Recent salvage excavations at an eroding early 15th century site on the Canterbury coast resulted in the discovery of a range of carbonised fibre artefacts that had been preserved in a simple, burned-out shelter. Included in the assemblage were fragments of textiles that, because of the weaving technique used and stylistic relationships to historic examples, may be specimens of a whāriki ‘floor mat’, a small kete ‘bag’, a tātua ‘belt’ and a fragment of finely woven material that may be part of a cloak, waist garment or shoulder cape. These will be described fully elsewhere, but the latter fragment is worthy of a short note in advance of a more complete report. The weave patterns of the fragment are indistinguishable from those of Māori garments recorded ethnographically. The discovery of these fragments provides insights into the history and development of Māori weaving technology. In particular, they demonstrate the presence in 15th century New Zealand of both a specialised weaving technology known as whatu aho pātahi ‘single pair twining’ and the preparation of soft, pliable fibres for weaving.

In January 2000, Dan and Alison Witter discovered the remains of a burnt shelter with associated cooking fires and a flounder bone midden at the western end of Kaitorete Spit, near Banks Peninsula (Fig. 1). The site (M37/6 in the NZAA Site Recording Scheme) was visible as a thin layer exposed at the base of a steep sand dune on the south facing ocean beach, where it had been damaged by wave action.
Because of the threat of further damage to the site, the Department of Conservation, which manages the land, commissioned two small salvage excavations that were carried out in May 2000 and in April 2001. After storm surges had exposed more of the site in 2003, further salvage work was carried out in September of that year. It was during the 2003 work, a joint exercise involving the New Zealand Historic Places Trust, the University of Otago, Te Runanga o Taumutu and the Department of Conservation, that textile fragments, including the piece discussed here, were discovered. Artefacts in fibre such as woven mats, bags or clothing, and perishable organics more generally, are only recovered from archaeological sites under a narrow range of circumstances such as in dry caves or waterlogged anaerobic deposits. At Kaitorete Spit the fibre artefacts were preserved by first being carbonised as a result of combustion in an oxygen-poor environment and then being rapidly buried under windblown sand.

The fragility of the carbonised material was exacerbated in the field because the entire layer was damp. This made recovery problematic and sections of the deposit were therefore cast in situ in plaster of Paris and removed to the conservation laboratory at Canterbury Museum for excavation and conservation under the direction of Dilys Johns of the University of Auckland.

Figure 1: Location of site M37/6.
The finely woven textile fragment is small, about 120 x 30 mm, and was found doubled over at one end. It is completely carbonised and therefore extremely fragile. On the basis of weaving style and the historic use of fibres for Māori weaving, it is likely that the material is muka (called whitau in the South Island), a soft fibre that is extracted from flax (Phormium tenax) leaves. The extracted fibre has been loosely twisted to form a fine, double-ply yarn approximately 0.7-1.0 mm in diameter. The whenu ‘warp’ elements are doubled at the beginning of the row to form what Te Rangi Hiroa (1926:311) described as a selvaged commencement edge, and are spaced at approximately 0.18 mm intervals (6 warps/cm). The aho ‘weft’ elements are twined through the whenu in a pattern known as whatu aho pātahi ‘single-pair twining’ (Te Rangi Hiroa 1926:311) and are 9-10 mm apart (Fig. 2). There is no evidence of any attachments such as thrums or feathers.

Figure 2: Photograph of the carbonised textile fragment before preservation.
The fineness of the material used, combined with the close spacing of both the warp and weft rows, makes it possible that this was part of a fine cloak. Although some much finer examples are known, it is comparable in fineness to some of the highest quality cloaks in museum collections.

A sample of the thatching material (a sedge or tussock-like leaf fibre) from the burned-out shelter returned a radiocarbon date of 500 ± 70 years B.P. which, when calibrated, indicates that the site was occupied in the early years of the 15th century A.D. (Bruce McFadgen, pers. comm.). The thinness of the occupation deposit suggests that the site was only occupied briefly—perhaps for as little as a month or so.

Textiles and textile fragments are very rare in New Zealand’s archaeological record and examples for which there is any chronological control are rarer still. In 1967 a cloak, different in construction from the Kaitorete example, was found with a cave burial at Mary Island in Lake Hauroko, Fiordland (Simmons 1968), and dated to the 17th century A.D. In 1983 two small cloak fragments (constructed using single pair twining) were discovered during an excavation at Lee Island in Lake Te Anau, also in Fiordland (Anderson et al. 1991). Three radiocarbon dates from this site indicate a 16th to early 17th century occupation. In 1988, a number of fragments, representing up to four different cloaks, were found during excavations at Raupa, a contact-period site on the Hauraki Plains (Lander 1992). Simmons (1968:4) described the Hauroko cloak as being made of strips of scutched flax and having the bottom edge warps cut rather than selvaged and with the upper edge similarly finished except for the addition of strips of dog skin. He compared it with a cloak fragment found with a burial in a cave on Cottesbrook Station near Middlemarch, named the “Strath Taieri fragment”. This fragment had warps of scraped or poorly scutched flax but wefts of much finer flax fibre (more tightly plied than is usual for cloak wefts—more like cordage or fishing line). It also had the skin and feathers of both weka (Gallirallus australis) and moa incorporated in its construction (Simmons 1968:6).

The single-pair twining technique used in clothing manufacture was one of the techniques used for making hinaki or eel traps (e.g., see Best 1977: Fig. 52) with vines or roots. The technique is used in other parts of the world, including island tropical Polynesia, where it is applied to “minor items of clothing as well as to fish traps” (Pendergrast 1987:6).

The Hauroko cloak is generally similar to the Strath Taieri example, consisting of single-pair twining of prepared flax (muka) but with additional features in the form of a “passive” weft paired with a “running” weft that was wrapped around the passive thread between each warp element in a technique described as “wrapped twined weaving” by Te Rangi Hiroa (1926: Fig 5). Pieces of bird skin were attached to the inside of the cloak with a fine cord attached with a diamond lashing.

Te Rangi Hiroa and Simmons both proposed developmental models for Māori clothing that placed the single-pair twine somewhere near the beginning of the sequence. In Te Rangi Hiroa’s “evolutionary” approach the complex dress-cloak with tāniko borders was the end point of a sequence that started in New Zealand with the simplest kilts. The trend towards increasing technical complexity was
underpinned by the evolution of those social processes that demanded increasingly complex items of clothing. He believed that the single-pair twine was introduced to New Zealand from Polynesia and cites examples from Rarotonga (Te Rangi Hiroa 1926: Fig 9) and the Tuamotus (Roth 1923:118-19). In another work, Te Rangi Hiroa (Buck 1954) proposed a four-step sequence: (i) introduction of bark cloth, (ii) plaited garments, (iii) single pair twining of rain capes then cloaks, and (iv) double pair twining and the various dress cloaks. In his 1968 work, Simmons agreed with the basic structure of Te Rangi Hiroa’s model but suggested that the earliest indigenous clothing industry may have relied heavily on the use of skins. This was evidenced by the dominance of tools like the *ulu* (a thin, flat, polished stone tool named by H.D. Skinner [1974] after an Inuit term for a skin-scraping implement), common in southern New Zealand during the earliest phases of settlement. Weaving technology was elaborated later in the sequence.

The Strath Taieri weka skin fragment is suggestive of the type of clothing worn when Maori weaving as such was in its infancy…. The Strath Taieri cloak with its half-hitch weft and curious warp could represent the earliest type of Maori weaving. The Hauroko example would seem to be a more developed form of the same tradition. Next in time are the single pair twined cloaks with no shaping, two of which were once lined with plaited textile, then the double pair twine cloaks with no shaping, followed by the double pair twine with shaping (Simmons 1968:13-14).

The Kaitorete fragment provides radiometric support for Te Rangi Hiroa’s and Simmons’s argument for the antiquity of the single-pair twine but lends little support to the notion of an evolutionary sequence towards increasingly fine manufacturing methods and artistic sophistication. The Kaitorete sample is 150 to 200 years older than either of the other dated examples, but it is much closer in technological terms to ethnographic examples of finely made cloaks. This challenges the assumption that the earliest weaving traditions of New Zealand were necessarily simple or crude in comparison with historic examples, although we have no doubt that they were different. Indeed an elaboration of rank and status, the very social conditions that Te Rangi Hiroa believed were implicated in the development of fine weaving technology, must have been present in founder communities that possessed the social and technological resources necessary to colonise New Zealand. If an evolutionary model is to be used in relation to the development of Māori clothing it may be more useful to frame it in explicitly neo-Darwinian or selectionist terms. According to this model, changes that took place in New Zealand weaving and clothing design were not an expression of a tendency towards increasing sophistication, but involved functional adaptations to specific environmental needs and available material resources, plus stylistic (selectively neutral) innovations relating to changing social conditions and values (Dunnell 1978). But these innovations and selections took place within the context of an ancient and sophisticated weaving technology with its origins in East Polynesia and beyond.
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