



## A NEW SPECIES OF *NOTOPERLA* (PLECOPTERA: GRIPOPTERYGIDAE) FROM CHILE

Ian McLellan<sup>1</sup>, Maritza Mercado<sup>2</sup> & Simon Elliott<sup>2</sup>

<sup>1</sup>Research Associate, Landcare Research Ltd., Auckland, New Zealand (Postal address: PO Box 95, Westport, New Zealand)  
E-mail: [mclellan@xtra.co.nz](mailto:mclellan@xtra.co.nz)

<sup>2</sup>BENTHOS, Estudios en Aguas Continentales, Independencia 625, tercer piso, Valdivia, Chile  
E-mail: [maritzamercado@uach.cl](mailto:maritzamercado@uach.cl) and [selliott@entelchile.net](mailto:selliott@entelchile.net)

### ABSTRACT

*Notoperla macdowalli* new species is described from an apterous male and larvae collected from Estero La Leonera, Santuario de la Naturaleza Yerba Loca, Región Metropolitana, Chile. A comparison with the other species of the genus and a description of habitat are given.

**Keywords:** Systematics, Plecoptera, Gripopterygidae, *Notoperla macdowalli* new species, Chile

### INTRODUCTION

*Notoperla*, a poorly known South American genus, has so far been found between Latitude 33°00'00" S and 54° 50' 00" S in Chile and Argentina. Four species are known, the type species *N. fuegiana* (Enderlein), *N. archiplatae* Illies, *N. tunelina* (Navas), and *Notoperla macdowalli*, the new species described here.

This genus is urgently in need of revision but so far the available material is sparse and mainly consists of nymphs from scattered localities. An adequate revision will only be possible when sufficient material, including many adults is collected from a network of localities through Chile and Argentina.

The type material and other material examined are deposited in collections indicated by abbreviations in parentheses in type data and material examined. The abbreviations for the repositories are: BENTHOS, Estudios en Aguas Continentales, Independencia 625, tercer piso, Valdivia, Chile; MNHNC, Museo Nacional de Historia Natural, Santiago, Chile; NZAC, New Zealand Arthropod Collections, Landcare Research Ltd., Auckland New Zealand.

*Notoperla* Enderlein, 1909

*Notoperla* Enderlein, 1909, p. 393.

*Senzilla* Navás, 1917, p. 192.

*Abranchioperla* Illies, 1958, p. 123.

*Notoperla*, Illies, 1963, pp. 163 – 171.

Type species *Notoperla fuegiana* (Enderlein 1905)

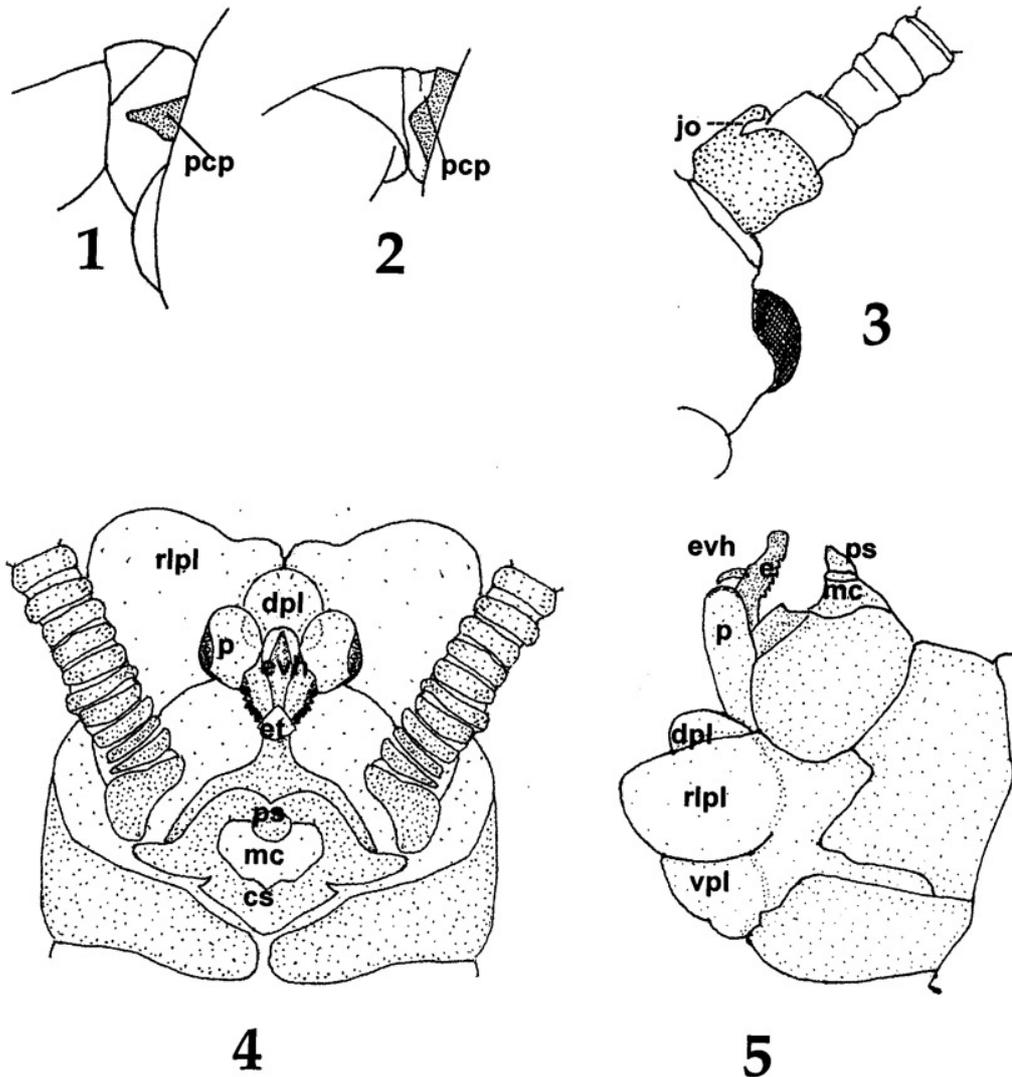
Illies (1958) described *Abranchioperla archiplatae* from larvae only and proposed the genus *Abranchioperla* and the family *Abranchioperlidae* to contain the species *Abranchioperla archiplatae*. He based the generic and family name on the lack of anal gill filaments in larvae and chose as the holotype a larva from a mountain stream at 2000m by Lo Valdés near Santiago, Chile (33° 45' 00" S).

Illies (1960) gave a diagnosis for *Abranchioperlidae*, described and illustrated the female of *Abranchioperla archiplatae* from a female from Rio Murta which flows into Lago Buenos Aires (46° 30' 00" S) and illustrated a larva from Rio San Ricardo in Tierra del Fuego. In 1963 Illies revised *Notoperla* and declared *Abranchioperla* a new synonym. He also stated that his 1960 *A. archiplatae* larval illustration was that of the larva of *Notoperla fuegiana* and that the female he described was a *N. tunelina* female. He then invalidly designated as holotype of *Notoperla archiplatae* a male from Las Trancas, Cordillero Nuble, Chile (36° 56' 00" S) and the previous holotype larva as a paratype. For the 3 species known at that stage he supplied a distribution map showing *Notoperla fuegiana* restricted to Tierra del

Fuego; *N. tunelina* from Patagonia to Chiloe Island and *N. archiplatae* above there to about level with Santiago.

Illies (1963) is still the authority on *Notoperla* but should be used carefully for 3 reasons. There is still

insufficient information on the known species, there may be other undescribed species and the distribution map may not show the true distribution of the species.



Figs. 1- 5. *Notoperla macdowalli*. 1. Adult left front procoxal projection. (pcp - procoxal projection); *Notoperla archiplatae*. 2. Adult left front procoxal projection. (pcp - procoxal projection); *Notoperla macdowalli*. 3. Johnston's Organ. (jo - Johnston's organ). 4. Male genitalia, dorsal. (e - epiproct, evh - epiproct ventral hook, mc - membranous cone, dpl - dorsal penial lobe, rlpl - right lateral penial lobe, p - paraproct, ps - posterior sclerite). 5. Male genitalia, lateral. (e - epiproct, evh - epiproct ventral hook, cs - central sclerite, mc - membranous cone, dpl - dorsal penial lobe, rlpl - right lateral penial lobe, vpl - ventral penial lobe, p - paraproct; ps - posterior sclerite).

***Notoperla macdowalli*, McLellan & Mercado**

(Figs. 1, 3-6)

**Material.** Holotype ♂, Chile, Region Metropolitana, Estero La Leonera, Santuario Nacional Yerba Loca, altitude 1812 m; 33° 18' 40.5" S; 70° 19' 15.24" W, Oct. 2003, Simon Elliott (MNHNC); 1 paratype mature female larva, Chile, Region Metropolitana, Estero La Leonera, altitude 1812 m; 33° 18' 40.5" S; 70° 19' 15.24" W, Oct. 2003, Simon Elliott (BENTHOS); 4 paratype female larvae, Chile, Region Metropolitana, Estero La Leonera, Santuario Nacional Yerba Loca, altitude 2297 m; 33° 18' 54.72" S; 70° 18' 22.92" W, Oct. 2003, Simon Elliott (MNHNC); 1 paratype male larva, 2 paratype female larvae, Chile, Region Metropolitana, Estero La Leonera, Santuario Nacional Yerba Loca, altitude 2297 m; 33° 18' 54.72" S; 70° 18' 22.92" W, Oct. 2003, Simon Elliott (NZAC). **Other Material Examined.** 51 larvae, Chile, Region Metropolitana, Santuario Nacional Yerba Loca, 17 – 20 Sept. 2003, A. Vera (MNHNC).

**Male.** Body length 19.5 mm; antenna 13.5 mm; cercus 8.5 mm. A teneral wingless specimen with pale legs and pronotum; remainder of body light brown with darker bars on antennae. Dorsal surface of body glabrous. Ventral surface of abdomen with last 3 sternites and ventral plate densely covered with short bristles, those in the center of ventral plate with circular bases. Head with large black eyes and 3 prominent ocelli; distal segment of maxillary palp not expanded at tip; Antennae clothed in minute dark hairs, pedicel with prominent Johnston's organ (Fig. 3). Pronotum subrectangular, wider posteriorly and with all angles well rounded. Mesonotum and metanotum without wings, with small flaps in their place. All legs with a pair of tibial spurs. Forelegs with a sharply pointed triangular procoxal production (Fig. 1), this production not as pronounced on the remaining legs.

**Male genitalia.** Tergite 10 with medial sclerite sclerotized but almost transparent with white papillate setae scattered over its surface; membranous cone about as long as medial sclerite with minute dark spines over its surface; posterior sclerite lightly sclerotized, about half as long as cone and with a rounded tip. Epiproct with smooth, unadorned basal half; distal half abruptly curved upwards, each margin tapered and with a row of triangular teeth, apex rounded and ventral hook

large. Paraprocts broad, not tapered, short (terminating before ventral hook) and with rounded tip. Penis membranous with 4 lobes (a pair of large lateral lobes, a large ventral lobe and a small dorsal lobe). Cerci clothed in short dark hairs.

**Female.** Unknown.

**Larva.** Fringe of hairs mediadorsally on the body, and also dorsally on cerci and legs. Procoxal projections on the front legs are pointed and triangular. Distinct dark marks across abdominal tergites 1-9 and 4 dark marks on the mid base of tergite 10. Hind margin of abdominal tergite of mature male larva not greatly produced and much rounded.

**Etymology.** This species is dedicated Dr. R. M. McDowall (NIWA, Christchurch, New Zealand) for his extensive work on the freshwater fishes of the Southern Hemisphere.

**Comparison with other species.** The adults of *N. macdowalli* are apterous but those of *N. fuegiana*, the type species of the genus and *N. archiplatae* and *N. tunelina*, are winged although wing length may vary from full length to brachypterous. In the male genitalia the epiproct of *N. macdowalli* is much shorter and thicker than that of *N. fuegiana*, *N. archiplatae* and *N. tunelina*, but the posterior sclerite and membranous cone of *N. fuegiana*, *N. macdowalli* and *N. archiplatae* are similar in length. However in the holotype of the latter species it looks shorter because the shrivelled condition of the specimen has caused a depression at the tip of the membranous cone and the posterior sclerite is sunk in it. The membranous cone of *N. tunelina* is much longer than that of the other species. The paraprocts of all species are similar.

The larvae of *N. fuegiana*, *N. archiplatae* and *N. tunelina* have wingpads but *N. macdowalli* larvae have none. *N. macdowalli* and *N. tunelina* larvae possess pointed and triangular procoxal projections but those of *N. fuegiana* and *N. archiplatae* are rounded. There is a hairy fringe along the dorsal midline of thorax and abdomen of *N. macdowalli*, *N. archiplatae* and *N. tunelina* but not on *N. fuegiana*. The larva of the new species is more robust than the more slender larva of *N. archiplatae*. The abdominal markings are darker and more pronounced than in *N. archiplatae* where they are fainter on tergites 1-9 and absent on tergite 10. Also tergite 10 in the larva of *N. macdowalli*, is not

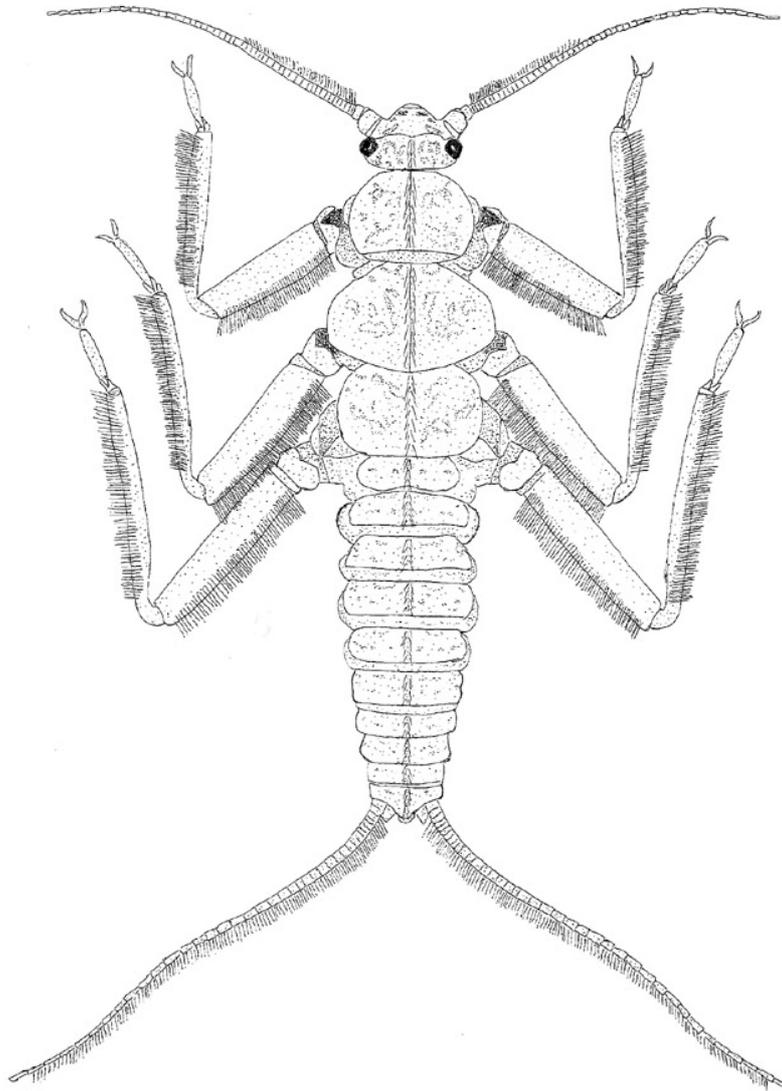


Fig. 6. *Notoperla macdowalli*: larval, habitus.

produced much and is very rounded, even in male larvae, but in *N. archiplatae* it is produced to a sharp point in both male and female larvae.

**Remarks.** Tibial spurs are present only in the last instar larvae of all *Notoperla* species. Their absence on earlier instars has caused some confusion in attempts to construct keys for South American gripopterygids.

A lobed penis used for producing and inserting a spermatophore is common to all members of the Antartoperlaria (McLellan 1993). This organ is invaginated under the subgenital plate and

evaginated just prior to copulation. There is some variability in the number of lobes. In Austroperlidae for example in the *Klapopteryx* of South America *K. armillata* has 3 lobes and *K. kuscheli* has 7 (McLellan 2001). In New Zealand the monotypic austroperlid genus *Austroperla* has 5 (McLellan 1997), in *Zelandobius* (Antartoperlinae) there are between 3 and 5 (McLellan 1993), yet all *Stenoperla* (Eustheniidae) have 4 lobes (McLellan 1996) and all species of *Zelandoperla* have 3 lobes (McLellan 1999). In some genera, but not others, the number of lobes

and their shape could be useful characters in distinguishing species, however specimens with evaginated penes are not common.

There are quite a number of apterous species in Gripopterygidae of South America and New Zealand. They are usually alpine species or species at

higher latitudes where they are subject to cold temperatures and high winds. In some cases a species may have wing variation in populations ranging from apterous through to full wing populations.

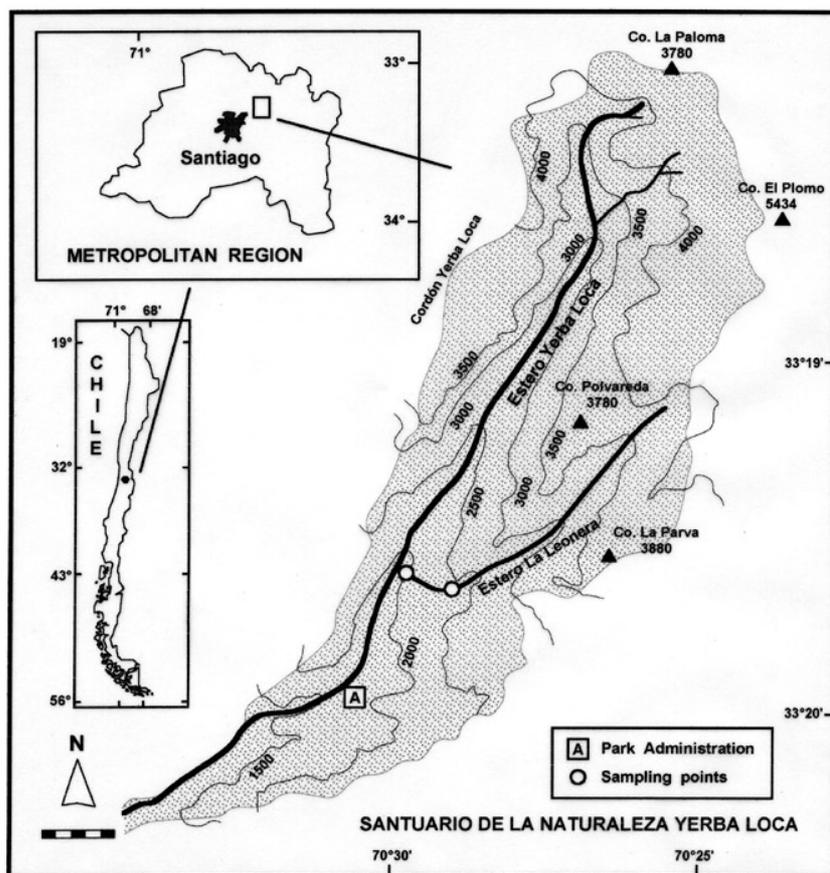


Fig. 7. Locality maps.

**Locality and environment description.** Estero La Leonera (see Figure 7) is located in the Yerba Loca Natural Sanctuary in the Andean piedmont of the Metropolitan Region of Chile. It is a permanent first order stream, main tributary of Estero Yerba Loca and ultimately part of the larger Maipo basin.

As with most Andean watercourses at this latitude, La Leonera has a nivo-glacial regime with violent late spring runoffs in December and minimal flow in late fall (autumn).

The environment is semiarid piedmont with sparse vegetation of Andean sclerophytes that form

low forests along the watercourses and deep creeks. Such woods are seldom more than 10 m wide but can be quite dense and in some stretches even cast a canopy over the watercourse. The dominating arboreal species at La Leonera are *Escallonia revoluta* (Lun o Ñipa) aprox.70%, and *Kageneckia angustifolia* (Olivillo), aprox. 30%. Both are native and they provide ample allochthonous matter although the wood and leaves are hard and slow to decay .

Physico-chemical conditions in La Leonera, as sampled in September 2004, showed cold oligotrophic waters (pH: 7.65, Conductivity: 95.9  $\mu$ S/cm,

Table 1. Other macro-invertebrates in Estero La Leonera.

Species	Family	Order	Abundance
<i>Protochauliodes sp.</i>	Corydalidae	Megaloptera	less scarce
<i>Simulium sp.</i>	Simuliidae	Diptera	less scarce
<i>Dicrotendipes sp.</i>	Chironomidae	Diptera	scarce
<i>Dasybasis andicola</i>	Tabanidae	Diptera	scarce
<i>Hydaticus sp.</i>	Dytiscidae	Coleoptera	less scarce
<i>Antarctoperla michaelsoni</i>	Gripopterygidae	Plecoptera	abundant
<i>Neonemura barrosi</i>	Notonemouridae	Plecoptera	scarce
<i>Metamonius anceps</i>	Nesameletidae	Ephemeroptera	abundant
<i>Massartellopsis irarrazavali</i>	Leptophlebiidae	Ephemeroptera	most abundant
<i>Meridialaris sp.</i>	Leptophlebiidae	Ephemeroptera	scarce
<i>Andesiops peruvianus</i>	Baetidae	Ephemeroptera	abundant
<i>Polycentropus sp.</i>	Polycentropodidae	Trichoptera	less scarce
<i>Pseudoradema spinosissimum</i>	Hydrobiosidae	Trichoptera	abundant

TDS: 76.6 mg/L, BOD<sub>5</sub>: <2.0 mg/L, PO<sub>4</sub>-P: 3.2 µg/L, P: 11.2 µg/L, T°: 4.6°C). The accompanying macrozoobenthic fauna (Table 1) is consistent with good water quality. Other Plecoptera were found such as *Antarctoperla michaelsoni* and *Neonemura barrosi*, as well as abundant mayflies such as *Massartellopsis irarrazavali* and *Metamonius anceps*, the latter is known to be very demanding in environmental quality, inhabiting only rhithronic waters undisturbed by human activity.

In contrast, there is no macrozoobenthos in Estero Yerba Loca, nor is there any aquatic vegetation, apparently because of the high sulphate, arsenic, copper and iron content of the water plus high acidity (pH 3.45). These characteristics are entirely natural, because Estero Yerba Loca issues from La Paloma Glacier where it is poisoned by minerals which the glacier pours into it as it grinds over the rocks containing those elements. Therefore Yerba Loca may be considered a barrier for the dispersal of freshwater fauna from and into La Leonera.

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