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A SIGNIFICANT CHERT SOURCE AT RAGLAN, WAIKATO COAST

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Introduction

In 2003 an occurrence of chert at Te Mata, about 8 km south of Raglan, was brought to Owen Wilkes' attention by local farmer and geologist Michael Carter, who had known about it since the 1950s. This occurrence is not mentioned in the geological literature or shown on any maps (e.g., Waterhouse and White 1994). It consists of pebble to cobble-sized pieces and nodules of good quality, yellowish-brown chert, which were exposed during the excavation of farm drains.

Pieces of almost identical chert had previously been discovered in the Oporuru inlet at Raglan by local farmer and collector Keith Bird (Dante Bonica pers comm). This was considered by Turner (2000) to be the main source of chert flakes and drill points found in sites all along the west coast of the North Island south of Manukau Harbour, although there are other potential sources in the vicinity of Raglan township which could also have been exploited (Figure 1).

This paper presents new information on the location and nature of chert deposits in the Raglan area, on the composition of the chert, and its prehistoric exploitation. It is largely based on fieldwork in January and April 2005, examination of earlier collections made by Owen Wilkes, Richard Cassels and others, and information from available reports and the Site Record File. Work on the paper had begun prior to Owen's unexpected death in May 2005.

Nature of the deposits

At Te Mata pieces of chert up to 25 cm in diameter have been found over an area of about 400 by 300 m, mostly within or adjacent to drains ex-

cavated along the valley floor. The greatest concentration is at grid reference R15 2674200 6367500, where one large block (probably *in situ*) and several boulders of fossiliferous sandstone have also been exposed during excavation of the drains. Initially it was assumed that the chert had weathered out of the sandstone but there is no direct evidence for this. In other places chert pebbles were seen in clay and alluvial sediments beneath the peaty topsoil.

Another large deposit of chert has been located in the Wainui area west of Raglan township, at about grid reference R14 2672900 6374600 (Figure 1). Here the chert occurs in a very similar situation to that at Te Mata, i.e., in clay and alluvial sediments exposed along drains in the lower part of the valley. It is abundant and ranges from pebble-sized pieces to boulders up to 30 cm in diameter.

The same type of chert has also been found at the mouth of the Opoturu River at the head of the tidal inlet; in the lower reaches of Waiwhatawhata Stream; and on the nearby hillside. Although some of the chert may have been washed down river from Te Mata, most of it probably came from the hill slopes to the west.

Other concentrations of chert have been located in the Omahina inlet and along the southern side of Kaitoke inlet. Much of the chert in the Kaitoke inlet has a slightly different appearance and some of it seems to have formed along veins in the outcropping Te Kuiti Group (Oligocene) rocks. A few pebbles, cobbles, and pieces of chert have also been found near Tokatara Rocks, on the southern shore of Raglan Harbour. They were probably derived from Quaternary gravels exposed in the adjacent cliffs.

It seems unlikely that any other significant chert deposits will be found west of the line shown on Figure 1, since that area is underlain by volcanic rocks forming the flanks of Mt Karioi (Waterhouse and White 1994), and from evidence presented below the chert clearly did not originate from the volcanics. However, there could be some additional occurrences in the vicinity of Raglan township. So far no natural deposits of chert have been located on the northern side of the harbour.

Description of the chert

On freshly broken surfaces the Raglan chert is predominantly pale yellowish brown to brownish grey in colour, but usually weathers to darker yellowish-brown, moderate brown, yellowish-orange or light to medium grey (Rock Colour Chart). Some is olive grey, olive black and dark reddish-brown. The cortex is invariably rough, pitted and porous. The chert has a very distinctive speckled ('hokey pokey') appearance due to the presence of abundant fossil remains, primarily bryozoa, which are clearly visible in hand

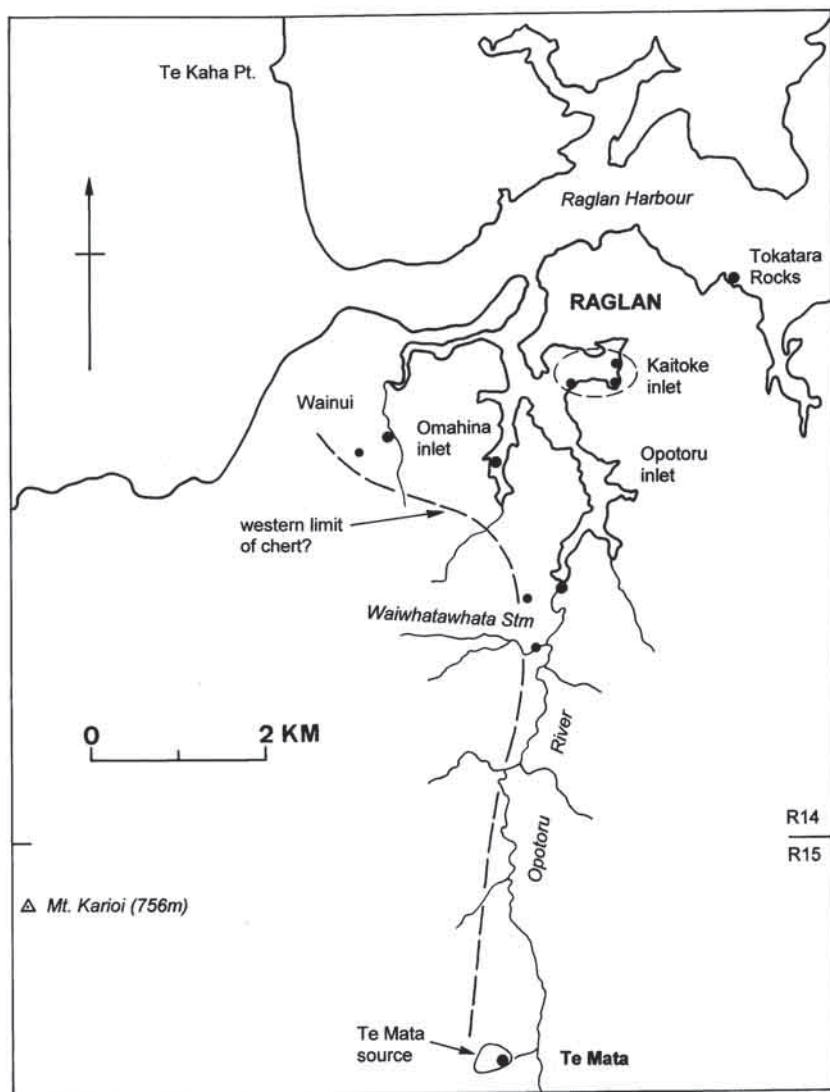


Figure 1. Map of the Raglan area showing the location of chert deposits (black dots).

specimen. One bryozoan form has been identified as a member of the family Tubuliporidae (J. Grant-Mackie pers. comm.). The chert also contains, rarely, bivalves, possibly a species of *Lima*.

Chert from the Kaitoke inlet is more variable in colour, though commonly yellowish-brown, yellowish-orange or moderate brown. Some is reddish-brown, yellowish-grey, and olive grey. Cortex ranges from rough to relatively smooth (water worn), and some pieces from the westernmost locality (KT-1) in particular have an unusual patterned surface resulting from the replacement of calcite by silica, most likely along veins.

In thin section typical Raglan chert consists of microcrystalline quartz with vague to obvious bryozoan remains. A few samples also contain detrital grains and foraminifera. In contrast the Kaitoke chert consists of fine grained microcrystalline quartz with few, if any, bryozoan remains, and some samples are pervaded by iron oxides or contain clay minerals.

The differences in colour, cortex and composition between typical Raglan chert and much of that from the Kaitoke inlet are sufficient to regard the Kaitoke deposits as a separate sub-source.

Chemical analyses

Four samples, one from Te Mata (TM1), one from the Wainui area (RG3), and two from Kaitoke inlet (KT2 and 3), were analysed by X-ray fluorescence (Table 1). The analyses show that the chert has a very high silica content ($\text{SiO}_2 > 98\%$) but contains low concentrations of most other elements. The slightly higher Fe content of the Kaitoke cherts is notable and reflects their greater colour range. However there do not appear to be any significant differences in trace element values between typical Raglan chert and the Kaitoke material.

The similarity in composition of the Raglan and Kaitoke cherts suggests that the silica came from a common source and is most likely biogenic, i.e., from the dissolution of siliceous organisms. There is no obvious volcanic signature in the analyses.

Exploitation

Although the Te Mata chert locality was initially classified as a quarry site (R15/737) no definite evidence for the working of chert nodules *in situ* has been found, and it would be better described as a source site. There are a considerable number of broken nodules or cobbles in the area, but at least some of these were probably broken during excavation of the drains. It is also uncertain how much chert was actually exposed in pre-European times, given that most of it appears to be derived from beneath the peaty topsoil. Nevertheless,

Table 1: Chemical analyses of Raglan chert (anhydrous). MnO and some trace elements excluded because of very low values. Analyses by J. Wilmshurst, Geology Department, University of Auckland

Locality	TM-1	RG-3	KT-2	KT-3	LOD*
wt%					(ppm)
SiO ₂	99.35	98.56	98.91	99.23	177
TiO ₂	0.02	0.02	0.03	0.02	26
Al ₂ O ₃	0.17	0.21	0.41	0.19	116
Fe ₂ O ₃	0.08	0.1	0.31	0.3	14
MgO	0	0	0.08	0.07	61
CaO	0	0.13	0.02	0.19	42
Na ₂ O	0	0	0.07	0	73
K ₂ O	0.03	0.04	0.06	0.03	14
P ₂ O ₅	0.01	0.1	0.02	0.02	16
(H ₂ O)	0.51	0.46	0.21	0.29	
(LOI)	1.03	0.97	1.62	0.84	
Total	99.66	99.17	99.92	100.06	
ppm					
V	1	5	5	3	4.6
Cr	5	5	6	2	3.2
Rb	1	1	2	1	1.4
Sr	7	15	27	11	1.3
Y	3	3	3	1	0.7
Zr	8	10	10	9	1
Ba	95	117	131	41	9.6
Ce	6	6	5	6	12.8
U	2	4	2	2	2.4

* Limit of determination

the name Te Mata (mata or mataa = chert or obsidian) does suggest that this occurrence, or one nearby, was exploited in the past.

There is also little evidence of working of chert cobbles at any of the localities near Raglan. While a few concentrations of broken pieces have been seen, for example in the Omahina inlet, it appears that some of these may have formed by natural fracturing of cobbles through long exposure to the sun. And although several flakes and pieces have been found in the upper Kaitoke inlet (KT-3), and possible cores near Tokatara Rocks, it is difficult to establish if these were created by early Maori or by rockhounds.

It seems, therefore, that nodules and cobbles of chert were generally picked up and transported elsewhere before being worked. This would explain the high proportion of cortex present on both artefacts and waste mate-

rial at many sites, and the poor quality of some pieces. From the nature of the cortex, i.e., commonly slightly water-worn, much of the chert may have been obtained from the tidal inlets around Raglan rather than at Te Mata.

Cultural distribution

So far Raglan chert has been positively identified from at least 18 sites along the west coast between Manukau South Head in the north and Awakino in the south, a distance of about 185 kilometres (Figure 2). Chert is also recorded at a further 14 sites in map sheet R16 (Wilkes 1994), although there is no certainty that all of that material was derived from the Raglan area.

The Bramley Collection from the Matatuahu site (Q11/344) at Manukau South Head contains approximately 650 pieces of chert (Prickett 1987), of which at least 5 flakes and 3 drill points are made of Raglan material. Three large flakes of Raglan chert have also been identified among the artefacts recovered during an excavation at this site in 1960 (Ambrose 1961).

A considerable quantity of chert; at least 60 flakes, 5 cores and 12 drillpoints; was collected from two sites (R14/256 and R14/330) at Waikoria Stream in the 1980s, and one small core was found at Waimai (R14/284). Several middens on the Te Horea dunes north of Raglan Harbour mouth, particularly sites R14/56, 58, 110 and 280–282, have also yielded a range of chert artefacts. Most of the cores, flakes and drillpoints from R14/280–282 consist of typical Raglan chert, with remnants of rough or water-worn cortex, but a few small flakes of distinctive dark yellowish orange chert have been found as well. This is remarkably similar to some of the material at Kaitoke inlet. Chert artefacts have also been recorded at two sites (R14/55 and R14/247) on the south side of the harbour, at Wainamu Beach.

Very little chert was apparently found in sites on the north head of Aotea Harbour during an extensive survey of the area in 1971–72 by Richard Cassels. However, two pieces were recovered from a terrace site (R15/10 [N64/25]) excavated in 1972–73 (Fox and Cassels 1983). One of these was described as a flake of pinkish siliceous sinter, which was considered to originate from Coromandel Peninsula, the other was of a yellowish material. Two drill points were also collected from nearby Kororomaiwaho pa (R15/1 [N64/8]), one composed of yellow chert, thought to be derived from local Mesozoic rocks, the other of dark reddish-brown siliceous sinter, possibly from Coromandel. The yellow chert sounds suspiciously like Raglan material and it is possible the “sinter” was actually misidentified. These artefacts have not been re-examined.

In contrast, chert artefacts seem to have been relatively common in the Taharoa area (Wilkes 1994) and Raglan chert has been positively identified

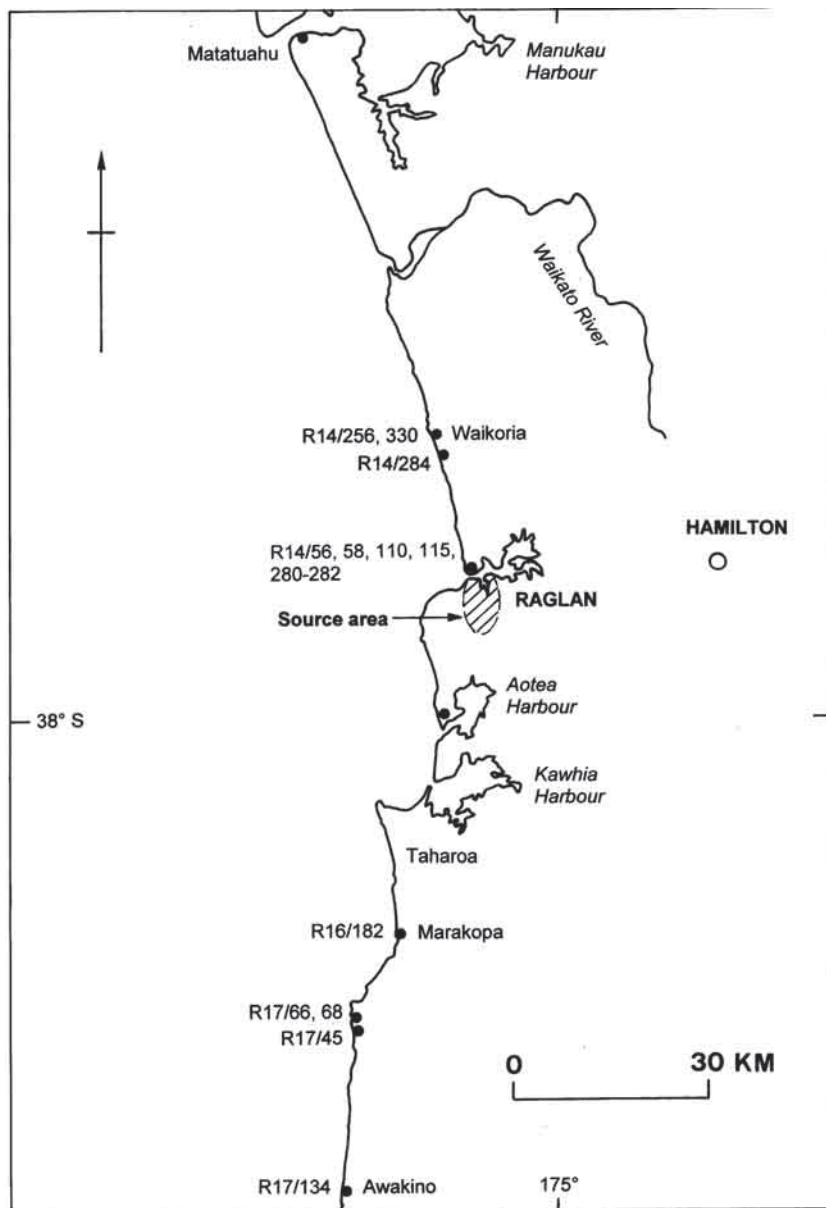


Figure 2. Map of the west coast showing the location of sites containing artefacts of Raglan chert, and chert source area.

from one site (R16/182) at Marakopa. Artefacts of this chert have also been recorded from two sites (R17/66 and R17/68) at Ngararahae Bay and a midden at Mangungu Stream (R17/45) near Waikawau. Site R17/66 contained a large quantity of chert, including numerous pieces with remnants of rough to slightly water worn cortex (Figure 3), as well as flakes, cores and drillpoints. The southernmost locality from which Raglan chert has been identified by us is site R17/134 at Awakino, which is approximately 100 km from the source area (by sea).



Figure 3. Collection of Raglan chert from site R17/66 near Waikawau. Note the high proportion of rough cortex. Photo Owen Wilkes.

Period of exploitation

Very few sites along the Waikato coast have been excavated or radiocarbon dated, making it difficult to establish when and for how long the Raglan chert was exploited. Nevertheless, some indication of age can be gained from the types of artefacts and range of lithic materials used at some of the sites.

Although the Matatuahu site at Manukau South Head is undated, it is considered to have been occupied prior to AD 1300, based on its artefact assemblage (Prickett 1987). Many of the other sites where Raglan chert was utilised are probably also early, judging from the presence of working floors

and the range of artefacts recorded, which include typical Archaic forms such as Type 1, 3 and 4 adzes made of argillite (Wilkes 1994, Turner 2000). In addition, a few of the sites contain moa or seal bone.

The terrace site N64/25 near Aotea Harbour, excavated by Richard Cassels in 1972–73 and from which two pieces of chert or sinter (one possibly of Raglan chert) were recovered, has been dated to the late 15th or early 16th century (Fox and Cassels 1983). One of the sites (R16/10) at Taharoa, excavated by McKinley and others, was also dated to the 15th or 16th century (Wilkes 1994), although it is not certain that Raglan chert was present at this pit/midden/workshop site.

The available evidence, therefore, would seem to indicate that the Raglan chert was exploited at a very early stage, perhaps prior to AD 1300, but that its use had seriously declined by about the 15th or 16th century.

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