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The Grays Hills silcrete source, inland South Canterbury

Phillip R Moore[1], Michael Trotter[2] and Kyle Davis[3]

[1]*Canterbury Museum, Rolleston Avenue, Christchurch 8013, New Zealand*

Email: peninres@xtra.co.nz

[2]*Tuahiwi, North Canterbury, New Zealand*

Email: summerwine@xtra.co.nz

[3]*Mahaanui Kurataiao Ltd, 17 Allen Street, Christchurch 8011, New Zealand*

Email: kyle.davis@ngaitahu.iwi.nz

The Grays Hills quarry, in the Mackenzie Basin, appears to have been one of the more significant sources of silcrete (or orthoquartzite) utilised by South Island Māori for the manufacture of cutting implements. This paper provides a brief description of the quarry, and a nearby source site, along with an account of previous work, visual attributes of the silcrete and some of the artefacts recovered from the area.

Keywords: artefacts, Grays Hills, Mackenzie Basin, quarry site, silcrete, South Canterbury

Introduction

Silcrete or orthoquartzite was one of the more important stone materials utilised by early Māori settlers in the southern half of the South Island, and was procured from a number of sources mainly in North and Central Otago (Hamel 2001; Anderson 2003). The Grays Hills quarry in the Mackenzie Basin, South Canterbury, was re-discovered in 1930. Limited excavations were undertaken in 1938 (Irvine 1943) and 1970 (Trotter 1970), but the site has not been previously described in any detail, and the large number of artefacts collected remain unstudied.

Brief visits were made to the area in March 2017 and 2018, and two separate silcrete sources are described in this paper: the Grays Hills quarry (site I38/1 of the New Zealand Archaeological Association Site Recording Scheme, www.archsite.org.nz) and a smaller working area located about 4 km to the south, which is referred to here as the Stony River site I39/1 (Fig. 1). The paper also includes a review of existing records, new information on the nature of the silcrete, and a description of some of the artefacts held by Canterbury Museum. It is intended to provide a basis for further research, such as additional field investigations and an analysis of existing artefact collections.

Previous work

The earliest published account of the Grays Hills silcrete quarry appears to be that by Irvine (1943), who reported on a brief visit to the site with H S McCully and B Beck in April 1938, following its discovery by McCully in 1930 (Simmons and Wright 1967: 73). In addition to recording three main pits, Irvine and his colleagues also investigated a circular hollow, which was 8–9 feet (2.4–2.7 metres)

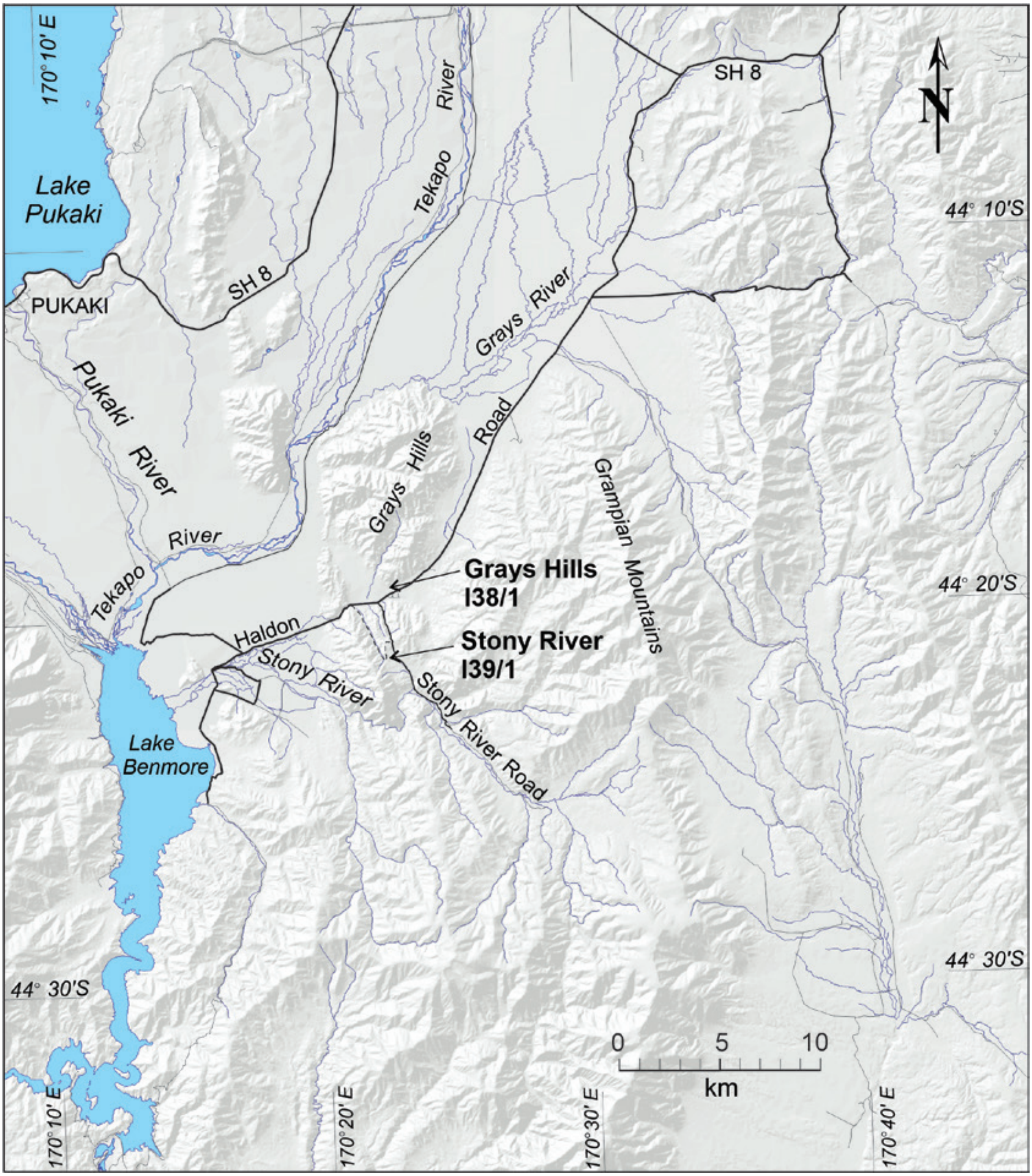

Figure 1. Location of the Grays Hills and Stony River silcrete sources

in diameter and about 1 foot 6 inches (45 cm) in depth. In the centre of this was a fireplace, and excavation of the remainder of the feature revealed "finished tools stacked around the outer margin" along with a "complete set of rough chipping tools made of black stone foreign to the locality" (Irvine 1943: 90). The circular hollow was interpreted as a hut site (see also Anderson 1986).

The quarry was revisited on 29 January 1970 by Michael Trotter and several members of the Canterbury Museum Archaeological Society (CMAS), at which time a plan was made of the entire site and seven test squares were excavated

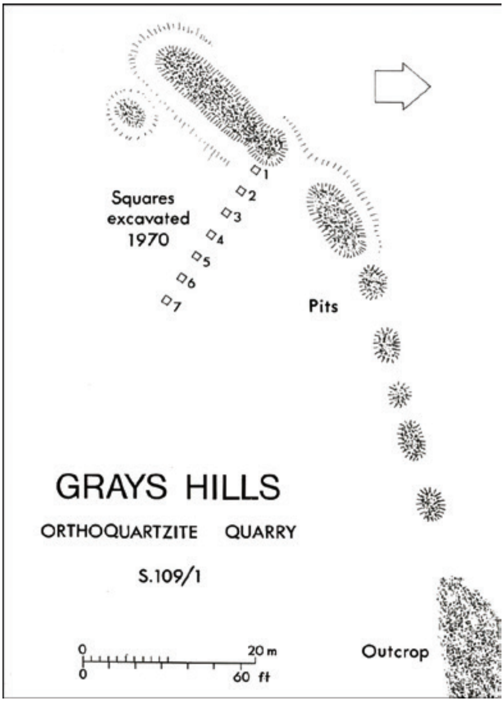

Figure 2. Plan of the Grays Hills quarry site showing the location of quarry pits and squares excavated in 1970 (plan drawn in 1970)

(Trotter 1970; details provided in field book number 9; pp 117–118). These 'squares' were approximately 3 feet by 2 feet (90 cm by 60 cm) and up to 9 inches (23 cm) deep, and extended in a single row southeast of the largest pit (Fig. 2). Thousands of flakes were uncovered (see Trotter 1970), though only a few hundred items, mainly from squares 6 and 7, were retained (now held by Canterbury Museum).

The Stony River site was briefly described by McCully (1953: 410), where he reported seeing "white quartzite flakes strewn over 2–3 acres (0.8–1.2 hectares)", as well as many beneath the surface. The site was revisited and surface collected by CMAS in 1970 (Trotter 1970).

Geological context

Grays Hills is located on the southern margin of the Mackenzie Basin, near Lake Benmore (Fig. 1). This area has not been mapped in any detail geologically and the silcrete occurrence is not depicted on the latest 1:250,000 scale geological map (Forsyth 2001). However, the silcrete probably represents a minor outlier either of the Miocene Manuherikia Group or Eocene Eyre Group, which has been preserved by down-faulting into the much older surrounding Permian-Triassic greywacke (which is exposed in a modern quarry only about 100 metres to the north). The nearest recorded occurrence of Manuherikia sediments is on the western side of Lake Benmore near Shepherds Creek, approximately 20 km to the southwest (Forsyth 2001). Eyre Group strata outcrop along the eastern side of the Grampian Mountains in the upper Hakataramea River valley and Snow River, about 15 km to the east (Cox and Barrell 2007). The silcrete at Stony River, which occurs on an alluvial fan, appears to be derived from a buried outlier, possibly also down-faulted.

Description of sites

Grays Hills (site I38/1)

The quarry site is located directly opposite the Grays Hills homestead, within a gently sloping paddock about 250 metres west of the Haldon Road at approximately 470 metres above sea level (Fig. 1). It is clearly identified by two large willow trees (Fig. 3). The site was originally known as the No. 1 quarry (McCully 1953).

The site extends over a distance of about 130 metres and covers a total area of approximately 1,670 m^2 (based on GPS readings). It consists of a line of pits and row of boulders trending northeast to east-northeast (Fig. 2). The main part of the site comprises two large pits (c.f. Irvine 1943), the first one (from the southwest) being about 20 metres long with a deep, round pit at its northeastern end (Fig. 4). The second large pit is more oval-shaped. Both pits have raised rims. Beyond these there is a series of five or six smaller, shallower pits on a slightly different trend, ranging from 3 to 4 metres in length. To the northeast, these line up with a group of boulders composed not of silcrete but limonite. These boulders were previously referred to as the "outcrop" (Irvine 1943), but

Figure 3. View southwest of the Grays Hills quarry site. Willow trees mark the position of the two large pits. Limonite boulders in foreground. Photograph by Phil Moore, March 2017

none appear to be in situ and in fact silcrete does not form a solid outcrop anywhere on the site. About 5 metres east of the first pit there is a shallow, almost circular, depression, and this is likely to be the feature excavated by Irvine et al. in 1938.

Michael Trotter's field notes on the seven test squares excavated by CMAS in 1970 provide some indication of the sub-surface stratigraphy (Fig. 5). In squares 1 and 2, nearest the largest pit, he recorded that there were "many large immovable pieces [of silcrete] at a depth of only 6–9 inches", but in squares 3–7 a "clay floor" was encountered at a depth of between 5 and 9 inches (12–23 cm). This suggests that the sub-surface silcrete 'seam' may extend at least 5–6 metres east of the pit, but beyond that is either absent or concealed beneath a clay layer (alluvial silt or loess). It was not recorded whether any of the "immovable pieces" had been worked.

Irvine (1943: 90) estimated that approximately 100 tons (102 tonnes) of "material" had been excavated from the three main pits that he recorded, each of which was said to be 16 feet (4.8 metres) long by 8–9 feet (2.4–2.7 metres) wide and about 6 feet (1.8 metres) deep. Whether "material" meant silcrete plus clay and soil or just silcrete is not clear (but the latter was assumed by Challis 1995: 32). However, based on Irvine's measurements, and using the formula for the volume of a half barrel (sectioned lengthwise), we calculated a total volume of about 48 m^3. The density of quartz is 2.7 g/cm^3, giving a maximum weight of silcrete of 130 tonne. But since the silcrete body might only consist of about 70% solid rock (otherwise quarrying would have been extremely difficult), Irvine's

Figure 4. Largest of the quarry pits, Grays Hills. Photograph by Phil Moore, March 2017

figure of 100 tons seems quite reasonable, if it referred to silcrete only.

A calculation for the largest pit only, using our estimated measurements (about 20 metres long by 3–4 metres wide and 2 metres deep) and the same formula, produced a volume of 45 m^3 and quantity of approximately 85 tonne of silcrete (at 70% solid rock). If we include the amount quarried from the other pits, allow for some subsequent infilling and accept that the silcrete must have been exposed above ground level originally, then 100 tonne is probably a minimum figure for the amount of silcrete removed from the pits.

Stony River (site I39/1)

The Stony River site was originally referred to as the No. 2 quarry (McCully 1953). It was described in 1970 as consisting of "quantities of white flakes of orthoquartzite on the surface" with "odd scattered flakes elsewhere on the hillside" (Site Record Form[1]), though there was no indication of the total area concerned. Trotter (1970) reported there were "thousands of large flakes of better quality white orthoquartzite" there (Fig. 6).

This site was relocated in March 2018 in a shallow depression on the alluvial fan, adjacent to a fence line, at GPS position 44.35839°S 170.37584°E (NZTM E1390880 N5084970), which is approximately 350 metres east-southeast of the originally recorded location. It lies at an altitude of approximately 650 metres above sea level. The site consists of scattered flakes, cores and a few worked and unmodified boulders of white to grey silcrete, spread over an area of about 90 metres by 60 metres. Some of the boulders are up to 70 cm

Figure 5. Silcrete artefacts in square 6, Grays Hills quarry. Photograph by Michael Trotter, 1970

across, and flakes up to 20 cm long. In 2017, one isolated boulder of silcrete (26 cm across) and a sparse scatter of flakes were found, at different locations, approximately 200 metres north-northwest of the main site (the flakes are at GPS position 44.35658°S 170.37530°E, NZTM E1390830 N5085170).

The original (geological) source of the silcrete is uncertain. Based on the presence of boulders within the alluvial fan, at one time it must have been exposed further upslope, but our search of the higher part of the fan and steep, rocky hillside revealed no outcrop of silcrete. McCully, though, stated that he followed a "reef outcrop" for a distance of roughly 30 metres "at a little below ground level" (McCully 1953: 410). If so, this outcrop must have been subsequently buried by further deposition of gravel on the alluvial fan.

Petrography

Ten silcrete samples, all waste pieces, were surface collected (with appropriate permission) from various parts of the Grays Hills quarry site in order to provide a reasonably representative selection of material for petrographic study, and these were examined both macroscopically and under a binocular microscope. Most pieces, in natural light, are light brownish grey (2.5Y 7/1–7/2) to grey (2.5Y 6/1), and some have a white weathered surface (colour codes are those of the Munsell Soil Color Chart 2000). Fresh surfaces typically have a waxy lustre. Some silcrete is composed of fine grained, well-sorted, silica-cemented sandstone made up predominantly of angular to rounded quartz grains, with a few larger clasts up to 2 mm across, and rare black and red mineral grains. A number of samples, however, consist of scattered quartz grains in a milky, clayey matrix, and these have a distinctly cherty appearance. A few include small white spherical structures about 0.5 mm in

Figure 6. The Stony River site. Photograph by Michael Trotter, 1970

diameter and other possible organic remains.

Artefacts previously collected from the quarry were also examined (see below) and the colour was recorded for 21 of these. The majority are light grey (N7 to 5Y 7/1), but some are white, very light grey, grey (5Y 6/1) and variably grey and pale yellow.

Only two samples were collected from the Stony River site. These are white to light grey (2.5Y 8/1–7/1) with a yellowish weathering rind and have a sugary to waxy lustre. Both samples are composed of very pure silcrete consisting of very well-sorted fine sandstone with scattered black and red mineral grains. Neither have a milky matrix, as seen in many samples from the Grays Hills quarry.

In a pioneering petrographic study of silcretes from selected South Island sources and archaeological sites, Simmons and Wright (1967) examined four samples from "Gray's Hills Quarry", although their description of the site as consisting of "small boulders of quartzite and much working debris in a dish-shaped hollow" could just as easily refer to the occurrence at Stony River (Simmons and Wright 1967: 73). Three of the samples consisted of angular to sub-rounded quartz grains in a matrix of stained, secondary quartz. The other was grey and flinty with narrow, darker grey sub-parallel bands (1–2 mm thick) of chalcedony, and a matrix of chalcedony and finely granular quartz. Minor mineral grains identified in these samples included zircon, magnetite, and rare tourmaline and hornblende.

Artefacts

A significant number of artefacts have been previously collected from both the Grays Hills quarry and Stony River site, which are held by Canterbury Museum. There are also some in the South Canterbury Museum (not examined) and Otago Museum (Simmons

Figure 7. Mid-section of a broken serrated-edged 'knife', Grays Hills quarry. Canterbury Museum 2008.1157.13

Figure 8. Unusual silcrete tool (100 mm length) showing secondary flaking to produce a central 'waist', Grays Hills quarry. Canterbury Museum 2008.1157.50

1973). No detailed study of the hundreds of flakes and cores recovered during the 1970 excavations at the Grays Hills quarry has yet been undertaken, but about 30 items were examined to provide some indication of the range of artefact types produced, and material used. They included unmodified flakes, cores and a few retouched flakes and blades, along with pieces of waste rock. Some of these are illustrated in Figures 7 and 8.

Flakes vary considerably in size and form, from what may be termed spalls to large, elongate blades (roughly defined as having a length:width ratio >2, Leach and Leach 2019: 248). Most can be classified as waste flakes, but some show evidence of secondary retouch (fine flaking) along the edges. This includes a small broken blade which is serrated along both sides and presumably intended for use as a knife (Fig. 7). There is also an unusual tool which has been retouched to produce a distinct waist. (Fig. 8). It is somewhat similar to a tanged blade from the Shag River Mouth site, illustrated by Anderson (2003: fig. 12.10). Of the cores, a number have elongate flake scars. These artefacts were made from both high quality white to light grey silcrete and poorer quality, distinctly cherty material with a milky matrix, as also seen among the 10 petrographic samples collected by us.

A single spall of greywacke was recovered in 1970 from Square 7, which had clearly been struck off a well-rounded cobble and indicates that such cobbles were likely used as hammer stones. A greywacke cobble was also found by us at the first pit. Additionally, McCully (1953: 410) reported there was a greywacke "anvil", apparently the same one observed by Irvine et al. in 1938, set in the ground near the line of limonite boulders. It was not seen in 2017.

The range of artefact material at the Stony River site is similar to that seen at the Grays Hills quarry. It consists mainly of flakes, with some cores and worked boulders. Some of the flakes show secondary retouch (Fig. 9). No hammer stones were found in 2018, but one rounded greywacke cobble (Canterbury Museum 2008.1157.42) was collected in 1970, which had probably been used for that purpose.

Discussion

There is no direct evidence for the age of the Grays Hills quarry, though Duff (1956: 272) considered "it must also have been first worked in Moa-hunter times", based on the finding of an unfinished serpentine reel on the adjacent "Streamlands" station at an altitude of 1,700 feet (about 520 metres) above sea level, close to the base of the hills in this area. Anderson (2003: fig. 12.1) also recorded a slate knife or ulu from Grays Hills. Both artefacts are certainly indicative of an early Māori presence in the area.

In 1848, a sketch map of the Waitaki River and its tributaries was drawn by Te Ware Korari

Figure 9. Two large flakes (141 mm and 147 mm in length) of white silcrete with secondary retouch along edges, Stony River site. Canterbury Museum 2008.1157.51 (left) and 2008.1157.52

for W Mantell showing the Māori names for many rivers, streams and important cultural sites along the river catchment (Andersen 1916: 39). This included what was labelled an "Ancient Settlement" named Rauru, located close to the confluence of the Tekapo and Pukaki rivers, somewhere near the head of present day Lake Benmore. In 1953, McCully (1953) attempted to relocate this settlement, which he considered should be found on Grays Hills station, but failed to do so. Nevertheless, it is tempting to speculate that Rauru may have been associated with the Grays Hills quarry.

Exactly how the Grays Hills source was originally discovered is somewhat puzzling, given that there is no outcrop or scatter of silcrete boulders there today. However, some exposure of the rock must have been evident on the surface, which it can be reasonably assumed was subsequently quarried away. We have no way of knowing how much silcrete was actually removed off-site, but even 5% of the estimated minimum of 100 tonne quarried (i.e. 2 m^3 or 5.4 tonne) constitutes a substantial amount, and to that we can probably add at least 100 kilograms from the Stony River site. But since it is evident from Irvine's (1943) account and the Canterbury Museum collections that finished tools were actually being produced at Grays Hills, the quantity of raw material transported to early settlements along the Canterbury (and perhaps Otago) coast need not have been that great.

There is clearly a need for further work at the Grays Hills quarry, particularly the preparation of a more detailed plan of the site and perhaps additional excavations. A proper analysis of material from the 1970 investigations is also required to determine the range of artefact types produced and processing technology used, and to facilitate comparisons with some of the well-studied silcrete quarries in Otago (e.g. Leach and Leach 2019).

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Endnote

1 Site record form for site I39/1. New Zealand Archaeological Association Archaeological Site Recording Scheme. www.archsite.org.nz

References

Andersen JC. 1916. *Jubilee History of South Canterbury*. Christchurch: Whitcombe & Tombs Ltd.

Anderson A. 1986. "Makeshift structures of little importance": a reconsideration of Maori round huts. *Journal of the Polynesian Society* 95 (1): 91–114.

Anderson A. 2003. *Prodigious Birds. Moas and moa-hunting in prehistoric New Zealand*. Cambridge: Cambridge University Press.

Cox SC, Barrell DJA. 2007. Geology of the Aoraki area. Institute of Geological & Nuclear Sciences 1:250,000 geological map 15.

Challis AJ. 1995. *Ka Pakihi Whakatekateka o Waitaha: the archaeology of Canterbury in Maori times*. Science and Research series no. 89. Wellington: Department of Conservation.

Duff R. 1956. The moa-hunter period of Maori culture. *Canterbury Museum Bulletin* 1: 1–400.

Forsyth PJ. 2001. Geology of the Waitaki area. Institute of Geological & Nuclear Sciences 1:250,000 geological map 19.

Hamel J. 2001. *The Archaeology of Otago*. Wellington: Department of Conservation.

Irvine R. 1943. Quartzite quarry at Grays Hills, Mackenzie country. *Journal of the Polynesian Society* 52 (2): 90.

Leach BF, Leach HM. 2019. Excavation of a twelfth-century prepared-core prismatic-blade workshop at Oturehua, Central Otago, New Zealand. *Tuhinga* 30: 209–255.

McCully HS. 1953. In quest of Rauru. *Journal of the Polynesian Society* 62 (4): 410–411.

Simmons DR, Wright JB. 1967. Use of the polarising microscope for classifying quartzite artefacts from South Island sites. *Transactions of the Royal Society of New Zealand* 2 (4): 71–78.

Simmons DR. 1973. Suggested periods in South Island prehistory. *Records of the Auckland Institute and Museum* 10: 1–58.

Trotter M. 1970. Lake Tekapo survey. Canterbury Museum Archaeological Society Newsletter 21, March 1970.

A significant silcrete source near Oxford, North Canterbury

Phillip R Moore[1] and Kyle Davis[2]

[1]*Canterbury Museum, Rolleston Avenue, Christchurch 8013, New Zealand*

Email: peninres@xtra.co.nz

[2]*Mahaanui Kurataiao Ltd, 17 Allen Street, Christchurch 8011, New Zealand*

Email: kyle.davis@ngaitahu.iwi.nz

An isolated occurrence of silcrete at Miro Downs, near Oxford, North Canterbury, was utilised by early Māori settlers to manufacture cutting implements. New information on this important stone source, which has been largely overlooked in recent years, is presented, including a description of two additional archaeological sites and some of the artefacts previously collected from the area.

Keywords: archaeological sites, artefacts, Canterbury, Oxford, silcrete, stone source

Introduction

Hard, silica-cemented sandstone or silcrete (also referred to as quartzite or orthoquartzite) was one of the stone materials most widely utilised by early Māori at occupation sites along the Canterbury and Otago coasts (Anderson 2003). At Rakaia, for example, it was the predominant rock type used for knives and scrapers (Trotter 1972). Most of the silcrete is assumed to have been procured from well-known quarries in Central and North Otago (Anderson 2003: fig. 12.4) and from Grays Hills in the Mackenzie Basin, South Canterbury (Moore et al. 2020). However, there is also an isolated deposit in North Canterbury at Miro Downs, which has been largely overlooked in recent archaeological literature. It constitutes the most northerly known occurrence of silcrete in the South Island.

This paper presents new information on the spatial distribution of the Miro Downs silcrete, on its visual attributes, and on artefacts found in the vicinity. We have also attempted to establish to what extent material from this source may have been used by early Māori settlers in the wider Canterbury area. The source lies within the takiwā of Ngāi Tūāhuriri.

Location and environment

Miro Downs is a long-established pastoral farm located approximately 10 km due west of Oxford, and 7–8 km north of the Waimakariri River, on the margin of the Canterbury Plains (Fig. 1). The area as a whole is known as View Hill, but since there is also an isolated hill named View Hill situated 3 km to the south, we prefer to use the more specific name of Miro Downs for the silcrete source. The silcrete deposits are located on an unnamed hill (463 metres above sea level) just north of the Eyre River (Fig. 2). The hill is largely in pasture, with some areas of light scrub and pine trees.

The View Hill area was almost certainly forested at the time Polynesian settlers arrived in the late thirteenth or early fourteenth century (McGlone 1989). In the 1850s, remnants of this forest apparently formed part of the Oxford Bush, which consisted primarily of beech (*Fuscospora* spp.) with some kahikatea (*Dacrycarpus dacrydioides*), matai (*Prumnopitys taxifolia*) and rimu (*Dacrydium cupressinum*) (Clark 1926). Timber milling began at View Hill in the 1870s.

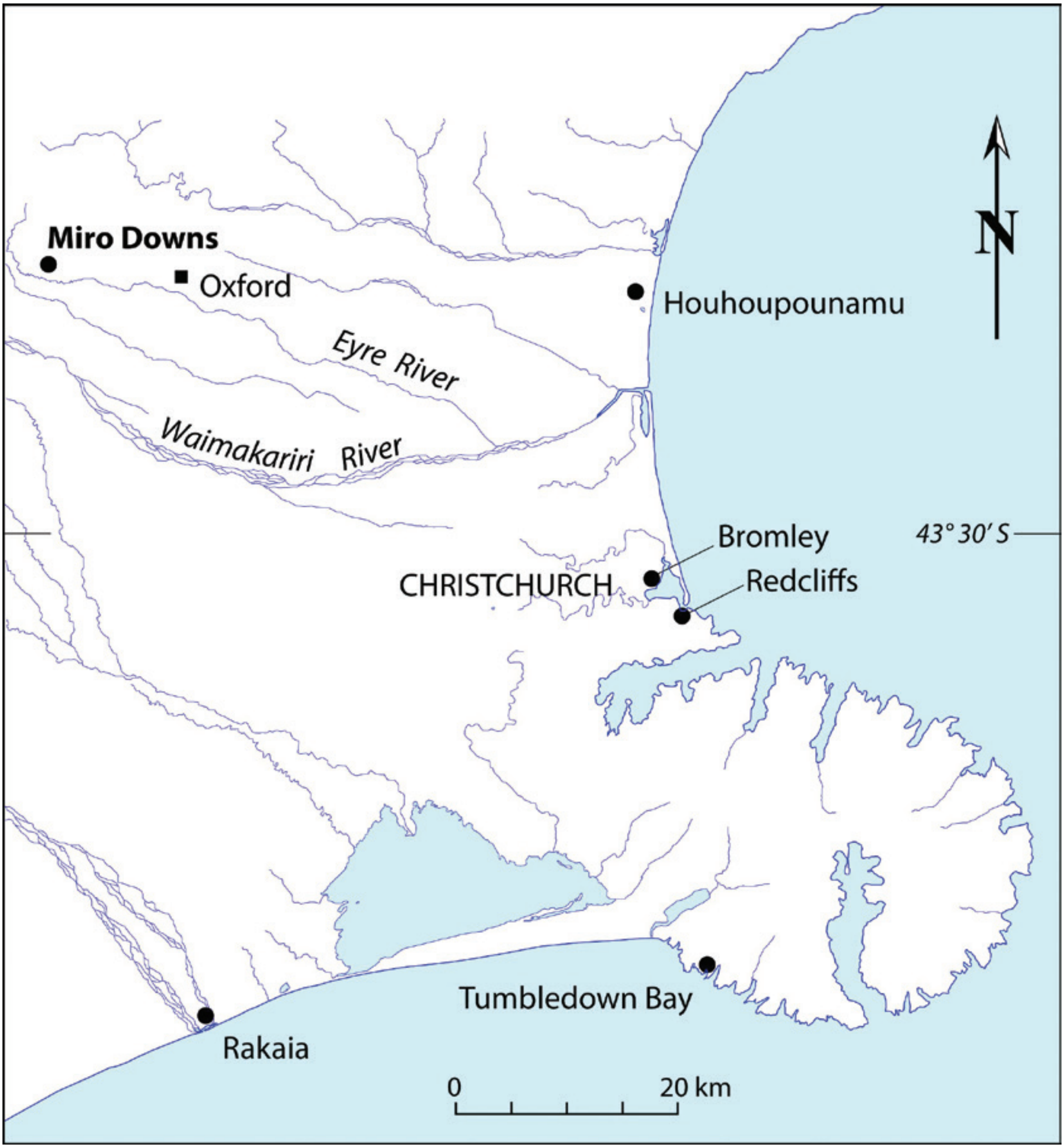

Figure 1. Location of Miro Downs and other archaeological sites mentioned in the text

Previous observations

The existence of outcrops of quartzite in the Oxford area was first reported in the archaeological literature in 1959 (Griffiths 1959). Subsequently, Griffiths (1960) provided more detailed information on this occurrence, which, from the grid references he recorded, is undoubtedly the Miro Downs locality. He described the quartzite "outcrops" as extending along the tops of the hills in this area in a discontinuous line trending northeast-southwest for a distance of approximately 1.5 miles (2.4 km), but noted that the quality of the stone declined quite rapidly from the southwestern end. Although Griffiths (1960: 8) found one "small pile of conchoidal flakes" he did not record any other evidence of stone-working.

In 1978, Sally Burrage formally recorded an area of quartzite outcrops as a source site (L35/23 (formerly S75/6), New Zealand Archaeological Association Site Recording Scheme, www.archsite.org.nz). She noted that "many of the outcrops show signs of striking and flaking but no hammer stones were found. Cores, flakes and knives with secondary working are lying on the surface". Burrage also made a small collection of artefacts from this site. Since then the source has received only passing mention in reviews of Canterbury archaeology (e.g. Challis 1995), or been completely overlooked (e.g. Anderson 2003).

Geological context

The geology of the View Hill area has been described in some detail by Speight (1928) and McLennan (1981). It is also depicted on the recent 1:250,000 scale geological map (Forsyth et al. 2008). Although Speight (1928) did not specifically mention the occurrence of quartzite, he refers to a "great development of cherty masses" on the ridge east of Whites Creek (p.416), and also to such masses northeast of the Miro Downs homestead (p.417). It is clear from his comment that these cherty rocks were "probably cemented from sands interstratified with the [basalt] flows", that he was talking about the silcrete and also that he considered it was closely associated with the volcanic rocks in this area (p.420).

McLennan (1981) produced a more detailed geological map of the area, but surprisingly made no mention of silcrete. However, comparison of our observations with his unpublished map suggests the silcrete occurs in situ just beneath the Oxford Basalt (which caps the hill), within what McLennan referred to informally as the Chalk Quarry Sand, of Oligocene age. This unit is not distinguished by Forsyth et al. (2008), who apparently regarded it as part of the Homebush Sandstone (of Eyre Group), of Eocene age. The overlying Oxford Basalt is Miocene in age, and thus considerably younger than the sandstone.

Description of the silcrete source

We have identified four separate areas (boulder fields) on the hill west of Miro Downs homestead where silcrete is particularly common (labelled A, B, C, and D, Fig. 2). Parts of three of these areas (A, B, D) are recorded as archaeological sites. Area A is on the lower northeastern side of the hill and includes two main concentrations of blocks and boulders. At the base of the hill is the site (L35/23) originally recorded by Burrage, where boulders of good quality silcrete cover an area of approximately 50 x 30 metres. However, only a few of these show obvious flake scars. A second working area was identified in March 2018 about 150 metres to the northeast beneath a clump of beech trees and since it constitutes part of Area A, has been included in site L35/23. Several worked boulders, one large flaked piece and a broken greywacke cobble were found at this location. The well-rounded cobble (23 cm long) showed impact damage at both ends and was almost certainly used as a hammer stone.

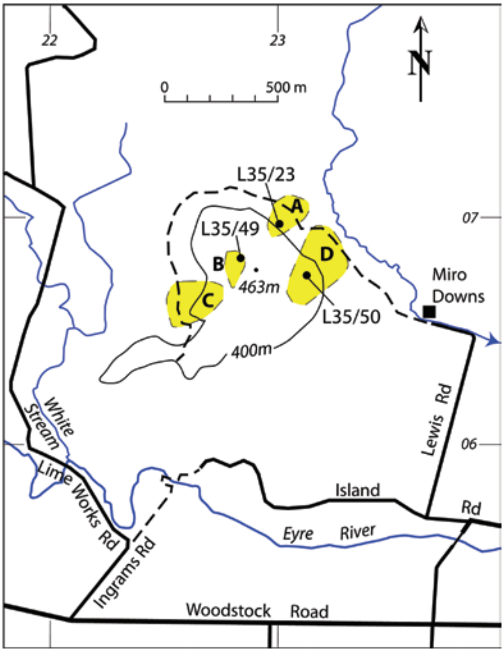

Figure 2. Map of the View Hill area showing the location of silcrete deposits (Areas A–D) and archaeological sites at Miro Downs

Figure 3. Piles of silcrete boulders (covered by vegetation), including some cores and flakes, at Miro Downs site L35/49 (Area B), near the top of the hill. View northwest

It had split down the middle.

The best evidence of stone-working was found in Area B, on top of the hill about 40–50 metres northwest of the highest point (463 metres). Here there are three distinct piles of blocks, boulders, cores, pieces and rare flakes of good quality silcrete, covering an area of approximately 30 x 10 metres (Figs 3, 4). They have been recorded as site L35/49. The silcrete is mostly light grey and rarely reddish brown. A few worked boulders and cores were also found up to 60 metres further west, but no hammer-stones were seen. The silcrete boulders in Area B cover a total area of about 150 x 80 metres (Fig. 2).

The third area (C) is located on the southwestern side of the hill. There are a few scattered boulders and pieces of silcrete in this area, but none show any sign of being worked. No silcrete was seen along the ridge to the southwest of this area.

Area D is located on the eastern spur of the hill (Fig. 2). It consists of scattered boulders up to 1.5 metres across, some with definite flake scars. A few cores (up to 23 cm in length) and rare flakes were also found in this area, and the upper part has been recorded as an archaeological site (L35/50). The site does not appear to encompass the entire extent of Area D.

Our observations clearly differ from those of Griffiths (1960) who, as noted above, considered the silcrete "outcrops" extended in a linear fashion for over 2 km in a northeast direction from his southern-most point, which agrees well with the position of Area B (site L35/49). We also disagree with both Griffiths' and Burrage's use of the term

Figure 4. Large silcrete core, at Miro Downs site L35/49 (Area B)

"outcrop", as we saw no exposures of silcrete that were undoubtedly in situ. In our opinion all of the blocks and boulders in Areas A, C and D are displaced and originated from the upper part of the hill. In particular, the boulders in Area A probably came from Area B as the result of a landslide. However, the boulder piles forming the main part of site L35/49 in Area B are probably close to being in situ. Overall, the silcrete deposits extend over a distance of <1 km.

Visual attributes

In natural light, silcrete samples and artefacts are predominantly light grey (N7) to grey (N5-N6), or slightly bluish grey (5PB 6/1), with common white to pale yellow blotches and streaks (colour codes according to the Munsell Color Chart, 2000 version). Some are weak red (10R 5/2-5/4), as a result of staining by hematite. Freshly broken pieces of better quality silcrete have a distinctly waxy lustre, similar to that of chert.

Under low power magnification the silcrete can be seen to be composed of fine to very fine grained quartzose sandstone, cemented by silica. The sandstone is well-sorted and quartz grains are mainly angular to sub-rounded. Many samples also include rare black to red-brown grains, and some pieces contain a few very thin straight veins of chalcedony. The white to yellowish patches consist of less well-cemented and possibly slightly clayey sandstone.

Figure 5. Silcrete flakes from the Griffiths collection. Note secondary working of edge on flake at right. Canterbury Museum E169.288 (left) and E169.285

Artefacts

Only a small number of artefacts previously collected from Miro Downs (or View Hill) are held by Canterbury Museum. Griffiths obtained nine items from two sites "near Oxford", almost certainly from, or close to, the source area. This includes two cores, one (E169.286.1) with a remnant of cortex, along with five well-formed flakes. One of these flakes (Canterbury Museum E169.285) has large notches along one edge (Fig. 5), while three others show some retouch and can therefore be classified as flake tools. Most are made from light grey to pale yellow silcrete.

Burrage collected 12 flakes and pieces, apparently all from site L35/23, and drawings of six of them were included on the original site record form; five of these are illustrated in Figure 6. Four of the flakes show secondary retouch on the edges. In addition, there is a single large core (Z793[1]) from "View Hill", of light grey silcrete with a portion of smooth, possibly water-worn cortex (Fig. 7). Also from "View Hill" is a rounded greywacke cobble (Z938[1]) with bruising mainly on the wider end, almost certainly from use as a hammer stone. It weighs 1217 g.

The large worked piece collected from the eastern part of site L35/23 in 2018 (Z21199[1]) shows prominent flake scars on one side, some of which are truncated and were therefore formed prior to the whole piece being removed from the parent block or core. This side also has a remnant of weathered cortex, indicating it came from the outer part of the original core. The opposite (proximal) side is relatively flat and there is no sign of secondary working.

Figure 6. Part of the Burrage collection of flakes and pieces from site L35/23. Flakes at top centre and bottom left show secondary retouch along edges. Taonga tūturu registration numbers Z794–Z798[1]

Field observations, particularly in Area D, suggest the silcrete may have been partly quarried by utilising natural spalls, as well as prising apart boulders along open fractures in the rock. Clearly, greywacke cobbles were also employed to remove large flakes or spalls. These methods are perhaps similar to those used at the metasomatised argillite quarries in the Nelson-Marlborough region (Walls 1974).

Silcrete artefacts were also examined from several occupation sites in mid Canterbury (e.g. Bromley, Redcliffs Tumbledown Bay, Fig. 1) to try and determine if they could have originated from Miro Downs. One item of particular interest is a large core (Canterbury Museum 2008.1108.279, 132 mm across) of light grey/yellowish silcrete from Redcliffs, formed from a water-worn cobble. Since such cobbles are unlikely to have been transported all the way from Otago, and do not occur at the Grays Hills quarry in the Mackenzie Basin (Moore et al. 2020), there is a strong possibility that it came from Miro Downs. Cobbles of silcrete are common in the small stream east of the hill and some may have found their way into the Eyre River.

Some of the flakes and blades of silcrete from Redcliffs have a very similar grain size and degree of sorting to the material from Miro Downs, as do those found at other locations in Christchurch (e.g. New Brighton). Those from Bromley (site S84/46) are mostly very light to medium grey in colour and also similar to the material at Miro Downs. At this stage, however, we cannot positively identify the original source of the silcrete at any of these sites.

Discussion

The available evidence would suggest that Miro Downs was an important local source

Figure 7. Silcrete core (12 cm diameter) from 'View Hill'. Taonga tūturu registration number Z793[1]

of silcrete. However, while it likely provided at least some of the artefacts found at early coastal sites in mid Canterbury, flake production at the source appears to have been on a relatively small scale. Except at site L35/49 (Area B), no sizeable concentrations of flakes and cores have been located, though it is possible that many remain concealed below ground. In addition, there is no indication of sub-surface quarrying as seen, for example, at Grays Hills in South Canterbury (Moore et al. 2020) and Oturehua in Otago (Anderson 2003). Our impression, then, is that intensive working of the silcrete was very limited, and that flakes and cores were produced mainly from conveniently situated boulders exposed beneath the inferred forest cover (at least until that was cleared). If this was the case then the total quantity of material actually removed from the source may only have been in the order of a few hundred kilograms.

There is no clear indication, at present, of when the silcrete source was exploited or for how long. We assume that its initial discovery and use was early based on the fact that silcrete artefacts are mainly found at early 'Moa-hunter' sites, dating from the fourteenth century, though silcrete is also quite common at Houhoupounamu, for example, which ranges in age from the fifteenth to the seventeenth or eighteenth century (Challis 1995). Thus, potentially, the Miro Downs silcrete might have been utilised over a period of more than a hundred years.

Further work at Miro Downs is certainly warranted in order to establish the extent of flake production, the variation in artefact types and, if possible, the chronology of the site. In particular, it would be useful to compare technological aspects to those documented at some of the well-known silcrete quarries in Otago.

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Endnote

1 Taonga tūturu registration number under the Protected Objects Act 1975

References

Anderson A. 2003. *Prodigious Birds. Moas and Moa-Hunting in Prehistoric New Zealand*. Cambridge: Cambridge University Press.

Challis AJ. 1995. *Ka Pakihi Whakatekateka o Waitaha: The Archaeology of Canterbury in Maori Times*. Science & Research series no.89. Wellington: Department of Conservation.

Clark AF. 1926. Canterbury's native bush. *New Zealand Journal of Forestry* 2 (1): 1--22.

Forsyth PJ, Barrell DJA, Jongens R, compilers. 2008. Geology of the Christchurch area. Institute of Geological and Nuclear Sciences 1: 250,000 geological map 16.

Griffiths RE. 1959. Some random thoughts. New Zealand Archaeological Association Newsletter 3 (1): 1–2.

Griffiths RE. 1960. Quartzite. New Zealand Archaeological Association Newsletter 4 (1): 7–8.

McGlone MS. 1989. The Polynesian settlement of New Zealand in relation to environmental and biotic changes. *New Zealand Journal of Ecology* 12 (supplement): 115–129.

McLennan JM. 1981. The Cretaceous-Tertiary rocks of Avoca, Oxford and Burnt Hill, central Canterbury. M.Sc thesis. Christchurch: University of Canterbury.

Moore PR, Trotter M, Davis K. 2020. The Grays Hills silcrete source, inland South Canterbury. *Records of the Canterbury Museum*. 34: 5–14.

Speight R. 1928. The geology of View Hill and neighbourhood. *Transactions of the New Zealand Institute* 58 (4): 408–431.

Trotter MM. 1972. A Moa-hunter site near the mouth of the Rakaia River, South Island. *Records of the Canterbury Museum* 9 (2): 129–150.

Walls JY. 1974. Argillite quarries of the Nelson Mineral Belt. New Zealand Archaeological Association Newsletter 17 (1): 37–43.

Hugh McCully's 'mogie'

Rosanna McCully McEvedy[1], Marion Seymour[2] and Anthea McCully[3]

[1]*Bishopdale, Christchurch, New Zealand*

Email: pmcevedy@hotmail.co.nz

[2]*Ferintosh Station, Mt Cook, New Zealand*

[3]*Bryndwr, Christchurch, New Zealand*

Mōkihi (raupō canoes) were traditional Māori water craft used on navigable South Island rivers, lakes and lagoons by Māori and early European explorers, but their use died out in the late nineteenth century once the basic road-and-bridge network was established. The skills to make them had largely fallen into disuse by 1950 and because they were made of biodegradable raupō (bullrush) and harakeke (flax), nineteenth century mōkihi had rotted away. In 1950, our grandfather Hugh Simms McCully commenced making a mōkihi (E151.209) and was joined by Pita Paipeta (Peter Piper) in this endeavour. A separate model cross-section (E151.210) was made for people to study closely. Both objects were donated to Canterbury Museum in January 1951 to celebrate the Centennial of Canterbury. This is the story of the construction of the mōkihi now in Canterbury Museum and of its accompanying model.

Keywords: anchor stones, Centennial of Canterbury, experimental archaeology, Hugh McCully, mōkihi, Pita Paipeta, raupō canoe, Waitaki early Māori site

Introduction

"Moki" was the shortened form of the word mōkihi used by Southern Māori in their dialect (Fyfe 2012: 21) and was pronounced 'mogie', with a phonetically hard [g], by pioneers like Hugh McCully. The current story is that the mōkihi (Fig. 1) was "made and presented by Pita Paipeta, assisted by Hugh McCully, as a Centennial gift to Canterbury Museum" (Fyfe 2012: 36). Archaeopedia New Zealand (Archaeopedia contributors 2019) states it was "made at Temuka in 1950 by Pita Paipeta of Arowhenua, assisted by Hugh McCully" and the *Community High Country Herald* (24 March 2004: 5), reporting on the new Transport Gallery in Canterbury Museum, makes the same claim and labels it the "Arowhenua mōkihi". These three statements contradict the facts of its construction recorded in the newspapers of the day and in photographs.

The mōkihi and cross-section were made in our grandfather's backyard in Luxmoore Road, Timaru, in autumn 1950 outside Marion Seymour's former bedroom window. It was not made at Temuka or Arowhenua. In an article reporting the presentation of the mōkihi to Canterbury Museum, the *Press* (24 January 1951: 7) noted who lead the endeavour:

> *The initiative in the building of the canoe was taken by Mr McCully of Timaru, and formerly of Peel Forest. Mr McCully has taken a great interest in the Maori history of South Canterbury and has been specially interested in the use of the mokihi for crossing and travelling down shingle rivers.*

Who was Hugh McCully? He was one of New Zealand's foundation archaeologists. From 1904, long before the term experimental archaeology was coined, McCully was engaged in it while concurrently inventing 11 farm machines, six of which won medals. It made complete sense to him to make an early Māori Neolithic toolkit alongside Industrial Age agricultural machinery

Figure 1. Mōkihi made by Hugh McCully and Pita Paipeta in autumn 1950. Canterbury Museum E151.209

because both toolkits exploited the South Canterbury landscape. He applied his knowledge of physics and mechanics to the manufacture of both toolkits and wrote nine papers on stone tools from the viewpoint of a mechanic. The majority were published in the *Journal of the Polynesian Society* in the 1940s. *The Evening Star* (19 July 1933: 11) summarised McCully's then revolutionary view on the technological similarities between the two toolkits:

> *Some kinds of cutting edge were so fundamental … that they had been hit upon by the men who used Acheulean tools in the Ice Age of Western Europe … some of the humbler implements used by Neanderthal men were identical with some of the humbler tools made by the Maori … [and] some of these features had been carried on into the specialised tools of the present day.*

Before others took up the cause, McCully was deeply committed to preserving the Māori rock art of South Canterbury and North Otago, declaring it should be made tapu to all to prevent vandalism (*Timaru Herald*, 10 July 1917: 3). He included archaeologists among those who should be banned. This view annoyed Roger Duff who believed only archaeologists should have access to sites. McCully fossicked from Cape Campbell (Marlborough) to Greenhills (Southland) and collected moa bones as well as the skeletal remains of bats, cats, dogs and extinct geese. He donated objects to Otago Museum, Canterbury Museum, Auckland War Memorial Museum and the Dominion Museum (Museum of New Zealand Te Papa Tongarewa). His nephew-Executor sold his final collection to the Evans family who donated it to the South Canterbury Museum where it is now part of the Evans Collection. Items rejected by the Evans family remain in the possession of Hugh

McCully's granddaughters.

With his Box Brownie, McCully took photographs of the Waitaki River mouth early Māori site from 1926 onwards, of river flats upstream strewn with moa bones and ovens, of precisely arranged sets of 20–40 toki and 50–100 flakes in his collection(s), and of other foundation archaeologists in the field. His century-old scroll of the Craigmore moa, drawn when they were first discovered in 1921, has survived. He was our grandfather and we remember him catching weka with snares, showing us how to make fire with fire sticks, and his collection of Māori artefacts in the 'whare' in his backyard. Making a mōkihi was a natural development of his interests.

Anchor stones and moa-on-mōkihi

The story of the mōkihi in Canterbury Museum is linked to the presence of anchor stones at the Waitaki River mouth. In 1926, J B Chapman ploughed what has become known as "No. 1 Terrace" at the Waitaki "moa-hunter" site (Teviotdale 1939: 168). His plough turned up moa bones, middens, adzes and flakes. Hugh McCully's gossip network alerted him to Chapman's finds and within a fortnight he visited the site with Raniera Martene (Daniel Martin) who told Hugh McCully they were cattle bones. Hugh McCully and his extended family farmed and slaughtered cattle and Hugh could not imagine what catastrophe could have produced that number of cattle bones. He picked one up and immediately realised what lay before him was a "great necropolis" of moa bones (Buick 1937: 164) covering about 150 acres (60.7 hectares). No. 1 Terrace lay within the 198 hectare Korotuaheka Reserve set aside by Judge Fenton of the Māori Land Court in 1868 for Ngāi Tahu. By 1879, the sea had scoured away about 81 hectares (Taylor 1952: 102). Chapman said the sea had eroded a further half-chain (10 metres) in the 11 years he had owned the property (Teviotdale 1939: 167) and by the time Knight and Gathercole (1961: 133) visited it with Hugh McCully in 1961, it measured 50.5 hectares.

Our grandfather told us that when he first saw the site in 1926, the "ground was white with bones" because the thin topsoil had been swept away by a gale that blew in just after Chapman did his spring ploughing and exposed them. The gale may have been the rain, hail, snow showers and strong southwest winds of 17 September 1926, which were followed by more strong and squally southwest winds the next day (*Otago Daily Times*, 18 September 1926: 12).

McCully advised Otago and Canterbury Museums of Chapman's finds. It was 5 years later, in March 1931, that David Teviotdale of Otago Museum visited the site with Arthur George Hornsey and Hugh McCully and the trio excavated for 4 days. Between 1926 and 1931, Hornsey, McCully and others picked over the site and weathering caused some deterioration of bones and middens. The site continued to deteriorate until December 1936 when Teviotdale (1939: 168) began a 4-month excavation and "expected that this site would prove the richest moa-hunter [early Māori] site ever investigated … the high hopes formed were disappointed, but, nevertheless, the site proved interesting".

While fossicking between 1926 and 1931, Hugh McCully became familiar with the palaeochannels that wove through the site and discovered anchor stones strewn above the high-water mark of the former channels. In March 1931, he showed some of the anchor stones, in situ, to David Teviotdale who recorded in his diary 18–25 March 1931:

> *At one time the back water of the river reached near here and Mr McCully showed me a number of large stones he called anchor stones lying on a level piece of ground. One was broken but had a rough groove on one side. No other stones were near & these have evidently been carried here.*

These anchor stones, and the existence of early Māori camps at Te Akatarawa and Waitangi up the Waitaki River, inspired Hugh McCully to formulate his theory that it became necessary to push back into the hinterland to hunt moa in order to procure sufficient supplies of moa meat to meet trade demand from the North Island. There were killing sites upstream and butchery sites such as those at the Waitaki River mouth. At killing sites, moa were either slaughtered or incapacitated by having their legs broken to stop them wandering away and to preserve the freshness of their flesh. As children, we shuddered as our grandfather imparted this information about alive-but-immobilised moa. Carcases and trussed live moa were transported downstream on mōkihi to the butchery site to be potted, preserved and exchanged for North Island goods. Hugh McCully was initially derided for his moa-on-mōkihi transportation theory but Buick (1937: 191) enthusiastically adopted it:

> *It is therefore a reasonable assumption that in times past it was not an unusual sight to see fleets of mokihi speeding down the river laden with the bodies of dead Moas destined for polite traffic per medium of gifts and counter-gifts to friendly tribes of the North Island.*

Teviotdale's diary entry for 18–25 March 1931 reveals his qualified support for Hugh McCully's moa-on-mōkihi theory. Teviotdale, Hornsey and Hugh McCully obviously talked about "mogies" rather than mōkihi when discussing the theory:

> *He* [McCully] *holds the idea that the moas were killed near the upper reaches of the river and conveyed in "Mogis" to the camp. This is quite probable but does not account for all the bones nor the great extent of the camp and I think a larger number would be driven in by bands of men and killed on the ground. Mr McCully also suggests that the moa flesh was preserved much as the mutton birds are preserved and taken to other districts to be consumed.*

Roger Duff (1977) was a supporter of the moa-on-mōkihi theory, and tapped into the implied seasonality of hunting moa in McCully's suggestion they were preserved like mutton birds, and commented:

> *Spectacular and romantic as it seems, this theory accords well with the normal seasonal Maori fishing and fowling routine. For each type of fish and fowl, whitebait and eels of the former, and mutton birds of the latter, there was one season in which they could be taken in enormous quantities, so that special means of preservation by drying and potting in fat were regularly employed for seasons of scarcity* (Duff 1977: 68).

Today Hugh McCully's moa-on-mōkihi idea is orthodoxy.

The peak of moa-hunting in the South Island was from 1280 to 1445 (Latham et al. 2019). All stages of the moa life-cycle were over-hunted – eggs, chicks and adults. Spatial sympatry occurred among the nine species; between four and seven moa species could share the same habitat. On the Canterbury Plains, four species were generally available to hunters; up the Waitaki River and in the southern lakes belt six or seven species were available (Latham et al. 2019: fig. 2(A)). Depending on where they hunted, between four and seven moa were available per km^2 to the hunting party (Latham et al. 2019: fig. 2(B)). Moa had not evolved a fear of humans and so, regardless of whether the founding population of early Māori was 100, 200 or 500 people, moa were easy to eradicate within 200 years of the arrival of people in an isolated insular ecosystem (Latham et al. 2019: 9).

Hugh McCully also thought foodstuffs other than moa were transported on mōkihi. He believed that the trunks of tī kōuka (cabbage tree, *Cordyline australis*) were transported on mōkihi along the Ōpihi River to the umu kaha (strong ovens) at Temuka.

Raupō, harakeke bindings and drains

The killing and trussing of moa and construction of a mōkihi in the upper reaches of the Waitaki River presented early Māori with a few logistical issues to solve. The first issue was completing the construction of a mōkihi before the dead moa deteriorated. A mōkihi could take several men three days to construct. Explorer Edward Shortland (1851: 200) describes the construction of an 18 ft by 2 ft (5.5 metre by 0.6 metre) mōkihi from 11 to 13 January 1844 by Te Huruhuru's men. Raupō (bullrush) was cut with tomahawks on 11 and 12 January and left to dry out on the ground for 12–24 hours before construction commenced in the afternoon of 12 January and was completed on 13 January. The semi-dried raupō leaves were tied in bundles with harakeke (flax) bindings. How many mōkihi the moa hunters made at a killing site, or embarkation site, and whether they were 5 metres or 10 metres long would depend on how many whole carcases or haunches or trussed moa had to be transported. Was raupō pre-cut and left to dry for 24 hours before the hunt commenced? Did one group stay behind and make the mōkihi while others hunted? The sequence of events is unknown.

Sourcing raupō was not an issue but finding harakeke to make the bindings could be an issue depending on where the killing, or embarkation, site was located. If bindings were to be made on the spot then it was a third task the moa hunters had to complete. Hugh McCully knew where harakeke and raupō grew up the Waitaki River and commented that mōkihi were made wherever raupō was available but if they were to be made above the point where "the Otematata Creek joins the river, flax for binding had to be carried, as past this point it was not obtainable" (*Christchurch Star-Sun*, 25 January 1951: 2). Stevenson (1943: 191) also makes this point about the non-availability of harakeke upstream. Hugh McCully made the harakeke bindings before starting work on the mōkihi.

There is a family story that some of the raupō to make the mōkihi was collected by McCully and Paipeta from the Orakipaoa-Milford-Temuka area and some was also collected from the Boyd Road drain (Fig. 2), which used to get choked by harakeke and raupō. The cut raupō was put in the three-bay shed in Hugh McCully's backyard while it semi-dried out.

The wider McCully family were obsessed with drains. They were farming people from Loughries, County Down, Northern Ireland, where drains kept the swampy land bordering Strangford Lough fertile and free from water-logging. On taking up their farms from the Rangitata River to Seadown, they viewed the mahinga kai (food gathering) areas as flax-covered, raupō-infested swamps and set about draining them to turn them into rich farm land. On being confronted by a drained pond where harakeke had once been cut, a Ngāi Tahu elder told Herries Beattie in the 1920s that his self had been erased – the removal of the pond from the landscape erased his image and him (Tau 2001: 149).

Figure 2. Boyd Road drain. March 2019. McEvedy collection

Express delivery

Hugh McCully wrote that a journey on foot up the Waitaki River took several days to complete:

When travelling to the interior on foot a

Figure 3. The 'scientific' model cross-section to demonstrate how water tightness relied on correctly tied and knotted bundles of raupō. Canterbury Museum E151.210

distance of about 10 miles [16 km] a day was covered as indicated by stopping places up the river and far inland. Compared with "swagging" a load, the rate and ease of travel by mokihi can be appreciated. To the moa-hunter it was express delivery (Christchurch Star-Sun, 25 January 1951: 2).

Hugh McCully was puzzled why early Māori had occupied the river terrace given it was so exposed and bleak but was told by Māori friends that the river terraces could be seen 60 miles (96.5 km) upstream at the Māori Swamp. This is quite a distance – further than from Christchurch to Ashburton – and we wondered if McCully's Māori informants got the distance wrong, but we calculated that if an early Māori stood on ground that was 710 metres above sea level, had a clear line-of-sight to Korotuaheka and possessed good long-distance eyesight, the terrace could be seen. Hugh McCully thought that those hunting upstream could have exchanged smoke signals with those downstream and the ovens be fully prepared by the time the moa cargo arrived. Travelling down the Waitaki River at around 6 mph (10 kph), as Shortland did in 1844, 10 hours was ample time in which to get ovens ready. Beattie (1939: 44) says smoke signalling was called "whakapua" and was used "to a fair extent to let parties indicate their whereabouts to keep in touch with each other".

Hugh McCully viewed the disappearance of mōkihi as another loss. The absence of mōkihi in the landscape bothered him because they had been so important in keeping the supply-chain of moa meat functioning and he told his daughter, Lilian Mahon, and her daughter, Marion Seymour, that he resolved to make one for the centennial.

He was not alone in this intention. What is not generally known is that around 1950, mōkihi-making was a mini-craze among the 'Timaru Four' archaeologists (Arthur George Hornsey, James Robert Irvine, Gordon Griffiths and Hugh McCully). We have a photo of Arthur Hornsey posing with his mōkihi outside the tin sheds in Timaru where he kept his artefact collection. The news of their mōkihi-making spread to Pita Paipeta.

Hugh McCully was an old style pro-British Empire patriot and wanted to do something to mark the centennial of the colonisation of Canterbury. Why not make a mōkihi? He decided to make one and give it to Canterbury Museum. He had already embarked upon the

Figure 4. Cut ends of raupō bundle on model exposing how the internal structure of raupō leaves aided buoyancy. Canterbury Museum E151.210

task when Pita Paipeta heard about it and asked if he could join the project. Hugh agreed and Pita Paipeta travelled between Temuka and Timaru for quite a while.

Pita Paipeta was also known as Peter Piper. Although he spent his childhood at Rāpaki, he had moved south to Arowhenua Marae by 1902 where he was appointed Chair of the Arowhenua Māori Council at its inaugural meeting (*Temuka Leader*, 21 October 1902: 1). In 1905, under the name of Peter Piper, he read in English the welcome address to officials and locals who attended the opening of the new meeting house called Te Hapa o Niu Tireni at Arowhenua. Its name was to "stand as a constant reminder of the shortcomings of our Government in respect to … the Native Land question" (*Otago Daily Times*, 16 June 1905: 3). Paipeta was active in revitalising traditional Māori crafts and skills and was involved in the building of a model Māori village behind the Rātana Gate at Arowhenua Marae (*Otago Daily Times*, 28 January 1938: 16). We visited it a few times as children but it is no longer there. He was married to Wikitoria Kahu Paipeta, the granddaughter of Te Maiharoa who, in 1877, established a new settlement called Te Ao Marama in protest against the Government's inaction on, and indifference to, Ngāi Tahu requests for redress on land matters. Paipeta was prominently involved at Arowhenua Marae when marae representatives threatened to boycott the centennial of the Treaty of Waitangi because of unresolved land claims (*Press*, 17 July 1939: 10; *Gisborne Herald*, 24 July 1939: 7). It is understandable that some would assume that he would be the instigator of the mōkihi-making activity because of his involvement in reviving traditional crafts but he was not. A man with his marriage-ties and history of protest would hardly initiate an activity to celebrate 100 years of colonisation and land loss.

Both men are likely to have had a different motivation. Hugh McCully wanted to be "scientific" in the pursuit of his task. He decided to make an additional model cross-section (Figs 3, 4), which would reveal to anyone interested in hands-on study the internal structure of raupō stalks and the technicalities of tying the bundles of raupō together. It was made after the mōkihi had been completed. The scientific objective is an integral and important part of the overall mōkihi story but the cross-section model is too easily overlooked. Pita Paipeta's motivation might have been to make sure the construction adhered to traditional conventions.

In autumn 1950, Pita Paipeta and Hugh McCully made the mōkihi together (Fig. 5). McCully family photographs record changes in their clothing and indicate they worked for a considerable time on it. The autumnal weather and keeping up supplies of dried raupō had to be factored in. The mōkihi was put in the three-bay shed at Luxmoore Road after each working session and they were under no pressure to finish within 3 days. Photos show other people visited the backyard to watch it being made. The house and the whare where Hugh McCully kept his collection of artefacts are still there in Luxmoore Road.

Before the ends of the mōkihi were finished off, Hugh McCully himself photographed it resting on saw horses in his backyard (Fig. 6). Hugh McCully included this photograph in his four-column article in the *Christchurch Star-Sun*

Figure 5. Hugh McCully (sitting in the mōkihi) and Pita Paipeta (standing) jointly tying off flax bindings. Photographed by Lilian Mahon, Hugh McCully's daughter, in autumn 1950. Seymour collection

(25 January 1951: 2), published to coincide with the presentation of the mōkihi to Canterbury Museum on 24 January 1951.

When they made the mōkihi, Hugh McCully was 72 and Pita Paipeta was 83. We think the mōkihi was not a bad effort from two elderly men.

Conclusion

Hugh McCully initiated the mōkihi to celebrate 100 years of British colonial settlement in Canterbury and to honour a water craft that had disappeared from the landscape. It was made in his backyard in Timaru. Whether Pita

Figure 6. The almost completed mōkihi in Hugh McCully's backyard. McEvedy collection

Paipeta held a similar positive attitude towards colonisation is highly debatable but he was certainly interested in preserving ancient skills and a willing contributor to making it.

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References

Archaeopedia contributors. 2019. McCully Hugh. Archaeopedia New Zealand. Available from: http://archaeopedia.com/wiki/index.php?title=McCully_Hugh&oldid=9569 [cited 22 January 2020].

Beattie H. 1939. The Maori as a signaller and tracker. *The New Zealand Railways Magazine* 14 (5): 41–44.

Buick TL. 1937. *The Moa-Hunters of New Zealand: Sportsman of the Stone Age*. New Plymouth: Thomas Avery.

Duff R. 1977. The Moa-Hunter Period of Maori Culture. *Canterbury Museum Bulletin* No. 1. Wellington: Government Printer.

Fyfe R. 2012. A review of early accounts of the use of Mōkihi in Te Wai Pounamu, South Island, New Zealand. *Records of the Canterbury Museum* 26: 21–40.

Knight H, Gathercole P. 1961. A reconnaissance at the Waitaki River mouth, Otago. New Zealand Archaeological Association Newsletter 4 (3): 133–136.

Latham DA, Latham MC, Wilmhurst JM, Forsyth DM, Gormley AM, Peh RP, Perry GLW, Wood JR. 2019. A refined model of body mass and population density in flightless birds reconciles extreme bimodal population estimates for extinct moa. *Ecogeography* 42: 1–12.

Shortland E. 1851. *Southern Districts of New Zealand: a Journal, with Passing Notices of the Customs of the Aborigines*. London: Longman.

Stevenson GB. 1943. Waitaki Maori paintings. *Journal of the Polynesian Society* 52 (4): 191–198.

Tau, Te Maire. 2001. The death of knowledge: ghosts on the Plains. *New Zealand Journal of History* 35 (2): 131–152.

Taylor WA. 1952. *Lore and History of the South Island Maori*. Christchurch: Bascands Ltd.

Teviotdale D. 1931. Diary entry, 18–25 March 1931. MS-0500/014a. Hocken Collections, Uare Taoka o Hākena. Dunedin: University of Otago.

Teviotdale D. 1939. Excavation of a Moa-Hunters' Camp near the Mouth of the Waitaki River. *Journal of the Polynesian Society* 48 (192): 167–185.

A review of the role of diadromous ikawai (freshwater fish) in the Māori economy and culture of Te Wai Pounamu (South Island), Aotearoa New Zealand

Roger Fyfe and Julia Bradshaw[1]

Canterbury Museum, Rolleston Avenue, Christchurch 8013, New Zealand

[1]Email: jbradshaw@canterburymuseum.com

Canterbury Museum holds two rare examples of kupenga (nets) used to catch diadromous freshwater fish in Te Wai Pounamu (South Island). This paper places the kupenga in context and gives details of the eight species of freshwater fish harvested (five species in the family Galaxiidae (*Galaxias maculatus*, *G. brevipinnis*, *G. fasciatus*, *G. argenteus* and *G. postvectis*), the extinct upokororo (grayling, *Prototroctes oxyrhynchus*) and two types of paraki (smelt, *Retropinna retropinna*, *Stokellia anisodon*)). A review of ethnohistorical accounts highlights the significance of the fishery as a seasonal food source and demonstrates that traditional fishing technology is the source of techniques for modern day whitebaiting.

Keywords: fish preservation, food preparation, food source, freshwater fish, ikawai, īnaka, kōaro, kōkopu, kupenga, mata, nets, paraki, upokororo, whitebait

Introduction

Traditional Māori fishing practices exhibited an extensive knowledge of the most productive times and techniques for catching fish in both marine and freshwater environments. In most New Zealand ethnographic literature, tuna (eels, *Anguilla australis*, *A. dieffenbachii*) have been widely documented as the most important dietary freshwater species exploited. In contrast, the focus of this paper is to review both biological and ethnohistorical information relating to the economic and cultural significance of the seasonal harvest of eight additional species of diadromous native freshwater fish taken from the rivers of Te Wai Pounamu (South Island).

The review will demonstrate the economic importance of fishing strategies that focused on the seasonal harvest of smaller diadromous species, targeting predictable migrations of concentrated shoals of fish to ensure the capture of substantial numbers, far exceeding the requirements for immediate consumption. The intention was to produce a substantial surplus that would be preserved for later consumption (Anderson 1998: 136).

To achieve this outcome, a comprehensive range of fishing equipment was developed. Ethnohistorical records demonstrate that local practices combined selected technology with a variety of freshwater fishing methods in order to ensure the efficient exploitation of widely differing riverine conditions encountered throughout Aotearoa (Best 1929: 170–212).

Many types of traps and nets were utilised, often in conjunction with human-made obstacles or other forms of modification to river channels. While numerous recorded ethnohistorical accounts of Māori freshwater fishing methods have survived, the same cannot be said of examples of the technology used or related archaeological evidence.

Traditional traps and nets constructed using organic materials were not inherently durable and in many cases no complete examples of the nets recorded in the ethnohistorical literature now exist. The fragile lightweight nets designed to capture the smallest diadromous species were of course susceptible to degradation and no surviving examples can now be located of seine and bag nets recorded as once being in widespread use in Te Wai Pounamu.

However, Canterbury Museum is fortunate to care for two examples (E72.85 and E139.74) of a third variety of lightweight scoop net described in the literature. These nets are particularly significant because they are thought to be the only examples in any public collection worldwide.

This paper reviews a variety of relevant sources including Māori traditional and ethnohistorical accounts pertaining to the harvest of eight diadromous freshwater fish species identified as having been exploited in Te Wai Pounamu. Relevant aspects of the biology of these species is discussed, the technology used during harvest described and a brief outline of the cultural practices involved in the capture and subsequent preservation of the surplus catch for later consumption is presented. The significance of the dietary and economic contribution of eight species is evaluated and both examples of the nets in Canterbury Museum are described in detail.

Overview of natural historical evidence of subject species

Every family of native freshwater fishes in Aotearoa has at least one species that must spend part of their life in the sea. This migratory lifecycle between sea and freshwater is called diadromy, of which there are three main types: anadromy, catadromy and amphidromy. The eight subject species in this paper are either anadromous or amphidromous.

Most of the growth of anadromous fish, such as paraki, takes place at sea. Mature or near mature fish migrate upstream into freshwater to spawn and resulting larvae are later carried downstream to the sea where they live until it is time to breed. Catadromous fish such as tuna enter rivers as juveniles and return to the sea to spawn. Adults of amphidromous fish, such as īnaka/mata, spawn in freshwater with larvae going to sea for a short period of rapid growth before returning to freshwater to grow to adulthood.

A feature of Aotearoa's native freshwater fish fauna is the high proportion (more than 50%) of species that are diadromous. The migration of fish between freshwater and the sea provided an opportunity for Māori to collect vast numbers of them, both as adults when they migrated downstream to spawn and as juveniles when they returned from the sea.

The eight diadromous species seasonally exploited in Te Wai Pounamu include five species in the family Galaxiidae, New Zealand's only species from the family Prototroctidae and two species in the family Retropinnidae (see Table 1). The Māori names used in this paper are those most frequently recorded in published references relating to Te Wai Pounamu.

Shoals of juveniles migrating upstream in springtime were traditionally referred to as īnaka or mata (īnaka is the Ngāi Tahu dialectic pronunciation of īnanga, while mata is the term used most often in Te Tai o Poutini (West Coast)) and were called whitebait by Pākehā. It is now recognised that this migration may comprise up to five distinct species of Galaxias, which were captured in mixed-species shoals. Like modern whitebaiters, traditional Māori did not distinguish between the various species present. This is not surprising as this exercise is still sometimes challenging for biologists (for a comprehensive discussion of this see McDowall 2011: 280–282).

One of the difficulties encountered when analysing ethnohistorical accounts relating to Māori freshwater fishing is establishing exactly to which species any particular Māori name refers. Of the hundreds of names recorded some have widespread use, some are limited to a certain region, some names refer to multiple species and yet others appear to refer to particular life-stages. It is important to note that the usage of any particular Māori name will also reflect elements of indigenous knowledge and

Table 1. Overview of diadromous species discussed.

Scientific Name	**Māori Name**	**Common Name**	**Diadromy**
Galaxias maculatus	īnaka, mata	īnanga/whitebait	amphidromous
Galaxias brevipinnis	kōaro	kōaro	amphidromous
Galaxias fasciatus	kōkopu	banded kōkopu	amphidromous
Galaxias argenteus	kōkopu	giant kōkopu	amphidromous
Galaxias postvectis	kōkopu	shortjaw kōkopu	amphidromous
Prototroctes oxyrhynchus	upokororo	grayling	amphidromous
Retropinna retropinna	paraki, pōrohe, īnaka	common smelt	anadromous (complex and regionally variable)
Stokellia anisodon	paraki, pōrohe, īnaka	Stokell's smelt	anadromous

cultural significance of individual species. For instance, as many as four species of diadromous galaxiids were often collectively grouped under the name kōkopu. In the context of this paper it is really of little consequence that scientists later identified them as four individual biological species; to Māori they were all caught using the same techniques during the same seasonal period and collectively provided an abundant dietary resource to be exploited.

There is also little doubt that Māori would have observed strong similarities in the life-cycles of these species. The kōaro and all three kōkopu species spawn during autumn floods in their inland habitats, although the giant kōkopu tends to make a slight downstream migration first. They spawn in gravels, vegetation or organic debris along the edges of floodwaters, leaving eggs stranded when the flood abates. A second flood is required to inundate and stimulate the eggs to hatch and carry the larvae to sea. Kōkopu and kōaro mature at 2 or 3 years old and can live for a decade or more unlike īnaka/mata, which are an annual species that die after spawning (for further details see McDowall 2000).

The spawning behaviour of īnaka/mata differs only slightly in that they use high tides instead of floods. In autumn īnaka/mata migrate downstream in large shoals to spawn during a very high (king) tide, depositing eggs amongst riparian vegetation. The next king tide, usually a few weeks later, stimulates hatching and the receding water carries the larvae to sea. The larvae of all these galaxiid species spend 3 to 5 months at sea before the juveniles return as whitebait (McDowall 2000: 85). The migratory patterns of īnaka/mata are unique in that it offers fishers two opportunities to exploit migratory shoals, firstly in the spring when juveniles are moving upstream to freshwater habitats and later in the autumn when adults are moving downstream to spawn. An added economic benefit of the autumn harvest was that the fish were larger adults and in optimal breeding condition.

Prototroctes oxyrhynchus (upokororo, Fig. 1) are closely related to retropinnids (smelt) and their life cycle was probably similar to smelt and whitebait. Adults were known to Māori as upokororo and the young as haparu. Now extinct, knowledge of their life cycle relies on traditional accounts and observations made by ichthyologists before their numbers plummeted in the 1870s.

In the 1870s, ichthyologist Frank Clarke found grayling juveniles amongst the shoals of whitebait arriving during spring but noted that they did not appear until later in the season (usually the start of November) along with the fry of paraki and bullies (*Gobiomorphus* spp.). Then all three species formed a large part of the

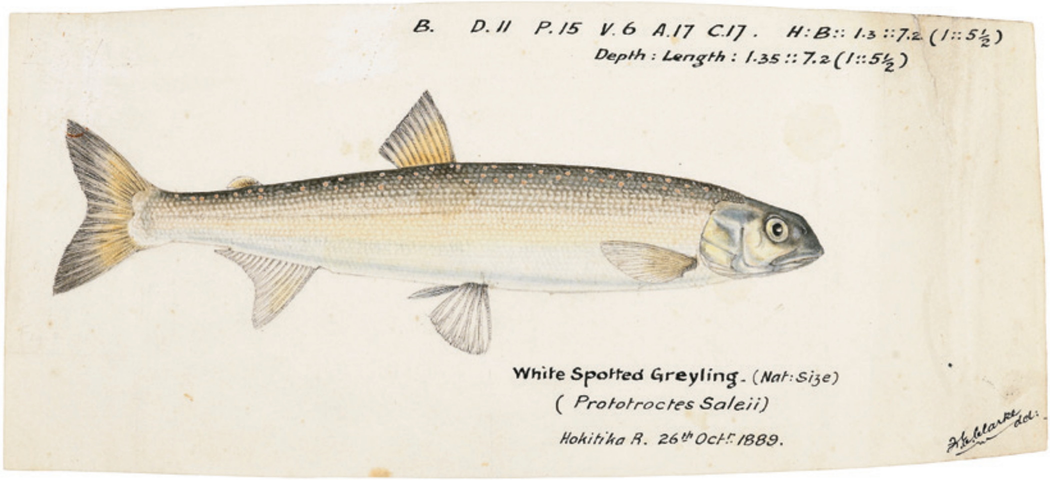

Figure 1. Frank Clarke's drawing of an upokororo/grayling caught in Hokitika River in 1889. Museum of New Zealand Te Papa Tongarewa 1992-0035-2278/1

shoals until the end of the season (Clarke 1898: 78).

Adults were generally between 350 and 560 grams, though some were significantly heavier, and were typically 255 to 300 mm long. Upokororo were noticeable in immense shoals in the mid-reaches of rivers during January and again in autumn when they were presumably migrating downstream to spawn (Phillipps 1923: 115–117).

Both retropinnid species are frequently referred to as paraki and sometimes as silveries or cucumbers. Paraki spend most of their growth phase at sea and migrate into rivers in spring and summer. Common smelt spend several months in fresh water feeding and maturing before spawning in autumn and winter on sandy bars and estuary shorelines. In contrast, Stokell's smelt do not feed in fresh water and only spend a short time there before spawning, mainly on gravels located in the vicinity of freshwater riffles above estuaries. The eggs of both species sink and adhere to the substrate, hatching several weeks later when the larvae are swept to sea. Both species die after spawning. The distribution of Stokell's smelt is limited to the tidal reaches of larger braided rivers on the East Coast between the Waiau and Waitaki rivers. The distribution of common smelt is widespread, usually near the coast, but they can penetrate far upstream when the gradient is low (McDowall 2000: 44–49).

Paraki enter estuaries and river mouths in huge roving shoals to spawn between late spring and autumn. Paraki are listed as a taonga/taoka species in southern Te Wai Pounamu and were a highly valued seasonal food. They were harvested in spring and summer and eaten either fresh or dried and stored for later consumption. Dried paraki are very nutritious and would have been useful to carry when travelling as they are very light and would keep for quite some time if kept dry (McDowall 2011: 254).

Historical and ethnohistorical records of species abundance

The analysis of records relating to species abundance again raises the issue encountered in establishing a clear correspondence between Māori names, names used by Europeans and specific species recognised by biologists. However, it is possible to make some broad observations based on information derived from the ethnohistorical records.

Ethnohistorical accounts confirm that Māori communities harvested īnaka/mata during both migration phases and that capture during the adult downstream spawning movement in autumn was a seasonal activity of considerable dietary significance due to the plumpness of the adults, perhaps more so than the spring migration of juveniles. For example, in the Kawatiri (Buller) River weirs and eel baskets were used to catch fully grown īnaka/mata returning to the sea (Mitchell 1948: 45). Today capture is legally restricted to spring migration.

It is difficult to quantify how abundant the spring migration of īnaka/mata was prior to early European catch records, but it seems logical to accept that at least reasonably similar quantities would be available for harvest during the pre-European period. Māori remembered shoals of īnaka/mata in the Kawatiri River that "covered the face of the water" for miles and, as late as 1890 in the same river, "shoals several hundred feet long and varying from three to six feet in width were not uncommon sights" (Mitchell 1948: 45).

The largest historic harvests recorded are from South Westland. In 1930, a staggering 2.75 tonnes was recorded as being harvested by one person in a single day, while records of another catch by a single fisher over a period of little more than a decade (late 1940s to early 1960s) amounted cumulatively to 104 tonnes (McDowall 2011: 284–285). From the small Awarua River, which runs into Te Hokiauau (Big Bay), an average of 900 kg per week was caught during the 1950s with the best single day yielding 590 kg (Simpson 1959: 15).

While lacking in any quantitative estimates of volume, the earliest ethnohistorical accounts of harvesting īnaka/mata from Te Tai o Poutini (West Coast) clearly indicate the traditional dietary significance of the seasonal īnaka/mata harvest (Brunner 1850: 359; Heaphy 1862: 167). The ongoing significance of the practice is reinforced by later twentieth-century observers who confirm the cultural continuity of the traditional seasonal harvest of īnaka/mata at numerous locations on Te Tai o Poutini (Harper 1921: 780; McCaskill 1954: 138).

Although īnaka/mata are present throughout Te Wai Pounamu it would not be a valid exercise to extrapolate catches quantified for Te Tai o Poutini to other districts such as Waitaha (Canterbury). However, ethnohistorical accounts relating to methods of capture from various districts suggest that large catches were traditionally taken and that the seasonal dietary contribution made by the īnaka/mata harvest was widespread in all coastal areas of Te Wai Pounamu. During the nineteenth century, Ngāi Tahu hapū (subtribe) occupying kāika (villages) along the lower Taieri River left nets set permanently during the spring seasonal migration of īnaka/mata, at which time they provided a staple part of the diet (Wanhalla 2005: 92).

Other species were abundant too. Hector (1902: 314) recorded that upokororo were originally found in clear running streams in all parts of Aotearoa but by the 1880s they had vanished from most rivers. There are several references to rivers swarming with shoals of upokororo during the summer and autumn. "Explorer" Douglas who spent more than 30 years in South Westland commented that grayling "sometimes 20 inches long" (about 500 mm) occurred in "shoals of thousands" (Pascoe 1957: 223). One fisher recorded that he caught 207 in one day on the Nile River in April 1877 (*Westport Times*, 24 April 1877: 2) and two weeks later 552 were caught on the Taramakau River in one haul of a net (*Kumara Times*, 2 May 1877: 2).

Edward Shortland appears to have been the first European to record the capture of paraki in Te Wai Pounamu when he described "a small fish like whitebait caught at the mouth of the Waitaki River" (Shortland 1851: 312). In September 1865, it was recorded that Kaiapoi Māori were fishing for whitebait and "smelts, little fish about six to eight inches long" that were more prized by some than whitebait (*Press*, 9 September 1865: 2). Large catches have been recorded. One account from South Canterbury records that "when the silveries (cucumber smelts) were running up the rivers in the spring of the year, the Maoris would catch huge quantities of them in nets … I have known them to catch drayloads in a day or two, for some of the shoals would keep running for weeks" (Studholme 1940: 22)

Methods of capturing Ikawai

Various ethnohistorical accounts describe different nets and techniques used in Te Wai Pounamu for catching diadromous freshwater fish (see Table 2).

Capture: īnaka/mata

Teone Taare Tikao told researcher Herries Beattie that, "Whitebait (mata) were caught in a kohao (net) of very close weave known as koko. It was put in the side of a river, and when full, the string around the mouth was pulled, and it was lifted out and emptied into a basket" (Beattie 1939: 137).

Nets such as those previously described as set permanently in the lower Taieri River were probably bag nets, but without associated descriptions of how they were used, these conclusions remain speculative. The use of "bag nets" was observed at Whakatipu Waitai (Martins Bay), Fiordland (Hector 1872: 126). There is no record of dimensions of the bag or method of use, which now only allows the generic description of bag net.

Beattie (1994: 527) was told that in Te Tai o Poutini one method used was to "… place a

Table 2. Summary of nets referred to in the text.

Name*	Description**	Location	Source
Kohao/koko	Bag net, draw string	Waitaha (Canterbury)	Beattie 1939: 137
?	Bag net	Martins Bay	Hector 1872: 126
?	Long bag net	Taieri	Wanhalla 2005: 92
?	Set net	Te Tai o Poutini, Waitaha	Beattie 1994: 527
Kohao/koko	Scoop net with pole	Te Tai o Poutini, Waitaha	Beattie 1994: 527
?	Circular set bag net	Te Tai o Poutini	Beattie 1994: 527
Koko harakeke	Scoop net with pole	Murihiku, unknown, Waimakariri River, Te Tai o Poutini	Beattie 1994: 137, 139, 310. Grey River Argus, 9 December 1913: 7
Kaka	Woven set net, 1.5 metres x 4.5 metres	Te Waihora (Lake Ellesmere)	Beattie 1994: 310
Kaka	Woven funnel, spout	Waitarakao (Wash-dyke)	Beattie 1994: 139
Kaka	Woven seine net	Wairewa (Lake Fo-rysth), Riverton	Beattie 1994: 135
Kaka	Woven seine net, 1.8 metres x 91 metres, 2 metres x 30 me-tres, 20 metres long	Te Waihora, Waiw-era, Southland	Phillipps 1926: 291, Beattie 1920: 59
?	Woven seine net 15 metres x 1.2 metres	Te Tai o Poutini	Brunner 1850: 347
?	Woven seine net	Te Tai o Poutini	Heaphy 1863: 5

*The generic term for a mesh net was koko. The generic term for a handle fitted to a net was kohao.

**All nets were made of a fine mesh of strips of harakeke (flax), *Phormium tenax*.

Figure 2. Catching īnaka using a small koko. Reproduced from White 1891

basket facing downstream and in the morning lift it out well laden. The basket was open-mouthed and had no contrivance to hold the mataa [sic] prisoner but they would swim into it and fiddle away inside it for hours." Beattie's informant further noted that, "The stronger the current the more they remained in the basket and he had known them to stick there all night". This account shows that the same kind of net could be used with a handle as a scoop net or as a set net with the handle removed.

Several more detailed accounts of nets and techniques for use were recorded by Beattie. According to one informant, īnaka were caught by "… placing a koko [Fig. 2] or finely woven net or basket on a long stick and kahao the tiny fish out of the rivers and creeks in which they were swarming in apparently endless lines" (Beattie 1994: 527).

A female informant told Beattie that:

> *We used to catch inaka in a basket called a koko-harakeke. It is closely woven … The aho (string) of which it is made is wound round the flax whenu (string running lengthwise) strand after strand … If the mat is made long enough it is doubled and the sides sewn, leaving the top open as a waha (mouth). If it is knit in two parts separately, one of these is placed on the other, the sides are sewn and one end also and there you have your koko-harakeke. If the mouth requires stiffening use pirita (supplejack)* [*Ripogonum scandens*]. *The basket is tied to a pole and it taken to a potirimata (shoal of whitebait) and put in the water you can koko (scoop) the whitebait out easily.* (Beattie 1994: 139).

During the 1860s, Māori were using scoop nets on the Mawhera (Grey) River, which were described as "large oblong baskets made of flax and fitted with a manuka pole" (*Grey River Argus*, 9 December 1913: 7). These descriptions match the two nets at Canterbury Museum described later in this paper.

Scoop nets were further described to Beattie. A Murihiku woman said:

> *The Kahao was to catch fish and the stick which formed its handle was te kakau o te kahao. The mesh was flax … The mouth of the net was kept circular by a rim (called kaututu) of supplejack* [pirita], *aka or the tororaro vine* (Beattie 1994: 137).

A Ngāi Tūāhuriri man described kaka used in the Waimakariri River to catch īnaka, paraki

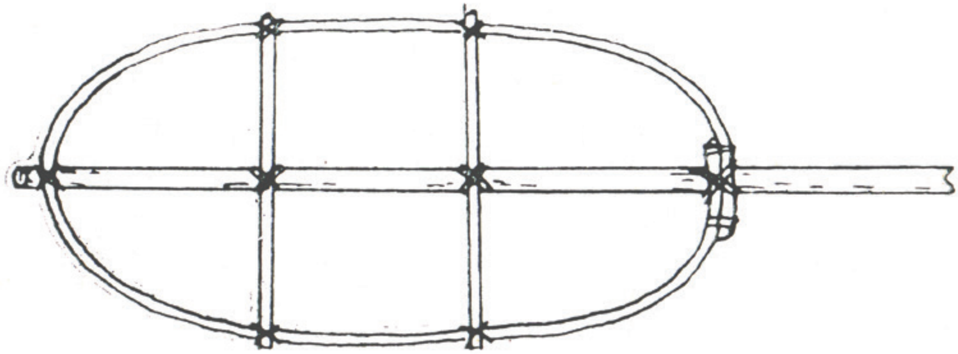

Figure 3. A drawing of an upokororo kupenga (net for catching grayling) that clearly shows the oblong pirita frame to which the net was attached. Reproduced from Hiroa 1926

and other small fish as:

> *made all of flax and lines run down and others across in close formation. For whitebait (mata) a length is doubled and sewn up edges leaving a waha (mouth) using pirita (supplejack) as a stiffener. The whole net is then known as a koko and a pole (forgets name) is attached to lift it handily. In the bottom an opening (kumu) about nine inches long is made and attached to koko is a flax bag (te kotere or te kumu)* (Beattie 1994: 310).

The flax bag made it much easier to empty the īnaka/mata out of the koko. See the following description of E139.74 for another example of this.

Alternative methods of capture are also recorded. One method recorded by Beattie states:

> *About February you will see the minnows (inaka) rushing to the sea, and the Maori caught them with kaka (nets). I have seen the net laid out flat at the lake end nearest the sea and tapered to a spout … Closely knit baskets (kete-putaputa) were placed under this spout, and as each filled with inaka, another was substituted until thirty, forty or fifty baskets were filled as required and then you stopped* (Beattie 1994: 139–140).

Charles Heaphy noted that on the West Coast he saw "quantities of dried inanga or whitebait taken with fine meshed nets of enormous length" (Heaphy 1863: 5). Beattie also records the use of long nets in southern Aotearoa, "mata … was caught with Maori nets (kaka) which were sometimes a chain [about 20 metres] long" (Beattie 1920: 59). It is possible that long nets were designed to function as seine nets used to catch by the dragging method. Beattie recorded that an informant said:

> *To catch inaka use a close net, the kaka, with a pou (pole) at each end. A man holds each pole and drags the net along enclosing the fish. We call this dragging rau. When plenty of inaka are enclosed, pull the kaka ashore and secure the catch* (Beattie 1994: 139).

No examples of long nets are known to exist. A similar system of awa or channels made to catch eels was also used to catch whitebait. The ditches made along a river bank had the mouth facing downstream rather than upstream as in awa-tuna (eel channel). Beattie recorded that, "The tiny fish were caught in a net with a round mouth which was put in the drain, filling it from side to side, and through which water flowed" (Beattie 1994: 139).

Evidence of the use of artificial channels in Te Wai Pounamu was also supplied to Elsdon Best:

> *The first run of these fish commenced in the autumn, and these early ones are called pukoareare. When they entered the streams, the channels dug for the purpose of taking them had already been prepared by the Maori. The water of the stream was allowed flow through these channels even to the time*

the inanga migrated. When the fish entered a channel it was blocked with a kaka, a form of fish trap. The place selected for taking the fish was carefully prepared. In the early morn they were arranged when the sun was well up, then the traps were lifted and found to be full of fish (Best 1929: 177–178).

Beattie records catches of eight or nine tonnes, which suggest traditional catches were potentially larger than modern and recreational catches (Beattie 1994: 314). Beattie also noted that adult īnaka/mata were caught at 36 rivers and streams along the Ngā Pākihi Whakatekateka o Waitaha coastline (Beattie 1945: 63).

There are several records of the capture of īnaka/mata during their mass downstream breeding migration in autumn. An informant told Herries Beattie that:

…as the tiny fish rush to the sea the Maori fisher gathers them in with the kaka, a closely woven net (or mat) four or five feet in depth and up to fifteen in length … one and all were full of roe (hua) (Beattie 1994: 310).

It is probable that this is the same style of net and rau (dragging technique) previously described.

Beattie was also told of the preference for ripe females rather than males, "The males … have a whitish paste and are more bitter to eat than the female with its brownish roe like very wee sago" (Beattie 1994: 316). It seems that any surplus of the juvenile īnaka/mata caught in the spring upstream migration were preserved for later consumption, "If the olden Maoris had plenty of inaka, they would put out the males as these were bitterer and as they shrivelled up flatter when dried" (Beattie 1994: 314).

In the absence of evidence to the contrary it appears likely that the second harvest was captured and preserved using the same methods discussed later in this paper.

Capture: upokororo

As they returned from the sea at a similar time of year as īnaka/mata, (albeit slightly later), the young of upokororo (haparu) were caught in the same way as (and with) īnaka/mata using set or scoop nets in estuaries or the lower reaches of the rivers (Clarke 1898: 78).

Adults were caught using set nets in the middle reaches of rivers where there were shallow rapids. The design of the set net (Fig. 3) used to catch upokororo was similar to that of a scoop net but with short handles on either side of the long end of the hoop, which were used to fix the net in a stationary position (Hiroa 1926: 637).

Positioning of the nets took advantage of the fact that, when startled, upokororo always fled downstream. When a shoal were spotted in a river, set nets would be placed in the next shallow rapids downstream of the shoal (Fig. 4) and the fish deliberately startled into the nets (Beattie 1994: 526–527).

Seine nets were used to catch adults in deeper rivers such as the Kawatiri. In January 1847, Thomas Brunner, in his journal of his journey down the river, noted that Ekehu and his other Māori guides had finished making a net about 50 feet long by four feet (approximately 50 metres by 1.2 metres) which they used to catch 150 upokororo over the next week (Brunner 1850: 347).

Capture: paraki

Paraki were caught in Te Wai Pounamu using a similar range of techniques described for īnaka/mata (sometimes as a mixed species catch). When Hector was at the mouth of the Whakatipu-ka-tuku (Hollyford River) in September 1863 he noted that Māori were catching paraki "as the tide fell by closing weirs made of flax net across the small creeks" while smaller fish were caught with "bag nets" (Hector 1902: 316).

Several references suggest that in lakes or estuaries the use of seine nets appears to have been the method that prevailed. One of Herries Beattie's informants told him of catching "paraki … in Lake Forsyth (Wairewa) with a kaka [seine net] weighted with pohatu (stones) at the bottom" and another informant had seen seine nets used in "the estuary at Riverton [Aparima River] years ago when they secured baskets and

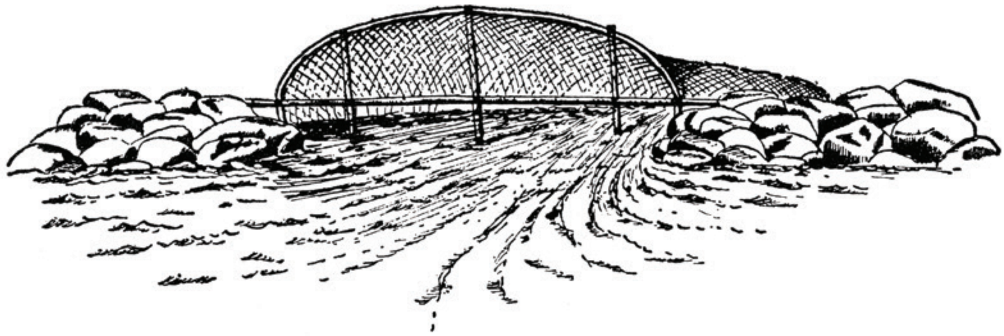

Figure 4. A sketch by B Osborne showing how an upokororo kupenga was used. Reproduced from Best (1929)

baskets" of various fish species including paraki (Beattie 1994: 135).

William Phillipps observed the making and use of seine nets in Wairewa (Lake Forsyth) and Te Waihora (Lake Ellesmere) to catch large quantities of paraki:

> *To make a net, blades of flax were stripped down to a width of approximately 3 mm and plaited with cross-stands, all being kept uniform to prevent weak patches* [Fig. 5]. *The net was 6 ft.* [1.8 metres] *high and 30 to 100 yards* [27–91 metres] *in length and the mesh seldom exceeded 1 ½ mm. Poles held the net upright at the ends, and sinkers were attached below. The net was dragged along parallel to the shore, held by a party on land and another party in a canoe, each moving simultaneously, until a sufficient catch was obtained* (Phillipps 1926: 291).

Phillipps made a sketch of the use of the net for Elsdon Best (Fig. 6) and added the following information:

> *The net was taken to point A in a small bay of the lake. Here the net was placed on board a canoe, one end being left on shore, where it was held upright by one or more natives. The canoe was then taken in a semicircular direction to the point B, the net being payed* [sic] *out as the canoe proceeded. On arrival at B, assuming all the net to have been payed* [sic] *out, the boat was turned to row slowly with the net parallel to the shore in the direction of D, while simultaneously natives at A commenced to drag their end of the net to C* (Best 1929: 177).

Rare archaeological evidence for the use of kaka/seine nets possibly exists. During salvage excavations at Pegasus Town, 25 km north of Christchurch, a group of elongated greywacke pebbles, interpreted as net sinkers, was uncovered adjacent to a former lagoon/estuary dating to about 500 years ago (Witter 2007: 176–185). Based on the pattern of the sinkers the net was interpreted to be about 8 metres long and made of dressed cordage, possibly in a gill net pattern, rather than plaited split flax. The suggested target species was juvenile red cod (*Pseudophycis bachus*). Five alternative methods of use were also suggested: a set net, gill net, wing net, drag net and throw net. The evidence for the use of seine nets in Waiwera and Te Waihora is not cited and it seems reasonable to suggest the strong possibility that the net weights once belonged to a short kaka or seine net used to capture paraki rather than the other options offered by Witter.

Cooking, preservation and storage

Īnaka/mata

Because they are small and boneless, īnaka/mata were always eaten whole. Māori often boiled them and, after the water was drained, the fish were pressed into a solid mass before being eaten and the flavoured water drunk (Tregear 1904: 108). Īnaka/mata were also observed being cooked in umu (underground ovens) (Power 1849: 78). It can be assumed that

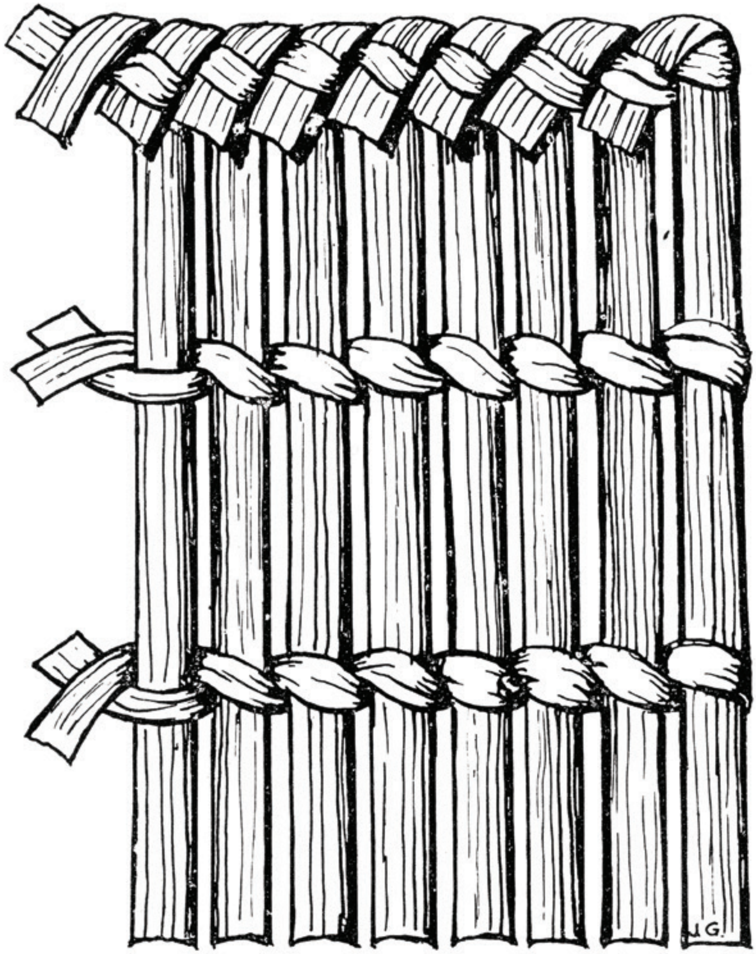

Figure 5. Sketch by B Osborne showing the universal whatu aho patahi (single pair twining) technique used for all kupenga īnaka/mata and described by Phillipps. Reproduced from Best (1929)

cooking in an umu was the traditional method and boiling was adopted once European cooking vessels became available.

Māori communities in many districts were observed preserving surplus catch by sun drying them for later consumption. In Murihiku (Southland), Beattie's informant said "inaka caught at the [Mataura] falls were spread on flax mats and sun-dried. When properly done they would last a long time" (Beattie 1920: 70).

Thomas Brunner observed a similar process in Te Tai o Poutini when he travelled through the district in 1847, "The natives take large numbers, which they lay on flax mats, and expose them to the sun for three of four days; then pack them tightly, and preserve them in their storehouses for winter use" (Brunner 1850: 357), perhaps using the storage method illustrated in Figure 7. On an earlier journey to Te Tai o Poutini, Brunner and Heaphy had left Kararoa village (south of Barrytown) in June with 12 lbs (5.4 kg) of dried whitebait, which must have been preserved the previous season (Heaphy 1846: 2).

Another account of the drying process comes from Ngā Pākihi Whakatekateka o Waitaha (Canterbury Plains):

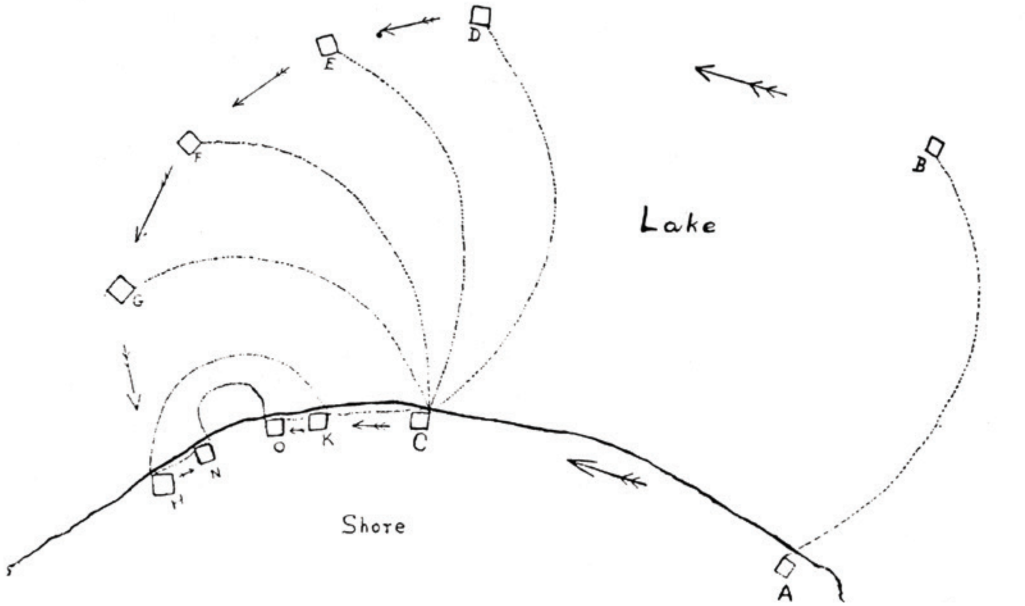

Figure 6. Sketch made by W J Phillipps to illustrate his explanation of how a seine net was used to catch paraki in Wairewa (Lake Forsyth) and Te Waihora (Lake Ellesmere). Reproduced from Best (1929)

> *The people prepared gravel beds (wahi taurakitaka inaka) to dry the inaka in the sun (taraki=drying) and the little fish were spread on these drying grounds, which were commonly known as ka-wa-inaka. Two or three good days will dry them, but you must hurihuri or keep turning them* (Beattie 1994: 140).

Elsdon Best recorded a similar account of preservation provided by a Te Wai Pounamu (South Island) informant who said that the īnaka/mata:

> *…were spread out on papaki or on ordinary mats* [Fig. 8]. *These papaki fabrics were carefully plaited by women to serve as mats on which to spread these fish. They were so exposed for as long as seven days, or even longer, then packed in baskets and stowed on stages … Great numbers were taken in kaka traps, and spread out to dry. Those who did not care to spread their fish out on the papaki flax mats just spread them on the surface of the earth or on tussock-grass; some considered that the fish acquired from the flax mats was an acquired taste* (Best 1929: 178).

It is possible that although Best's informant described the fish being preserved as īnaka/mata they may possibly have been paraki as in some localities the same name was used collectively for both species.

Dried īnaka/mata was eaten during the leaner winter months and was sometimes beaten into mashed aruhe (fern root). The resulting mash was known as kohere-aruhe (Beattie 1920: 67).

Particularly in Te Tai o Poutini (West Coast), which can have long periods of rain during the spring, a comprehensive understanding of weather patterns would have been necessary to ensure that whitebait was caught when a sunny spell was sure to follow, allowing the fish to dry thoroughly before the next spring downpour.

Upokororo

Upokororo were widely regarded as good eating. In January 1866 Te Tai o Poutini Māori were recorded as journeying to an island near the confluence of the Māwheranui and Māwheraiti Rivers (near present day Ikamatua)

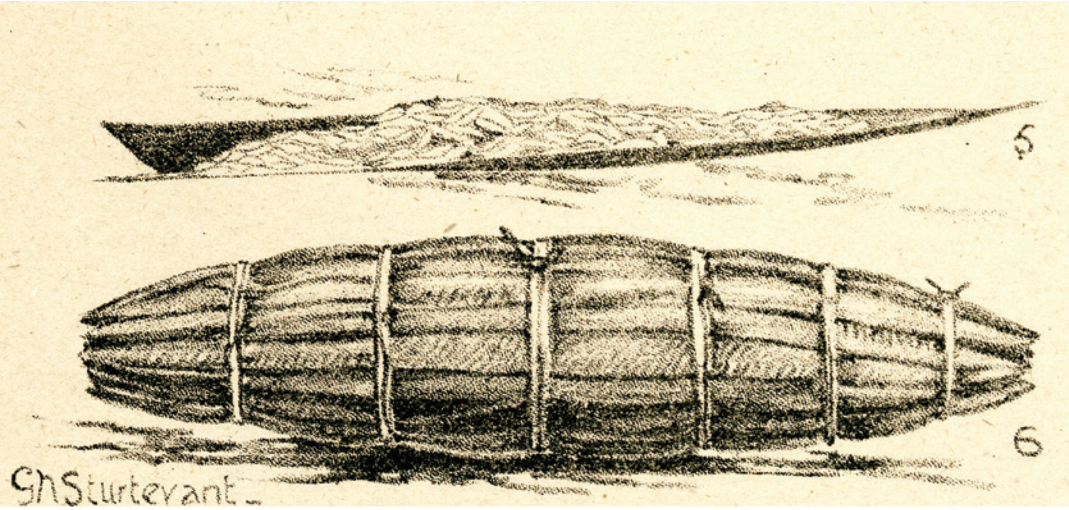

Figure 7. Dried īnaka/mata (top) and poha (kelp bags wrapped in totara bark) used to store dried īnaka. Reproduced from White (1891)

Figure 8. Drying īnaka/mata on harakeke (flax) mats. Reproduced from White (1891)

and spending a week catching and preserving upokororo, a task they undertook at the same time every year (*Nelson Examiner*, 20 January 1866: 3). There is scant information about the cooking and preservation of upokororo but one of Beattie's Nelson informants said that it was cooked in a hangi or on a rara (grid) (Beattie 1994: 501).

Paraki

Paraki were probably cooked, preserved and stored in the same manner as īnaka/mata including being compressed in bundles of leaves or kete (woven bags). They were sun-dried for up to 7 days on specially prepared flax mats, tussock, gravel or rock surfaces for preservation and later consumption (Studholme 1940: 23, McDowall 2011: 259). Occasionally paraki were

Figure 9. The kupenga īnaka/mata attributed to Te Ana o Hineraki (Moa Bone Point Cave), intact but in very fragile condition. Canterbury Museum E72.85

"dried by hanging them in kits so that the air could circulate" (Studholme 1940: 23). Paraki have not been captured for consumption in Te Wai Pounamu since the mid-twentieth century and awareness of their traditional significance as a taonga species is almost forgotten.

Kupenga īnaka/mata at Canterbury Museum

Canterbury Museum has two rare examples of whitebait nets in its collection.

E72.85 Whitebait net

This net is believed to be the one found in Te Ana o Hineraki (Moa Bone Point Cave) at Redcliffs during an excavation directed by Canterbury Museum Director Julius Haast in 1872. In a paper given to the Philosophical Institute in September 1874, Haast's list of items found included "a portion of a net for catching inangas" (Haast 1874: 3).

The net appears to have been displayed by Haast amongst the exhibition of taonga Māori within the carved meeting house Hau Te Ananui o Tangaroa which opened to the public in 1874. The 1895 "Guide to the Collections in the Canterbury Museum" refers to the presence within the displays of "nets for cray-fish and white-bait" (Hutton 1895: 217). In 1933, a newspaper article stated that the Museum housed a "portion of finely woven whitebait netting" which had been found at the Te Ana o Hineraki in 1872. (*Press*, 11 July 1933: 9).

The first catalogue inventory for Canterbury Museum was a card index initiated by then Museum Director Edgar Ravenswood Waite in 1907 (Burrage 2002: 97). All taonga in the "Maori House" were allocated the prefix MH. The MH card numbered 43.0 is for a whitebait net, but no direct provenance attribution to Te Ana o Hineraki is included in the text.

The first attribution of a whitebait net to Te Ana o Hineraki is an entry in the hand written Ethnology Register No.1 compiled by Roger Duff in 1938. This records the archaeological material excavated in 1872 and includes E72.85, which is described as "portion whitebait net" from the upper deposits of Te Ana o Hineraki.

The degraded condition of E72.85 is distinctly similar to other organic taonga in the Canterbury Museum collection securely provenanced to Te Ana o Hineraki. However, given the relatively thin inventory trail analysed above and the absence of other material evidence (such as radio carbon dates) to give weight to provenance, it is probably best, in the interim, to adopt a cautious approach and refer to whitebait net E72.85 as "Te Ana o Hineraki (Moa Bone Point Cave) (attributed)".

Method of manufacture

The process used in the construction of kupenga īnaka/mata appears to borrow techniques widely employed in traditional whatu (cloak) weaving and also elements from traditional raranga (plaiting).

The first stage in the process would have been the preparation of long, thin strips of harakeke for the whenu or warps (the vertical elements). These flax strips were not modified in any way. Each whenu strip would be approximately 2–3 mm in width and 1,400 mm in length as, once woven together, they were folded in half to create the 700 mm deep bag net. Approximately three whenu are required for every 10 mm of width.

The whenu were woven together horizontally with aho (wefts) of very thin strips, (approximately 1.5 mm wide) of unmodified harakeke, using the whatu aho patahi (single pair twining) technique (see Fig. 5). Each row of whatu aho patahi were woven approximately 17–18 mm apart.

Both upper and lower exposed ends of the whenu were incorporated back into the body of the weave by using the process known as selvedge commencement, in which a tag left at the top of each whenu is bent over and re-enters the same aho (weft), usually two whenu to the right.

Once the body of the kupenga (net) was complete it was folded in half and the seams at either end were neatly bound together with what appears to be a form of cross stitch incorporating two thin strips of unmodified harakeke. This completed the body or bag of the net. The approximate external dimensions of the whitebait net E72.85 are 1,860 mm wide by 700 mm deep (Fig. 9).

E72.85 still has its hoop opening attached. It is made from two lengths of light, slender pirita (supplejack) lashed together (2,150 and 2,400 mm long respectively), which would have held the mouth of the net open. The netting bag is laced onto the pirita hoop by a thin, knotted, continuous strip of unmodified harakeke which is lashed using loop knots at variable intervals (approximately 30–50 mm apart) around the pirita and through the netting immediately beneath the selvedge commencement (Fig. 10).

The natural tension present in the pirita would have resulted in a circular or semi-circular shaped opening. However, as the hoop is flexible the shape could easily have been modified into a more oval outline by the addition of a pole handle to form a scoop net, or by the addition of wooden cross braces to form a set net (see Figs 3 and 4).

E139.74 Whitebait net

This scoop net was donated to Canterbury Museum on 30 March 1939 by James Gibbs Stanton (Canterbury Museum Accession Register 62/39). The following information was recorded by the Museum at the time:

> *Whitebait net given to donor over 60 years before by Tuahiwi Maori. This net was subsequently used by the donor to catch whitebait until now. It is somewhat damaged but the green flax fabric after 60 years is still strong* (Canterbury Museum Ethnology Register: E139.74).

The net has been crudely repaired with both twine and strips of flax, almost certainly by Stanton (Fig. 11).

The donor, James Gibbs Stanton (1856–1945), was an early settler at Woodend in North Canterbury, living there from about 1858 until his death. Stanton remembered Māori nets as "a work of art" and said that it took about two weeks for a woman to make a large net from flax. "The net was suspended from a wooden frame, and had a little trap-door in one corner to let out the catch" (Stanton 1932: 12). This description matches well with the net he later donated to Canterbury Museum, which has a spout at one end (Fig.11).

Figure 10. Photograph showing the loop knot lashing used to lace the pirita hoop onto whitebait net. Canterbury Museum E72.85

Stanton described the net as over 60 years old when he donated it in March 1939 which suggests that it was made prior to the autumn of 1879. Interestingly, Stanton married in July 1878, at the start of the whitebait season, and it is possible that this net was made for him as a wedding present.

Method of manufacture

The process used to construct E139.74 is very similar to that previously described for E72.85 and the net is of a similar size (approximately 1,720 mm wide and 600 mm deep).

The long, thin, unmodified harakeke strips for the whenu (warps) are approximately 2–3 mm in width and 1,200 mm in length and once woven and folded in half they would have created a bag net 600 mm deep. As with E72.85, approximately three whenu were required for every 10 mm of width.

The whenu were woven together horizontally with aho (wefts) of very thin, approximately 1.5 mm wide, strips of unmodified harakeke, using the whatu aho patahi (single pair twining) technique (Fig. 12). Each row of whatu aho patahi were woven with approximately 30 mm spacing between most rows (although one is 25 mm and one other 40 mm).

Both the upper and lower exposed ends of the whenu were incorporated back into the body of the weave by using the process known as selvedge commencement. This results in, not only a tidier, but also a stronger aho (weft) corresponding to the point at which the net would later be lashed to the hoop of pirita to define the mouth of the net.

Once the body of the kupenga was complete it was folded in half and the seams at either end were neatly bound together with what appears to be a form of cross stitching utilising two thin strips of unmodified harakeke (Fig. 13).

It is apparent that Stanton made many repairs to the fabric of the net using both cotton thread and split flax and in some areas these cover the integrity of the original workmanship (Fig. 14).

One very innovative design incorporated into the lower corner of one side-seam of E139.74 was a tapered conical spout also created by the whenu (warp) and aho (weft) technique. This convenient feature was designed to facilitate pouring of the catch from the net into another container (Fig. 11).

Figure 11. Whitebait net E139.74 with the spout for pouring out the catch at lower left edge. Note also the repairs made to the net. Photograph by Jane Ussher

There was no hoop attached to the mouth of E139.74, but there is some stretching clearly indicating one had previously been attached, but subsequently removed by the owner. This process may have been traditionally done annually as it would not only facilitate storage by allowing the net to be rolled or folded, but would also potentially minimise damage to the net weave by releasing inherent tensions caused by the pirita hoop.

Conclusion

The two scoop style kupenga that survive in Canterbury Museum are possibly the only surviving examples worldwide and are highly significant as evidence of construction techniques and size of this type of net. Their manufacture appears to have obvious similarities to raranga and some whatu (cloak) weaving techniques. The nets were multi-purpose and could be used as koko harakeke (scoop nets) to catch īnaka/mata or attached to a frame and used as a set net to catch young upokororo.

The nets at Canterbury Museum could become templates for weavers and assist with the rescue of the almost abandoned manufacture of harakeke nets.

The ethnohistorical evidence presented in this paper firmly establishes the economic, dietary and cultural significance of the seasonal harvest of eight diadromous species in Te Wai Pounamu. Targeting predictable migrations of shoals ensured substantial quantities of fish were caught, which far exceeded the requirements for immediate consumption. There was an obvious economic strategy in operation; well organised fishing parties moved and camped at the right place, at the right time, with the right gear to catch and preserve target species. To be effective, the application of this strategic approach clearly required Māori to have developed intimate awareness and understanding of the life-cycles of each of the targeted diadromous species.

Historical evidence refers to huge quantities that could be preserved for later consumption when required. Most of the literature reviewing Māori cultural food gathering practices in Te Wai Pounamu greatly underestimates the vital contribution that these eight diadromous species made to traditional subsistence economies. Large quantities of juvenile fish were harvested from August to January and many were preserved for the leaner months of winter. A second harvest of migrating adult fish took place in autumn and this important protein rich food may also have been preserved.

Although the historical accounts reviewed in this paper are chronologically and geographically scattered, all Māori communities across Te Wai Pounamu would have undertaken seasonal freshwater fishing activities simultaneously in

Figure 12. Detail of whitebait net E139.74 showing weaving technique. Canterbury Museum E139.74

Figure 13. Photograph showing cross stitching method of binding together two edges of the kupenga/net E139.74. Canterbury Museum E139.74

Figure 14. Two views of kupenga/net E139.74 showing repairs. **A**, repair made with harakeke. **B**, repair made with string. Canterbury Museum E139.74

rivers and lakes within their individual rohe (tribal areas).

There are two conspicuous differences between traditional and modern harvests. It is now illegal to harvest adult īnaka/mata on their autumn downstream breeding migration and today paraki are not seen as desirable for consumption. Paraki were traditionally a taonga species, particularly on the east coast, and frequently a catch more prized than īnaka/mata.

It may be surprising to modern-day whitebaiters to discover that contemporary fishing practices, such as set nets, sock nets and scoop nets, are virtually identical to traditional Māori techniques and technologies which are centuries old (Fig. 15). The one legal and technological exception is the construction and use of seine nets like those designed to catch huge shoals of paraki and īnaka/mata in Te Waihora (Lake Ellesmere) and possibly at Pegasus Town.

Now that all diadromous species are under threat it is further hoped that the evidence presented in this paper will help raise public awareness and be a timely reminder of the former cultural significance of these taonga species.

Acknowledgements

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Figure 15. A whitebaiter on the Grey River in 1959 using a scoop net that, despite the modern bag, is almost identical in design to the two scoop style kupenga at Canterbury Museum. Archives New Zealand AAQT 6539 W3537 57/ A71885

References

Anderson AJ. 1998. *The Welcome of Strangers*. Dunedin: University of Otago Press.

Beattie JH. 1920. Nature Lore of the Southern Māori. *Transactions and Proceedings of the Royal Society of New Zealand* 52: 53–77.

Beattie JH. 1939. *Tikao Talks: Traditions and Tales of the Canterbury Māoris as told by Tione Taare Tikao to Herries Beattie*. Wellington: AH & AW Reed.

Beattie JH. 1945. *Māori Place Names of Canterbury*. Dunedin: Otago Daily Times.

Beattie JH. 1994. In: Anderson A, editor. *Traditional Lifeways of the Southern Māori*. Dunedin: University of Otago Press.

Best E. 1929. F*ishing Methods and Devices of the Māori. Bulletin 12*. Wellington: Dominion Museum.

Brunner T. 1850. Journal of an expedition to explore the interior of the Middle Island of New Zealand. *Journal of the Royal Geographic Society* 20: 344–378.

Burrage, S. 2002. An historical guide to collection cataloguing at Canterbury Museum. *Records of the Canterbury Museum* 16: 94–109.

Clarke FE. 1898. Notes on New Zealand Galaxidae, more especially those of the Western Slopes; with Descriptions of New Species, &c. *Transactions and Proceedings of the New Zealand Institute* 31: 78–91.

Haast J. 1874. On results of excavations and researchers in and near the Moa-bone Point Cave, Sumner road. *Lyttelton Times*, 18–22 September 1874.

Harper AP. 1921. The first crossing of the Southern Alps. *New Zealand Alpine Journal* 3: 75–81.

Heaphy C. 1846. Notes of an Expedition to Kawatiri and Araura, on the Western Coast of the Middle Island, performed by Messrs Heaphy and Brunner. *Nelson Examiner and New Zealand Chronicle*, 5 September 1846 to 17 October 1846.

Heaphy C. 1862. A visit to greenstone country. *Chapman's New Zealand Monthly Magazine* 1 (3): 107–111, 166–171.

Heaphy C. 1863. A Visit to Greenstone Country. *Lyttelton Times*, 28 January 1863: 5.

Hector J. 1872. Notes on the edible fishes. In: Hutton FW, editor. *Fishes of New Zealand*. Wellington: James Hughes.

Hector J. 1902. Notes on New Zealand Whitebait. *Transactions and Proceedings of the Royal Society of New Zealand* 35: 312–319.

Hiroa TR (Buck PH). 1926. The Māori Craft of Netting. *Transactions and Proceedings of the Royal Society of New Zealand* 56: 597–646.

Hutton, FW. 1895. *Guide to the collections in the Canterbury Museum*. Christchurch: Canterbury Museum.

McCaskill M. 1954. The Poutini coast: A geography of Māori Settlement in Westland. *New Zealand Geographer* 10: 134–150.

McDowall RM. 2000. *The Reed Field Guide to New Zealand Freshwater Fishes*. Auckland: Reed Books.

McDowall RM. 2011. *Ikawai: Freshwater fishes in Māori culture and economy*. Christchurch: Canterbury University Press.

Mitchell GGM. 1948. *Māori Place Names in the Buller County*. Wellington: AH & AW Reed.

Pascoe, J. 1957. *Mr. Explorer Douglas*. Welllington: AH & AW Reed.

Phillipps WJ. 1923. Life-history of the New Zealand Grayling, *Prototroctes oxyrhynchus*. *New Zealand Journal of Science and Technology* 6: 115–117.

Phillipps WJ. 1926. Additional notes on New Zealand freshwater fishes. *New Zealand Journal of Science and Technology* 8: 289–98.

Power WT. 1849. S*ketches in New Zealand with Pen and Pencil: From a journal kept in that country from July 1846 to June 1848*. London: Longman, Brown, Green and Longman.

Shortland, E 1851. *The Southern Districts of New Zealand: A journal with passing notice of the aborigines*. London: Longman, Brown, Green and Longman.

Simpson, SG. 1959. Flying Small Fry. *Australian Outdoors* 21 (2): 12–15.

Stanton JG. 1932. Vanished Trees. *North Canterbury Gazette*, 11 November 1932: 12.

Studholme EC. 1940. *Te Waimate: Early station life in New Zealand*. Wellington: Reed.

Tregear E. 1904. *The Māori Race*. Wanganui: AD Willis.

Wanhalla A. 2005. Marrying 'In': The geography of intermarriage on the Taieri, 1830s–1920s. In: Ballantyne T, Bennett JA, editors. *Landscape/Community: Perspectives from New Zealand*. Dunedin: Otago University Press.

White J. 1891. Illustrations prepared for White's Ancient History of the Maori. Wellington: Government Printer. Available from: British Library http://access.bl.uk/item/pdf/lsidyv2b0d9ed8[cited 7 January 2020].

Witter A. 2007. Stone net weights at Pegasus Town, North Canterbury. *Archaeology in New Zealand* 50 (3): 175–185.

Theridion pumilio (Theridiidae) and *Drapetisca australis* (Linyphiidae) are transferred to *Diploplecta* Millidge, 1988 (Araneae: Linyphiidae, Linyphiinae)

Brian M Fitzgerald and Phil J Sirvid[1]

Museum of New Zealand Te Papa Tongarewa, PO Box 467, Wellington 6140, New Zealand

[1]Email: phils@tepapa.govt.nz

An examination of the type specimens of *Theridion pumilio* Urquhart, 1886 (Theridiidae) and the description of *Drapetisca australis* Forster, 1955 (Linyphiidae) showed that, on the basis of epigynal characters, the two species should be transferred to *Diploplecta* Millidge, 1988.

Keywords: aerial dispersal, Antipodes Islands, Linyphiidae, money spiders, New Zealand.

Introduction

Diploplecta is a genus of small linyphiid spiders established by Millidge (1988). He described seven species, all of them new and endemic to the New Zealand region. As he noted, “taxonomically this genus is a difficult one”; the males are impossible to identify to species in most cases, and “diagnosis of the females is also far from simple”. He could diagnose them “with certainty only by examination of the internal genitalia, which necessitates excision of the epigynum followed by clearing …. This procedure, with these tiny epigyna, is laborious and time-consuming, but at the present time there is, in most cases, no alternative”. He also admitted “the genus needs more study” and “might lead to the elimination of some of the species described … or, alternatively might result in the recognition of additional species” (Millidge 1988: 48–51).

We have found that two species, placed by earlier workers in other genera by default, belong in *Diploplecta*. They are *Theridion pumilio* Urquhart, 1886, from Karaka, near Auckland, and *Drapetisca australis* Forster, 1955, from the Antipodes Islands. Here we transfer them to *Diploplecta* and discuss the implications of these decisions.

Taxonomy

Diploplecta Millidge, 1988

Type species *Diploplecta communis* Millidge, 1988.

Holotype female, “Hawkes Bay, Waitetola. 8–11.v.67”, collector R W Hutton, Otago Museum (not examined).

The locality name, “Waitetola”, is a misspelling of Waitetoko, near Lake Taupo, and the collection label has the date 8–11 May 1968 (Vink et al. 2011).

Diagnosis: All the species have the same basic colour pattern (Fig. 1). The carapace has a black longitudinal median stripe and black margins and the abdomen a black median dorsal stripe, often broken into a series of spots. The sides are mottled black.

The form of the epigynum is diagnostic (Millidge 1988: 45, fig. 215 (type)) (Fig. 2A). “There is a well-defined atrium … enclosed between the ventral and dorsal plates; the dorsal plate is extended posteriorly as a narrow scape which carries a minute socket distally, and there is in most species a short pseudoscape … which projects from the ventral plate over the entrance to the atrium”.

One species, *Diploplecta nuda* Millidge, 1988, lacks the pseudoscape but is based on just one

Figure 1. Dorsal view of a male specimen of *Diploplecta* sp. showing characteristic dorsal stripe. (Te Paki, Spirits Bay, Northland, New Zealand, ex pit trap, O J-P Ball, Oct–Nov 2006. Museum of New Zealand Te Papa Tongarewa, AS.4743)

specimen and Millidge suggested that it could be an "abnormal example of *D. duplex*" (Millidge 1988: 56). On the male palp the paracymbium has a narrow basal arm and a broad distal arm, the suprategulum has a long apophysis, and the embolic plate has three sclerites and a slender, curved embolus (Millidge 1988: 45 & 48, figs 221–223).

Diploplecta pumilio **(Urquhart, 1886) new combination**

Theridion pumilio Urquhart 1886: 190–192, pl. 7, figs 3 a–f. – Bryant 1935, 55; Paquin, Vink & Dupérré, 2010: 62.

Type material: Te Karaka, Auckland, collector A T Urquhart, Canterbury Museum (2005.135.547–2005.135.549, 3 female syntypes present, male and female types missing). (Te Karaka is now known as Karaka) (examined).

Comments: Urquhart gave his collection of spiders to Canterbury Museum in 1899. Soon afterwards Professor F W Hutton prepared a hand-written "List of Types in the Canterbury Museum" (Canterbury Museum 2010.160.267). The list of arachnid types, although incomplete, included some of Urquhart's types, among them *Theridion pumilio*. However, when Bryant (1933) examined and re-described what were considered to be all of Urquhart's types (52 species), *T. pumilio* was not among them. Subsequently, Bryant (1935) examined additional Urquhart specimens, identifiable from his writing on the labels. They included *T. pumilio* but Bryant noted only that "all the specimens are female" and gave no indication of their type status (Bryant 1935: 55). Later, when Nicholls et al. (2000) compiled a list of the arachnid types held in Canterbury Museum, they recorded four female syntypes of *T. pumilio*. We have examined the specimens of *T. pumilio* in the Canterbury Museum collection. There is just one vial, containing three females, with a label in Urquhart's handwriting stating on one side "Theridium pumilio" (torn in two at the "l") and on the other "Vol. XVIII – 190". These are almost certainly the specimens seen by Bryant (1935) and Nicholls et al. (2000). One female consists of a cephalothorax with abdomen attached and the scape visible. There are also two cephalothoraxes without abdomens, plus fragmentary material but no epigyna amongst it. The poor, fragmented condition of the material may account for the different totals given by Nicholls and by us.

We take at face value that the specimens we examined are part of the type series. The label in Urquhart's own hand linking the vial to the description indicates that it includes type material. However, the only measurement given by Urquhart was the total length, and for this reason, combined with the uncertainty about the true number of syntypes we will not designate a lectotype.

Description: Urquhart (1886: plate 7, fig. 3e) illustrated the epigynum of *Theridion pumilio* (reproduced here, Fig. 2B). He clearly shows the atrium, with the dorsal plate having a narrow scape projecting posteriorly, and the margin of the ventral plate having a short pseudoscape, which are diagnostic features for *Diploplecta*. In concert with our examination of Urquhart's material, this is our reason for transferring this species to *Diploplecta*. We did not illustrate

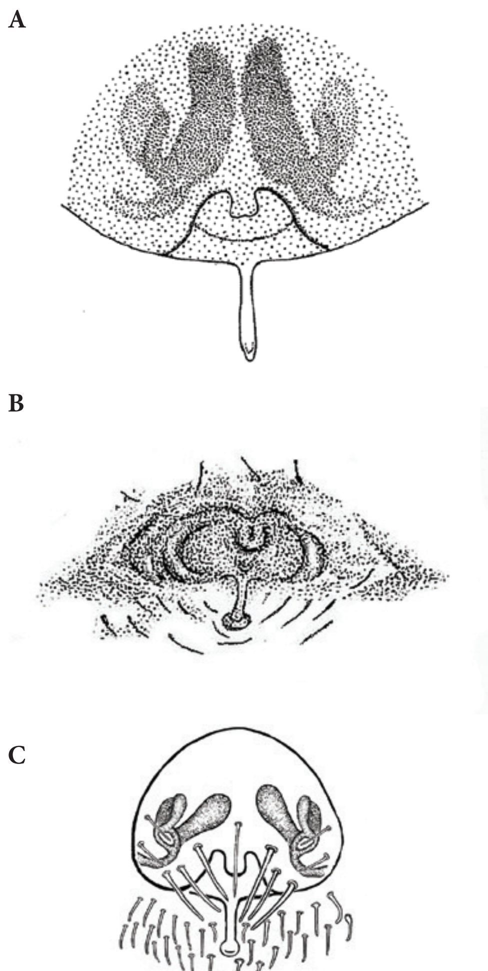

Figure 2. Epigyna of the three species of *Diploplecta* treated here. **A**, epigynum of *Diploplecta communis* (reproduced from Millidge 1988: fig. 215, with permission of Otago Museum). **B**, epigynum of *Theridion pumilio* (reproduced from Urquhart 1886: plate 7, fig. 3e, with permission of the Royal Society of New Zealand). **C**, epigynum of *Drapetisca australis* (reproduced from Forster 1955: fig. 44)

Urquhart's specimen as although it was sufficiently well-preserved for us to consider it a reliable match for Urquhart's figure, it had degraded over the last 134 years. Any new illustration would not have been as clear as Urquhart's depiction, which was drawn when the specimen was fresh. Although the only measurements Urquhart gave were the total length of an adult female (1.75–2 mm) and of an adult male (1.5 mm), these are within the range of 1.5–2.0 mm given for the genus by Millidge (1988), as is the only specimen still measurable. Millidge did not give the sequence for leg length but Urquhart gave the sequence of 1, 2, 4, 3 for *Theridion pumilio*. No male examples were available to examine in Urquhart's material and for this reason we have emphasised female genitalic characters. However, Urquhart did provide a figure of the male palp (Urquhart 1886: plate 7, fig 3c) and this bears a general similarity of form to the palp of *Diploplecta communis* illustrated by Millidge (1988: fig. 221) and very little resemblance to the palp of *Theridion pictum* (Walckenaer, 1802), the type species for that genus (e.g. Almquist 2005: figs 124 a–c).

***Diploplecta australis* (Forster, 1955) new combination**

Drapetisca australis Forster 1955: 193–195, figs 40–44. – Paquin, Vink & Dupérré, 2010: 56.

Type material: Holotype female, Top of slope above Ringdove Bay, Antipodes Islands, ex mould under *Poa literosa* with *Polystichum vestitum*, 10 November 1950, E G Turbott, Auckland Museum (not examined).

Comments: Forster (1955) described *Drapetisca australis* from just one female specimen and placed it in the genus *Drapetisca*, with some reservations, "until more adequate material is available". *Drapetisca* and *Diploplecta* are both in the Linyphiinae and Forster was probably influenced by Hickman's (1939) description of *Drapetisca antarctica* from the Crozet Islands (note: Forster stated, in error, that *D. antarctica* was from Macquarie Island and that Hickman's paper was published in 1941). Hickman (1939) described *Drapetisca antarctica* from an immature female. Later, Tambs-Lyche (1954) found an adult female of *D. antarctica* in a collection of dried spiders from the Crozet Islands Whaling Expedition of 1907–1908. He realised that these specimens did not belong in *Drapetisca*, so established the genus *Ringina* for Hickman's species and described his own as *Ringina crozetensis*. Subsequently, Ledoux (1991) recognised *Ringina crozetensis* as a junior synonym of *Ringina antarctica*. With these changes, *Drapetisca australis* became the sole southern hemisphere representative of the genus.

Forster (1955) described *Drapetisca australis* from just one female. However, his figure of the epigynum shows clearly the atrium, pseudoscape and scape that are diagnostic for *Diploplecta* (Fig. 2C) and we hereby transfer this species to that genus. Also, the colour pattern (carapace pale yellow with blackish median band and lateral margins and the abdomen cream with a thin black antero-median line) is consistent with that for the genus.

When Millidge (1988) created the genus *Diploplecta* he described seven species, including *Diploplecta proxima* Millidge, 1988 from the Antipodes Islands, Snares Islands and the South Island of New Zealand. He overlooked Forster's description of *Drapetisca australis* whereas Marris (2000), in his checklist of arachnids and insects of the Antipodes Islands, included *Drapetisca australis*, but not *Diploplecta proxima*. Measurements for *Drapetisca australis* (female, carapace 1.29 mm, abdomen 1.53 mm, = total length 2.82 mm) given by Forster (1955) are substantially greater than those for *Diploplecta proxima* (female, carapace 0.8 mm, total length 1.7–1.8 mm) (Millidge 1988). Forster (1955) gave the measurements of the legs and the sequence, 1, 2, 4, 3 is the same as given by Urquhart for *Theridion pumilio*.

It seems unlikely that an island of just 2,025 ha, covered mainly in tussock grassland, would have two species of *Diploplecta*. Despite the apparent size difference, it is possible that *Diploplecta proxima* may prove to be identical with *Diploplecta australis* so we leave the two species as current species until a full revision of the genus can be done.

Natural history of *Diploplecta*

Many linyphiids, commonly known as money spiders, are aerial dispersers, and *Diploplecta* is amongst them. Suction traps operated by Laura Fagan at Pukekohe, Auckland, to measure aerial dispersal of insects and spiders, caught substantial numbers of adult *Diploplecta* (C J Vink, pers. comm.).

Urquhart gave a brief account of seasonality, habitat and web structure of *Theridion pumilio*. "Mature examples, especially females, may generally be taken throughout the winter months. Until winter rains set in, these little spiders are often numerous about pastures and amongst low native vegetation in damp spots. They spin a fine horizontal web, with a small triangular mesh; one portion is drawn up to a stem or blade, beneath which the spider rests" (Urquhart 1886: 192). The type of *D. australis* was collected from "mould under *Poa literosa* with *Polystichum vestitum*" (Forster 1955) and of *D. proxima* "in litter of *Poa foliosa*" (Millidge 1988). Also, many of the specimens of the various species of *Diploplecta* examined by Millidge (1988) were collected from moss, lichen, and grasses.

Conclusion

With the transfer of *Drapetisca australis* to *Diploplecta*, the genus *Drapetisca* contains just four species, all in the Northern Hemisphere; *Drapetisca alteranda* Chamberlin, 1909 (Canada and northern USA), *Drapetisca bicruris* Tu & Li, 2006 (China), *Drapetisca socialis* (Sundervall, 1833) [type species] (Britain and northern Europe), and *Drapetisca oteroana* Gertsch, 1951 (New Mexico) (World Spider Catalog 2019).

The transfer of *Theridion pumilio* and *Drapetisca australis* to *Diploplecta* increases the number of species of *Diploplect*a from seven to nine. However, the number of species could be further revised in future if molecular analysis of substantial collections of specimens from throughout the New Zealand region is undertaken.

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References

Almquist S. 2005. Swedish Araneae, part 1: families Atypidae to Hahniidae (Linyphiidae excluded). *Insect Systematics & Evolution*, Supplement 62: 1–284.

Bryant EB. 1933. Notes on types of Urquhart's spiders. *Records of the Canterbury Museum* 4 (1): 1–27.

Bryant EB. 1935. Notes on some of Urquhart's species of spiders. *Records of the Canterbury Museum* 4 (2): 53–70.

Forster RR. 1955. Spiders from the subantarctic islands of New Zealand. *Records of the Dominion Museum* 2: 167–203.

Hickman VV. 1939. Opiliones and Araneae. British Australian and New Zealand Antarctic Research Expedition 1929–1931. Reports Series B 4 (5): 157–187.

Ledoux J-C. 1991. Araignées des îles subantarctiques françaises (Crozet et Kerguelen). *Revue Arachnologique* 9: 119–164.

Marris JWM. 2000. The beetle (Coleoptera) fauna of the Antipodes Islands, with comments on the impact of mice; and an annotated checklist of the insect and arachnid fauna. *Journal of the Royal Society of New Zealand* 30: 169–195.

Millidge AF. 1988. The spiders of New Zealand. Part VI. Family Linyphiidae. *Otago Museum Bulletin* 6: 35–67.

Nicholls DC, Sirvid PJ, Pollard SD, Walker M. 2000. A list of arachnid primary types held in Canterbury Museum. *Records of the Canterbury Museum* 14: 37–48.

Paquin P, Vink CJ, Dupérré N. 2010. *Spiders of New Zealand: Annotated family key & species list*. Manaaki Whenua Press, Lincoln. 118 pages.

Tambs-Lyche H. 1954. Arachnoidea from South Georgia and the Crozet Islands with remarks on the subfamily Masoninae. The Norwegian-British-Swedish Antarctic Expedition 1949–1952, Scientific Results 35: 1–19.

Urquhart AT. 1886. On the spiders of New Zealand. *Transactions of the New Zealand Institute* 18: 184–205.

Vink CJ, Hutton RW, Fraser C. 2011. The mysterious Waitetola, type locality of several New Zealand spiders. *The Weta* 41: 35–37.

World Spider Catalog. 2020. World Spider Catalog Version 21.0 Natural History Museum Bern. Available from: http//wsc.nmbe.ch [cited 11 March 2020].

Any relic of the dead is precious: Nineteenth-century memorial jewellery at Canterbury Museum

Lyndon Fraser[1] and Julia Bradshaw[2]

[1]*University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand*

Email: lyndon.fraser@canterbury.ac.nz

[2]*Canterbury Museum, Rolleston Avenue, Christchurch 8013, New Zealand*

Email: jbradshaw@canterburymuseum.com

Canterbury Museum houses a small but varied collection of memorial jewellery from the nineteenth century that provides a window into European relationships and deathways during the period. This article places these objects in the context of far-reaching changes that led to a new social order of the dead. The first section locates our work within historical writing on death, grief and mourning in the late Georgian and Victorian eras. In the second, we attempt to make sense of the material evidence and offer a close analysis of the various mementos. We argue that these keepsakes played a crucial consolatory role in mourning practices at the time and assisted the bereaved to come to terms with their loss.

Keywords: death, memorials, memory, migration, mourning jewellery, nineteenth century

Introduction

Canterbury Museum holds a collection of items that have an intimate connection to people's emotions and memories: items of jewellery that were created as love tokens and memorials to the dead. The collection encompasses jewellery made from jet, metal, semi-precious stones and, most intimate of all, human hair. The construction and use of these pieces took place in the midst of a revolutionary shift in the care of the dead throughout parts of Europe, North America and the British Empire. Many of the key changes in the nineteenth and early twentieth centuries are ones that we take for granted today. In the words of historian Thomas Laqueur, the cemetery became the site of a "new regime of the dead; its promise of liberty, landscaping, and cosmopolitanism helped bring down the old" (Laqueur 2015: 161). Its eventual triumph over the deeply-rooted custom of churchyard burial began in France in 1804 with the opening of the Cimetière du Père-Lachaise in Paris, shortly after Napoleon was crowned emperor. Designed by architect Alexandre-Théodore Brongniart and modelled on the ancient site of Karameikos in Athens, this modern Elysium set a high international standard for spaces of the dead and gave rise to a new necro-geography. The influence was clear in the late Georgian creations of London's Kensal Green and the Glasgow Necropolis (both 1833), and echoed later in Victorian cemeteries like Rockwood in Sydney (1867) and – on a far smaller scale – Christchurch's Barbadoes Street Cemetery (1851). These commemorative garden landscapes also contained an additional feature – necro-nominalism – that we expect to find nowadays at places of the dead, whether on graves, or monuments to the absent dead such as the Canterbury Earthquake Memorial. By the Victorian era in Britain, Ireland and far-flung settler colonies, we see a great expansion in the naming of the dead that would have been unthinkable one century earlier. Like the new cemeteries, the demand to be written in death represented part of a major transformation in ways of thinking about the departed and afterlives that was grounded in memory, history and sentiment. Beneath these momentous changes were other practices that spoke to the place of the dead in this new order, including the emergence of elaborate commercial funerals, funerary undertaking and novel funeral rituals. In this paper we take one such aspect: the role played by keepsakes in late-Georgian and Victorian deathways. Our specific focus is on Canterbury Museum's collection of memorial jewellery. The next two sections provide a context for these poignant objects, exploring how historians have depicted people's experiences of death and grief in nineteenth-century Britain and New Zealand, and highlighting the place of mementos in mourning customs and their value in helping the bereaved to come to terms with loss.

Nineteenth-Century Deathways and Historical Writing

Queen Victoria has enjoyed renewed popularity in recent years with the on-line launch of her private diaries, the publication of new biographies, the release of feature films and a television series that captures the burning passions of her relationship with Prince Albert.[1] Modern readers have been intrigued by her candid writings with the *New Zealand Herald* memorably describing them – with pardonable exaggeration – as "50 Shades of HRH".[2] The public availability of the archives and the swathe of interpretations in print and visual media have led to a much more nuanced view of Queen Victoria that destroys many of the old stereotypes. There is one myth, however, that remains. She is often said to best exemplify the unhealthy obsession of Victorians with death and has been held up not only as 'a Crepe Deity' but also a fairly typical mourner from the period. The image of Queen Victoria in 'widow's weeds' has been firmly etched in popular imagination and the broad details of her story are well known. She lost her mother, the Duchess of Kent, on 16 March 1861, and fell into deep melancholy from which she was only just recovering when her beloved Prince Albert died unexpectedly 9 months later. In a moving letter to King Leopold of Belgium, she lamented how she had now become "the utterly broken-hearted and crushed widow of forty-two! My *life* as a *happy* one is *ended*! the world is gone for *me*!"[3]

Historian Patricia Jalland has convincingly argued that Queen Victoria suffered from a form of chronic grief that was characterised by an "obsessive preoccupation" with her husband and a severe depression, which lasted for many years (Jalland 1996: 320). There was no doubt that she suffered terribly. Her diaries and letters, for example, reveal how she struggled with the sorrow of "losing half of her body and soul, torn forcibly away … it is like *death* in life".[4] Albert's room and personal belongings, including fresh clothes, were set out each day as if he would re-enter this world again at any moment. Victoria experienced crippling headaches, disturbed sleeps and dreadful aches and pains. She was haunted by memories of Albert to such a degree that even the smallest prompts, such as the sound of a nightingale, could trigger intense pining and distress. The 'Widow of Windsor' withdrew from public life and the length of her seclusion went well beyond the two or three years expected at the time. There were persistent rumours of insanity. The Queen received criticism in the British press and endured a campaign against her absence from public ceremonial duties, even though she continued the work of state behind the palace doors. Victoria's recovery was gradual and erratic. Ten years after Albert's death her physician, Sir William Jenner, would still write that her condition was a "form of madness" (Jalland 1989: 174).

The Queen, it turns out, was certainly neither a typical Victorian mourner nor a typical widow. She engaged in conventional practices and rituals such as mourning dress and keepsakes, but the kind of "*violent*" and protracted grief to which she was particularly susceptible was as unusual then as it is today.[5] There is no doubt that her experience has tainted historical writing about the period. Whereas Philippe Ariès (1981) painted a sympathetic portrait of the Victorians in his magisterial study of Western attitudes to death, some British scholars attacked what they saw as the obsessive morbidity of the era. Even John Morley's *Death, Heaven and the Victorians* (1971), which seems so path-breaking now in terms of its emphasis on material culture and the influence of Romanticism, is not entirely separate from this narrative. Queen Victoria serves an important illustrative function here, especially in relation to dress and etiquette.[6] The most scathing critique, however, was made in an important essay by David Cannadine (1981), for whom "the Victorian celebration of death was not so much a golden age of effective psychological support as a bonanza of commercial exploitation". The ostentatious funerals, elaborate rituals and mourning paraphernalia were "more an assertion of status than a means of assuaging sorrow, a display of conspicuous consumption rather than an exercise in grief therapy, from which the chief beneficiary was more likely to be the undertaker than the widow" (Cannadine 1981: 191). An excessive focus on loss and sorrow was both unnecessary and damaging to such an extent that it "robbed" the bereaved of "the will to recover". Queen Victoria, on this reading, was the most spectacular example of a much wider disorder.

The work of historians over the last three decades has refuted this interpretation and given us a deeper understanding of Victorians and death in Britain and throughout the empire. In the first place, it has reminded us not to confuse grief (the experience of sorrow) with its formal expression (mourning rituals) or to assume a causal relationship between the two (as in the case of Queen Victoria). The available evidence from diaries, letters and other sources show that many Victorians found solace in contemporary mourning customs, which allowed them to express sorrow in ways that made their grieving more bearable. Black crepe, veils and gloves, for example, could be expensive, restrictive and uncomfortable, but they were more a valuable therapeutic aid than a form of sartorial torture when viewed in their wider cultural framework and alongside the literary evidence (Jalland 1996: 300–307). Morley's depiction of a "congealed" and "morbid romanticism" has not fared well (Morley 1971: 14, 15). Nor have ethnocentric interpretations that view the period's beliefs and practices as macabre, mawkishly sentimental, "rather absurd" or downright "pathetic" (Curl 1972: xiii, xiv).

The ground has also shifted underneath the taken-for-granted notion that the Victorian period was somehow peculiar in its concern with death. Ruth Richardson (1987), Patricia Jalland (1996), John Wolffe (2000) and others have clearly shown that so many of the features we associate with Victorian deathways are, in fact, the outcome of various influences and precedents, many of them Georgian and some, like the ars moriendi (the art of dying well), from a much longer lineage. We have a better appreciation now of the crucial consolatory role played by spiritual resources, including Evangelicalism, in helping Victorians make sense of their loss and sorrow. There are excellent studies in Britain, New Zealand and Australia on a range of topics that include grief and poverty (Strange 2005), colonial mortuary politics (Ballantyne 2014), cemeteries (Trapeznik and Gee 2013; Deed 2015), suicide (Bailey 1998), and dissection (MacDonald 2006). In short, this research reveals continuities as well as the revolutionary changes mapped so brilliantly in Thomas Laqueur's *The Work of the Dead* (2015).

Figure 1. Black enamel locket with lily of the valley decoration and pearl bud inlay. The locket contains a clipping of blonde hair (right). It came to the Museum from the estate of Janet Mabella Shaw (1883–1958) but the story of the locket has been lost. Canterbury Museum EC158.303

Making Sense of Nineteenth-Century Mourning Art

What can the mourning jewellery held by Canterbury Museum tell us about nineteenth-century migrant deathways? To what extent does it match wider patterns from the period? To answer these questions we need to turn to new work that has been influenced by the material turn in historical research and how it adds further depth to our understanding of late Georgian and Victorian practices of remembrance and commemoration (Fraser 2017). Women will-makers in Canterbury, for example, made bequests that suffused everyday material objects with emotive charge in ways that were different to men. The symbolic tokens varied in kind from money to clothing, and from furniture to jewellery, but they shared a capacity to venerate close personal ties. Domestic servant Mary Lukeman, for example, gave "two pairs of long netted curtains", a "fancy patchwork quilt" and her watch, chain and "fancy work" to friends.[7] Peternell Manaton, who arrived in the province aboard the *Mermaid* in 1862, made many bequests including an unmade black silk dress, a paisley shawl, a set of earrings and a gold ring to her daughter, Mary Opie, and a dress cap and shawl for her sister, Eliza Keast.[8] Testamentary writing, then, constituted an act of remembrance in which tokens of affection exchanged post-mortem intimately linked the living with the dead, often over long distances (Fraser 2019).

Outside of wills we find other melancholy objects that served as vehicles of memory across the English-speaking world. Flowers and scented plants were used symbolically, for example, on beautifully rendered memorials at Addington Cemetery, Christchurch. The flower, lily of the valley (*Convallaria majalis*), is associated with loss and was used in mourning jewellery, as in the black enamel locket in Figure 1. Flowers also featured prominently in death portraiture. Posthumous images of children followed, in their composition, nineteenth-century conventions of 'the last sleep', and became powerful visual mementos that were kept in albums and bibles, or placed on display in family homes. Death masks, samplers, memorial church windows, portraits and gravestone inscriptions, to name but a few, served as important sources of consolation for the bereaved. Many museums throughout New Zealand and Australia also hold commissioned pictures of widows in their 'black weeds' of paramatta and crepe. Although the provenance of many of these photographs has been lost, they do reveal the gendered experience of grieving, the social expectations that accompanied their new status, and the different sartorial phases through which they passed. If faith and memory provided solace for widows, dress made mourners visible. It showed respect for the deceased and captured the sombre mood of loss. These images also reveal a close association between mourning attire and memorial jewellery: a variety of brooches, rings and lockets are evident in the photographs, much like those found in Canterbury Museum's collection.

One of the most striking aspects of these intimate artefacts is the use of human hair to commemorate close personal ties and provide physical proximity to the dead. This practice will be familiar to readers of nineteenth-century fiction. In Emily Brontë's *Wuthering Heights* (1847), for example, Nelly Dean, the amiable housekeeper at Thrushcross Grange, confesses after Catherine Linton's death to being "seldom otherwise than happy while watching in the chamber of death", where, on this occasion, she admits to enclosing two curls of hair in a trinket that hung around the deceased's neck: "I see a repose that neither earth nor hell can break; and I feel an assurance of the endless and shadowless hereafter – the Eternity they have entered – where life is boundless in its duration, and love in its sympathy, and joy in its fullness" (Brontë 2006: 196). When Virginie dies in Flaubert's 'A Simple Heart' (1877), a distraught Félicité does not leave her bedside for two nights. She prays incessantly, sprinkles holy water on the sheets, and gazes "fixedly" at the girl's corpse. After laying out Virginie, wrapping her in a shroud and placing her in a coffin, Félicité arranges her hair. The housemaid cuts off a long lock "and slipped half of it into her bosom, resolving that it would never be separated from her" (Flaubert 2005: 25). The power of hair mementos in binding the living and the dead is also captured in Elizabeth Barrett Browning's poem 'Only a Curl' (1862), which speaks to the continuing bonds between a grieving mother and the daughter she has lost:

You know how one angel smiles there.
Then weep not. 'Tis easy for you
To be drawn by a single gold hair
Of that curl, from earth's storm and despair,
To the safe place above us. Adieu.

Outside the realm of fiction and poetry, historians have uncovered numerous examples of the ways in which hair jewellery was used symbolically to represent the dead. Soon after Prince Albert's death, Queen Victoria commissioned a range of keepsakes that included a gold pin with an onyx cameo portrait of her husband with a locket fitting at the back for his hair. At the first post-mortem wedding anniversary, her sister, Princess Feodora of Leiningen, gave her a bracelet set with Albert's hair and that of her family (Bury 1997). When Lord Frederick Cavendish was murdered in Phoenix Park, Dublin, in 1882, a quick-thinking Lord Spencer not only arranged the post-mortem photographs for his wife but also cut off a lock of his hair. Lucy Cavendish took "deep comfort" from the images and treasured the hair which she had

Figure 2. Brooch with gold border in flower and leaf design. Swivel centre with glass on both sides for displaying portraits or hair. Donated in 1962 by Janet Storry, the granddaughter of the original owner, Elizabeth White (c.1826–1904). Canterbury Museum EC162.116

Figure 3. Elizabeth White (c.1826–1904) wearing the brooch EC162.116 (Fig. 2). Canterbury Museum 1970.163.35

set into a diamond locket (Jalland 1989: 182). Hair mementos also travelled. Historians who have studied the personal correspondence of Irish migrants in nineteenth-century Australasia have noted how symbolic tokens such as locks of hair from deceased relatives formed an important part of the ritual of communication. The exchange of relics of this type carried a great deal of risk. Letters could be lost or delayed, creating anxiety for both the intended recipient and writer (Fitzpatrick 1994; McCarthy 2005; Fraser 2007).

Hair of the living was often used to express love and connections. Elizabeth Barrett Browning, for example, treasured both her sisters' and husband's locks in this way (Ofek 2009: 47). Locks of human hair were important mementos. Swivel brooches were designed to hold photographs of loved ones, but the space on the back (closer to one's body) was often used to keep a lock of hair. Elizabeth White née Wain (c.1826–1904) who arrived in Lyttelton in 1852 wore a gold brooch of this design (Fig. 2) and can be seen wearing it in Figure 3. Unfortunately it is impossible to see what Elizabeth had in the brooch and it was empty when it was donated to Canterbury Museum in 1962.

Jewellery made from human hair was fashionable in late Georgian and Victorian times and Canterbury Museum has some exquisite examples. The beautifully rendered hair watch cord with fob, pictured in Figure 4 (EC164.19), was made as a token of affection between a wife and husband. The hair in this piece was Arabella Anderson's, who arrived in Canterbury on the *Crusader* in 1872, and the cord was worn by her husband, Charles. It was not only the hair in this piece that was symbolic. One side of the tiny bottle in the fob is made from carnelian, which signifies contentment and friendship, while the other side is made of green agate, signifying health and longevity.

The watch and cord in Figure 5 (EC158.78.2) may have had a similar sentimental connection. It was donated to the Museum by Dr Donald Currie and was described as his grandmother's. Any story behind the personal connection of Christchurch teacher Annie Webb (1867–1960) with the necklace or armlet made from six woven braids of human hair (Fig. 6, EC165.96) has since been lost.

We are in a better position in relation to the stunning bracelet shown in Figure 7 (EC177.211), which was made from three strands of plaited human hair. It features gold, ivory, diamonds and rubies. The back of the clasp has a small oval glass locket for a lock of hair. According to family memory, it was made from the hair of Emma Parkerson (née Mount, 1810–1894) (see Fig. 8), who sailed to Canterbury in 1853 and became prominent in church affairs and charitable work.

While the intricate craft and design of these keepsakes suggests that they were commissioned from jewellers, who most likely left the fine weaving to women hairworkers, it is possible that they were made at home. Shirley Bury (1997) and Maureen DeLorne (2004) have both noted the keen popular interest in this art form during the nineteenth century and how magazine articles and books

Figure 4. A watch cord woven from human hair with metal fittings and a tiny bottle included in the 40 mm long fob. The bottle has green agate on one side and red carnelian on the other. Donated in 1964 by the two surviving daughters of Arabella Anderson (c.1845–1930) whose hair was used to make this love token for her husband Charles. Canterbury Museum EC164.19

on the subject fostered hair work as a home craft. An influential text entitled *The Lock of Hair* was written by Alexanna Speight, a London businesswoman and hairworker, and published in 1871. Part II of the book is subtitled *The Art of Working in Hair* and it offered Victorians finely detailed instructions on how to go about this task. First, the hair was to be "cleansed" from impurities with water, soda and borax, before being spread out on a palette and trimmed at the ends (Speight 1871: 87). In the second step, curling-irons and a candle flame were to be used to create the curl that was fixed "by means of a little gum" and pressed under a sugar loaf weight (Speight 1871: 90). Finally, it was completed by dampening the curl, removing the gum, spreading it out carefully with a knife and leaving it to dry. Speight's advice extended from basic shapes to far more complex creations such as feathers, ears of barley, pearl bands, sprays and plaits. *The Lock of Hair* gives modern readers a clear idea about how this work was done and the skill required to manage needles, gold wire, naked flame and other aspects of the process.

Mark Campbell's *Self-Instructor in the Art of Hair Work* published in the United States in 1867 provided similar guidance. Campbell made the point that by doing the weaving themselves (rather than taking hair to a professional), a person had the certainty

Figure 5. One pocket watch on a guard chain made from braided human hair. The watch was made by B Petersen & Co of Christchurch, c. 1900. Donated in 1958 by Dr Donald Currie. Canterbury Museum EC158.78.2

Figure 6. A love token made from six woven tubes of human hair and finished with gold fittings. Originally described as an armlet, it is now thought to be a short necklace with the connecting chain missing from the back. Donated in 1965 by Esme Hewitt, the niece of the previous owner, teacher Annie Webb (1867–1960). Canterbury Museum EC165.96

Figure 7. Bracelet made from three strands of plaited human hair with a gold and ivory clasp, set with 12 small diamonds and four cabochon rubies. Attached to the clasp is a thin gold link chain with two pendants of ivory each set with five cabochon rubies. The back of the clasp has a small oval glass locket for hair. Donated in 1968 by Emma Blackler, the daughter of Emma Parkerson whose hair this bracelet was made from. Canterbury Museum EC177.211

Figure 8. Emma and Burrell Parkerson with one of their daughters. Photographed by Alfred Barker, 21 June 1870. Canterbury Museum 1944.78.222

Figure 9. Framed carte de visite with hair work decoration. The sitter is unknown but the portrait was taken by photographer Samuel Charles Louis Lawrence, known as Charles Lawrence, who had a studio in Oxford Terrace, Christchurch, c.1866 to 1875. Canterbury Museum 2009.28.69

of "*knowing* [original emphasis] that the material of their own handiwork is the actual hair of the 'loved and gone'" further indicating the sentimental importance of the hair itself (Campbell 1867: 6).

In New Zealand, hair jewellery was made commercially by jewellery establishments such as W Sandstein of Christchurch who in 1880 exhibited "some beautiful specimens of hair work" including crosses mounted in gold and silver (*Press*, 17 July 1880: 3), but it is clear that this was a craft that was also undertaken at home. In 1891, a writer reminisced that 20 or 30 years ago a popular hobby "was the weaving knitting and plaiting of hair" and that "many a lover was the recipient of a watch guard woven by his fair one's hands from her own locks" (*Ashburton Guardian*, 12 November 1891: 2).

While not an item of jewellery, Canterbury Museum has one example of hair work made in the 1870s that has a looser and more variable construction technique, strongly suggesting that it was made at home by a grieving relative (Fig. 9). This piece is also significant because it reveals that the memorial practice of surrounding the visual traces of the dead with flowers and woven locks was present in Canterbury at that time, just as it had been in parts of Europe and the Americas (Batchen 2004: 91).

Tokens of love and affection could, in turn, transition into memento mori. Such was the case for the simple necklace in Figure 10 (EC160.181) donated in 1960 by Annie Isabella (Nancy) Foley. She was a descendant of one of two Scottish-born sisters, Cecilia (1802–1880) and Isabella Pringle (1805–1836), whose hair was combined to craft this keepsake. Although there is significant fading, a close inspection reveals that the hair of these

Figure 10. One 815 mm long double-string hair necklace with five joins and a hinged catch. Made from the hair of two sisters, Cecilia (1802–1880) and Isabella Pringle (1805–1836) and donated to the Museum in 1960 by Nancy Foley, Isabella's granddaughter. Canterbury Museum EC160.181

women had quite different shades. It seems most likely that the necklace was made in the early 1830s, shortly before Isabella set sail for India, perhaps an indication that the sisters felt that it was unlikely that they would meet again. Isabella married in India in 1835 and died one year later, shortly after the birth of her only child. The necklace passed to her son, Robert John Foley, who followed his father into the British Army and was in New Zealand on military service by the 1860s.

Style and differences between love tokens and keepsakes can be very small or even non-existent, which can make them difficult to identify correctly. Once the story of the item has been lost it can be difficult to tell whether a piece was made as a token of affection or as a mourning object. And, as already mentioned, an item may have transitioned from one to the other. We have identified two pieces at Canterbury Museum that are examples of this. The first, shown in Figure 11 (EC167.50), is a weighty silver chain with an intricately detailed locket. On the back of the locket, the name Maggie Kennedy has been engraved and inside the locket is a small piece of plaited human hair. The hallmark indicates that the locket was made in Birmingham in 1893 and it is likely that it was engraved locally. Was the necklace given to Maggie Kennedy and a piece of her hair added after her death, or did she add the hair of a loved one to her own necklace?

The second is an excellent example of one of the most popular post-1850 forms of curling. Figure 12 (EC169.35) shows a tubular metal brooch featuring a Prince of Wales plume and gold embroidery. The item was donated by Annie Connal Dent (1884–1969) along with a miniature of her grandfather Captain William

Figure 11. Silver chain necklace with locket containing a loose plait of human hair (inset), c.1893. The back of the locket has a hallmark indicating that it was made in Birmingham in 1893 and the name Maggie Kennedy engraved on it. Donated in 1967 by Pamela Jekyll Cuddon. Canterbury Museum EC167.50

Figure 12. A tubular metal brooch, 60 mm wide, with human hair inset with the hair arranged in the Prince of Wales style with gold embroidery. Donated by the estate of Annie Connal Dent in 1969. Canterbury Museum EC169.35

Figure 13. Captain William Roose, miniature on ivory, painted in Barcelona, c.1834. Canterbury Museum EC169.35A

Roose (Fig. 13) and it is possible that both items are memorial objects.

Other items are more clearly associated with mourning and the jewellery in all these cases is beautifully executed. One of the most striking can be dated to the late Georgian era. Figure 14 (EC161.64) takes the form of a braided necklace and pendant in the shape of a cross made from the hair of Ann Ollivier (née Wilby), who died in London in 1819 after the birth of her eighth child. John Ollivier (1812–1893) (Fig. 15) was 6 years old when his mother died and presumably brought this necklace with him as a keepsake when he came to Canterbury on the *John Taylor* in 1853. The necklace passed down a male line to his son, Arthur, and then to a grandson, Cecil. When it was donated to the Museum by Cecil's daughter, Lois, the necklace had not lost its family connection despite being 142 years old.

Figure 14. One hair necklace with gold fittings and an 80 mm long hair pendant in the shape of a cross. On the centre reverse of the cross is the engraving "A.O. August 30.1819, aged 49". "A.O." was Ann Ollivier née Wilby (1778–1819), wife of London accountant Claude Nicholas Ollivier. Ann died after the birth of her eighth child. The necklace was donated by Ann's great-great-granddaughter Lois Boyle in 1961. Canterbury Museum EC161.64

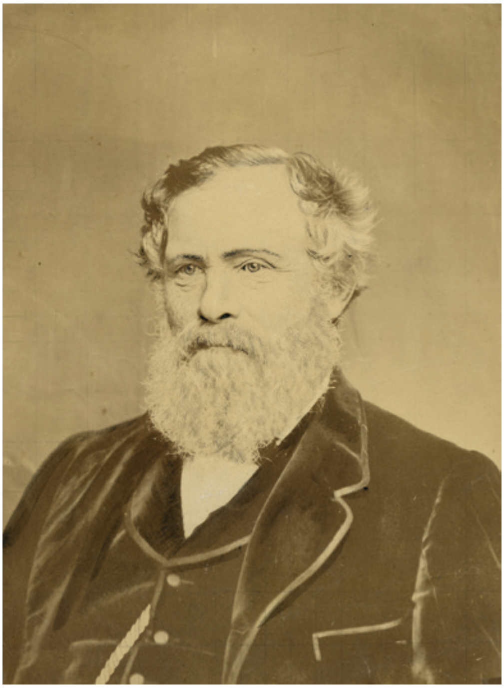

Figure 15. John Ollivier (1812–1893) who brought a necklace made from his mother's hair with him when he came to Canterbury in 1853, 34 years after his mother's death. Canterbury Museum 19XX.2.510

Also especially poignant is the black enamel locket (Fig. 1, EC158.303) with lily of the valley decoration. The flower symbolised a return to happiness and was often associated with mourning. Inside the locket is a lock of blonde hair. The elaborate bracelet made from multiple human hair braids in Figure 16 (EC151.56) also has an attached locket that contains a palette-worked curl, which is still in excellent condition. The piece was associated with Nellie Reeves, the daughter of newspaper editor William Reeves (1825–1891) and his wife Ellen (née Pember, c.1834–1919).

Other varieties of sentimental jewellery are less well represented in the collections. The Museum has only three examples of portraiture. The story behind the gold cameo brooch with a swivel mount and hand-tinted portrait on the reverse side (Fig. 17, EC150.401) is better recorded. It depicts Nelson schoolteacher Thomas Warnock (b. 1842), who died 3 days after the death of his youngest daughter, Florence, in 1891. The well-worn silver locket containing a photograph of Robert Stone Florance as a younger man in Figure 18 (EC158.141) may well have belonged to his wife Matilda, who outlived her husband by nearly a quarter of a century, and transitioned into a mourning object after his death.

Also connected with the Florance family is the wonderful collection of memorial objects in Figure 19 (EC160.154). The locket is clearly a mourning item. Confusingly, it contains a photograph of Matilda Sophia Henrietta Florance née Bamford (1862–1952) as a young woman. As Matilda died only 8 years before the locket was donated (aged 90), it is likely that the photo was added to this locket after her death, perhaps from another locket. The other two objects both contain human hair. In one it is clearly on display while in the other a fancy curl is hidden under a hinged cover.

Mourning rings were popular but Canterbury Museum has only one example. The gold signet ring with an uncut cameo in Figure 20 (EC174.448) is dated to 1861. The cameo is hinged and underneath is a small lock of fair hair.

There are a small number of objects in the collection that feature jet-working. Jet has been worked for centuries, but the industry expanded rapidly in England from the mid-nineteenth century due to technological advances (the lathe) and growing consumer demand after its central role in court mourning for William IV (1765–1837) and its display at the Great Exhibition in Hyde Park, London, in 1851 (Morley 1971: 66). The best jet mourning jewellery, and certainly the most desirable for modern collectors, was fashioned from English Whitby. There were also important imitations of this type of coal, with French jet (glass), England's Vauxhall glass, and Irish bog oak providing viable alternatives (DeLorne 2004: 110–115). The matching set of necklace, earrings and brooch in Figure 21 (19XX.3.372) is a striking example of jet

Figure 16. Bracelet made from multiple human hair braids twisted together. The attached gold locket with cross contains a lock of hair (right). Donated in 1951 by Elizabeth Hope O'Rorke from the estate of her aunt Ellen Mary Reeves (1866–1951). Canterbury Museum EC151.56

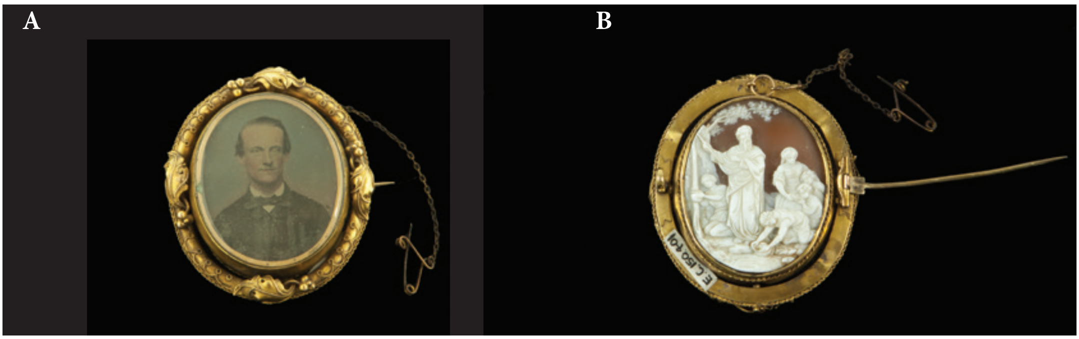

Figure 17. Gold brooch with swivel mount. **A**, the hand-tinted portrait on one side is of Thomas Warnock (1842–1891). **B**, the cameo on the other side is of a biblical scene. The brooch was donated in 1950 by Thomas Warnock's daughter, Maude Warnock, on behalf of her sister Sarah. Canterbury Museum EC150.401

Figure 18. Engraved silver locket, shown closed (left) and open (right) with a photograph of lawyer Robert Stone Florance (1856–1928). The 40 mm long locket was donated in 1958 by Florance's daughter Ethel Moffat. Canterbury Museum EC158.141

Figure 19. This group of memorial objects was donated by Ethel Moffat in 1960. **A**, the small (20 mm) gold "in memory of" locket contains a photograph of Ethel's mother, Matilda Sophia Henrietta Florance née Bamford (1862–1952), the wife of Robert Stone Florance (see Fig. 18). **B**, the small clear container has a lock of hair in it. **C**, the gold coloured round locket with the hinged cover contains a piece of curled hair and a pearl. Canterbury Museum EC160.154

manufacture. It was originally donated to the Pilgrims' Association by Gertrude Lovell-Smith and came to Canterbury Museum as part of the Pilgrims' Association transfer in the late 1940s.

Items made from jet tended to be less personal than jewellery containing hair and photographs and women may well have had a number of pieces that could be worn whenever the occasion warranted it. In terms of Canterbury Museum's collection, none of the jewellery made from jet have any association with a particular bereavement, for example Figures 22 and 23. The two beautiful sets of black earrings (Figure 24, EC1990.866 and EC1990.867) worn by Nina Fox (c.1872–1950) of Christchurch suggest that these kinds of pieces were worn during mourning into the twentieth century in New Zealand.

Figure 20. A gold signet ring with an uncut cameo which is hinged, underneath is a small lock of fair hair, c.1861. This ring was donated anonymously in 1974. Canterbury Museum EC174.448

Conclusion

The mourning jewellery housed in Canterbury Museum was made, used and treasured at a time of momentous changes in European deathways, which would become world historical in their impact. The shift to a new regime of the dead and views of the departed and afterlives that was grounded in memory and sentiment was vividly expressed on the edge of empire in spaces like the Barbadoes Street Cemetery. It is also evident in industries that fed a growing demand for keepsakes such as those we have showcased in this article. Yet capitalism's move into "the market for memory" is only part of the story (Laqueur 2015: 293). Hair bracelets, for example, brought mourners into intimate association with the body of the deceased and provided solace at a time of grief. In some cases these objects transitioned from love to death or, put differently, from tokens of affection to

Figure 21. Matching necklace, earrings and brooch carved in jet. The necklace's larger central pendant has been lost. Originally given to the Pilgrims' Association by Gertrude Lovell-Smith née Hicks, the set came to Canterbury Museum as part of the Pilgrims' Association transfer in the late 1940s. It is not known whether they were a family heirloom or had been given to Gertrude to pass on to the Pilgrims' Association. Canterbury Museum 19XX.3.372

Figure 22. Donated by Janet Storry in 1962, this delicate mourning bracelet is made of small and medium size jet beads. Canterbury Museum EC162.130

momento mori. Some were made locally but most had travelled to New Zealand and many had been commissioned in Britain. Perhaps the best explanation for the power of these pieces in nineteenth century practices of mourning and commemoration was given by Emily Brontë's fictional Nelly Dean when she reads an old letter she had kept from Isabella Linton. "Any relic of the dead is precious," she tells a convalescing Mr Lockwood, "if they were valued living" (Brontë 2006: 159). Yet objects which came into museums could lose this contemporary value as connections within families were lost or forgotten. Such objects often transitioned, as we have shown, to become curios and collector's items, as families donated them to a place where they could be kept safely, enjoyed, and valued by a much wider range of people.

Acknowledgements

The authors are grateful to Louise Donnithorne and Joanna Szczepanksi for help in locating jewellery, Geraldine Lummis for information on the Kinsey Collection, Jill Haley for information on photographer Charles Lawrence, Margaret Lovell-Smith for family history information, and Nicolas Boigelot for photography. Thank you to peer reviewers Claire Regnault, Jill Haley and Chloe Searle for their very helpful comments and suggestions.

Endnote

1 See, for example, Julia Baird (2016); *Victoria* (ITV Series, 26 August 2016 – 12 May 2019); *Victoria and Abdul* (dir. Stephen Frears, 2017).

Figure 23. Donated by Dorothy Isobell Oliver in 1958, the history of this three string necklace of jet beads has been lost. Canterbury Museum EC158.366

Figure 24. Two pairs of mourning earrings worn by Nina Fox (c.1872–1950) of Christchurch. The pair at the left are made of jet and have a drop of 35 mm while the pair on the right are black glass with a drop of 75 mm. The earrings were presented to the Museum in 1990 by Sylvia Sibbald Fox, the daughter of Nina and Dr Walter Fox. Canterbury Museum EC1990.866 (left) and EC1990.867

2 Danilea Elser, Queen Victoria's Wild Royal Sex Diaries Revealed, *New Zealand Herald*, 26 May 2019. Available from: https://www.nzherald.co.nz/lifestyle/news/article.cfm?c_id=6&objectid=12234408

3 Queen Victoria to King of the Belgians, 20 December 1861, in Benson and Esher (1908).

4 Queen Victoria to Earl Canning, 10 January 1862, in Benson and Esher (1908).

5 The italicized '*violent*' is from Queen Victoria to Lady Waterpark, Osborne, 10 February 1867, British Library Manuscripts, Add. 60750, Extract 60750, Lady Waterpark, 1:271. Quoted in Baird (2016: 349).

6 See, for example, Taylor (1983).

7 Will of Mary Lukeman, Archives New Zealand, Christchurch, CH A95/1874.

8 Will of Peternell Manaton, Archives New Zealand, Christchurch, CH A18/1875.

References

Ariès P. 1976. *Western Attitudes Toward Death: From the Middle Ages to the Present*. Baltimore and London: John Hopkins University Press.

Ariès P. 1981. *The Hour of Our Death*. New York: Knopf.

Baird J. 2016. *Victoria the Queen: An Intimate Biography of the Woman Who Changed the World*. Sydney: HarperCollins.

Bailey V. 1998. *This Rash Act: Suicide Across the Life Cycle in the Victorian City*. Stanford: Stanford University Press.

Ballantyne T. 2014. *Entanglements of Empire: Missionaries, Māori, and the Question of the Body*. Durham: Duke University Press.

Batchen G. 2004. *Forget Me Not: Photography and Remembrance*. New York and Amsterdam: Princeton Architectural Press and Van Gogh Museum.

Benson AC, Esher V, editors. 1908. *The Letters of Queen Victoria: A Selection from Her Majesty's Correspondence between the Years 1837 and 1861. Volume III, 1854–1861*. London: John Murray.

Brontë C. 2006. *Wuthering Heights* (1847). London: Penguin.

Bury S. 1997. *Jewellery, 1789–1910: The International Era, Volume II, 1862–1910*. Woodbridge: Antique Collector's Club Ltd.

Campbell M. 1867. *Self-Instructor in the Art of Hair Work, Dressing Hair, Making Curls, Switches, Braids and Hair Jewellery of Every Description*. New York: Mark Campbell. Available from: https://www.gutenberg.org/files/38658/38658-h/38658-h.htm [cited 19 March 2020].

Cannadine D. 1981. War and death, grief and mourning in modern Britain. In: Whaley J, editor. *Mirrors of Mortality: Studies in the Social History of Death*. London: Europa; p. 187–244.

Curl J. 1972. *The Victorian Celebration of Death*. Towbridge and London: David & Charles.

Deed S. 2015. *Unearthly Landscapes: New Zealand's Early Cemeteries, Churchyards and Urupā*. Dunedin: Otago University Press.

DeLorne M. 2004. *Mourning Art and Jewellery*. Atglen: Schiffer.

Fitzpatrick D. 1994. *Oceans of Consolation: Personal Accounts of Irish Migration to Australia*. Cork: Cork University Press.

Flaubert G. 2005. "A Simple Heart" in *Three Tales* (1877). London: Penguin.

Fraser L. 2007. *Castles of Gold: A History of the West Coast Irish*. Dunedin: Otago University Press.

Fraser L. 2017. "Death in Nineteenth-Century Australia and New Zealand". *History Compass* 15: 1–14.

Fraser L. 2019. "To my child now expecting to be born": Women's Wills as Acts of Remembrance in Victorian Canterbury. Unpublished paper presented at: 1869 Conference and Heritage Festival; University of Otago, 27 September 2019.

Jalland P. 1989. Death, grief and mourning in the upper-class family. 1860–1914. In: Houlbrooke R, editor. *Death, Ritual and Bereavement*. London and New York: Routledge; p. 171–187.

Jalland P. 1996. *Death in the Victorian Family*. Oxford: Oxford University Press.

Laqueur TW. 2015. *The Work of the Dead: A Cultural History of Mortal Remains*. Princeton: Princeton University Press.

MacDonald H. 2006. *Human Remains: Dissection and its Histories*. Yale: Yale University Press.

McCarthy A. 2005. *Irish Migrants in New Zealand, 1840–1937*. Woodbridge: The Boydell Press.

Morley J. 1971. *Death, Heaven and the Victorians*. London: Studio Vista.

Ofek G. 2009. *Representations of Hair in Victorian Literature and Culture*. Farnham and Burlington: Ashgate Publishing.

Richardson R. 1987. *Death, Dissection and the Destitute*. London and New York: Routledge and Kegan Paul.

Speight Mrs. A. 1871. *The Lock of Hair: Its History, Ancient and Modern, Natural and Artistic; With the Art of Working in Hair*. London: A Goates, Printer.

Strange J. 2005. *Death, Grief and Poverty in Britain, 1870–1914*. Cambridge and New York: Cambridge University Press.

Taylor L. 1983. *Mourning Dress: A Costume and Social History*. London: Allen and Unwin.

Trapeznik A, Gee A. 2013. "Each in his own narrow cell for ever laid": Dunedin's Southern Cemetery and its New Zealand Counterparts. *Public History Review* 20: 42–67.

Wolffe J. 2000. *Great Deaths: Grieving, Religion and Nationhood in Victorian and Edwardian Britain*. Oxford: Oxford University Press.

A redescription of *Philoponella congregabilis*, an Australian hackled orb weaver spider (Uloboridae) now found in Christchurch, New Zealand

Cor J Vink[1,2,3] and Kate M Curtis[1,3]

[1]*Canterbury Museum, Rolleston Avenue, Christchurch 8013, New Zealand*

[2]*Zoological Museum, Centre of Natural History, University of Hamburg, Martin-Luther-King-Platz 3, D-0146 Hamburg, Germany*

[3]*Department of Pest-management and Conservation, Lincoln University, Lincoln 7647, New Zealand*

Email: cvink@canterburymuseum.com

Philoponella congregabilis (Rainbow, 1916), an Australian spider in the family Uloboridae, has recently established in Christchurch, New Zealand. The species is redescribed. It builds reduced, horizontal or sloping orb webs in low vegetation, on fences, under eaves and in outbuildings. The webs of different individuals can be interconnected. *Philoponella congregabilis* is found in eastern and southeastern Australia and its current New Zealand distribution is limited to the southern suburbs of Christchurch.

Keywords: invasive spider, taxonomy, uloborid

Introduction

The Uloboridae include small spiders that are unusual in that they do not have cheliceral venom glands. Instead of envenomating their prey, uloborids wrap their prey tightly with large amounts of silk, which breaks the cuticle (Eberhard et al. 2006). The spider then regurgitates digestive enzymes over its prey and feeds on the liquefied body (e.g. Weng et al. 2006). Most uloborids, including the genus *Philoponella* Mello-Leitão, 1917, construct small, reduced, cribellate orb webs and are commonly known as hackled orb weavers. Uloborids can be mistaken for small members of the orb weaving family Araneidae, but can be differentiated by their cribellum and calamistrum (Figs 1–4). These structures are used to produce cribellate (hackled) webbing.

Waitkera waitakerensis (Chamberlain, 1946), found only in the North Island (Opell 2006), used to be the only species in the family Uloboridae known from New Zealand. That changed sometime before October 2014, when the Australian species *Philoponella congregabilis* (Rainbow, 1916) established itself in Christchurch and has now spread to a number of localities in southern Christchurch. Because the original and only description of *P. congregabilis* is not sufficient to identify specimens with certainty, we redescribe *P. congregabilis* here. We also plot its current distribution in New Zealand so that any further spread can be followed.

Methods

Specimens were collected from locations in the south of Christchurch. In some cases adults could not be found, so immature specimens were reared in the laboratory until they moulted as adults. Specimens were examined in 80% ethanol with a dissection microscope. Female internal genitalia were excised using a sharp entomological needle and cleared in lactic acid. All measurements are in millimetres (mm). Measurements of the redescribed specimens were made using

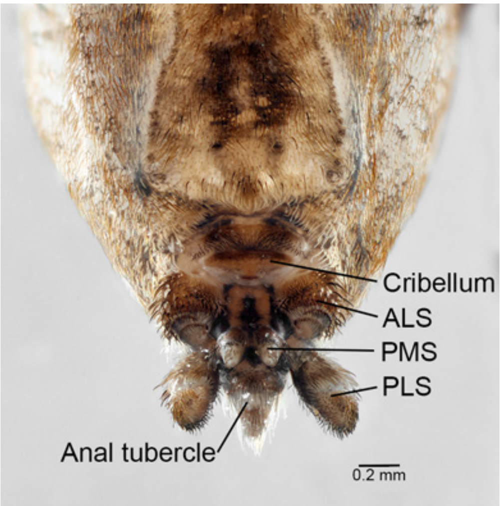

Figure 1. Ventral view of the anterior of a male *Philoponella congregabilis* (ZMH A0002084). Abbreviations: ALS, anterior lateral spinneret; PLS, posterior lateral spinneret; PMS, posterior median spinneret

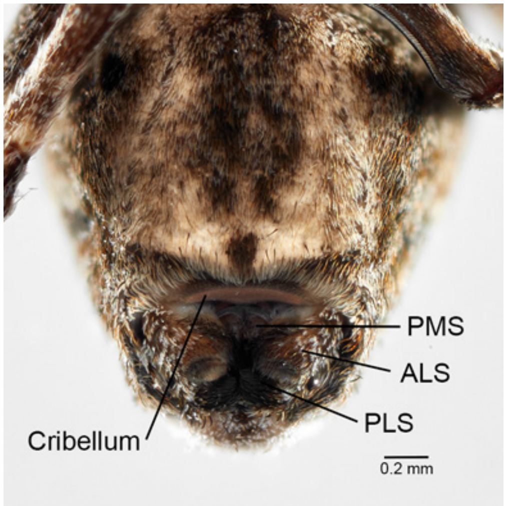

Figure 3. Ventral view of the anterior of a female *Philoponella congregabilis* (ZMH-A0002084). Abbreviations: ALS, anterior lateral spinneret; PLS, posterior lateral spinneret; PMS, posterior median spinneret

Figure 2. Hindleg IV of male *Philoponella congregabilis* (ZMH A0002084) showing the calamistrum on the dorsal surface of the metatarsus

Figure 4. Hindleg IV of female *Philoponella congregabilis* (ZMH A0002084) showing the calamistrum on the dorsal surface of the metatarsus

Nikon NIS Elements software and a Nikon DS-Ri1 camera attached to a Nikon AZ100M stereomicroscope. Carapace and body length measurements of multiple specimens were made with a micrometer ruler fitted to the eyepiece of a Leica MZ8 stereomicroscope. The colouration description is given from specimens preserved in 80% ethanol. High resolution images of specimens were produced by Nadine Dupérré at the Zoological Museum, Centre of Natural History, University of Hamburg, using a BK Plus Lab System (Dun, Inc.) with integrated Canon camera, macro lens (65 mm) and Zerene focus stacking software. Specimens were also illustrated by Nadine Dupérré who used digital photos to establish proportions and microscope examination for detail and shading. Morphological nomenclature of the pedipalp and the epigynum follows Opell (1979).

Type specimens of *P. congregabilis* were loaned from the Australian Museum, Sydney, Australia, as the original illustrations by Rainbow (1916) were only lateral views of the entire male and female specimens, therefore identification could not be certain. High quality images of the types of the other two Australian *Philoponella* species that are held at the Zoological Museum, Centre of Natural History, University of Hamburg (ZMH), were compared to *P. congregabilis*; a syntype male and female of *P. variabilis* (Keyserling, 1887)

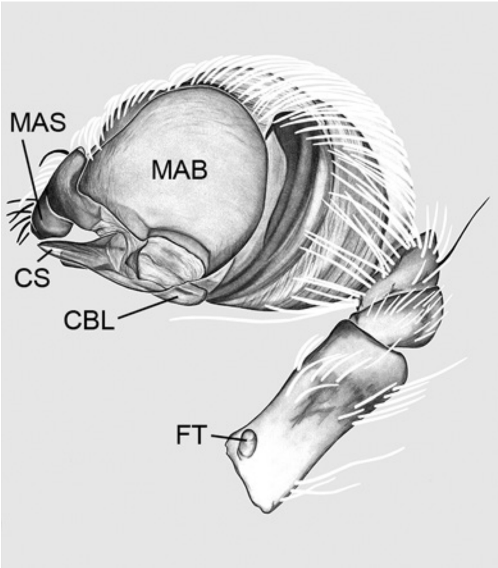

Figure 5. Left male pedipalp of *Philoponella congregabilis*, lateral view (ZMH A0002084). Abbreviations: CBL, conductor basal lobe; CS, conductor spike; FT, femoral tubercle; MAB, median apopysis bulb; MAS, median apophysis spur

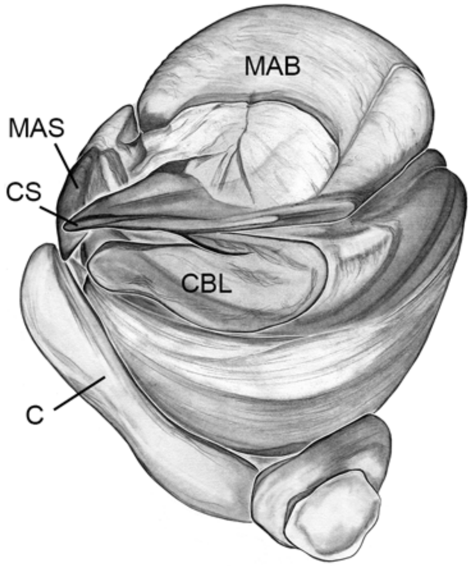

Figure 6. Left male pedipalp of *Philoponella congregabilis*, retrolateral view (ZMH A0002084). Abbreviations: C, cymbium; CBL, conductor basal lobe; CS, conductor spike; MAB, median apophysis bulb; MAS, median apophysis spur

(ZMH A0002113) and the possible type of *P. pantherina* (Keyserling, 1890) (ZMH A09184).

Specimens of *P. congregabilis* have been placed in the Canterbury Museum (CMNZ), Lincoln University Entomological Research Museum (LUNZ), Museum of New Zealand Te Papa Tongarewa (MONZ), New Zealand Arthropod Collection (NZAC) and ZMH.

Taxonomy

Philoponella congregabilis (Rainbow, 1916)

Figures 1–16

Uloborus congregabilis Rainbow 1916: 59, figs 1–2 (male and female).

Philoponella congregabilis (Rainbow); Lehtinen 1967: 258 (transferred from Uloborus).

Type specimens: Syntypes: 1 male and 3 females (AM KS6766), 2 males and 4 females (AM KS9272), examined. Australia: New South Wales: Parramatta, 11 Jan 1915, coll. A R McCulloch.

Other specimens examined: New Zealand: Christchurch: Hoon Hay, 43.5744°S, 172.6150°E, 18 Oct 2014, coll. M Provis, 1 male (CMNZ 2020.94.1). Cashmere, 43.5627°S, 172.6372°E, on fence, 7 Nov 2016, coll. K M Curtis, 2 males, 1 female (CMNZ 2020.94.2, 2020.94.3, 2020.94.8). Westmorland, 43.5825°S, 172.6057°E, outside greenhouse, 7 July 2019, coll. K M Curtis, collected as juveniles and reared in lab until adults, 1 male, 1 female (MONZ AS.004744); same data, 3 males, 2 females (NZAC 03029409). Westmorland, 43.5825°S, 172.6057°E, in greenhouse, 23 July 2019, coll. K M Curtis, collected as juveniles and reared in lab until adults, 2 males, 3 females (ZMH A0002084); same data, 1 male, 1 female (CMNZ 2020.94.4, 2020.94.5); same data, 1 male, 2 females (LUNZ 00012949). Somerfield, 43.56265°S, 172.62785°E, in web in garden, 4 Nov 2019, coll. C J Vink, 1 female (CMNZ 2020.94.6). Cashmere, 43.57547°S, 172.62914°E, in potting shed, 24 Nov 2019, coll. C J Vink & S J

Figure 7. Male *Philoponella congregabilis*, lateral view (ZMH A0002084)

Crampton, 1 female (CMNZ 2020.94.7); same data, 1 female and eggsac (CMNZ 2020.94.9). Huntsbury, 43.5643°S, 172.6508°E, under deck, 17 Nov 2019, coll. K M Curtis, 1 female and an eggsac (CMNZ 2020.94.10).

Diagnosis: Philoponella congregabilis can be separated from other species in the genus by the shape of the median apophysis bulb (Fig. 5) and the well-developed conductor basal lobe (Fig. 6). The large dorsal projection on the anterior half of the abdomen (Figs 7 and 8) separates *P. congregabilis* from the other two Australian *Philoponella* species, *P. variabilis and P. pantherina*. The gonopores of *P. congregabilis* (Fig. 8) are more anterior than those of *P. variabilis* and *P. pantherina*. The median apophysis bulb is much smaller in *P. congregabilis* than it is in *P. variabilis*. *Philoponella congregabilis* can be separated from *Waitkera waitakerensis*, which is the only other uloborid found in New Zealand, by the large dorsal projection on the anterior half of the abdomen in the former species (Figs 7 and 8) and by the very different form of the male pedipalp (Figs 5 and 6) and female epigyne (Figs 9 and 10).

Description: Male. Total length 2.95, carapace length 1.54, sternum length 0.92, abdomen length 1.91, carapace width 1.46, sternum width 0.69, and abdomen width 1.21. Leg I total length 7.41, length of articles: femur 2.28, patella 0.64, tibia 1.79, metatarsus 1.74, tarsus 0.96; leg II 3.77 (1.27, 0.47, 0.65, 0.86, 0.52); leg III 2.73 (0.85, 0.30, 0.45, 0.67, 0.46); leg IV 4.69 (1.36, 0.53, 0.97, 1.12, 0.71). Chelicerae length 0.35 and chelicerae width 0.21. Carapace black-brown with sparse yellow-brown pubescence and a longitudinal median strip of whitish setae (Fig. 11). Chelicerae, endites, labium a dusky red with blackish tones, sternum

Figure 8. Female *Philoponella congregabilis*, lateral view (ZMH A0002084). Abbreviation: PER, posterior epigynal rim

black-brown with cream setae (Fig. 12). Sternum brown with mostly white setae and some pale orange-brown setae (Fig. 12). Legs pale orange-brown distally to black-brown proximally. Legs with dark brown bands both ventrally and dorsally; many segments with light proximal bands and dark distal bands. Calamistrum on dorsal surface of metatarsus IV (Fig. 2). Abdomen pale yellow-cream with a large dorsal projection with six small dark tufts; black-brown dorsal square patch on the posterior end of the abdomen with white dots on the median edges of the square (Fig. 11). Venter of abdomen two longitudinal brown lines in a faint hourglass shape (Fig. 12). Anal tubercle and spinnerets dusky brown with specks of cream and cribellum present (Fig. 1). Male pedipalp with long pale yellow-cream setae that extend from the cymbium over the bulb (Figs 5 and 12) and finger-like femoral tubercle (Fig. 5). Median apophysis spur blunt and conductor spike with pointed tip (Fig. 5). Conductor blade well-developed (Fig. 6).

Female. Total length 4.90, carapace length 1.50, sternum length 1.02, abdomen length 3.81, carapace width 1.27, sternum width 0.72, and abdomen width 2.03. Leg I total length 6.14, length of articles: femur 1.97, patella 0.59, tibia 1.49, metatarsus 1.34, tarsus 0.75; leg II 3.27 (1.03, 0.46, 0.53, 0.71, 0.54); leg III 2.7 (0.84, 0.38, 0.40, 0.64, 0.44); leg IV 4.67 (1.38, 0.55, 0.99, 1.08, 0.67). Chelicerae length 0.46 and chelicerae width 0.24. Carapace brown with white and orange pubescence and longer setae forming two white longitudinal lines (Fig. 13). Chelicerae, endites, and labium pale orange with blackish tones (Fig. 14). Sternum brown with mostly white setae and some orange setae (Fig. 14). Legs brown with the metatarsus and tarsus light orange in legs I and II and the tarsus orange in legs III and IV. Calamistrum on dorsal surface of metatarsus

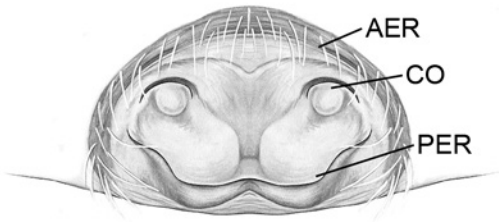

Figure 9. Epiginum of *Philoponella congregabilis*, ventral view (ZMH A0002084). Abbreviations: AER, anterior epigynal rim; CO, copulatory opening; PER, posterior epigynal rim

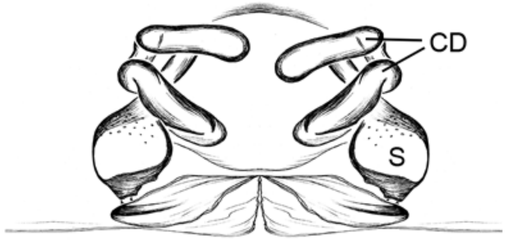

Figure 10. Internal genitalia of *Philoponella congregabilis*, dorsal view (ZMH A0002084). Abbreviations: CD, copulatory duct; S, spermatheca

IV (Fig. 4). Abdomen grey-brown with cream speckles and a thick longitudinal black-brown strip with a white outline (Fig. 13). Venter of abdomen is dark brown around the edge with the middle grey-brown with cream setae. Anal tubercle and spinnerets dark brown with white bands and cribellum present (Fig. 3). Epigynum with copulatory openings toward the anterior epigynal rim and a wide posterior epigynal rim (Fig. 9). Posterior epigynal rim with lobes that extend ventrally (Fig. 8). Internal genitalia with copulatory ducts that twist and initially extend anteriorly and then posteriorly to round spermathecae (Fig. 10).

Variation: Male body length 3.7–5.0, $\bar{x}$ 4.5, n = 7. Female body length 3.8–5.4, $\bar{x}$ 4.7, n = 10. Male carapace length 1.5–2.1, $\bar{x}$ 1.7, n = 12. Female carapace length 1.5–2.1, $\bar{x}$ 1.8, n = 17. Overall colouration varies between pale cream, dark orange and brown.

Notes: In all but one male of the syntypes, the opisthosoma had detached from the prosoma and many of the legs had also detached. There were four eggsacs and a broken opisthosoma with some of the syntypes (AM KS9272) and many of the legs had been caught up in the silk around the eggsacs. There were also three small Diptera wrapped in silk.

Natural history: Philoponella congregabilis construct untidy looking horizontal or sloping orbwebs. Webs are built in low vegetation and in human modified areas they are built on fences, under eaves or in outbuildings (e.g. sheds and garages). The webs of different individuals can be interconnected with several spiders in the one web complex. There is often debris in the web, which helps to camouflage the spiders and their eggsacs. Eggsacs (Fig. 15) are elongated (9.2–11.6 mm long, n = 6) with various protuberances and contain about 20 eggs.

Distribution: Eastern and southeastern Australia: southern Queensland, New South Wales, Victoria, South Australia (S Sato & S Derkarabetian pers. comm.) and Tasmania. New Zealand: southern suburbs of Christchurch (Fig. 16).

Discussion

It is unknown how and when *Philoponella congregabilis* came to New Zealand. Due to its small size, it may have gone unnoticed for some time, however, arachnologists living in the south of Christchurch (CJV, KMC and Simon Pollard) noticed it as soon as their webs appeared in the properties where they lived. Given that this species is found in and around buildings, fences and gardens both in Christchurch and in Sydney, it is likely to spread to other parts of New Zealand, especially to warmer areas north of Christchurch. It is unlikely to compete with New Zealand's single endemic species *Waitkera waitakerensis*, as that species is only found in forests in the North Island (Opell 2006). It is also unlikely to be a specific threat to endemic insects as their

Figure 11. Male *Philoponella congregabilis*, dorsal view (ZMH A0002084)

Figure 12. Male *Philoponella congregabilis*, ventral view (ZMH A0002084)

Figure 13. Female *Philoponella congregabilis*, dorsal view (ZMH A0002084)

Figure 14. Female *Philoponella congregabilis*, ventral view (ZMH A0002084)

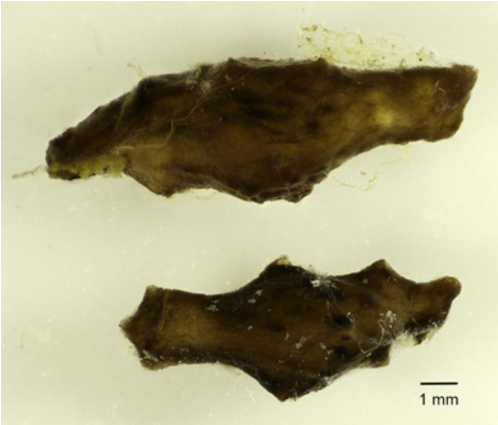

Figure 15. Eggsacs of *Philoponella congregabilis* (top CMNZ 2020.94.9, bottom CMNZ 2020.94.10)

web is used for general prey capture.

New Zealand is estimated to have a spider fauna of 2,000 species (Paquin et al. 2010) and 50 of the 73 introduced spider species established in New Zealand are Australian (CJV unpublished). Australian species continue to be found in New Zealand (e.g. Forster 1982; Smith et al. 2012; Vink and Thorpe 2013) and our nearest neighbour is likely to carry on drip-feeding its spider fauna to Aotearoa New Zealand.

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We thank Marcus Provis for bringing the first New Zealand specimen to our attention and Volker Framenau (Murdoch University) for alerting CJV to the possibility of it being an Australian uloborid. Graham Milledge (AM) organised the loan of the type specimens and Helen Smith provided us with information on their webs and biology in New South Wales. Simon Pollard graciously allowed us to collect specimens from his property. We are especially grateful to Nadine Dupérré (ZMH) for the excellent photos she took, for her wonderful illustrations and providing images of the types of *P. variabilis* and *P. pantherina*. Shoyo Sato (Giribet Lab, Harvard University) kindly provided feedback on the structures of the pedipalp and epigyne and he and Shahan Derkarabetian (Giribet Lab, Harvard University) informed us of the presence

Figure 16. Locality records of *Philoponella congregabilis* in Christchurch, New Zealand. Yellow location markers are examined specimens, red location markers are specimens photographed and reported on iNaturalistNZ (https://inaturalist.nz/taxa/521225-Philoponella-congregabilis [cited 14 July 2020]). Satellite imagery copyright TerraMetrics, Inc. www.terrametrics.com

of *Philoponella congregabilis* in South Australia. Thanks to Brent Opell and Volker Framenau for their helpful reviews.

References

Eberhard WG, Barrantes G, Weng J-L. 2006. Tie them up tight: wrapping by *Philoponella vicina* spiders breaks, compresses and sometimes kills their prey. *Naturwissenschaften* 93: 251–254.

Forster LM. 1982. The Australian redback spider - an unwelcome immigrant to New Zealand. *The Weta* 5: 35.

Lehtinen PT. 1967. Classification of the cribellate spiders and some allied families, with notes on the evolution of the suborder Araneomorpha. *Annales Zoologica Fennici* 4: 199–468.

Opell BD. 1979. Revision of the genera and tropical American species of the spider family Uloboridae. *Bulletin of the Museum of Comparative Zoology* 148: 443–549.

Opell BD. 2006. Molecular phylogenetic evidence for the parallel evolution of rock ecomorphs in the New Zealand orb-weaving spider *Waitkera waitakerensis* (Family Uloboridae). *Journal of Arachnology* 34: 467–475.

Paquin P, Vink CJ, Dupérré N. 2010. *Spiders of New Zealand: Annotated Family Key & Species List*. Lincoln: Manaaki Whenua Press.

Rainbow WJ. 1916. Some new Araneidae from the County of Cumberland. *Australian Zoologist* 1: 58–61.

Smith HM, Vink CJ, Fitzgerald BM, Sirvid PJ. 2012. Redescription and generic placement of the spider *Cryptachaea gigantipes* (Keyserling, 1890) (Araneae: Theridiidae) and notes on related synanthropic species in Australasia. *Zootaxa* 3507: 38–56.

Vink CJ, Thorpe S. 2013. A new record of the Australian wolf spider *Artoriopsis expolita* (L. Koch, 1877) (Araneae: Lycosidae) in New Zealand. *The Weta* 45: 38–41.

Weng JL, Barrantes G, Eberhard WG. 2006. Feeding by *Philoponella vicina* (Araneae, Uloboridae) and how uloborid spiders lost their venom glands. *Canadian Journal of Zoology* 84: 1752–1762.

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For references:

Journal

Ward JB. 1995. Nine new species of New Zealand caddis (Trichoptera). *New Zealand Journal of Zoology* 22: 91–103.

Whitehead SF. 2010. A territory of such varied picturesqueness: Gerard Carrington and the beginnings of the Christchurch Tramping Club. *Records of the Canterbury Museum* 24: 15–25.

Book

Forster RR, Forster LM. 1999. *Spiders of New Zealand and their Worldwide Kin*. Dunedin: Otago University Press.

Fraser L, McCarthy A, editors. 2012. *Far from 'Home': The English in New Zealand*. Dunedin: Otago University Press.

Winterbourn MJ, Knox GA, Burrows CJ, Marsden ID, editors. 2008. *The Natural History of Canterbury*. Christchurch: Canterbury University Press.

Book chapter

Fraser L. 2012. Memory, mourning and melancholy: English ways of death on the margins of empire. In: Fraser L, McCarthy A, editors. *Far From 'Home': The English in New Zealand*. Dunedin: Otago University Press; p. 99–122.

Wilson HD. 2008. Vegetation of Banks Peninsula. In: Winterbourn MJ, Knox GA, Burrows CJ, Marsden ID, editors. *The Natural History of Canterbury*. Christchurch: Canterbury University Press; p. 251–278

Unpublished thesis

Malumbres-Olarte J. 2010. Spider Diversity and Ecology in Native Tussock Grasslands of the South Island, New Zealand. PhD thesis. Lincoln: Lincoln University.

Website

Food Standards Australia New Zealand. 2008. Canned foods: purchasing and storing. Wellington: Food Standards Australia New Zealand. Available from: http://www.foodstandards.govt.nz/consumer/safety/cannedfoods [cited 15 February 2015].

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