



***Pseudoamycle polylepisae* gen. et sp. nov., a fulgorid from the highlands of Northern Chile (Hemiptera: Fulgoridae)**

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Abstract

Pseudoamycle polylepisae gen. et sp. nov. is described from northernmost Chile (Arica and Parinacota Region). It is characterized by the small and brown body, head with no preocular flange, cephalic process porrect and dorsoventrally compressed, dorsal surface from lateral view not angulate at level of eyes, eyes round, tegmina concolorous and vein MP of tegmen pectinate. The new taxon was found to be associated with *Polyepis rugulosa* Bitter (Rosaceae).

Key words: Fulgoromorpha, Fulgoroidea, lanternfly, taxonomy, *Polylepis*, South America

Resumen

Se describe *Pseudoamycle polylepisae* gen. et sp. nov. del extremo norte de Chile (Región de Arica y Parinacota). Se caracteriza por el cuerpo pequeño y café, cabeza sin reborde preocular, proceso cefálico porrecto y dorsoventralmente comprimido, superficie dorsal en vista lateral no angulosa en el nivel de los ojos, ojos redondos, tégmenes concolóreos y vena MP del tegmen pectinada. El nuevo taxón se encontró asociado a *Polylepis rugulosa* Bitter (Rosaceae).

Palabras clave: Fulgoromorpha, Fulgoroidea, fulgórico, taxonomía, *Polylepis*, Sudamérica

Introduction

Family Fulgoridae Latreille, 1807 is currently composed by 761 species in 143 genera (Bourgoin, 2018). It includes many of the larger representatives of the Fulgoroidea and can be often distinguished by the presence of numerous crossveins in the hindwings, including in the anal region (O'Brien, 1988). Additionally, Fulgoridae usually have opaque, brightly colored forewings (and sometimes hindwings), and a row of spinules at the apex of the second metatarsal segment. Fulgoridae is sister to Dictyopharidae Spinola, 1839 (Urban & Cryan, 2009), and discrimination between the two families is controversial among taxa until recently considered basal clades in the Dictyopharidae (Emeljanov, 1979; 2011; Song *et al.*, 2011). Fulgorids show a great diversity in head process morphology and its current higher classification is based on characters of the head; however, Urban & Cryan (2009) found that the head projection (a feature shared with Dictyopharidae) is homeoplastic, having been gained and lost several times, with convergences among unrelated lineages, and is a poor upon which to base higher classification.

The richest fauna for this family occurs in the New World, particularly in the humid tropic: 23 species in 9 genera have been recorded for the Nearctic and 268 species in 68 genera for the Neotropical Region (Bartlett *et al.*, 2018). Species of economic importance are *Lycorma delicatula* (White, 1845) (introduced to the United States from China), which threatens grape (*Vitis* spp.) and tree fruit industries (Barringer *et al.*, 2015), and *Phrictus diadema* (Linnaeus, 1767), reported as a minor pest of cocoa trees (*Theobroma cacao* L.) in Brazil (Silva, 1944; Caldwell, 1945).

In Chile, only *Hypaepa transversalis* Signoret, 1863 has been recorded with no specific location (Signoret, 1863). The purpose of this contribution is to describe a new taxon of this family from the highlands of far north Chile. It possesses an elongate cephalic process but cannot be associated with any of the New World genera treated by O'Brien (1988) further than *Amycle* Stål, 1861, a genus distributed in the Northern Hemisphere which still shows some distinct morphological differences.

Materials and methods

The type material is deposited in the following collections:

JFCW Juan F. Campodonico collection, Santiago, Chile;
MNNC Museo Nacional de Historia Natural, Santiago, Chile

Genitalia was macerated in a KOH solution, washed in distilled water and placed in glycerine for study under stereoscopic (Ample Scientific SMZ10) and compound microscope. All parts were placed in glycerine within a microvial pinned below the specimen for permanent storage. Photographs were taken by a digital camera (Canon Powershot SX530) adapted to the respective microscope.

Morphological terminology mainly after Anufriev & Emeljanov (1988) and O'Brien (1988). Bourgoin (1993) was followed for female genitalia and Bourgoin *et al.* (2015) for wing venation.

Taxonomy

Hemiptera Linnaeus, 1758

Fulgoromorpha Evans, 1946

Fulgoridae Latreille, 1807

Amyclinae Metcalf, 1938

Amyclini Metcalf, 1938

Pseudoamyacle gen. nov.

(Figs 1–27)

Type species. *Pseudoamyacle polylepisae* sp. nov., here designated.

Diagnosis. Body small, general coloration brown. Head distinctly narrower than pronotum, strongly projected, lacking preocular flange (*Amycle* with preocular flange). Cephalic process porrect, intraspecifically variable in length, compressed, lateral sides sinuate, dorsally flat, ventrally convex, apex narrowed distally to truncate. Eyes round. Dorsal surface from lateral view not angulate at level of eyes (*Amycle* with dorsal surface distinctly angulated at level of eyes from lateral view). Tegmina opaque and concolorous; MP pectinate (*Amycle* with patterned tegmina except for *A. amabilis* (Westwood, 1842); MP not pectinate). Hindwing transparent except near base.

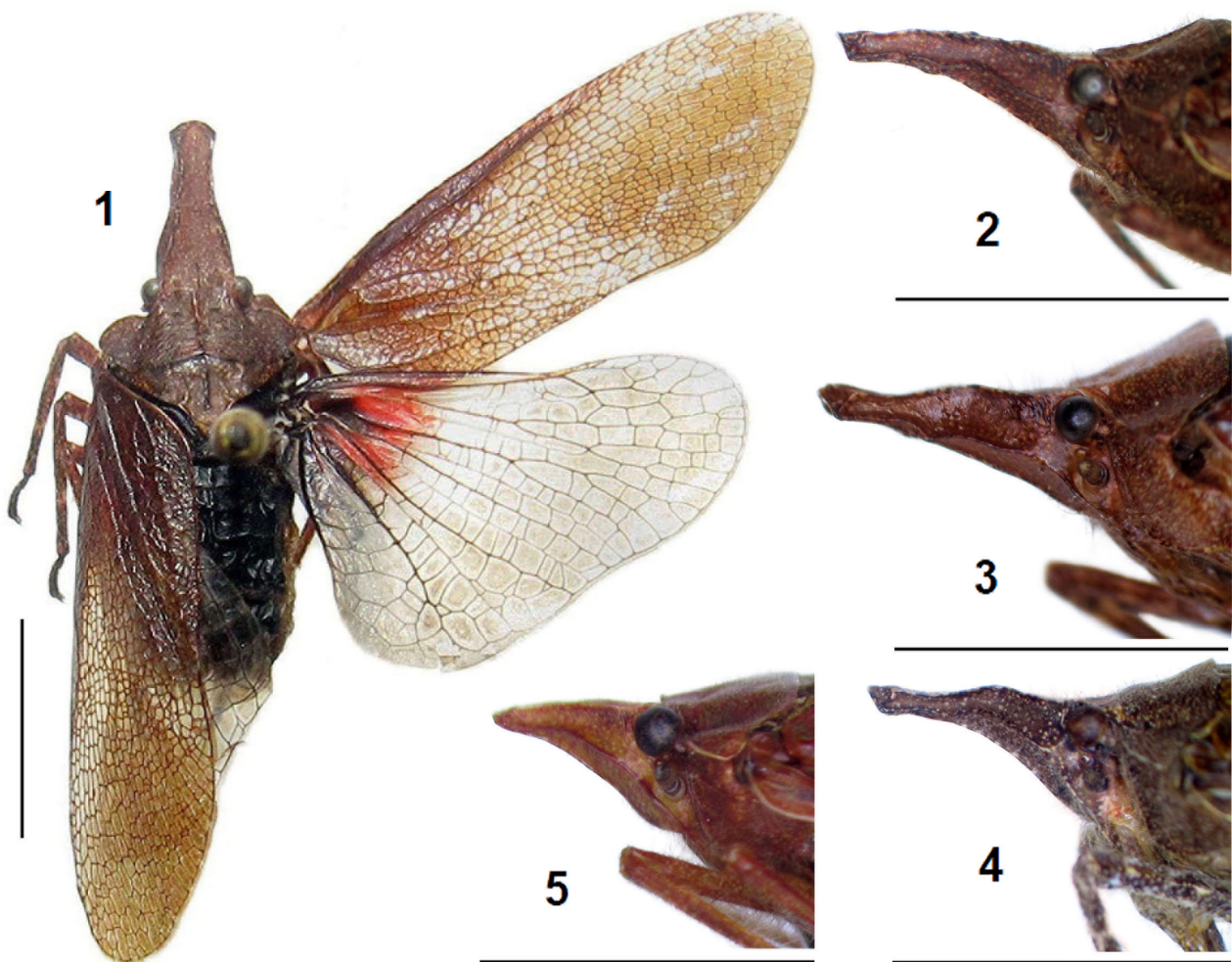
Description. Body small, less than 25 mm in total length; covered with abundant fine pilosity (Figs 1, 27).

Coloration. Head, pro- and mesothorax, legs and sterna brown, with pale granules and markings. Tegmina opaquely brown, concolorous. Hind wings proximally opaque, distally transparent. Metanotum, terga and area of mesonotum concealed by pronotum blackish; lateral sides of abdomen orangish to creamy white (Figs 1–11).

Head. Base including eyes, in dorsal view, distinctly narrower than pronotum (Figs 6–8). Head in dorsal view with elongate process (intraspecifically variable), laterally somewhat flattened, attenuating distally to truncate apex; sides sinuate; in cross section process dorsally flat, ventrally convex. Coryphe (~vertex) flat, trapezoidal

basal portion, then at process lateral margins somewhat parallel; weak transverse ridge delimitating basal portion of coryphe from rest of surface of cephalic process, interrupted medially and sometimes vanished; median carina weak or obsolete (Figs 6–8). Dorsal surface from lateral view not angulate at level of eyes (Figs 2–5). Preocular flange and pleural carina of head process absent (Figs 2–5). Eyes round. Ocelli between eyes and base of antennae (Figs 2–5). Metope (~frons) concave in lateral view; median carina incomplete or obsolete; lateral carinae conspicuous, reaching apex of process (not reaching metopoclypeal suture; Figs 9–11). Clypeus with basal width about 3/5 of length; median carina weak at anteclypeus (Figs 9–11). Rostrum long, reaching abdominal sternum V.

Thorax. Pronotum with anterior margin trilobed; posterior margin medially notched; median carina present; pair of fossettes at anterior half of disc (Figs 1, 6–8). Paranotal lobes expanded, foliate, with horizontal carina. Mesonotum with median carina obsolete near scutellum; intermediate carinae from hind margins at medial margins of fossettes, obsolete before midlength; lateral carinae diverging, weak or obsolete (Figs 1, 6–8).



FIGURES 1–5. *Pseudoamycte polylepisae* gen. et sp. nov. 1. Male habitus, dorsal view. 2–5. Head, lateral view. 2. Male. 3–4. Female. 5. Male with short cephalic process. Scale bars = 5 mm.

Wings. Tegmina held tectiform; reticulation of crossveins dense over entire surface; main veins very slightly coarser than crossveins; MP pectinate in more than five branches before level of apex of clavus; CuA forked distad to first fork of MP and before level of apex of clavus, with two main branches until nodal line (Fig. 1).

Legs. Prismatic, slightly flattened. Femora quadrangular and tibiae triangular in cross section. Metatibia with 4–5 lateral teeth somewhat equidistant; apically with 4–5 outer teeth, slightly decreasing in size from outermost to innermost; 2 inner teeth. Basal metatarsomere with 8 apical teeth, about as long as both subsequent.

Male genitalia. Pygofer small in relation to width of abdomen; in caudal view laterally compressed (Figs 12–13, 25–26). Styli obovate; apex rounded; laterodorsal tooth at outer margin in basal half (Figs 16–17, 25–26). Segment X (~anal flap) large, in dorsal view subtriangular; dense pilosity at margins (Figs 18–19, 25–26).

Female genitalia. Tergum IX projected over ovipositor, dorsoventrally compressed (Figs 20–21). Gonocoxae VIII broad, punctuate (Fig. 20). Segment X (~anal flap) large, covering ovipositor; sides densely covered with setae (Fig. 22).

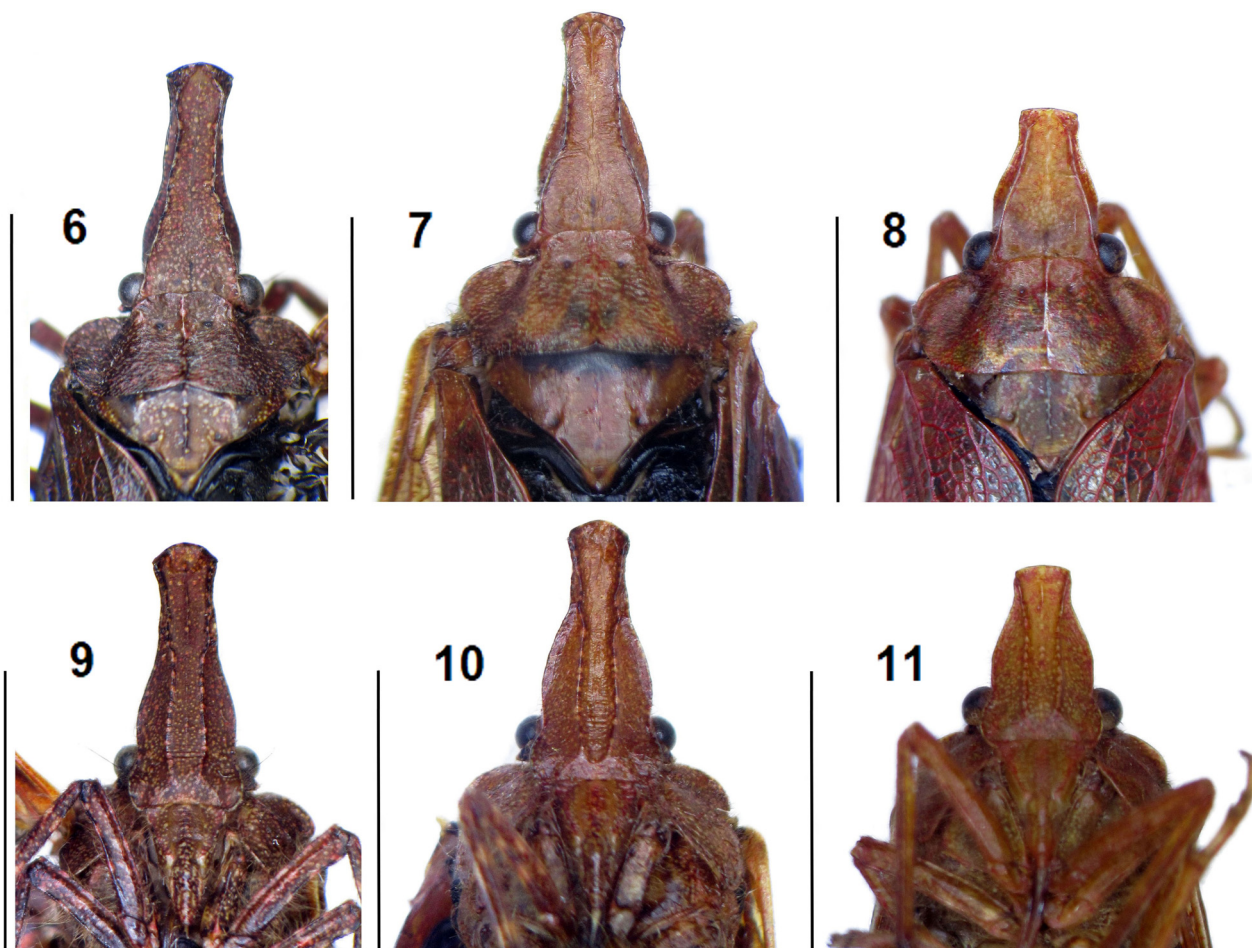
Etymology. Combination of the greek prefix ψεῦδο (= *pseudo*, false) and the genus name *Amycle*. This due to the resemblance among these two taxa. The name is neuter in gender.

***Pseudoamyacle polylepisae* sp. nov.**

(Figs 1–27)

Type material. Holotype: male, Chile, [Arica and Parinacota reg.] Parinacota prov., Socoroma, 2.III.2017. Mauricio Cid Arcos leg., on *Polylepis rugulosa* (MNNC). Paratypes: Chile, [Arica and Parinacota reg.] Parinacota prov., Putre, Zapahuira, 23.III.2013. A. Fierro leg., under bark of *Polylepis rugulosa* 1 male, 1 female (MNNC); Chile, R. de Arica y Parinacota, Zapahuira, *muerto en tela de araña* [dead in a spider web], V. 2014, Leg. J. Sepúlveda, 1 female (JFCW).

Description. *Measurements.* Total length: male holotype, 19.6 mm; female paratype, 24 mm; male paratype with short cephalic process, 20 mm. Body length (excluding wings): male holotype, 15 mm; female paratype, 16.8 mm; male paratype with short cephalic process, 12.8 mm. Width (maximum width of thorax): male holotype, 4.6 mm; female paratype, 6 mm; male paratype with short cephalic process 5.2 mm.



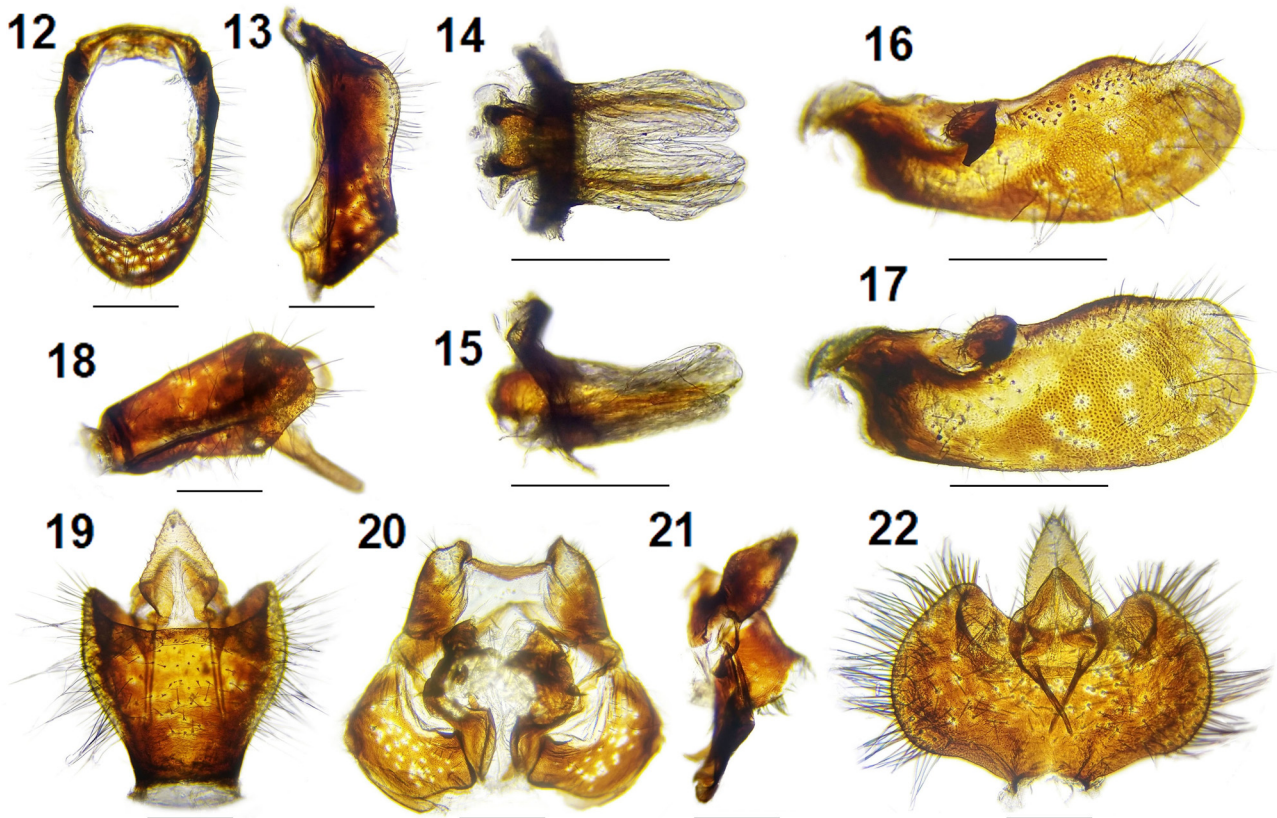
FIGURES 6–11. *Pseudoamyacle polylepisae* gen. et sp. nov. 6–8. Head and thorax, dorsal view. 6. Male. 7. Female. 8. Male with short cephalic process. 9–11. Head, ventral view. 9. Male. 10. Female. 11. Male with short cephalic process. Scale bars = 5 mm.

Coloration. General body brown, with reddish or yellowish tones due to reddish or yellowish pale granules and markings (Figs 1–11, 27). Pale granules densely covering head, pronotum and legs; slightly sparser at discal areas of mesonotum (Figs 1–11). Median carinae of pro- and mesonotum and carinae of head with slightly darker coloration, regularly interrupted with pale markings or granules (Figs 2–11). Legs with darker coloration alternated with transverse paler fringes. Hind wings with base first black, then red; translucent area indistinctly infusate with brown at cells; venation black to dark brown (Figs 1, 27).

Head. Coryphe including process about as long as pro- and mesonotum, nearly twice as basal width; basal trapezoidal section slightly shorter than process section with subparallel margins; apex slightly widened, arcuate (Figs 6–7). Head from lateral view with process tapering apically, first diagonally ascendant, then abruptly or gradually declivous; dorsal and ventral marginal carinae of process sharp, variably angulate near midlength; vertical striae craniad to eye (Figs 2–4). Metope with lateral carinae starting slightly craniad of metopoclypeal suture, at first slightly diverging, then parallel until fore 1/3 where they abruptly bend outwards and inwards, and finally diverge to apex of process (Figs 9–10).

Thorax. Pronotum with median length about 1/3 to 2/5 of maximum width; median lobe of anterior margin indistinctly notched; fossettes positioned near level of base of median lobe; marginal carinae arcuate and sharp; lateral angles obtuse (Figs 6–8). Mesonotum with length from posterior margin of pronotum to apex about 1/2 of width; disc subapically somewhat depressed, then scutellum elevated (Figs 6–8).

Wings. Tegmina elongate and narrow, 3/2 as long as broad; costal and sutural margins subparallel, then costal margin very slightly converging after nodal line; costal angle moderately arcuate; sutural angle smooth (Fig. 1). Hindwings well developed; costal margin somewhat straight at basal 4/7, then slightly convex; external margin indistinctly concave near middle; angles broadly arcuate (Fig. 1).



FIGURES 12–22. *Pseudoamycle polylepisae* gen. et sp. nov. 12–19. Male genitalia. 12–13. Pygofer: 12. Caudal view; 13 – Lateral view. 14–15. Phallus: 14. Dorsal view; 15. Lateral view. 16–17. Stylus: 16. Lateral view; 17. Ventrolateral view. 18–19. Postgenital segments: 18. Lateral view; 19. Ventral view. 20–22. Female genitalia. 20–21. Tergum IX and ovipositor: 20. Caudal view; 21. Lateral view. 22. Postgenital segments, dorsal view. Scale bars = 0.5 mm.

Male terminalia. Pygofer about 3/2 as tall as wide; in lateral view subtrapezoidal, with length at middle about 2/7 of basal height; hind margins gently sinuate (Figs 12–13, 25–26). Phallus from dorsal view broadened

subapically, slightly longer than wide; suspensorium wide, platelike, bent from lateral view (Figs 14–15, 23–24). Styli more than two times as long as maximum wide; outer margin with laterodorsal tooth positioned at end of basal third; laterodorsal tooth with base broad, apical spine curved ventrad and craniad (Figs 16–17, 25–26). Segment X (~anal flap) with maximum width subapical, slightly wider than median length; hind margin roundly concave; in lateral view broadened subapically, then obtusely angled caudally (Figs 18–19, 25–26). Segment XI with paraproct rhomb shaped, about 3/5 as long as median length of segment X; epiproct with hind margins angulate in V (Fig. 19).

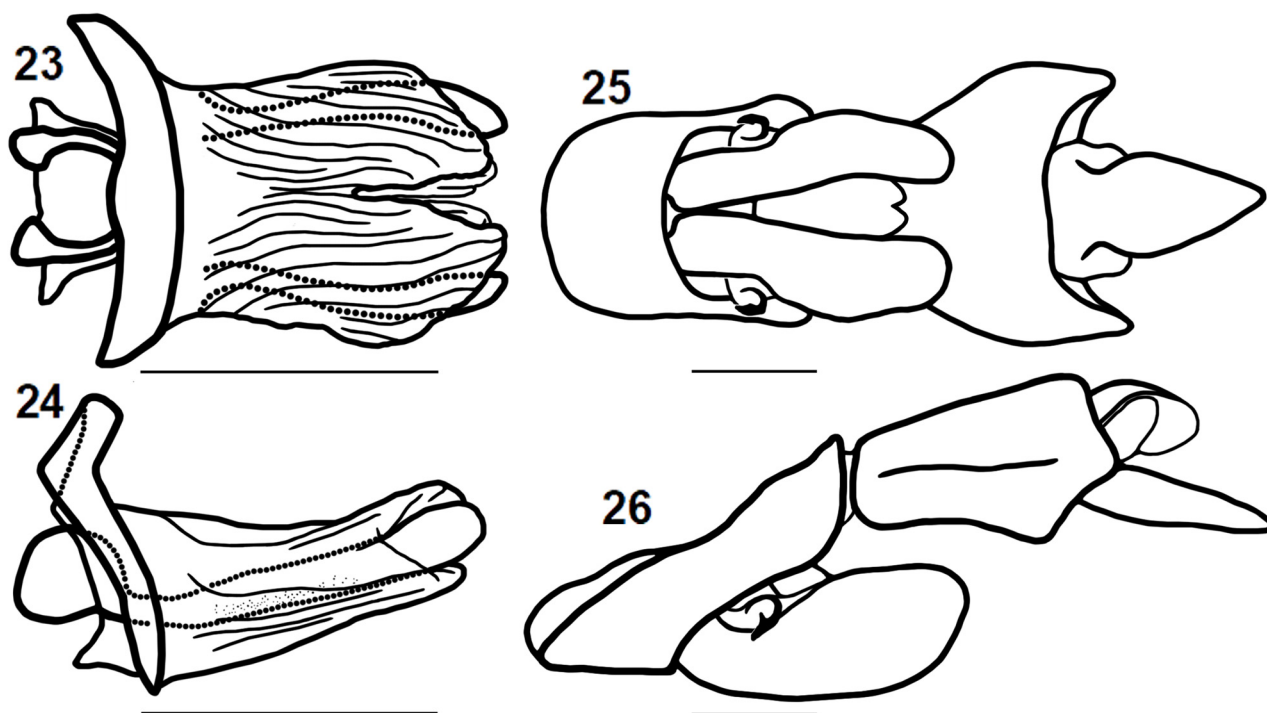
Female terminalia. Tergum IX with arms stout, from ventral/dorsal view slightly converging distad (Figs 20–21). Gonoplacs with dorsal margin concave; hind margin with inferior half convex, superior half concave and membranous (Fig. 21). Gonocoxae VIII with basal margin convex until inferior side which is gently concave; hind margin concave (Fig. 20). Segment X (~anal flap) with median length about one half of maximum width; sides flat with margins rounded; hind margin roundly concave; base obtuse (Fig. 22). Segment XI with paraproct ovate, apex acute, about 4/5 as long as median length of segment X; epiproct with hind margins angulate in V (Fig. 22).

Intraspecific variation. The male from *Zapahuiria* has a distinctly shorter cephalic process and eyes slightly larger (Figs 5, 8, 11); length of coryphe 2/3 as long as pro- and mesonotum and 1.4 times of basal width; basal trapezoidal section of head longer than process section with parallel sides; apex of process truncate; metope with lateral carinae immediately diverging to apex of process after parallel portion (not abruptly bent outwards and inwards).

Etymology. The specific name refers to the host plant genus, *Polylepis* Ruiz & Pav.

Note. Additional five specimens of undetermined sex were destroyed due to the damage suffered during the barking.

Host plant. Seven specimens of newly described species were found under the bark and one was collected by beating the leaves of *Polylepis rugulosa* Bitter (Rosaceae). This plant is categorized as “vulnerable” according to the IUCN Red List of Threatened Species (World Conservation Monitoring Centre, 1998) and as “endangered” according to the Chilean legislation (Ministerio Secretaría General de la Presidencia, 2008).

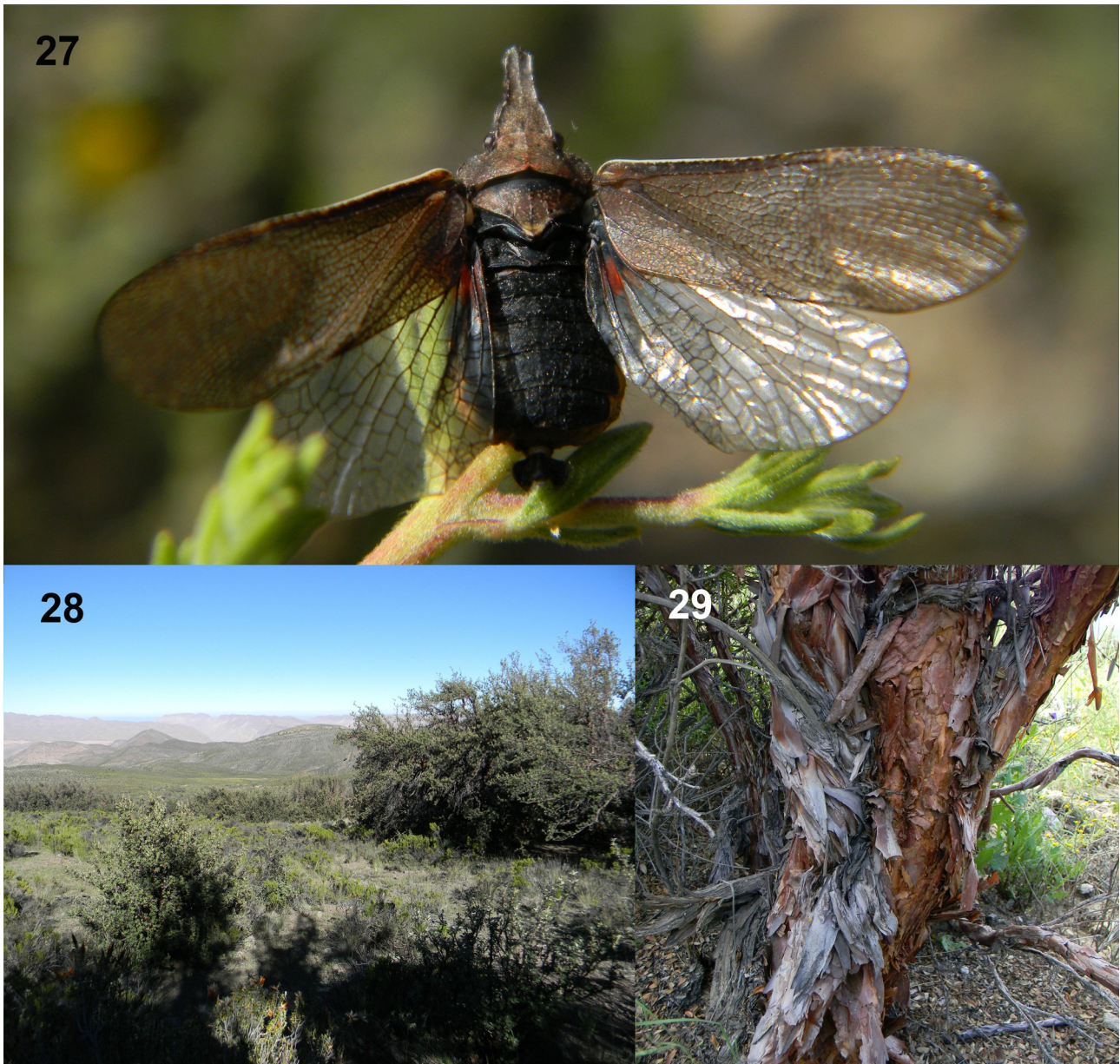


FIGURES 23–26. *Pseudoamycle polylepisae* gen. et sp. nov. male genitalia. 23–24. Phallus. 23. Dorsal view. 24. Lateral view. 25–26. Pygofer, styli and segments X–XI. 25. Ventral view. 26. Lateral view. Scale bars = 0.5 mm.

Key to New World genera of Amyclini

(Modified from Bartlett *et al.*, 2014: 31)

- 1. Cephalic process narrowed apically or only slightly expanded: base of coryphe nearly twice as wide as apex 2
- Cephalic process distinctly expanded apically: base of coryphe and apex subequal in width 3
- 2. Preocular flange present; vein MP of tegmina not pectinate *Amycle* Stål, 1861
- Preocular flange absent; vein MP of tegmina pectinate *Pseudoamycle* **gen. nov.**
- 3. Cephalic process with dorsal side scalloped in lateral view, carinae foliaceous. *Scolopsella* Ball, 1905
- Cephalic process with dorsal side smooth in lateral view, carinae not foliaceous *Rhabdocephala* Van Duzee, 1929



FIGURES 27–29. 27. *Pseudoamycle polylepisae* **gen. et sp. nov.**, female. 28–29. Patches and bark of *Polylepis rugulosa* Bitter in premountain range of Pachama, Putre District, Arica and Parinatoca Region. Photographs: Andrés Fierro.

Discussion

Following O'Brien (1988), *Pseudoamycle* may fall in the same couplet as *Amycle* (N° 13) due to the opaque tegmina, hindwing without eyespot, small body (under 26 mm length) and head process porrect and semicircular in cross section. Besides morphological differences in head, venation and coloration of tegmina, there is a significant

geographic distance between these two taxa (*Amycle* is distributed in the United States of America, Mexico, Guatemala and Honduras).

Pseudoamycele is assigned to Amyclini because of the resemblance with the type genus. However, its placement may change as the higher classification is revised. The branching of the MP vein of tegmen and the presence or absence of a preocular flange are the most significant characters that can separate these taxa.

The host plant *Polylepis* is a genus of small trees and shrubs (2 to 5 meters tall) endemic to South America, whose almost twelve species are mainly distributed across tropical and subtropical highland forests of the Andes from Venezuela to Northern Chile and Central Argentina (Kessler & Schmidt-Lebuhn, 2006). As other Andean highland tropical and subtropical habitats, the *Polylepis* forests are among the most endangered of the world (Renison *et al.*, 2004).

In Chile, only two *Polylepis* species are present, with *Po. rugulosa*, endemic to Andean forests and distributed between 3400–4100 meters above sea level from Arequipa (Perú) to Arica-Parinacota (Chile) (Brako & Zarucchi, 1993; Schmidt-Lebuhn *et al.*, 2006) (Fig. 29) and *Po. tarapacana* Phil., endemic to the Andean plateau and distributed between 4100–5200 meters above sea level from Puno and Tacna (Perú) to Potosí (Bolivia) and Antofagasta (Chile) (Schmidt-Lebuhn *et al.*, 2006).

All *Polylepis* trees species have complex trunks and abundant foliage, as well as a laminar and dense bark, which are adaptations to extreme conditions of wind and cold of their habitats (Kessler & Schmidt-Lebuhn, 2006).

Adult and nymphs of fulgorids are phytophagous and are usually found on the trunks of their hosts (O'Brien, 1988). Eight of nine specimens of *Ps. polylepisae* were found in *Po. rugulosa*, and none in other accompanying shrub species. Further, seven of nine specimens of *Ps. polylepisae* were exclusively found under the bark of *Po. rugulosa*. This apparently restricted host preference of *Ps. polylepisae* on *Po. rugulosa* may indicate a trophic specialization (*Po. rugulosa* is the only *Polylepis* tree species in its habitat), as well as a ecological specialization to structural features of this tree species (e.g. laminar and complex bark) (Fig. 29) in respond to biotic (e.g., predators) and abiotic (e.g. extreme cold) pressures prevailing in highland habitats (Eastop, 1972; Johnson & Foster, 1986). For example, *Po. rugulosa* trees are isolated or form small patches surrounded by a matrix structurally simple of small and sparse shrubs (Fig. 28), where *Ps. polylepisae* is exposed to the action of predators (e.g. parasitoids, lizards, birds) and the extreme thermal oscillations daily (Kowoll, 1993), which may face living under the dense, laminar and complex bark of *Po. rugulosa*.

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