

**A new species of the genus
Riccardoella Berlese, 1923 (Acari: Ereynetidae)
occurring as a parasite in the pallial cavity of Athoracophoridae
(Gastropoda) in New Zealand**

by Alex Fain¹ and Gary M. Barker²

¹ Institut royal des Sciences naturelles de Belgique, rue Vautier 29, 1000-Bruxelles, Belgium.

² Landcare Research, Private Bag 3127, Hamilton, New Zealand.

Summary

Riccardoella (*Proriccardoella*) *novaezealandiae* Fain & Barker new species (Acari: Ereynetidae) is described from the pallial cavity of a slug in the family Athoracophoridae (Gastropoda: Pulmonata), collected from montane *Nothofagus* forest on Mt Hikurangi, Poverty Bay, New Zealand. This represents the first record of the natural occurrence of the genus *Riccardoella* Berlese, 1923 outside the Holarctic region. A revised key to the species of the genus is presented.

Keywords: *Riccardoella*, Athoracophoridae, Gastropoda, New Zealand.

Introduction

The genus *Riccardoella* Berlese, 1923 was created for the mite *Acarus limacum* Schrank, 1776 living in the pallial cavity of the snail *Helix pomatia* Linnaeus (Gastropoda, Helicidae) in Europe. A second species, *Riccardoella oudemansi* Thor, 1929 was subsequently described from material collected from the pallial cavity of several gastropod slugs in Holland. These two species often occur at the same sites, albeit generally on separate hosts, and have had a very confused taxonomic history because researchers often did not recognise *R. oudemansi*.

Fain and van Goethem (1986) divided the genus *Riccardoella* into two subgenera, with the nominal subgenus containing only one species, *R. limacum*, and subgenus *Proriccardoella* Fain and van Goethem, 1986 with *R. oudemansi* as the type species. These authors also described two new species in *Proriccardoella*, namely *R. (P.) canadensis* Fain & van Goethem, 1986 from humus in Canada and *R. (P.) reaumuri* Fain &

van Goethem, 1986 from the pallial cavity of the helcid snail *Arianta arbustorum* (Linnaeus) collected in southern France. A few years later *Riccardoella* (*Proriccardoella*) *triodopsis* Fain & Klompen was described from the snail *Xolotrema obstricta* (Say, 1821) (= *Triodopsis obstricta*) (Polygyridae) from the U.S.A (Fain and Klompen, 1990).

While at least *R. oudemansi* has been dispersed to various parts of the world with its hosts (Fain, 2004), the gastropod-parasitising Ereynetidae have long been regarded as being confined naturally to the Holarctic. However, Fain and Barker (2003) recently described *Austreynetes maudensis* Fain & Barker, 2003, new genus and species, from the pallial cavity of *Pseudaneitea schauinslandi* Plate, 1897, a New Zealand gastropod of the family Athoracophoridae. Here we describe a further ereynetid species parasitising an additional New Zealand athoracophorid species. Remarkably, this newest discovery confirms the natural presence of the genus *Riccardoella* in the SW Pacific.

Systematics

Ereynetidae Oudemans, 1931

Ereynetinae (Oudemans, 1931) Fain, 1957

Riccardoella (*Proriccardoella*) Fain & van
Goethem, 1986

Riccardoella (*Proriccardoella*) *novaezealandiae*
Fain & Barker, new species

Description:

This new species is represented in collection only by the holotype male.

Male, holotype (figs 1-11)

Body: Length, including gnathosoma, 363 μm . Width maximal between coxae II and III, 258 μm . **Dorsum:** Cuticle striated without punctate shields. **Length of setae:** *vi* 18 μm , *ve* 7 μm , *sci* (anterior sensilla) 51 μm , *sce* 18 μm , *d1* to *d4* 15 μm , *d5* 18 μm , *l1* 15 μm , *l4* (posterior sensilla) 70 μm , *l5* 18 μm . All these setae are very finely barbed. **Venter:** Coxae I and II partly covered by cuticular lines or fine ridges. Coxae III and IV almost completely covered by a cuticular

reticulum or network. Coxal setae I-IV with 2-1-3-1 short barbed setae. **Genital area:** With an external row of 5 and an internal row of 4+5 setae. Genital vestibule with 3 pairs of short setae. A sclerotized structure is visible in front of the genital slit. Behind the genital slit there is one pair of anal setae. A large testicle is visible in the opisthosoma. **Gnathosoma:** 54 μm long (maximum), and 54 μm wide near its base. **Palpal tarsus:** Bearing 4 barbed setae, all situated in the apical half of the tarsus. **Legs I-IV:** Length of tarsi I-IV: 45-39-39-39 μm . Length of tibiae 39-30-30-30 μm . Length of genua 24-21-21-20 μm . Length of the femora 45-45-45-35 μm (?). Length of trochanters 25-30-27-30 μm . **Chaetotaxy:** See Table 1. **Ereynetal organ** (on tibia I): Famulus 30 μm long, cylindrical, with the apical third spoon-like. Guard-seta very thin, as long as the famulus. **Solenidions:** On tarsus I the solenidion is cylindrical and 15 μm long. On tarsus II the solenidion is also cylindrical and 10 μm long.

Table 1. Chaetotaxy (number of setae) on the legs, the palpal tarsus and the anal area as in the genus *Riccardoella*:

Notes : 1. The guard seta (not the famulus) of tibia I is included in the number of leg setae; 2. The intercoxal setae situated between coxae I or on the margin of coxae I are not included in the number of coxal setae; 3. The solenidions are not counted in the number of setae.

		Subgenus <i>Proriccardoella</i>					Subgenus <i>Riccardoella</i>
		<i>R. oudemansi</i>	<i>R. reaumuri</i>	<i>R. canadensis</i>	<i>R. triodopsis</i>	<i>R. novae- zealandiae</i>	<i>R. limacum</i>
		♀♂	♀	♀	♀♂	♂	♀♂
Legs:							
Tarsi	I	12	12	12	12	12	12
	II	9	9	8(9)	9	8	9
	III	8	8	8	8	7	8
	IV	8	8	8	8	7	8(7)
Tibiae	I	5	5	5	5	5	5
	II, III, IV	3	3	3	3	3	3
Genua	I, II	4	4	4	4	4	4
	III, IV	3	3	3	3	3	3
Femora	I	6	6	6	6	4	4(5)
	II	4	4	4	4	3	3
	III	3	4	3	3	3	2(3)
	IV	3	3	3	3	3	3
Trochanters	I,II	1	1	1	1	1	1
	III	1	1	1	1	1	0
	IV	0	0	0	0	0	0
	Coxae	I	2	2	2	2	2
Coxae	II	1	1	1	1	1	1
	III	3	2	3	2	3	2
	IV	1	1	1	1	1	1
	Palp tarsi:		3	3	4	4	4
Anal setae (pairs):		2	2	2	2	1	2

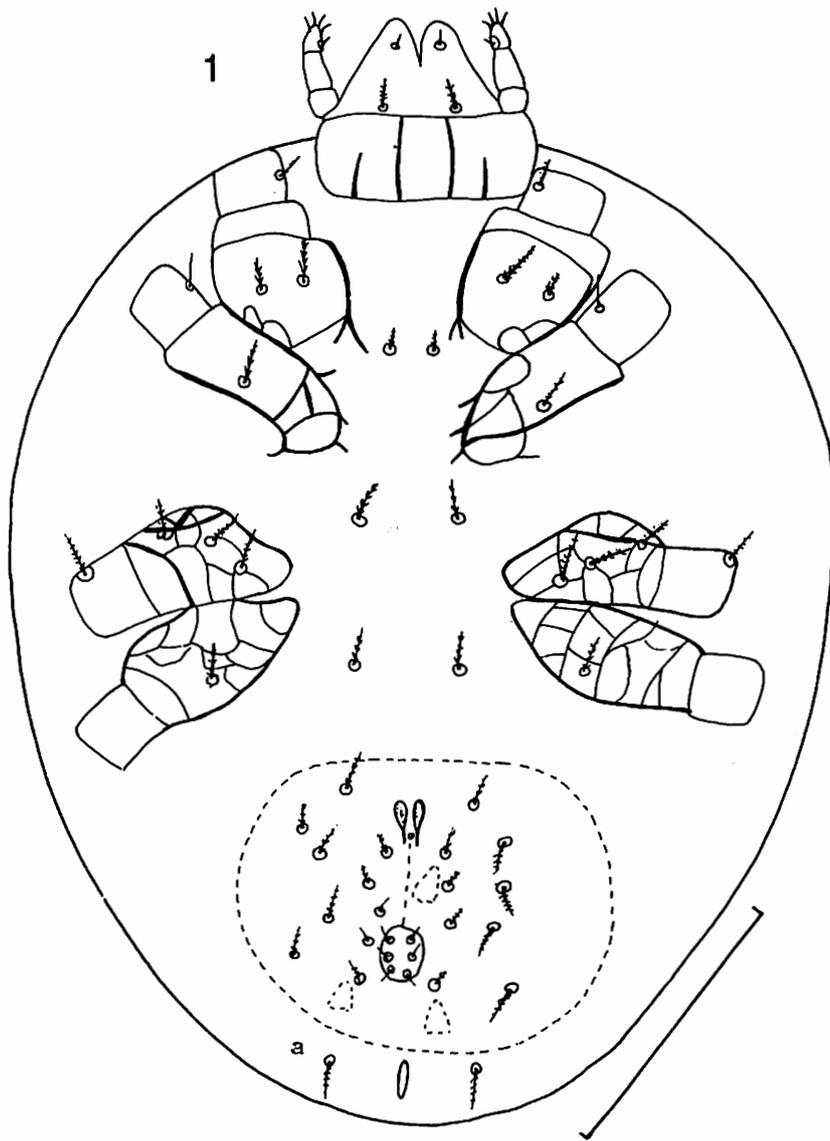


Fig. 1. *Riccardoella (Proriccardoella) novaezealandiae* Fain & Barker sp.n. Holotype male in ventral view. Scale line: 100 μ m.

Comparative morphology:

Riccardoella (Proriccardoella) novaezealandiae Fain & Barker new species is distinguished from other known species of the subgenus *Proriccardoella* by the following combination of characters:

1. Famulus as long as the guard seta, thus similar to the condition in *R. canadensis*, but distinguished by its apical third being spoon-like. While the famulus of tibia I in *R. triodopsis* is very slightly inflated (less than mentioned in the original figures of that species) and thus somewhat approaches the condition in *R. novaezealandiae*, it is distinctly shorted than the guard seta in that species.
2. Coxae as in *R. oudemansi*, with 2-1-3-1 setae. They differ, however, by a number of features including: the presence of 4 setae of the palptarsus; the reduction of the number of setae on tarsi III and IV (7) and on femora I (4); and the loss of one pair of anal setae.
3. Coxae III and IV are completely covered with a cuticular reticulum or network. Such a network is lacking in all other *Riccardoella (Proriccardoella)* species.
4. Palptarsi with 4 setae, and thus differing from *R. oudemansi* and *R. reaumuri*. The 4 setae on the palptarsi are apical or subapical and cylindrical, and thus differ in position and the

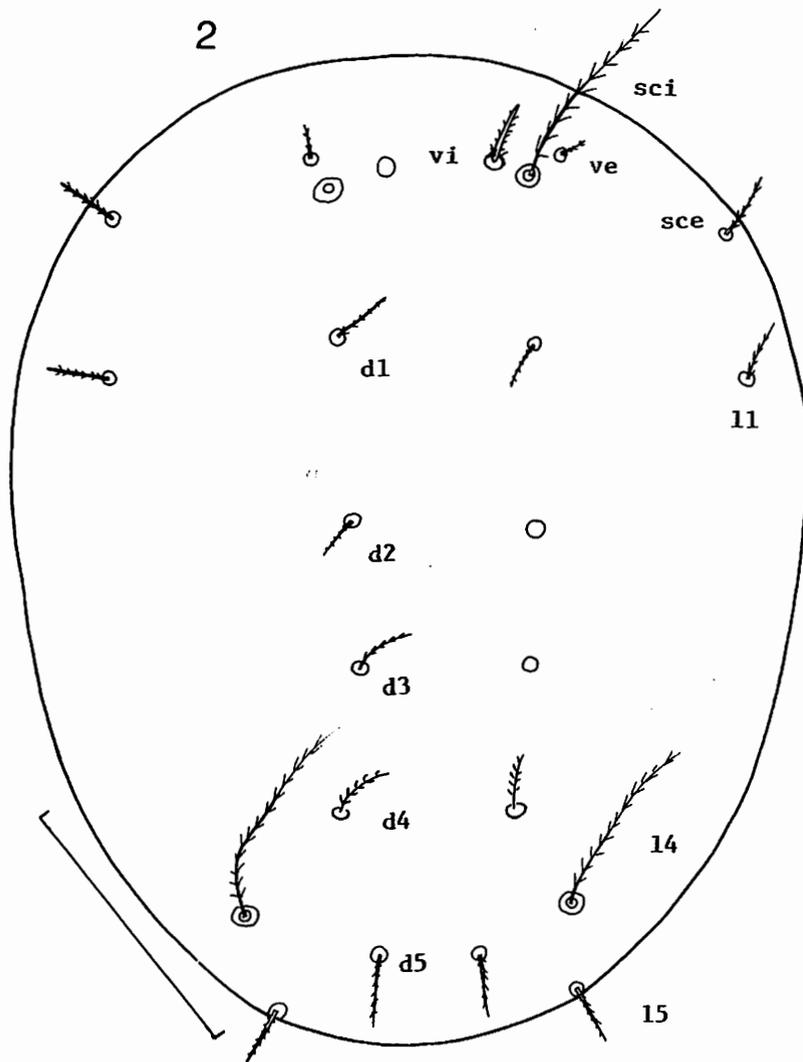


Fig. 2. *Riccardoella* (*Prorickardoella*) *novaezealandiae* Fain & Barker sp.n. Holotype male in dorsal view. Scale line 100 μ m.

shape from the 4 setae on the palptarsi in *R. canadensis* where 3 setae are club-shaped and sited apically (2) or subapically (1), and where 1 seta is cylindrical and situated in basal half of the tarsus (figs 11-12).

Type Material:

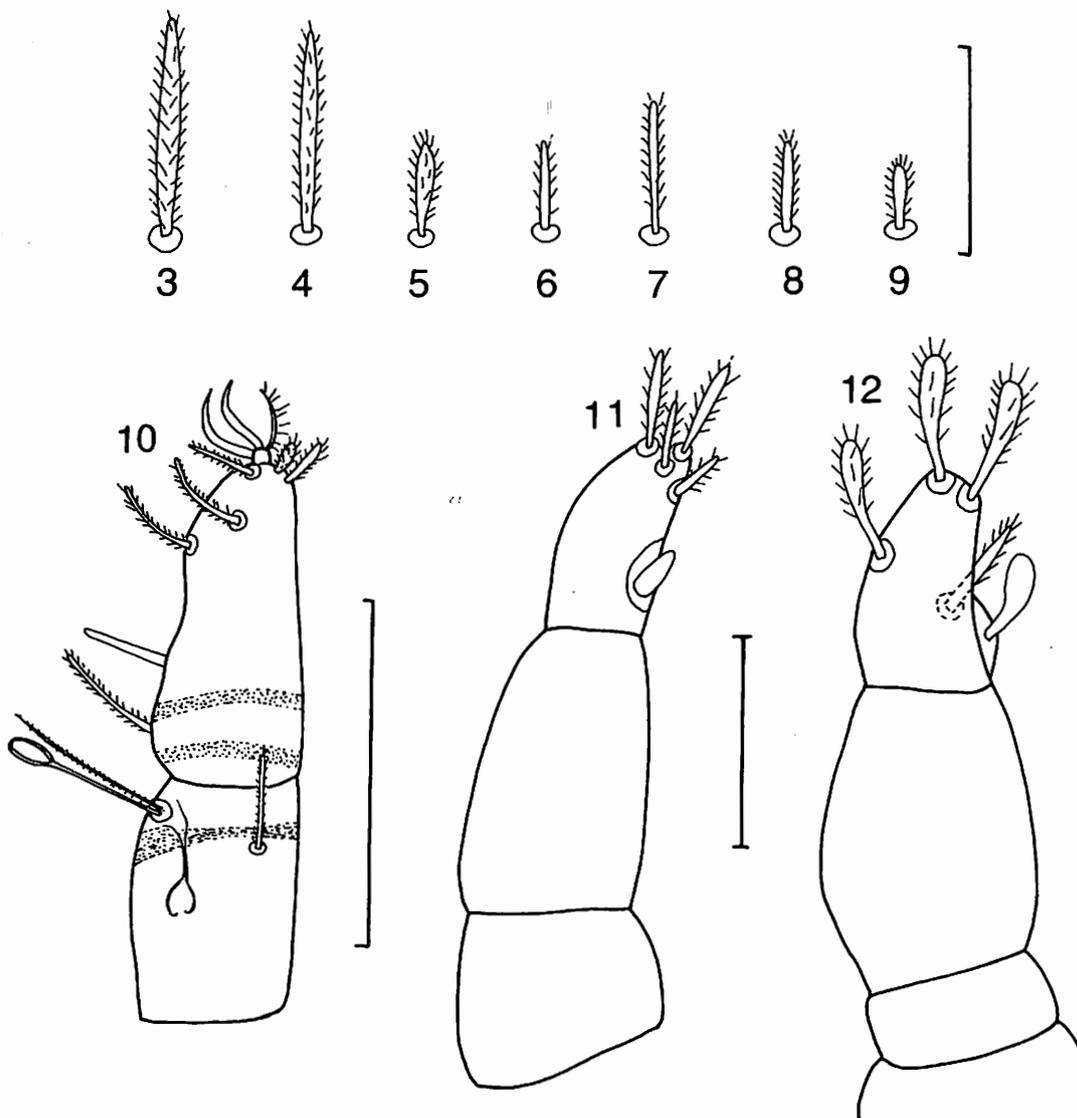
Holotype (New Zealand Arthropod Collection, Landcare Research, Auckland, New Zealand). Male, and only specimen. From the pallial cavity of an undescribed species and new genus of Athoracophoridae (Gastropoda: Pulmonata), collected at 800 m in montane *Nothofagus* forest, Mt Hikurangi, Poverty Bay, New Zealand (37° 54.43'S, 178°3.37'E), 11 December 2000 by G.M. Barker.

Key to the Genus *Riccardoella*

Note: The characters used here have been found to be identical in both sexes in the species represented in collections by males and females (*R. limacum*, *R. oudemansi* and *R. triodopsis*).

1. Trochanters III bare; coxae I with 1 seta; the three setae of the palptarsi and a few setae of the legs (apical segments) barbed and ending apically in a very thin and smooth filament; famulus of ereynetal organ short and less than half the length of the guard seta *t*

Riccardoella (*Riccardoella*) Berlese, 1923
 Monotypic, represented by *R. (R.) limacum* (Schrank, 1776)



Figs 3-11. *Riccardoella (Proriccardoella) novaezealandiae* Fain & Barker sp.n., holotype male. 3: Setae vi. 4: Setae II. 5: Setae ic 3. 6: Setae cx e. 7: Setae cx i. 8: Setae ge. 9: Setae gi. 10: Tarsus and tibia I with ereynetal organ. 11: Left palp in ventral view.
 Fig. 12. *Riccardoella (Proriccardoella) canadensis* Fain & van Goethem, 1986, left palp in ventral view.
 Scale lines: 10 μ m (11-12), 20 μ m (3-9), 50 μ m (10).

- Trochanters III with 1 seta; coxae I with 2 setae; all the setae of the palptarsi and of the legs not prolonged by a filament; famulus of ereynetal organ long, more than 60% the length of the guard seta *t* 2
Riccardoella (Proriccardoella) Fain & Van Goethem, 1986

2. Solenidion of tarsus II globulous, very thick (diameter 6-7 μ m); famulus of tibia I very thin, about as long as guard seta *t*, and very

shortly forked at apex; palptarsi with 4 setae; femora I with 6 setae.

Riccardoella (Proriccardoella) canadensis
 Fain & Van Goethem, 1986

- Solenidion of tarsus II cylindrical or subcylindrical; famulus of tibia I variable in shape; palptarsi with 4 or 3 setae; femora I with 4 to 6 setae 3

3. Palptarsi with 4 barbed setae; famulus of tibia I with apex not forked 4

- Palptarsi with 3 barbed setae; famulus of tibia I with apex forked 5

4. Famulus of tibia I slightly spindle-shaped in its apical half, and shorter than the guard seta; femora I with 6 setae; coxae with 2-1-2-1 setae; with 2 pairs of anal setae.

Riccardoella (Prorriccardoella) triodopsis
Fain & Klompen, 1990

- Famulus of tibia I spoon-like in its apical third, as long as the guard seta; femora I with 4 setae; coxae with 2-1-3-1 setae; with 1 pair of anal.

Riccardoella (Prorriccardoella) novaezealandiae Fain & Barker, new species

5. Coxae III with 3 setae; femora I and III with 6 and 3 setae respectively; famulus of tibia I slightly shorter than guard seta; solenidions of tarsi I-II 15 µm and 10 µm long respectively; setae of palptarsi subcylindrical.

Riccardoella (Prorriccardoella) oudemansi
Thor, 1932

- Coxae III with 2 setae; femora I and III with 6 and 4 setae respectively, famulus of tibia I about one third shorter than guard seta; solenidions of tarsi I and II 6 µm and 7.5 µm

long respectively; setae of palptarsi dilated apically.

Riccardoella (Prorriccardoella) reaumuri
Fain & van Goethem, 1986

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