

Ferdinand von Hochstetter's Description of Mere Pounamu in Vienna

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Ferdinand von Hochstetter visited New Zealand in 1858–1859 and undertook an extensive survey in the central North Island and northernmost part of the South Island. He also took great interest in the Māori people and culture, including their descriptive vocabulary relating to geological phenomena and materials. He developed a special fascination with pounamu (nephrite jade) and the way it was used for the manufacture of ornaments, tools and weapons. After his return to Vienna a small selection of specimens formed the basis for early mineralogical analyses. In 1876 he was appointed the founding director of the Viennese Natural History Museum. One of the identified gaps in the collection was a mere pounamu and through Julius von Haast, Director of Canterbury Museum, and the Reverend James West Stack, he was able to purchase one of a pair of mere traditionally manufactured by hand using stone tools by Tamati Tikao of Ngāi Tahu who lived at Wainui, on Akaroa Harbour. The other mere was purchased by the natural history museum in Dresden under the direction of Adolf Bernhard Meyer. This paper presents for the first time an annotated English translation of Hochstetter's original descriptive paper on the mere, published in 1884 and explores the provenance of the two mere held in the museum collections in Vienna and Dresden. Much of the information used by Hochstetter in his paper was provided by Reverend Stack, communicated through Julius von Haast.

Keywords: Adolf Bernhard Meyer, Ferdinand von Hochstetter, James West Stack, Julius von Haast, mere pounamu (nephrite), Museum für Völkerkunde Dresden (Dresden Museum of Ethnology), Naturhistorisches Museum Wien (Natural History Museum Vienna), Tamati Tikao (Ngāi Tahu), Weltmuseum Wien (Ethnology Museum Vienna)

Introduction

Ferdinand von Hochstetter (Fig. 1A), now celebrated as the “Father of New Zealand Geology”, arrived in New Zealand as a member of the scientific contingent on the Austrian *Novara* expedition in 1858. He spent 9 months exploring and surveying in the North Island and northernmost South Island (Johnston and Nolden 2011). During his stay in New Zealand, Hochstetter became

acquainted with pounamu (nephrite) highly prized by Māori who utilised it as a material for the manufacture of weapons, tools and ornaments. Visiting the central North Island volcanic area along with 18 others including Julius von Haast (Fig. 1B) in March–April 1859, he met the powerful and influential Ngāti Tūwharetoa chief Iwikau Te Heuheu Tūkino III (c.1790–1862) at Pūkawa

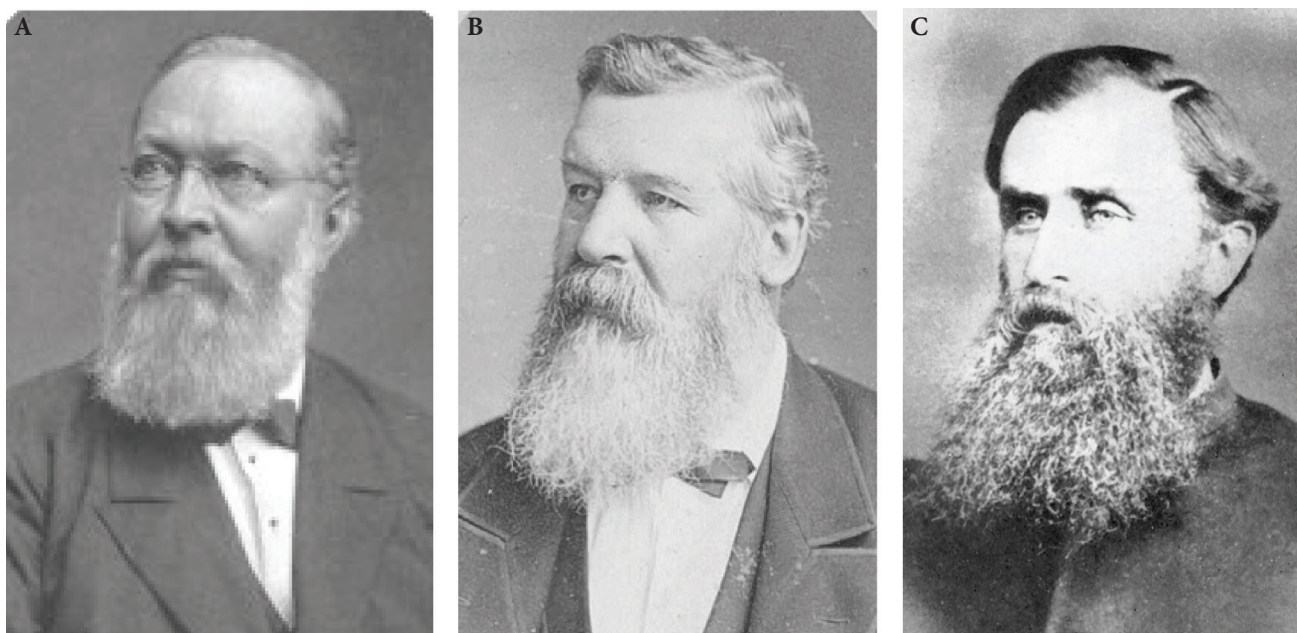
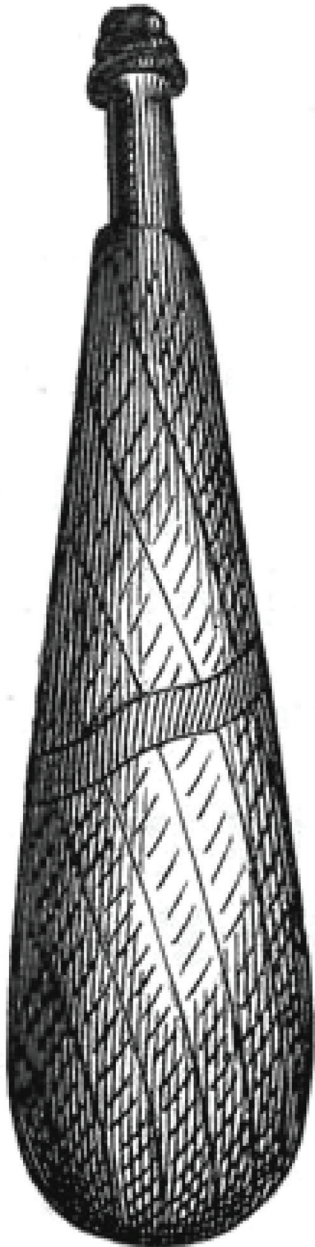


Figure 1. A. Ferdinand von Hochstetter (1829–1884), heliographic portrait by Victor Angerer 1884 (Haardt 1885). B. Julius von Haast (1822–1887), studio portrait by Nelson King Cherrill, Christchurch, c. 1880 (Alexander Turnbull Library, PA2-0471). C. James West Stack (1835–1919), undated portrait in Reed (1938)

A



B



Figure 2. A. Illustration of Iwikau Te Heuheu’s nephrite mere in Hochstetter (1867: 362). B. Lithograph of a painting by George French Angus of Mananui Te Heuheu and Iwikau Te Heuheu (standing) at their pā, Pūkawa, Lake Taupō, and illustrating the nephrite mere that Hochstetter was shown in 1859 by Iwikau Te Heuheu, its inheritor (Angus 1847: plate 56).

on the southwestern shores of Lake Taupō. Here he was shown a magnificent mere pounamu (Fig. 2) described as:

- 15 inches [38 cm] long, and cut out of the most beautiful, transparent nephrite, an heirloom of his illustrious ancestors, which he kept as a sacred relic. He explained to me that this murderous weapon was taken from a hostile chief in bloody combat, that five times already it had been buried with his ancestors, and that the notch on one side of it dated from the last fatal blow struck at a hard skull. (Hochstetter 1867: 362)^[1].

Later that year, in June, Hochstetter visited Coromandel Harbour to examine its gold prospects with Charles Heaphy^[2] who sketched a watercolour portrait of one of the local Māori chiefs, Paora Matutaera (Paul Marshall),

depicting him brandishing an impressive mere pounamu (Fig. 3). Heaphy presented the watercolour to Hochstetter who used it as the source image for the engraved chromolithographic frontispiece in his *New Zealand* (Hochstetter 1867; Nolden 2011).

Hochstetter returned to Vienna in January 1860, and in 1864 published a seminal paper on New Zealand nephrite in which he briefly described mere pounamu:

Above all, the pounamu is sought as a material for the mere, the battle axe of the Maori chief. Such a nephrite battle axe (called mere pounamu), especially when it was wielded by the hand of a brave ancestor in bloody conflict is regarded as a treasure, and is kept with the greatest of care in the family of the chief and passed on from generation to



Figure 3. Watercolour sketch of the Coromandel chief Paora Matutaera (Paul Marshall) by Charles Heaphy (June 1859), (Nolden and Nolden 2011: 33; Hochstetter Collection Basel, HBC 1.4.7). A chromolithograph based on this sketch forms the frontispiece of Hochstetter's 1867 book on New Zealand. Hochstetter writes: "The frontispiece of this work gives us an idea of the half-civilized state in the very exterior of a still living chief. He wears European shirt and neck-lace, over it his Maori mantle, in one hand a gun, in the other a Maori weapon, the mere of nephrite. The albatros[s] feathers of old in their head-dress are supplanted by those of a peacock" (Hochstetter 1867: 215).

generation. Only a few years ago a mere pounamu was found that had been lost in war and was repurchased from the fortunate finder by a tribe near Auckland for the sum of 1,200 pounds sterling; and the most precious gift which the subjugated natives presented to the Queen of England was also a mere pounamu^[3] (Hochstetter 1864; Grapes and Nolden 2021).

In 1876, Hochstetter was appointed Director of the newly founded Imperial Royal Natural History Museum in Vienna, where he developed an increasing interest in New Zealand nephrite and its utilisation by Māori as revealed in a letter to Haast, who was Director of Canterbury Museum in Christchurch:

I have recently been very interested in the nephrite question. Is there still now no locality known where it originates from, and are pounamu pieces still being found? Fischer^[4] bought a boulder of New Zealand nephrite weighing 3 hundred-weight in London a few days ago for £136; it is on its way to Vienna and I want to buy it for the museum. Write to me about nephrite in New Zealand sometime, what you know about it. Are [tiki] and [mere] made of pounamu now rare and what do they cost? (Hochstetter to Haast, 4 January 1878; in Nolden 2013: 189).

By 1881 Hochstetter had set up an exhibit of New Zealand cultural items in a display cabinet in his museum office:

In my office in the museum I have now put together a sample exhibit of our 'New Zealandiana', which fills a wall cabinet 2.5 metres high and 5.5 metres long. Grouped around a Maori bust, which was very well executed by a friend, are cloaks, weapons and numerous beautiful carvings; we have no fewer than a dozen greenstone [tiki], but are missing a greenstone mere. I am therefore very interested in purchasing one of the two you write about, if they have the elegant shape of Te Heuheu's mere as illustrated in my book [Fig. 2], and the price is no higher than £20, or at the most £25. (Hochstetter to Haast, 18 April 1881; in Nolden 2013: 202).

Haast obligingly arranged to send Hochstetter one of the two mere pounamu that were being prepared for him at the time, informing Hochstetter in a letter dated 30 December 1881 of its dispatch. It was still en route on a New Zealand Shipping Company vessel when Hochstetter replied to Haast on 4 April 1882:

The case no. 7 per 'Waimate' with the pounamu mere and other things that you announced in your letter of 30 December has not arrived yet. I am expecting the shipment any day now and am really excited in anticipation. (Hochstetter to Haast, 4 April 1882; in Nolden 2013: 205).

Haast's shipping case containing the mere arrived in Vienna via London nearly 3 months later:

Finally I can send you the good news of the successful arrival of your shipment of one case for our museum and one case for Professor Suess^[5]. Yesterday I unpacked the case, and was especially pleased with the greenstone mere; this really is a very fine piece which gave me much pleasure. Now I ask you to give me some more details on this:

1) *Where does the maker Mahia Tamate Tikao^[6] live, how old is he and how long did he work on the piece?*

2) *How and with what tools and materials did he polish the piece? Could one get the grindstone from him? That would certainly be interesting. (Hochstetter to Haast, 7 July 1882; in Nolden 2013: 207).*

The details of the making of the two mere pounamu and the information asked for by Hochstetter were provided by Haast via his friend, Reverend James West Stack (Fig. 1C), Church of England missionary and an authority on Māori ethnology, and are detailed below. Hochstetter's communication on the mere pounamu was made at the Anthropological Society meeting in Vienna on 12 February 1884 based on this information and occasioned by the presentation of the mere to the ethnographic department of the Viennese Natural History Museum.

Translation of Hochstetter's Paper

The following is an English translation by the authors, of Hochstetter's German language paper published in the journal of the Anthropological Society in Vienna:

Ferdinand von Hochstetter, "Zwei neu angefertigte neuseeländische Mere aus Nephrit", *Mittheilungen der Anthropologischen Gesellschaft in Wien*, volume 14, 1884, pages 25–26.

Two newly manufactured New Zealand nephrite mere and the presentation of one of them.

In 1881 the ethnographic department of the Imperial Royal Natural History Museum, through the mediation of Dr Julius von Haast, Director of the Canterbury Museum, Christchurch (New Zealand), took possession of a mere pounamu [Fig. 4], a stone axe of New Zealand, which is interesting because it has only been made in the last few years by a 68-year-old Maori, Mahia Tamate Tikao, who lives in Wainui on Banks Peninsula in Canterbury Province [Fig. 5]. Simultaneously with this, Tamate Tikao made a lovely copy that is in the possession of the Royal Ethnographic Museum in Dresden [Fig. 4]. Tikao is said to have worked on these two mere for 8 years, which were finished in 1881. The thick cord made of New Zealand flax attached to the handgrip was made by Tikao's wife, Mairehe, from one undyed cord and two cords dyed yellow and black in the old Maori style.

The dimensions of the two new mere are:

Length	400mm
Greatest width of the blade	117mm
Width of handgrip	45mm
Width of the pommel	60mm
Thickness of the blade	12mm
Thickness of the handgrip	20mm

The piece is uniformly green in colour and has only a few scaly, schistose detachment surfaces.

These two mere are probably the last ever made by a Māori^[7].

According to letters from Rev. J. W. Stack, Duvauchelles Bay, Akaroa Harbour, Canterbury [Fig.5] (received December 1882), I can add the following about the manufacture of the mere: The 'pounamu stones' meaning nephrites, most valued by the Maori for the manufacture of mere, were those found as boulders or cobbles in river beds. The stone, when found, was named after the name of the deity who revealed its location to the Tohunga, who was the guide of the search party. The Maori on the east coast of the South Island were in the habit of setting out in autumn in small groups over the familiar Alpine passes to the west coast [Fig. 5].

After arriving at the coast, the leader of the party, the Tohunga, separated from the group and carried out certain religious ceremonies to determine from the deities, the place where the treasured stone was to be found. When the Tohunga awakened, he was imbued with this revelation, and everyone set out for the designated area and scattered to search all the watercourses. Once the stone was found, it was immediately named after the deity that helped to discover it. In the water the individual blocks of greenstone differ little from one another, since they generally appear grey or brown on the outside.

Since only relatively small amounts of the most valued varieties of nephrite were found in the manner described, the Maori also had to visit the primary in situ locality of the rare mineral in order to take samples from the rock themselves. To do this, they chose a large, round block of nephrite^[8], which showed a mineral structure that was as irregular or intertwined as possible in every direction, so it was sure to be quite tough. They fastened this block to the end of a wooden beam and in this way made a hammer. Three ropes were then attached to the end of the hammer, and the hammer was raised near the nephrite rock at about 80 degrees, with a man holding or fastening a rope, and others using the other two ropes to direct the hammer in such a



Figure 4. The two nephrite mere made by Tamati Tikao. Upper: Labelled as: “A greenstone club, patu pounamu pounamu” (Inv. no. 14.180, Museum of Ethnology, Vienna), purchased from Haast in 1882, among other New Zealand objects, for 27 pounds sterling, considered to be an enormous price for the time (Moschner and Mandl 1967: 29). Dr Georg Sauer describes the same mere: “Another mere, from the Julius Haast collection, was purchased in 1892 [sic 1882]. It is made of dark green nephrite, beautifully cut and polished, it has sharp edges and the handle is decorated with four circumferential grooves. A braided carrying and fastening cord made of flax fibres is threaded through a hole just in front of the handle. Length: 40.2 cm, greatest width 11.7 cm, diameter of the pommel: 0.4 cm”, together with a black and white photo (Sauer 2012: 15–16). The dimensions (in mm) and further details are given in the translated text of the descriptive paper by Hochstetter (1884). Lower: Labelled as “Nephrite mere or battle axe” (Inv. no. 5086, Museum for Ethnology, Dresden) – a copy of the one sent to Hochstetter by Julius von Haast. The catalogue describes it as: “The striking weapon – at the same time a status symbol for its owner – was bought by the museum in 1883 through the mediation of the New Zealand geologist Julius von Haast”. Specific gravity - 3.03; colour - grass green (15 d-e), lighter in translucent light (up to 13 i-m) (Meyer 1883: 58–59). Inset: Colours defined by Otto Radde's 'International Colour Scale' of 1877 for grass-green given by Meyer (op cit) for the Dresden mere; number = hue (hue numbers 1-42); letter = tone (21 tone letters). No.15 = 2nd transition to blue-green; No.13 = cardinal tone

way that it would point exactly to the desired part to be separated.

Hakapato Ataotu^[9], an old Maori, said that it would take 30 men to work with the hammer when he made his first nephrite collecting trip to the West Coast 60 years ago.

The tools which were used to work the nephrite are:

1. *Kuru Kohatu*, stone hammer, consisting of a round, head-sized block of nephrite, by means of which pieces were chipped off larger blocks. In order to create a straight break, a furrow was ground out beforehand at the appropriate point.
2. *Parihi Kohatu*, a sharp-edged fragment of basalt or some other hard stone, by means of which the furrow was ground out by rubbing backwards and forwards.
3. *Hoanga*, grindstone, any granular sandstone to grind down the rough surface.
4. *Kuru paka*, a mica-rich, but nevertheless quite hard coal shale, as it often occurs on the West Coast, in order to grind out grooves or furrows.
5. *Mata*, an obsidian point, used as a drill to drill holes.

The Canterbury Maori obtained their grindstones from the upper end of Lyttelton Harbour in the immediate vicinity of Quail Island, where a suitable trachytic sandstone is found.^[10] [Fig. 5]

Working on nephrite was a favourite pastime of old chiefs, persevering day and night with the monotonous work. During the day they carried their stone to some secluded resting place (*taumata*) on the summit of a neighbouring hill, where they sat all day with the grindstone, grinding backwards and forwards on the surface of the nephrite, with no other entertainment than being able to observe everything that was going on in the village. A busy chief carried his stone home in the evening, sat down against the wall of his hut so as not to nod off and lose time. When sleep overtook him, he still kept his grindstone in his hand so that he could continue work as soon as he woke up again. With such constant work, he could complete a mere in about 12 months. In most cases, however, it took much longer. (Hochstetter 1884; English translation by Rodney Grapes and Sascha Nolden).

The mere was displayed in the Viennese Natural History Museum opened to the public in 1889, and later the Museum of Ethnology opened in 1928, originally known as Museum für Völkerkunde and more recently as Weltmuseum Wien. Descriptions are published by Irmgard Moschner (Moschner and Mandl 1967) and Georg Sauer (Sauer 2012). Tamati Tikao's other mere was acquired by Adolf Bernhard Meyer (1840–1911), Director of the Dresden Museum for Ethnology in 1883 and was described by him (Meyer 1888) and reproduced in Christine Schlott's papers on the relationship and

correspondence between Meyer and Haast (Schlott 2021, plate IX, Fig.1; Schlott 2022: 45) (Fig. 4).

Background to the Mere Pounamu in Vienna and Dresden

The story of the two mere pounamu made by Tamati Tikao apparently begins sometime in 1872 when Haast asked Stack if he could obtain a representative sample or samples of pounamu from its source area on the West Coast (Fig. 5; see also Grapes and Nolden 2021) for Canterbury Museum. Evidently, pounamu was not so easily obtained at the time:

My dear Haast,

I only got back yesterday from a three weeks' tour. I was on the West Coast, and did not forget your commission about the greenstone. I saw Tainui^[11], but he said he had none; that he is pestered with applications from all parts of the country for greenstone. But I saw splendid specimens in the shop window of a man called Procter^[12], in Hokitika. He was away at Ross, and although I called several times and wrote to him, he would not deal till he returned. I left word with his wife that when he came back I should be glad if he would communicate with me. I am expecting to hear any day. If you can get the raw material from him the Maoris would make it up for a £5 note. I and George^[13] have both tried to get meres but the owners ask £30 a piece. (Stack to Haast, Kaiapoi, 4 October 1872; Alexander Turnbull Library, MS-Papers-0037-138-06-1, -2, -3; reproduced in Reed 1935: 73–74).

From this letter it would appear that Stack was aware that Haast wanted some pounamu objects, i.e. mere, to be made by a Māori craftsman, i.e. Tamati Tikao. Hochstetter states that Tikao worked on two mere for eight years, and as these were completed in January 1881 as indicated below, he would have begun the work in early 1873, post-dating Stack's 4 October 1872 letter:

My dear von Haast,

I hope you will receive the meres safely. The boys have promised to deliver them this afternoon. Tamate Tikao the chief at Wainui [Fig. 5] gave them the last finishing touches, and his wife Mairehe dyed the flax and plaited the cords. I gave them £1 for their trouble. (Stack to Haast, Duvauchelles Bay, 23 January 1882; Alexander Turnbull Library, MS-Papers-0037-138-18-1; reproduced in Reed 1935: 77)

Stack was informed by Haast of their safe arrival in Vienna in October 1882 and replied accordingly:

My dear von Haast,

I am glad to find that Dr. Hochstetter was pleased with your efforts to provide him with the meres, for it is not always that trouble taken on behalf of another is properly appreciated. With reference to your enquiries. It is hard to say the exact time it took to make a mere. I have heard them say that it could be done within the month, but I will get

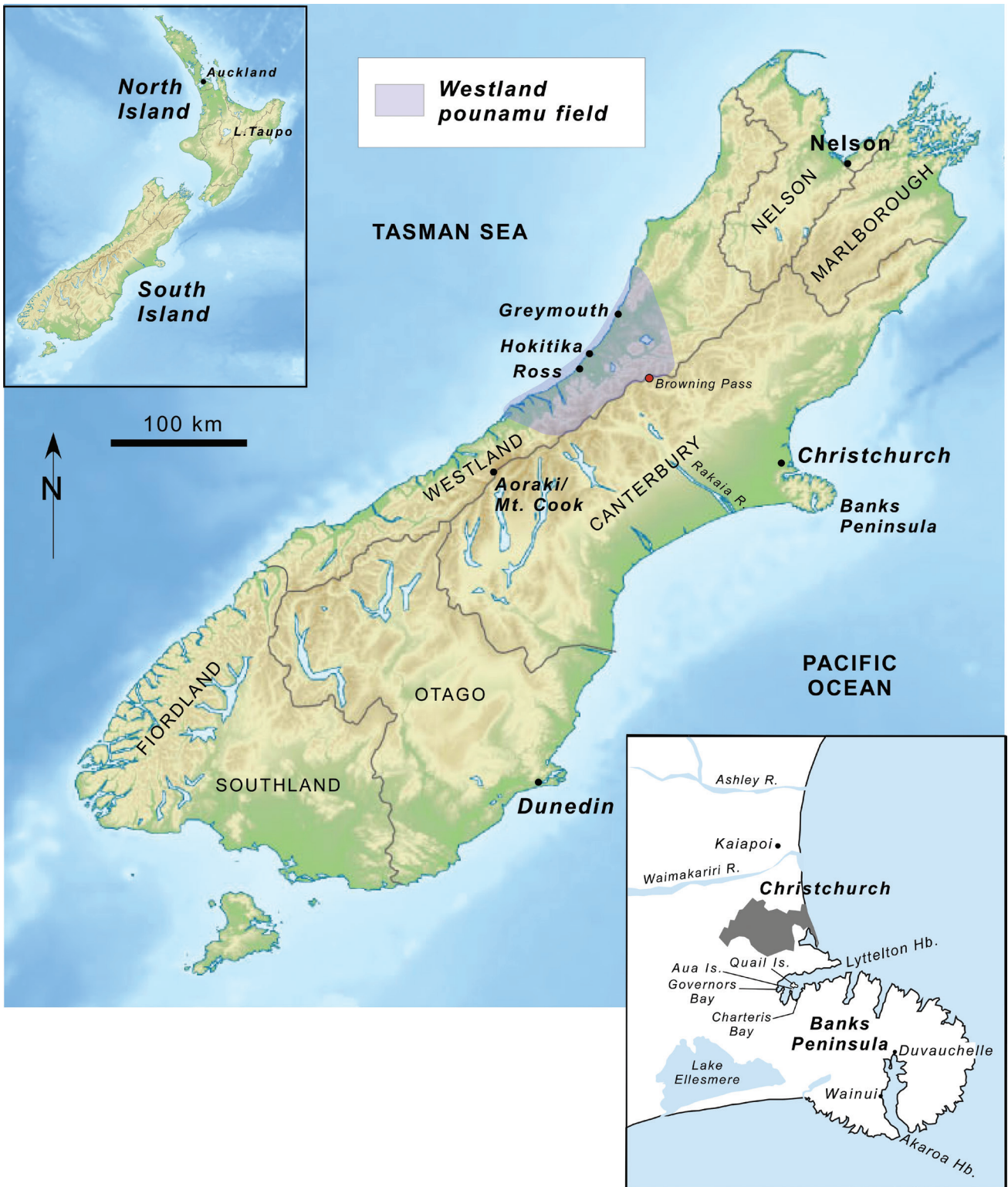


Figure 5. Map of Te Waipounamu (the South Island of New Zealand) showing area of Westland pounamu occurrences and place names mentioned in the text. A traditional route across Kā Tiritiri o te Moana (the Southern Alps) to Te Tai Poutini (the West Coast) taken by Māori to obtain pounamu was up the Rakaia River via Nōti Raureka (Browning Pass), and descending by either the headwaters of the Arahura River or the Styx River to Hokitika. Lower inset: Map of Te Pātaka-o-Rākohaitū (Banks Peninsula) showing place names mentioned in the text.

from my old friends the shortest period within their recollection in which a mere was completed.

I will try and obtain the stones you require. I have found several pieces in the old pas on the Peninsula. Tamati Tikao is about 68 years of age.

There were no ceremonies connected with the manufacture of greenstone. I will enclose what I have gleaned on the subject of the manufacture. (Stack to Haast, Duvauchelles Bay, 10 October 1882; Alexander Turnbull Library, MS-Papers-0037-138-19-1; reproduced in Reed 1935: 80).

Stack's cover letter for his promised notes^[14] on the manufacture of greenstone was addressed to Haast on 22 October 1882:

*My dear von Haast,
I enclose a copy of the notes I have made that relate to the manufacture of greenstone by the Maoris.*

I met my old friend Hakopa te Ata o Tu, one of the few real old Maori chiefs – one who knows what he is talking about when you ask him questions relating to the customs of the people prior to the advent of the Pakeha.

He told me I was mistaken about the time it took to make a mere – that I must have been thinking of small axes – that a mere took a year or two years, according to the nature of the stone, and the grindstone used to reduce it. I asked him to help me to get the tools used. He said he could get some, but not all. (Stack to Haast, Duvauchelles Bay, 22 October 1882; Alexander Turnbull Library, MS-Papers-0037-138-20-1; reproduced in Reed 1935: 270–271).

Stack's notes were duly forwarded by Haast to Hochstetter who acknowledged their receipt on 11 February 1883:

I still have to reply to your two letters of October and November of last year and to thank you for the notes by Rev. Stack on nephrite that were of great interest to me. By the way, Stack must have used the same source as I did in regard to the Maori names for the different types of nephrite^[16], as I already wrote about this but more precisely and in more detail in my publication on New Zealand pounamu in the year 1860 [sic 1864], of which I unfortunately no longer have an off-print^[17]. I will use the other notes by Stack for a note in our anthropological journal. I ask you not to forget about the other materials for working on nephrite, even if I have to wait for a suitable shipment. (Hochstetter to Haast, 11 February 1883; in Nolden 2013: 209).

Concluding Remarks

Museums in German-speaking Europe, like elsewhere, were actively collecting material from New Zealand, and Canterbury Museum under the direction of German-born Julius von Haast, was a very popular exchange partner at this time (Nolden, Hofmann, Schedl 2016; Schlott 2021, 2022). However, for some of the most sought after and scarce objects, where there was greater demand than supply, or where museums and other collecting institutions had limited material to offer for exchange, items were also procured by direct purchase from Haast. The mere pounamu were among the rarest and most recognisable of the manufactured objects from New Zealand and commanded a high price, especially when manufactured in the traditional manner using only stone tools. Both the Imperial-Royal Museum in Vienna and the Royal Museum in Dresden held substantial

New Zealand collections, and the mere represented an important addition, completing a series of representative objects, which would often include moa skeletons in the palaeontological collections and a pair of mounted Huia in the natural history department. Canterbury Museum played a key role in the establishment and enhancement of the New Zealand collections of many museums around the world, mostly through a series of exchanges, and in return built its collections on a monumental scale that completely belied the significant limitations on its purchasing budget at the time.

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Endnotes

- 1 The pounamu mere seen by Hochstetter was also described and illustrated by Edward Shortland (1812–1893), explorer, Māori scholar and interpreter: “A very celebrated one [mere] which I saw in the possession of Te Heuheu, at Taupo, was of the form here represented, about twenty inches [508 mm] long, the blade about four inches [102 mm] wide, and three-fourths of an inch [18 mm] thick in the middle, tapering on either side to a tolerably sharp edge [illustrated below]. The stone was of a pale green colour, mixed with opal, so as to present a wavy appearance, like that of a mackerel sky, translucent at the edge, and not disfigured by a single black speck. This weapon was named Kaiarero and was obtained from a chief of the east coast, whom an ancestor of Te Heuheu had killed in battle” (Shortland 1851: 34).
- 2 Charles Heaphy (1820–1881), artist and draughtsman of the New Zealand Company, explorer and soldier. Hochstetter became acquainted with Heaphy while he was in Auckland. At that time Heaphy was the chief surveyor in Auckland and had produced a map of the Auckland volcanoes.
- 3 The pounamu mere presented to Queen Victoria is illustrated in Taylor (1855: 244). No scale is given.
- 4 Professor Leopold Heinrich Fischer (1817–1886), University of Freiburg in Breisgau, Germany. Distinguished by his investigations on the origin and character of jade published in his book, *Nephrite and jadeite according to their mineralogical properties as well as their prehistoric and ethnographic importance* (1875).
- 5 Eduard Suess (1831–1914), professor of geology at the University of Vienna. For the correspondence and exchanges with Julius von Haast at Canterbury Museum, including the purchase of a complete moa skeleton, see Nolden, Hofmann and Lein (2016).
- 6 Tamati Tikao (1810–1885), also known as Pukurau, was a highly respected Rangatira and teacher who resided at Ōpukutahi, Wainui in Akaroa Harbour, where he died on 29 September. During time spent living with Reverend Charles Reay in Nelson he became a lay reader for the Anglican Church (Tikao 2015: 25). He was remembered for his contribution to, and recognition of the value of education,

having opened a boarding school for Māori children at Little River in 1860. Thomas Gore Browne appointed him to the position of Native Assessor at Little River and Akaroa. In this capacity he was responsible for the construction of a school, church, and whareniui at Wairewa. Tikao was a close friend of Reverend James Stack and an Anglican lay preacher (see Obituary: Tamati Tikao, *Lyttelton Times*, 1 October 1885: 6). Tamati Tikao was married to Raheha Mairehe Tikao (1820–1900), and biographical notes were recorded by their only child Hōne/Teone Taare Tikao (c. 1850–1927) (O'Regan 1993) and published by Raheha Tainui in the *Journal of the Polynesian Society* (Tainui 1946).

- 7 Hochstetter, like his counterpart Meyer in Dresden, purchased the mere made by Tamati Tikao on the understanding that they had been made by hand in the traditional manner using only stone tools, which substantially added to their price, and relative value for the collections of the two museums, as representative of indigenous craftsmanship.
- 8 Stack records that some greenstone could not be broken by any other stone but greenstone (Supplemental answers by the Rev. J.W. Stack, No.15; Chapman 1891: 515).
- 9 Hakopa Te Ata-o-Tu (c.1800-1883), Ngāi Tahu chief at Kaiapoi, known as a skilled pounamu carver and at the time reputed to be 83 years old.
- 10 The rock collected by the Māori and used as grindstones was the Charteris Bay sandstone, an indurated quartz-cemented medium to fine-grained light-grey to yellow-brown sandstone, from Aua (King Billy Island), close to the much larger Otamahua (Quail Island) at the head of Lyttelton Harbour (Inset in Fig. 5). Robert Speight comments that in places where the stratification of the sandstone is particularly well-developed 'large flags suitable for paving and for making grindstones' are easily obtained (Speight 1916: 373).
- 11 Werita Tainui (d. 1880) a Rangatira of Ngāti Waewae, a hapu of Ngāi Tahu (the principal iwi of the South Island). Ngāti Waewae controlled much of the pounamu trade with North Island tribes from its base at Māwhera (Greymouth) (Fig. 5).
- 12 Thomas Robert Procter (1826-1905) arrived in New Zealand in 1861, making a name for himself as a jeweller and watchmaker as well as advertising himself as an optician, in Hokitika and various other South Island towns, before going to Australia in 1888 (Cole 2017).
- 13 A reference to either Reverend George Cotterill (1814-1902), Christchurch, or Reverend George Peter Mutu (d. 1902), assistant to James Stack (*Press*, 24 June 1902).
- 14 Reverend Stack's notes on Māori manufacture of greenstone: "There are seven, or according to some Maoris, eight different varieties of greenstone, or "Pounamu." [15]
 1. Inanga. A very pale green approaching to a milky white colour.
 2. Kahotea. A dark green, often found with black spots through it. Found in large blocks in the neighbourhood of the Taramakau, Westland. A variety not highly prized
 3. Kawakawa. A very bright green.
 4. Auhunga. Pale green, between (1) Inanga and (3) Kawakawa.
 5. Kahurangi. A pure green, without flaws or spots.
 6. Kahurangi. With (1) Inanga streaks through it.
 7. Kokotangi wai. A soft and brittle variety found at Piopiotahi (Milford Sound), beautifully transparent, with the appearance of water drops inside. Hardens on

exposure to the air.

8. Aotea. A worthless, opaque variety.
- The greenstones most highly prized for meres, were those found in detached boulders in the riverbeds. The boulder, when found, was called by the name of the spirit who revealed its position to the tohunga (priest or learned person), acting as guide to the search-party. The natives on the east coast of the South Island were in the habit of going, in small parties, during the autumn, across the ranges by the several passes known to them, to the West Coast [18]. On arriving there, the tohunga of the party would separate himself from the rest, and go through certain religious ceremonies to induce the atua (gods) to show him where greenstone was to be found. When propitious they would grant his request by revealing to him in a dream the spot where the coveted stone was to be found. On awaking the tohunga would tell his companions what had been revealed to him, and they would all start for the spot indicated, spreading themselves across the riverbed as they approached it. When the boulder was found it was at once named after the spirit who helped the party to its discovery. When in the water a greenstone boulder differed very little in appearance from any other, the outer surface being generally grey or brown. As only a limited number of the more highly prized varieties of greenstone were found in the manner just described, the Maoris [sic] depended for the bulk of the raw material they required, upon what they could detach from the masses of greenstone rock, such as Kahotea. The method they adopted for breaking off fragments was to procure what they describe as a "knotty" round greenstone boulder, the grain of which was twisted in every direction. This they fixed to the end of a beam of wood, and having fastened three ropes to the hammer end of the beam-end, they raised it to an angle of about 80 degrees; then, fastening one of the ropes, and leaving a man in charge, the rest of the party would return close to the rock, holding the two ropes in such a manner as to cause the hammer to fall on the exact spot they wanted. Hakopa te Ata o Tu told me that thirty men were employed to work the hammer, on the occasion of his going for greenstone to the West Coast, about sixty years ago. The tools used in the manufacture of greenstone were:

1. Kuru pohatu. Stone hammer, being nothing more than a round boulder of cross-grained greenstone, about the size of a human skull. This was for breaking off pieces from the rough blocks, which had been carried across the Alpine ranges on men's backs to the places of manufacture on the east coast. To ensure a straight fracture a groove was first cut.
 2. Parihi pohatu. A sharp-edged chip of trap, or some other hard stone. This was worked backwards and forwards, to cut the groove.
 3. Hoanga. Grindstone. Any sort of gritty sandstone for rubbing down the rough surface.
 4. Kurupaka. A micaceous stone, plentiful on the West Coast beaches, used for cutting grooves.
 5. Mata. Obsidian for pointing the drill or pirori.
- The natives in Canterbury procured the grinding stones from the upper end of Lyttelton Harbour, in the immediate vicinity of Quail Island. The manufacture of greenstone was the favourite employment of old chiefs, who worked day and night at their monotonous task. During the day they carried the stone to their "taumata" or favourite seat on the top of

some neighbouring hillock, where they passed the day, rubbing the grindstone backwards and forwards across the surface of the greenstone block, the only relaxation being derived from watching from their look-out for the arrival of strangers. After grinding all day on the taumata, an industrious chief would carry his work back to his house, propping himself up against the wall lest he should be tempted to recline, and so lose too much time in rest. When overcome by sleep, he would still retain his hold of the grindstone, and starting up at intervals during the night, with a peculiar grunt would renew his self-imposed task. By dint of incessant labour a mere might be completed in about twelve months, but if the stone was very hard it took a much longer time. There were no religious ceremonies connected with the manufacture of greenstone, beyond those relating to its discovery in the first instance. It was the article of supreme value amongst the Maoris [sic], and became, shortly before the colonisation of the country, the principal medium of exchange” (Alexander Turnbull Library, MS-Papers-0037-138-29-1, -2, -3, -4; reproduced in Reed 1935: 271–274). In 1881, Professor Fischer (see endnote 4 above) sent a list of questions about the process of making hei-tiki, its meanings, and Māori beliefs and traditions about nephrite, to George Henry Frederick Ulrich (1830–1900), professor of mineralogy and metallurgy, and Director of the School of Mines at Otago University. Ulrich passed these on to the jurist, botanist and ethnologist Frederick Revans Chapman (1849–1936) in Dunedin who translated Fischer’s questions into English and circulated them to men he considered learned in Māori culture, one of whom was the Reverend Stack. Stack’s replies to Fischer’s questions were communicated to Chapman on 20 July 1882 (Chapman 1891: 512–515), and a copy given to Haast on 22 October 1882 to be forwarded to Hochstetter (see above) who made extensive use of them in his 1884 article (see also ‘Chapter II: Nephrite and Germans’, Street (2017): 37–50).

- 15 In addition to the greenstone varieties provided by Stack, Hakopa Te Ata-o-Tu adds matakirikiri (greenstone pebbles), (Stack to Chapman, 31 July 1881; in Chapman 1891: 515).
- 16 Hochstetter obtained the Māori names for different varieties of pounamu from Reverend Richard Taylor’s book: *A leaf from the natural history of New Zealand: or a vocabulary of its different productions, etc., etc., and their native names* (Taylor 1848). Richard Taylor (1805–1873), a missionary of the Church Mission Society in New Zealand, wrote numerous articles and books about the natural and cultural environment in New Zealand.
- 17 An annotated translation of Hochstetter’s 1864 paper: ‘Über das Vorkommen und die verschiedenen Abarten von neuseeländischem Nephrit (Punamu der Maoris) [On the occurrence and the different varieties of New Zealand nephrite (pounamu of the Maori)]’, *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften in Wien – mathematisch-naturwissenschaftliche Classe*. Vol. XLIX, 1864: 466–480, is given in Grapes and Nolden (2021).
- 18 In the 1860s the Public Works Department of the Canterbury Provincial Government asked Reverend Stack for information about Māori travel routes across the Southern Alps to the West Coast. In a letter dated 31 March 1865, Stack wrote: ‘I am sorry to say the only Maori who has gone to the West Coast by the old route is now too infirm

to leave his whare. There are no Maoris now living, except this old man, who know anything about the route beyond what they have heard in the past from others’ (Taylor 1952: 188). This ‘old man’ was probably Hakopa Te Ata-o-Tu. A traditional travel route up the Rakaia River and across Nōti Raureka (Browning Pass), on the main divide of Kā Tiritiri o te Moana (the Southern Alps) (Fig. 5), played a significant role in the Ngāi Tahu people reaching the West Coast and obtaining its pounamu.

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