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A Revision of the Genus *Zelandobius* (Plecoptera:  
Antarctoperlinae)

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**Abstract**

A NEW diagnosis is given for *Zelandobius*. The descriptions of *Zelandobius confusus* (Hare), *Z. furcillatus* Tillyard, and *Z. unicolor* Tillyard are revised and *Z. pallidus* Winterbourn is placed in synonymy with *Z. confusus* (Hare). The genitalia and larva of *Z. unicolor* Tillyard are described for the first time. *Z. illiesi* n.sp., is described and figured. Keys to adults and larvae are given, and *Z. hudsoni* (Hare) is declared *nomen dubium*.

INTRODUCTION

HARE (1910) described the first known species of this genus placing them in *Leptoperla*, but Tillyard (1921) erected the present generic name to contain two new species described by him and two described by Hare. Originally *Zelandobius* was assigned to the family Leptoperlidae by Tillyard (1921) but was later transferred to Gripopterygidae when Kimmins (1951) pointed out the priority of Gripopterygidae over Leptoperlidae. When Illies (1963) divided Gripopterygidae into five subfamilies he placed *Zelandobius* in Antarctoperlinae but with reservations. However, after my investigations I see no reason why this genus should not remain in that subfamily.

Family GRIPOPTERYGIDAE Enderlein, 1909

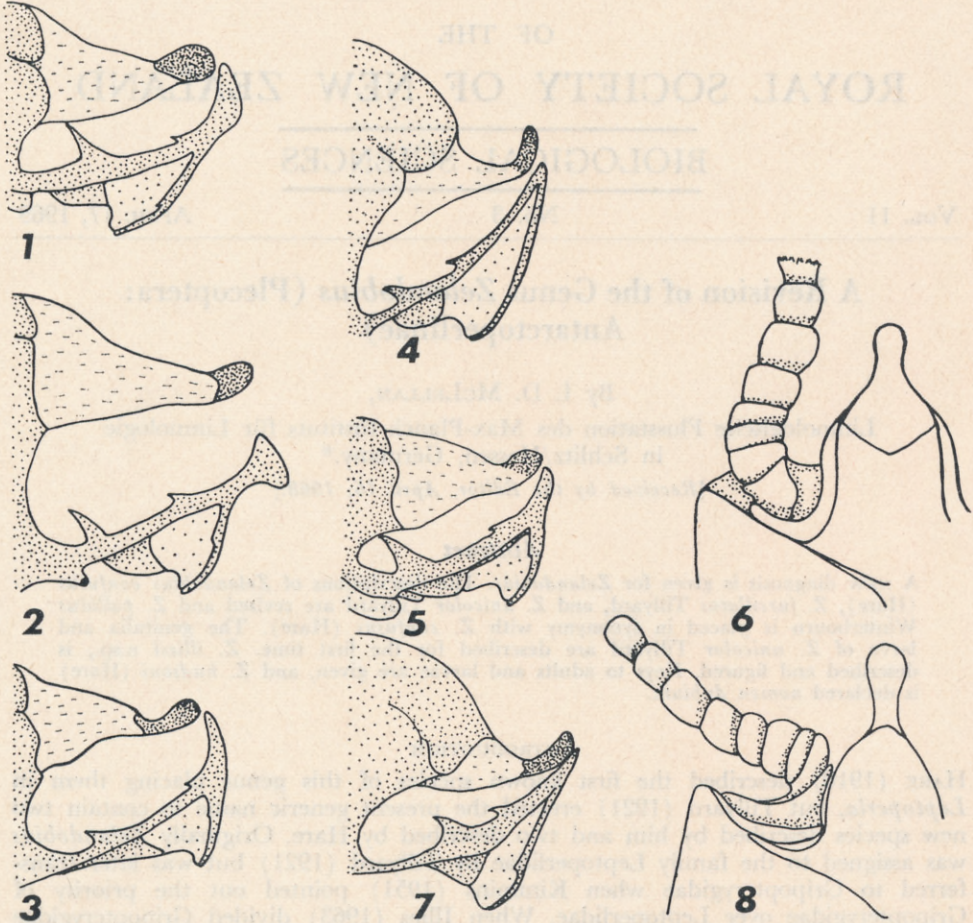
Subfamily ANTARCTOPERLINAE Enderlein, 1909

DIAGNOSIS: Small to medium-sized insects with forewing up to 15mm. Pterostigma always without crossveins. Rs unforked or with a very short fork which may be difficult to recognise when its anterior branch is fused with R. Cu 1, always unforked in the forewing. Cerci very strongly shortened, imagines with 5–15 segments. Male with segment X divided into tergite and pleurites—the pleurites may fuse dorsally so that the tergite lies behind them. Tergite XI more or less distinctly present at least as a rudiment. Larvae, at generic level, of very different physique, usually with pointed or spinose prolongations of the pronotal corners. Maxillary palp with segment IV slightly shortened in comparison with segments III and V.

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FIGS. 1-8.—FIGS. 1, 2, 3, 5.—*Zelandobius confusus* (Hare), Lateral views of tergite XI and epiproct showing variability of male genitalia; FIG. 4.—*Zelandobius unicolor* Tillyard, Male genitalia, lateral view of tergites X and XI and epiproct; FIG. 7.—*Zelandobius furcillatus* Tillyard, Male genitalia, lateral view of tergites X and XI and epiproct; FIG. 6.—*Zelandobius confusus*, Male genitalia, dorsal view of tergites X and XI and cerci; FIG. 8.—*Zelandobius furcillatus*, Male genitalia, dorsal view of tergites X and XI and cerci.

### *Zelandobius* Tillyard, 1921

*Zelandobius* Tillyard, 1921, *Canad. Ent.* 53: 43.

**DIAGNOSIS:** Maxillary palp with distal segment almost twice as long as IVth. Rs in both wings with terminal fork. Distal crossveins in forewing irregularly placed and not numerous. Hindwing with fusion of M3+4 and Cu 1 incomplete distally. **Male Genitalia:** Tergite X with a rudiment of tergite XI projecting posteriorly more or less in the form of a cone terminating in a sclerotised knob. Epiproct hastate in plan, with a ventrally projecting spine arising from near its apex and usually with a pair of teeth on each lateral margin. Paraprocts not tapered but wide distally and usually dorsally concave. **Female Genitalia:** With or without production of sternite VIII on to sternite IX. **Larva:** Subanal lobes tongue-shaped. Distal segment of maxillary palp almost twice as long as IVth segment. Segment X of abdomen usually long and bulged basally. Cerci short and in some species thread-like. Legs without hairy fringe.



Type species: *Leptoperla confusus* Hare, 1910.

Note: The holotype has apparently been destroyed.

*Zelandobius confusus* (Hare, 1910). Figs. 1–3, 5, 6, 11, 12.

*Leptoperla confusa* Hare 1910, *Trans. N.Z. Inst.* 42: 29.

*Zelandobius confusus* (Hare) Tillyard, 1921, *Canad. Ent.* 53: 43.

*Zelandobius pallidus*: Winterbourn, 1965, *N.Z. Jl Sci.* 8: 3: 275–277.

DIAGNOSIS: Pronotum rectangular (width-length ratio 1.3 approximately), with angles rounded. Forewing with distal crossveins surrounded by grey markings either as an oval around each crossvein or as irregular patches surrounding those crossveins which approximately form transverse lines. *Male Genitalia*: Tergites X and XI almost campaniform laterally. Cerci of 12–15 segments with basal segments directed posteriorly. Epiproct with a pair of teeth on each lateral margin. Paraprocts with a short terminal spine. *Female Genitalia*: Subgenital plate not produced and with hind margin emarginate medially. Cerci 10–13 segments. *Larva*: Pronotum rectangular, slightly wider than long. Posterior margin of mesonotum deeply reentrant. Tergite X not bulged basally. Cerci half body length. Clothing of very short bristles.

#### DESCRIPTION OF IMAGO

##### Measurements (in mm):

		Male	Female
Body Length	.....	7–10.5	8–12
Forewing	.....	6.5–10	7–12
Antenna	.....	6–9.5	6–10.5
Cercus	.....	0.5–1	0.5–1

*General Colour*: Gold brown to dark brown. *Head*: Antennae covered with short dark hairs; scape twice as long as pedicel. Dorsal callosities oval and slightly darker than rest of head. Epicranium mottled. Segment V of maxillary palp almost twice as long as segment IV. *Thorax*: Pronotum rectangular, slightly wider than long with angles rounded. *Wings*: Forewing with distal crossveins surrounded by grey markings which occur either in the form of an oval around each crossvein or as irregular patches surrounding those crossveins which approximately form transverse lines. Remainder of forewing tinged grey-brown with or without a slightly darker pterostigma. *Male Genitalia*: Tergites X and XI almost campaniform with the terminal sclerotised knob variable in shape (Figs. 1, 2, 3, 5). Cerci 12–15 segments with the basal segments directed posteriorly (Fig. 6). Paraprocts wide distally and curved outwards and upwards each with a short terminal spine which may be directed inwardly or dorsally. Epiproct with a pair of teeth on each lateral margin. Sternite IX forms a broad ovoid subgenital plate. *Female Genitalia*: Subgenital plate not extended on to sternite IX, wide posteriorly with hind margin emarginate medially. Cerci with 10–13 segments. Subanal lobes with rounded apices.

#### DESCRIPTION OF LARVA (late instar), (Fig. 9).

##### Measurements (in mm):

		Male	Female
Body Length	.....	7–11	8–12
Antenna	.....	4–5	5–5.5
Cercus	.....	3.5–4	4–4.5

*Colour*: Amber dorsally, lighter ventrally. *Clothing*: Covered with very short bristles. *Head*: Epicranium and dorsal callosities no darker than rest of head. Eyes reddish-brown; ocelli present. Antennae with pedicel much shorter than scape. Maxillary palp with distal segment twice as long as IVth segment; lacinia with



two lacinia dentes and a row of bristles on dorsal edge. Mandibles with strong teeth and basal grinding plate. *Thorax*: Pronotum rectangular, slightly wider than long (width to length ratio 1.3 approximately). Posterior margin of mesonotum deeply re-entrant. *Legs*: Wide and flattened femora and tibiae; short spines on distal

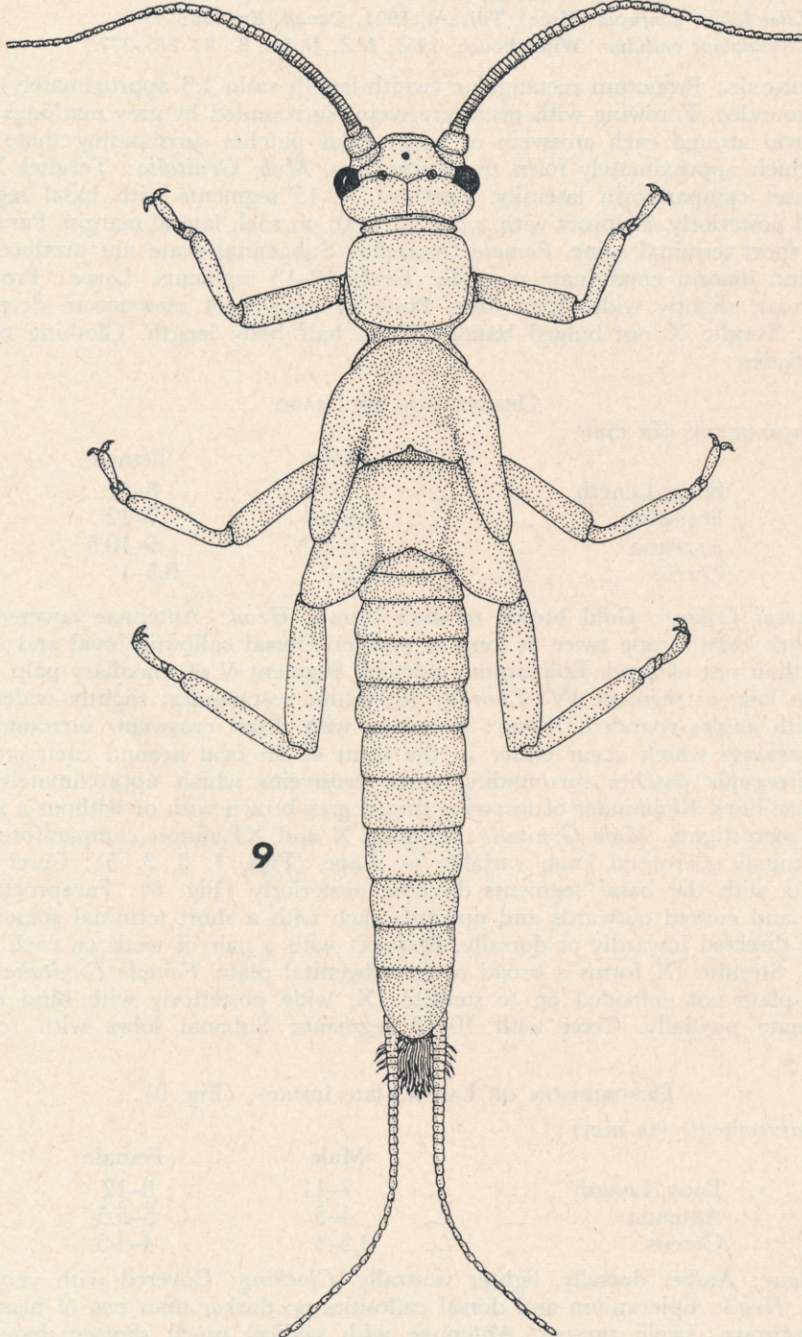


FIG. 9.—*Zelandobius confusus*, Late instar larva, dorsal view.



ventral portion of tibiae and tarsal segments I and II. *Abdomen*: Tergite X not bulged basally. Gills a well-developed anal rosette.

**VARIATION**: This common species shows some variation in size and wing coloration from population to population. Wing coloration may or may not be allied with small differences in male genitalia. Four forms encountered with different wing coloration in the forewing are:—

(a) The type form as described by Hare (1910) and Tillyard (1923) and illustrated in Fig. 11. This form is usually found with tergites X and XI and the epiproct of the shape shown in Fig. 5. An exception was found in a single specimen from the Upper Hollyford Valley, Fiordland, which has an epiproct of the shape shown in Fig. 2.

**DISTRIBUTION**: Widespread throughout northern and western areas of the South Island and found in southern and central parts of the North Island.

(b) The Ohika form which has wing coloration similar to the type form but with each distal crossvein outlined in hyaline. The genitalia of this form as shown in Fig. 3. Again a single exception in male genitalia occurs in a specimen from the Lower Hollyford Valley—the genitalia being identical with the type form shown in Fig. 5.

**DISTRIBUTION**: Apart from the Hollyford specimen this form is found in the Ohika-nui River which enters the Buller River 12 miles above Westport.

(c) The northern *pallidus* form described by Winterbourn (1965) as *Z. pallidus*. This form has each distal crossvein surrounded by a faint grey oval and male genitalia identical with the type form, Fig. 5.

**DISTRIBUTION**: Found in northern and north-eastern areas of the North Island.

(d) The southern *pallidus* form which has much darker and distinct ovals surrounding the distal crossveins and has male genitalia of the pattern shown in Fig. 1.

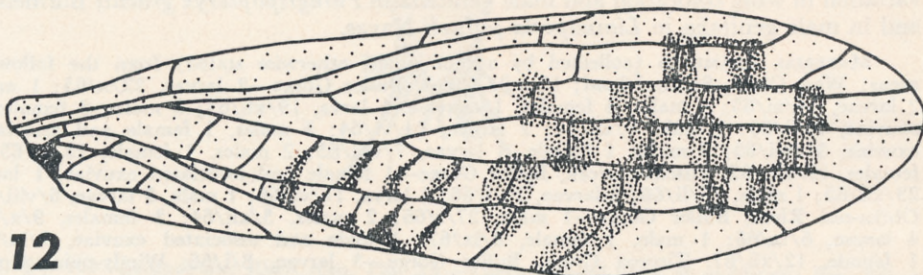
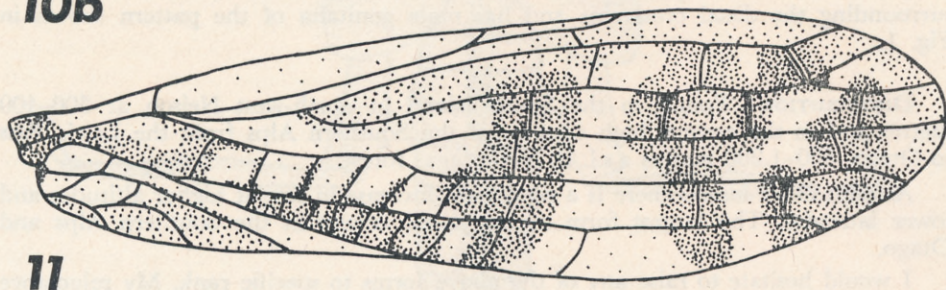
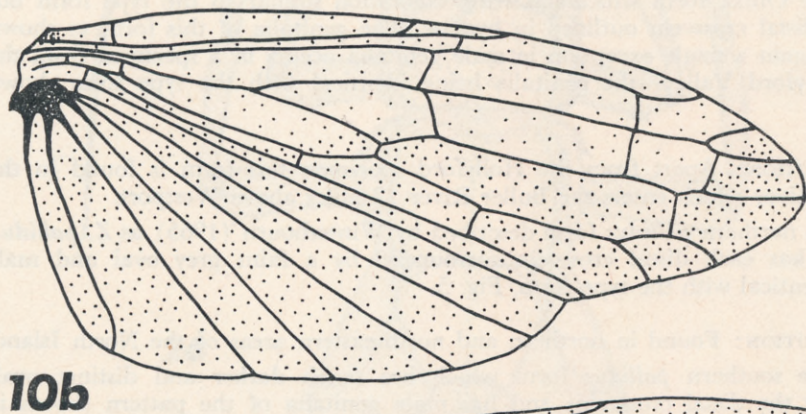
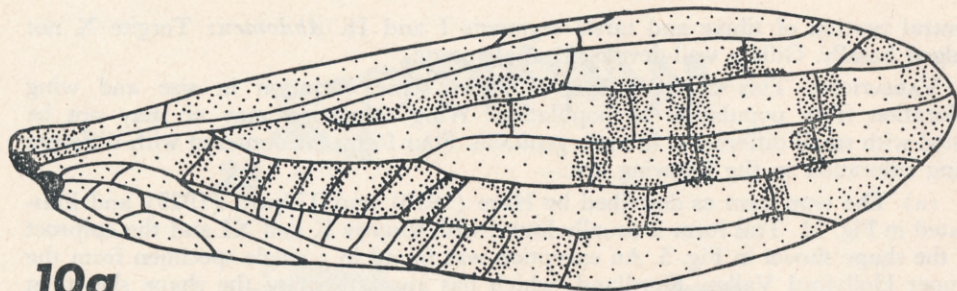
**DISTRIBUTION**: Found in the South Island in north-west Nelson at 300–400 metres and in the eastern high country of the Southern Alps from the Lewis Pass to Otago, 600–1,200 metres a.s.l. in *Nothofagus* forest.

As with other insects there is a significant increase in size at higher altitudes and lower latitudes. The largest form so far found occurs in the Southern Alps and Otago.

I would hesitate to raise any of the above forms to specific rank. My reluctance arises from the fact that, apart from those differences noted, in all other characteristics these forms are identical and that the same degree of intraspecific variability occurs in other species of Gripopterygidae. Illies (1963) described comparable variation in wing coloration and male genitalia in *Paragripopteryx gracilis* Burmeister and in male genitalia in *Limnoperla jaffueli* Navas.

**MATERIAL EXAMINED** (collected by author unless otherwise stated) from the following areas: West Coast, South Island; 10-mile Creek, Buller Gorge—2 larvae, 22/x/65; 1 male, 2 larvae, 14/xi/65; 4 males, 4 females, 1 exuviae, 1 larva, 19/xii/65; 8 males, 3 females, 2 exuviae, 16/i/66; 1 male, 6/xii/64; 2 larvae, 24/vi/64; 4 males, 1 female and associated exuviae, 31/vii/65; 5 males, 1 female, 3 larvae, 7/viii/65; 2 males, 1 female, 25/ix/65; 2 females, 19/viii/67. Fuschia Creek, Buller Gorge—1 female and associated exuviae, 1 larva, 23/xii/65; 1 male, 26/ii/66; 2 larvae, 26/i/66; 1 larva, 11/vi/66; 1 male, 3 larvae, 6/viii/66. Ohika-nui River, Buller Gorge—1 male, 27/i/66; 2 males, 5/xii/64; 3 females, 9/x/65; 4 larvae, 6/ix/66; 1 male, 1 female, 8/ix/67; 1 male and associated exuviae, 7/ix/67; 1 female, 12/xii/67. Tiroroa Creek, Buller Gorge—3 larvae, 8/i/66. Windy-point Creek, Buller Gorge—1 male, 8/ix/67. Rahu Creek, Rahu Saddle, Maruia—32 larvae, 2/ix/65; 2 males, 3 females, 16/x/65; 1 female, 4/xii/65. Duffy Creek, Rahu Saddle—3 larvae, 30/x/65.





FIGS. 10-12.—FIGS. 10a, 10b.—*Zelandobius illiesi* n.sp. Wings; FIGS. 11, 12.—*Zelandobius confusus*, Forewings to show variability.



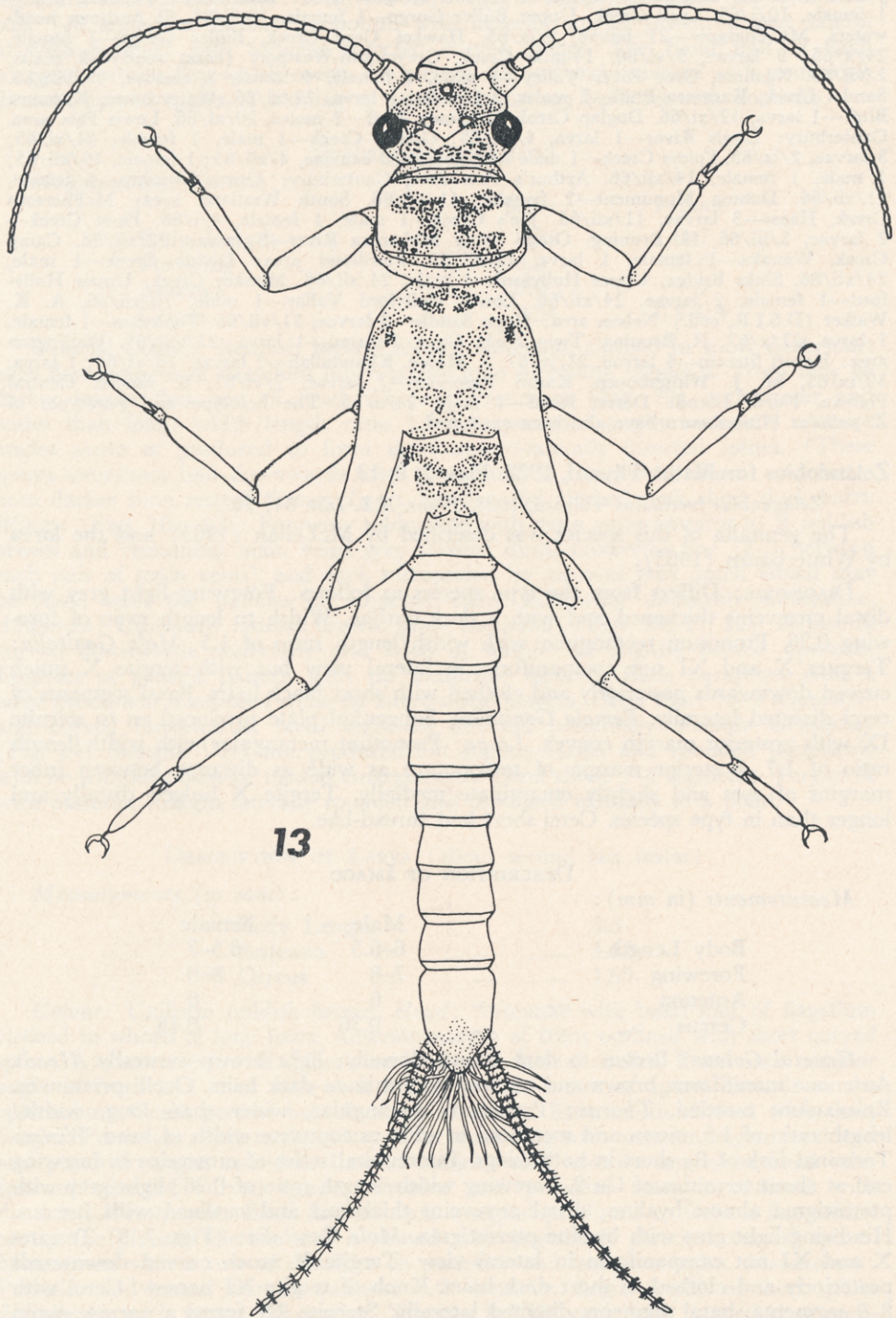


FIG. 13.—*Zelandobius furcillatus*, Late instar larva, dorsal view.



Jackson's Creek, Maruia—7 larvae, 4/xii/65. Tiropahi River headwaters, Paparoa mts.—1 female, 10/i/65. Lyell Creek, Upper Buller Gorge—1 female, 19/ii/66. St Andrews headwaters, Mt Glasgow—21 larvae, 9/ix/65. Hawkes Crag Creek, Buller Gorge—1 female, 24/x/65; 9 larvae, 5/vi/66. 14-mile Creek, Greymouth-Westport (coast road)—3 males, 2/vii/65. Ngahere, Grey River Valley—1 male, 1 female, 4 larvae, 2 exuviae, 25/viii/66. Sandel Creek, Karamea Bluff—2 males, 5 females, 1 larva, 12/xi/66. Watercourse, Karamea Bluff—1 larva, 12/xi/66. Doglap Creek, Karamea Bluff—2 males, 20/xi/66. Lewis Pass area, Canterbury: Lewis River—1 larva, 4/xii/65; Goings Creek—1 male, 1 female, 21/xi/65; 3 larvae, 2/ix/65. Foleys Creek—1 male and associated exuviae, 4/xii/65; 1 female, 19/xii/65; 1 male, 1 female, 14/xii/66. Arthur's Pass area, Canterbury: Otira township—1 female, 11/xii/66. Dobson Monument—2 females, 11/xii/66. South Westland area: McPhersons Creek, Haast—3 larvae, 11/xii/65. Joe's Creek—1 male, 1 female, 4/i/66. Pivot Creek—2 larvae, 3/iii/66. H. Bruning. Otago area: Makarora River—3 larvae, 22/xii/66. Camp Creek, Wanaka—1 female, 1 larva, 12/xii/65. Fiordland area: Divide Creek—1 male, 24/xii/66. Sinks Bridge, Upper Hollyford—1 male, 24/xii/66. Monkey Creek, Upper Hollyford—1 female, 2 larvae, 24/xii/66. Lower Hollyford Valley—1 male, 10/xii/66. A. K. Walker (D.S.I.R. coll.). Nelson area: Hope Saddle—3 larvae, 31/vii/66. Tophouse—1 female, 1 larva, 27/x/67. H. Bruning. Twin Forks Cave, Paturau—1 larva, 27/viii/67. Wellington area: Karori Stream—4 larvae, 21/iv/67. S. Moore. Khandallah—2 larvae, 18/vi/64; 1 larva, 30/ix/65. M. J. Winterbourn. Karori Reservoir—7 larvae, 7/vi/67. S. Moore. Central Plateau, North Island: Desert Road—1 male, 24/x/65. The holotype and paratypes of *Z. pallidus* Winterbourn have also been examined.

*Zelandobius furcillatus* Tillyard, 1923. Figs. 7, 8, 13.

*Zelandobius furcillatus* Tillyard, 1923, *Trans. N.Z. Inst.* 54: 207.

The genitalia of this species was described by McLellan (1965) and the larva by Winterbourn (1965).

**DIAGNOSIS:** Differs from the type species as follows: Forewing light grey with distal crossveins thickened and with a dark outline. Width to length ratio of forewing 0.26. Pronotum rectangular with width/length ratio of 1.5. *Male Genitalia:* Tergites X and XI not companiform in lateral view but with tergite X much curved downwards posteriorly and clothed with short black hairs. Basal segments of cerci directed laterally. *Female Genitalia:* Subgenital plate produced on to sternite IX with posterior margin convex. *Larva:* Pronotum rectangular with width/length ratio of 1.7. Posterior margin of mesonotum as wide as distance between inner margins of eyes and slightly emarginate medially. Tergite X bulged distally and longer than in type species. Cerci short and thread-like.

#### DESCRIPTION OF IMAGO

##### Measurements (in mm) :

	Male	Female
Body Length .....	6-6.5	6.5-7
Forewing .....	7-8	8-9
Antenna .....	6	6
Cercus .....	0.36	0.45

*General Colour:* Brown to dark brown dorsally; light brown ventrally. *Head:* Antennae moniliform, brown and covered with minute dark hairs. Ocelli prominent. Epicranium mottled. *Thorax:* Pronotum rectangular, wider than long, width/length ratio of 1.5, meso- and metanota as wide as complete width of head. *Wings:* Terminal fork of Rs short in both wings. Intercubital series of crossveins in forewing end at about terminus of Cu 2. Forewing width/length ratio of 0.26; light grey with pterostigma almost hyaline; distal crossveins thickened and outlined with fuscous. Hindwing light grey with hyaline pterostigma. *Male Genitalia:* (Figs. 7, 8) Tergites X and XI not campaniform in lateral view. Tergite X much curved downwards posteriorly and clothed in short dark hairs. Knob of tergite XI narrow. Cerci with 8-9 segments; basal segments directed laterally. Sternite IX forms a narrow ovoid subgenital plate. *Female Genitalia:* Subgenital plate produced on to sternite IX with posterior margin convex. Subanal lobes divergent with acute apices.



## DESCRIPTION OF LARVA (Fig. 13)

*Measurements (in mm):*

		Male	Female
Body Length	.....	6-6.5	6.5-7
Antenna	.....	4.5	5
Cercus	.....	2	2

*General Colour:* Light brown with grey markings on nota. *Clothing:* Scattered fine light hairs. *Head:* Frons bulged posteriorly. Ocelli prominent and dark. A dark patch extends from medial ocellus to front of eyes. Epicranium mottled. *Thorax:* Pronotum rectangular with rounded angles, wider than long, width/length ratio 1.7. Each half of pronotum with a grey C-shaped marking with its convex side to the median suture. Meso- and metanota with posterior margins slightly emarginate. Posterior margin of mesonotum as wide as distance between inner margin of eyes. *Legs:* Light brown. Each femur and tibia with a dorsal row of fine light hairs which does not form a distinct fringe. Fore tibiae equal in length to corresponding femora. *Abdomen:* Light brown with or without darker medial line. Tergite X bulged basally and longer than in type species. Gills long but not closely packed. Cerci short, less than half abdomen length and thread-like distally; each segment with a ring of short hairs distally.

These larvae are slender, delicate animals with a thin cuticle through which the tracheal trunks of the abdomen can be seen.

**MATERIAL EXAMINED** (collected by author unless otherwise stated): Buller River, near 10-mile Creek—17 males, 12 females, 39 larvae, 27/viii/65; 1 male, 1 female and associated exuviae, reared from larvae, 29/viii/65; 2 males, 3 females, 1 larva, 19/x/65; 1 female, 6 larvae, 19/viii/67. Buller River, Hawkes Crag—2 males, 2 females, 24/x/65. Waipunga, Tarawera-Rangitaiki—1 female, 2 larvae, 10/i/66, A. Hemmingsen. Waitomo Caves—1 larva, 23/xi/66, J. A. McLean. Tiritea Stream, Tararua River—2 males and associated exuviae, 23/viii/65; 1 female, -/x/66, M. J. Winterbourn. Konewa—1 larva, 5/ix/65, M. J. Winterbourn. Norris Creek, near Spooner Range—8 larvae, 31/vii/66. Cardrona River—male and female exuviae, 22/xii/66. Tiropahi River, Buller County—4 males, 5 females, 18 larvae, 24/viii/63. Holotype and allotype, Tarawera, 15, 16/xi/19, R. J. Tillyard in Ent. Div. D.S.I.R., Nelson.

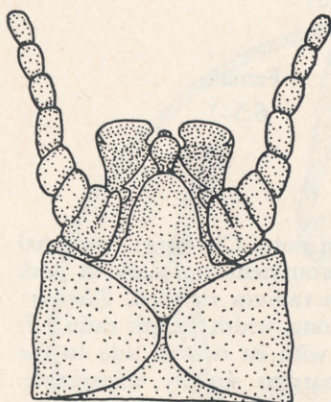
*Zelandobius unicolor* Tillyard, 1923, Figs. 4, 14-19.

*Zelandobius unicolor* Tillyard, 1923, *Trans. N.Z. Inst.* 54: 208.

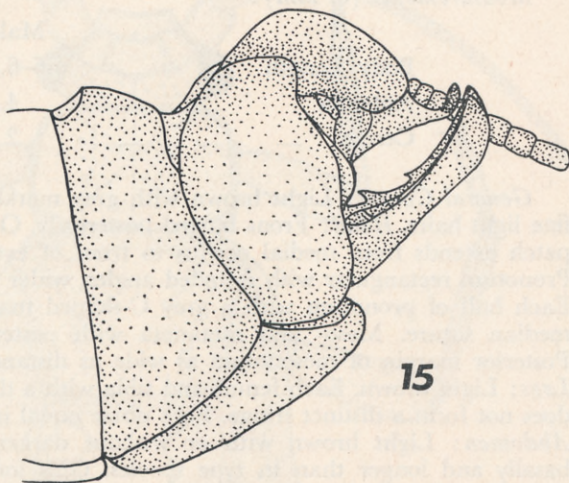
Tillyard states that the type specimen is apparently a male. As the abdomen of this specimen is very shrivelled this cannot be verified, but comparative measurements show that it is most likely a female.

**DIAGNOSIS:** Differs from type species as follows: Forewing with distal crossveins thickened and outlined with fuscous, broader than in *Z. furcillatus* with width/length ratio of 0.3. Pronotum rectangular (width/length ratio of 1.7) extending almost level with outer margins of eyes. Meso- and metanota much wider than width of head (width of mesonotum/width of head is 1.15). *Male Genitalia:* Tergites X and XI not campaniform in lateral view but with tergite X much curved downwards posteriorly and without clothing hairs. Knob of tergite XI wide and round from dorsal aspect. Basal segments of cerci directed laterally. *Female Genitalia:* Subgenital plate produced on to sternite IX and with convex posterior margin. *Larva:* Pronotum rectangular and as wide as head. Mesonotum very wide, posterior margin wider than distance between inner margins of eyes and slightly emarginate medially. Abdominal tergites ridged dorsally apart from tergite X which is bulged basally. Cerci short and thread-like.

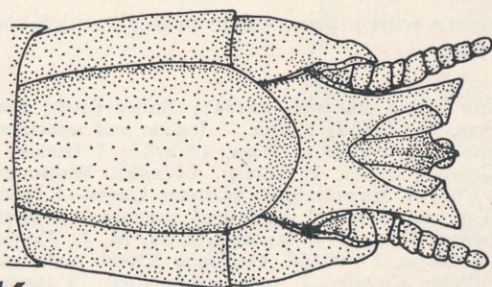




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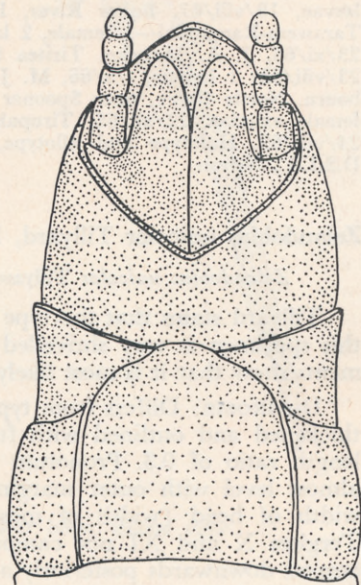
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18

FIGS. 14-18.—*Zelandobius unicolor*. FIG. 14.—Male genitalia, dorsal view; FIG. 15.—Male genitalia, lateral view; FIG. 16.—Male genitalia, ventral view; FIG. 17.—Pronotum; FIG. 18.—Female genitalia, ventral view.



## DESCRIPTION OF IMAGO

## Measurements (in mm):

			Male	Female
Body Length	.....	.....	6.0	8.0
Forewing	.....	.....	7.65	9.0
Antenna	.....	.....	6.5	5.5
Cercus	.....	.....	0.45	0.55

*General Colour*: Brown to dark brown. *Head*: Uniform in colour or with a slightly darker patch bounded by ocelli. Epicranium mottled. *Thorax*: Pronotum (Fig. 17) rectangular with rounded angles; much wider than long (width/length ratio of 1.7) extends almost width of head. Meso- and metanota much wider than width of head (width of mesonotum/width of head is 1.15). *Forewing*: Broader than in *Z. furcillatus* (width/length ratio 0.3); subhyaline tinged with pale brown; pterostigma whitish and veins yellowish brown. Distal crossveins few in number, thickened and outlined with fuscous. Basal crossveins between M and Cu 1 outlined with fuscous. *Hindwing*: Hyaline faintly tinged with yellowish brown. Distal crossveins few, thickened and outlined in light grey. *Abdomen*: Lighter than thorax especially in females. *Legs*: Femora shorter in relation to tibiae than in *Z. furcillatus*. *Male Genitalia*: (Figs. 14, 15, 16) Of very similar configuration to *Z. furcillatus*. Tergites X and XI not campaniform in lateral view but with tergite X much curved downwards posteriorly and without dark clothing hairs. Knob of tergite XI wide and round from dorsal aspect. Cerci short and of 8–9 segments, basal segments directed laterally. Sternite IX forms an ovoid subgenital plate. *Female Genitalia*: (Fig. 18) Subgenital plate with convex posterior margin extended on to sternite IX. Subanal lobes with rounded tips. Cerci very short with 4–7 segments.

## DESCRIPTION OF LARVA (Fig. 19)

## Measurements (in mm):

			Male	Female
Body Length	.....	.....	—	6.5
Antenna	.....	.....	—	3.8
Cercus	.....	.....	—	1.35

*Colour*: Gold brown with indistinct markings on nota and tergites. *Head*: Broad and flat (not bulged medially). Ocelli prominent. Frons with dark mark between ocelli. *Thorax*: Pronotum rectangular with angles rounded; much wider than long; as wide as width of head. Meso- and metanota very wide with slightly emarginate posterior margins. Posterior margin of mesonotum wider than distance between innermost points of eyes. *Legs*: Clothed with scattered light hairs. Fore tibiae over one-fifth longer than corresponding femora. *Abdomen*: Tergites I–IX angled at mid-dorsal line to form a ridge. Tergite X bulged basally and longer than in type species. Anal gill rosette consists of many fine filaments. Cerci short and thread-like. Subanal lobes rounded distally.

The male genitalia of this species bears some similarity to that of *Z. furcillatus*. This fact and other features of the morphology of *Z. unicolor* show that it is closely allied to *Z. furcillatus*. There would be a temptation, on the basis of similarity of genitalia and wing venation, to declare these two species synonymous. However, the most obvious differences in the thorax of adults and the decidedly different larvae outweigh the similarity of genitalia. This similarity of genitalia amongst widely differing species is also found in other Gripopterygids.

**MATERIAL EXAMINED** (collected by author unless otherwise stated): Lewis Pass area, Canterbury: Foleys Creek—1 male, 1 female, 4/xii/65. Jacksons Creek, Maruia—2 larvae, 4/xii/65. Westland area: Omeoora River, near Fox Glacier—1 female, 14/xii/65. Crooked River, Lake Brunner—1 female, 1 larva, 10/x/64; 1 male and associated exuviae, 1 larva, 14/x/67. North Island: Waitangi Stream, Waiouru—1 larva, 11/v/66. Holotype, Arthur's Pass, 18/i/20, R. J. Tillyard, Ent. Div. D.S.I.R., Nelson.



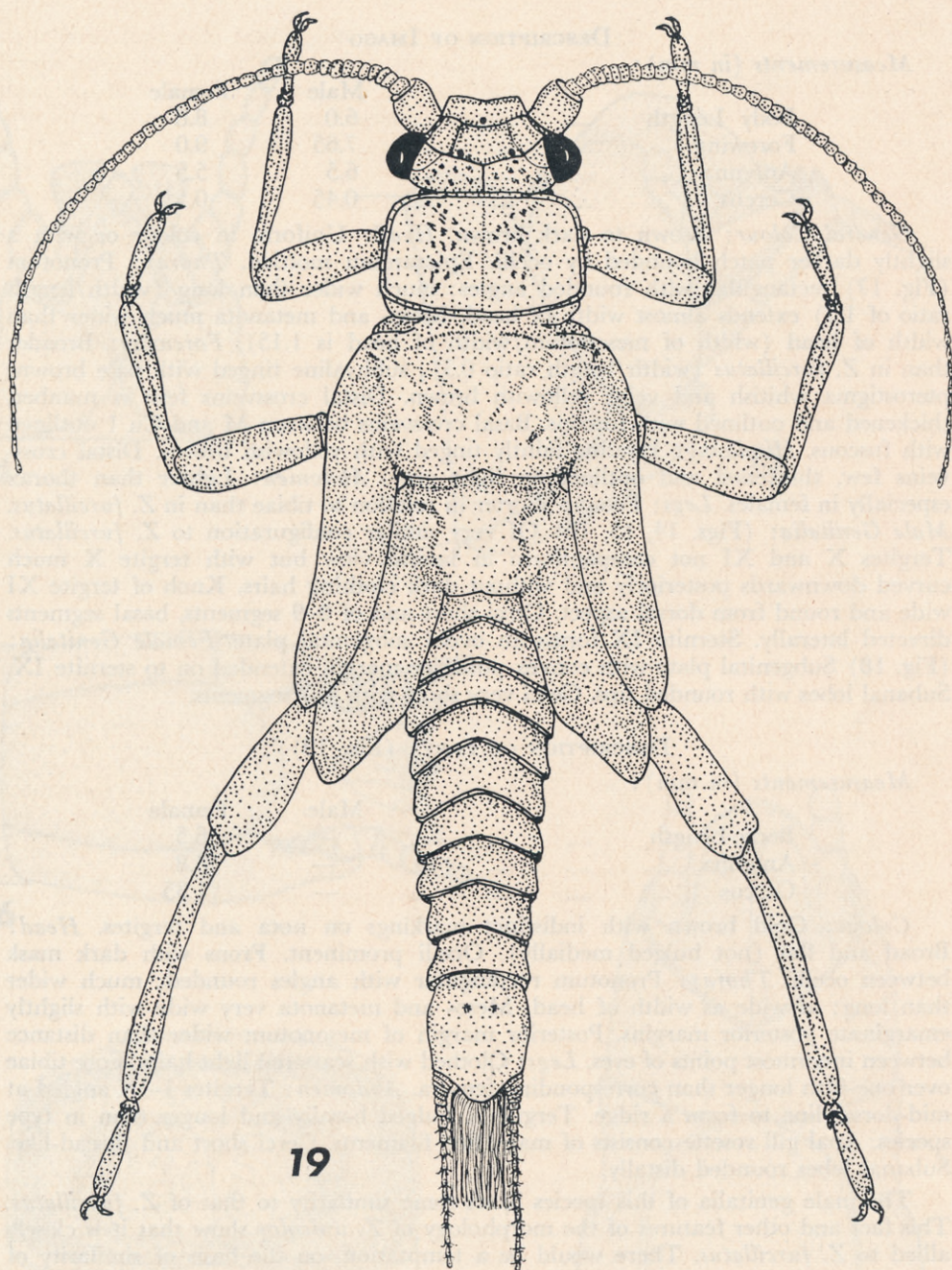


FIG. 19.—*Zelandobius unicolor*, Late instar larva, dorsal view.

*Zelandobius illiesi* n.sp. Figs. 10a-b, 20-26.

DIAGNOSIS: Differs from the type species as follows: Pronotum with anterior angles acute or produced to form short spines. Forewing with fewer distal crossveins surrounded by dark ovals (8-10 as against approximately 15 in the type species).

*Male Genitalia*: With tergites X and XI curved downwards posteriorly; each para-proct with a large latero-posteriorly projecting apical spine; cerci short with 8-9



segments. *Female Genitalia*: With the same type of subgenital plate but cerci with only 7–8 segments. *Larva*: Pronotum with anterior angles produced and lateral margins outlined with forward directed curved spines. The basal half of each wingpad forms a flap which covers the pleural sclerites and is armed with posteriorly directed curved spines. A number of other margins are outlined with denticles.

## DESCRIPTION OF IMAGO

*Measurements (in mm):*

	Male	Female
Body Length .....	6.0	6–7
Forewing .....	8.0	7–8
Antenna .....	7.0	7
Cercus .....	0.54	0.3–0.4

*General Colour*: Reddish brown. *Head*: Antennae clothed in short dark hairs with first segment of flagellum much larger than succeeding segments. Frons may be darker brown than rest of head. *Thorax*: Pronotum (Fig. 23) rectangular and wider than long; width/length ratio 1.3–1.5; posterior angles rounded; anterior angles acute or produced to form short antero-laterally directed spines. (These spines sometimes fold downwards after the animal is preserved.) Meso- and metanota darker than rest of thorax. *Legs*: Slender and clothed with short dark hairs. *Wings*: (Figs. 10a, 10b) Forewing subhyaline with main veins anterior to R reddish brown and remaining main veins grey brown; distal crossveins few (2–3 between each pair of main veins) and each surrounded by an oval grey patch which may be fused with the patches of adjacent veins. Hindwing uniformly subhyaline. *Abdomen*: Uniformly reddish brown. *Male Genitalia*: (Figs. 20, 21, 22) Tergite X curved downwards posteriorly and knob of tergite XI slightly turned upwards. Epiproct of generic pattern with tip uniformly tapered. Each paraproct with a large prominent sclerotised spine on latero-distal margin. Cerci short (8–9 segments) and curved downwards; basal segments directed posteriorly. *Female Genitalia*: (Fig. 24) Sternite VIII not produced but slightly raised and rounded posteriorly with or without posterior medial emargination. Cerci short, 7–8 segments. Tergite X with posterior margin laterally rounded and produced medially to a point.

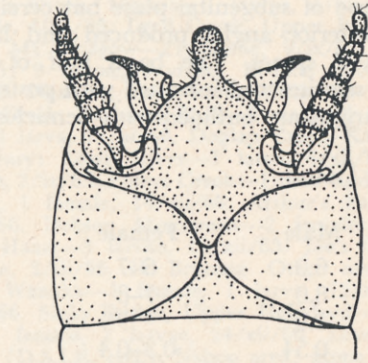
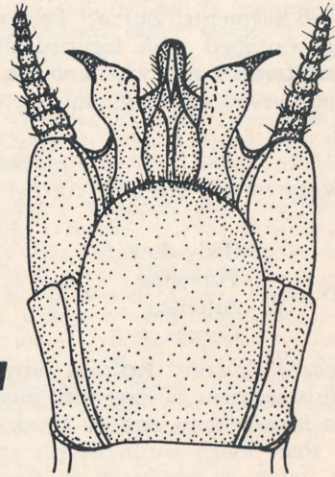
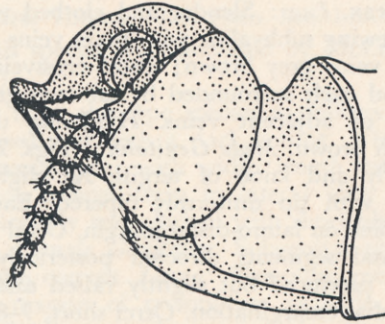
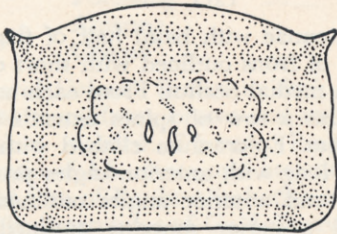
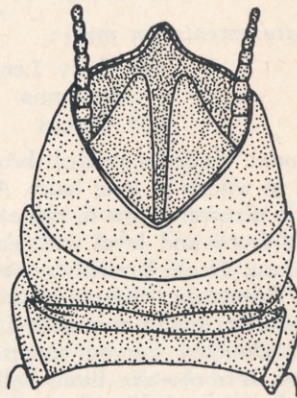
## DESCRIPTION OF LARVA (about second last instar)

*Measurements (in mm):*

Body Length .....	5.5
Antenna .....	4.12
Cercus .....	1.65

*Colour*: Uniform reddish brown. *Head*: Antennae with basal half of flagellum clothed in whorls of long hairs. Anterior margin of frons outlined with short curved spines. A transverse row of spines runs level with medial ocellus. From each anterior angle of frons and level with each lateral ocellus a row of spines extends to the epicranium. Ocelli present but obscured by spines. Epicranium clothed with short bristles. *Pronotum*: Sub-rectangular, wider than long with anterior angles produced and posterior angles rounded. Lateral margins and anterior angles outlined with forward directed curved spines. Anterior and posterior margins outlined with denticles. *Mesothorax*: Basal half of each wingpad produced to form a flap which covers the pleural sclerites and is armed with posteriorly directed curved spines. Mesonotum with a row of denticles on posterior and lateral margins. *Metanotum*: Posterior and lateral margins outlined with denticles. *Legs*: A pair of short spines dorsally on each femur. *Abdomen*: Tergites I–VIII each with a medial postero-dorsal projection clothed with denticles. Tergites I–IX with posterior margins outlined with denticles. Tergite X about as long as in type species. Subanal lobes



**20****21****22****23****24**

FIGS. 20-24.—*Zelandobius illiesi* n.sp. FIG. 20.—Male genitalia, dorsal view; FIG. 21.—Male genitalia, ventral view; FIG. 22.—Male genitalia, lateral view; FIG. 23.—Pronotum; FIG. 24.—Female genitalia, ventral view.



tongue-shaped. Gills a well developed anal rosette. Cerci short and thread-like distally.

REMARKS: Each long curved spine terminates in a hair-like projection.

TYPE MATERIAL: Holotype female and associated exuviae reared from larva collected 10/ix/66 emerged 15/xii/66; allotype male and associated exuviae reared from larva collected 7/ix/67 emerged 18/ix/67. Paratypes consist of 8 larvae collected 6/ix/66. All material from an un-named stream 1km east of Ohika-nui River bridge, Buller Gorge. (Type material deposited in Entomology Division, D.S.I.R., Nelson.)

HABITAT: Larvae of this species were found mainly on dead fronds of a tree fern (*Cyathea smithii* Hook. f.) in small shallow streams flowing through mixed *Nothofagus-Podocarp* forest. These streams which have a substratum of sand, gravel and some mud, frequently disappear under the roots of trees. Rainfall is high (250cm per annum) and flooding often occurs so that much dead vegetation is swept into the streams to lodge against any obstruction.

OTHER MATERIAL EXAMINED: From the same locality as the type material: 1 larva, 1/v/66; 1 larva, 4/ix/66; 6 larvae, 10/ix/66; 1 larva, 16/x/66; 2 females, 19/xi/66; 5 larvae, 7/ix/67. (All material above collected by the author.) 2 larvae, 25/x/66, J. Illies.

It gives me great pleasure to name this species after Professor Dr J. Illies of the Max-Planck Institute of Limnology, Western Germany, who collected with the writer in the type area during his 1966 visit.

#### *Zelandobius hudsoni* (Hare, 1910).

*Leptoperla hudsoni* Hare, 1910, *Trans. N.Z. Inst.*, 42: 30.

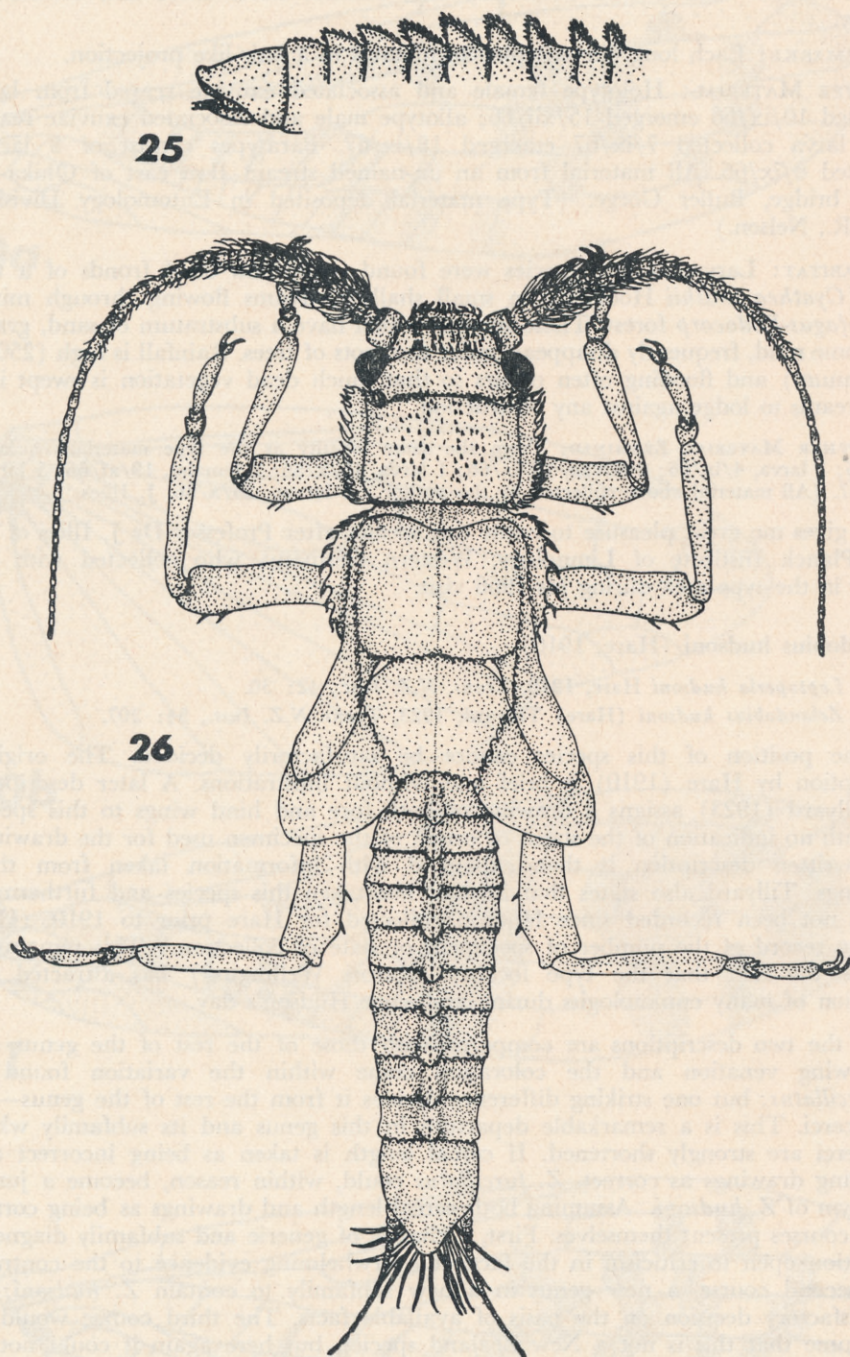
*Zelandobius hudsoni* (Hare) Tillyard, 1923, *Trans. N.Z. Inst.*, 54: 207.

The position of this species cannot be satisfactorily decided. The original description by Hare (1910) is brief and without illustrations. A later description by Tillyard (1923) assigns a drawing of both fore and hind wings to this species but with no indication of the status or origin of the specimen used for the drawings. The written description is then expanded with information taken from these drawings. Tillyard also states that he had not taken this species and furthermore it has not been recorded since Hudson collected for Hare prior to 1910. (Hare lists no record of the number of specimens or date of collection.) This remains so despite the fact that the type locality (Karori Wellington) has attracted the attention of many entomologists during and since Hudson's day.

If the two descriptions are compared with those of the rest of the genus, the size, wing venation and the coloration come within the variation found in *Z. furcillatus*; but one striking difference divides it from the rest of the genus—the long cerci. This is a remarkable departure in this genus and its subfamily where the cerci are strongly shortened. If cercal length is taken as being incorrect and the wing drawings as correct, *Z. furcillatus* could, within reason, become a junior synonym of *Z. hudsoni*. Assuming both cercal length and drawings as being correct three courses present themselves. First, a change of generic and subfamily diagnosis, an action open to criticism in the face of overwhelming evidence to the contrary. The second course, a new genus in a new subfamily to contain *Z. hudsoni*; an unsatisfactory decision on the basis of available facts. The third course would be to assume that this is not a New Zealand species, but here again it could not be placed in any known subfamily.

In view of the impossibility of arriving at a satisfactory conclusion I propose, dependent on the decision of the specialists on Gripopterygidae, that *Zelandobius hudsoni* (Hare, 1910), be treated as a *nomen dubium*.





FIGS. 25, 26.—*Zelandobius illiesi* n.sp. FIG. 25.—Larva, lateral view of abdomen; FIG. 26.—Late instar larva, dorsal view.



KEY TO ADULTS OF *Zelandobius*

1. (a) Forewing with large dark irregular patches or dark ovals around crossveins ..... 2  
     (b) Forewing with crossveins thickened and outlined in darker colour ..... 3
2. (a) Pronotum with anterior angles rounded; female cerci 10-13 segments; male with tergites X and XI campaniform laterally and each paraproct with a short spine apically ..... *Z. confusus*  
     (b) Pronotum with anterior angles acute or produced into short spines; female cerci 7-8 segments; male with tergites X and XI not as for 2 (a) but much curved downwards; each paraproct with a large spine apically ..... *Z. illiesi*
3. (a) Pronotum with width/length 1.5; mesonotum as wide as head; width/length of forewing 0.26; male with tergite X clothed with dark hairs; female cerci about 9 segments ..... *Z. furcillatus*  
     (b) Pronotum width/length 1.7; mesonotum distinctly wider than head; width/length of forewing 0.3; male tergite without clothing hairs; female cerci 4-7 segments ..... *Z. unicolor*

## KEY TO LATE INSTAR LARVAE

1. (a) Pronotum with lateral margins outlined with spines ..... *Z. illiesi*  
     (b) Pronotum without spines ..... 2
2. (a) Posterior margin of mesonotum slightly emarginate ..... 3  
     (b) Posterior margin of mesonotum deeply re-entrant; pronotum slightly wider than long; cerci strongly developed ..... *Z. confusus*
3. (a) Posterior margin of mesonotum as wide as distance between inner margins of eyes; each fore tibia equal in length to corresponding femur; tergites I-IX not ridged on dorsal midline ..... *Z. furcillatus*  
     (b) Posterior margin of mesonotum wider than distance between inner margins of eyes; each fore tibia over one-fifth longer than corresponding femur; tergites I-IX ridged on dorsal midline ..... *Z. unicolor*

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