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Cover image: Chisels, gouges and adzes manufactured from fine-grained basalt. From Auckland Museum's Pitcairn Island stone tool assemblage. Upper row: Chisels and gouges. Collection of Auckland Museum 31214.1, 28881.2, 30141.1, 2019.x.58, 28398.1, 28445.1 and 28324. Lower row: Adzes. Collection of Auckland Museum 24360.1, 17016.1, 28890 and 32014.6.

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The Auckland War Memorial Museum Collection of Stone Tools from Pitcairn Island, Southeast Polynesia

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Abstract
Auckland Museum Tāmaki Paenga Hira holds approximately 20,000 stone tools from Pitcairn Island. Acquired in the 1930s–1950s it is the largest museum-held collection of tools from the island. A wide range of tool types are represented across all manufacturing stages, use and condition. The collection remains largely under researched, just as the history of Polynesian occupation on Pitcairn is poorly understood. An initial description of the Auckland Museum's unique collection is provided within the known archaeology of the island, while also exploring Pitcairn's position in southeast Polynesia as a source of valuable stone material.

Keywords
Pitcairn Island; Polynesia; archaeology; stone tool; basalt; Auckland Museum.

INTRODUCTION

Auckland Museum Tāmaki Paenga Hira holds the largest known Pitcairn collection totalling approximately 20,000 stone tools. A wide range of tool types are represented including adzes and adze roughouts, chisels and gouges, fishhooks, hammer stones, *yolla* (grater) stones, pounders, files and abraders, and stone flakes. Despite historical collecting practices resulting in poor provenance within the island (Furey and Ash 2020) the collection represents tools across all stages of manufacture, use and condition, and can inform on methods of tool production, use and repair. Famously known as the final landing place of the *Bounty*, Pitcairn was unoccupied when the mutineers sought refuge from the British Navy on 23 January 1790. There is also evidence of earlier Polynesian occupation including marae, petroglyphs, stone artefacts and introduced food plants (Erksine 2004: 167; Gathercole 1964: 4). The tools will be discussed within the context of the limited archaeological evidence from the island, while also exploring Pitcairn's position as a source of valuable stone material.

BACKGROUND

Situated at the margins of Central East Polynesia, the Pitcairn Group consists of the volcanic island of Pitcairn (5 km^2), the raised limestone island of Henderson (37 km^2) and the two small coral atolls of Oeno and Ducie. Pitcairn's closest neighbours outside the Pitcairn Group are Mangareva (15 km^2), approximately 400 kilometres west in the Gambier Group, and Rapa Nui 1,700 kilometres to the east, making Pitcairn one of the most geographically isolated places on earth (Weisler 1996: 615). Topographically Pitcairn is the summit of a volcano with an eroding northern rim, steep sides, (Gathercole 1964: 3) and very little flat land. The island is cliff bound with no protective reef, limiting safe landing in rough seas (Cowell 1965: 72; Erksine 2004: 10). Despite the isolation and challenging environmental conditions both Pitcairn and Henderson show evidence of long-term Polynesian settlement.

Previous investigations on Pitcairn, summarised in Furey and Ash (2020: 3–4), discuss the presence of habitation sites, postholes, oven stones, stone working areas and a small quantity of food refuse including fish, bird, and pig bone (Gathercole 1964: 77; Sinoto 1983: 61). The existence of at least three marae point to sustained occupation of Pitcairn, rather than short-term visits (Routledge 1919: 303–314). Two uncalibrated early radiocarbon dates 615±105 (I-5629) and 590±105 (I-5630) (Sinoto 1983: 361) have large standard errors, and two later dates 180±50 (B-62940) and 140±70 (B-62937) (Weisler 1995: 389) are available, but the wider colonisation story for the southeast Pacific indicates the earliest evidence has not been located (Weisler 1995, 1996). Pitcairn-sourced stone in dated sites on neighbouring islands suggests a date around 11th–12th century AD for the initial settlement of Pitcairn (Kirch *et al.* 2010; Kirch *et al.* 2015; Sinoto 1983: 61; Weisler 1995: 89–90), consistent with the generally accepted chronology for wider Central East Polynesia (Molle and Hermann 2018: 73; Weisler and Green 2001).

STONE RESOURCES

Basalt outcrops are found in several places on the island, with an especially fine-grained source located at Tautama on the seaward side of the crater rim (Fig. 1). Tautama offers one of the best quality sources of fine-grained basalt in Central East Polynesia (Molle and Hermann 2018: 78). The basalt has few phenocrysts, fractures sub-conchoidally, and is geochemically high in silica, which all contribute to its fine-grained and flakeable properties (Gathercole 1964: 44; Sheppard *et al.* 2001; Weisler 1996). Stone was sourced from flows at the base of the cliff and eroded blocks on the talus slope. Gathercole (1964: 38) described a strip of flakes 10 yards (9 m) wide running from the base of the cliff to the sea. The absence of finished tools at the quarry source (Gathercole 1964: 43) could be attributed to widespread fossicking in the 1930s and 1940s, but there is also an absence of finished tools at Tahanga in New Zealand as adze blanks were removed to settlements for further shaping and finishing (Turner and Bonica 1994; Turner 2000). The rocky beach at Down Ha Cask, where basalt boulders display fracturing and flaking, was also noted as a likely source (Gathercole 1964: 40–44). The importance of stone working is visible across the landscape with Gathercole noting 'the entire island is a site' due to the large concentrations of waste debris, up to one metre thick in some areas (Cowell 1965: 73; Gathercole 1964: 19).

Volcanic tuff of distinctive red colour was another important material employed in tool manufacture. Located at Red Hole on the north-east coast and at Jinser Walley cave on the south-west coast (Fig. 1), seams of tuff were likely mined using basalt tools found on the floor of the cave, similar in appearance to flaked, unfinished adzes and points (Gathercole 1964: 49–51; Heyerdahl and Skjölsvold 1965a: 6, 1965b: 155, Plate 1). The material was used for abraders and files, with fragments found in association with tool manufacture across the island. It was also shaped into large *tiki* figures [statues] which graced the now destroyed marae (Heyerdahl and Skjölsvold 1965a: 3–5). Volcanic glass erodes from cliffs at Down Rope (Fig. 1), described in Gathercole (1964) as small sub-rounded cobbles of ignimbrite with patches of grey and black glass of poor quality. Flakes of this material were employed for scraping and cutting (Weisler 1995; Weisler and Green 2001: 429)

CHARACTERISTICS OF THE PITCAIRN COLLECTION

Throughout the 19th and early 20th centuries a large number of stone tools were removed from the island (see Furey and Ash 2020; Gathercole 1964). Observing the potential to generate income, Pitcairn Islanders in the 1930s–1950s began systematically collecting stone tools to sell. Auckland Museum was a major purchaser and smaller transactions with private collectors and other museums, such as Canterbury Museum and Otago

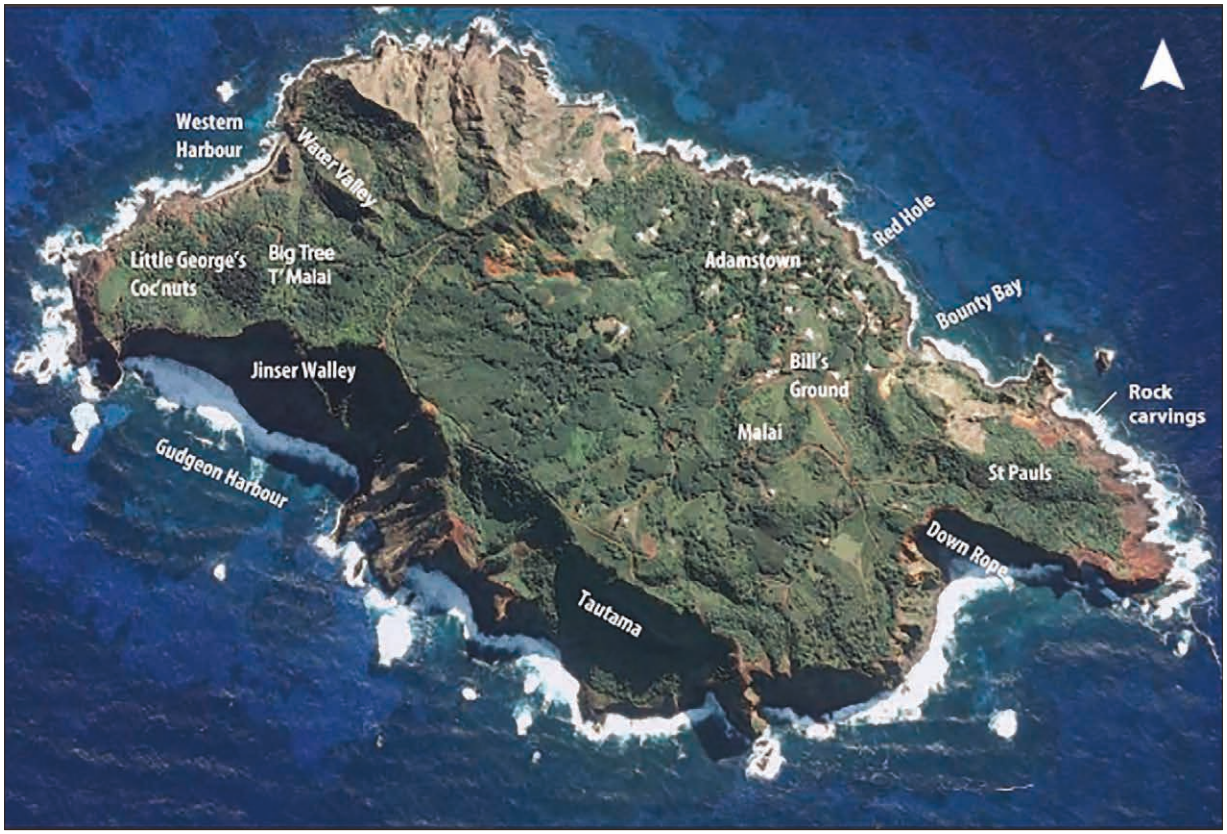

Figure 1. Map of Pitcairn Island highlighting key sites and landmarks mentioned in the text (Furey and Ash 2020: 2)

Museum, also occurred. Museum collections in the northern hemisphere are comprised predominately of complete adzes selected based on size or unique form (Emory 1928; Furey and Ash 2020; Gathercole 1964; Hamilton *et al.* 2013).

Auckland Museum's Pitcairn collection is predominantly surface collected material found while clearing vegetation or during gardening activities. The amount paid for finished adzes was greater than for roughouts, providing a monetary incentive for islanders to also dig in likely areas (Furey and Ash 2020: 8). The collection has a significantly higher proportion of roughouts to ground adzes, supported by Sinoto's excavation of a pit at Jim's Ground which produced a single finished ground adze and 61 adze blanks (Sinoto 1983: 61). Gathercole's excavations possibly produced similar results as he commented on the general absence of finished tools (Gathercole 1964: 43). However, the contents of his excavated assemblages in Otago Museum are unknown, and have not been examined. There is likely little difference between surface collected and excavated material, with the qualifier that the museum collection does not contain many stone flakes which were evidently abundant in working areas and settlement sites (Gathercole 1964: 38; Sinoto 1983: 61; Weisler 1996: 621)

The collection comprises stone one-piece fishhooks, stone drill points/awls, abraders, hammer stones, scrapers and sinkers, with chisels, gouges, adzes and adze roughouts making up the bulk of the collection. Many tools equate with those described by Brown (1900), Emory (1928) and Heyerdahl and Skjölsvold (1965b) and are considered unique to Pitcairn Island (see stone points and miscellaneous objects below). Turner (2010) provided an important description of the adzes and quantification of some, but not all, artefact types. Her count of 12,065 objects did not include approximately 8,000 objects that have continued to be added to the museum database since 2010. Approximately 97% of the items are manufactured from fine-grained basalt, likely from the Tautama source, however geochemical analysis is required to confirm this. A number of these basalt artefacts display a distinctive oxidised red-orange exterior with a dark grey interior. Tools are also manufactured from red volcanic tuff, obsidian, vesicular basalt and coral, and there are a few post-Bounty objects made from metal and stone (Fig. 2). Stone tools in all stages of manufacture, use and condition are present making the collection highly valuable for investigations of Polynesian stone tool technology.

Figure 2. Square head nail from post-Bounty occupation. Auckland War Memorial Museum 1985.332.1400

Adzes, Roughouts, Chisels and Gouges

Earlier descriptions of Pitcairn adzes (Brown 1900; Duff 1959; Emory 1928; Figueroa and Sanchez 1965) focused on small numbers of complete adzes that were often large and of unusual shape. The adzes in Auckland Museum (Figs 3–5) suggest that these examples are likely to be a result of selective collecting and are a misleading representation of the overall assemblage. Turner's (2010) analysis of nearly 6,000 adze and adze roughouts in Auckland Museum followed the same methodology employed in the study of New Zealand adzes manufactured from Tahanga basalt. In addition to addressing technical aspects her approach focused on the life history of an artefact (Turner 2000, 2005) and was able to make several significant observations about the characteristics of Pitcairn basalt and the impact on tool manufacture and morphology. Roger Duff's (1959) descriptive classification of adze types based on cross section shape has dominated Polynesian adze studies for decades and was previously used to explore cultural relationships between island groups. Deficiencies in Duff's classification have been identified (Shipton *et al*. 2016) and technological studies of flaking and adze manufacture, coupled with an understanding of how certain adze shapes performed in wood-working tasks, revealed shape and use was also dictated by the properties of the material used (Sheppard *et al*. 2001; Shipton *et al*. 2016; Turner 2000, 2005) creating a more complex interpretation than Duff. However, for ease of description of overall shape, Turner retained Duff's Types 1–6.

Pitcairn adzes display a high degree of breakage with unbroken primary (original shape) adzes and roughouts accounting for only 12.6% of the examined tools (Turner 2010: 136). Despite an abundance of raw material, a distinctive feature is the amount of recycling: 71% of the broken adzes and 79.7% of the roughouts have been reworked into other tools. This is similar to the amount of re-working of adzes from Tahanga (Turner 2000) and Papeno'o Valley, Tahiti (Kahn 2009),

Figure 3. Chisels and gouges manufactured from fine-grained basalt. A–B, chisels. C–G, gouges, illustrating range of forms described in the text. Auckland War Memorial Museum 31214.1, 28881.2, 30141.1, 2019.x.58, 28398.1, 28445.1, 28324

Figure 4. Adzes manufactured from fine-grained basalt. Auckland War Memorial Museum 32014.6, 24360.1, 17016.1, 28890

however, unlike these examples which were re-worked into new adzes, Pitcairn adzes were re-worked into other tool types such as drill points/awls. The low incidence of re-working into new adze forms could be attributed to the abundance of available basalt and the method of construction. Sub-vertical joints within the basalt flow allowed the parent rock to split along fracture planes (Turner 2010: 148). The blanks were therefore often thin and tabular, requiring little additional shaping. One face of the adze commonly displays little or no flaking due to the properties of the stone.

The collection is dominated by narrow-bladed type 6 tools (N=4,398), described as chisels if the blade edge is straight (N=1,762) (Figs. 3a, b) and gouges (Fig. 3c) if the blade is curved (N=529). Due to the absence of the blade edge this distinction could not be made for the remainder. These tools are often small with complete examples measuring 48–305 mm with a mean length of 122 mm and standard deviation of 47. Triangular and quadrangular cross sections are the most common, represented in 48% and 25% respectively. Variation within the type 6 tools, particularly the gouges, suggests use for specialised and finely detailed wood working.

Infrequent examples measure over 200 mm in length, are circular or triangular in cross section and often well ground (Figs 3c, d). Other examples are thick and heavy and only present as fragments: Figure 3f measures 40 mm across, is well ground on the fragment remaining, and has a planoconvex cross section. Complete examples are illustrated elsewhere (Brown 1900; plate IV). Steep, narrow blades measuring less than 5 mm are another notable feature and often associated with tapering of the blade and butt ends (Fig. 3e). These forms are well ground, some displaying a multi-facetted cross section created by grinding (Fig. 3g). Butt modification includes polish and hammer-dressing for in-line hafting, reduction and the more unusual examples display shoulders and projections (Figs 3d, g). Chipping and bruising damage to the poll is also common.

The second most common is the wide-bladed type 2 adze (N=1,004) which Turner (2010) and Shipton *et al.* (2016) have argued were used for forming and dressing planks (Fig. 4a), followed by type 4 (N=166) for primary wood reduction (Fig. 4c), and type 3 (N=21) for shaping curved surfaces. Thick and heavy functional type 1 (N=11) for cutting large trees (Fig. 4b), and type 5 (N=8) (Fig. 4d), also known as side hafted, for hollowing out logs and use in tight spaces, are underrepresented, consistent with descriptions of other adze collections from the island (Brown 1900; Emory 1928; Figueroa and Sanchez 1965). No complete examples of type 5 are present in the collection. Type 1 adzes are the largest with a mean length of 260 mm. Irrespective of Duff's classification, and including non-classifiable adzes, the assemblage is dominated by trapezoid cross sections consistent with origins as tabular blanks with flaking on the sides to shape.

Interesting features include flaring of the blade towards the cutting edge, predominately seen on type 2 adzes, a high degree of modification in the butt (haft) area, including reduction in thickness to the front and one or two shoulders. Reduction using flaking or grinding is common, with little hammer-dressing (Emory 1928; Turner 2010), possibly attributable to the properties of the basalt that allowed stone to be easily shaped (Turner 2010: 147). Projections in the butt area are a feature primarily seen on types 2, 4 and 6.

Unique tools which more closely resemble hafted knives or ulu include Figures 5a, b with a shallow cross section, severe butt reduction to a small knob and wide blade. A similar example is presented in Brown (1900: Plate IV) and Figueroa and Sanchez (1965: Plate 2-3e). Figure 5c displays marked spade shoulders, a poll with pronounced ground projections and a thin quadrangular cross section. A similar tool is described as a cleaving implement by Emory (1928: 132, plate 2a). These tools are all well ground.

Experimental work with adzes of different cross sections and shapes (Shipton *et al*. 2016; Turner 2010) suggest the Pitcairn adzes represent a range of types for use in specific wood working actions. While Turner (2010: 135) emphasised canoe manufacture as a primary

Figure 5. Unique adzes. A–B, adzes with reduced knob-like butt. C, unique adze with spade shoulders and poll features. Auckland War Memorial Museum 28319, 28318, 26344

industry, house timbers, bowls and other containers, paddles and implements all required a similar range of adze types. Large tree species growing on Pitcairn are limited in number (Florence *et. al*. 1995) and in the medium height range of 7–10 m, although it is likely in primary forest the trunk diameter could be a metre or more at the base. Canoe construction from a tree this size and diameter would require multiple planks to be joined together, accounting for the dominance of wide-bladed tools for forming planks, and narrow gouges and chisels for lashing holes. This scenario does not entirely account for the low incidence of type 1 and type 5 adzes, however, which would most likely be used for felling trees and hollowing out the base of composite canoes.

Stone fishhooks

Fishhooks from Pitcairn are rare. Auckland Museum has a single complete one-piece hook and eight broken or unfinished hooks fashioned from fine-grained basalt, plus several roughly shaped stone fragments that could represent early stages of manufacture (Fig. 6a–h). Only four other fishhooks are known: complete hooks in Fiji Museum and Otago Museum, and a complete hook and tab in Canterbury Museum (Green 1959: 21). The complete example in Auckland Museum (Fig. 6h) is 43 mm long and is a rotating one-piece hook with a round cross section, similar to the hook in Otago Museum (Skinner 1942: Fig. 73). The point leg is slightly curved and the tip is acutely in-turned with a

Figure 6. Stone fishhooks. A, possible stone fishhook blank. B–F, fishhooks showing stages of manufacture. G–H, fragment and complete stone fishhooks. Auckland War Memorial Museum 2020.x.28, 28325.1, 1985.332. 26, 28325.2, 31035, 28325.3, 32013, 31134

narrow gap between tip and shank. If complete Figure 6g would have been similar. The method of manufacture appears similar to that reported for stone fishhooks from Rapa Nui (Metraux 1940: 174–176) and is not dissimilar to that used to make one-piece hooks in bone and shell in New Zealand and elsewhere in Polynesia.

A rectangular shape was formed through flaking of the edges to create a tab (Fig. 6a), then the centre of the tab was drilled out from both sides. Five of the fishhooks are in this stage of manufacture (Figs 6b–f), with three snapped through the perforation, suggesting this was a high-risk stage. A depression around the drill hole indicates either a tool with a tapered end was used, or the hole involved a two-stage process with the bulk of the thickness removed by a wider-diameter tool and a narrow tool making the breakthrough. Examples of suitable tools, manufactured from red volcanic tuff, are present in the collection (Figs 8a, b). Grinding was then employed to smooth remaining surfaces. Some examples display evidence of a former use. Remnant polish indicates reject and broken tools were being re-worked into fishhooks. The hooks in Auckland Museum are small, with unfinished hooks ranging from 41 to 65 mm in length, with an especially large example measuring 105 mm (Fig. 6b) that shows drilling through the centre from one side and an incomplete perforation from the opposite side to make the central perforation larger.

Excavations elsewhere in Polynesia are characterised by large numbers of fishhooks, reflecting the emphasis on fishing. The few from Pitcairn is a noted contrast. Alternative materials to stone are limited in number. Pearl shell, commonly used throughout Eastern Polynesia, does not grow in the vicinity of Pitcairn and had to be imported. Bone from sea birds, humans, or pig could have been used but no hooks of these materials have been found during the limited archaeological investigations on the island. Historically wood was used elsewhere in Polynesia in conjunction with shell or bone points (Anell 1955), but again there is no evidence of wooden hook use on Pitcairn.

Pearl shell is generally under-represented in Pitcairn's archaeological record: a single pearl shell fishhook, resembling the Mangarevan form (Gathercole 1964: 76), a reported scraper, two worked pieces (Heyerdahl and Skjölsvold 1965b: 156) and a complete shell placed with a burial on one of the *marae* (reported in Heyerdahl and Skjölsvold 1965a: 4). In contrast, multiple pearl shell items including fishhooks have been recovered from investigations on neighbouring Henderson (Molle and Hermann 2018: 81; Weisler 1994: 91, 1996), which also naturally lacks pearl shell, suggesting that the absence on Pitcairn is due to poor survival. The nearest source of shell is Mangareva, and the Henderson hooks display similarities to Mangarevan types, providing evidence for the transfer of shell resources between Mangareva and the Pitcairn Group.

Elsewhere, in the absence of fishhooks it has been suggested that nets may have been the primary method of catching fish (Bollt 2008) but the rocky coastline of Pitcairn is not conducive to this technology. Given the absence of a reef around the island, Weisler and Walter (2016: 377) suggested land-based fishing would have limited returns and canoe-based fishing was more likely, although dependent on favourable sea conditions. On neighbouring Henderson more than 5000 fish bones and numerous fishhooks have been recovered from excavations suggesting fishing played a key role in the economy (Weisler 1994: 95). In stark contrast only a small amount of fishbone is reported from Pitcairn investigations (Gathercole 1964). The limited fish bone evidence, coupled with the under-representation of fishhooks and sinkers, suggests fishing may have been a minor activity. However, the lateritic soils are not conducive to good bone and shell preservation, affecting the representation of both faunal material and possibly fish hooks made of material other than stone.

Hammer stones / Spherical stones

Two types of tools with percussive bruising, and resembling hammer stones, are represented. The most common are round stones of a grey-brown vesicular basalt with white flecks and a pitted cortex, similar in appearance to natural lava bombs (N=153). These range in size from 28–130 mm and weigh between 26–1549 g. Light bruising, chipping and flattening of one or two faces is present on 90% of those catalogued but may in some cases be natural shape or wear. The remainder show no signs of use and have been compared to sling stones (Hamilton *et al.* 2013; Heyerdahl and Skjölsvold 1965b: 186), although this is speculative as slingstones tend to be elongated and taper to a broad point at one end (York and York 2011).

Repurposed broken tools, most likely adzes (N=17) have also been used as hammers. These are often trapezoidal–sub-triangular in cross section with minor flaking, measure 61–181 mm in length and weigh between 88 and 978 g. Re-use as a percussion tool is evident from the bruising and flattening on the poll or fractured face. The number of hammer stones is not unexpected considering the large amount of stone working evident. In addition to the smaller percussive tools in the collection, large hammers or anvils at Down Ha Cask have use-wear marking consistent with being used as hammers to remove large flakes from boulders (Gathercole 1964: 40).

Abraders and files

Abraders and files number 158 pieces and were reported from stone working areas (Gathercole 1964: 54). The majority (N=138) are manufactured from red volcanic tuff with hard black crystal-like inclusions and gritty texture, sourced to either Jinser Walley or Down Rope. These are largely fragments with one or more flat faces, ranging in length from 21–323 mm with 88% measuring less than 100 mm. A large worn slab of tuff with a flare to one end and shallow quadrangular cross section (Fig. 7a) is 323 mm in length and weighs 1096 g. Its flat surfaces were probably used for grinding and honing. Large fully ground, planoconvex abraders (Figs 7b, c), with one flat and three convex faces, taper towards each end, with Fig. 7c tapering to a point at one end and a chisel-like edge at the other.

Files are mostly oval in cross section, tapering to one end (not unlike the sandstone files used in fishhook manufacture in New Zealand, or coral files). Figures 8a and 8b are unusual and have a broad point tip and shoulders, suggesting they were used for a specialised purpose such as filing holes to a particular diameter. Very few objects, apart from the fishhook tabs, display evidence of this technique, however, the files were likely also employed in woodworking to enlarge or smooth lashing holes. Five well ground files are manufactured from the same porous vesicular basalt as the *yolla* stones and range from 50–122 mm length. These are all broken transversely and are cylindrical to lenticular in cross section, or multi-faceted and taper to the end (Figs. 8d–f). Figure 8d is perforated through at one end and may have served another function. The remainder (N=14) are small fragments of volcanic stone, measuring 44–150 mm in length and largely triangular to quadrangular in cross section with minor grinding to one or more face. The single coral abrader (Fig. 8c) measures 95 mm, is sub-rectangular in outline and worn on all surfaces. Corals are present in the water surrounding Pitcairn at a depth of 10–30 m and fragments would have been accessible (Irving and Dawson 2013).

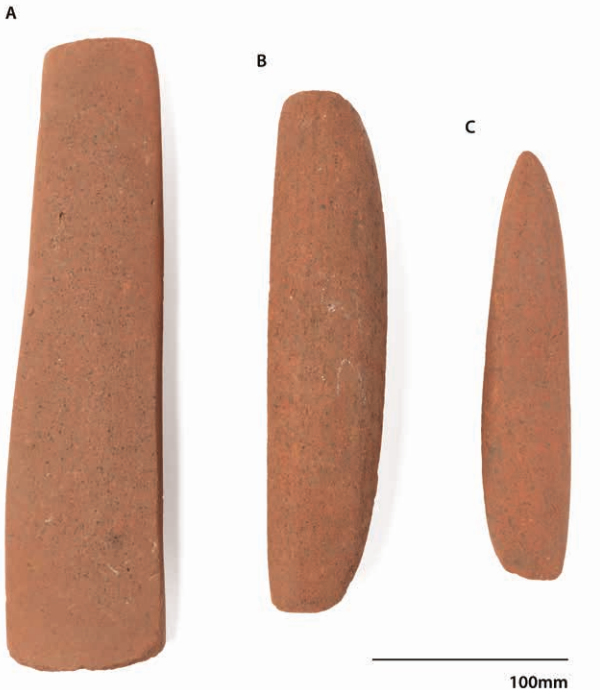

Figure 7. Abraders, red tuff. Auckland War Memorial Museum 28389, 28331.2, 28331.1

Figure 8. Files. A–B, red tuff. C, coral file. D–F, vesicular basalt. Auckland War Memorial Museum 28894.3, 28894.5, 29090, 28358, 28596, 30658

Stone points

Stone points are the second most common tool type in the collection (Figs. 9, 10), numbering approximately 1355 catalogued objects. They have been termed stone points in that they have been reduced by flaking to a narrow, pointed end but they may have had several different uses. Manufactured from fine-grained basalt, likely from the Tautama source, the points are similar in appearance to those previously described (Gathercole 1964: 66; Heyerdahl and Skjölsvold 1965b: 155). Although Auckland Museum registers from the 1940s commonly refer to these tools as either rimers or awls, the terminology does not appear to relate to the physical variation observed and all have been reclassified as stone points.

Complete points measure 42 to 242 mm in length. The most common cross sections are triangular (42%) and trapezoid (35%) but quadrangular, planoconvex and lenticular sections also feature. At least two main types of points have been recognised due to manufacturing differences. The larger examples are typically refashioned from existing tools such as chisels, adzes or roughouts that have broken during manufacture or use. The fractured end has been re-flaked and shaped to a long, tapered point (Figs 9a, b), and in some examples sloping shoulders created where the grip transitions to the point. Where the former adze has broken transversely, and the blade selected for refashioning into a point, the flared blade has been re-purposed as a haft. Additional

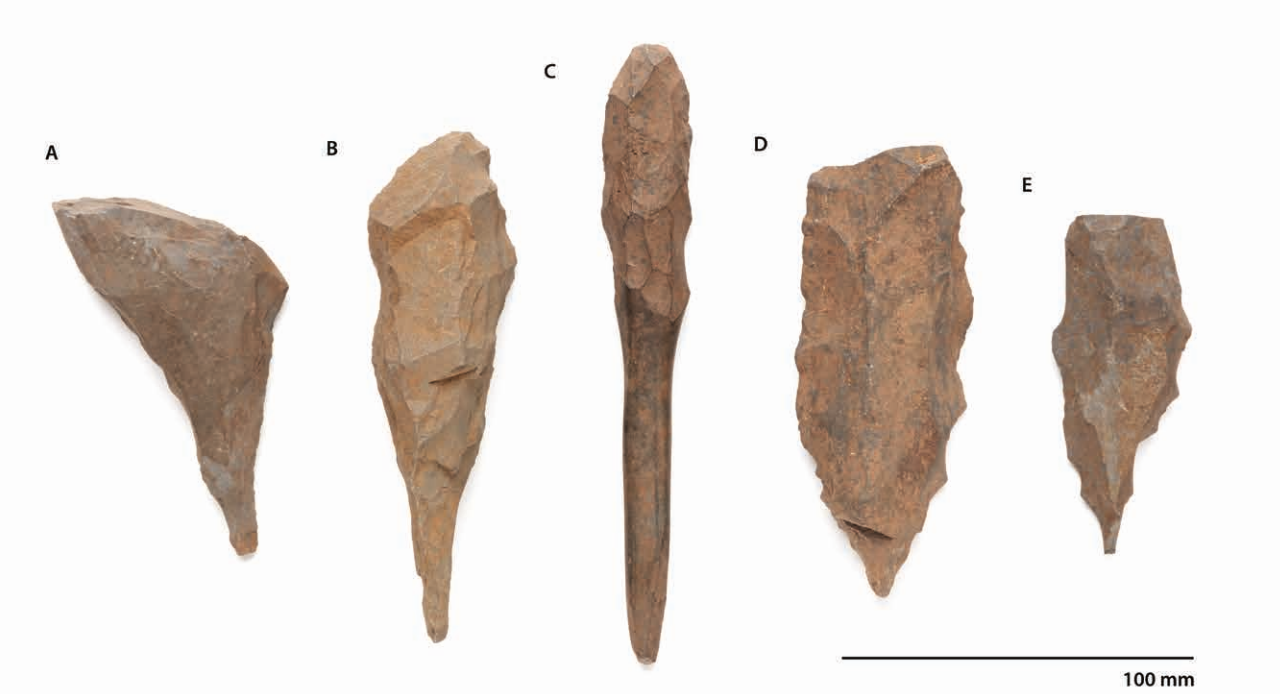

Figure 9. Basalt tools re-worked into stone points. Auckland War Memorial Museum 30555.6, 28505.5, 28816.2, 27628.4, 28384

Figure 10. Stone points manufactured from flakes. Auckland War Memorial Museum 28807.3, 33146, 1985.332.40, 32673.

examples of this type have an oval, bulbous grip which is flat on one face and convex on the other, with polish or hammer-dressing in the haft area on a small number of examples. Figure 9c is especially well made, measuring 147 mm in length with a bulbous flaked haft that is flat to one face, transitioning into a long, well ground point similar in appearance to a modern screwdriver.

Smaller, finer points were manufactured from flakes, shaped by secondary flaking to produce a long or short, tapered point. Shoulders are often prominent on these points and a number retain the striking platform and bulb of percussion (Fig. 10). Approximately 7% have two or more points on one tool (Fig. 10d). A common feature on all fine points is the polish and use-wear all around the tip extending up the shaft of the point, indicating use as drills or awls. The tip of the point has snapped off 28% of the points catalogued and 9% show signs of fire and chipping damage. Residue was not observed on any of the catalogued points.

The high incidence of stone points, and variation in point thickness and length, supports inferences about the importance of wood-working on the island (Turner 2010). Points were employed in the drilling and reaming of holes for lashings in composite canoes and house timbers among other wood working activities. However, it is unlikely the finer points or awls were employed in canoe manufacture and their use remains unknown. Interestingly, stone points of these types appear to be unique to Pitcairn and have not been reported in large numbers from neighbouring islands, with only a few, manufactured on stone flakes found on Henderson (Weisler 1995: 392).

Pounders

There are eight complete and three broken stone pounders in the collection and could have been used for mashing foods such as breadfruit to create pastes, and to crush leaves, bark and roots for dyes. The pounders are manufactured from both coarse and fine-grained basalt. The simplest forms (N=3) are water-rolled cobbles of an elongated oval shape with bruising to the ends on the long axis. They measure between 127 mm and 158 mm in length. Additionally, there are elongated water-rolled cobbles that show no evidence of modification or use despite suitability. A second form (N=5) are oval in cross section and are shaped through hammer-dressing to reduce the butt and create a knobbed handle for grip (Fig. 11). These examples flare to a flat pounding surface and are larger in size with complete examples ranging from 111–228 mm in length, and 861–2034 g.

Three more elaborate pounders are similar in style to the T-bar Tahitian food pounder (Hooper 2006) with a cross-bar handle and oval cross section flaring towards a circular flat pounding face (Fig. 12). This form is between 143–180 mm in length and weight ranges from 1464–3084 g. Two are manufactured from fine-grained basalt, are well shaped and ground. The third example is made from vesicular basalt and is much simpler in appearance. The Tahitian style pounders are likely associated with the later Bounty-related occupation of the island.

Figure 11. Stone pounder. Auckland War Memorial Museum 12552

Figure 12. Stone pounder of Tahitian form. Auckland War Memorial Museum 26528

Sinker

A single sinker (Fig. 13) is manufactured from coarse basalt. Measuring 159 mm in length and weighing 2,690 g, it is spherical with a suspension hole drilled at the top. However, unmodified stones may have been tied on as a weight, and there is no shortage of beach cobbles or other stones such as the inferred lava bombs.

Miscellaneous objects

Many of the stone tools equate with those found elsewhere in East Polynesia, including New Zealand. However, some forms appear unique to Pitcairn, including unique, multi-point tools manufactured from fine-grained basalt. Examples of special mention include a six-pointed star-shaped tool (Fig. 14a) measuring 136 x 112 x 15 mm. The projections are different lengths with rounded, blunt tips. The concave spaces between the projections have been flaked to create curves of varying width.

Figure 13. Sinker. Auckland War Memorial Museum 28357

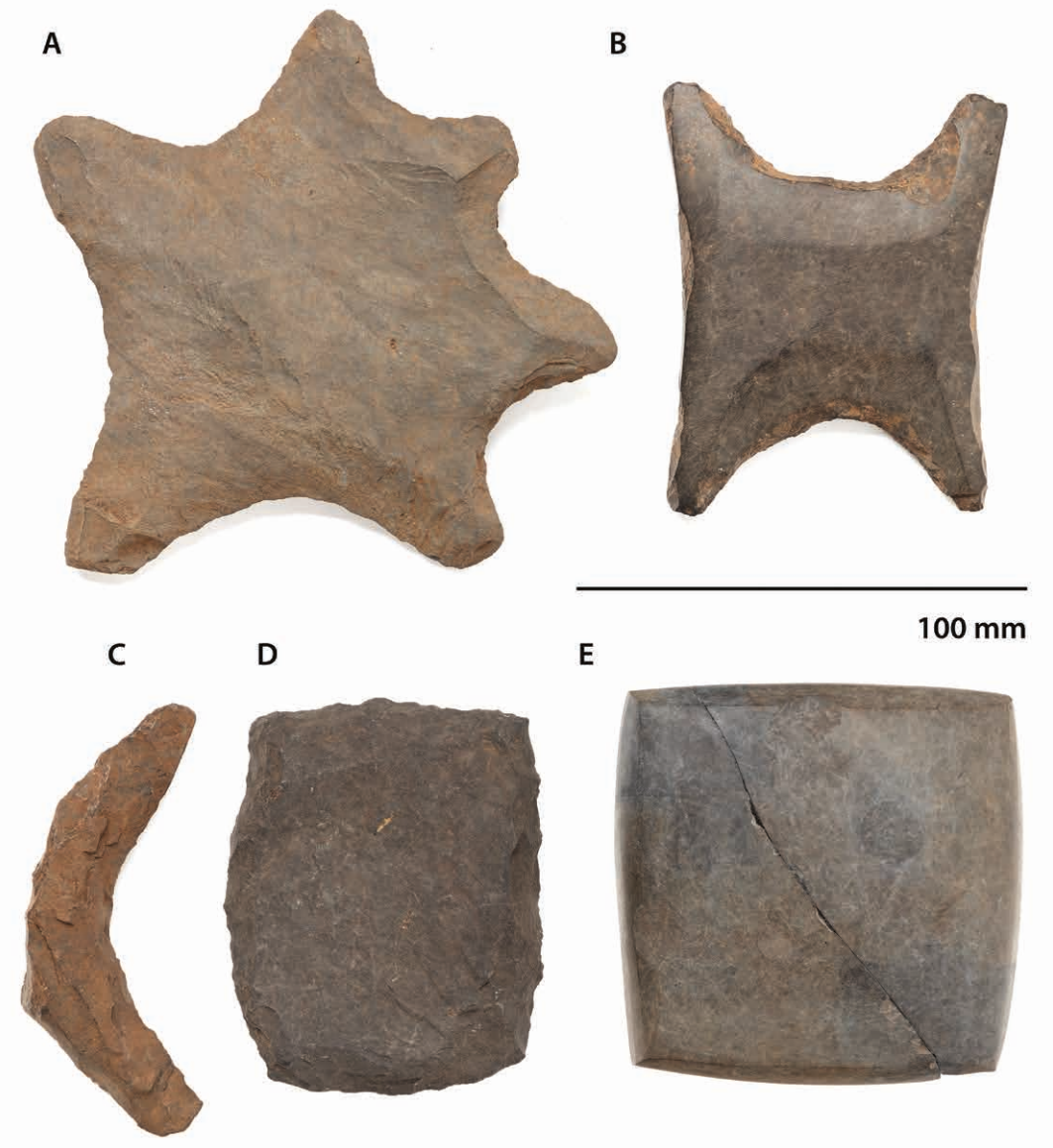

Figure 14. Unique tools. A–B, wood scrapers. C, curved tool of unknown use. D, possible palette or fishhook roughout. E, stone palette. Auckland War Memorial Museum 36087, 18810, 2020.x.29, 24628.3, 2020.x.27

Another example (Fig. 14b), also manufactured from fine-grained basalt, is square in outline and has been flaked laterally to create curved edges and blunted points that do not appear to have been used for drilling but are a by-product of the reduction of the sides. It has a shallow quadrangular cross section, measures 96 x 70 x 30 mm and is fully ground on the remaining edges and broad faces. Likened to a fishing line holder by Gilbert Archey (Furey and Ash 2020: 8), this object, along with the other multi-point tools, are more likely to be scrapers or spokeshaves for shaping round wooden shafts of different diameters. Figure 14b, with the concave edges shaped through bifacial flaking, is the only example that displays polish on the broad surface, suggesting reworking from one of another tool form.

Tools of unknown use include narrow crescent-shaped objects with a triangular cross section. Three examples measure around 100 mm in length, are shaped through flaking and taper at both ends: flaking is most extensive on Figure 14c that in shape resembles a barracouta hook point from New Zealand, where the distal end of the point slots into a wooden shank.

Also present are palette-like objects. These are square in outline with right-angled or curved corners, well ground, and with one flat and one concave broad face. A complete example (Fig. 14e) measures 91 x 90 x 16 mm and is ground all over. Figure 14b would have been similar before reduction of the sides to create a scraper. In addition to these well-made examples there are similar rectangular objects with polish and flaking around the edges, described earlier as fishhook blanks, but could also be an early stage of manufacture for the palette-like objects (Fig. 14d). Collectively these demonstrate the uses to which high-quality basalt could be flaked and worked into unusually shaped tools.

Stone flakes / Scrapers

Despite the prevalence of stone working on Pitcairn and the mounds of debitage reported (Cowell 1965), stone flakes (Fig. 15) are under-represented in the museum collection and are largely restricted to flakes that display secondary flaking and use-wear. This absence is attributed to collecting behaviour that monetarily rewarded collectors for shaped objects over unmodified stone flakes (Furey and Ash 2020).

Flakes of fine-grained basalt (N=113) range from 22 to 193 mm in length. Gathercole (1964: 42) reported large flakes were obtained from beach boulders but size of these compared to those in the museum collection is unknown. Retouched flakes (Figs 15b, c) have secondary flaking to the distal end where small flakes have been detached to form a sharp edge for cutting or scraping. Approximately 20% of the catalogued basalt flakes have use-polish along one edge indicating use on a hard abrasive material, or remnant polish from the previous tool form (Figs 15a–c). Broken adze blades were also likely employed as scrapers as chipping damage is present along the used edges.

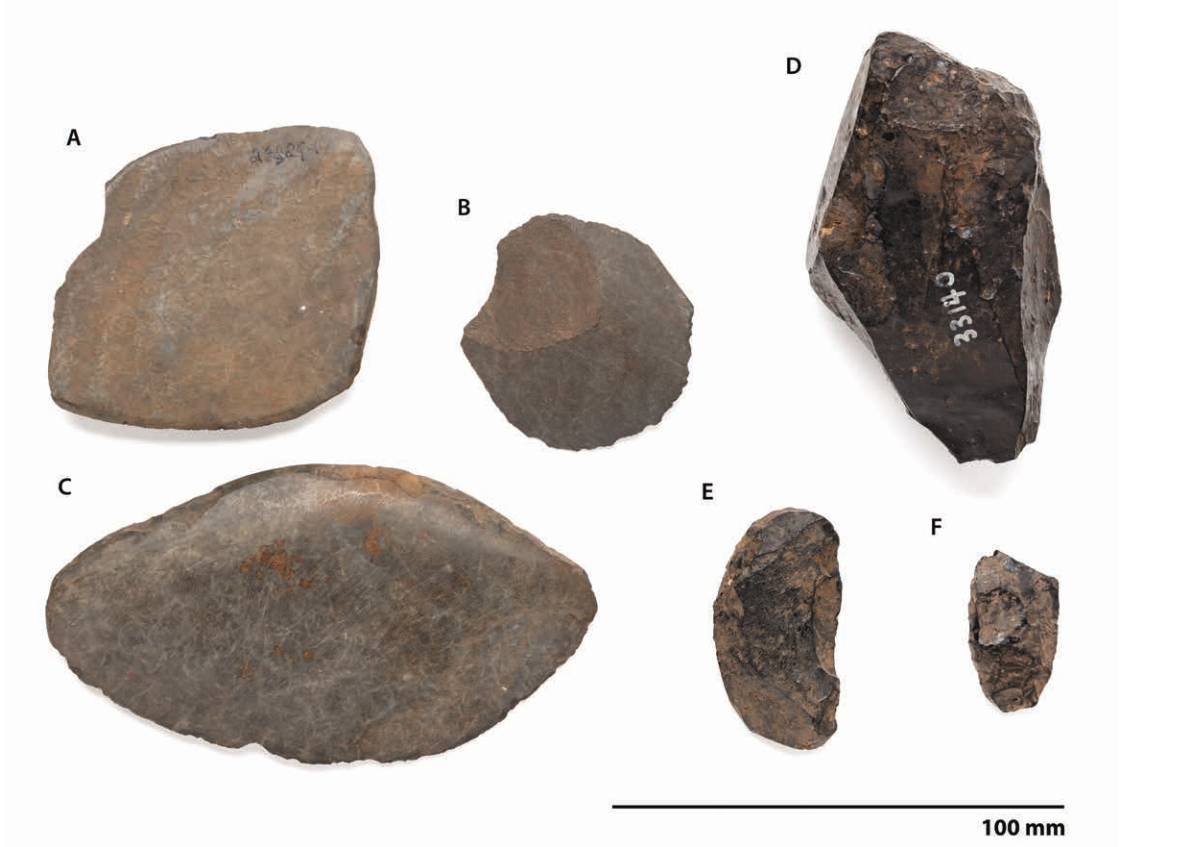

Figure 15. Scrapers and stone flakes. A–C, scrapers. D–F, flakes and cores of volcanic glass. Auckland War Memorial Museum 28329.1, 1985.332.127, 1985.332.19, 33140, 28903.2, 28589

There are seven cores and flakes of dense grey volcanic glass of poor quality, likely the local source (Figs 15d–f). Cores display only one or two small flake scars and their size fits Gathercole's description as small inclusions in ignimbrite. There is no evidence on the island of a large flow source.

Yolla Stones / Food Graters

Within the collection are distinctive stone items interpreted as food graters, believed to be from the post-Bounty period as similar objects were taken to Norfolk Island during the forced resettlement of all Pitcairn Islanders in 1856 (Erskine 2004: 242). On Norfolk they are known as *yolla* stones and placed on a four-legged wooden stool with a projecting neck similar to stools used for coconut grating (http: norfolkonlinenews.com/non-heritej-nyus-heritage-news/).

Two near complete slabs and five fragments are made from vesicular basalt that is coarse and porous (Figs 16a, b). Transverse and longitudinal grooves on both broad surfaces form a grid of raised knobs or 'teeth', which, together with the open texture of the basalt, would shred vegetable flesh. The finished edges of the objects are straight and ground smooth. The largest and most complete example measures 140 x 134 mm (Fig. 16a). Broken examples predominately display transverse or oblique breaks through the centre of the slab, likely the weakest point. Two examples have at least one narrow cut mark (groove) on the broad face outside of the grid patterning. The slabs are between 22–30 mm thick, with one outlier being 92 mm thick. In addition, six slabs of the same vesicular basalt show shaped edges and evidence of grinding to all surfaces, but do not have the raised 'teeth' seen on the other examples. Figure 16b has a different surface treatment and is pitted, most likely using a stone point to further roughen the faces.

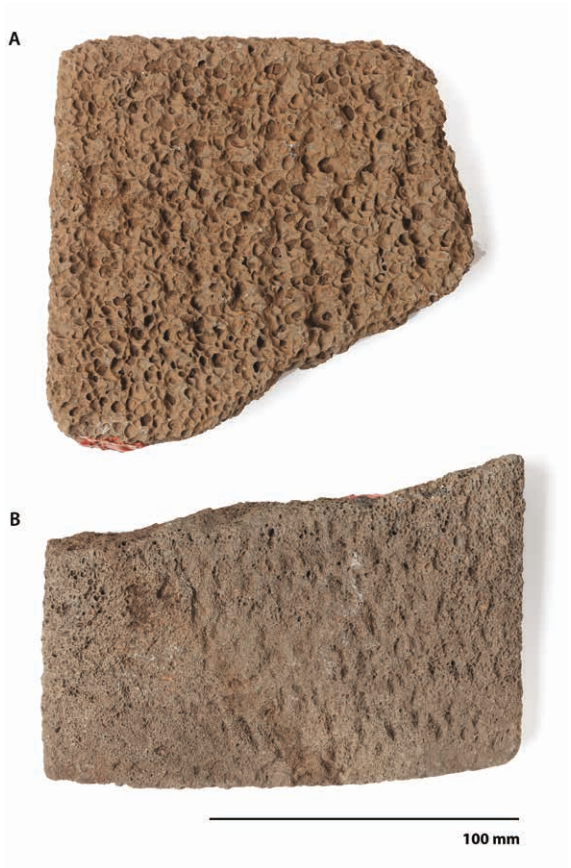

Figure 16. Yolla stones or food-graters. Auckland War Memorial Museum 28593, 28592

Preparation for a variety of food dishes throughout Polynesia involved peeling, grating, pounding, kneading, chopping and scraping, although tools varied across island groups (Leach 2008). The *yolla* stones, because of their shape and width, were not used to grate the flesh from the coconut shell but could have been used to process taro and breadfruit which grew on the island (Erskine 2004: 37). More commonly cowrie shells, absent from Pitcairn, were used to scrape the skin from the breadfruit (Allen and Ussher 2013).

PITCAIRN'S STONE INDUSTRY & INTER-ISLAND INTERACTION

Stone provenance studies have shown contact between island groups was maintained for several centuries after initial settlement (Weisler 1997). An interaction sphere existed between Pitcairn, Henderson and Mangareva (Weisler 1994, 1996, 1997) where Pitcairn provided fine-grained basalt and volcanic glass to Henderson and Mangareva. In return black-lipped pearl shell (*Pinctada margaritifera)* and economic plants such as swamp taro *(Cyrotosperma sp.)* and candlenut (*Aleurites moluccanus*) were likely imported to Pitcairn and Henderson from resource rich Mangareva (Green and Weisler 2002: 233; Molle and Hermann 2018: 80). Henderson, a raised limestone island, also received vesicular basalt for oven stones (Weisler 1996, 2002: 254). Connections between island groups through the exchange of resources and people likely aided the survival of small populations on remote and marginal islands.

Pitcairn has been attributed the role of a quarry island (Sinoto 1983: 61) or place of specialist adze manufacture, where large and elaborate adzes were produced and traded as prestigious goods (Molle and Hermann 2018: 77). However, these interpretations of the island's stone industry are based on small and selective collections (Brown 1900; Emory 1928; Figueroa and Sanchez 1965). Good quality basalt allowed unique objects to be produced (Gathercole 1964; Weisler 1996: 621) but the conclusion by Molle and Hermann (2018: 77) that types 3 and 4 adzes were of exceptional size (over 300 mm in length) is not supported by the evidence: the few complete examples measure between 148 and 249 mm in length (Figueroa and Sanchez 1965; Turner 2010: 141). Beyond the southeast network, only a single Pitcairn-sourced adze is known from Katiu Atoll in the Tuamotu Archipelago (Collerson and Weisler 2007), and volcanic glass from Atiahara on Tubuai in the Austral Group (Hermann *et al*. 2015). Despite the large quantity of worked basalt in the Atiahara site, none has been identified as from Pitcairn (Hermann 2013). Further, the adzes sourced to Pitcairn on Henderson, Mangareva and the single Pitcairn adze from the Tuamotu Group are not large prestigious objects (Richards 2019: 180). Tautama

basalt roughouts, flakes, cores and associated debitage demonstrates raw material, not just finished adzes, was being transported to nearby neighbours (Weisler 1994: 94, 1996: 624, 1997: 163; Green and Weisler 2002: 233).

There is a striking contrast between the limited distribution of Tautama basalt from Pitcairn and basalt from the Marquesas Island of Eiao, which has been identified in the Society Islands (Weisler 1998), Mangareva (Weisler 1998), Tuamotus (Collerson and Weisler 2007), Austral Islands (Hermann 2013) and Line Islands (Di Piazza and Pearthree 2002), and basalt from the Society Islands which is present on Mangareva (Weisler and Green 2001). Richards (2019: 8) attributed three basalt adzes from Pitcairn in museum collections to a Marquesan source, although the analytical data needs to be examined further. It is possible that some of the adzes analysed by Richards (2019) may have been incorrectly assigned to Pitcairn: for example, two quartz projectile points in Pitt Rivers Museum collected on Pitcairn in 1883 (Hamilton *et al*. 2013; Heyerdahl and Skjölsvold 1965b: plate 1) have no parallels in form or material on the islands of East Polynesia, and while they were collected on Pitcairn it is unlikely they were made on the island. Several interaction spheres have been proposed for Eastern Polynesia (Rolett 2002; Weisler 1996; Weisler and Walter 2016), where materials were transported, sometimes to distant islands based on networks of economic exchange, yet the very small quantities of imported Pitcairn stone does not fit models of major trading and resource sharing. The limited distribution of Pitcairn basalt and the apparent presence of Marquesan basalt on Pitcairn could provide an example where social systems based on maintaining ancestral connection and relationships played a greater part than economic exchange. Further investigation is needed to shed light on the settlement of Pitcairn and its role as a source of good quality stone.

The contraction of inter-island voyaging throughout East Polynesia around AD 1450 (Rolett 2002; Weisler 1996) has been cited as the catalyst for the abandonment of the islands within the Pitcairn Group (Weisler *et al*. 2016: 8154). However, the population of Henderson was able to survive for almost another 200 years after the loss of inter-island voyaging, with radiocarbon dates placing abandonment around the early 17th century (Weisler 1994: 89–90, 1995). Therefore, the abandonment of the Pitcairn group prior to European arrival is undoubtedly multi-faceted and a complex interplay of socio-political and ecological factors (Anderson 2001) and their impact on the island's carrying capacity (Weisler *et al*. 2016; Molle and Hermann 2018: 89). A documented equivalent is the transfer of Pitcairn Islanders to Tahiti in 1831 due to drought and weather events, and the later 1856 removal of all islanders to Norfolk due to environmental damage resulting from high population (Erskine 2004; Furey and Ash 2020: 5).

The museum collection of Pitcairn stone tools, although not *in situ*, provides the opportunity for investigation of stone tool technology in Eastern Polynesia in the first few hundred years of colonisation. Different methodologies in adze reduction are apparent, varying with intended cross section shape (Clarkson *et al*. 2014, 2015; Kahn 2009; Hermann 2013; Jennings *et al*. 2018; Jennings and Weisler 2020; Shipton *et al*. 2016; Turner 2000). While Duff (1959) focussed on differences in adze shape reflecting cultural connection, recent studies indicate properties of the stone heavily influence shape and manufacture (Jennings and Weisler 2020; Sheppard *et al*. 2001; Turner 2000; Turner 2010: 147–148), highlighting the need for further investigation. The Pitcairn assemblage can be assessed against these studies to further understand the range of Polynesian stone-working strategies. Comparison with continental rocks in New Zealand with similar physical characteristics also needs to be explored further and whether similar reduction techniques were employed. Duff (1959) certainly drew links between Pitcairn and New Zealand, based on the similarity of stone tool technology, that have no evidential basis. The stone points and the more unusual tools, some with elaborate hafts, have no equals anywhere. Further investigation is warranted into the activities they were used for, and whether they are a unique response to tool requirement for activities which elsewhere were carried out using other materials.

CONCLUSION

The large Pitcairn collection housed in Auckland Museum comprises a range of tool types across all stages of manufacture, use and repair. Adzes, chisels and gouges make up the bulk of the collection, with a number displaying unique attributes such as a flared blade on type 2 and 3 adzes, and butt modifications such as projections on type 6 gouges. The second most common tool are stone points, which are made on stone flakes or recycled from broken tools. The number and variation presented within this tool type is indicative of a broad range of wood working tasks such as forming holes and grooves for lashing, and possibly carving.

This focus on Pitcairn artefacts has shown how little is known of the history of settlement of the island: when it was settled and when it was abandoned. The adze forms and unique tools raise many questions about activity on the island. The basalt is fine-grained and of good quality, yet, unlike basalt from other islands, hasn't been widely distributed in Eastern Polynesia. Research is needed into how well the stone performs in a variety of tasks to eliminate the properties of the stone as a reason for its apparent limited off-island use. Not only were finished adzes not widely distributed but unfinished adzes and unmodified stone were also not regularly dispersed. The wider island absence of what is currently perceived as valuable Pitcairn stone may be due to Pitcairn's isolation or suggest social systems were more important than economics, and that the key component of interactions among neighbouring islands was maintaining *whakapapa* [genealogy] links and establishing new connections with gifted goods to cement relationships.

The collection is complementary to the material excavated from several sites by Gathercole in 1964, housed in Otago Museum. Although little is known of the excavated material, or the excavations, it is assumed to largely consist of stone flakes and other tools from documented contexts, and geological samples. Unfortunately, due to past collecting practices that did not

consider the importance of context, the Auckland Museum collection is largely unprovenanced within the island although there are exceptions. Despite these shortcomings the size of the collection and representation of tool types makes it valuable for research on the complex interplay between raw material and morphology, technological adaptation, breakage patterns and geochemical studies, and the role of inter-island voyaging in sustaining small populations on ecologically improvised islands.

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Dr Ezra Newton Drier (1871–1942) and his collection of New Zealand Mollusca

Wilma M. Blom Auckland War Memorial Museum | Tāmaki Paenga Hira

Abstract
In 2014, the Drier Collection of New Zealand molluscs, comprising 4,000–5,000 lots, was transferred from Museum of Vancouver to Auckland Museum. This shell collection is thought to have been assembled between 1926 and 1929 by Dr Ezra Newton Drier, who came to New Zealand in 1916 as the surgeon aboard a troop ship. He and his family settled in New Zealand until in early 1930 they embarked on a two-year world tour before returning permanently to Vancouver, Canada, where Dr Drier died in 1942. While in New Zealand, he met A.W.B. Powell, who started him on his shell collecting, and Drier is believed to have carried out most of his collecting between 1926 and 1931 in New Zealand and Australia. The collection is considered to be of high value to Auckland Museum because it will contribute additional baseline biodiversity data for the mid- to late-1920s, a period for which few dates are recorded in the Auckland Museum molluscan collections. Initially little was known of Dr Drier himself, but as part of further research to contextualise the mollusc collection, a picture of an energetic, perhaps driven man, has emerged from information held in online resources and the archives of Museum of Vancouver and Auckland Museum.

Keywords
E.N. Drier, A.W.B. Powell, shell collecting, Auckland Museum, Museum of Vancouver, World War I

INTRODUCTION

In November 2012, Joan Seidl, Director of Collections and Exhibitions at Museum of Vancouver (MOV), contacted Auckland Museum (AM) about 'a large shell collection that was largely assembled between 1921–1941 by Dr. E. Newton Drier, who did the majority of his collecting between 1929 and 1931 in New Zealand and Australia'. She explained that as the MOV's vision had shifted to focus on Vancouver and immediate environs they were seeking good alternative homes for at least some of this shell collection.

They had recruited the help of Dr Melissa Frey, Curator of Invertebrates at Royal British Columbia Museum to carry out an initial assessment of the Drier Collection. She described it as a large and diverse shell collection composed primarily of bivalves and gastropods, along with an assortment of chitons and scaphopods. The collection was thought to consist of approximately 2,500+ museum lots and over 500,000 individual specimens. The majority of these specimens (>75%) were thought to have been collected from New Zealand and Australia in 1929–1931 by Dr. E. Newton Drier. The bulk of material was deemed to be in good condition, with little evidence of infestation or decay.

All associated data, namely taxonomic identifications and geographic locations, were typed or hand-written on paper labels and stored with the specimens. Most labels included information about collection location and in some cases, it also included the date of collection. In most cases, specimens were identified to species level.

However, none of the collection had been properly catalogued or databased, but a cursory appraisal suggested that the collection comprised thousands of mollusc species (Joan Seidl pers. comm. 2012). From later dates and annotations which appeared on some labels, there were also suggestions that the collection had been added to or worked on after Drier's death in 1941 (Fig. 1).

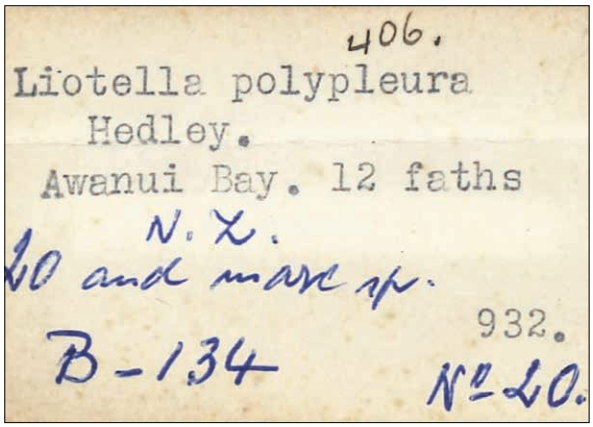


Figure 1. A type-written label created by E.N. Drier for shell specimens in his collection. The later annotations in blue ball-point pen were made by an unknown source. (Author's image).

An assessment of AM collections in 2012 showed that out of an estimated total 135,000 lots of molluscs, there were only 402 lots from the period 1919–1929 and a mere 89 from the period 1927–1929. As our collections are about providing baseline biodiversity information to stakeholders, the acquisition of any of the Drier-collected marine and terrestrial specimens with good data would therefore significantly boost this information for the mid to late 1920s. Based on this, the Auckland Museum Collection Development Committee approved my visit to MOV for two weeks in July 2013 to evaluate the E.N. Drier Collection for scientific as well as historical and cultural value.

I estimated that there were ~15,000 lots altogether with just under 5,000 from New Zealand, just over 5,000 from Australia and the remainder from the rest of the world, including some from western Pacific islands. Collection dates for the New Zealand shells all fell between 1926 and late 1929, while collection dates for the Australian shells all fell in 1930. After my visit to MOV, I recommended that AM accept all New Zealand lots of Tertiary fossils, land snails and marine molluscs with good locality data.

In September 2013 members the AM Museum Circle approved $10,000 from their funds to support the travel of a collection manager to MOV as well as the cost of packing and shipping the collection back to New Zealand. In March 2014 AM gave the final approval for the acquisition of the New Zealand component of the Drier Collection and in May 2014, Severine Hannam, the Marine Collection Manager, travelled to Vancouver to pack up and dispatch the Drier specimens back to Auckland Museum. At the same time, Alison Miller, Technical Officer, Malacology, of the Australian Museum, Sydney, packed up Drier's Australian-collected specimens for return to their museum collections.

In November 2019, the Conchology Section of the Auckland Institute and Museum (aka the Auckland Shell Club), which has had an association with Auckland Museum dating back to 1930, approved a $25,000 donation from its funds toward employing a specialist technician to catalogue the Drier Collection. The Lottery Environment and Heritage Committee approved a further $50,000 towards this in June 2020, but due to the increasing effects of the SARS-CoV-2 pandemic a technician was not employed for the project until May 2021. The work is due to be finished at the end of 2023.

One purpose of this paper is to provide background to the acquisition of the E.N. Drier Collection and its compatibility with AM's collections. A second is to give context to the collector and therefore his collection. When compared to 2013, so many more resources are available in 2022. This has enabled a much more detailed and complex picture to be constructed both for the times and of Dr Drier, who appears to have been an energetic man with a great sense of purpose and someone who was determined to make his mark in life.

A second paper is intended, which will report on the results and significance of the Drier acquisition at the end of the cataloguing project.

IN SEARCH OF DR EZRA NEWTON DRIER

Early life

Ezra Newton (known as Newton) Drier (Fig. 2) was born in Middle Simonds (1881–1920 Marriage Registry, Woodstock, New Brunswick, Canada, available through Ancestry.com), around 20 km north of Woodstock, Carleton County, New Brunswick. There is uncertainty around the date of his birth as it does not appear to have been recorded, but his birth year is often given as c. 1871 (e.g., Find a Grave 2022). In the Canadian Census April 1891, he is listed as being 20 years old, single and a schoolteacher (Library and Archives of Canada, item 266494). He married Hope Aradine Kilbourne on 28 August 1895 and on their marriage certificate it also states he was then a teacher (Provincial Archives of New Brunswick).

Four years later, in 1899 he had graduated as a physician from McGill University (McGill University 1899: 124). After this, the Driers moved to Kelowna, a small city approximately 200 km east of Vancouver, for a year where E.N. Drier took over the practice of Dr Boyce (*The Greenwood Miner* 1899: 97). In 1902 he took a 2-month posting as the surgeon on the SS *Moana*, a passenger ship owned by the Canadian–Australian Steamship Company, which operated a trans-Pacific service between eastern Australian ports and Vancouver (*Building Vancouver* blog 2022). The Union Steamship Company of New Zealand acquired a controlling interest in 1900, and although it was not until 1911 that New Zealand ports were permanently added to the route,

Figure 2. Dr Ezra Newton Drier, possibly in the 1930s. (Courtesy of City of Vancouver Archives, item CVA 677-1041).

they were visited sporadically prior to this date (Hoskin 2007). So, it may well be that Drier had his first taste of New Zealand in 1902 while serving on the SS *Moana*.

British Columbia City Directories 1860–1955 show that by 1905 Drier appears to have established a practice in Granville Street Vancouver (Vancouver Public Library 2022) and around this time, he also had a house designed and built for him just north of the Burrard Street Bridge (*Building Vancouver* blog 2022). United States patent records show that Drier developed a surgical arm-splint 'designed to be adaptable for either right or left arm or forearm and adjustable in size to the requirements of either youth or adult'. He filed the patent for this in September 1905 and it was granted in May 1906 (United States Patents Office 1905). In 1906 he also spent six months at Harvard University for post-graduate studies (*The Bulletin of the Vancouver Medical Association* 1941: 317).

Continuing in the same entrepreneurial spirit as before, in the same year he hired a firm to design a commercial block near downtown Vancouver. So, nine years after Drier had his house built, it was demolished, and he was involved in the development on the same site of the six storey Hampton Court apartments which are still there today (*Building Vancouver* blog 2022).

After being ill for some time Hope died in 1908 and was taken back to her native Richmond, New Brunswick by her husband and mother. On 26 January 1909 Drier married 27-year-old Jesse Townsend Reid (*Building Vancouver* blog 2022) at a quiet ceremony in Vancouver (Ancestry.com 2022). Shortly after, they left for Europe aboard the RMS *Empress of Ireland* and arrived in Liverpool on 20 February 1909 (Passenger lists, Ancestry.com 2022). Drier went on to Edinburgh to pass the examinations required to become a Fellow of the Royal College of Surgeons of Edinburgh (The Royal College of Surgeons of Edinburgh archives 2022).

Newton Drier then took his wife on an extended tour of Europe (*Building Vancouver* blog 2022) and along the way acquired yet another qualification, this time a Diploma from the University of Vienna (The *Bulletin of the Vancouver Medical Association* 1941: 317). On his return to Vancouver, he resumed his medical practice and a daughter, Francelle Marjorie, was born in 1910. A son followed but died on 22 May 1911 (Find a Grave 2022).

In 1914 the family moved yet again, this time into a newly built house in McNicoll Avenue, Kitsilano (Fig. 3). Ironically, this is only a stone's throw from the present-day site of the MOV, where Drier's shell collection would be in storage for nearly 50 years. In August of the same year, Drier was also responsible for the installation of an electrocardiograph at St. Paul's Hospital in Vancouver–the first such machine in western Canada (*The Daily News* 1914: 7).

However, after the outbreak of war in Europe he signed up with the Canadian Army Medical Corps (Certificate of Military Instruction available through Ancestry.com). By 1915 he was in London to help with the WWI effort as a temporary lieutenant in the Royal Army Medical Corps (*London Gazette* 1915: 12548) and was posted to France (*Auckland Star* 1916a).

Figure 3. The Drier's 1914 house in Kitsilano photographed in 2013. The present owner had commissioned a history of the house which confirmed that Dr Drier had been its first owner (Author's image).

Residence in New Zealand

An advertisement in the lost and found section of the New Zealand Herald of 5 July 1916 (*New Zealand Herald* 1916), asking for the return of his lost diploma from the University of Vienna, dates Drier's arrival in Auckland as the surgeon aboard the troop ship RMS *Ruapehu* (Fig. 4). His intention to remain is made clear by a notice placed on 13 July 1916 in the *New Zealand Gazette* (1916: 2398) 'that I intend applying on the 3rd August next to have my name placed on the Medical Register of the Dominion of New Zealand'. A further advertisement on 1 August in the *New Zealand Herald* (1916) that Dr E. Newton Drier 'has taken over Dr B.J. Dudley's practice while the latter is on active service' reiterated this intention. His registration on 3 August 1916 as a medical practitioner is formally acknowledged in the *New Zealand Gazette* (1917: 60).

Presumably after the cessation of war and the return of Dr Dudley, Drier started his own practice with medical rooms in the Pacific Buildings, on the corner of Wellesley Street and Queen Street, while he and his family lived 500 m up the hill at 70 Symonds Street. This information came from a note found in the AM archives, dated 2 October 1928, from Drier to L.T. Griffin, who at the time may have been the Acting Director at AM. The note was written on a page of Drier's medical script notepad (Fig. 5) and bore the addresses and hours of practice. The same notepads were later recycled into labels for the shells Drier collected in Australia in 1930,

Figure 4. The RMS (Royal Mail Ship) *Ruapehu*, which was built by Wm Denny & Bros, Dumbarton, Scotland in 1901, the same company which built the SS *Moana*. During WWI she was used as a troop ship on several occasions. (Image courtesy of National Library of New Zealand, PAColl-3037, John Dickie Collection, 1869–1942, Ref. 1/1-002409-G).

after he left New Zealand for good. A notice referring to the sale of the same property in the *Sun (Auckland)* newspaper of 6 September 1929 described the Drier's home as a 'three-storeyed Italian villa residence [containing] 12 rooms and offices [with] four balconies and a garage' (*Sun (Auckland)* 1929).

Although no record for their arrival in Auckland has been found in passenger lists, at some point Drier was joined by his wife Jesse and daughter Francelle, perhaps after the end of WW1 when it was safer to travel.

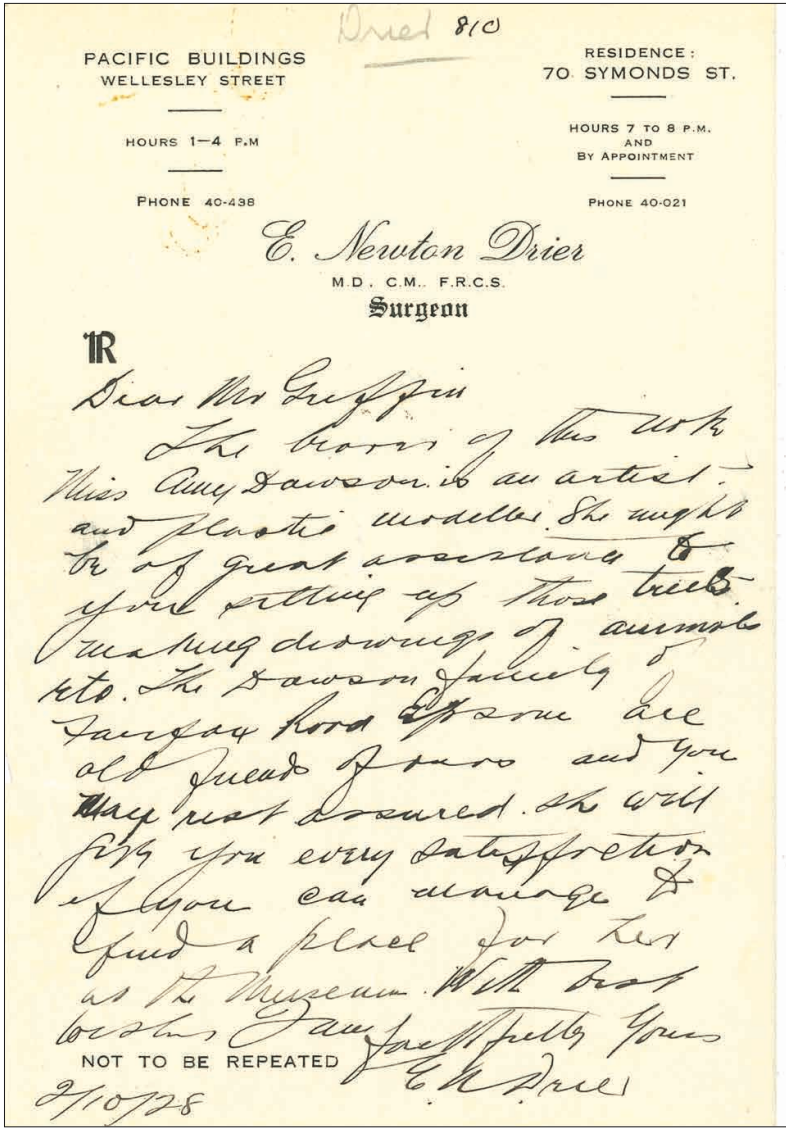
It appears that Drier quite quickly became part of the fabric of Auckland society. Only two months after his arrival he took part in debates on the nationalisation of the medical service in New Zealand–something that he was not in favour of (*Auckland Star* 1916b). In April 1918 he became a member of the United Grand Lodge of England Freemasons, Remuera (Ancestry.com 2022), although a reference to the resignation of his membership of the Acacia Lodge No. 22 in 1910 (Grand Lodge of British Columbia A.F. & A.M. 1910) showed that he had been a Freemason before his arrival in New Zealand.

Between mid-1916 and late 1929 there are numerous other references in the local newspapers to Dr Drier and sometimes his wife and daughter. Often, these refer to him in his professional capacity as a doctor or surgeon, at other times as an ordinary citizen, such as the time when he caused a 'motor car collision' because he had been driving on the wrong side of the road (*New Zealand Herald* 1919). Appendix 1 lists further examples of records in Auckland newspapers which relate to Dr Drier or his family.

There is no record of Dr Drier having collected shells before 1926, but in this year, he joined the Auckland Museum Institute (*Auckland Institute and Museum Annual Report* 1926–27: 36) where he would have met A.W.B. Powell. By this stage, Drier was around 55 years old and may have been thinking of retiring or at least slowing down. Though not officially a curator at Auckland Museum until 1929, Powell had been made Honorary Conchology Curator by T.F. Cheeseman in 1916 when he was 15 years old, and he was well-versed in shell collecting (Cernohorsky 1988). There is a letter in MOV archives from A.W.B. Powell to T.P.O. Menzies, the Secretary Curator of the City Museum, dated 3 August 1943, in which Powell stated that he was 'not only instrumental in starting him [Drier] with his [shell collecting] hobby but also accompanied him on practically all his New Zealand collecting trips' (Fig. 6).

The Museum of Vancouver has an image in their Drier Archives (labelled 'New Zealand 1925'; Fig. 7) of a 'van camper'. Although it is not recorded, it is tempting to think that the vehicle belonged to Dr Drier and was used for at least some of his collecting trips.

Perhaps contrary to current beliefs about the 1920s, it was not unusual for the time to be touring the country in a motor car or 'van camper' as New Zealanders appeared to have had an already well-established tradition of 'getting away for Christmas'. An article in the *New Zealand Herald* on 22 December 1927 stated that 'Officials of automobile associations and tourist organisations estimate that over 10,000 motor touring



PACIFIC BUILDINGS
WELLESLEY STREET

HOURS 1—4 P.M

PHONE 40-438

RESIDENCE:
70 SYMONDS ST.

HOURS 7 TO 8 P.M.
AND
BY APPOINTMENT

PHONE 40-021

E. Newton Drier
M.D. C.M. F.R.C.S.
Surgeon

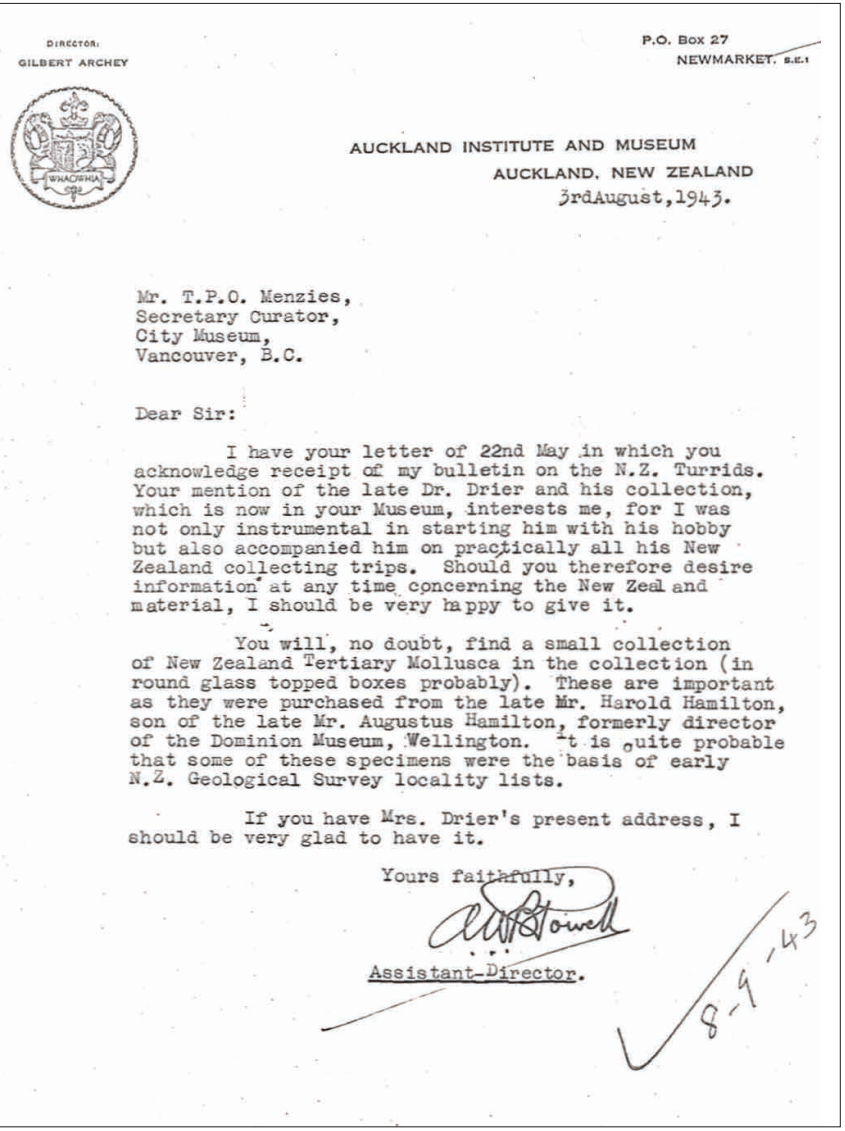
℞

Dear Mr Griffin

The bones of this work
Miss Amy Dawson is an artist
and plastic modeller. She might
be of great assistance to
you setting up those birds
making drawings of animals
etc. The Dawson family
Langley Road Epsom are
old friends of ours and you
may rest assured she will
give you every satisfaction
if you can arrange to
find a place for her
at the Museum. With best
wishes I am Yours faithfully
E.N. Drier

NOT TO BE REPEATED

2/10/28



DIRECTOR:
GILBERT ARCHEY

P.O. Box 27
NEWMARKET, S.E.1

AUCKLAND INSTITUTE AND MUSEUM
AUCKLAND, NEW ZEALAND
3rd August, 1943.

Mr. T.P.O. Menzies,
Secretary Curator,
City Museum,
Vancouver, B.C.

Dear Sir:

I have your letter of 22nd May in which you acknowledge receipt of my bulletin on the N.Z. Turrids. Your mention of the late Dr. Drier and his collection, which is now in your Museum, interests me, for I was not only instrumental in starting him with his hobby but also accompanied him on practically all his New Zealand collecting trips. Should you therefore desire information at any time concerning the New Zealand material, I should be very happy to give it.

You will, no doubt, find a small collection of New Zealand Tertiary Mollusca in the collection (in round glass topped boxes probably). These are important as they were purchased from the late Mr. Harold Hamilton, son of the late Mr. Augustus Hamilton, formerly director of the Dominion Museum, Wellington. It is quite probable that some of these specimens were the basis of early N.Z. Geological Survey locality lists.

If you have Mrs. Drier's present address, I should be very glad to have it.

Yours faithfully,

A.W.B. Powell

Assistant-Director.

8-9-43

Figure 5. (left) A note from E.N. Drier to L.T. Griffin showing that the former had his medical rooms in the Pacific Buildings, Wellesley Street and his residence at 70 Symonds Street. (Courtesy of Auckland Museum, MUS-1995-42-Drier1928) Figure 6. (right) A.W.B. Powell's letter to T.P.O. Menzies which stated he was responsible for starting E.N. Drier on his shell collecting hobby (Courtesy of MOV archives).

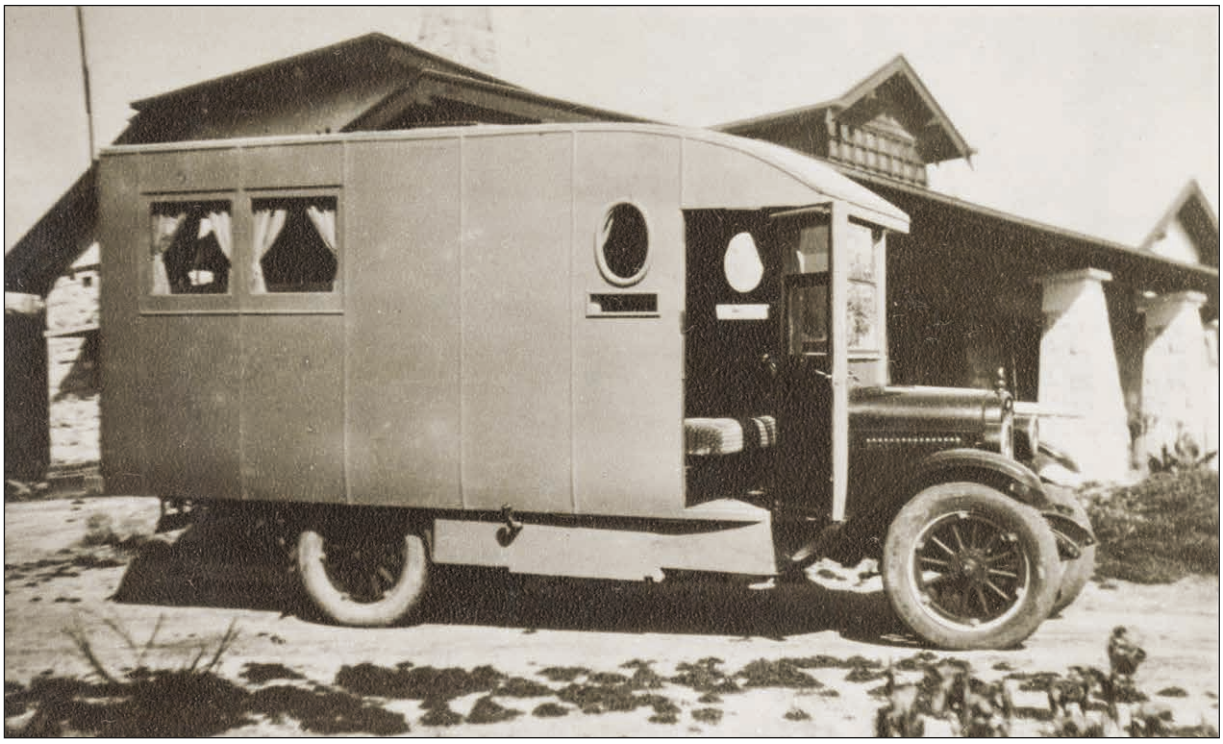


Figure 7. This image was found in the Drier archives at Museum of Vancouver, labeled 'New Zealand 1925'. It shows a 'van camper' conversion most likely of a Chevrolet one-ton commercial chassis with a locally built body. This marque was popular in New Zealand at the time and the vehicle may have belonged to Dr Drier or it may have been hired (Image courtesy of Museum of Vancouver).

and camping parties will be on the North Island roads between Christmas and New Year. The bureaux of the larger motorists' associations have been supplying information for projected tours for over a month and the Auckland Automobile Association had issued nearly 1000 itineraries by the middle of this month. Auckland motorists are venturing everywhere. A few will ship their cars to the South Island in search of new scenes, but new roads have opened up so much territory within this province [Auckland] that even the insatiable pioneers with 25 years of motoring experience may find something novel not 200 miles from home' (*New Zealand Herald* 1927).

The Driers appear to have been part of this trend as shown by a notice in the local papers on 17 December 1927 (*Auckland Star* 1927) that 'Dr Drier will be absent for some time on holidays. Dr Murphy will attend to his appointments'. A further notice in the social columns on 3 February 1928 (*Sun (Auckland)* 1928) advised readers that 'Dr and Mrs Drier and their daughter [had] returned to town from a two-months' motor trip through the North and South Islands'.

However, a year-and-a-half later, the Drier's substantial three-storeyed 'Italian villa' at 70 Symonds Street was sold at auction on 6 September 1929. Although it did not make the auction reserve 'by a small figure' it was sold through private negotiations after the sale (*Sun (Auckland)* 1929). On the following 11 November the *New Zealand Herald* carried a notice on behalf of Drier 'who is leaving New Zealand' for an auction 'today (Monday) at 11 o'clock' at his Symonds St residence for the balance of his household, library, office furniture (*New Zealand Herald* 1929a). And on 23 November the contents of his consulting rooms in the Pacific Buildings were advertised 'to doctors, collectors and those looking for good high-class furniture' at public auction (*New Zealand Herald* 1929b).

The social pages of the *New Zealand Herald* reported on 25 January 1930 that the Driers and Dr Rose of Canada had returned to Auckland from a fortnight's fishing at Taupo (*New Zealand Herald* 1930a). In the same column readers were also informed that 'Mrs E. Newton Drier and Miss Francelle Drier are leaving by the *Maunganui* next week for a world tour'. The Drier family finally departed New Zealand for Sydney on 31 January 1930 in 'First Saloon' on board the SS *Maunganui* (*New Zealand Herald*, 1930b).

Extended travels

The trip around the world was a leisurely one during which the Driers kept in touch with their New Zealand friends by way of the social pages in the Auckland newspapers. On 26 May 1930, the *New Zealand Herald* carried a paragraph that 'Dr and Mrs Drier and Miss Francelle, of Symonds Street, have been extensively touring Australia. They have visited Sydney, Melbourne, Adelaide, Brisbane and the country districts around Brisbane, returning to the latter city in time for the Science Congress on May 23, which Dr Drier is attending. Early in June they will leave for the Great

Barrier Reef, and after that for Cairns, the Philippines and Japan' (*New Zealand Herald*, 1930c). Although no mention has been found of a visit there, there were large numbers of New Caledonian *Placostylus* specimens in the Drier Collection at MOV. Some had labels made of Drier's recycled note pads and were dated 1930, which suggests they most probably also took in New Caledonia.

At the end of October 1930, it was reported that 'Dr. and Mrs. E. Newton Drier, and Miss Francelle Drier, of Auckland, who are away on an extensive tour of the world, spent an interesting month in Manila and from there went up to Japan via Shanghai and Hongkong [sic]. A month was also spent at Yokohama. From Singapore they went to Rangoon and Calcutta and saw India via Calcutta, Benares, Delhi, Agra, Lahore, Bombay and Madras, across to Kandy and Colombo. On November 13 they will go through to Egypt and Naples and by Christmas expect to be in Vienna, where they will stay for a month or so' (*New Zealand Herald*, 1930d).

Instead, they spent Christmas in Florence, after first visiting Naples and Rome. From Florence they then went to Venice, Milan, Nice and Cannes. From there they continued, via Switzerland, to Vienna, Berlin and then to The Netherlands, Belgium, Denmark and down to Spain intending to be in London by Easter 'or a little later'. They had been joined in Colombo by another peripatetic Aucklander, Miss Phyllis Eady, who accompanied them for the rest of their travels (*New Zealand Herald* 1931a).

On 16 April 1931 according to the *New Zealanders at Home* column in the *New Zealand Herald* (1931b) 'Dr E.N. Drier, of Auckland, accompanied by Mrs Drier and Miss Drier, has already had many delightful travel experiences. In June they will go to Canada and the United States. Dr. Drier intends to spend some time in Canada, the land of his birth'.

In May 1931 the papers reported that the Driers arrived in London in April and that after visiting Scotland Mrs E. Newton Drier and Miss Francelle Drier, accompanied by Miss Eady, would leave for Montreal toward the end of that month. They intended to visit friends in the United States for a few weeks before again returning to London (*New Zealand Herald* 1931c).

Return to Canada

It is not clear whether the return journey to the United States ever took place, but the 13 August 1931 *New Zealand Herald* (1931d) informed its readers that 'Dr. and Mrs. E. Newton Drier and Miss Francelle Drier, formerly of Symonds Street, Auckland, who have been on a world tour, have arrived in Vancouver from London, where they spent two months.' However, they intended to spend the summer in Vancouver and the winter in California. Miss Phyllis Eady, who accompanied them on part of their tour, expected to return to Auckland by Christmas that year.

After his return to Vancouver probably sometime in late 1931, Dr Drier sought to gift his collection of shells to the Vancouver City Museum. This is dealt with in the next section, but from 1931 on, news of the Driers becomes increasingly sparse.

There were two more communications to Drier on file at Auckland Museum. One is from Powell in February 1932 (AV2.6.30 1932D) and the other from the Director (presumably Gilbert Archey) in February 1934 (AV2.6.32 1934D). Both are clearly in reply to a letter from Drier enquiring about the non-receipt of copies of the *Transactions and Proceedings of the Royal Society of New Zealand*.

On 14 July 1932, there is what may have been the final mention of the Driers in the social pages of the *New Zealand Herald* (1932), reporting that they were spending the summer at Vancouver Island and that Dr Drier had been elected conchologist of the Vancouver Museum.

Correspondence held at MOV between him and the Director, T.P.O. Menzies indicates that while at Vancouver Island he continued his molluscan research but collected only a few shells. One further letter to Menzies, dated 10 March 1936, shows that he was continuing to work on the collection, but unhappy at the speed with which the City Museum was providing cases for the display of the shells. This appears to be the last known record of Drier on file at MOV.

Dr Ezra Newton Drier was at Vancouver City Museum as Honorary Curator of Conchology from 23 June 1932 until he died aged 70 on 27 June 1941 of pancreatic cancer (*The Bulletin of the Vancouver Medical Association* 1941: 317). He is buried at Mountainview Cemetery, Vancouver, alongside the baby son who died in May 1911 (Find a Grave 2022).

THE DRIER COLLECTION AT MUSEUM OF VANCOUVER

The Museum of Vancouver was founded in 1894 by the Art Historical and Scientific Association (AHSA). E.N. Drier joined the AHSA as a member in September 1931 and in April 1932 the MOV, then known as the City Museum, formally accepted the Drier Collection of molluscs from several countries as 'absolute property' of the Museum. In the following June Dr Drier was officially appointed as the Honorary Curator of Conchology (AHSA minutes and reports, COV Archives MSS 388).

While Drier's motivation for the donation of his collection appears to have been its public display as well as the facilitation of his own continued research, for the City Museum there appears to have been another, more pragmatic reason. At the time the Museum was in the Carnegie Building in the Downtown Eastside of Vancouver, and it had long outgrown its allocated space (Wikipedia, 2022). It was felt that the acquisition of a large collection such as the Drier Collection, would help the AHSA bolster their campaign for new, bigger and better premises (TPO Menzies letter on file at MOV).

However, it was not until 1968 that the Museum finally moved to its present site in Vanier Park and by this stage the Drier Collection had been without its collector and honorary curator for at least 25 years. It is not known when the Drier Collection was packed up and crated to be put into permanent storage, but at least some of it was used for a 'Gift and Giver' gallery display at MOV in 1975 (Mayer, 1991).

Figure 8. (left) The Drier Collection as it was housed at MOV, in the stacked cardboard crates on the left and at the far end of their main storeroom. (Author's image). Figure 9. (right) Four wooden trays shown inside one of the stacked cardboard crates. (Author's image).

Figure 10a. (above) A.W.B. Powell in the 1950s, surrounded by some of the molluscan collection at Auckland Museum (Image courtesy of Auckland Museum, PH-NEG-NZH-H2199). Figure 10b. (below) E.N. Drier at his desk at the City Museum (now MOV) in 1934. The use of stacked wooden trays for collection storage is strikingly similar to the arrangement shown in Fig. 10a (Image courtesy of MOV)

At MOV most of the Drier Collection was housed along the walls of the main collection store in 274 stacked cardboard boxes (crates) which were arranged seven or eight high inside a frame of plywood (Fig. 8).

The collection was divided into two rough groupings. The largest group, the marine shells, was housed in 230 of the cardboard crates and the second group, consisting of land snails, was housed in the remaining 44. There was also a miscellaneous collection of shells and other invertebrates, fossils, minerals and office and conservation supplies stored in nine large wooden drawer cabinets. One of these cabinets contained a very fine collection of approximately 340 New Zealand Tertiary, mostly molluscan, fossils, many of which came from the Augustus Hamilton Collection (Fig. 6).

The cardboard crates contained an average of four wooden trays each, with a maximum of six (Fig. 9). In a randomized inventory of 33 boxes, I estimated the total collection (including the land snails) to be 12,000–15,000 specimen lots, with approximately one third from New Zealand and a third from Australia. The remainder was from all over the world, including Canada, the USA, Pacific islands, Europe and southeast Asia.

Based on an anonymous, undated handwritten catalogue (made after Drier's death) of the entire land snail collection there were ~5159 land snail lots in total, with ~536 from New Zealand, and ~217 from Australia. However, I found that some marine taxa were also mistakenly included in the terrestrial collections.

Apart from starting Drier on his collecting hobby, Powell presumably also influenced how the collection was arranged and organised by Drier in the space he was allocated at the City Museum (Figs. 10a and 10b) and much of the housing and the arrangement of specimen within the trays mirrored that of the AM's mollusc collections in its early days.

Even some of the trays at MOV were identical in size and materials to those in use at AM after it moved to its present location in Auckland Domain. AM opened its doors in the Domain on 28 November 1929 and a letter from 'the Secretary and Curator' (presumably Gilbert Archey) dated 1 November 1929 acknowledged payment to Drier 'for the wooden trays with which you supplied us' (AV2.6.27, 1929D). So, here too Drier appeared to show his entrepreneurial spirit in the sale to AM of what may have been his surplus trays just prior to leaving New Zealand for his world tour and eventually Canada. It is, therefore, quite probable that some of the Drier trays still in use at MOV in 2013 came from the same New Zealand source as those in use at AM until a collection storage upgrade in ~1991.

Similarly, many of the individual, paper-taped, cardboard specimen boxes used to house the specimen lots inside the trays were identical to ones used in the AM collections (Figs. 11a and 11b). And as was the case at AM, for larger specimens a variety of household cardboard boxes were used. Smaller specimens were stored in a variety of containers, such as cut pipette glass, pill boxes or gelatin capsules, again displaying a similarity to the methods used by AM.

There was some evidence from fragmented catalogues, that originally Dr Drier had his collection arranged by broad geographic regions, and then taxonomically within these. However, at MOV shells were arranged inside the trays mostly alphabetically by genus and without regard to higher classification or geography. Some trays contained a mix of taxa from different families, while others contained a single family or genus. Although there

Figure 11a. (left) Small rectangular cardboard storage boxes, round cardboard 'pill' boxes, glass vials and pipette glass tubes shown inside one of the wooden trays at MOV. All were used by Drier to house individual specimen lots of shells. (Author's image). Figure 11b. I (right) n the early 1990s AM's wooden storage drawers were replaced by large brown cardboard boxes, but this image shows that the smaller containers - which remained in use until they were replaced recently–were in many cases identical to those used by Drier. (Author's image).

was at least one attempt in the early 1960s to update the scientific names in the collection, by and large the taxonomy was that which was accepted in the 1930s.

Vancouver's cold winters may have benefitted the survival of the Drier Collection in good condition. Except for those specimens used for display, for most of its life the collection would have been stored in dark museum stores. Certainly, for the later part of its storage at the Vanier Park location, it was kept in best-practice, dark, climate-controlled conditions. As such, the bulk of the Drier specimens were generally in excellent condition and there was no evidence of pest infestations or activity, such as insect frass or damaged or eaten labels. There was slight foxing on a very few labels and for a small minority of the small cardboard boxes their edges or tape had deteriorated. Small shells are particularly vulnerable

Figure 12. One of the very large lots in the Drier Collection, collected in 1930 from Heron Island, Queensland, Australia. The multiple labels may indicate that this was an amalgamation of several smaller lots collected by Drier. (Author's image).

to glass-disease if stored within cut pipette glass tubes, but none in the Drier Collection showed evidence of this. Similarly, the approximately 340 New Zealand Cenozoic fossil lots, which came originally from the Augustus Hamilton Collection, were in many cases in better condition than comparable ones held at AM as the latter had often deteriorated due to pyrite disease.

There did not any longer appear to be a working Drier catalogue. A large cardboard box containing massed cards were from an original Drier card catalogue and showed that the New Zealand shells were originally a separate collection. However, they no longer related to the trays and their organisation in the MOV store.

A second catalogue, consisting of A5-sized ring binders contained taxonomic and location information in what looked to be Drier's handwriting. It also had alpha-numeric data which seemed to relate to books for taxonomic information. However, none could be matched with specific specimen lots or trays.

A third catalogue appeared to have been started in the mid-2000s by a museum volunteer and did relate to the collection as then organized at MOV. This volunteer completed a handwritten inventory of the land snails, which listed shell lots in sequence (box/drawer/lot) and which transcribed information on labels. A similar catalogue was started for the marine specimens but did not go beyond the first few trays.

The specimen lots

There were some very large lots, numbering tens or hundreds of shells. Some of these had a single accompanying label, while others had multiple labels showing that these were likely to have been an amalgamation of several smaller lots (Fig. 12).

Labels

The bulk of the Drier Collection specimens had labels with at least some primary data (location information and dates), but more than 10% of lots had labels without this information and were therefore of little value to museums.

Dr Drier's labels were either handwritten (Fig. 13) or typewritten (Fig. 1). Slight idiosyncrasies in the typeface show this was the same typewriter sometimes used by Drier for his medical correspondence and therefore generated by him and not at some later date. Sometimes old labels appeared to have been replaced with new ones, whereas in other cases catalogue dates and numbers were added to original Drier labels. As shown by additional alpha numeric information on some labels (Fig. 1), at least one attempt was made in the 1960s to catalogue the collection. Many of the labels which accompanied the specimens collected while in Australia were made of Drier's recycled doctor's notepads.

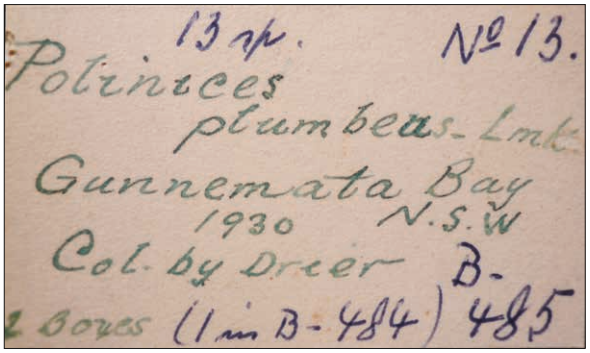


Figure 13. One of Drier's labels written in greenish ink, which appears on all the labels with specimens collected on the Australian, Pacific and Asian legs of the Drier's world tour. This ink appears to run out in 1931, when the Driers are in Europe. (Author's image).

Collecting locations

The collection contained marine, freshwater and terrestrial specimens from around the world. The one third of the collection that was from New Zealand included marine and terrestrial shells from all over New Zealand, including offshore islands such as Great Barrier, Chatham and Stewart Islands, but with the terrestrial material coming especially from around Auckland and Northland.

The third that was from Australia came mostly from eastern and southeastern locations from as far west as Adelaide, south to Tasmania, and north as far as Queensland.

The remaining third included material from all over the world, including Pacific locations such as 'Polynesia', Fiji, Papua New Guinea, New Caledonia, Society Islands (French Polynesia), New Hebrides [Vanuatu], Samoa as well as Japan, which the Driers may have visited on their world trip.

There were also a significant number of specimens from Ceylon [Sri Lanka], the USA (especially Florida, New York and North Carolina) and Central America (especially Cuba and Mexico) with fewer from Europe. The latter were sometimes from markets, presumably obtained when the Driers visited Europe in 1931.

Collecting dates

We know that Dr Drier started collecting shells as a result of meeting A.W.B. Powell (Fig. 6) when he became a member of the Auckland Institute and Museum in 1926 and that he left New Zealand permanently on 31 January 1930. It is therefore almost certain that his New Zealand material is all from the period 1926–1929.

Australian and Pacific lots are all assumed to date from 1930. As shown above, the journey through Australia is well-documented and dated and those labels which are dated bear the year 1930. In addition, all Australian and Pacific labels, including undated ones, were written in the same greenish ink (Fig. 13). This ink finally appears to run out in 1931, when the Driers are in Europe. It is therefore a reasonable assumption that all shell lots which have labels written in green ink were collected during 1930 and into the first half of 1931.

Unfortunately, little else is known of Drier's collecting during his further travel, except that the bulk of his 'world' specimen lots had little collecting information and were of little museum value.

There was also evidence that after Drier donated his collection to MOV in 1932, he continued collecting and acquired entire collections from collectors or their estates. These appeared to be mostly from the USA and much of this traded, exchanged or otherwise acquired material suffered from the same lack of collecting data. Again, these have little museum value.

DISCUSSION

One of the many functions of museum natural history collections is to provide baseline biodiversity information to stakeholders. Only a very small percentage of specimens is ever used for public displays and their greater value comes from the information which they hold about our natural environments, both past and present (e.g., Naggs, 2022).

However, this information is often imperfect. For example, early molluscan collectors and museum curators alike frequently omitted collection dates for their specimens, and we can only date these if we are able to establish when the collectors were active. This is so for the molluscan collections at Auckland Museum. Powell brought the more than 60,000 lots in his personal collection, mostly undated, to Auckland Museum when he started there in 1929 as its Curator of Conchology and Palaeontology (Powell *et al*. 1967). However, after this date, as well as building a museum collection, he continued to add to his own collection and so it cannot be assumed that all the undated Powell shell lots attributable to him predate his move to Auckland Museum. Of more than 140,000 lots of molluscs in the AM collections only 402 are recognizably from the period 1919–1929 and a mere 89 from the period 1927–1929.

The Drier Collection therefore significantly boosts data for this period, provided the time of Drier's collecting can be determined. As shown above, Drier arrived in July 1916 and left New Zealand on 31 January 1930. His collecting therefore cannot fall outside this 14-year period. Furthermore, based on his membership of the Auckland Museum Institute and Powell's letter to T.P.O. Menzies (Fig. 6), it is almost certain that Drier did not start building his molluscan collection until 1926. The collecting period for New Zealand material is therefore reduced to less than four years—from 1926 to late 1929.

The difference in volume of digitised manuscript, newspaper and family history resources available online now as compared to 2013 when the Drier Collection was first assessed has contributed to a much more complete, though not exhaustive, profile of Dr Drier and the society in which he moved. It has exposed a potential for the Drier Collection to contribute to a social history as well as a natural history. By the time Drier started his collecting in 1926, Powell was already part of a well-established network of mollusc collectors in New Zealand, Australia and further afield (AV2.6.30 1932D). Many of these names appear in Drier's collections either as primary donors, or perhaps secondarily, via gifts or purchases from other collectors.

For these men, collecting frequently appears to have been about building large, diverse collections for both themselves and the museums with which they were often associated. They did so through not only personally collecting, but also trading with others within their network. Therefore, surplus specimens were always needed to enable exchanges.

Current cataloguing work for the Drier Collection bears this out. Drier's specimen lots are often very large, numbering in the hundreds, such as the 611 specimens of the ostrich foot, *Struthiolaria papulosa*, entirely collected from Cheltenham Beach, Auckland. The assumption is that these were all collected by (or for) Drier during the few years when he was engaged

in his shell collecting hobby in New Zealand (1926–late 1929). Even if these were the product of multiple collecting events, their numbers are in a stark contrast to today, as few, if any, of this species are in evidence at this locality now (pers. Obs., 2022).

The frequently out-size lots show that Drier's collecting activities may have been extreme, possibly even for his day, but especially when judged against modern standards. However, as a result, his collection provides us with a useful window into the past on the natural abundance that once existed within New Zealand. So notwithstanding the ethics of Drier's collecting practices, his specimens now serve a purpose which cannot have been foreseen by him.

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I would like to thank the following people: Joan Seidl, Director of Collections and Exhibitions at Museum of Vancouver (retired) and Wendy Nichols, Curator of Collections at Museum of Vancouver for their help from 2012–2014 to get the Drier Collection repatriated to Auckland Museum; Mr Eric Wickham for sharing information about his McNicol Avenue house with a total stranger from New Zealand; also Wendy Nichols and Christine Pennington, Curatorial Associate at Museum of Vancouver for their help nearly ten years later to source images of Dr Drier; my colleagues Elizabeth Lorimer and Martin Collett for help with access to relevant Drier material in the AM archives; my husband Hugh Grenfell for producing the plates; the NZ HET (Hudson Essex Terraplane) Club for their help with identifying the marque of the 'van camper'; Brian Gill for his review of the manuscript and John Early and Jami Williams for their editorial input. Finally, also my grateful thanks to all those anonymous people who continue the digitisation of historical archives. Your collective work has enabled a much more interesting picture of Dr E. Newton Drier than was possible even nine years ago.

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APPENDIX 1

This list of *Papers Past* references represents some of the search results found in local newspapers for Dr Drier. They give a chronology and flavour of Dr Drier's nearly 14 years in Auckland. All links were accessible on 01 November 2022.

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Hochstetter's missing rocks – the Kirk to Haast letter, 1869

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Abstract
In 1859 Ferdinand Hochstetter (1829–1884) donated geological specimens from his work in the Auckland Province to the Auckland Museum. A short letter from Thomas Kirk to Julius Haast in 1869 inquiring about the specimens gives us a clear insight into the perilous state of the fledgling Auckland Museum 17 years after its formation in 1852 and 10 years after Hochstetter had left New Zealand. A background of the events leading up to the letter, its relationship to Hochstetter's time in Auckland, the Hochstetter - Heaphy controversy, early Museum curators and the sad fate of the specimens are discussed.

Keywords
Hochstetter, Haast, Heaphy, Auckland Museum early history and curators.

INTRODUCTION

On the 22 December 1858 the young 29-year-old German geologist Dr Christian Gottlieb Ferdinand Hochstetter (who was later knighted and became Dr Ferdinand Ritter von Hochstetter) arrived in Auckland, aboard the Austrian Imperial Navy frigate SMS *Novara*. He would have had no idea that he was to spend the next nine months in New Zealand and the enormous impact he would subsequently have on our geological and natural history knowledge. The *Novara* was on a research voyage which circum-navigated the globe from 1857–1859. Very soon after arriving in Auckland Hochstetter was effectively "loaned" by the Austrian Government to the Provincial Government of Auckland to carry out geological work in the Province (and later to the Nelson Provincial Government). The extent of the considerable resources put at Hochstetter's disposal and the value placed on his work by the Provincial Government is exemplified in a catalogue of the "Expenses of the Geological Survey of the Auckland Province" (AWMM MS-18). This catalogue is worthy of further research. The *Novara* and crew subsequently sailed on without him and Hochstetter found his own way home later via Australia. Much has been written about his time in New Zealand and his contributions (e.g., Kermode 1992, Nolden 2007, Johnston & Nolden 2011, Johnston, Nolden & Hoke 2012). Shortly after arriving Hochstetter met another German, Johann Franz Julius Haast (later Sir Julius von Haast, 1822–1887), who had arrived in New Zealand only the day before Hochstetter and became his lifelong friend (Nolden, 2013).

Almost immediately after taking up accommodation at Claremont House in Princes Street Hochstetter set about acquiring specimens and a letter he wrote to Edward William Stafford (then Colonial Secretary and later three times Premier of New Zealand) was published. He wrote

> With a view to make my stay in New Zealand as conducive as possible to a more complete acquaintance with the Natural History of the country than has hitherto been attainable, I have the honor to suggest that it would be desirable that public notice should be given to the inhabitants of the Colony, that I shall be happy to receive specimens illustrative of any branch of Natural History from every part of New Zealand, together with information relative to the locality from whence obtained and any other remarks that may be thought likely to render the scientific examination more perfect. By sending such specimens in duplicate the donors would enable me to transmit one set to Europe for the purposes of the Expedition to which I belong and to leave the other here as a nucleus for a New Zealand Museum - every specimen in which being numbered to correspond with those sent home. The future Report of the Expedition would enable the colonists to identify them and to learn all that had been ascertained in reference to them by the united labours of men eminent in their respective branches of science in Europe.' (New Zealander, 1859a).

The history of geology at the Auckland Museum has been documented by Alan Mason (Mason, 1996, 1999, 2001) and the Museum's early history and curators by former Museum Director Stuart Park (Park, 1998). As noted by Mason (1996) at this stage Hochstetter did not appear to know the Auckland Museum existed and this

probably reflects the low profile it already had by this time. The Museum's perilous state then is also evidenced by letters to the papers about access and visiting hours (see Park 1998, p. 30).

In the next few months after a lot of field work in the Auckland area, Hochstetter and his party (including Haast and Captain George Drummond Hay) covered a tremendous amount of ground completing a big circuit south of Auckland, down the west coast (e.g., to Raglan, Kawhia), across to the Central North Island (e.g., Taupo-Rotorua area, Tarawera) and then back up the east coast through the Bay of Plenty.

Specimens from this expedition were added to those already collected by Hochstetter in the immediate Auckland area and also from the Coromandel. Before going south to work in the Nelson Province Hochstetter donated a duplicate set of material from his explorations to the Auckland Museum. He had rectified his early lack of knowledge of the Museum's existence when writing a letter, published in the New Zealander, to the Superintendent of Auckland Province, John Williamson *'I have also the pleasure to inform you that I have arranged a duplicate collection of geological specimens and fossils, which I have obtained during my exploration of this Province, and this collection I have now the great pleasure to hand over to your Honor for the Auckland Museum.'* (New Zealander, 1859d).

In July 1859 Williamson wrote a testimonial for Hochstetter published in the *New Zealander* and he significantly refers to *'the valuable collection of Minerals he has placed in my charge for our Provincial Museum'* (see Park, 1998 p. 31). There was also a lavish testimonial ceremony in the Hall of the Mechanics Institute in Chancery Street (see Pulman's 1863 map, Section 4, Allotment 26) presided over by Williamson and attended by some 70 people (Nelson Examiner and New Zealand Chronicle 1859b). The entry fee was Gentlemen 10/-, Ladies 5/- (New Zealander, 1859c). Following Hochstetter's reply and thanks to the addresses by Williamson and Colonel Thomas Rawlings Mould he was also addressed and thanked by Ngāti Whātua chief Pāora Tūhaere. In turn Hochstetter gave an extensive reply in apparently fluent Māori (Nelson Examiner and New Zealand Chronicle 1859b). Among other gifts, Heaphy presented Hochstetter with a water colour of Lake Rotomahana 'Te Tarata'.

THE LETTER

In April 1869 Thomas Kirk (1828–1898), then Secretary of the Auckland Institute and Curator of the Auckland Museum, wrote an intriguing and puzzling letter (Fig.1) to Julius Haast at the Canterbury Museum. The one-page document (AWMM MUS-1995-38-155) is an early example of paper conservation in that it has handwriting from three people on it. First, Kirk in a demanding tone; then overwritten by Haast, a terse and pointed reply and finally, on the reverse, a denial by Charles Heaphy (1820–1881). Some of the handwriting is difficult to read, particularly the scrawl by Heaphy but an attempted transcription follows:

Kirk to Haast

> Auckland Institute
> April 6, 1869
>
> Dear Sir,
> I am instructed by the Council of the Institute to enquire if you can furnish any information respecting certain geological and other specimens collected by Dr Hochstetter for the Auckland Museum and which are supposed to have been committed to your care. The said specimens are not in the Museum nor is any mention of their actual presentation to be found in the books.
> Believe me Dear Sir.
>
> Yours sincerely,
> Thomas Kirk
> Secretary.
>
> Dr Haast F.L.S [Fellow of the Linnean Society] etc.

Haast to Kirk

> The specimens were left in a cottage furnished by the Provincial Gov ?? [Government] close to Mr Winch's boarding house, when we, Dr Hochstetter and myself, left Auckland. They were as far as I can remember given in charge of Mr Heaphy.
>
> J. Haast
> Chch [Christchurch] 1 May, 1869.

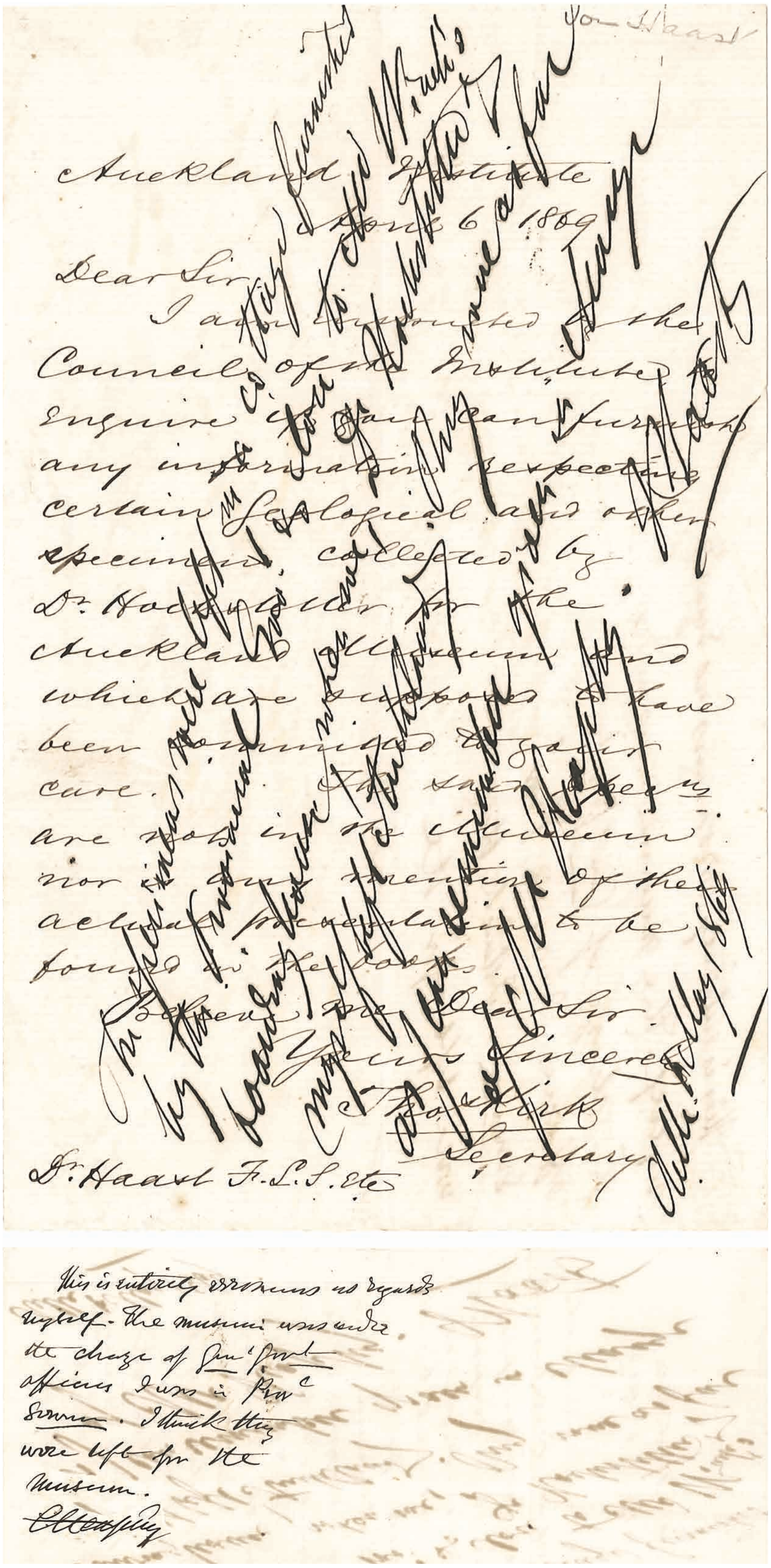
Heaphy

> This is entirely erroneous as regards myself. The Museum was under the charge of General Government officers. I was in Provincial ? Government. I think they were left for the Museum.
>
> Charles Heaphy (no date).

CLAREMONT HOUSE

'Winch's boarding house' mentioned by Haast in the letter above is notable. Charles Winch and his wife ran the Claremont Boarding House (spelt Clermont by Hochstetter below) which was on the corner of present-day Kitchener Street and Princes Street (see Pulman, 1863, Section 4, Allotment 18), diagonally opposite Old Government House which was built in 1856 in the now Auckland University grounds. Hochstetter (1867, p. 14) wrote

> After the departure of the Novara I had taken up spacious and comfortable quarters in the so-called Clermont-House, Princes Street with Mr. Winchy an ever obliging and complaisant host. A large saloon-like apartment with a commanding view over a large portion of the lower town with the harbour as far as the wood-clad Titirangi Range ... the Government fitted up a neat little house close by for my museum. It was open to the public at all times on my return from excursions ....



Auckland Institute
April 6 1869

Dear Sir
I am instructed by the Council of the Institute to enquire if you can furnish any information respecting certain Geological and other specimens collected by Dr. Hochstetter for the Auckland Museum and which are supposed to have been committed to your care. The said specimens are not in the Museum nor is any mention of their actual accumulation to be found in the books.

Believe me Dear Sir
Yours Sincerely
Tho. Kirk
Secretary

Dr. Haast F.L.S. etc

This is entirely erroneous as regards myself - the museum was under the charge of Gen' Govt officers I was in Prov.c Service. I think they were left for the museum.
C Heaphy

Figure 1. Correspondence between Thomas Kirk and Julius Haast, April 1869. Heaphy's comment and signature on the reverse. (AWMM MUS-1995-38-155).

Park (1998, p. 31) speculates that this nearby 'neat little house' supplied by the Provincial Government and the Auckland Museum in Grafton Road are one and the same. It is possible but then Hochstetter refers to 'my museum' not 'the museum'.

The history of the Claremont House site is as follows:

- In 1842 the site was occupied by the 'Old' Royal Hotel (see O'Mealy, 1842). It was built in 1841 by Dr Samuel Allen Wood (1813–1884) who later also built the Masonic Hotel next door (see Fig. 2).
- By 1850 the former 'Wood's' Royal Hotel is described as being the residence of Major-General Pitt of the 58th Regiment, with a sentry-box outside (see Fig. 2, John Williams, 1850) and later was the Imperial Officers Mess.
- In 1859 Claremont (Clermont) House was a boarding establishment run by Charles Winch and his wife. Newspaper advertisements at that time sometimes refer to 'Mrs Winch's boarding house'. From March 1860, after the death of his wife, Charles continued to run it (New Zealander, 1860a). It is unclear whether a Charles Winch who had a watch and jewellery shop in nearby Shortland Street is the same person.
- In 1866 a 'New Family Hotel' is to be built on the site of the former Claremont House (Daily Southern Cross, 1866). It is described in great detail in the newspaper article.
- In 1867 the 'New' Royal Hotel was completed. It is a brick building with 'two facades faced with cement in imitation of stone' (Daily Southern Cross, 1866).
- Very quickly it apparently became the Provincial Council Building (Mason, 1996). The Auckland Museum was given a '*large room in the new building'* from May 1867 (Park, 1998, p. 27) and until 1869 this was the second site of the Auckland Museum. Later there was a third site in the dilapidated old Prince's Street Post Office. This building is possibly just visible in a sketch from the same viewpoint as Williams (1850) by Robert Henry Wynyard (1849). The third building on the right. The fourth and penultimate move in 1876 was into a purpose built Museum near the corner of Eden Crescent and Princes Street (see Pulman, 1863, Section 7, Allotments 1&2) and this included the old Post Office site (see Wolfe, 2001 for details). However, it should be noted that another (earlier?) Post Office site is shown by John Bonfield O'Mealy (1842) next to Wood's Royal Hotel (later Claremont House).
- In 1869 the Royal Hotel/Provincial Council Building became the Northern Club which it still is today.

It is an odd coincidence that in 1867 the Auckland Museum should be located at the site where Hochstetter had stayed, where his workspace once was and very near to where Hochstetter's own 'museum' had been in 1859.

Figure 2. Sketch of Princes Street in 1850 by John Williams. Looking north near the intersection with present day Kitchener Street and Waterloo Quadrant. From top left to right is Woods Royal Hotel (later Claremont House), the residence of Major-General Pitt at that time (note sentry box), the Royal Masonic Hotel, the Union Bank of Australia (with flag) and St Pauls Church at the end of the street (with the permission of the Turnbull Library).

WHO KNEW?

It seems very strange that Kirk (and the Institute) could be so ignorant of the state of the Museum's collections and why was he writing to Haast in such an accusatory tone when there were others in Auckland who had direct knowledge? First let's examine who he could/should have asked first and what existing Museum documents Kirk could have looked at.

Those he should have talked to include John Alexander Smith, Charles Heaphy, George Eliott Eliott, Elwin Brodie Dickson, E. Watkins, Thomas Francis Winstanley and Captain Frederick Wollaston Hutton.

John Alexander Smith (1814–1889)

Park (1998) has written a very detailed account of Smith. The tiny Auckland Museum established by Smith (a merchant) opened in 1852. It remained at its first location in Grafton Road, a stone's throw from the basalt walls of the Auckland Barracks, until 1867 (see Powell *et al.* 1967, Park, 1998). To be more precise the Daily Southern Cross (1867) states "...the wooden one-storied building erected between allotments 5 and 6 of a subdivision of lot 21, section 9 of the town or city of Auckland...." (see Pulman's 1863 map). Smith left Auckland for Napier in 1857 and handed over administration of the Museum to George Eliott Eliott on the 4 September 1857 (Park, 1998 p. 19). Although he does not overlap with Hochstetter being in Auckland he could have been asked about the state of the Museum up to 1857.The last entry by Smith in the original Museum catalogue (AWMM MUS-2015-1, p. 50) is the 3 August 1857. Then there is a gap of more than two years until the 17 March 1860 when Elwin Dickson was appointed curator. So Hochstetter's donation of specimens in 1859 is not recorded at all.

Charles Heaphy (1820–1881)

Heaphy was of course well known to Hochstetter and Haast. He would have known what was going on at the Museum since he donated items himself and he and his wife were regular visitors (Auckland Museum visitor book AWMM MUS-1995-4-2). It seems extremely unlikely he would not have known where Hochstetter's rocks were, or had been, since he used other resources such as maps and papers left by Hochstetter for his own benefit. Haast is adamant that Heaphy was asked to look out for them and that this subsequent lack of care relates to the Hochstetter-Heaphy controversy discussed below.

George Eliott Eliott (1817–1901)

Eliott was Chief Clerk in the Colonial Secretary's Office. He was effectively in charge of the Museum from late 1857. He doesn't seem very interested in the Museum (e.g., the gap in the original Museum catalogue mentioned above) and even tried to palm it off to the Mechanics Institute at one stage. In 1860, on the pretext that the Museum building was going to be required for other purposes, he wrote to the President of the Auckland Mechanics Institute trying to pass over the contents of the Museum (except the books) with conditions to the Mechanics Institute (AWWM MUS-1995-2-3, see also Park 1998, pp. 23–24). Nothing came of this but it is clear the Museum was in trouble at this time.

Elwin Brodie Dickson (1828–1891)

Dickson was a Clerk in the Post Office and was appointed Honorary Curator by Eliott in August 1859 and served until September 1864. However, it appears that his wife Emma did most of the day-to-day chores. Park (1998, p. 25) thought that Emma Dickson could be considered New Zealand's first female curator. This period is critical to Kirk's enquiry. Importantly in 1861 Dickson tells us where Hochstetter's specimens were and writes of a lack of resources, dilapidated conditions and neglect when he took over in 1859 (see AWMM MUS-1995-2-3). In this report to the 'Superintendent' he wrote of a need to "rescue the Museum—too valuable a collection to be lightly abandoned–from the state of torpor to which the neglect of the public has lately consigned it". When he started he found collections had been "totally neglected for a considerable period, and the moths had made sad havoc amongst them". Among the few additions in the previous two and a half years he noted

> the beautiful series of fossil shells presented by the Gentlemen of the scientific expedition which visited this Colony in the Imp. R. Austrian frigate "Novara" – a case of books which accompanied the above, from the same donors; a considerable number of Geological Specimens obtained by Dr. Ferdinand Hochstetter during his subsequent stay in this Province... the geological collections of Dr. Hochstetter, above mentioned, remain packed away in the cases in which they were removed hither. These being of necessity bulky, and not very attractive to a general public, it was deemed better to keep unopened, as they would thereby sustain no damage.

This optimism was almost certainly unfounded as moth larvae and silverfish love labels. With labels destroyed the specimens would be useless without a catalogue and numbering on them (see below also). He wrote again in 1876 in a similar vein (see Park, 1998, pp. 24–25).

An article in the Daily Southern Cross (1863) expressed further concern about the state of the Museum and the fate of Dr Hochstetter's and other specimens. 'Many specimens for want of accommodation remain unpacked in their cases'. Interestingly a catalogue thought to have been presented by Hochstetter is mentioned but apparently not seen at this time. Dickson remained as Curator until September 1864 and in October 1864 became Chief Postmaster in New Plymouth (Park, 1998 pp. 24–25).

E. Watkins (??–??)

Watkins is a bit of a mystery. We know he replaced Dickson who describes him as 'a gentleman of ill-health' (Park, 1998 pp. 24–25) and that he didn't stay very long (?six months). The original Museum Catalogue (AWMM MUS-2015-1) under 'Contributions since November 1,

1864' says E. Watkins, Curator. The same page records the purchase and donation by the 'General Government of New Zealand' of two volumes of Hochstetter's work, acknowledged in the Southern Cross newspaper on the 16 November 1865. They were described as 'Voyage of the Austrian frigate Novara' and the 'Geology of Auckland and Nelson' (Provinces). It is not clear if the latter were the original Austrian versions or the translation from the German by Aucklander, and friend of Hochstetter, Dr Carl Frank Fischer (?–1893). This was published by Fischer's brother-in-law and fellow Queen Street homoeopathist, Theodore DeLattre, and was commonly advertised for sale in Auckland at the time (e.g., Daily Southern Cross, 1864a). The Museum visitor book (AWMM MUS-1995-4-2) for November 1864 is also headed 'E. Watkins, Hon Curator'. Incidentally this page of the visitors book is signed twice by Charles Heaphy and once by his wife.

An interesting unsigned draft letter or report presumed to have been written by Watkins in November 1864 provides valuable collection insights (AWMM MUS-1995-2-7). The handwriting is not Dickson's if a comparison is made with Dickson's application for the position of Curator in 1873 (AWMM MUS-1995-9). For example, the capital A's are very different. The report confirms Watkins began as Curator on the 28 September 1864 and attempts to describe "the present state" of the Museum. He states that in addition to the specimens and objects on display there were "4 cases of mineralogical specimens, 4 cases of shells, 2 cases various curiosities" etc. He examined the contents of all the cases. Regarding the "mineralogical specimens" some were labelled with names, others had numbers relating to a catalogue with data. Many had no descriptive labels at all. He "unpacked two boxes of stones which had apparently been lying for a long time unopened on the Museum floor, one of which contained specimens collected by Dr Hochstetter. I found that although each stone had evidently originally been carefully labelled with a description and locality where found the majority of such labels through the ravages of moths or insects were either entirely destroyed or made illegible, rendering the specimens almost, if not quite, useless." This is the last time Hochstetter's specimens are mentioned and the answers Kirk needed were in Museum letter book (AWMM MUS-1995-2-3), this letter (AWMM MUS-1995-2-7) and other reports the whole time. It is sadly ironic that Watkins' report is made at the same time as the Hochstetter - Heaphy controversy is going on (see below) and that within a couple of years of him leaving Auckland Hochstetter's rocks, which clearly had had good data, were unrecoverable because of serious neglect. The catalogue referred to above may have recorded Hochstetter's specimens but that too has been lost it seems.

Thomas Francis Winstanley (1832–1894)

In July 1865 the Museum visitor book (AWMM MUS-1995-4-2) is ruled off and the name 'T.F. Winstanley, Curator' appears. Winstanley's appointment is noted at the same time in the Daily Southern Cross newspaper (Daily Southern Cross, 1865a). Also published in July 1865 was a detailed account of the contents of the Auckland Museum, its state and Winstanley's appointment (Daily Southern Cross, 1865b). There was absolutely no mention of Hochstetter's donation or indeed the material donated by the *Novara* Expedition (books and fossils). Like Watkins very little is known about Winstanley and he was Honorary Curator from July 1865 to January 1867.

Captain Frederick Wollaston Hutton (1836–1905).

Hutton was a geologist and scientist of great versatility who came to New Zealand in 1866. He went on to hold many posts including the Curator of the Otago Museum and was Professor of Biology with responsibility for Geology and Palaeontology at Canterbury College. After the death of Haast in 1887 he became Curator of the Canterbury Museum (Parton, 1993). A New Zealand Herald article noted Hutton's appointment as Honorary Curator of Auckland Museum in 1867 and the move of the Museum to its second location, a room in the new Provincial Council Building (later Northern Club), the former Claremont House site, on the corner of Princes and Kitchener Streets (New Zealand Herald, 1867a).The Herald in June 1867 records Hutton hard at work in the Museum and mentions 'a case of Tertiary fossils from the Vienna Basin, presented by Dr Hochstetter.' (New Zealand Herald, 1867b).

The fossils are presumed to be those donated to the Museum by the *Novara* Expedition in 1859 (see Dickson, 1861–AWMM MUS-1995-2-3) and not a separate more recent donation from Hochstetter. This beautiful collection with many original labels is still held in the Palaeontology Collections of the Auckland War Memorial Museum (e.g., lots AWMM MA34174, MA34204, MA34223, MA34534, MA35546, MA35561) and is the subject of ongoing research. The hundreds of specimens come from the collections of the Austrian Kaiserlich Königlichen Geologischen Reichsanstalt (Imperial Royal Geological Institute) who often prepared such collections for exchange (e.g., Hörnes, 1852). The Nelson Museum received a similar collection, delivered by Hector in 1868 (Nelson Evening Mail, 1868), but this was from Hochstetter himself who was then Professor of Mineralogy and Geology at the Polytechnic Institution of Vienna and had connections. This collection now appears to have been lost or discarded (personal enquiries).

Information about Hutton's time in Auckland can be found in his letters to Hector (see Mason, 1999. James Hector Papers, Hocken Library MS443). Hutton was clearly very frustrated by the ongoing lack of resources and funding available to him to improve the Museum and halt its decline (Mason, 1999, p. 26). This is perhaps exemplified in a letter to Hector from January 1869

> I hear that the Canterbury Government have voted 1200 pounds to build a museum and make Haast curator. I wish I could get the semi-educated drunkards who govern up here to do the same. (Mason, 1999, p. 17).

Hutton with Thomas Bannatyne Gillies (1828–1889) was pivotal in the formation of the Auckland Philosophical Society in November 1867 (see New Zealand Herald, 1867c) which then became the Auckland Institute in March 1868. The Provincial Government transferred control of

the Museum to the Institute in 1869 (Mason, 1999, p. 17) which saw the formation of the Auckland Institute and Museum. Of the eight papers on geology presented to the Auckland Institute from 1868–1870 five were by Hutton (Mason, 1999). Hutton's association with the Museum and the Institute apparently ended in 1871 when he moved to Wellington (Campbell, 1984, p. 27) which represented a great loss to the Auckland Province and the Museum.

THE HOCHSTETTER-HEAPHY CONTROVERSY

Much has been written on this subject (e.g., Mason, 2002 and 2003, Lowe, 2010, Hayward *et al.* 2011, Schoeman, 2012, Grenfell, 2013). In 1860 Heaphy's paper 'On the volcanic country of Auckland, New Zealand' (Heaphy, 1860) was published and his 'Geological Map of the Province of Auckland' (geology of the upper half of the North Island) was exhibited at the International Exhibition in London in 1862. In a footnote to his 'Geologisch-topographischer Atlas von Neu-Seeland' (Hochstetter and Petermann, 1863) Hochstetter complained about Heaphy's use of his intellectual property in these publications without acknowledgement. The issue first came to the attention of New Zealand colonists when Fischer's English translation was published in 1864 (Hochstetter and Petermann, 1864). The Daily Southern Cross newspaper published a positive review of Fischer's version and also drew attention to Hochstetter's footnote on p. 50 about Heaphy (Daily Southern Cross, 1864b). This sparked a lot of jingoistic writing and opinion in New Zealand newspapers of the day for quite some time. It was the verdict of the cycloptic colonial correspondents that Hochstetter was the plagiarist. Carmia Schoeman's paper is a particularly good summary of the facts (Schoeman, 2012). Mason (2003) clearly considered Hochstetter to be a plagiarist and some (e.g., Hayward *et al.* 2011, p. 40) have sought to excuse Heaphy's actions because he was worried Hochstetter was not going to acknowledge his contributions. Schoeman (2012) is correct that both these views are wrong. Johnston and Nolden (2011, p. 267) are correct that it all 'suggests a certain deviousness on Heaphy's part'. Iain Sharp in his biography of Heaphy states 'He [Heaphy] was simultaneously ambitious and servile, duplicitous and honourable, a pragmatist and a dreamer, an optimist and a disappointed man.' (Sharp, 2008, p. 209).

It is clear that while Hochstetter was in the Auckland Province he had a lot to do with Heaphy and was on friendly terms from the first week of his arrival (e.g., Schoeman, 2012). However, Hochstetter was completely blindsided when shortly after his return to Austria Heaphy's 1860 paper on the Auckland Volcanic field was published. The manuscript of this paper must have been sent to London while Hochstetter was still in New Zealand but he had no knowledge of it. Contrary to what is often believed there is no acknowledgment of Hochstetter's contributions to the paper's contents by Heaphy himself. An acknowledgement is made by the editor of the journal and appended to the paper (see Heaphy, 1860, Schoeman, 2012). The editor perhaps suspected the work was not entirely Heaphy's.

When Heaphy exhibited a 'Geological Map of the Province of Auckland' at the 1862 International Exhibition in London it was apparently again without any acknowledgement of Hochstetter and clearly using his work. In 1864 Heaphy had his friend E. King (who was the Hon. Sec. New Zealand International Exhibition Commissioners, 1862) write a letter (among others solicited by Heaphy to support him) which was published in the New Zealander (New Zealander, 1864b) stating that Heaphy had acknowledged Hochstetter's contributions to him. While that may be true it doesn't mean that acknowledgement ultimately appeared on anything presented at the Exhibition in London. Otherwise, why would Hochstetter react in such a way? Since no copy of the International Exhibition map seems to exist, we will probably never know. Heaphy however did have a track record of not putting acknowledgements on his maps (see below).

Heaphy was a surveyor and landscape artist, not a geologist. His 1860 paper is garbled and the map rudimentary, especially when compared with Hochstetter and Petermann's 1863 map of Auckland's geology (Hochstetter & Petermann, 1863). Heaphy's 1857 map of the geology of part of the Coromandel area is not much better and also shows a lack of geological knowledge (Heaphy, 1857). A very interesting copy of this map, heavily annotated with handwritten notes in German, is held by the Humboldt University, Berlin. A digital copy is available through the National Library (see Heaphy 1857 reference). The original map (and another of the Wellington region) was probably taken from New Zealand to Vienna by Hochstetter and later taken to Humboldt University in Berlin by Albrecht Penckin 1906 (see the National Library website referred to). New Zealand's Hochstetter expert Dr Sascha Nolden was consulted and he believes the handwritten annotations and corrections are Hochstetter's (Sascha Nolden pers. comm.). Hochstetter and Haast visited the Coromandel with Heaphy in June 1859 and a chromolithograph in Hochstetter (1864, p. 89) of the basalt cliffs at Cathedral Rock (Moturoa), Great Mercury Island is derived from a sketch by Heaphy and acknowledged as such by Hochstetter. However, Hochstetter does not describe going to Great Mercury himself. But having seen the geology of the island myself his accurate comments in German about the geology and topography of the Mercury Islands are intriguing. They may simply be Hochstetter perceptively interpreting the observations of others.

An 1858 tracing, supposedly of Heaphy's 1857 map of the Auckland District showing the location of some Auckland volcanoes, has been attributed to Auckland Museum Curator at the time Elwin B. Dickson (Dickson, c. 1858). The veracity of the tracing is important since no original of the Heaphy 1857 map, which supposedly formed the basis of his 1860 map (Heaphy, 1860), is known. Thus, the tracing has been used as evidence of Heaphy's work prior to Hochstetter (e.g. Mason, 2002). However, the handwriting and signature on the map tracing are clearly not Dickson's. For example, if a comparison is made with Dickson's report in 1861 (see AWMM MUS-1995-2-3) and his job application for the position of Curator in 1873 mentioned above (AWMM MUS-1995-9) the signature is very different, the capitals A and G are very different and so on. So it is a moot

point that the tracing is by Dickson. Also in question is whether the tracing is of an early Heaphy or Hochstetter map. It is important to note that the coastal outline is the same as used by Heaphy, 1860 (unacknowledged) and Hochstetter, 1863 (acknowledged) and is derived from the surveys of Stokes and Drury (see further below). If it is a tracing of Heaphy's 1857 map (which Heaphy says was the basis for his 1860 paper) is it only a partial tracing or Heaphy's 1857 map was very inaccurate and many centres were not recognised by him? What is missing are volcanoes such as the Domain, Albert Park, Taylors Hill, Glover Park, Browns Island, Onepoto, Tank Farm, Panmure Basin, Gloucester Park etc. Strikingly, four of the above are explosion or maar craters lacking scoria cones or lava flows. This type of volcano was well known to Hochstetter who had studied the similar basaltic Eifel Volcanic Field in the German Rhine Valley where maars (e.g., Laacher See) were already well understood. Heaphy was probably unaware the Auckland examples represented volcanic centres. This is a factor in terms of who copied who. Alternatively, remembering the map is said to be 'c. 1858' the tracing may be a partial tracing of some of Hochstetter's work in 1858–59. The area to focus on is a line south of Mt Mangere. There are depressions outlined just southeast of Mt Mangere, just northeast of Waitomokia and in the area just north of Crater Hill near Kohuora. These were mapped to be maar or 'tuffcraters' on Hochstetter and Petermann's 1863 map–incorrectly it turns out for all except Kohuora. Heaphy also indicates Kohuora itself. The other area to look at is around Otuataua. The tracing clearly indicates four volcanic centres but on Heaphy's 1860 map it says 'Not examined' with two numbers and a few meaningless scattered dots. Hochstetter and Petermann's 1863 map has four volcanic centres and they name Pukeiti, Otuataua and Mangataketake.

In June 1859 Hochstetter gave a long and detailed public lecture (chaired by Heaphy) to a packed audience. This was published at the time (e.g., Nelson Examiner and New Zealand Chronicle, 1859a) and also in Hochstetter and Petermann (1863, 1864). In it he acknowledged the generous help and valuable information he had received from the Auckland community and beyond in general, and in particular from 'my friends, the Rev. A.G. Purchas and Mr C. Heaphy'. Heaphy is also specifically acknowledged elsewhere in the lecture and as well for the presence of Heaphy illustrations on the walls of the lecture room. Hochstetter also acknowledged previous work such as that by Dieffenbach and Dana. One work he could have acknowledged (if he was aware of it) was that of Frederick Septimus Peppercorne (1852). But there can be no doubt he gave extensive acknowledgements all round before going onto the actual content of his lecture.

After the lecture Heaphy as chairman thanked Hochstetter for the lecture (New Zealander, 1859b). His opening words are telling.

> Dr. Hochstetter, your excellent lecture of this evening–the scientific portion of which I am not able adequately to appreciate [underlined by Grenfell]–has confirmed an interest on places and objects around us, with which we are familiar as with "Household words", but whose History in the Past required to be traced by the pen of the Geologist. Wherever your descriptions are read–and I trust that you will allow your lecture to be printed by the Institute–they will command the deep attention of the scientific world.

So here Heaphy himself recognises that he is no geologist. It is also interesting to compare the public lectures of Heaphy in 1860 and 1865 with Hochstetter's 1859 published lecture. Although we don't have the full text of Heaphy's lectures (only reports such as in the New Zealander, 1860b and Daily Southern Cross, 1865c) it is clear they 'borrowed' from Hochstetter's in terms of structure and content with no apparent acknowledgement. At the same time he introduced some strange concepts. For example, the lack of fossils in the Tertiary of the Auckland area (although it is hard to understand why the highly fossiliferous basal Waitemata Group rocks at Waiheke, Matheson's Bay and Kawau were not known about) is explained by the contemporaneous volcanism making the environment too poisonous.

During the controversy a letter to the New Zealander by Heaphy in 1864 criticises Hochstetter for many things including not acknowledging the work of others (including himself) but notably the work of Provincial Government employees Mr Toyle and Mr Boulton (a surveyor) who had been put at Hochstetter's disposal by the Government (New Zealander, 1864a). In the same letter he is forced to retract some of the accusations he made earlier about Hochstetter. The accusations regarding Hochstetter not acknowledging Provincial Government employees by Heaphy are a classic case of the 'The pot calling the kettle black'. You will find no acknowledgement of the work or assistance of others on any Heaphy map. For example, maps of the 'geology' of Wellington, Coromandel and the Auckland district acknowledge no-one but he must have had assistance. Heaphy does not even acknowledge the fact that the coastal, river and estuary outlines and some topographic details he used were the work of British naval surveyors such as Captain J. Lort Stokes and Commander Byron Drury. In contrast Hochstetter does acknowledge Stokes and Drury on his 1864 Auckland District map (Hochstetter and Petermann 1863). As noted above Hochstetter was generous in his acknowledgement of others while in Auckland and Nelson. It is true that after 1860 Heaphy was not popular with Hochstetter but to his credit Hochstetter's New Zealand publications continue to acknowledge his contributions (e.g., Hochstetter 1864, p. 89, Hochstetter, 1867–List of Illustrations XIV, XV.).

It is interesting that at the October 1868 meeting of the Institute Council Hutton proposed that Hochstetter be made the first Honorary member of the Institute (Daily Southern Cross, 1868). It was seconded by the Provincial Superintendent Thomas Bannatyne Gillies (1828–1889). Gillies said 'it was doing honour to themselves more than to the doctor.' One wonders what Heaphy, an Institute member, thought about it.

CONCLUSION

It is hoped that future research will find the duplicates of Hochstetter's specimens in Vienna collections. The loss of Hochstetter's donation of early, unique material which clearly had good data is tragic. Kirk's April 1869 letter was undoubtedly at least eight years too late and addressed to the wrong person(s). By 1861 Dickson's report (AWMM MUS-1995-2-3) clearly indicates that even then the contents of the Museum were in serious danger. Heaphy's denial of Haast's clear statement that Hochstetter's specimens were left '*in charge of Mr Heaphy'* is weak given that he was supposed to be Hochstetter's friend, a frequent visitor to the Museum and donated material himself. The conditions at the Museum simply could not have escaped his attention.

Shoeman (2012, p. 29) may be correct that it is pointless to take sides in the Heaphy-Hochstetter controversy in the absence of the original Heaphy 1857 Auckland map. The Dickson map tracing (Dickson, c. 1858) discussed above is not useful to the debate. However, other evidence that he could be devious and duplicitous (Sharp, 2008, Johnston and Nolden, 2011) and Heaphy's demonstrated hypocrisy regarding acknowledging others is evidence of a flawed character. Hochstetter on the other hand generally acknowledged his success in New Zealand relied heavily on the assistance of others and was highly respected for the rest of his life. An example of a prominent Aucklander who remained a lifelong friend is the polymath the Rev. Dr Arthur Guyon Purchas (see Grenfell, 2022). But perhaps the most important question is– if Heaphy was such a good friend of Hochstetter, why would he send his paper (published in 1860) to the Geological Society, London in 1859, while Hochstetter was still in New Zealand without telling him? The Hochstetter-Heaphy controversy and the fate of Hochstetter's specimens are clearly linked.

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