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Contents

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A revision of the distribution maps and database of New Zealand mayflies (Ephemeroptera) at Canterbury Museum

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ABSTRACT

New Zealand mayflies form an important component of the freshwater aquatic fauna, being of particular interest to conservationists, bio-geographers, recreational fishermen and all people with an environmental concern for the health of rivers and streams. The database lists more than 10,800 records largely based on Canterbury Museum's mayfly collection. For the 39 species with previously published maps, more comprehensive maps with many additional datapoints are now given. A further 11 wholly new maps for recently described species are added. The database is at present being expanded to incorporate uncertainty estimates of site location data, and the data for Canterbury Museum specimens is being transferred to the Vernon Collection Management system, which will aid specimen retrieval. These additions are explained. The possible conservation status of some mayfly species is discussed.

KEY WORDS

Ephemeroptera; mayflies; distribution; New Zealand.

INTRODUCTION

Phillips (1930) prepared the first comprehensive survey of the mayfly fauna as then known, including locality data. A distribution map for one New Zealand mayfly species was given by Wisely (1962). Maps for 30 Leptophlebiidae distributions were given by Towns and Peters (1996). The initial Canterbury Museum database (Hitchings 2001) included 5,737 records and 39 species maps. Fifty mayfly species in 19 genera and 8 families have now been described and their distributions are mapped in this paper. Each record in the database corresponds to one or more individuals collected on the same date at a particular site and preserved in 75% ethanol. More than 88% of these records are for specimens held in Canterbury Museum and all these records are being transferred to the Vernon Collection Management system.

METHODS, MATERIALS AND CONVENTIONS

In addition to aerial nets for winged and sieves for aquatic life stages, more comprehensive collecting methods have recently been employed by collectors and Museum staff. These include the use of ultraviolet lights (15 W) for subimagos and imagos and electric fishing techniques (A. Staniczek and A. Sinton: pers. comm.) for larvae. The latter method has given access to deeper waters than have usually been searched. Many of the specimens in the collection are due to the efforts of collectors who have been primarily interested in other orders.

Comprehensive keys for most life stages have been given for species of the Leptophlebiidae by Towns and Peters (1996), the Nesameletidae (Hitchings and Staniczek 2003) and the Rallidentidae (Staniczek and Hitchings 2013). Recently, individual species descriptions have been given by Hitchings (2008, 2009 and 2010) and Winterbourn (2009). The most comprehensive keys to identification of the larval stages of genera are those of Winterbourn et al (2006).

The existence of two species described in the literature, *Coloburiscus tonnoiri* Lestage, 1935 and *Oniscigaster intermedius* Eaton, 1899 remains uncertain. The Auckland Islands endemic species *Cryophlebia aucklandensis* (Peters, 1971) is also not included in these maps. The ubiquitous genus *Deleatidium* Eaton, 1899 has been divided into two sub genera, *Deleatidium* and *Penniketellus* Towns & Peters, 1979 (Towns and Peters 1996) and these are indicated (*D.*) and (*P.*) respectively in the map captions. Following the species name the number of records used to prepare the map is given in brackets.

Abbreviations used in the original Microsoft Access database (Hitchings 2001) are used along with the following additions: GPS = geo-positional site, lat = latitude, long = longitude, m = altitude in metres above sea level, LINZ = Land Information New Zealand. Canterbury Museum's Vernon database includes all of these data together with unique specimen accession numbers for specimens held at this museum eg CMNZ 2014.2.20912–14 (in this example a record consists of a specimen lot based on three specimens). Note that the maps included here also include data from records of catches identified by the authors but held at other institutions or by private collectors.

The vial labels including their five figure easting and northing grid references are presently being rechecked against the original database and transcription errors detected and corrected. Locality names are amended to conform to the standard New Zealand Gazetteer names. Map grid references have been converted to decimal latitude and longitude using the online conversion tool available from Land Information New Zealand (http://apps.linz.govt.nz/coordinate-conversion/), using co-ordinate conversion with the free format entry advanced option and WGS1984 datum.

RETROSPECTIVE ESTIMATES FOR MAYFLY CO-ORDINATE DATA

The site descriptions supplied in the database are brief, most often naming only the watercourse collected from. Why would future users trust the accompanying point data? The watercourses sometimes extend over considerable distances and maximum uncertainty estimates based just on these site descriptions would often encompass 20,000 to 50,000 metres and sometimes more. For co-ordinate data to be trusted and reliably interpreted by future users, we are supplementing co-ordinate data with uncertainty estimates and brief rationales for uncertainty estimates.

Most of the mayfly records at Canterbury Museum, that is, the Vernon accessioned specimens owned by Canterbury Museum, present a different situation from many other geo-referencing efforts. Elsewhere a principal challenge has been to establish co-ordinates for named places in legacy data (Chapman and Wieczorek 2006). However, this class of data applies to only a small proportion of these mayfly records since the mayfly database has been routinely furnished with mappable co-ordinates as it was created. Canterbury Museum has been fortunate that several local entomologists have consistently provided co-ordinate data (e.g. Ward and Henderson 1993; Fuller et al 2013). As a result of this approach, the present database is well furnished with co-ordinate data; the quality of this data is variable, but most often of high quality. The current challenge has been to apply retrospective uncertainty estimates to Canterbury Museum data in an efficient and transparent manner. Standard guidelines (eg Chapman and Wieczek 2006) do not cover this type of geo-referencing task. We use a standard definition of co-ordinate uncertainty: "the horizontal distance (in metres) from the given decimal latitude and decimal longitude describing the smallest circle containing the whole of the location" based on the Darwin Core Standards (http://rs.tdwg.org/dwc/terms, accessed 3 February 2015).

For the mayfly database, co-ordinate data has been assembled as follows: map grid references were either supplied by the collector, most typically referenced from the MS 260 map series, or were derived from the site and description by the authors. Whether co-ordinates were supplied originally or secondarily derived was not originally recorded, but is often known by the authors. All co-ordinates have been individually checked either using Topo50 maps or more recently on the website NZ Topo Map (www.topomap.co.nz) or with the software Freshmap for Windows Version 1.0 (www.freshmap.co.nz).

Currently each mayfly specimen is being assigned an individual number and accessioned into Canterbury Museum's Vernon Collection Management System. The co-ordinates are being supplemented with uncertainty estimates and accompanying brief rationales (see Table 1 for examples).

INTERPRETING UNCERTAINTY ESTIMATES FROM VERNON MAYFLY DATABASE

The following caveats apply. The uncertainty estimates have been applied according to the authors' knowledge of individual collectors, and usually to all of that collector's records. Only occasional adjustments have been made within the set of uncertainty estimates and rationales as applied to an individual collector. Otherwise it has been assumed that a given collector has consistent standards in data collecting.

Thus uncertainty estimates and comments have not been reviewed for individual records. The overall purpose of the rationales and uncertainty levels is to provide useful information that gives some confidence in the estimate; in the absence of a rationale, uncertainty might have to be subsequently inflated due to a lack of information. The authors consider that future data users will have some rationale to better assess the records that interest them.

VARIOUS COMMENTS INCLUDING RATIONALE FOR UNCERTAINTY LEVEL	UNCERTAINTY LEVEL
Description of locality is vague; given LAT/LONG is based on a reasonable assumption about intersection between the likely road access and a particular stream. Nothing known about the collector. Accuracy very approximate.	2,000 metres
The senior author's knowledge of this site indicates difficulty in accurately locating sites without GPS, since there are very few usable landmarks.	1,000 metres
The collector is known by the senior author to provide accurate grid references.	1,000 metres
The collector provided site names that describe the general area only. However, the senior author located points on the watercourses where, based on access routes, he was fairly certain the collecting sites were.	300 metres
The collector was known to use older maps to derive grid references.	200 metres
The collector supplied reliable local data. If there was any ambiguity, the collector was consulted and map grid reference decided by discussion.	100 metres
The collector provided GPS readings	50 metres

Table 1. Accuracy scale for uncertainty estimates

SPECIES DISTRIBUTION MAPS

On the maps (Figs 1–50) all records within a circular area with diameter 10 km have been aggregated to a single dot. The clustering of collecting sites on a map is frequently an artefact of the nature of the collecting effort. A row of stream sites adjacent to a road is often obvious. For this Museum, collecting opportunities have been much greater in the South Island than in the North Island.

Unroaded, remoter areas do not necessarily mean the absence of mayflies but the lack of collecting opportunity in those places.

The doubling of records since the last maps were published (Hitchings 2001) has not greatly altered the overall distribution patterns. Thirteen additional newly described species have been added.

Cook Strait remains an effective barrier to mayfly migration, with 10 species restricted to the North Island and 12 to the South Island. Seven species are not only widely distributed in the North Island but extend into northwest Nelson and northern Westland as described earlier (Hitchings 2001).

The extent to which a collector has been able to collect all the species present at a particular site is hard to estimate. Both the techniques employed, time spent, species life histories, water flow characteristics and many

other abiotic factors influence success in building a species list for a location. These lists provide the records for the database. The resulting map distributions will always be incomplete. For these reasons distribution maps such as that for *Rallidens platydontis* Staniczek & Hitchings, 2014 found at present in the southern and eastern South Island may prove to have a continuous range rather than several apparent discrete populations as implied by the map. Similarly *Deleatidium* (*D.*) *branchiola* Hitchings, 2009 and *Deleatidium* (*D.*) *kiwa* Hitchings, 2010 will probably be found to have more extended distributions than is known at present.

Species likely to continue to be of sufficiently restricted distribution to be regarded as potentially endangered are *Aupouriella pohei* Winterbourn, 2009, *Deleatidium* (*P.*) *insolitum* (Towns & Peters, 1979), and *Nesameletus vulcanus* Hitchings & Staniczek, 2003, as is apparent from their distribution maps. *Nesameletus vulcanus* seems to be present as two disjunct populations showing some morphological differences.

DATABASE AVAILABILITY

A fully checked and verified specimen-based database incorporated within the Vernon Collection Management System at Canterbury Museum is expected to be complete by late 2016. We expect that these data will be available online after 2016, but in the interim, data on which these maps are based can be made available to *bona fide* researchers who contact the senior author.

ACKNOWLEDGEMENTS

This database and mayfly collection has only been made possible thanks to the efforts of 161 largely voluntary field collectors who, in the last 75 years, have traversed the back country of New Zealand and donated the results to this Museum. Specimens from selected regions and held by other museums have also been identified and the data incorporated in these maps. Their loans have added significantly to the species coverage. In particular Auckland Museum, Florida A&M University, USA and the National Museum of Natural History, Washington DC, USA are to be thanked.

Thanks are due to Lynette Hartley, Janette Leyland and Rachael Fone who are undertaking accessioning of the mayfly collection and incorporating it within the wider Canterbury Museum collection and Vernon database. Mike Winterbourn's helpful advice and guidance have been very much appreciated. Ian Henderson's mapping programme "Amnesia" has been invaluable in the preparation of mayfly distribution maps. Canterbury Museum and the curator responsible for invertebrates, Cor Vink, are thanked for providing research facilities and the professional support needed to bring this project to fruition.

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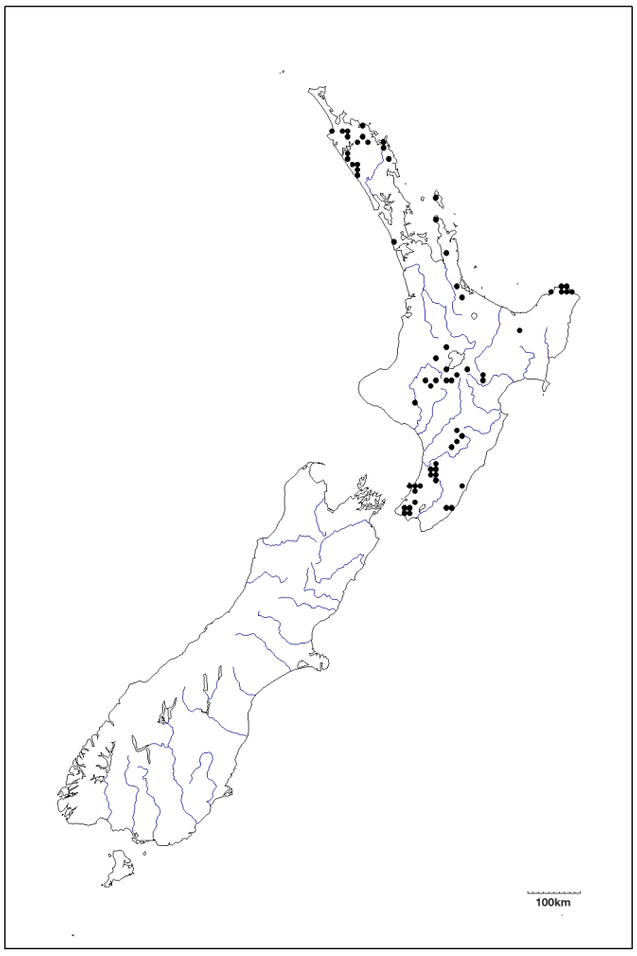

Fig 1: *Acanthophlebia cruentata* (Hudson, 1904) (117 records).

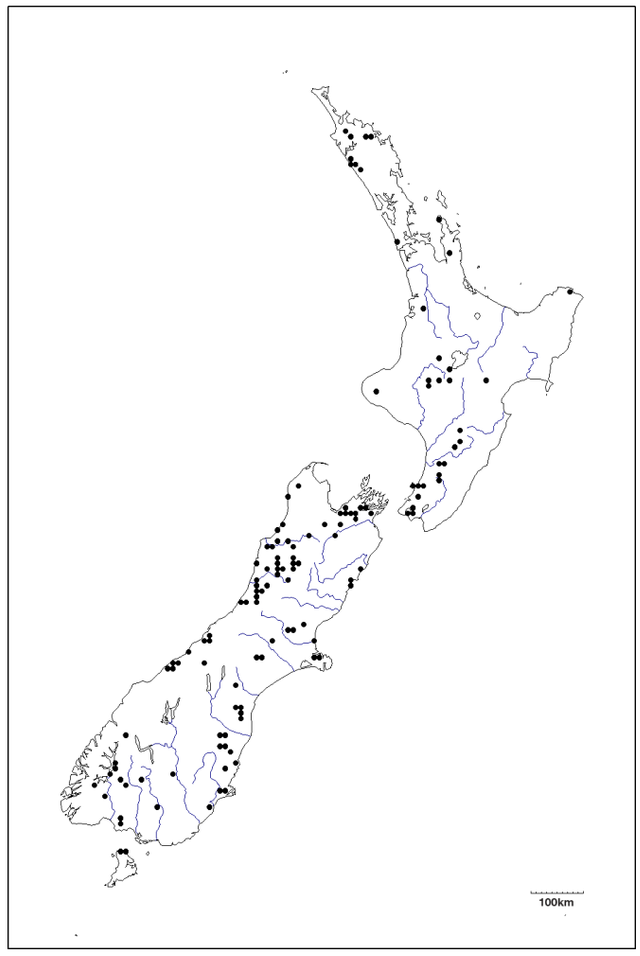

Fig 2: *Ameletopsis perscitus* Eaton, 1899 (239 records).

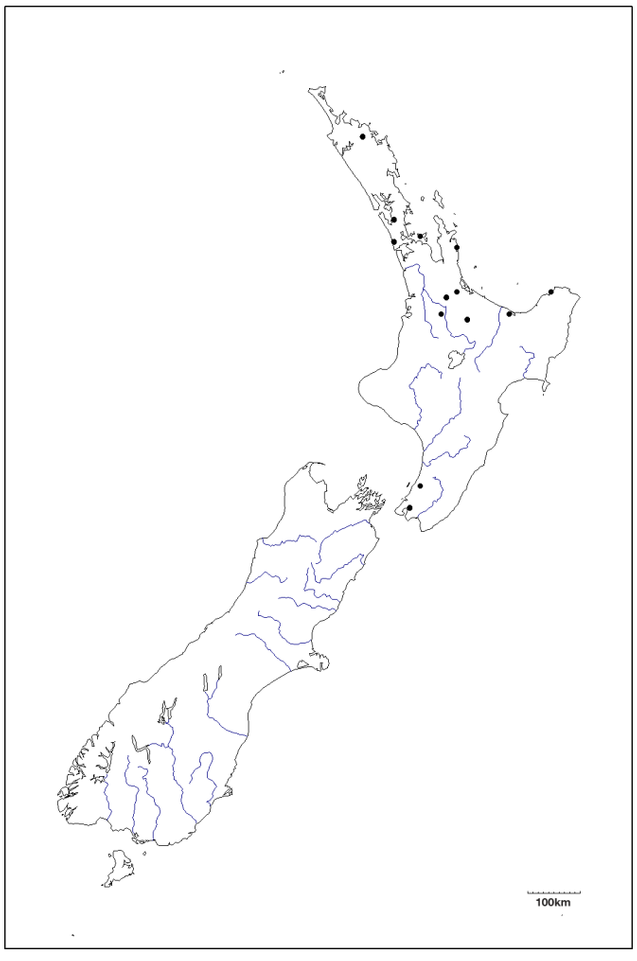

Fig 3: *Arachnocolus phillipsi* Towns & Peters, 1979 (18 records).

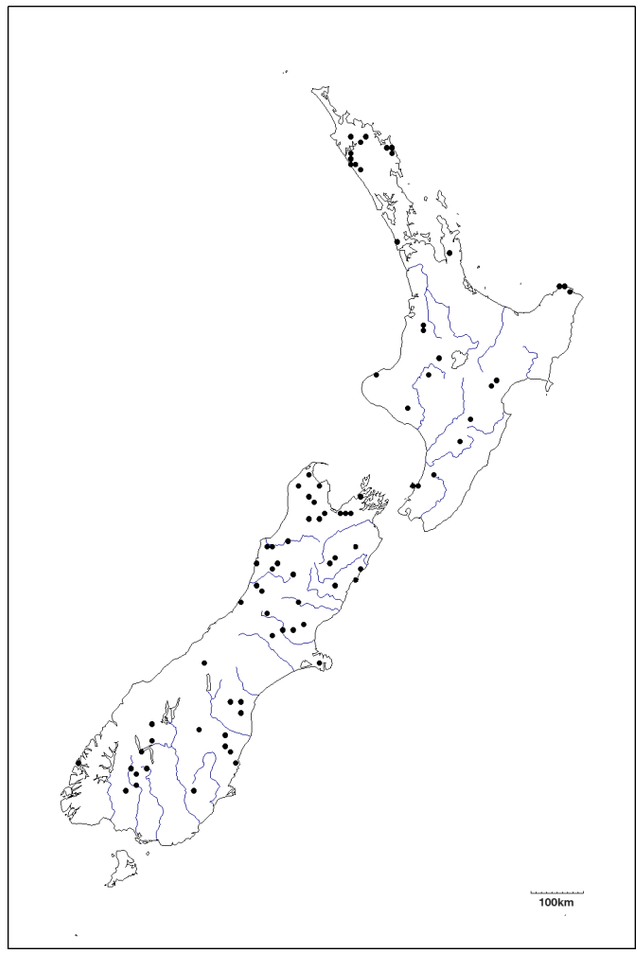

Fig 4: *Atalophlebioides cromwelli* (Phillips, 1930) (181 records).

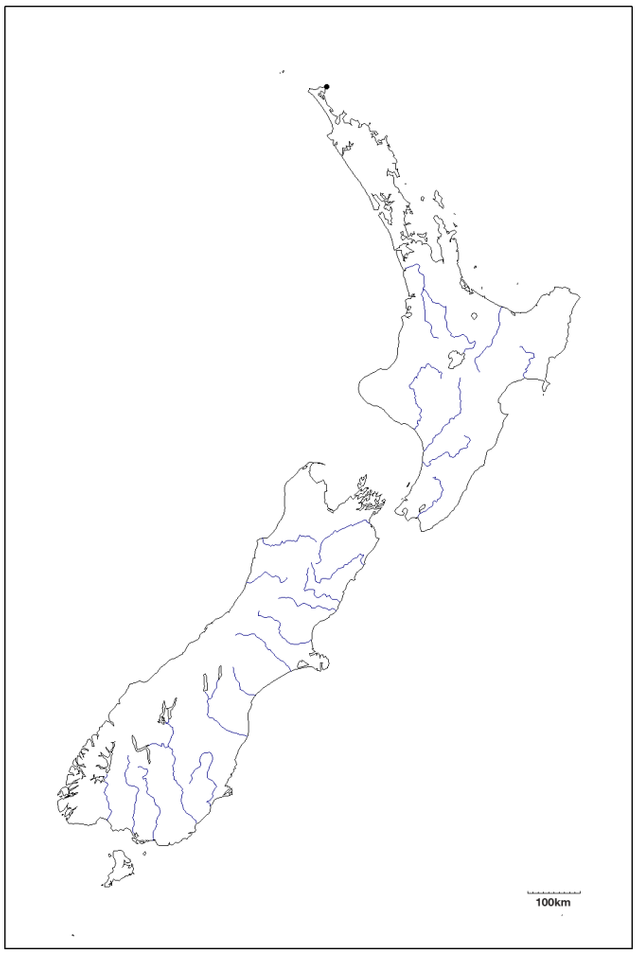

Fig 5: *Aupouriella pohei* Winterbourn, 2009 (1 record).

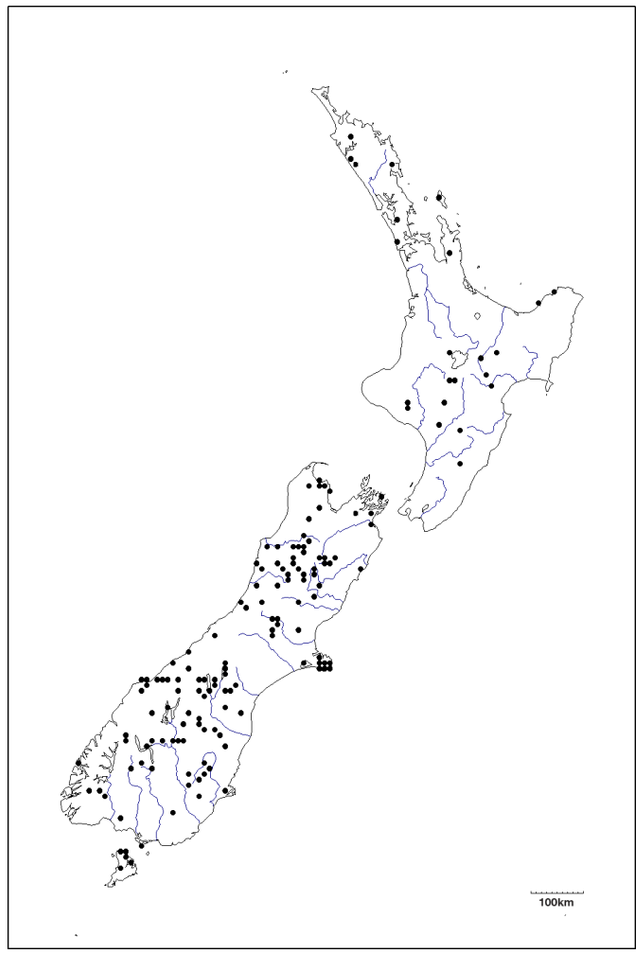

Fig 6: *Austroclima jollyae* Towns & Peters, 1979 (218 records).

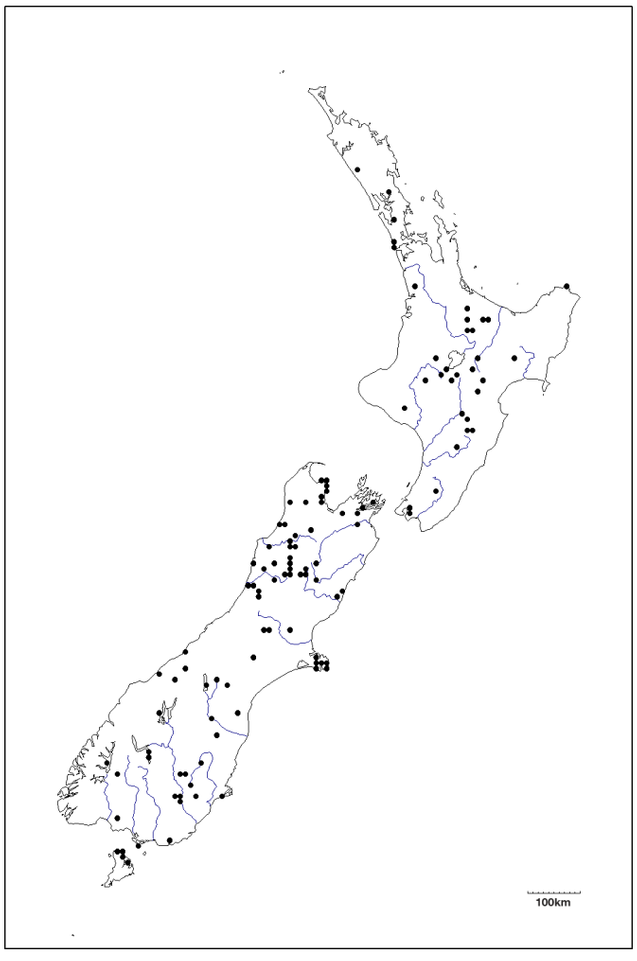

Fig 7: *Austroclima sepia* (Phillips, 1930) (180 records).

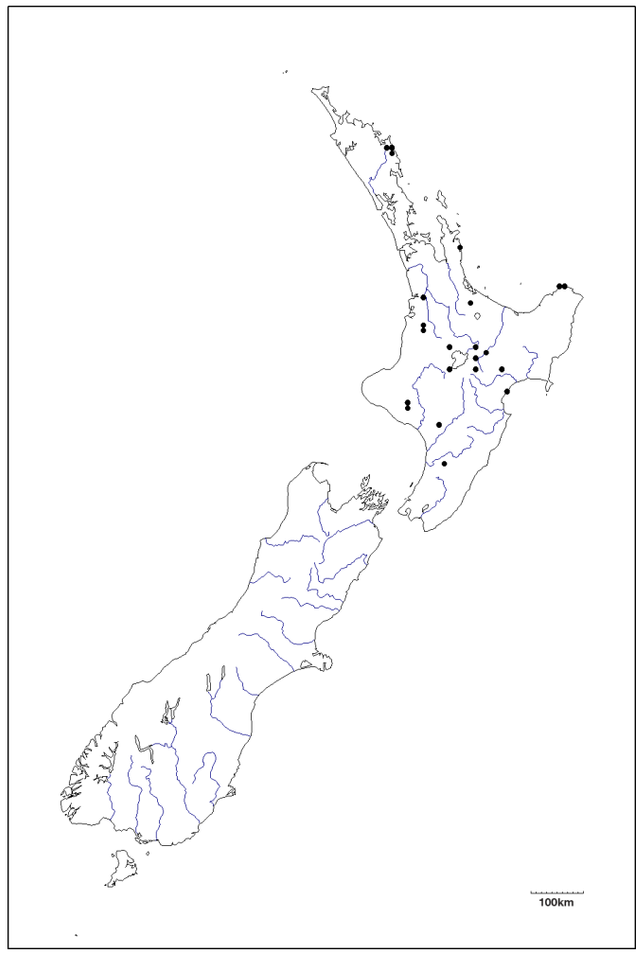

Fig 8: *Austronella planulata* Towns, 1983 (25 records).

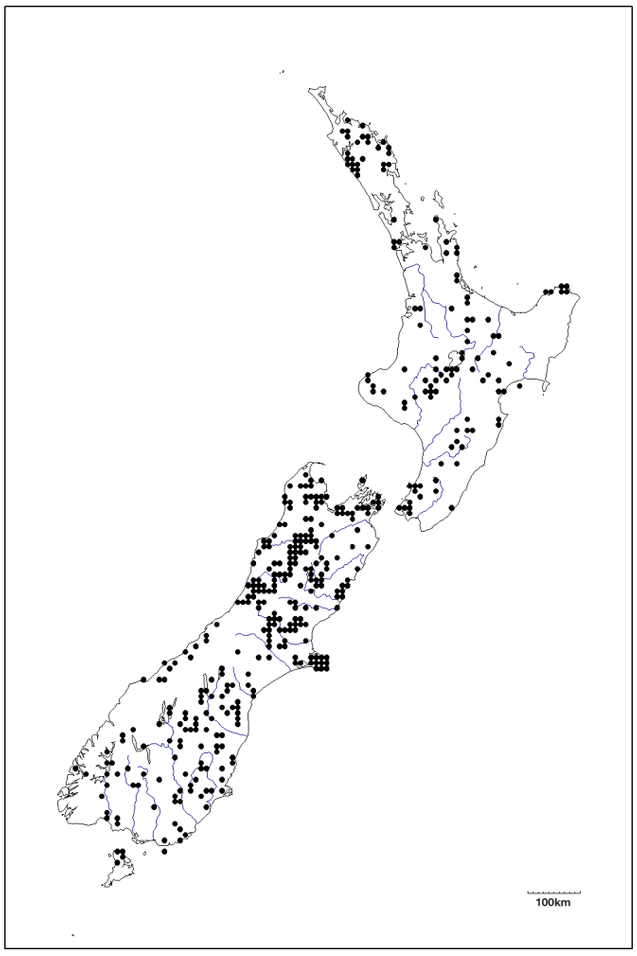

Fig 9: *Coloburiscus humeralis* (Walker, 1853) (986 records).

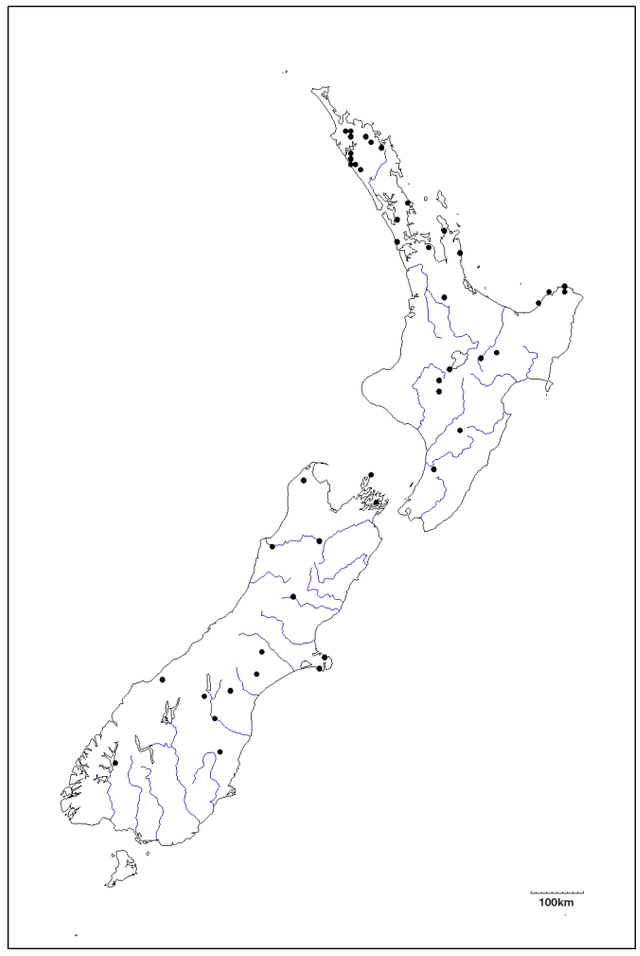

Fig 10: *Deleatidium* (*D.*) *angustum* Towns & Peters, 1996 (67 records).

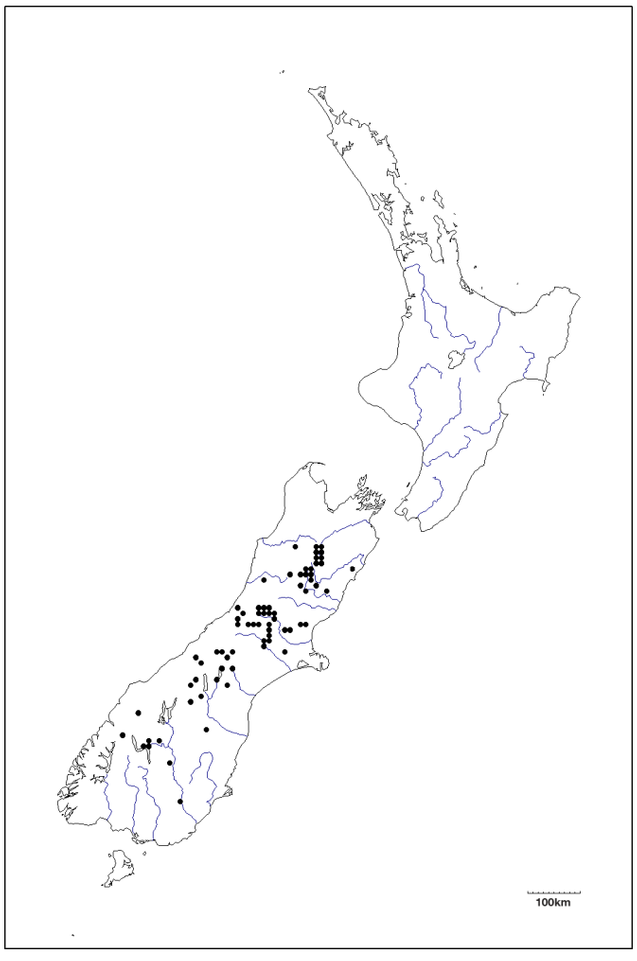

Fig 11: *Deleatidium* (*D.*) *atricolor* Hitchings, 2009 (173 records).

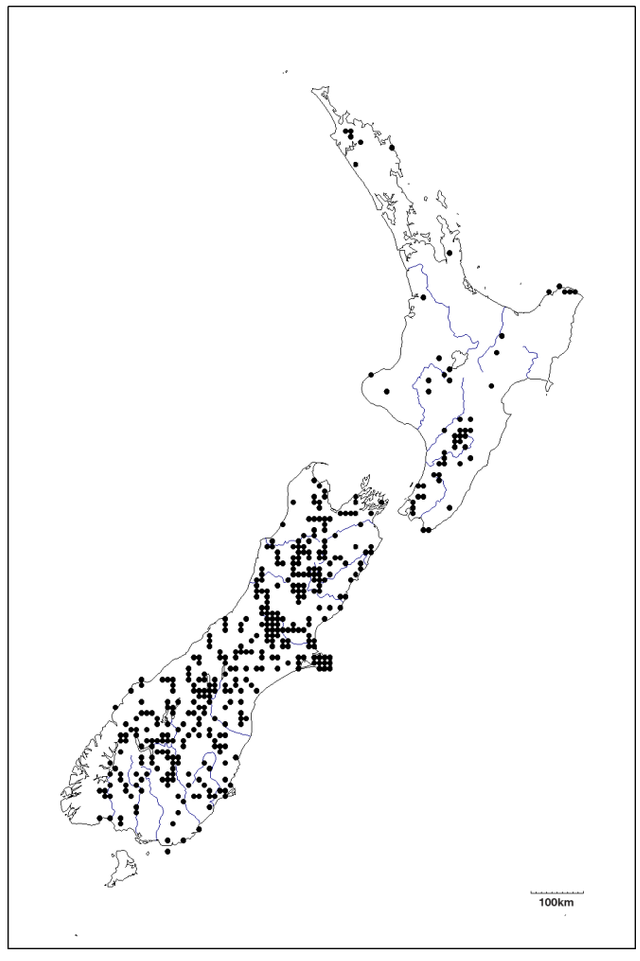

Fig 12: *Deleatidium* (*D.*) *autumnale* Phillips, 1930 (907 records).

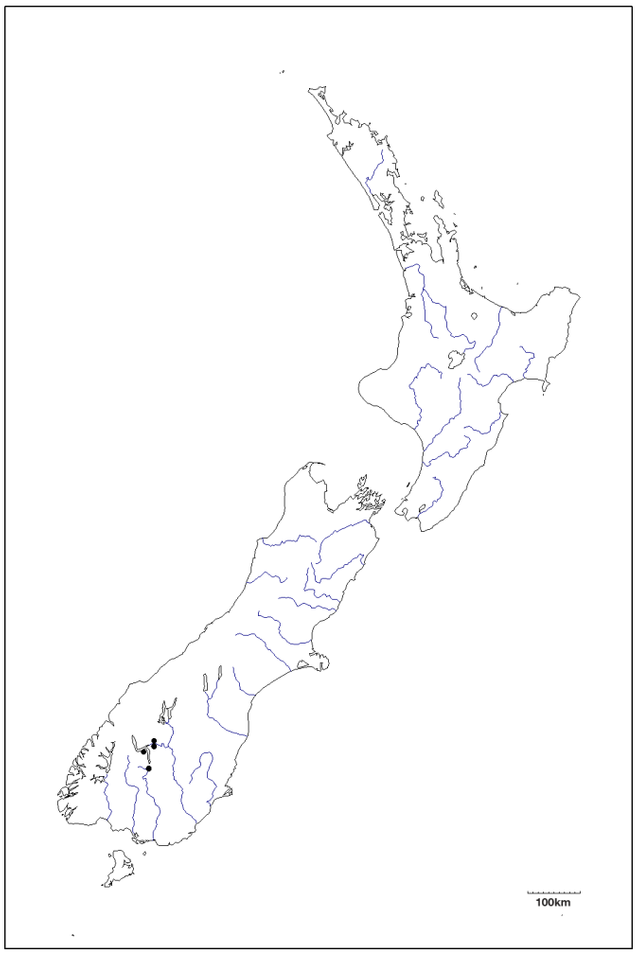

Fig 13: *Deleatidium* (*D.*) *branchiola* Hitchings, 2009 (6 records).

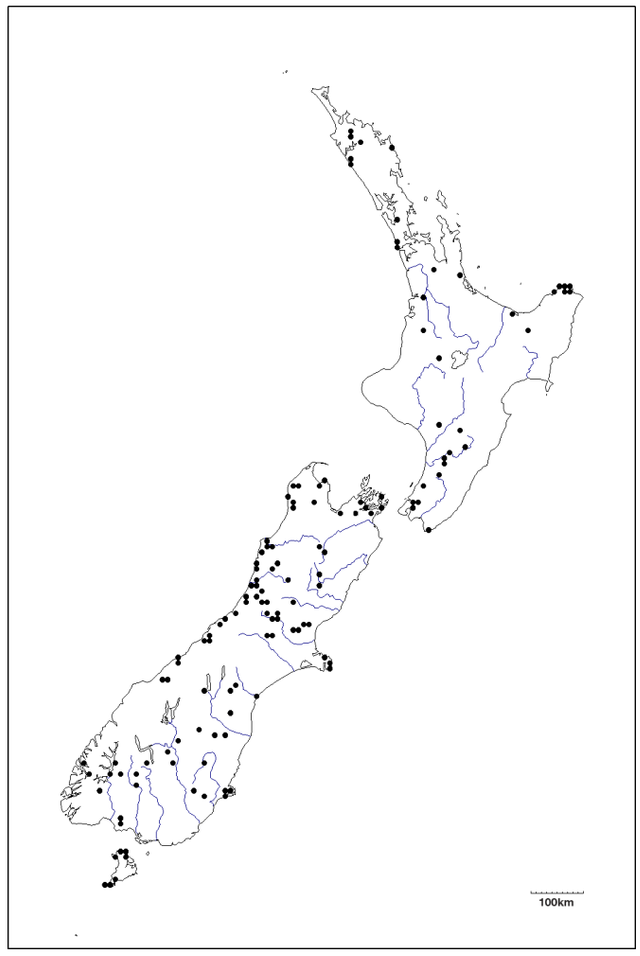

Fig 14: *Deleatidium* (*D.*) *cerinum* Phillips, 1930 (213 records).

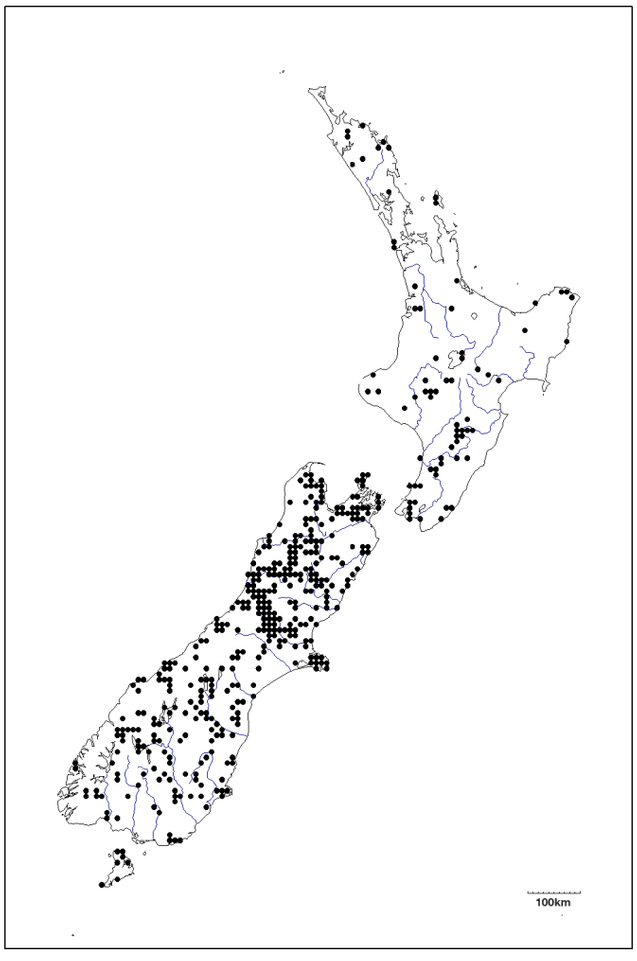

Fig 15: *Deleatidium* (*D.*) *fumosum* Phillips, 1930 (968 records).

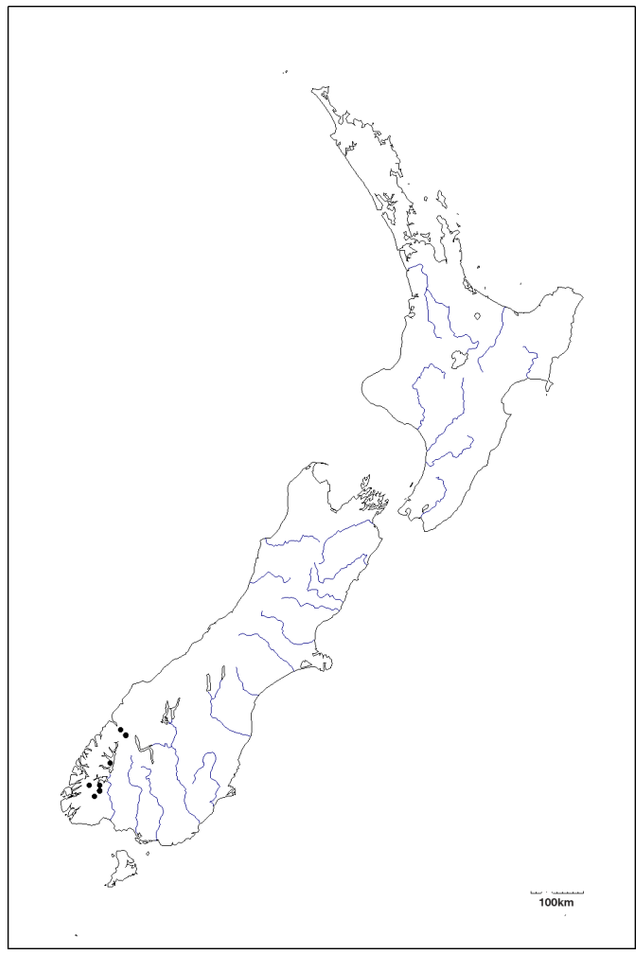

Fig 16: *Deleatidium (D.) kiwa* Hitchings, 2010 (16 records).

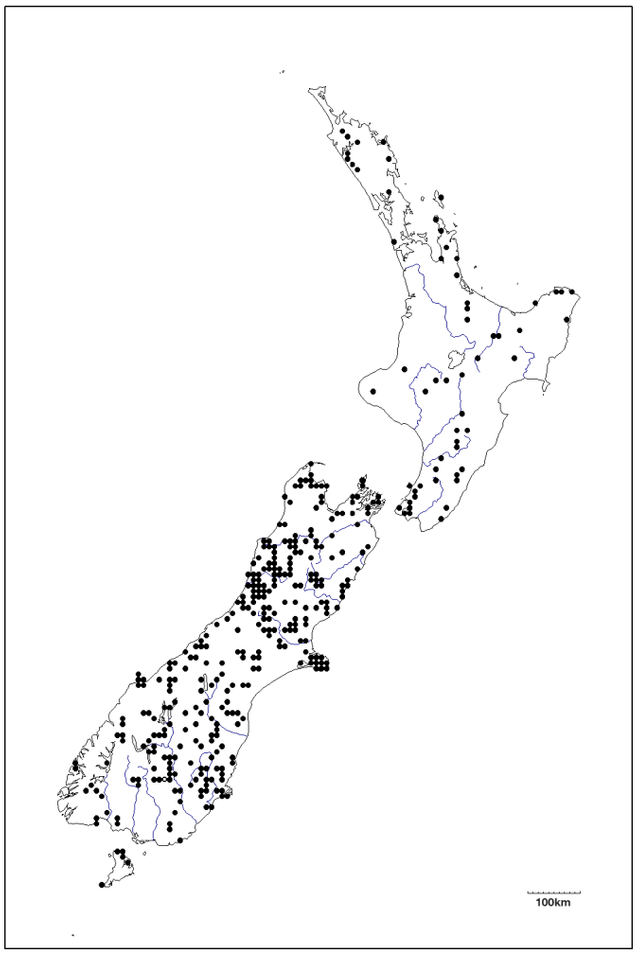

Fig 17: *Deleatidium* (*D.*) *lillii* Eaton, 1899 (732 records).

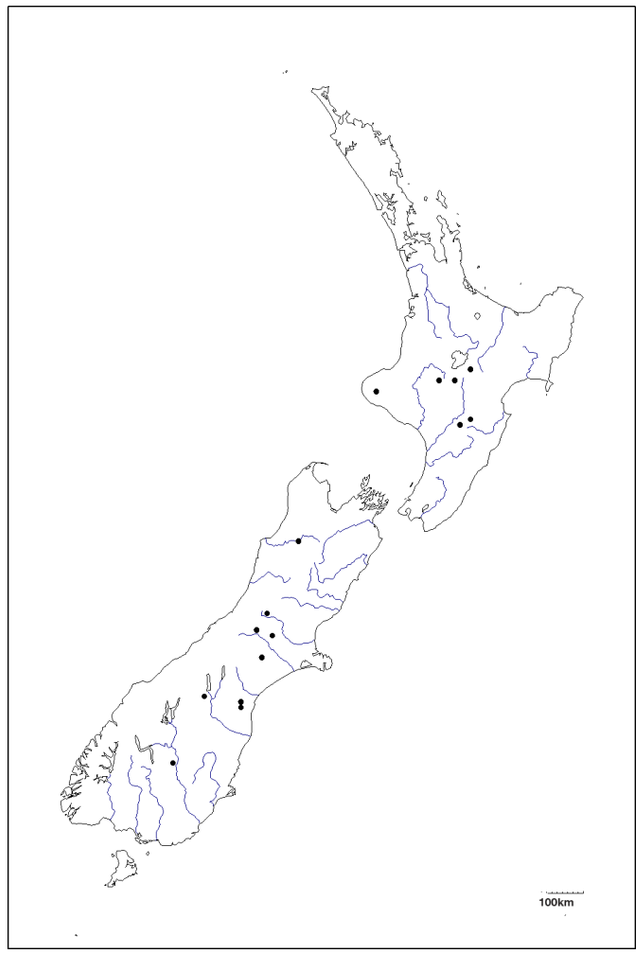

Fig 18: *Deleatidium* (*D.*) *magnum* Towns & Peters, 1996 (26 records).

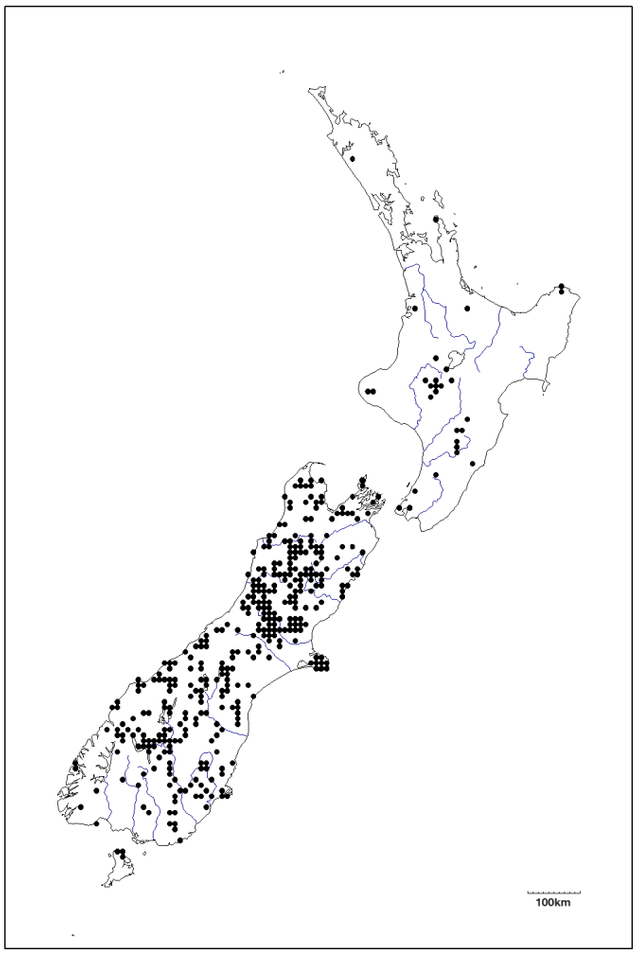

Fig 19: *Deleatidium* (*D.*) *myzobranchia* Phillips, 1930 (959 records).

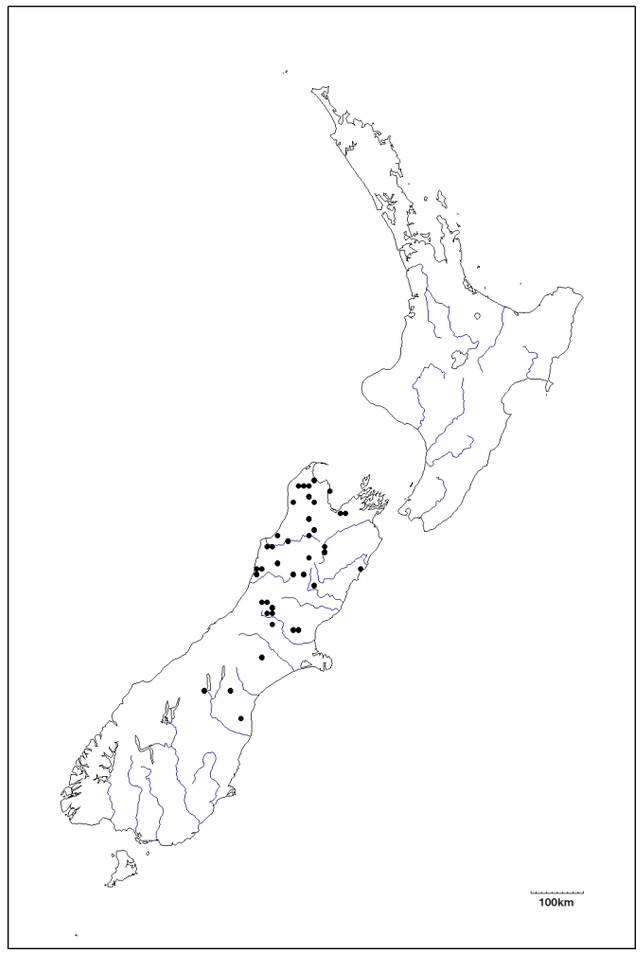

Fig 20: *Deleatidium* (*D.*) *townsi* Hitchings, 2009 (84 records).

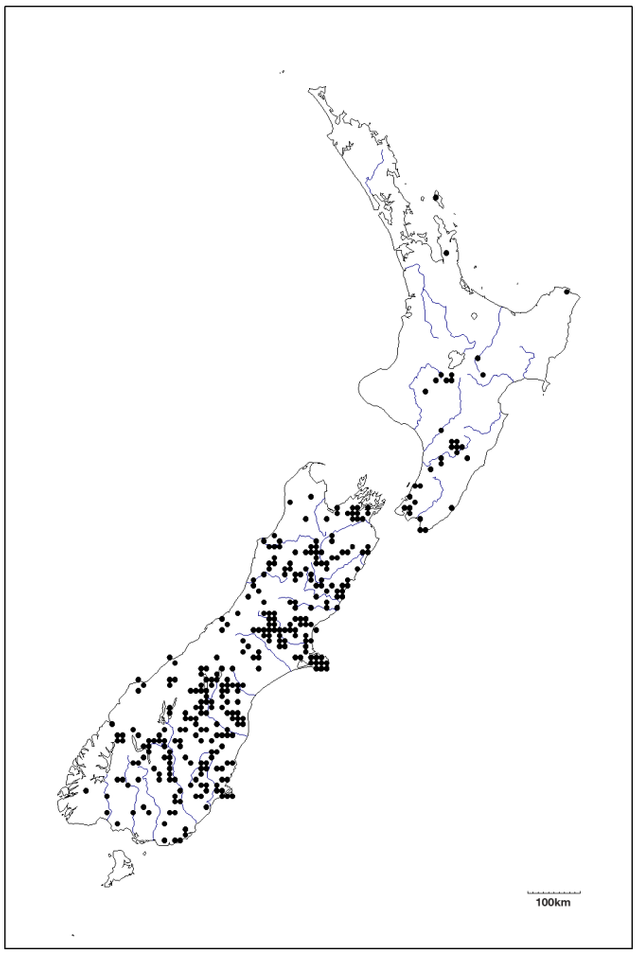

Fig 21: *Deleatidium* (*D.*) *vernale* Phillips, 1930 (743 records).

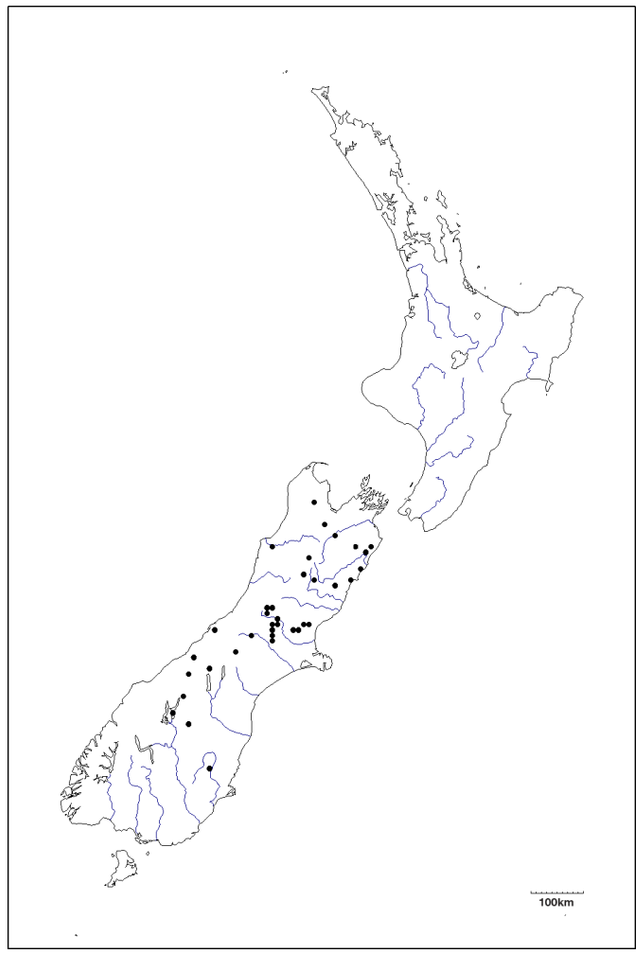

Fig 22: *Deleatidium* (*D.*) *wardorum* Hitchings, 2010 (78 records).

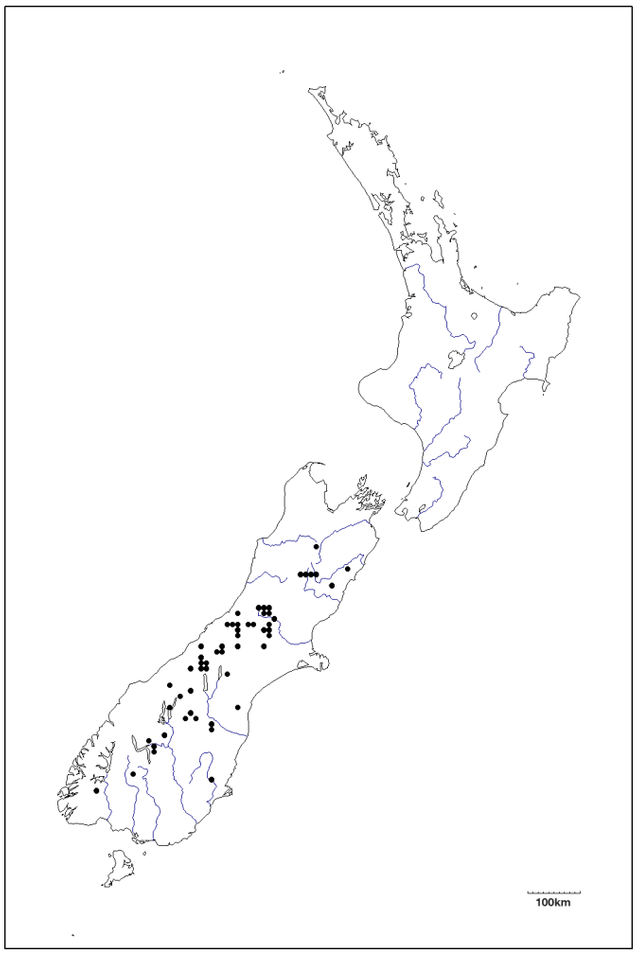

Fig 23: *Deleatidium* (*P.*) *cornutum* Towns & Peters, 1996 (127 records).

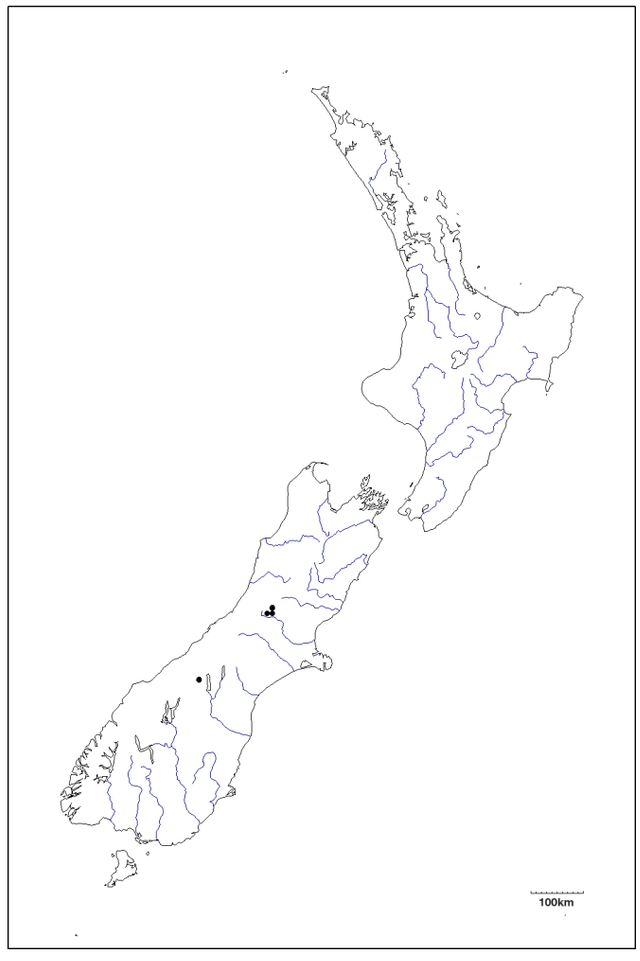

Fig 24: *Deleatidium* (*P.*) *insolitum* (Towns & Peters, 1979) (10 records).

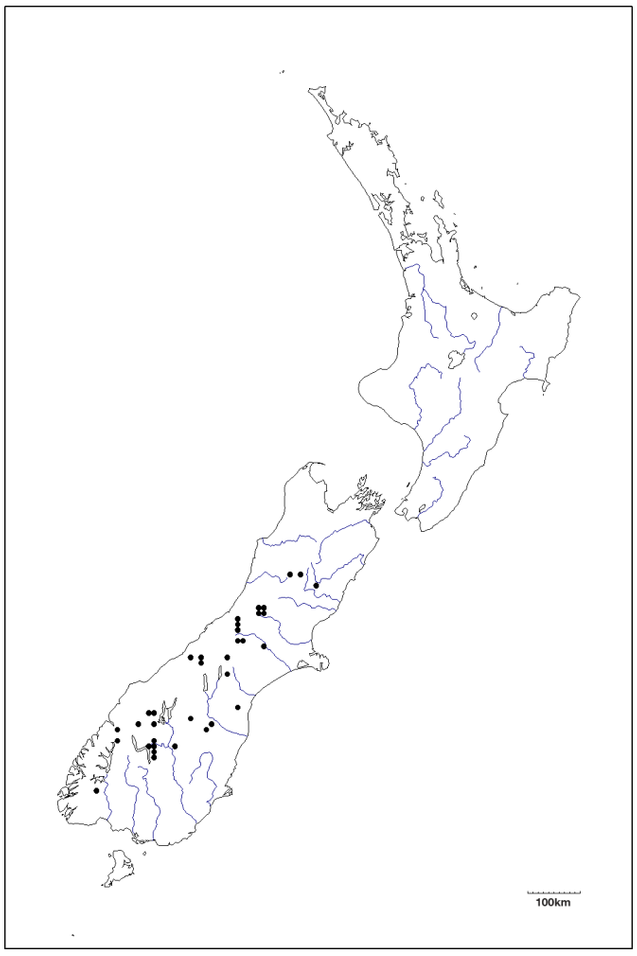

Fig 25: *Deleatidium* (*P.*) *patricki* Hitchings, 2008 (59 records).

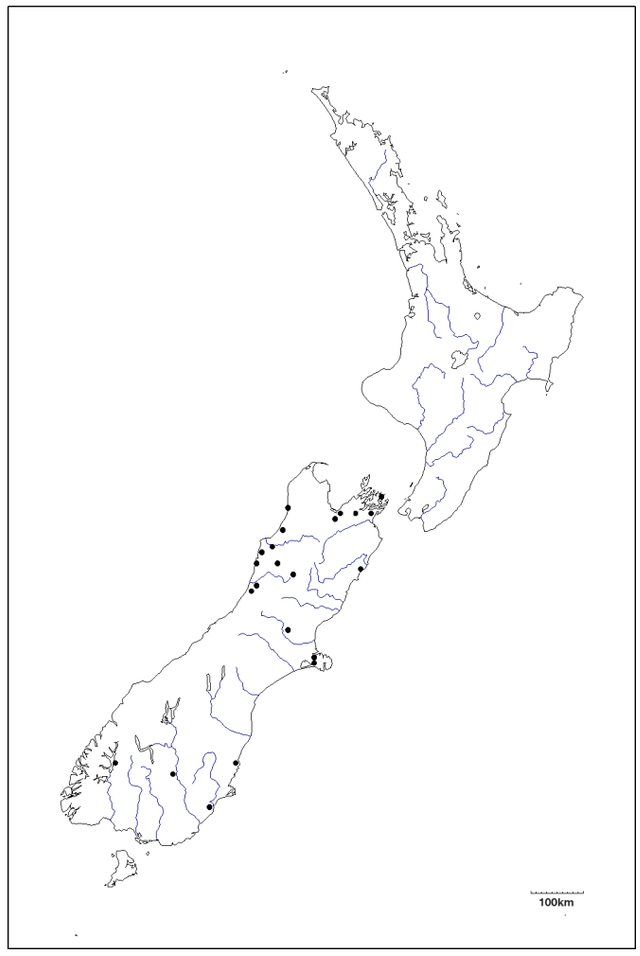

Fig 26: *Ichthybotus bicolor* Tillyard, 1923 (31 records).

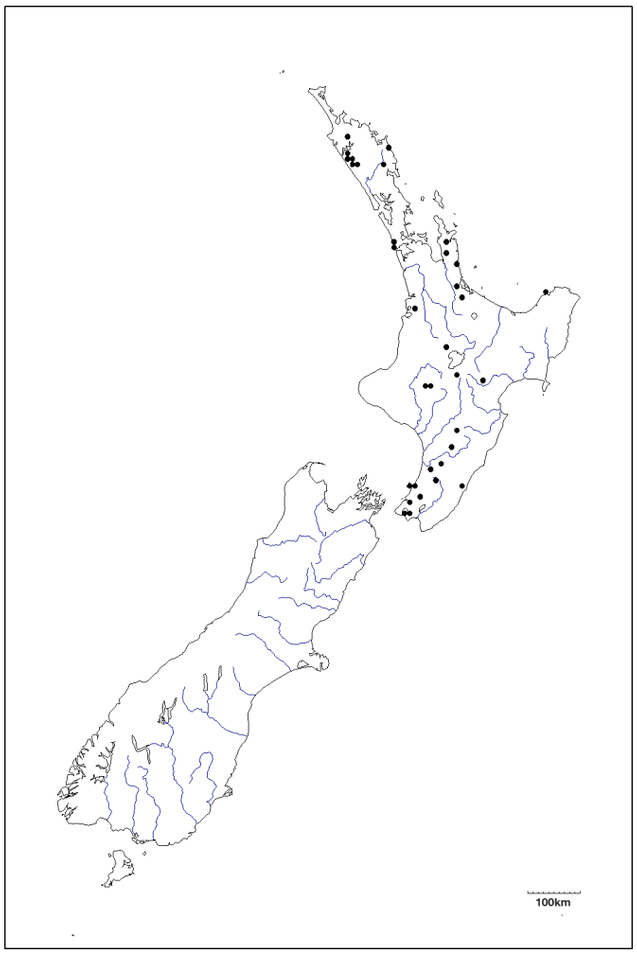

Fig 27: *Ichthybotus hudsoni* (McLachlan, 1894) (55 records).

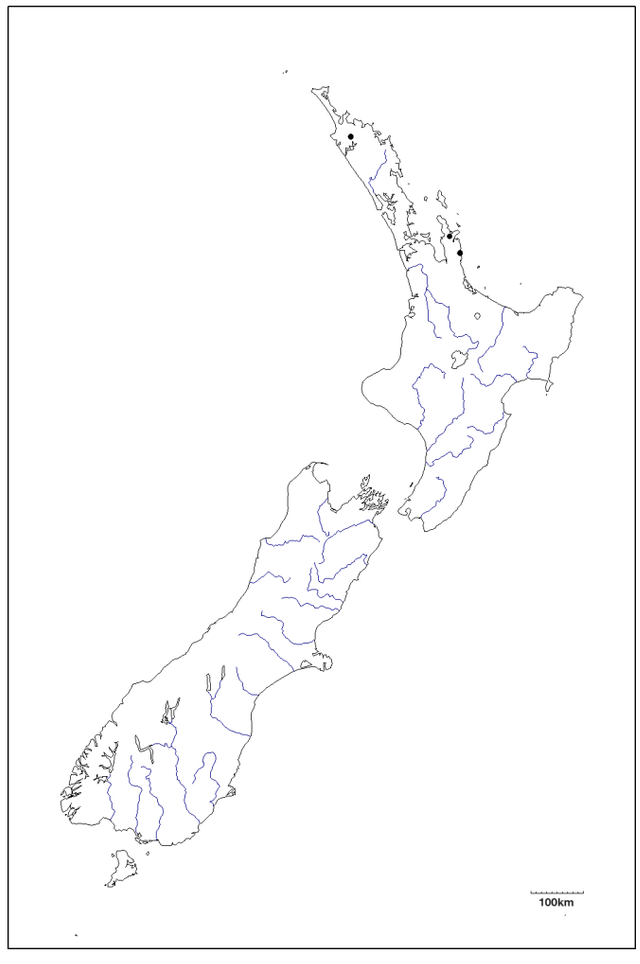

Fig 28: *Isothraulus abditus* Towns & Peters, 1979 (4 records).

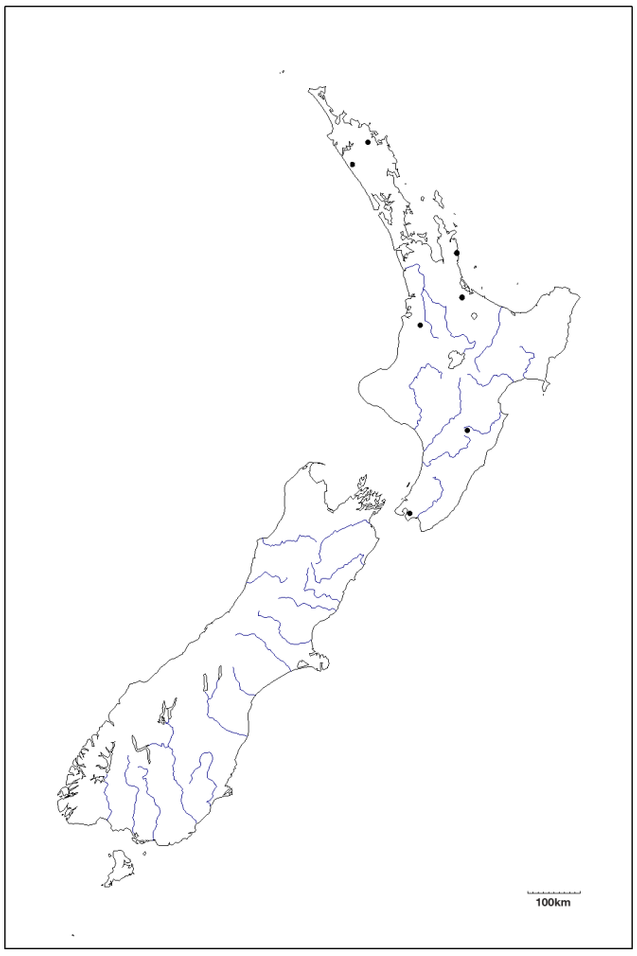

Fig 29: *Mauiulus aquilus* Towns & Peters, 1996 (9 records).

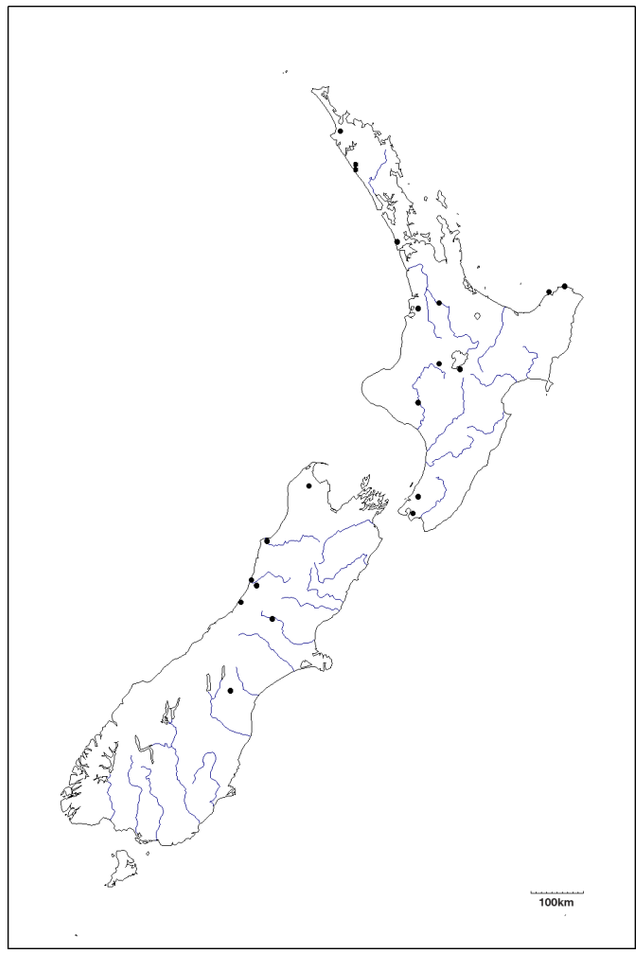

Fig 30: *Mauiulus luma* Towns & Peters, 1979 (23 records).

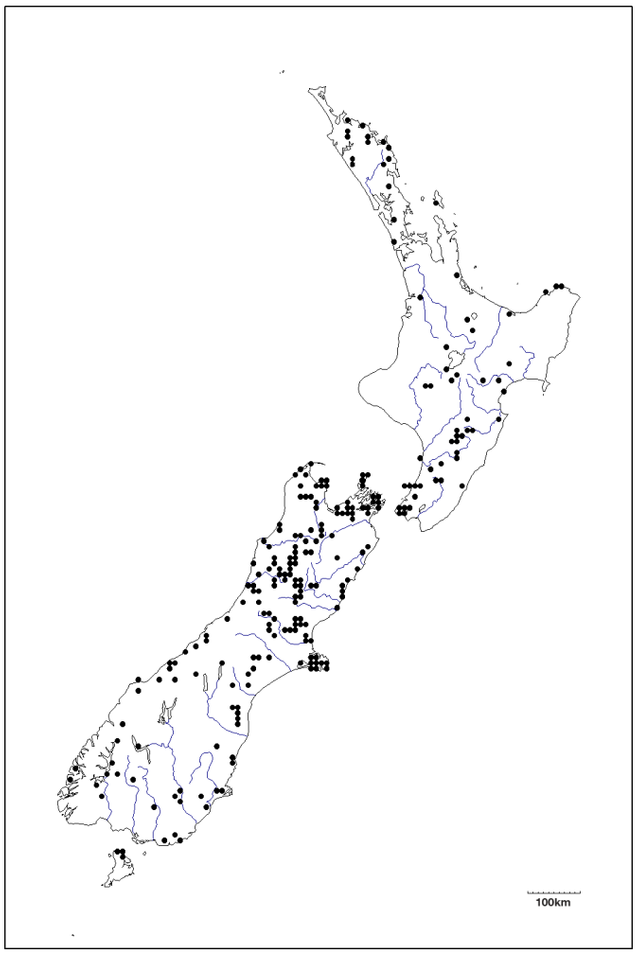

Fig 31: *Neozephlebia scita* Walker, 1853 (535 records).

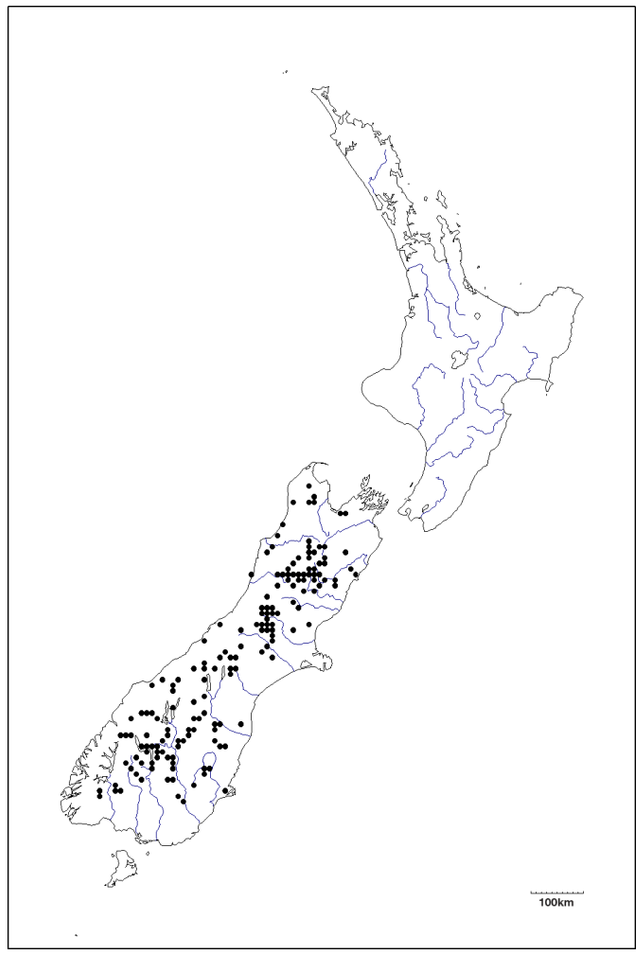

Fig 32: *Nesameletus austrinus* Hitchings & Staniczek, 2003 (409 records).

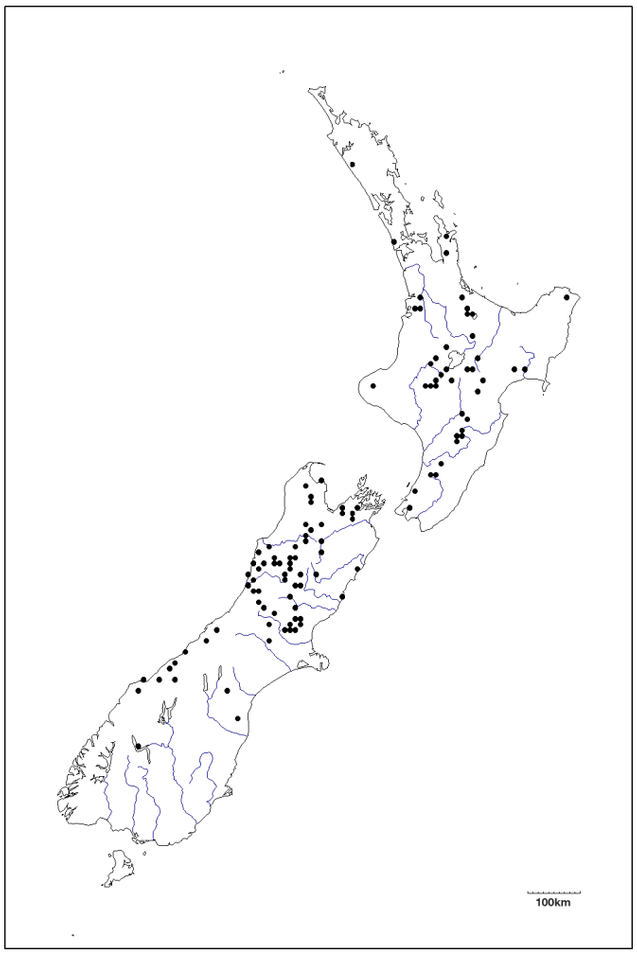

Fig 33: *Nesameletus flavitinctus* Tillyard, 1923 (236 records).

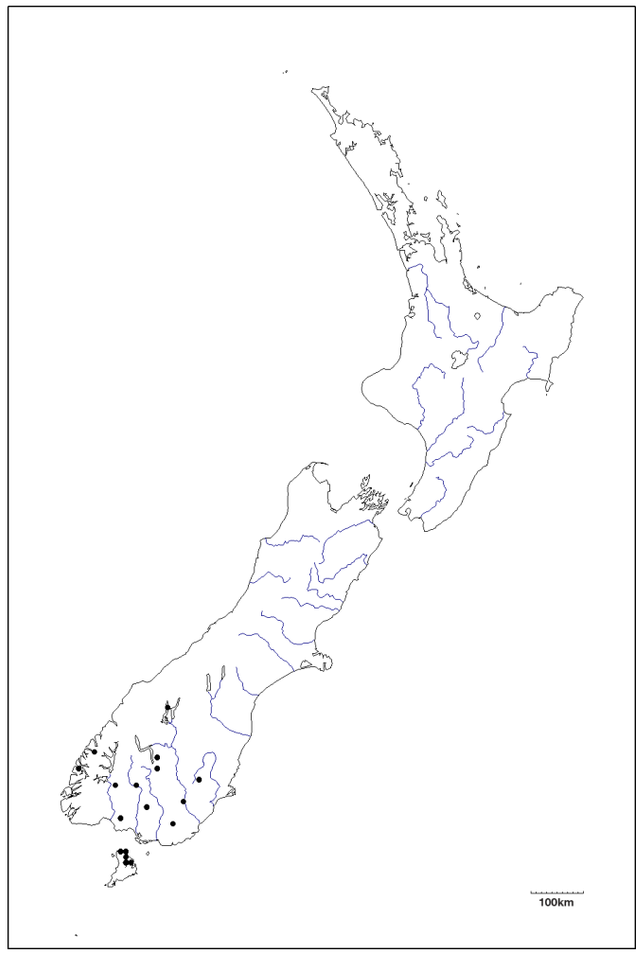

Fig 34: *Nesameletus murihiku* Hitchings & Staniczek, 2003 (36 records).

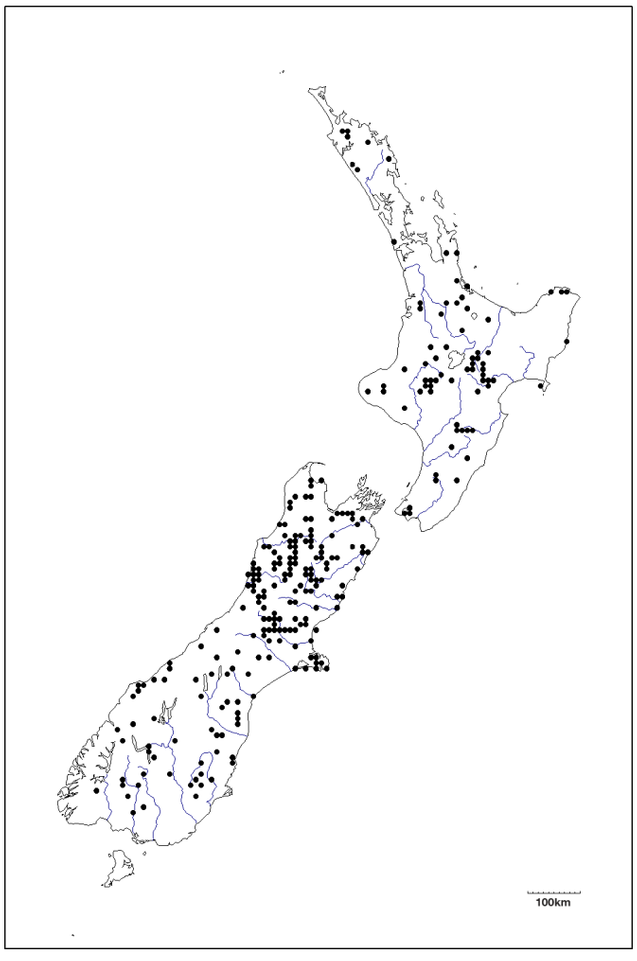

Fig 35: *Nesameletus ornatus* Eaton, 1883 (587 records).

Fig 36: *Nesameletus vulcanus* Hitchings & Staniczek, 2003 (42 records).

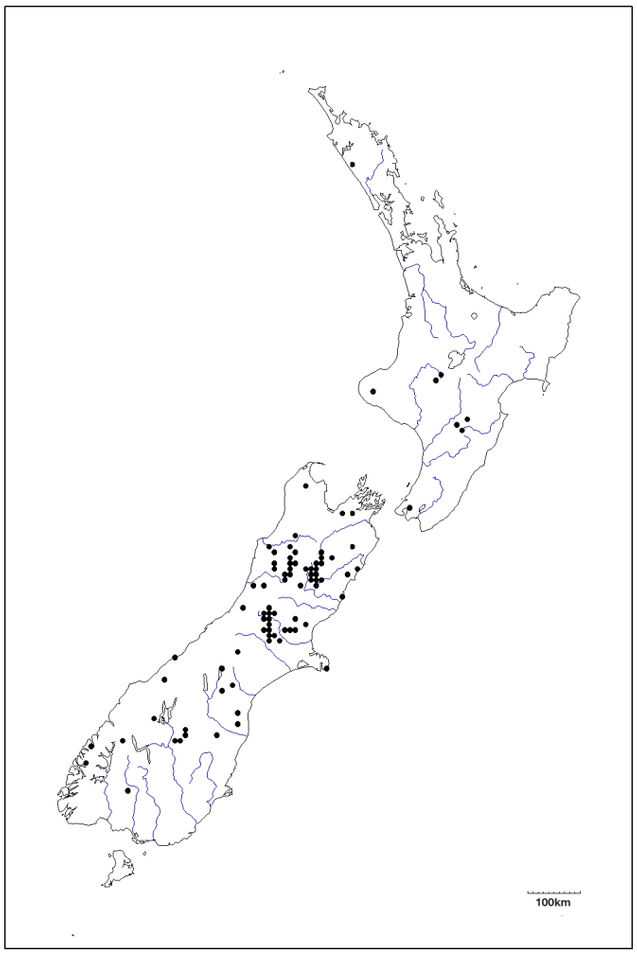

Fig 37: *Oniscigaster distans* Eaton, 1899 (146 records).

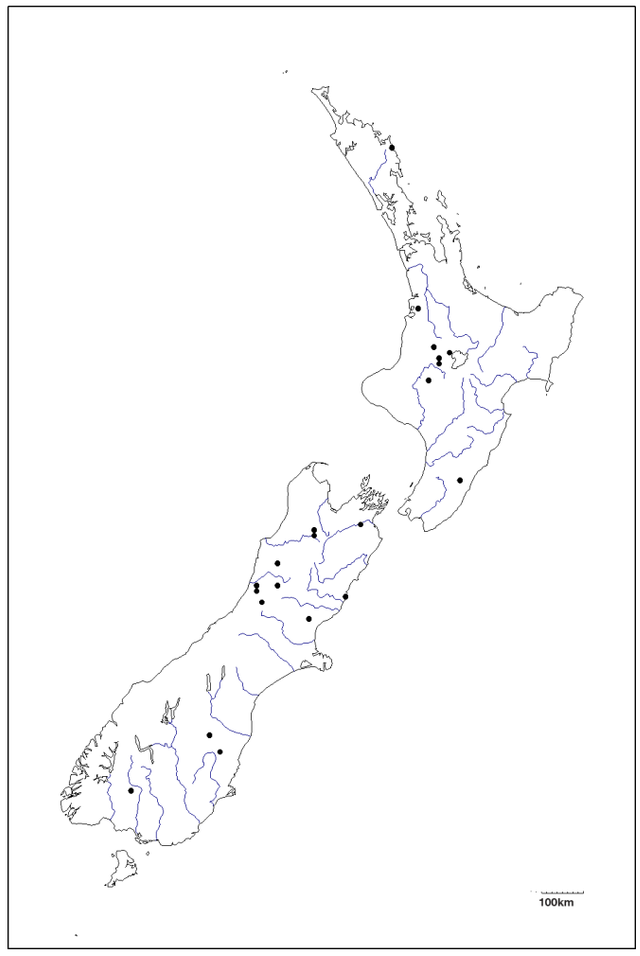

Fig 38: *Oniscgaster wakefieldi* McLachan, 1873 (40 records).

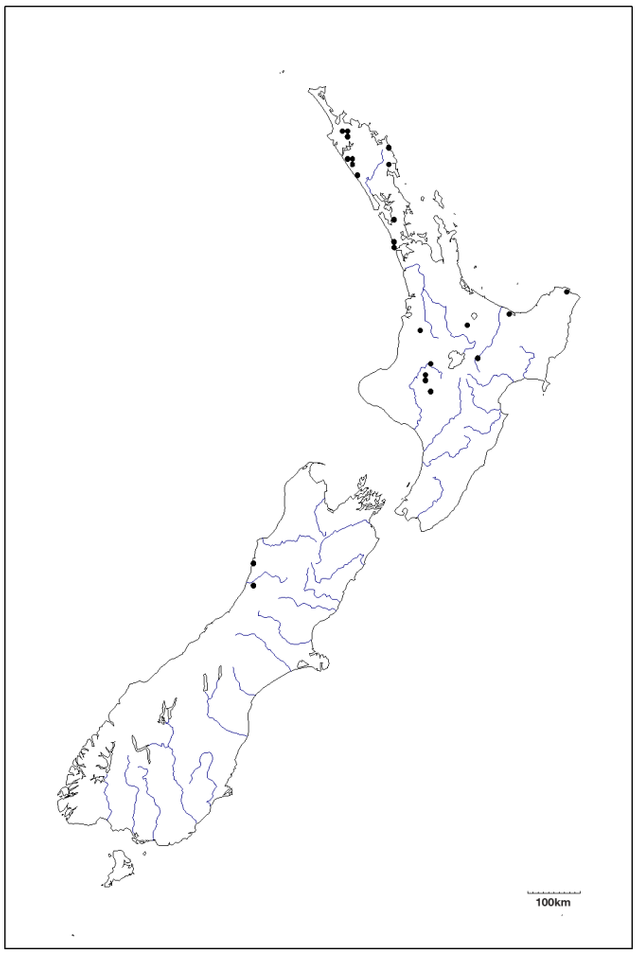

Fig 39: *Rallidens mcfarlanei* Penniket, 1966 (68 records).

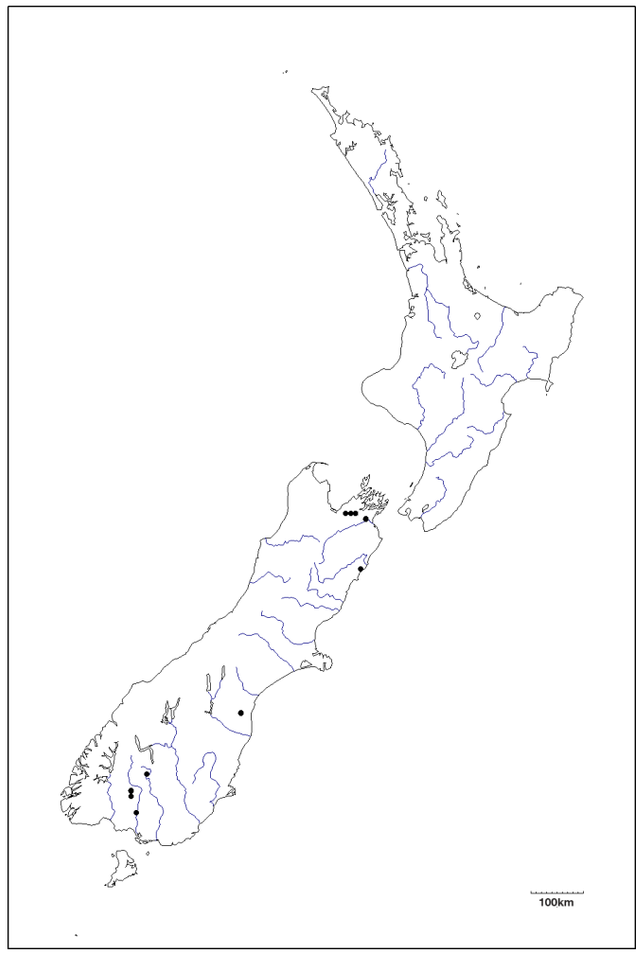

Fig 40: *Rallidens platydontis* Staniczek & Hitchings, 2014 (27 records).

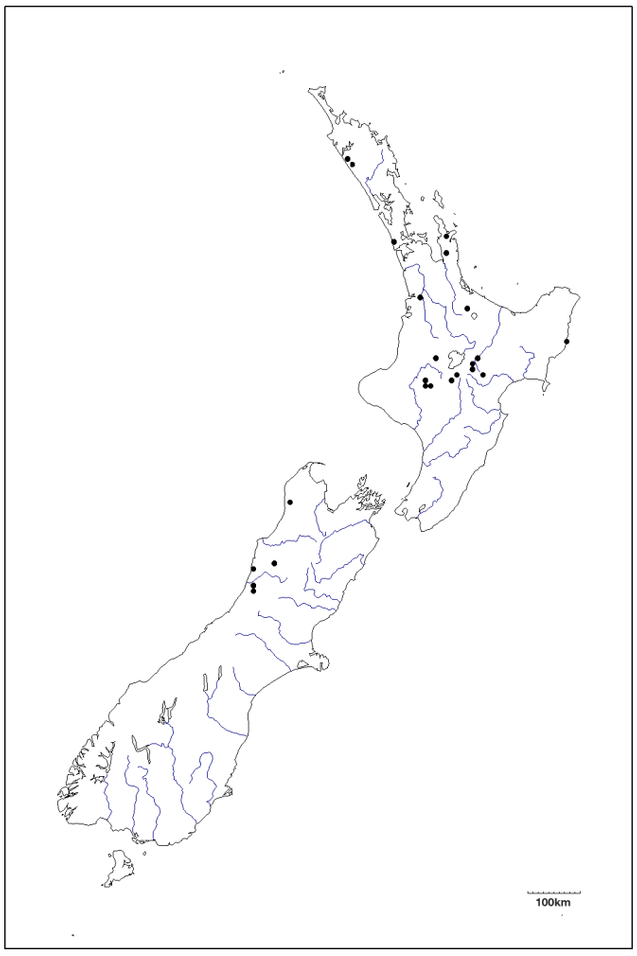

Fig 41: *Siphlaenigma janae* Penniket, 1962 (53 records).

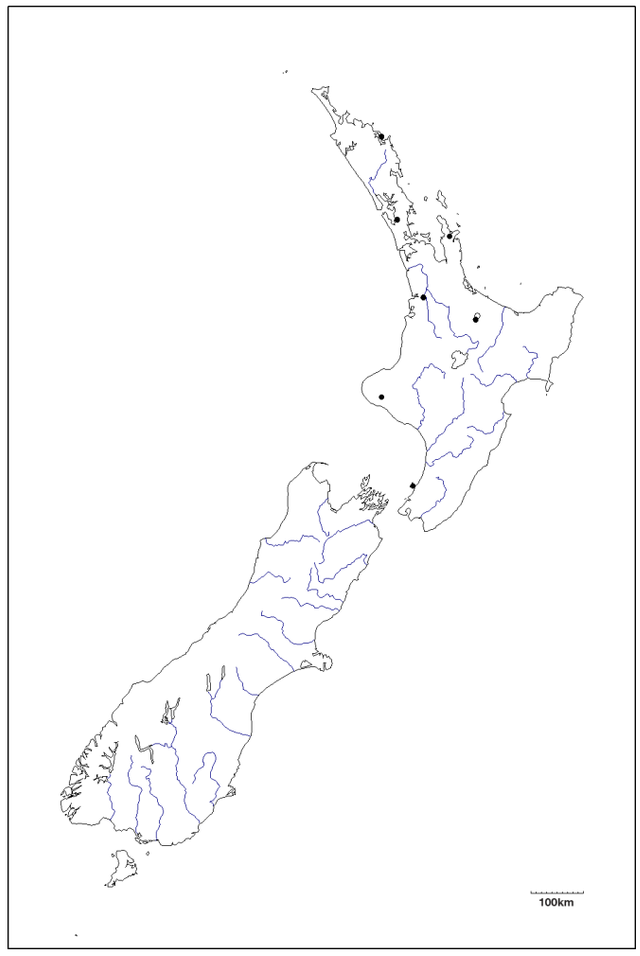

Fig 42: *Tepakia caligata* Towns & Peters, 1996 (8 records).

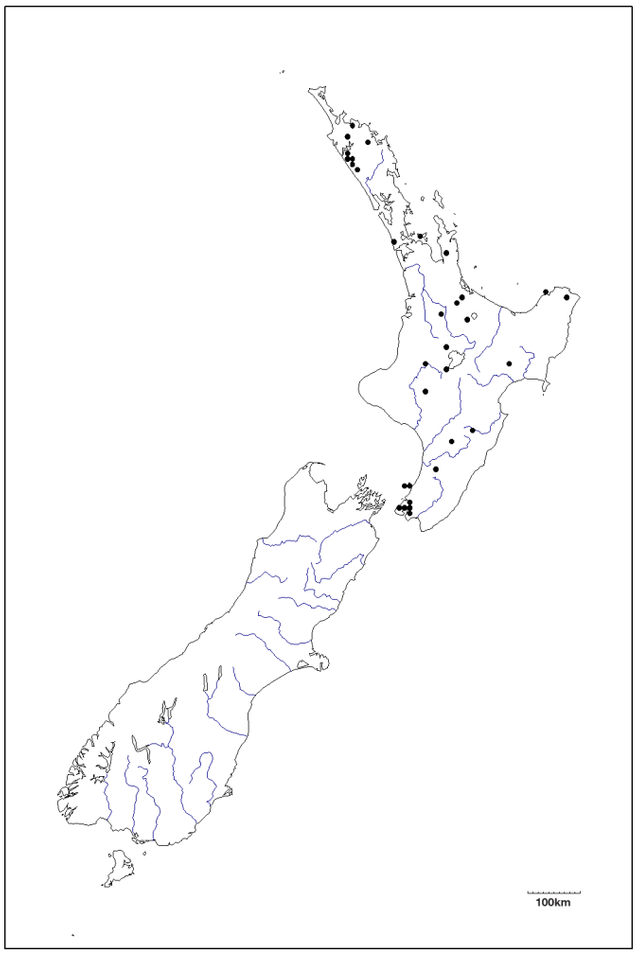

Fig 43: *Zephlebia borealis* (Phillips, 1930) (50 records).

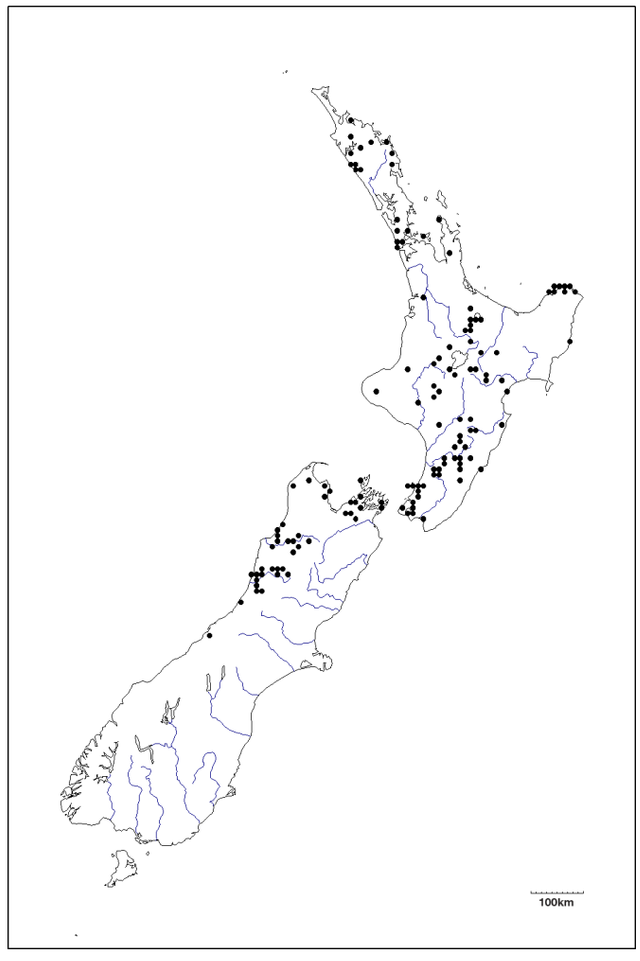

Fig 44: *Zephlebia dentata* (Eaton, 1871) (234 records).

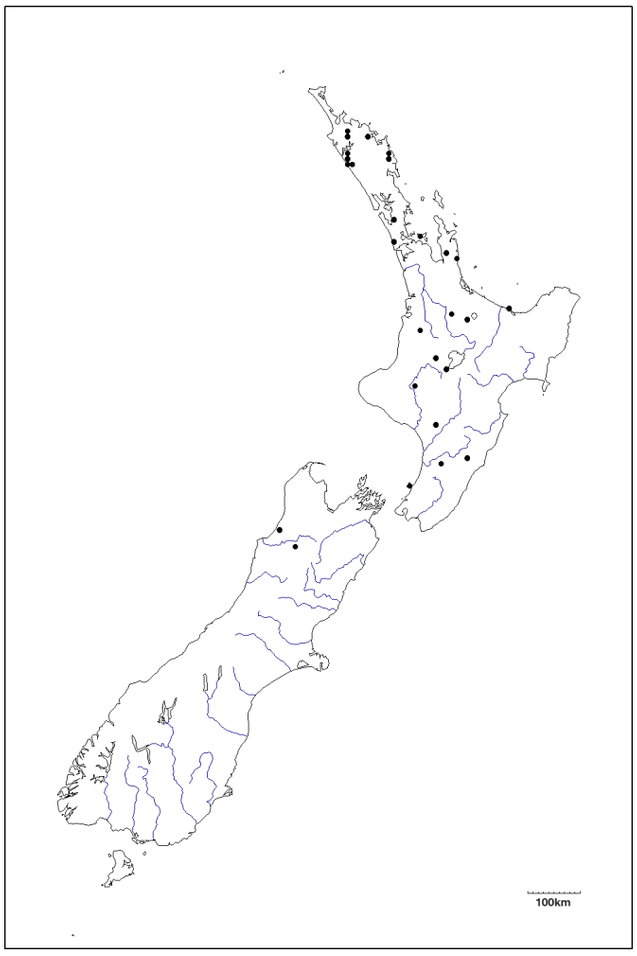

Fig 45: *Zephlebia inconspicua* Towns, 1983 (43 records).

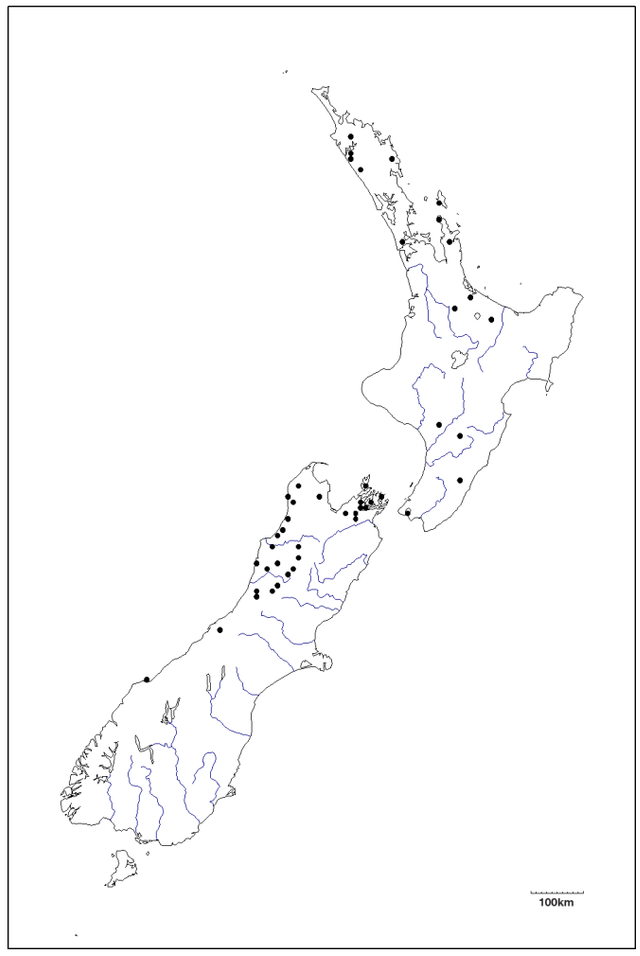

Fig 46: *Zephlebia nebulosa* Towns & Peters, 1996 (64 records).

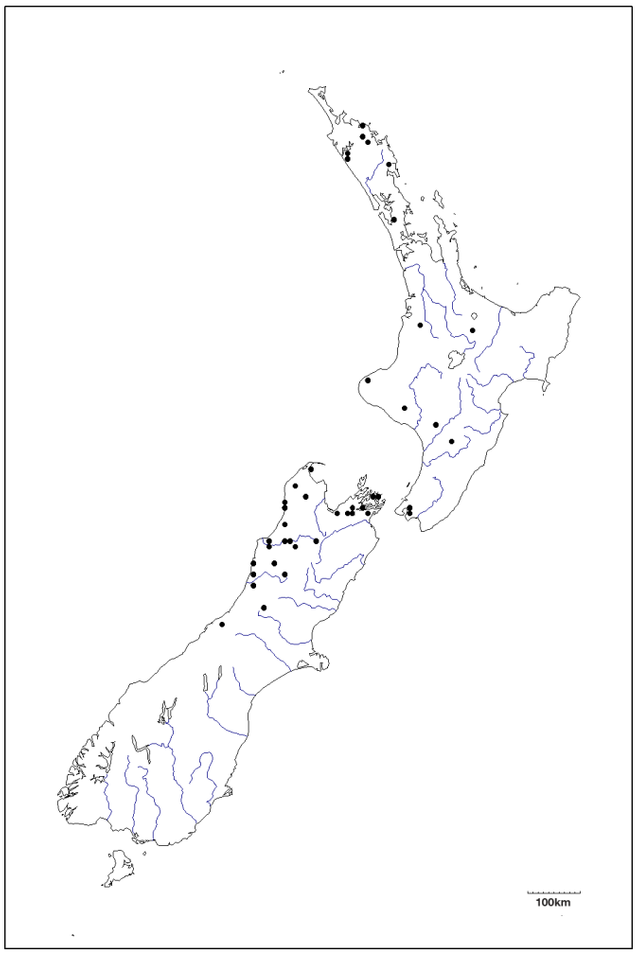

Fig 47: *Zephlebia pirongia* Towns & Peters, 1996 (54 records).

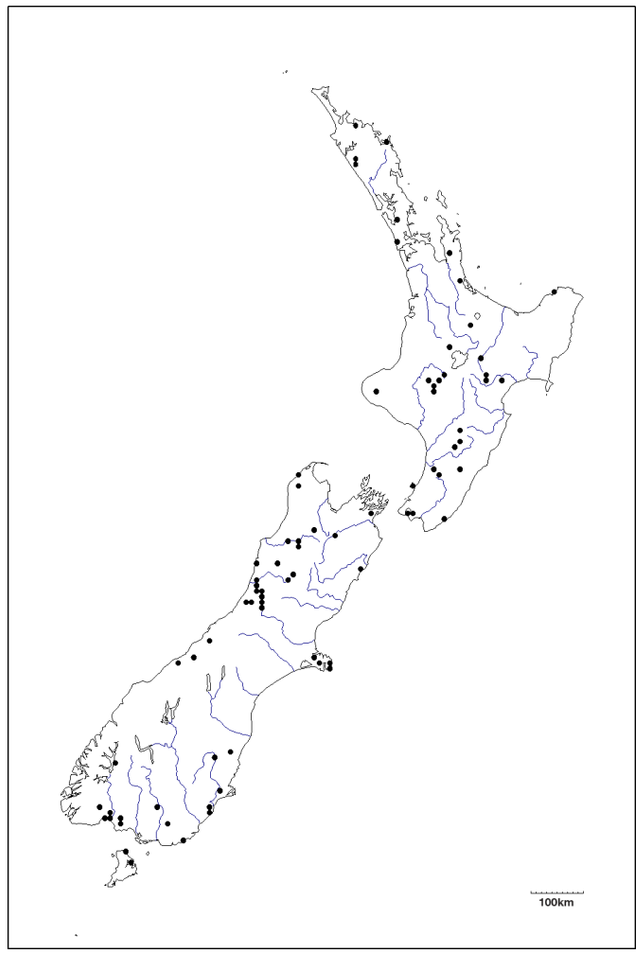

Fig 48: *Zephlebia spectabilis* Towns, 1983 (127 records).

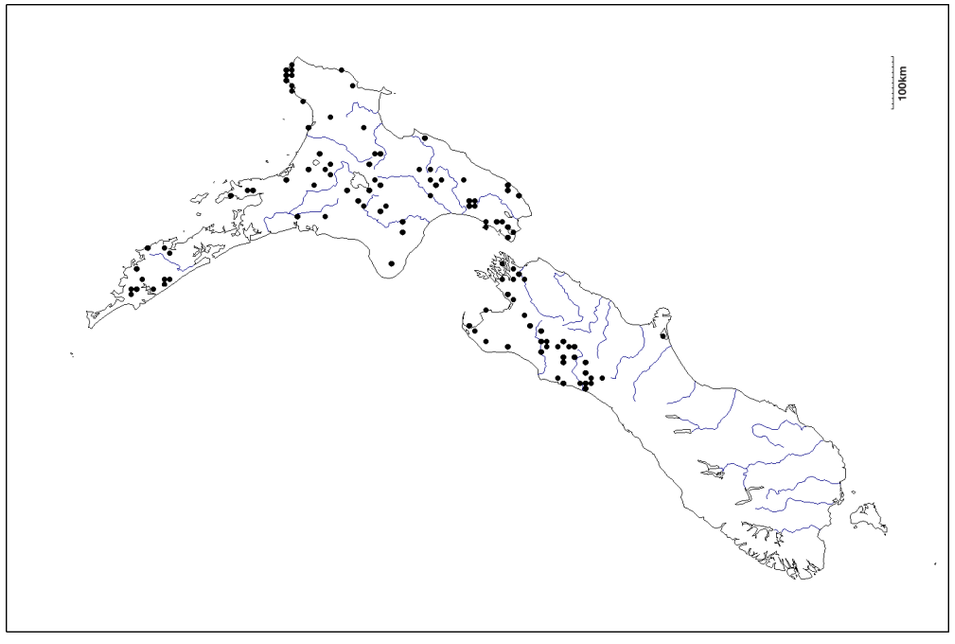

Fig 50: *Zephlebia versicolor* (Eaton, 1899) (180 records).

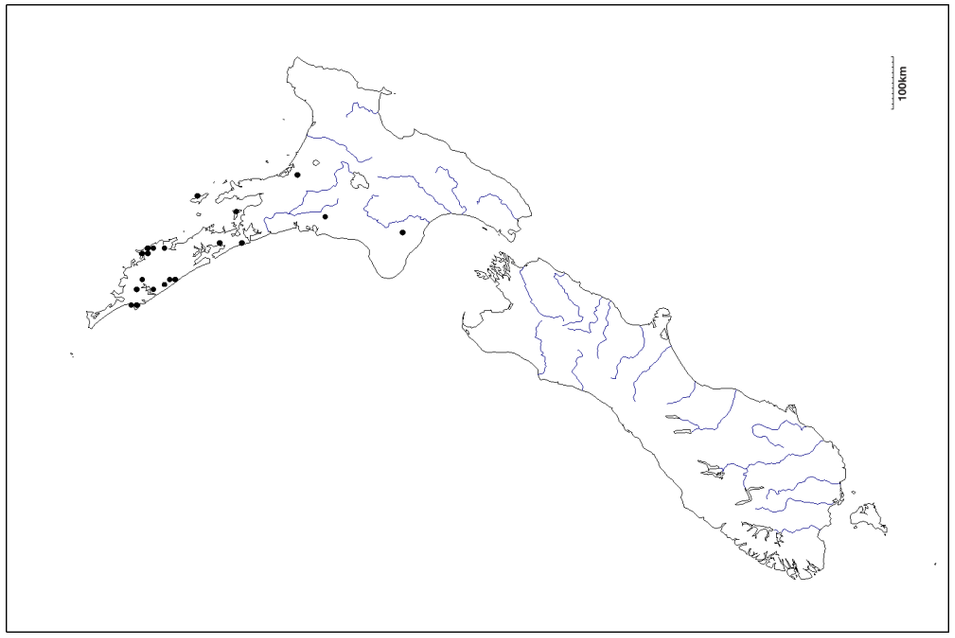

Fig 49: *Zephlebia tuberculata* Towns & Peters, 1996 (31 records).

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Harvesting of ngā hua manu (bird eggs) in Te Waipounamu (South Island), New Zealand

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ABSTRACT

The presence of large quantities of moa egg shell in a number of archaeological contexts has been interpreted as testimony that eggs formed a substantial seasonal component of the moa hunter diet as well as serving a wide range of other functions such as grave goods and raw material for artefacts. Despite the archaeological potential of eggshell, apart from moa, the analysis of eggshell in archaeological sites in New Zealand is to date non-existent. Eggshell is almost impossible to reliably identify taxonomically based on morphology alone and even where it has been retained, archaeological eggshell is often archived without taxonomic identification. This paper utilises ethno-historical evidence to establish that the eggs of a wide range of species are known to have been exploited in Te Waipounamu (the South Island) of New Zealand. The eggs of seabirds in particular, offered a significant resource that remained a seasonal focus of economic activity until the early twentieth century. The application of scientific advances in eggshell identification techniques are reviewed for their potential to be used to overcome perceived problems with the interpretation of eggshell in archaeological assemblages in New Zealand.

KEYWORDS

bird eggs; eggshell; genetic analysis; mass spectrometry; ethno-history; seasonal harvesting; archaeology.

INTRODUCTION

This paper undertakes a selected literature review of a variety of sources including recorded Māori traditional and ethno-historical accounts pertaining to harvesting bird eggs, the breeding biology of species identified in these accounts and the research outcomes of recent genetic and mass spectrometry analyses pertaining to eggshell. Although it might seem that these disparate sources are inherently incompatible it will be demonstrated that it is possible to draw a number of conclusions as to what this corpus of accounts can reliably establish about the Māori cultural practice of bird egg harvesting. It is not the purpose of this paper to undertake any in-depth critical analysis of the sources themselves, but to cautiously extract information deemed relevant to making a robust contribution to the current understanding of the economic role of bird egg harvesting in New Zealand.

ARCHAEOLOGICAL AND SCIENTIFIC EVIDENCE

This section includes a selective literature review of the evidence for the seasonal harvest of eggs of now extinct bird species, largely moa, and a brief summary of how recent research outcomes utilising genetic analysis have made possible a better understanding of the cultural practice of egg harvesting.

Moa and other large birds

Evidence of the intensive exploitation of moa is apparent in most early archaeological deposits by the presence of bone and eggshell. The bones of other large species such as Haast's eagle, geese, adzebills, takahe and swan have also been identified in early sites (Worthy and Holdaway 2002: 541). Moa eggs and eggshell have been found in various archaeological situations including in association with burials, in circumstances indicating they had been cooked and eaten, but more frequently the eggshell present, while clearly of archaeological origin, was unable to be ascribed any specific cultural context (Anderson 1989: 143, 184).

There is limited data concerning the clutch size of moa, but available data suggests that no more than one or two eggs are represented in any one collection of eggshell from each discrete nesting event (Anderson 1989: 81, 84; Worthy and Holdaway 2002: 187). The sequence of moa breeding behaviour remains essentially conjecture, based on analogy with the breeding patterns of other extant ratites, such as emu, where the female lays in April or May and the male incubates for about 56 days (Anderson 1989: 85). The widespread presence of moa eggshell (and occasionally bones of chicks) in archaeological sites is, however, clear evidence of exploitation during the incubating season, when both the eggs and incubating birds could be obtained simultaneously (Anderson 1989: 154).

Recent advances in protocols and techniques for the isolation, amplification and characterisation of ancient DNA (aDNA) preserved in eggshell of moa and other species demonstrate how the ability to genetically characterise historic and fossil eggshell from a range of species and sample sizes would benefit future archaeological research (Oskam et al 2010). Previously species identification using moa eggs had been based on relative size and shell thickness (Anderson 1989: 80-81). Reliable identification to species level using either visual or microscopic examination and measurement of thickness, however, has been shown to be virtually impossible (Oskam et al 2011: 2). The potential of archaeological sites in New Zealand to contain eggshell and remains of any of the six genera of moa, together with the remains of other extinct species of large birds and extant species such as kiwi and seabirds, further complicates species identification of eggshell. The accurate identification of fragmentary eggshell samples to species level is clearly an essential precursor for any reliable determination of the parameters of cultural uses of birds and eggs. Eggshell fragments excavated from archaeological middens potentially represent more than one egg and more than one species. Genetic analysis has now not only made it possible to reliably assign a species to eggshell fragments, even those that have been thermally modified, but can also be used to establish the minimum number of individual eggs the fragments represent (Oskam et al 2011: 6; Oskam et al 2012: 43).

A potential alternative technique for the identification of archaeological egg shell fragments by analysis of their protein component (ZooMS) has also been recently published (Stewart et al 2013). A recent application of this technique has shown that in contrast to genetic analysis it has the advantage of being rapid and much less labour intensive, and therefore more suitable for the analysis of large archaeological assemblages (Stewart et al 2014: 248). Unfortunately the process has some limitations that would appear to severely compromise its present value as an application appropriate for use in New Zealand archaeology. The primary issue appears to be that currently the level of resolution varies between taxa. For instance, at this time, there is no way of confidently distinguishing between different members of the closely related and highly specialised family Laridae (Stewart et al 2014: 250). It is likely, however, that compilation of a more robust and developed reference collection may eventually overcome this issue. The technique also has one further limitation when compared to the outcomes resulting from genetic analysis. While it will allow the identification of archaeological eggshell by analysis of their protein component, it will not allow the determination of the minimum number of individual eggs present in the study sample.

Results of genetic studies to date have confirmed the heavy exploitation of seasonally available moa eggs. A small sample of the total volume of eggshell previously excavated from seven sites has identified at least 105 individual eggs, fifty of which came from the Wairau Bar site (Fig 1)

alone (Oskam et al 2012: 46). Given the estimate that one large ratite egg may contain the equivalent of a dozen or more chicken eggs the annual harvest would have made a significant dietary contribution (Oskam et al 2011: 1). A reasonable explanation for the widespread presence of thermally modified moa eggshell appears to be that the eggs were cooked. How, or indeed if, moa eggs were cooked remains conjecture, they may have been eaten raw, cooked in the shell or cooked outside the shell. Analogies to cooking methods employed with rhea eggs (Patagonia) and emu eggs (Australia) including placing them in hot ashes in a prepared hole as well as puncturing one end and placing them vertically on a slow fire have been suggested (Oskam et al 2011:4).

Because of the difficulties in obtaining reliable

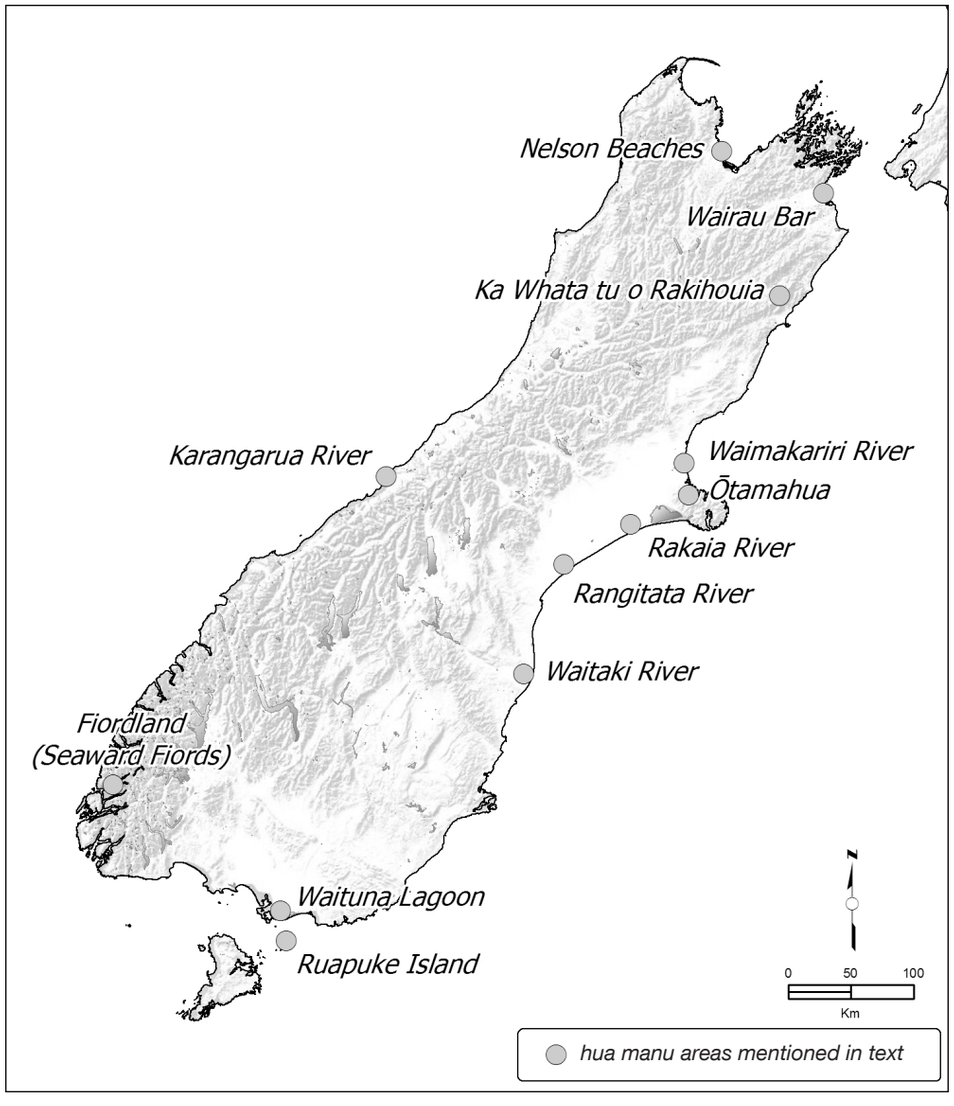

Fig 1: Map of hua manu areas mentioned in this text.

Fig 2: Selection of bird egg images, from left to right: *Larus bulleri*, Canterbury Museum AV103737, *Haematopus finschi*, Canterbury Museum AV4701, *Phalacrocorax varius*, Canterbury Museum AV4719, *Eupdyptes pachyrhynchus*, Canterbury Museum AV4106.

identification of eggshell fragments (examples of colour similarities and size differences can be seen in Fig 2) to species level prior to genetic analysis, there is an existing corpus of eggshell fragments previously collected from archaeological sites throughout New Zealand already available awaiting research. Research focused on the identification of eggshell of species other than moa would now seem to be a research project worth pursuing.

A very similar argument to that presented to support the rapid extinction of moa appears also to apply to other large birds such as Haast's eagle, geese, swan and adzebill (Worthy and Holdaway 2002: 547). Perhaps the most obvious evidence for this statement is that while the earliest archaeological sites contain the remains of almost all of the larger flightless species they are conspicuously absent from later sites. Although the presence of eggshell from these species has yet to be identified in archaeological contexts it seems reasonable, given the lack of research, to postulate that like moa they too would have been subjected to seasonal harvest of eggs.

Human arrival also had a demographic impact on several species of marine bird. The king shag (*Leucocarbo carunculatus*) was eliminated from the North Island and from most of the South Island, the Waitaha penguin (*Megadyptes waitaha*) was exterminated and the New Zealand crested penguin (*Eudyptes pachyrhynchus*) underwent substantial range reductions following Polynesian settlement (Rawelence et al 2015; Worthy and Holdaway 2002: 574). Ethnographic evidence presented later in this paper suggests that these species were likely to have been subjected to the practice of seasonal egg harvesting.

Waders, gulls and terns

This section includes a summary of distribution and breeding biology of bird species for which, as yet, there is only traditional and historical evidence for the cultural practice of seasonal harvest of eggs (Table 1).

With a long coastline, numerous islands and extensive braided river systems New Zealand has a diversity of species of waders, gulls and terns (Charadriformes). Although

MĀORI NAME	COMMON NAME	SPECIES	LAYING TIMES	NUMBER OF, INCUBATION TIMES
Kawau Paka*	Little Pied Shag	*Phalacrocorax melanoleucos brevirostris*	Oct–Dec	3–5 eggs, 28 days
Kawau tuawhenua	Black Shag	*Phalacrocorax carbo*	Apri–Jun, Dec–Feb	3–5 eggs, 27–31 days
Kāruhiruhi	Pied Shag	*Phalacrocorax varius varius*	Feb–Mar, Aug–Sept	2–4 eggs, 28 days
Kawau tūī	Little Black Shag	*Phalacrocorax sulcirostris*	Mar–May, Aug–Dec	2–4 eggs, 28 days
Kawau-a-Toru	King Shag	*Leucocarbo carunculatus*	Mar–Aug	1–3 eggs, 28 days
Māpua	Stewart Island Shag	*Leucocarbo chalcanolatus*	Any time of year	2–3 eggs, 28 days
Kawau tikitiki	Spotted shag	*Stictocarbo punctatus*	Aug–Nov	1–4 eggs, 28–31 days
Torea*	South Island Pied Oystercatcher	*Haematopus finschi*	Mid Sept–early Feb	2–3 eggs, 25–32 days
Pohowera	Banded Dotterel	*Charadrius bicinctus bicinctus*	Late Aug–early Dec	2–3 eggs, 25–27 days
Karoro*	Kelp Gull	*Larus dominicanus dominicanus*	Mostly summer, but also Winter and Spring	1–5 eggs, 23–30 days, may relay
Tarāpunga*	Red-billed Gull	*Larus scopulinus*	Late Sept–late Dec	1–3 eggs, 19–26 days, may relay
Tarāpukā*	Black-billed Gull	*Larus bulleri*	Sept–Jan	1–4 eggs, 20–24 days, may relay
Taranui	Caspian Tern	*Hydroprogne caspia*	Oct–Jan (gen. from Sept–mid Nov	1–2 eggs, 21 days, will relay several times
Tarapirohe*	Black-fronted Tern	*Childonias albostriatus*	Oct–Dec	2 eggs, 22–24 days, will relay several times
Tara	White-fronted Tern	*Sterna striata*	Mid Oct–Jan	1–2 eggs (rarely 3), 25–27 days, may relay
Tawaki*	Fiordland Crested Penguin	*Eudyptes pachyrhynchus*	Late July & Aug	2 eggs, 31–36 days
Hoiho	Yellow-eyed Penguin	*Megadyptes antipodes*	Sept or Oct	1–2 eggs, 39–51 days
Unknown	Waitaha Penguin	*Megadyptes waitaha*	Unknown	Unknown
Korora*	Little Penguin	*Eudyptula minor*	July–Dec	2 eggs, 33–43 days
Putakitaki*	Paradise Shelduck	*Tadorna variegata*		8–9 eggs (rarely 5–15) 21–22 days
Pateke*	Brown Teal	*Anas chlorotis*	June–Oct (peaks in Jul & Aug)	5–6 eggs (rarely 4–9) 27–30 days
Parera*	Grey Duck	*Anas superciliosa*	July–Dec	10–12 eggs (rarely 7–14) 26–32 days
Whio*	Blue Duck	*Hymenolaimus malacorhynchos*	Aug–Dec (rarely Jul–Mar)	5–6 eggs (rarely 4–9) 31–32 days

(* indicates a species mentioned in Maori traditional or ethno-historical accounts)

Table 1. Summary of breeding behaviour of potential range of target species (compiled from Scofield and Stephenson 2013)

there is a relatively limited range of breeding species of waders, these are all endemic. Terns are more diverse and include both endemic and cosmopolitan species. In the South Island there are five species of tern two of which, the black fronted and white fronted terns, are endemic. The Caspian tern reaches the southern limit of its huge breeding range in Southland, although distribution may have formerly been restricted to northern harbours and beaches. Isolated pairs nest at many points along the coast, but there are small colonies at some favoured places. The fairy tern is now extinct in the South Island and the population greatly reduced in the North Island. In the nineteenth century it was reported as breeding on the riverbeds in Canterbury. The white fronted tern breeds at many points along the coast, in pairs and in large colonies, from Northland to the Auckland Islands. Some white fronted terns also feed far up the larger South Island braided rivers.

Three species of gull breed in New Zealand. Only one species, the black-billed gull, is endemic and is adapted to nesting on braided rivers of the South Island. It is one of four different species, including the black-fronted tern, black stilt and wrybill, that is characteristic of the braided gravel riverbeds of the South Island. Red-billed gulls breed adjacent to where significant marine upwellings produce concentrations of food. The Kaikoura coast is currently the most significant South Island breeding site. Elsewhere small numbers nest near river mouths and rocky islands. Kelp gulls (commonly known as black-backed gull) have been reported as being uncommon both in the fossil record and when Europeans arrived. Most breeding colonies are on coastal dunes, salt flats and braided riverbeds. Isolated pairs nest beside high country tarns or on rocky coasts (Worthy and Holdaway 2002: 414-415).

TRADITIONAL AND ETHNO-HISTORICAL ACCOUNTS

All traditional and historic accounts located that refer to harvesting bird eggs were compiled by Herries Beattie and George Roberts and for that reason presumably all geographically relate to Te Waipounamu/South Island, which was the focus area for their oral history recording (Beattie 1994: 11–30). No comparable accounts relating to Te Ika a Maui/North Island were located, although they may exist. For clarity the accounts located will be quoted in full and presented as either traditional accounts or historical accounts and where appropriate presented in geographical groupings.

Traditional accounts

There are three references recorded that are clearly traditional accounts passed down in Ngāi Tahu oral history. The first records the relationship between geographic nomenclature, tipuna and cultural practice. The cliffs of the South Island (and in particular the cliffs of Kaikoura peninsula and seaward Kaikoura Ranges) are proverbially called 'Ka-whata-tu-a-Te Rakihouia' (Fig 1), or sometimes rendered 'Ka-whata-kai-a-Te-Rakaihouia' or more commonly 'Kā Whata Tū o Rakihouia', (the standing foodhouses of Rakihouia) because Rakahouia, the son of Rakaihautu, got food from them. Shags and seabirds lived on the cliffs and men were lowered over with ropes to secure the eggs and young birds, hence the origin of the name (Beattie 1918: 159).

A second traditional account referring to the practice of collecting bird eggs is also captured in a geographical place name (Te Kawakawa/Otamahua/Quail Island). Two authors record one of the traditional names for Quail Island in Whakaraupo/Lyttelton Harbour as Otamahua (Fig 1), which literally translates as 'the place where children gathered bird eggs. The relative marine isolation of Quail Island would have made it a preferred nesting site for kelp gulls and red-billed gulls and the island's physically less demanding terrain would make it a suitable location to engage children in egg gathering activities (Cowan 1923: 20; Andersen 1927: 97, 144).

The third account is of an unidentified species of bird known as Ruruwhenua (possibly Laughing Owl *Sceloglaux albifacies*) that was recorded as having been hunted at Lake Waituna (Fig 1) in the past. 'It had four or five eggs of a white colour and the party ate them and put the bird on a kohika (toasting stick) at the fire' (Beattie 1954: 40).

All these accounts suggest that the seasonal harvesting of bird eggs has been a longstanding cultural practice.

Ethno-historic accounts

For convenience the accounts are presented from north to south.

Whakatu/Nelson: This account presents a generic overview of the seasonal practice of harvesting and cooking of both eggs and chicks:

> *In Nelson the Maoris used to eat young karoro (seagulls) which were found in nests on beaches and riverbeds. The people used to eat the eggs of the tarapunga (sea martin), the karoro, the torea and ducks. These eggs were put in ashes of fires or in hangi (ovens) – he had never heard of them being eaten raw. Long ago the Maoris went to a little rock island (about two acres in extent) near Nelson to get tarapunga eggs* (Beattie 1994: 506).

Nga Pakihi Whakatekateka o Waitaha and Waitaki/Mid-Canterbury, South Canterbury and North Otago: All these accounts relate to the exploitation of species of terns and gulls that breed on the major braided riverbeds of Waimakariri, Rakaia, Rangitata and Waitaki rivers (Fig 1).

There is one brief reference for the Waimakariri River mouth area: 'A Kaiapoi man said the people there got eggs of the torea, the sea martin, and other birds at Kairaki', so the practice was widespread (Fig 1) (Beattie 1954: 44).

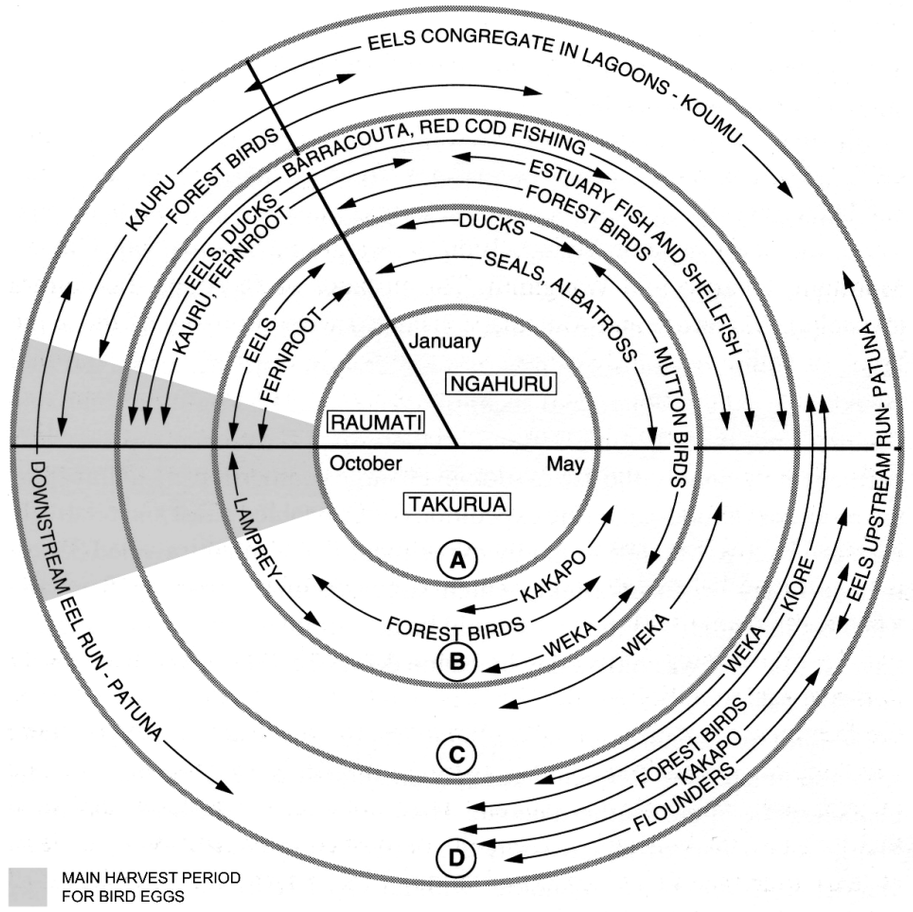

Fig 3: Ngāi Tahu seasonal calendar, with egg harvest information added (after Anderson 1998: 117; Dacker 1990: 10–11).

There are both historic and eye witness accounts for the Waitaki River:

> *Some Maoris were quite ignorant of their customs and one aged woman told me the Maoris did not eat seabirds' eggs on the islands up the Waitaki River but along the seacoast. Crossing the Waitaki Bridge on the bus an alert school boy pointed out to me flocks of seabirds flying about in a very agitated state, and he pointed out one or two human figures moving about below the circulating flights, saying they were Maoris collecting eggs. I asked a Maori matron about this and she said it was an annual affair. The eggs were lying about all over the place, and it was easy to go round with a basket and pick them up. The parent birds resented this appropriation of their lawful property and would pick up pebbles in their beaks and fly overhead dropping them on the searchers. In the riverbed (sic riverbed) the usual kinds were tarapirohe, or sea martin, which was all grey, and the tarapuka (accent second vowel) about the same size as a black head. The eggs were small and dainty, but the karoro or seagull laid a larger egg of richer quality. At Tauhinau, the site opposite the last ferry, there is an old Maori cemetery and opposite it on the islands out in the river is a noted karoro nesting place where the Maoris go to collect the eggs in their due season each year* (Beattie 1954: 44).

A further account pertains to the Rakitata River (Rangitata River):

> *An Arowhenua Maori told me he and his neighbours got kerosene tins full of seabirds' eggs from the Rakitata River. They could bake them in an umu and then break the shell and eat the eggs hard, but he could not say how old the custom was. Another Arowhenua resident said the birds eggs were principally those of the karoro (seagull). This bird usually laid three eggs and rarely four, and they were very rich. The gatherers would make a fire in a hole in the sand and let it go out; gather the eggs and put them in the ashes and let them boil hard before eating. For cooking the sand was always wet, and this with the ashes of the fire generated steam and this did the eggs excellently* (Beattie 1949: 45).

A brief, perhaps traditional, account also confirms that bird eggs were also harvested along the Rakaia River:

> *A favourite settlement of the ancient Rapuwai people was called Huatau. It is inland up the Rakaia River and the karoro (seagull) nested there and you could collect the hua (eggs) there. It was between the uppermost bridge and the sea* (Beattie 1949: 138).

Murihiku/Southland: There are three accounts from Murihiku (Fig 3), which record the harvesting of gull and also penguin eggs:

> *A Bluff woman told me that besides the eggs of karoro, tarapuka, and tarapirohe, they ate the eggs of torea (red bill) and korora (penguin). The last were not so good as the others, and they could only eat the yolk as the rest went to jelly. She forgot the name for the yolks. The other eggs ate just like hen's eggs and were very good for baking as they were rich and tasty. A Bluff man included in the list the big yellow eggs of the tawake penguin* (Beattie 1949: 44).

There is another generic account of harvesting and processing seabird eggs on Ruapuke Island. A Māori informant states that:

> *…the karoro eggs were a little stronger than ducks' eggs. The terapuka eggs were smaller. The big gulls' nests are well separated, but the small gull nests in clusters and you can pick up dozens of their eggs at one spot. They lay about November 25, and you can collect at once as they turn in two days. The tarapirohe laid at the same time on the rocks; the eggs perhaps were smaller but were edible, and had to be used within three days or they were no good. On Ruapuke the men got suitable kelp and would caw-caw (perhaps a transliteration of an unknown Māori word that denotes a separation to make a cavity) the blades open and break the eggs into them for carrying, the shells being thrown away. At home the contents of their kelp bags would be poured out and would keep for two or three days. I never went in for the big gulls' eggs as it would have taken a whole day to find enough to be of any use, but the others were so thick and handy they could be gathered quickly* (Beattie 1949: 44).

There is one reference to the plentiful resources available in Fiordland that includes an oblique reference to harvesting penguin eggs: '…the Maori could get plenty of the best clothes, and to his taste delicious food also; abundance of fish in the smooth water, penguins in season and their eggs, and mutton birds on some of the islands…' (Beattie 1949: 69).

Poutini/West Coast, Westland: There is one ethno-historical account from Poutini, West Coast (Fig 1), which is based on notes made from discussions with kaumatua at Makawhio (Jacobs River) in 1897 by surveyor William Wilson on behalf of GJ Roberts, Commissioner of Crown Lands for Westland: 'At Black River, Karangarua, and other sandy spits they got gulls' eggs. They would make a large fire near the nesting-ground, heat stones, and roast two or three hundred eggs at a time' (Skinner 1912: 144). In an interesting endnote to this paper Skinner postulates, 'The same procedure seems to have been followed with moa eggs by Moa-hunters' (Skinner 1912: 150).

DISCUSSION

Recent research involving the genetic analysis of moa eggshell has demonstrated that it is possible to not only establish the range of species represented but also to establish the minimum number of individual eggs the fragments represent (Oskam et al 2012). The presence of quantities of moa eggshell in excavations of most hunting sites indicates that at least some hunting commonly occurred during the incubating season. Whether moa nested communally at specific favoured locations and were therefore more economically located by hunters during the incubating season is not known. There is no doubt, however, that egg harvesting was a contributing factor in the rapid decline of moa. The presence of both moa and small bird bones in early archaeological sites indicates that moa hunting was pursued as part of a wider fowling strategy. Whether harvesting of eggs of smaller species was also part of this strategy is yet to be established.

Further genetic analysis of eggshell from archaeological contexts will no doubt resolve the issue as to whether the cultural practice of harvesting bird eggs in early archaeological sites also included a wider range of species. Of particular interest will be the opportunity to examine the potential hypothesis that following the demise of moa and other large birds, the focus of egg harvesting reflected the modus operandi of the new hunting strategy, where intensive hunting was transferred to particular, preferred, alternative, smaller extant species. Ethno-historical evidence suggests that this might be the case and that the preferred species that were the focus of the new collecting strategy became a limited range of habitual, communal breeding species where egg size provided sufficient return to justify the effort expended (Table 1). For species where nesting behaviour resulted in more dispersed colonies (kelp gulls and penguins) it appears likely that harvesting may have had a somewhat more opportunistic bias and focussed towards localised exploitation of nests adjacent to human habitation or encountered during seasonal movement to take advantage of other resource availability. The fact that both kelp gull and penguin eggs were somewhat larger than other target species may have in part off-set the extra time required for location and harvest.

This paper demonstrates, however, that by combining the information contained in traditional and historic accounts of bird egg harvesting in several regions of Te Waipounamu with the known breeding biology of the target species identified it is also possible to establish a useful overview of the economic and cultural significance of harvesting bird eggs (Fig 2). In addition, the evidence raises the possibility that the practice of egg harvesting may also be implicated in the demographic and distributional impacts observed for two species of penguin (yellow-eyed penguin and New Zealand crested penguin) following human arrival. While most of the ethno-historical accounts cited date to the late nineteenth and early twentieth century it seems reasonable to suggest that some of the key elements observed, especially those relating to cooking and processing of eggs, may be useful analogies for the interpretation of the presence, or absence, of eggshell in archaeological contexts. The recorded traditional accounts may also be used cautiously to suggest the possibility of continuity and longevity of egg harvesting as a cultural practice across the time period of human occupation of New Zealand. The validity of this will only be established once eggshell samples from archaeological contexts reflecting the full chronology of settlement have been analysed.

While ethno-historical accounts confirm that bird eggs were a welcome seasonal delicacy that could not be preserved and therefore needed to be consumed within a few days of harvesting, they were, however, clearly a brief annual resource that offered a very timely dietary contribution in many localities. The spring breeding schedule of the target species occurred at a time when other seasonal resource possibilities were either limited or absent in many districts (Fig 2). As with many other seasonally available resources egg harvesting would clearly require a degree of group mobility and planning to be present at the breeding colonies at just the right time to

take advantage of the resource. The harvesting of eggs of species with dispersed, isolated nesting preference is likely to have been more incidental and opportunistic and resulted in limited returns for the effort and site locating time involved. In contrast the harvesting of eggs of species that habitually nested at customary communal locations resulting in accumulated, concentrated egg resource would have made a substantial economic contribution, especially where the target species had the propensity to re-lay multiple times should a clutch of eggs be forfeited (Table 1). By taking advantage of this breeding behaviour it would also potentially be possible to manipulate egg laying to extend over several weeks and thereby greatly increase the total resource available.

The traditional and ethno-historical accounts also give insight into the processes of harvesting and consumption of eggs. The most challenging method of harvesting was clearly the traditional account that recorded the use of ropes to abseil down cliffs to reach nests. This same account is the only reference to harvesting shag eggs and simultaneously taking young birds. There is only one ethno-historical account that mentions gathering and eating both eggs and young birds and only one traditional account of collecting and consuming both eggs and adult birds. The majority of accounts of harvesting involve the collection by hand of freshly-laid eggs from communal nesting colonies and removing them intact from the breeding site in containers. Only one account records breaking the eggs, pouring the liquid contents into poha rimu (kelp bags) and discarding the eggshells at the place of harvest. There is no specific reference to the eggs being cooked in the poha rimu into which they had been poured during collection, only that they would last several days when collected in this manner. The majority of accounts that relate to the consumption of eggs refer to cooking them in hot ashes, only one reference refers to the use of a traditional hāngī/umu (stone lined earth oven). No accounts specifically refer to eggs being eaten raw. The most detailed account indicates that the cooking fire was always prepared in a hole in wet sand and was allowed to reduce to hot ashes before the eggs were introduced and then left until completely cooked by exposure to heat and steam.

Clearly when intact eggs were cooked by either of these methods the archaeological footprint left would be ash, a fire pit or hangi and an adjacent scatter of eggshell. Obviously where eggshells were discarded at the point of harvest subsequent archaeological evidence of egg harvesting would be impossible to interpret. Further genetic analysis of eggshell from a wider temporal range of archaeological sites will not only clarify the range of species from which eggs were harvested, but also have the potential to assist with the interpretation of the function of archaeological hearth-like features situated adjacent to eggshell concentrations.

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Southern spirits: The case of the Psychical Research Society of Christchurch

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ABSTRACT

This research report analyses the eclectic yet incomplete archives of the Christchurch Psychical Research Society held at Canterbury Museum and the Macmillan Brown Library, University of Canterbury. The Society, active in the early decades of the twentieth century, was part of a wider international spiritualist movement situated on the border of science and religion. This report presents a critical reading of the Society's scrapbook evidence collated by its leader, Edgar Lovell-Smith, between the 1920s and 1940s. Through these ephemeral fragments and in particular the ritual of the séance, the authors attempt to better understand what can be learnt about psychical research in Christchurch, a historical hub for reformist and alternative spiritualist movements, in the interwar period. The research methodology combined family history with a critical and descriptive reading of archive documents on a topic – Spiritualism – frequently overlooked by mainstream academic historians. Drawing from key secondary alternative religious literature we sought to uncover how investigations into the paranormal by the Society were simultaneously embraced and questioned by its members.

KEY WORDS

Spiritualism; New Zealand; Edgar Lovell-Smith; Christchurch Psychical Research Society; Post-World War One recovery; Museum and Library collections.

INTRODUCTION: OPENING THE SPIRITUALIST ARCHIVE

Housed in the Macmillan Brown Library is a scrapbook. It is a thick volume bound in dark cloth and faded brown velvet, with some gilding. Its marbled page edges testify to a post-Victorian culture of scrapbooks and collecting. Inscribed in the front cover, written in blue ink, is the following "The SCRAP-BOOK of the Psychic Research Society of Christchurch Inc., 27 Chancery Lane, Ch.". Inside is a collection of national and international newspaper articles from the 1930s and 1940s from publications such as *Aquarius*, a New Zealand psychic magazine, *The Harbinger of Light*, a Melbourne-based spiritual magazine and *The Truth*, a newspaper published in Sydney. Some stories were transcribed while others were clippings. Combined with these are letters and séance transcripts which fill 186 of a total 700 pages. In addition, the Macmillan Brown Library houses the catalogue of the Bycroft Psychic Library as public education was part of the Society's culture. A clipping from *The Greater World* (25 July 1936), noted that Gertrude Lovell-Smith started the library in the late 1920s 'for the benefit of local enquirers into psychic subjects' and had readers from all parts of New Zealand.[1] Her husband, Edgar Lovell-Smith, the main figure of the Psychic Research Society and eldest son of Jennie and William Lovell-Smith, supported the library project.[2] This local family was entrenched in

Christchurch reform movements, including universal women's enfranchisement, Fabian socialism and general philanthropy. Their story is chronicled in *Plain Living, High Thinking*, the family biography written by Margaret Lovell-Smith. In this family, men and women worked together to effect change. Their staunch Methodism instilled a practical worldview given to philanthropy and social reform. Edgar Lovell-Smith trained at the Canterbury College School of Art and at art and technical colleges in England where he met Gertrude. Returning to New Zealand he worked as a lithographic draughtsman at Smith and Antony Press, Christchurch; he was, in Margaret's words, 'the family historian and entertainer.' Having been a member of the Anglican Church, he left it in the mid-1930s for the Christian Spiritualist Church, 'his role virtually that of a pastor.' Spiritualism is understood as a belief in the ability to contact the spirits of the dead. This traditionally took the form of séances, rituals where a talented medium could contact the departed on request. Robert S Elwood describes Spiritualism as an 'esoteric religion' and a form of 'alterative spirituality'.[3]

The Society was active in the 1930s and 1940s, before disappearing at the end of the decade.[4] The scrapbook contains little information as to the Society's fortunes after 1950, the year in which Lovell-Smith died. As rich as the scrapbook is, other sources offer insights into the darkened rooms of spiritualist thought. Canterbury Museum possesses samples of 'spirit writing' collected by the Society. These writings and drawings were scrawled in a trance by a medium, and were a challenge to decipher. More accessible were the messages from an Ouija board. Taken from the French and German words for 'yes', Ouija had begun its life as a parlour game in the 1890s, but by World War One, mediums were frequently using it to spell out messages from the other world.

Working with the fragmentary nature of archival-based historical research is not unusual and has been addressed by Bronwyn Dalley and Bronwyn Labrum in *Fragments: New Zealand Social and Cultural History*. The allure and challenge of re-reading and re-interpreting archival documents with historical distance has been documented by Michele Leggott in her chapter 'Opening the Archive' in an edited collection about New Zealand writers. We also take the cautionary words of historian Robert C Williams, and understand that history is 'nonfiction, not fiction. It is imaginative, but not imagined.'[5] We have engaged in some form of imagined reconstruction of the mind-set behind the Psychic Research Society of Christchurch, a movement that emerged during a time of religious disaffection, pseudoscience and wartime death. Interest in Spiritualism was sparked during the Victorian period when there was a jump in technology; travelling long distances was facilitated by steam, the telegraph enabled 'real time connections' with people from the other side of the world and photography invited the enquiring mind to explore new territory such as the spirit world. Throughout the nineteenth and early twentieth century communities of active and enquiring readers – in urban or rural spaces and in the Old and New Worlds – tapped into international networks through print media, lecture tours, demonstrations and visual media.[6] These factors combined to make Spiritualism and its analysis by psychical research a rising force in New Zealand between the 1920s and 1950s. The formation into societies was a vehicle for giving alternative spiritual movements 'institutional shape.'[7] Never completely mainstream, Spiritualism did succeed in unsettling the academic and religious networks of New Zealand society, while the Spiritualists themselves were confident that a new age of enlightenment and spiritual contentment was about to dawn.[8]

HISTORY OF SPIRITUALISM

Contacting the dead has been a long, persistent undercurrent in Western culture, from Renaissance legends of black magic and necromancy to mystical visions of paradise. Biblical bans on the occult notwithstanding, it was during the Enlightenment that a belief previously considered superstition surfaced. Emanuel Swedenborg, a Swedish scientist and theological writer, in his book *Beyond Heaven and Hell* (1758) developed the idea that the souls of the dead could be contacted. He reconceived the Trinity as a multi-sphered spiritual residence for the departed. Swedenborg later immigrated to Britain in the 1780s and continued to develop and teach his ideas. By the nineteenth century, Swedenborgianism had taken root in Britain and America. Spiritualism, as a religious and social movement, began in America with the Fox sisters in New York State in the 1850s, and spread out to parlours across the Anglosphere.[9] In colonial New Zealand the early proponents of Spiritualism also met in 'spirit circles' in the domestic sphere. As the movement matured in the early 1900s, these groups formalised into churches or societies, which, like the Psychic Research Society of Christchurch, met in hired rooms. Visiting lecturers 'was the lifeblood' of Spiritualism in New Zealand and advances in mass media and travel facilitated the spread of the religious movement.[10]

In a period where modern science and a craze for the occult co-existed, the Christchurch Society followed a broad pattern of attempting to merge the two in psychic research. Such research was first undertaken in 1882, with the foundation of the Society for Psychical Research (SPR) in Britain. Led by Henry Sidgwick, Frederic Myers and Edmund Gurney, the SPR aimed to measure psychic phenomena by scientific standards through conducting research into phenomena such as telepathy, clairvoyance, precognition and psychokinesis.[11] Writing in 1980, CEM Hansel was adamant that 'during the past 50 years [psychic phenomena] have been demonstrated in the laboratory by means of rigorously controlled experiments.' These experiments, however, were in doubt, because they 'appear to have established the reality of phenomena which conflict with well-established principles.'[12] In other words, although the SPR was obviously serious about academic rigour, the supernatural nature of their research enquiries left audiences sceptical.

An American SPR was founded in 1885, and led to similar societies in Paris, Berlin and as far afield as Warsaw. These faculties, together with myriad local associations, helped to spread an empirical attitude toward the psychical. Nevertheless, the public ridicule of Spiritualism quickly tainted the name. In turn, Duke University academic JB Rhine, one of the main American exponents of the discipline, renamed it as *parapsychology* in 1930, a term coined by German parapsychologist Max Dessoir in 1889 (*parapsychologie*). This indicates some of the growing tension between Rhine and the academy, and after his retirement, Duke University ceased its Parapsychology Studies. The spillover of Spiritualism into the academy was surprising, yet natural. Much of its success can be attributed to wealthy Spiritualists, whose fortunes allowed them to be patrons of the movement. When professional scientists took an interest, it inevitably required more rigour. Yet, unsurprisingly, the small toeholds it did establish in the academy were short-lived. Renée Haynes in *The Society for Psychical Research, 1882–1982: A History* argued that the scientific apparatus, which initially lent credence, soon became a source of ridicule. Heather Wolffram in *The Stepchildren of Science* came to similar conclusions in her study on psychical research and parapsychology in Germany.[13]

The quest for alternative spirituality had numerous fellow travellers. Theosophy, a blend of Tibetan Buddhism and Hellenistic Hermeticism, was developed by the Russian adventuress Madame Blavatsky in the United States and had small but concentrated followings worldwide in the late nineteenth and early twentieth centuries.[14] Hermeticism, following a minor pursuit in Renaissance Europe, spawned a number of secret 'lodges', where late antiquity mysticism was imbibed. Robert Ellwood in *Islands of the Dawn*, states that the intellectual movement of Theosophy had an important presence in New Zealand. Theosophy developed a Wellington branch from 1894. The Hermetic Lodge of the Golden Dawn in Havelock North was also the centre of the School of Radiant Living, a local offshoot of Christian Science, whose first branch formed in Christchurch in the early 1900s.[15] Preoccupations with mental health are reflected in the scrapbook with articles from *The Harbinger of Light* on psychic healing and in newspaper advertisements dedicated to ecclesiastical and spiritual matters.[16]

It would be a mistake to see these systems as dominant in their era; scientific rationalism and Christian orthodoxy both took a dim view of these beliefs, and constantly warned against them. After an initial period of novelty, it was precisely as a reaction that alternative spiritualties found a niche: in a disenchanted, materialist world, Spiritualism, Theosophy and other systems offered enchantment and transcendence for its followers. It is in this capacity that such a flowering offered a unique episode in the history of Western culture. Beginning in the *fin de siècle*, it intensified as world war, cultural crisis and economic depression took hold; Spiritualist historiography from the 1990s shows that alternative beliefs had powerful echoes, deep in the South Pacific.[17]

CHRISTCHURCH SPIRITUALISM

It is unknown exactly what events spurred the founding of the Psychic Research Society of Christchurch. As early as

1873 'spirit rapping' – a form of communication between the souls of the dead and the living whereby the medium tapped out messages by knocking on a hard surface – had attracted coverage in *The Press*.[18] Arthur Conan Doyle, author of the *Sherlock Holmes* novels and a high-profile advocate of Spiritualism, visited Australia and New Zealand in 1920 and shared with his audiences the pain of 'still-fresh losses to the demons of battle' during World War One.[19] This naturally boosted Spiritualism and possibly caught Lovell-Smith's attention. Doyle, recounting his visit to Australasia in *The Wanderings of a Spiritualist* (1921), believed he 'woke up the Cathedral City' where both the Catholic Bishop and the Anglican Dean were vocal in their criticism calling 'Spiritism, the abrogation of Reason' and 'a blasphemy nurtured in fraud'.[20] The Society was founded in 1940 in imitation of its counterpart in Wellington, in which many of its members were involved. Lovell-Smith became involved in Spiritualism, filling several notebooks with records of the séances and at their home, Bycroft, co-created a library with his wife Gertrude.

Outside the orbit of Edgar Lovell-Smith, the other members of the Christchurch Psychic Research Society appear something of an enigma. Drawing from the types of articles pasted onto the scrapbook pages we can deduce they were equally interested in investigating 'creative thought' and psychic phenomena.[21] A series of names continually recur in the minutes: Violet Barker, the Sumner resident, who was a regular at the Chancery Lane séances; Mrs Lily Hope, the medium; Mrs Eddles the medium's assistant and photographer; Mr Edlin and his wife, who both created and posed in 'spirit photographs'; Mr O'Brien, who organised a visit to the nearby town of Timaru to spread the Spiritualist ideas; and another couple, Mrs Jessie and Mr Cecil Eyles, all bear testament to a circuit of the committed, the helpful, and possibly the fraudulent.[22] Overall the Society members are a shadowy presence in the archive sources, arguably even less visible than the spirits they searched for.

Lovell-Smith, despite his vehement distaste for hierarchy, appeared to have taken a strong hand in the compilation of the Society's research. The scrapbook's focus is on spiritual phenomena and paranormal events. It is a text-based scrapbook rather than pictorial, designed to educate the readers rather than for display.[23] The scrapbook begins with 'The Archer Insurance Policy Case', which involved meticulous tracing by the Society of a Linwood family whose dead son communicated to his family about an unclaimed life insurance policy hidden in their garden shed. Nine letters to insurance companies in New Zealand, Australia and Britain searched for the name, to no avail. A sketch by Lovell-Smith of the garden shed enriches the scrapbook pages (Fig 1).[24] From here, the contents of the scrapbook diversify, containing a lengthy series of New Zealand and British newspaper articles, going back to 1876, discussing spirit photography, local incidents and hoaxes.[25]

On page 67 of the scrapbook the late Prime Minister of New Zealand, Richard Seddon, came back from the dead, 'he being dead, yet speaketh', offering enlightenment for all who leave their stubbornness to become 'spiritual children.' Distinctly less reassuring was Henry Slade, the self-styled 'Doctor', whose 'spirit rapping' turned out to be an ingenious mechanism in his table, offering insight into the mind of the Spiritualist, which on the one hand projected a desire to discover truth while on the other hand embarked in fraudulent empirical methods. Wartime death and memory emerge with a clipping about Ada Dean's photographs, which are believed to have captured the spirits (ectoplasm) of the fallen 'heroic boys' during the Armistice Day service at the Whitehall Cenotaph, London, on Armistice Day, 11 November 1923.[26] Dean's spirit photographs are housed in the British Library.

Within the Lovell-Smith family papers at Canterbury Museum is the Psychic Research Society's Ouija collection, with the letters and numbers written on a large sheet of paper – these are the disjointed fragments of 'spirit writing.' Only some of the messages are legible. Lovell-Smith saw his grandmother come back to offer old-time spiritual advice, with a quick greeting from national and international suffrage heroine, Kate Sheppard, who was connected to the family.[27]

In the early twentieth century, Spiritualists took pains to show themselves as 'scientific', proving that the séance rested on empirical results.[28] As a result, the rituals inevitably incorporated safeguards to 'prove' that the medium was not falsifying apparitions. These grew increasingly elaborate as Spiritualism spread and as hoaxes were exposed. Wolffram outlines how spirit photography and witness reports were frequently employed as tangible evidence of 'what had taken place' and that such proof was necessary to quell claims that those present were not fraudulent, 'hypnotised nor delusional'.[29] Mediums in the early twentieth century described their work as a 'science', yet complained that efforts to validate the apparitions empirically disturbed the spiritual atmosphere and made the materialisations feeble.[30] The Spiritualists also framed their work in explicitly Christian terms. Many séances began with the Lord's Prayer and signs of the cross, and Lovell-Smith's papers included a list of biblical references supposedly supporting communication with the dead, probably to counteract religious opposition. An anonymous note in the scrapbook says 'One should start with a prayer through Christ for protection and guidance…if it is his will.'[31] This kind of Spiritualism operated on the border of science and religion, not entirely at ease with either, yet appropriating strains of both. Within these conditions, the ritual of the séance unfolded. The Chancery Lane séances of the Christchurch Psychic Research Society were no exception.

One Friday night in 1937, at 8 pm, the spirits of a cultured nun and a Native American girl materialised for a rapt audience. The medium who facilitated these materialisations, Mrs Lily Hope, was, the *Psychic News* asserted, a woman of 'the highest integrity', unassuming and earnest in her sacred work.[32] Norah Foster, one of the Society members, wrote the article, which was copied into the scrapbook and labelled as a 'spirit test.'[33] According to this article, the séance room was entirely dark, except for a red light. Mrs Hope was sewn into a chair in her 'cabinet'; curtains held up with safety pins hung across the northwest corner of the room. Black cloth covered the walls and ceiling. The especially dim light would not 'disturb' the notoriously shy spirits. Lengths of ribbon held Mrs Pope to her chair. With these guards against fraud set in place, Society members sat in a circle and recited 'two or three' verses of *Abide with Me* and the Lord's Prayer. From the darkness two greetings

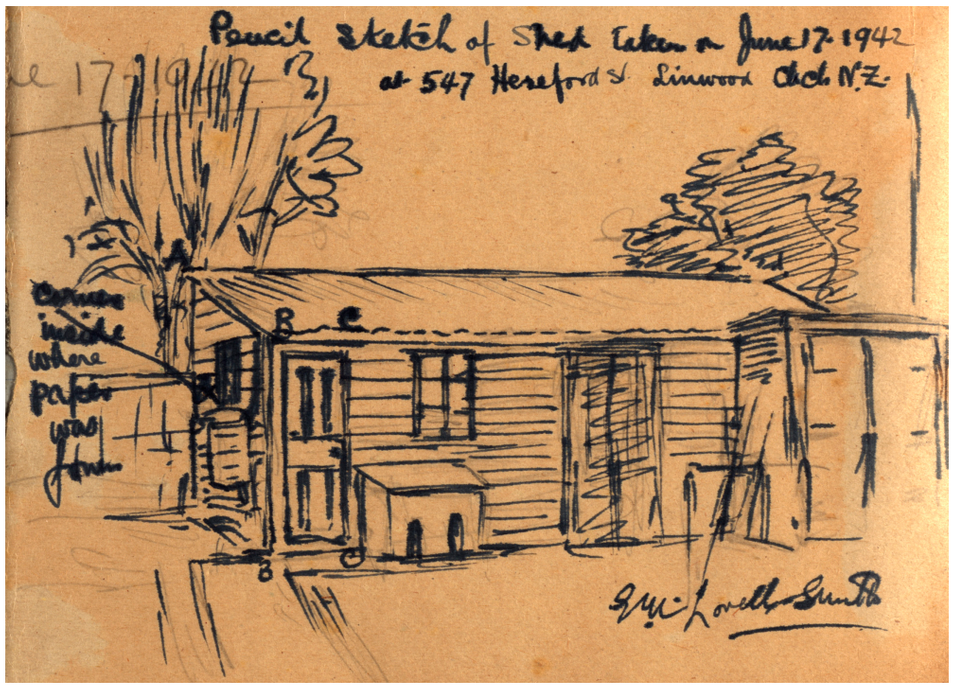

Fig 1: Pen and ink drawing: "The garden shed, Linwood" by E. M. Lovell-Smith, 17 June 1942. *Scrapbook of the Psychic Research Society of Christchurch New Zealand Inc.*, Macmillan Brown Library, University of Canterbury, MB 705.

were heard, ostensibly from the spirits. The disembodied voices requested that the safety pins be undone, but asked the gathered to continue singing. Puzzled by this request, the assistant Mrs Eddles stalled before unpinning the curtains. She then felt the medium's hands, head and face. The medium was warm, but her hands were cold. The wrists were strapped in. The curtains were pinned again, and the assembled began singing *Holy, Holy, Holy, Lord God Almighty*.[34]

Subsequently, two personalities, Sister Monica and Sunrise, appeared. According to those there, Sister Monica materialised before the onlookers. Sunrise, a more reticent spirit, preferred merely to speak. In her account of the séance, Norah Foster, who had previously seen Sister Monica in Wellington, was enraptured by her appearance. She 'has a beautiful, cultured voice, sweet facial expression;' a photograph of a drawing (Fig 2) of

Fig 2: Photograph: "The materialisation of Sister Monica". S*crapbook of the Psychic Research Society of Christchurch New Zealand Inc.*, Macmillan Brown Library, University of Canterbury, MB 705.

the materialisation reveals a plump, youthful, slightly pouting face under the black veil. The nun was quite willing to show her feet, and, according to Foster, all the toes were intact; whereas the medium, Mrs Hope, had part of a toe amputated. At another point two flowers fell from the ceiling. Sunrise, the native American girl who frequently accompanied Sister Monica, was claimed to have sprinkled carnations as a way of marking her presence. What did the floral apparition symbolise? An answer may be found from a departed woman who appeared in the Wellington séance: 'Don't put flowers on my grave. I'm not there.'[35]

Even deceased members of the Society could make an appearance. A nameless woman wrote to her sister on the slate and her husband was greeted by his late father. The content of these messages was quite typical: an undescribed 'bliss' awaited the dead. In the context of post-World War One recovery, where so many families had lost loved ones, such edification was comforting to the bereaved, with promises of meeting again, meanwhile keeping contact via the ritual of a medium in a séance room. After this conversation, the ribbons that bound the medium, Mrs Hope, were cut. It was found that Mrs. Hope's feet were crossed and strapped, still within the sateen confines. Formerly, they had been strapped straight, suggesting that a spirit had changed them without breaking the ties.[36]

UNDERSTANDING SPIRITUALISM IN NEW ZEALAND

This recounting of events was not a credulous tale intended to win converts – or was it? Such incidents and many more, form the scrapbook and collection of spirit writings and drawings of the Christchurch Psychic Research Society. These collections represent a New Zealand body devoted to probing stories of the supernatural, in an effort to test the occult through scientific means. The significance of reading these combined archival sources reveals an approach to the supernatural unique to New Zealand. 'The New Zealand islands', wrote Elwood in his 1993 study of alternative spirituality, 'are islands of the dawn in more ways than one.' As well as being among the first islands to see the sun rise, 'they were also the last separate terrain to receive, subsequently, large-scale European settlement. Thus there is something dawn-like about life and culture in New Zealand. However old the cultures from which its various waves of settlers derived, in that land humanity is barely past sunrise.'[37]

New Zealand was also among the most secular parts of the English-speaking world.[38] This does not necessarily mean that religion was unimportant. John Stenhouse and Jane Thomson have both advocated for church as a focus for social activism and prestige. Secularisation refers not only to religious belief and practice, but shifts of morality and social outlooks from religious to secular frames of reference. In Stenhouse's study, religious practice was low, but churches offered both a forum for activist causes such as women's enfranchisement and an evangelical morality to fuel such causes. They offered social networks for newly arrived immigrants, dispensed charity and provided forums for activism. The most notable example is the granting of female suffrage, enabled through the Women's Christian Temperance Union. Through the gathered minutiae of the studies of individual congregations and parishes in the nineteenth and twentieth century, a clear picture emerges: small-scale networks of support and grassroots activism, which included limited numbers, but which animated society as a whole.[39] Rather than full secularisation, denominational fragmentation filled a secular vacuum. While working-class Spiritualism was a replacement for traditional religion, the middle-classes used it as a supplement to evangelical piety, integrating Spiritualist 'churches' into the denomination spectrum.[40] Following the Stenhouse argument, the older generation of Lovell-Smiths were devout Methodists who ploughed efforts into their church, with its cultural pursuits, temperance campaigns and feminism and exemplified an avant-garde. The offspring of this practical arrangement looked elsewhere in their search for transcendence, while appropriating aspects of their heritage. In this way, Christchurch was a hotbed of alternative ideologies, spiritualties as well as secular philosophies.

CONCLUSIONS

Working with incomplete collections is both alluring and challenging to the researcher but we believe it offered a springboard into experimental history writing. A critical and descriptive reading of the Society's archival fragments served as a connection between international movements and local expressions set against a backdrop of post-World War One recovery. Less religiously structured, New Zealand was more open to experimentation, improvisation and blending of belief systems and both women and men were actively involved. Antipodean Christchurch was a pioneering site of esoteric and alternative religions. Yet mainstream historians portray New Zealand as among the most secular of English-speaking societies in the early twentieth century.[41] Settled in an era of advancing secularism, and without an established church, it had lower rates of church attendance, possibly allowing a greater opportunity to indulge in alternative spiritualist practices. The 1949 letters to *The Press* pasted in the scrapbook exhibit a great deal of frustration with 'theology, orthodoxy and ritual', as a straitjacket which inhibited the things that religion ought to do – provide comfort to an uncertain world.[42] The paradoxical effect was to set up a 'new religion', with theologies, orthodoxies and rituals to beguile the jaded. Spiritualism had the mystery, which the high-minded philanthropy of the Lovell-Smiths lacked. There was also a link between this quest for the mysterious and the activism of Edgar's forbears. Alternative beliefs often blended with emerging political ideologies, just as traditional orthodox churches leaned to conservative politics, the search for 'alternatives' found parallel expressions in politics and religion. The links between Fabian socialism and Theosophy in Britain provide a case in point, as well as the well-documented presence of Fabianism in Christchurch. At the same time, it led to an existential gap, which could be filled by Spiritualism, Theosophy or Rosicrucianism.[43] It is in these other forms of alternative spirituality that the modern heir of Spiritualism can be found. Spiritualism was just one of Edgar and Gertrude Lovell-Smith's shared interests, horse-drawn carriages was another and that story is connected to another part of the Canterbury Museum collection.

ACKNOWLEDGEMENTS

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END NOTES

[1] This article is an expansion of a digital exhibition "Southern Spirits" http://www.canterbury.ac.nz/southern-spirits/. Objects examined included the Scrapbook of the Psychic Research Society of Christchurch New Zealand Inc., Macmillan Brown Library, University of Canterbury, MB 705. A list of the publications housed in the Bycroft library was pasted in the scrapbook. Works include Annie Besant, *Birth and Evolution of the Soul*; Emanuel Swedenborg, *God, Creation, Man and Heaven and Hell*; HP Blavatsky, *Key to Theosophy* and *Nightmare Tales*; Rev. DHD Wilkinson, *A Christian Searchlight on Spiritualism*; and Rev. G Vale Owen, *The Lowlands of Heaven, The Highlands of Heaven* and *Body, Soul, Spirit*. Publication dates are not noted.

[2] In 1921 Gertrude and Edgar built their home Bycroft at 15 Middleton Road, Upper Riccarton, next door to his parents Will and Jennie Lovell-Smith, see Margaret Lovell-Smith, *Plain Living: High Thinking: The Family Story of Jennie and Will Lovell-Smith* (Christchurch: Pedmore Press, 1994), 124, 131–132.

[3] Robert S Ellwood, "Esoteric Religions," in *Religions of New Zealanders*, ed. Peter Donovan (Palmerston North: Dunmore Press, 1996), 144-158; Robert S Ellwood, *Islands of the Dawn: The Story of Alternative Spirituality in New Zealand* (Honolulu: University of Hawaii Press, 1993).

[4] Edgar Lovell-Smith died in March 1950, which could account for the end of the Society, see Lovell-Smith, *Plain Living: High Thinking*, 124.

[5] Bronwyn Dalley and Bronwyn Labrum, "Introduction" to *Fragments: New Zealand Social and Cultural History*, eds., Bronwyn Dalley and Bronwyn Labrum (Auckland University Press: Auckland, 2000), 1–13; Michele Leggott, "Opening the Archive: Robin Hyde, Eileen Duggan and the Persistence of Record," in *Opening the Book: New Essays on New Zealand Writing*, eds, Mark Williams and Michele Leggott (Auckland University Press: Auckland, 1995), 266–293; Robert S Ellwood, *Islands of the Dawn*, 51; Robert C Williams, *The Historians Toolbox: A student's guide to the theory and craft of history* (New York and London: M E Sharpe, 2012), 56.

[6] James H Carrott and Brian David Johnson, *Vintage Tomorrows: A historian and a futurist journey through Steampunk into the future of technology* (Sebastopol, California: O'Reilly Media, 2013), ix–xi.

[7] Ellwood, *Islands of the Dawn*, 21.

[8] The Spiritualist Church of New Zealand Act of 22 September 1924 formally recognised the Spiritualist denomination, its constitution and dealings with property, see http://www.legislation.govt.nz/act/private/1924/0002/latest/DLM93588.html. The Act gave regional Spiritualist groups a legal entity and equal standing with other Orthodox churches, Ellwood, 52–53.

[9] To understand the influence of Maggie and Katy Fox see Logie Barrow, *Independent Spirits: Spiritualism and English Plebians*, 1850–1910 (London: Routledge, 1986), 4; Bret E Carroll, *Spiritualism in Antebellum America* (Bloomington: Indiana University Press, 1997), 21, 38, 121; Ellwood, *Islands of the Dawn*, 20.

[10] Ellwood, *Islands of the Dawn*, 32.

[11] Benjamin B Wolman, *Handbook of Parapsychology* (New York: Van Nostrand Reinhold Company, 1977), 11.

[12] CEM Hansel, *ESP and Parapsychology: A Critical Reevaluation* (New York: Prometheus Books, 1980), 3.

[13] Wolman, *ESP and Parapsychology*, 7, 20; Alan Gauld, *The Founders of Psychical Research* (London: Routledge, 1968), 144; Richard S Broughton, *Parapsychology: The Controversial Science* (New York: Ballantine Books, 1991), 364; Renée Haynes, *The Society for Psychical Research, 1882–1982: A History* (London and Sydney: MacDonald & Co, 1982), 172; Heather Wolffram, *The Stepchildren of Science: Psychical Research and Parapsychology in Germany, c 1870–1939* (San Francisco: Clio Medica, 2009).

[14] Scrapbook, 65, 67.

[15] Mary Simpson is credited for becoming the first ordained Christian Science practitioner in New Zealand. She held meetings in her home from the late 1890s then trained in Sydney in 1911 before returning to Christchurch. See Margaret Lovell Smith, "Simpson, Mary Elizabeth", the Dictionary of New Zealand Biography. *Te Ara - the Encyclopedia of New Zealand*, updated 12-Feb, http://www.TeAra.govt.nz/en/biographies/3s19/simpson-mary-elizabeth. Edgar Lovell-Smith's sister, Connie, converted to Christian Science in the 1920s when she briefly moved to Wellington to teach, see Lovell-Smith, *Plain Living: High Thinking*, 111.

[16] Scrapbook, 120. From the late nineteenth century Christian Science lectures were advertised in the Christchurch *Star*, 5 September 1891 and letters from the editor debated the healing powers of Christian Science thought. See "Correspondence to the Editor: Christian Science," *Star*, 11 December 1902, 2. A search of ecclesiastical notices in national New Zealand newspapers throughout the 1930s revealed a variety of listings such as Methodist and Baptist church sermons to alternative spiritualties including the Baha'i Faith, the Christian Spiritualist Church and Christian Science in addition to notices about lectures and psychic demonstrations from visiting mediums like Neil Michie from Sydney see *Auckland Star*, 3 September 1938, 23. Teaching the bible in schools was debated in the *New Zealand Herald*, 14 August 1937, 26. In these alternative faith movements women were actively involved as members, mediums and minsters; this was not the case with orthodox churches, see Ellwood, *Islands of the Dawn*, 40. For a study about the feminisation of the church see Paula Nesbitt, *Feminization of the clergy in America: occupational and organizational perspectives* (New York: Oxford University Press, 1997).

[17] Ellwood, *Islands of the Dawn*, 9–14, 53; Barrow, *Independent Spirits*, 272; and Shaun Broadley, "Science, Spiritualism and Nineteenth Century New Zealand," *Australasian Victorian Studies Journal* 2 (1996): 115.

[18] Spiritualist 'amusements' such as "Mr Tyerman on Spiritism," *The Press*, 30 November 1873, 3, and "Mr Stead as a Spiritualist" are advertised in The *New Zealand Herald*, 4 March 1893, 2. Correspondence debating the worth of Spiritualism can be found in *The Press*, 24 February, 3, and 6 March of that year, "Stead v Spiritualism," *The Press*, 3.

[19] Ellwood writes that Doyle had 'altered the point of view of many hundreds of people who attended' his lectures in Australia and New Zealand, see Ellwood, *Islands of the Dawn*, 54–55; Ellwood, "Esoteric Religions", 147; Harold Sell in "Spiritualism in New Zealand" wrote that Doyle's visit 'aroused great interest' and gave Spiritualism in New Zealand 'stimulus and direction', see The Spiritualist Church of New Zealand, http://www.spiritualists.org.nz/cms/pages/history/n.z-spiritualism.php.

[20] See Project Gutenburg's *The Wanderings of a Spiritualist* by Arthur Conan Doyle, http://www.gutenberg.org/files/39718/39718-h/39718-h.htm. Drawing from scrapbook evidence on page 92 is a newspaper clipping highlighting the burial of Conan Doyle.

[21] Within the scrapbook are newspaper clippings such as "Personal Demonstrations: the power of creative thought," *Aquarius Journal*, 21 June 1939, 130; and a listing of 'psychic phenomena in the Bible,' includes 'spirit writing', 'levitation', 'trumpet speaking', 'dreams' and 'spirit voices', 130.

[22] Ellwood describes Lily Hope as a 'remarkable new materialization medium'; see Ellwood, *Islands of the Dawn*, 51.

[23] For insight into how to analyse scrapbooks we drew from Raechel Guest, *Victorian scrapbooks and the American middle class* (Unpublished Master's thesis, University of Delaware, 1996), 1–2.

[24] 'The Archer Insurance Policy Case,' Scrapbook, 10–12. Filed loosely within the scrapbook are letters from The National Mutual Life Association of Australia (dated 23 August 1944), Norwich Union Life Insurance Society (24 August 1944), Provident Life Insurance (30 August 1944) and The Prudential Assurance Company Limited (31 August 1944). The 'District Manager' signed all correspondence.

[25] The topic of spirit photography appeared frequently within the scrapbook pages, see 6, 44–48.

[26] One of the 'Armistice Day spirit photograph' articles is stamped with 'Bycroft Psychic Library, 15 Middleton Road, Upper Riccarton', see scrapbook, 150, 166. For more on Ada Deans spirit photography go to the British Library "Help for researchers," http://www.bl.uk/reshelp/findhelprestype/prbooks/namedcolnprintedmat/namedcolnprintedmatb/namedcolnprintedmatb.html. See also A Gauld, *The Founders of Psychical Research*, 124–25.

[27] Lovell Smith Family Papers, Canterbury Museum, Christchurch, ARC 1988.88, Box 5, Folder 26, Item 284, Automatic Writing; Folder 27, Item 294, Spiritualist Readings; Folder 28, Item 296, Spiritualist Notebook.

[28] Alex Owen, *The Darkened Room* (Chicago: University of Chicago Press, 2004), 237.

[29] Wolffram, *The Stepchildren of Science*, 9.

[30] Owen, *The Darkened Room* (Chicago: University of Chicago Press, 2004), 69.

[31] Scrapbook, 130.

[32] Scrapbook, 94, 106. See also Ellwood, *Islands of the Dawn*, 51, who noted that by the late 1920s Spiritualism was growing rapidly in New Zealand, in this section of the book he was referring to the Waikato and Auckland in the North Island.

[33] Scrapbook,110–118.

[34] Ibid, 90, 102, 126.

[35] Ibid, 18, 107–108, 110, 116.

[36] Ibid, 104; Ellwood, *Islands of the Dawn*, 53.

[37] Ellwood, *Islands of the Dawn*, 2.

[38] In 1891, church attendance nationwide was approximated at 32 per cent and Canterbury was a little higher at 32.5 per cent. This compares to 74 per cent in Victoria, Australia, in 1900 (almost certainly an inflated figure), and 45 per cent in New South Wales. The Lovell-Smiths were initially Methodist, of whom nearly 88 per cent practised in 1896, but Edgar was described by

Margaret Lovell-Smith as Church of England, which had a much lower attendance rate of about 27 per cent. See Hugh Jackson, "Churchgoing in Nineteenth Century New Zealand," *New Zealand Journal of History* 17 (1983): 43–59.

[39] John Stenhouse, "Religion and Society," in *The New Oxford History of New Zealand*, ed G Byrnes (Oxford: Oxford University Press, 2009), 323–356. See also Ellwood, *Islands of the Dawn*, 2; Keith Furniss, "Moray Place Congregational Church: A Social History, 1862–1966," in *Building God's Own Country: Historical Essays on Religions in New Zealand*, eds, John Stenhouse and Jane Thomson (Dunedin: Otago University Press, 2004), 78–80; Laurie Guy, *Shaping Godzone: Public issues and church voices in New Zealand 1840–2000* (Wellington: Victoria University Press, 2011), 177.

[40] Broadley, 117; Gauld, 75.

[41] Ellwood, 186; see also Philippa Mein Smith, *A Concise History of New Zealand* (Melbourne: Cambridge University Press, 2012), 91 and James Belich, *Paradise Reforged: A history of New Zealanders from the 1880s to the year 2000* (Auckland: The Penguin Press, 2001), 164–165.

[42] Scrapbook, 61–62.

[43] Lovell-Smith, *Plain Living High Thinking*, 53. See also Jim McAloon, "Radical Christchurch," in *Southern Capital Christchurch: Towards a city biography, 1850–2000*, eds, John Cookson and Graeme Dunstall (Christchurch: Canterbury University Press, 2000), 172, 194–197.

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Scientific publications

The convention of citation in text in the format author surname (year) and (author surname, year) is used. Two authors are cited as Forster and Forster (1999) or (Forster and Forster 1999) and three or more authors as Winterbourn et al (2008) of (Winterbourn 2008).

For references:

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

- Book
    - Winterbourn MJ, Knox G A, Burrows C J, Marsden I D eds (2008) *The Natural History of Canterbury*. Canterbury University Press, Christchurch.
    - Forster RR, Forster LM (1999) *Spiders of New Zealand and their Worldwide Kin*. Otago University Press, Dunedin.
- Book chapter
    - Wilson HD (2008) Vegetation of Banks Peninsula. In: Winterbourn MJ, Knox GA, Burrows C J, Marsden I D (eds) *The Natural History of Canterbury*, pp 251–278, Canterbury University Press, Christchurch.
- Unpublished thesis
    - Malumbres-Olarte J (2010) *Spider Diversity and Ecology in Native Tussock Grasslands of the South Island, New Zealand*. PhD thesis. Department of Ecology, Lincoln University, Lincoln.
- Use an unspaced en-dash not a hyphen for page ranges.

<u>Human History publications</u>

We follow the Chicago style of referencing along the following lines:

For footnotes:

- Journal
    - Sarah Whitehead, "A Territory of such varied picturesqueness: Gerard Carrington and the beginnings of the Christchurch Tramping Club", *Records of the Canterbury Museum* 24 (2010): 15–25.
- Book
    - Lyndon Fraser and Angela McCarthy, eds, *Far from 'Home': The English in New Zealand* (Dunedin: Otago University Press, 2012).
    - John Wilson, *Historic Canterbury* (Auckland: David Bateman Ltd, 2012).
- Book chapter
    - Lyndon Fraser, "Memory, Mourning and Melancholy: English Ways of Death on the Margins of Empire," In *Far From 'Home': The English in New Zealand*, ed Lyndon Fraser and Angela McCarthy (Dunedin: Otago University Press, 2012), 100.
- Unpublished source
    - Portrait: Sir Julius von Haast by A B Cambridge, 1888. Canterbury Museum, ABC

For references:

- Journal
    - Whitehead, Sarah. "A Territory of such varied picturesqueness: Gerard Carrington and the beginnings of the Christchurch Tramping Club", *Records of the Canterbury Museum* 24 (2010): 15–25.
- Book
    - Fraser, Lyndon and Angela McCarthy, eds, *Far from 'Home': The English in New Zealand*. Dunedin: Otago University Press, 2012.
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- Unpublished source
    - Portrait: Sir Julius von Haast by A B Cambridge, 1888. Canterbury Museum, ABC
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