JPS

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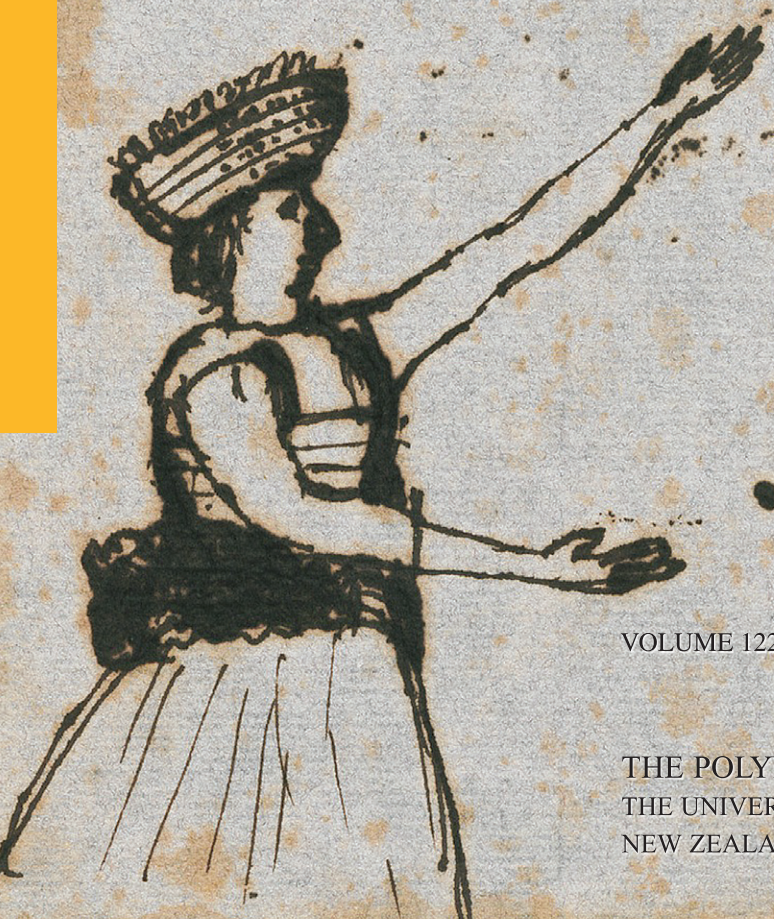

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AUCKLAND, NEW ZEALAND

Volume 122 SEPTEMBER 2013 Number 3

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Contributors to This Issue

Jeremy Coote is Curator and Joint Head of Collections at the University of Oxford's Pitt Rivers Museum, where he has worked since 1994. Trained as a social anthropologist, with research interests in South Sudan and East Africa, since joining the staff of the Museum his research has focussed on the history of its early collections and, in particular, on identifying the full extent of the Cook voyage collections and researching their history.

Jeremy Uden is Deputy Head of Conservation at the University of Oxford's Pitt Rivers Museum, where he has worked since 2008. Trained first as a biologist, before training as a conservator, he has worked in a number of museums in the UK as well as at Auckland Museum. He is currently the holder of a Clothworkers Foundation Conservation Senior Fellowship (2012-14), during which he is researching and conserving the Cook voyage collections at the Pitt Rivers Museum.

Andrew McAlister holds a PhD from the Department of Anthropology, University of Auckland, New Zealand. His 2011 thesis focused on the geochemical and physical analysis of Marquesan basalt artefacts. He is currently investigating the geochemistry and distribution of lithic materials in the Marquesas Islands, the Cook Islands and New Zealand as a means of identifying cultural interaction.

Peter Sheppard is currently Head of the Department of Anthropology at the University of Auckland. His interests include the archaeology of the Solomon Islands where he has conducted research since 1989. His methodological expertise lies in Archaeological Science with one focus being on the sourcing and study of lithic material culture and its distribution within the Pacific including New Zealand.

Melinda Allen is an Associate Professor in Anthropology at the University of Auckland. She has conducted archaeological research in the southern Cook and Marquesas Islands since 1987. She is currently leading an inter-disciplinary study in the Cook Islands examining palaeoclimate change and the effects on prehistoric populations and their marine resources. This research is supported by the Royal Society of New Zealand Marsden Fund.

Andrea Bender completed her PhD in cultural anthropology at the University of Freiburg (Germany) and is now Professor of Psychology at the University of Bergen (Norway). She specialises in the interactions of culture, language and cognition, and has conducted extended fieldwork on Tonga. Her current research focuses on numeration systems and on how their culture-specific properties affect numerical cognition.

Te Papa and Polynesian Society Event

The Friends of Te Papa in association with the Polynesian Society hosted a special set of lectures on *Archaeology—New Frontiers of Pacific Research* 12 November 2013 at the Museum of New Zealand Te Papa Tongarewa (Wellington). Recognising that archaeology has played a significant role in developing new understandings of Pacific

cultures and their histories, Te Papa invited members to listen to three illustrated talks by senior archaeologists Atholl Anderson, Janet Davidson and Geoff Irwin. These archaeological *kaumatua* shared their experiences of working in New Zealand and the Pacific, highlighting key discoveries in the region and opportunities for new research.

AGM Highlights

A highlight of the July AGM was the award to Professor Emeritus Geoff Irwin of the Elsdon Best Memorial Medal. Following the formal presentation, Professor Irwin offered the Society, and interested members of the public, a lecture on his extensive research at the North Island lake village site of Kohika (Whakatane). Kohika is famous not only for its remarkable assemblage of well-preserved organic artefacts, but also Professor Irwin's detailed analysis of the settlement's layout, structure and on-site activities. Kohika was compared with other North Island areas where Prof. Irwin has worked, including Poutu in the Kaipara and Ponui Island, highlighting regional variability in socio-political processes across these varied localities.

Also of note, Ethan Cochrane has recently joined the *JPS* editorial team as co-Book Review Editor along with Lyn Carter. Hamish Macdonald and Ben Davies continue to work on the Society's website and the *Journal* has now posted contents from the last five issues. The site also allows for online manuscript submissions for the *Journal*, as well as new registrations/subscriptions. Ben Davies also manages the Society's stand-alone *FaceBook* page.

News from Bernice Pauahi Bishop Museum (Honolulu): New Permanent Exhibition

On 21 September 2013, the Bishop Museum re-opened its permanent exhibition space in Pacific Hall (formerly Polynesian Hall) following extensive renovations. The Hall celebrates the peoples and cultures of Oceania and showcases objects from the museum's Ethnology and Archaeology Collections. One floor of the Hall provides visitors with information about the settlement of the region and cultural traditions throughout Oceania. About two-thirds of the objects on display here derive from the Archaeology Collections. These objects were recovered from stratigraphic excavations by prominent Bishop Museum archaeologists such as Kenneth P. Emory, Yosihiko H. Sinoto, Roger C. Green and Patrick V. Kirch. Another notable inclusion in the newly renovated hall is the "How We Know" panel, an interactive display where visitors learn about the tools that archaeologists use to reconstruct life in the past. The Bishop Museum hopes the newly renovated permanent exhibition space will be a focal point for dissemination of knowledge about the Pacific region and related archaeological research (communicated by Dr Mara Mulrooney, Bishop Museum, Honolulu).

The Elsdon Best Memorial Medal

The Council of the Polynesian Society considers possible recipients of this award at the end of each year, but does not make an award annually. "The Medal is for outstanding scholarly work on the New Zealand Māori. The research for which the Medal is awarded may be in the fields of Māori ethnology, social anthropology, archaeology,

prehistory or linguistics." The Medal is normally presented at the Society's mid-year Annual General Meeting and the recipient is asked to present a paper on that occasion.

The Nayacakalou Medal

The intention and conditions of the award are as follows (as recorded in the Polynesian Society Council Minutes of November 1991):

> The Nayacakalou Medal honours the late Dr Rusiate Nayacakalou for his outstanding ethnological writing on Fijian and Polynesian society and culture. The Medal will be considered, but not necessarily awarded, annually for recent significant publication on the Island Pacific relevant to the aims and purposes of the Polynesian Society and the interests and concerns of Dr Nayacakalou.

The recipient may be asked to present a paper on the occasion of receiving the Medal.

The Skinner Fund for Physical Anthropology, Archaeology and Ethnology

The Skinner Fund is sponsored jointly by the Royal Society of New Zealand, the Polynesian Society and the New Zealand Archaeological Association. Funds granted range from $500 to $1000 and applications normally close in mid-April.

The purpose of the Fund is to promote the study of the history, art, culture, physical and social anthropology of the Māori and other Polynesian peoples, particularly through the recording, survey, excavation and scientific study of prehistoric and historic sites in New Zealand and the islands of the Pacific. For further information, contact The Executive Officer, The Royal Society of New Zealand, P.O. Box 598, Wellington.

Te Rangi Hiroa Medal of the Royal Society of New Zealand

Te Rangi Hiroa, [Sir Peter Buck)] was a pioneer New Zealand social scientist. He qualified in medicine from the University of Otago in 1904 and practiced for 22 years, making major contributions to Māori health. After a brief period in Parliament, he embarked on a career in anthropology, undertaking research on Māori and Pacific cultures. His appointment to the Bishop Museum in Honolulu, as Director, and to Yale University, as a Professor of Anthropology, are testimony to the international recognition of his scholarly research and writing.

The Te Rangi Hiroa Medal was established by the Academy of the Royal Society of New Zealand in 1996, with the support of Ngāti Mutunga at Urenui, in memory of Te Rangi Hiroa to recognise excellence in the social sciences. It is awarded biennially in rotation in four areas of the social sciences to a researcher who, working within New Zealand, has undertaken work of great merit and has made an outstanding contribution towards the advancement of the particular area of social science.

- Historical approaches to societal transformation and change: this includes appropriate contributions by archaeologists, physical and social anthropologists, historians of all sub-disciplines, and others using study of the past to elucidate important processes of change, whether in New Zealand or elsewhere.

- Current issues in social and cultural diversity and cohesion: this includes appropriate contributions by criminologists, educationalists, geographers, linguists, philosophers, sociologists, social anthropologists, psychologists and others who make major advances in the understanding of current society, both in New Zealand and elsewhere.
- Social and economic policy and development: this includes appropriate contributions by economists, political scientists, demographers, public health researchers, public and social policy specialists and others who make a major contribution to identifying and shaping social and economic trends, whether in New Zealand or elsewhere.
- Medical anthropology: relationship between human behaviour, social life, and health within an anthropological context.

For further information see: http://www.royalsociety.org.nz/Site/funding/MedalsAwards/awards/academy_awards/hiroa.aspx or contact: Manager—Corporate Affairs, Royal Society of New Zealand, P.O. Box 598, Wellington 6140. Email: awards@royalsociety.org.nz

THE REDISCOVERY OF A SOCIETY ISLANDS *TAMAU*, OR HEADDRESS OF HUMAN HAIR, IN THE "COOK-VOYAGE" FORSTER COLLECTION AT THE PITT RIVERS MUSEUM —AND A POSSIBLE PROVENANCE

JEREMY COOTE and JEREMY UDEN
Pitt Rivers Museum, University of Oxford

A famous moment in the history of the study of Polynesian art was recounted by B.A.L. Cranstone and H.L. Gowers in a contribution to the *British Museum Quarterly* in 1968. In it they reported on the dismantling of a Tahitian mourner's dress believed to have been collected on James Cook's second famous voyage to the Pacific on HMS *Resolution* in 1772–75. This had been on display in the Polynesian section of the "ethnographical gallery" at the British Museum until late 1966 when the exhibition was subjected to a partial rearrangement. In particular, they described the step-by-step disassembling of the headpiece and reported that:

> Removal of this barkcloth hood revealed that the solid support inside it was in fact a complete wooden human figure of considerable sculptural merit, carved in traditional Tahitian style, the existence of which had not hitherto been known. Its discovery naturally caused some excitement since these figures are not common and the addition of one to the corpus of Cook material is not an everyday event. (Cranstone and Gowers 1968: 141)

The figure was assigned the British Museum registration number TAH 78A (the mourner's dress was already numbered TAH 78) and has gone on to have an illustrious career, featuring in the famous *"Artificial Curiosities"* exhibition in Honolulu in 1978 (see Kaeppler 1978a: 136 and 137, Fig. 236) and, more recently, in the major "Cook" exhibition that opened in Bonn in 2009 and toured to Vienna and Berne in 2010–11 (see Jessop 2009).[1]

More than 40 years later, in July 2010, Uden set about dismantling the Tahitian mourner's dress in the collections of the University of Oxford's Pitt Rivers Museum, in order to conserve and research the component parts before preparing it for redisplay. This dress is known to have been collected on Cook's second voyage, having formed part of a collection of more than 220 "curiosities" that Johann Reinhold Forster and his son Johann George gave the University in 1776 after serving as naturalists on the *Resolution*

(Coote, Gathercole and Meister 2000). The collection was housed at the University's Ashmolean Museum until 1886, when it was transferred to the newly founded Pitt Rivers Museum.

Uden's sense of anticipation at the prospect of working with such important material was heightened by the possibility that a discovery similar to that reported by Cranstone and Gowers might be made. Given that the dress had been dismantled as recently as 1970, in preparation for its display in a special exhibition devoted to the Forsters' collection, *"From the Islands of the South Seas, 1773–4"* (Gathercole no date [1970]; see also Coote 2005), it seemed unlikely that any major discovery would be made. Moreover, although that dismantling and reassembly had not been documented according to 21st-century conservation standards, it had been recorded photographically, and there was nothing in the surviving images to suggest that any stray figures or other objects might have found their way into the dress and were waiting to be discovered there (see, for example, Fig. 1 here).[2] Nevertheless, there was a palpable sense of excitement in the museum's conservation studio as the process of dismantling the dress was begun. As it turned out, Uden was to make not a "discovery" of a previously unknown piece, but a "rediscovery" of a previously missing object.

A HYPOTHESIS

In fact, some ten years earlier the possibility that a Society Islands *tamau*—that is, a headdress made of plaited skeins of human hair—might be concealed within the dress had been raised by Coote. When Anne D'Alleva examined the dress in June 1994, as part of her doctoral research into the art of 18th-century Tahiti and the Society Islands more generally, she noted that the tying cords around the barkcloth turban in the dress's headpiece were "wrapped with finely braided human hair, tamau" (D'Alleva 1997: 562). After a second examination in January 2001, she stated that the dress "incorporates whole skeins of *tamau* in its headpiece" (D'Alleva 2001: 85). On both occasions, D'Alleva's examination of the dress had been hampered by its being on display in the Museum in a cramped case—as a result her investigation was limited to what was immediately visible or could be seen with some gentle lifting and separating of the overlayered parts. She had been able to make out the presence of braided human hair, but had not been able to investigate further.

As D'Alleva's wording indicates, what she had glimpsed was not a *tamau* headdress as such, but merely skeins of hair wrapped around the headpiece's barkcloth turban; these skeins also being known—a little confusingly for present purposes—as *tamau*. However, her reference to *tamau* struck a chord with Coote for, since he had begun to take an interest in the Forster Collection

Figure 1. View of the partially assembled Tahitian mourner's dress during the preparations for the special exhibition "*From the Islands of the South Seas, 1773–4*" at the Pitt Rivers Museum in April 1970; from a photograph taken for the Museum by Peter Narracott (PRM000011658; PRM neg. R1.3). Courtesy and copyright, Pitt Rivers Museum, University of Oxford.

in the mid-1990s, he had been aware that the Forsters had included a *tamau* headdress in the collection they gave to the University of Oxford in 1776 and that it had not been seen nor heard of since. As it happens, even the very fact that the Forsters' donation had included a *tamau* had not been known to Museum staff or the wider scholarly community until 1969 when Adrienne Kaeppler "rediscovered" the Forsters' manuscript "Catalogue of Curiosities sent to Oxford" (Kaeppler 1972). Indeed, it was only once Kaeppler had made her discovery that the full extent of the Forsters' collection became known. The *tamau* listed by the Forsters as number 40 under the heading "OTaheitee and the Society Isles", that is, "The Tamow, or Headdress of platted hair" (Coote *et al.* 2000: 188), is one of some 30 objects for which no later record exists. In particular, there is no record for a *tamau* at either the University's Ashmolean Museum (where the collection was originally housed) or the Pitt Rivers Museum (to which the collection was transferred in the mid-1880s); the *only* record for it is in the Forsters' manuscript catalogue. From 1969 onwards, therefore, the Forster-collection *tamau* was regarded as "missing".

As it happens, rediscovery of the Forsters' manuscript catalogue had been made in time for Peter Gathercole to list the *tamau* as "missing" in his *Short Guide* to the 1970 exhibition (Gathercole no date [1970]). Kaeppler also included it—again as "missing"—in the section devoted to "Tahiti... Ornaments of Hair" in her comprehensive listing of Cook-voyage artefacts in the catalogue of the *"Artificial Curiosities"* exhibition (Kaeppler 1978a: 131). Since 1994, when he started to take an interest in the Forster collection, the *tamau* headdress had been one of the objects that Coote had been hoping might "turn up". Given that there was no record for it at either the Ashmolean or the Pitt Rivers, however, it seemed unlikely that it had survived. Nevertheless, along with every other item listed by the Forsters, in 2001 Coote (2001a) created an entry for it in the website dedicated to the collection,[3] but without being able to say much about it, other than it was missing.

D'Alleva's references to skeins of hair in the headpiece of the mourner's dress, therefore, raised Coote's hopes that the missing headdress might somehow have been incorporated into it. Thus, in September 2001 he added the following speculative note to the entry for the missing item in the online database for the Forster Collection:

> it has occurred to me that this item may have been incorporated into the mourning dress without a separate record for it having been made. In particular, it might have been incorporated into Forster 2 (PRM 1886.1.1637.6), 'the Turband called Ta-oopo consisted of many sorts of their cloth pasted together, and ornamented with cords of the same'. That this possibility is worth investigating is encouraged by Anne D'Alleva's discovery during

> a re-examination of 'the Oxford mourning dress' in January 2001 that it 'incorporates whole skeins of *tamau* in its headpiece'. (Coote 2001a)

Coote concluded by noting that, "along with a number of other queries, the resolution of this question will have to await a new, detailed study, and thus dismantling, of the mourning dress as currently displayed in the Museum". Which is, of course, exactly what Uden embarked on in July 2010.

DISCOVERY, DESCRIPTION, AND CONSERVATION

On 5 July 2010, the mourner's dress at the Pitt Rivers Museum was removed from display to the Museum's conservation studio. Uden and his colleagues then set about dismantling the dress into its component parts (Uden 2011a, 2011b). As it was disassembled, it was clear that the headpiece comprised a pandanus cap, from which hung a barkcloth cape, and on which rested a hair-wrapped barkcloth turban supporting a feather headdress. As soon as the headpiece was separated from the rest of the dress, however, it became apparent that there was a large quantity of hair both around and under the turban's bindings. By this stage it could already be seen that there was also a mass of hair underneath. In order to reveal what was hidden it was necessary to unwind the bindings (Fig. 2). The knots securing the ends of the bindings were untied, and the bindings slowly unwound. It turned out that three sections of binding had been used: two shorter pieces measuring 6.25 and 10.1 metres, each of which consisted of a core of coconut fibre cord wrapped around with narrow lengths of barkcloth and then strands of plaited human hair; and a longer piece, measuring 12.1 metres, which had a core of plaited hair, also wrapped around with barkcloth and human hair. Once the bindings had been removed, it was apparent that the mass of hair was actually a *tamau* headdress that had been placed directly on to the pandanus-leaf cap that was the basis of the structure of the headpiece (Fig. 3).

Once it had been removed, it was possible to examine the *tamau* more closely. It was clear that the *tamau* had suffered a good deal of moth damage, with many of the strands having been broken. Moreover, the hair was dry and brittle. In order to allow it to return to something like its original appearance, the *tamau* was humidified with the water vapour heated to 40 degrees centigrade. This made the hair stronger and more lustrous, and of its own accord it returned to what we may assume was more or less its original form (Fig. 4). During this process much frass (insect excreta and related debris) fell out, together with powdery residues formed from the breakdown of the hair. In addition, a few fragments of plant material were caught in the hair. These may well be remains of the plants with which *tamau* were both filled and decorated when they were being prepared for use in a dance (see below).[4]

Figure 2. Close-up of the Tahitian mourner's dress in the process of being dismantled in July 2010; although the feather headdress and the barkcloth turban have not yet been removed, the *tamau* is already visible; from a photograph taken for the Museum by Jeremy Uden (PRM000130296). Courtesy and copyright, Pitt Rivers Museum, University of Oxford.

The location of a large handwritten label, which had been pasted on to the hat under both the bindings and the headdress, was puzzling. This is one of the labels prepared by Edward Evans, underkeeper at the Ashmolean from 1879, who was given the task of cataloguing the Ashmolean's ethnographic collections in preparation for their transfer to the Pitt Rivers in the mid-1880s. Drawing on the inventories, notes and labels of his predecessor George Augustus Rowell, as well as his own research, Evans compiled an extraordinarily detailed set of catalogue entries preserved in two manuscript volumes now held at the Pitt Rivers Museum,[5] and also prepared detailed labels, which he pasted on to the objects themselves. Evans could not have stuck this label on to the hat without removing the *tamau*, which in turn would have required the untying and unwinding of the bindings and the disentangling of the feather headdress.

Figure 3. The headpiece of the Tahitian mourner's dress in the process of being dismantled in July 2010. The feather headdress and the barkcloth turban have been removed, but the barkcloth cape and the *tamau* remain attached to the pandanus cap; from a photograph taken for the Museum by Jeremy Uden (PRM000130294). Courtesy and copyright, Pitt Rivers Museum, University of Oxford.

When Uden "discovered" the *tamau*, there was no label on it, but it was immediately clear that it was a separate object and that it was the missing item given by the Forsters to the University in 1776.[6] It was duly accessioned into the Museum's collections, being given the accession number 1886.1.1685 ("1886.1." being the prefix retrospectively assigned to the collection transferred from the Ashmolean in the mid-1880s, and "1685" being the next unused number in the sequence).

It is not known for sure when the *tamau* was incorporated into the mourner's dress, but it was presumably done soon after the arrival of the Forster Collection in Oxford in early 1776. This would help to explain why

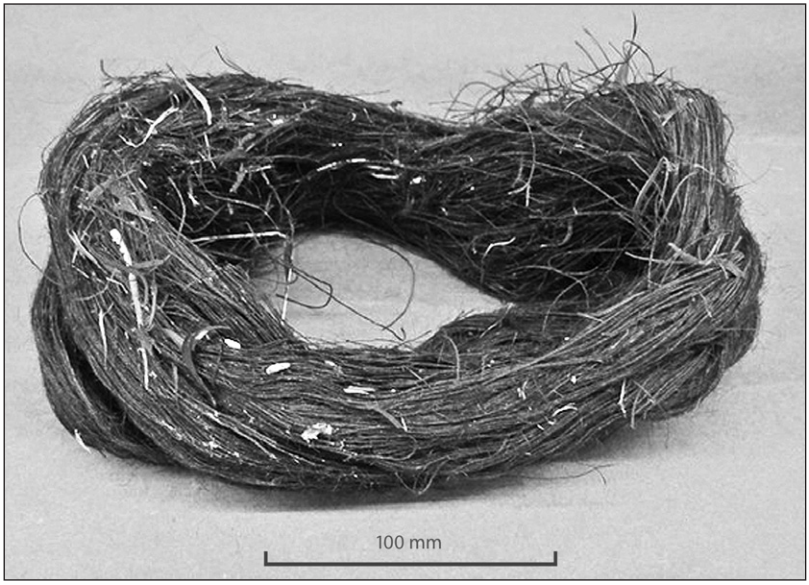

Figure 4. The *tamau* in July 2010; from a photograph taken for the Museum by Jeremy Uden (PRM000130297). Courtesy and copyright, Pitt Rivers Museum, University of Oxford.

there is no record of its existence in any of the documentation at either the Ashmolean or the Pitt Rivers museums. Given that the *tamau* was listed separately by the Forsters in their manuscript catalogue, we can be confident that it was not incorporated before the collection reached Oxford; and given that the *tamau* was not listed as a separate item when the Forster Collection was transferred to the Pitt Rivers in the mid-1880s, it seems virtually certain that it was incorporated before then. Moreover, we know from the account of a visit to Oxford by Danish scientist Thomas Bugge that the dress was mounted for display at the Ashmolean by 11 October 1777: "There are costumes and other curiosities from the South as well as from Otaheite. A man dressed for war, and another figure in mourning. They correspond exactly to the drawings found in Cook's voyages" (see Pedersen and de Clerq 2010: 124-5; also Ovenell 1986: 169). We can thus conclude that the *tamau* had almost certainly been incorporated by October 1777; that is, it appears that almost immediately after the dress had been donated to the University it was set up for display at the Ashmolean with the *tamau* incorporated into

it. Presumably, the resemblance between the hair binding on the barkcloth "turban" and the hair of the *tamau* itself was enough to suggest to the staff of the Ashmolean at the time that the two went together. It also seems clear that when the headpiece was dismantled in the early 1880s (which it must have been for the label to have been stuck on to the pandanus cap), it was put back together more or less as it had been found, that is, again incorporating the originally separate but unrecognised *tamau*.

TAMAU

Anne D'Alleva notes that *tamau* "present a challenge to interpretation…for there is little direct exegesis of these artworks in Tahitian or early-voyage sources" (D'Alleva 2001: 82). As we see it, a necessary preliminary step is to note that the term was applied not only to the type of headdress discussed here, but also to the plaited hair from which such ornaments were made, and which also was used to make and decorate other objects. From the accounts of the early voyagers, we know that Society Islanders placed a high value on such plaited hair. Joseph Banks noted that "the rich have enormous quantities" of it (see Beaglehole 1962 [v. II]: 332), and it appears that such reserves were drawn on whenever a *tamau* was required; any headdress would thus be likely to be made up of the hair of a number of different—presumably related—women (D'Alleva 2001: 85). Probably anything made from or incorporating such plaited hair was highly valued, and the headdresses certainly were. Banks noted that the *tamau* was the ornament "they value more than any thing they have" (see Beaglehole 1962 [v. I]: 324); while in the official account of the third voyage Cook noted how, along with *taumi*, or breastplates, *tamau* were the sort of very valuable objects which Tahitian thieves were severely punished for stealing (Cook and King 1785 [v. II]: 172; see D'Alleva 2001: 83).

Drawing on the accounts of Banks, Cook, the Forsters, and other voyagers, as well as later literature, and examination of examples surviving in museum collections, D'Alleva has provided the two most detailed accounts of what is known about the manufacture, use and significance of *tamau* in all its forms, as well as its place in a comparative Polynesian context. Thus we draw here on both her doctoral thesis (D'Alleva 1997: 255 ff.) and her later essay "Captivation, Representation, and the Limits of Cognition: Interpreting Metaphor and Metonymy in Tahitian *Tamau*" (D'Alleva 2001), though our account mostly leaves aside questions of meaning and significance, which D'Alleva and other specialists are better qualified than us to discuss.

Based on her examination of a number of examples, but not—for reasons already explained—the example reported on here, D'Alleva noted in 1997 that "the bundles of braided hair that survive… exhibit a remarkable uniformity of construction" (D'Alleva 1997: 257). Here is her later, generalised description:

> Each skein consists of a very fine three-ply braid, with each ply typically composed of anywhere from fifteen to thirty-five strands of hair. The hair itself is uniformly brown and straight, and perhaps it was sorted for colour and texture, for there are never grey or curling hairs in evidence. While the fineness and evenness of the braiding is remarkable, what is most impressive about *tamau* is their great length, seemingly many yards, and the fact that the braids are absolutely seamless. It is impossible to distinguish where hair has been added to create such long, smooth braids. (D'Alleva 2001: 85)

As D'Alleva also points out, "the *tamau* bundles extant today are too fragile to unwind and measure" (D'Alleva 1997: 258). However, estimates have been made concerning the dimensions of other surviving examples, and we offer below our own estimate for the example preserved at the Pitt Rivers Museum. The example collected on Cook's second voyage by Anders Sparrman, now in Stockholm, "made of black human hair made into a number of plaits consisting of three-ply string", is said to measure 500 cm (Söderström 1939: 33). Thomas Psota estimates that "in its original form" the plaited hair in the third-voyage example collected by John Webber, now in the Historisches Museum in Bern "was 80 to 100 metres in length and was wound into a thick bun with 200 to 250 turns" (Psota 2009). However, Joseph Banks claimed that "a common head dress contains at least 2 Leagues" and that he had "measured a peice [*sic*] made upon an end without a knot above an English mile and three quarters in Lengh [*sic*]" (see Beaglehole 1962 [v. II]: 332). Given that a league was equivalent to approximately three miles, Banks is claiming that *tamau* were commonly made of braided strands measuring longer than six miles or nine kilometres.[7]

The newly discovered headdress differs from D'Alleva's generalised description in that each ply consists of between six and ten, rather than between 15 and 35 strands of hair (see Fig. 5). We cannot say why the newly discovered example differs in this way from those examined by D'Alleva, though it may perhaps be a local variant. As for its dimensions, since its humidification and passive reshaping, it has a maximum length of 285 mm and a maximum width of 200 mm. More precisely perhaps, it weighs 164 gm, this providing a starting point for assessing the total length of the braided strands. Our various calculations lead us to estimate that the plaited hair in the Oxford *tamau* measures between two-thirds of a kilometre and one kilometre.[8]

The rediscovered *tamau* is one of only a few that can be traced to Cook's voyages or to the 18th century more generally. In the "Tahiti and Society Islands" section of her *"Artificial Curiosities"* catalogue, Kaeppler (1978a: 131-32) lists nine "ornaments of hair" that can be provenanced to Cook's voyages (some only circumstantially). As noted above, despite being "missing" at the time, the present example was included by Kaeppler in

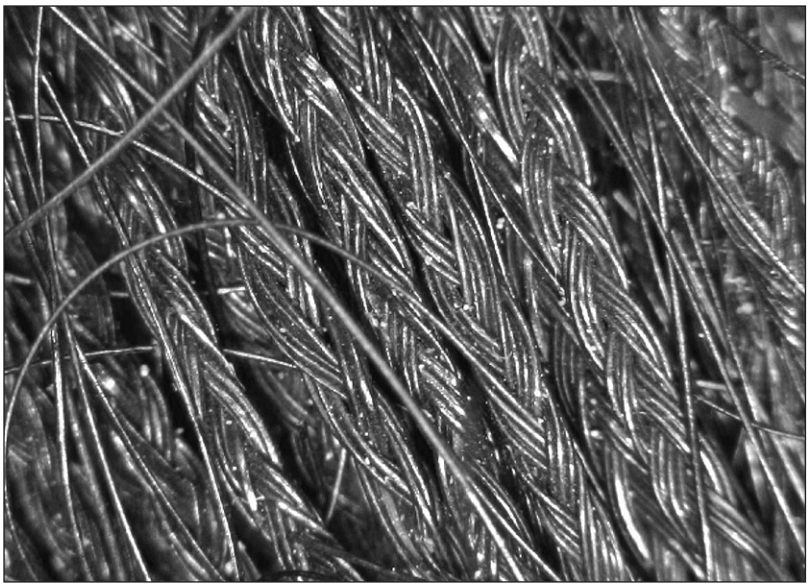

Figure 5. Microscopic detail of the plaited hair in the *tamau* in July 2010, from a photograph taken for the Museum by Jeremy Uden (PRM000130298). Courtesy and copyright, Pitt Rivers Museum, University of Oxford.

her list of nine examples. In her doctoral thesis, D'Alleva listed 11 "hair ornaments" as having "secure eighteenth-century provenance", of which she specifically identifies seven as *tamau* (D'Alleva 1997: 540-44); and she lists a further five (all identified as *tamau*) of "probably eighteenth-century provenance" (pp. 636-37). Because its whereabouts were unknown at the time of her research, D'Alleva did *not* include the present example in either of her lists.[9] There *may* be other examples awaiting discovery in museum collections, but it is clear the *tamau* collected in 1773–74 by the Forsters and now rediscovered at the Pitt Rivers Museum is one of very few attested early examples and thus part of a limited corpus. Indeed, given that D'Alleva stated in both 1997 and 2001 that "no headdress survives intact today" (D'Alleva 1997: 256, 2001: 84), it is worth stressing that the present example appears to be as close to intact as one could expect a 240-year-old ornament of human hair to be. From what we have been able to gather from the literature about the other surviving examples, in both headdress and "loose" forms, it is also the best preserved.

A POSSIBLE PROVENANCE

Our original intention in preparing this article was only to report the "rediscovery" and provide a description. However, we are encouraged by D'Alleva's discussion of the number of references in the voyaging and other early literature to *tamau* being presented by high-ranking women to particular European visitors to at least consider whether a likely source might be suggested for the example preserved at Oxford. As D'Alleva's discussion demonstrates, that the Forsters might have been given a *tamau* by a woman would not be surprising, given what is known about gift-giving during the early European voyages. Drawing on the log book of the voyage of the *Dolphin*, D'Alleva says that "during the first European voyage to Tahiti, in 1767, the high-ranking woman Purea gave *tamau* to Captain Samuel Wallis and his officers" (D'Alleva 2001: 86).[10] She also notes that, in 1792, 'Itia, the wife of Pomare I, gave George Tobin "a present of plaited human hair about the thickness of a double thread" (p. 86, quoting Oliver 1988: 170; see also Tobin 2007: 96), and that seven years later Pomare I's consort, Vaiareti, gave William Wilson of the *Duff* "a quantity of human hair made into fine sinnet" (p. 86, quoting Wilson 1966: 209). In all these cases, the givers and receivers of the gift are thought to have been *taio*, that is, friends with reciprocal obligations.[11] As it happens, we did not have far to look for a potential source for the Forster-collection *tamau*. The Forsters' writings suggest a possible—though admittedly speculative and arguably excessively romantic—provenance.

The elder Forster's most significant mentions of *tamau* occur in his Journal entries for 11 September 1773, during the *Resolution*'s first visit to Ra'iatea, and 29/30 May 1774, during the *Resolution*'s second visit. In the first of these entries he provides a detailed account of the *heiva* or dance put on for the visitors by Reo, the Borabora regent of the island.[12] One of the dancers was Reo's daughter Poiatua (Fig. 6),[13] whom Forster calls "a fine young Girl". Forster describes the dancers' appearance:

> Their dress is singular & remarkable: on their heads they had a high twist or turbant of plaited hair; on the crown in the circle between ye plaited hair all was filled with Cape Jasmin flowers & the front of the bunch of plaited hair was ornamented with 3 or 4 rows of the white flowers of the *Morinda citrifolia*, which looked so pretty as if the head had been set of[f] by pearls. (Hoare 1982 [II]: 360)

Reinhold Forster was clearly struck by Poiatua's appearance and was moved to sketch either her or one of her similarly dressed companions (see Fig. 7).[14] Moreover, he goes on to record that after the dance and a sort of play had finished "we made the Actors presents" (p. 361). He does not say specifically

that Poiatua was given presents, but it seems clear that she was, and if so—we suggest—she may have given either Reinhold or George the *tamau* from her head in return. Such speculation is strengthened by the detailed description the elder Forster provides, especially of the flowers set into the ornament; we can imagine him writing up his journal in the Resolution's Great Cabin with the newly acquired *tamau* on the table in front of him.

That this may indeed be what happened is also suggested by George Forster's account in his *Voyage Round the World*, based in large part on his father's journal. George gives a detailed report of the same event, including a reference to "Poyadua, the fair daughter of the chief Orèa, and the other a tall well shaped lady, of very agreeable features, and likewise a very fair complexion" (J.G. Forster 1777 [v. I]: 399, 2000a: 216). With reference to the *tamau* he comments:

> The neck, shoulders, and arms were left uncovered, but the head was ornamented with a kind of turban, about eight inches high, made of several skains [skeins] of plaited human hair, which they call tamòw. These being laid above each other in circles, which enlarged towards the top, there was a deep hollow left in the middle, which they had filled up with a great quantity of the sweet-scented flowers of the (*gardenia*) Cape jasmine. But all the front of the turban was ornamented with three or four rows of a small white flower, which formed little stars, and had as elegant an effect on the jetty black hair as if it had been set out with pearls. (J. G. Forster 1777 [v. I]: 399, 2000a [v. I]: 216)

Again, one can imagine George drawing on his memories—perhaps even on notes he had made—of the *tamau* he and his father had sent to Oxford in January 1776 as he wrote this section of his *Voyage* later that year. George also records the giving of presents: "The officers of both ships, who were present, and ourselves, loaded them with a great variety of beads and ornaments, which they had so well deserved" (J. G. Forster 1777 [v. I]: 399, 2000a: 217).

As for the second occasion, in his Journal for 29 May 1774, Reinhold records the sighting of a different type of *tamau*, but again brings his account back to Poiatua:

> I took a little walk ashore & saw two other Girls dance a *Heìvā*. The plated Hair were not wound round their heads, but laid in locks, which looked well enough: but their performances were not so good, as those of *Teipoyādòoā*'s, who has fine hands & an elegant shape above (Her feet being extremely large) & her motions are extremely gracefull. (Hoare 1982 [v. III]: 525)

In his Journal for 30 May (the next day in "ship's time", which ran from noon to noon), he also records "After dinner we came again ashore to *Orèā*'s

house, where we saw *Teipoyādòoā* dance. She was more dressed out than ever" (Hoare 1982 [v. III]: 525). George provided accounts of both these events in his *Voyage*. Of the dance on 29 May he wrote:

> I had been on shore in the creek during this time, and saw a heeva, or dance, performed by two little girls; but their dress was not so grand, and their action much inferior to that of Poyadua. The tamow, or head-dress of plaited hair, was not laid like a turban, but formed several large locks, which had a pretty effect, and resembled in some measure the high heads of our modern ladies. (J. G. Forster 1777 [v. II]: 141, 2000a [v. I]: 395)

Of the performance by Poiatua on 30 May he wrote:

> In the afternoon Poyadua performed a dance; and as if she meant to outshine the other actresses, she had ornamented her dress more than usual, and wore a great quantity of various sorts of European beads. Her wonderful agility, the graceful motion of her arms, and the quick vibration of her fingers, were as much admired there by the natives, as we applaud them in our dancers; and since all these accomplishments are taught in the South Sea islands by nature only, it must be confessed that Poyadua deserved the encomiums which all the spectators bestowed upon her. (J. G. Forster 1777 [v. II]: 141, 2000a [v. I]: 395)

Taken together, the elder and younger Forsters' accounts of encountering Poiatua in September 1773 and May 1774 provide some of the very best descriptions we have of the form and nature of *tamau* headdresses. More than that, however, they seem to speak of a direct engagement with at least one specific example, which—we suggest—may be that preserved at the Pitt Rivers Museum. What we are suggesting, therefore, is that either Reinhold and/or George Forster may have been in a *taio* relationship with Poiatua and that the *tamau* may have been one of the gifts Poiatua gave them.

DISCUSSION

We recognise that our suggestion that the *tamau* headdress preserved today at the Pitt Rivers Museum was given by Poiatua to Reinhold or George Forster in September 1773 or May 1774 is speculative. There are numerous other possible histories for this object. Poiatua may have given it to one or other of them on another occasion during the *Resolution*'s two visits. Or someone else may have presented it to Reinhold or George during one of the *Resolution*'s visits to Ra'iatea—or during one of the visits to Tahiti. Given what is known about how "curiosities" were exchanged between the voyagers themselves, and indeed about how the Forsters sometimes purchased items from the sailors on the voyage, it may be that the *tamau*

now in Oxford has a different history altogether. Among other possible scenarios, given Lieutenant Pickersgill's seemingly close relationship with Poiatua (see note 14), it is possible to imagine that Poiatua gave the *tamau* to him and that he subsequently gave or sold it to the Forsters. All we know for sure, admittedly, is that the *tamau* headdress now in Oxford was acquired on Cook's voyage of 1772–75.

However, it is striking that all the mentions of *tamau* headdresses in the Forsters' accounts relate closely to Poiatua and her performances. This might lead one to expect that they would have mentioned the acquisition of a *tamau* from her in their writings and/or that her name would be mentioned in the relevant entry in the "Catalogue of Curiosities sent to Oxford". Anyone familiar with the Forsters' writings in general, however, knows that they rarely mention individual objects and their acquisition; frustratingly, the written accounts provide few reliable clues as to where and when individual objects were acquired—and there is no mention of the acquisition of a *tamau*. Moreover, with one exception—a Māori cloak from "Dusky Bay" (no. 102; see Coote *et al*. 2000: 188)—the entries in the Forsters' manuscript catalogue of the collection they gave to Oxford in 1776 do not include specific provenances beyond island or island group. Thus the provenance for the *tamau* is given only as "OTaheitee and the Society Isles".

We should also note that the Forsters appear to have collected more hair than the *tamau* now in Oxford. In a list the Forsters drew up in February 1778 of material they had available for sale, they refer to "des *fils* qu'on a fait des cheveux de leurs femmes, & dont ils font un ornament pour leurs danseuses" (threads that they make from the hair of their women, of which they make an ornament for their dancers; our translation).[15] Moreover, a "bundle of very fine, braided human hair cords" was included in the collection they gave to Fürst Leopold Freidrich Franz of Anhalt-Dessau, formerly housed in the Südsee Pavilion at Wörlitz Castle.[16]

For now, there is little more to add, other perhaps than to wonder whether the suggestion made by William Wales, astronomer on the *Resolution*, was valid. Wales suggests that the Forsters were guilty of inappropriate sexual behaviour, in his reference to "the affair of the *old man and his son* at Uliatea [Raʻiatea], where a girl and a *knife* was concerned" (Wales 1778: 55, 2000: 726; original emphases). Although refuted by George Forster as a 'pretty story' (J. G. Forster 1778: 32, Forster 2000b: 770), might it relate in some way to the existence of a special (sexual?) relationship between one or the other, or even both Forsters, and Poiatua? Rather than fanning the flames of 18th-century gossip, however, we think it best to comment no further.

* * *

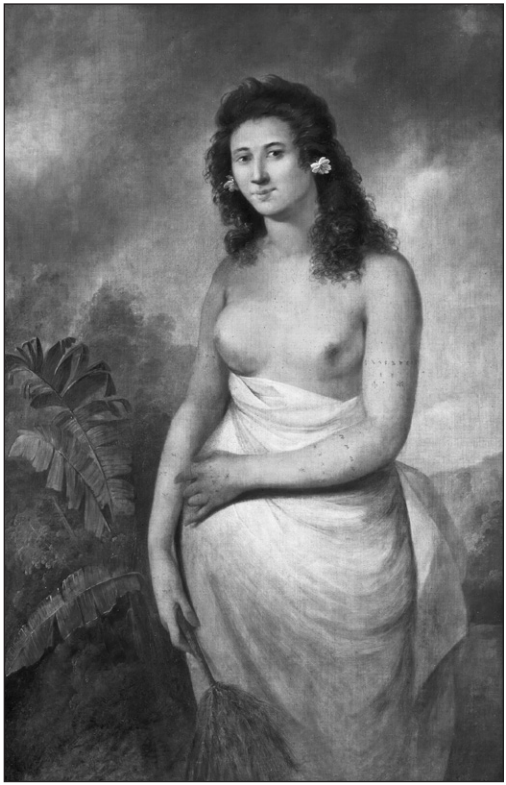

Figure 6. John Webber, *Poedooa, the Daughter of Oree*, 1777, oil on canvas, 1454 x 959 mm, in the Ministry of Defence Art Collection at the National Maritime Museum (BHC2957). Webber painted Poiatua's portrait during her confinement on board the *Discovery* during Cook's visit to Raʻiatea on the third voyage. She is thought to have been aged 19 or so and pregnant at the time; the flowers at her ears are identified as Cape jasmine, that is, the same flowers the Forsters say were used to decorate the front of the *tamau*. This painting is one of at least three worked-up versions, presumably based on sketches made on board the *Discovery*, produced by Webber back in London after the voyage. For a detailed account of the painting, see the entry for it on the website of the National Maritime Museum, at <http://collections.rmg.co.uk/collections/objects/14430.html>; see also Thomas 2003: 351. Courtesy and copyright, National Maritime Museum, Greenwich, London, Ministry of Defence Art Collection.

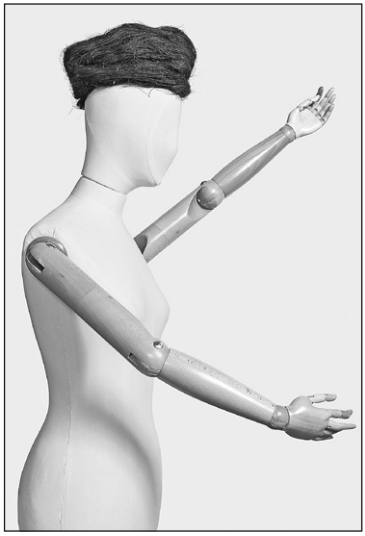

Figure 7 [left]. Johann Reinhold Forster, untitled sketch of a woman dancing, Hamanino, Raʻiatea, 11 September 1773; pen and ink, 203 x 141 mm: "Their dress is singular & remarkable: on their heads they had a high twist or turban of plaited hair… Over the upper part of the Shoulders & breast a white thin cloth was spread, & under it over the upper part of the body, the one had a brown gummed cloth, & the other a blue Woolen European Cloth; below they were dressed in a kind of wide & long petticoat of white cloth, but about the hips on both sides there was a very large 4 rowed ruff of red & white cloth" (Hoare 1982 [II]: 360). Staatsbibliothek Preussischer Kulturbesitz, Berlin; J. R. Forster's Journal II, MS germ. Quart. 224, opp. folio 133. Courtesy and copyright, Staatsbibliothek, Preussischer Kulturbesitz, Berlin.

Figure 8 [right].View of the *tamau* mounted on a mannequin in the photographic studio at the Pitt Rivers Museum in June 2012; from a photograph taken for the Museum by Malcolm Osman (PRM000130302). Courtesy and copyright, Pitt Rivers Museum, University of Oxford.

Paul Tapsell's recent speculative discussion concerning how at least some of the objects in the collection Joseph Banks gave to Christ Church, his old Oxford college, after Cook's first voyage might have belonged to the Raiatean priest-navigator Tupaia has given those objects increased intrinsic interest—greater potential *mana* perhaps (Tapsell 2009; cf. Coote 2004). Similarly, our speculation that the *tamau* preserved at Oxford might have once adorned the

head of Poiatua is likely to give it greater appeal. In her 2001 essay, D'Alleva notes the "unprepossessing appearance" of surviving *tamau*: "rarely on exhibit, they sit in drawers and boxes, brittle skeins of braided hair without sheen or lustre" (D'Alleva 2001: 82). The juxtaposition here of Reinhold Forster's sketch (Fig. 7), the studio photograph of the newly discovered example displayed on a mannequin (Fig. 8), and Webber's portrait (Fig. 6) goes some way towards bringing the object to life. Certainly, it seems likely that it will now be launched on a "career" of publication and exhibition, just as the figure found in the mourner's dress at the British Museum was, once it had been published by Cranstone and Gowers in 1968.

Our engagement with "ethnographic objects" is increased immeasurably by linking them with particular individuals, makers or owners—especially when something is known about them and we have their portraits to gaze upon. As we have endeavoured to stress, we recognise that our suggestion that Poiatua gave the Forsters this particular *tamau* is speculative and that there is a danger that by repeating it here it may become an unwarranted "fact". As we see it, however, attempting to identify the high-ranking woman from whom the Forsters acquired the *tamau* contributes to the recent shift in focus in accounts of Cook-voyage objects from the agency of the voyagers who "collected" them to that of the people who made, used, and gifted or exchanged them. In that spirit we like to imagine that the girl portrayed by John Webber is the same girl sketched by Reinhold Forster and that the newly discovered headdress is the one that adorned her head as she danced for her father's visitors on 11 September 1773—or 30 May 1774.

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NOTES

1. The modern form of the figure's registration number (which needs to be used for retrieving the relevant entry from the British Museum's online database) is Oc,TAH.78.a.
2. For more images of the exhibition being prepared, see Coote 2005.
3. The "Forster Collection" website was launched in 2001 (see Coote 2001b). Unfortunately, in recent years, technical difficulties have made it impossible to update the site with further information, as was originally intended. Work on a new, fully updated (and updateable!) version of the site has begun; see <http://web.prm.ox.ac.uk/cookvoyages/>.
4. Uden is currently endeavouring to see whether it is possible to identify the origins of this material.
5. University of Oxford, Pitt Rivers Museum, Accession Books etc., "List of Anthropological Objects Transferred from the Ashmolean to the Pitt Rivers Museum", 2 volumes, (compiled by Edward Evans, 1884–86). For a transcription, see MacGregor 2000: 255-413. For an account of the work of Evans and his controversial predecessor Rowell, see Ovenell 1986: 230 ff.; see also MacGregor 2000: 255.
6. The *tamau* does not bear one of Evans's labels, nor any trace of one. Nor does it bear one of the small labels with handwritten numbers matching those in the Forsters' "Catalogue of Curiosities sent to Oxford" that provide indisputable evidence of an object's being part of the Forster collection. We are, however, as sure as we can be that the *tamau* discussed here is the object listed as number 40 by the Forsters in their manuscript catalogue. We discount the possibility that the newly discovered *tamau* was somehow part of the mourner's dress and that the separately listed *tamau* remains missing. From our knowledge of the history of the Museum's collections, we also discount the possibility of the *tamau* having come from a different source.
7. In his edition of Banks's Journal, J.C. Beaglehole notes that a marginal note in a hand other than Banks's records: "Jany. 21. 1772 measurd one 6144 feet another 7294 feet" (Beaglehole 1962 [I]: 339, n. 1).
8. According to Legrand *et al*. (2005), 120 mm of hair weighs roughly 0.001 gm, thus one metre of hair weighs 0.00833 gm (i.e., (0.001 ÷ 120) x 1000). The hair in the Oxford *tamau* comprises three plys of up to ten strands each; i.e., there are no more than 30 strands in a single plait. The weight of a one metre section of the sort of plaited hair in the Oxford *tamau* can thus be calculated as weighing 0.25 gm (i.e., 0.00833 x 30). Given that the Oxford *tamau* weighs 164 gm, we can calculate that the braided hair measures 656 m (164 ÷ 0.25). If that figure is not impressive enough, we should point out that, unbraided, the hair in the *tamau* would measure almost 20 km. Alternatively, the "What Do We See: The Shaft" section of L'Oréal's *Hair Science* website (at <http://www.hair-science.com/>) suggests that 72 gm of hair is equivalent to 13 km in length. Thus the weight of the Oxford *tamau*, 164 gm, would equate to 29.6 km. Given that the hair in the Oxford *tamau* comprises three plys of up to ten strands each, i.e., 30 strands

in a single plait (and leaving aside the troublesome question as to whether or not Polynesian hair weighs more or less the same as other human hair), we can calculate that the total length of the braided hair in the Oxford *tamau* is 0.99 km.

9. For Roger Rose's summary of his findings concerning *tamau*, see Rose 1971: 795-96. Rose did not, of course, examine the newly discovered example.
10. This log book is held, like so much other material relating to the early British voyages, in the Public Records Office (PRO) collections at the National Archives of the United Kingdom (TNA): TNA:PRO, ADM 55/35.
11. In her recent book *Intimate Strangers: Friendship, Exchange and Pacific Encounters*, Vanessa Smith (2010) throws doubt on previous understandings of the nature of *taio* relationships—and even on their very existence. What remains clear and sufficient for our purposes, however, is that people gave each other things and, in particular, that elite women gave hair to European voyagers.
12. For recent accounts of the *Resolution*'s first visit to Ra'iatea, see Salmond 2003: 206 ff., Thomas 2003: 199-200; for Cook's Journal account, see Beaglehole 1969: 223 ff. For recent accounts of the *Resolution*'s second visit to Ra'iatea, see Salmond 2003: 256 ff., Thomas 2003: 235 ff.; for Cook's Journal account, see Beaglehole 1969: 419 ff.
13. With typical orthographic precision, Reinhold Forster gives the girl's name as Teipoyādòoā. George Forster gives Poyadua. Other voyage journalists give Poedu. Among recent authors, Salmond (2003) gives her name as Poiatua, Thomas gives Poetua, and others Poedua. For convenience's sake, we follow Salmond's (2003) usage here.
14. In his Journal, Richard Pickersgill (Third Lieutenant on the *Resolution*) also recorded what appears to be the same event (though there appears to have been a number of dances over the course of a few days and a number of exchanges of presents). Indeed, Pickersgill claims that he was taken ("carried", he says!?) by Poiatua to watch her being dressed for the performance: "her head dressed in the Manner of a Turband with fine Platted black hair ornamented with flowers" (see Beaglehole 1969: 771). As Beaglehole (1969: 223, n. 6) comments, "Pickersgill seems to have got on extremely well with this charmer, 'Miss Poedua'". See also the account in William Wales's Journal (Beaglehole 1969: 804-5). It would also be worth considering whether other examples of *tamau* that can be definitively traced to Cook's second voyage were acquired on this occasion; for example, the hair in the collection of Anders Sparrman held by the Statens Etnografiska Museum in Stockholm (see Söderström 1939: 33 and Pl. ix, Fig. 4).
15. "Nota rélativement aux Curiosités Artificielles, qu'on a rapportées de la Mer du Sud", manuscript signed by "Jean Renaud Forster" and George Forster; New Zealand, Wellington, National Library of New Zealand / Te Punā Mātauranga o Aotearoa, Alexander Turnbull Library, MS–Papers–3497; for a full transcription, see Hoare 1982 [IV]: 780-82; for an English translation, see Kaeppler 1978b; see also Dawson 1979: 12-13.
16. This is also a recent "rediscovery", reported by D'Alleva (1997: 541-42).

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ABSTRACT

In July 2010, a Society Islands' *tamau*, or headdress of human hair, collected on James Cook's second famous Pacific voyage of 1772–74, which had been missing since 1776, was "rediscovered" at the University of Oxford's Pitt Rivers Museum. A report of its rediscovery is followed by a technical description, an account of its conservation, and a partly speculative discussion of its history and provenance.

Keywords: Society Islands, Cook's voyages, collections, museums, ornaments

THE IDENTIFICATION OF A MARQUESAN ADZE IN THE COOK ISLANDS

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The islands of East Polynesia were among the last places on Earth to be settled by humans. To embark on such an undertaking, involving hundreds of islands separated by thousands of kilometres of ocean, would almost certainly have required a high degree of organisation, and many of the questions that have interested archaeologists working in the region revolve around how this feat was achieved (see Allen and Kahn 2010, Kirch and Kahn 2007 for reviews of recent research). Irwin (1990, 1992) has shown that a deliberate and coordinated strategy of exploration provides the most plausible explanation for the discovery of habitable islands, while other researchers have argued that some degree of post-colonisation interaction would have been needed to maintain viable settlements on ecologically-marginal islands (e.g., Di Piazza and Pearthree 2001; Weisler 1993, 1997a).

Archaeologists have employed various lines of evidence to demonstrate this kind of mobility and interaction between communities. Some types of evidence, such as stylistic similarities of artefacts and architecture, shared genetics, common languages and the remains of introduced plants and animals, can demonstrate initial contacts (or common origins) but they will not necessarily reflect on-going relationships. A less ambiguous and more direct method of demonstrating interaction has been to identify the presence of exotic objects made from compositionally distinctive materials. In other parts of the world, such materials have included obsidian (e.g., Cann and Renfrew 1964, Hughes 1986), various metals (Hosler and Macfarlane 1996, Knapp 2000), manufactured glasses (Saitowitz and Read 2001), ceramics (Kennett, Anderson, Cruz *et al.* 2004) and shell valuables (Aswani and Sheppard 2003, Kirch 1988: 108). However, with the exception of obsidian and volcanic glass, which is common only in New Zealand, Rapa Nui and Hawai‘i (McCoy, Mills, Lundblad *et al.* 2011; Sheppard, Irwin, Lin *et al.* 2011; Ward 1972), these materials are absent or extremely rare in pre-contact East Polynesian assemblages (Weisler 1993: 19). For this reason, archaeologists working in Polynesia have for the most part concentrated on identifying the geographical origins of adzes and other tools made from basalt, a commonly-occurring volcanic stone, using X-ray fluorescence spectrometry (XRF) and related techniques (Parker and Sheppard 1997, Shackley 2010, Weisler and Sinton 1997).

GEOCHEMICAL BASALT ANALYSES IN POLYNESIA

Over the past three decades, geochemical analyses of basalt tools have been increasingly employed as the primary means of identifying interaction in Polynesia. Early provenancing studies were, however, somewhat limited by relatively small sets of reference data. For example, Best's (1984) pioneering study of Pacific adze geochemistry included only 35 reference specimens from across the region and some sources were represented by single samples. Since then, concerted efforts have been made to systematically sample and analyse most of the major Polynesian basalt sources (e.g., Allen and McAlister 2013; Best , Sheppard, Green *et al.* 1992; Bollt 2008; Hermann 2011; Johnson 2005, 2010; Kahn, Mills, Lundblad *et al.* 2008; Kahn, Sinton, Mills *et al.* 2013; McAlister 2011; Mills, Lundblad, Smith *et al.* 2008, Mills, Lundblad, Field *et al.* 2010; Mills, Lundblad, Hon *et al.* 2011; Mintmier, Mills and Lundblad 2012; Sheppard, Sand and Parker 2001; Sheppard, Walter and Parker 1997; Walter and Sheppard 2001; Weisler 1993, 1998; Weisler, Conte and Kirch 2004; Weisler, Kirch and Endicott 1994; Weisler, Collins, Feng *et al.* 2013; Winterhoff 2007), resulting in geochemical data for more than 2000 reference specimens. Consequently, analysts are now in a better position to understand the characteristics of various sources, including the ranges of their internal variability.

Provenancing studies have shown that most communities in Polynesia did not develop in isolation but remained in contact with one another for several centuries after colonisation. Weisler (1997b, 1998, 2008), who has been at the forefront of this research, has identified a number of distribution patterns, which he suggests reflect interaction spheres of varying scales. Two basalt sources in particular have very wide distributions (Fig. 1). Adzes from the Tataga Matau Quarry on the Samoan island of Tutuila have been identified in several West Polynesian assemblages, including the Polynesian outlier of Taumako in the Solomon Islands (Best *et al.* 1992), and were distributed eastwards to the Cook Islands (Allen and Johnson 1997, Sheppard *et al.* 1997, Weisler 1993). Similarly, tools sourced to Eiao, an extensive "island-quarry" of fine-grained basalt in the north of the Marquesas archipelago (Charleux, McAlister, Mills *et al.* in press; Linton 1925; Rolett 2001), have been found in several central East Polynesia assemblages (Collerson and Weisler 2007, Hermann 2011, Weisler 1998) and even as far north as the Line Islands (Di Piazza and Pearthree 2001).

A notable feature of large-scale distributions is that they tend to involve the transfer of materials from large, high-quality sources to islands either possessing basalts of lower quality or altogether lacking adze-quality stone. Within island groups possessing extensive sources of high-quality basalt, distributions often are limited to intra-archipelago sources. For example, four

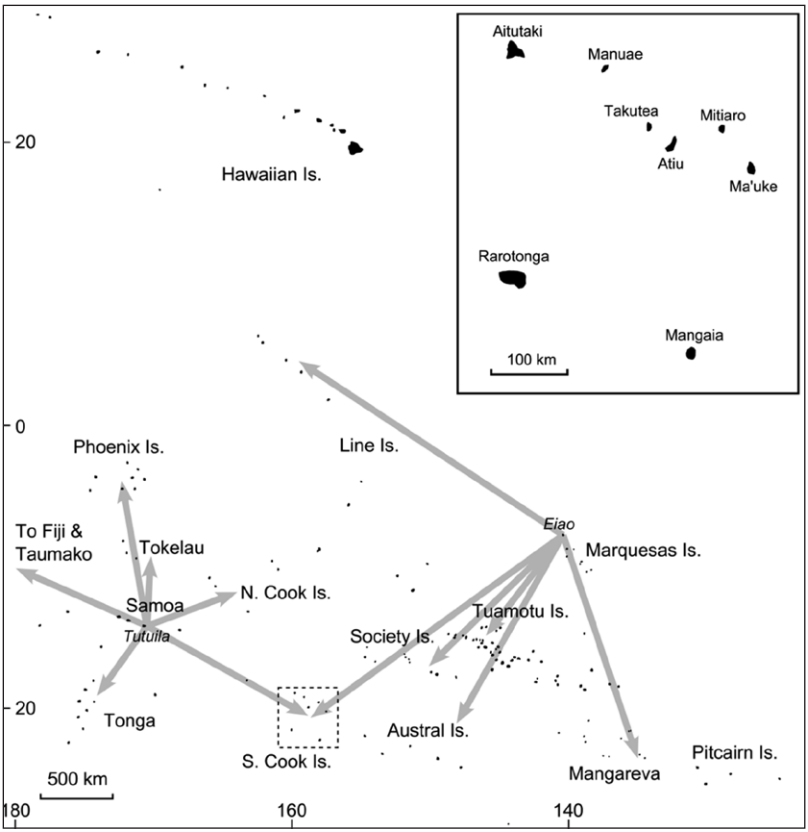

Figure 1. Central Polynesia, showing known distributions of basalt from Tutuila, Samoa (left) and Eiao, Marquesas Islands (right). Inset: the southern Cook Islands.

studies have geochemically analysed basalt tools from Marquesan sites (Allen and McAlister 2013; McAlister 2011; Rolett 1998; Rolett, Conte, Pearthree *et al.* 1997) and all have found that the assemblages contained only Marquesan stone. Additionally, basalt from Eiao was identified in all of the assemblages that were examined. Similarly, several studies of assemblages in the Hawaiian Islands, where high-quality fine-grained stone is widespread, have found that basalts from within the archipelago were widely distributed but, thus far, no examples of imported stone have been identified (see for example Kahn *et al.* 2008, 2013; Kirch, Mills, Lundblad *et al.* 2012; Mills *et al.* 2010).

In contrast, island groups without large reserves of fine-grained tool-quality basalt tend to have high proportions of imported stone from several sources. To date, Collerson and Weisler's (2007) analysis of adzes collected in the Tuamotu Islands, a group of mainly coral atolls completely lacking in basalt sources, has identified the greatest diversity of imported tools. From a relatively small sample of 19 specimens, they found adzes imported from several East Polynesian sources. These included examples from sources in the Society Islands, Rapa and Rurutu in the Australs, Pitcairn, Eiao in the Marquesas, and even one example from the Hawaiian island of Kahoʻolawe over 4000 km to the north.

PROVENANCING STUDIES IN THE COOK ISLANDS

The Cook Islands, the focus of this communication, fall between the extremes represented by the Tuamotu and Marquesas Archipelagos. While there are several local sources of fine-grained basalt that were regularly worked into adzes and distributed within the group (see Allen and Johnson 1997; Sheppard *et al.* 1997: 87; Walter 1990, 1998; Weisler *et al.* 1994), no extensive quarries of high-quality basalt have been identified in the Cook Islands. Sheppard and Walter (Sheppard *et al.* 1997, Walter and Sheppard 2001) systematically surveyed the islands with aim of locating and sampling potential basalt sources for geochemical analysis and concluded that local basalt was primarily exploited from river cobbles and small localised dike exposures. Additionally, they suggested that the comparatively low silica content, and propensity to weathering typical of Cook Island basalts, might result in poor flaking properties. It is perhaps for these reasons that Cook Island provenancing studies have identified materials imported from other island groups. Stone from Samoa has been found on most of the southern Cook Islands, including Mangaia (Sheppard *et al.* 1997, Weisler 1993), Rarotonga (Sheppard *et al.* 1997, Walter and Sheppard 1996), Maʻuke (Best *et al.* 1992; Walter 1990, 1998), Aitutaki (Allen and Johnson 1997), and possibly also on Pukapuka in the northern Cook Islands (Best *et al.* 1992: 81). Several of these studies also have identified a smaller number of adzes from the Society Islands that were tentatively sourced to Raʻiatea Island (Allen and Johnson 1997, Sheppard *et al.* 1997, Walter 1990, Walter and Sheppard 1996).

In addition to collecting reference specimens, Sheppard *et al.* (1997: 86; see also Walter and Sheppard 1996) sampled 40 adzes from the Cook Islands Library and Museum Society collections. In their analysis, the majority of these were found to be compatible with intra-archipelago sources on Rarotonga, Maʻuke, and Aitutaki. They also identified imports from Samoa and the Society Islands, and noted that a few adzes possessed chemical compositions that could not be readily associated with known sources. One specimen that was

considered both physically and geochemically distinct was an adze (identified as R68-1) with a reversed-triangular section (i.e., Duff Type 3A) that, according to the Museum's records, was collected on Rarotonga (Sheppard *et al.* 1997: Appendix 6a). The authors suggested that the adze was probably exotic on the grounds that it possessed a particularly low niobium concentration and plotted away from the other specimens in their sample (Sheppard *et al.* 1997: 101). Additionally, a thin-section taken from this adze showed that the specimen was atypical of Cook Island adze-stone in that it contained biotite, the groundmass was extremely fine-grained and phenocrysts were very rare.

In the following section, we report on a re-analysis of this adze, drawing on reference data from recent studies, and suggest that Eiao Island in the Marquesas is its most likely origin. When Sheppard, Walter and Parker conducted their analysis, not much was known about the geochemical properties of Marquesan tool-stone in general, or that of Eiao in particular. Best (1984: 403; see also Best *et al.* 1992) had analysed four Marquesan basalt samples from the Bernice P. Bishop Museum collections, including a flake from Eiao (AN42), for major oxides only. Since then, a number of studies have provided a more comprehensive understanding of the characteristics and variability of Eiao tool-stone. In 1997, Sinton and Sinoto published a quarry average for Eiao based on major element analyses of 19 adzes collected on various Marquesan islands and attributed to Eiao on the grounds of geochemical similarities (John Sinton pers. comm., 23 January 2008). In addition, trace element concentrations were determined for three of the specimens. It was not until 1998, however, the year after Sheppard, Walter and Parker's study, that the first securely-provenanced geochemical source data for Eiao were published. Weisler (1998: 523) selected three flakes from an assemblage of "shop fragments" collected on Eiao by Robert Suggs (1961) in the late 1950s and analysed them for both major and trace elements using Wavelength Dispersive X-ray Fluorescence (WDXRF). Collerson and Weisler (2007) subsequently re-analysed one of these flakes (832-1) for an extended range of elements and isotopes. More recently, McAlister (2011) analysed a large sample of adzes from the Marquesas and reported WDXRF data for one additional sample collected on Eiao and for 24 adzes collected on Nuku Hiva and attributed to Eiao. Overall, these studies have found that both source samples from Eiao, and artefacts assigned to the island, cluster closely together on plots and are geochemically distinct from all other known Polynesian adze-stone sources. Physical analyses of thin-sectioned specimens of Eiao basalt also have noted that the material has a distinctive dark grey colour, an extremely fine-grained matrix and few phenocrysts (Charleux *et al.* in press, McAlister 2011, Rolett *et al.* 1997).

RE-ANALYSIS OF THE R68-1 ADZE

While successive studies of many Pacific basalt sources are resulting in increasingly detailed insights into the production and distribution of stone tools in the region (Kahn *et al*. 2013, Kirch *et al.* 2012, Winterhoff 2007), the large geochemical datasets generated by such studies have, at the same time, complicated provenancing methods. The earliest investigations found that bivariate scatterplots or ternary diagrams allowed good discrimination among the relatively small sets of reference data available at the time (see for example Best 1984, Best *et al.* 1992, Weisler 1993). However, as reference databases are updated to include current information, a number of sources are becoming more difficult to separate by such simple means. As Figure 2 illustrates, bivariate plots of the trace element ratios niobium/strontium against zirconium/strontium, which served well in earlier studies (Allen and Johnson 1997, Sheppard *et al.* 1997, Weisler 1993), now show considerable overlap among many island groups.

One response to this situation has been to employ multivariate techniques, such as Principle Components and Discriminant Function Analyses (following Johnson 2005, McAlister 2011). While these sorts of techniques are useful for complex datasets, they tend to be methodologically involved, and the results often are difficult to present in a clear and concise format (e.g., Neff 1995). Another method of analysing large datasets that has been successful in geochemical provenancing studies is to use a recursive or nested approach, in which a complex problem is divided into a series of simpler steps by successively excluding the most dissimilar sources (see Baxter 1994, Hancock, Hancock and Hancock 2008, McAlister 2011, Weisler 1993: 143). Restricting the axes of the scatterplot shown in Figure 2 shows that reference samples from only three archipelagos—Hawai‘i, the Marquesas and Samoa—cluster near the R68-1 adze (Fig. 3). Additionally, these samples derive from single sources within each of those archipelagos: the Hawaiian samples are all from Kīlauea Caldera on Hawai‘i Island, the Marquesan samples are all from Eiao, while the single Samoan specimen, which is compositionally similar to the R68-1 adze, is from Malaeloa, Tutuila (Winterhoff 2007: Appendix C, Sample E). Despite the overlap in their element ratios, the three sources are easily separated when trace element concentrations are examined, and the adze repeatedly clusters closest to the Eiao specimens, suggesting that this is the most probable source (Fig. 4).

As Weisler and Sinton (1997: 180) suggested, the most secure way to match an unknown sample to a source is to examine the concentrations of all measured elements (Table 1). To quantify the similarity of artefacts to sources, Collerson and Weisler (2007) have employed a ratio measure (A/S),

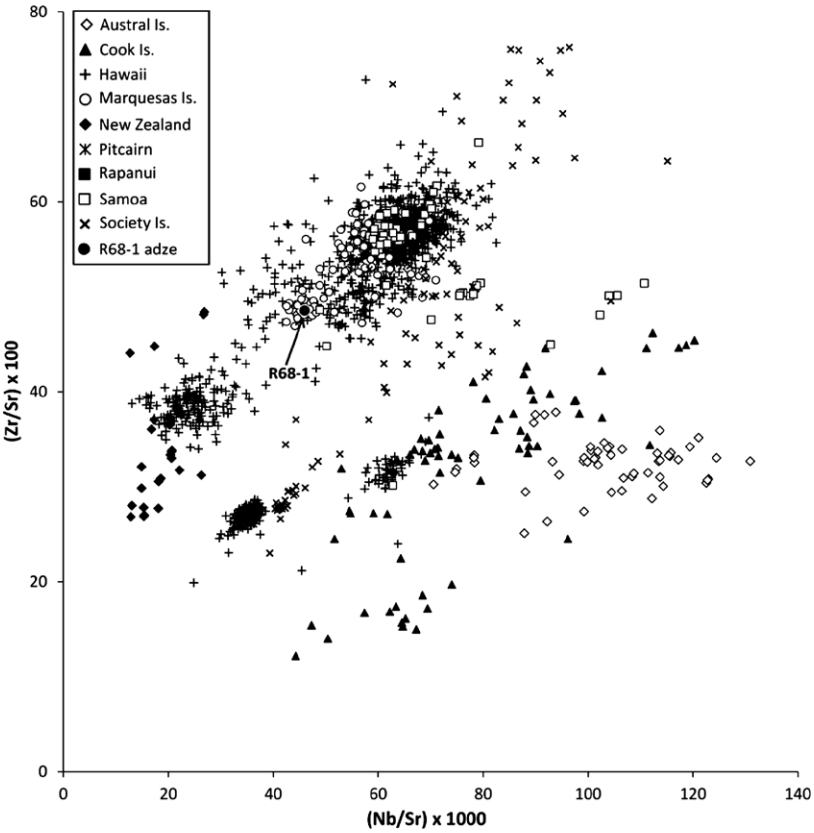

Figure 2. Bivariate scatterplot of trace element ratios for Polynesian basalt sources (1000 x Nb/Sr against 100 x Zr/Sr). Data are collated from all the works cited in the text that include values for the three trace elements.

which consists of dividing artefact values by source compositions, where a value of 1.00 represents an exact match to a source average and higher or lower values show increasing dissimilarity (see Table 1). Comparing the R68-1 adze to the source averages for Eiao and Kīlauea, and the single Malaeloa specimen, shows that Eiao is a much closer match for all elements except nickel. Moreover, the large differences between the adze and the Kīlauea and Malaeloa data for major elements silicon, sodium, aluminium,

calcium and potassium suggest that the adze is unlikely to be derived from the same volcanic events that produced these deposits. Overall, our analysis indicates that the Eiao source provides the closest match for the Cook Island adze R68-1. While it is never possible to determine the origin of an artefact with absolute confidence, on the basis of our current knowledge, the adze is unlikely to have derived from any other known Polynesian basalt source.

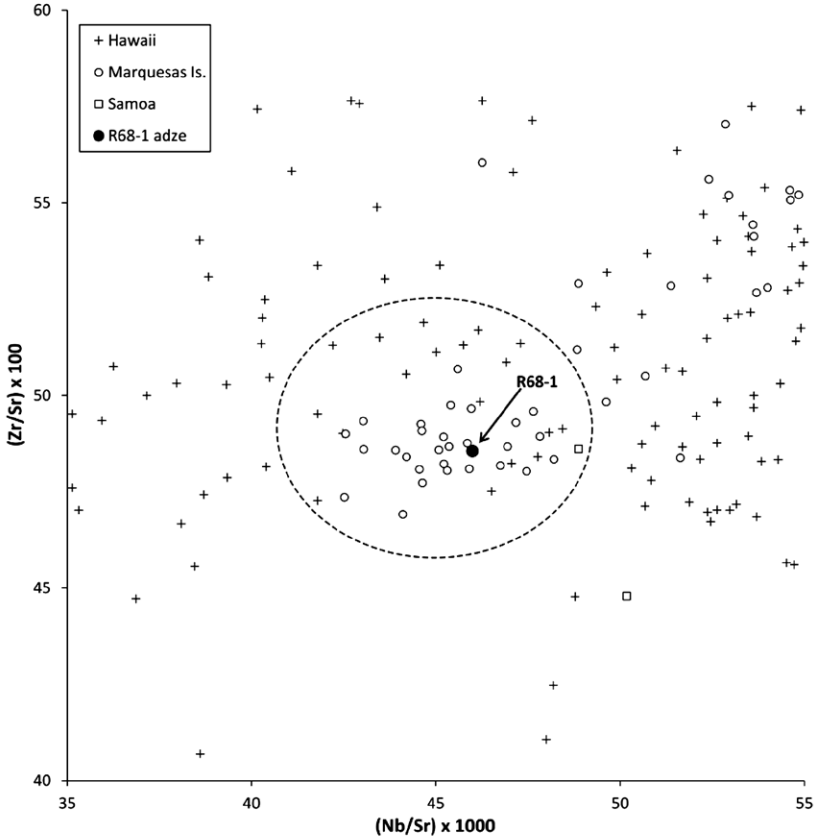

Figure 3. Bivariate scatterplot of Polynesian basalt source data clustering close to the R68-1 adze (1000 x Nb/Sr against 100 x Zr/Sr).

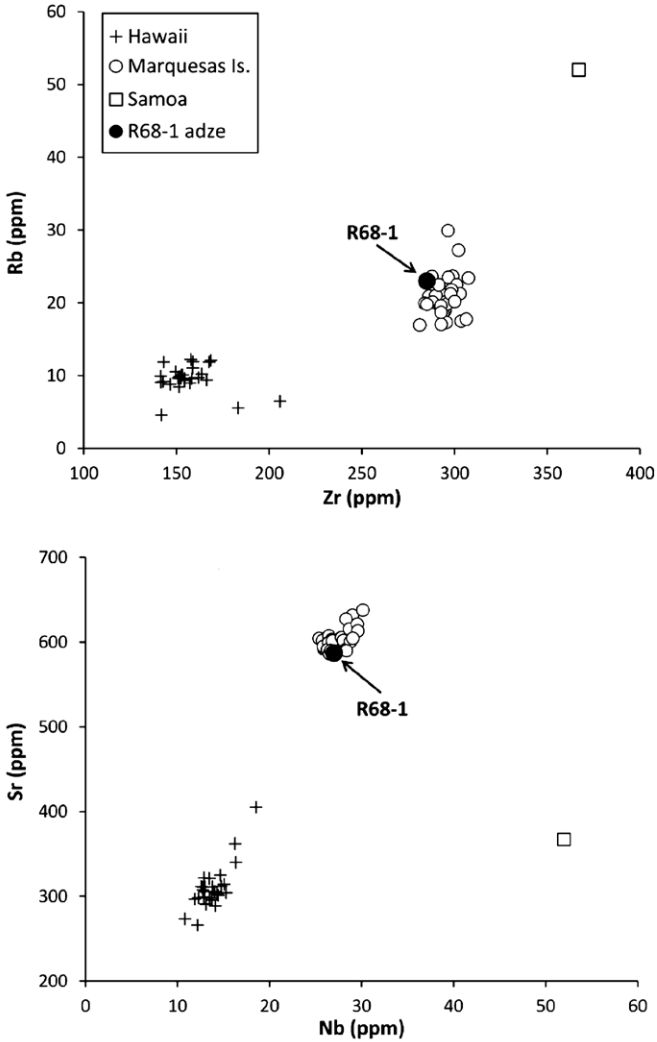

Figure 4. Bivariate scatterplots of Zr against Rb (top) and Nb against Sr (bottom) for source samples clustering near the R68-1 adze in Figure 3. Markers are jittered slightly (± 0.25 ppm) to avoid overprinting.

Table 1. Mean values and standard deviations for the Eiao, Kīlauea and Malaeloa sources compared to adze R68-1. Data for the adze, and the Eiao and Malaeloa source samples, are from WDXRF analyses and those for the Kīlauea source are from Energy Dispersive X-ray Fluorescence (EDXRF).

		R68-1	Eiao, Marquesas			Kīlauea, Hawai'i[1]			Malaeloa, Samoa[2]	
Element		Adze	Mean	S.D.	A/S[3]	Mean	S.D.	A/S	Value	A/S
SiO_2	%	45.86	46.85	0.36	0.98	61.1	14.08	0.75	49.5	0.93
TiO_2	%	3.78	3.89	0.08	0.97	2.4	0.23	1.58	3.3	1.15
Al_2O_3	%	15.23	15.05	0.15	1.01	9.5	2.57	1.60	14.8	1.03
Fe_2O_3[4]	%	13.22	13.46	0.18	0.98	13.7	1.88	0.97	12.0	1.10
MnO	%	0.22	0.17	0.01	1.29	0.2	0.01	1.35	0.1	2.20
MgO	%	6.83	6.44	0.13	1.06	6.2	2.14	1.10	5.8	1.18
CaO	%	9.20	9.30	0.06	0.99	8.3	1.43	1.11	7.6	1.21
Na_2O	%	3.20	3.19	0.09	1.00	1.7	0.06	1.78	3.4	0.94
K2O	%	0.99	1.01	0.04	0.98	0.5	0.04	1.98	1.9	0.53
P_2O_5	%	0.51	0.52	0.03	0.98	-	-	-	0.8	0.64
V	*ppm*	290	298	10.1	0.97	348	36.0	0.83	218	1.33
Cr	*ppm*	121	70	12.4	1.73	-	-	-	164	0.74
Ni	*ppm*	129	100	30.4	1.29	142	20.4	0.91	142	0.91
Zn	*ppm*	135	128	13.1	1.05	123	8.4	1.10	180	0.75
Rb	*ppm*	23	21	3.6	1.10	10	2.0	2.30	52	0.44
Sr	*ppm*	587	597	7.5	0.98	301	31.6	1.95	755	0.78
Y	*ppm*	34	37	1.3	0.92	25	3.9	1.36	37	0.92
Zr	*ppm*	285	293	8.7	0.97	160	14.4	1.78	367	0.78
Nb	*ppm*	27	28	1.2	0.96	14	2.4	1.93	37	0.73
Ba	*ppm*	217	156	44.3	1.39	-	-	-	366	0.59

1 Data for Kīlauea basalt compositions were taken from the online resource maintained by the Geoarchaeology Laboratory, University of Hawai'i, Hilo, and are available online at http://hilo.hawaii.edu/depts/geoarchaeology/.

2 Malaeloa source data for Sample E (Winterhoff 2007: Appendix C).

3 Ratio of artefact geochemical values to those of source (see text).

4 Iron values Kīlauea and Malaeloa recalculated as Fe_2O_3 to enable comparisons.

DISCUSSION AND CONCLUSION

As discussed above, previous studies have identified the importation of stone artefacts into the Cook Islands but, apart from small numbers of adzes from the Society Islands, extra-archipelago contacts seem to have been mainly with Samoa to the west (see Allen and Johnson 1997, Walter and Sheppard 1996, Weisler 1993). In addition to Samoan adzes, Walter and Dickinson (1989) have suggested a West Polynesian, possibly Tongan, source for two ceramic sherds recovered from a 14th century context on Ma‘uke. Archaeological findings of connections with West Polynesia are reflected in Cook Island oral traditions, which speak of direct contact with Samoa (Gill 1880, Nicholas 1892, Stair 1895; see also Allen 1996, Bellwood 1978, Walter and Sheppard 1996).

Although there has been no direct archaeological evidence until now, contact between the Cook Islands and Marquesas also is a recurring theme in Polynesian traditions. There are several versions of a Marquesan legend concerning the voyage of Aka, who travelled from the Marquesas to the Cook Islands to obtain red parrot feathers as gifts for his children (Handy 1930: 130, Kaiser and Elbert 1989, Terrell 1988), while the Rarotongan traditions recorded by Te Ariki-Tara-Are during the 19th century recount several episodes in a protracted conflict between Tangiia and his cousin Tu-tapu, a chief from the Marquesas (Te Ariki-Tara-Are 1920; see also Walter and Moeka‘a 2000). In another Rarotongan legend, two Marquesans, Tangaroa and Aumake, are reputed to have come to Rarotonga and constructed a road around the island (Browne 1897). There are also traditions of Cook Islanders visiting the Marquesas; one recounts the voyage of Rau Mataiapo and his son, from Puaikura in Rarotonga, who went to Nuku Hiva to deliver a shipment of red feathers as payment for “secret” tattoo designs that were obtained from a Marquesan chief, Tui, the year before—presumably during a previous voyage (Jonassen 1981: 27).

Our identification of an adze from Eiao provides the first physical evidence of the prehistoric links between the Cook Islands and the Marquesas that are indicated by oral traditions. This study also demonstrates the usefulness of re-examining results from previous studies in light of the more comprehensive reference data that has become available. More broadly, the Marquesas-Cook Islands relations evidenced here gives new insight into the potential scale of post-settlement interaction. Although more evidence is needed to place these contacts in a temporal context, and to make inferences regarding their frequency, the current find opens tantalising possibilities for future research.

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ABSTRACT

We report on the provenance of an adze from the Cook Islands that was previously geochemically analysed by Sheppard, Walter and Parker (1997) but could not be assigned a source at that time because of the paucity of reference data. Drawing on basalt characterisation studies from the last two decades, we can now demonstrate that the adze most likely derives from the Marquesan island of Eiao, over 2500 km to the east. This find extends the western distribution of the Eiao basalt source, which was previously limited to the Society Islands.

Keywords: archaeology, Cook Islands, interaction, stone tools, X-ray fluorescence

TWO ACCOUNTS OF TRADITIONAL MANGAREVAN COUNTING… AND HOW TO EVALUATE THEM

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Time and again over the past centuries, Polynesian numeration systems have attracted considerable attention. Beginning with reports by early missionaries, almost every large ethnographic and linguistic description devoted paragraphs or whole chapters to counting sequences and their application in a range of contexts. Some reports were concerned entirely with the significance of numbers and the art of counting and calculating (e.g., Best 1906, 1907, Biggs 1990, Clark 1839, Clark 1999, Hughes 1982, Large 1902, Lemaître 1985; for examples from Melanesia and Micronesia see Alkire 1970, Benton 1968, Carrier 1981, Harrison and Jackson 1984, Lean 1992, Panoff 1970).

This interest is spurred by several peculiarities of counting in Oceanic languages, which include some of the most regular (mostly decimal) systems with occasionally large power terms, often co-existing with specific counting systems based on diverging counting units (Beller and Bender 2008, Bender and Beller 2006a, 2006b, 2007, Lemaître 1985). The latter gave rise to speculations regarding a vigesimal nature of these systems (Best 1906, Large 1902), some of which still lingered until recently (Bauer 1997: 289, Hughes 1982).

A particularly fascinating case is the numeration system(s) reported for Mangarevan at the turn of the last century (Buck 1938, Janeau 1908). Its power terms are among the highest in Polynesia, and its specific counting systems are unique in that they have their principally decimal structure superposed with binary steps (Beller and Bender 2008). Information on these systems, however, is scarce and in parts contradictory, and these contradictions cannot be resolved empirically as the specific counting systems had already ceased to be used by the beginning of the last century (Janeau 1908: 21). The goal of this paper is to explore whether it is nonetheless possible to reconstruct sufficient information for an evaluation of two accounts. To this end, advantage can be taken of two facts: (i) that counting systems have structural properties that render some instantiations more plausible than others, and (ii) that the counting systems in Mangarevan can be compared to number systems in related languages and cultures. After all, Mangarevan belongs to the Oceanic branch of the Austronesian language family, which is arguably the best documented and researched language family worldwide (see Greenhill, Blust and Gray 2008, Lynch, Ross and Crowley 2002, Tryon 1995).

CULTURAL AND LINGUISTIC BACKGROUND

Mangareva, the main island in the Gambiers, is situated in East Polynesia, approximately 1650 km southeast of Tahiti. The islands were settled around 950 CE from the west, and served as the starting point for expeditions to the eastward islands of Pitcairn, Henderson and Rapa Nui (Green and Weisler 2002, Kirch, Conte, Sharp *et al.* 2010, Weisler 2008). The Mangarevan language belongs to the Eastern subgroup of the Nuclear Polynesian languages (Fischer 2001). According to *Ethnologue*, it was still spoken by about 1600 people in 1987, but this number has dropped to 600 in 2011, and the language is now classified as "in trouble".

Despite its small size, in terms of land area as well as inhabitants, Mangarevan society was highly stratified (Goldman 1970: 150-67) and embedded in extensive exchange relations, both internally, by way of tributes and redistribution (Buck 1938: 207, Kirch 1984: 167), and externally, by way of long-distance exchange with the Marquesas and Society Islands as indicated by stone adzes, and possibly the Tuamotu, Austral and Cook Islands as suggested by similarities in fishhook forms (Green and Weisler 2002: 233, Weisler 2008).

European influence on Mangareva increased with the beginning of proselytisation in 1834 by French padres (Fischer 2001), who also provided the first linguistic descriptions and, concomitantly, the first reports on Mangarevan counting systems. At the same time however, their activities, perhaps unwillingly, also set an end to these specific systems (Janeau 1908: 21). By the end of the 19th century, the Gambier Islands became a French protectorate and part of what was later labelled the Overseas Territory French Polynesia.

Most of the material on traditional counting systems in Mangarevan goes back to French missionaries of the Congrégation des Sacrés-Coeurs de Picpus (Buck 1938: 12, Fischer 2001: 113). The first was Father Honoré Laval, who proselytised in the group from 1834 to 1871 and compiled a dictionary in the 1830s and 1840s, preserved only in Tregear's (1899) English edition. A generation later, Cyprien Lyaousseau incorporated much of Laval's linguistic work into his own lexicon, which then provided a basis for the lexicon compiled mainly by Father Vincent-Ferrier Janeau (Buck 1938: 12, Fischer 2001: 113). Janeau's (1908) lexicon comes with a 200-page grammar that also contains a subsection on numeral adjectives. In addition to the linguistic descriptions by Tregear and Janeau, information on counting is also provided by Laval's (1938) history and Buck's (1938) ethnology of Mangareva. Sir Peter Buck, better known under his Māori name Te Rangi Hiroa, was an anthropologist, doctor, and politician of Polynesian descent and a native speaker of Māori (Beaglehole 1966); he spent 70 days on the

islands during the Mangareva expedition, organised by the Bernice P. Bishop Museum in 1934 (Buck 1938: 3).

Of those sources, Tregear's dictionary is confined to translations for terms, but does not provide any description of counting sequences, and Laval's history is largely incorporated in Buck's *Ethnology of Mangareva,* due to the high quality attested to it by Buck (1938: 13). This analysis therefore focuses on the accounts by Janeau (1908) and Buck (1938).

What all of the above-mentioned sources agree upon is the co-existence of different types of counting systems (in this paper tentatively labelled "general" and "mixed systems") and some of their constituents, namely the basic numerals for the numbers from 1 through 9, and some of the terms for the powers of 10 (see Table 1). But the exact numerical values to which these power terms refer are already controversial, and even more controversial are the structure of and the referents for the specific counting systems.

Table 1. General number words reported for Mangarevan by Tregear (1899), Buck (1938) and Janeau (1908).

Basic numerals (n)			
1 = ta'i, 2 = rua, 3 = toru, 4 = 'a, 5 = rima, 6 = ono, 7 = 'itu, 8 = varu, 9 = iva			
Power numerals (P) according to the account of …			
P	Tregear	Buck	Janeau
10^1	*rogo'uru*	*rogo'uru / takau*	*rogo'uru*
$2{\cdot}10^1$	*takau*	*rogo'uru / takau*	*takau*
10^2	*rau*	*rau*	*rau*
10^3	*mano*	*mano*	*mano*
10^4	*makiu*	*makiu*	*makiu*
$2{\cdot}10^4$	*makiukiu*		
10^5		*makiukiu*	*makiukiu*
10^6		*makorekore*	*makore*
10^7		*maeaea*	*makorekore*
10^8			*tini*
10^9			*maeaea*
infinite	*makorekore tini*	*tini(tini) mokiukiu*	

Note: Spelling according to Buck (1938); terms that refer to pair-counting ($2{\cdot}10^x$) are shaded.

BUCK'S ACCOUNT

In his *Ethnology of Mangareva*, Buck (1938) devotes two pages (pp. 416-18) to the "system of counting". In quoting Laval (1938), he distinguishes five methods of counting: a general counting system, a pair counting system and a mixed system in three variants.[1] As the pair counting system differs only in one aspect from the general system, the two are merged in the following description.

The general (and pair) counting system.
The general manner of counting in Mangarevan employed the basic numerals for the numbers 1 through 9 and terms for the powers of 10 up to 10^7, as given in Table 1. These numerals constitute a decimal and (unlike English) perfectly regular system, as was widespread throughout Polynesia (Bender and Beller 2006a). The composition of number expressions in this system is polynomial:

$$N_{gen} = [n\ P_{10^7}] + \ldots + [n\ P_{10^2}] + [n\ P_{10^1}] + [n]$$

with $n \in \{1, \ldots, 9\}$ and P = power numeral (according to Table 1).

N in this formula represents any number expression in the counting sequence, *n* the basic numerals for 1 through 9, and *P* the power terms, with the subscript numbers indicating the power level. Square brackets indicate that terms are optional. The only (minor) irregularity is that two alternate terms could be used to denote 10: *rogo'uru* and *takau*. For illustration of the formula, consider the following instance:

2063 =		2	P_{10^3}		6	P_{10^1}		3	
	e	rua	mano	e	ono	rogo'uru	e	toru	tou'ara
	ART	*two*	*thousand*	ART	*six*	*ten*	ART	*three*	*units*

(Please note that, in addition to the numerical constituents included in the formula, this expression also encompasses the indefinite article (ART) and a term indicating a unit *(tou'ara)* that is added to ten or to a multiple of ten.)

This system was used for counting in general, and in particular all those items for which the object-specific counting system did not apply, such as men, houses, boats, stars, etc. (Buck 1938: 417).

The pair counting system used the exact same numerals and power terms as the general system, with the exception that items were counted in pairs (*tauga*). This system of pair counting was used for breadfruits and other fruits (Buck 1938: 417). The expression:

2063 =		2	P_{10^3}		6	P_{10^1}		3	
	e	rua	mano	e	ono	rogo‘uru	e	toru	tauga
	ART	*two*	*thousand*	ART	*six*	*ten*	ART	*three*	*units*

therefore differs from the one above only by usage of the term *tauga* (rather than *tou‘ara*), which implies an object-specific counting unit. That, in the case of breadfruits, this unit contained a pair of fruits is something one needed to know in order to assess the correct absolute number of items, namely 4126 breadfruits.

The mixed counting system.
The mixed system contrasts more sharply with the general counting system in that it mixes two different bases by superposing binary steps on the decimal structure (cf. Table 2). The primary counting unit *tauga* was counted with numerals from 1 through 9; 10 *tauga* then equalled 1 *takau*, 2 *takau* = 1 *paua*, 2 *paua* = 1 *tataua*, and 2 *tataua* = 1 *varu*. This latter unit was then again counted with numerals from 1 through 9 (up to *iva varu*). The composition of number expressions in this sequence was thus patterned after the following rule:

$$N_{mix} = [n\ U_{80}] + [U_{40}] + [U_{20}] + [U_{10}] + [n\ U_1]$$

with $n \in \{1, \ldots, 9\}$ (according to Table 1) and U = unit term (according to Table 2 [over the page]).

For illustration of the formula, consider the following instance:

295 =		3	U_{80}	U_{40}	[no U_{20}]	U_{10}		5	U_1
	e	toru	varu	tataua		takau	e	rima	tauga
	ART	*three*	*eighties*	*forty*		*ten*	ART	*five*	*units*

The mixed system occurred in one of three variants, which differed solely in the size of the counting unit. Depending on the object counted, the counting unit *tauga* took a value of 1 (in the case of turtles), of 2 (in the case of fish), or of 4 (in the case of coconuts) (Buck 1938: 417). Laval (1938: 211) mentions a fourth variant, restricted to counting octopuses, in which *tauga* took a value of 8. Assuming that in the instance above coconuts were counted, the expression for 295 would then refer to 295 units of 4 each = 1180 single coconuts.

The largest possible number to be composed in this system is 9 *varu* + *tataua* + *paua* + *takau* + 9 *tauga* = 720 + 40 + 20 + 10 + 9 = 799 *tauga*, which equals absolute numbers of 799, 1598 and 3196 (and perhaps 6392), respectively.

Table 2. Counting systems in comparison.

Buck's (1938) account								
general & pair counting				mixed systems				
L	*numeral*	V_g	V_p	*L*	*unit U*	$V_{m(1)}$	$V_{m(2)}$	$V_{m(4)}$
1	*(ta'i)*	1	2	1	*tauga*	1	2	4
10^1	*rogo'uru/takau*	10^1	$2{\cdot}10^1$	10	*takau*	10	20	40
10^2	*rau*	10^2	$2{\cdot}10^2$	20	*paua*	20	40	80
10^3	*mano*	10^3	$2{\cdot}10^3$	40	*tataua*	40	80	160
10^4	*makiu*	10^4	$2{\cdot}10^4$	80	*varu*	80	160	320
10^5	*makiukiu*	10^5	$2{\cdot}10^5$					
10^6	*makorekore*	10^6	$2{\cdot}10^6$					
10^7	*maeaea*	10^7	$2{\cdot}10^7$					

Janeau's (1908) account								
general & pair counting				mixed systems				
L	*numeral*	V_g	V_p	*L*	*unit U*	$V_{m(2)}$	$V_{m(4)}$	$V_{m(8)}$
1	*(ta'i)*	1	2	1	*tauga*	2	4	8
10^1	*rogo'uru*	10^1		10	*paua*	20	40	80
	takau		$2{\cdot}10^1$	20	*tataua*	40	80	160
10^2	*rau*		$2{\cdot}10^2$	40	*varu*	80	160	320
10^3	*mano*		$2{\cdot}10^3$					
10^4	*makiu*		$2{\cdot}10^4$					
10^5	*makiukiu*		$2{\cdot}10^5$					
10^6	*makore*		$2{\cdot}10^6$					
10^7	*makorekore*		$2{\cdot}10^7$					
10^8	*tini*		$2{\cdot}10^8$					
10^9	*maeaea*		$2{\cdot}10^9$					

Note: *L* = power level; *V* = absolute value to which the numeral refers; indexed *g*, *p* and *m* indicate the general counting system, the pair counting system and the mixed system, respectively (with number in brackets explicating the actual counting unit). It is also worth noting that (only) Tregear (1899) reports *tauga* to mean not only "a pair, a brace; a double count", but also "a score (double ten)".

JANEAU'S ACCOUNT

Section 3 of Chapter III in Janeau's *Essai de grammaire* (1908: 18-21) is devoted to the numeral adjectives, but also provides information on counting manners. Janeau distinguishes two principle manners of counting, based on how the units of 10s are denoted: one in which they are denoted *takau*, and one in which they are denoted *paua.* The former, occurring in two variants, corresponds to the general counting systems, and the latter, occurring in three variants, corresponds to the mixed system. As emphasised by Janeau, in all of these variants, it was always the objects that dictated which manner of counting was required.

The general (and pair) counting system.
According to Janeau, the most general manner of counting in Mangarevan employed the basic numerals for the numbers 1 through 10 and terms for the powers of 10 up to 10^9, as given in Table 1. In contrast to other accounts, however, the power terms reported by Janeau do not refer to the pure powers of 10, but to 2 times these powers: 2 *rogo'uru* are reported to equal 1 *takau* (20), 10 *takau* = 1 *rau* (200), 10 *rau* = 1 *mano* (2000) and so on. The composition of number expressions in this system thus contains an irregular step:

$$N_{gen} = ([n\ P_{10^9}] + \ldots + [n\ P_{10^2}] + [n\ P_{10^1}])_{[2]} + [10] + [n]$$

with $n \in \{1, \ldots, 9\}$ and P = power numeral (according to Table 1); the indexed number 2 in square brackets indicates the new counting unit, which, however, remained implicit.

Janeau himself did not provide concrete examples for how a compound number expression in this system would look, but according to his description (and the convention of adding an indefinite article to each constituent, as indicated by Buck) the number 2063 from above should be expressed here as follows:

2063 =		$2{\cdot}P_{10^3}$		3	$2{\cdot}P_{10^1}$		3	
	e	mano	e	toru	takau	e	toru	tou'ara
	ART	*two-thousand*	ART	*three*	*two-ten*	ART	*three*	*rest*

This manner of general counting occurred in one of two variants: one variant in which items were counted one by one (*tipau tahi*), and one variant in which they were counted in pairs (*tipau rua*). Janeau's list of singly counted objects includes people, game, reptiles, birds, insects, shells, land, trees, boats, cloth, pearls, stars, etc., while the other group includes breadfruits, pandanus leaves used for thatching, agricultural tools, sugar cane, etc.

In pair counting (*tipau rua*), a single item was called *tou'ara* (i.e., rest), and if a pair of 10s (*takau*) was not complete, the single 10 was called *rogo'uru tou'ara*.

The mixed counting system.
The second counting manner employed the same basic numerals for the numbers 1 through 9 as the general system, albeit combined with *tauga* which, again, indicates a diverging counting unit. The units of 10s were denoted *paua*, with 2 *rogo'uru* = 1 *paua*, 2 *paua* = 1 *tataua*, and 2 *tataua* = 1 *varu* (cf. Table 2). As in Buck's (1938) account, but to a lesser extent, these specific terms introduced binary steps into an otherwise decimal system. The unit *varu* was then again counted with numerals from 1 through 10 (up to *rogo'uru varu*). Single items were called *tou'ara* (rest), and if a *tataua* was not complete, the single *paua* was called *paua tou'ara*. The composition of number expressions in this sequence was thus patterned after the following rule:

$$N_{mix} = [n\ U_{40}] + [U_{20}] + [U_{10}R] + [n\ U_1] + [R]$$

with $n \in \{1, \ldots, 9\}$ (according to Table 1), U = unit term (according to Table 2), and R = rest (*tou'ara*).

Again, no examples are provided by Janeau, but according to his description, the number 295 (taken to illustrate Buck's account above) should be expressed here as follows:

295 =		7	U_{40}	[no U_{20}]	U_{10}		5	U_1
	e	hitu	varu		paua	e	rima	tauga
	ART	*seven*	*forties*		*ten*	ART	*five*	*units*

The mixed system occurred in one of three variants, which differed solely in the size of the counting unit (Janeau 1908: 20): Depending on the object counted, the counting unit *tauga* took a value of 2 (as in pair counting and for the objects described there), of 4 (in the case of, for example, ripe breadfruits and octopuses), or of 8 (in the case of the first breadfruits and octopuses of the season).

The largest possible number to be composed in this system is 10 *varu* = 400 *tauga*, which equals absolute numbers of 800, 1600 and 3200, respectively.

COMPARISON AND ASSESSMENT

Although, at first glance, the systems described by Buck (1938) and Janeau (1908) may appear rather similar, they do diverge in important aspects. The general (and pair) counting systems differ with regard to (i) the number and (ii) the value of power terms, (iii) the relation of general and pair counting systems, and of *rogo ʻuru* and *takau* in particular; and, the mixed systems differ with regard to (iv) the number of binary steps, (v) the value that the counting unit *tauga* could take, and (vi) the objects that were counted in these manners.

It will be impossible to resolve with ultimate certainty which of these accounts (or whether, indeed, *any* of these accounts) is correct. They were written at different times, and counting systems may simply have changed in between. And yet, some of the details given by the authors—in combination with what is known about Polynesian counting systems more generally—may help to shed light on this question.

All Polynesian languages contained general counting systems that were regular and decimal, with terms for large powers of 10. Most Polynesian languages also contained, in pre-European times, distinct counting systems that were restricted to specific objects and based on diverging counting units, typically involving one or more of the factors 2, 4, 10 and 20, all of which are even numbers (Bender and Beller 2006a: 41, 2006b: 369). This is in line with the concern for symmetry as well as large numbers, attested to for various Polynesian groups and particularly the highly stratified societies (Bender and Beller 2006a, 2007; Best 1906; Elbert 1988: 186, 198; Elbert and Pukui 1979: 161; Hanson 2004; Henry 1928: 323; Hughes 1982; Lemaître 1985). Differences across languages basically concern the number and value of power terms, the value of the specific counting units, and the objects specifically counted (Bender and Beller 2006a, 2006b).

Against this background, the differences in the accounts of Buck (1938) and Janeau (1908) regarding the range of power terms, the value of counting units and the specific objects cannot be resolved. Variation in these properties has emerged recurrently, and likely in adaptation to cultural and or environmental requirements. For the other differences, however, an evaluation can be attempted.

Both Buck and Janeau describe a general system (in two variants), which they clearly distinguish from three mixed systems used for counting specific objects only. However, the general system in Buck's account is perfectly regular and decimal; it is supplemented by a pair counting system, which simply duplicates the general system; and it is set apart from a type of system in which the decimal structure is superposed with binary steps (see Table 2). In contrast, the general system as described by Janeau already entails a

binary step, namely from *rogo'uru* to *takau*. From 20 onwards, all number expressions purportedly refer to pairs of items, even those in the system for counting singly (*tipau tahi*). Still, this system is said to be supplemented by a pair counting system (*tipau rua*), but how exactly this was operationalised is not explicated. The regularity of both the general and the pair counting system in Buck's account—as opposed to the opaque and incoherent description by Janeau—thus supports the former.

When we turn to the mixed systems, the most conspicuous difference between the two accounts concerns the number of binary steps, of which there is one more in Buck's account (where *takau* is inserted between *tauga* and *paua*). While there is nothing about binary steps themselves to suggest which number might be more plausible, the terms are suggestive. First, of all systems in Janeau's account, it is the mixed system that does *not* comprise the term *takau*—in stark contrast to a range of Polynesian languages, in which *takau* is virtually indicative (and sometimes even exclusively so) of a mixed system (Bender and Beller 2006a, 2006b). And second, the largest specific term in the mixed system, concordantly reported by both, is *varu*, although denoting 40 units in Janeau's account, and 80 in Buck's account. As *varu* also refers to 8 in the basic sequence (see Table 1), it seems more plausible that *varu* should refer to 80 units, thus favouring, again, Buck's account over Janeau's account.

Finally, a quite minor, yet perhaps telling detail is that the largest power term in the mixed systems is reported as 9 *varu* by Buck, but as 10 *varu* by Janeau. The latter would be a violation of the polynomial schema according to which almost all number expressions in almost all Polynesian languages are composed (Beller and Bender 2008, Bender and Beller 2006a, 2006b), namely using distinct terms for each new power level, whereas in European languages such as English or French, such violations do occur (e.g., in "ten thousand"). Even if this mistake were a simple slip of the pen, it is in line with the overall assessment.

* * *

In conclusion, the system described by Buck (1938) appears, by and large, to be more meticulous and reliable, at least with regard to those properties for which one may venture an evaluation, informed by and based on cross-cultural and cross-linguistic data. This approach does not solve all the puzzles offered by historical accounts of Mangarevan counting systems. How far power terms actually reached, for instance, or what these large numbers could have been used for, may never be fathomable (see Elbert and Pukui 1979: 160f.). Other issues for investigation, such as the possible advantages offered by a counting system with binary steps, require different approaches

altogether (see Bender and Beller, MS.; Bender, Schlimm and Beller, MS.). But the approach presented here does enable the evaluation of the relative plausibility of diverging accounts, and offers tentative resolutions for some of the contradictory evidence with which we are often confronted.

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NOTE

1. Notably, Laval himself described *four* variants of the mixed system (1938: 211-13).

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ABSTRACT

Among the traditional counting systems in Polynesian languages, those conveyed for Mangarevan provide particularly interesting and challenging cases. Accounting for their peculiarities presupposes accurate descriptions of their structure and key properties. Unfortunately, however, available descriptions are contradictory and partly incoherent. This paper attempts to resolve some of these contradictions by analysing and contrasting two accounts of Mangarevan counting and placing them in a cross-linguistic context.

Keywords: Mangareva, numeration systems, specific counting, power terms, Polynesian languages

REVIEWS

Moyle, R.M.: *Takuu Grammar and Dictionary: A Polynesian Language of the South Pacific*. Canberra: Pacific Linguistics, Research School of Pacific and Asian Studies, The Australian National University, 2011. 428 pp., bib., DVD, figs. AUD$95.00.

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Pacific lexicographers have been a disparate lot. The earliest were traders and beachcombers, then for a long time the market was cornered by missionaries, who morphed into linguists and anthropologists. This dictionary of Takū, however, is something of a radical departure, one researched and compiled by an ethnomusicologist, the third in a series of monographs resulting from extensive field work spread over 15 years.

This is a very substantial work. It comprises an introduction, a grammatical sketch of some 50 pages, a dictionary with approximately 6,000 entries, some with profuse and fascinating detail, and an English-Takū finder-list. Apart from the minutiae of the physical and cultural environment, many helpful notes on usage are included—for example, the observation (p. 27) that the *a/o* possessive distinction was retained by some speakers up until the 1990s. Another particularly valuable bonus is a DVD of the text which also includes hundreds of photos and video clips illustrating flora and fauna, topography, material culture and song and dance performances.

Takū is an atoll, politically part of Papua New Guinea, the people of which speak the second most westerly Polynesian language (only Nukuria is further west). It subgroups immediately with Nukuria, Nukumanu, Ontong Java (Pelau and Luaniua) and Sikaiana, and more remotely with Nukuoro and Kapingamarangi to the north. Remarkably, the number of Takū speakers appears to have plunged to as few as 12 in the late 19th century, but is now approximately 500. In terms of material culture, Takū holds the distinction of being one of the few Polynesian cultures which traditionally used a loom and penis sheath (not necessarily at the same time); linguistically it is almost unique (along with Nukuoro) in having metathesised Proto Polynesian *niu 'coconut' to *nui* and, like Tuvalu and some other outlier languages, is characterised by geminate consonants, while there are ongoing changes of *l > r and *f > h, which are described and illustrated in detail in this work. Because of its relative isolation and lack of natural resources, coupled with the decision not to admit missionaries until recently, Takū is arguably the most traditional of all Polynesian communities. In recent years it has gained some unwanted notoriety by being the first Pacific island to be so threatened by rising sea levels and salination of gardens that there are plans to evacuate the entire population and resettle it on nearby Bougainville—witness the poignant entry for *kamatū* "shrub taxon… formerly plentiful in the soft ground at Sialeva, but all such locations have now been eroded by rising sea levels".

As Moyle recounts in the introduction, this is not the first Takū dictionary. A predecessor was compiled, but never published, by the linguist Irwin (later Jay) Howard and associates, including myself, at the University of Hawai‘i in the late 1970s. Moyle has built on this pioneering work, and includes quite a number of entries which were recorded in it, but had become unknown by the time Moyle conducted his fieldwork some 20 years later, particularly in more arcane fields such as tattoo design and string figures.

The dictionary is attractively produced and easy on the eye and in the hand, with helpful drawings showing canoe, house and loom parts, but alas no map. It could have been better proof-read. I counted some 70 typos, mis-orderings, mis-glossings and other slips, the most egregious being the misspelling of grammar as ‘grammer’ in, of all places, the cataloguing-in-publication entry, and the replacement of the headword *vere* with *vasi*. A whole section of the sketch grammar is repeated, almost verbatim—appearing first as “2.3.4 Nominalised verbs” then reappearing a couple of pages later as “2.3.7 Verbal nominalizations” (the forests weep).

The author acknowledges his debt to linguists who guided him, or whose work he followed, in writing the sketch grammar and compiling the dictionary, but there are a number of places where he appears to have ventured out alone into unfamiliar territory: the claim (p. 3) that all dictionaries are “founded on the assumption of uniform usage”, confusion between “grammar” and “syntax” (p. 6), accounts of the functions of tense markers—in particular *ku*—and prepositions and conjunctions which are at odds with the examples given or linguistically implausible, confusion over demonstrative pronouns (pp. 30-31), failure to note that demonstratives often function as articles, failure to note a number of other “compound verbs” like *hanake* (p. 41), and the redundant information (p. 172) that locative nouns are not preceded by an article. The section on phonotactics also omits to mention the very obvious fact that recent loans from Tokpisin and English have radically changed syllable structure, introducing non-geminate initial consonant clusters (e.g., *skul*), final consonants (e.g., *mak*), and even a new phoneme, the velar nasal (e.g., *ring*, *teng*—found in examples but not listed in the dictionary). In all of these cases, however, it is a saving grace that the profusion of examples given throughout the work enables readers to draw their own conclusions.

The dictionary does not list Proto Polynesian sources, but does attempt to provide etymologies of loan-words, most of which are from English via Tokpisin, or simply from Tokpisin, and a few from neighbouring Nukumanu. Some obvious loanwords are not given etymologies—e.g., *kapa* ‘metal, tin-can, corrugated iron’, *mameapu* ‘pawpaw’, *tiāina* ‘banana species’—and a number of proposed etymologies are wide of the mark: I find it hard to believe that *hōia* ‘a long time ago’ comes from English *before*; and *suluka* ‘hand-rolled cigarette made from banana leaves’ is not from English *cheroot* via Samoan, but from Fijian *suluka*, presumably via a Melanesian pidgin. Most intriguingly, *sāita* ‘time’ is not indicated as a borrowing, but I would wager good money that it is from German *Zeit*, even though it is not found in Tokpisin.

Most of the natural species are identified, thanks to a number of experts duly credited by Moyle; but I would certainly check the identification of *karū*, a tree with edible fruit, as *Barringtonia asiatica*, whose fruit is a well-known fish-poison, and

the identification of a kind of tuna (*laku*, *takua*) as *Istiophorus*, which is a sailfish.

I have a few minor concerns of a more general nature. The first is regarding the orthography. In Moyle's previous publications on Takū, he used—sensibly, in my view—a macron to indicate vowel length. Here he uses double vowels, explaining (p. 3) that this was a condition of his being given access to Howard's dictionary. I, and again the world's forests, would have preferred that he had not so readily acquiesced to this rather strange condition.

My second quibble concerns example sentences. Many are detailed and useful, but some are totally predictable and provide no further information, e.g., for *mahana* 'feverish' the example given is *te tama nei e mahana* 'this child is feverish', for *vvare* '(of a limb) numb' the example given is *taku vae e vvare* 'my leg is numb', etc.

Finally, the organisation of non-predictable derivatives is always a problem for Pacific lexicographers, because of the extensive use of prefixes—whether to just put them all under the base, or simply list them all as separate heads, or (the solution I prefer as most user-friendly) refer to them under the base then list and define them as separate heads, or vice versa. Moyle has opted mostly for the first strategy, which means that many words are not to be found in alphabetical order, for example *kāoti* 'stop, quit' is found only under *oti*, *pallē* 'move quickly' is only found under *llē*, *takallī* under *llī*, *mēmata* under *mata* 4, *moemiti* under *miti*, and so on.

The author seems unduly pessimistic about the survival of the culture that he has so meticulously recorded, commenting (p. 2) that, if it happens, "the abandonment of the island will render meaningless or superfluous much of Takuu culture currently practised, including its language". However, this is not necessarily the case, as witness many examples of relocated communities in the Pacific that have retained largely intact their language and culture, such as the Banabans of Ocean Island and the Vaitupuans of Tuvalu who have been living on Rabi and Kioa, respectively, in Fiji for nearly 70 years.

Overall, this dictionary is of high quality and excellent value and packed full of many kinds of information, as we have come to expect from Pacific Linguistics, and it is sad to note that, now that de Gruyter Mouton have become co-publishers of PL, the quality will no doubt remain but the cost will shoot through the roof: we will be paying Mouton prices for most Pacific dictionaries from now on.

Hooper, Antony and Iuta Tinielu: *Echoes at Fisherman's Rock: Traditional Tokelau Fishing*. Paris: UNESCO, 2012. xi + 120 pp., bib., figs, glossary, maps (paper). Soft copies available at http://unesdoc.unesco.org/images/0021/002184/218436e.pdf

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Echoes at Fisherman's Rock is a book, originally written and published in Tokelauan, by a group of Tokelauan elders living in the Wellington, New Zealand, who wanted to have a permanent record of some of the fishing and food gathering traditions in Tokelau. These men, who had lived in New Zealand for a number of years, are part of

the growing population of Tokelauans settling permanently in New Zealand although they visit home from time to time when possible. They have witnessed the growing numbers among the increasingly mobile Tokelauan communities who know and dearly love their island homelands but must live elsewhere because of modern realities. Younger people are speaking less and less Tokelauan and there is an associated decline in the appreciation and knowledge of many traditional practices. These practices were once the basis of survival in the atolls of Tokelau, as well as testimony to Tokelauan cultural ingenuity and environmental adaptation.

Thirty of these elders are from Atafu, the smallest and the most northerly of the group of atolls which comprise Tokelau, and the atolls of Fakaofo, Nukunono and Olohega are represented by three others. The Atafu elders, recognising the similarities between the traditional Tokelau practices explored in the book, consulted communities from other atolls. While these communities supported the project they decided to let it be an Atafu-based project.

The book is divided into four chapters. The first focuses on food collecting practices which are carried out on land—mainly bird catching from trees—and along the shore. It lists various ways of catching coconut crabs (*ugauga*), large rock crabs (*kamakama*) and beach crabs (*tupa*), and of netting and catching birds in the tree canopies.

Chapter 2 explains the types of fishing that are done in the lagoon. The method which dominates fishing in the lagoon is line-fishing and several species like mullet (*kanae*), grouper (*gatala*), bait goldfish (*kalo*), big-eye emperor (*mū*) are caught this way. Nets and fish traps are also commonly used to catch a variety of species which are not attracted to lures. Collecting shellfish, especially the sought after tridacna clams (*fāhua*) is popular. Torch fishing, traditionally using bundled dry coconut leaves, today commonly involves uses of pressure benzene or kerosene lamps, or battery-powered torches.

The long list of species which are caught on the reef, usually at low tide, is evident of how important the reefs are in the food chain. Chapter 3 explains how to catch about 45 different species of fish, octopus and shellfish on the reef using scoop nets, baits, spears or a combination of all these methods depending on the fish, the tides and other circumstances.

Chapter 4 describes the fishing approaches and materials used to catch species out in the open sea. Methods for catching skipjack (*atu*), yellow fin tuna (*kakahi*), mackerel scad (*uli*), sharks and turtles are explained. This chapter gives very rich and valuable detailed descriptions and illustrations of materials used and how they are applied.

The book is delightfully interspersed with excerpts from Tokelauan songs and chants, many of Biblical inspiration, all of them engaging the reader's imagination by the way in which poetic imagery is combined with the getting of a livelihood. Singing or chanting while fishing keeps the fisherman alert. Many songs and chants which are romantic or in praise of natural beauty, even hymns are voiced to encourage the fish to bite. They become prayers. Throughout the book the reader learns a lot about different times of the year when certain species are plentiful and why this is so. These times and seasons are usually connected to other events in the natural cycle of food production and consumption in Tokelau culture. My only wish for the book was for more pictures of the species of fish discussed.

I enjoyed reading this book very much; I grew up in a village where fishing was a major part of our livelihood. I am familiar with some of the methods, depending on the species, the time of day, the tide, the season and the weather. This is not surprising given the environmental, cultural and ethnic similarities between Samoans and Tokelauans. But we Samoans did not have to apply the same extent of ingenuity and marine knowledge to feed ourselves as did the Tokelau fishermen, at least not in my youth.

The Atafu men who initiated this book project must be congratulated. It is an excellent and unique initiative. They have provided a model which demonstrates how older people in other Pacific Island migrant communities might preserve their traditional knowledge. Iuta Tinielu and Antony Hooper in turn were recruited to the project when publishing a book was envisioned. To their credit they not only facilitated the publication in Tokelauan—*Hikuleo i te Papa o Tautai*—but also undertook to translate and arrange for the publication of *Echoes at Fisherman's Rock.* I hope the book will be an inspiration for more oral history and traditions projects of this kind. It would be a great to do a project of this kind involving both women and men. It illustrates how the pleasure of socialising and *talanoa* can be productive at the same time and demonstrates a practical way to preserve cultural knowledge and record traditional practices.

The publication is the fourth edition of the UNESCO-sponsored series "Knowledges of Nature". The presentation is most attractive and contains many beautiful photographs of Atafu taken by Judith Huntsman. It will be of value to all who are interested in Pacific Island cultural adaptation and the interaction between marine-dependent peoples and environment.

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I join Malama Meleisea in congratulating the elders of Atafu on this wonderful compendium of traditional Tokelau fishing practices. While Meleisea highlights the volume's contributions to the preservation of traditional Tokelauan fishing lore, I briefly consider its value to the academic community, including not only ethnographers, but also archaeologists, marine ecologists, ichthyologists and conservationists. Important in this regard are the efforts of the editors, Hooper and Tinielu, who have endeavoured to provide scientific names alongside the indigenous Tokelauan nomenclature therein making the information accessible to a broad audience.

When R.E. Johannes published his pioneering study of Palauan fishing practices, *Words of the Lagoon: Fishing and Marine Lore in the Palau District of Micronesia* (1981), he drew serious academic attention to the wealth of indigenous knowledge residing in Pacific Island communities in relation to marine species and environments. *Echoes at Fishermen's Rock* follows in that tradition. This volume, however, is unique in being generated by Tokelauan fishermen whose main aim was to preserve centuries of accumulated knowledge for their children and grandchildren. Fishing is broadly defined in this work to include not only the capture of finfish but also the hunting of other economically important organisms found at the marine-land interface, including

a multitude of crabs, several birds and sea turtles. The elders of Atafu identify more than a hundred different fishing strategies which are organised in reference to their use across the three main marine habitats of a Tokelau atoll, the lagoon, reef and open ocean. The entries not only explain the gear employed and the fish targeted, but also the microhabitats where a given technique should be used, the time of day or year when it is effective, preferred baits, common prey behaviours, tidal influences and even guidelines for successful fish stalking. With respect to fishing gear, the occasional identification of specific functional traits, whose utility might not be apparent to the non-specialist, is useful in considering the design and implementation of certain devices. For example, the entrance to traditional fish traps, the *matatupua*, can be rectangular or round, "it is up to you" (p. 35), or what archaeologists might classify as a "stylistic" trait. But, the authors caution, it is important that the opening of the trap taper inwards and be tilted downwards or the fish are likely to escape.

The entries also highlight social aspects of fishing activities and the organisation of labour in particular. Some techniques work well for the solitary fishermen. Others require a large community-scale labour force. But many rely on cooperation between two to three men and/or canoes. Some techniques further benefit from the guidance of a master fisherman who interprets the fish behaviours (especially those of schooling fish), anticipates their movements, and accordingly orchestrates the fishing party; the complexity of this specialist knowledge is made apparent by the quite detailed accounts of particular fishing strategies. As a whole, the entries provide insights into the varying scales of co-operative ventures and the time investments required by different techniques and, to a degree, the potential economic returns.

Also of considerable interest are the glimpses into traditional knowledge of weather and seasonality in relation to marine resources. The three chapters where specific techniques and targeted prey are reviewed are sprinkled with notes regarding the timing of fish aggregations, and seasonal variation in fish abundance and health (i.e., when fish are at their fattest), as well as knowledge of fish behaviours in response to diurnal and lunar cycles. In the final chapter we are offered further information on what might be termed indigenous meteorology, with a review of indicators of weather changes and seasonal transitions. For example, distant thunder may herald the seasonal onset of *ufu* and *pone* spawning (p. 107), while the burrowing activities of sand or ghost crabs may signal impending changes in weather.

The fishermen of Atafu, assisted by editor Hooper and translator Tinielu, provide a rich and engaging body of information on Tokelauan fish capture strategies, fish behaviours, and the associated fishing gear. This information will be valuable to scientists wanting to understand the complex relationships between foragers, their economically important resources, and marine environments, and the ways these dynamics might change over time. The book also will be useful for those wanting to compare traditional Tokelau fishing practices, or more generally atoll adaptations, with those of other Pacific islands. Finally, the book provides a foundation for considering how certain fishing strategies might affect fish populations. Moreover, in connecting the practices of fishing with their socio-cultural context, the volume offers information useful for fisheries management and for successful implementation of

conservation practices. Produced with UNESCO support as part of their indigenous knowledge series, this concise volume is not only informative but also attractive, well-illustrated and simply charming—a welcome addition to the bookshelf of all who enjoy the craft of fishing.

PUBLICATIONS RECEIVED*

March 2013 to September 2013

Agee, Margaret, Tracey McIntosh, Philip Culbertson and Cabrini ‘Ofa Makasiale: *Pacific Identities and Well-Being: Cross-Cultural Perspectives*. Dunedin: Otago University Press, 2013. 330 pp., bib., glossary, illustrations, index. NZ$45.00 (paper).

Arbeit, W.S.: *Links to the Past. The Work of Early Hawaiian Artisans*. Honolulu: University of Hawai‘i Press, 2013. 329 pp., appendix, illustrations, photos. US$75 (hardcover).

Benton, Richard, Alex Frame and Paul Meredith: *Te Mātāpunenga: A Compendium of References to the Concepts and Institutions of Māori Customary Law*. Wellington: Victoria University Press, 2013. 551 pp., bib., illustrations, index. NZ$80 (hardcover).

Childs, Elizabeth: *Vanishing Paradise. Art and Exoticism in Colonial Tahiti*. Berkeley: University of California Press, 2013. 329 pp., bib., glossary, illustrations, index. US$49.95 (hardcover).

Gagné, Natacha: *Being Māori in the City: Indigenous Everyday Life in Auckland*. Toronto: University of Toronto Press, 2013. 345 pp., bib., glossary, illustrations, index (paper).

Gerrits, G. J. M.: *The Haus Tambaran of Bongior*. Lugano, Switzerland: Museo delle Culture, 2012. 485 pp., appendices, bib., glossary, illustrations, index, plates (paper).

Nash, Joshua: *Insular Toponymies. Place-Naming on Norfolk Island, South Pacific and Dudley Peninsula, Kangaroo Island*. Amsterdam: John Benjamins Publishing Company, 2013. 302 pp., appendices, bib., illustrations, index. €99.00 (hardcover).

Suren, Peter: *Essays on the History of Tonga. Volume Three*. 2nd edition. Nuku‘alofa, Tonga: The Friendly Islands Bookshop, 2013. 419 pp., bib., illustrations (paper).

Wanhalla, Angela: *Matters of the Heart: A History of Interracial Marriage in New Zealand*. Auckland: Auckland University Press, 2013. 231 pp., bib., index, notes, plates. NZ$49.99 (softcover).

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

MINUTES OF THE 122nd ANNUAL GENERAL MEETING OF THE POLYNESIAN SOCIETY (INC.), 24 JULY 2013, DEPARTMENT OF MĀORI STUDIES, UNIVERSITY OF AUCKLAND.

Present: Dr Richard Benton in the chair and 14 members.

Apologies: Peter Sheppard. Benton/Carter: "That the apologies be sustained." Agreed.

Minutes of 2012 AGM: Carter/Allen: "That the Minutes be received as a true account of the meeting." Carried.

Presentation and Adoption of the Council's Report

The Hon. President presented and spoke to the Council's Annual Report and asked for approval for minor modifications in the Rules of the Society as approved by Council which will relieve the Society of filing tax returns.

The following Resolution was moved and carried:
Huntsman/Carter: "That the Polynesian Society (Inc.) is prohibited from making any payments at all to members or associates (unless payment is made as part of "ordinary course of business"), and prohibits any changes to aims/objectives, pecuniary profit and dissolution clauses without Inland Revenue approval."

The Report also showed that the membership has decreased mainly because of members' unpaid subscriptions and cancellations by Institutional subscribers, which may be attributed to the availability of the *JPS* online. The Society relies heavily on the Institutional Subscriptions to finance the *Journal*, but increases in royalties and other payments (e.g., JSTOR and Copyright Licensing Ltd) do compensate for declining subscription revenue to some extent.

Annual accounts have been completed for 2012 and were presented for information. The Reviewers report was attached to the Annual Accounts. The Society has shown a net surplus mainly attributed to interest earned on term deposits, copyright and royalty payments, and payment of subscription arrears.

The report again noted that the Society and its members benefit from the support of the University of Auckland that allows the Society to keep costs down. Specifically, the Department of Māori Studies provides the Society with its office and storage space, as well as access to office equipment; likewise, the Anthropology Department provides for the Hon. Editor and the JPS. These arrangements are not only economical but also very convenient and congenial.

Presentation and Adoption of the Annual Accounts

The Hon. Treasurer presented the Annual Accounts and Reviewers report for 2012. Rawiri/Carter: "That the 2012 Accounts be accepted." Carried.

Honoraria

Carter/Campbell: "That the honoraria for the year 2013 be at the same rate as 2012, and that they be paid." Carried.

Presentation and Adoption of the Editor's Report

The Hon. Editor's report was presented and the following matters highlighted.

Over the past year there has been a regrettable change in the editorial team. Siobhán Mattison has returned to the USA and therefore is unavailable to assist Lyn Carter with the book reviews. Melinda Allen was happily elected last year as Co-Editor and Dorothy Brown is carrying on as Assistant Editor. Production arrangements with Hamish Macdonald, recently designated "Production Manager", continue to be extremely satisfactory. We thank our fellow editors for their support throughout the year. Hamish, now a member of Council, has not only continued to prepare each issue for the printer and advise on printing arrangements but also to advise and initiate in matters digital.

The generous and generally anonymous referees who pass judgments and provide comments are crucial partners in maintaining the quality of our venerable publication. On behalf of the Officers and Council, we thank them.

The Hon. Editors also flagged that there will be no independent annual Index as the Index will be included in the No. 4 journal of each year.

JPS Online. The Society's website is maintained by the Hamish Macdonald and Ben Davies. The *Journal* has now posted contents from the last five issues as well as taking new registrations/subscriptions. In addition, the site has received three article submissions as well as many enquiries. Over 120 individuals have registered on the site but only 15 have taken step 2 to convert their registration in to a paid subscription. The site is also linked in to a stand-alone *FaceBook* page renovated by Ben Davies.

Huntsman/Campbell: "That the Hon. Editors Report be accepted." Carried.

Election of Officers

Having been duly nominated and seconded, the following were elected to hold office until the year 2014 AGM:

President: Richard Benton
Hon. Secretary: Rangimarie Rawiri

Hon. Treasurer: Rangimarie Rawiri
Hon. Co-Editors: Judith Huntsman and Melinda Allen

Election of Council Members

The following, whose nominations were duly nominated and seconded, were elected as Members of the Council for two years: Mat Campbell, Michael Reilly, Lyn Carter, Hamish Macdonald.

Election of Reviewers:

Rawiri/Carter: "That Tane & Assocs., Chartered Accountants be the elected Reviewers." Carried.

General Business

No items of General Business.

The President Dr Richard Benton thanked the Council and members for their support during the year.

There being no more business, the President thanked members for their attendance and declared the 2013 AGM meeting closed at 6:00 pm and invited all present to the presentation of the Elsdon Best Memorial Medal to Professor Emeritus Geoff Irwin, after which Professor Irwin will give an address: "The Lake Village of Kohika and Archaeological Approaches to the Study of Māori Settlement Patterns in the North".

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PUBLICATIONS OF THE POLYNESIAN SOCIETY

The publications listed below are available to members of the Polynesian Society (at a 20 percent discount, plus postage and packing), and to non-members (at the prices listed, plus postage and packing) from the Society's office: Department of Māori Studies, University of Auckland, Private Bag 92012, Auckland. All prices are in NZ$.

Some Memoirs are also available from: The University Press of Hawai'i, 2840 Kolowalu Street, Honolulu, Hawai'i 96822, U.S.A., who handle North American and other overseas sales to non-members. The prices given here do not apply to such sales.

MĀORI TEXTS

1. NGATA, A.T. and Pei TE HURINUI, *Ngā Mōteatea* (Part 1). New Edition of 1958 edition, 2004. xxxviii + 464 pp., two audio CDs, genealogies. 2004. Price $69.99 (hardback).
2. NGATA, A.T. and Pei TE HURINUI, *Ngā Mōteatea* (Part 2). New Edition of 1961 edition. xxxviii + 425 pp., two audio CDs, genealogies. 2005. Price $69.99 (hardback).
3. NGATA, A.T. and Pei TE HURINUI, *Ngā Mōteatea* (Part 3). New Edition of 1970 edition. xlii + 660 pp., audio CD, genealogies. 2006. Price $69.99 (hardback).
4. NGATA, A.T. and Hirini Moko MEAD, *Ngā Mōteatea* (Part 4). New Edition of 1991 edition with English translation. xviii + 380 pp., two audio CDs, genealogies. 2007. Price $69.99 (hardback).

MEMOIR SERIES

14. OLDMAN, W.O., *The Oldman Collection of Maori Artifacts*. New Edition with introductory essay by Roger Neich and Janet Davidson, and finder list. 192pp., including 104 plates. 2004. Price $30.
15. OLDMAN, W.O., *The Oldman Collection of Polynesian Artifacts*. New Edition with introductory essay by Roger Neich and Janet Davidson, and finder list. 268pp., including 138 plates. 2004. Price $35.
37. DE BRES, Pieter H., *Religion in Atene: Religious Associations and the Urban Maori*. 95pp. 1971. Price $4.10.
38. MEAD, S.M., Lawrence BIRKS, Helen BIRKS, and Elizabeth SHAW, *The Lapita Pottery Style of Fiji and Its Associations*. 98pp. 1975. Price $7.00.
39. FINNEY, Ben R. (comp.), *Pacific Navigation and Voyaging*. 148pp. 1975. Price $8.00.

41. McLEAN, Mervyn,. *An Annotated Bibliography of Oceanic Music and Dance*. 252pp. 1977, with 74pp. 1981 Supplement. Price $12.30.

43. BLUST, Robert, *The Proto-Oceanic Palatals*. 183+x pp. 1978. Price $12.00.

45. HOOPER, Antony and Judith HUNTSMAN (eds), *Transformations of Polynesian Culture*. 226+viii pp. 1985. Price $35.00.

47. SIIKALA, Jukka. *'Akatokamanāva. Myth, History and Society in the South Cook Islands*. 153+xi pp. 1991. Price $29.95.

49. SORRENSON, M. P. K., *Manifest Duty: The Polynesian Society Over 100 Years*. 160pp. 1992. Price $32.50.

50. BROWN, DOROTHY (comp.), *Centennial Index 1892-1991*. 279pp. 1993. Price $30.00.

51. TE ARIKI TARA 'ARE, *History and Traditions of Rarotonga.* Translated by S.Percy Smith. Edited by Richard Walter and Rangi Moeka'a. 216pp., genealogies and song texts. 2000. Price $70.00.

52. REILLY, Michael P.J., *War and Succession in Mangaia—from Mamae's Texts.* 112pp., geneaologies and maps. 2003. Price $16.00.

53. BIGGS, Bruce Grandison, *Kimihia te Mea Ngaro: Seek That Which is Lost.* 80pp. figs. 2006. Price $30.00.

54. REILLY, Michael P.J., *Ancestral Voices from Mangaia: A History of the Ancient Gods and Chiefs*. xiv + 330 pp., maps, drawings, genealogies, index. 2009. Price $40.00.

55. TE HURINUI, Pei, *King Pōtatau: An Account of the Life of Pōtatau Te Wherowhero the First Māori King*. 303 + xiv pp., figs, genealogies, indexes, maps. 2010. (Available to members of the Society only at $40.00.)

56. McRAE, Jane, *Ngā Mōteatea: An Introduction / He Kupu Arataki*. Māori translation by Hēni Jacobs. 158 pp., biblio., figs, notes, song texts. 2011. (Available to members of the Society only at $28.00.)

MISCELLANEOUS PUBLICATIONS

TOKELAU DICTIONARY. lii + 503 pp. Price: $35.00.

INCEST PROHIBITIONS IN MICRONESIA AND POLYNESIA: Special Issue, June 1976. 155pp. Price $12.00.

FUTURE DIRECTIONS IN THE STUDY OF THE ARTS OF OCEANIA: from *Special Issue*, June 1981. 70pp. Price $4.00.

BIOLOGICAL ANTHROPOLOGY IN THE PACIFIC: Special Issue, March 1994. 108pp. Price $12.50.

KIE HINGOA *'NAMED MATS'*, 'IE TŌGA *'FINE MATS' AND OTHER TREASURED TEXTILES OF SAMOA & TONGA: Special Issue*, June 1999. 120pp. Price $15.00.

ESSAYS ON HEAD-HUNTING IN THE WESTERN SOLOMON ISLANDS: Special Issue, March 2000. 144pp. Price $15.00.

POSTCOLONIAL DILEMMAS: REAPPRAISING JUSTICE AND IDENTITY IN NEW ZEALAND AND AUSTRALIA: Special Issue, September 2003. 124 pp. Price $15.00.

POLYNESIAN ART: HISTORIES AND MEANINGS IN CULTURAL CONTEXT: Special Issue, June 2007. 192 pp. Price $30.00.

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BACK ISSUES OF THE JOURNAL AVAILABLE

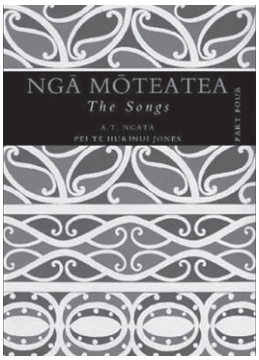
THE SOCIETY holds copies of most issues from Volume 76 (1967) onwards. Some copies of issues from earlier volumes are available, or become available from time to time. Orders and inquiries should be directed to the Assistant Secretary, Polynesian Society, Department of Māori Studies, The University of Auckland, Private Bag 92019, Auckland, New Zealand.

Prices per issue are as follows (exclusive of the *Special Issues* above):
Vol. 116 (2007) and earlier: $2.00 plus postage and packing
Vol. 117 (2008) onwards: $15.00 plus postage and packing

* * *

Ngā Mōteatea: The Songs

Volume Four



The singing of waiata, of songs and chants, has always been an integral part of Maori life. Today waiata are heard in formal ceremonies on marae, in business or political meetings, and at casual, social events. But their texts alone make fascinating reading as an archive of historical, cultural and tribal life.

Over a period of forty years Sir Apirana Ngata, of Ngāti Porou, distinguished leader and scholar, collected and recorded hundreds of songs and chants from the iwi of Aotearoa which became the four volumes of *Ngā Mōteatea*. The first three volumes included translations and annotations by Ngata and the Ngāti Maniapoto scholar, Pei Te Hurinui Jones. The contents of Part Four, the fourth volume, were not available until after the deaths of Ngata and Pei. It was first published in 1990 as an edition of the Maori texts, edited by Tamati Maturangi Reedy from Ngata's manuscripts, but without translation to English.

Now, for the first time, this new edition of Part IV comes with a translation of the waiata and annotations by Hirini Moko Mead, of Ngāti Awa. A scholar of rare and special expertise in Maori language and culture, he has also made important additions to the annotations. The translation to English opens up to a wide readership of Maori and non-Maori, nationally and internationally, the beauty of the poetic language of the waiata and a wealth of information about historic events and cultural practices of Maori life.

This is the last volume of a complete, new edition of this national treasure of *Ngā Mōteatea*, published by Auckland University Press in association with the Polynesian Society. The largest and most comprehensive collection of Maori waiata, it offers an enduring record for the practice of Maori waiata and teaching of tribal history, and a unique contribution to New Zealand poetry. This volume, like those preceding it, is a rich resource for continuing research and scholarship into the Maori poetic tradition, the language and the culture. It offers prime texts for the teaching of Maori language, literature and tribal history and serves as an inspiration for contemporary composition and performance.

This completely redesigned and reset edition of Part Four preserves the integrity of Ngata's texts and commentary. Two audio CDs of the waiata in this volume, collected by Mervyn McLean, and held in the Archive of Maori and Pacific Music at the University of Auckland, are included.

Hardback 398p, two audio CDs, genealogies. Price $69.99

AUCKLAND UNIVERSITY PRESS