

A NEW SPECIES OF *ZELANDOBIUS* (PLECOPTERA: GRIPOPTERYGIDAE: ANTARCTOPERLINAЕ) FROM NEW ZEALAND

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(Received and accepted 23 May, 1990)

ABSTRACT

Death, R.G. (1990). A new species of *Zelandobius* (Plecoptera: Gripopterygidae: Antarctoperlinae) from New Zealand. *New Zealand Natural Sciences* 17: 23-28.

Zelandobius pilosus n.sp., a hairy species of Gripopterygidae found in the streams of inland Canterbury is described. The adults are easily distinguished from others in the genus by the presence of longitudinal grey markings in the cells of the forewings and by the hairy appearance of the larvae. *Z. pilosus* is particularly unusual in that the adults only appear to emerge in mid-winter.

KEYWORDS: Plecoptera - Gripopterygidae - *Zelandobius pilosus*- new species - New Zealand.

INTRODUCTION

The stonefly genus *Zelandobius* Tillyard is endemic to New Zealand and contains six recognized species (McLellan 1969, 1977). In this paper a distinctive new species is described from material collected from the Porter River and adjacent streams in inland Canterbury. Winterbourn & Gregson (1989) drew attention to the existence of this species whose larvae have a hairy appearance unlike those of any other known species.

DESCRIPTION

ZELANDOBIUS PILOSUS N.SP.

Adult

General colour chestnut brown. Antennae filiform with 31-34 segments clothed in short dark hairs only visible with a light microscope. Length of scape 0.25 mm, pedicel 0.15 mm. Head a uniform chestnut brown with pale ocelli. Segment 5 of maxillary palp twice length of segment 4. Thorax clothed with long hairs predominantly on the pleurites. Pronotum (Fig. 1) rectangular, width:length ratio 1.20-1.55 (mean=1.39), all angles rounded, a paler band at the anterior and posterior ends. The posterior margin of the pronotum is flared upwards giving the appearance of a weakly developed ridge. Metanotum approximately the same width as head (males 1.1-1.4 mm, females 1.2-1.6 mm); mesonotum slightly wider.

Legs a lighter brown than thorax, clothed in hairs. Leg measurements as in Table 1. Forewing (Fig. 2) subhyaline with oval, longitudinal grey patches within most cells; maximum width:length ratio 0.24-0.34 (mean=0.28). Number of brown crossveins highly variable (Table 2), even differing between right and left wings of an individual. Hindwing uniformly hyaline. Abdomen chestnut brown with a variable amount of pale patterning in males. Dorsal surface of abdomen in females white and lacking sclerites except on segments 9 and 10 and two small plates on segment 1.

Male Genitalia (Fig. 3-5)

Central sclerite of tergite 10 curved strongly downwards. Posterior sclerite with upturned terminal knob. Epiproct with point varying in shape from a slightly upturned knob to a perpendicular, uniformly tapered point. Paraprocts relatively uniform in width with slight widening at distal end, curved upwards and slightly outwards with a round terminal portion. Sternite 9 with an ovoid sub-genital plate covered in fine transparent hairs. Cerci directed posteriorly and of 9 or 10 segments; basal sclerites directed laterally.

Female Genitalia (Fig. 6, 7)

Sternite 7 sclerotised; sub-genital plate and sternite 9 lacking sclerotisation. Sub-genital plate not extended on to sternite 9; hind margin slightly convex but emarginate medially. Subanal lobes

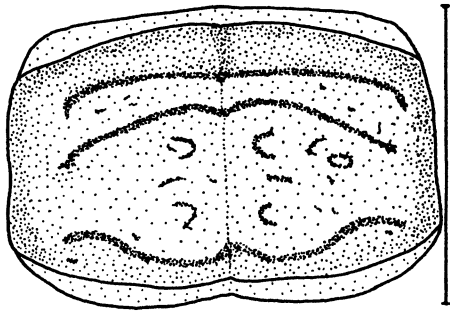


Figure 1. Pronotum. Scale bar = 1 mm.

with weakly pointed apices. Cerci with 7-10 segments.

Larva

General colour sandy brown, becoming progressively darker in later instars. Body and legs

covered in long (approx. 0.2 mm) translucent hairs (Fig. 8) that give the animal a shaggy appearance. Most of these hairs are in turn clothed in smaller hairs (Fig. 9), many with only half their circumference covered. The hairs trap detritus and make the larvae difficult to detect in their natural stream environment. Hairiness is greatly reduced in late instars (Fig. 10), which have hairs mainly on wing pads and legs. Head clothed in hairs; epicranium fairly uniformly coloured in earlier instars but with a more mottled appearance in late instars. Antennae filiform, tapering from a wide base to a relatively fine tip; segments becoming progressively elongate towards the distal end. Basal third of flagellum covered in whorls of long hairs similar to those on the body. Labrum without hairs. Ocelli absent or at least not visible with a light or scanning electron microscope. Pronotum rectangular with rounded angles; width:length ratio 1.7-1.9 (mean = 1.8) in middle instars, 1.5-1.8 (mean = 1.7)

Table 1. Mean leg dimensions (mm) (range in parentheses) of male and female *Zelandobius pilosus* (n = 19 specimens).

	MALE			FEMALE		
	Foreleg	Midleg	Hindleg	Foreleg	Midleg	Hindleg
Coxa	0.26 (0.22-0.30)	0.31 (0.25-0.38)	0.36 (0.30-0.38)	0.28 (0.25-0.32)	0.35 (0.28-0.40)	0.42 (0.38-0.48)
Trochanter	0.21 (0.17-0.25)	0.22 (0.17-0.25)	0.23 (0.20-0.25)	0.24 (0.23-0.28)	0.24 (0.22-0.280)	0.25 (0.23-0.30)
Femur	1.19 (1.15-1.25)	1.31 (1.25-1.38)	1.93 (1.83-2.10)	1.22 (1.17-1.30)	1.38 (1.25-1.45)	1.96 (1.88-2.00)
Tibia	1.45 (1.38-1.50)	1.59 (1.50-1.83)	2.36 (2.20-2.50)	1.43 (1.25-1.50)	1.64 (1.55-1.75)	2.44 (2.25-2.60)
Tarsus	0.73 (0.68-0.75)	0.76 (0.73-0.82)	0.99 (0.90-1.10)	0.77 (0.70-0.83)	0.80 (0.75-0.90)	1.03 (0.95-1.10)

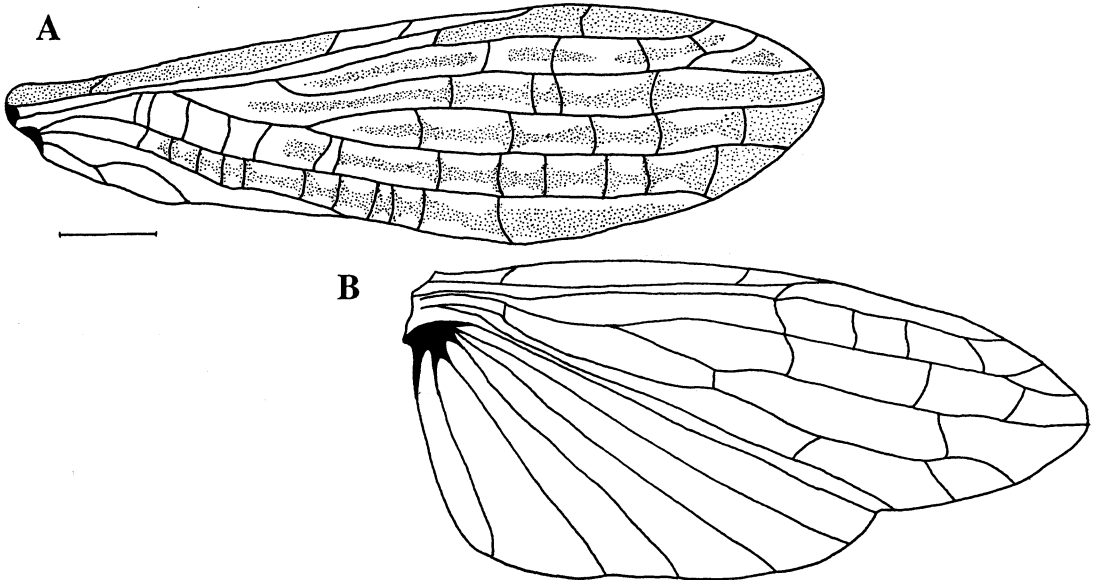


Figure 2. Wings. (A) Forewing. (B) Hindwing. Scale bar = 1 mm.

Table 2. Number of cross veins (mean and range) in the forewings of *Zelandobius pilosus* (n=25 specimens).

	Mean	Range
Humeral	2.7	1-4
Costal	2.9	1-5
Radial	4.2	3-6
Radio-medial	5.1	3-8
Medial	5.8	4-7
Medio-cubital	10.8	9-13
Intercubital	10.1	8-14

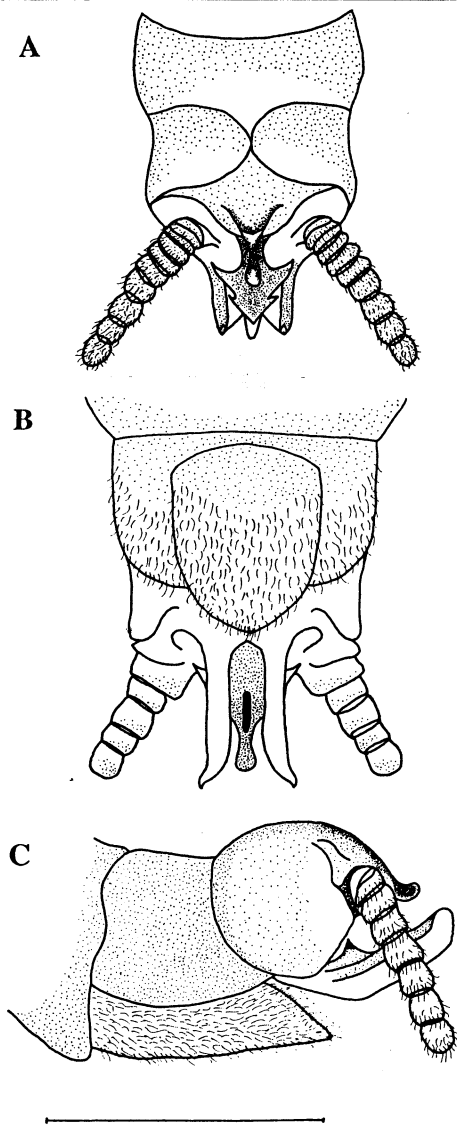


Figure 3. Male genitalia. (A) Dorsal view. (B) Ventral view. (C) Lateral view. Scale bar = 1 mm.

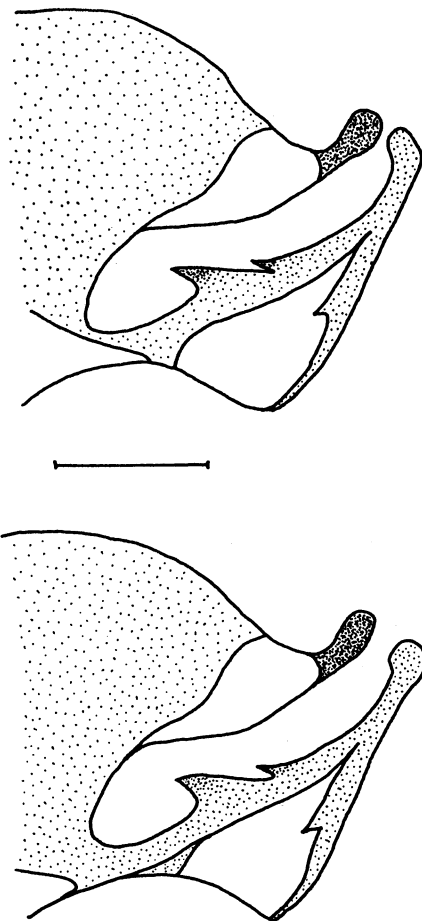


Figure 4. Lateral views of male tergite 10 and epiproct to show variability in shape of terminal point. Scale bar = 0.1 mm.

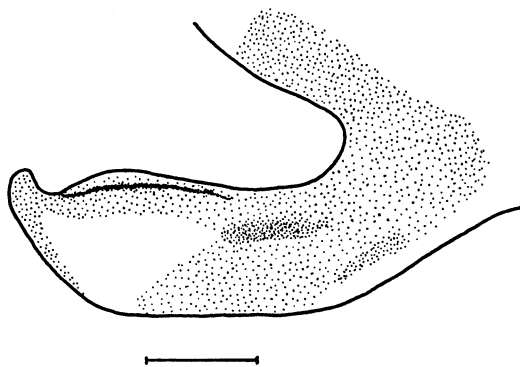


Figure 5. Lateral view of paraproct. Scale bar = 0.1mm.

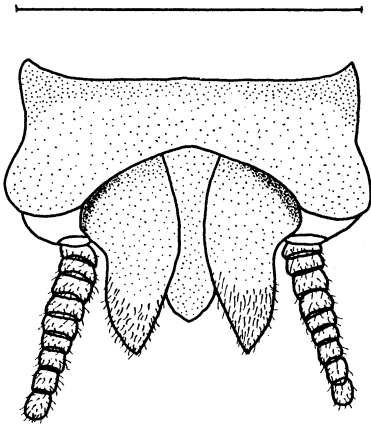


Figure 6. Female genitalia, ventral view. Scale bar = 1 mm.

in late instars. Pronotal hairs best developed around the periphery. Anterior and particularly posterior margins of pronotum slightly curved up so as to give the impression of a weakly developed ridge. Meso- and metanota thickly covered in hairs; hind margins of both plates straight. Legs clothed in hairs; tarsal claws long. Tibiae slightly longer than femora. Abdomen without a dorsal longitudinal ridge. A pale rectangular patch on abdominal tergites 5-9 is distinct in late instar larvae but less so in earlier instars. Tergite 10 weakly pointed and darker along its posterior edge. Cerci thread like, about half length of abdomen. Anal gill rosette well developed. Subanal lobes tongue shaped.

First instar larva

Body length 0.60-0.65 mm. Head width 0.21 mm. Eyes not visible. Antennae with 7-8 segments. A few long hairs present on body. Abdomen covered in short spines about 7 μ m long. Cerci 4-segmented.

Egg

Eggs are roughly spherical (Fig. 11), 0.3 mm diameter, with tuberculate sculpturing (Fig. 12).

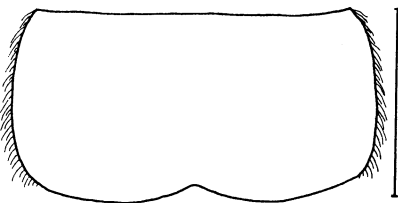


Figure 7. Female sub-genital plate. Scale bar = 0.5 mm.

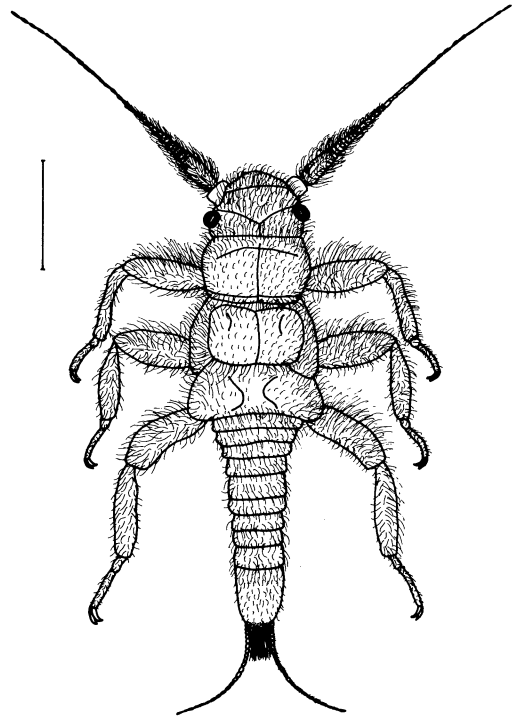


Figure 8. Middle instar larva. Scale bar = 1 mm.

Field collected adults laid the eggs in batches of 45-156, in petri dishes of water in the laboratory. Sometimes batches of eggs formed a coherent mass, 1 layer of eggs deep, which was stuck to the bottom of the petri dish with a jelly-like substance; other eggs were laid singly. Hatching of eggs occurred synchronously after 6 weeks at 5°C.

DIFFERENTIAL DIAGNOSIS

Adults clearly distinguished from others of the genus by the presence of longitudinal grey markings in cells of the forewings. Pronotum most similar to *Z. illiesi* with width:length ratio of 1.2-1.55, but lacking any spines or acute angles. Epiprocts of male with a pair of teeth on each outer margin as in type species (*Z. confusus* (Hare)). Paraprocts with a blunt terminal tip unlike those of *Z. confusus* which terminate in a dorsally directed tooth. Cerci directed posteriorly with laterally directed basal sclerite similar to *Z. fuscillatus* and *Z. unicolor*. Cerci shorter than in type species but similar to all others in the genus with 9-10 segments. Female sub-genital plate most similar to type species. Female cerci similar in length to oth-

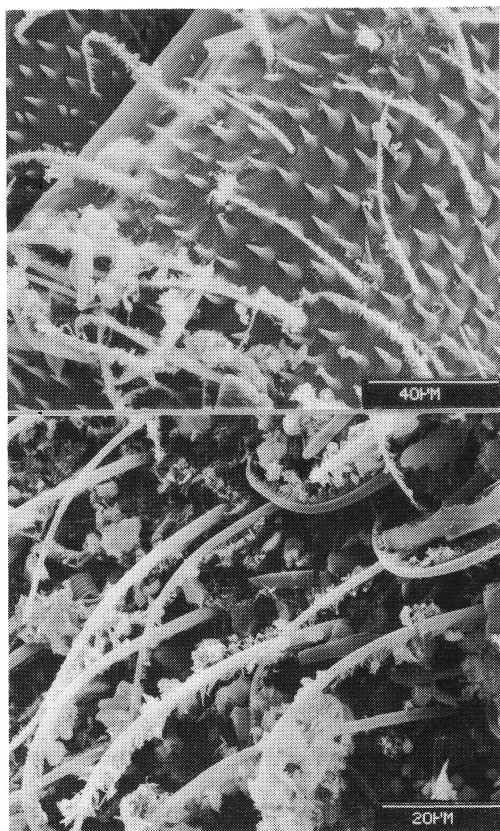


Figure 9. Scanning electron micrographs of hairs on pleurite of abdominal segment 5 of middle instar larva. (Note. The larva was placed in an ultrasonic cleaner for 10 s to remove some of the detritus and make viewing easier).

ers in genus except type species, with 7-10 segments.

Larvae are clearly distinguished from others in the genus by their very hairy appearance. Pronotum rectangular (width:length ratio 1.7-1.9) and most like that of *Z. fuscillatus*. Antennae re-

sembling those of *Z. illiesi* with basal portion covered in whorls of hairs. Hind margins of meso- and metanota straight unlike others in the genus. Abdomen lacking dorsal ridge found in *Z. fuscillatus* and *Z. unicolor*. Tergite 10 longer and more pointed than in type species, but similar to others in the genus. Cerci short and thread-like, most similar in length to *Z. unicolor*.

ETYMOLOGY

The specific name *pilosus*, (Latin for 'hairy') refers to the very hairy appearance of the larvae.

MATERIAL EXAMINED

Type material: Holotype ♂ : New Zealand, MC, Porter River, 732 m a.s.l., 27 Jun 1987, R.G. Death, NZAC. Paratypes: 1 ♂, 2 ♀♀, MC, Dry Stream, 16 Jun 1987; 6 ♂♂ 3 ♀♀, MC, Porter River, 27 Jun 1987, 4 Aug 1987 and 5 Jun 1988, R.G. Death; 8 mid instar larvae, MC, Porter River, 7 Mar 1990, R.G. Death, NZAC, AMNZ, NMNZ CMNZ. Other material examined 28 ♂♂ 19 ♀♀, MC, Porter River, 19 Jun 1987, 27 Jun 1987 and 4 Aug 1987, R.G. Death; 7 late instar larvae, MC, Porter River, 16 Jun 1987, R.G. Death; 2 mid instar larvae, MC, Porter River, 7 Mar 1990, R.G. Death.

NOTES ON BIOLOGY

All larvae were collected from small to medium sized streams in the Cass-Porter Heights region of inland Canterbury where they can occur in quite high densities. Although observations were made throughout the year, adults were only found during winter (June-August) when snow can lie on the ground for short periods, and air temperatures regularly fall below zero. Adults collected from the wild had no particulate materials in their guts but fed readily on sugar solution in the laboratory. Larvae appear to feed predominantly on detritus and periphytic algae although animal remains were found in guts of some late instar larvae.

DIMENSIONS OF ADULTS AND LARVAE (mm)

	Male (n=36)	Female (n=24)	Late instar larvae (n=7)	Mid instar larvae (n=10)
Body length	7.0-8.8 (\bar{x} =7.9)	9.3-10.6 (\bar{x} =9.8)	6.9-9.3 (\bar{x} =8.2)	3.7-4.3 (\bar{x} =4.2)
Head width			1.12-1.43 (\bar{x} =1.31)	0.92-0.97 (\bar{x} =0.94)
Forewing	8.0-9.0 (\bar{x} =8.4)	9.4-10.4 (\bar{x} =9.8)		
Antenna	5.8-7.2 (\bar{x} =6.4)	6.0- 7.9 (\bar{x} =6.9)	2.9-4.2 (\bar{x} =3.7)	2.0-2.8 (\bar{x} =2.5)
Cercus	0.43-0.58 (\bar{x} =0.50)	0.5-0.65 (\bar{x} =0.58)	0.8-1.1 (\bar{x} =0.9)	1.0-1.3 (\bar{x} =1.3)

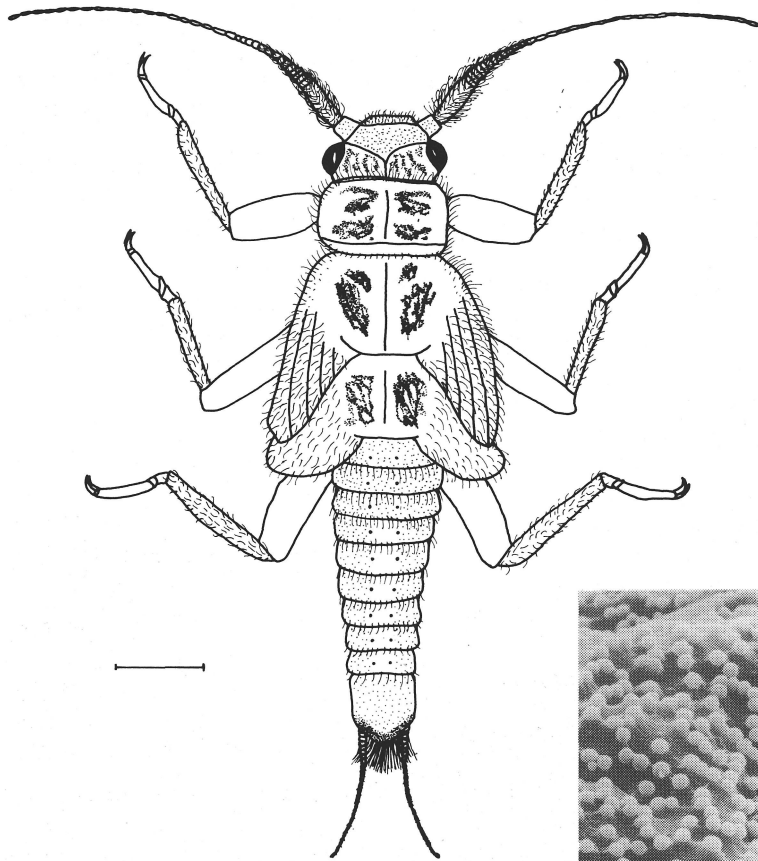


Figure 10. Late instar larva. Scale bar = 1 mm.

ACKNOWLEDGEMENTS

I am grateful to Mike Winterbourn for his encouragement and help in producing this manuscript, Jan Mackenzie for help with the Scanning Electron microscopy, and Tom Matheson for developing the photos. Thanks also to Ian McLellan for his comments on an earlier draft of this paper.

REFERENCES

McLellan, I.D. (1969). A revision of the genus *Zelandobius* (Plecoptera: Antartoperlinae). *Transactions of the Royal Society of New Zealand, Biological Sciences* 11(3): 25-41.

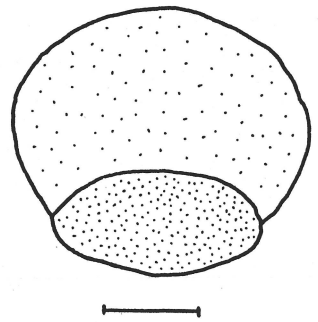


Figure 11. Egg. Scale bar = 0.1 mm.

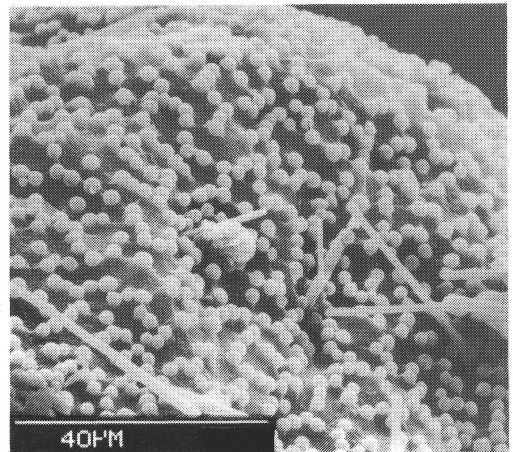


Figure 12. Scanning electron micrograph of egg showing surface sculpturing.

McLellan, I.D. (1977). New alpine and southern Plecoptera from New Zealand, and a new classification of the Gripopterygidae. *New Zealand Journal of Zoology* 4: 119-147.

Winterbourn, M.J. & Gregson, K.L.D. (1989). Guide to the Aquatic Insects of New Zealand. *Bulletin of the Entomological Society of New Zealand* 9.