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Phygopoda Thomson, 1864 and *Pseudophygopoda* Tavakilian &
Peñaherrera-Leiva, 2007
(Insecta: Coleoptera: Cerambycidae: Cerambycinae)

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Review of Carelli, A., and M.L. Monné, 2015. Taxonomic revision of *Phygopoda* Thomson, 1864 and *Pseudophygopoda* Tavakilian & Peñaherrera-Leiva, 2007 (Insecta: Coleoptera: Cerambycidae: Cerambycinae)

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Abstract. The taxonomic history of the rhinotragine genera *Phygopoda* Thomson, 1864 and *Pseudophygopoda* Tavakilian and Peñaherrera-Leiva, 2007 (Coleoptera: Cerambycidae: Cerambycinae) are discussed, and evidence is presented to suggest that some recent taxonomic changes made by Carelli and Monné (2015) were unjustified. Consequently, *Phygopoda nigratarsis* Gounelle, 1911 is moved to the genus *Neophygopoda* Melzer, 1933, creating the **new combination** *Neophygopoda nigratarsis*, the genera *Panamapoda* Clarke, 2014 and *Paraphygopoda* Clarke, 2014 are **revalidated**, and the species *Paraphygopoda viridimicans* (Fisher, 1952) and *Paraphygopoda nappae* Clarke, 2014 are also **revalidated**.

Key words. New combination, revalidations, Rhinotragini, taxonomy.

Introduction

Tavakilian and Peñaherrera-Leiva (2007) described the monotypic genus *Pseudophygopoda* for *Phygopoda subvestita* (White, 1855). They did not include *Phygopoda albitarsis* (Klug, 1825) or *Phygopoda panamaensis* Giesbert, 1996 in their genus, nor *Epimelitta longipennis* Zajciw, 1963 and *Epimelitta viridimicans* (Fisher, 1952).

They diagnosed their genus (apparently based on three females) as follows: Rostrum moderately long. Inferior lobes of eyes not contiguous. Apex of antennae not passing middle of urosternite II. Pronotum transverse. Prosternal process laminate and abruptly bent upwards towards apex. Procoxal cavities broadly open behind. Elytra dehiscent for more than half their length, and extended into long, rounded lobe towards apex; the latter not passing base of urosternite II. Hind leg: apex of metafemur not passing apex of abdomen; femoral peduncle short; tibia with dense brush on apical half; first tarsal segment about three times longer than second. Last abdominal segment truncate at apex; excavate at apex in male (the latter character state was presumably observed in a photograph).

Clarke (2014) revised a Rhinotragini species group sharing a combination of characters of special diagnostic value as follows: “prosternal process in males entirely laminate or weakly golf tee-shaped (as in most females); procoxal cavities widely open behind, and acutely angled at sides; elytra subulate (the apical third narrowly lobate), rather short, subfissate, or strongly dehiscent; mesosternum not declivous (weakly inclined to, and almost planar with mesosternal process); in male procoxae surmounted by conical tubercle; metatibia with long-haired, dense brush (but see *Phygomelitta* Clarke, 2014); lateral lobes of tegmen tongs-shaped, with abruptly widened, somewhat flattened apices.” Eight species (including two new ones) conformed to this diagnosis and were placed into either *Pseudophygopoda* or one of four new genera: *Panamapoda* Clarke, 2014, *Paraphygopoda* Clarke, 2014, *Paramelitta* Clarke, 2014 and *Phygomelitta*.

Carelli and Monné (2015) revised the genera *Phygopoda* and *Pseudophygopoda* and established the following new synonymies: *Panamapoda* Clarke, 2014 and *Paraphygopoda* Clarke, 2014 = *Pseudophygopoda* Tavakilian and Peñaherrera-Leiva, 2007; *Paraphygopoda viridimicans* (Fisher, 1952), *Paraphygopoda nappae* Clarke, 2014 and *Paraphygopoda longipennis* (Zajciw, 1963) = *Pseudophygopoda albitarsis* (Klug, 1825). They did this without providing a formal diagnosis of *Pseudophygopoda*.

Materials and Methods

During the process of making the taxonomic changes presented herein, data taken from specimens from the following institutions has been incorporated:

- FSCA — Florida State Collection of Arthropods, Gainesville, Florida, USA.
 MNKM — Museo Noel Kempff Mercado, Universidad Autónoma Gabriel René Moreno, Santa Cruz de la Sierra, Bolivia.
 MZSP — Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil.
 USNM — National Museum of Natural History, Smithsonian Institution, Washington, DC, USA.

The individual specimen data are as follows. The differences between ‘specimens analyzed’ and ‘specimens examined’ are explained in Clarke (2014).

Pseudophygopoda subvestita Tavakilian and Peñaherrera-Leiva, 2007

Specimens analyzed: BRAZIL, Amazonas, S. Gabriel, Rio Negro, 1 male, 5.X.1927, J.F. Zikán col. (MZSP); Para, Obidos, 1 female, XI.1921, H.C. Boy col. (MZSP).

Panamapoda panamensis Giesbert (1996)

Specimen analyzed: paratype, PANAMA, Panama pt., 7-10 km N El Llano, 1 male, 14-22.V.1993, E. Giesbert col. (FSCA).

Paraphygopoda albitarsis (Klug, 1825)

Specimens analyzed: PERU, Pucallpa, Rio Ucayali, 200 m, 1 male and 1 female, XII.1956, Dirings col. (MZSP).

Specimens examined: BRAZIL, Para, 1 male, Tippmann coll. '57 #213112 (USNM).

Paraphygopoda nappae Clarke, 2014

HOLOTYPE, male, BOLIVIA, Santa Cruz, Andreas Ibañez Province, Potrerillo de Guenda, 17°40'S/63°20'W, 6-8.XII.2011, Wappes, Lingafelter, Morris & Woodley col. (MNKM).

Paraphygopoda viridimicans (Fisher, 1952)

Specimens analyzed: BRAZIL, Espírito Santo, Linhares, 1 male and 1 female, IX.1972, P.C. Elias col. (MZSP).

Taxonomy

Review of Carelli and Monné's revision of the genus *Phygopoda* Thomson, 1864.

Carelli and Monné (2015) open their revision with a description of the genus, which includes these statements: “anterior coxal cavities rounded, not angular at sides, closed posteriorly (except for *P. nigratarsis*)”. In their description of *P. nigratarsis*, they further comment: “with procoxal cavities open posteriorly, which differs from all other species of the genus, ... this characteristic is frequently used as difference between genera in Cerambycidae, but we consider precipitate describe a new genus only for this species due the other characteristics that are shared with the rest of *Phygopoda* species.”

Both past and recent taxonomists have established the importance of the procoxal cavity (open or closed behind) as a diagnostic character. Crowson (1956) used it for higher taxa (superfamilies and families), stressing its importance in his “Glossary of Special Taxonomic Characters”. It has more recently been used as a tribal and generic diagnostic by Mermudes and Napp (2004), and as a generic diagnostic for the Rhinotragini by Tavakilian and Peñaherrera-Leiva (2003, 2005, 2007) and Martins and Santos-Silva (2010).

Melzer (1933) described the genus *Neophygopoda* for two new species: *Neophygopoda tibialis* (selected as the “genotype”) and *Neophygopoda exilis*. He stated that “this genus is very similar to *Phygopoda*,

but differs by the strongly thickened apex of the metatibiae, and by the short hairs on these". As both these characters can vary, it would have been better to include the open procoxal cavities as part of his diagnosis.

He stated that he had two female specimens collected by Bruch in the Argentinian province of Tucuman. The author has collected males (Figure 1) and females of this species in the Bolivian department of Tarija (adjacent to Argentina's frontier). A comparison of Clarke's photograph of *Neophygopoda tibialis* (Figure 1) with that of *Phygopoda nigratarsis* (Carelli and Monné 2015: Figure 1) shows that only the density of the metatibial brush (sometimes close to "haud autem scopiferis," to quote Melzer) appear to vary. That they are congeneric is confirmed by examining Carelli and Monné's drawing of the tegmen of *P. nigratarsis* and the author's photograph of the tegmen of *N. tibialis* (both shown in Figure 2). It should also be added that the form of the tegmen, with a buttress separating the base of the lateral lobe from its apical paddle (as seen in Figure 2) may be unique, and is certainly absent in species of *Phygopoda*.

Review of Carelli and Monné's revision of the genus *Pseudophygopoda*

The following quote from Carelli and Monné (2015) summarizes their justification for new synonymies: "the examination of large number of specimens of *Epimelitta viridimicans*, *Epimelitta longipennis* and *Pseudophygopoda albitarsis* comb. nov., and their original descriptions and photographs, as well as the study of original description and photographs of the holotype of *Paraphygopoda nappae* indicated that there is actually only one species and that the differences among the specimens are considered intraspecific variations, which can be partially observed in Figures 74 to 81."

This paragraph is misleading because it denies that the variety of morphological detail seen in the figures could arise from species differences, as discussed below.

Furthermore, in a tribe of mimics, natural selection is expected to reduce intraspecific variation to safeguard the integrity of the disguise. Differences in allometric growth, which could certainly disrupt it, have not been observed by the author. For further comments, see part 1b of the 'Review of the generic synonymies' section, below.

Both Clarke (2014) and Carelli and Monné (2015) considered the structure of the aedeagus, especially that of the tegmen, as a generic and specific diagnostic, and both of them provided illustrations and descriptions to account for their taxonomic decisions. Neither Clarke nor Carelli and Monné provided an illustration of the aedeagus of *Panamapoda panamaensis* (Giesbert, 1966); it is now shown here (Figure 3). The shape of the tegmen clearly conforms to Clarke's description in his "characters of special diagnostic value".

It is important to note that the figure legend in Clarke's (2014) last plate is incorrect: Figure 11 is not the tegmen of *Paraphygopoda albitarsis*, but *Phygomelitta triangularis* (Fuchs, 1931), and Fig 12 is not the tegmen of *P. triangularis*, but *P. albitarsis*. The necessary correction is shown here (Figures 4-7).

After examining Carelli and Monné's drawings of the tegmen of *Pseudophygopoda subvestita* (Figures 137-139) and *P. albitarsis* (Figures 85-87), all of which are reproduced here (Fig. 8), it appears that they are very different. In *P. subvestita*, the lateral lobes are hardly expanded at the apex and are not delimited by a strong constriction (i.e. they are not caliper-shaped), whereas in *P. albitarsis*, the apex of the lateral lobes are strongly expanded and constricted (i.e. caliper-shaped). The cogent difference depicted in these drawings would seem to support the placement of these species in separate genera, thus justifying the separation of *Panamapoda* from *Pseudophygopoda*, as shown in the photograph of the aedeagus of *Panamapoda* (Fig. 3).

However, there appears to be an error here. In Clarke's photographs (Fig. 4-5) the tegmen of *Pseudophygopoda subvestita* (Fig. 4) looks nothing like Carelli and Monné's drawing of this species (Fig. 8). In fact, the illustration looks more like the tegmen of a species of *Phygopoda*. The irony is that Carelli and Monné's drawing would provide strong support for the author's contention that *Pseudophygopoda* and *Paraphygopoda* are not congeneric, whereas the photograph of the author might not.

Review of the generic synonymies.

1. *Panamapoda* Clarke, 2014 = *Pseudophygopoda* Tavakilian and Peñaherrera-Leiva, 2007.

Carelli and Monné (2015) stated that *Pseudophygopoda* only differs from *Panamapoda* by the distribution of pronotal pubescence, and claim that Clarke's (2014) three additional diagnostic characters (color of the pronotal pubescence, shape of the abdomen, shape of the elytra) are not useful for separating the genera. These claims are refuted below.

a) Pronotal pubescence is claimed to be non-diagnostic because "both [genera] present pronotal pubescence golden (Figures 95, 96)". The author would not quibble about this, but White (1855) described the pubescence of his species as "sericeis" (which can be translated as silken and recumbent), and Giesbert (1996) described the pubescence of his as "fine and suberect". In their key to the species of *Pseudophygopoda*, Carelli and Monné (2015) used a single character to separate *P. subvestita* ("pronotal pubescence decumbent") from *P. panamensis* ("pronotal pubescence with erect setae"), and their figures confirm the difference. The nature, not the color, of the pubescence is a valid addition to a generic diagnostic.

b) Shape of the abdomen is claimed to be non-diagnostic because "the male holotype of *Pseudophygopoda subvestita* (type-species) (Figure 95) presents abdomen cylindrical or almost cylindrical." Carelli and Monné's drawing (2015: Figure 133) shows a moderately narrow abdomen, about 4.3x longer than wide, and their photograph (Figure 95) shows a comparatively wide abdomen, about 3.1x longer than wide. Both figures show an abdomen narrower towards the base and apex (and therefore by definition fusiform) and Clarke's (2014) photograph of *Panamapoda*'s abdomen (Figure 2b) shows a truly cylindrical abdomen about 6.1x longer than wide; confirming the obvious difference between the two species. The author maintains that in a tribe of mimics, the shape of the abdomen is a crucial element to bolster disguise. It is not only useful to resemble its model's appearance, but also to exhibit the model's flight pattern, which will depend upon the abdomen and its important role as a counterweight. For further commentary, see Clarke (2015).

c) Shape of the elytra is claimed to be non-diagnostic because "the shape of elytra presents considerable variation in *Pseudophygopoda subvestita*." This is only true if Carelli and Monné's synonymies are accepted. The shape of the elytra of *Pseudophygopoda subvestita* is strongly arched in the male, as shown by Carelli and Monné's drawing (2015: Figure 119) and Clarke's (2014) photograph (Figure 1a), but it is hardly arched in *Panamapoda* Clarke's (2014: Figure 2a).

Apart from the characters discussed above, Clarke (2014) maintained that the width of the interocular between the inferior lobes of eyes in males of *Pseudophygopoda* and *Panamapoda* were significantly different. Examination of Carelli and Monné's drawing (Figure 97) of *Pseudophygopoda subvestita* closely agrees with Clarke's statement that the interocular is almost 1/11 the width of one lower lobe (truly contiguous), while that of *Panamapoda* is 1/8 the width of one lower lobe.

In Tavakilian and Peñaherrera-Leiva's (2007) description of *Pseudophygopoda*, it is stated that the prothorax is "transverse"; according to Clarke (2014), who analyzed one male and one female specimen, the length/width ratio was 0.95 in the male and 0.91 in the female. It is also stated that "the genus [*Pseudophygopoda*] is readily separated from the genus *Phygopoda* by its transverse thorax." At the time that was written, *Panamapoda panamensis* was a species of *Phygopoda*. It must be concluded that Tavakilian and Peñaherrera-Leiva considered *P. panamensis* to belong to a different genus from their own *Pseudophygopoda*. Since the prothorax of *P. panamensis* is elongate ($l/w = 1.06$) they would seem to be right. This contradicts Carelli and Monné's (2015) statement in their redescription of the genus *Pseudophygopoda* that "the prothorax is as wide as long", in spite of their own drawings (Figures 111, 113) that show it to be transverse ($l/w = ca. 0.92$).

Since all the characters discussed in this section are frequently used as part of generic diagnoses, together they support the separation of *Panamapoda* from *Pseudophygopoda*.

2. *Paraphygopoda* Clarke, 2014 = *Pseudophygopoda* Tavakilian and Peñaherrera-Leiva, 2007.

Since *Paraphygopoda albitarsis* was also a species of *Phygopoda* when Tavakilian and Peñaherrera-Leiva described their new genus, it follows that they considered *Phygopoda albitarsis* to belong to a

different genus from their own. They had good reason to do so, as its prothorax is slightly elongate, as in the other species of *Paraphygopoda* (*P. viridimicans*, *P. longipennis*, and *P. nappae*).

Carelli and Monné (2015) stated that “according to Clarke (2014), *Pseudophygopoda* differs from *Paraphygopoda* by the following characteristics”, and go on to say: “of these only the surface of the pronotum is confirmed here”. These *Pseudophygopoda* character states are presented in the subsections below, with further commentary as to why they should be considered viable diagnostics.

a) Male inferior lobes of eyes contiguous. This has already been discussed above (in section 1), where I confirm this, by my own observations and Carelli and Monné’s own drawing (2015: Figure 97). In *Paraphygopoda*, inferior lobes are significantly further apart, separated by about 1/6 the width of one lobe.

b) Surface of the pronotum only shining on the elevations. Carelli and Monné (2015) agreed with this, but examination of Clarke’s (2014) photographs of *Pseudophygopoda subvestita* (Figure 1a) shows the pronotum to be densely pubescent, and those of *Paraphygopoda* (Figures 3a,4a,5a) generally glabrous, smooth and shining.

c) Ratio of length of metafemoral clave to that of peduncle about 1.3. Examination of the metafemora in Carelli and Monné’s drawing (2015: Figure 131) shows this to be a valid diagnostic; the ratio is significantly different from that of Clarke’s *Paraphygopoda* (0.56-0.86). Regardless of the actual ratio, examination of the metafemora in Carelli and Monné’s photographs of *P. subvestita* (Figure 96) and *P. albitarsis* (Figures 74-79) illustrate a cogent difference between them; as Bates (1873) observed when commenting on *Phygopoda subvestita*: “the hind thighs are longer and rather more abruptly clavate than any species of *Charis*, but they are less so than in *Phygopoda albitarsis*.”

d) Length of metatarsomere I distinctly longer than combined length of II and III. Examination of Carelli and Monné’s drawing (2015: Figure 130) of the metatarsus of *Pseudophygopoda* indicates the first metatarsomere to be 1.4x longer than II+III. An examination of Clarke’s photographs (2014: Figures 3-5) of *Paraphygopoda* suggests that his measurements of the metatarsomeres are probably correct. For the males of the three species at his disposal, metatarsomere I is equal in length to II+III in *P. albitarsis* and *P. nappae*, and 1.04x longer in *P. viridimicans*. To this, the following quotes from Clarke (2014) can be added: “metatarsus of *Pseudophygopoda* distinctly narrower than apex of metatibia” and “metatarsus [of *Paraphygopoda*] about as broad as apex of metatibia”.

In addition to the characters discussed above, the male abdomen of *Paraphygopoda* is very similar to that shown in Clarke’s photograph of *Paraphygopoda nappae* (2014: Figure 5b) but significantly different from that of *Pseudophygopoda* (Figure 1b).

As all of the characters discussed in this section are frequently included in generic diagnoses, together they support the separation of *Pseudophygopoda* and *Paraphygopoda*.

Review of the specific synonymies.

1. *Paraphygopoda viridimicans* = *Paraphygopoda albitarsis*.

In Clarke’s (2014) description of the genus *Paraphygopoda*, *P. viridimicans* has about twenty diagnostic characters that differentiate it from *P. albitarsis*; in many of the quantitative ones (and their quotients), one or the other is at the extreme limit for the genus. A photograph of a male *P. viridimicans* (Clarke 2014: Figure 76) shows notable differences in morphology, such as elytral length and size of the metatibial brush, when compared to the photo of *P. albitarsis* in Carelli and Monné (2015). This degree of variation suggests that the specimens in the two photos are not conspecific.

Furthermore, Clarke’s (2014) photographs of the tegmen of *P. albitarsis* (Figure 12) and *P. viridimicans* (Figure 13) suggest that it would be erroneous to consider them conspecific, as they are different in size and shape (the lateral lobes of *P. viridimicans* are considerably longer, and the expansion of the apical lobes and strength of preapical constriction are noticeably weaker than they are in *P. albitarsis*).

2. *Paraphygopoda nappae* = *Pseudophygopoda albitarsis*.

Carelli and Monné (2015: Figure 81) illustrated what they stated to be Clarke’s photograph of the holotype of *Pa. nappae*. However, they in fact copied Clarke’s photograph (2014: Figure 3b) of a female

Ps. albitarsis; it would seem that they synonymized *Pa. nappae* with *Ps. albitarsis* solely on that basis. Clarke's photographs of *Pa. nappae* (2014: Figure 5a,b) are not illustrated in Carelli and Monné (2015).

Furthermore, Carelli and Monné make no reference to Clarke's (2014) diagnosis of *Pa. nappae*, which is as follows: "metafemora long, base of clava just passing apex of abdomen (in the other species of the genus apex of clava just passing apex of abdomen); translucent panels of elytra reduced to small, narrow fascia (in other species of the genus broader and longer)."

Other characters of diagnostic value in *Paraphygopoda nappae* are as follows: Rostrum relatively long, width/length 2.3 (in *Paraphygopoda albitarsis* relative length is shorter, w/l 2.6); width of one inferior lobe 5.83x wider than interocular distance (in male *P. albitarsis* lobe 6.8 wider); superior lobes of eyes fusiform, and laterally narrowed by one-third their mesal width (in *P. albitarsis* lobate, and laterally narrowed by half their mesal width); prothorax elongate, length/width 1.1 (in male *P. albitarsis* l/w 1.04, substantiated by Carelli and Monné's own drawing (2015: Figure 111)); apex of elytra reaching apex of urosternite I (in *P. albitarsis* reaching basal third of II); abdomen short, lengths forebody/abdomen 1.1 (in *P. albitarsis* lengths forebody/abdomen about 0.9); urosternite V very narrow (in *P. albitarsis* narrow); apico-lateral margins of urosternites I-IV lacking patches of white pubescence (in *P. albitarsis* with white patches); abdominal puncturation sparse to moderately sparse (in *P. albitarsis* rather dense); abdominal process nearly flat (in *P. albitarsis* with 20° slope); metatibiae gradually widened from base to apex (in *P. albitarsis* parallel-sided for apical two-thirds).

3. *Paraphygopoda longipennis* (Zajciw, 1963) = *Paraphygopoda albitarsis*.

As the author did not have a specimen, or a good photograph, of *P. longipennis* to examine, he is hesitant to comment on Carelli and Monné's (2015) new synonymy. However, this species' elongate form and coloration suggests that *P. longipennis* mimics a different species of wasp, and is therefore likely to be a distinct species from *P. albitarsis*.

New taxonomic changes

With respect to Carelli and Monné's revision of *Phygopoda*, the author believes the transfer of *Phygopoda nigratarsis* Gounelle, 1911 to the genus *Neophygopoda* Melzer, 1933 has been justified. Therefore, *Neophygopoda nigratarsis* (Gounelle, 1911) is herein designated as a **new combination**.

With respect to Carelli and Monné's revision of *Pseudophygopoda*, the author contends the evidence presented above clearly shows their synonymies to be invalid. Therefore, the genera *Panamapoda* Clarke, 2014 and *Paraphygopoda* Clarke, 2014 are **revalidated**.

Paraphygopoda nappae Clarke, 2014 and *Paraphygopoda viridimicans* (Fisher, 1952) are **revalidated**.

Conclusions

Science does not, and should not, belong to anyone. Sadly, the wisdom inherent in this aphorism is no longer respected by some museums, for there is a growing tendency to slam their doors to those seeking mutual cooperation by instituting self-serving protocols. That this is a bankrupt policy, more damaging to themselves than those seeking their help, is substantiated by the fact that this paper had to be published in the first place.

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Figure 1. *Neophygopoda tibialis* male, dorsal habitus.

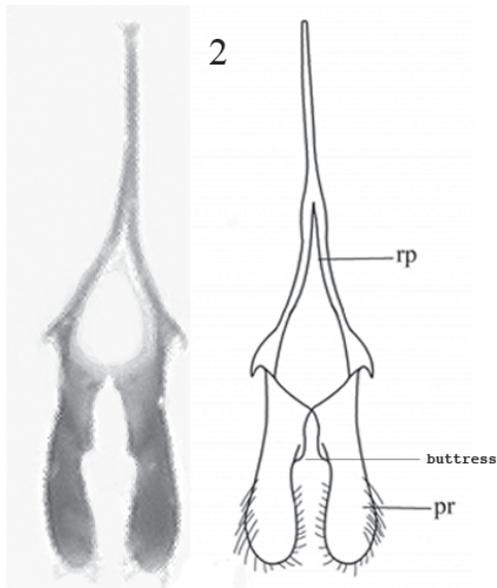
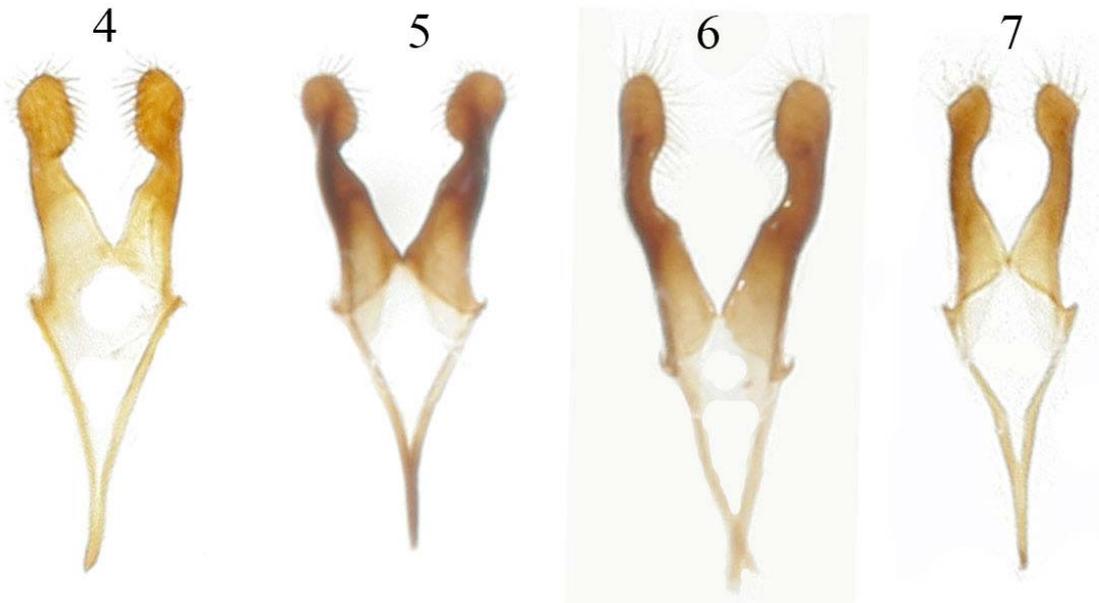


Figure 2. Left: Tegmen of *Neophygopoda tibialis*. Right: Illustration of tegmen of *Phygopoda nigritarsis*, from Carelli and Monné (2015).



Figure 3. Aedeagus of *Panamapoda panamaensis*.



Figures 4-7. Male genitalia: Tegmen of aedeagus (after Clarke (2014)). **4)** *Pseudophygopoda subvestita*. **5)** *Paraphygopoda albitarsis*. **6)** *Paraphygopoda viridimicans*. **7)** *Phygomelitta triangularis*.

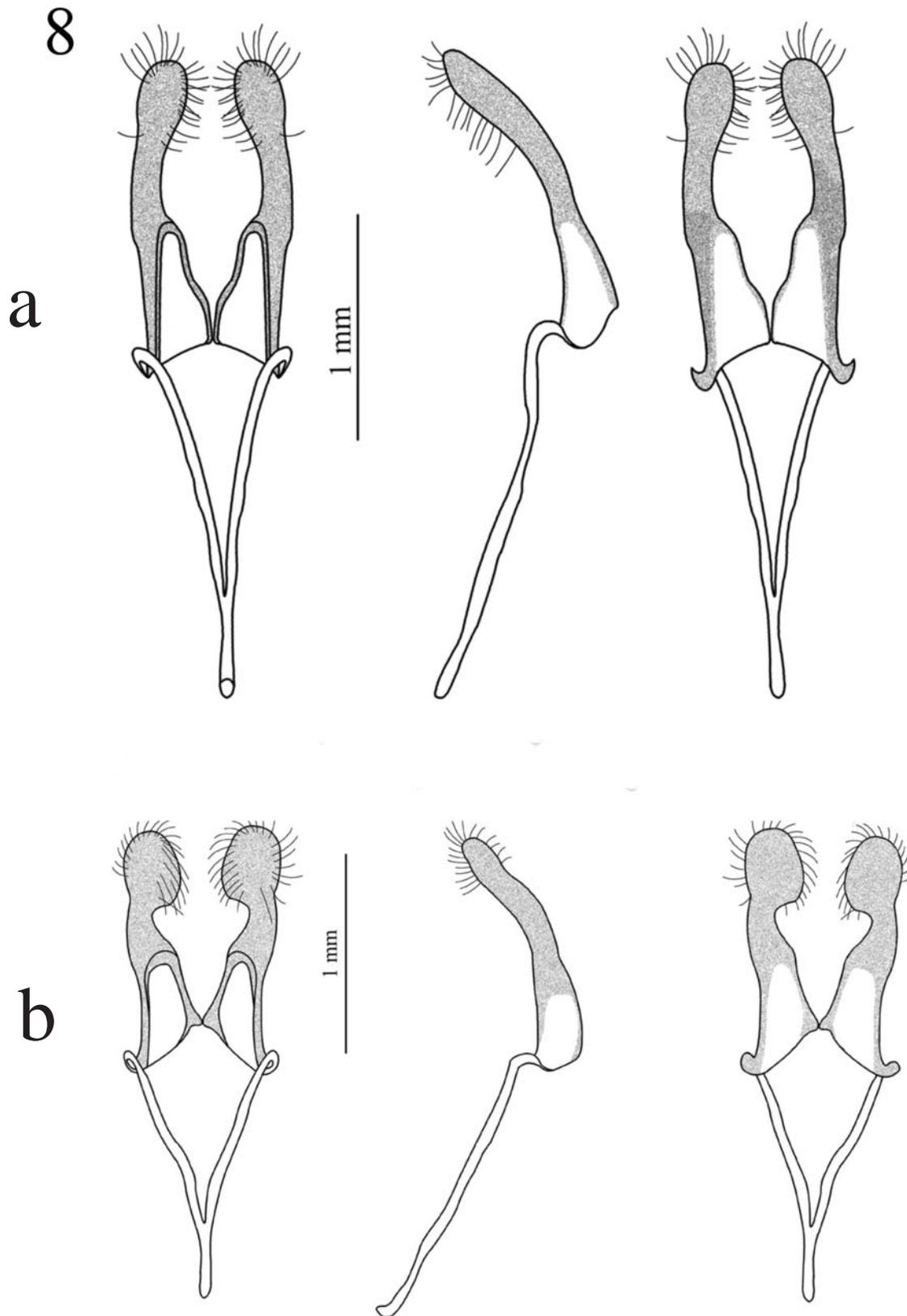


Figure 8. Tegmen of aedeagus in *Pseudophygopoda* (after Carelli and Monné (2015)), l-r dorsal, lateral, and ventral views. **8a)** *P. subvestita*. **8b)** *P. albitarsis*.