

A significant silcrete source near Oxford, North Canterbury

Phillip R Moore¹ and Kyle Davis²

¹Canterbury Museum, Rolleston Avenue, Christchurch 8013, New Zealand

Email: peninres@xtra.co.nz

²Mahaanui 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.

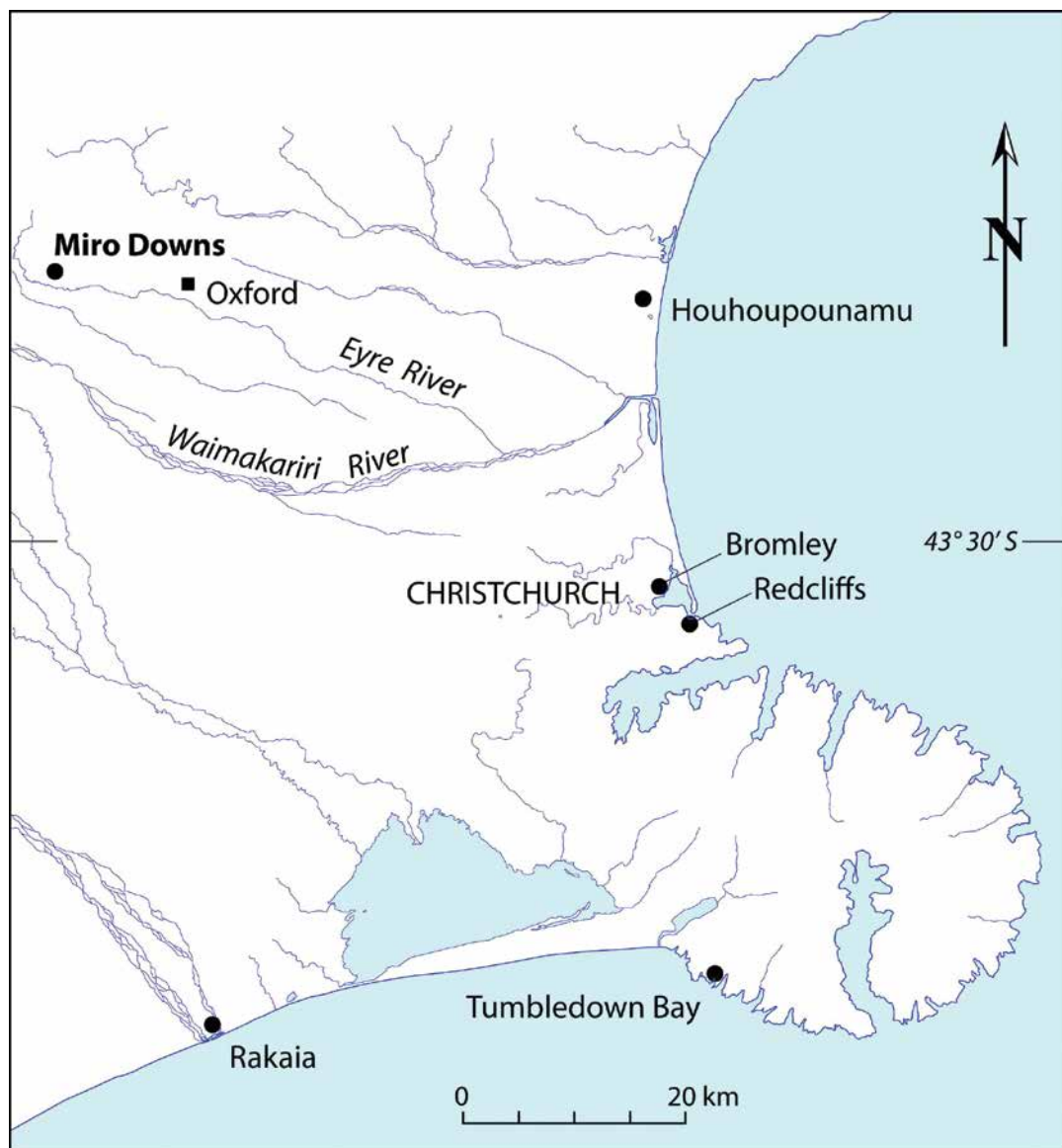


Figure 1. Location of Miro Downs and other archaeological sites mentioned in the text

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.

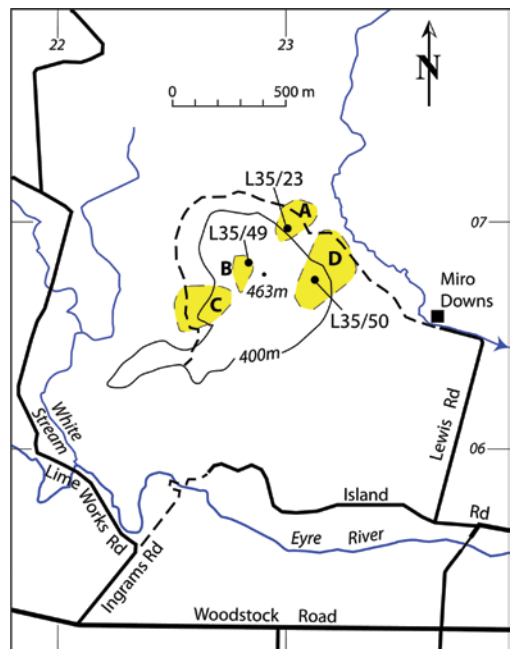


Figure 2. Map of the View Hill area showing the location of silcrete deposits (Areas A–D) and archaeological sites at Miro Downs



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 (Z793¹) 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 (Z938¹) 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 (Z21199¹) 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–Z798¹

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 Z793¹

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.

Acknowledgements

Our thanks to Alan Feary for kindly granting access to the silcrete source, Nicolas Boigelot (Canterbury Museum) for photography, and Michael Trotter and an unknown referee for helpful comments on the paper.

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.