Five new species of *Neusterensifer* from western New Guinea (Heteroptera: Veliidae) with biogeographic notes

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Five new species of *Neusterensifer* are described from western New Guinea and adjacent Yapen Island. The new taxa are as follows: *Neusterensifer dabrana* sp.n. and *Neusterensifer terrestris* sp.n. from the Mamberamo River basin; *Neusterensifer timikana* sp.n. from the Ajkwa River basin; *Neusterensifer wondiwoi* sp.n. from the Wandammen Peninsula; and *Neusterensifer yobi* sp.n. from Yapen Island. New distribution records are also provided for *Neusterensifer gladius* Polhemus & Polhemus from the Wandammen and Mangguar peninsulas of western New Guinea. Illustrations of key characters, color dorsal habitus photos, and distribution maps are provided for all new species treated, accompanied by a comprehensive checklist of *Neusterensifer* species and their geographic distributions, with species assigned to their freshwater areas of endemism within the island. The refined knowledge of species distributions based on these new collections indicates that the Wandammen Peninsula should likely be considered a discrete area of freshwater endemism within New Guinea.

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Introduction

This paper represents another contribution to our continuing taxonomic study of the rich and highly endemic assemblage of genera and species in the Heteroptera subfamily Microveliinae occurring in the Melanesian region, much of which is still undocumented. The most speciose genus within this regional assemblage is *Neusterensifer* Polhemus & Polhemus, 1994, which is endemic to New Guinea and nearby islands. In this paper, five new species in

this genus are described, bringing the total number of recognized *Neusterensifer* species to 35 (see Appendix 1). The current work builds on previous contributions by J. Polhemus & D. Polhemus (1994), D. Polhemus & J. Polhemus (2000a, 2000b, 2004), and Chen et al. (2008), and focuses on the *Neusterensifer* biota of western of New Guinea, including both the northern and southern flanks of the central mountain ranges, and certain offshore islands.

The included checklist of species also assigns taxa to

Figs 1–4. *Neusterensifer* species, dorsal habitus photos (all specimens from New Guinea, Tiri River, CL 7140).
1. *N. terrestris*, micropterous male; 2. *N. terrestris*, micropterous female; 3. *N. dabrana*, micropterous male;
4. *N. dabrana*, micropterous female.

Fig. 5. Distribution of *Neusterensifer* species on New Guinea. Diamond = *N. terrestris*; squares = *N. gladius*, circle = *N. wondiwoi*

areas of freshwater endemism for the New Guinea region as defined by D. Polhemus & Allen (2007). The species distributions of both new and previously described species of *Neusterensifer* conform well to this scheme, and are thus consistent with previous distributional results reported for other groups of Heteroptera such as *Ptilomera* (D. Polhemus & J. Polhemus 2001), and for the aquatic Coleoptera families Gyrinidae (D. Polhemus 2011) and Hydraenidae (Perkins 2011).

Material and methods

The specimens reported on below were collected by hand netting. The specimens were preserved on-site in 75% ethanol, and subsequently transported to the Smithsonian Institution, Washington, DC (USNM) or the Bishop Museum (BPBM), Honolulu, Hawaii for sorting and identification. Synoptic series were then dry mounted on points, with the measurements and descriptions presented below taken from such dry mounted specimens

All measurements are given in millimeters. GPS readings were taken at collecting sites in WGS 84 datum, using a Garmin hand-held satellite global positioning system. Water temperatures were taken at the water surface using a hand-held thermometer. The CL numbers in the material examined sections refer to a series of collection locality numbers used by the authors to catalog sampling sites and associated metadata in the Melanesian region as a whole.

Color illustrations were prepared at Bishop Museum

using an AutoMontage system, with the plates subsequently edited in PhotoShop CS 9.0.2 to remove artifacts such as small dust particles.

Taxonomy

Neusterensifer Polhemus & Polhemus

Neusterensifer J. Polhemus & D. Polhemus, 1994: 67 (type species *Neusterensifer compacta* Polhemus & Polhemus, 1994, by original designation).

Neusterensifer D. Polhemus & J. Polhemus 2000a: 113 (justified emendation).

Discussion

The diagnostic structural characters of this genus were provided by Polhemus & Polhemus (1994) and are not repeated here. However, in reading the descriptions below it is very important to bear in mind that in *Neusterensifer* the more commonly encountered “wingless” forms are actually microp- terous, so that the first abdominal tergite is covered by the metanotum. The first visible abdominal tergite dorsally in both males and females is therefore tergite II. In males, the best way to ascertain tergite numbering is count backward from the cylindrical first genital segment, which represents tergite VIII. Similarly, in females one may count backward from the proctiger, which represents tergite IX.

Ventrally, abdominal ventrite I is barely visible as a vertical plate lying between the metasternum and

well-developed abdominal ventrite II. By working backward from this it is possible to see that the final connexival segment is formed by the laterotergites of abdominal segment VII, thus as in the abdominal tergites, the first visible connexivum anteriorly is segment II.

***Neusterensifer terrestris* sp. n.**

Figs 1, 2, 5, 17, 23

Type material. Holotype, micropterous male: Indonesia, Papua Prov. [= former Irian Jaya Prov.], damp and muddy depressions in forest adjacent to Tiri River (trib. to Doorman River), 4.5 km SW of Dabra, 80 m [260 ft.], water temp. 25 °C., 9–13 September 2000, 3°17'30" S, 138°34'53" E, CL 7140, D. A. Polhemus (USNM).

Paratypes: Indonesia, Papua Prov. [= former Irian Jaya Prov.]: 35 micropterous males, 32 micropterous females, same data as holotype, D. A. Polhemus (USNM, BPBM).

Description

Size. Micropterous male, length 2.28–2.40 mm ($\bar{x}$ = 2.35, n = 6); width 0.85–1.00 mm ($\bar{x}$ = 0.92, n = 6). Micropterous female, length 2.35–2.50 mm ($\bar{x}$ = 2.42, n = 5); width 1.00–1.05 mm, ($\bar{x}$ = 1.01, n = 6).

Color. Micropterous male (Fig. 1): Ground color orange brown, marked with yellowish brown on anterior pronotum and legs, pronotum and mesonotum medium brown; sparse patches of short, shining, silvery pubescence present narrowly along lateral and posterior margins of metanotum and abdominal tergites II and III, narrowly along posterior margins of abdominal tergites IV–VI, along anterior margin of pronotum, and on sides of thorax and abdomen. Head medium brown; antennae uniformly medium brown; rostrum pale whitish-yellow, fuscous medially, piceous distally. Pronotum and metanotum medium brown; anterior pronotum bearing a pair (1+1) of elongate transverse yellowish brown spots to either side of narrow midline behind anterior margin. Abdomen including connexiva orange-brown dorsally, laterotergites broadly dark brown below connexiva. Legs generally medium brown, with coxae, trochanters, femora and ventral halves of tibiae pale whitish-yellow. Venter dark brown, acetabulae orange-brown.

Structural characters. Micropterous male: head of moderate length, declivant anteriorly, with weak impressed median line; length 0.40, width 0.60; width of eye/interocular space, 0.15/0.30. Pronotum long, covering mesonotum, length/width, 0.40/0.92. Metanotum length 0.30. Abdominal

tergites dull, without shining areas; lengths of tergites II–VII, respectively: 0.20: 0.15 : 0.10 : 0.15 : 0.15 : 0.40.

Entire dorsum and laterotergites covered with fine appressed golden pubescence, intermixed with numerous long, erect golden-brown setae. Antennae thickly clothed with short gold setae, scattered long erect brown setae present along anterior margins of antennal segments I–III, lengths of these latter setae exceeding width of segments on which they occur. Pronotum with humeri depressed; anterior section bearing a single transverse row of coarse punctuations behind head; posterior section bearing several transverse rows of coarse punctuations; similar punctuations also present on metanotum. Legs thickly clothed with short gold setae, intermixed with longer golden-brown setae along anterior margins of all tibiae; posterior margins of all femora bearing thick fringe of very short, densely packed pale setae; posterior margin of middle femur bearing 12–14 evenly spaced long, slender, erect brown setae; posterior margin of middle tibia bearing 6 very long, erect, slender brown setae evenly spaced on distal half, longest and most basal of these setae with length over $2 \times$ width of tibia; ventral margin of fore femur with a slight concavity on distal one-third.

Prosternum broadly sulcate along longitudinal midline; mesosternum slightly bitumescens, with broad, shallow sulcus posteromedially; metasternum tumid. Abdominal venter dull, lacking evident setae; abdominal ventrite I very short, barely exposed; abdominal ventrites II–IV broadly arching, unmodified; abdominal ventrite V bearing a shallow, narrow sulcus along longitudinal midline; abdominal ventrite VI produced posteromedially into a semi-circular process extending over base of ventrite VII, posterior apex of this process bearing a small tuft of dense black setae, this tuft in the shape of a posteriorly directed triangle; abdominal ventrite VII broadly excavate and concave medially, anteromedial section angling strongly upward when viewed laterally, posteromedial section forming a broad, horizontally oriented lamella adjoining base of genital capsule. Proctiger produced anteriorly into a moderately long, curving, blade-like process with an acute apex, and a small secondary process arising from base of anterior margin (Fig. 17). Parameres vestigial or absent.

Antennal formula I : II : III : IV; 0.35 : 0.30 : 0.50 : 0.58.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.65 : 0.61 : 0.31 : 0.0; of middle leg, 0.90 : 0.80 : 0.20 : 0.30; of hind leg, 0.95 : 1.30 : 0.25 : 0.25.

Micropterous female (Fig. 2). Similar to micropterous male in general structure and color, with following

exceptions: general coloration of dorsal head, thorax and abdomen dark brown, with dorsal connexiva orange-brown; metanotum and abdominal tergites II–VII with small patches of silvery setae laterally and along posterior margins, abdominal tergite VIII with a pair (1+1) of silvery setal patches centrally to either side of midline; connexiva with lateral margins broadly curving outward, margins of even thickness throughout, posterolateral angles not produced, widely separated, leaving all abdominal tergites completely exposed and visible from above; abdominal tergite VIII angled downward at approximately 45° when viewed laterally (Fig. 23); proctiger angled downward in nearly vertical orientation and cupped within lateral and posteroventral margins of abdominal ventrite VII, with posterior apex barely projecting beyond posterior margin of ventrite VII; abdominal venter unmodified, with all ventrites broadly and smoothly curving, lacking sulci or processes; leg segments simple and unmodified, fore femur lacking distal concavity ventrally.

Macropterous form. Unknown.

Etymology

The species name is derived from the Latin “terrestris”, of the earth, and refers to the habitat of this species, which occupies damp mud pans on the floor of seasonally flooded tropical rain forest.

Distribution

Western New Guinea (Fig. 5).

Comparative notes

Neusterensifer terrestris may be recognized by its orange-brown ground coloration and very limited extent of silvery setal patches on the pronotum and abdominal tergites in both sexes (Figs 1, 2), the strongly hooked process on the male proctiger with a basal secondary tubercle (Fig. 17), the presence of a single setiferous tubercle on male abdominal ventrite VI projecting posteriorly over a concavity on the basally excavate portion of ventrite VII, and the unmodified form of the terminal female abdominal segments when viewed laterally (Fig. 23). This species also has tarsal segment I of the hind leg elongated, such that its length is equivalent to that of hind tarsal segment II, rather than being shorter than hind tarsal segment II as seen in all other species of *Neusterensifer* known to date.

This is one of the more morphologically distinctive species in the genus, with a body form that is somewhat more elongate and less robust than most other *Neusterensifer*, coupled with the hind tarsal modifications noted above. These character states are likely to be related to its damp terrestrial rather than aquatic

habitat preferences. The morphological ground plan of *N. terrestris*, however, conforms to that of *Neusterensifer* as a whole, and the modifications of the male proctiger are consistent with placement in this genus (compare Figs 15–19).

Ecological notes

The type series was taken from a set of damp, muddy, shaded depressions on the floor of a tall, seasonally flooded forest adjacent to the Sungai Tiri, a low gradient tributary of the Doorman River emerging from the northern foothills of the central New Guinea mountains. The insects ran over the muddy surface in company with *Mesovelgia subvittata* Horváth, 1915 and an undescribed *Ochterus* species, and were found only in this habitat, being absent along the margins of the river itself. This, in combination with the elongate tarsi, suggests that this species is specifically adapted to inhabit these seasonally flooded depressions. Because such areas are not often sampled by aquatic entomologists, this further suggests that this species or others similar to it will be found in flood-plain habitats throughout New Guinea.

Based on known collections, this species occupies the Mamberamo Foreland area of freshwater endemism (Area 17) as defined by Polhemus & Allen (2007).

Neusterensifer dabrana sp. n.

Figs 3, 4, 9, 16, 24

Type material. Holotype, micropterous male: **Indonesia, Papua Prov.** [= former Irian Jaya Prov.], pools in sandy overflow channel branching from Tiri River (trib. to Doorman River), 4.5 km SW of Dabra, 80 m. [260 ft.], 3°17'30" S, 138°34'53" E, water temp. 25 °C., 9–13 September 2000, CL 7141, D. A. Polhemus (USNM).

Paratypes: **Indonesia, Papua Prov.** [= former Irian Jaya Prov.]: 7 micropterous males, 7 micropterous females, same data as holotype, D. A. Polhemus (USNM, BPBM); 1 micropterous male, 1 micropterous female, upper Furu River (trib. to Idenburg River), 3 km. SE of Dabra, 90 m. [300 ft.], water temp. 25.5 °C., 4–7 September 2000, 3°17'04" S, 138°38'10" E, CL 7135, D. A. Polhemus (USNM); 2 micropterous males, 1 micropterous female, Furu River (trib. to Idenburg River) and sand bottomed tributary, 3 km SE of Dabra, 80 m. [260 ft.], 3°16'45" S, 138°38'24" E, water temp. 25.5 °C., 7 September 2000, 08:30–09:30 hrs., CL 7138, D. A. Polhemus (USNM).

Description

Size. Micropterous male, length 2.25–2.50 mm ($\bar{x}$ = 2.35, n = 5); width 0.90–1.00 mm ($\bar{x}$ = 0.96, n = 5).

Figs 6–8. *Neusterensifer timikana*, dorsal habitus photos (all specimens from New Guinea, Ajkwa River, CL 7052).
1. Micropterous male; 2. Micropterous female; 3. Macropterous female

Fig. 9. Distribution of *Neusterensifer* species on New Guinea. Diamond = *N. dabrana*; square = *N. yobi*, circle = *N. timikana*

Micropterous female, length 2.40–2.50 mm ($\bar{x}$ = 2.47, n = 5); width 1.05–1.15 mm, ($\bar{x}$ = 1.07, n = 5). **Color.** Micropterous male (Fig. 3): Ground color dark brown, marked with orange brown on anterior pronotum; patches of short, shining, silvery pubescence present laterally on frons, vertex, pronotum, metanotum, and abdominal tergites II, III, V, VI and VII; in broad band across anterior pronotum; and on sides of thorax and abdomen. Head dark brown; eyes dark red; antennae uniformly medium brown; rostrum dark yellow, dark red medially, piceous distally. Pronotum dark brown, bearing a pair (1+1) of elongate transverse orange brown spots to either side of midline behind anterior margin. Metanotum and abdominal tergites dark brown, connexiva medium brown on outer halves and ventrally. Legs with coxae, trochanters, and majority of femora dark yellow; distal tips of femora, plus all tibiae and tarsi yellowish brown. Laterotergites below connexiva and all ventral surfaces dull black, except propleural region brown.

Structural characters. Micropterous male: head of moderate length, declivant anteriorly, with weak impressed median line; length 0.50, width 0.62; width of eye/interocular space, 0.15/0.32. Pronotum long, covering mesonotum, length/width, 0.45/0.90. Metanotum length 0.45. Abdominal tergites dull, without shining areas; lengths of tergites II–VII, respectively: 0.20 : 0.15 : 0.10 : 0.08 : 0.08 : 0.40.

Entire dorsum and laterotergites covered with fine

appressed golden pubescence, intermixed with scattered long, erect golden-brown setae; legs and antennae thickly clothed with short pale setae, scattered long erect black setae present along anterior margins of antennal segments I and II, anterior margins of all tibiae; fore femur ventral margin straight, not modified, bearing numerous short, erect pale setae along entire length, intermixed with evenly spaced comb of 6–8 long, erect, pilose pale setae; fore tibiae with inner margin straight, distal grasping comb extending for $0.4 \times$ the length of the segment; middle tibia bearing a row of evenly spaced, long pilose pale setae of progressively decreasing length, longest and most basal of these setae with length approximately exceeding $2 \times$ width of tibia; hind femur with numerous short, erect pale setae along posterior margin, lacking tumescences or specialized setal tufts.

Pro- and mesosternum broadly sulcate along longitudinal midlines; metasternum slightly tumescent. Abdominal venter set with very short appressed pale setae, and scattered longer pale setae; abdominal ventrites I–IV unmodified; ventrites V and VI shallowly sulcate centrally along longitudinal midline; ventrite VII with a roughly triangular depression posteromedially, the apex of this triangle directed anterad, this depression flanked by a pair (1+1) of raised carinae angling backward and outward. Proctiger produced anteriorly into a very long, multisinuate process tapering to a slightly rounded apex (Fig. 16); anterior margin of abdominal ventrite VIII with prominent conical tubercle arising immediately posterior to

elongate process originating on proctiger. Parameres vestigial or absent.

Antennal formula I : II : III : IV; 0.35 : 0.30 : 0.48 : 0.50.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.70 : 0.50 : 0.25 : 0.0; of middle leg, 1.00 : 0.90 : 0.20 : 0.30; of hind leg, 0.90 : 1.10 : 0.18 : 0.22.

Micropterous female (Fig. 4). Similar to micropterous male in general structure and color, with following exceptions: all abdominal tergites with small patches of silvery setae laterally, tergites IV–VI bearing narrow bands of silvery setae across their posterior margins, abdominal tergite VIII with anterior half lying 45° from vertical when viewed laterally, posterior half bent more sharply downward into nearly vertical orientation; connexiva broadly separated, bowing slightly outward, margins gradually convergent posteriorly, posterolateral apices of segment VII produced into small, angulate, posterior projections when viewed dorsally, rounded when seen in lateral view (Fig. 24); connexival margins of even width throughout, lacking specialized setal tufts; abdominal venter unmodified, set with numerous very short pale setae; legs unmodified.

Macropterous form. Unknown.

Etymology

The name “dabrana” refers to the type locality, near the village of Dabra in western central New Guinea.

Distribution

Western New Guinea (Fig. 9).

Comparative notes

Neusterensifer dabrana is a dark colored species (Figs 3, 4) that can be easily recognized by the very long, multisinuate process on the male proctiger (Fig. 16), the presence of a prominent conical tubercle arising from abdominal segment VIII immediately posterior to the proctiger, the form of the ventral male abdomen which lacks setiferous tubercles but does possess a pair of raised carinae angling backward and posteriorly outward on the posterior half of ventrite VI, and the rounded form of the female connexival apices when viewed laterally (Fig. 24).

Ecological notes

This species was common in small water pockets amid cobbles along the margins of first and second order streams shaded by primary rain forest in the Furu River catchment near Dabra, and also occurred on standing or slowly flowing pools in sandy, shaded overflow channels amid seasonally flooded primary rain forest in the Doorman River catchment to the

west. All of these streams are tributaries to the Idenberg branch of the Mamberamo River system in western central New Guinea.

Based on known collections, this species occupies the Mamberamo Foreland area of freshwater endemism (Area 17) as defined by Polhemus & Allen (2007).

Neusterensifer timikana sp. n.

Figs 6–9, 18, 21

Type material. **Holotype**, micropterous male: **Indonesia, Papua Prov.** [= former Irian Jaya Prov.], overflow channel adjacent to Ajkwa River above gravel mining area, N. of Kuala Kencana, 170 m [550 ft.], 4°24'12"S, 136°53'54"E, water temp. 26° C., 20 January 1997, 15:00–17:00 hrs., CL 7052, D.A. Polhemus (USNM).

Paratypes: **Indonesia, Papua Prov.** [= former Irian Jaya Prov.]: 1 macropterous female, 32 micropterous males, 7 micropterous females, same data as holotype, D. A. Polhemus (USNM, BPBM).

Description

Size. Micropterous male, length 2.20–2.37 mm ($\bar{x}$ = 2.30, n = 7); width 0.90–1.05 mm ($\bar{x}$ = 0.98, n = 7). Micropterous female, length 2.40–2.50 mm ($\bar{x}$ = 2.48, n = 5); width 1.00–1.10 mm, ($\bar{x}$ = 1.06, n = 5). Macropterous female, length 2.70 mm (n = 1); width 1.20 mm, (n = 1).

Color. Micropterous male (Fig. 6): Ground color dark grey, marked with orange brown on anterior pronotum; patches of short, shining, silvery pubescence present laterally on frons, vertex, pronotum, metanotum, and abdominal tergites II, III, V–VIII, in narrow transverse bands along posterior margins of pronotum and abdominal tergites II, V and VI; in broad band across anterior pronotum; and on sides of thorax and abdomen. Head dark grey; eyes dark red; antennae with segment I and basal half of segment II yellowish brown, distal half of segment II and segments III and IV darker brown; rostrum dark yellow, dark brown medially, piceous distally. Pronotum dark grey, bearing a pair (1+1) of elongate transverse orange brown spots to either side of midline behind anterior margin. Metanotum and abdominal tergites dark grey, connexiva brown on outer halves and ventrally. Legs with coxae, trochanters, and majority of femora, and all ventral surfaces yellowish brown; distal sections of femora, plus all tibiae and tarsi darker brown. Laterotergites below connexiva and all ventral surfaces dull black, except propleural region and genital segments brown.

Structural characters. Micropterous male: head of moderate length, declivant anteriorly, with weak impressed median line; length 0.40, width 0.60;

width of eye/interocular space, 0.15/0.30. Pronotum long, covering mesonotum, length/width, 0.35/1.00. Metanotum length 0.30. Abdominal tergites dull, without shining areas; lengths of tergites II–VII, respectively: 0.15 : 0.10 : 0.10 : 0.10 : 0.10 : 0.25.

Entire dorsum and laterotergites covered with fine appressed golden pubescence, intermixed with scattered short, erect golden-brown setae; legs and antennae thickly clothed with short pale setae, scattered long erect black setae present along anterior margins of antennal segments I and II, anterior margins of all tibiae; fore femur ventral margin straight, not modified, bearing numerous short, erect pale setae along entire length, intermixed with evenly spaced comb of 6–8 long, erect, pilose pale brown setae; fore tibia with inner margin straight, distal grasping comb extending for $0.45 \times$ the length of the segment; middle tibia bearing a row of evenly spaced, long pilose pale setae of progressively decreasing length distally, longest and most basal of these setae with length approximately exceeding $2 \times$ width of tibia; hind femur with numerous short, erect pale setae along posterior margin, lacking tumescences or specialized setal tufts.

Pro- and mesosternum broadly sulcate along longitudinal midlines; metasternum slightly tumescent. Abdominal venter set with very short appressed pale setae, and scattered longer pale setae; abdominal ventrites I–IV unmodified; ventrites V and VI shallowly sulcate centrally along longitudinal midline; ventrite VI bearing a pair (1+1) of transversely ovate tufts of short, dense dark setae to either side of depressed midline; ventrite VII with anterior half lying in nearly vertical orientation, slightly sulcate along longitudinal midline, weakly bitumescent to either side of this shallow medial depression, posterior half lying in horizontal orientation, forming a lamella adjacent to base of genital capsule. Proctiger produced anteriorly into a moderate length, blade-like process tapering to an acute apex (Fig. 18). Parameres vestigial or absent.

Antennal formula I : II : III : IV; 0.25 : 0.24 : 0.35 : 0.47.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.60 : 0.50 : 0.23 : 0.0; of middle leg, 0.70 : 0.70 : 0.15 : 0.25; of hind leg, 0.80 : 0.95 : 0.15 : 0.30.

Micropterous female (Fig. 7). Similar to micropterous male in general structure and color, with following exceptions: all abdominal tergites with small patches of silvery setae laterally, tergites IV–VI with scattered silvery setae across their entire widths, abdominal tergite VIII flat, lying in an entirely horizontal orientation; connexiva broadly separated, bowing slightly

outward, margins gradually convergent posteriorly, posterolateral apices of segment VII produced into small, angulate, posterior projections when viewed dorsally or laterally, apices of these angles bearing acuminate tufts of long, posteriorly-directed dark setae (Fig. 21); connexival margins of even width throughout, lacking specialized setal tufts other than those at posterior apices; abdominal venter unmodified, set with numerous very short pale setae; legs unmodified.

Macropterous female (Fig. 8). Similar to micropterous female in general structure and color, with following exceptions: pronotum greatly enlarged; anterior lobe bearing scattered long, erect dark setae laterally; posterior lobe with humeri prominent, forming rounded lateral knobs; central section of posterior lobe broadly domed, bearing short erect gold setae, and set of numerous obscure foveae; hind portion of posterior lobe roughly triangular, posterior apex blunt, bearing a few short silvery setae. Wings uniformly dull dark brown, lacking pale markings, not extending beyond tip of abdomen, bearing 4 closed cells, consisting of 2 moderately small cells in basal half of wing, and two more larger cells extending well into distal half of wing, veins delimiting basal cells set with numerous long, erect brown setae.

Etymology

The name “timikana” refers to the type locality, near the town of Timika in the southern part of western New Guinea.

Distribution

Western New Guinea (Fig. 9).

Comparative notes

Neusterensifer timikana is a dark-colored species that is superficially similar to *N. sepik* J. Polhemus & D. Polhemus, with both these species possessing a pair (1+1) of short, dense dark setal patches to either side of the longitudinal midline on male abdominal ventrite VI, but may be separated by the differently shaped process on the male proctiger which becomes constricted to a narrowed tip (Fig. 18), and the slightly upturned posterolateral angles of the female connexiva when viewed laterally (Fig. 21).

This is the species that was listed as “*Neusterensifer* sp. undet. #1” by D. Polhemus & J. Polhemus (2000c).

Ecological notes

The type locality was a broad, unshaded river in an alluvial bed of mixed cobble, sand and gravel, flowing across the foreland plain at the southern edge of the central New Guinea mountains. The channel contained alternating pools and shallow riffles,

Figs 10–13. *Neusterensifer* species, dorsal habitus photos. 10. *N. wondiwoi*, micropterous male (specimen from New Guinea, Aisandami village, CL 7540); 11. *N. wondiwoi*, micropterous female (specimen from New Guinea, Aisandami village, CL 7540); 12. *N. yobi*, micropterous male (specimen from Yapen Island, Ambaidiru village); 13. *N. yobi*, micropterous female (specimen from Yapen Island, Ambaidiru village).

Fig. 14. Type locality of *Neusterensifer wondiwoi*, a rocky stream with metamorphic boulders on the west coast of the Wandammen Peninsula near Aisandami village. The type series was taken from shallow pools along the margins of the stream channel.

bordered by primary rainforest. The type series of *N. timikana* was taken from small pools formed amid cobbles along the channel margins.

Based on known collections, this species occupies the Arafura Foreland area of freshwater endemism (Area 23) as defined by Polhemus & Allen (2007).

***Neusterensifer wondiwoi* sp. n.**

Figs 5, 10, 11, 14, 15, 22

Type material. Holotype, micropterous male: Indonesia, West Papua Prov. [= former Irian Jaya Prov.], Wandammen Peninsula, west coast, swift stream entering south side of Manu [Dwairi] Bay near Aisandami village, 0–60 m. [0–200 ft.], 2°29'30"S, 134°32'27"E, water temp. 26 °C., 11 November 2008, 15:30–17:00 hrs., CL 7540, D. A. Polhemus (USNM).

Paratypes: Indonesia, West Papua Prov. [= former Irian Jaya Prov.]: 2 macropterous males, 2 macropterous females, 11 micropterous males, 6 micropterous females, same data as holotype, D. A. Polhemus (USNM, BPBM)

Description

Size. Micropterous male, length 2.30–2.65 mm ($\bar{x}$ = 2.49, n = 7); width 1.05–1.22 mm ($\bar{x}$ = 1.13, n = 7). Micropterous female, length 2.60–2.95 mm ($\bar{x}$ = 2.83, n = 5); width 1.10–1.15 mm ($\bar{x}$ = 1.12, n = 5). Macropterous male, length 2.60 mm (n = 1); width 1.20 mm, (n = 1). Macropterous female, length 2.75 mm (n = 1); width 1.20 mm, (n = 1).

Color. Micropterous male (Fig. 10): Ground color dark grey, marked with orange brown on anterior pronotum, brown on outer portions of connexiva; patches of short, shining, silvery pubescence present laterally on frons, vertex, pronotum, metanotum, and abdominal tergites II, III, V–VIII, in broad band across anterior pronotum; and scattered on sides of thorax and abdomen. Head dark grey; eyes dark red; antennae uniformly medium brown; rostrum dark yellow, dark brown medially, piceous distally. Pronotum dark grey, bearing an elongate transverse orange brown patch behind anterior margin, width of this patch subequal to width of vertex. Metanotum and abdominal tergites dark grey, connexiva brown on outer halves and ventrally. Legs yellowish brown with distal apices of femora and tibiae plus all tarsi darker brown. Laterotergites below connexiva and all ventral surfaces dull grayish-black, except propleural region and genital segments brown.

Structural characters. Micropterous male: head of moderate length, declivant anteriorly, with weak impressed median line; length 0.30, width 0.62; width of eye/interocular space, 0.15/0.32.

Pronotum long, covering mesonotum, length/width, 0.40/1.10. Metanotum length 0.30. Abdominal tergites dull, without shining areas; lengths of tergites II–VII, respectively: 0.20 : 0.12 : 0.12 : 0.10 : 0.10 : 0.30.

Entire dorsum and laterotergites covered with fine appressed golden pubescence, intermixed with numerous, moderately long, erect brown setae; legs and antennae thickly clothed with short pale setae, scattered long erect brown setae present along anterior margins of antennal segments I and II, anterior margins of all tibiae; fore femur with ventral margin straight, not modified, bearing numerous short, erect pale setae along entire length, intermixed with evenly spaced comb of 6–8 long, erect, pilose pale setae; fore tibiae with inner margin straight, distal grasping comb extending for 0.5 × the length of the segment; middle tibia bearing a row of evenly spaced, long pilose pale setae of progressively decreasing length, longest and most basal of these setae with length approximately exceeding 2 × width of tibia; hind femur with numerous short, erect pale setae along posterior margin, lacking tumescences or specialized setal tufts.

Pro- and mesosternum broadly sulcate along longitudinal midlines; metasternum slightly tumescent. Abdominal venter set with very short appressed pale setae, and scattered longer pale setae; abdominal ventrites I–IV unmodified; ventrites V and VI raised centrally along longitudinal midline to form a low tumescence in the form of a triangle with a posteriorly directed apex, lateral margins of this low tumescence set with numerous moderately long, golden setae, forming a continuous golden setal patch in the form of a V-shape with the apex directed posteriorly; ventrite VII broadly depressed centrally. Proctiger produced anteriorly into a long, slender, sinuate process with a slightly hooked apex (Fig. 15). Parameres vestigial or absent.

Antennal formula I : II : III : IV; 0.30 : 0.25 : 0.40 : 0.50.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.62 : 0.60 : 0.30 : 0.0; of middle leg, 0.80 : 0.80 : 0.12 : 0.28; of hind leg, 1.00 : 1.10 : 0.20 : 0.29.

Micropterous female (Fig. 11). Similar to micropterous male in general structure and color, with following exceptions: abdominal tergites IV–VI bearing narrow bands of silvery setae across their posterior margins, abdominal tergite VII compressed between connexiva into a narrow, acute, triangle with apex directed posteriorly, abdominal tergite VIII hidden under convergent posterior angles of connexiva; connexiva broadly separated anteriorly, bowing outward, strongly convergent posteriorly, meeting over

abdominal tergite VIII and hiding it from dorsal view, posterolateral apices of segment VII produced into acutely angulate posterior projections when viewed both dorsally and laterally, these projections flanked subapically by small tufts of moderately long, erect brown setae (Fig. 22); connexival margins of even width throughout; lateroventrites on segment VII produced anteriorly in a broad crescent shape, this area depressed to form a broad, shallow, vertically aligned sulcus; abdominal venter unmodified, set with numerous very short pale setae; legs unmodified.

Micropterous male. Similar to micropterous male in general structure and color, with following exceptions: pronotum greatly enlarged; posterior lobe with humeri prominent, forming rounded lateral knobs; central section of posterior lobe broadly domed, bearing short erect gold setae, and set with numerous obscure foveae; hind portion of posterior lobe roughly triangular, posterior apex broadly rounded, bearing a few long, brown setae. Wings extending beyond tip of abdomen, bearing 4 closed cells, consisting of 2 moderately small cells in basal half of wing, and two larger cells extending well into distal half of wing; veins delimiting basal cells set with numerous long, erect brown setae; overall coloration of wings dull dark brown, with narrow pale tan streaks in the two basal cells, and faint indications of pale tan centrally in the two distal cells.

Macropterous female. Similar to micropterous female in general structure and color, with following exceptions: wings not exceeding tip of abdomen, with apices of posterior connexival projections slightly visible beyond wingtips when viewed dorsally.

Etymology

The name “wondiwoi” is a noun in apposition and refers to the Wondiwoi Mountains of the Wandamen Peninsula, the type locality for this species.

Distribution

Western New Guinea (Fig. 5).

Comparative notes

Neusterensifer wondiwoi is a dark brown species with rather extensive silvery markings on the dorsal female abdomen (Figs 10, 11), and can be easily recognized by the very slender, gently curving process on the male proctiger (Fig. 15), the relatively unmodified male abdominal ventrites which lack tubercles or prominently raised patches of setae, and the sharply pointed form of the terminal female abdominal segment when viewed laterally (Fig. 22). In addition, the laterotergites on female abdominal segment VII are depressed so as to form a broad, shallow, verti-

cally oriented, crescent-shaped sulcus, which may allow infolding of the female hind femur against the abdomen.

Ecological notes

The type locality was a swift, clear stream that served as a village water supply, occupying a boulder-strewn channel in a narrow, shady gorge cut into metamorphic rocks (Fig. 14), with waterfalls at the upper end. The type series of *N. wondiwoi* was taken from small pockets of water amid rocks and cobbles along the margins of this stream in the gorge area below the falls.

Based on known collections, this species occupies the Vogelkop Anticlines area of freshwater endemism (Area 6) as defined by Polhemus & Allen (2007).

Neusterensifer yobi sp. n.

Figs 9, 12, 13, 19, 20

Type material. **Holotype**, micropterous male: **Indonesia, Papua Prov.** [= former Irian Jaya Prov.], Yapen Is., Ambaidiru village, brook (Kali Manatiuna) running through village and degraded forest, 1°45'47"S, 136°10'44"E, 16 July 2006, VJK2006NG093, V. Kalkman (BPBM).

Paratypes: **Indonesia, Papua Prov.** [= former Irian Jaya Prov.]: 10 micropterous males, 8 micropterous females, same data as holotype, V. Kalkman (USNM, BPBM); 4 micropterous males, 2 micropterous females, Yapen Is., north coast, Yobi, river partly in degraded forest and partly in virgin forest, 1°32'20"S, 136°28'40"E, 18 July 2006, VJK2006NG268, V. Kalkman (BPBM).

Description

Size. Micropterous male, length 2.32–2.45 mm ($\bar{x}$ = 2.37, n = 7); width 0.95–1.05 mm ($\bar{x}$ = 1.00, n = 7). Micropterous female, length 2.50–2.70 mm ($\bar{x}$ = 2.60, n = 7); width 1.00–1.10 mm, ($\bar{x}$ = 1.05, n = 7).

Color. Micropterous male (Fig. 12): Ground color dark grey, marked with orange-brown on anterior pronotum and outer halves of connexiva; patches of short, shining, silvery pubescence present laterally on frons, vertex, pronotum, metanotum, and abdominal tergites II, III, VI–VIII, in broad band across anterior pronotum; and on sides of thorax and abdomen. Head dark grey; eyes dark red; antennae with basal two-thirds of segments I and II yellowish-brown, remaining distal portions of segments I and II and all of segments III and IV medium brown; rostrum dark yellow, dark brown medially, piceous distally. Pronotum dark grey, bearing an elongate transverse orange brown patch behind anterior margin, width of this patch subequal to width of vertex.

Figs 15–19. *Neusterensifer* species, male proctiger shapes, ventral views. 15. *N. wondiwoi*; 16. *N. dabrana*; 17. *N. terrestris*; 18. *N. timikana*; 19. *N. yobi*

Figs 20–24. *Neusterensifer* species, female terminal abdomen, lateral views. 20. *N. yobi*; 21. *N. timikana*; 22. *N. wondiwoi*; 23. *N. terrestris*; 24. *N. dabrana*

Metanotum and abdominal tergites dark grey, connexiva orange-brown on outer halves and ventrally. Legs yellowish-brown; distal apices of femora and distal tarsi darker brown. Laterotergites below connexiva and all ventral surfaces dull black, except propleural region, mesoacetabulae and abdominal ventrites VII–IX yellowish brown.

Structural characters. Micropterous male: head of moderate length, declivant anteriorly, with weak impressed median line; length 0.30, width 0.60; width of eye/interocular space, 0.15/0.30. Pronotum long, covering mesonotum, length/width, 0.40/1.00. Metanotum length 0.40. Abdominal tergites dull, without shining areas; lengths of tergites II–VII, respectively: 0.20 : 0.15 : 0.10 : 0.10 : 0.10 : 0.30.

Entire dorsum and laterotergites covered with fine appressed golden pubescence, intermixed with scattered medium length, erect golden-brown setae; legs and antennae thickly clothed with short pale setae, scattered long erect golden-brown setae present along anterior margins of antennal segments I and II, anterior margins of all tibiae; fore femur ventral margin straight, not modified, bearing numerous short, erect pale setae along entire length, intermixed with evenly spaced comb of 6–8 long, erect, pilose pale setae; fore tibiae with inner margin straight, distal grasping comb extending for $0.45 \times$ the length of the segment; middle tibia bearing a row of evenly spaced, long pilose pale setae of progressively decreasing length, longest and most basal of these setae with length approximately exceeding $2 \times$ width of tibia; hind femur with numerous short, erect pale setae along posterior margin, lacking tumescences or specialized setal tufts.

Pro- and mesosternum broadly sulcate along longitudinal midlines; metasternum slightly tumescent. Abdominal venter set with very short appressed pale setae, and scattered longer pale setae; abdominal ventrites I–IV unmodified; ventrites V and VI shallowly sulcate centrally along longitudinal midline; central portion of ventrite VI produced posteriorly into a roughly trapezoidal projection extending posteriorly over base of ventrite VII, lateral margins of the projection converging posteriorly, densely set with short, stiff, shining golden setae, middle portion of projection bearing a pair (1+1) of patches of short, dense, dark setae to either side of slightly depressed longitudinal midline, posterior apex of projection truncate, bearing a few long, pale, posteriorly directed setae; ventrite VII bitumescent basally, bearing a pair (1+1) of rounded tumescences in the section beneath the overhanging central section of ventrite VI, these tumescences narrowly separated by incised longitudinal midline, posterior and lateral sections of

ventrite VII adjacent to these tumescences depressed and flattened. Proctiger produced anteriorly into a moderately long, slightly sinuate, blade-like process tapering to a bluntly rounded apex (Fig. 19). Parameres vestigial or absent.

Antennal formula I : II : III : IV; 0.35 : 0.30 : 0.40 : 0.50.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.60 : 0.50 : 0.20 : 0.0; of middle leg, 0.70 : 0.80 : 0.18 : 0.30; of hind leg, 0.90 : 1.20 : 0.20 : 0.30.

Micropterous female (Fig. 13). Similar to micropterous male in general structure and color, with following exceptions: general coloration dark brown; pale markings on anterior pronotum consisting of a pair (1+1) of transverse, roughly rectangular dark yellow patches broadly separated by a dark coloration along the longitudinal midline; outer halves of connexiva dark orange; all antennal and leg segments medium brown with distal apices of tibiae and tarsi darker brown; patches of silvery setae present laterally on abdominal tergites II, III, and V–VII, these silvery setae also forming narrow transverse bands across posterior margins of tergites V and VI; abdominal tergite VIII with anterior three quarters lying 45° from vertical when viewed laterally, posterior one quarter bent more sharply downward into nearly vertical orientation; proctiger barely visible below tergite VIII, lying in nearly vertical orientation; connexival margins nearly straight, evenly convergent posteriorly, widely separated, leaving all tergites visible from above, inner faces of segments VII bearing small, inwardly directed tubercles projecting over posterolateral portions of tergite VII, apices of these tubercles bearing small, acute tufts of pale setae; posterolateral angles of segment VII produced into small, angulate, posterior projections when viewed both dorsally and laterally (Fig. 20); connexival margins of even width throughout, lacking specialized setal tufts; lateroventrites on segment VII slightly produced anteriorly in a crescentic shape, this area of the segment depressed to form a broad, shallow, vertically dimpled sulcus; abdominal venter unmodified, set with numerous very short pale setae; legs unmodified.

Macropterous form. Unknown.

Etymology

The name “yobi” is a noun in apposition and refers to the village of Yobi on Yapen Island, near which the type series of this species was collected.

Distribution

Yapen Island (Fig. 9).

Comparative notes

Neusterensifer yobi is a dark brown species (Figs 12, 13) that can be recognized by the form of the process on the male proctiger which is relatively short and has a broadly rounded apex (Fig. 19), the structure of the male ventral abdomen in which ventrite VI possesses a trapezoidal process projecting posteriorly over the bitumescent base of ventrite VII, and by the concave form of the posterior margin of the female abdomen when viewed laterally (Fig. 20). The female abdomen is also distinctive when viewed from above in that it bears small, inwardly-directed tubercles on the inner faces of the seventh connexival segment, which project over the posterolateral portions of tergite VII. In addition, the female seventh laterotergites are slightly depressed to form small, vertical sulci, in a manner reminiscent to, but less pronounced than, the character state seen in *N. wondiwoi*.

Biological notes

No information is available on the habits of this species except the label data indicating that the type series was taken from a “river partly in degraded forest and partly in virgin forest.” Based on known collections, this species occupies the Yapen Island area of freshwater endemism (Area 9) as defined by Polhemus & Allen (2007).

Neusterensifer gladius Polhemus & Polhemus

Fig. 5

Neusterensifer gladius J. Polhemus & D. Polhemus 1994: 70.

Material examined. Indonesia, West Papua Prov. [= former Irian Jaya Prov.]: 4 macropterous males, 4 macropterous females, 11 micropterous males, 8 micropterous females, Manggaur Peninsula, stream on east coast, N. of Jauer village, 0–45 m [0–150 ft], 3°00'04"S, 134°49'19"E, water temp. 25 °C., 10 November 2008, 08:30–10:45 hrs., CL 7537, D. A. Polhemus (BPBM); 7 micropterous males, 8 micropterous females, Wandammen Peninsula, rocky river and tribs. on east coast near northern tip, 0–120 m. [0–400 ft.], water temp. 25 °C., 9 November 2008, 08:00–14:00 hrs., CL 7535, D. A. Polhemus (BPBM); 1 macropterous male, 1 macropterous female, 19 micropterous males, 23 micropterous females, Wandammen Peninsula, west coast, swift stream entering south side of Manu [Dwairi] Bay near Aisandami village, 0–60 m. [0–200 ft.], 2°29'30"S, 134°32'27"E, water temp. 26 °C., 11 November 2008, 15:30–17:00 hrs., CL 7540, D. A. Polhemus (USNM).

Comparative notes

This species was previously described from a short series taken at a waterfall inland from Nabire, in company with a far larger series of *N. nabire*

J. Polhemus & D. Polhemus. These new records extend the geographic range of this species well to the west, onto the Mangguar and Wandammen peninsulas.

Biogeographic discussion

The new discoveries and range extensions reported in this paper are useful in refining the scheme of freshwater areas of endemism proposed by D. Polhemus & Allen (2007), and highlight the position of the Nabire area at the southeastern margin of Cenderawasih Bay as a potential contact zone between two such areas. For instance, the Mangguar and Wandammen peninsulas represent separate geological terranes in the scheme of Pigram & Davies (1987), but the distribution of *Neusterensifer gladius* on both terranes (Fig. 5), and nowhere else, indicates they have shared similar biotic histories. In addition, the absence of *N. nabire* in these two areas suggests that the core range of this latter species probably lies further to the east, in the Weyland Mountains, and that the Nabire area represents a contact zone between the respective ranges of taxa endemic to the Weyland Mountains on one side (*N. nabire*) and the Mangguar/Wandammen terranes (*N. gladius*) on the other.

In addition, based on this new veliid data, as well as recent *Argiolestes* damselfly descriptions (Kalkman et al. 2010), it appears that Area 6 (Vogelkop Anticlines) as proposed by D. Polhemus & Allen (2007) may warrant subdivision to accommodate the Wandammen Peninsula and adjacent Roon Island as a separate area of freshwater endemism. Although current distributions of both *Neusterensifer* and *Argiolestes* are not inconsistent with retaining Area 6 as currently defined, the unit's combination of geographic features of disparate geological origin, including the Lengguru Fold Belt anticlines, the Etna Bay area, Lake Yamur, and the Wandammen and Mangguar peninsulas was largely a compromise solution based on inadequate survey data. As noted by D. Polhemus & Allen (2007): "The Wandammen Peninsula has also been included in this unit, but this mountainous sliver of Australian craton will likely prove to be yet another discrete area of aquatic endemism once adequate faunal surveys are conducted." With the advent of such surveys and consequently refined distributional knowledge, this hypothesis has gained support.

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The holotypes of the new species described herein are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM); paratypes are held in that collection, and in the Bishop Museum. This paper represents a contribution to the latter institution's Pacific Biological Survey.

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Appendix

Checklist of the *Neusterensifer* species and their geographic ranges.

Species are assigned to areas of freshwater endemism as defined in Polhemus & Allen (2007); the names of these areas are provided in the note below the checklist. For each species in the checklist, specific river basins or other localities of known occurrence are referenced, parenthetically followed by the broader area of freshwater endemism in which these localities lie.

Genus *Neusterensifer*

- acuminata* D. & J. Polhemus 2000: 119
Adelbert Mtns. (Area 14)
- aviavi* D. & J. Polhemus 2004: 185
Lakekamu River Basin (Area 25)
- batantana* D. & J. Polhemus 2000: 282
Batanta Is. (Area 2)
- bowutu* D. & J. Polhemus 2004: 179
Bowutu Mtns. (Area 22)
- compactus* J. & D. Polhemus 1994: 69
East Papuan Central Highlands (Area 21)
- cyclops* J. & D. Polhemus 1994: 69
Cyclops Mtns. (Area 12)
- dabrana* D. & J. Polhemus 2011: 143
Mamberamo Foreland (Area 17)
- dentrecaesteaux* D. & J. Polhemus 2004: 172
Papuan Peninsula, D'Entrecasteaux Is. (Areas 30, 34, 35)
- etna* D. & J. Polhemus 2000: 121
Etna Bay (Area 6)
- femoralis* D. & J. Polhemus 2004: 157
Papuan Peninsula, D'Entrecasteaux Is. (Areas 30, 34, 35)
- gamensis* D. & J. Polhemus 2000: 283
Gam Is. (Area 1)
- gladius* J. & D. Polhemus 1994: 70
Manguar and Wandamman Peninsulas (Area 6)
- goilala* D. & J. Polhemus 2004: 181
Owen Stanley Mountains (Area 31)
- hunteri* D. & J. Polhemus 2004: 160
Papuan Peninsula, D'Entrecasteaux Is. (Areas 30, 34, 35)
- iriana* D. & J. Polhemus 2000: 122
Star Mtns. (Area 20)
- kula* D. & J. Polhemus 2004: 174
D'Entrecasteaux Is. (Area 35)
- kutubu* D. & J. Polhemus 2000: 115
Kikori River Basin (Area 25)
- lousiadae* D. & J. Polhemus 2004: 163
Rossel Is. (Area 39), Tagula Is. (Area 38)
- lubu* D. & J. Polhemus 2000: 115
Kikori and Lakekamu River Basins (Area 25)

- microrivula* D. & J. Polhemus 2004: 184
Lakekamu River Basin (Area 25)
- misima* D. & J. Polhemus 2004: 168
Misima Is. (Area 37)
- misoolicus* D. & J. Polhemus 2000: 281
Misool Is. (Area 3)
- muyuw* D. & J. Polhemus 2004: 170
Woodlark Is. (Area 40)
- nabire* J. & D. Polhemus 1994: 71
Weyland Mountains (Area 19)
- pseudocyclops* D. & J. Polhemus 2000: 117
Trans-Fly Foreland (Area 24)
- sagarai* D. & J. Polhemus 2004: 155
Cloudy Mountains (Area 34)
- sepik* J. & D. Polhemus 1994: 72
Sepik River Basin (Area 16)
- stysi* Chen, Nieser & Lansbury 2008: 275
Prince Alexander Mountains (Area 13)
- sulcata* D. & J. Polhemus 2004: 165
Tagula Is. (Area 38)
- terrestris* D. & J. Polhemus 2011: 142
Mamberamo Foreland (Area 17)
- timikana* D. & J. Polhemus 2011: 146
Ajikwa River Basin (Area 23)
- tufi* D. & J. Polhemus 2004: 177
Cape Nelson Peninsula (Area 33)
- wondiwoi* D. & J. Polhemus 2011: 150
Wandammen Peninsula (Area 6)
- yela* D. & J. Polhemus 2004: 164
Rossel Is. (Area 39)
- yobi* D. & J. Polhemus 2011: 151
Yapen Is. (Area 9)

Note. Areas of freshwater endemism in the New Guinea region as defined in Polhemus & Allen (2007) and referenced in the checklist above: Area 1. Waigeo Is.; Area 2. Batanta Is.; Area 3. Misool Is.; Area 4. Vogelkop Lowlands; Area 5. Vogelkop Highlands; Area 6. Vogelkop Anticlines; Area 7. Fakfak and Kumafa Mountains; Area 8. Biak and Supiori Islands; Area 9. Yapen Is.; Area 10. Northwest Papuan Coastal Lowlands; Area 11. Van Rees and Foja Mountains; Area 12. Cyclops Mountains; Area 13. Bewani, Torricelli and Prince Alexander Mountains; Area 14. Adelbert, Finisterre and Saruwaged Mountains; Area 15. Mamberamo Basin; Area 16. Sepik-Ramu-Markham Basin; Area 17. Mamberamo Foreland; Area 18. Sepik-Ramu Foreland; Area 19. Weyland Mountains; Area 20. West Papuan Central Highlands; Area 21. East Papuan Central Highlands; Area 22. Morobe Highlands; Area 23. Arafura Foreland; Area 24. Trans-Fly Foreland; Area 25. Papuan Gulf Foreland; Area 26. Arafura Coastal Lowlands; Area 27. Trans-Fly Coastal Lowlands; Area 28. Papuan Gulf Coastal Lowlands; Area 29. Aru Islands; Area 30. South Papuan Peninsula Foreland; Area 31. Owen Stanley Mountains; Area 32. Popondetta Foreland; Area 33. Cape Nelson Peninsula; Area 34. Cloudy Mountains; Area 35. D'Entrecasteaux Islands; Area 36. Basilaki Island; Area 37. Misima Is.; Area 38. Tagula Is.; Area 39. Rossel Is.; Area 40. Woodlark Is.