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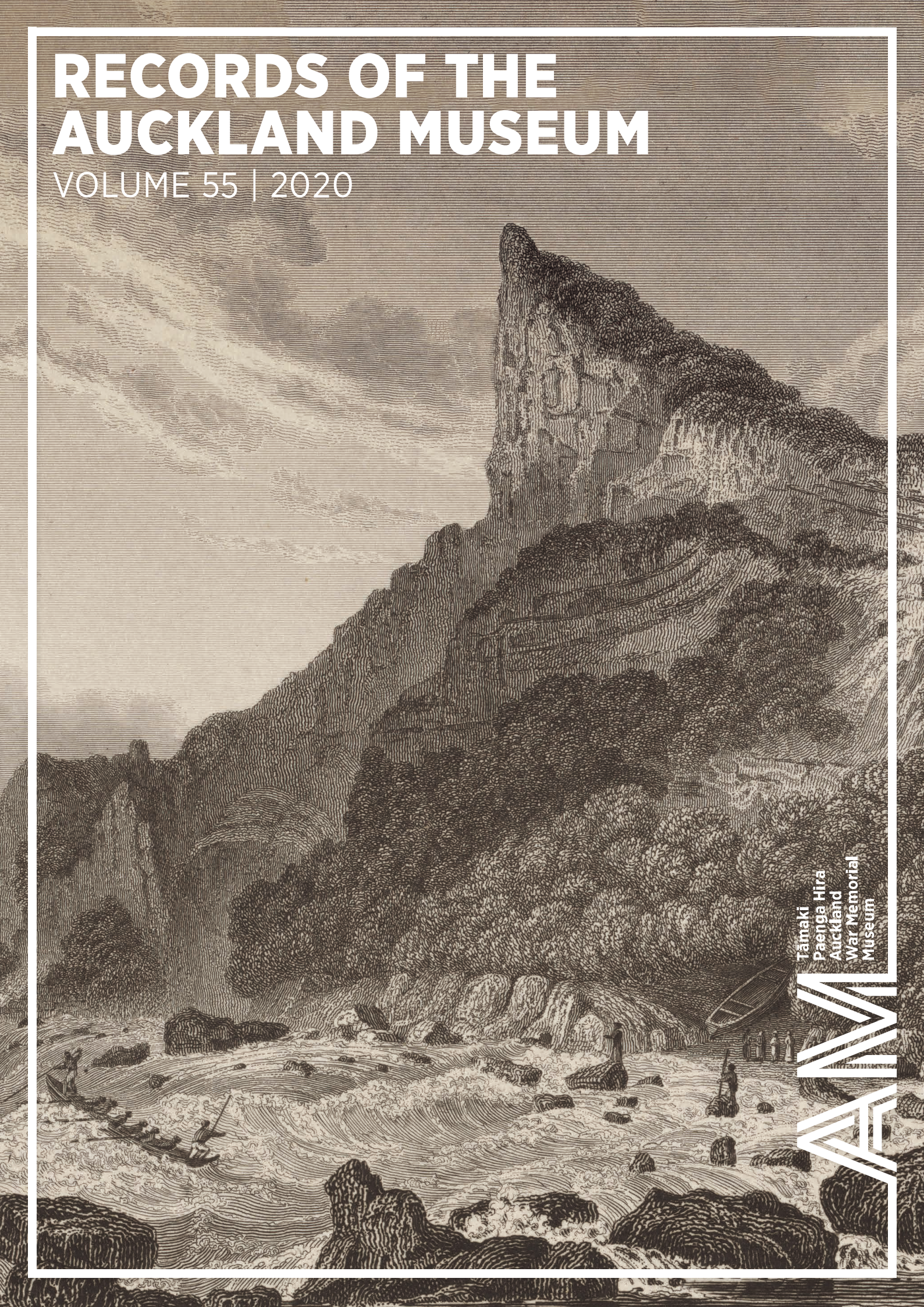

Tāmaki Paenga Hira Auckland War Memorial Museum

Māori Archaeological Textiles: A Structural Analysis of Māori Raranga 'Woven' Basketry from the Waitakere Ranges in Auckland Museum

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Abstract
Māori wove a diverse array of textiles including a wide range of basketry. There has been little examination of the Māori pre-contact woven textiles from archaeological contexts in the collections of Auckland Museum, particularly those manufactured using the technique Māori call *raranga*. The key structural attributes of woven bags and baskets, and woven fragments from Te Wao Nui a Tiriwa (Waitakere Ranges), Tāmaki Makaurau were identified. These attributes included the raw material, weave form, strand width, pattern, and edge types, along with the type of commencement and finishing structures. Examination revealed diverse materials and manufacturing processes to create bags and baskets. Comparison with other Māori archaeological textiles from Aotearoa confirmed the value of a structure-based investigation to contribute to known customary and ethnographic knowledge bases. In addition, the presence of distinctive structural combinations has extended our understanding of *raranga* technology, revealing the continuity, and diversity, of Maori textile manufacturing processes in the past.

Keywords
archaeological textiles; Māori weaving; kete; Waitakere Ranges

INTRODUCTION

Archaeological textiles encompass a broad range of objects, including *kupenga* (fishing nets), *kete*, *whāriki*, *kākahu* and cordage for building and waka lashings. Manufactured from organic materials, archaeological textiles rarely survive unless in very arid or wet conditions (Cameron 2012). Plant material responds in different ways to variations in depositional contexts and this is reflected in an artefact's condition (Kronkright 1990; Cameron 2012). For example, the *para* 'epidermis' of harakeke (NZ flax, Phormium tenax) is water resistant and will survive in wet deposits while the *muka* 'inner fibre' disintegrates. In contrast, the *muka* will be preserved in dry deposits while the *para* disintegrates. The visibility of the inner structure of the leaf on fragments allows an assessment of how an object was constructed and reveals diverse techniques such as knotting, twisting, plaiting, twining, weaving, and sewing.

This article concentrates on bag and basket fragments manufactured in *raranga*, i.e., woven using leaf strips. Two sets of elements (groups of leaf strips) are interlaced at an oblique angle, are functionally undifferentiated and have a common starting point (Emery 1966: 60). The sets are further distinguished by their direction, the dextral whenu 'leaf strips' lean to the right and the sinistral whenu lean to the left (Hiroa 1950: 145). In addition, the weave can be open or closed (Figs 1 and 2).

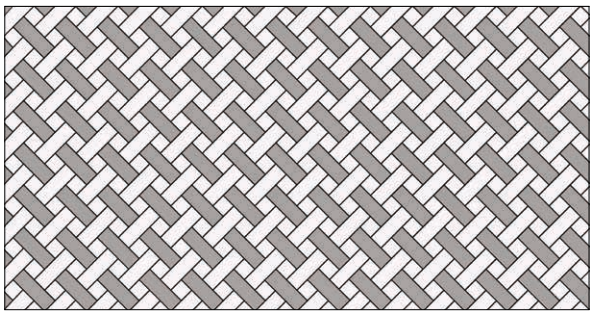

Figure 1. *Takitahi* (check pattern), open weave, sinistral *whenu* are grey and dextral *whenu* are white.

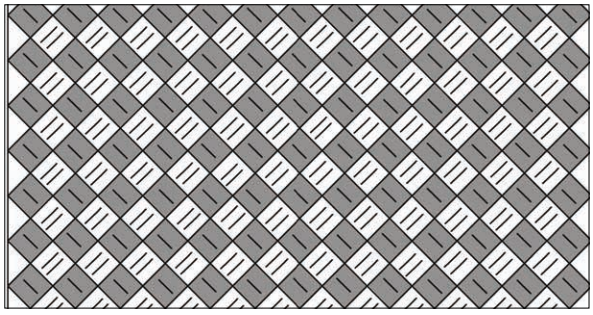

Figure 2. *Takitahi* (check pattern), closed weave, sinistral *whenu* are grey and dextral *whenu* are white.

https://www.aucklandmuseum.com/discover/research/publications/records/vol55/ raranga
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MĀORI WOVEN TEXTILES

A wide variety of fibre objects such as fishing equipment, clothing, general purpose baskets and cordage were essential to survival for pre-contact Māori. However customary Māori weaving technologies were in serious decline by the early 20th century due to the rapid uptake of European materials (Mead 1969). Elsdon Best (1856–1931) and Rangi Hiroa (1877–1951), believing they were documenting a dying art, recorded Māori textile construction methods, techniques and protocols. Their in-depth studies included the detailed drawings of techniques together with Māori terminology by Hiroa (1923, 1926, 1950), and important tikanga 'protocols' and weaving *whakapapa* 'connections' from Best (1898). These publications provide a rich resource for identifying and understanding *raranga* technological practices.

Māori wove a diverse range of woven *kete* 'bags/baskets' using many raw materials, construction methods and patterns for everyday activities and special occasions. *Kete* were ususally woven for distinct purposes and 'named accordingly' (Puketapu-Hetet 1999:47). There were many types of utilitarian containers, known generally as *kete tātahi* 'open weave/general purpose baskets' (Hiroa 1923). They were woven for everyday use and include the *rourou* and *kono* 'small food baskets', *kete* 'bag', *kete kāwhiu* 'shellfish bag' and *kete kumara* 'kumara bag' (Puketapu-Hetet 1999). As Hiroa (1923: 732) commented, 'woven baskets were used for so many purposes that it is difficult to imagine Maori being without them'. These expedient baskets were for resource gathering and storage. In contrast, the class of finer woven textiles took longer to weave and required a high skill level. The *kete pūputu* 'close weave' group includes the *kete pūtea* 'finely woven bag' and *kete whakairo* 'patterned bag'. These bags were highly valued for storing significant *taonga* such as cloaks, or for tools and materials required for fibre work (Hamilton 1896; Puketapu-Hetet 1999: 50). In addition, *kete pure* 'ceremonial bags' were manufactured for ritual purposes (Hiroa 1923: 725; Puketapu-Hetet 1999: 49).

MANUFACTURING PROCESSES

Māori arrived in Aotearoa with the necessary skills to manufacture a full suite of textiles specific to their requirements (McCrae-Tarei 2013; Smith 2015). The importance of textile-related plants to Māori is demonstrated by the *tapu* 'sacredness' that surround all aspects of their lifecycle; planting, harvesting, processing, and weaving (Puketapu-Hetet 1999; Te Kanawa 2006). In Aotearoa, weavers followed strict protocols for all aspects of *raranga* manufacture that display respect for the environment, the people, and the object. These processes were important during the manufacture of simple and complex textiles (McCallum and Carr 2012). To assess the significance of the objects and various structural attributes, an understanding of the relevant harvesting, processing and manufacturing strategies used by Māori is required. The following provides a summary of the materials and construction methods used by Māori to weave *raranga* textiles, based on traditional, ethnohistorical and practical knowledge.

Raw Materials

There were many suitable raw materials available, including harakeke (New Zealand flax, *Phormium tenax*), kiekie (*Freycinetia banksii*), tī kōuka (cabbage tree, *Cordyline* spp.), nikau (*Rhopalostylis sapida*), pīngao (golden sand sedge, *Ficinia spiralis*) and houī (lacebark, *Hoheria* spp.) (Hiroa 1923; McCallum and Carr 2012; Puketapu-Hetet 1999). The importance of weaving materials is illustrated by their inclusion as a *taonga* species in the Ngāi Tahu Claims Settlement Act 1998 (McCallum and Carr 2012: 183). Plants were selected based on various factors, including abundance, ease of preparation, leaf width, flexibility and strength.

Harakeke was the preferred weaving material across Aotearoa as it was plentiful and had long, strong leaves (Hiroa 1923; Puketapu-Hetet 1999; Scheele 2005). The tī kōuka were also readily available and favoured for their strength and durability (Hiroa 1923; McCallum and Carr 2012; Smith 2015). These species were particularly suited for everyday open weave textiles, as illustrated by the large number of *kete tātahi* in museum collections woven from harakeke and tī kōuka. Given the superior nature of harakeke it was also used, along with kiekie, in the manufacture of closely woven items such as the *kete pūtea* and *kete pure*.

Preparation and Processing Methods

The various raw materials used in textile manufacture require different harvesting and processing techniques depending on the intended textile (Puketapu-Hetet 1999). The first process after harvesting harakeke is to strip the leaves into the required width. The broad harakeke leaves allow for a range of strip widths to be produced making it suitable for weaving a variety of object types and sizes. In comparison, plants such as pīngao and kiekie have narrower leaves yet they are very strong and durable.

The leaves from harakeke, tī kōuka and nikau could be used without any further processing (Best 1941; Hiroa 1923; McCallum and Carr 2012). Unprocessed plant strips shrink as they dry, leaving gaps between each strip and creating an open weave structure. This natural drying process was exploited by Māori who wove many open weave *kete* of this form for particular purposes such as drainage of liquids, or where air circulation was required e.g., the loose weave of *kete kumara* allows soil to drop through the gaps. When using harakeke, the strips were often removed from the base of the leaf using the tākirikiri technique (Hiroa 1923). This involved separating the *whenu* from the base with a 'quick, sharp pull' (Hiroa 1923: 710) to leave fibrous rather than cut distal ends, which were then plaited together. The most valued textiles were manufactured with leaf strips that had undergone further processing such as softening or boiling.

The *hāro*[1] or *hapine* 'softening' process for harakeke removes moisture from the leaf without breaking the surface layers (McCallum and Carr 2012). The leaf strip is pulled firmly along its length against the back of a shell (Puketapu-Hetet 1999). This results in less shrinkage and more flexible strips ensuring a close weave

1. *Hāro* is a common term for extracting *muka* fibres.

structure. Harakeke leaf strips could be further processed by boiling the strips in a *kumete* or *oko* 'wooden bowl' with hot stones to make the strips whiter (Hiroa 1923: 711; Maori Dictionary 2020). The water-resistant upper surface layer of the flax leaf makes it difficult to absorb dye. However, black colouration was achievable using iron-rich *paru* 'mud' (Puketapu-Hetet 1999: 16).

Manufacturing Techniques

Starting Structure

General purpose bags were often woven from unprepared *whenu* with a two corner, four corner or three-ply plait start. For example, the *kono* 'small food baskets' and everyday *kete* had a flat four corner base. However, both *kete tātahi* and *kete pūputu* could begin with a *whiriwhiri* 'three-ply plait' (Hiroa 1923). In contrast, special bags were mainly woven from processed leaves, with the same start as a *whāriki* 'floor mat' (Hiroa 1923: 732). This uses narrow strips still attached to the butt end of the leaf to ensure a secure starting structure.

Patterns

Patterns are created by varying the number of *whenu raranga* 'weaving strip' each strip passes over or under. The two simplest and most used weaving patterns are *takitahi* 'plain or check weave' (Figs 1 and 2) and *takirua* 'twill weave' (Hiroa 1923: 733; Connor 1983: 197). The *takitahi* pattern has both *whenu* (dextral and sinistrals) go over one strip, then under one strip, to create an even check pattern (Connor 1983: 197). The *takirua* weave has both the dextrals and sinistrals carried over two strips, with Māori distinguishing between two types: *torua whakatu* 'vertical twill', and *torua whakatakoto* 'horizontal twill' (Pendergrast 2005). Other more intricate pattern arrangements were created for special items include *kete whakairo*, for which the patterns could be *papakirango*, *rau kumara* and *hai tamana*, which are usually *rohe* 'region' specific (Pendergrast 1991; Te Kanawa 2006). The pattern is not overlaid after manufacture but created during construction, with the first row or *whakapapa* setting out the pattern by using the variation in colour of the upper and lower leaf, or by combining natural and dyed strips. The patterns represent the natural and cultural environment, for example, *hapu* living near rivers used the *niho taniwha* 'monster teeth' pattern (Puketapu-Hetet 1999).

Finishing Structures

The presence of a start and finish edge is informative of the original size when examining fragmented textiles. The primary method to finish a simple bag was with a *whiri kawe* 'three-ply plait' started directly from the *raranga* structure (Hiroa 1923: 735). This is recognisable by the loop effect from the strips as they wrap around the back of the plait. There are many examples of this structure in collections at Auckland Museum, Tāmaki Paenga Hira (Pendergrast 1984, 1995), though seldom seen in contemporary practitioners' work. Another common finish for mats and bags was *tāpiki* or *kopetipeti* (Hiroa 1923: 718), a selvedge edge where both the sinistrals and dextrals are folded back along the body of the work. Often a *whiri* 'plait' was added around the rim to create a firm edge for attaching the handles.

MUSEUM COLLECTION

This raranga textile assemblage is from various coastal locations: Anawhata, Piha (Whakāri Pā, Te Ahuahu Point and Takatu Point) and Karekare. The find places include overhangs and shelters on cliffs and exposed coastal sites, small in size and not suitable for long term occupation (Lawrence 1989). In the wider area is a range of Māori occupation evidence such as pā, terraces, pits and midden. The forest, river valleys and coastline of Te Wao Nui a Tiriwa have been actively occupied by small tribal groups for about 600–800 years, who managed the marine and terrestrial resources (Taua 2009). Unfortunately, conflict over land during the early 1800s decimated many people, leaving only a few small groups to maintain *ahi kā* 'burning fires of occupation' (Taua 2009: 51).

The fibre remains discussed below were collected by Sir F. Mappin, A.T. Pycroft, G. Fairfield and W.E. Browne, and accessioned into Auckland Museum Tāmaki Paenga Hira collections between 1928 and 1951. The complete textile assemblage consists of cordage, fishing nets, cloak fragments, belts, mats and discard fibres. In depth discussion of the entire collection is beyond the scope of this paper (see Mckendry (2017a) for discussion of the cordage, Mckendry (2017b) for details on the cloaks from Whakāri Pā and Lawrence (1989) for the remaining stone, wood and bone artefacts).

THE RARANGA TEXTILES

The rāranga textiles were recorded using particular attributes, including the material type, weave form, strand width, pattern type, and the start, finishing and edge techniques. The raw materials were identified by Jean Goulding using comparative textile and plant samples, although techniques for scientifically identifying archaeological fibres have since improved dramatically with micro-computed tomography, SEM and polarized light microscopy (Smith *et al*. 2018). One *kōnae*, six *kete tātahi*, four *kete pūputu* and one *kete pure* (Table 1) were identified and examined.

Anawhata

The two fragments (23887.2 and 23887.3) are woven in the *takitahi* pattern from tī kōuka and nikau, respectively (Goulding 1971). Textile 23887.2 (Fig. 3) has a variation in the *raranga* structure with groups of eight *whenu* woven with a selvedge edge to make separate bands of weaving and a *whiri kawe* rim. These two pieces may be from a *kete tātahi*.

Piha, Whakāri Pā

The two *kete* from this site are partially intact and identified as *kete pūputu*. They are both closely woven from harakeke with *whiriwhiri* starts, differentiated by their strip widths and pattern types. *Kete* 26447.3 (Fig. 4) is woven in the *torua whakatakoto* pattern with medium strips (7 mm) and *kete* 26447.4 is in the *takitahi pattern* (15 mm wide strips), with only the fibres remaining.

Table 1. The attributes of the bags and fragments; material type, weave form, strip width, pattern, start, finish, object type and condition.

Bags, Baskets	Material	Weave Form	Strip Width mm	Pattern	Start	Finish	Object	Condition
Anawhata								
23887.2	Tī kōuka	Open	3	*Takitahi*		three-ply plait	*Kete tātahi* rim	Frag.
23887.3	Nikau	Open	5	*Takitahi*		three-ply plait	*Kete tātahi* rim	Frag.
Piha, Whakāri Pa								
26447.3	Harakeke	Close	7	*Torua whaka-takoto*	three-ply plait		*Kete pūputu*	Partial
26447.4	Harakeke	Close	15	*Takitahi*	three-ply plait		*Kete pūputu*	Partial
Piha, Te Ahuahu Shelter								
43127.1	Kiekie	Open	5	*Takitahi*	four-corner	three-ply plait	*Kete tātahi*	Complete
43127.2	Harakeke	Open	5	*Takitahi*	four-corner		*Kete tātahi*	Complete
Piha								
19773	Kiekie	Open	4	*Torua whaka-takoto*	knot		*Kete pure*	Complete
19775.1	Astelia	Open	18	*Takitahi*	two-corner	three-ply plait	*Konae*	Complete
2012.x.217.2	Kiekie	Open	5	*Takitahi*	three-ply plait		*Kete tātahi*	Partial
26448.3	Toetoe	Open	8	*Takitahi*	four-corner	three-ply plait	*Kete tātahi*	Complete
Karekare								
33011.7	Harakeke	Open	4	*Takitahi*	three-ply plait		*Kete tātahi* base	Frag.
33011.11	Harakeke	Open	4	*Takitahi*		three-ply plait	*Kete tātahi* handle	Frag

Piha, Te Ahuahu Shelter

The two complete *kete tātahi,* 43127.1 and 43127.2 (Figs 5 and 6), have an open weave in the *takitahi* pattern, a flat base with a four-corner start, medium strip widths, plaited handles and *whiri kawe* rim. They are made from kiekie and harakeke, respectively. Both have an irregular structure, with the degraded base of *kete* 43127.1 possibly the result of use-wear, and *kete* 43127.2 having the appearance of basketry weaving. These may be expedient baskets such as *kete kumara*.

Piha

A complete *kōnae* 'purse' (19775.1, Fig. 7) is made from astelia in an open weave, with two corners in the *takitahi* pattern, wide *whenu* and a three-ply plait rim (18 mm). An unfinished *kete pure*, 19773, encloses a small lock of *makawe* 'human hair'. It is made from kiekie in the *takirua* pattern with 4 mm strands and the commencement has four leaf strips knotted together in pairs, with two becoming sinistrals and two dextrals.

This site produced one complete and one partial *kete* which appear to be general use baskets. The complete *kete tātahi* (26448.3, Fig. 8) is made from toetoe with an open weave in the *takitahi* pattern, a flat base with a four-corner start, medium strand widths (5–8 mm), a whiri *kawe* rim and three-ply plait handles. The total degradation of the epidermis layer indicates this *kete* has been exposed to very dry conditions. The partial *kete* (2012.x.217.2, Fig. 9) is made from kiekie with an open weave in the *takitahi* pattern and a *whiriwhiri* start with medium strips. The dextrals lie at right angles and the sinistrals flat against the plait, contributing to an unbalanced weave.

Karekare

The two small open weave fragments are made from harakeke in the *takitahi* pattern with 4 mm strips and with their lower leaf surface front facing. One, 33011.7 (Fig. 10), is a rim fragment which retains a three-ply plait handle where the *whenu* goes directly into the *whiri kawe*, and the other fragment 33011.11 (Fig. 11) has the *whiriwhiri* start.

Figure 3. Plaited rim with band of weaving, fragment. Auckland War Memorial Museum 23887.2. Photo by Tim Mackrell.

Figure 4. *Kete pūputu*, partial. Inside view of the *whiriwhiri* start and *torua whakatakoto* pattern. Auckland War Memorial Museum 26447.3. Photo by author.

Figure 5. *Kete tātahi*, complete; open *takitahi* weave, plaited rim and handles, degraded base. Auckland War Memorial Museum 43127.1. Photo by Tim Mackrell.

Figure 6 *Kete tātahi*, complete; uneven open *takitahi* weave, *whiri kawe* rim and plaited handles. Auckland War Memorial Museum 43127.2. Photo by Tim Mackrell.

DISCUSSION

There is a long history of settlement, mobility and seasonal expeditions in the resource rich forests and coastline of Te Wao Nui a Tiriwa (Taua 2009; Hayward and Diamond 1978). The *raranga* textiles reflect this complex history and retain sufficient structural variables to reveal common object types and diverse manufacturing processes. The majority were identified as *kete tātahi* 'general use bags'. The distribution of these utilitarian *kete* across all the sites reflects their essential use for everyday activities. Open weave baskets were ideal for large scale collection of cockles, pipi, scallops and mussels, and the harvesting and storing of kumara. The shaping of the band on the open weave fragment 23887.2 (Fig. 3) is a technique which allows the bag to close around a form, such as a hue 'gourd' used to store water or preserved foods. The close weave *kete* at Whakāri Pā also provide evidence of the care of special items and demonstrate the work of skilled weavers. In general, the attribute variability of the *kete* were as expected, with evidence of a range of weaving and plaiting techniques, using multiple raw materials.

Materials

There is a reliance on harakeke for everyday use *kete*. The identification of plants, such as toetoe, nikau and astelia, which are rarely seen in collections, supports Māori and ethnohistorical narratives of widespread use of many fibre plants (Goulding 1971; Hiroa 1923; Puketapu-Hetet 1999; Tregear 1904). These materials were easily available, growing in lowland forests and swamps and well suited for general baskets due to their ease of harvesting and processing (Best 1977; Puketapu-Hetet 1999). In addition, tī kōuka and toetoe are recorded as being particularly suitable for cooking baskets due to their water-resistant qualities (Pendergrast 1996; Puketapu-Hetet 1999). These plants have thick, strong and durable leaves that are valuable for the making of utilitarian baskets. The use of toetoe at Karekare, nikau

Figure 7. *Kōnae*; open *takitahi* weave and three-ply plait rim. Auckland War Memorial Museum 19775.1. Photo by Tim Mackrell.

Figure 8. *Kete tātahi*, complete; open *takitahi* weave, *whiri kawe* rim and plaited handles. Inner fibre only remaining. Auckland War Memorial Museum 26448.3. Photo by Tim Mackrell.

Figure 9. *Kete tātahi*, partial; inside view of *whiriwhiri* start and unbalanced weave (the dextrals lie at right angles and the sinistrals flat against the plait). Auckland War Memorial Museum 2012.x.217.2. Photo by Tim Mackrell.

Figure 10. *Kete*, rim and handle fragment; *whiri kawe* rim and plaited handle. Auckland War Memorial Museum 33011.7. Photo by Tim Mackrell.

and tī kōuka at Anawhata and astelia from Takatu Point, alongside the ubiquitous harakeke, demonstrates the utilisation of local resources for everyday use objects.

Structural Attributes

Many archaeological textiles are degraded fragments without start or finishing structures, constraining their identification as specific objects. However, the detailed recording of textile structures based on standard attributes and raw material has provided clues. The diverse array of structural attributes identified supports known customary Māori weaving knowledge. Further, various structural combinations yielded some interesting results. Due to the nature of the material, it was expected that harakeke or kiekie strips would be narrower than other materials. However, the item with the narrowest *whenu* was manufactured from tī kōuka (23887.2, Fig. 3). In contrast, the complete *konae* from Takatu Point (19775.1, Fig. 5), woven in astelia has unusually wide strands measuring

Figure 10. *Kete*, base fragment; inside view of the *whiriwhiri* base. Auckland War Memorial Museum 33011.11. Photo by Tim Mackrell.

18 mm, and more than double the width seen in other objects. It has a typical flat two-corner start for a small *konae*; however, the wide strips, open weave and *whiri kawe* rim are more common on larger *kete*. In this case, an examination of the leaf strips identified the mid-rib of the leaf in each strip, indicating a whole astelia leaf was used to create each element or strip. The expected range of start and finish weaving techniques and weave variation are represented in this collection. The five complete *kete* all have *whiri kawe* finishing edges, four have an open weave in the *takitahi* pattern with three starting methods; two-corner, flat four-corner and *whiriwhiri*. The partial closely woven *kete*, and other open weave fragments, also have *whiriwhiri* starts, and all finish edges are *whiri kawe* suggesting widespread knowledge of these particular techniques. The k*ete* from Whakaari Pa (26447.3, Fig. 4) is the only textile with a twill weave pattern. This could be further identified as *torua whakatakoto* 'horizontal twill' due to the presence of the starting plait, and alongside the very close weave, warranted the title *kete pūputu*.

Another variation in structural combinations was evident in textile 19773 from Takatu Point. This unique *kete* was begun by knotting four strands of kiekie together, a technique more typically found on a *rourou*, using harakeke or tī kōuka. The faster, but more difficult pattern *torua whakatakoto* is unfinished. The textile wraps around a bundle of *makawe* 'human hair'. The sacredness of human hair to Māori, considered to contain the spirit of the person, is well recorded within oral traditions and ethnohistoric accounts (see Cowan 1930; Shortland 1856; Salmond 1985; Taylor 1855). Best (1924: 533) states 'cut hair was carefully deposited at the tapu place, or on a tree, or secreted in some way'. Wrapping the textile around the hair demonstrates the importance of covering the hair prior to deposition, and the expedient manufacturing techniques used suggests some urgency in this process. These examples illustrate the variability in textile objects and structures, influenced not only by raw material availability but also the intended purpose.

Archaeological Comparisons

A few complete and fragmented kete, largely in poor condition, have been excavated or collected from caves near Taupo; a wetland pa site at Kohika in the eastern Bay of Plenty (Aranui 2006); Raupa near Paeroa (Lander 1992); a coastal site at Kaitorete Spit (Smith 2015); and other pieces from various locations held at Southland Museum and Art Gallery (Smith 2015). As with the Waitakere collection the primary material is harakeke, with the addition of tī kōuka, kiekie, and astelia. This confirms the superiority of harakeke as a strong durable material which is readily available and easy to harvest and process. There were also similar anomalies in construction, such as the use of kiekie for an open weave form and tī kōuka for a closely woven bag. In this case, the kiekie kete is very degraded, with a lot of fibre visible as the epidermis has deteriorated, which may explain why the weave form appears open. Alternatively, it may have been constructed by a less experienced weaver and the tī kōuka *kete* by a skilled practitioner. Further, the type of plant species does not appear to have any influence on the width of the strips. They were uniform across all materials, weave forms and object types, and across all collections, with the majority being of medium width (5–10 mm). This suggests the strip width, though constrained by the plant morphology, is also determined by the weaver and intended textile.

The general use *kete* had the expected attributes; a *whiriwhiri* (usually a three-ply plait) start, an open weave, wide and narrow strips, *takitahi* and *takirua* patterns, and a *whiri kawe* rim. This includes two complete *kete tātahi* from Southland Museum and Art Gallery, three from Taupo in Auckland Museum, and two from Kohika, Bay of Plenty. Like the Waitakere textiles, these bags vary in overall shape and size. A key difference is in the starting method for the *kete tātahi* from the Waitakere Ranges where the complete bags have a flat four-corner start, not a *whiriwhiri* 'three-ply plait start'. This could indicate different functions, the length of the plant material available (as a four-corner start requires longer strips) or it may simply be the preference of this area. In addition, it reflects the versatility of basic weaving techniques, giving a weaver the ability to adapt to the required function of the object.

As previously mentioned, many archaeological textiles are very small fragmented pieces. Smith (2015: 277) comments that most Kaitorete Spit *raranga* specimens 'were such small fragments that only a few had recognisable structures', and only nine of the 64 textile fragments are quantifiable and recognisable. The charred *raranga* remains from the Raupa site near Paeroa are also considered too small to assign to a specific object (Lander 1992), although in spite of poor preservation they are all still identifiable as *raranga* textiles by their interlaced structure and flat leaf strips. In the main these fragments have recognisable attributes such as variations of a plain weave and narrow to wide strips. For example, the Raupa fragments have a *takirua* weave and 3–6 mm wide flax strips (Lander 1992), and the Kohika fragments have the four basic pattern types; *takitahi* and *takirua* variations (Aranui 2006). However, it is the presence of intact finishing edge structures that can be particularly enlightening.

A small open weave fragment from Kohika woven in *takitah*i, with wide strips of unprocessed flax, has a folded rim edge reminiscent of a *rourou* or *kono* (McAra 2004: 157). *Rourou* were containers made expediently from raw flax leaves for everyday and often single-use occasions. In contrast, two fragments from Kaitorete Spit, closely woven from medium width flax strips, are *whakakitaratara* 'triangular edge' fragments (Smith 2015: 258–345). This finish along the rim of a *kete*, of a series of triangles, represents a very high skill level and is solely a decorative finish. Hiroa (1923: 738) states this was a recent innovation, even though his informant maintained this finish is 'ancient', and it is a common Pacific technique. An exquisite *kete whakairo* discovered at Puketoi Station (see Hamilton

1896, Smith 2015), complete with a range of weaving resources, provides an insight into the type of *kete* the *whakakitaratara* fragments may belong to. This closely woven *kete* has a complex pattern from narrow strips and is coated in *kōkōwai*, indicating it was a prized possession. In addition, this *kete* was so finely woven and used for squeezing the juice of beaten tutu kernels and is known as a pukoro, or pututu. Given the nature of organic materials, the lack of similar high-quality textiles at other sites doesn't mean they were not used there but demonstrates the difficulty of making robust interpretations about past activities based solely on surviving evidence. Despite this, many of the limitations present in the analysis of archaeological textile collections are counteracted by a structural analysis.

CONCLUSION

Several raranga textiles presented here share structural components which aid in identification of their object type. Examination revealed a diverse use of materials and manufacturing processes to create a wide variety of bags and baskets, including every-day and potentially ritual textiles. In addition, the distinctive structural combinations of certain textiles reflect the diversity of past Māori textile manufacturing processes and demonstrate the flexibility of weavers to respond to the available plant material and required purpose. Future analyses, with broader data sets, could help identify regional and individual techniques, as well as contributing to the continuity of customary fibre-working practices.

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