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RESEARCH ARTICLE

New taxa of pygmy grasshoppers from Australia with notes on classification of the subfamily Batrachideinae (Orthoptera: Tetrigidae)

Новые таксоны тетригид из Австралии с замечаниями по классификации подсемейства Batrachideinae (Orthoptera: Tetrigidae)

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Abstract. The pygmy grasshopper subfamily Batrachideinae consists of three tribes: Batrachideini Bolívar, 1887; Cassitettigini Yin, 1984, **nom. resurr.**; Bufonidini Hancock, 1907, **nom. resurr., stat. nov.** The Australian pygmy grasshoppers of the tribe Bufonidini are reviewed. Three new genera are described, namely *Paraselina* **gen. nov.** (type species *Vingselina multifora* Rehn, 1952), *Anaselina* **gen. nov.** (type species *Vingselina minor* Sjöstedt, 1921), and *Selivinga* **gen. nov.** (type species *Selivinga tribulata* **sp. nov.**). Four new combinations are proposed: *Paraselina multifora* (Rehn, 1952), **comb. nov.**; *P. trituberculata* (Sjöstedt, 1932), **comb. nov.**; *P. brunneri* (Bolívar, 1887), **comb. nov.**; *Anaselina minor* (Sjöstedt, 1921), **comb. nov.** A key to Australian genera of Batrachideinae is provided.

Резюме. В подсемействе прыгунчиковых Batrachideinae выделено три трибы: Batrachideini Bolívar, 1887; Cassitettigini Yin, 1984, **nom. resurr.**; Bufonidini Hancock, 1907, **nom. resurr., stat. nov.** Дан обзор австралийских представителей трибы Bufonidini. Описаны три новых для науки рода: *Paraselina* **gen. nov.** (типовой вид *Vingselina multifora* Rehn, 1952), *Anaselina* **gen. nov.** (типовой вид *Vingselina minor* Sjöstedt, 1921) and *Selivinga* **gen. nov.** (типовой вид *Selivinga tribulata* **sp. nov.**). Предложены четыре новые комбинации: *Paraselina multifora* (Rehn, 1952), **comb. nov.**; *P. trituberculata* (Sjöstedt, 1932), **comb. nov.**; *P. brunneri* (Bolívar, 1887), **comb. nov.**; *Anaselina minor* (Sjöstedt, 1921), **comb. nov.** Приводится определительная таблица австралийских родов подсемейства Batrachideinae.

Key words: pygmy grasshoppers, taxonomy, Australia, Tetrigidae, Batrachideinae, Batrachideini, Cassitettigini, Bufonidini, new taxa, generic key

Ключевые слова: прыгунчики, таксономия, Австралия, Tetrigidae, Batrachideinae, Batrachideini, Cassitettigini, Bufonidini, новые таксоны, родовой ключ

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Introduction

The first Australian species of the subfamily Batrachideinae was described from Sydney as *Diotarus brunneri* by Bolívar (1887). The most important investigations were made by Sjöstedt (1921, 1932, 1936). He described the genus *Vingselina* Sjöstedt, 1921 with three Australian species, including Bolívar's *Diotarus brunneri*, and placed this new genus in the "section Batrachidae" of the family Tetrigidae on account of the sulcate upper side of fore and mid femora (Sjöst-

edt, 1921). Later he described fourth species of *Vingselina* (Sjöstedt, 1932) and revised these taxa (Sjöstedt, 1936). In the next revision of Australian Tetrigidae, one new species of *Vingselina* was described and the genus was placed in the subfamily Cladonotinae on the basis of the considerably widened frontal ridge (Rehn, 1952). But this point of view was not accepted, and *Vingselina* was again placed in the subfamily Batrachideinae (Otte, 1997; Cigliano et al., 2018). *Vingselina willemsei* Günther, 1937 was described from the Solomon Islands (Günther, 1937), but later this species was placed in the monotypic genus *Vilma* Steinmann, 1973; the differences of both genera are given in a key (Steinmann, 1973). Thus, the genus *Vingselina* up to now included five species distributed in Australia (Cigliano et al., 2018). All species of the genus were described from females only.

In the present paper, *Vingselina* is divided into four genera. One new species and a previously unknown male of one old species are described also. A key to Australian genera of the tribe Bufonidini is provided and the taxonomic position of the tribes of Batrachideinae is briefly discussed.

This paper is based on the specimens collected by the author in Australia in 2000. The specimens are dry and pinned. All photographs were made using a Canon EOS 6D digital camera with EF 100 mm f/2.8L Macro IS USM macro lens, Falcon Eyes Slk-2400S flash, and the Combine ZM imaging software. The morphological terminology follows Devriese (1999) and Tumbrinck (2014). Length of body is measured from the frontal ridge to the apex of subgenital plate; other measurements are standardized for Tetrigidae (Tumbrinck, 2014). The specimens examined are deposited at the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZIN).

Taxonomic part

Family **Tetrgidae** Rambur, 1838

Subfamily **Batrachideinae** Bolívar, 1887

Genus ***Vingselina*** Sjöstedt, 1921

Vingselina Sjöstedt, 1921: 14; Sjöstedt, 1932: 9; Sjöstedt, 1936: 16; Rehn, 1952: 35; Steinmann, 1973: 168; Yin et al., 1996: 929; Otte, 1997: 11.

Type species *Vingselina crassa* Sjöstedt, 1921, by original designation.

Description. Body medium-sized for subfamily Batrachideinae. Antennae filiform. Antennal grooves situated distinctly below lower margins of eyes (Fig. 3). Compound eyes not elevated above pronotum in lateral view. Frontal ridge, in lateral view, rounded with deep concavity near lateral ocelli (Fig. 1); in frontal view this ridge broad; lateral carinae of frontal ridge diverging downwards (Fig. 3). Pronotum short; anterior margin of pronotum, in dorsal view, narrowly triangular and far produced over head; apex of posterior process of pronotum broadly rounded (Fig. 2). Median carina of pronotum elevated, in profile almost arch-like before shoulders and straight behind shoulders (Fig. 1), in cross-section triangular. Hind margin of lateral lobes of pronotum with vestigial lower sinus; tegminal sinus absent; lower edge of infrascapular area barely sinuate (Fig. 1); lower part of lateral lobe of pronotum, in dorsal view, forming rounded lobule (Fig. 2). Tegmina and hind wings absent. Lower carinae of fore and mid femora with two lappets; dorsal side of fore femora distinctly sulcate. Upper carina of hind femora serrated, without lappets. First tarsal segment of hind leg distinctly longer than its third segment. Female subgenital plate with deep median furrow bordered with ridges. Valves of ovipositor narrow, dentate.

Differential diagnosis. This genus is similar to *Vilma* and *Bufonides* Bolívar, 1898 but differs from both in the shape of lateral lobes of pronotum (in *Vilma* and *Bufonides*, the lower part of lobe triangular). *Vingselina* is easy recognizable from the other Oriental and Australasian genera (*Saussurella* Bolívar, 1887, *Palaioscaria* Günther, 1936 and *Wiemersiella* Tumbrinck, 2014) in wide frontal ridge forming so-called "scutellum" (in above listed genera, the frontal ridge narrow with parallel lateral carinae). Apex of posterior process of the pronotum in *Vingselina* is rounded, while in other Australian Batrachideinae and *Bufonides*, this apex is excised. *Vingselina* is most similar to *Paraselina* **gen. nov.** in the position of antennal grooves but differs from the latter in the shape of median carina of pronotum and direction of lateral carinae of frontal ridge (see key below). *Vingselina* is easy recognizable from *Anaselina* **gen. nov.** in the almost arch-like median carina of pronotum (in *Anaselina* **gen. nov.**, the median carina is low and almost straight) and similar in

this aspect to *Selivinga* **gen. nov.**, but differs from the latter in the shape of lateral lobes of pronotum and position of antennal grooves (in *Selivinga* **gen. nov.**, the lateral lobes of pronotum with shallow lower sinus and antennal grooves situated between lower margins of the eyes). Habitually *Vingselina* is also similar to the genera *Deltonotus* Hancock, 1904 and *Boczkitettix* Tumbrinck, 2014 (subfamily Cladonotinae), especially in the median carina of pronotum arch-like and far produced over the head. Genus *Deltonotus* consists of seven species distributed in Sri Lanka, India, China and Vietnam (Hancock, 1904; Storozhenko, 2011; Cigliano et al., 2018), and *Boczkitettix* includes two species from Borneo and New Guinea (Tumbrinck, 2014). Both genera of Cladonotinae are easy recognizable from *Vingselina* in occurrence of the deep lower sinus on the hind margin of lateral lobes of the pronotum and the keeled dorsal side of the fore and mid femora (in *Vingselina*, the dorsal side of the fore and mid femora are typical for Batrachideinae and lower sinus absent).

Composition. Genus consists of a type species only.

Vingselina crassa Sjöstedt, 1921
(Figs 1–3)

Vingselina crassa Sjöstedt, 1921: 20 (holotype – female, Australia: southeastern Queensland, Colosseum; deposited in Naturhistoriska riksmuseet, Stockholm); Sjöstedt, 1936: 16; Rehn, 1952: 37; Steinmann, 1970: 157; Steinmann, 1973: 168; Yin et al., 1996: 929; Otte, 1997: 11.

Description. The detailed description of this species was given by Rehn (1952).

Distribution. Australia (Queensland).

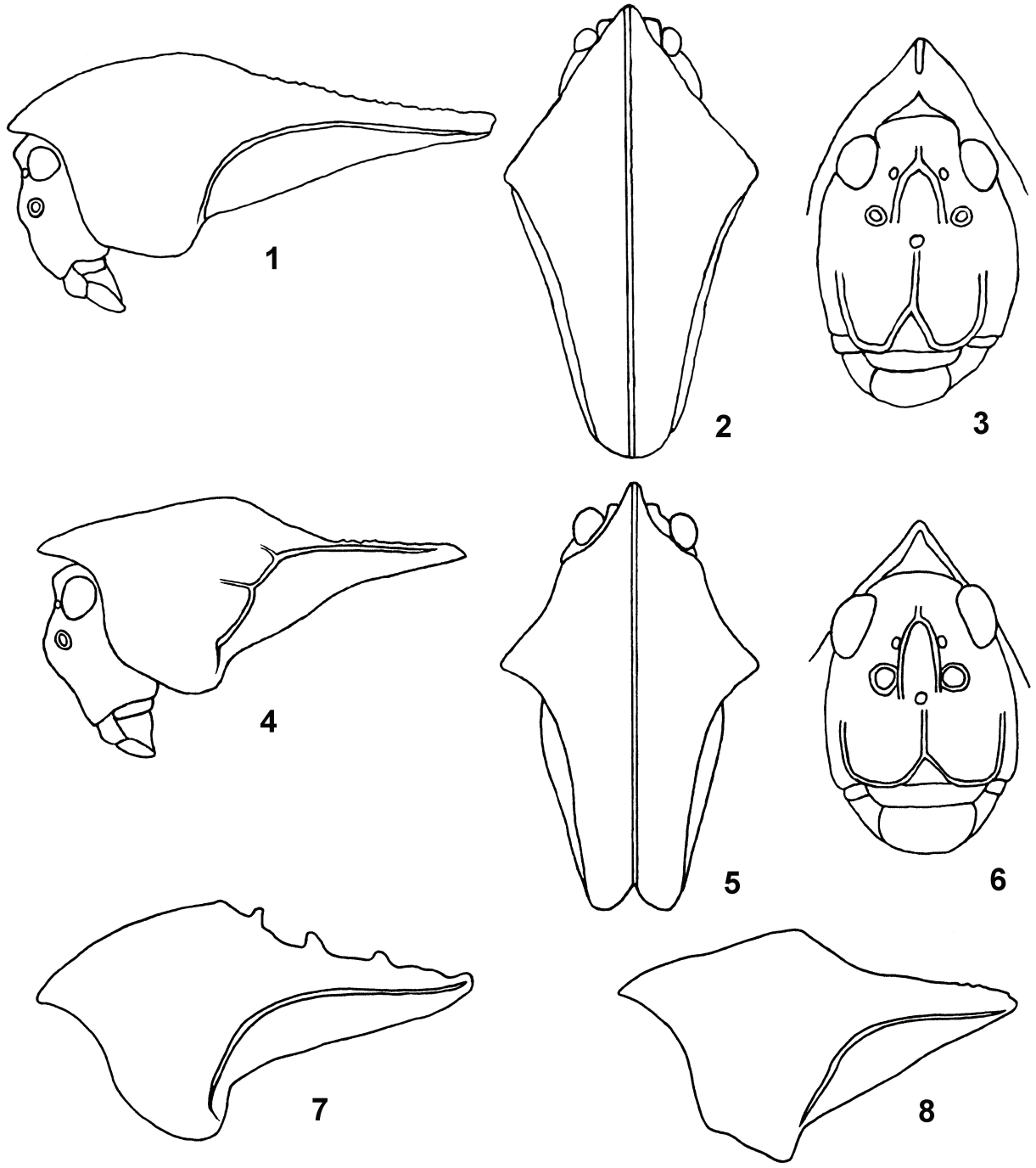
Remarks. The males of this species are unknown. The photos of female holotype prepared by J. Tumbrinck are available in the Orthoptera Species File (Cigliano et al., 2018). It allows me to clarify the diagnostic features of the genus and species.

Genus ***Paraselina*** Storozhenko, **gen. nov.**

Type species *Vingselina multifora* Rehn, 1952.

Description. Body medium-sized for Australian Batrachideinae. Antennae filiform. Antennal grooves situated distinctly below lower margins of eyes (Fig. 6). Compound eyes not elevated above pronotum in lateral view. Frontal ridge, in lateral view, broadly rounded with distinct concavity near lateral ocelli (Fig. 4); in frontal view this ridge broad; lateral carinae of frontal ridge almost parallel (Fig. 6) or diverging downwards. Pronotum short; anterior margin of pronotum, in dorsal view, narrowly triangular and far produced over head or at least reaching frontal line of eyes; apex of posterior process of pronotum excised (Fig. 5). Median carina of pronotum in profile almost arch-like before shoulders and distinctly excised behind shoulders (Figs. 4, 7, 8), in cross-section triangular. Hind margin of lateral lobes of pronotum with vestigial lower sinus; tegminal sinus absent; lower edge of infrascapular area barely sinuate (Fig. 4, 7, 8); lower part of lateral lobe of pronotum, in dorsal view, forming rounded lobule (Fig. 5). Tegmina and hind wings absent. Lower carinae of fore and mid femora sinuate or almost straight; dorsal side of fore femora distinctly sulcate. Upper carina of hind femora serrated, without lappets. First tarsal segment of hind legs distinctly longer than 3rd segment. Female subgenital plate with deep median furrow bordered with ridges. Valves of ovipositor very narrow, dentate.

Differential diagnosis. The new genus is most similar to *Vingselina* but differs from the latter in the characters given in the key below. *Paraselina* **gen. nov.** is similar to *Selivinga* **gen. nov.** in strongly elevated median carina of pronotum and distinctly excised apex of the posterior process of pronotum, but differs from the latter in the position of antennal grooves (in *Selivinga* **gen. nov.**, the antennal grooves situated between the lower margins of the eyes). *Paraselina* **gen. nov.** is easy recognizable from *Anaselina* **gen. nov.** in the shape of median carina of the pronotum (in *Anaselina* **gen. nov.**, the median carina is low). *Paraselina* **gen. nov.** is also similar to the genera *Gestroana* Berg, 1898 and *Tetradinodula* Zha, 2017 (subfamily Cladonotinae) in the median carina distinctly elevated in the anterior part and strongly depressed in the posterior part of pronotum, as well as in the lower position of antennal grooves. There are 16 species of *Gestroana* in Papua New Guinea (Berg, 1898; Tumbrinck, 2014; Tan et al., 2016); all of them have a few strong lappets situated on the upper carina of the hind femur, while in *Paraseli-*



Figs 1–8. Batrachideinae, female: **1–3**, *Vingselina crassa*; **4–6**, *Paraselina multifora*; **7**, *P. trituberculata*; **8**, *P. brunneri*. Head and pronotum, lateral (1, 4) and dorsal (2, 5) views; pronotum, lateral view (7, 8); head and dorsal part of pronotum, frontal view (3, 6). [1–3, after photos of Tumbrinck (Cigliano et al., 2018); 4–6, after photos of Rehn (1952); 7, 8, after Sjöstedt (1932)].

na **gen. nov.**, the hind femur without lappets. The monotypic genus *Tetradinodula* from South China (Zha et al., 2017) differs from *Paraselina* **gen. nov.** in the deep lower sinus of the lateral lobes of the pronotum (in the new genus, the lateral lobes of pronotum with vestigial lower sinus).

Composition. The genus consists of three species.

Etymology. This name is originated from Latinized Greek prefix "para-" and the genus *Vingselina*. Gender feminine.

Key to species of *Paraselina* gen. nov.

1(2) Median carina of pronotum in profile behind shoulders with three large tubercles (Fig. 7). . . . . ***P. trituberculata***

2(1) Median carina of pronotum without large tubercles (Figs. 4, 8).

3(4) Median carina of pronotum between shoulders angular in profile; lower side of infrascapular area almost straight (Fig. 8). Larger: length of hind femur 7.0 mm . . . . . ***P. brunneri***

4(3) Median carina of pronotum between shoulders rounded in profile; lower side of infrascapular area moderately sinuate (Fig. 4). Smaller: length of hind femur 4.7–5.7 mm. . . . . ***P. multifora***

Paraselina brunneri (Bolívar, 1887), **comb. nov.**
(Fig. 8)

Diotarus brunneri Bolívar, 1887: 212 (lectotype – female, Australia: New South Wales, Sidney; deposited in Naturhistorisches Museum Wien, Vienna); Hancock, 1907: 17; Kirby, 1910: 10.

Vingselina brunneri: Sjöstedt, 1921: 20; Sjöstedt, 1936: 16; Rehn, 1952: 38; Steinmann, 1970: 157; Steinmann, 1973: 168; Yin et al., 1996: 929; Otte, 1997: 11.

Description. The description of this species was given by Bolívar (1887) and Sjöstedt (1921).

Distribution. Australia (New South Wales).

Paraselina multifora (Rehn, 1952), **comb. nov.**
(Figs 4–6)

Vingselina multifora Rehn, 1952: 38 (holotype – female, Australia: Macleay Range in northeastern New South Wales, Dorrigo; deposited in Museum of Comparative Zoology of Harvard University in Cambridge, Massachusetts); Steinmann, 1970: 157; Steinmann, 1973: 168; Yin et al., 1996: 929; Otte, 1997: 11.

Description. The detailed description of this species was based on four females from the New South Wales and provided by photos of holotype (Rehn, 1952).

Distribution. Australia (New South Wales).

Remarks. Two paratypes of *V. multifora* from the type locality and one paratype from Salisbury in the New South Wales are deposited at the Museum of Comparative Zoology of Harvard University in Cambridge and at the Academy of Natural Sciences of Philadelphia (Rehn, 1952).

Paraselina trituberculata (Sjöstedt, 1932), **comb. nov.**
(Fig. 7)

Vingselina trituberculata Sjöstedt, 1932: 9 (holotype – female, Australia: southeastern Queensland, Mt Tambourine [isolated mountain situated about 12 miles SW of Coomera]; deposited in Queensland Museum, Brisbane); Sjöstedt, 1936: 16; Rehn, 1952: 42; Steinmann, 1970: 157; Steinmann, 1973: 168; Yin et al., 1996: 929; Otte, 1997: 11.

Description. The description of this species was given by Sjöstedt (1932) and Rehn (1952).

Distribution. Australia (Queensland).

Remarks. The photo of male is available in the Orthoptera Species File (Cigliano et al., 2018).

Genus ***Anaselina*** Storozhenko, **gen. nov.**

Type species *Vingselina minor* Sjöstedt, 1921.

Description. Body small-sized for Australian Batrachideinae. Antennae filiform. Antennal grooves situated between lower margins of eyes (Figs 9, 12, 14). Compound eyes not elevated above pronotum in lateral view. Frontal ridge, in lateral view, broadly rounded with shallow concavity above lateral ocelli (Figs. 9, 12); in frontal view, this ridge broad; lateral carinae of frontal ridge moderately diverging downwards and gentle incurved below antennal grooves (Fig. 14). Pronotum short; anterior margin of pronotum, in dorsal view, broadly triangular and almost reaching middle of eyes; apex of posterior process of pronotum excised (Figs. 10, 13). Median carina of pronotum low, in profile almost straight (Figs. 9, 12), in cross-section triangular. Hind margin of lateral lobes of pronotum with shallow lower sinus; tegminal sinus absent; lower edge of infrascapular area barely sinuate (Figs. 9, 12); lower part of lateral lobe of pronotum, in dorsal view, forming rounded lobule (Figs. 10, 13). Tegmina and hind wings absent. Fore and mid femora with lower carinae weakly sinuate; dorsal side of fore femora sulcate. Upper carina of hind femora gentle serrated, without lappets. First tarsal segment

of hind legs distinctly longer than third segment. Female subgenital plate with deep median furrow bordered with ridges (Fig. 11). Valves of ovipositor narrow, dentate.

Differential diagnosis. The new genus differs from the Oriental genera of Batrachideinae in the same characters as *Vingselina* and easy recognizable from Australian taxa in the low and almost straight median carina of the pronotum. *Anaselia* **gen. nov.** is also similar to the genus *Epitettix* Hancock, 1907 (subfamily Cladonotinae) especially in the low median carina of the pronotum and the shape of frontal ridge. All species of *Epitettix* are characterized by keeled dorsal side of the fore and mid femora and by smooth female subgenital plate (Hancock, 1907; Tumbrinck, 2014; Storozhenko & Dawwrueng, 2014; Zheng & Liu, 2016), while in *Anaselia* **gen. nov.**, the dorsal side of the fore and mid femora sulcate, and the female subgenital plate with deep median furrow.

Composition. The genus is monotypic.

Etymology. This name is originated from Latinized Greek prefix "ana-" and the genus name *Vingselina*. Gender feminine.

Anaselina minor (Sjöstedt, 1921), **comb. nov.** (Figs 9–15)

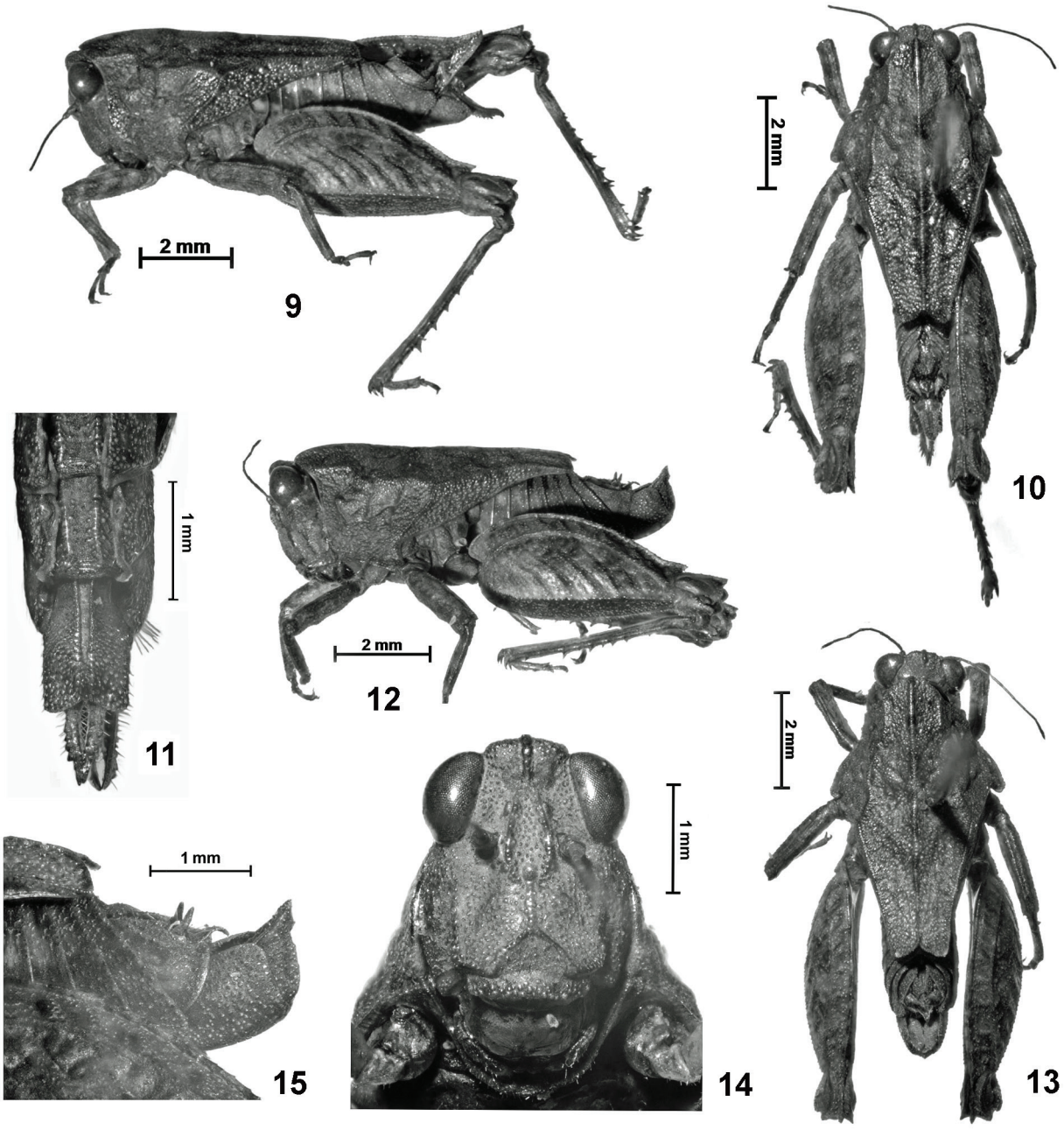
Vingselina minor Sjöstedt, 1921: 20 (holotype – female, Australia: northern Queensland, Heberton; deposited in Naturhistoriska riksmuseet, Stockholm); Sjöstedt, 1936: 17; Rehn, 1952: 37; Steinmann, 1970: 157; Steinmann, 1973: 168; Yin et al., 1996: 929; Otte, 1997: 11.

Material examined. **Australia**: 2 males, 1 female, Queensland, Cape Tribulation, 16°07'S, 145°26'E, tropical rainforest, 10–30.III.2000, S. Storozhenko (ZIN).

Description. Female. Body robust. Antennae 15-segmented, 1.5 times as long as fore femur; middle segments (seventh–ninth) 5–6 times as long as wide. Antennal grooves situated almost between lower margins of eyes, i.e. upper margins of antennal grooves located at same level as lower margins of eyes. Fastigium of vertex 1.5 times as wide as one compound eye seen from above; anterior margin of vertex straight, slightly surpassing frontal line of eyes; lateral margins of vertex parallel; median carina of fastigium short; transverse carinae only traced by few tubercles; supraocular lobes and fossulae absent. Lateral ocelli situated between middles of eyes. Frontal ridge, in lateral view, broadly rounded with two shallow concavities, one above lateral ocelli and another below antennal grooves. Width of frontal ridge near base of antennae 1.8 times as great as width of first antennal segment. Pronotum slightly surpassing 1/3 of hind femora. Lateral carinae of pronotum well defined, parallel; prozona as long as wide. Humero-apical carinae sinuate; interhumeral carinae absent. Infrascapular area long and narrow. Fore and mid femora with upper carinae almost straight; lower carinae weakly sinuate. Fore femur 3.3 times and mid femur 3.5 times as long as wide. Hind femur stout, 2.5 times as long as wide; upper and lower carinae gentle serrated; genicular tooth as long as antegenicular tooth. Upper side of hind tibia with 7–8 outer and 5–6 inner spines. First tarsal segment of hind legs 2.7 times as long as third one (without claws). Subgenital plate elongated, 1.3 times as long as wide, with deep median furrow bordered with ridges; apex of plate distinctly excised. Cerci conical, narrowing apically, with rounded apices, 2.3 times as long as wide near cercal base. Upper valve of ovipositor 4.5 times as long as its maximum width; lower valve of ovipositor 5.7 times as long as its maximum width.

Body blackish brown. Head blackish. Eyes dark brown. Antennae brown. Dorsal side of pronotum blackish with indistinct brown marks. Lateral lobes of pronotum blackish brown with lower parts brown; infrascapular area blackish. Fore and mid femora blackish with brown marks. Fore and mid tibiae brown, with two black rings. First segment of fore and mid tarsi dark brown, with second segment light brown but having black apex, and with brown claws. Outer side of hind femur above lower outer keel brown with blackish marks, but below lower outer keel, this femur black. Hind tibiae blackish with brown rings situated at base and near middle; apex of tibia light brown. Hind tarsi light brown. Abdomen blackish with light brown lateral and medial stripes, but sternites and subgenital plate completely blackish, and cerci blackish brown. Ovipositor brown.

Male (**nov.**). Body similar to female but smaller. Antennae 14-segmented, 1.6–1.7 times as long as fore femora; mid segments of antennae 5.5–6.3 times as long as wide. Vertex as in female;



Figs 9–15. *Anaselina minor*: **9–11**, female; **12–15**, male. Body, lateral (9, 12) and dorsal (10, 13) views; apex of abdomen, ventral (11) and lateral (15) views; head, frontal view (14).

fastigium of vertex 1.5–1.6 times as wide as one compound eye seen from above. Width of frontal ridge near base of antennae 1.8 times as great as width of first antennal segment (Fig. 14). Pronotum as in female, but prozona 1.1 times as long as wide; posterior pronotal process almost reaching epiproct. Femora as in female; fore femur 3.3–3.4 times, mid femur 3.3–3.6 times and hind femur 2.4–2.5 times as long as wide. Dorsal side of hind tibia with 7–8 outer and six inner spines. First tarsal segment of hind leg 2.5–2.8 times as long as third one (without claws). Epiproct narrowly triangular, 1.8 times as long as wide near its base, with pointed apex. Subgenital plate, in lateral view, short with pointed apex (Fig. 15); apex of this plate bifurcated in ventral view. Cercus 2.1–2.3 times as long as wide, widened near base and narrowed in apical part.

Colouration as in female, but cerci light brown.

Length (in mm). Body: male 8.3–8.5, female 8.8; pronotum: male 5.3–5.4, female 6.3; antenna: male 3.0–3.2, female 2.9; fore femur: male 1.8–1.9, female 2.0; mid femur: male 2.0, female 2.1; hind femur: male 5.4–5.5, female 5.9; ovipositor 1.3.

Distribution. Australia (Queensland).

Remarks. This species was briefly described from the single female without hind legs. The photos of this specimen prepared by J. Tumbrinck are available in the Orthoptera Species File (Cigliano et al., 2018). It allows me to correctly identify this species. The previously unknown male is described above.

Genus ***Selivinga*** Storozhenko, **gen. nov.**

Type species *Selivinga tribulata* Storozhenko, **sp. nov.**

Description. Body medium-sized for Australian Batrachideinae. Antennae filiform. Antennal grooves situated between lower margins of eyes (Fig. 18). Compound eyes not elevated above pronotum in lateral view. Frontal ridge, in lateral view, almost straight with extremely shallow concavity above lateral ocelli (Figs. 16, 21); in frontal view this ridge broad; lateral carinae of frontal ridge distinctly diverging downwards but almost parallel below antennal grooves (Fig. 18). Pronotum short; anterior margin of pronotum, in dorsal view, narrowly triangular and far produced over head; apex of posterior process of pronotum excised (Figs. 17, 22). Median carina of pronotum strongly elevated, in profile almost arch-like (Figs. 16, 21), in cross-section almost lamellate (Fig. 18). Hind margin of lateral lobes of pronotum with shallow lower sinus; tegminal sinus absent; lower edge of infrascapular area almost straight (Figs. 16, 21); lower part of lateral lobe of pronotum, in dorsal view, forming rounded lobule (Figs. 17, 22). Tegmina and hind wings absent. Fore and mid femora with lower carinae straight; dorsal side of fore femora sulcate. Upper carina of hind femora distinctly serrated, without lappets. First tarsal segment of hind legs distinctly longer than third one. Female subgenital plate with deep median furrow bordered with ridges (Fig. 19). Valves of ovipositor narrow, dentate (Fig. 20).

Differential diagnosis. The new genus is most similar to *Vingselina* in the arch-like median carina of pronotum and distinctly diverging downwards lateral carinae of frontal ridge, but it differs from the latter genus in the position of antennal grooves, the shape of lateral lobes and posterior process of the pronotum (in *Vingselina*, the antennal grooves situated below lower margins of the eyes, the lateral lobes of pronotum with vestigial lower sinus, and the apex of posterior process rounded). *Selivinga* **gen. nov.** differs from *Vilma* in the shape of lateral lobes of the pronotum (in *Vilma*, the lower part of lobe triangular). *Selivinga* **gen. nov.** is easy recognizable from *Anaselina* **gen. nov.** in the arch-like median carina of the pronotum (in *Anaselina* **gen. nov.**, the median pronotal carina is low) and differs from *Paraselina* **gen. nov.** in the position of antennal grooves, which are situated distinctly below the lower margins of eyes in the latter genus. *Selivinga* **gen. nov.** resembles the genus *Tuberfemurus* Zheng, 1992 (subfamily Cladonotinae) in the strongly elevated in profile and lamellate in cross-section median carina of the pronotum. *Tuberfemurus* consists of four species from China and Thailand (Zheng, 1992; Storozhenko & Dawwrueng, 2014; Cigliano et al., 2018) and is characterized by the presence of three projections on the lower outer keel of the hind femora, while in *Selivinga* **gen. nov.**, the hind femora are without such projections.

Composition. This genus includes the type species only.

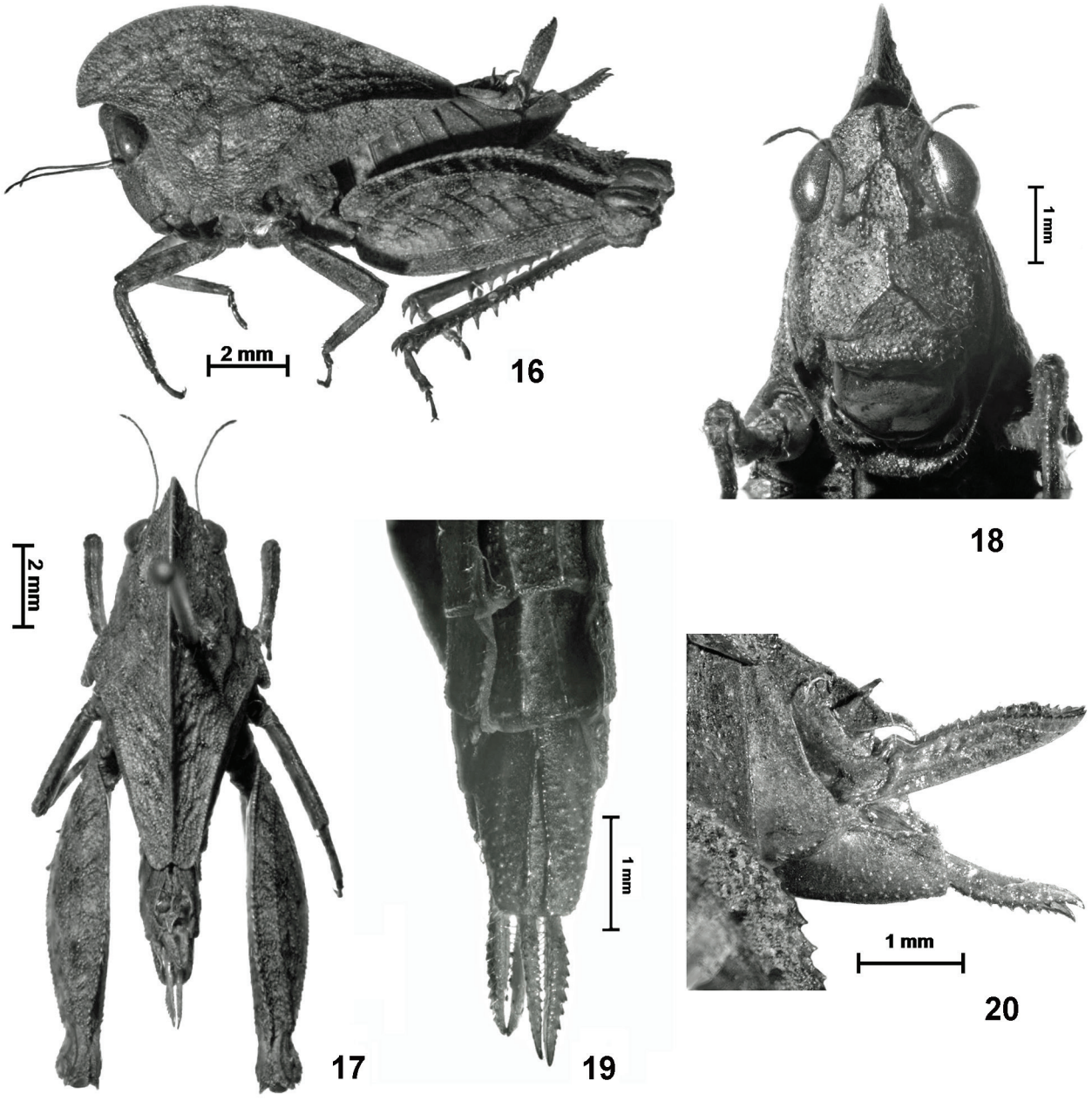
Etymology. This name is an anagram of the genus name *Vingselina*. Gender feminine.

Selivinga tribulata Storozhenko, **sp. nov.**
(Figs 16–23)

Holotype. Female, **Australia**, Queensland, Cape Tribulation, 16°07'S, 145°26'E, tropical rainforest, 10–30.III.2000, S. Storozhenko.

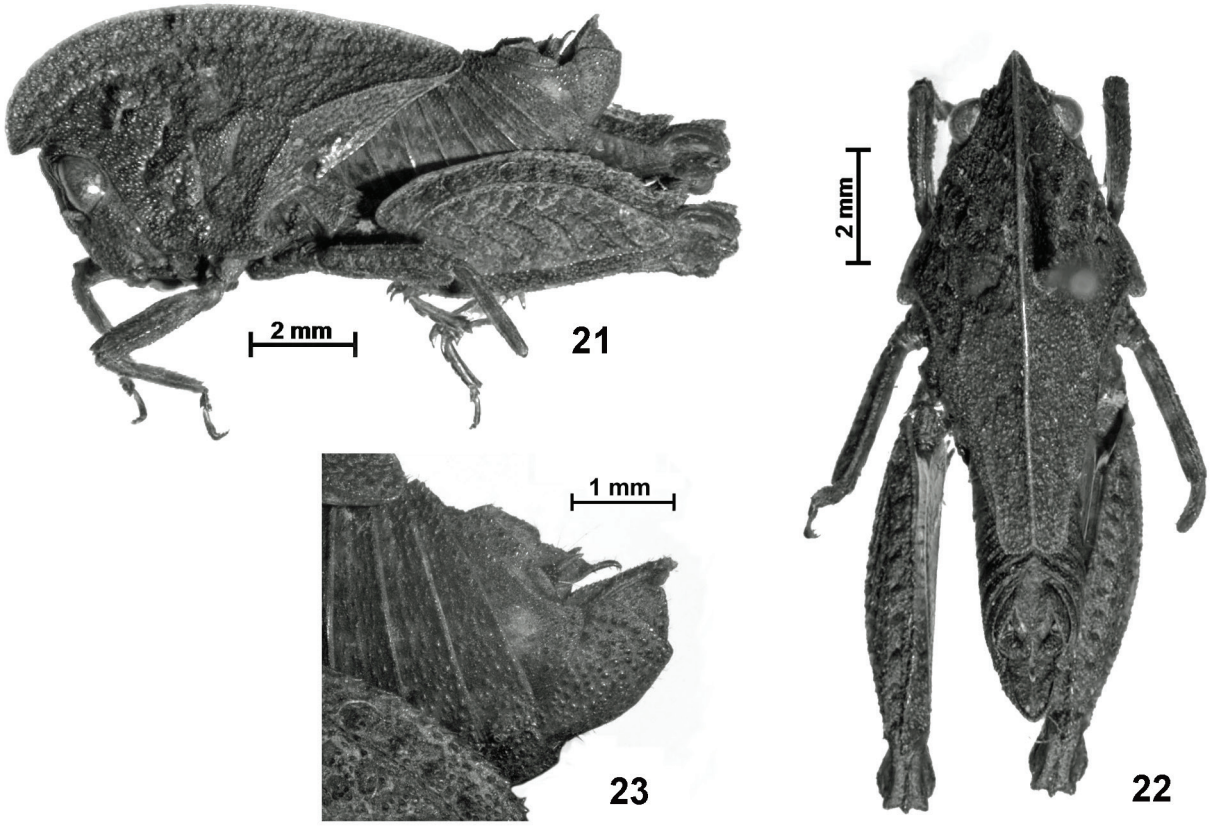
Paratypes: One male, 2 females, same data as for holotype.

Description. Female. Body robust. Antennae 16–17-segmented, 1.1–1.2 times as long as fore femur; middle segments (seventh–ninth) 3.5–5 times as long as wide. Fastigium of vertex 2.3–2.4 times as wide as one compound eye seen from above; anterior margin of vertex straight, surpassing frontal line of eyes; lateral margins of vertex parallel; median carina of fastigium short; transverse carinae only traced by few tubercles; supraocular lobes and



Figs 16–20. *Selivinga tribulata* **sp. nov.**, female: **16**, **17**, body, lateral (16) and dorsal (17) views; **18**, head and pronotum, frontal view; **19**, **20**, apex of abdomen, ventral (19) and lateral (20) views.

fossulae absent. Lateral ocelli situated between lower third of eyes. Frontal ridge, in lateral view, almost straight with extremely shallow concavities: one above lateral ocelli, another one below antennal grooves. Width of frontal ridge near base of antennae 2.6–2.8 as great as width of first antennal segment. Pronotum reaching 1/3 of hind femora. Lateral carinae of pronotum weak, parallel; prozona 1.2 times as long as wide. Humero-apical carinae sinuate; interhumeral carinae absent. Infrascapular area long and broad. Fore and mid femora with upper and lower carinae straight. Fore femur 3.9–4.1 times and mid femur 3.8–3.9 times as long as wide. Hind femur stout, 2.6–2.7 times as long as wide; upper carina distinctly serrated; lower carinae gentle serrated; genicular tooth



Figs 21–23. *Selivinga tribulata* **sp. nov.**, male: **21**, **22**, body, lateral (21) and dorsal (22) views; **23**, apex of abdomen, lateral view.

shorter than antegenicular tooth. Dorsal side of hind tibia with 12–17 outer and 9–11 inner spines. First tarsal segment of hind legs 2.4–2.5 times as long as third one (without claws). Subgenital plate elongated, 1.5–1.6 times as long as wide, with deep median furrow bordered with ridges; apex of this plate almost straight. Cerci conical, narrowing apically, with rounded apices, 2.1–2.3 times as long as wide near cercal base. Upper valve of ovipositor 4.4–4.5 times as long as its maximum width; lower valve of ovipositor 6.5–7 times as long as its maximum width.

Body light brown with blackish marks. Head blackish brown. Eyes brown. Antennae light brown. Dorsal side of pronotum light brown with a few small black spots. Lateral lobes of pronotum and infrascapular area completely brown. Fore and mid femora brown with blackish marks. Fore and mid tibiae brown, with two black rings. Fore and mid tarsi brown, with second segment having blackish apex, and with brown claws. Outer side of hind femora above lower outer keel light brown with blackish marks; below lower outer keel, hind femora black. Hind tibiae black. Hind tarsi light brown. Abdomen blackish brown, but sternites and subgenital plate blackish, and cerci brown. Ovipositor light brown.

Male. Body similar to female but smaller. Antennae 16-segmented, 1.2 times as long as fore femur; mid segments of antennae 4.5–5 times as long as wide. Vertex as in female; fastigium of vertex 2.3 times as wide as one compound eye seen from above. Width of frontal ridge near base of antennae 2.4 times as great as width of first antennal segment. Pronotum as in female, but prozona 2 times as long as wide; posterior pronotal process not reaching epiproct. Femora as in female; fore femur 4.1 times, mid femur 4 times and hind femur 2.6 times as long as wide. Upper side of hind tibia with 12 outer and 8–9 inner spines. First tarsal segment of hind legs 2.3 times as long as third one (without claws). Epiproct narrowly triangular, 2.8

times as long as wide near base, with pointed apex. Subgenital plate, in lateral view, short and with pointed apex (Fig. 23); apex of this plate bifurcated in ventral view. Cerci two times as long as wide, widened near base and narrowed in apical part.

Coloruration as in female, but body and pronotum dark brown, epiproct and subgenital plate blackish brown, and cerci brown with light brown apices.

Length (in mm). Body: male 11.3, female 11.3–11.7; pronotum: male 8.8, female 9.1–9.5; antenna: male 3.2, female 3.0–3.1; fore femur: male 2.5, female 2.5–2.7; mid femur: male 2.8, female 2.7–2.9; hind femur: male 7.2, female 7.9–8.0; ovipositor 2.0–2.1.

Distribution. Australia (Queensland).

Etymology. The new name is the Latin adjective "tribulatum" refers to the type locality, the Cape of Tribulation.

Key to Australian genera of subfamily Batrachideinae

1(4) Antennal grooves situated considerably below lower margins of the eyes (Figs 3, 6). Frontal ridge, in lateral view, with distinct concavity situated near lateral ocelli (Figs. 1, 4).

2(3) Posterior process of pronotum, in dorsal view, with rounded apex (Fig. 2). Median carina of pronotum elevated, in profile almost arch-like before shoulders and almost straight behind shoulders (Fig. 1) ..... ***Vingselina***

3(2) Posterior process of the pronotum, in dorsal view, with excised apex (Fig. 5). Median carina of pronotum in profile distinctly elevated before shoulders and strongly depressed behind it (Fig. 4) ..... ***Paraselina* gen. nov.**

4(1) Antennal grooves situated between lower margins of eyes (Figs. 14, 18). Frontal ridge, in lateral view, with weak concavity situated near lateral ocelli (Figs. 9, 16).

5(6) Median carina of pronotum in profile low and almost straight (Figs. 9, 12), in cross-section triangular. Anterior margin of pronotum, in dorsal view, broadly triangular and almost reaching middle of eyes (Figs. 10, 13) ..... ***Anaselina* gen. nov.**

6(5) Median carina of pronotum strongly elevated, in profile completely arch-like (Figs. 16, 21), in cross-section almost lamellate (Fig. 18). Anterior margin of pronotum, in dorsal view, narrowly triangular and far produced over head (Figs. 17, 22) ..... ***Selivinga* gen. nov.**

Discussion

Six species in four genera of subfamily Batrachideinae are known from Australia and distributed along the western coast of continent from Heberton in northern Queensland southwards to Sydney in New South Wales. Australian genera and the genus *Vilma* from Solomon Islands differ from all American, African and Oriental genera of Batrachideinae in the strongly widened frontal ridge forming the so-called "scutellum" (in other genera of Batrachideinae the frontal ridge relatively narrow with the lateral carinae gentle diverging downwards or almost parallel). The widened frontal ridge is considered as the most important taxonomic character of the subfamily Cladonotinae (Tumbrinck, 2014), but probably the broadened scutellum is not exactly a typical character to distinguish Cladonotinae from other subfamilies of Tetrigidae (Zha et al., 2017). Australian Batrachideinae differs from Cladonotinae in the sulcate dorsal side of the fore and mid femora, the shallow or vestigial lower sinus of the lateral lobes of pronotum, and the female subgenital plate with deep median furrow (in latter subfamily, the fore and mid femora are keeled, the lower sinus of lateral lobes of the pronotum is deep, and the female subgenital plate is smooth or provided by a low median keel). While the Australian Batrachideinae is a group of closely related species, they demonstrated habitual parallelism with different genera of Cladonotinae. The genus *Vingselina* habitually resembles the genera *Deltonotus* and *Boszkitettix*; the genus *Paraselina* **gen. nov.** similar to *Gestroana* and *Tetradinodula*; the genus *Anaselia* **gen. nov.** looks like *Epitettix*; *Selivinga* **gen. nov.** resembles the genus *Tuberfemurus*. Namely habitual parallelism with different genera of Cladonotinae is a reason for dividing of the former genus *Vingselina* in the separate genera.

Based on the morphology of the male genitalia of four species of the subfamily Tetriginae and two species of Batrachideinae, Podgornaya (2001a, 2001b, 2003) divided the latter subfamily into two tribes: Batrachideini and "Cassitettini". But a little earlier Otte (1997) seems to have correctly modified the original name of the latter group (subfamily "Cassitettinae" Yin, 1984) in Cassitettiginae. Nowadays Cassitettiginae and "Cassitettini" are considered as synonyms of Batrachidein-

ae (Cigliano et al., 2018). However, the Oriental and African genera of this tribe differs from the American genera (Batrachideini) in shallow lower sinus on the hind margin of lateral lobes of the pronotum (in the latter tribe, the lower sinus is deep) and must be separated in different tribes based on this character as well as on the shape of male genitalia and the general distribution of both groups. The lower sinus on lateral lobes of the pronotum is also almost completely reduced in the Australasian genera, but these genera differ from Cassitettigini by strongly widened frontal ridge. By shape of pronotum and wide frontal ridge, Australian Batrachideinae seems to be most closely related to the genus *Bufonides* Bolívar, 1898 consisting of three species endemic to New Guinea (Bolívar, 1898; Hinton, 1940). *Bufonides* was placed in the "section Bufonidae" by Hancock (1907), but Steinmann (1970) transferred it in Cladonotinae. Later Otte (1997) allocated this genus to the tribe Tetrigini (subfamily Tetriginae), while Tumbrinck (2014) considered Bufonidinae as a synonym of Cladonotinae. Nowadays Bufonidinae is treated as a synonym of Batrachideinae (Tumbrinck & Skejo, 2017; Cigliano et al., 2018).

The subfamily Batrachideinae is provisionally divided here in three tribes based on the general distribution of these groups of pygmy grasshopper and morphological features. The short diagnosis and the composition of tribes are given below.

The tribe Batrachideini Bolívar, 1887 (type genus *Batrachidea* Audinet-Serville, 1838) is characterized by the narrow or gently widened frontal ridge, which is narrower, equal or only 1.2 times as wide as first antennal segment, and by the distinct lower sinus on the hind margin of lateral lobes of the pronotum [see photos of holotype of *B. mucronata* (Saint-Fargeau et Serville, 1825) which is *Batrachidea* type species (Cigliano et al., 2018)]. The Batrachideini consists of the type genus and the genera *Cranotettix* Grant, 1955, *Eutettigidea* Hancock, 1914, *Halmatettix* Hancock, 1909, *Lophoscirtus* Brunner, 1910, *Paurotarsus* Hancock, 1900, *Paxilla* Bolívar, 1887, *Plectronotus* Morse, 1900, *Puiggaria* Bolívar, 1887, *Rehnidium* Grant, 1956, *Scaria* Bolívar, 1887 and *Tettigidea* Scudder, 1862; this tribe is distributed in South and Central America as well as in the southern part of North America.

The tribe Cassitettigini Yin, 1984, **nom. resurr.** (type genus *Cassitettix* Yin, 1984 = *Saussurella* Bolívar, 1887) is characterized by the very narrow or gently widened frontal ridge, which is 0.7–1.2 times as wide as first antennal segment, and by the shallow lower sinus on the hind margin of lateral lobes of the pronotum [see photos of holotype of *S. cornuta* (Haan, 1843) which is *Saussurella* type species (Cigliano et al., 2018)]. This tribe consists of the type genus *Saussurella* and the genera *Ascetotettix* Grant, 1956, *Palaioscaria* Günther, 1936, *Phoeonotus* Bolívar, 1887 and *Wiemersiella* Tumbrinck, 2014; the tribe is distributed in the Oriental region, New Guinea and Africa southwards to Sahara.

The tribe Bufonidini Hancock, 1907, **nom. resurr. et stat. nov.** (type genus *Bufonides* Bolívar, 1898) is characterized by the wide frontal ridge forming so-called "scutellum", which is 1.8–2.8 times as wide as first antennal segment, and by the shallow or vestigial lower sinus on the hind margin of lateral lobes of the pronotum [see also photos of *Bufonides* species from New Guinea (Tumbrinck, 2014)]. This tribe consists of the type genus and genera *Anaselina* **gen. nov.**, *Paraselina* **gen. nov.**, *Selivinga* **gen. nov.**, *Vilma* and *Vingselina* from Australasian region (Australia, New Guinea and Solomon Islands).

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