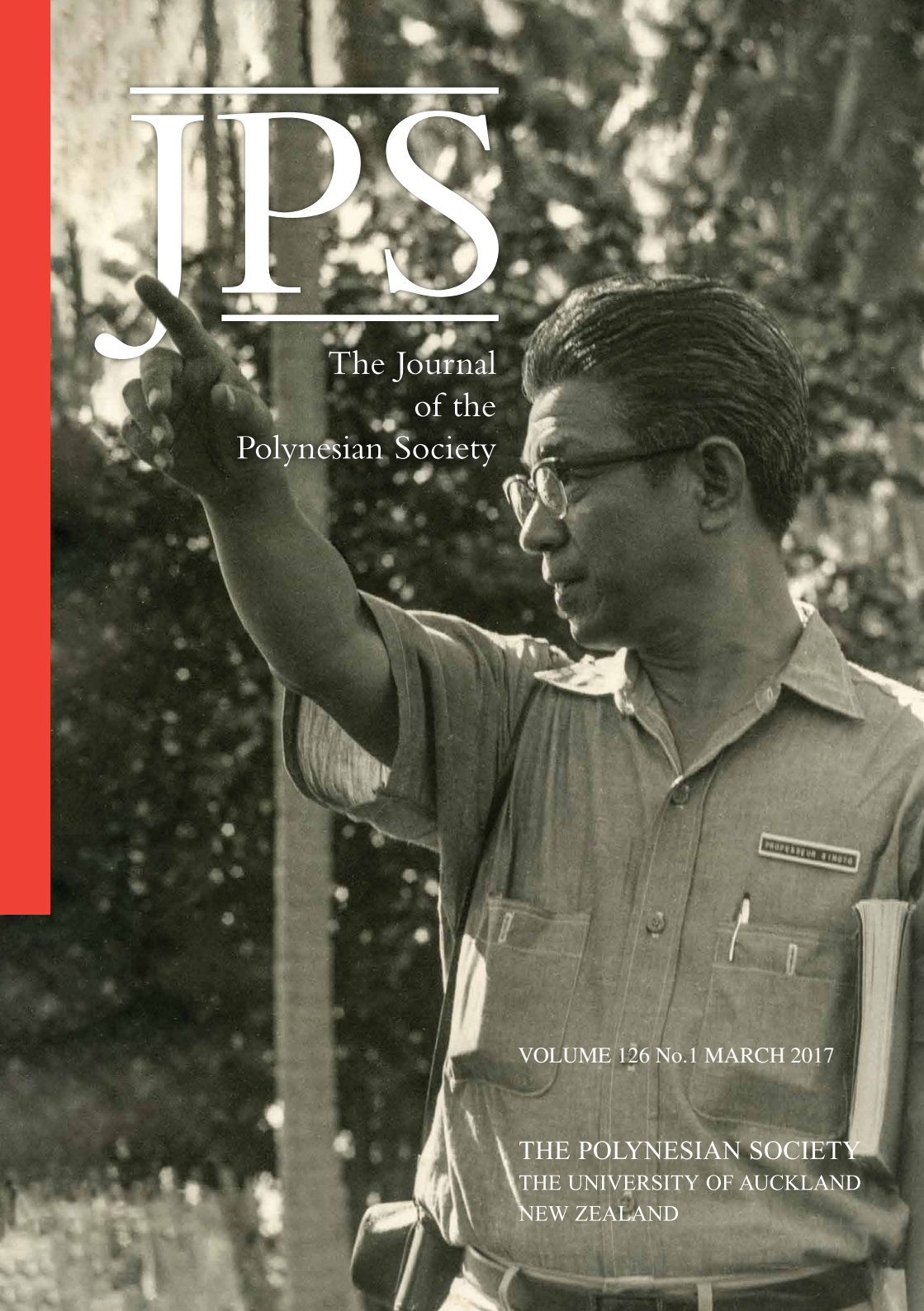

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Cover image: Dr. Yosihiko Sinoto teaching a class of Tahitian students on Huahine, Society Islands, August 1972. (Photograph courtesy of the Bernice P. Bishop Museum)

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AUCKLAND, NEW ZEALAND

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TUAI OF NGARE RAUMATI: TEACHING EUROPEANS IN THE EARLY 19TH CENTURY

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KUNI KAA JENKINS
Te Whare Wānanga o Awanuiārangi

This article seeks to bring into focus a shadowy figure in early New Zealand history, a young man, Tuai of Ngare Raumati, who played a significant role in both settling the first settlers in northern New Zealand, and teaching Europeans about early 19th-century Māori society. Tuai was probably the most written-about Māori in the first quarter of the 19th century. His name, or a version of it, appears in most indexes of books about the pre-1830s Bay of Islands. But almost all modern references to him are in passing.[1] Tuai appears as a bit-player in histories, a small fry among men linked to Ngāpuhi, such as Te Pahi, Ruatara and Hongi Hika, whose names are common in stories of the earliest Bay of Islands Māori-settler engagements.

Yet our research indicates that Tuai, who was born in about 1797, should be more widely remembered for the key roles he played in those first engagements. His short life—he was 27 when he died—included periods living in Australia and England, and he probably knew more than any other contemporary Māori person about European life. Tuai's engagement with the iron-technology-rich European world shaped his desire for Māori to assimilate its things, and its people. He sought Pākehā allies, and worked hard at educating them about the Māori world, actively teaching those who were interested. Like other Māori, Tuai had anxious premonitions of Pākehā domination. But he thought that by actively forming alliances and exchanging knowledge with the newcomers, both groups would benefit. He lived at a time of tension between his Ngare Raumati people who lived in the south of the Bay of Islands and an alliance of *hapū* 'kin groups' from the north under the leadership of Ngāpuhi. These tribal politics determined the pattern of earliest Pākehā settlement in the Bay of Islands, and shaped Tuai's life.

TUAI'S NAME

A note on Tuai's name is necessary. Almost everyone he met spelled his name differently. Two handwritten Ngare Raumati *whakapapa* 'genealogies' use different spellings: Te Tuhi and Tui. An old Ngāpuhi account gives the name Tai.[2] In unpublished primary sources, he is called Tohi, Toi, Toohe, Touai, Toui, Tuai, Tuaea, Tuaia, Tuhi, Tui and Tuihi. Secondary published works refer

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most commonly to Tuai, Tui or Tuhi. In our book *He kōrero: Words Between Us—First Māori-Pākehā Conversations on Paper* (Jones and Jenkins 2011) we chose Tuai as the spelling, for reasons we explain there. The name Tui is used by historians Anne Salmond (1997) and Judith Binney (2005) and by the authors of the Waitangi Tribunal Report on the Te Paparahi o Te Raki Inquiry (2014). Te Tuhi seems to be favoured in the north, and Tuhi is used commonly by earlier researchers such as John Rawson Elder ([ed.] 1932, 1934), Leslie Kelly (1938), Laurence Rogers (1961) and Jack Lee (1983), as well as historian Angela Ballara (2003). Some who met Tuai wrote Tooi. Samuel Marsden usually wrote Tooi, as did the Church Missionary Society (CMS) churchmen. So Tuai himself learned this version, and signed his letters from England 'Thomas Tooi'. Given this complexity, it is impossible to be certain about how to correctly spell Tuai's name in accepted modern orthography. We use Tuai in this account.

NGARE RAUMATI AND NGĀPUHI

Tuai's Ngare Raumati people are an ancient people who trace their ancestry to Huruhuru. Their territory extended from the islands and lands of Te Rāwhiti in the southern Bay of Islands to Motu Kōkako in the northeast, and Taupiri Bay in the southeast—the area known today as Cape Brett and Rākaumangamanga. In the early 19th century, the "Ngare Raumati confederation" (Sissons *et al*. 2001: 46) comprised a large number of *hapū*.[3]

Before Tuai was born, a rival alliance of *hapū* led by Ngāpuhi, who trace their ancestry to Rāhiri, was steadily expanding its territories east from inland Te Waimate towards the southern Bay of Islands, offering a serious threat to Ngare Raumati's once great power in the region. In one significant event about 1800, a woman named Te Whakahoe, of Ngāi Tawake (a Ngāpuhi aligned *hapū* based at Te Waimate), had been taken from Te Hakiro, her Ngare Raumati husband, to become the wife of Whitirua, also of Ngāi Tawake. As a result, Ngare Raumati had attacked Te Waimate killing several people including Rewa's mother Te Auporo, and his sister Te Korehu (or Te Karehu), both high status women of Ngāpuhi. In the years following, a northern alliance of Ngāpuhi (led by Te Hōtete, Hongi Hika's father) and others from Waimate, Kaikohe, Whangaroa and Hokianga Districts, as well as from Te Puna in the northern Bay of Islands, launched a number of return attacks on the southern Bay of Islands people. The Ngare Raumati leader Te Tāwheta (Tuai's direct ancestor) was killed by Te Hōtete's Ngāi Tawake forces at Tāpeka Point in revenge for the above deaths (Ballara 2003; Cloher 2003: 180-81; Kelly 1938; Lee 1979; Sissons *et al*. 2001: 51, 133).

Clashes within and between Bay of Islands and inland *hapū* redistributed the population in all directions, and the tensions between the Ngare Raumati

and Ngāpuhi alliances continued to simmer during Tuai's life, the first quarter of the 19th century. Tuai, his older brother Korokoro, and his closer relations had kinship ties to the invaders through a woman named Raumati, who was of both Ngāpuhi and Ngare Raumati descent, and through Korokoro's mother [or wife; see Note 4], Te Awhi of Ngāi Tawake (*NMB* 1905, vol. 36, p. 124). So Ngare Raumati, "a confederation of non-Ngā Puhi hapū" (Sissons *et al.* 2001: 87), continued to inhabit some of the islands and the coastland of Pāroa and Manawaora Bay in the southeastern Bay of Islands throughout Tuai's lifetime, and remained a dominant force there under Korokoro, who died in 1823.

According to published *whakapapa* and other information, Tuai appears to have had at least four older brothers including the powerful Korokoro, Te Ngawa and Te Rangi (Kelly 1938: 25; Sissons *et al.* 2001: 17, 46, 48, 50, 137), and some sisters including Te Hinu and Makiri. Tuai's direct male elders included the venerable Kaipo ('Old Bennee'), and Mauhikitia, son of Tūkawau, son of Te Tāwheta. Some *whakapapa* suggest Korokoro's (and presumably Tuai's) father was Tūkawau, others that he was Mauhikitia.[4] Samuel Marsden reported that Tuai's father had been a priest, or *tohunga* (MOA Marsden to Pratt, 12.10.1814).

After Tuai's death in 1824, Ngāpuhi finally chased most of Ngare Raumati out of their homelands, and they became a dispersed people. Their stories faded behind those of their Ngāpuhi rivals, whose accounts are told in a number of books, as for example Cloher 2003, Hohepa 1999, and Sissons *et al.* 2001. By contrast, rare published accounts of Ngare Raumati cast them merely as a defeated group (Kelly 1938; Sissons *et al.* 2001: 133ff). The Ngare Raumati stories are yet to be written.

BRINGING THE PĀKEHĀ TO NEW ZEALAND

Tuai was to play a key role in bringing European settlers to New Zealand. His generation was the first to have grown up familiar with the Pākehā. His parents and grandparents remembered infrequent and frightening encounters with the strange white *maitai tupua* or sea goblins (White 1879 [Māori version]: 72; Salmond 1991: 221). But during Tuai's childhood, increasing numbers of Pākehā ships—following maps made by the 18th-century visitors James Cook and Marc-Joseph Marion du Fresne—appeared in the waters of Ngare Raumati, on their way to and from whaling grounds. By the time Tuai was an young adolescent, about 50 whaling ships had visited the Bay of Islands (Wilson 1990: 16). A few local men got work on the ships, and sailed away. Some came back; others did not.

Tuai became one of these adventurers. He first enters the European written records in March 1814, aged about 17, in Parramatta, New South

Wales. He was living with Thomas Kendall's family, near the home of chaplain and magistrate Samuel Marsden, and had learned enough English to communicate "tolerably well" (MOA Kendall to Woodd, 11.03.1814). Like a number of other young Bay of Islands men, Tuai had gone to Parramatta to visit Marsden's farm, a place James Belich (1996: 144) aptly called "that great Māori college of European studies". Marsden had opened his home in Parramatta to any visiting Māori and, responding to invitations from the northern Bay of Islands *rangatira* or chiefs Te Pahi and Ruatara who had visited Parramatta some years before, was planning a (mission) settlement in the Bay of Islands.

Tuai's interest in English and his intelligent curiosity led to his becoming a go-between in Marsden's settlement plan. Marsden sent him in March 1814 from Australia on the *Active*, with Thomas Kendall, to check whether the chiefs from the Bay of Islands would still welcome Pākehā settlers. Relationships between Europeans and Te Taitokerau Māori had become anxious and uncertain following disastrous incidents in late 1809. The Pākehā crew and passengers on the trader *Boyd* were killed in Whangaroa Harbour, and in return Te Pahi and his people were fatally attacked in the Bay of Islands by whalers in early 1810.

After taking Marsden's question to the Bay of Islands, Tuai returned to Sydney on the *Active* in August of 1814 with his brother Korokoro, who was keen to get settlers for Ngare Raumati and the southeastern end of the Bay of Islands. Their rival Ruatara accompanied his kinsman Hongi Hika on board, also hoping to collect Pākehā settlers for themselves. During the return voyage from Australia to the Bay of Islands, Ruatara gained Marsden's agreement that the Pākehā would make their settlement at Rangihoua, next to Ruatara's *kainga* and *pā* (open and fortified settlements respectively) under his and Hongi Hika's protection. The northern alliance had won the first settlers.

Nevertheless, Tuai and Korokoro's people were actively involved in the arrival of the first Pākehā settlers. The Ngare Raumati people on Panaki (one of the Cavalli Islands) were to greet Marsden when he first stepped ashore on 19 December 1814, on his way to the Bay of Islands. Then, a few days later on 24 December 1814, Korokoro and Tuai, and 200 Ngare Raumati warriors dressed in full regalia, guided Marsden through a culturally and historically significant 400-strong *pōwhiri* (specifically a *waka taki* or 'welcome between sea and shore') at Rangihoua, an event the Pākehā arrivals misunderstood as a "sham fight" performed for their entertainment (Jones and Jenkins 2011: 80). For Māori, the event was an expected part of a process of asserting *mana whenua* 'authority over the land', establishing the intentions of the arriving party, and bringing that party under the protection of the *tangata whenua* or 'people of that land', in this case a kin group of Ngāpuhi. Tuai and Korokoro, displaying

the *mana* 'authority' and strength of Ngare Raumati on this occasion, would have anticipated that the next group of settlers would come to them.

Tuai and Korokoro, like other non-Ngāpuhi leaders around the Bay of Islands, wanted Pākehā to settle amongst their people partly as insurance against attacks by Ngāpuhi, and partly for the significant iron and gun trading benefits they would bring. Hongi's European settlers would soon become dependent on the northern allied *hapū* for food supplies, particularly pigs. And Hongi's people would increasingly trade only for iron tools, gunpowder and guns.

VOYAGE TO ENGLAND

Tuai disliked the constant skirmishes caused by tribal tensions, and he often expressed a desire to move permanently to Australia to avoid the anxiety and insecurity around the Bay of Islands. He admired much about the Europeans, including their "regulations and customs" (Nicholas 1817: 118), and he now regularly wore a shirt and trousers, and spoke good English. Korokoro would have been keen for Tuai to capitalise on his new knowledge for the benefit of Ngare Raumati. With his older brother's encouragement, Tuai decided to go to England. After working on at least one whaling ship, the *Phoenix*, he finally managed to get a passage to England on the brig *HMS Kangaroo*. Tuai and another young man, Tītere (from Rangihoua[5]), had persuaded Marsden in Parramatta to pay for their passage to England. The *Kangaroo* left Port Jackson in April 1817. Tuai and Tītere were to stay with Marsden's colleagues at the Church Missionary House in central London.

During an eventful voyage to England, Tuai learned more about European political and social life. He witnessed a serious fracas in Tasmania between government officials and the controversial captain of the *Kangaroo* Lieutenant Charles Jeffreys, who had taken on board some escaped convicts, and a quantity of prohibited spirits (Gill 1979). He experienced alarming storms and dangerous reefs as the *Kangaroo* followed an uncharted path inside the Northern Queensland reef. Aboriginal people were sighted, always keeping their distance. On land near the top of the Cape York Peninsula, Tuai, Tītere, and some soldiers encountered a group of aboriginal men. After a cautious but friendly interaction, Tuai gifted his earring to one of the group (Hassall Journal 25.07.1817). At the port of Batavia (now Jakarta, Indonesia), Tuai and Tītere both contracted a fever. They recovered, though several other passengers died. On 17 December 1817, the *Kangaroo* stopped at the south Atlantic island of St Helena, where it is possible they met the exiled French general Napoleon Bonaparte, whose war exploits were to become legendary in the Bay of Islands (Dumont D'Urville in Legge 1992: 327, note 9). The *Kangaroo* arrived in London on 23 February 1818.

WRITING DOWN THE LANGUAGE

In England, Tuai was able to make another small contribution to a significant project already started in Parramatta where he had assisted Thomas Kendall with writing down the Māori language. They were visited by the Reverend Samuel Lee, a linguistics professor at Cambridge University, and protégé of the Church Missionary Society. Lee had been asked to compile a comprehensive grammar and vocabulary of "the New Zealand Tongue" on behalf of the Church Missionary Society (MR 1818: 93). This work in London was cut short because, soon after arriving in wintry London at the Church Missionary House in Salisbury Square, both men became ill with bronchial problems. As Tītere put it, a "bad friend" by the name of "Mr Coughee" had assaulted them (MOA Titere to Marsden, 12.10.1818).

Four years previously, in 1814, Tuai had taught the Māori language to Thomas Kendall in Parramatta (MOA Kendall to Woodd, 11.3.1814). The Māori language was yet to be recorded in more than vocabulary lists; Kendall was determined to write the language systematically in "such a method as would render it easier to be understood by an Englishman" (MOA Kendall to Pratt, 20.11.1808). Kendall, the school teacher in the first group of Pākehā settlers, also needed to organise the written language so he could teach Māori children to read and write—as had been requested by Ruatara. In Parramatta under Tuai's instruction, Kendall aimed to "fix the Language of the New Zealanders so that they may be instructed in their own Tongue" (MOA Kendall to Pratt, 25.3.1814). The result was the first New Zealand book, *A Korao no New Zealand; or, the New Zealander's First Book Being An Attempt to Compose some Lessons for the Instruction of the Natives*, published in Sydney in 1815. The little 54-page book was the first printed attempt at full sentences and phrases in the Māori language. For this alone, Tuai should have a prominent place in the history of literacy in New Zealand.

In England, as it turned out, due to Tuai and Tītere's illness, not a lot of progress was made on the project of expanding on *A Korao no New Zealand*, though the second New Zealand book, *A Grammar and Vocabulary of the Language of New Zealand*, was later published by the Church Missionary Society in London in 1820 under Lee and Kendall's names. Tuai did, however, discuss the project, and his advice led churchman George Mortimer to caution (ineffectually) against the too-quick development of a New Zealand grammar because there were "a number of languages and dialects in New Zealand" (ATL Mortimer to Pratt, 8.8.18). The *Grammar* contains songs and chants probably supplied by Tuai; he was later to demonstrate his familiarity with these to a French visitor to the Bay of Islands. Tuai's considerable contribution to the missionaries' language projects, and

to the earliest systematic recording of Māori language in writing, was acknowledged in a short footnote to the preface of the *Grammar*.

As they recovered, Tuai and Tītere also sketched ink drawings on paper. Some of these drawings, of Korokoro's *moko* 'facial tattoo', decorated and peopled war canoes, and Tītere's kites, can be viewed in collections in Auckland and Birmingham.[6] The beautiful pen and ink drawings are the earliest Māori drawings in existence.

ENCOUNTERING THE INDUSTRIAL REVOLUTION

Tuai was soon to experience the might of the Industrial Revolution, in "the most extraordinary district in the world" (Trinder 1977: 12), the Ironbridge Gorge in Shropshire. In May 1818, he and Tītere were sent to the countryside to get well. They stayed with the evangelical Reverend George Mortimer in the town of Madeley near the first cast iron arch bridge, built in 1781 across the Severn River. There, Tuai and Tītere encountered ironworks, china factories, squatters' and workers' houses, inns, retail stores, boat builders, lime works, a rope factory, massive water and steam-driven machines, tunnels and mines. Hundreds of working people and migrant families—coal, glass, porcelain, brick, rope and iron workers, mine workers, child labourers, carpenters, blacksmiths, colliers, boatmen, potters, barge haulers, prostitutes, furnace keepers, traders—lived in and near the river valley. Admiring foreign visitors wrote about the region's dramatic Gothic landscape with its strange juxtaposition of tranquil trees, fields, valleys and savage scenes of fire, steam and smoke (Trinder 1977: 36-37, 1981).

Francis Hall, a prospective missionary who lived in Madeley, wrote down what Tuai and Tītere said about their time in Shropshire as aside from their names, neither Tuai nor Tītere could write independently. So Hall wrote down their words, which they then copied onto paper in the form of letters to their English friends. In total, nine letters by Tuai, and 10 by Tītere, still exist.[7] These letters outline their experiences around Shropshire and give the first "direct" access to Māori expression in English. For example, on his return from an iron foundry, on 26 June 1818, Tītere reported: "I seen the iron make, the iron run down like water, I go home tell my countrymen they no believe". At the great Coalport porcelain works Tuai recalled conversing with the renowned proprietor, John Rose: "I make four cups. Mr Rose tell me you soon learn—yes I say, very soon learn with my fingers, but Book very hard". In the town of Wellington, they visited a glassworks. Tuai recalled: "Teeterree blew a bottle, and Tooi blew a bottle: very much pleased to see glass blow" (ATL Tooi to Pratt, 20.8.1818).

Later, at the naval dockyards on the Thames, Tītere wrote: "plenty people at work: man as strong as a horse". The machinery of a steam sawmill carried great oak tree trunks, ready for sawing into planks. Huge ropes were rolled out in long warehouses: "the saw mill go by steam. I see the iron waggon by steam, he took up two tree and away she goes, and the massive rope warehouses see rope as big as my body". Warships bristling with cannons were under construction: "the Prince Regent 120 Guns: never see so large Man of war". Gigantic hand-forged iron anchors and chain swung out from an enormous smithery. Tītere wrote: "I sing out O dear me New Zealand man no believe, nor I, but I see with my own eye, same as the iron work: quite astonished" (MOA Tītere to Bickersteth, 08.01.1819).

Later, too, at the Tower of London, they learned about the arts of war, European-style. The Tower housed the military hardware of England; there were chests of artillery tools, battle axes, banners, certificates, instruments of torture, suits of armour, cannons, trophies, and tens of thousands of small arms and muskets in impressive displays. Tītere was perplexed that men so extravagantly endowed with weaponry could not spare one or two guns for him to take away: "I see thousand thousand guns no give me one at all" (MOA Titere to Marsden, 12.10.1818).

Tuai and Tītere were witnessing the greatest military force in the Western world, and their experience underlined the immense, in fact unbelievable, military and technological power of the Europeans. Such power would have reinforced for Tuai the necessity for close Ngare Raumati relationships with these people. Tuai thought, too, about the possibilities for an industrial future in the Bay of Islands. When he arrived home, Tuai would tell Hongi Hika about the English iron production, prompting Hongi, during his 1820 visit to England, to seek miners to come as settlers to New Zealand (ATL Kendall to Secretary, 04.08.1820).

Back in London during October to December 1818, Tuai and Tītere experienced other aspects of early 19th-century England. They had their portraits painted by James Barry, a lay member of the Church Missionary Society. About the same time, an unknown artist made two beautiful little silhouettes, which Tuai and Tītere signed themselves (Fig.1).[8]

As exotic foreigners in London, Tuai and Tītere were sought-after dinner party guests. In December, the New Zealanders were guests of honour at a bizarre "Grand Cannibal Dinner" at the Gower Palace in London. Here they proved to be apparently willing instructors on life in New Zealand. They entertained with witty stories about culinary habits in New Zealand, and demonstrated "the war dance", "the ceremony of killing and cutting up a pig", "the operation of tattooing", and the way of carrying children (*The Family Chronicle* 1818: 209).

Figure 1. Silhouette of Tuai by unknown artist, with Tuai's own signature. Te Papa Tongarewa, Museum of New Zealand, Registration No. 2006-0014-1/2; used with permission.

RELIGIOUS INSTRUCTION

It was Marsden's intention that Tuai and Tītere would be converted to Christianity in England and return home "to impart very fully to their Friends the views of the [Church Missionary] Society in sending Europeans to live amongst them" (MOA Marsden to Pratt, 2.3.1817). To this end, during their time in England, Tuai and Tītere were obliged to attend church regularly and to have daily lessons in scriptural study, and writing and reading in English. Tuai learned to chant the Lord's Prayer, and to correctly answer religious

questions, but neither man was enthusiastic. They much preferred physical work such as harvesting, digging or building: "into almost every species of manual labour, they enter with delight" reported Mortimer (MR 1818: 231). "All goes well", said one of their tutors, Francis Hall, "till they are brought to study" (MOA Hall to Pratt, 26.2.1818).

Evangelical plans for demolishing the heart of Māori culture were revealed in stark detail in the letters copy-written by Tuai and Tītere. Wrote Tītere: "Hope the English Bible make New Zealand man leave off the tabboo tabboo, and like English way". "I go home to my Countrymen that Jesus is the true God Atua [Māori for gods] is false no God all nonsense", wrote Tuai. Abandoning Māori spiritual rules meant that Māori people will "leave off eating mans flesh and New Zealand woman no hang herself when her husband he die but marry again in two or three years". "I tell them Book of Books say no cut no hang no tattoo … no tattooing all no cutting his self". There was to be no more fighting: "Hope New Zealand man little quiet and no fight"; "New Zealand mans spear make no happy I te[ll] my poor Countrymen Christians no fight no use War Club no spear" (MOA Tuai to Bickersteth, 14.12.1818).

There is no evidence that Tuai or Tītere believed any of these statements. Both knew their hosts regarded their struggle with instruction and religious conversion as an ungrateful failing. Their letters contained self-deprecating apologies: Tītere confessed that he is "a very bad boy" because he is not making enough effort to learn to read the Bible (MOA Titere to Pratt, 20.8.1818). Tuai wrote: "I hope please the Lord learn Book a little very hard to learn. […] I go to my bed at night and my heart sorry for sin before God. I kneel down and pray God make my heart quite good" (ATL Tooi to Pratt, 20.8.1818).

At one crisis point, Tuai almost became the convert so keenly desired by Marsden. In January 1819 he became gravely ill with a bronchial infection, and for the first time took a serious interest in Jesus who, he had been told, could cure European diseases. He made a bargain with Jesus that he would "boldly speak of him to his friends [in New Zealand] if it please the Lord to spare him to see them again" (MOA Hall to Pratt, 9.1.1819). Such was his ambivalence about his wager that Tuai had a disturbing night visitation from his dead father and brother who asked why he was communicating with the Pākehā god, and abandoning his own. Tuai answered " 'because Jesus Christ make me good, make me happy'. They then hid their faces and went away sorrowful" (MOA Hall to Pratt, 9.1.1819). Tuai recovered, and his bargain with Jesus was soon forgotten.

Despite his admiration for aspects of European life, Tuai held a deep loyalty towards his own spiritual beliefs, and failed to see that European religious ideas were useful for the Māori people. The disappointed churchmen in England found Tuai and Tītere "much attached to their own Country Religion" (MOA

Bickersteth and Pratt to Marsden, 12.3.1818). Tuai argued that the Europeans' persistent criticisms of his beliefs was unjustified. For instance, when a Pākehā had complained in New Zealand about "inhospitable superstitions" (such as the rule that food must be eaten outside), and said that "the taboo taboo [*tapu*] was all gammon ["nonsense"]", Tuai retorted that if the Englishmen's prayers were not rubbish, then neither were Māori ideas about *tapu* (Nicholas 1817: 274). Tuai maintained this position throughout his life.

Tuai and Tītere finally left England on 27 January 1819, on a crowded convict ship, the *Baring*. On the *Baring* were the families recruited by the Church Missionary Society for the second Pākehā settlement in New Zealand, including Francis Hall, Reverend John Gare Butler, James Kemp and their families. In return for not working their passage, Tuai and Tītere had to keep at their daily studies. Again, they were scolded about their lack of interest in religious lessons. On board, Hall noted sadly: "it is really painful to see how reluctantly they come to their studies" (MOA Hall Journal, 15.12.1818).

Tuai and Tītere preferred to spend time with the sailors and soldiers on the *Baring*. But amongst these men, too, they did not find allies. They were taunted by the soldiers who boasted they could easily overrun New Zealand "in the way they have taken possession of New South Wales" (MOA Hall Journal, 4.5.1819). Tuai by now had the most knowledge of all his people about the possibilities and the problems of European engagement. He stood at the fulcrum between the traditional world of his ancestors and the changed Māori world that was inevitably coming.

(NOT) GETTING THE NEW SETTLERS

On 26 June 1819, the *Baring* came to anchor at Port Jackson in Sydney harbour, and the New Zealanders stayed with the Marsdens in Parramatta, catching up with news from kinsmen and friends staying there. The *General Gates* then carried Tuai, Tītere and the new group of Pākehā settlers, with Marsden (on his second visit), to New Zealand, and anchored off Rangihoua in the northern Bay of Islands on 13 August 1819. Korokoro quickly arrived from the southeastern end of the Bay. His brother Tuai "had been long absent from him, and his friends: had gone to England: had brought out the [new] white people with him" (MOA Marsden Journal, 19.8.1819)—surely this was effort enough for Ngare Raumati to get their share of settlers. A bidding war started between him and Hongi Hika, who both offered Marsden any land he wanted in their respective territories. To Korokoro's anger and dismay, and that of other rivals of Ngāpuhi and the northern alliance, Marsden agreed to settle Butler and the others at Kerikeri near Hongi Hika's stronghold. Korokoro bitterly accused Marsden of ingratitude and hypocrisy for effectively strengthening Hongi's hand.

Tuai was deeply distressed by his conflicting loyalties between his brother's desires and those of his new friends, the Europeans. Marsden said: "we pitied Tooi. He was anxious to live a civilised life and not to conform to the Native habits and dress any more, but he said he could not stand his ground if he had not one or more Europeans to support him" (MOA Marsden Journal, 19.8.1819). Many years later, John Butler recalled the momentous decision to live in Hongi Hika's territory, saying that "we were obliged to go and reside with a tribe much more powerful than Tuai's people; otherwise we should have endangered their safety" (Barton 1927: 399). Perhaps to protect his people from Hongi's threats, Tuai had privately informed Marsden that Hongi's alliance was stronger than Korokoro's, and therefore Marsden should go with the strongest. Ngare Raumati did get one settler, an inferior Pākehā, the rough ex-convict James Boyle, who was stationed as a salt maker in their territory. The Ngare Raumati were dissatisfied, and Boyle was harassed. In January 1820 Butler warned that if the Ngare Raumati people were not kind to Boyle, no Pākehā settlement or school would be made amongst them (Barton 1927: 64). By September 1821, Boyle's house had been burned down by Ngare Raumati. Hongi Hika had, in effect, won the strategic war for control of the Pākehā.

After their return from England, Tuai and Tītere sold their English gifts of china, cooking pots, and other domestic items to the Rangihoua settlers, probably for powder or guns. Tītere returned to his people near Rangihoua. Turning his back on the missionaries, Tītere joined allied warring parties, and by April of 1821 he had the full *moko* of a warrior. He was now married to the sister of the Ngāti Manu *rangatira* 'Wevea' (Whiria, also known as Pōmare II) of Waikare to whom Tītere had given a musket in exchange (ATL Hall Journal, 16.8.1821).

Like Tītere, Tuai returned to his people, and fought in on-going campaigns alongside Korokoro, this time in the Thames and Hauraki regions. He too had a full facial *moko* completed. Marsden had told him that tattooing was "a very foolish and ridiculous custom", and that as Tuai had seen so much of "civil life" he should now "lay aside the barbarous customs of his country and adopt those of civilized nations" (MOA Marsden Second Visit Journal, 1819). Far from being a "foolish custom", a *moko* was necessary to Tuai's identity as a *rangatira* within Ngare Raumati. He did, however, wear European clothes. And he stayed in close touch with any European ships anchoring in the southern Bay of Islands, to trade and to form beneficial alliances.

WORK AS A TRANSLATOR

Tuai's ability to speak English gained him advantage when it came to trading with European visitors to the Bay of Islands. The popular whaling anchorage at Pāroa in the heart of Ngare Raumati homelands had supplied Korokoro

and Tuai, and their allies, with enough guns to get the upper-hand against their enemies to the south at Hauraki, who had no such firepower (Ballara 2003: 193). As Richard Cruise (1824 [1974]: 298) said of Korokoro in 1820: "the name of Krokro, who is known to have fifty stand of arms, is heard with terror 500 miles from the Bay of Islands". Once any ship was anchored off Pāroa, Korokoro considered it his, and such was his power that no one could trade without his permission. Their rival Hongi Hika was soon to dramatically increase *his* cache of arms as well, as a result of his visit to England in 1820 (see Cloher 2003).

His facility with English also enabled Tuai to get work with visiting Europeans and to observe European relationships with enemy leaders in other districts. In March 1820, dressed in a blue coat, trousers, and boots, and a cocked hat with a long white feather, Tuai boarded the British government store ship, the *HMS Dromedary*, to assist officers in negotiating for *kahikatea* (*Dacrycarpus dacrydioides*) and *kauri* (*Agathis australis*) timber spars from Hokianga for the Admiralty. The ship's navy commander Richard Cruise (1824 [1974]: 34) thought Tuai was "not unlike a foreign officer; and when he ascended the deck, he addressed the persons around him in English". Tuai and another man named Whiti were to be translators on an overland visit to Hokianga, then on a sea voyage on the *Dromedary* to the Hokianga Harbour mouth. As it turned out, the *Dromedary* could not cross the Hokianga bar, and returned empty-handed to the Bay of Islands.

So Korokoro offered the British officers *kauri* logs from his district at Manawaora. But the trees were impossible to get out, and the Ngare Raumati workers were uncooperative. This was probably because the *Dromedary's* Captain Skinner, maybe under official orders, refused to trade in guns or gunpowder as the whalers did. Tuai sarcastically noted that Skinner was prepared to waste gunpowder firing off cannons as part of an arms maintenance programme. Tuai became openly hostile to the *Dromedary* officers, and Cruise (1824 [1974]: 145) wrote that "the trouble and expense that had been bestowed in attempting to civilise [Tuai] appeared to have entirely failed; and we found him, without exception the greatest savage, and one of the most worthless and profligate men in the Bay of Islands".

At the end of May 1820, Tuai was working as a translator on another British government ship, the *HMS Coromandel* under Captain James Downie, also seeking timber spars for the Admiralty, this time in the Hauraki region. Tuai's wife Hiri (or Hiria) accompanied him (Hawkins 1993: 40). Following this period of working as a translator and as a go-between for the timber traders, Tuai with Korokoro left the Bay of Islands on several fighting expeditions.

INTER-TRIBAL WARFARE, PĀKEHĀ ALLIANCES

In July 1821, Tuai and Korokoro's rival Hongi Hika returned from London and Sydney with a massive supply of arms. Hongi Hika aimed to decimate his old enemies in the Tāmaki and Hauraki areas. Tuai and Korokoro decided to join him. They had political reasons to fight alongside their rivals. Korokoro had previously suffered losses at the hands of Ngāti Pāoa of Tāmaki, and the people of Ngāti Maru of Hauraki were implicated in the death of the son of Korokoro's uncle, Kaipo. Tuai and Korokoro had already attacked Ngāti Maru as a result of that incident. By September, Tuai and Korokoro, along with hundreds of Ngare Raumati-aligned warriors, were preparing to join in probably the largest collaboration of northern tribes ever amassed (Barton 1927: 172).

Ngāpuhi historians and others, including Marsden himself, informed by Hongi's general, Wharepoaka, have outlined reasons for Hongi's planned mass assault against largely unarmed rivals (MOA Marsden Journal, 28.8.1823; see also Ballara 2003; Cloher 2003; Sissons *et al.* 2001; Smith 1899, 1900). The motives for Korokoro's alliance with Hongi Hika on the great war expedition are less discussed, though some maintain that "rather than turn their recently acquired muskets against each other, the northern alliance, southern alliance and Ngare Raumati joined forces … and embarked upon war expeditions to the south" (Sissons *et al.* 2001: 52). This focus elsewhere meant a temporary respite for Ngare Raumati.

So Korokoro, Tuai and their people joined forces with the northern alliance to lay waste to the Ngāti Pāoa people at Tāmaki. Tuai later reported that he led his warriors during the fighting at Tāmaki, working strategically with Hongi and other chiefs; he recalled with apparent relish the gory details of the devastating siege on the unarmed (without guns) but well-fortified Ngāti Pāoa *pā* on the Tāmaki River (Lesson in Ollivier 1986: 146). It is likely Tuai or Korokoro did not go on to fight the Ngāti Maru at Te Tōtara near the Waihou River on the Firth of Thames due to kin relations there—their names are not on the list of *rangatira* who planned with Hongi Hika a treacherous plan to feign peace and then attack (Smith 1900: 30), though Tuai probably then joined a further northern allied raid against the Waikato people (see Ballara 2003: 220-22).

Eight months later, in June 1822, Tuai was back in the Bay of Islands, now very thin and having had "many narrow escapes, and received many wounds" (MR 1822: 507). He had become a war leader. Visiting Francis Hall, he boasted that "when the people to the eastward have all been destroyed, those to the northward shall be attacked". He informed Hall that he now had five wives, presumably captives (MR 1822: 507). No doubt anxious about expected retributive attacks, Tuai had visited his Pākehā friends at Kerikeri to argue again the Ngare Raumati case for settlers. Butler felt guilty, and

ineffectually promised to visit Pāroa soon: "They are exceeding [sic] anxious for somebody to go and live at their place. I think they have a fairer claim than any tribe in New Zealand, as they have always been very kind, and manifested their regard to Europeans". Butler added that he "would have been glad if it had fallen to my lot to have settled among them" (Barton 1927: 232), but no Pākehā settlers went.

Then, during 1823, Ngare Raumati warriors including Tuai and Korokoro again joined Hongi Hika and about 1200 men from almost all of the northern alliance tribes in an assault on the Te Arawa people near Rotorua. Korokoro did not return alive. On 1 October 1823, Marsden—during his fourth visit to New Zealand—visited Pāroa. The place was crowded with Ngare Raumati women and children in mourning. Tuai was at Whitianga, waiting with Korokoro's body until it could be brought back to the Bay of Islands. Korokoro had died at Katikati following the fighting (MOA Marsden Journal, 1.10.1823). Tuai's uncle Kaipo,too, had died, slain at Mokoia Island in Rotorua. Korokoro and Kaipo's deaths left Ngare Raumati and the people of Te Rāwhiti very exposed to their traditional enemies, Ngāpuhi. Tuai again contemplated leaving the country (MOA Marsden Journal, 1.10.1823).

Yet again, the people at Pāroa begged for a Pākehā to live with them, and "said they had been long promised one, and contended they had a claim as Koro Koro came first to Parramatta for the Missionaries, and Tooi went afterwards to England" (MOA Marsden Journal, 1.10.1823). Marsden's excuse this time was that because all the fighting parties from the Bay of Islands called in at Pāroa on their way south, any settler would be in danger. But Tuai had not yet given up looking for European settlers. In April 1824, another Pākehā arrived to settle in the Bay of Islands—the gunsmith-turned-missionary, George Clarke, whom Tuai had met in England (Clarke Journal, 3.4.1824). He was employed by Marsden to go to Kerikeri. Clarke reported his conversation with Tuai: "Are you not, says [Tuai], come to live with me, to which I answered in the Negative. Ah says he with a sigh; Mr Marsden promised my brother a Missionary, since then he died; by and by I shall be dead then what good will a missionary do me" (Clarke Journal, 19.10.1824). Clarke's going to Kerikeri, into Hongi Hika's territory with all the other Pākehā settlers, was another bitter blow to Tuai's Pākehā-settlement plans, and very bad tidings for the Ngare Raumati people.

TEACHING: TUAI'S CONTRIBUTIONS TO SCIENCE

On 2 April 1824, *La Coquille,* a French scientific ship, had arrived from Sydney, and anchored near Pāroa. Tuai's appearance on deck caused astonishment amongst the officers. Jules Dumont Dumont D'Urville, the ship's chief lieutenant, thought at first he was "an Englishman who had

settled in New Zealand and had been tattooed, as sometimes happens" (Dumont D'Urville in Sharp 1971: 38). René Primevère Lesson, the naval doctor on *La Coquille* maintained Tuai was "the only New Zealander who speaks the English language passably well and he is esteemed by his own people for that accomplishment" (Lesson in Ollivier, 1986: 139). Tuai stayed on *La Coquille* with his main wife Hiri and infant son for the two weeks of the ship's visit, conversing in English about local politics and activities, answering the French officers' questions "with the greatest willingness and remarkable intelligence" (Dumont D'Urville in Sharp 1971: 33). Tuai was to provide the French scientists with extensive, detailed insights into Māori life—information that was subsequently published in several languages as the Europeans extended their knowledge about the peoples of the Pacific and other parts of the world.

La Coquille became Tuai's ship, and he and his wife controlled a profitable prostitution business using women war captives taken from the Hauraki area, who stayed on board for the duration of the ship's visit. As an aside, Ormond Wilson (1990: 50) observed that because "only Tuai is known to have pocketed the proceeds of services rendered by others", he was the first Māori entrepreneur! Tuai also regulated the daytime barter of hogs, fish and vegetables for guns and powder. He drove a hard bargain, and prices went up daily. He also allowed a lucrative clandestine trade in dried human heads. Hongi Hika largely stayed away from the ship, and whenever Hongi was mentioned on *La Coquille*, Tuai reminded the company that Hongi Hika's family was "less ancient than his own" (Dumont D'Urville in Sharp 1971: 36).[9]

Tuai engaged in wide-ranging conversation with Dumont D'Urville who, as a French scientist, was intent on collecting as much information as he could about Māori people (as well as the geology, flora and fauna of the region). He had to negotiate this carefully, and learned something about what might today be called cross-cultural respect. Tuai would not tolerate European criticism of his beliefs (Dumont D'Urville in Sharp 1971: 41). They discussed the contents of the 1820 *Grammar*, Māori beliefs and ceremonies, including naming practices, death and war rituals, marriage and slavery, taking prisoners, and the rules for eating prisoners (Rolland 1993: 123). Tuai invited some French officers on a veritable "social studies" tour of Kahuwera Pa, the largest fortification in the district, where Tuai now had authority. (Dumont D'Urville in Legge 1992: 234 n 19; Lesson in Ollivier 1986:156; Lesson in Sharp, 1971: 74; Rolland 1993: 123). They saw children playing whipping tops, large drying racks covered with gutted fish, and women preparing flax by cutting the leaves into strips with shells then beating the wet flax with mallets to remove the fibre. A water supply was kept in large gourds, each containing an aromatic herb to keep the water sweet. Captives were busy

cooking kumara (*Ipomoea batatas*), or pounding fern root to make a sort of bread. Tuai selected a piece of this bread for Dumont D'Urville to try. Touao, Tuai's powerful cousin, proudly pointed out his wife, lying on her stomach, undergoing a tattoo from a female tattooist: "half her back was already furrowed with deep patterns, similar to the ones which embellish the faces of Koro-koro's relatives, and the other side was being worked on" (Dumont D'Urville in Legge 1992: 288 n 26). Touao himself bared his buttocks for Tuai to demonstrate how his buttock tattoo had been made. Tuai explained how the *pā* was defended, and said that the huts were built low to avoid the wind. Tuai also took the French to the nearby Orokawa Pā above Te Hue beach where the French captain Marion du Fresne had been killed in 1772, and discussed the possible reasons for that disastrous event.

By this time, Tuai was no longer a friend of the missionaries, having given up on their promises to send him a Pākehā settlement. When the French officers questioned him about the letters he wrote in England, Tuai said that he was unable to read or write, and had no idea what the missionaries had passed off under his name. He told the officers not to rely on Marsden's accounts of the New Zealanders; Marsden did not understand the local situation or the facts that underpinned battles, he said (Ollivier 1986: 146).

On 16 April 1824, after 13 days and nights on board, Tuai, his wife and child, and the group of women who had entertained the sailors, left *La Coquille* for the last time. The ship sailed for Rotuma, on their way back to France, carrying away piles of zoological, botanical and geological specimens, treasures such as flutes (including some of Korokoro's possessions, sold by his son Wi Korokoro), and some inked sketches of Tuai, Hongi Hika, and several women, made by the ship's draughtsman Jules Le Jeune (see Morgat 2005). Copies of these images, along with the officers' accounts, were widely published in Europe in the following ten years.[10] Tuai's teaching had made a considerable contribution to (at least) early 19th-century French and German knowledge of the lives and practices of the Māori people.

DEATH AND AFTERMATH

Tuai's death, which came six months after the departure of *La Coquille*, was marked with a respect reflecting his accomplishments in his Māori and European worlds. In May 1824, Tuai had most likely gone to fight against Ngāti Kahungunu alongside Pōmare in Hawke's Bay, as he had told the French he would (Lesson in Ollivier 1986: 155). Then, on 19 October 1824, George Clarke in Kerikeri heard the news that Tuai had died in the Bay of Islands two days before, after a short unspecified illness (Clarke Journal, 19.10.1824). He was only about 27 years old. Tuai's people did not stint on death preparations. One of Tuai's servants was killed in the hope that Tuai's

death could be averted, and then four more were sacrificed to accompany him in his journey after death. Tuai's wife Hiri died soon after; she probably took her own life, and that of their little son (Dumont D'Urville in Wright 1950: 195).

The Europeans in London announced Tuai's death in the *Missionary Register*:

> Tooi is now dead; he departed this life, under painful circumstances, on 17 October, 1824. Captain Lock, of the *Mary*, then lying in the Bay, heard that he was very ill on shore, and had no sustenance but fern-root and water. Captain Lock sent his boat for him that he might have medical assistance [probably the method called bleeding] and proper food. But it was too late: Tooi died on board. (MR 1826: 304)

A fanciful sketch of Tuai as a "native" in traditional clothing accompanied his death notice in the *Missionary Register*. Ignoring Tuai's enduring loyalty to his own beliefs and people, the missionary writer thought that if the Church Missionary Society "could have complied with his early and earnest and repeated request to place a faithful Missionary with his Tribe, that good thing which seemed to be in him toward the Lord his God might not have been so hidden and kept down by the temptations and difficulties which surrounded him" (MR 1826: 304).

Tuai's death heralded the dispersal of the Ngare Raumati people. Without Tuai and Korokoro—and with no protective Pākehā settlement in place—the people around Pāroa now lived in a political vacuum. Within a year, Hongi Hika's cousin, Rewa, took the opportunity to renew *utu* 'revenge' for the earlier death of his mother and sister during the war with Ngare Raumati more than two decades previously—the fighting during which Tuai's ancestor Te Tāwheta had died (Ballara 2003; Cloher 2003). In early 1826, with Ngai Tāwake and Ngāti Rāhiri, Rewa led assaults on several *pā* in the southeast Bay of Islands, including Tuai's Kahuwera Pā. The *pā*, which "had flourished under the laws of Koro-Koro and whose position seemed impregnable … became a desert, leaving in the place it once occupied nothing but a confused heap of half-ruined huts" (Dumont D'Urville in Wright 1950: 178).

Within a year, many of Tuai's people had either withdrawn or been dispersed, divided between allies of Ngāpuhi. Some went to Kerikeri, some withdrew down the coast to their kin at Whangaruru and Whananaki (Ballara 2003: 197). Henry Williams met some Ngare Raumati people in May 1827, and noted that they "still did not possess any desire" to become Christians, and that they had been "harassed from place to place, unable to find refuge anywhere" (Williams in Rogers 1961: 55). The Ngāpuhi-allied push into the southern end of the Bay of Islands was now complete, and Ngāpuhi

descendants would talk about the conquest of Ngare Raumati. Ngare Raumati descendants, however, reject the Ngāpuhi narrative of conquest and emphasise their intermarriage with Ngāpuhi (*NMB* 1898 vol. 25, p. 106ff).[11]

Dumont D'Urville returned to the Bay of Islands in March 1827 on the *Astrolabe* (as *La Coquille* had been renamed), expecting to see Tuai, and others from Ngare Raumati. He could not understand why no one came to greet the ship as it anchored off Pāroa. Looking through his telescope at Tuai's village, he realised to his dismay "that the place had been abandoned and all its huts were more or less in ruins. We concluded that the pa of Kahou-Wera [Kahuwera], formerly occupied by a very active population, had ceased to exist" (Dumont D'Urville in Wright 1950: 175). Hongi's tribe, "who had sworn long ago to destroy the people of Paroa", said Dumont D'Urville (in Wright 1950: 196-97), had taken advantage of Tuai's death to carry out their plans. The French officers walked amongst the ruins of Kahuwera Pā. They fondly remembered Tuai's teaching and his pride in his impressive seine nets on the beach; "now nothing was left but the uprights of the shed in which they were once stored" (Dumont D'Urville in Wright 1950: 197).

Three years later, on 10 April 1830, Marsden visited the remains of Tuai's people at Pāroa. He recalled that when he first visited the Bay of Islands in 1814, these people were "one of the most powerful but now reduced by war to a very small number". Marsden spent a few hours at Pāroa, talking to the few remaining people, "conversing upon the miseries which they had brought upon one another by their disputes. They contended that New Zealand was in such a state that they could not help themselves. I felt much for them!" (MOA Marsden Journal, 10.4.1830). Tuai would have been justified in feeling deeply cynical, even despairing, about Marsden's sorrow. Marsden had, by his own actions, contributed to Hongi Hika's superior firepower and trade advantage, and Marsden's Pākehā had protected Tuai's enemies, Ngāpuhi, by their presence amongst them. Marsden had not sent to Tuai and his brother Korokoro the Pākehā they so earnestly wanted, despite Tuai going to England and Australia, and teaching the Europeans about Māori.

* * *

Tuai is not as widely remembered as his Ngāpuhi rivals, perhaps because 'history is told by the victors', but he makes several important contributions to the history of Aotearoa New Zealand. The success of the northern alliance under Ngāpuhi in gaining the first Pākehā settlers, a success that contributed to their domination of the Bay of Islands area, means that their rivals Ngare Raumati have had little attention. But for any account of the development of the earliest Māori-Pākehā relationships in the north of New Zealand, Ngare Raumati stories told through Tuai's life are important. Tuai's work as an

educator and instructor of the Pākehā was crucial to much of the earliest New Zealand history: to the establishment of the first Pākehā settlement and the first New Zealand school there at Rangihoua, to the compilation of the first two New Zealand books, and to early 19th-century English and French studies of Māori knowledge and society. His role as a negotiator and translator for English visitors, including British Navy timber traders, facilitated the earliest official Māori-British trade negotiations, and no doubt reduced the problems that might have arisen without Tuai's advice and guidance. Tuai's travels, and in particular his visit to London and Shropshire in 1818, positively informed the English public about Māori people, brought knowledge about European technology, including warfare, back to the *hapū* around the Bay of Islands, and stimulated and informed the history-changing visit to England by Hongi Hika in 1820 when Hongi was able to accumulate the firepower to engage in the now legendary devastation of tribes in the upper North Island.

In addition, the recorded details of Tuai's experiences bring to life in fascinating detail the engagement between Māori and Europeans in New Zealand, Australia and England in the early 19th century.[12] It is impossible not to admire Tuai's determination to maintain his own customs and beliefs in the face of the powerful "civilising" campaign fought by the Church Missionary Society men with whom he was forced to spend much of his travelling time, and whom he wanted to woo. Nor can we help but feel appreciative of his genuine interest in teaching Pākehā about Māori life—something he did with generosity, pride and enthusiasm.

NOTES

1. An exception is Wilson (1963, 1969, 1990).
2. These *whakapapa* are in the possession of Murphy Shortland of Kororāreka. Tai is mentioned by John White, *The Ancient History of the Maori, His Mythology and Traditions: Nga-Puhi.* [Vol. X, Chapter 9, English version], p. 102. Available at: http://nzetc.victoria.ac.nz/tm/scholarly/tei-Whi10EAnci-t1-body-d30.html (accessed 13 July 2016).
3. According to Murphy Shortland, Ipipiri (the Bay of Islands) was settled by the Ngare Raumati people following their arrival there from other regions in the late 15th century. Throughout the years, Ngare Raumati "intermarried with Arawa, Ngati Maru, Te Tawera, Ngati Pou, Ngati Awa, Ngati Kahu, Ngati Hauata, Nga Manu, Ngati Wai, Te Urirata and Ngati Tu drawing together whanau [family] from as far distant as Whangapararoa in the south and Mangonui in the north, thus forming the hapu of Taunga, Urihaku, Tawa, Ngati Kopae, Patu Tahi, Parepuha, Te Aketai, Ngati Taura and Ngati Taue" (Shortland 1995).
4. As Tuai's name does not appear on published *whakapapa* other than those written to reflect the Europeans' memory of Tuai, some relationships have to be inferred from other genealogical information about (his probable brother) Korokoro,

which is also scarce. The *whakapapa* on p. 137 of Sissons *et al.* (2001) shows Tūkawau as Korokoro's father; this relationship could also be inferred by the Northern Minute Books of the Māori Land Court (1905 vol. 36, p. 124) which does not mention Korokoro or Tuai by name. Other *whakapapa* in Sissons *et al.* (2001: 17, 46, 48, 50) suggest that Mauhikitia, son of Tūkawau, was Korokoro's (and Tuai's) father. According to Harry Maki Midwood, Korokoro and Mauhikitia were the same person: "The name Korokoro is the original given name of our tupuna [ancestor]. Mauhikitia was given when he was carried back by his brother from Katikati following his death" (pers. comm. 2 June 2016). If this was the case, Te Awhi (Mauhikitia's wife) was Korokoro's wife rather than his mother, as suggested in some genealogies.

5. Tītere is sometimes confused with the famous *rangatira* Titore of Kororāreka. See Parkinson (2012: 54).
6. Tuai and Tītere's original drawings are in GNZMMS 147, Sir George Grey Special Collections, Auckland Libraries, and Folder ACC14, Cadbury Research Library Special Collections, Records of the Church Missionary Society, University of Birmingham, UK.
7. The letters by Tuai and Tītere are housed in three collections: the Alexander Turnbull Library in Wellington, New Zealand; the Hocken Collection, University of Otago, Dunedin, New Zealand; and the Cadbury Research Library Special Collections, University of Birmingham. In a note on the back of a letter (ATL Thomas Tooi to Josiah Pratt, 26.6.1818) Francis Hall explained, "The words of these Letters are their own. I was their amanuensis, & put them down on a slate, from which they copied them; but they cannot read what they have written". See also Wilson (1969).
8. Silhouettes of Tuai and Tītere, Registration numbers 2006-0014-1/2 and 2006-0014-1/1 respectively. Te Papa Tongarewa, Museum of New Zealand. Artist unknown.
9. Harry Maki-Midwood states that "Hongi Hika was of the Ngapuhi nation and strictly speaking from junior lines of descent, both from Mataatua (Puhimoanaariki) and also from Mahuhukiterangi (Manaia) whereas Tui [Tuai] could claim senior descent directly from Manaia and Toi, both ancient lineages in the north" (pers. comm., 10 January 2016).
10. A number of copies (of varying accuracy) were made of Le Jeune's original sketches for publication in multiple volumes which often separated the plates from the text. The French title is *Voyage autour du monde : exécuté par ordre du roi, sur la corvette de Sa Majesté, la Coquille, pendant les années 1822, 1823, 1824, et 1825.* Paris, 1826. Material copied from Le Jeune, and from *La Coquille*'s visit to the Bay of Islands, was also published in Germany: *Malerische Reise um die Welt*, vol. 1. Leipzig: Baumgartner, 1835, 1837.
11. For Ngare Raumati views expressed in the Maori Land Court Minutes in 1898 and 1905, see *NMB* 1898 vol. 25, vol. 26, *NMB* 1905 vol. 36. According to Harry Maki-Midwood (pers. comm., 10 January 2016): "The position of Te Ngare Raumati became untenable and many not directly descended from the hapū at Pāroa were compelled to move away. Eventually, to consolidate the various hapū most if not all of the hapū of Te Ngare Raumati moved off their ancestral lands.

In later years the Māori Land Court became a field of battle and representatives of the ancient lines resurfaced in an attempt to retain a foothold of these lands. However, the weight of public opinion and poorly informed Pākehā opinions were arrayed against the tribe. Eventually the main conductor of the Te Ngare Raumati case, Eru Maki, acquiesced and fell in with the Ngāpuhi position that there had in fact been a conquest of Te Ngare Raumati lands generally and that those of the tribe that remained in the area did so by virtue of intermarriage with the conquerors. Although portrayed as having gone over to his Ngāpuhi side, especially due to his evidence being pivotal in determining proper tenure of the area, I believe that Eru Maki acted in the only way possible to ensure that his people would retain at least a measure of mana whenua ['authority over the land'] in their ancestral lands. Eru Maki stated: 'I admit a combat but I did not suffer loss of prestige'. This statement is very telling in that Eru Maki represented Te Akitai, the people of Pāroa and by extension Te Ngare Raumati. Te Ngare Raumati, it was admitted and adduced through weight of evidence, had suffered a conquest; however, it was clear by all accounts, including those of Ngāpuhi, that Pāroa had been made exempt, due to certain whakapapa links into Ngāpuhi."

12. For a more detailed account see Jones and Jenkins (forthcoming, 2017).

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ABSTRACT

Tuai of Ngare Raumati was probably the most written-about Māori in the first quarter of the 19th century. He was a man who lived in unstable times, who moved flexibly within European and Māori society, and who engaged with almost everyone he met, according to a French observer, with "the tact and shrewdness which enabled [him] to realise with whom he had to deal and by what means he could commend himself to all" (Dumont D'Urville in Sharp 1971: 38). His name—or a version of it—appears in most indexes of books about the pre-1830s Bay of Islands. But almost all modern references to him are in passing. Our article seeks to bring into focus this shadowy figure who played a significant role in New Zealand history, and in particular the relationships between Māori and the first Pākehā settlers in the north of New Zealand.

Keywords: Tuai, Tui, 19th-century Aotearoa New Zealand, Pākehā settlers, Ngare Raumati, Ngāpuhi, Bay of Islands

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REFINING THE SOCIETY ISLANDS CULTURAL SEQUENCE: COLONISATION PHASE AND DEVELOPMENTAL PHASE COASTAL OCCUPATION ON MO‘OREA ISLAND

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The Society Islands are critical to chronology building in East Polynesia, as the archipelago served as a potential first landfall for voyagers moving out of the West Polynesia homeland. Yet determining the particulars of migration sequences and settlement chronology in the Society Islands, like the rest of East Polynesia, has been challenging. Here, we report on a dating and re-dating program of four coastal sites on the island of Mo‘orea, Windward Society Islands, in an effort to refine the archipelago's cultural chronology and its place within larger settlement trends for East Polynesia. We begin with a brief discussion of 1960s archaeological research in the Society Islands, and the archipelago's role in the East Polynesian colonisation debate, before turning to a discussion of the newly dated and re-dated Mo‘orea coastal sites.

SOCIETY ISLANDS ARCHAEOLOGY IN THE 1960S

The early 1960s were an exciting time for Society Islands archaeology, as numerous researchers from international institutions turned their attention to survey and excavation programs in the archipelago. Kenneth Emory and Yosihiko Sinoto of the Bishop Museum led coastal archaeological projects in an effort to develop regional cultural sequences and to determine the origins of the initial settlers of the Hawaiian Archipelago. Roger Green and colleagues began their own excavations at both inland and coastal sites on Mo‘orea. All of these archaeologists were influential in establishing the Pacific Area Archaeology Program (PAAP) developed at the 10th Annual Pacific Science Congress. Given that considerable work had been completed at the corners of the East Polynesia triangle (Hawai‘i, Easter Island and New Zealand), archaeologists attending this conference decided to collectively turn to Central East Polynesia (CEP: Societies, Australs, Tuamotus and Marquesas) as an area of interest. They agreed that the CEP archipelagos needed greater survey and excavation coverage, as they potentially represented "one of the earliest settled areas and the sources of some of the more marginal cultures" (Solheim 1961:74).

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Sinoto's subsequent archaeological work at the Ana Paia Rockshelter on Mo'orea (M3) (Fig. 1) in 1960 was a part of this general research plan. The goals were strictly culture historical: to retrieve datable charcoal samples and artefacts that could be placed in relative sequences. Short reports of this work were published in French and English (Sinoto and Verin 1965; Verin 1960-61). Then, in 1962, the National Science Foundation funded a three-year program of East Polynesia site survey and excavation, headed by Emory and Sinoto. This led to Society Islands fieldwork, headed up by teams of American researchers from the Bishop Museum, French researchers from ORSTOM (Office de la Recherche Scientifique et Technique d'Outre-Mer) and researchers from other institutions. The research objectives were to determine the length of island occupation and to outline material culture phases from initial settlement onwards (Solheim 1961: 77), supporting the main principles of cultural historical archaeology as it was carried out in Polynesia. As part of this project, Yosihiko Sinoto, in collaboration with Pierre Verin, surveyed, surface collected and test excavated numerous sites on Mo'orea and its offshore islets (*motu*), including extensive excavations at the Afareaitu Fishing Village (M5). Aspects of the M5 excavations were discussed in an unpublished report (Emory and Sinoto 1965). Our discussion of the original M3 and M5 excavations draws from these sources, as well as archived field notes held by the Anthropology Department of the Bishop Museum in Honolulu.

At the same time as these Bishop Museum projects were being carried out, Roger Green and Ann and Roy Rappaport were completing survey and excavations along the Papeto'ai coast of Mo'orea. A total of eight sites were surface collected or excavated (ScMt-1, ScMf-1 to 6). Two of these sites were dated and basic analyses of the faunal remains and portable artefacts were discussed in their monograph publication (Green *et al.* 1967). The Green and Rappaport analyses of the portable artefacts, notably the fishing gear, attempted to integrate analysis of manufacturing stages, similar to Suggs's (1961a) study of Marquesan adzes. Yet many of their larger interpretations centred on classic cultural historical questions, such as which archipelagos had portable artefacts closely resembling those found in the Society Islands. Our re-analysis focuses on sites ScMf-2 and -5 where the densest midden deposits were recovered (Fig. 1). We utilise notes from the 1967 monograph, in addition to unpublished field notes held by the American Museum of Natural History in New York, to contextualise the sites' deposits.

Utilising data from the early 1960s culture historical work in the Society Islands, archaeologists began to postulate about differences in regional East Polynesian material culture, notably the paucity of coral files, urchin files and bone fishhooks in the Societies, and differences in the form of octopus lures and fishhook manufacture between the Societies, Hawai'i, the Marquesas and

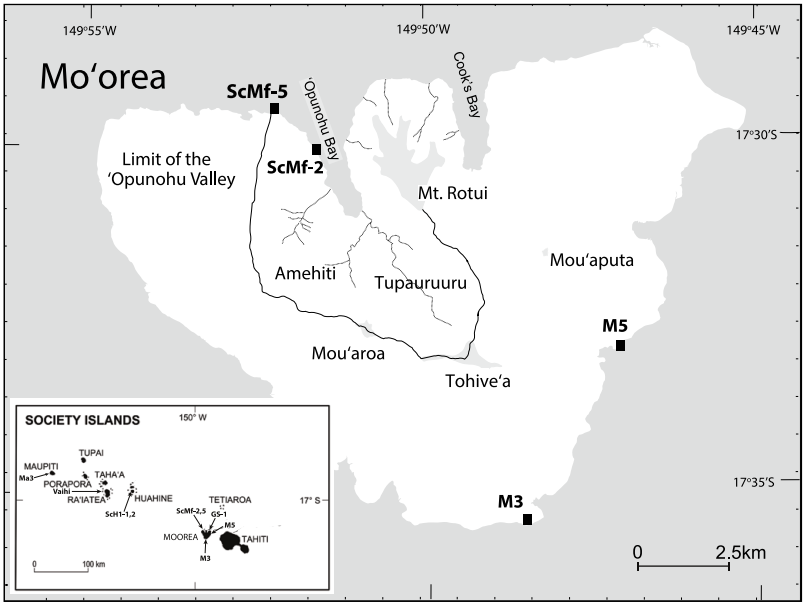

Figure 1. The Society Islands with sites discussed in the text and inset of Mo'orea Island with location of sites investigated.

Mangareva (Emory and Sinoto 1965; Green *et al.* 1967). Others discussed how artefacts excavated from Society Islands sites differed from assemblages held in museums, hinting at the perhaps significant role of change through time (Green *et al.* 1967).

Despite the fact that many Society Islands sites excavated in the 1960s were rich in artefact content, many were never published in any detail and numerous sites were not dated via the newly developed ^{14}C methodology. This is all the more damaging given that the Society Islands remain one of the greatest lacuna in terms of establishing the settlement sequence for Central East Polynesia (Allen 2014; Kahn 2012; Kirch 2011). Following this, we decided to re-date archived charcoal samples originally excavated from sites M3, M5, ScMf-2 and ScMf-5 in the 1960s. These re-dating efforts are part of larger goals of refining the 1,000-year settlement history of the Society Islands (Anderson *et al.* 2000; Anderson and Sinoto 2002; Kahn 2006, 2010, 2011) and for outlining the substantial geomorphological changes wrought upon its coastal shores, which leave its early settlement sites so difficult to discover (Kahn *et al.* 2015a, 2015b).

SOCIETY ISLANDS AND THE EAST POLYNESIA CHRONOLOGY DEBATE

The development of a robust, reliable chronology for East Polynesia has had a difficult history. Recent re-analysis of sites excavated in the 1960s—early on in the development of radiocarbon as a dating technique—have shown that original age estimates are often incorrect by several hundred years or more. Advancements in the radiocarbon technique, most notably the Accelerated Mass Spectrometry method, and the ability to date extremely small samples that have been identified to short-lived species, have allowed researchers to refine the East Polynesia chronological sequence. Many re-dating efforts have focused on New Zealand, the Hawaiian Islands and the Marquesas Islands to refine local and regional settlement chronologies, with a consensus emerging that initial colonisation from West Polynesia began around 950–1000 BP, with the far margins settled by 700–750 BP (Allen 2014; Kahn 2014; Kirch 2011; Reith and Cochrane 2015).

For the Society Islands archipelago, the first re-dating study was that of Atholl Anderson and colleagues (2000) who used samples derived from new excavations to re-analyse the Maupiti burial site, Motu Paeao (Ma3) (Fig. 1). The site had material culture assemblages with artefacts diagnostic of Archaic East Polynesian culture (Emory and Sinoto 1964, 1965). Site occupation, originally thought to be early in the sequence c. 1100 BP (Emory and Sinoto 1964), was re-dated to the 13th to 15th centuries but most likely dates to the 15th century, significantly younger than the original determinations. The single wood charcoal sample that was dated by Anderson and colleagues was not identified to species and might have had some in-built age. The authors also noted that some of their bone collagen dates might be contaminated, leaving the bone dates too old (Anderson *et al*. 2000: 60-61).

Anderson and Sinoto (2002) then re-dated the Vaito‘otia-Fa‘ahia sites (ScH1-1, 2) on Huahine, originally excavated by Sinoto in the 1970s (Fig. 1; Sinoto 1979; Sinoto and McCoy 1975). Like the Maupiti burial ground, the site had material culture assemblages with artefacts diagnostic of Archaic East Polynesian culture. The Vaito‘otia-Fa‘ahia sites originally produced radiocarbon determinations extending to c. 1150 BP, or c. AD 800–850 (Sinoto and McCoy 1975). Anderson and Sinoto (2002) built a new site chronology derived from shell and charcoal samples dating between AD 1050–1450 (2σ). However, only a few of their samples derived from short to medium-lived species, including coconut shell dating to AD 989–1277 (2σ) and shell dating to the 11th to14th centuries AD. Given the large age spans, the occupation of the Vaito‘otia-Fa‘ahia sites cannot be accurately placed in either the Colonisation or Developmental/Expansion Phases (see discussion below); however, as with the earlier study, the new dates were younger than the original determinations. More recently, Anderson reported a new suite of dates (n=11) from the Society Islands in a meta-analysis of East Polynesian

dates by Wilmshurst and colleagues (2011). In a recent article discussing the Marquesan sequence and the CEP sequence more broadly, Melinda Allen verified with Anderson (in Allen 2014: 8) that these new samples derive specifically from the Vaito'otia-Fa'ahia sites and were run on short-lived materials, but their provenience details remain to be published. The reported calibrated age ranges are listed as a minimum of 768 ± 31 to 982 ± 32 BP (Wilmshurst *et al.* 2011, Table S1), suggesting initial settlement of the sites could be as early as the 10th to 13th centuries.

Finally, Kahn (2011) provided new data from a coastal site found along Cook's Bay on the north shore of Mo'orea (Fig.1). At the GS-1 site, the basal cultural deposit included charcoal flecking and a limited number of basalt flakes. A *Hibiscus tiliaceus* fragment from the deposit was dated and provided a range of AD 1031–1210 (2σ). The date may have some inbuilt age, but calibrates to the same time period as the Society Island dates published by Wilmshurst *et al.* (2011).

Overall, the suite of dated coastal sites from the Society Islands with samples dated via modern techniques is small, but they suggest colonisation as early as the late 10th century up to the late 12th century. As this brief review suggests, the Colonisation Phase in CEP remains hotly debated even after three decades. Strict classification-based approaches to CEP settlement argue for colonisation of the Societies (AD 1025–1120) and the Gambier archipelago (AD 1108–1275) (Wilmshurst *et al.* 2011). Approaches utilising broader evidence for early cultural activity, including evidence for plants and animals introduced via colonising populations, argue for initial settlement of CEP almost one hundred years earlier, c. AD 900–1000 (Conte and Kirch 2004; Kirch 2011; Kirch *et al.* 2010; Molle 2011). Some of the strongest evidence for settlement in the region dating to ca. AD 900–1000 include Molle and Conte's recent work at Hane (Conte and Molle 2014; Molle 2011; see also Anderson *et al.* 1994) and Kirch *et al.*'s work at the Onemea site on Taravai (2010) (see discussion in Allen 2014).

Currently, there are two cultural-chronological sequences for the Society Islands. Lepofsky and Kahn (2011) developed an 'Opunohu Valley, Mo'orea sequence and an archipelago-wide sequence tied to temporal phases. A more recent model by Kahn (2014) situates the Society Islands within the regional CEP context and draws from Hawaiian models (Kirch and McCoy 2007) in utilising Colonisation, Developmental/Expansion and Classic phases. The latter will be used in this article for the ease of comparing the Society Islands sequence to others within East Polynesia. As Kahn (2014) outlined, the Society Island Colonisation Phase dates to c. AD 1000–1250, the Developmental/ Expansion Phase dates to AD 1250–1550, and the Classic Phase runs from AD 1550 up to European Contact in 1767. As previously noted, the Colonisation Phase remains the most under-studied within the Society Islands.

BACKGROUND TO THE MO‘OREA ISLAND SITES AND THE EXCAVATIONS

In the late 1950s and 1960s, much of the focus of archaeological analysis in East Polynesian was on coastal middens and rockshelters, although Green’s pioneering settlement pattern analysis in the ‘Opunohu Valley (Green 1961; Green *et al.* 1967) provided an alternative, as did Robert Suggs’s Marquesan work (Suggs 1961a; see discussion in Kirch 2000). Compared to Hawai‘i, Emory and Sinoto’s survey in the Society Archipelago failed to discover richly stratified sites with high artefact content (Emory and Sinoto 1965: 18), yet numerous coastal sites were test excavated between 1960 and 1961. On Mo‘orea, M3 (Ana Paia Rockshelter) and M5 (Afareaitu Fishing Village) (Fig. 1) represented the most promising sites in terms of stratified deposits and artefact recovery, particularly fishhooks. As such, both sites were further investigated in the early 1960s with broader excavation samples. Green’s research team likewise investigated coastal sites on Mo‘orea as a means to provide comparative materials for their inland valley excavations, given that the inland assemblages lacked preservation sufficient for organic artefacts such as fishing gear, shell remains or animal bone (Green *et al.* 1967).

Ana Paia Rockshelter (M3)

This small rockshelter was found along the southern portion of Mo‘orea in the Ha‘apiti District (Figs 1 and 2). The modern circum-island road has destroyed this site, which was situated inland of the ocean along a narrow coastal flat. The interior of the shelter was small, c. 15 m long by 2 to 3 m wide (Fig. 2). A stone wall of 70 cm length was found running parallel to the rockshelter’s dripline and delineated the sheltered interior portion of the site from its unsheltered exterior portion.

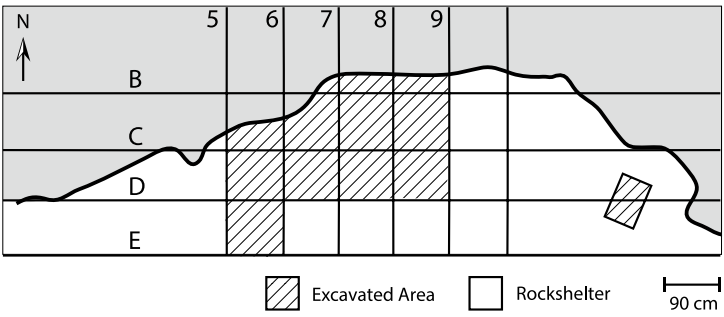

Figure 2. Plan view of the M3 site with the areas excavated.

The rockshelter was excavated in 1960 by Pierre Verin, an archaeologist affiliated with ORSTOM, in collaboration with Yosihiko Sinoto from the Bishop Museum. While test excavations suggested that the M3 site was not rich in artefacts, the site stratigraphy was undisturbed, lacking tree roots and frequent crab holes, and had high frequencies of midden and charcoal, leading the two archaeologists to expand their excavations.

Overall c. 9 m^2 were excavated to sterile at M3. Five stratigraphic levels were identified with the entirety of the cultural deposit ranging from 60 to 100 cm deep (Fig. 3). The basal deposit (referred to here as LV) was a sterile reddish clay with frequent rocks (Sinoto 1960, field notebook, July 22 entry). Above this was a blackish cultural deposit (LIV), c. 25–40 cm thick, at the base of which was a stone pavement. Above this was a c. 15–39 cm thick deposit (LIII), replete with charcoal and ash lenses. Above this was a black humic layer (LII), c. 20–28 cm thick, with dense shell midden, capped by 10–15 cm of overburden (LI). Field notes and profiles indicate that the ash lenses began c. 30–40 cmbd (cm below datum). Fish bone and shell midden were most abundant in LII-LIV. The surface lacked historic artefacts, but a pearl-shell button with two holes found in the upper deposits (LI or LII) indicated some site occupation during the first half of the 19th century (Sinoto and Verin 1965: 574; Verin 1960–61: 5). The site was interpreted as a fishermen's cave given the dense marine midden and the recovery of pearl-shell and *Turbo* fishhooks, and a limited number of adzes, adze debitage and coral files.

Afareaitu "Fishing Village" (M5)

This site is found in the Afareaitu District on the southeast coast of Mo'orea (Fig. 1). The site complex is situated on a coastal flat c. 180 m in width. The surface architecture includes four temple sites (*marae*), an upraised stone platform (*paepae*) interpreted as a feasting platform (M5-1), and a small rectangular house foundation (M5-2). The surface midden extended over a 34,000 m^2. The area was intensively surface collected in 1961–62, yielding fishing gear (complete fishhooks, blanks, shell sinkers, octopus lures and cut shell), stone tools (adzes, adze flakes, polishing stones, hammerstones) and a wide range of other tools (coral files, shell chisels, worked bone, sling stones).

At the M5 site Sinoto and Verin utilised a six inch auger to locate sub-surface midden deposits. Sub-surface excavations commenced in 1961 and continued into 1962 (Fig. 4). Overall, 72 units were excavated. Test pits ranged from 2 by 2 m in size to 2 by 1 m and were completed in different numbered units/zones. Limited excavations were carried out in the vicinity of the Unit 1 zone, the region around and in-between the M5-1 feasting platform and M5-2 rectangular house. Limited excavations were also completed at the Unit 2 zone adjacent to the enclosing wall and the *ahu* of M5-3, in and

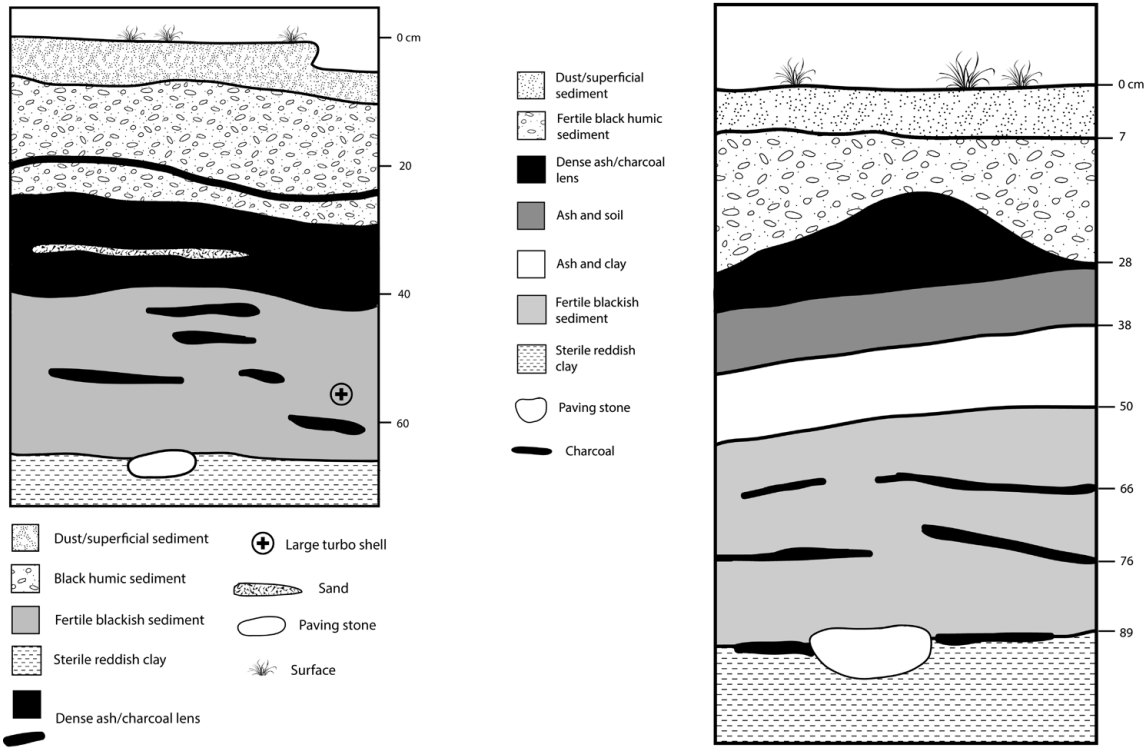

Figure 3. M3 stratigraphic profiles, Units C8, B7.

Figure 4. Excavations in progress at M5.

around a simple coastal *marae* with dressed loaf-shaped stones, and adjacent to M5-4 and M5-5, two coastal *marae* with dressed loaf stones. Extensive excavations focused on the Unit 3 zone, the surface flat to the east of the M5-3 *marae*. In this area, 44 test pits were excavated, uncovering a concentration of midden and sub-surface features, including pits and fire features, some with stone outlines.

While the specifics of the M5 site stratigraphy have not been published, the unpublished report indicates that the Unit 1 zone near M5-1 and M5-2 had three cultural deposits, while the Unit 3 zone had a single cultural deposit with a depth of c. 30 cm. Artefact and midden recovery was frequent across the site but most pronounced in the Unit 2 zone. Emory and Sinoto's (1965) generalised culture-historical analysis of the M5 artefacts stressed that "adz and fishhook types (one-piece hook heads and t[r]olling-hook points), and a consideration of the type of maraes at Afareaitu, seem to indicate that the whole

complex of the Afareaitu site is characteristic of the late period of Tahitian prehistoric culture, some of which was retained into protohistoric time" (p. 57).

ScMf-2

This site, also known as Hauiti on the land parcel of Oramatoua (Rappaport and Rappaport 1960, field notebook), is situated at the easternmost portion of the Papetoʻai District at the western headlands of ʻOpunohu Bay along the north shore of Moʻorea (Fig. 1). The site is found on a narrow coastal flat, and had a moderate amount of surface midden. As part of Green's crew, the Rappaports excavated seven units, each 9 ft by 9 ft (c. 51 m^2), at the site (Fig. 5); each unit was excavated as four separate quadrants. Quarter-inch screen was used to sift the excavated deposits (Green *et al.* 1967).

A detailed description of the ScMf-2 site stratigraphy has not been published. Unpublished notes (Rappaport and Rappaport 1960, field notebook) and published descriptions suggest that the stratigraphy of the Unit 1 and Unit 2 excavation blocks varied slightly from one another. Notes indicate that the basal deposit was coralline sand or limestone conglomerate. A single cultural deposit, described as a black midden layer, was excavated in arbitrary six inch levels. This cultural deposit varied in depth across the site, ranging from 45 cm to 100 cm. While the Rappaports discussed this as a single cultural deposit, their stratigraphic descriptions and profiles suggest that the upper deposit may be differentiated from the lower deposit (Fig. 6). The uppermost portion of the deposit contained a mixture of pre-contact and historic artefacts in a loose, black-grey, sandy midden. At about a depth of 30 cm, the deposit has frequent ash and charcoal lenses, as well as fire pits with fire-cracked rock and earth oven stones which continue until c. 56 cmbd (Fig. 7). At about 60 cm the sediment lightens in colour and becomes sandier in texture, but no changes in midden composition were observed.

Two postholes were also documented in the excavations, along with a possible storage pit. Recovered artefacts included fishing gear, adzes and related stone artefacts, faunal remains, marine shell and historic materials. Forty-five wood charcoal samples were collected but none were sent for radiocarbon dating. Both in their unpublished field notes and in the monograph, the Rapapports referred to specific charcoal samples that were associated with the basal limit of the cultural deposit. They also noted that post-depositional disturbance, most notably crab burrowing, was found across the site.

ScMf-5

ScMf-5, also known as the Te Amaama site, is found at the western headlands of Papetoʻai Bay, across from the Terau reef pass, on the north shore of Moʻorea (Fig. 1). As Green notes (1967: 181), the site is recorded in oral histories as

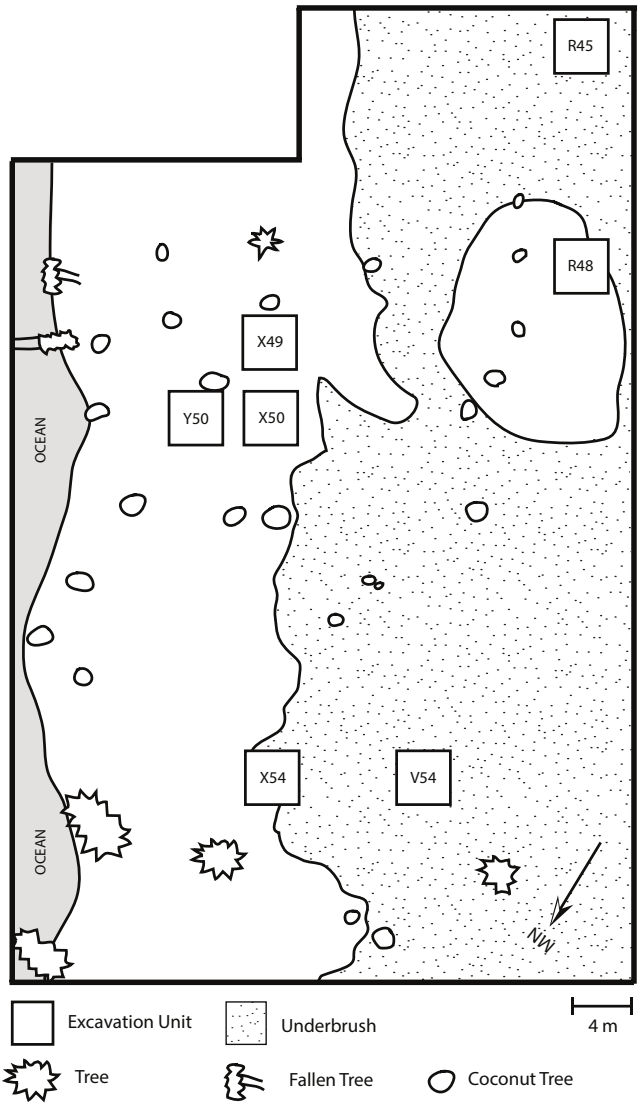

Figure 5. ScMf-2, schematic plan of the site excavations (after Rappaport and Rappaport 1960, field notebook).

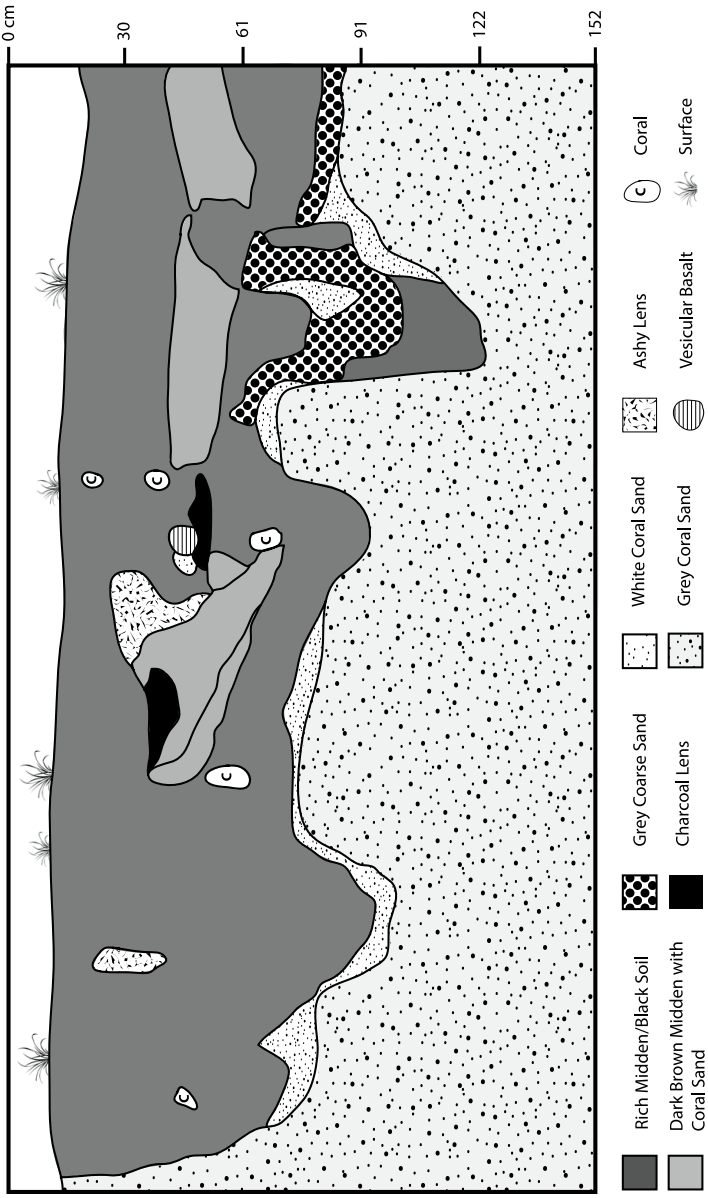

Figure 6. Stratigraphic profile of Unit X49 at ScMf-2.

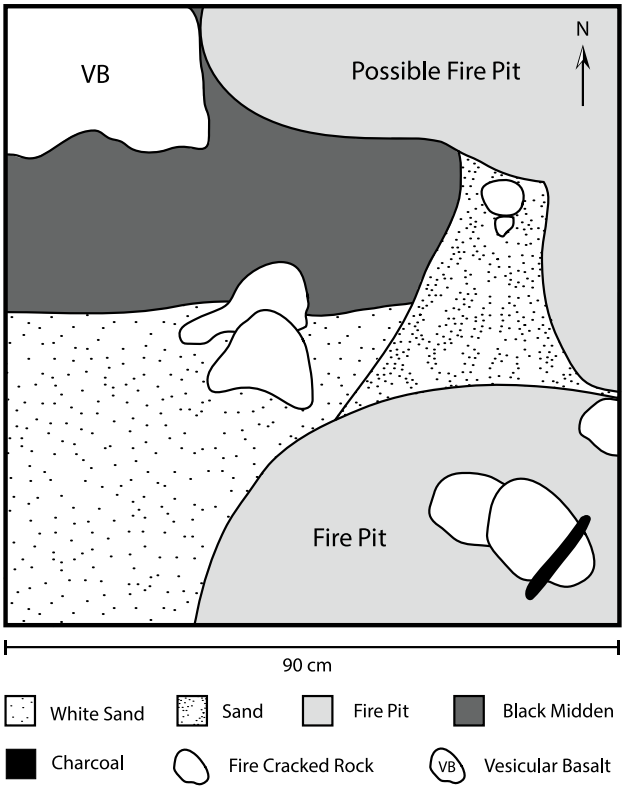

Figure 7. Plan of ScMf-2 Unit X49, SW quadrant, at 48–56 cm below datum, showing fire pits with concentrated charcoal and fire-cracked rock.

an important residential area and was the location of a large coastal temple named Taputapuatea, after the "origin" temple of the same name in Raʻiatea (see also Cauchois 2015). Approximately 43 m^2 were excavated at ScMf-5 in two large blocks that were excavated as quadrants (Green 1960, field notebook). The Unit 1 excavation block was situated 61 m in from the coast. The Unit 2 excavation block was located 76 m inland, closer to edge of the site that was bounded by a stream. It is unclear if quarter-inch screen was used to sieve all of the excavated deposits or if only the column samples were sieved and the rest of the deposits were hand-picked without being screened.

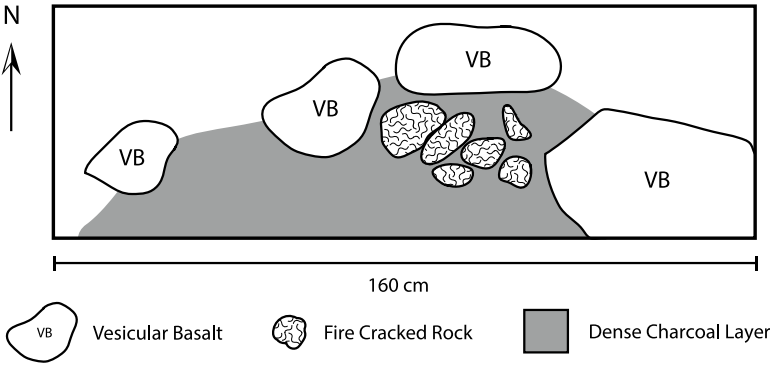

Figure 8. Plan of ScMf-5, Unit 2, NW Quadrant.

A detailed description of the ScMf-5 site stratigraphy has not been published. Published notes indicate that the basal deposit was a brown clay in the Unit 1 block and a coral sand in the Unit 2 block (Green *et al.* 1967: 182). A single cultural deposit of dark grey sandy loam was encountered across the site and ranged in depth from 67 cm in the Unit 1 block to 106 cm in the Unit 2 block. The cultural deposit at ScMf-5 contained historic artefacts (most frequent in the upper layers), dense shell and fish and mammal bone midden, as well as adzes and adze-related debris, a pearl-shell coconut grater and a *Conus* shell chisel. Numerous possible earth ovens and fire features are depicted in the quadrant plan views (Fig. 8; see Green 1960, field notebook). A sub-surface earth oven was encountered in the Unit 2 block at 67–106 cmbs (cm below surface), the bottom of which was under the water table. Wood charcoal from this feature was dated. Weisler (1998) geochemically analysed an adze recovered in the dated earth oven feature, documenting its source of origin to an adze quarry found on Eiao Island in the Marquesas Archipelago.

THE 1960S DATES

Numerous issues affect the interpretation of radiocarbon dates run in the Pacific Islands in the 1950s-60s. The earliest radiocarbon dating method, the only available at the time, required large samples, such as the entire contents from a single hearth or burn event. This practice potentially merged charcoal burned in different events. Wood charcoal identification was not practiced at the time, leaving samples open to the "old wood" bias. All of the original M3, M5, and ScMf-5 dates were not adjusted for isotopic fractionation (i.e., $\delta^{13}C$ value) and are uncalibrated (hence the "reported age" category in Table 1). They were originally presented as absolute calendar year dates that could

be subtracted from 1950, which is problematical. Given that many of the dates also have large error estimates, the reliability of these dates is highly questionable. Finally, four of the five original M3 and M5 dates were run by the Gakushin Lab (lab identifier GaK, Table 1). Subsequent re-dating studies have shown that GaK dates from the 1950s and 60s often produced overwhelmingly young dates, suggesting mistreatment, contamination, or use of unstable modern standards (Kahn 2006; Kirch 1984: 73, 1986: 23; Lepofsky 1994, 1995; Rolett 1998: 53; Spriggs 1989; Spriggs and Anderson 1993).

Two bulk wood charcoal samples from M3 were originally submitted for ^{14}C dating to the Groningen Lab (Table 1). Sample GRN-2960, derived from a pavement associated with a hearth in LIV, Unit C8, at a depth of 90–105 cmbs (Emory 1962; Sinoto 1960, field notebook; Suggs 1961b: 89; Vogel and Waterbolk 1964). This date has been reported as 550 ± 55 or c. AD 1400 (Table 1). A second sample from the same unit, consisting of isolated charcoal recovered at a depth of 90–105 cmbs, was also dated and reported as 680 ± 60 or c. AD 1280. The two dates are stratigraphically consistent and suggested occupation of the site as early as the late 13th century and continuing up to the mid-15th century.

Four wood charcoal samples were dated from M5 (Emory and Sinoto 1965: 51-52); all of these samples were dated by the Gakushin Lab. Two samples (GaK-217, 218) were recovered from area excavations between the M5-1 feasting platform and the M5-2 rectangular house foundation. The two samples provided discordant and inverted dates, reported as 160 ± 80 or c. AD 1790 and 940 ± 90 or c. AD 1010 respectively. A third sample (GaK-215) was recovered nearby from TP16 in a scattering of charcoal found at 12–15 cmbs in association with the M5-2 rectangular house pavement. This dated sample was reported as 0 ± 100 or c. AD 1850 or younger. The final sample, GaK-332, recovered from the M5-3 temple excavations, yielded a reported date of 480 ± 240 or c. AD 1470 ± 240. The large error ranges and lack of patterning in the M5 dates, in terms of stratigraphic position, leave these original dates from the site open to question. The potentially early component at M5 (GaK-218) is of interest, as only a few sites which potentially date to the Colonisation Phase have been identified on Mo‘orea.

Finally, a single wood charcoal sample was dated from ScMf-5. The sample derived from an earth oven cut from the middle of the main cultural deposit into the underlying sterile sand. The wood charcoal sample was taken at c. 106 cmbs at the base of the earth oven. It was reported as dating to 760 BP ± 80 or c. AD 1190 ± 80 (Green *et al.* 1967: 182). Again, the potential for this sub-surface feature to date to the Colonisation Phase is of interest. Only one other site on Mo‘orea (GS-1) is currently dated to this phase utilising modern AMS techniques (Kahn 2011), but the GS-1 date is not on a wood charcoal sample from a secure sub-surface feature.

Table 1. Original radiocarbon dates from the 1960s. The Oxcal 4.2 program was used to calibrate the dates (Bronk-Ramsey 2009).

Sample #	Lab #	Site #	Site Name	Provenience	Conventional ^{14}C Age Years BP	Reported Age
TRC-1	GRN-2960	M3	Ana Paia Rockshelter	C8, scattered charcoal from 76-89 cmbs	550 ± 55	AD 1400 ± 55
TRC-82	GRN-2902	M3	Ana Paia Rockshelter	C8, northern part, 90-105 cmbs	680 ± 60	AD 1280 ± 60
TRC-7	GaK-215	M5	Afareaitu Fishing Village	TP16, 12-15 cmbs, scattered charcoal associated with M5-2 rectangular house pavement	0 ± 100	AD 1850 or younger
TRC-9	GaK-217	M5	Afareaitu Fishing Village	TP12, 45 cmbs, scattered charcoal collected between M5-1 feasting platform & M5-2 rectangular house foundation	160 ± 80	AD 1790 ± 80
TRC-8	GaK-218	M5	Afareaitu Fishing Village	TP13, 30 cmbs, basal limit of cultural deposit; collected between M5-1 feasting platform & M5-2 rectangular house foundation	940 ± 90	AD 1010 ± 90
TRC-11	GaK-332	M5	Afareaitu Fishing Village	M5-3 temple, Unit G10, 20-30 cmbs, below east retaining wall of marae	480 ± 240	AD 1470 ± 240
AMNH-188	Not available	ScMf-5	Te Amaama	Square 2, 106 cmbs, at base of earth oven	760 ± 80	AD 1190 ± 80

NEW AMS DATES

Archival samples from the Anthropology Department at the Bishop Museum and the American Museum of Natural History were used to select new wood charcoal samples for re-dating. The M3 and M5 samples were identified to species by Gail Murakami, while the ScMf-5 samples were identified by Emilie Dotte-Sarout. Each identified wood charcoal sample was submitted to Beta Analytic for AMS ^{14}C dating.

Few archival samples were available from the M3 and M5 sites, which limited our re-dating efforts. While we set out to identify and date short-lived species, short-lived nutshells, or branch wood for all the samples (Allen and Huebert 2014; Allen and Wallace 2007), these simply were not available for M3 and M5. As a result, we dated *Artocarpus altilis* (breadfruit) samples, (Table 2) in addition to *Hibiscus tiliaceus*, a soft-wood and native shrub; both can have life spans over 50 years (Table 2; Allen and Huebert 2014; Kahn 2006; Reith *et al.* 2011). However, the *Artocaprus altilis* samples have the advantage of being Polynesian introductions and thus must date activities related to Ma‘ohi (or pre-contact Tahitian) occupation (see Dye 2011). All of the new ScMf-2 and ScMf-5 samples were run on short-lived materials with under ten years of inbuilt age, including *Cocos nucifera* endocarp, *Aleurites moluccana* (candlenut) endocarp and a *Syzygium malaccense* (Malay apple) twig with a diameter of 6 mm.

Two new samples were dated from the M3 site (Table 2). The first is an archived split sample of the TRC-82 sample originally dated in the 1960s. This sample (Beta-335458) derived from ash and charcoal lenses found in the basal level of the cultural deposit in Unit C8 (Fig. 3). The two sigma calibrated age range is AD 1033–1204. This is just a bit earlier than the original AD 1220–1340 date reported for this split sample. A second sample (Beta-335457) recovered from Unit B7, and again derived from ash and charcoal lenses found at the basal portion of the cultural deposit (Fig. 3), yielded a calibrated age range of AD 1184–1275. The two new dates overlap at two standard deviations and one overlaps with the original TRC-82 sample. These data indicate that the first occupation of the M3 site was most likely in the late 12th to mid-13th centuries during the Colonisation Phase.

Two new samples were dated from M5. These included a wood charcoal sample collected from Unit G9 (Beta-335459). This sample was retrieved at 22 cmbd from underneath a stone paving that was associated with the rectangular house (M5-2) site. When calibrated the sample has multiple intercepts and most likely dates to AD 1735–1806. A second sample (Beta-335456) collected from a similar depth in TP16 near the *paepae*, or the M5-1 feasting platform, calibrates to a similar period and most likely dates to between AD 1826–1832.

Table 2. New AMS radiocarbon determinations. The Oxcal 4.2 program was used to calibrate the dates (Bronk-Ramsey 2009).

Lab No.	Site	Site name	Provenience	Taxon dated	Potential inbuilt age	Conventional ^{14}C age BP	δ^{13}C ‰	Calibrated age at 2σ
Beta-335458	M3	Ana Paia Rockshelter	N part of C8, 90-105 cmbs, basal level of cultural deposit with charcoal & ash lenses, just above sterile; previously dated as TRC-82, lab #GRN 2902	*Hibiscus tiliaceus* wood charcoal	Little to many decades	910 ± 30	-25.6	AD1033-1190 (94.0%) AD 1198-1204 (1.4%)
Beta-335457	M3	Ana Paia Rockshelter	TP1-e, 80-90 cmbs, basal level of cultural deposit with charcoal & ash lenses, just above sterile; originally collected as TRC-81	*Hibiscus tiliaceus* wood charcoal	Little to many decades	800 ± 30	-25.2	AD 1184-1275 (95.4%)
Beta-335459	M5	Afareaitu Fishing Village	G9, 22 cmbd, under pavement area of M5-2 house site; originally collected as TRC-13	*Artocarpus altilis* wood charcoal	Many decades; > 50 years	220 ± 30	-27.0	AD 1642-1684 (36.7%) AD 1735-1806 (44.7%) AD 1933-modern (14.0%)
Beta-335456	M5	Afareaitu Fishing Village	TP16, 12-15 cmbd, W half of *paepae* (M5-1); originally collected as TRC-6	*Artocarpus altilis* wood charcoal	Many decades; > 50 years	160 ± 30	-25.7	AD 1664-1706 (16.7%) AD 1719-1826 (47.4%) AD 1832-1884 (12.6%) AD 1914-modern (18.6%)
Beta-411447	ScMf2	Hauiti	Unit X-49-50 baulk, fire pit, 41-66 cmbd	*Cocos nucifera* endocarp	Short-lived	660 ± 30	-24.8	AD 1276-1322AD (47.6%) AD 1347-1393 (47.8%)

Beta-411448	ScMf2	Hauiti	Unit X-54, fire pit NW corner, 66 cmbd	*Aleurites moluccana* endocarp	Short-lived	580 ± 30	-23.8	AD 1300-1369 (63.6%) AD 1380-1418 (31.8%)
Beta-411449	ScMf2	Hauiti	Unit V-54, 30 cm to bottom	*Cocos nucifera* endocarp	Short-lived	200 ± 30	-24.3	AD 1646-1690 (24.9%) AD 1728-1810 (51.2%) AD 1926-modern (19.3%)
Beta-411450	ScMf2	Hauiti	Unit X49, 61 cmbd	*Syzygium malaccense* twig with 6.0 mm diameter	Short-lived	10 ± 30	-27.1	AD 1696-1725 (14.7%) AD 1814-1836 (10.2%) AD 1845-1850 (0.9%) AD 1876-1918 (69.7%)
Beta-411451	ScMf5	Te Amaama	Unit 1, earth oven rake out, 79 to 97 cmbd	*Cocos nucifera* endocarp	Short-lived	770 ± 30	-24.9	AD 1216-1282 (95.4%)
Beta-411452	ScMf5	Te Amaama	Unit 1, earth oven rake out, 64-79 cmbd	*Cocos nucifera* endocarp	Short-lived	640 ± 30	-22.7	AD 1282-1329 (41.0%) AD 1340-1396 (54.4%)
Beta-411533	ScMf5	Te Amaama	Unit 2, 36-51 cmbd	*Cocos nucifera* endocarp	Short-lived	840 ± 30	-24.7	AD 1059-1062 (0.4%) AD 1154-1264 (95.0%)

The new dates suggest that some of the surface architecture at M5 most likely dates to the late prehistoric to early contact period spanning the late 17th to mid-19th centuries. Our new data suggests that the original AD 1010 date is too early, either due to the old wood problem or lab processing issues. We were unable to re-date any samples associated with the deposits pre-dating the construction of the three *marae*. This leaves open the possibility that the original GaK-332 (dating to the late 15th century) accurately dates a use of the site prior to the construction of the later 'Oro style temples and associated feasting platform and rectangular house.

Four new samples were dated from the ScMf-2 site. Beta-411447 is a sample taken from a fire feature at the base of the cultural deposit at a depth of 41–66 cmbd. At 2σ the sample calibrates with multiple intercepts, producing an age range of AD 1276–1393. Beta-411448 dates another fire feature sample in a unit in the near vicinity and at a similar depth at the basal portion of the cultural deposit. This sample calibrates to AD 1300–1418 and most likely dates to the AD 1300–1369 portion of the age range. These two dates from the same portion of the site are internally consistent and suggest initial site occupation as early as the late 13th century, but most likely in the mid-14th century. Unfortunately, Beta-411450, which dated a short-lived material at a depth similar to that of Beta-411447 and Beta-411448, yielded a much later calibrated age range of AD 1675–1918. It seems likely that this sample derived from an upper portion of the cultural deposit that was secondarily deposited by crab burrowing. The final sample, Beta-411449, was analysed to investigate site stratigraphy and chronology in a different portion of the site. This sample did not have the most precise context and derived from the mid- to bottom portion of the cultural deposit (30 cm or deeper). The sample yielded a calibrated age range of AD 1646 to modern and most likely dates to the AD 1728–1810 age range. Taken as a whole, our results suggest that ScMf-2 site had multiple occupations, with the first in the Developmental/ Expansion Phase and the second in the Classic Phase.

Three new samples were dated from ScMf-5. Beta-411451 and -411452 derive from two distinct earth oven rake-out events in the lower portion of the cultural deposit. Beta-411451 tightly calibrated to AD 1216–1282, while Beta-411452 has two intercepts and calibrates to between AD 1282–1396. The two dates overlap at 2σ and indicate that the basal portion of the cultural deposit in the Unit 1 block dates to the 13th to 14th centuries. A final sample, Beta-411533, was retrieved from the lower portion of the Unit 2 block cultural deposit. This sample yielded the oldest date, calibrating to AD 1059–1264. The newly dated Unit 2 sample overlaps at 2σ with Green's original date from an earth oven at the base of this cultural deposit, indicating that ScMf-5 was initially occupied in the Colonisation Phase.

A REVISED SOCIETY ISLAND CHRONOLOGY

With this new corpus of ^{14}C dates, we now have evidence for three well-studied Society Islands sites dating to the Colonisation Phase, including two sites on Mo‘orea (GS-1 and ScMf-5) and one on Huahine (ScH1-1, -2) (Fig. 1). Both GS-1 and ScMf-5 are situated on gently sloping coastal flats of some width on Mo‘orea. They are each found at the headlands of northern bays and are situated across from important reef passes. The early component of the GS-1 site is largely ephemeral, similar to data from Colonisation Phase sites in Mangareva (Kirch *et al.* 2010) and the Marquesas Islands (Allen 2014). The site's upper deposits (reported as ScMo-341 in Kahn *et al.* 2015b) represent episodes of high and low-energy fluvial deposition of terrigenous sediments; these data have been linked to soil erosion resulting from slash and burn agriculture and high-energy storm events. These geomorphological activities buried the earliest cultural deposits with 220 cm of sediment, effectively erasing the Colonisation Phase activities from easy detection.

In contrast, the earliest dated occupation of the ScMf-5 site contained an earth oven, diverse artefacts and dense faunal remains indicative of a permanent and perhaps large, settlement along the northern shore of Mo‘orea. The ScMf-5 Colonisation Phase component is similar to that found at the Fa‘ahia-Vaito‘otia site on Huahine. There, extensive Colonisation Phase deposits were found on a large, flat coastal plain near a major reef pass. Site excavations recovered diverse artefacts types, dense midden and house posts. The Vaito‘otia excavations uncovered several zones of spatially segregated activities, including a sector for storage houses located away from the main habitation area. The Fa‘ahia excavations demonstrated the spatial differentiation of habitation and certain production activities, including a "stone workshop area" and zone for craft production (Sinoto 179: 4, 8), while *tapa* 'bark-cloth' production may have taken place outside of the probable house structure (1979: 8).

Overall, these results point to established Society Islands populations from the 11th to 13th centuries AD, supporting both the Wilmshurst and colleagues (2011) Conservative Model of East Polynesian settlement and more inclusive synthetic models (Allen 2014; Kirch 2011). Occupations dating to this time period are widespread in the archipelago, found in the Windward Islands (north shore of Mo‘orea) and the Leeward islands (northwest shore of Huahine). The inhabitants of at least one of these sites, those at ScMf-5, imported or traded for adzes deriving from Eiao in the Marquesas Islands (Weisler 1998: 523). Materials from this adze quarry are also found at Colonisation Phase sites in the Marquesas Islands (Allen 2014), the Line Islands (Di Piazza and Pearthree 2001), and the Cook Islands (McAlister *et al.* 2013), as summarised by Allen (2014), in addition to sites in the Austral Islands (Hermann 2013).

Another Society Islands site potentially dating to the Colonisation Phase is the Vaihi site on the north shore of Rai'atea (Charleux 1977; Semah *et al.* 1978) where Archaic style artefacts were recovered. The site has a single conventional radiocarbon date on unidentified charcoal reported as AD 1210 ± 80, but must be re-dated to precisely place it within the revised Society Islands cultural chronology.

It is telling that two of the three Colonisation Phase sites in the Society Islands include waterlogged deposits or cultural deposits that are under the current water table. It has long been argued that geomorphological conditions in the Societies, notably subsidence, have been a major hindrance to the recovery of coastal sites (Bellwood 1970; Kirch 1986). Extensive excavations of the last few years along the coasts of Mo'orea and Maupiti have likewise illustrated how major erosional deposits have masked the evidence of early settlement in the Societies (Kahn *et al.* 2015a, 2015b). Settlements on old beach ridges are now covered with 2 to 3 m of alluvial sedimentation. It is then no surprise that three of the four Colonisation Phase sites (the one exception is ScMf-5) were found by accident. We are in full agreement with Allen (2014: 13) that "targeted geomorpologically informed field studies will be required for solving the puzzle of East Polynesian dispersals" in the Society Islands. The lack of concerted sub-surface archaeology in the archipelago leaves open a high possibility that additional Colonisation Phase sites will be located in the future.

In terms of the new Developmental Phase dates from ScMf-2, at this time new parts of the Mo'orea north shore were inhabited, while other earlier coastal sites continued to be occupied, tentatively suggesting population increase. This correlates well with Lepofsky's (1994, 1995) 'Opunohu Valley (Mo'orea) work which established the presence of widespread inland valley agriculture by the end of the 13th century, with both rain-fed terraces and barrage pondfields represented. Inland expansion by c. AD 1350 is also documented in 'Opunohu Valley residential sites, which exhibit characteristics of low, moderate and high rank (Green 1996: 218; Green *et al.* 1967: 166; Kahn and Kirch 2013). This major inland expansion brought newly established interior valley communities into the territories of expanded coastal polities. It was likely motivated by population increase and the need for increased economic production (Kahn 2006; Lepofsky and Kahn 2011).

The M5 component, with its elaborate temples of the 'Oro cult style (Green and Green 1968), fits well into accepted dates for the Classic Phase (Kahn 2014). Re-analyses of 'Oro style temples with loaf shaped stones in the Windward Society Islands document their construction during the 17th to 18th centuries. Their construction may have signalled allegiances to the newly established paramount Pomare lineage on Tahiti (Kahn 2010; Maric

2012), as well as localised incursions of the *ario'i* (fertility) and war cults originating in the Leeward Islands and moving into the Windward Islands. The elaboration and expansion of *marae* and ritual centres during the Classic Phase occurs in both interior valley contexts and coastal zones throughout the principal islands of the archipelago (Kahn and Kirch 2014; Maric 2012; Sharp *et al.* 2010; Wallin and Solsvik 2006: 17), signalling widespread intensification of socio-ritual and economic systems. Intensified feasting is also prevalent during this period, permitting socio-ritual elites to compete in highly visible material expressions of their rank and power.

CONCLUSIONS

Our re-dating program has not only allowed us to refine the Society Islands cultural sequence, but has permitted precise identification or confirmation of two sites dating to the Colonisation Phase. The new Society Islands cultural chronology supports a rapid regional colonisation or "advancing wave" of colonists in CEP (Allen and McAlister 2013; Kahn 2014; Wilmshurst *et al.* 2011). These data have, in part, spurred new interest in modelling push versus pull factors in the settlement of CEP (Anderson *et al.* 2006; Bell *et al.* 2015; Montenegro *et al.* 2014). In addition, the shortened CEP chronology has required that archaeologists re-think models concerning the pace and development of social complexity in the region. Certainly as sub-surface excavations in the Society Islands archipelago continue in conjunction with geomorphological analyses, we must expect that additional Colonisation Phase sites will be identified. Equally important will be the study of Developmental/Expansion Phase sites in coastal contexts, as current samples from the 1950s and 1960s lack methodological rigor in excavation techniques and artefact recovery (due to screen sizes or lack of screening).

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ABSTRACT

The Society Islands are critical to chronology building in East Polynesia, as the archipelago served as a potential first landfall for voyagers moving out of the West Polynesia homeland. Yet determining the particulars of migration sequences and settlement chronology in the Society Islands, like the rest of East Polynesia, has been challenging. Here, we report on a dating and re-dating program of four coastal sites on the island of Mo'orea, Windward Society Islands, aimed at refining the archipelago's cultural chronology and its place within larger settlement trends for East Polynesia. We begin with a brief discussion of 1960s archaeological research in the Society Islands and the archipelago's role in the East Polynesian colonisation debate before turning to a discussion of the newly dated and re-dated Mo'orea coastal sites. Our new corpus of ^{14}C dates provides evidence for two well-studied Mo'orea Island sites dating to the Colonisation Phase (GS-1 and ScMf-5). The earliest dated occupation of the ScMf-5 site contained an earth oven, diverse artefacts and dense faunal remains indicative of a permanent, and perhaps large, settlement along the north shore of Mo'orea. Results point to established Society Island populations from the 11th to 13th centuries AD, supporting both the Conservative Model of East Polynesian settlement and more inclusive synthetic models. Developmental Phase dates from ScMf-2 illustrate that new parts of the Mo'orea north shore were inhabited at this time, while other earlier coastal sites continued to be occupied, tentatively suggesting population increase. The re-dated M5 site, with its elaborate temples of the 'Oro cult style, fits well into accepted dates for the Classic Phase. Our re-dating program has not only allowed us to refine the Society Islands cultural sequence, but has permitted precise identification or confirmation of two sites dating to the Colonisation Phase.

Keywords: Chronology building, settlement, Society Islands, central East Polynesia, colonisation, Mo'orea Island

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ALLOGRAPHS, GRAPHIC VARIANTS AND ICONIC FORMULAE IN THE KOHAU RONGORONGO SCRIPT OF RAPA NUI (EASTER ISLAND)

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Ho'okauhua Hina-a-ke-ahi, hānau he moa,
He huamoa ke keiki a Hina

"Hina-of-the-Fire conceived, a fowl was born,
The child of Hina was delivered in the shape of an egg"

(*Kumulipo*, lines 1990-1991 in Beckwith 1951)

Dedicated to the memory of Boris Kudrjavtzev whose discoveries gave birth to this work.[1]

The Kohau Rongorongo script of Rapa Nui (Easter Island) remains undeciphered. It has been suggested that the script is an invention inspired by early contacts with European visitors (Emory 1968: 154). Nevertheless, the unique direction of writing, sometimes termed "double" or "reverse boustrophedon", and the logosyllabic nature of the script evidencing use of logographic signs, syllabic signs and phonetic complements (Davletshin 2012a, 2012b), make the hypothesis of a direct borrowing improbable. Emphatically, none of numerous pictorial signs of Kohau Rongorongo depict expected European objects such as ships, hats and knives. This observation strongly suggests that the invention of the script took place in pre-contact times. It also makes highly unlikely the hypothesis of an indirect borrowing based on observations of Europeans who wrote in the presence of islanders. After decipherment of the script scholars will have at their disposal a unique source of information about the pre-contact culture and language of Rapa Nui (referred to by linguists as Rapanui) and Oceania in general as the script is the only known writing system of Oceania that pre-dates the arrival of Europeans. Along with the Near East, the Far East and Mesoamerica, Rapa Nui seems to be one of three or four places where writing was independently invented by humankind.[2] Thus, decipherment of the Kohau Rongorongo script would significantly contribute to development of the typology of writing systems. Importantly, the surviving texts are of considerable length, around 12,000 glyphs in total. The size of the corpus implies that the writing system can be deciphered. Here glyphs are writing units separated by spaces. The total length of the texts in signs is considerably larger. Without doubt one of the

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main reasons why the Kohau Rongorongo script has not yet been deciphered is its intricate graphic system, a system with signs of a highly pictorial nature and without recognised word-dividers. Kohau Rongorongo signs are frequently combined to form complex ligatures, which also complicates graphic analysis of the script.

Graphic analysis is crucial for further development of Rongorongo studies. Nowadays, different authors give quite different estimations of the total number of individual signs used in the surviving texts. In his seminal work, Boris Kudrjavtzev (1949) detected 427 signs in two texts alone, the Great St Petersburg Tablet and the Small St Petersburg Tablet. He also presented graphic variants for some of the identified signs. Thomas Barthel's (1958) catalogue developed a classification scheme with 799 positions, some 190 of which remained empty. In a later publication Barthel (1971: 1170) indicated that if one counts only those signs that occur at least three times, 322 signs remain, and if one searches for the simplest graphical elements that cannot be further analysed one obtains a basic inventory of approximately 120 fundamental constituents. It should be noted that it is difficult to reconcile the two claims made by Barthel (1971: 1170), because the simplest graphical elements that cannot be further analysed are individual signs. The most recent catalogue (Pozdniakov and Pozdniakov 2007: 8) comprises 52 signs that are considered to account for 99.7% of all the texts. These estimations differ considerably in size (322, 120 and 52 signs). The consequences of such differences are dramatic because different systems of writing make use of different numbers of signs (see for example, Champollion 1822; Friedrich 1954; Kondratov 1969). The number of signs in an alphabetical system is about the number of phonemes in a language, for which the writing system was developed. The sign inventory of an alphabetical system would consist of a couple of dozens of independent units—the expected number depends on the particular language. For the Rapanui language, with its ten consonants and five vowels, the alphabetic system is expected to have 15 independent signs, which is definitely not the case for the Kohau Rongorongo script. In a syllabic system, this number can be equal to the number of independent syllables found in the language, though commonly only syllables of a certain type are represented. The number of syllables in Rapanui is 54, taking into account the absence of the syllable *vu* in the language (Fedorova 1963: 87). *Logosyllabic* writing systems show even larger inventories of signs, around several hundred, because they possess at least two functional types of signs—*phonetic signs* (those that indicate abstract sequences of sounds) and *word-signs* (those that spell words and indicate their lexical meanings). Boris Kudrjavtzev's tables and Thomas Barthel's catalogue imply a pronouncedly logographic nature for the Kohau Rongorongo script, even for those who reasonably believe that purely logographic writing cannot exist. At the same time, Igor and Konstantin Pozdniakovs' catalogue evidences

a syllabic writing system. Neither Barthel's nor the Pozdniakovs' catalogue explicitly presents graphic analysis of individual signs, evidently due to a lack of space. Remarkably, the relatively recent voluminous compendium on the script of Easter Island, which is 774 pages long (Fischer 1997), neither includes a catalogue of signs nor a chapter on graphic analysis.

Paradoxical divergences of counts between different scholars in the field are easy to understand: what one scholar considers as two different signs, another treats as graphic variants of the same sign. Alexander Kondratov (1969: 183) was the first to make use of the term "allograph" in Kohau Rongorongo studies, stating that "some allographs have not been recognised by Barthel and assigned different numbers in his catalogue". Irina Fedorova (1982: 37) was the first to give examples of "allographs".[3] Since then many works on the Kohau Rongorongo script have been dedicated to allographs either entirely or partially (Guy 2006; Horley 2005, 2007, 2009, 2010, 2011, 2012; Pozdniakov 1996; Rjabchikov 1988; Wieczorek 2011a, 2011b). The authors rarely give a definition of the term "allograph".[4] A careful reading reveals that in the literature on Kohau Rongorongo an allograph or allographic variant of a sign has been implicitly defined as "a similar graphic design", with a tacit implication that "a similar looking graphic design probably possesses a similar reading value". By implication, the art of graphic analysis is determined by the ability of the scholar to detect similarities between outwardly different graphic designs. However, this definition would not be accepted by students of other writing systems. This paper seeks to apply concepts developed and generally accepted in the graphic analysis of other pictorial writing systems with large numbers of signs. Its main purpose is to show that the graphic inventory of the Kohau Rongorongo script is quite different from what is found in the literature. Importantly, it is not necessary to decode the texts or assign any reading values to individual signs to achieve this purpose.

THEORETICAL CONCEPTS AND TECHNICAL TERMS

Writing is a system of visually perceived signs, traditionally painted or incised, and the rules for their combination developed for the purposes of transmitting messages in a certain human language in order to influence the behaviour of the receiver of the message (Davletshin 2003: 87; cf. Coulmas 1999: 560; Daniels and Bright 1996: 3). A *sign* represents the relationship between a certain *graphic design* (*signifier* or external form of the sign) and a certain *reading value* (*signified* or internal form of the sign) that is assigned to a particular graphic design in a given writing system. Reading values realise in certain contexts, i.e., in combinations with other signs (Davletshin 2003: 92). Sometimes a set of different reading values is associated with a particular graphic design. Signs that possess more than one reading value are called *polyvalent signs* or *homographs*.

It is easy to illustrate these statements with three examples based on English writing. Here I use the International Phonetic Alphabet as it is an explicit and acknowledged unifying system of transcription. Walking on a sea beach one might find a nicely drawn "o" in the sand; it would be ambiguous as to whether this was an abstract drawing or a letter, and if the latter, should it be read [oʊ] or [ɔ]; most likely you would interpret this as a circle. Importantly, no-one would be able to prove that the circle drawn on sand is a letter, which has a reading value. Further, one would read the letter "o" differently according to the context—as [oʊ] in "bone" versus [ɔ] in "dog". In another example, a native speaker of English, would probably read "John has been beaten by Mary, that is to say, Mary has beaten Jahn" as a misspelling, where "a" has been incorrectly substituted for "o" in the second reference to John. These examples show that a reading value does not exist without context and even interpretation of a graphic design depends on the reading values of its sign. Further, a speaker of Spanish and a speaker of English would read the same letter "o" in quite different ways, as for example in the word "tortilla"; this highlights that writing systems have been developed and are used for particular human languages.

There is considerable variation concerning the exact form of a sign, particularly in handwriting. It is exactly the relation between a graphic design and an associated reading value that permits us to recognise dramatically distorted forms of signs and assign the reading value "o" to the letter "a" in the sentence "... Mary has beaten Jahn". Nevertheless, different graphic variants of the same sign share graphic elements. Graphic designs can be described or defined verbally; such definitions are called *iconic formulae* in this paper. In pictorial scripts the graphic design of a sign refers to the idea or mental concept depicted as an object or action. The method of *iconic formulae* involves analysing two or more graphic designs for potentially shared elements. To obtain an iconic formula for a graphic design, it is necessary to gather as many examples as possible of a given sign and then formulate a description of its graphic design. This description should correspond to all attested examples and at the same time it should differ from graphic designs of other signs in the writing system. If verbal descriptions of two graphic designs partially coincide, they are considered *graphic variants* of the same sign; if not they belong to different signs. If two graphic designs possess the same reading value and the graphic descriptions have nothing in common, they are considered allographs, as further discussed below. Thus it is possible to define *graphic variant* as a standardised modification of a graphic design that preserves its general outlines, is recognisable as such, and therefore is used with the same reading value. Typically, writing systems also include different *graphic designs* that indicate the same reading value or the same set

of reading values. For example, in English writing there are three different signs: "A", "a" and "ɑ". It is easy to show that the three are not different graphic variants but different graphic designs. By applying the method of iconic formula we determine that "A" has three lines, "a" has two and "ɑ" has one, and none of these lines are of the same form. In fact, only our cultural knowledge that prevents us from seeing how different these graphic designs are from a formal point view. It should be stressed that formal description of a writing system is a synchronic procedure and has nothing to do with the origin of its constituents, which sometimes go back to another writing system developed for another language and situated far away in time and space. In the above case, for example, historically, the three graphic designs originated from an image of a triangular ox head with two horns extended.

The term "allograph" is used to differentiate incomparable graphic designs with the same reading value (Houston *et al.* 2001; Knorozov 1963). Sometimes they are called *homophonic signs*. The term homophonic signs is etymologically incorrect but it helps to avoid inaccurate parallels with the linguistic terms phoneme and allophone (see Pulgram 1951).[5] To differentiate allographs in transliteration, the most frequent of them is indicated by the reading value only: for example, **a**, the second most frequent is indicated by the reading value with a subscript "2" as in $\mathbf{a}_2$, the third as $\mathbf{a}_3$, and so on. Herein a polyvalent sign, that is a sign with different reading values, is treated as one entity and signs that possess the same reading value are treated as different entities. From a formal point of view it is possible to distinguish different graphic designs but it is impossible to prove that a polyvalent sign is a set of different signs that coincide graphically but not a set of different reading values associated with the same graphic design. As a rule, allographs of a polyvalent sign are assigned the same set of different reading values; for example, the English signs "A", "a" and "ɑ". The existence of different signs with the same reading values, and signs with different reading values, is possible and unavoidable due to such universal characteristics of semiotic systems as insufficiency and redundancy. Exact transmission of a message in detail is too costly, so the system resorts to insufficiency but then the system needs to disambiguate and resorts to redundancy, transmitting the same information more than once.

A direct corollary of the definition of "sign" is that graphic variants and allographs are in free distribution in texts and consequently they substitute for each other in the same context. The only reason for utilising a certain graphic design is the associated reading value, and the graphic design itself has no influence on its use. The last statement is not always correct because sometimes the choice of graphic variants or allographs depends on their ability to combine with adjacent signs, as for example in the case of English

handwritten letters that are found at the beginning, in the middle or at the end of a word. In this case we deal with *functional graphic variants* or *ligature graphic variants*. Note that the distribution of functional graphic variants also depends on the context.

Reading values can be of a different nature depending on the functional type to which a particular sign belongs, and on a particular writing system, because different writing systems make use of different functional types of signs (e.g., Daniels and Bright 1996; Gelb 1963). Some signs are phonetic, that is, they indicate abstract sounds or abstract sequences of sounds that form syllables, as for example, English letters. Other signs are word-signs that indicate both sounds of a word and corresponding lexical meanings, as for example, numerals "1" and "2" in English. Diacritical signs do not possess a phonetic reading value but indicate that a sign nearby has a special reading value, as for example in English capital letters can indicate the beginning of a sentence, a personal name, etc. Semantic determinatives do not possess a phonetic reading value on their own but indicate the semantic class to which a spelled word belongs. This functional type is absent in English writing systems but it is very important, for example, in Chinese writing where such signs are called radicals. Importantly, the functional type to which a particular sign belongs does not affect the relation between its graphic shape and the reading value assigned to this graphic shape.

COMPARISON WITH OTHER WRITING SYSTEMS

Allography is a wide-spread phenomenon in writing systems, which are not restricted to alphabetic traditions, at least the author is unaware of any writing system that does not make use of allographs. Writing systems differ in how often and how many allographs they use—some of them rely more heavily on allographs than the others. The total number of signs in the Kohau Rongorongo script considerably exceeds the number of syllables in the Rapanui language (54 syllables in total) and certain combinatorial properties of signs imply the logographic nature of some signs and the syllabic nature of the others (Davletshin 2012a, 2012b, 2016). Because of this, I will make comparisons with other logosyllabic writing systems.

Allographs are prolific in Maya hieroglyphic writing (Houston *et al.* 2001; Knorozov 1952: 116; Lounsbury 1984). A recently published list of syllabic signs (Stuart 2005: 28-32), which can be easily expanded mostly thanks to allographs, includes 84 different reading values but 133 different signs; in other words, 49 signs (37% of the entire list) are allographs of more frequent signs. In Maya hieroglyphic writing allographs abound in both phonetic signs (syllabic signs) and word-signs (logographs). To illustrate the importance of allographs in the script I have chosen the Tablet of 96 Hieroglyphs from Palenque, Mexico (for drawings and photos see Miller and Martin 2004: 124;

Pérez de Lara n.d.). The text is 356 signs long and the number of individual signs is 149; 39 of them are allographs of more frequent signs and they constitute 23% of the text, that is 83 signs in total. In the text consisting of 356 signs, only the syllable '*u* is written by nine different signs and the word '*ajaw* 'lord, king' by five different signs (Fig. 1).

In Nahuatl hieroglyphic writing (Aubin 1849; Lacadena 2008) allographs are less frequent. The syllabic grid of Nahuatl script is still incomplete. Out of 54 expected positions in the syllabic grid only 41 are filled, seven signs in this list (or 15% of the entire list) are allographs of more frequent signs (Fig. 2). Examples of Nahuatl hieroglyphic writing nicely illustrate one important feature of pictorial writing systems. In *linear scripts*, graphic designs are abstract combinations of lines, strokes, dots and wedges (Akkadian Cuneiform, Modern Chinese, English, etc.), while in *pictorial scripts* (Egyptian, Maya, Nahuatl, Kohau Rongorongo, etc.) graphic designs mostly depict recognisable objects and actions. In other words, in pictorial scripts a reading value is associated with a visually depicted object or action, and not with the way the object is depicted. In Nahuatl script one of the graphic designs with the syllabic reading value **a** depicts "Flowing Water (with Shells some of which are Transversally Cut)", while the other represents "Stagnant Water (Reservoir with Similarly Depicted Shells)" (Fig. 2). Both graphic designs refer to the idea of water and the syllabic value of the sign is acrophonically derived from the Nahuatl word *ātl* 'water'. One of the syllabic

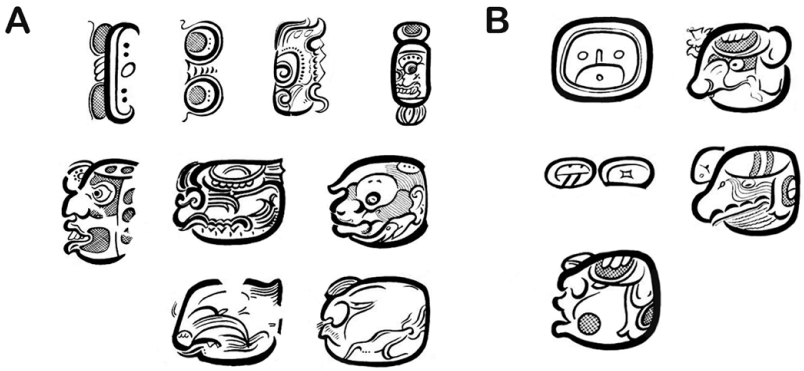

Figure 1. Allographs in Maya hieroglyphic writing. A. Different signs with the phonetic reading value '**u** found on the Tablet of the 96 Hieroglyphs, Palenque, Mexico. B. Different word-signs for '**AJAW** 'lord, king' found on the same tablet. After Simon Martin's drawing with his permission.

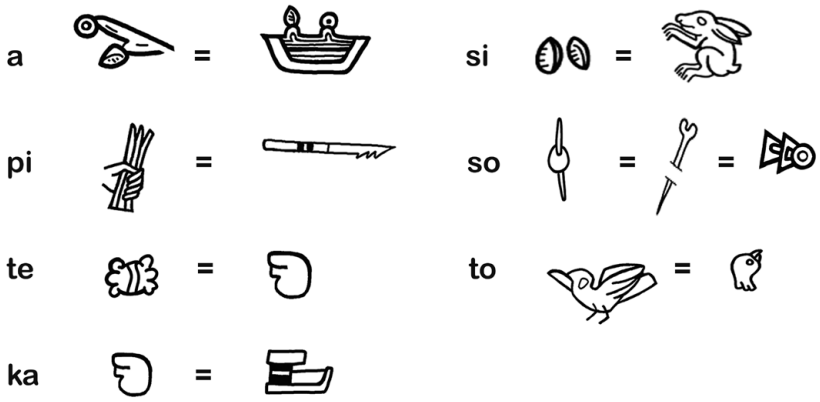

Figure 2. Allographs and graphic variants of **CV** phonetic signs in Nahuatl hieroglyphic writing. The sign "Mouth" is polyvalent; it is used with two different syllabic values—**ka** and **te**. Drawings by the author.

signs **so** depicts a "Threaded Bead", another one depicts "(Something) Pierced by a Bone Awl" and the third one depicts a "Nose-Plug". The three graphic designs refer to the idea of *sōk* '(something) pierced'. Both "Bird Head" and "Bird (as a Whole)" have the syllabic value **to** related to the generic word for 'bird' in Nahuatl *tōtōtl*. The method of iconic formulae method can help us to distinguish between graphic variants of the same sign and allographs: in the case of graphic variants their verbal descriptions partially coincide. Applying this definition one can see that two graphic designs with the reading value **ka** in Nahuatl script depict two different objects: "Mouth" derived from *kamatl* 'mouth' and "Sandal" derived from *kaktli* 'sandals' (Fig. 2). These are allographs. In contrast, the graphic designs for the syllable **a** "Flowing Water" and "Stagnant Water" depict the same visual idea 'water', so they should be classified as graphic variants.

To recap, a *sign* is the relationship between a *graphic design* and a *reading value* assigned to it. In pictorial scripts, graphic designs depict recognisable objects that can be verbally described by means of their shared graphic designs, that is a shared iconic formula. If two similar graphic designs possess the same reading value and can be described by means of one iconic formula, they are *graphic variants* of one sign. If two graphic designs possess the same reading value but look very different and cannot be described by means of one iconic formula they are considered *allographs*.

METHODS

The method of *sign substitution* has been shown to be efficient for identifying graphic variants and allographs (Knorozov 1952: 116; Lounsbury 1984; Stuart 1987). The method consists of examining changes in the writing of the "presumed" same unit of script in identical contexts, where identical surroundings imply the same reading value of the signs in question. In the Rapa Nui case, I used Tablet P as my point of reference. The occurrence of a given sign on Tablet P (for example #A Seal) was compared with the occurrence (or substitution) of that sign in corresponding places on the other two tablets, H and Q. From a practical point of view, unique examples of substitution, and examples with the appearance of additional symbols before and after the sign in question, should not be considered. It is important to distinguish *complete* and *incomplete substitutions*. Incomplete substitutions are those that show interchange between two signs only in some particular contexts. An incomplete substitution does not imply identical, but rather similar, reading values of two signs. In Maya script, for example, incomplete substitutions between syllabic signs at the end of the words are restricted to the syllables that share the same consonant and differ in vowels; this kind of substitution is related to the loss of vowel length and glottalisation in the Late Classic Period and their representation by disharmonic spellings (Houston *et al.* 1998). Sometimes incomplete substitutions include functional graphic variants of signs. For example, in Maya script the so-called "Distance Number Introductory Glyphs" '*uhtiiy* '**u-ti-ya** prefers the syllabic sign '**u** of square form because two remaining signs **ti** and **ya** are elongated. That is why rare allographs of '**u** are frequently found in Distance Number Introductory Glyphs (see examples in Stuart 1990).

Sign substitutions often remind non-epigraphers of homonyms. Nevertheless, examples of substitutions in Maya script show that this is almost never the case. Probably this is because absolute homonyms are extremely rare in natural languages, which tend to eliminate instability resulting from homonymic conflict (Williams 1944).

Importantly, the same method of sign substitution can be used to prove that two graphic designs possess different reading values in spite of their visual resemblance. Two graphic designs with the same reading value are in free distribution so that the probability of sign substitution between two graphic designs A and B should be close to the probability obtained by multiplication of probabilities of occurrence for the designs A and B in the texts. If this condition is not satisfied, in the case of an infinitely large text it would be possible to prove that all graphic designs attested are allographs, because there always are errata and unrecognised differences of similar, but not identical contexts. Errata and unrecognised differences of contexts

result in *false substitutions*, that is, seeming equivalences between two signs that do not exist in the writing system under study. I will call this method for identification of seeming allographs the "*inverse sign substitution*". I also suggest the following practical criterion to avoid examples of false substitutions in graphic analysis: a substitution is considered reliable if at least two signs to the left of the sign in question, and two signs to the right, match in two texts under analysis. This criterion is particularly useful when passages of two different texts are compared. In the case of two long parallel texts, false substitutions are infrequent, though some examples when one or more signs are inserted are also attested in parallel texts.

In sum, a *sign* is the relationship between a *graphic design* and a *reading value* assigned to it. If two similar graphic designs systematically substitute for each other in identical contexts, they are considered *graphic variants* of one sign. If two similar graphic designs do not systematically substitute for each other in identical contexts, their resemblance is illusive and they are should be considered two different signs. One can call such graphic designs *false* or *seeming graphic variants*. If two similar graphic designs systematically substitute for each other in identical contexts, but look very different and cannot be described by means of one iconic formula, they are considered *allographs*.

DATA AND ABBREVIATIONS USED

The surviving Kohau Rongorongo texts provide us with many different testing areas for the study of substitutions. These include: (i) two lengthy parallel texts, one consisting of three inscribed artefacts—the Great St Petersburg Tablet, the Small St Petersburg Tablet and the Great Santiago Tablet (Kudrjavtsev 1949) and another one attested on the London Tablet and the recto side of the Small Santiago Tablet (Butinov and Knorozov 1956, 1957), as well as (ii) several attested lists (Barthel 1958; Butinov and Knorozov 1956, 1957), (iii) recurrent sign-groups shared by various texts (Butinov and Knorozov 1956, 1957; Horley 2007; Pozdniakov 1996), and (iv) highly structured text fragments (Guy 1982). Different versions of the two parallel texts seem to be almost exact copies of each other, while the parallel text fragments show a considerable degree of variation. Because of this, the present study is based mainly on the large parallel text discovered by Boris Kudrjavtzev (Kudrjavtzev 1949; Olderogge 1949). Following the Assyriological tradition, I suggest that the interlinearly ordered comparisons of these three texts be called the Kudrjavtzev collations (Fig. 3). The data from the other texts are used only when necessary.

In this paper, I use drawings by Paul Horley (2009, 2010, 2011), which were compared with drawings by Mikhail Kudrjavtsev (published in Olderogge 1949), Bodo Spranz (published in Barthel 1958), Steven Fischer (1997), and

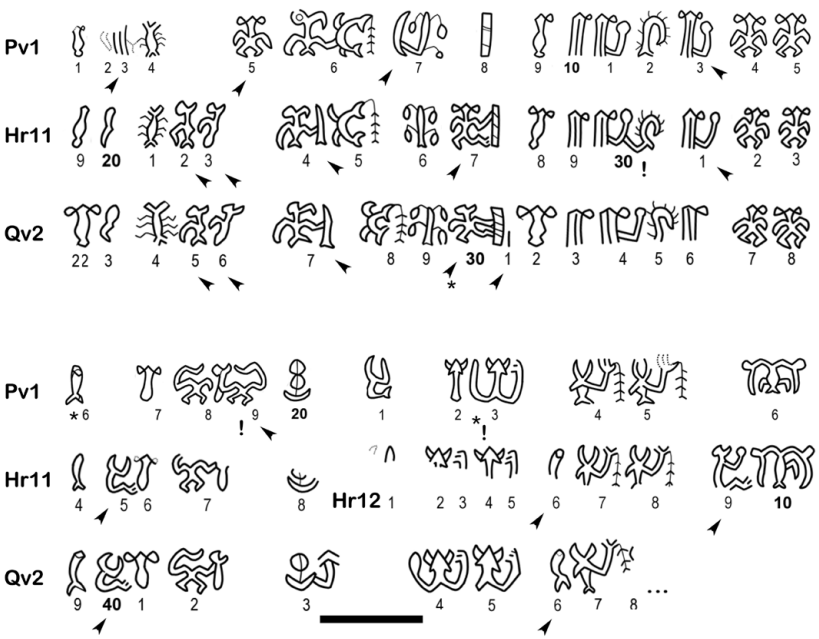

Figure 3. Fragment of Kudrjavtzev collations. An interlinearly ordered comparison of Line 1, verso on the Large St Petersburg Tablet (P) with parallels on the Large Santiago Tablet (H) and the Small St Petersburg Tablet (Q). Arrows indicate signs that are omitted in parallel texts, asterisks—significant graphic variations, exclamation marks—different ligature compositions and black squares – possible substitutions of a sign for two others. Numbers refer to the corresponding glyph counted from the beginning of the line, where the sign in question occurs. Note that alternative interlinear ordering is possible in at least two cases: Pv1:3 and Pv1:21-23. After Paul Horley's drawings with his permission.

my own drawings and photographs taken in the Peter the Great Museum of Anthropology and Ethnography, St Petersburg and in the British Museum, London. Satisfactory photographs of the Great Santiago Tablet have never been published, so I am particularly grateful to Rafal Wieczorek for the opportunity to work with his photographs of the cast of the Great Santiago Tablet hosted in the Father Sebastian Englert Anthropological Museum on Rapa Nui.

Following traditional conventions, I use capital letters to refer to Barthel's designations of the Kohau Rongorongo texts (Barthel 1958):

A (Tahua Tablet)
B (Aruku Kurenga Tablet)
C (Mamari Tablet)
D (Échancrée Tablet)
E (Keiti Tablet)
F (Chauvet Fragment)
G (Small Santiago Tablet)
H (Large Santiago Tablet)
I (Santiago Staff)
L (London Small Reimiro Wooden Gorget)
M (Large Vienna Tablet)
O (Berlin Tablet)
P (Large St Petersburg Tablet)
Q (Small St Petersburg Tablet)
R (Small Washington Tablet)
S (Large Washington Tablet)

Lowercase letters r and v stands for the sides, *recto* and *verso*, when the beginning of the text is identified; lowercase letters a and b are conventional designations of two sides for the cases when the beginning of the text is unknown. Designation of lines on the Santiago Staff (I) are given after Horley (2011). Numbers following lowercase letters indicate the corresponding line, and numbers following the colon sign ":" refer to the corresponding glyph counted from the beginning of the line, where the sign in question occurs. Here glyphs are writing units separated by a space; they can be individual signs or ligatures (connected writings) of several signs. The multiplication sign "×" indicates substitution between two parallel texts. For example, "Pr3:4 × Qr2:42" should be read as "a sign found in the fourth glyph of line 3 on the *recto* of the Great St Petersburg Tablet and a sign found in position 42 of line 2 on the *recto* of the Small St Petersburg Tablet substitute for each other". The question mark sign "?" shows that the identification of a graphic design is problematic, mostly because of poor preservation.

I use the method of iconic formulae to identify graphic designs and assign them descriptive nicknames. These are given in double quotation marks and listed in the Appendix. In this article every graphic design is assigned a capital letter, preceded by the number sign "#"; graphic variants are indicated by lowercase letters. "#Hb" should be read as "the variant b of graphic design H". It is important to emphasise that the specific nickname "Turtle" does not mean that the sign should be read as "turtle" in Rapanui, only that the sign looks like a turtle. To the extent possible, I am inclined to apply descriptive nicknames consistent with iconographic analysis of the signs in question but to date many signs have not received satisfactory iconographic interpretations.

The equality sign "=" and the non-equality sign "≠" are used to indicate equivalences and differences between readings values of two signs.

A final note is about ligatures (connected writings of two and more signs). Taking into account the complexity of the Kohau Rongorongo graphic system, and the great number of ligatures, sometimes it is impossible to determine whether a graphic design is a ligature of two signs or an independent sign, and sometimes it is impossible to determine what would be a ligature version of a particular sign. Because of this, I try to avoid discussions of ligatures and ligature variants of signs in this paper.

A CONSERVATIVE GRAPHIC ANALYSIS OF THE KOHAU RONGORONGO SCRIPT

Allographs

The graphic design #A represents a "Seal (Sitting on Its Tail)", alluding to the particular skeletal structure of sea lions and fur seals that allows them to sit in semi-upright positions. It is attested 13 times on P (Table 1), though mostly in ligatures (r1:25, v4:52, v5:28, v5:50, v6:53, v7:2, v7:43, v8:32, v9:48, v11:10). Ligature forms are slightly different visually and thus can be a different graphic design. The sign #A "Seal" is attested 13 times on P and 14 times is found in corresponding places of the two other texts, H and Q, an occurrence that is referred to here as "without substitution". Two times, however, instead of the sign #A, we see the sign #B "Blenny Fish", that is, the sign #B substitutes for the sign #A (Fig. 4; for images of the blenny in the Rapanui art see Horley and Lee 2012: 16, Fig. 14). Note here and below that the parallel text of the Kudrjavtzev collations is attested in all three versions (Tablets H, P and Q). This means that if a graphic design is attested on P, for example 10 times, it can theoretically be substituted 20 times for another graphic design. The sign #B is uncommon, and only attested six or seven times in the Kohau Rongorongo texts in total (Hv9:23,25; Gv6:21-24; ?Ia3:75).

There are two different types of Kohau Rongorongo signs according to their combinatorial properties. Some signs form sequences of the kind ABAB, BABA, AAAA and AAA in combinations with other signs; here A and B designate the same sign in combinations (Davletshin 2012a). Other signs do not form such sequences, tend to be used in isolation, and not as parts of sign groups (Davletshin 2016). Probably signs of the first type are phonetic signs (spelling syllables) and signs of the second type are word-signs (spelling lexical roots). The sign #A is attested in ABAB sequences twice (Pv10:33-36, Db1:4-5) and the sign #B is attested as ABAB (Hv9:23-26) and as AAAA (Gv6:21-24). Thus, the signs #A and #B belong to the same combinatorial class supporting the suggestion that they share their reading value.[6]

Table 1. Allographs on Tablet P and their substitutions on Tablets H and Q.

Sign #A "Seal" × Sign #A "Seal": Pr1:25 × Hr1:26 × Qr1:17, Pv4:52 × Hv2:40 × Qv5:25, Pv5:28 × Hv3:24 × Qv6:13, Pv5:50 × Hv4:2, Pv6:23 × Hv4:24 × Qv7:14, Pv6:53 × Hv5:2, Pv7:2 × Hv5:9, Pv7:43? × Hv6:4, Pv8:32 × Hv6:53, Pv11:10 × Hv9:63 See also: Pv9:48
Sign #A "Seal" × Sign #B "Blenny Fish": Pv10:33 × Hv9:23, Pv10:35 × Hv9:25
Sign #C "Two Vines Growing Up" × Sign #C "Two Vines Growing Up": Pv8:25 × Hv6:46 See also: Pr3:56
Sign #C "Two Vines Growing Up" × Sign #D "Tuber (a Kind of)": Pr2:40 × Hr2:44 × Qr2:18, Pv5:48 × Hv3:45, Pv6:50 × Hv4:51
Sign #D "Tuber (a Kind of)" × Sign #D "Tuber (a Kind of)": Pr3:59 × Hr4:16, Pr6:59 × Hr7:26 × Qr7:11
Sign #F "Berried Stem" × Sign #F "Berried Stem": Pr8:22 × Qr8:42, Pv1:7 × Hr11:26 × Qv2:29, Pv3:33 × Hv1:24 × Qv4:19, Pv4:9 × Hv1:40 × Qv4:36, Pv4:12 × Hv1:43, Pv4:20 × Hv2:8, Pv4:25 × Hv2:13, Pv6:27 × Hv4:28 × Qv7:18, Pv10:17 × Hv8:49, Pv11:2 × Hv9:54 See also: Pr5:69
Sign #G "Stem Stripped of Berries" × Sign #F "Berried Stem": Pv4:16 × Hv2:4, Pv4:46 × Hv2:34

The graphic design #C represents "Two Vines Growing Up" and #D, a "Tuber (of a Kind)" (Fig. 4). Note that the graphic design "Two Vines Growing Up" is different in distribution from "Two Vines Hanging Down" (see Pr4:39 × Hr4:57 × Qr4:38). The design #C is attested four times on P, and it is substituted four times for #D (Table 1). #D is attested two times on P ; in three cases it is used without such substitution in the parallel texts. Remarkably, the sign #C is not attested on Q and it is attested only once on H, so it is characteristic to the text P. Thus, #C and #D are allographs and possibly depict different part of the same plant. Both #C and #D are used in isolation as word-signs. Notably some tablets bear traces of two-stage carving,

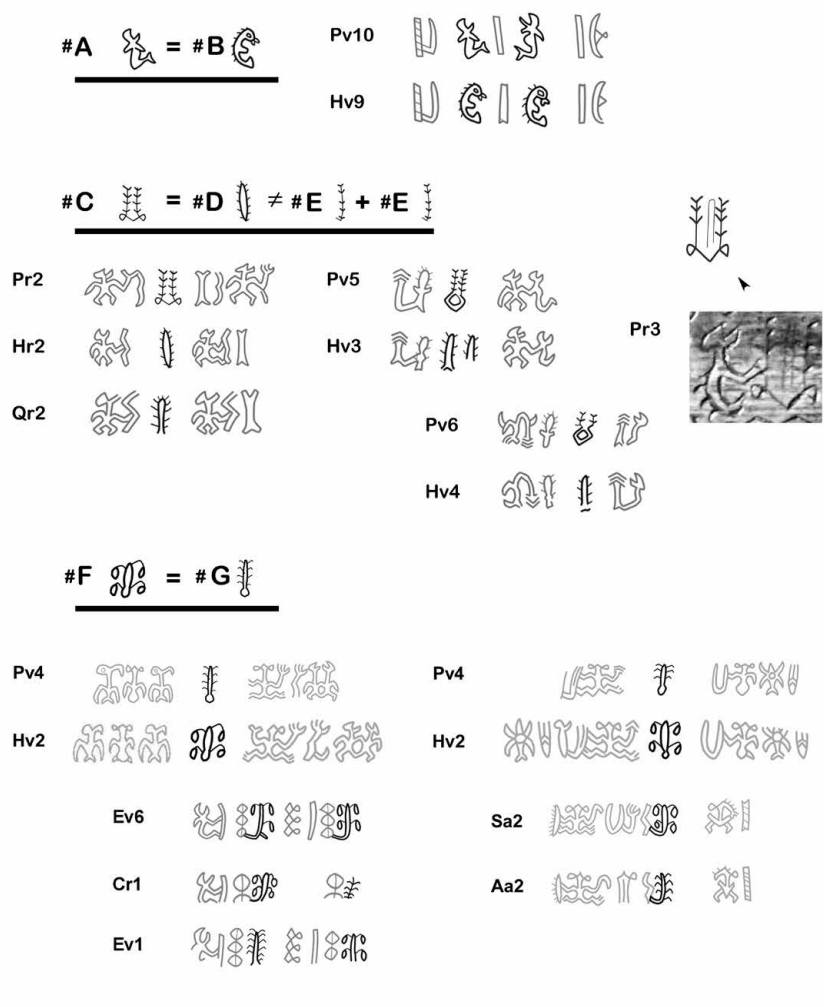

Figure 4. Allographs in the Kohau Rongorongo texts: Sign #A "Seal" = Sign #B "Blenny Fish", Sign #C "Two Vines Growing Up" = Sign #D "Tuber (a Kind of)" ≠ Sign #E "Leaved Vine Growing Up" + Sign #E "Leaved Vine Growing Up", Sign #F "Berried Stem" × Sign #G "Stem Stripped of Berries". After Paul Horley's drawings, with his permission, and a photograph of the Great St Petersburg Tablet by the author.

pre-incising with an obsidian flake and posterior contour enhancement with a shark tooth (Fischer 1997: 388-9; Horley 2009). Sometimes signs originally incised with an obsidian flake were corrected and/or replaced with other signs during a second stage of writing. On Pr3:56 the pre-incised contours of a sign #D can be seen inside the sign #C (Fig. 4). These findings may indicate that #C and #D have the same reading value. If so, the scribe may have substituted one sign for the other during the second stage of writing.

It is possible to suggest that the design #C, "Two Vines Growing Up", are two signs #E "Leaved Vine Growing Up" written together as a ligature. Therefore #D is a word-sign of the structure $C_1V_1C_1V_1$ and E is a syllabic sign C_1V_1; here C stands for a consonant and V for a vowel, and the subscript number indicates whether or not the consonants or vowels are identical. Nevertheless, I could not find any plant names in Rapanui or proto-Eastern-Polynesian of the structure $C_1V_1C_1V_1$ (see Englert 1978; Greenhill and Clark 2011). #C on Pv5:48 is substituted for two identical signs #D on Hv3:45-46, the last of which is on the edge of the tablet and damaged; in other words, what is written as #C in the text P is written as #D + #D in the text H. Rhetorical repetitions of words, which abound in traditional Polynesian narratives, is a likely explanation for this (Davletshin 2012c).

The graphic design #F represents a kind of plant with berries or round leaves "Berried Stem" and the graphic design #G is a "Stem Stripped of Berries" (Fig. 4). The design #G is attested two times on P, it is substituted three times for #F (Table 1). #F is attested 10 times on P and 14 times is used without substitution. #F and #G substitute for each other several times in the parallel fragments on the tablets A, C, E and S (Fig. 4). #G is a very uncommon sign but it is possible to show that it possesses the same reading value as #F, thanks to the substitutions attested. #F behaves as a word-sign but it is difficult to maintain the same claim about #G due to its rarity. Probably the designs #F and #G depict the same plant in two different ways.

Graphic Variants

The graphic design #H represents "Turtle". Sometimes the turtle's tail is depicted (#Hb "Tailed Turtle"), its plastron is shown (#Hc "Overturned Turtle"), its mouth is open (#Hd "Gaping Turtle"), the back flippers are missing (#He "Turtle, Without Back Flippers"), one of flippers is clipped (#Hf "Turtle, One Flipper Clipped") or its belly is shown as hollow (#Hg "Turtle, Hollow Belly") (Fig. 5). On one occasion, the turtle sign is carved with a tail and plastron, which in the suggested system will require the simultaneous use of two characterising letters, #Hbc. The total number of occurrences for the sign #H "Turtle" on P is 25, with two problematic cases where it is difficult to be sure about identification of the sign (Pv10:19,

Pv10:21). #Hb, #Hd and #Hg are attested only once each and #Hf twice. The graphic variant #Hg is not attested on P and only once on Q. In other words, the graphic variants #Hb, #Hd, #Hf and #Hg are very uncommon. The variant #Hc "Overturned Turtle" is attested four times on P and once on Q, that is #Hc is the characteristic variant of the text P. The variant #He "Turtle, Without Back Flippers" is attested seven times on P and three times on H; specifically this graphic variant is not used by the carver of the Tablet Q. In the three texts, these graphic variants of the "Turtle" sign are found in free distribution (Table 2): #Hb is attested once and once it is substituted for another variant, #Hc is attested four times and four times it is substituted for other variants, #Hd is attested once and once it is substituted for another variant, #He is attested seven times and seven times it is substituted for other variants, #Hf is attested twice and twice it is substituted for another variant, once #Hg substitutes for #Hf, and once two designs #Hb and #Hc co-occur (Pv7:44). It is clear that one sign has seven different variants and all of them depict the same subject, a turtle. The sign "Turtle" behaves as a word-sign.

The graphic design #I represents a "Head? on a X-shaped Base" and #Ib is a "Head? on an Angular Pedestal" (Fig. 5). Two graphic variants freely substitute for each other (Table 2): #I is attested four times on P, five times no substitutions are found in the parallel texts and three times it is substituted for Ib. Interestingly, the graphic design #I (Fig. 5) never substitutes for the visually similar design #J representing a "Sprout? on a X-shaped Base" which is found in free distribution with #Jb "Sprout? on an Angular Pedestal" (Table 2): #J is attested six times on P; five times no substitutions are found in the parallel texts and three times it is substituted for #Jb. A recently published paper (Wieczorek and Horley 2015: 132; see also Fig. 5) has shown that the only problematic example of the substitution between #I and #J (Ma2:25) is an artefact of inaccurate drawings. One can suspect that the graphic designs "Angular Pedestal", "X-shaped Base", "Head?" and "Sprout?" are independent signs with their own reading values which combine with one another to spell certain words. Simple statistical observations rule out this possibility; none are attested in combinations with other signs and none are used independently. An exception is the graphic design "Head?" which may be attested independently (Aa8:76, Aa8:78, etc.) and in combination with other signs (Hr7:34, Pr3:25, etc.). This anomaly strongly suggests that the graphic design "Head?" by itself on one the hand, and "Head? on an Angular Pedestal/X-shaped Base" on the other, belong to two different signs with two different reading values. All examples of the graphic element "Angular Pedestal" are found on Q. One can suspect that the graphic element "Angular Pedestal" and "X-shaped Base" refer to the same object, while "Head?" and "Sprout?" are differential graphic elements of the two signs. Unfortunately, it is not clear what "Pedestal",

Table 2. Graphic variants on Tablet P and their substitutions on Tablets H and Q.

Sign #H "Turtle" (#b—"Tailed Turtle", #c—"Overturned Turtle", #d—"Gaping Turtle", #e—"Turtle, Without Back Flippers", #f—"Turtle, One Flipper Clipped", #g—"Turtle, Hollow Belly"): Pr1:8(#c) × Hr1:9, Pr1:12(#f) × Hr1:13, Pr1:21 × Hr1:22 × Qr1:14, Pr4:60 × Hr5:18 × Qr5:8, Pr6:35(#e) × Hr7:5 × Qr6:37, Pr8:3(#e) × Qr8:8(#g), Pr11:13 × Qv2:1, Pr11:14 × Qv2:2(#c), Pv2:20(#f) × Qv3:7, Pv4:14(#e) × Hv2:2, Pv4:47(#e) × Hv2:35 × Qv5:18, Pv5:9 × Hv3:3 × Qv5:34, Pv7:44(#bc) × Hv6:5, Pv7:46(#c) × Hv6:7, Pv8:26(#e) × Hv6:47(#e), Pv8:42(#d) × Hv7:7, Pv8:44 × Hv7:10, Pv8:46 × Hv7:13, Pv9:4(#e) × Hv7:33(#e), Pv9:10(#c) × Hv7:40, Pv9:21 × Hv7:52(#e), Pv9:51(#e) × Hv8:32 See also problematic examples: Pv10:19(#e)? × Hv8:51(#e), Pv10:21(#e)? × Hv9:1(#e)-2 See also: Pv9:37
Sign #I "Head? on a X-shaped Base" (#Ib—"Head? on an Angular Pedestal"): Pr2:31 × Hr2:36 × Qr2:10(#b), Pr2:36(?) × Hr2:41(?) × Qr2:15(?#b), Pr7:9 × Hr7:39 × Qr7:23(#b), Pr9:27 × Hr10:14, Pv8:51 × Hv7:16
Sign #J "Sprout? on a X-shaped Base" (#Jb—"Sprout? on an Angular Pedestal"): Pr6:55 × Hr7:21 × Qr7:6, Pr7:14 × Hr7:44 × Qr7:28(#b), Pr8:25 × Qr8:45(#b), Pr9:36 × Hr10:23, Pr9:42 × Hr10:29, Pv3:9 × Qv3:43(#b)
Sign #K "Calabash" (#Kb—"Hollow Calabash"): Pr7:5 × Hr7:36 × Qr7:20, Pv3:8 × Hv1:6 × Qv3:42, Pv5:4(#b) × Hv2:46(#b) × Qv5:29, Pv7:13 × Hv5:29(#b) × Qv8:11, Pv7:15 × Hv5:31(#b) × Qv8:13, Pv7:17 × Hv5:33(#b) × Qv8:15, Pv7:26 × Hv5:44(#b) × Qv8:26, Pv7:27 × Hv5:45(#b) × Qv8:28, Pv8:28(#b) × Hv6:49(#b), Pv8:41 × Hv7:6
Sign #L "Gourd": Pr6:31 × Hr7:1 × Qr6:33, Pr8:24 × Qr8:44, Pv9:8 × Hv7:38, Pv9:19 × Hv7:51, Pv9:48 × Hv8:29

"X-shaped Base" and "Sprout" depict. The two signs #I and #J seem to be word-signs (but see Fa4:3-6 for #J).

The graphic design #K represents a "Calabash" and #Kb represents a "Hollow Calabash" (Fig. 5). They freely substitute for each other: #K is attested eight times on P, ten times no substitutions are found in the parallel texts and five times it is substituted for #Kb. #Kb is attested twice on P, twice it is substituted for #Kb and once for #K (Table 2). The graphic element

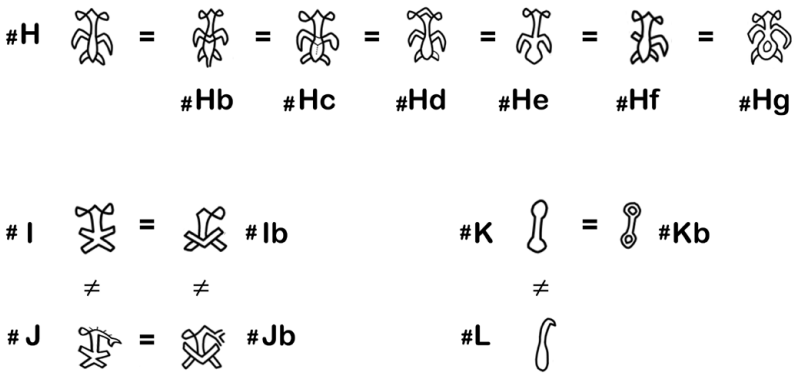

Figure 5. Graphic variants in the Kohau Rongorongo texts: Sign #H "Turtle" = #Hb "Tailed Turtle" = #Hc "Overturned Turtle" = #Hd "Gaping Turtle" = #He "Turtle, Without Back Flippers" = #Hf "Turtle, One Flipper Clipped" = #Hg "Turtle, Hollow Belly", Sign #I "Head? on a X-shaped Base" = #Ib "Head? on an Angular Pedestal Pedestal" ≠ Sign #J "Sprout? on a X-shaped Base" = #Jb "Sprout? on an Angular Pedestal", Sign #K "Calabash" = #Kb "Hollow Calabash" ≠ Sign #L "Gourd". After Paul Horley's drawings with his permission.

"Hollow" is never found on Q. A very similar graphic design, #L "Gourd", represents a "calabash with slightly narrowed upper part" (Fig. 5). #L never substitutes for #K "Calabash" and #Kb "Hollow Calabash" (Table 2): #L is attested five times on P and occurs without substitution six times. #L "Gourd" never includes the graphic element "Hollow", so this graphic element is characteristic of the sign #K "Calabash". Remarkably, #K is likely to be a phonetic sign according to its properties (Pv7:13-16 × Hv5:29-32 × Qv8:11-14) and #L is not (see Ab6:42-55).

Seeming Graphic Variants

There are many different graphic designs depicting fish on the three tablets: #M "Fish (Head Upwardly)", #N "Spiny Fish", #O "Fish Upside Down", #P "Swimming Fish", #Q "Fish on Fishing Line" and #R "Catch of Fish (Fishes Strung on A Cord)" (Fig. 6). These are different signs because they do not substitute for each other: #M is attested 17 times on P and occurs without substitution 27 times in parallel texts. #N is attested 11 times on P and occurs without substitution 17 times. #O is attested five times on P and occurs without substitution 13 times, #P is attested twice on H and is occurs without substitution three times, #Q is attested six times on P and occurs

without substitution nine times, and #R is attested three times on P and occurs without substitution five times (Table 3). One example of the sign #N (Pr10:39) is so obliterated that only its general outlines can be seen. There are three problematic examples of substitution between #M and #N which require discussion: Pr10:15(#M) × Qv1:9(#N) and Pr10:37(#M) × Hr10:48(#N) × Qv1:33(#N). They can be analysed as examples of incomplete substitution. However, three examples are restricted to two contexts and in both cases there are some other changes in neighbouring signs; in other words, they might represent examples of false substitution. #P on Pv1:16 rather looks like #M, but it is found on the very edge of the tablet, which makes it difficult to differentiate the two graphic designs and would make it difficult to carve the sign. Besides this, the slight variations in the text between Pv1:16 and Hr11:34 × Qv2:39 suggest false substitution as an alternative explanation. The signs #M, #N and #Q are syllabic signs, while #P and #R are word-signs (for ABAB and AAA combinations see Br7:4-5, Ca5:26-28, Db4:7-8, Er6:37-39, Ev2:17-20, Gv5:14-16, Ma2:9-14, Rb4:3-6, Sb3:30-32). It is difficult to be sure about the type to which the sign #O belongs because the only likely example of #OOO may involve another graphic design (?Ma1:14-16). It is possible to analyse #N as a combination of two signs written in ligature "Spikes" and "Fish". However, the sequence #NNNN found on Rb4:3-6 rules out this possibility and shows that #N is a syllabic sign.

Different graphic elements accompany the signs #M-R: #b—"Fish, Gills", #bb—"Fish, Double Gills", #c—"Fish, Bulbed Tail", #d—"Fish, Lateral Line", #e—"Fish, Extra Fins", #f—"Fish, Without Head". None of them are discriminating graphic elements and sometimes they are combined (Table 3). The graphic element #c is restricted to the signs #M and #N and #f to the sign #O. Remarkably, the element #e is never attested as part of the sign #R and seldom (only twice) as part of the sign #P, probably due to the lack of space. The number of fishes strung on a cord in the sign #R "Catch of Fish" can be four (five of eight examples) or three (two of eight examples found on P). One example of "two fishes strung" (Hv9:53) can be explained by the lack of space at the end of the text.

Surprisingly, Barthel's catalogue (1958) recognises only three different fish signs between the discussed examples: "Fish, Gills" (700), "Fish, Without Gills" (710) and "Fish on a Fishing Line" (711). Seven graphic designs depicting fish (#B, #M-R) are attested in the three parallel texts under consideration and have been discussed here, but even more signs depicting fish can be found in other Kohau Rongorongo texts.

Orientation according the vertical axis, "Up" versus "Down", seems to be an important principle of the Kohau Rongorongo graphic system. Two similar graphic designs, #E "Leaved Vine Growing Up" and #S "Leaved Vine Hanging Down", have been never recognised as independent signs in the literature (Fig. 6). Nevertheless, they never substitute for each other and

belong to different contexts: #E is attested five times on P and occurs 10 times without substitution, while #S is attested 42 times on P and occurs 72 times without substitution (Table 3). Without doubt these two signs are assigned two different reading values in the script. They behave as syllabic signs (see ABAB for #E: Aa1:39-40, Cb8:9-10, Gr5:29-30, Pr5:18-19 × Hr5:35-36 × Qr5:26-27 and for #S: ?Bv3:43-Bv4:1, Bv4:4-5, ?Gv8:29-30, ?Rb4:12-13). The graphic designs #T "Arm (Pointing Up)" and #U "Arm Pointing Down" follow the same principle of the vertical axis (Fig. 6). Note that I distinguish two different graphic designs here: "Hand" and "Arm", the latter including an "Elbow" in its graphic design. The sign #U is extremely rare; it is attested only once on P and occurs once without substitution and I do not know of other non-ligature examples of the sign in question (Pv8:60 × Hv7:24). Ligature examples of graphic design may correspond to another sign (see Br5:36, Bv12:28, 41). The sign #T is attested 13 times on P and occurs 14 times without substitution (Table 3). #T seems to be a syllabic sign (for ABAB see Ev3: 14-17, Ev8:2-3, ?Fa4:3-6, Ma2:9-14, Ma5:8-11, Oa8:18-21, Pr24-26). It is difficult to identify the class of the sign #U due to its rarity. Note also that the graphic design "Fish Upside Down on Fishing Line", which is attested only four times on C7-9, is contrasted by the context with the sign #Q "Fish on Fishing Line" (Guy 1990: 140) and probably represents another sign with a different reading value.

The only difference between two very similar graphic designs #V "Comb" and #W "Wide-Handled Comb" is a little swelling on the lower end of #W (Fig. 6). It is unclear what these two signs depict and "Comb" is just a nickname here. The sign #V is commonly interpreted as *kōmari* 'female genitalia, vulva' based on comparison with the well-known Rapa Nui rock-art motif (Geiseler 1883 in Ayres and Ayres 2005: 58; Lee 1992: 35; Métraux 1940: 409; Thomson 1891: 517). Paul Horley (pers. comm., 2014) has pointed out to me that the sign on the tablets is oriented the other side up, so that it is unlikely to represent female genitalia. Besides, there is a sign which depicts *kōmari* and resembles the corresponding rock-art motif; see for example, La:33, Ia9:88 and Ia14:9. Two graphic designs #V and #W never substitute for each other (Table 3): #V is attested 16 times on P and occurs 22 times without substitution, #W is attested seven times on P and occurs 12 times without substitution. They belong to different contexts and neither of them participates in ABAB sequences.

The graphic designs #X "Worm" and #Y "Eel" represent snake-like living creatures; #X "Worm" differs from #Y "Eel" by its wriggling body (Fig. 6). Two graphic designs #X and #Y never substitute for each other (Table 3): #X is attested five times on P and occurs 10 times without substitution, #Y is attested four times on P and occurs five times without substitution. A very similar graphic design #Z "Hand-Tailed Eel" is attested twice in the three texts (Pv6:25 × Hv4:26) and once it seems to be substituted for #Y (Qv7:16).

Table 3. Seeming graphic variants on Tablet P and their substitutions on Tablets H and Q.

Sign #M "Fish" (#b—"Fish, Gills", #bb—"Fish, Double Gills", #c—"Fish, Bulbed Tail", #d—"Fish, Lateral Line", #e—"Fish, Extra Fins"):
Pr1:7(#bc) × Hr1:8(#b), Pr1:45(#b) × Hr1:47(#b), Pr2:51(#b) × Hr2:53(#b) × Qr2:27(#b), Pr4:25(#bbe) × Hr4:44(#b) × Qr4:24(#b), Pr4:35(#b) × Hr4:52(#b) × Qr4:33(#b), Pr6:17(#bce) × Hr6:53(#b) × Qr6:19(#b), Pr8:51(#bde) × Hr9:24(#b) × Qr9:23(#b?), Pr9:32(#bce) × Hr10:19(#b), Pr9:38(#bc) × Hr10:25(#b), Pr11:24(?) × Hr11:9(#b) × Qv2:12(#b), Pv3:30(#bb) × Hv1:21(#b) × Qv4:16(#b), Pv4:6(#bb) × Hv1:37(#b) × Qv4:32(#b), Pv4:34(#b) × Hv2:22(#b) × Qv5:5(#b), Pv6:28(#bb) × Hv4:29(#b) × Qv7:19(#bb?), Pv7:64(#bc) × Hv6:21(#b), Pv8:1(#bbc) × Hv6:22(#b), Pv8:29(#bc) × Hv6:50(#b)
Sign #N "Spiny Fish" (#b—"Fish, Gills", #c—"Fish, Bulbed Tail", #e—"Fish, Extra Fins"):
Pr8:38(#bce) × Hr9:10(#b) × Qr9:9(#b?), Pr10:13(#b) × Qv1:10(#b), Pr10:26(#b) × Qv1:20(#b), Pr10:27(#b) × Qv1:21(#b), Pr10:29(#b) × Hr10:40(#b) × Qv1:25(#b), Pr10:31(#b) × Hr10:42(#b) × Qv1:27, Pr10:33(#b) × Hr10:44(#b) × Qv1:29, Pr10:35(#b) × Hr10:46(#b) × Qv1:31, Pr10:39?(#b?) × Hr11:2(#b) × Qv1:35(#b), Pv9:42(#bc) × Hv8:23(#b), Pv9:43(#bc) × Hv8:24(#b)
Sign #M "Fish" × Sign #N "Spiny Fish" (problematic examples, #b—"Fish, Gills"):
Pr10:15(#Mb) × Qv1:9(#Nb), Pr10:37(#Mb) × Hr10:38(#Nb) × Qv1:23(#N?)
Sign #O "Fish Upside Down" (#b—"Fish, Gills", #bb—"Fish, Double Gills", #f—"Fish, Without Head"):
Pv5:45(#bbf) × Hv3:42(#b), Pv6:16(#bbf) × Hv4:18(#bb) × Qv7:8(#bbf), Pv6:45(#bbf) × Hv4:46(#bbf) × Qv7:36(#b), Pv7:37(#b) × Hv5:55(#bbf), Pv8:7(#b) × Hv6:28(#b) × Qv9:13(#b?)
Sign #P "Swimming Fish" (#b—"Fish, Gills"):
Pv1:16?(#b) × Hr11:34 × Qv2:39(#b) See also: Hr12:6(#b) × Qv2:46(#b)
Sign #Q "Fish on Fishing Line" (#b—"Fish, Gills"):
Pr2:61 × Hr3:5 × Qr2:36, Pr4:10 × Hr4:31 × Qr4:12(#b), Pr4:13 × Hr4:33 × Qr4:14, Pr8:5 × Hr8:37 × Qr8:12, Pv8:65(#b) × Hv7:29 See also: Pr6:49

Sign #R “Catch (of Fish)”: Pv7:26(3 fishes) × Hv5:44 × Qv8:26, Pv7:27(3 fishes) × Hv5:45 × Qv8:28, Pv11:1(?) × Hv9:53(2 fishes)
Sign #E “Leaved Vine Growing Up” × Sign #E “Leaved Vine Growing Up”: Pr5:18 × Hr5:35 × Qr5:26, Pr5:19 × Hr5:36 × Qr5:27, Pr5:22 × Hr5:39 × Qr5:31, Pr5:24 × Hr5:41 × Qr5:34, Pr6:15 × Hr6:51 × Qr6:17 See also: Hr4:13
Sign #S “Leaved Vine Hanging Down” × Sign #S “Leaved Vine Hanging Down”: Pr1:16 × Hr1:17 × Qr1:9, Pr1:17 × Hr1:18 × Qr1:10, Pr1:18 × Hr1:19 × Qr1:11, Pr1:24 × Hr1:25 × Qr1:16, Pr1:25 × Hr1:26 × Qr1:17, Pr1:26 × Hr1:27 × Qr1:18, Pr2:54 × Hr2:56 × Qr2:30, Pr2:57 × Hr3:1 × Qr2:32, Pr3:8 × Hr3:16 × Qr3:2, Pr3:19 × Hr3:27 × Qr3:13, Pr3:22 × Hr3:30 × Qr3:17, Pr3:23 × Hr3:31 × Qr3:18, Pr3:25 × Hr3:32 × Qr3:19, Pr3:26 × Hr3:33 × Qr3:20, Pr3:27 × Hr3:34 × Qr3:21, Pr3:28 × Hr3:35 × Qr3:22, Pr3:29 × Hr3:36 × Qr3:23, Pr3:30 × Hr3:37 × Qr3:24, Pr3:31 × Hr3:38 × Qr3:25, Pr3:34 × Hr3:42 × Qr3:29, Pr3:36 × Hr3:43 × Qr3:30, Pr3:39 × Hr3:48 × Qr3:35, Pr3:40 × Hr3:49 × Qr3:36, Pr3:42 × Hr3:50 × Qr3:37, Pr3:63 × Hr4:20, Pr4:38 × Hr4:54 × Qr4:35, Pr7:1 × Hr7:32 × Qr7:16, Pr7:18 × Hr7:48 × Qr7:33, Pr7:54 × Hr8:34, Pr8:3 × Qr8:9, Pr11:24 × Hr11:9 × Qv2:12, Pv1:6 × Hr11:25 × Qv2:28, Pv1:24 × Hr12:7 × Qv2:47, Pv1:25 × Hr12:8, Pv3:13 × Qv3:47, Pv7:11? × Hv5:22 × Qv8:4, Pv8:56 × Hv7:20, Pv8:58 × Hv7:22, Pv8:60 × Hv7:24, Pv8:63 × Hv7:27, Pv9:11 × Hv7:40 See also: Pr3:54
Sign #T “Arm (Pointing Up)” × Sign #T “Arm (Pointing Up)”: Pr3:12 × Hr3:21 × Qr3:6, Pr3:14 × Hr3:23 × Qr3:8, Pr3:16 × Hr3:25 × Qr3:10, Pr7:54 × Hr8:34, Pv4:18 × Hv2:6, Pv4:8 × Hv2:6, Pv6:44 × Hv4:45 × Qv7:35, Pv8:63 × Hv7:27, Pv9:52? × Hv8:33, Pv10:3 × Hv8:37 See also: Pr3:24, Pr3:25, Pv6:34, Hv8:35
Sign #U “Arm Pointing Down” × Sign #U “Arm Pointing Down”: Pv8:60 × Hv7:24
Sign #V “Comb” × Sign #V “Comb”: Pr1:3 × Hr1:4 × Qr1:4, Pr2:18 (twice) × Hr2:23 (twice), Pr2:18 × Hr2:23, Pr4:13 × Hr4:33 × Qr4:14, Pr6:38 × Hr7:8 × Qr6:40, Pr7:46 × Hr8:25, Pr7:50 × Hr8:28, Pr7:52 × Hr8:32, Pr7:59 × Qr8:5, Pr8:45 × Hr9:17 × Qr9:16, Pr9:29 × Hr10:16, Pv4:44 × Hv2:32 × Qv5:15, Pv4:49 × Hv2:37 × Qv5:20, Pv8:55 × Hv7:19, Pv8:64 × Hv7:28 See also: Hr11:4 × Qv1:37, Hr11:5 × Qv1:38

– Table 3 continued over page

Sign #W "Wide-Handled Comb" × Sign #W "Wide-Handled Comb": Pr4:17 × Hr4:37 × Qr4:17, Pr7:33 × Hr8:13, Pv7:19 × Hv5:35 × Qv8:17, Pv7:21 × Hv5:37 × Qv8:19, Pv7:22 × Hv5:38 × Qv8:20, Pv7:24 × Hv5:40 × Qv8:22, Pv11:47 × Hv10:38
Sign #X "Worm" × Sign #X "Worm": Pr5:12 × Hr5:29 × Qr5:20, Pr5:13 × Hr5:30 × Qr5:21, Pr5:14 × Hr5:31 × Qr5:22, Pr5:15 × Hr5:32 × Qr5:23, Pr6:34 × Hr7:4 × Qr6:36
Sign #Y "Eel" × Sign #Y "Eel": Pr5:52 × Hr6:6, Pv5:27 × Hv3:22 × Qv6:10, Pv5:49 × Hv4:1, Pv6:52? × Hv5:1?
Sign #Z? "Hand-Tailed Eel" × Sign #Z? "Hand-Tailed Eel": Pv6:25 × Hv4:26 × Qv7:16(?)

It should be noted that the sign #Y on Q is obliterated, with only its general outlines preserved. It is difficult to assert that the graphic design #Z "Hand-Tailed Eel" is an independent sign due to its rarity. It can be a graphic variant of the sign #Y or a ligature of the sign #Y with the sign "Hand", but the fact that two known examples of #Z are restricted to the same context suggests that #Y and #Z are two different signs. The sequence #XXXX, which is attested 4 times (Aa1:5-8 × Pr5:12-15 × Hr5:32 × Qr5:23), implies that #X is a syllabic sign. The sign #Y behaves as a word-sign (see Ab6:42-55).

* * *

Application of the technical terms and concepts developed in graphic analysis of other pictorial writing systems to the surviving Kohau Rongorongo texts leads us to promising results. First, it has been shown for the first time that some visually different signs of the Kohau Rongorongo script have the same reading value. Signs of this type (allographs) are relatively uncommon in the Kohau Rongorongo script in contrast to, for example, Maya writing. Second, several graphic designs that were previously thought of as variants of more frequent signs have been identified as independent signs. Some of them are very rare in the inscriptions. Probably a thorough graphic analysis would considerably increase the total number of signs attested in the Kohau Rongorongo writing system. Some graphic variants are limited to particular tablets; they probably pertain to certain scribes or schools of scribes or could be chronological variations of the script (see Wieczorek 2011b). Some graphic variants are restricted to contexts where there is a lack of space. It

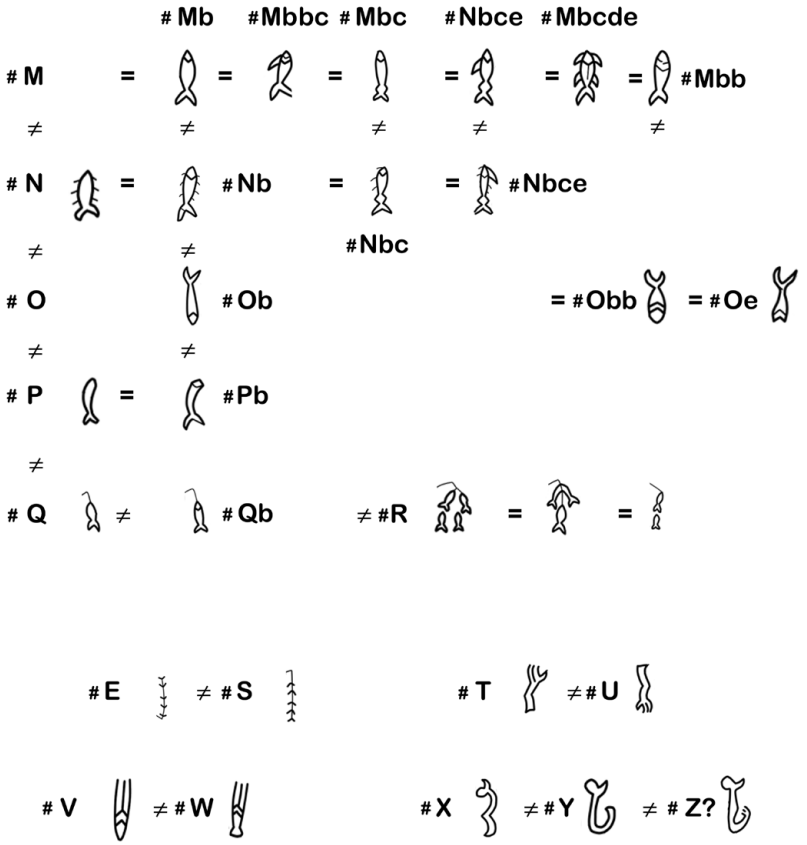

Figure 6. Seeming graphic variants in the Kohau Rongorongo texts: Sign #M "Fish" ≠ (#b "Fish, Gills", #bb "Fish, Double Gills", #c "Fish, Bulbed Tail", #d "Fish, Lateral Line", #e "Fish, Extra Fins") ≠ Sign #N "Spiny Fish" (#b "Fish, Gills", #c "Fish, Bulbed Tail", #e "Fish, Extra Fins") ≠ Sign #O "Fish Upside Down" (#b "Fish, Gills", #bb "Fish, Double Gills", #f "Fish, Without Head") ≠ Sign #P "Swimming Fish" (#b "Fish, Gills") ≠ Sign #Q "Fish on Fishing Line" (#b "Fish, Gills") ≠ Sign #R "Catch of Fish"; Sign #E "Leaved Vine Growing Up" ≠ Sign #S "Leaved Vine Hanging Down"; Sign #T "Arm (Pointing Up)" ≠ Sign #U "Arm Pointing Down"; Sign #V "Comb" ≠ Sign #W "Wide-Handled Comb"; Sign #X "Worm" ≠ Sign #Y "Eel" ≠ Sign #Z? "Hand-Tailed Eel". After Paul Horley's drawings with his permission.

is the context that is important in graphic analysis because graphic analysis is concerned with signs that possess reading values, that is meanings, which actualise in certain graphic environments. Every violation of the free distribution statistics of two graphic designs that supposedly represent the same sign should be addressed in detail. If such violations cannot be explained in a satisfactory way, it would indicate that graphic analysis alone is insufficient. Sometimes violations can be explained by the fact that the available data is scarce (i.e., sample size effects). Third, sometimes variations of the same graphic design with corresponding verbal descriptions help us to understand the objects depicted by signs. The method of iconic formulae may lay down a foundation for the future iconographic analysis of highly pictorial signs of the Kohau Rongorongo script.

My aim here was not to identify as many allographs and independent signs as possible but rather to show how the mechanics of the Kohau Rongorongo graphic system work. Because of this, I have excluded graphically complex signs, such as those depicting birds and human beings. I have also restricted myself to the three large parallel texts. The results presented here can be easily applied to and verified with data from the other inscribed tablets. I suggest that the methods of graphic analysis outlined here—sign substitution, inverse sign substitution and iconic formulae—should be carefully applied to every single sign of the Kohau Rongorongo script and the results of such application should be constantly re-checked and revised. Graphic analysis of individual signs and their identifications should not be freely assumed, but explicitly presented and justified. It is important to bear in mind that sometimes examples of substitution are lacking or their number is insufficient, so we cannot be sure with the data at our disposal whether two similar graphic designs are indeed variants of the same sign or if they belong to two different signs with two different reading values.

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NOTES

1. I dedicate my article to Boris Kudrjavtzev who in 1938, around the age of 16, made one of the most important Kohau Rongorongo discoveries to date: the same text is written on the Great St Petersburg Tablet, the Small St Petersburg Tablet and the Great Santiago Tablet (Zhamoida 1996: 1113). Boris recognised the significance of his discovery, which makes it possible to establish the reading order, and identify graphic variants, ligatures and word boundaries of the three texts, but tragically he died at a young age during World War II. Although he was not able to complete his studies, a very interesting 46-page manuscript was posthumously published (Kudrjavtzev 1949; Olderogge 1949). It is a crucial work for scholars working on the Kohau Rongorongo script, but unfortunately has never been translated into any European language. The miraculous birth from an egg referred to in this epigraph is a wide-spread heroic motif in Polynesia and in many other parts of the world.
2. The logosyllabic writing systems of the Far East (Chinese, Japanese, Jurchen, Khitan, Tangut, etc.) are similar graphically and thus undoubtedly derived from one original system. Several families of writings developed in the Near East (Cretan, Cuneiform, Egyptian, Luwian, including the Indus script) are different in external form, and typologically, so they cannot be derived from one source. The mere fact that different writing systems quickly developed in geographical proximity strongly suggests that the idea of writing was invented only once and afterwards other systems were developed by the people who were familiar with this idea (Gelb 1963). In my opinion, it is unclear which writing system of the Near East appeared first; the Cuneiform script and the Egyptian one are likely candidates. It is also unclear whether the idea of writing was independently invented in the Far East or was somehow introduced thereto from the Near East.
3. The following signs of Barthel's catalogue are considered allographs by Fedorova: 011=001, 041=040, 056=027, 081=008, 091=090, 102=003, 174=015, 205=204, 246=244, 356=244, 386=385, 421=430, 606=604, and 651=680 (Fedorova 1982: 42-70).
4. Jacques Guy (2006: 55) coined the odd term "alloglyphs" which are defined as variants of the same "glypheme", that is, the same letter. He also claims to borrow the term "glyph" from Mayanists. In Maya epigraphy "glyph" is an informal abbreviation for the term "hieroglyph", defined as a sign or a combination of several signs that are used to write a word. The basis for his claim that "the Russian School has been using the term grapheme to cover what is all at once graph, grapheme and allograph in Crystal's glossary" is also unclear, as is what he means by "the Russian School".
5. The term allography was originally introduced by analogy with the terms "phoneme" and "allophone" by Ernst Pulgram (1951). Unfortunately, the author makes use of a non-formal emic concept "letter" and does not distinguish two different phenomena which are called "allographs" and "graphic variants" in the present paper. This makes it impossible to use his definitions for graphic analysis of an undeciphered writing system.
6. The Rapanui word for 'seal' is *pakia* and 'blenny' is *pātuki*, suggesting the reading value **pa** for the signs under discussion.

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APPENDIX:
LIST OF SIGNS, THEIR DESCRIPTIVE NICKNAMES AND NUMBERS ACCORDING TO THOMAS BARTHEL'S CATALOGUE OF 1958

#A "Seal" – 730
#B "Blenny Fish" – 790
#C "Two Vines Growing Up" – ?30b
#D "Tuber (a Kind of)" – 22c
#E "Leaved Vine Growing Up" – 3a
#F "Berried Stem" – 34
#G "Stem Stripped of Berries" – ?73b
#H "Turtle" – 280
#I "Head? on a X-shaped Base/Pedestal" – 99
#J "Sprout? on a X-shaped Base/Pedestal" – 522
#K "Calabash" – ?74a
#L "Gourd" – 45, 46
#M "Fish" – ?700a
#N "Spiny Fish" – unrecognised as a graphic design, transcribed 700f
#O "Fish Upside Down" – ?710b
#P "Swimming Fish" – unrecognised as a graphic design
#Q "Fish on Fishing Line" – 711
#R "Catch of Fish" – unrecognised as a graphic design
#S "Leaved Vine Hanging Down" – 3b
#T "Arm (Pointing Up)" – 6
#U "Arm Pointing Down" – unrecognised as a graphic design, transcribed 6x
#V "Comb" – ?50
#W "Wide-Handled Comb" – unrecognised as a graphic design, transcribed 50
#X "Worm" – unrecognised as a graphic design, transcribed 440
#Y "Eel" – 451
#Z "Hand-Tailed Eel"? – unrecognised as a graphic design, transcribed 451

ABSTRACT

In a writing system with a large number of signs, in particular in the case of a pictorial script, some similarity of two graphic designs is an insufficient basis for considering them to have the same reading value. This paper seeks to apply concepts developed in the graphic analysis of other pictorial writing systems to the still undeciphered script of Rapa Nui (Easter Island). The following technical terms are adapted and defined from both theoretical and practical points of view: sign, reading value, graphic design, allograph, graphic variant, seeming graphic variant, iconic formula, and complete, incomplete and false substitution. A modified version of the substitution method

(method of inverse sign substitution) is proposed for verifying equivalences and differences between readings values corresponding to the graphic designs analysed in this paper. This method is based on the assumption that two graphic designs that possess the same reading value are in free distribution, so the probability of sign substitution between them should be close to the probability obtained by multiplying the probabilities of their occurrences in texts. Application of these technical concepts to the parallel texts discovered by Boris Kudrjavtzev shows that many graphically similar signs with different reading values have not been previously recognised. This conservative graphic analysis also has permitted the identification of allographs in the strict sense of the word, i.e., signs that look different but possess the same reading value. However, technically speaking, "allograph" in the strict sense of the word is an antonym for "graphic variant". It is suggested that the method of iconic formulae provides a useful foundation for future iconographic analysis of the highly pictorial signs of the Kohau Rongorongo script.

Keywords: Kohau Rongorongo script, Rapa Nui (Easter Island), logosyllabic writing systems, graphic analysis, allographs (homophonic signs), substitution method

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COSMOLOGY AND STRUCTURE: THE *TĀHUHU* IN THE 19TH-CENTURY *WHARE* MĀORI

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The *tāhuhu* is the ridgepole of the traditional Māori house or *whare.* It is a single beam that typically spans the length of the building, integrating the entire articulated timber frame. The *tāhuhu* is the New Zealand manifestation of a ubiquitous Polynesian building system that features ridge-beams and supporting posts (Austin 2001: 11-13). It has been detected archaeologically in both large and small pre-European houses (Leach *et al*. 2000: 94-95) and is strikingly present in the surviving large-scale meeting houses of the 19th century. This paper considers the *tāhuhu* both in the process of building and in its continuing role in the stability of the physical and social structure of the house. It is written largely from an architectural viewpoint, a viewpoint informed by the materiality and geometries of *whare* components resident in museums, and those that form part of *whare* in extant *marae* 'meeting grounds, community centre' complexes. The arguments here are also developed from the narratives and imagery of history, and the written and oral accounts of Māori ancestry and technology.

Māori construction of increasingly large *wharenui* 'meeting houses' in the second half of the 19th century was an architectural manifestation of wider concerns held by Māori about the loss of land and the threat of military action, both of which affected Māori culture in fundamental ways (Neich [1994] 2011: 110-11;Walker 2007: 167). House development also responded to meet the needs of missionary-led Christian rituals and subsequently of indigenous expressions of Christian worship that were seen as more relevant to some Māori.

As the meeting house became an object of group identity and pride it developed complex systems of representation to anchor the genealogical and social worlds of the *hapū* 'subtribe'. It is well known that in this sense, the meeting house allowed each person to trace their *whakapapa* 'genealogy' back to the origins of the space and light of the world—Te Ao Mārama. The interior of the *whare* became a metaphor for this foundational event, its interior constituting the inhabitable space of the world cleaved open by the god Tāne, who forced apart the embrace of Ranginui, the sky father, from Papatūānuku, the earth mother. In this built metaphor the roof of the *whare* is Ranginui, the floor is Papatūānuku and Tāne is the prop that separated them (Sadler 2014: 1440).[1]

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This paper is concerned with the role of the *tāhuhu* in the structure and construction of the 19th-century *whare*, not simply as a predictable technical accomplishment but as a cultural construction that sits in complex relationship with the representational art practices for which the *whare* is well known. In this analysis, Māori tectonics are aligned with the Māori creation narrative: Te Ao Mārama becomes the structural prescription of the *whare* Māori—cosmology, *whakapapa* and structure inseparably fused both in physical composition and in the esoteric and inaccessible knowledge of the *whare wānanga* 'traditional house of learning' (Hone Sadler pers. comm. 2013). Equally inaccessible to this enquiry into Māori tectonics is the craft knowledge of the *tohunga* 'expert'. Unpublished and largely unknown to those not inculcated into its knowledge and practices, this commentary on the concepts and narratives underpinning the practices of construction remain obscure. Professor Ranginui Walker described the master carver Paki Harrison's 20th-century nocturnal inculcation into the lore of the *wānanga* by his mentor Pine Taiapa. He explained the individual instruction as a practice that formerly took place in the ancestral houses of tribal communities but one that was no longer practiced, due to the dispersal of young men in search of individual work (Walker 2008: 60-61).

To find a way to think about Māori tectonics, this paper has situated a Western epistemology to one side of the Māori conflation of creation cosmology and tectonics. Western engineering practice is born of the discipline of physics, whose core narrative also extends to the creation of matter and the origin of the universe. In contrast to the interrelated epistemologies built into the *whare*, Western physics, by virtue of its origins in Enlightenment classification, can be excised from the context of its application. Its capacity to be abstractly and theoretically constructed allows for use in design and, as in this paper, in analysis.

This kind of cross-epistemological analysis risks being interpreted as the continuation of the colonial tradition of appropriating and redefining indigenous knowledge. Examples of the process of the colonising and controlling of knowledge can be seen in the translations in Rev. L.W. Williams' 1892 *Dictionary of the Maori Language*. In this edition we see that the terms for the structures used to raise the *tāhuhu*, '*rangitapu'* and '*tokorangi'* (references to the Te Ao Mārama separation of Ranginui from Papatūānuku), were translated as functional nouns,'scaffolding' and 'sheers', thereby excising the cosmological significance embedded in the Māori words. This paper looks to give careful attention to the cultural implications of 19th-century etymology juxtaposed against the functionalist abstraction of Western engineering analysis as applied to the images, narratives and house components that survive from that time.

Finally, this paper considers the completed *whare* structure and suggests that the forces composed in sophisticated and surprising relationships are in many ways antithetical to Western structural thinking. It is further argued that this apparent structural otherness has contributed to the colonial tendency to deny indigenous constructional agency.

THE *TĀHUHU* IN PRINT

Colonial descriptions of Māori architecture leave the impression that Māori building structures excited little curiosity. Māori buildings have long been the subject of studies in anthropology and art history, which have emphasised carving and other surface arts. More recent examples of this disciplinary focus include the works of Roger Neich (2011[1994]), Deidre Brown (2003), Ngarino Ellis (2016) and Damian Skinner (2016). By contrast, little attention has been paid to the culture of Māori building technology. Between 1896 and1949 analyses of structural concepts were subsumed into accounts of building process—with descriptions of construction sequences substituted for analysis and description of structure. Authors of these descriptions include the Rev. Herbert W. Williams (1896), Augustus Hamilton (1896), Elsdon Best (1924), Makereti (1986 [1938]) and Te Rangi Hiroa (1949). However, these publications drew heavily from each other, sometimes including almost identical phrases, as in Makereti (1986 [1938]: 302) and Best (1924: 565). Similarly, Augustus Hamilton (1896: 81-87) reproduced many of the details of the Williams paper of the same year. Hiroa (1949) referenced the Williams article and Ngata's (1897) subsequent commentary. These restricted publications and their images continued to be referenced throughout the 20th century in general texts on traditional Māori life.

One explanation for this lack of curiosity about Māori structural thinking is that Māori constructions were presumably seen to be, in Western engineering terms, "simply supported" by a post and beam structure in which beams carried gravity loads, which were transferred through supporting posts and dispersed into the ground. Resistance to strong winds and earthquakes was probably attributed, if considered at all, to the action of the posts in the ground as standing cantilevers.

However, in the 1990s at Kohika in the Bay of Plenty, archaeological evidence was uncovered by Geoff Irwin (Irwin *et al.* 2004) of a pre-contact 18th-century *kainga* 'village' where some small *whare* had been constructed with a sophisticated technique by which the structure of the *whare* was stiffened against lateral forces. The *whare* were built with transverse lines of structure involving individual *poupou* 'wall posts' and *heke* 'rafters' paired across the *tāhuhu*. (Fig. 1). From the artefacts found at the Kohika site, Irwin

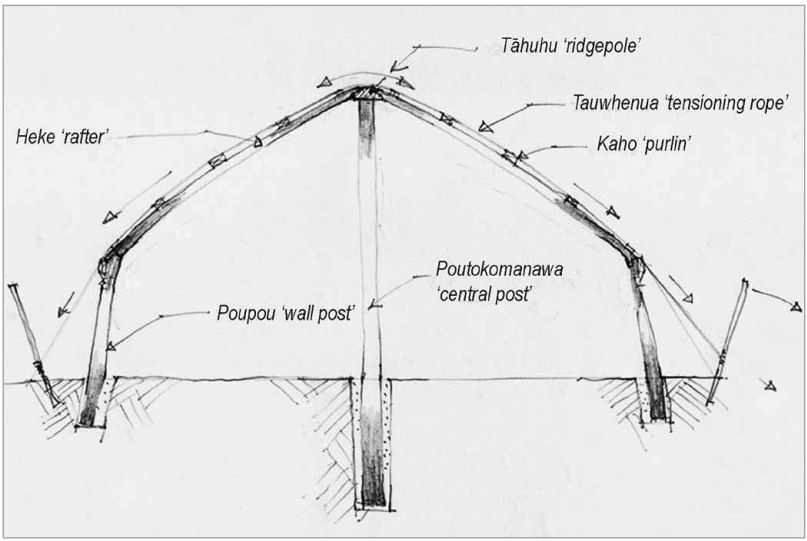

Figure 1. Schematic cross-section of the compressed arched frame of the *whare*. Drawing by J. Treadwell, 2014.

and colleagues (2004: 122-48) reconstructed the cross-sectional components of the *whare* as a sequence of transverse frames. From the geometries of lashing holes discovered on the backs of the *heke* and the *poupou*, and an unmistakable "shadow" on the timber from a plaited rope, Irwin was able to convincingly demonstrate that the cross-sectional structure of the *whare* had been post-tensioned.

Each structural frame consisted of opposing, paired *poupou* and *heke*, compressed against the *tāhuhu* with the use of a *tauwhenua* 'tensioning rope'. The collective action of these arched frames contributed to the formation of a stiff cross-sectional structure. The finds at Kohika were the first physical confirmation of Makereti's (also known as Maggie Papakura) 1930s description of the post-tensioning process in her book *Old Time Maori* which, until recent times, had remained largely unexamined. However, despite substantiation of the use of post-tensioning, the buildings at Kohika were very small and the implication of Makereti's description was that the process had been applied to larger 19th-century buildings. Her account conveys a real sense of the effort and forces involved when applied to larger buildings:

> A short piece of rope was tied to the tuawhenua [*sic*] described on the previous page, while the other end was tied to the tree trunk to be used as a

> lever. The use of this lever placed a great strain on the rope, and this strain locked the timbers of the house. The two pou opposite each other took the strain, and the rafters were held together on wall and ridgepole. The creaking of timbers was heard under the strain. The end of the tightened rope was tied to the outer strut, and then the lever and short rope were taken away. (Makereti 1986 [1938]: 303)

Despite the obvious indications in the text of the scale of elements and the forces involved, "tree trunks" for levers, "creaking timber" and "great strain", more recent commentary by art historian Richard Sundt expressed doubt about the efficacy of this technology at a large scale. Sundt's (2010: 166) views on this issue extend a 19th-century scepticism of Māori engineering capability, which he elaborates further in an argument that large-scale 19th-century Māori building had been possible essentially because of the uptake of European technology.

This argument has been examined in respect of that particular and primary act in the construction of a *whare*, that of how 19th-century Māori raised the sometimes massive *tāhuhu* to the top of its supporting posts (Treadwell 2012). In that paper it was proposed that the discourse describing Māori building processes had generally simplified Māori technology by confining considerations to physical and operative parameters and failing to consider that building could also be enacted by the functional integration of social, environmental, cosmological and indigenous knowledge systems. The discussion also proposed that the abstract nature of the machine function that increasingly drove the 19th-century colonial enterprise had had the effect of distancing individuals from the mass and nature of the material world. In *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill,* anthropologist Tim Ingold (2011: 296) tracked the estrangement that developed between the operative and the artisan with the development of the machine. Ingold cited J. Bruzina who wrote, "…the entire work-action [of the machine] becomes something that can be dealt with independently of the human being in its properties and principles of function" (Bruzina and Wilshire 1982: 170). As individual colonists and commentators became progressively physically and then conceptually isolated from the industrialising and professionalising world, so functionality came to reside, uninterrogated within the machine. Treadwell (2012: 1165) further argued that the emergent industrialising colonial culture was therefore rendered less able and less willing to understand or imagine the sophistication and effectiveness of a coordinated socially-driven indigenous engineering.

It was within this context that Treadwell (2012) assembled evidence that before the arrival and availability of Western technology Māori had in fact developed technologies that could manipulate large-scale infrastructure and potentially the capability of raising *tāhuhu* in excess of 1100 kg. It was

also argued that traditional Māori engineering proceeded, not as a machine operation of measureable and predictable outcomes, but as a complex negotiation of relations between their sophisticated technology of the everyday with a continuing presence of a cosmological past. Further, the internal relations within this cultural technology should be seen, as Māori saw them, as both indivisible and performative.

THE *TĀHUHU*—A CONSTRUCT OF COLLECTIVE ENGINEERING

Māori capability in large-scale engineering tasks has been documented by Elsdon Best and other ethnographers, most vividly illustrated in the felling and transporting of very large trees (Best 1924: 193-95, 2005 [1927]: 79). As a result of interrogating Best (1924) and applying data to the structures outlined, Treadwell (2012: 1161) argued that Māori had developed a sophisticated lifting technology that had the capacity to raise the longest and heaviest ridge beams in the large *whare* constructed in the second half of the 19th century (Fig. 2). The technology took advantage of *mātauranga Māori* 'Māori knowledge,

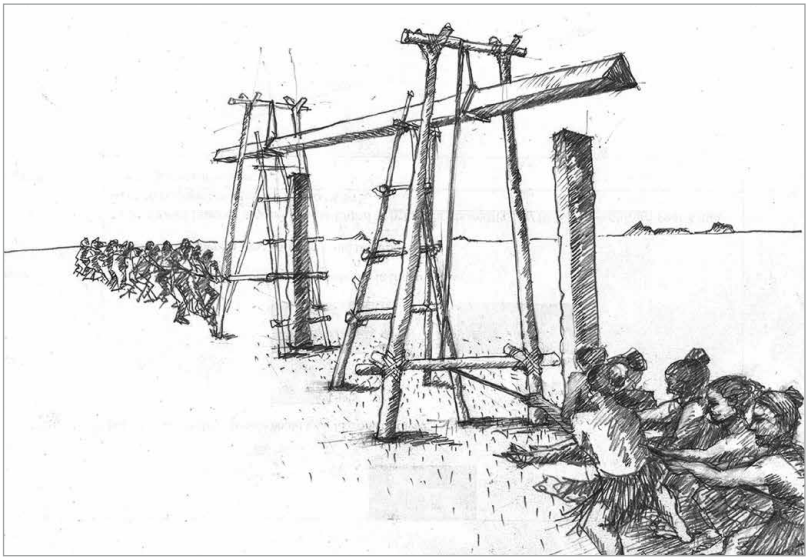

Figure 2. Interpretation of Elsdon Best's (1924) description of the *rangitapu*. The low horizontal member allowed as many people as were needed to pull the rope horizontally and raise the *tāhuhu* without excessive over-turning forces. The additional friction was overcome with plant lubricants and extra people pulling the ropes. Drawing by J. Treadwell, 2014.

understanding', including that of plant lubricants to reduce friction in the mechanism and the deployment of a lifting structure whose geometry allowed for as many men as necessary to participate in the act of raising the *tāhuhu*.

New Zealand historian and ethnographer James Cowan (1930: 123) wrote of this social capacity for large-scale infrastructural tasks: "In the heart of the Urewera Country, at Mataatua, is the largest *whare-whakairo* [carved house] of purely Māori construction. It is about 80 feet [c. 24 m] in length and 36 feet [c. 11 m] in width. The raising of the massive ridge-pole, when the house was built for Te Kooti in 1890, engaged the efforts of a hundred men". Seventy men from the 'Ngāti Awa *iwi* 'tribe, people' were said to have participated in the building of the Mataatua house. There are several other such accounts, including those of Phillipps (1946: 37) and master carver Pine Taiapa, who said with reference to a meeting with Ngāti Whātua about a prospective building in Auckland, "You must have manpower to do it. I was pleased to hear our *kaumatua* [elders] say in Hicks Bay that Ngāti Whātua have 30,000 people. I can picture the building we put up in Auckland being 120 feet long [36 m], 60 feet wide [18 m], because man-power is there" (Taiapa 1965). In this statement Taiapa explicitly links social participation to building size, a relationship absent from calculations about structural performance and machine function.

THE *TĀHUHU* IN COSMOLOGY AND REPRESENTATION

This section considers Māori building structure not as a description of building process or as a theoretical structural model but as a formation of structural relationships given scale, meaning and function consistent with its cosmological origins and genealogical and social purposes. In this context, alignment will be sought between structure and the metaphorical and representational roles necessary for the social and structural stability of the house.

If the technical act of raising the *tāhuhu* was fuelled by collective endeavour and material and environmental knowledge, it was given meaning through its ritual recapitulation of the Te Ao Mārama construct—the coming of light and knowledge into the world of *iwi* (Treadwell 2012: 1153). The ritual incantation by a *tohunga* 'specialist' (priest in this case) of a *karakia* 'prayer' to raise the *tāhuhu* was, in this context a mediation between *te ao tāngata* 'the world of humans' and the realm of *atua* 'gods'. The necessity for a *tohunga* to invoke the sanction of *atua* to raise the *tāhuhu* was a measure of the physical magnitude and cosmological peril implicit in the task. As the Ngāti Awa *rangatira* 'chief' Mereana Mokomoko recalled of the construction of the great house Hotunui at Hauraki in 1878, "The first post erected was named after Pereki Awhiowhio, chief of Ngatiwhanaunga. When an attempt was made to lift the ridge-pole it failed: then we sent for Paroto Manutawhiorangi, who uttered an incantation, or karakia, called 'Tehuti o Tainui' (the raising of Tainui), and lo! the great tree was lifted up quickly

and easily. Such was the power of magic as exercised by Maori priests of old" (Mokomoko 1897: 41).

In the Māori world the *tāhuhu* is conventionally understood as representing the backbone of the eponymous ancestor in the anthropomorphic house. But its representational role of defining the origin of all ancestral and social relationships within the house is overlaid by the equivalent structural role in which all structural relationships are played out in equivalence to the social relationships which give purpose and life to the house. So, in this sense, the *tāhuhu* is not a metaphor but a relational element in which structure and genealogy are inseparably intertwined.

Another example of this structural and social equivalence in the *whare* can be seen in the *heke* and its connection to *poupou*. '*Heke*' means 'rafter' in Māori but it also means 'to descend' or 'descent' (Ryan 2008: 60; Williams 1892: 26). In the top-down construction of the *whare*, '*heke*' signals the rafters' physical descent from the *tāhuhu* to the *poupou*.[2] In genealogical terms *heke* could be read as the ancestral descent depicted in the repeating patterns of *kōwhaiwhai '*painted geometries representing ancestral history on the underside of the *heke'*. As Neich (2011 [1994]: 130) summarised, "…the structure of the house constitutes a genealogical plan…" and more specifically, "… the rafters [*heke*] were equated with branching lines of descent leading down to the ancestral representations of the *poupou*".

In Māori cosmology the forcible separation of Ranginui from Papatūānuku created the space and light of the world: Te Ao Mārama. In this foundational narrative, Tāne Mahuta, the last of the offspring gods, was finally successful in forcing his parents apart: "It was the fierce thrusting of Tāne which tore the heaven from the earth, so they were rent apart, and darkness was made manifest and so was the light" (Reed 2004: 11). It is in relation to this origin story that the *tāhuhu* and Tāne can best be understood. In the narrative Tāne interposes himself between Ranginui and Papatūānuku, pushing Ranginui upwards with his legs. Tāne, at this moment, becomes the first element of Māori tectonics—the *toko* or prop. Specifically, Tāne becomes a *tokorangi*, literally the prop of Rangi. It was the *tokorangi* that was later to be used as a prop or trestle to support the *tāhuhu* of the *whare* during its elevation to the top of the posts (Best 1924: 193-94).

In the early 1871 edition of the *Dictionary of the New Zealand Language*, *toko* was translated as both 'a pole to shove with' but also as 'rays of light' (Williams 1871: 152, 204). The implication of the latter is, of course, that these are the rays of light that first shone upon Papatūānuku as Ranginui was forced from her. It is of particular interest then that in anthropologist Donald Tuzin's account of the building of the house *Tambaran* in the Sepik River area of Papua New Guinea he described the hoisting of the massive ridgepole as always taking place at dawn (Tuzin 1980: 139).

In the Ngāpuhi (tribe of Northland) narrative of Te Ao Mārama, when Tāne pushed Ranginui from Papatūānuku he then propped his father and mother apart with four prepared poles or *toko*: one for his feet, two for his armpits and one for his head (Hone Sadler pers. comm. 2013). Sadler describes the interior of the *whare* and its construction as a metaphor for Te Ao Mārama, in which the roof is Ranginui and floor is Papatūānuku. The raising and propping of the *tāhuhu* within the *whare* recapitulates that moment when light and consciousness entered the world, metaphorically reconstructed in the interior space of the *whare,* the realm of Te Ao Mārama (Hone Sadler pers. comm. 2013). In the Te Arawa (tribe of Rotorua) houses located at Whakarewarewa, Wahiao (1908) and Rauru (c. 1900), the metaphor of Tāne propping Ranginui was made more explicit, but in these versions he used his arms not his legs. W.J. Phillipps wrote of the house Wahiao, "The principal pillar supporting the ridge pole has at the top, just under the ridge pole, a representation of the god Tāne Mahuta, he who separated the heaven and the earth, with arms upraised supporting the ridge pole. The carved end of the ridge pole shows Rangi the Sky Parent, with his mouth open ever sorrowing because of this separation from Papa, the earth mother" (Phillipps and McEwen 1946-48: 27).[3] Tāne makes similar figural appearances on top of *'poutokomanawa* 'intermediate posts supporting the ridgepole' in the Whanganui River house known as Poutama (1884) at Galatea (also known as Karatia) (Phillipps 1955: 98-100) and in Hine Nui te Po at Te Whaiti (Mead 1970: Record No. 374048). However, in other versions the *poutāhu* 'front wall post' is known as Tāne's post (Neich 2011 [1994]: 127).

In the South Island, Teone Taare Tikao narrated a largely Ngāi Tahu version of the creation story in which Tāne propped Ranginui from Papatūānuku with "a great pole" that was later laid horizontally across the sky as with a ridgepole in a *whare*. From Tane's great pole were suspended the nine layers of heaven (Tikao 2004 [1939]: 29). Tectonically this mirrors the traditional suspension of the *kaho* 'purlins' on either side of the *tāhuhu* (Williams 1896: 149).

In these narratives and representations, Tāne is simultaneously the *tāhuhu* and the tree (the embodiment of Tāne himself as the god of the forest). Ngāti Maniapoto (a western Waikato tribe) historian and genealogist Pei Hirunui Jones wrote of these multiple manifestations, "… when the waka [canoe] Tainui became stuck on the portage between the Waitematā and the Manukau harbours the hauling chant was called. In the chant Tainui, the canoe, is conflated with Taane (God of the Forest)" (in Jones and Biggs 1995: 44). The accompanying footnote records, "The canoe is referred to as Taane, for it was made from a tree which was itself the manifestation of Taane …" (Jones and Biggs 1995: 44). From the above we can see that the *toko* and the *tāhuhu* within the *whare* are foundational to Māori tectonics, and in this built context, they are also foundational to Te Ao Mārama and the life that followed.

The tribal nature of Māori society often complicates any assertion of the universality of representations such as the above. However, the representativeness of the cosmological and tectonic expressions of Te Ao Mārama and its participants has been well established. Roger Neich (2011 [1994]: 126) wrote of the "… almost universal representation of Rangi the sky-father and Papa the earth-mother shown in *cupulo* [coupled] on the portion of the ridgepole projecting over the porch, in houses ranging from the earliest chief's house through to Te Hau ki Turanga and all later meeting houses".

Implicated by the omnipresence of Rangi and Papa in the meeting house is Tāne who enacted the narrative of Te Ao Mārama. Tāne's presence within the traditional house is tectonically specific, as discussed above, but Tāne is also more generally associated with both the physical and social dimensions of the house. Neich (2011 [1994]: 127) continues:

> … Tanewhakapiripiri is known as the god that presides over the meeting house, where the qualifier *'whakapiripiri'* meaning 'the uniter' refers to the way that Tane brings people together by enclosing them in the house. Since most of the materials for the meeting house are obtained from the domain of Tane as the god of the forest, the house itself is often regarded as the personification of Tane.

It appears from ethnographic records that the chief's house tended to be a *wharepuni*, 'warm house or sleeping house', carved and typically larger than the other houses in the village (Prickett 1974: 60-62). One of the earliest and most detailed records of these houses was the 1772 account of a house in Spirits Bay by Lieutenant T. Roux of Marion du Fresne's ship *Le Mascarin*. Of interest to this paper is the reference to "planks two to three inches thick, quite well carved [and] … a large carved post supporting the ridge of the roof and the two others at the ends" (Olliver and Spencer 1985: 133). Figuration carved into the house suggests the incorporation of identity and *whakapapa* in the structure. With Neich's comment in mind, it seems plausible that the house is representative of Neich's "near universality" of the presence of Ranginui and Papatūānuku and, by association, the embodiment of the Te Ao Mārama narrative within the *whare.* Ranginui and Papatūānuku's residence in the pre-contact *whare* raises the question as to the origin of this tradition and its subsequent extension into the tectonics that supported it.

Pacific cultures have been widely studied in relation to cultural origins and migration history. In this context, as is now known, Pacific architecture is considered tectonically and spatially distinct from Western architecture but strongly related between Pacific Island groups. Professor Mike Austin wrote of the essentials of Pacific building, "structurally these roofs are supported on free-standing posts and the ridge beam is typically supported on poles rather than coupled rafters. The ridge-pole support is, in some ways, the sign of a Pacific building and is given all sorts of importance" (Austin

2001: 13). Houses of Sāmoa and Tonga (*fale*), the Cook Islands (*'are*) and the *whare* Māori all express this tectonic formula.

The words used for house components also indicate their shared ancestry. The ridgepole is *'au'au* in Sāmoa (Hiroa 1930: 11) but *tāhuhu* is used on Aitutaki, one of the southern Cook Islands (Hiroa 1927: 15), as in New Zealand. *Poutāhu* in the *whare* Māori is *poutāhuhu* in the southern Cook Islands, and *poupou* becomes *pouturuturu* (Hiroa 1927: 4). Polynesian cosmologies, including the Māori Te Ao Mārama construct, are characterised by what ethnologist E.S. Craighill Handy (1927: 34-38) referred to as a "dualistic philosophy" involving parallel oppositions, including light and dark and male and female and *tapu* 'sacred' and *noa* 'profane'. While these island cosmologies also shared equivalent narrative events, protagonists and developmental epochs, there are significant differences in their expressions across the different island groups.

Pacific Islands' cultures constructed large gabled buildings, both before and after European contact, in which the genesis of the structure remained the ridgepole and its supporting posts (Treadwell 2015a: 341). The ridgepole was the largest of the building components and necessarily required co-ordinated collective effort to install. The original title of an early 20th-century image (Fig. 3) describes the event of erecting the ridgepole for a Cook Islands *ariki* 'chief' house as "ceremonial". However, the extent to which the ceremonial nature of this crucial building event was given metaphorical significance through the culture's creation tradition is not yet understood and it is also beyond the scope of this paper to look for the metaphorical extension of these creation narratives into their building culture.

Figure 3. Cook Island Annexation Celebrations. An Important Ceremony Erecting the Ridgepole of the Ariki's House (*Otago Witness*, 1907)

THE BURGEONING *TĀHUHU* AND INVOLVEMENT OF EUROPEAN TECHNOLOGY

Between settlement and the 19th century, the *whare* Māori expanded from small domestic buildings to large religious and political meeting houses. The increased width of these large houses was taken up by elongation of the rafters on both sides of the *tāhuhu*—each side assuming half of the increase in the building's width. As houses increased in length from between 5-6 m to over 25 m, the length of the single ridge-beam was increased to match. This single element of the building was increased by up to five times its pre-19th century length. With few exceptions, the tāhuhu of the large churches and *whare* buildings of the 19th century were cut out of single trees.[4]

Sundt (2010: 114-18) has argued that it was the construction of the large *whare karakia* 'churches' between the 1830s and 1860s, made possible because of Māori uptake of European technology, which enabled Māori to construct the larger *whare* following the New Zealand Wars. However, there is now increasing evidence that Māori were building very large *whare* as early as 1820, suggesting that the church building occurred in the context of a building culture that was, in some regions, already familiar with the problems of large-scale construction. In a summary of evidence of early large-scale *whare* structures archaeologists Robert Brassey and Matthew Campbell (2016) documented a house site at the Te Pua a te Mārama Village visited by Samuel Marsden in 1820. The village was identified in local tradition as that of the Ngāti Whātua leader Mawete and was located 7 km to the west of Helensville.[5] The site has been interpreted as indicating a house 30 m long by 15 m wide. This is wider than any of the *whare karakia* described by Sundt (2010).

Much of the discourse surrounding the development of *whare karakia* and the large meeting houses that followed has focused on the Māori adoption of Western industrial technologies, such as block and tackle, mill-sawn timber, and mortise and tenon connections. It appears, however, that the scale and the geometries of the late 19th-century *tāhuhu* and *heke* would have almost precluded their production using Western technology.

The *tāhuhu* of the 19th-century *whare* was sectionally formed as an isosceles triangle with the two inclined faces at around 38 degrees from the horizontal. To cut these faces at a sawmill would have required a demanding series of manipulations of the large baulk of timber and the capability of the saw to cut at selected angles. First, the raw log would need to have been partially squared with at least three passes through the saw. Then it would have required that the blade of the saw be set to approximately 52 degrees. Assuming that the saw, at this time and context, had this unlikely capability, then the massive beam would have to have been rotated end-for-end between each of the angled cuts.

If the mill had, as is much more likely, a fixed vertical blade, then the required angle of cut could potentially have been achieved if the baulk of timber was set up on a jig. The jig or supporting frame would have had to position the developing *tāhuhu* at the correct angle for its whole length (up to 25 m) as it passed through the saw. This would need to have been repeated to cut the other face of the beam after rotating the beam and the jig, end-for-end.[6]

Additionally, the bed of the saw would have needed to be able to support and guide the great length of timber through the blade. None of these requirements would have been easily or likely met in a 19th-century rural mill focusing on the production of significantly shorter lengths of rectangular section timber. So, while the process was potentially achievable, it would have been both technically and physically difficult, and very time-consuming to set up and implement. Even greater difficulties arise when contemplating the production of the semi-circular section curved *heke* using Western industrial technology.

This analysis is supported by a more recent account that the replacement 22 m *tāhuhu* for a re-building of Tāne Whirinaki (Ngāti Ira meeting house built near Ōpōtiki in 1874) was adzed (not milled) by Paki Withers at Waioeka out of a raw *totara* (podocarp species) log around 1940 (*Waka Huia* 2014). All this suggests that in the last three decades of the 19th century it would have been extremely unlikely that Māori would have found greater efficiencies in the production of these key elements of the *whare* using Western technology. Further, even by the mid-20th century, European industrial technology would struggle to practicably produce these primary components required in the traditional *whare*.

SECURING THE *TĀHUHU*

The *tāhuhu* of the large, late 19th-century *whare* structures like Mataatua built at Whakatāne in 1874 (Mead 1990: 18), Hotunui at Parawai in 1878 (Barton and Reynolds 1985: 5) and Te Whai a te Motu at Ruatahuna in 1888 (Cowan 1930: 127), are calculated to have weighed around 1000 kg. With the emplacement of such heavy components, the on-going structural stability of these buildings became contingent on the security and immobility of the *tāhuhu* in its location on top of its supporting posts. However, there is little certainty in the literature of *whare* construction about how *tāhuhu* were secured to the top of their supporting *pou*. Hiroa (1949: 123) wrote: "The flat base surface [of the *tāhuhu*] sometimes two feet wide rested on the ridgepost and was fixed in position by wooden pegs driven from each side into the tops of the ridge posts or sometimes lashed to eyes". Hiroa draws this directly from the Rev. Herbert W. Williams' 1896 (p. 147) translated account of the Ngāti Porou carver Rev. Mohi Turei. However, Ngāti Porou scholar Apirana Ngata's subsequent commentary on the Williams paper implied that Mohi

Turei, although respected and well informed on Ngāti Porou *tikanga* 'lore, practices', was not known as an authority on Ngāti Porou house construction (Ngata 1897: 85). Ngata used his father's traditional knowledge to clarify aspects of Ngāti Porou building processes. On this basis the description, reproduced by Hiroa, must be seen as indicative only of Ngāti Porou practice. The methods of other tribes remain unclear. In 1896, Augustus Hamilton included identical information in his publication but in addition he illustrated wooden pegs in the cross-sectional drawing of the *whare* (Hamilton 1896: 82). However, these drawings must be seen as entirely interpretive because the drawings in the original Williams paper do not show pegs.

As a part of his 1924 discussion of Māori construction, Elsdon Best (1924: 195) described the raising up of the *tāhuhu*: "When the ridgepole was swung up to the crosspieces [of the *rangitapu*] it was, of course, higher than the top of the posts that were to support it, and could then be lowered so as *to rest on them*" (author's emphasis). However, it is not clear how to interpret this as subsequently, when discussing the structure of the *whare*, Best (p. 563) referred to the securing of the *tāhuhu* to its supporting posts, "by strong ties of *aka* or vines".

Sundt (2010) interrogated the structural remains of Rangiātea, the Ōtaki *whare karakia*, through forensic site-drawings by architect Chris Cochran following the 1995 fire that destroyed the church. Sundt pointed to the presence of mortise and tenon joints (Fig. 4) connecting the *tāhuhu* to the *poutāhu* 'supporting post in the front wall', and the *poutokomanawa* 'mid-span supporting post' as "… coinciding with Māori adoption of the Western method of block and tackle for hoisting massive timbers" (Sundt 2010: 118). Sundt's analysis of the construction of Rangiatea is susceptible to different interpretations.

Rangiātea was built by Raukawa *iwi* and affiliated *iwi* Te Wehiwehi (of the lower West Coast of the North Island) beginning in 1848 with overseeing involvement of the mission in the person of the Rev. Samuel Williams (S. Treadwell 1995: 78). The stealthy nocturnal shortening of the *tāhuhu* by Rev. Williams, against the wishes of the Māori builders, indicates that he was determined to exert significant influence over the construction of the building (S. Treadwell 1995: 41). The amputation of the *tāhuhu* was significant in that the loss of the ten feet [c. 3 m] of length precluded construction of the *mahau* 'porch' and the formal and ritual use of the building as a *whare*. The shortening of the *tāhuhu* also could be seen as the "denial of an embodying ancestor" (S. Treadwell 1995: 42). Williams' interventions into the building process at this primary level must cast some doubt on the use of mortise and tenons to secure the *tāhuhu* as a Māori initiative at this time.

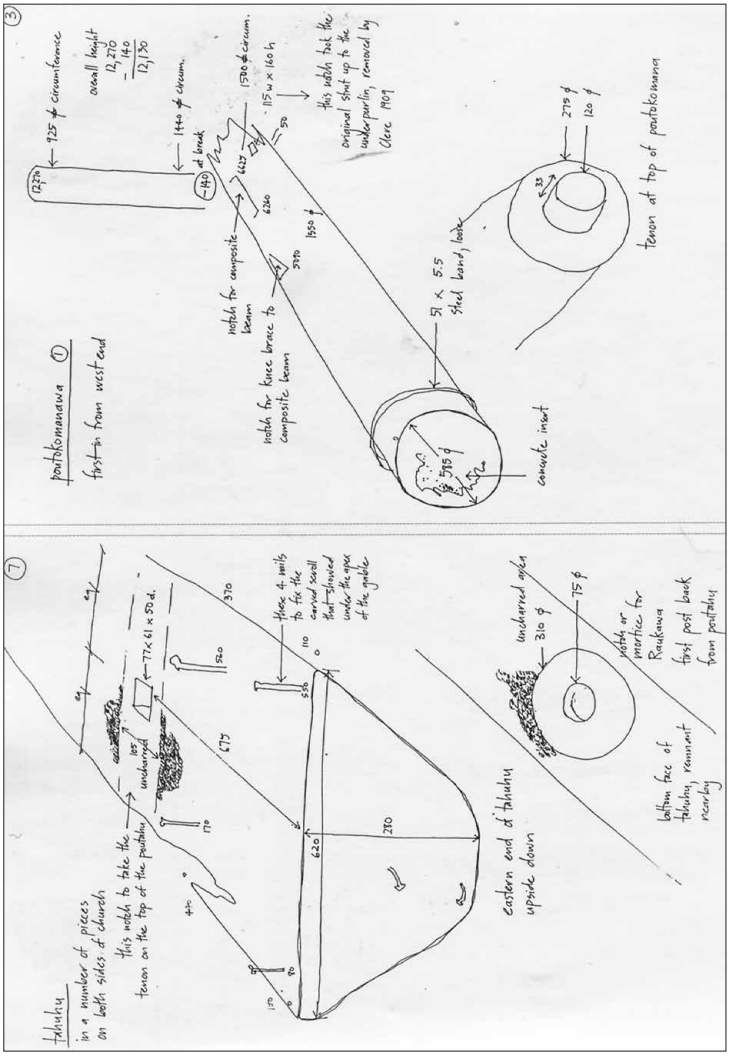

Figure 4. Details of mortise and tenon junctions on the *poutokomanwa* and *tāhuhu* of Rangiātea.
Drawing by Chris Cochran (1995); used with permission of the Rangiātea Vestry.

It has been suggested above that Sundt's proposition that Māori technology would struggle to raise the *tāhuhu* represented a misunderstanding of both the process and its capability (Treadwell 2012: 1161). Similarly, the use of Western mortise and tenons to secure the *tāhuhu* at Rangiātea appears not to represent an advance in Māori construction, but rather a misplaced Western intervention in Māori constructional tradition. Coordinating five tenons to engage with up to five mortises on top of five separate 12 m posts requires an extremely high level of constructional accuracy and positional control of the *tāhuhu* suspended high above the ground and controlled with ropes and props from below. That the Māori builders achieved this is more a testimony to their building skills than to the appropriateness of the use of multiple tenons and mortises to locate the *tāhuhu* on its posts. The Rev. Hohepa Taepa of the Rangiātea Vestry related an account of the original construction process, which illustrates the difficulty and the anxiety this process can cause: "There was another incident concerning the ridge pole. The builders were finding great difficulty in dropping the ridgepole into position on the centre pillars when there was a sudden outburst from the people. The pole had fallen into place and the Māori folk broke into a *haka* 'dance' of joy and gladness" (Taepa 1966: 36).

Cutting multiple tenons to fit corresponding mortises is exacting work in normal manual carpentry as even minor discrepancies multiply, creating, this quote suggests, difficulties in assembly. This quote is consistent with a description of a prolonged struggle to get all the tenons on top of the separate *poupou* to simultaneously engage with the mortises cut into the underside of the *tāhuhu*. Perhaps as a consequence of the difficulties experienced at Rangiatea, mortise and tenon construction was not, as will be shown, to become characteristic of the large-scale Māori constructions of the late 19th century.

The almost 25 m *tāhuhu* of the much-travelled Mataatua *wharenui* is now in storage in Whakatāne in three lengths, its segmentation a matter of shipping convenience (Mead 1990: 83). An examination of the three lengths shows that there are no mortises to locate any tenons on the top of the supporting *poupou*. The carvers who reconstructed Mataatua in 2011 confirmed that the original *tāhuhu* (not included in the recent reconstruction of the house) had been kept in place on top of its posts by its own weight (Jeremy Gardiner pers. comm. 2011).

Of additional relevance here is the concave, adzed under-surface of the Mataatua *tāhuhu* (Fig. 5). Its profile coincides with the curved convexity of the *poutuarongo* 'end wall post' and *poutāhu* (Fig. 6). There is a reference to this feature in Best's discussion of *whare* construction (Best 1924: 563). As a means of locating and securing the *tāhuhu* it seems that the reciprocal curving of posts and beams confers some constructional advantages. For example,

Figure 5. Curved under-surface of the *tāhuhu* of Whare Mataatua, Whakatane. Photo by J. Treadwell (2013); used with permission of Ngāti Awa.

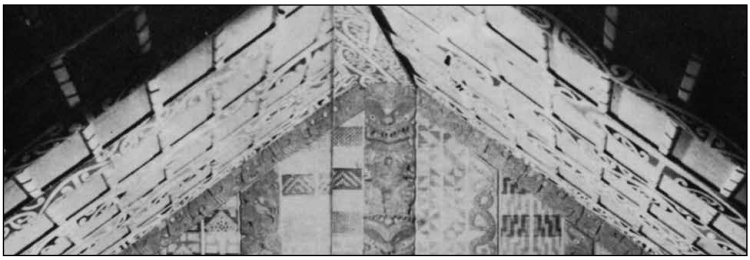

Figure 6. Interior of Whare Mataatua: The concavity of the *tāhuhu* corresponds with convexity of *poutuarongo*. Detail from Phillipps and Wadmore (1956: 18).

the curved tops of the supporting posts allowed the *tāhuhu* to be adjusted (rotated in axis) to a central position on top of the *poupou*. In addition, the central (neutral) positioning of the *tāhuhu* assisted its stability through both the slightly increased frictional area of the curved surface (compared to a flat surface) and its inherent resistance to lateral displacement. This technique can be seen as a more practical alternative to the difficulties of aligning multiple tenons with multiple mortises, as experienced by the builders of Rangiātea.

On loan to the Auckland War Memorial Museum by it owners Ngāti Maru, the meeting house Hotunui, was constructed by Ngāti Awa carvers in 1878. In this case, the 24 m *tāhuhu* has, in its decades in the museum environment, twisted at the rear of the house, exposing the top of the *poutuarongo*. Like its equivalent in Whakatane wharenui, Mataatua, the *tāhuhu* has no mortise and tenon to secure it and it remains at the top of the post under its own weight. Neither is there any evidence of a tenon locating the *poutokomanawa* to the underside of the *tāhuhu*.

There are two other complete *tāhuhu,* known to be in New Zealand museums. In Te Papa Tongarewa Museum of New Zealand resides the complete carved and painted *tāhuhu* from the Ngāti Raukawa *whare* Tokopikowhakahau, originally constructed near Tīrau around 1885 (Phillipps and McEwen 1946-48: 43) (Fig. 7). Like the Mataatua *tāhuhu*, but smaller at 15 m in length, this *tāhuhu* lacks any mortise openings on the underside and there is no evidence of pegs or holes in the sides. The *tāhuhu* of a *wharepuni* from Te Miro at Maungakawa, now held at the Waikato Museum, also lacks evidence of any fixings apart from what appears to have been an end coupling to another *tāhuhu* in an adjacent *wharepuni*. However, a tenon was used on the lengthened *poutuarongo* of Tāne Whirinaki c.1940 and the *poutokomanawa* of the *whare* known as Whakauetaunga at Awahou c.1883.[7]

At this distance in space and time it is not known why Māori adopted aspects of Western technology in some situations and not in others. While pragmatic and technical explanations are the most accessible and convenient, it may be that there are also more complex issues at work that reflect the intersection of Western and Māori world views. It is clear in Sundt's (2010: 123) accounts that the mission-influenced shift from *whare runanga* 'assembly houses' to *whare karakia* involved complex negotiations between world-views expressed in building form, carved representation and indeed technology. It is possible that in the course of these negotiations technical changes, such as use of mortise and tenons, were acceptable to Māori because, in the mission context, structure and cosmology could be more easily separated. What does seem clear is that not all Western techniques were seen as acceptable or technically adequate in subsequent large-scale *whare* constructions.

There are several large, late 19th-century *whare* in Aoteoroa that survive as evidence that Māori recognised that the elevation of the *tāhuhu,* which had required the collective effort of people, along with the mediation of the *tohunga* and the authority of the *atua,* did not also require the discipline of the Pākehā mortise and tenon to keep it in place. Perhaps Māori calculated the sheer mass and scale of the *tāhuhu* to be commensurate with both the collective effort to produce and position it, and the cosmological negotiation that sanctioned it. Given the examples above it seems that the tenons and

Figure 7. *Tāhuhu* from Whare Tokopikowhakahau. Te Papa Tongarewa Museum of New Zealand, 2014. Used with permission of Jonathan Tai, Raukawa (Waikato).

mortises as used in Rangiātea in 1848 were not seen by all *iwi* as a necessary feature of large-scale *whare* construction. The final issue overlaying this discussion of the security of the *tāhuhu* in place on top of its supporting posts, is consideration of the effects of post-tensioning and the role of the *tauwhenua* in maintaining the position of the *tāhuhu.* This will be discussed below as part of the detailed implementation of post-tensioning.

While *hapū* and *iwi*-led church-building programmes such as the one for Rangiātea, had provided Māori with more opportunities to extend their large-scale building practices, their duration was relatively short-lived because, in particular regions, many Māori turned away from the church missions and adopted syncretic forms of religion, such as Ringatū movement. Under Te Kooti's influence, Māori of the central North Island, Bay of Plenty and Poverty Bay areas in particular, built their churches in *whare* form, extending *whare* traditions such as carving but also innovating with the development of figurative painting (Linzey 1990: 26-32). For example, Tāne Whirinaki was originally built as a *whare rūnanga* 'council house' in resistance to the land confiscations of 1865, but following its rebuilding and enlargement in 1886 its *kaupapa* 'purpose' shifted and its role at Waioeka became that of a *whare karakia* (Treadwell 2015b: 31).

Many of the meeting houses/*whare karakia* built from 1870s onwards approached the scale of the earlier churches but these *whare* were structurally innovative in ways that were consistent with Māori technical traditions. Examples of these solutions included the development of pre-cambered and semi-circular section *heke*. With the additional application of cross-sectional post-tensioning to the house, these developments increased the spanning capacity of *heke*, and with it the width of the *whare.*

THE *TĀHUHU* IN STRUCTURE

The collapse of masonry pediments and gable-ends following the Christchurch earthquakes in 2010 and 2011 confirm a general principle of Western engineering: that weight in buildings is best kept low to the ground. This is to reduce the demands on vertical support, but is also to avoid the effects of inertia should horizontal forces come to act on the structure. Given the perils and difficulties associated with the production and elevation of the *tāhuhu,* why did Māori choose to build their houses with such apparently inordinate components? Was the massive triangular section of the *tāhuhu* foremost a response to the supernatural world, a balancing out of cosmological and physical forces? And what does the theory of physics have to say about the structural performance of beams like this?

When compared to rectangular section beams, the triangular section *tāhuhu* has much more cross-sectional mass. The fragments of the original Tāne Whirinaki *tāhuhu* indicate a beam 600 mm across the base with 38 degree

sides and a height of 357 mm. A rectangular-section beam of equivalent vertical load capacity is much less massive: 325 mm by 90 mm (John Chapman pers. comm. 2015). If the rectangular beam is a closely calculated equation between beam performance and minimum materials, then the triangular section *tāhuhu* appears to have been furnished by other priorities.

While a relatively thin beam of 325 mm by 90 mm might perform comparably to the triangular *tāhuhu* of Tāne Whirinaki in terms of vertical loads, in relation to construction processes the thinner beam has some disadvantages. First, it is more likely to deflect laterally under horizontal rafter pressure. Second, as a rectangular-section ridgepole presents a small surface area on the top face, it is harder to securely attach the *heke* to. Alternatively, the *heke* must be face-fixed to the ridgepole. However, neither alternative had the security in place, or the ease of fixing, of the *heke,* which was rebated against the bottom edge and fixed to the inclined upper surfaces of the triangular *tāhuhu.*

Given the extreme physical difficulties in procuring and elevating such a large triangular section beam, it seems unlikely that the constructional advantages of the triangular-section beam are sufficient to explain its persistence throughout the 19th century. However, the commitment to the great mass and scale of the triangular-section *tāhuhu* is more reasonable when considered in relation to the Māori technology uncovered at Kohika that is, post-tensioning.

PRE-CAMBERING AND POST-TENSIONING

At Kohika, the archaeological evidence showed that the *tauwhenua* had been pulled tight over the *tāhuhu* from both sides of the *whare*, and down the back of each opposing *heke*, before being lashed to the back of the corresponding *poupou*. By the mid-19th century, in many *whare,* the contacting junctions between the *heke* and the *poupou*, and between the *heke* and the *tāhuhu*, had been specifically fabricated to lock together under tension (Fig. 8.). At the upper end of the underside of these *heke* a rebate was formed to engage with a squared shoulder on the bottom edge of the *tāhuhu* (Hiroa 1949: 126). In the first half of the 19th century the *heke*, of rectangular section, engaged with a rectangular slot in the *poupou* and were locked in place with compression shoulders formed on both components. Both the top and bottom joints of the *heke* worked in compression, and the stability of the joints required that a constant compressive pressure be maintained along the axis of each element.

By the late 19th century, these joints had become more sophisticated in order to cope with the increased sizes and forces of the expanding *whare*, and to transmit the increased loads more directly between components. In response to the development of semi-circular sectioned *heke*, the junction between the *poupou* and the bottom end of the *heke* had been transformed

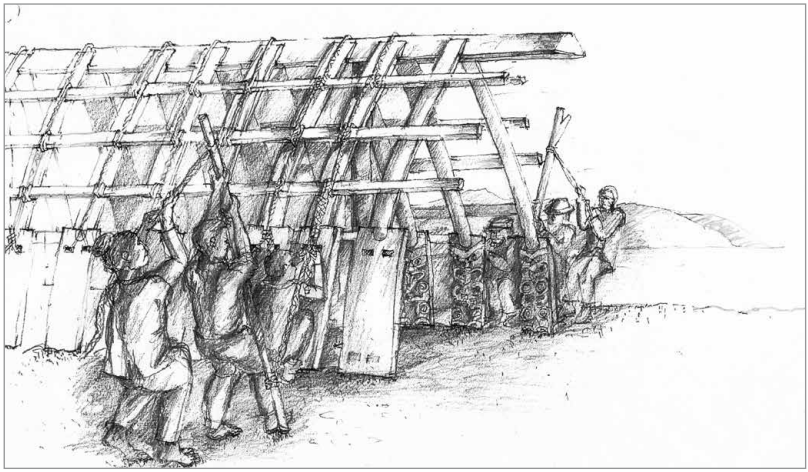

Figure 8. Interpretation of post-tensioning process, incorporating evidence from *whare* components, historic accounts and structural model testing. Kaho *paetara* 'horizontal batten at top of *poupou*' omitted on near side for clarity. Drawing by J. Treadwell, 2016.

into what was known as the *rua whetu* joint, which was a sophisticated semi-circular socket-joint that frequently worked with a compression shoulder (Fig. 9). The *rua whetu* joint is not apparent in early 19th-century sketchbooks and diaries, but is referred to in ethnological accounts from the mid-century (Taylor 1855: 387). The earliest surviving components of a *rua whetu* joint have been identified in *poupou* and *heke* from Māui Tikitiki-a-Taranga, built at Paerauta in 1865. The *poupou* are in the Auckland War Memorial Museum and some of the *heke* are at the Tairāwhiti Museum. The *rua whetu* joint was most widely used across the Bay of Plenty and down the East Coast.

In the second half of the 19th century, two innovations combined to improve the functionality of the locked frame system, in part by a more direct engagement with the mass of the *tāhuhu*. The first was the pre-cambering of the *heke*. Pre-cambering is the shallow convex curvature built into a beam to compensate for deflection under load. While pre-cambering does not confer greater load-carrying capacity on its own, when combined with post-tensioning it does. It appears that in the application of post-tensioning, in Ngāti Porou practice, the *tauwhenua* was separated from the top surface of the *heke*, by increasing the thickness of the centre *kaho* (Ngata 1897: 87). The effect of this, when the tensioning was applied, was to slightly flatten the pre-camber of the *heke*, an effect that marginally increased its

length and, when constrained by the mass of *tāhuhu* against which it bore, increased the compressive force at the junctions.

These effects were demonstrated and documented in a large-scale structural model built by the author at the University of Auckland in 2015. While the details of this modelling project will be discussed in detail in a future publication, three generalities can be drawn from it. The first is that the operational method of post-tensioning combines tension and compression to achieve stability of the *whare* structure. This is also characteristic of traditional and contemporary maritime construction. (For example see: http://smalltridesign.com/masts/Rigging-Mast-Loads.html). Not only does tension-induced compression form the basis of rigging systems but it is widely used to join strakes onto dugout canoe bodies, floats to outriggers and cross struts to hulls and is a ubiquitous form of construction in the Pacific.

The second general point is that the *tauwhenua* augmented the weight of the *tāhuhu* in resisting uplift under constructional tensioning, as it did in response to uplift generated by wind. At the same time the *tauwhenua* was resisting uplift, it was also acting as an additional restraint against any movement of the *tāhuhu* from its position on top of its posts. This may explain in part the Māori decision not to use mortise and tenon connections between the *tāhuhu* and its supporting posts in many late 19th-century *whare*. The third understanding to emerge from the structural model was that it is beneficial in post-tensioned buildings to have the apex of the *tāhuhu* rounded to a gentle radius. This rounding of the apex eased the movement of the *tauwhenua* over the top of the *tāhuhu* (Fig. 9). This feature is characteristic of all the *tāhuhu* examined to date.

Figure 9. *Heke/tāhuhu* junction (left) and *rua whetu* joint (right) fabricated as part of a structural model designed, built and photographed by the author in 2015 to investigate the tectonic effects of post-tensioning. Note compression shoulders on both ends of *heke.*

The crucial issue for this paper is that the amount of tension-induced compression applied to "lock" together the structural frames of *heke* and *poupou* on both sides of the *tāhuhu* was ultimately limited or controlled by the weight of the *tāhuhu*. As engineer, Regan Potangaroa (pers. comm. 2013) commented, "The weight of the main beam [*tāhuhu*] would have been important as the degree of post-stressing could only be equivalent to the weight of the structure reacting against it, the so-called dead load."

The weight of the *tāhuhu*, the very thing that had agitated European commentators into print (Treadwell 2012), plus the pre-camber of the *heke*, became the means by which compression could be increased in the joints across the house. Increased compression in the joints and their great shear strength meant that the whole structural section would, in addition, become implicitly resistant to uplift. University of Auckland engineer John Chapman (pers. comm. 2014) emphasised that uplift from wind would have been the biggest temporary load on the house, creating a tensile load on the roof elements. The tensioned *tauwhenua* and the compression effect of the great weight of the *tāhuhu* countered this effect and was described by Chapman as "a very elegant solution to the problem of uplift".

It is necessary to reposition this discussion again, away from the preceding Western structural analysis, to a way of thinking that is materially grounded but informed by *matauranga* Māori. In this conception, the *tāhuhu* is a mass suspended, a carefully reconciled formation of present structure and past ancestry. In the construction of the house, as scripted by Te Ao Mārama, the social and metaphysical space of the house is forced open. The *poutokomanawa*, *poutāhu* and *poutuarongo* take up the weight of the *tāhuhu* (now conflated with Tāne). On each side of the *whare*, the people strain the *heke* and *poupou* upwards against the *tāhuhu*. The interior world of the *whare* is manifested between the massive inertias of Tāne and Papatūānuku. In this reading of the structural and cosmological house, it is the mass of Tāne, simultaneously *atua* and ancestor, who constructs and maintains present social space, not as elsewhere in the Pacific in a lashed metaphor of social cohesion (Dixon 2015: 410) but as a light-filled opening given form and forced from the darkness of Te Pō.

In this primordial context, the construction and inhabitation of the interior of the *whare* may be seen as somewhat perilous occupations enabled by the scaffolding of ritual and respect. The construction of *wharenui* in the late 19th century was still controlled by complex protocols directed at the maintenance of the *mana* 'prestige, power' of the emergent house, its carvers, the ancestors and *atua* represented. The significant physical perils of construction were matched by the dangers of *tapu* associated with the process. Transgression of the protocols designed to preserve *mana* sometimes led to the deaths of people

linked to the house and the collapse of built structure. Tāne Whirinaki acquired layers of *tapu* associated with prophets Te Kooti, and later Rua Kenana. Attempts to reconstruct the house failed catastrophically on two occasions, with a carver dying and the *tāhuhu* being thrown aside. After the second failure the fallen *tāhuhu* was considered irreconcilably dangerous and was burnt on the *marae* while the *poupou* were placed in storage (Treadwell 2015b: 35). Another example is Nuku te Apiapi, a Te Arawa house. Here the construction was traumatically set back by the breaking of a *tapu* 'restriction' attached to the practices of one of the master carvers, which was followed by the death of several relatives associated with the project (Neich 2008 [2001]:154-55).

Occupation of the house traditionally proceeded only after complex rituals to render the house safe for women to enter. Mereana Mokomoko recounted one ceremony and the structural consequence of failure to observe it: "… three women (myself, Kitemate Kiritahanga and Mere Taipari) were sent for to *takahi te paepae* (to tread on or cross over the threshold, and thus remove the enchantment which debars women from entering a sacred house until this ceremony is ended), for, as you know, the ridge-pole would sag down in the middle and destroy the appearance of the house were this ceremony disregarded" (Mokomoko 1897: 42).

In this complex narrative, the influence of the *tapu* of the house seems to be extended beyond people to potentially affect the security of the ancestral relationships as enacted in the house's structure. If the *tāhuhu* sagged, not only would that disturb the structural relationships below it, but the deformation would possibly have been seen as damaging to the *mana* of the *tūpun*a 'ancestors' and distorting to the relationships that are embodied in the carved and painted structure. When rendered *noa* by the enactment of this ceremony the completed house remained an active assembly of physical and social gradients, oppositions and prohibitions that proscribed its use. This formation was given orientation and significance by the physical scale and deep logic of the house's structure and associated *mana*.

* * *

This paper has argued a close correspondence between the *tāhuhu* as a primal cosmological figure in a cultural narrative about origins, and as a fundamental tectonic element within the structure of the 19th-century *whare* Māori. The *tāhuhu* has been represented in the text as simultaneously monumental in ancestry and scale. Referencing the past within the social space of the *whare,* the *tāhuhu* maintains the present and points to the future.

Tāne's mass is also of course the measure of the collective effort that must go into his elevation. This commitment enforces the bodily knowledge of the

forces at stake in the construction of a *whare* but also insists on the collective participation of *hapū* or *iwi*, which establishes the house and maintains the social world that it structures.

Colonial and subsequent Western discourse has had little to say about the *tāhuhu* other than to remark on its size and insist that it required Western technology to position it. This paper has proposed that the *tāhuhu* was also a key element within a sophisticated and high-performing Pacific building technology that is, in many ways, antithetical to Western building principles. Further, as part of that proposal, arguments have been presented that it was the elevated mass of the *tāhuhu* that sustained the post-tensioning process.

As a post-script to this paper, and specifically the argument for the existence of a sophisticated Māori building technology, there is also historical evidence of its structural resilience. In a survey of the newspapers available on the National Library of New Zealand 'Papers Past' website (https://paperspast.natlib.govt.nz/), between 1840 and 1940, there was only one mention found of a Māori meeting house being blown down (*New Zealand Herald* 1934). While it was regularly recorded during the period surveyed that Māori houses were destroyed by fire (although no mention is made of the many houses torched by colonial and Imperial troops), no record was found of *wharenui* being destroyed by earthquakes or volcanic eruptions. It was, in fact, during the most extreme seismic and volcanic event of the 1840 to 1940 period that Māori *whare* construction most vividly demonstrated its resilience. During the ash showers and earthquakes of the Mt Tarwera eruption, when the MacCrae Hotel had largely collapsed, local Pākehā and Māori sought refuge in the Guide Sophia's *whare* and the Hinemihi *wharepuni*, both of which survived the eruption intact *(New Zealand Herald* 1931).

NOTES

1. In this discussion the interior of *whare* constitutes Te Ao Mārama the world of light /enlightenment. Outside the *whare*, within the *marae,* is Te Pō (darkness, night) and beyond the *marae* is Te Korekore, the realm of potential.
2. The Rev. Herbert Williams' 1896 account of the construction of the *whare* indicates that following the placement of the central posts the *tāhuhu* was the first element to be fixed in place. All subsequent structural elements were fitted below it, in genealogical and structural relationship to it.
3. Wahiao was opened in 1908, built after the famous Whakarewarewa house known as Rauru had been sold.
4. *Totara (Podocarpus totara), Kahikatea* (*Podocarpus dacrydioides*) and *Kauri* (*Agathis australis*) trees all grew in excess of 30 m high. These species were typically used to form the single *tāhuhu* of late 19th-century *whare*. Where houses exceeded this general length they may have required the *tāhuhu* to be formed from two elements (Sundt 2010: 125).

5. The Te Pua a te Mārama Village site is now listed as a Category A site in the Auckland Unitary Plan (Brassey and Campbell 2016).
6. This process was modelled at a small-scale using a table saw with the blade at right angles to the table surface. With fixed saw blades the construction of robust angled jigs to support the timber is the only way of cutting at the angles necessary. The necessity to rotate the timber end-for-end is a consequence of this.
7. Tāne Whirinaki, a large Whakatohea house, was rebuilt for Te Kooti at Waioeka in 1886, apparently with tenons on top of the *pouturarongo*, *poutokomanwa* and *poutāhu* with which to engage the *tāhuhu*. Complicating the issue, it turns out that the house has been reconstructed several times, including during 1946. It was at this time that all the vertical supports were increased in length. It is not known if this included the tops of posts supporting the *tāhuhu*. If so, this may have involved adopting mortise and tenons.

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ABSTRACT

Māori construction and structural principles have received limited detailed attention since Reverend Herbert W. Williams published *The Maori Whare: Notes on the Construction of a Maori House* in this journal in 1896. Since then, publications that have considered Māori construction have relied heavily on this text. Subsequent discussion of Māori construction has examined 19th-century practices largely through Western historical and technical perspectives. This paper discusses Māori building concepts and technology from a bicultural viewpoint, involving both Māori tectonics and cosmology, and Western engineering principles. In doing so it draws from a close scrutiny of *whare* 'house' components, written and oral accounts of Māori cosmology and building, and from the analysis of large-scale structural models. The article focuses on the *tāhuhu* 'ridgepole' as a principal component of Māori architecture that activates both the primary cosmological structure of Te Ao Mārama 'creation narrative' and the structural system of the 19th-century Māori house. It is argued that the *tāhuhu* in its metaphorical manifestation as the *atua* 'god' Tāne (within Te Ao Mārama) corresponds in the construction of the *whare* with the holding up of the roof, understood as Ranginui, the sky father. Monumental in scale and ancestry, the *tāhuhu* mobilised a cooperative social dimension to its deployment in the *whare*, co-opting manpower from *hapū* and *iwi* 'subtribal and tribal groups'. The paper concludes that the *tāhuhu* was a key element in a sophisticated and high performing Pacific building technology that was, in many ways, antithetical to Western building principles. Located in the abstract and conceptual distance of machine function, Western analysis appears to have failed to identify and understand the effective capacity of socially-collective Polynesian engineering.

Keywords: Māori *whare* (house), indigenous architecture, *tāhuhu* (ridgepole), Māori cosmology, New Zealand architecture

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REVIEWS

EDMONDS, Penelope: *Settler Colonialism and (Re)conciliation: Frontier Violence, Affective Performances, and Imaginative Refoundings*. New York: Palgrave Macmillan, 2016. 253 pp., bibliography, illustrations, index. US$95.00 (hardcover); US$69.00 (eBook).

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This book argues that contemporary political reconciliation cannot be understood without exploring the political, historical and colonial genealogies of conciliation. As such, Edmonds poses the following questions: How can reconciliation occur within contexts of unacknowledged founding violence and ongoing colonial oppression? How can re-conciliation occur when conciliation was either never attempted or was itself coercively enforced? What kinds of emancipatory politics do Indigenous groups envision, and how are they evoked in decolonised, grassroots (re)conciliatory performances?

Edmonds examines reconciliation performances as crucial rites of passage in the settler societies of the United States, Australia and Aotearoa New Zealand. As transformative moments, such acts reflect the desire of Indigenous and non-Indigenous peoples in contemporary settler states to build new covenants based upon the utopic hope of an equitable future. These performances, therefore, are vital for reconstructing history with the purpose of both bridging different communities and enhancing the engagement between citizens and the state. In other words, such performances strive to create new post-colonial socialities. Of course, this engagement is rarely uncomplicated. Reconciliation performances become mythic, symbolic exchanges that attempt to resolve potentially irresolvable tensions between the domination and friendship of which the Indigenous-settler relationship is unavoidably enmeshed. Indeed, state-sponsored (re)conciliation performances often serve to reinforce histories that minimise genocidal foundational violence. They also reproduce Euro-American, Christian rituals and values associated with "white civility". Such performances, therefore, neglect Indigenous histories. In response, Indigenous communities differently engage in state-sponsored performances, including promoting their own grassroots alternatives that privilege localised knowledge-practices. Nonetheless, settler states often obligate Indigenous communities to petition the state for justice. By submitting to the state's legal and hegemonic authority, such petitions serve to negate Indigenous sovereignty.

Edmonds justifies this book by arguing that scholarship on settler colonialism has tended to focus upon historical *narratives* of conciliation rather than on the legacies of conciliation as cross-cultural, performative phenomena. This analysis, therefore, is an attempt at comparative transnationalism. Reconciliation has become a part of a global lexicon and an attribute of late liberal modernity. Consequently, this book explores

local socio-political specificities and Indigenous responses and tactics, although within a context of dynamic transnational flows of colonial (re)conciliation and emancipatory resistance. By tracing reconciliatory performances as a relatively new, intersubjective genre, this book also illuminates transnational "affective economies" that evoke co-mingled emotions of shame, anger, mourning, optimism, togetherness and so on. Significantly, sometimes these emotions cultivate an assimilationist politics of consensus, while at other times they unsettle such consensus in order to develop a dissenting political space.

The book successfully situates these performances within a transnational "Age of Apology" whereby settler states have acknowledged (some of their) foundational violence, for example, although without simultaneously acknowledging Indigenous sovereignty, providing reparations or altering oppressive structures. The analysis could be strengthened, however, if Edmonds were to more effectively frame—as she asserts in the Introduction—reconciliatory performances within an equivalently global trans-Indigenous scholarly politics. In other words, while it is clear how contemporary settler politics resort to a global (re)conciliatory genre, what remains less clear is how Indigenous knowledge-practices of resistance have also circulated on a global scale.

Edmonds' monograph is divided into seven sections. The introductory and concluding bookends serve to theoretically frame the local case studies that comprise the body of the text. Each of these chapters charts how state-sponsored and Indigenous reconciliation performances differently call settler histories into the present and imagine utopic futures. Chapters 1 and 2 are situated in the United States. The former explores the symbolic enactment of the Tawagonshi Treaty/Two Row Wampum Treaty, framing Haudenosaunee Wampum knowledge-practices as a potential framework for decolonisation. The latter analyses the Future Generations Ride as a Native response to the bicentennial re-enactment of Lewis and Clark's "Voyage of Discovery". Chapters 3 and 4 are situated in Australia. The former juxtaposes the symbolically powerful, though politically empty, Sydney Harbour Bridge Walk for Reconciliation with the Aboriginal-led Myall Creek ceremonies. The latter chapter investigates how Tasmanian Aboriginal peoples have creatively engaged Sorry Day performances, particularly through their rejection of Christian-centric demands for forgiveness.

Perhaps of most interest to the readers of *JPS* (aside from the Introduction and Conclusion), is Chapter 5, which is situated in Aotearoa New Zealand. This chapter centres a broader discussion of settler violence and Māori resistance within an analysis of Tūhoe activist Tame Iti's rejection of state-sponsored commemorations of the Treaty of Waitangi. Iti's performance of "shot gun diplomacy" in 2005 underscores the contradictions surrounding such reconciliation events, namely that they present settlers as already at home when they arrived in Aotearoa. Revealing more about the present than the past, therefore, this chapter highlights that contemporary commemoration events ignore historical conflict and disrespect biculturalism because they allow for the co-existence of distinct Māori and Pākehā ontologies only if colonial violence is written out.

Perhaps most problematically, particularly given the complexities of Indigenous-settler politics (of scholarship), is the relative lack of a discussion of methods or Edmonds' positionality. While acknowledging that Edmonds is a historian (and not, say, a social anthropologist for whom it would be more expected to reflexively interrogate

one's positionality), such a discussion would certainly help the reader to situate Edmonds' analysis. Edmonds discloses her participation in Melbourne's reconciliation march, for example, but little else. This becomes all the more important because she highlights the intersubjective and affective nature of reconciliation performances.

In all, Edmonds' is a strong analysis. On the one hand, it connects the United States, Australia and Aotearoa New Zealand within the broader settler colonial world, past and present. On the other hand, by (re)centring Indigenous communities and global processes of colonisation, this transnational analysis helps to transcend certain problematic geopolitical conventions. This book adds a significant critical perspective on the topic of reconciliatory settler politics. Thus, it will appeal not only to scholars interested in Indigeneity and (neo)colonisation within the Pacific and beyond, but also to those engaging debates about empire and imperialism, war, the state and creative, collaborative resistance.

KAHN, Jennifer, G. and Patrick Vinton Kirch: *Monumentality and Ritual Materialization in the Society Islands: The Archaeology of a Major Ceremonial Complex in the 'Opunohu Valley, Mo'orea*. Bishop Museum Bulletins in Anthropology 13. Honolulu: Bishop Museum Press, 2014. 267 pp., appendices, bibliography, figures. US$50.00 (softcover).

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The 'Opunohu Valley on the island of Mo'orea in the Society Islands group holds a special place in the history of Polynesian archaeology as one of those sites where modern method and theory was first introduced and tested on the ground. It was there, in 1961, where the recent graduate Roger Green first applied the settlement pattern approach that he had learned from Gordon Willey, his mentor at Harvard, which became one of the dominant methodologies in Polynesian field archaeology. The authors, especially Kirch, were in turn mentored by Green and their work is not only influenced by Green's ideas but draws directly on some of his original field data. This publication is a data-rich monograph that contributes to research into the evolution of social complexity in chiefdoms using the 'Opunohu Valley as the case study. Although the work draws deeply on Polynesian and, more specifically Society Islands, ethnography, the authors' ambition is for the analysis to contribute to the worldwide study of chiefdoms. The work achieves that goal.

The archaeology of socio-political change has been a central focus in much of the theoretical and field-based work of both authors. This particular study picks up and develops key ideas and positions that Kirch has been developing in his writings over the last four decades—most recently this includes his work on the Hawaiian chiefdom, as well as ideas showcased in earlier works such as *The Evolution of the Polynesian Chiefdoms* (1984). It also shows a continuing commitment to the historical anthropology methodologies developed by Kirch and Green (e.g., Kirch and Green 1987; Kirch and Green 2001). Yet it would be a mistake to assume that the 'Opunohu research represents the application of a standard set of methods and ideas in a new

Polynesian setting. This volume presents some new insights and the prospect for critical re-evaluations of ideas about chiefdoms, ideology, power and landscapes presented in earlier works on these subjects. It is less ecologically focussed than other works, and it centralises ideas around "community" and "house society", which are topics Kahn has been developing in her landscape studies since her graduate work.

Chapter 1 describes the aims of the work. The project investigates the role of *marae* 'temples' and other monumental sites of ritual activity in the evolution of a complex Ma'ohi (indigenous Tahitian) society founded on inequality, rank and social hierarchy. In Mo'orea the authors identify ideology as a major source of elite power and the materialisation of ideology (DeMarrais *et al.* 1996) as the key means by which rank and status difference was promoted and stabilised in Ma'ohi society. The authors argue that processes of "intensification" of cyclical ritual activity in temple compounds led to an increase in the scale and elaboration of monumental construction over time. The key actors in this process were "houses" not lineages or sub-lineages as might be expected. The authors define "houses", using Susan Gillespie's (2000) critical interpretation of Levi-Strauss's house society concept, as a corporate body organised by shared residence, means of production and ritual actions. Thus the composition of a "house" may have a strong kinship basis but it is not determined nor reproduced by kinship processes alone. The ancestral temple—*marae*—was the focus for corporate actions of "house" members and continued investment in the *ritual estate* of the "house" should reflect shifting organisation at the community scale, especially the centralisation of power and emergence of hierarchy.

Chapter 2 is a history of *marae* archaeology in the Society Islands, including a critical discussion of classification and an evaluation of chronological models. The authors are critical of much earlier work on classification arguing that "types" were often ill-defined and awkwardly arranged into classificatory structures (or more properly perhaps "non-classificatory arrangements" [after Dunnell 1971]). Although they do not present a new classification for Mo'orean *marae* here, they argue that future work should follow Dunnell's (1971) classificatory approach and that it should be a *taxonomic* or hierarchical system prioritising the platform or court. In the discussions of chronology and classification it is fascinating to see again and again the value and prescience of Emory's early observations. Although Emory was not equipped with sophisticated field gear or theory, his work highlights the significance of those insights that emerge through long field engagement—a point I am sure the authors would agree on.

Chapters 3 through 5 present the field survey, excavation and chronological data. The survey data was all produced either using tape and compass or, in the more complex landscape settings, plane table and alidade. The authors are strong advocates of the plane table, arguing that it has yet to be replaced by any digital instrument capable of producing similar results. I strongly agree with those views. The plane table does require skills that take time to acquire and which I suspect are not being passed on as much as they once were, but the results stand out and the maps in this volume are excellent. Unfortunately, the production quality does not do justice to the fine field mapping. The critically important Figure 3.2, which shows ScMo-124, spans two pages and several of the key features are obscured by the binding. The photos too look a little dull on these pages. I would also have liked a larger scale

map that shows both the Upper and Lower Sectors (SCMo-124 and ScMo-125) together. The chronology of construction was achieved using seriation, radiocarbon and U-series dating methodologies. The overall picture is of a relatively late (15th to 16th century) ritual landscape but one that shows clear signs of sequence "… the emergence of complex monumentality through sequential additions to structures—tangible symbols of the increasing control of elites over surface production and the ritual calendar" (p. 199).

The final chapters of the volume reflect on the archaeology of the SCMO-124/125 complex and its growth, in relation to site function as inferred from ethnography and traditional accounts. The authors then refer back to the theoretical concepts and arguments introduced in Chapter 1 and expand these to set out a more general model linking ritual and economy in Polynesian chiefdoms and showing how elaborate architectural remains aggregate and eventually emerge as administrative centres through the intensification of ritual acts that centralise power around social elites.

This is a valuable contribution to the archaeology of landscape and the literature on chiefdoms and the evolution of social hierarchy. One of the features that especially appealed to me was the commitment to the role of quality field data. Some of the linkages between key concepts did not seem entirely transparent or fully developed, but this volume will be a vital part of the ongoing discussions around landscape, monumentality and power in Polynesian chiefdoms and the authors are to be highly commended.

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LEVINE, Stephen: *Pacific Ways, Government and Politics in the Pacific Islands*. 2nd edition. Wellington: Victoria University Press, 2016. 416 pp., bibliography, illustrations, notes. NZ$40.00 (softcover).

ANTHONY VAN FOSSEN
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This is an important and convenient reference handbook. It is clearly written and systematically constructed around exploring the history, structure and functioning of the political institutions of 27 states in Oceania. This is an area of great political

diversity and experimentation. The book's significance is revealed by its being issued in this second edition, only seven years after it first appeared.

Pacific Islands' political elites are pushed by foreign governments and international organisations into making globalising reforms (specific chapters referenced by their authors in the following). The book alludes to this in relation to Australia's and New Zealand's increasing role in political restructuring in many parts of the region (Jon Fraenkel), Australia's reconstruction of Solomon Islands (Gordon Leua Nanau), the UK's enactment of a lengthy, complicated global-human-rights-oriented constitution for Pitcairn Island (Peter Clegg), and France's imposition of gender quotas in New Caledonia's parliament (Nic Maclellan).

Globalising pressure is extremely powerful and subtly pervasive. There is too little about it in most of these essays, especially in relation to the political policies that are constantly promoted to integrate the islands further into global capitalism. An example of a relatively unexplored area is the political and economic hold that the international tourism industry exercises over several jurisdictions—recognised in some chapters, in cases such as the Northern Marianas (Frank Quimby) and Rapa Nui/Easter Island (Forrest Wade Young)—but ignored in chapters on some other polities, such as Guam (Kelly G. Marsh and Tyrone J. Taitano).

At the same time as economic and social globalisation spreads, there are currents running toward smaller political units and a dispersion or devolution of political sovereignty. Independence or secession movements are important in New Caledonia (where intriguing long-term, large-scale political experimentation is taking place), French Polynesia (Lorenz Gonschor), Bougainville in Papua New Guinea (Vergil Narokobi), Rapa Nui/Easter Island in Chile, West Papua in Indonesia (Gregory B. Poling), Malaita in Solomon Islands, and Chuuk in the Federated States of Micronesia (Glenn Petersen and Zag Puas). These are buoyed by the success of Timor Leste/East Timor in becoming independent from Indonesia in 1999 (Michael Leach).

A counter-example has been the US federal reassertion of control over immigration and the minimum wage in the Northern Mariana Islands and Australia's recent and controversial removal of territorial autonomy in legislation, income taxation and other important state functions from Norfolk Island. Norfolk deserves its own chapter in this book on "the Pacific Islands", which would be more focussed if it did not include chapters on Australia (Nigel S. Roberts) and New Zealand (Stephen Levine).

There are intermediate cases between these extremes of independence and secession, on one hand, and external removal of elements of sovereignty, on the other hand. In American Samoa and Guam the indigenous emphasis has been on gaining greater local powers of action within the US constitutional framework, and in the Cook Islands (Phillipa Webb), Niue (Salote Talagi) and Tokelau (Kelihiano Kalolo) the movement for complete independence from New Zealand has been weak.

The policies of the Pacific Islands governments are heavily influenced by their relations with metropolitan governments. Sovereignty continues to be an important resource—providing votes at international organisations, considerable sea and air space, significant strategic and military advantages, and even sovereignty businesses such as passport sales and offshore tax havens. Many countries are sustained by aid or migrant remittances.

MIRAB (Migration, Remittances, Aid, Bureaucracy) political economies have spread through most of Polynesia and Micronesia and, arguably, are moving into some parts of Melanesia. In the book this MIRAB feature is mentioned by name only in relation to Wallis and Futuna and French Polynesia. What are the effects on the politics of those countries where large proportions (even, in some cases, vast majorities) of the population have emigrated to friendly metropolitan countries and whose remittances are subsidising neo-traditional life back "home"?

Neo-traditionalism is taking new forms. One striking recent trend is the notable decline, but not disappearance, of the political power of indigenous aristocracies in parts of Oceania. This is particularly true in Fiji (Robert Norton), and to a lesser extent in Tonga (Steven Ratuva), the Marshall Islands (David W. Kupferman), and Wallis and Futuna (Hapakuke Pierre Leleivai). On the other hand, there appears to have been relatively little deterioration in the strength of the traditional political elites in Samoa (Iati Iati), American Samoa (J. Robert Shaffer and Cheryl Hunter), the Federated States of Micronesia and Palau (Wouter Veenendaal), although these customary hierarchies may be in more of a holding pattern. How can we explain this unevenness?

The Pacific Islands have the highest per capita foreign aid recipient levels in the world. How do the close and cooperative relations with donors affect the recipients' policies? Is the aid dependency relationship an external clientelism that complements the internal clientelism explicitly noted in Kiribati (Takuia Uakeia), Tuvalu (Jack Corbett and Jon Fraenkel), Palau and Papua New Guinea, and implicit in the accounts of corruption in Nauru (Max Quanchi), Vanuatu (Marc Lanteigne), the Northern Marianas, Tuvalu and West Papua? How does the rapidly rising role of China as an aid (loan) giver, noted in a few of the chapters, affect the allegiances and ethical decisions of political leaders in the Pacific? How are internal and external forms of clientelism connected to the prevalence of independent politicians and general weakness of political parties in the region? While the book cannot do everything, all of these important questions deserve more complete, analytical answers.

Levine's edited volume is an important handbook, reference and text book, although it would be more effective if it had an index and more statistical and summarising tables. The book helps the reader comprehend the history, structure and functioning of the region's domestic political institutions in a relatively unified way. The broader contribution of the work is that it can lead to further study, other ways of understanding, and new methods of approaching government and politics in the Pacific Islands.

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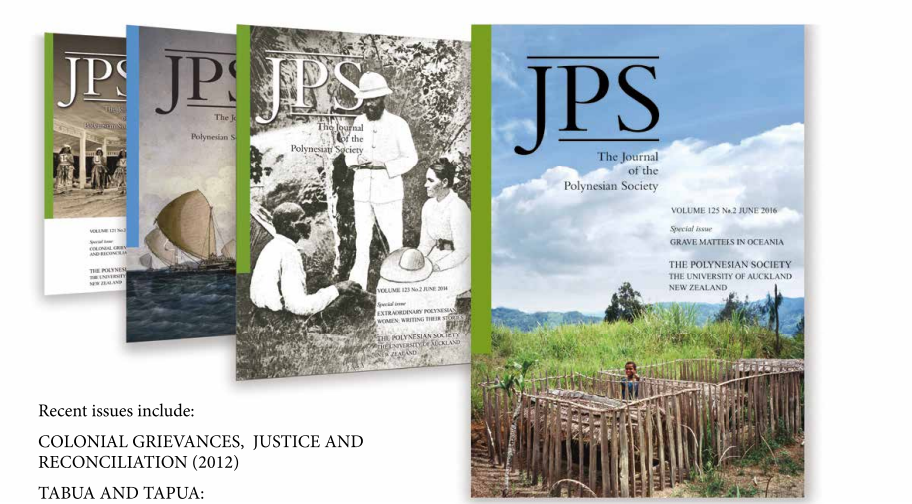

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