



On the monophyly of *Porrhothele antipodiana* (Porrhothelidae: Mygalomorphae) and a new species of *Porrhothele* from Banks Peninsula

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ABSTRACT

Porrhothele (Mygalomorphae: Porrhothelidae) is a genus of tunnelweb spider endemic to New Zealand. The most frequently encountered species, *Porrhothele antipodiana*, is widespread throughout New Zealand and it has been suggested that it might represent a cryptic species complex. A phylogenetic hypothesis was generated using sequences of mitochondrial DNA cytochrome oxidase 1 from specimens collected throughout New Zealand. The genetic evidence suggests that *P. antipodiana* comprises a single widespread species consistent with morphological evidence. However, additional novel lineages were revealed by the analysis for which morphology suggests the presence of undescribed species. One of these, *Porrhothele peninsularis* sp. nov. is described.

<http://lsid:zoobank.org:pub:F4159C21-C4BA-4982-BF0B-D24632A89734>

Introduction

New Zealand has five recognised species of *Porrhothele* tunnelweb spiders in the endemic family Porrhothelidae: *P. antipodiana* (Walckenaer, 1837); *P. blanda* Forster, 1968; *P. moana* Forster, 1968; *P. modesta* Forster, 1968; *P. quadrigyna* Forster, 1968 (Hedin et al. 2018). All species except for *Porrhothele antipodiana* (Walckenaer, 1837) are characterised by having restricted distributions (Table 1). Tunnelweb spiders live in silken tubes that are typically found under rocks or logs or in natural hollows and crevices in earthen banks or trees. The females usually spend their entire lives in their tube, whilst the males will leave in search of a mate once they reach maturity (Forster & Wilton 1968). Until recently, *Porrhothele* was placed in the family Hexathelidae, of which the New Zealand endemic genus *Hexathele* is also a member (Raven 1980). As a result of phylogenetic analysis of DNA sequences from ultra-conserved elements, Hedin et al. (2018) proposed that *Porrhothele* be assigned to its own family, Porrhothelidae.

The species *Porrhothele antipodiana* (Figure 1) was one of the first spider species to be described from New Zealand (Vink, 2017) and has been recorded throughout both main islands of New Zealand and from Auckland to the Otago region and Chatham Island (Forster & Wilton 1968). There have been numerous synonymies and redescriptions and four new species of *Porrhothele* were described with restricted ranges (Forster & Wilton 1968).

Mygalomorph spiders tend to be morphologically conserved, making species level identification difficult and the presence of cryptic species rather common (Satler et al. 2013; Leavitt et al. 2015).

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Table 1. Known distributions of *Porrhothele* species.

Species	Distribution
<i>Porrhothele antipodiana</i> (Walckenaer, 1837)	Widespread from the Auckland region to the Dunedin region.
<i>Porrhothele blanda</i> Forster, 1968	Restricted to the Nelson and Marlborough Sounds regions.
<i>Porrhothele moana</i> Forster, 1968	Restricted to the Westland region.
<i>Porrhothele modesta</i> Forster, 1968	Restricted to the Gisborne region.
<i>Porrhothele quadrigyna</i> Forster, 1968	Restricted to the Northland region.

This challenge can be partly overcome with the use of genetic data, which typically reveals large amounts of mtDNA sequence diversity between and within species. However, the weakness with this approach is that Mygalomorphae populations are genetically structured (Satler 2013), so are susceptible to oversplitting if taxonomic decisions rely only on a single locus e.g. ‘DNA-barcode’ (Satler 2013). Invertebrate species in New Zealand frequently have intraspecific DNA divergence levels well above the thresholds considered interspecific in the Northern Hemisphere (Morgan-Richards et al. 2017). The best solution to this problem is not to rely entirely on genetics, but rather use it in tandem with morphology as a form of integrative taxonomy (Padial et al. 2010).

Although *Porrhothele antipodiana* are morphologically conserved, they have some variability in size and colour pattern among regions. Because of this, it is possible that *P. antipodiana* represent numerous, as yet undiagnosed, cryptic species (Forster & Wilton 1968). We used mitochondrial DNA sequencing within *Porrhothele*, focusing on the *P. antipodiana* group, to seek evidence for undescribed lineages. If representatives of novel mtDNA lineages possess diagnostic morphological traits we will have support for distinct taxa (Mallet 1995).

Materials and methods

Collection

Spiders of the genus *Porrhothele* were collected throughout New Zealand from native forest, sand dunes and subalpine tussock. Specimens were found by searching under logs and stones or by luring spiders out of their web retreats at night. Specimens were also donated by seven collectors throughout New Zealand (Table 2). Spiders were euthanized by freezing and preserved in 70% ethanol. Leg IV was removed and preserved in 98% ethanol to preserve the DNA.

mtDNA sequencing

Muscle tissue was extracted from the femur of one leg IV. The salting out procedure for DNA extraction followed that used in Trewick & Morgan-Richards (2005). Alternatively, QIAGEN



Figure 1. Example of typical female New Zealand tunnelweb spider *Porrhothele antipodiana*. Photo by Bryce McQuillan all rights reserved.

Table 2. Collection data of *Porrhothele* and *Hexathele* specimens sequenced. Districts follow that of Crosby et al. (1998).

Collection Code	GenBank Code	Species	Sex	Stage	Locality	Coordinates	District	Date	Collector
MPN_MY83	PH285938	<i>P. quadrigyna</i>	Female	Adult	Edge of Waipapa River, Puketū Forest	−35.277, 173.680	ND	26/1/2020	SA Trewick & M Morgan-Richards
AS.006173	PH285939	<i>P. 'mini'</i>	Female	Adult	Dansey Reserve, Rotorua	−38.08, 176.11	BP	4/10/2018	BN McQuillan
MPN_MY106	PH285962	<i>P. antipodiana</i>	Female	Adult?	Durham Drive, Havelock North	−39.683, 176.9048	HB	15/2/2020	SA Trewick & M Morgan-Richards
AS.006118	PH285964	<i>P. antipodiana</i>	Female	Adult?	Durham Drive, Havelock North	−39.683, 176.9048	HB	15/2/2020	SA Trewick & M Morgan-Richards
MPN_MY108	PH285966	<i>P. antipodiana</i>	Female	Adult?	Durham Drive, Havelock North	−39.683, 176.9048	HB	15/2/2020	SA Trewick & M Morgan-Richards
AS.006150	PH285968	<i>P. antipodiana</i>	Female	Adult?	Te Mata Peak	−39.6986, 176.9002	HB	3/10/2019	M Lusk
AS.006152	PH285961	<i>P. antipodiana</i>	?	Juvenile	Te Mata Peak	−39.6986, 176.9002	HB	3/10/2019	M Lusk
AS.006120	PH285959	<i>P. antipodiana</i>	Female	Adult	Cape Kidnappers	−39.660, 177.044	HB	5/11/2019	M Lusk
AS.006117	PH285954	<i>P. antipodiana</i>	?	Juvenile	Cape Kidnappers	−39.660, 177.044	HB	5/11/2019	M Lusk
AS.006119	PH285960	<i>P. antipodiana</i>	Female	Adult	Cape Kidnappers	−39.660, 177.044	HB	5/11/2019	M Lusk
AS.006111	PH285955	<i>P. antipodiana</i>	?	Juvenile	Cape Kidnappers	−39.660, 177.044	HB	5/11/2019	M Lusk
AS.006114	PH285958	<i>P. antipodiana</i>	?	Juvenile	Cape Kidnappers	−39.660, 177.044	HB	5/11/2019	M Lusk
AS.006165	PH285953	<i>P. antipodiana</i>	Female	Adult?	Cape Kidnappers	−39.660, 177.044	HB	5/11/2019	M Lusk
AS.006170	PH285957	<i>P. antipodiana</i>	Female	Adult?	Cape Kidnappers	−39.6644, 177.0447	HB	5/11/2019	M Lusk
MPN_MY72	PH285975	<i>P. antipodiana</i>	Female	Adult?	Mohi Bush, Hawkes Bay	−39.8572, 176.9015	HB	8/8/2014	SA Trewick
AS.006172	PH285963	<i>P. antipodiana</i>	Male	Adult	Te Mata Peak	−39.6986, 176.9002	HB	19/4/2019	AH Simpson
AS.006157	PH285967	<i>P. antipodiana</i>	Female	Adult	Te Mata Peak	−39.6986, 176.9002	HB	19/4/2019	AH Simpson
AS.006112	PH285952	<i>P. antipodiana</i>	?	Juvenile	Fern Walk, Pohangina Valley	−40.1483, 175.8449	RI	2/2/2020	SA Thompson
AS.006128	PH285941	<i>P. 'ruahine'</i>	Female	Adult	Rangiwahia Hut track, tussock zone	−39.8950, 176.0439	RI	13/10/2019	SA Thompson
AS.006153	PH285970	<i>P. antipodiana</i>	?	Juvenile	Atene Skywalk, Whanganui	−39.7232, 175.1368	WI	2/1/2020	SA Thompson
AS.006147	PH285973	<i>P. antipodiana</i>	Female	Adult	Ashhurst Domain	−40.3036, 175.7580	WI	9/6/2019	SA Thompson
AS.006161	PH285972	<i>P. antipodiana</i>	?	Juvenile	Bledisloe Park	−40.3823, 175.6189	WI/WN	9/2/2019	SA Thompson
AS.006169	PH285971	<i>P. antipodiana</i>	Female	Adult?	Bledisloe Park	−40.3823, 175.6189	WI/WN	24/6/2019	SA Thompson
AS.006131	PH285978	<i>P. antipodiana</i>	Female	Adult	Waikawa Beach	−40.6879, 175.1452	WN	13/12/2018	SA Thompson
AS.006198	PH285979	<i>P. antipodiana</i>	?	Juvenile	Waikawa Beach	−40.6879, 175.1452	WN	13/12/2018	SA Thompson
AS.006130	PH285977	<i>P. antipodiana</i>	Female	Adult	Waikawa Beach	−40.6879, 175.1452	WN	13/12/2018	SA Thompson
AS.006110	PH285976	<i>P. antipodiana</i>	Female	Adult	Kuku Beach	−40.6685, 175.1549	WN	17/10/2019	SA Thompson
AS.006134	PH285949	<i>P. antipodiana</i>	Female	Adult	Murphy's Rd, Pauatahanui	−41.1189, 174.9304	WN	3/1/2019	SA Thompson
AS.006126	PH285974	<i>P. antipodiana</i>	Female	Adult	Pauatahanui Village	−41.1064, 174.9167	WN	26/7/2019	SA Thompson
AS.006174	PH285940	<i>P. 'mini'</i>	Male	Adult	Percy Reserve, Lower Hutt	−41.2141, 174.8766	WN	26/4/2019	BN McQuillan
MPN_MY64	PH285969	<i>P. antipodiana</i>	Female	Adult	Te Awaiti, Wairarapa	−41.4703, 175.5249	WA	8/11/2019	SA Trewick & M Morgan-Richards
AS.006113	PH285956	<i>P. antipodiana</i>	Female	Adult	Castlepoint, Wairarapa	−40.9036, 176.2257	WA	4/1/2020	SA Thompson
AS.006160	PH285944	<i>P. antipodiana</i>	Female	Adult	Cobb Valley, Takaka	−41.12, 172.60	NN	1/12/2019	BN McQuillan

(Continued)

Table 2. Continued.

Collection Code	GenBank Code	Species	Sex	Stage	Locality	Coordinates	District	Date	Collector
AS.006116	PH285942	<i>P. antipodiana</i>	?	Juvenile	Cave site, Fossil Point, Farewell Spit	−40.51, 172.84	NN	30/11/2019	SA Trewick & M Morgan-Richards
AS.006115	PH285943	<i>P. antipodiana</i>	?	Juvenile	Cave site, Fossil Point, Farewell Spit	−40.51, 172.84	NN	30/11/2019	SA Trewick & M Morgan-Richards
AS.006140	PH285947	<i>P. antipodiana</i>	Female	Adult?	Wharariki Beach, Cape Farewell	−40.50, 172.67	NN	1/12/2019	BN McQuillan
MPN_MY77	PH285945	<i>P. antipodiana</i>	Female	Adult?	Rimu Gulley, Badlands, Cape Farewell	−40.51, 172.71	NN	30/11/2019	SA Trewick & M Morgan-Richards
MPN_MY78	PH285946	<i>P. antipodiana</i>	Female	Adult	Cave site, Fossil Point, Farewell Spit	−40.51, 172.84	NN	30/11/2019	SA Trewick & M Morgan-Richards
AS.006141	PH285948	<i>P. antipodiana</i>	Female	Adult?	Nina Valley, Lewis Pass	−42.463, 172.355	BR	4/1/2018	KM Curtis
AS.006194	PH285937	<i>P. peninsularis</i> sp. nov.	Female	Adult	Montgomery Scenic Reserve, Banks Peninsula	−43.746, 172.870	MC	1/2/2023	SA Thompson
AS.006195	PH285936	<i>P. peninsularis</i> sp. nov.	Female	Adult	Omahu Bush, Banks Peninsula	−43.661, 172.620	MC	2/2/2023	SA Thompson
AS.006171	PH285950	<i>P. antipodiana</i>	Female	Adult	Macraes Flat, Otago	−45.384, 170.423	CO	?	James Tweed
AS.006196	PH285951	<i>P. antipodiana</i>	?	Juvenile	Tomahawk Lagoon, Dunedin	−45.865, 170.504	DN	?	James Tweed
AS.006197	PH285965	<i>P. antipodiana</i>	?	Juvenile	Te Mata Peak	−39.698, 176.900	HB	13/3/2019	M Lusk
MPN_MY110	PV241460	<i>Hexathele</i> sp.	Female	Adult	O'Connor Bush, Greytown	−41.075, 175.459	WA	10/8/2020	M Lusk
MPN_MY8	PV241461	<i>Hexathele</i> sp.	Female	Juvenile	Totara Reserve, Pohangina Valley	−40.121, 175.854	WN	5/5/2019	SA Thompson

DNeasy Blood & Tissue Kit was used following standard procedures. A section of the mitochondrial cytochrome oxidase 1 (CO1) gene ~700 bp long (Folmer et al. 1994) was amplified using forward primer LCO1490 (5'-GGTCAACAAATCATAAAGATATTGG-3') and the reverse primer HCO2198 (5'-TAAACTTCAGGGTGACCAAAAAATCA-3'). Thermocycler conditions consisted of initial denaturation at 94°C for two minutes followed by 40 cycles of denaturation at 94°C for 15 s, primer annealing at 49°C for 30 s and extension at 72°C for two minutes. In the last stage, final extension was at 72°C for seven minutes. PCR products were visualised on a 1% agarose gel to confirm amplification then sequenced using the LCO1490 primer at the Massey Genome Service's ABI 3730 genetic analyser (Applied Biosystems Inc. Carlsbad, CA). From Genbank, 32 sequences of *Porrhothele* from Banks Peninsula with registration numbers MG432408 – MG432439 generated by MacDonald (2013) were downloaded and used in the phylogeny. All generated sequences are available on Genbank (Table 2).

Phylogeny

An alignment 610–710 bp in length was produced in Geneious version 9.1.8 (Kearse et al. 2012) using 77 sequences of *Porrhothele* and two *Hexathele* specimens as an outgroup. The alignment was used in ModelFinder (Kalyaanamoorthy et al. 2017) and model TPM3u + F + I + G4 was selected. The alignment was then uploaded to IQTree (Nguyen et al. 2015) and used to create a Maximum Likelihood tree with a bootstrap analysis of 1000 (Hoang et al. 2017) (Tables 3–8).

Morphology

Identification of *Porrhothele* was principally done using leg spine counts and sex characteristics such as the structure of the female epigynum and the male palps. The morphological terminology and spine count system follows that of Forster & Wilton (1968). In brief, Forster & Wilton's spine count methodology was to divide each leg into 3–4 equal sections and record the spination on each surface in that section. Tibia I in males is an exception because of the complex, heavy spination, so figures are used instead. Colour descriptions are based on several year old preserved specimens but live colours are also described where possible. All measurements are in millimetres.

The epigynum, the external genital structure which covers the opening of the sperm storage receptacle (spermathecae) of adult female specimens, was excised using a hypodermic needle and left in a 10% solution of KOH for a few hours until the tissue was cleared away and the structures were visible. They were then transferred into a small vial of 70% ethanol and kept with the spider.

Repositories

All specimens were deposited at either Lincoln University Entomology Research Collection (LUNZ) or Museum of New Zealand Te Papa Tongarewa (MONZ).

Results

Two described species of *Porrhothele* were morphologically identified in our sampling from across New Zealand. *Porrhothele antipodiana* was collected from 17 locations from Hawkes Bay in the

Table 3. Body measurements of *Porrhothele peninsularis* nov. sp. holotype. Size ranges of other males are in parentheses.

	Length	Width
Carapace	6.5 (6.4–9.9)	5.6
Abdomen	8.1 (7.8–11)	5.3
Total length	14.6 (14.2–20.9)	–

Table 4. Eye measurements of *Porrhothele peninsularis* nov. sp. holotype.

	AME	ALE	PME	PLE
Eye Width	0.9	2.6	0.7	0.9
Distance from AME	0.3	0.2	–	–
Distance from ALE	0.2	–	–	0.3
Distance from PME	–	–	1.3	0.1
Distance from PLE	–	0.3	0.1	–

north to Otago in the south, including Christchurch. *Porrhothele quadrigyna* was collected from Puketi, Northland.

A total of 43 specimens of *Porrhothele* were sequenced (Table 2), and 33 sequences were downloaded from GenBank. An alignment of 610–710 bp in length was made with these 77 DNA sequences which contained 37% variable sites. None of the sequences contained stop codons. The GC-content for the alignment was 37.7% which is within the typical range of GC-content for Mygalomorphae (Hamilton et al. 2014; Sanggaard et al. 2014). The alignment was trimmed to 17 haplotypes to improve resolution of the maximum likelihood analysis. Based on the AIC values generated in MEGA (Tamura et al. 2021), the best substitution model was TN93 + G + I (Tamura & Nei 1993) with a shape parameter of 0.18 and proportion of invariable sites at 0.60.

The phylogenetic trees resolved five *Porrhothele* lineages (Figure 2(A)) representing the species *P. antipodiana* and *P. quadrigyna* which is restricted to Northland, plus three additional lineages that potentially represent undescribed species. Three species had good bootstrap support (100%), but the phylogenetic relationships among putative species were less well resolved.

An alignment with all 59 *P. antipodiana* and *P. peninsularis* sp. nov. DNA sequences was used to generate a neighbour-joining tree to view the geographic structure of their mtDNA diversity. Within the *P. antipodiana* group, clusters were resolved that only loosely corresponded to geographic region (Figure 2(B)). Two specimens collected from Otago have mtDNA haplotypes similar to those sampled from Wellington (Figure 2(B)). Similar levels of genetic divergence and structure are resolved within the lineage restricted to Banks Peninsula.

Discussion

The phenotypic variation and level of mtDNA sequence diversity we detected suggests that *P. antipodiana* is a widespread species. The phylogeny also reveals several distinct lineages of *Porrhothele* that may represent undescribed species. Notably, specimens that were previously identified as *P. antipodiana* from Banks Peninsula (Macdonald 2013) formed a clade that is clearly separate from the majority of *P. antipodiana* haplotypes sampled widely across New Zealand. The distinct mtDNA lineage sampled only from Banks Peninsula is concordant with morphological traits suggesting a distinct species, *Porrhothele peninsularis* (Thompson & Sirvid) sp. nov. Similarly, two other previously unknown mtDNA lineages are clearly distinct from *P. antipodiana* and represent putative new species.

Intraspecific divergence within species of Mygalomorphae has previously been observed in the range of 2–11%, so *P. antipodiana* appears to have a normal level of intraspecific divergence (~7.2%) for a Mygalomorph species. Additionally, the presence of geographic structure within

Table 5. Leg measurements of *Porrhothele peninsularis* nov. sp. holotype.

	fem.	pat.	tib.	met.	tar.	total
Leg I	5.4	2.7	3.1	4.0	2.2	17.4
Leg II	5.0	2.6	3.1	4.0	2.5	17.2
Leg III	5.0	2.8	3.1	3.7	2.2	16.7
Leg IV	4.6	2.3	2.9	3.7	2.5	16.1
Palp	2.9	1.2	1.9		1.1	7.2

Table 6. Body measurements of *Porrhothele peninsularis* nov. sp. allotype. Size ranges of other females are in parentheses.

	Length	Width
Carapace	9.1 (7.8–10.4)	7.9
Abdomen	9.8 (8.8–16.3)	7.7
Total length	18.9 (16.6–26.7)	–

Table 7. Eye measurements of *Porrhothele peninsularis* nov. sp. allotype.

	AME	ALE	PME	PLE
Eye Width	1.0	1.2	0.9	1.1
Distance from AME	0.8	0.3	–	–
Distance from ALE	0.3	–	–	0.6
Distance from PME	–	–	2.0	0.1
Distance from PLE	–	0.6	0.1	–

Table 8. Leg measurements of *Porrhothele peninsularis* nov. sp. allotype.

	fem.	pat.	tib.	met.	tar.	total
Leg I	6.2	3.7	3.4	3.9	2.5	19.7
Leg II	5.4	3.4	3.3	3.7	2.2	18.0
Leg III	5.1	3.1	2.9	3.7	2.8	17.6
Leg IV	6.0	3.6	4.0	5.0	2.9	21.5
Palp	3.9	2.0	2.2		2.8	10.8

the *P. antipodiana* phylogeny is typical of a mygalomorph species. With the specimens sampled this suggests that *P. antipodiana* is a single colour – and size-variable species with a widespread distribution, rather than several geographically distinct unknown species. The inclusion of the Otago Macrae’s Flat and Dunedin Tomahawk Lagoon specimens (MY19, MY109) in the southern North Island mitochondrial cluster is unexpected. One could speculate that these outliers are the result of a translocation of a population of *Porrhothele* to the Otago region. Tunnelweb spiders are frequently found in firewood and logs, so transport of these materials may have introduced them to the Otago region. This scenario is lent support by the accidental translocation and establishment of a population of the Wellington tree wētā *Hemideina crassidens* to Dunedin (Harris 2009).

The discovery of *Porrhothele peninsularis* sp. nov. is notable because this species has previously been considered *P. antipodiana* (e.g. Macdonald 2013). In the most recent revision of *P. antipodiana*, Forster & Wilton (1968) included several specimens of *Porrhothele* from Banks Peninsula. Morphological examination of *P. peninsularis* sp. nov. found differences in the colouration, leg spine counts, male palps and shape of the female spermatheca that support the inclusion of this lineage as a new species, but these traits are subtle enough to be difficult to interpret without the genetic hypothesis. In particular, colouration becomes faded when specimens are preserved, so differences are more difficult to detect.

The divergence of *P. peninsularis* sp. nov. from other *Porrhothele* is consistent with this species evolving when Banks Peninsula was a near shore island. If correct, then it can be predicted that a dated phylogeny would show that the species diverged before glacial outwash connected it to the mainland, but after the island emerged (Late Miocene 11–5.8 Ma) (Sewell 1986). Of the other unknown species revealed by the phylogenetic tree, *Porrhothele* ‘mini’ is distinct because of its size, colouration and habitat. This species is notable because it is much smaller than that of all other sampled *Porrhothele* species, which makes it difficult to distinguish from females from juveniles of larger species. Forster & Wilton (1968) had previously noted unusually small *Porrhothele antipodiana* on the Brothers Islands in the Cook Strait, which the authors hypothesise might represent *Porrhothele* ‘mini’. Expanding sampling from one adult female (Rotorua) and one adult male

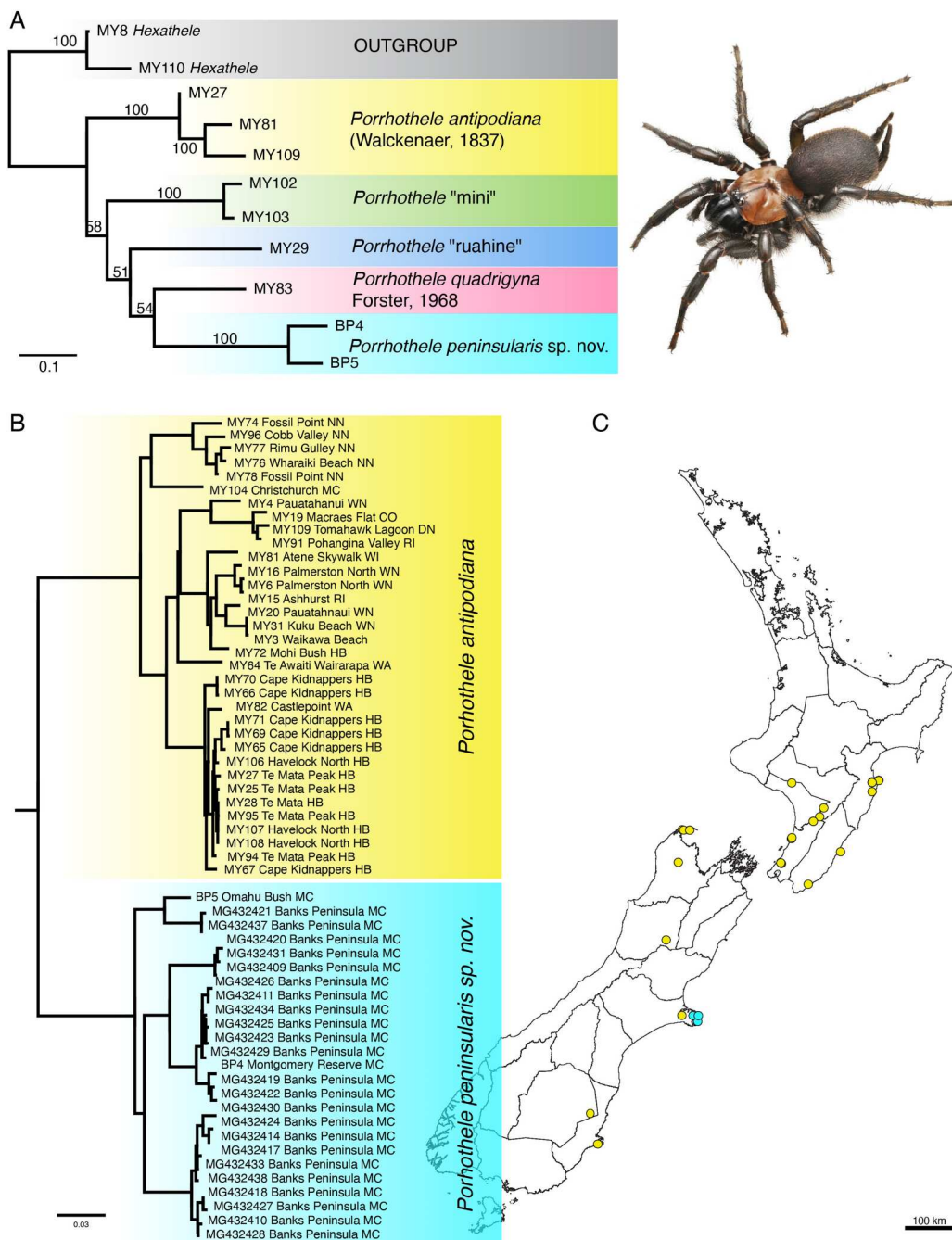


Figure 2. Phylogeny of *Porrhothele* tunnelweb spiders based on mitochondrial cytochrome oxidase I DNA sequences. (A) Maximum Likelihood tree of the *Porrhothele* genus. Specimen photo by Saryu Mae CC BY 4.0. (B) Phylogeny and distribution map of New Zealand *Porrhothele antipodiana* (yellow) and *P. peninsularis* sp. nov. (teal).

(Wellington) will be needed to uncover the full extent of this undescribed species. The distinct lineage *Porrhothele* 'ruahine' is known from only a single location in the tussock zone of the Ruahine Ranges. More specimens are needed to reveal its full range and to provide sufficient material for formal description.

The Banks Peninsula species, *Porrhothele peninsularis* sp. nov. is described below. The other undescribed species await description until enough specimens are available.

Species description

Porrhothele peninsularis Thompson & Sirvid sp. nov.

urn:lsid:zoobank.org:act:8E471A41-0CB9-4A60-9AEE-B16062524DC9

Figures 3–5)

Etymology. The species name refers to Banks Peninsula, the type locality.

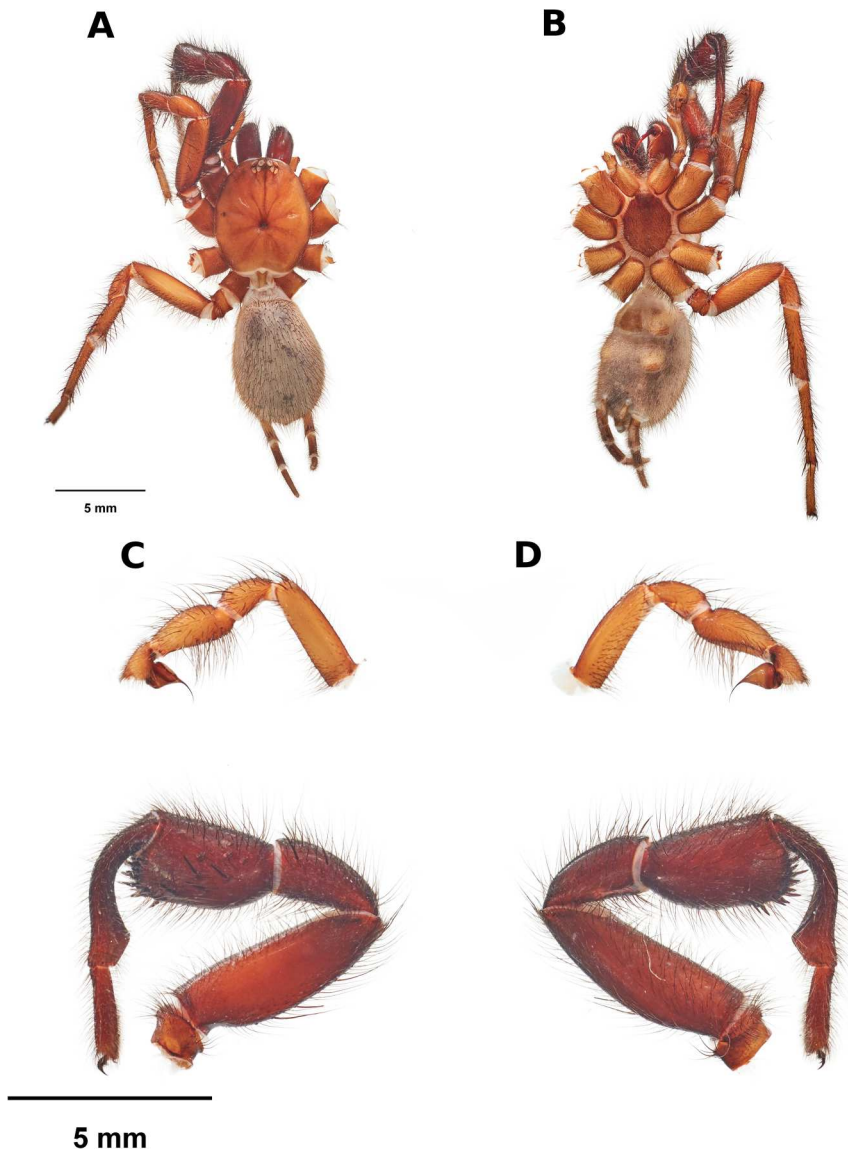


Figure 3. Adult male *Porrhothele peninsularis* sp. nov. from Banks Peninsula, New Zealand. (A) Dorsal overview, (B) Ventral overview, (C) Palp and leg 1 prolateral surface (D) Palp and leg 1 retrolateral surface. Photo by Jean-Claude Stahl CC BY 4.0.

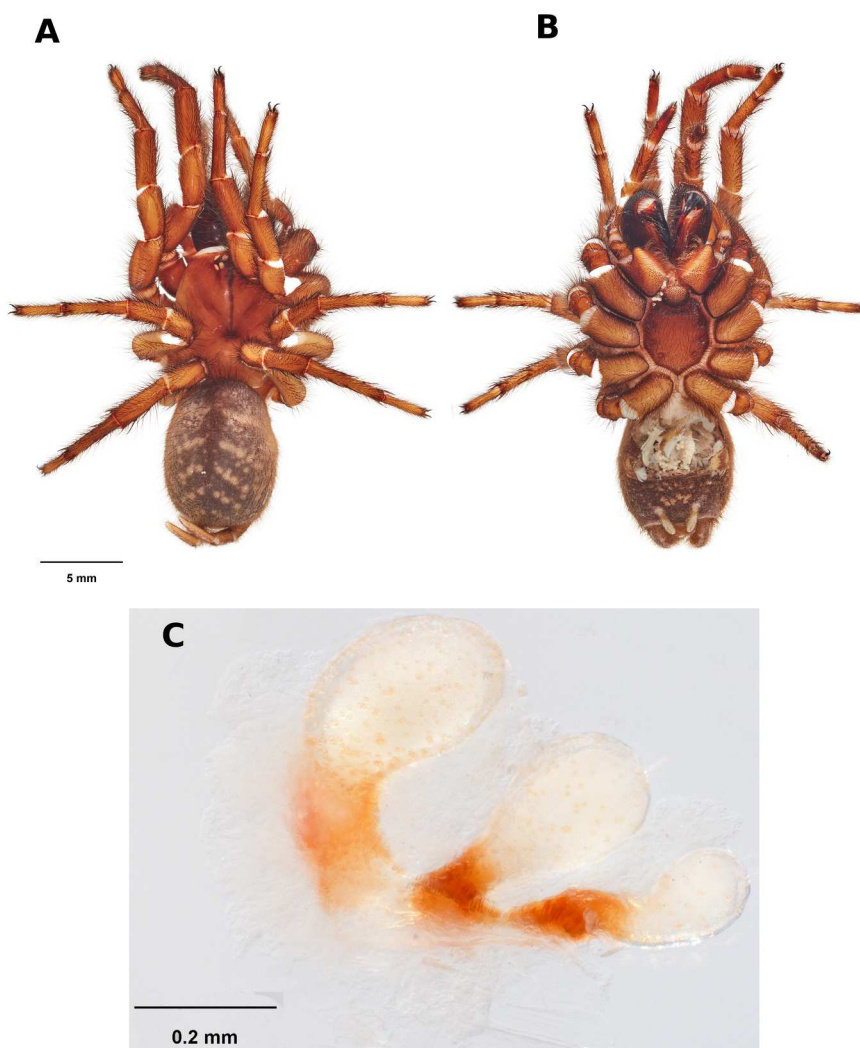


Figure 4. Adult female *Porrhothele peninsularis* sp. nov. from Banks Peninsula, New Zealand. (A) Dorsal overview, (B) Ventral overview, (C) Epigynum. Photo by Jean-Claude Stahl CC BY 4.0.

Distribution. Presently only known from Banks Peninsula, likely to be restricted to this locality.

Diagnosis. Males are diagnosed by the leg I tibia spination pattern. Females are diagnosed by the distinctive pattern on the dorsal side of the abdomen and the spination of leg IV metatarsus. Most closely resembles *Porrhothele moana* Forster 1968, but can be distinguished by a more pronounced colour pattern (chevrons or indistinct blotches often present), the form of the female internal genitalia and the shape of the male cymbium (broader anteriorly in *P. moana*).

Description.

Holotype ♂

Carapace: Head brownish orange (dark brown to black when alive), darker at anterior margin, black in eyegroup. Hairs in medial line between eye group and fovea.

Chelicerae: Dark reddish brown. Promargin with 10 teeth, retromargin with 7 teeth.



Figure 5. Live adult *Porrhothele peninsularis* sp. nov. (A) male, (B) female. Photos by Laura Montes de Oca all rights reserved.

Maxillae: Spines in a roughly triangular grouping, widest at mid-posterior margin, occupying roughly 1/5 of maxilla area and extending approximately half maxilla length.

Labium: Width to length 1.08×0.93 . Spines covering roughly 2/3 of the anterior to central part of the labium.

Sternum: Longer than wide (4.25×2.63), orange brown, three pairs of sigillae along dark reddish brown lateral margins.

Legs: Brownish orange (blackish when alive). Leg 1. Femur p.0.0.1, d.7-8 (weak). Patella p.0.1.1. Tibia (Figure 3(C,D)). Metatarsus 0. Tarsus 0. Leg 2. Femur d.9. Patella p.0.1.1. Tibia p.1.0.1, v.1.2.0.3. Metatarsus p.0.1.0, v.0.1.1.4. Tarsus 0. Leg 3. Femur d.10 (weak). Patella p.1.1.1, r.1.1.0. Tibia p.0.1.1.1, v.1.0.2, r.1.1.1. Metatarsus p.0.1.1.1, v.0.2.3, r.1.1.1. Tarsus 0. Leg 4. Femur d.8. Patella p.0.0.1, r.0.1.0. Tibia p.0.1.1, v.1.1.0.3, r.0.1.1. Metatarsus p.1.1.1.1, v.1.2.0.4, r.1.1.0.1. Tarsus 0. Claws with 9 teeth. Inferior claw with 2 teeth.

Palp: Brownish orange (blackish when alive). Femur 0. Patella 0. Tibia 0. Tarsus 0.

Abdomen: Variable colouration, greyish brown, sometimes with three pairs of creamy chevron markings, otherwise uniform or with irregular cream blotches. Book lung covers pale yellow, with greyish brown marking. Anterior spinneret pale yellow, posterior spinneret greyish brown.

Allotype ♀

Carapace: Head brownish orange (dark brown to black when alive), darker at anterior margin, black shading around eye group. Hairs in medial line between eye group and fovea.

Chelicerae: Black, reddish orange along ventral margin. Promargin with 10 teeth and retromargin with 17 teeth.

Maxillae: Spines in a roughly triangular grouping, widest at mid-posterior margin, occupying roughly 1/5 of maxilla area and extending approximately half maxilla length.

Labium: Width to length ratio roughly 1.55×1.39 . Spines covering roughly 2/3 of the anterior to central part of the labium.

Sternum: Longer than wide (4.62×4.02): Brownish orange, reddish brown, three pairs of sigillae along each lateral margin.

Legs: Brownish orange (blackish when alive). Spine counts vary but roughly as follows. Leg 1. Femur 0. Patella p.1. Tibia p.0.1.1, v.0.1.3. Metatarsus v.0.0.2. Tarsus 0. Leg 2. Femur p.1. Patella p.1.1. Tibia p.0.1.1, v.0.1.3. Metatarsus p.0.1.0, v.0.1.3. Tarsus 0. Leg 3. Femur 0. Patella p.0.1.2 (fine), r.0.1.0 (fine). Tibia p.1.1, v.0.2.3, r.0.1.1. Metatarsus p.1.1.0.1, v.0.0.2.3, r.1.1.0.1. Tarsus 0. Leg 4. Femur 0. Patella r.0.1.0. Tibia p.0.0.1, v.0.1.3, r.0.1.1. Metatarsus p.1.1.1.1, v.0.2.1.3, r.0.1.1.1. Tarsus 0. Claws with 9 teeth. Inferior claw with 2 teeth.

Palp: Brownish orange (blackish when alive). Femur 0. Patella p.1 (weak). Tibia p.0.0.1, v.2.2.3. Tarsus v.0.2.1. Claws with 8 teeth.

Abdomen: Colour variable, greyish brown, sometimes with four pairs of dorsal medial creamy chevron markings, otherwise with irregular creamy blotches in larger specimens. Book lung covers pale yellow, with greyish brown marking. Anterior spinneret pale yellow, posterior spinneret greyish brown.

Genitalia: Receptacles trilobed. Arranged as in [Figure 4](#).

Table 9. Paratype specimens of *Porrothele peninsularis* nov. sp. from Banks Peninsula.

Collection	Registration	Sex	Stage	Locality	Coordinates	Date	Collector	Collection note
LUNZ	LUNZ00013046	Male	Adult	Hinewai Reserve, Banks Peninsula		11/1/2011	MH Bowie	Pitfall trap
LUNZ	LUNZ00013047	Female	Adult	Mt Sinclair, Banks Peninsula	−43.7177, 172.8587	16/12/2022–20/1/2023	MH Bowie & DM Lamont	Pitfall trap
LUNZ	LUNZ00013048	Female	Adult	Hinewai Reserve, Banks Peninsula		11/6/2001	MH Bowie	
LUNZ	LUNZ00013049	Female	Adult	Mt Sinclair, Banks Peninsula	−43.7177, 172.8587	16/12/2022–20/1/2023	MH Bowie & DM Lamont	Pitfall trap
LUNZ	LUNZ00013050	Male	Adult	Mt Sinclair, Banks Peninsula	−43.7177, 172.8587	16/12/2022–20/1/2023	MH Bowie & DM Lamont	Pitfall trap
LUNZ	LUNZ00013051	Male	Adult	Mt Pearce Reserve, Banks Peninsula	−43.71481, 172.94318	15/1/2021		
LUNZ	LUNZ00013052	Male	Adult	Mt Pearce Reserve, Banks Peninsula	−43.71114, 172.93615	15/1/2021		
LUNZ	LUNZ00013053	Male	Adult	Mt Pearce Reserve, Banks Peninsula	−43.71114, 172.93615	15/1/2021		
LUNZ	LUNZ00013054	Male	Adult	Mt Pearce Reserve, Banks Peninsula	−43.71114, 172.93615	15/1/2021		
LUNZ	LUNZ00013055	Male	Adult	Mt Pearce Reserve, Banks Peninsula	−43.71114, 172.93615	15/1/2021		
LUNZ	LUNZ00013056	Male	Adult	Otepatotu Reserve, Banks Peninsula	−43.74905, 173.01537	14/1/2021		
LUNZ	LUNZ00013057	Male	Adult	Otepatotu Reserve, Banks Peninsula	−43.74905, 173.01537	14/1/2021		
LUNZ	LUNZ00013058	Male	Adult	Ellangowan Reserve, Banks Peninsula	−43.79818, 173.03436	13/1/2021		
LUNZ	LUNZ00013059	Male	Adult	Ellangowan Reserve, Banks Peninsula	−43.79818, 173.03436	13/1/2021		
MONZ	AS.004723	Female	Adult	Hinewai Reserve 'Big Beech', Banks Peninsula		27/8/1996	PJ Sirvid	
MONZ	AS.004731	Male	Adult	Omahu Bush Scenic Reserve, Banks Peninsula		22/12/2004–18/1/2005	JB & GM Ward	Malaise trap
MONZ	AS.006194	Female	Adult	Montgomery Scenic Reserve, Banks Peninsula	−43.746, 172.870	1/2/2023	SA Thompson	
MONZ	AS.006195	Female	Adult	Omahu Bush, Banks Peninsula	−43.661, 172.620	2/2/2023	SA Thompson	

Holotype. (LUNZ00013044) Mt Sinclair Banks Peninsula, 16/12/2022–20/1/2023, MH Bowie & DM Lamont, Pitfall trap.

Allotype. (LUNZ00013045) Omaha Bush Scenic Reserve, 26/3/2022, WT Frost.

Paratypes. See Table 9.

Comments. This species is fairly abundant in the remnant forest areas of Banks Peninsula under logs or stones. Based on morphological evidence, it most closely resembles *P. moana* while genetically it is most similar to *P. antipodiana*.

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