and Mqa *ute* are seen as likely deriving from **qaCute* is that there is an optional phonological rule shared by Marquesan and Mangarevan that raises an antepenultimate **a* to *e* before *-Cu-*, e.g., PPn **qatule* ‘big-eyed scad fish’ > Mva *eture*; Mqa *etu‘e*. Another rule that drops an initial antepenultimate *e*, e.g., Mqa *e‘e‘o*, *‘e‘o* ‘tongue’, explaining the *eute*, *ute* variation. The existence of the consonant (*C*) between *-aCu-* explains why the common Marquesan and Mangarevan rule of antepenultimate **-au-* > *-ou-* did not affect their terms for paper mulberry while it did affect the term for *Hibiscus*, Mqa, Mva *koute*.
16. There are parallels between the spread of ***qaute* ‘paper mulberry’ and the spread of ***kūmara* ‘sweet potato’, which also must have been brought from an external source, namely in South America, at an early period to some key location in East Polynesia—possibly the Marquesas. The paper mulberry and sweet potato were then dispersed throughout East Polynesia, including to New Zealand, Rapa Nui and Hawai‘i, possibly as early as the initial discovery period of those distant points.

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REVIEWS

BERMAN, Elise: *Talking Like Children: Language and the Production of Age in the Marshall Islands*. New York: Oxford University Press, 2019. 224 pp., biblio., illus., index, maps, notes. £20.99 (softcover).

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Three decades ago, a "new" kind of child research posited novel ways of thinking about childhood: that children are agentive social actors; that children produce culture; that children are not innocent. As sociologist Allison Pugh points out, these now old tenets of childhood studies are unfortunately still "new" to sociology, and I would add, to a broader anthropology as well. Despite a proliferation of studies centring children, childhood often remains a "special" topic, othered by adult-centric assumptions of an adult "standard" human, while the vast theory generated from anthropological studies of children in societies is, like children themselves in western cultures, cloistered into "child" spaces and domains of study.

Elise Berman's book *Talking Like Children: Language and the Production of Age in the Marshall Islands* is an excellent example of why the cloistering of childhood anthropology is to the detriment of the discipline. Berman rightly points out that while other variables of difference such as gender, ethnicity and class have been well examined in anthropological analyses, age as a key structure of societies has been generally neglected, leading to oddly "ageless" analyses of human culture. In six compendious chapters, Berman demonstrates how the anthropology of childhood contributes important new theory not only to childhood studies but to anthropology as a whole.

The discipline's neglect, Berman suggests, is perhaps due to assumptions of age as biological fact rather than another socially produced axis of difference. Defined as "relative position in the life course", Berman maintains that age, like gender or race, is an ideology, produced through family histories and relational interaction, both malleable and entrenched, and employed to explain, justify or enable particular social functionalities. For the Marshallese in the tiny town of Jajikon, children's child status allows them to do things that would be shameful for adults: carry food in public, spread gossip, spy on others. As such, children are powerful mediators of economic and political life for adults, not in spite of but *because* of their childness.

In establishing that child–adult differences are socially produced, Berman moves beyond the (old) "new" premise that children have agency to consider how children's agency is *different*. Children and adults both have agency, but *all* agency is aged. "Aged agency" therefore describes how age-defined social rules differently enable and constrain children and adults. Marshallese children in Jajikon hold three kinds of age-specific agency: "negative agency", which accords them the ability to resist those in power; "encompassed agency", which frees children from

accountability for their actions; and "non-moral agency", which allows children to do things that are considered immoral for adults. The notion that agency is produced in aged varieties invites exciting new possibilities for advancing structure–agency theory in anthropology.

The adult-centric conflation of immaturity with incompleteness has limited much socialisation research to views of children as adults-in-waiting or unfinished adults. Berman's intervention here asks not only how children learn to be adults, but importantly, how children learn to be *children*. What makes children different from elders within a society? Adult–child differences in the Marshall Islands are produced through language, emotion and ideologies of who children are (that they have no shame; that they cannot lie). These socialisation processes are not only the purview of adults, however; children themselves also produce differences between older and younger children: through sharing, demands, force, threats, criticisms and insults, they create their age relative to each other—which might be different from their chronological age.

This notion that "before children learn to be adults, they learn to be different from adults" (p. 146) upends conventional thinking about the processes of socialisation, even given more recent acknowledgements that children actively participate in socialising themselves and each other. Socialisation is not a progressive movement from novice to expert but a process of producing differences, of "constantly taking on and discarding age-specific modes of being and speaking" (p. 7). The implications of this are enormous; if culture is acquired multiple times throughout the life course, then, as Berman notes, the socialisation of age could represent a key mechanism of both cultural reproduction and change. Moreover, if children first learn to be children, then other kinds of novices must first learn to be novices, including those who are constructed as learners, trainees or junior members of adult institutions (hospitals, universities, churches, police).

The notion that children learn to be children will resonate with many of us who conduct research with children. In a particularly useful quote, Berman summarises what I have long noticed about children's participation in research: "Children become immature partly because people expect them to be immature and treat them as such" (p. 56). Expect children to be competent social actors and they will demonstrate competent social actions. Treat children as though they have important things to say and they will tell you important things. The insinuation here is that children's behaviour is not necessarily tied to their developmental abilities but to their social status as children. As well as the obvious implications for research approaches, this insight may be particularly useful to researchers who study children's participation in health care, education, decision-making and family or community life.

Talking Like Children is an excellent text for students, using lively storytelling to explicate a variety of foundational anthropological topics, including kinship, social rules, emotions, age structures and exchange. Each chapter hooks the reader with a central mystery: Who will get Pinla's baby? How will Elise get the soda? Will Rōka keep his lollipop? Was Ryan lying? These questions invite student discussion to piece together ethnographic evidence of multiple cultural phenomena and unpack the complexities, contradictions and contingencies of human social norms. Chapter

two, which challenges commonly held assumptions about age with cross-cultural evidence, will be of particular relevance and interest to college students, themselves encountering a socially constructed life stage.

The book provokes further questions about the role of schooling in producing immaturity and maturity and transitions from one to another. As Berman notes, schools are typically structured around chronological age, and starting and finishing school for the Marshallese also marks life transitions. Future directions could examine how teacher–student or senior–junior peer differences are produced through the institutional context and how these relate to the production of age in society more generally.

I have a (facetious) test for child research: if we were to replace "children" with "cows", would that significantly change the nature of the research? Too many studies, especially in public health, treat children like livestock: as objects of adult actions, and as outcomes of adult interventions to be weighed, measured and returned to their paddocks. In *Talking Like Children* it would be impossible to replace children with cows. Children's agentive actions drive both narratives and theory; they read and make social situations, and they actively produce their age status and that of others. Children, in this book, teach us what it means to be a human of any age, just as the anthropology of childhood does for anthropology.

CARREAU, Lucie, Alison Clark, Alana Jelinek, Erna Lilje and Nicholas Thomas (eds): *Pacific Presences: Oceanic Art and European Museums, Volumes 1 and 2*. Leiden: Sidestone Press, 2018. Vol. 1 254 pp., Vol. 2 512 pp., biblio., illus., index, notes. Vol. 1 £74.95, Vol. 2 £39.95 (softcovers; both volumes can also be read online for free at sidestone.com).

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These two volumes compile work associated with the project of the same name funded by the European Research Council over the period 2013–2018. The project examined Pacific collections in museums across Europe, particularly focusing on lesser-known collections in storage. This included developing relationships with communities from which the objects came, working with "scholars, curators, artists, elders and community members" (p. 9) from around the world. The project also focused on making connections between collections, reassembling assemblages in some cases. In the introduction, Thomas describes the four sets of issues the project sought to investigate. These relate to the content of the collections, the original collection context, the place of these collections in Europe, and their contemporary significance for Pacific communities.

The two volumes are distinct. The first provides a summary of the historical contexts of the assemblages and the second illustrates the nature and importance of connections between collections and communities in a variety of creative and innovative ways. At the beginning of Volume 2, Thomas uses a mapping metaphor

for the two volumes. Volume 1 provides a "historical atlas of Pacific presences across Europe" (p. 9) and ultimately a partial historical atlas of European presences in the Pacific. These chapters highlight the activities of individual nations, but also the interconnectedness of European activity and collecting in the Pacific. Because of the inherent limitations of Volume 1, Volume 2 provides space for expansion. Volume 2 traces some of the "many journeys which can be undertaken across the territories" (p. 9) as object collections included provide resources for new knowledge and artistic inspiration, as well as connections between communities and their ancestors.

In Volume 1, the tumultuous period of the seventeenth to nineteenth century is viewed through the lens of the colonial endeavour in the Pacific. Five chapters present the histories of collections now in Britain, France, the Netherlands, Russia and Germany. The chapters provide an interesting insight into the drivers of these endeavours, both individual expeditions and the wider political agendas of states. They highlight the importance of understanding the specific contexts of collections and collecting. Overall Volume 1 is an extremely useful synthesis and provides an excellent scholarly source. Although in some places handled well, at times there seems to be a slight reluctance to acknowledge the extent of the impact European presences had on the Pacific with regards to various engagements around material culture, the impact of collecting and outright destruction of material culture.

Volume 2 consists of 33 chapters and is introduced by Thomas, who gives a sense of the enormity of this project and its ultimate reach. Volume 2 is divided into four parts: Part 1 *Materialities*, Part 2 *Collection Histories and Exhibitions*, Part 3 *Legacies of Empire* and Part 4 *Contemporary Activations*. The volume of work represented here is impressive and the diversity in approaches is inspiring. Volume 2 demonstrates the many ways museums and other institutions can and do engage with contemporary communities. Several themes come through in Volume 2, including the concept of re-igniting connections between communities and collections, reassembling assemblages, the importance of collections beyond museums and academic spheres, the importance of building relationships, and different methods of engagement with the wider community.

Part 1 *Materialities* contains analyses of specific sets of objects. Through this common issues in research are revealed such as historical misinterpretation and lack of information regarding context. Despite the issues these examples demonstrate the power of research that spans across collections and across the Pacific. Nuku (Chapter 4) in particular highlights the transformative power of materials and the shared materiality and cosmologies throughout the Pacific that cut across time and space.

Some of these themes continue in Part 2 *Collection Histories and Exhibitions*, which compiles eight chapters on specific collections and their histories, including contemporary activities. The complexities of different encounter, collection and display contexts are considered. So too are the additional datasets that may shed light on the historical context of object collection, inherent challenges with collection-based research and issues with practices that restrict access to collections. Vivid accounts of the collectors themselves are also presented in this section.

Part 3 *Legacies of Empire* presents eight chapters describing collections associated with empires and their colonial contexts. The historic context of exchange forms

the focus of case studies from across the Pacific involving a variety of European political entities. This section illustrates the significance of exchange for Pacific communities in the past, but also those in the present. Understanding the history of objects, assemblages of objects and built heritage additionally reveals the complexity of colonial encounters, including the displacement of people throughout the region.

Part 4 *Contemporary Activations* consists of 10 chapters that demonstrate the significance of these collections in contemporary settings in a wide variety of ways. Many of these activations are carried out by or in collaboration with Pacific scholars and artists. In Chapter 24, Wilkinson and Adams note "the absence of the object was central" (p. 303). In many ways this sets the tone for the remainder of the section, where absence is acknowledged as much as presence. Kahanu also remarks on the importance of acknowledging absence in the introductory chapter.

In the final chapter (Chapter 33) before the Epilogue, Rosanna Raymond cuts to the heart of the matters uncovered by the project and this publication. She comments, "The museum is itself an artefact of colonization, and this legacy is deeply embedded in the core of most museum policies, practices and communities" (p. 403). Raymond suggests many collections have lost their agency. As with absence, this notion is pervasive in Part 4, although not always explicitly stated. As the examples in this volume illustrate, there are a variety of ways this can be addressed. Furthermore, changes in technology provide new opportunities for communities to access and engage with objects and collections.

The volumes bring together approaches from a variety of disciplines and modes of practice that demonstrate the value of broad interdisciplinarity. As is illustrated here, objects in European collections may serve as important points of connection for Pacific people living overseas and in the Pacific. Collaborative projects have the potential to "activate and enliven" (p. 423) relationships, and for institutions, challenge ideals and practice. Such projects create space for communities to grieve for what was lost, connect with their ancestors and think about possibilities for the future. The examples presented here should encourage scholars working in this space to think creatively about ways to engage with communities, particularly ways that are co-developed by the communities themselves.

In sum this project is an ambitious undertaking, and this publication gives a sense of the whole process of the project laid bare. The content in the volumes weaves together academic passages with creative works, interviews and ethnographic vignettes, creating a narrative that is moving and vivid. The layout is clear and the variability in approaches to chapters makes for interesting reading. The photography is excellent and brings content to life in many places, as does supplementary content such as links to videos. *Pacific Presences* is successful in highlighting the importance of connecting people and objects. It is a reminder for all scholars working on collections in the twenty-first century to think about addressing and acknowledging colonial pasts and think critically about the context (past, present and future) of objects and assemblages. The legacy of these collections and their collecting persists in both their presences and absences. New methods of analysis highlight their continuing significance and relevance.

PUBLICATIONS RECEIVED*

July to December 2020

ANAE, Melani: *The Platform: The Radical Legacy of the Polynesian Panthers*. Wellington: Bridget Williams Books, 2020. 232 pp., notes. NZ$14.99 (softcover), NZ$4.99 (e-book).

DOIG, Tom (ed.): *Living with the Climate Crisis: Voices from Aotearoa*. Wellington: Bridget Williams Books, 2020. 224 pp., notes. NZ$14.99 (softcover), NZ$4.99 (e-book).

HALL, Nina (ed.): *Beyond These Shores: Aotearoa and the World*. Wellington: Bridget Williams Books, 2020. 248 pp., notes. NZ$14.99 (softcover), NZ$4.99 (e-book).

KAA, Hirini: *Te Hāhi Mihinare: The Māori Anglican Church*. Wellington: Bridget Williams Books, 2020. 248 pp., biblio., glossary, illus., index, notes. NZ$49.99 (softcover).

SOMERVILLE, Alice Te Punga: *Two Hundred and Fifty Ways to Start an Essay About Captain Cook*. Wellington: Bridget Williams Books, 2020. 120 pp., notes. NZ$14.99 (softcover), NZ$4.99 (e-book).

* The inclusion of a publication in this list neither assumes nor precludes its subsequent review.