Modified leaves for garment manufacture: a 19th century Maori cloak made from the leaves of the mountain daisy *Celmisia* (tikumu)

L. DOVGAN NURSE[1], D. EASTOP[2] & M. NESBITT[3]

1 Introduction

This rare Maori rain cloak is made from the leaves of the mountain daisy, *Celmisia* (Maori 'tikumu') and fibres of *Phormium tenax*. The cloak was donated to the Museum of Economic Botany at the Royal Botanic Gardens, Kew, UK in 1858 by Walter Mantell (1820-1895), a land surveyor on the South Island of New Zealand (1848-1855). Conservation of the cloak formed the subject of recent MA research at the Textile Conservation Centre, UK (Dovgan Nurse 2008). The cloak was displayed until 1993 in the former Museum at Kew (Desmond 2007), with the primary aim of demonstrating the uses of the daisy family (Compositae); its significance as taonga Maori was explored in this research. The development and implementation of the interim conservation treatment was the second objective of the conservation enquiry. Maori garments made from the leaves of *Celmisia* are mentioned in the literature but the method of manufacture has not been documented. The poster focuses on the way the leaves have been modified during the making of the cloak.

Reverse side of the cloak.

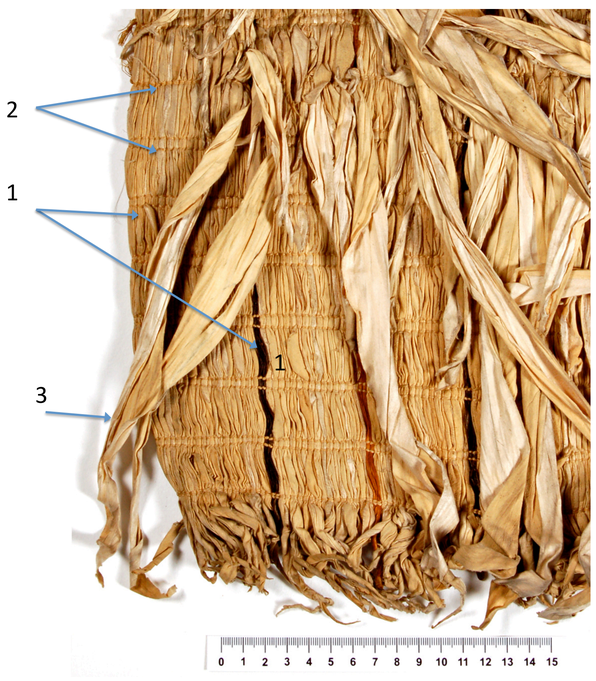
Cloak (TCC 3125, EBC 51440), length 1200 mm, width 1490 mm max., obverse (thatched) side.

2 Condition

The cloak is made using a spaced weft-twining technique that alternates single and double-pair twining, the latter is used to secure the long 'rain tugs' of the cloak to the ground fabric. The cloak exhibits unusual ageing properties: unlike herbarium specimens of *Celmisia* of the same age, the leaves of *Celmisia* on the cloak feel soft, pliable and suede-like to the touch, still retaining the qualities that gave the plant its 19th century vernacular name of 'leather plant' (Andersen 1926: 659).

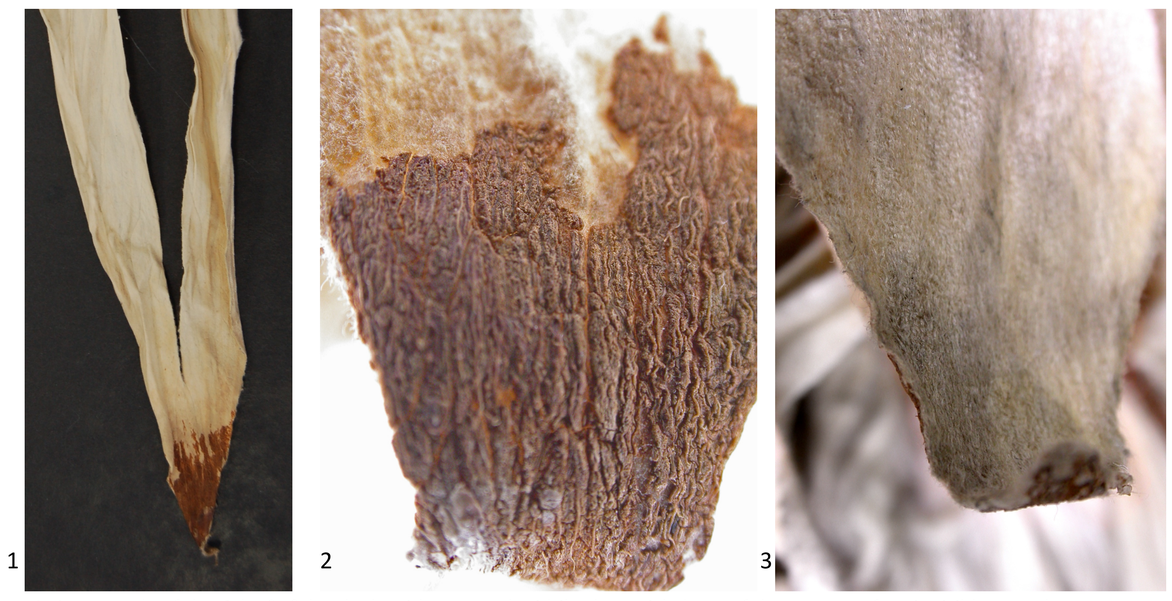
3 Investigation of the manufacturing techniques and condition of the cloak

Identification of the species as *C. hookeri* (Given 1980 & 1984) as part of this research enabled for direct comparison to herbarium specimens at Kew. This comparison and the examination of the cloak under UV illumination demonstrated that the leaves of the cloak had undergone extensive processing prior to weaving, which removed the midribs, the leaf margins and the cuticle layer of the epidermis of the upper surface of the leaf, making the leaf more pliable. The lower surface of the leaf appears intact, still retaining its white hairs (trichomes), which contributes to the functionality of this cloak as rain wear, due to the water-repellent properties of the hairs.



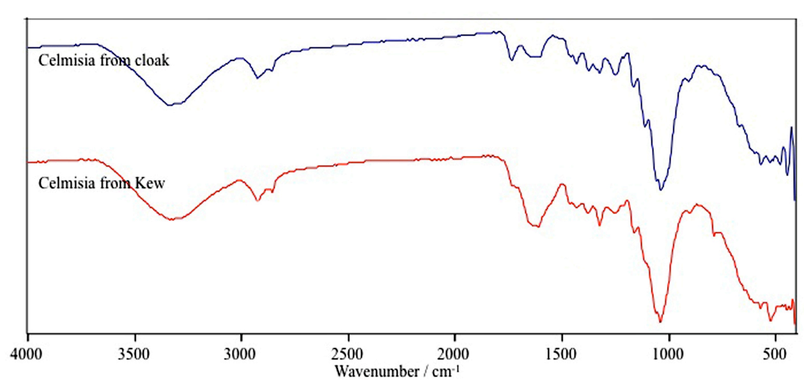
A detail of the lower left corner of the cloak (obverse), showing 1. warp: leaves of *Celmisi*a, alternated with the dyed fibres of *P. tenax*, 2. weft: undyed fibres of *P. tenax*, 3. the 'rain tugs' made from *C.* leaves.

One of the leaves of the cloak, photographed under UV illumination: 1. the presence of the cuticle layer on the upper surface (brown) is visible due to its absorption of UV light; 2. the lower surface of the same leaf: the white hairs reflect the UV light but the apex of the leaf reflects the light differently due to the presence of the cuticle layer on the other side.



1. An example of the *C.* leaf of the cloak with removed midrib; the cuticle layer of the upper surface is visible near the apex (brown areas). 2. A detail of the cuticle layer of the same leaf. 3. A detail of the lower surface of the same leaf, its white hairs appear intact.

The soft condition of the leaves raised a question of the possibility of the cloak being treated with a 'conditioner' by the museum staff in the past or by the makers that would preserve the 'suede' like quality of the leaves. However, the surface of the cloak did not exhibit any signs of coating or possible deterioration products of such coating. Fourier transform infrared spectroscopy (FTIR) was used to characterise the difference in condition between the leaves of the cloak and the sample of unprocessed *Celmisia* leaves (EBC 51438); no evidence was found of any chemical treatment. The spectrum of the 'unprocessed leaf' sample with a peak at ~ 1600 cm-1 perhaps can be interpreted as a higher volume of lignin present, i.e. presence of aromatic rings C=C (Garside 2002: 119), which is consistent with the condition of this sample that, unlike the leaves of the cloak, has midrib and cuticle layer intact, containing lignin responsible for the 'woody' appearance and feel of the sample. The spectra of both samples are very similar and consistent with the spectra of cellulose-based fibres characterised by the presence of the 'C-C ring band at ~ 1155 cm-1 and the C-O-C glycosidic ether band at ~ 1105 cm-1' (Garside & Wyeth 2003: 271).



FTIR spectra of the samples.

4 Conclusion

Morphological features of *Celmisia*, such as trichomes and the size of the leaf played an important part in the cloak's functionality as a waterproof garment. Removal of the cuticle from the upper surface of the leaves, and the midrib, prior to weaving, led to pliability. Could it have also contributed towards the preservation of the cloak by reducing the content of lignin and tannin, responsible in part for the deterioration of the cellulose-based materials?
The authors hope that the poster will facilitate further research and discussion of *Celmisia* artefacts in museum collections and inspire textile practitioners to experiment with the techniques illustrated. An obvious next step is experimental work, using living material of *Celmisia*.

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Authors

1. Luba Dovgan Nurse, textile conservator, e-mail: ld104@hotmail.com
2. Dinah Eastop, Senior Lecturer, Textile Conservation Centre, University of Southampton, email: D.D.Eastop@soton.ac.uk, www.textileconservationcentre.soton.ac.uk
3. Mark Nesbitt, Collections Manager, Economic Botany Collection, Royal Botanic Gardens Kew, email: M.Nesbitt@kew.org, www.kew.org/collections/ecbot