

On the identity of *Gargaphia subpilosa* Berg, 1879, *G. bergi* Monte, 1940 and *G. penningtoni* Drake, 1928 (Insecta, Hemiptera, Heteroptera, Tingidae), with the description of immatures of *G. bergi*

Sara I. MONTEMAYOR
Pablo M. DELLAPÉ

División Entomología, Museo de Ciencias Naturales de La Plata, UNLP,
Paseo del Bosque s/n, 1900 La Plata, Buenos Aires (Argentina)
smontemay@fcnym.unlp.edu.ar
pdellape@fcnym.unlp.edu.ar

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KEY WORDS

Insecta,
Hemiptera,
Heteroptera,
Tingidae,
Gargaphia,
type material,
nomenclature,
nymphs,
neotropical.

ABSTRACT

The correct designation of the lectotype of *Gargaphia subpilosa* Berg, 1879 is discussed and a paralectotype is recovered; *G. penningtoni* Drake, 1928 is considered a junior synonym of *G. subpilosa* Berg, 1879; *G. bergi* Monte, 1940 is raised from synonymy with *G. subpilosa* and instars II-IV are described. Illustrations of habitus of both species and of the immature stages II to V of *G. bergi* are provided together with photographs in the field of this last species.

RÉSUMÉ

Sur l'identité de *Gargaphia subpilosa* Berg, 1879, *G. bergi* Monte, 1940 et *G. penningtoni* Drake, 1928 (Insecta, Hemiptera, Heteroptera, Tingidae), avec une description d'immatures de *G. bergi*.

MOTS CLÉS

Insecta,
Hemiptera,
Heteroptera,
Tingidae,
Gargaphia,
matériel type,
nomenclature,
nymphe,
néotropical.

La désignation correcte du lectotype de *Gargaphia subpilosa* Berg, 1879 est discutée et un paralectotype est récupéré; *G. penningtoni* Drake, 1928 est considéré comme un synonyme plus récent de *G. subpilosa* Berg, 1879. La synonymie entre *G. bergi* Monte, 1940 et *G. subpilosa* est invalidée et quelques états immatures sont décrits. Des illustrations de l'habitus des deux espèces et des états immatures II à V de *G. bergi* sont incluses ainsi que des photographies prises sur le terrain de cette dernière espèce.

INTRODUCTION

Gargaphia subpilosa Berg, 1879 was described by Berg in his “Hemiptera Argentina” (1879) on the basis of specimens from Buenos Aires and Baradero. In this original description, Berg mentioned that there were eight specimens in the type series but he did not designate a holotype and there are no indication of where this material was deposited. Since the original description of this species there has been confusion regarding its identity and lectotype designation.

In their treatment of *G. subpilosa*, Drake & Poor (1938) mentioned a male “holotipo” and a female “alotipo” from Buenos Aires deposited in the Museo de La Plata (Argentina). They did not explain why they considered this materials part of the type series. In fact, the nomenclatural act established by Drake & Poor is a lectotype designation. Moreover, there is another specimen deposited in the Museo de La Plata which up to now has never been mentioned. It was collected in Chacabuco (Argentina, Buenos Aires province) by F. Lynch and has a label in Drake’s handwriting saying “*Gargaphia subpilosa* Paratype”.

Monte (1940a) redescribed *G. subpilosa* and considered the specimens chosen by Drake & Poor (1938) as not belonging to Berg’s type series. He established as lectotype of *G. subpilosa* a specimen from the Museo Argentino de Ciencias Naturales (Buenos Aires) and argued that the type specimens selected by Drake & Poor lacked the typus labels. Monte (1940a) also mentioned that the only fact that can suggest that these specimens are types is the locality label “Baradero, F. Lynch”. He also considered that the types selected by Drake & Poor do not agree with the original description of Berg, he thus concluded that Drake and Poor’s types belong to another species without mentioning the identity of the species. In the same paper, Monte described a new species, *G. bergi*, from material belonging to his collection (all from Buenos Aires, Argentina).

Drake (1948) disagreed with Monte’s designation and considered that his designation (Drake & Poor 1938) of lectotype was correct. Drake argued that the type labels were lost after his designation. He also indicated that the species label “*Gargaphia subpilosa* Berg” on the specimen selected by Monte

is not in Berg’s handwriting and that the generic name is incorrectly spelled. He concluded that two or three species may have been involved in the original description of *G. subpilosa*. Drake also synonymized *G. bergi* Monte, 1940 with *G. subpilosa* Berg, 1879, considering that the differences mentioned by Monte corresponded to intraspecific variations, particularly in the number of rows of areolae in the paranota and costal area.

A third species whose identity was confused with *G. subpilosa* is *G. penningtoni* Drake, 1928. Drake & Ruhoff (1965) in their catalog indicated that the illustration provided by Monte (1943) of *G. subpilosa* was in fact of *G. penningtoni*.

In the present contribution, we study and compare type specimens and additional material of *G. subpilosa*, *G. penningtoni*, and specimens of *G. bergi*. The identity of these species is clarified and instars II-V of *G. bergi* are described and illustrated.

MATERIALS AND METHODS

The material studied in this paper belongs to MACN, MLP and MNHN. A lectotype and a paralectotype of *G. subpilosa* and a paratype of *G. penningtoni* were studied. Additional material is also detailed in the section “Other material examined”. Vouchers of the immature stages of *G. bergi* were preserved in 70% alcohol and deposited in MLP and MNHN. In the synonymic lists of the species, when the identity is considered doubtful we indicate them as a “misidentification?”. Because of the way some of the material has been mounted it was not always possible to determine the sex, in which case, we indicated the specimen as “sex not det.”. Measurements are given in millimetres.

ABBREVIATIONS

MACN	Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires;
MLP	Museo de La Plata, Buenos Aires;
MNHN	Muséum national d’Histoire naturelle, Paris.

DISCUSSION

As a result of a detailed examination of the specimens designated by Drake & Poor (1938) and Monte

(1940a) as the lectotype of *G. subpilosa* Berg 1879, we conclude that they belong to different species and that the specimens designated by Drake & Poor do not fit with the original description of *G. subpilosa* and, moreover, that these specimens correspond to *G. bergi*, a species we consider valid. We also examined several labels of Berg's types at the MLP and corroborated that the specimens selected by Monte are labelled with Berg's handwriting, whereas this is not the case of the ones selected by Drake & Poor (1938).

According to the Article 74.2 of the ICZN (1999) "If it is demonstrated that a specimen designated as a lectotype was not a syntype, it loses its status of lectotype". Because of all the facts just mentioned, the designation by Drake & Poor (1938) is considered invalid. Therefore the correct designation of the lectotype was that made by Monte (1940a).

When examining Berg's collection at the MACN, one specimen was found labelled with Berg's handwriting as *G. subpilosa* outlined in red. We consider that this is one of the eight specimens belonging to the type series, and a paralectotype of *G. subpilosa*.

While studying the Berg types, we observed that this material fits the original description of *G. penningtoni*. After a comparison of a paratype of *G. penningtoni* with the types of *G. subpilosa*, we were able to confirm that in fact the specimens belong to the same species and therefore, *G. subpilosa* and *G. penningtoni* are synonyms.

It is interesting that Monte determined material from the MACN sometimes as *G. subpilosa* and other times as *G. penningtoni*, not realizing that these specimens were conspecific. As Monte (1937, 1938) wrote, the identity of *G. subpilosa* remained unclear for several years, and moreover, he mentioned that both *G. subpilosa* and *G. penningtoni* in the same contribution (Monte 1938). Because Drake never considered these species synonyms, it is clear that he was misled by the incorrect lectotype designation for *G. subpilosa* of Drake & Poor (1938).

We also consider *G. bergi* (Fig. 1A) a valid species, which can be easily distinguished from *G. subpilosa* (Fig. 1B) by differences in the paranota and hemelytra. The paranota of *G. bergi* are more slender and have two rows of areolae at its widest part (some specimens may have three rows). In

contrast, *G. subpilosa* has wider paranota with at least three rows of areolae at widest part. When at rest the hemelytral margins of *G. bergi* (Fig. 1A) are subparallel with their maximum width on the anterior third, the total length of the costal area has two rows of areolae, sometimes a few extra ones, and the discoidal area almost reaches one half of the hemelytral length. Whereas *G. subpilosa* (Fig. 1B) has divergent lateral hemelytral margins with the maximum width posterior, the total length of the costal area has three rows of areolae, and the discoidal area is shorter, reaching approximately one third of the hemelytral length.

Gargaphia subpilosa Berg, 1879 (Fig. 1B)

Gargaphia subpilosa Berg, 1879: 42. — Pennington 1921: 20. — Fenton 1934: 199 [misidentification?]. — Monte 1937: 36; 1938: 387, 388; 1940a: 301-306 [lectotype designation]. — Denier 1939: 555 [misidentification?]. — Bosq 1937: 129 [misidentification?]; 1940: 411 [misidentification?]. — Drake & Ruhoff 1965: 234. — Di Iorio 2004: 281 [misidentification?].

Gargaphia penningtoni Drake, 1928: 75; 1935: 20. — Drake & Hambleton 1934: 450. — Bosq 1937: 129. — Monte 1938: 388; 1939: 70; 1940b: 193; Drake & Poor 1939: 98. — Drake & Ruhoff 1965: 231. — Bosq 1940: 411 [misidentification?]. — Di Iorio 2004: 281. New synonymy.

TYPE MATERIAL. — Without locality, lectotype, 5653, (MACN); 1 paralectotype, 11949, *Gargaphia subpilosa* Berg, 169 (MACN). — Buenos Aires, 1 paratype, *Gargaphia penningtoni* Drake (MLP).

OTHER MATERIAL EXAMINED. — **Argentina.** Buenos Aires, C. Bruch coll., 7 ♂♂, 3 ♀♀, *Gargaphia penningtoni* (MACN). — C. Bruch coll., 1 ♀, *Gargaphia penningtoni* (MACN). — Guerrero FC. S., 25.III.1919, Blanchard E. E. coll. 1 ♂, 1 ♀, 1 nymph, 1 sex not det. (MACN). — Lomas FC.S., 5.II.1919, Blanchard E. E. coll., 3 ♂♂, 1 sex not det. (MACN). — San Isidro, 20.XI. (19)49, 1 sex not det. (MACN). — Quilmes, 1 ♀, 1 sex not det. (MACN). — delta río Chana, Blanchard E. E. coll., 1 sex not det. (MACN). — Buenos Aires ciudad, 20.III.(19)59, A. Moreno leg., 2 ♀♀ (MLP). Córdoba, 1.IX.?, C. Bruch coll., 1 ♂, *Gargaphia subpilosa* (MLP). — Agua de Oro, I.1940, J. A. De Carlo leg., 1 ♂, 3 sex not det., *Gargaphia penningtoni*, (MACN). — El Sauce, 18.XI.1970, Williner coll., 1 ♂ (MACN). — Dep.

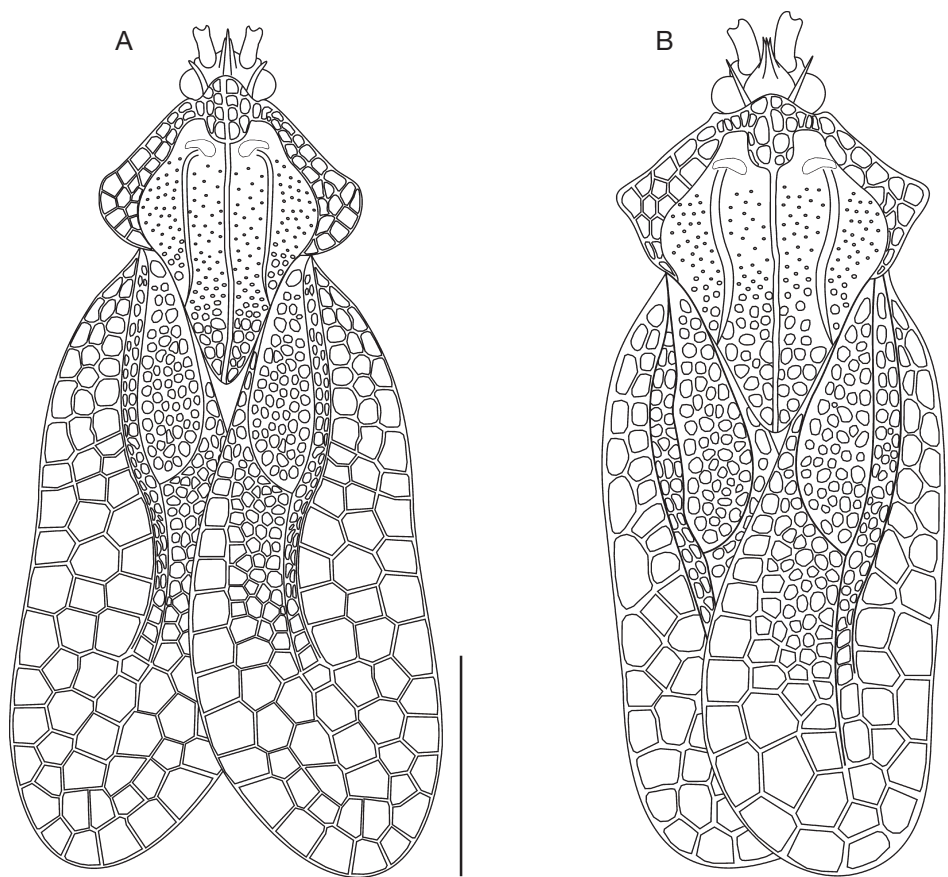


FIG. 1. — **A**, *Gargaphia bergi* Monte, 1940, habitus; **B**, *G. subpilosa* Berg, 1879, habitus. Scale bars: 1 mm.

Calamuchita, El Sauce, Manuel J. Viana coll., 1 ♂, 1 ♀, 1 sex not det. (MACN).

Chaco, Puerto Vilela, 15.XII.(19)36, Denier coll., 1 ♀ (MLP).

Formosa, Clorinda, 8.VIII.(19)40, P. Denier coll., 3 ♂♂, 1 sex not det. (MLP).

Jujuy, Urundel, 25.V.(19)49, Biraben leg., 1 ♂ (MLP). — Yata, 11.II.1946, Biraben coll., 2 ♂♂ (MLP). — 30.I.(19)46, Biraben coll., 1 ♂, 1 sex not det. (MLP). — Palmar San Pedro, XII-(19)54, Biraben coll., 1 ♂ (MLP). — 20.I.1957, A. Martínez, 1 sex not det. (MACN).

Salta, Dep. 5ta Victoria, 16.VII.(19)33, P. Denier coll., 3 sex not det. (MLP). — Pocitos, 24.XI.(19)54, Biraben coll., 1 ♂, ♀ (MLP). — San Pedro, XII.(19)54, Biraben coll., 1 ♂ (MLP).

Tucumán, X.1939, J. M. Bosq, 1 sex not det. (MACN). — same data, 1 sex not det. (MLP). — San Javier, 2.X.1938, Bosq coll., 1 ♂, 1 ♀, 2 sex not det. (MLP).

Gargaphia bergi Monte, 1940
(Figs 1A; 2; 3)

Gargaphia subpilosa – Drake 1931: 512; 1948: 432. — Drake & Poor 1938: 109 [lectotype designation, mis-identification]. — Torres 1950: 28, 29 [photograph of habitus].

Gargaphia bergi Monte, 1940a: 306.

MATERIAL EXAMINED. — **Argentina**. Buenos Aires: Baradero, Lynch, 1 ♂, 1 ♀, *Gargaphia subpilosa*, holotype and allotype (MLP). — Chacabuco, F. Lynch, 1 sex not det., *Gargaphia subpilosa*, paratype (MLP). — Capital Federal, 3.II.(19)50, 2 ♀♀ (MLP). — San Justo, 1933, Daguerre & De Carlo, 1 ♂ (MLP). — Tigre, 5.VIII.1957, J. Viana, 2 ♂♂ (MACN). — San Miguel, 5.XII.(19)75, P. Rivière, S. J., 1 ♂, 2 ♀♀ (MACN). — Lobos, 25.I.1932, 2 ♂♂, 1 ♀, 1 sex not det. (MACN). — Tigre, 3.XII.1949, N.

Kormilev, 1 sex not det. (MLP). — Tigre, 20.II.1948, N. Kormilev, 2 ♀♀ (MLP). — Tigre, 18.I.1948, N. Kormilev, 1 ♂ (MLP). — Rosas-F.C. Sud, Juan B. Daguerre, 2 sex not det. (MLP). — La Grande, *Gargaphia subpilosa* det C. J. D., 1 ♀ (MLP).

Catamarca, La Ciénaga (Belém), C. Bruch coll., 2 ♂♂, 1 ♀, 1 sex not det., Weiser Wolters leg., *G. subpilosa* det. Drake (MACN).

Córdoba, Calamuchita, El Sauce, 1939, Viana, 2 ♀♀ (MLP).

Corrientes, Manantiales, II-1945, Biraben coll., 1 ♀ (MLP). — San Roque, II.1920, Bosq col, E. E. Blanchard coll., 3 ♂♂, 1 ♀, 1 sex not det. (MACN). — Same data, 1 ♂, 1 sex not det., *Gargaphia subpilosa* (MACN).

Entre Ríos, Concordia, 1938, Honward coll., 2 ♂♂, 4 ♀♀, *Gargaphia* sp. M. V. A. Toledo det. (MLP).

La Pampa, Gral Acha, 12.III.2008, Dellapé, 10 ♂♂, 13 ♀♀ (MLP). — Same data, 10 ♂♂, 10 ♀♀ (MNHN).

Mendoza, I.1934, Koehler leg., 2 ♂♂, 2 ♀♀ (MACN). — Potrerillos, 4000 ft, 16-20.III.1920, Cornell Univ. Exp. 44387, 1 ♀, *Gargaphia subpilosa* det. Drake (MACN). — Same data, R. C. Harris col., 1 ♂ (MACN).

Santa Fe, Baner y Sigel, III.(19)69, Williner S.J, 1 ♂ (MLP).

Bolivia. La Paz, Nigrillani Nor-Yungas, I.(19)50, Williner, 2 sex not det. (MLP).

IMMATURE STAGES

Bizarre Tingidae morphology has been hypothesized to be adaptive because it becomes progressively more exaggerated, from basal to terminal species (Guilbert 2001). The same tendency has been observed in immature stages during the development of the life cycle. Guilbert (2005) suggests peramorphosis, a phenomenon that leads to a descendant with “overdeveloped” character states compared to its immediate ancestor, as a heterochronic phenomenon to explain that nymphs become more complex during development. This is also suggested to explain that adults as well as immature become complex during the evolution of the family. The study of immature stages can be very useful to detect heterochronic events as processes leading to reversion and homoplasies (Guilbert 2004; Guilbert *et al.* 2008), and to provide information of great value to perform phylogenetic analyses.

COMMENTS ON THE LIFE CYCLE

OF *GARGAPHIA BERGI*

The second author collected both adults and immatures on *Helianthus petiolaris* Nutt. (Asteraceae)

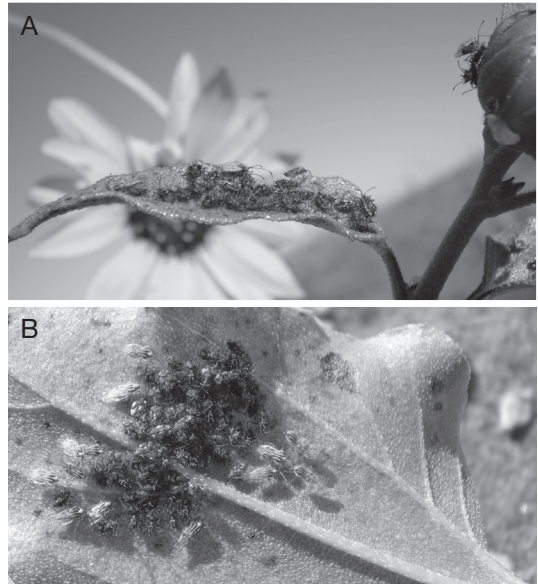


FIG. 2. — *Gargaphia bergi* Monte, 1940: **A**, nymphs and adults on leaves of *Helianthus petiolaris* (Asteraceae); **B**, nymphs and adults on underside of leaf.

in General Acha, La Pampa, Argentina. Some plants were heavily infested whereas others lacked specimens. The nymphs were found aggregated in large numbers on both sides of the leaves (Fig. 2) interspersed with a few adults near them. Scattered nymphs and adults were also observed on flowers and branches as shown in Figure 2B.

SECOND INSTAR (FIG. 3A)

MATERIAL EXAMINED. — **Argentina.** La Pampa, Gral. Acha, 12.III.2008, Dellapé, 3 nymphs (MLP).

Description

Body slender, yellowish brown. Body length: 0.94; width: 0.37. Antennal segment I approximately the same length as II but stouter, III longer than other segments, IV stout and fusiform, with a few long, scattered setae. Antennal segment measurements: I: 0.04; II: 0.04; III: 0.19; IV: 0.14. Head length: 0.25, width: 0.30. Head armed with five short spines, a frontal pair, a single median and an occipital pair. Frontal pair of spines divergent; occipital pair subparallel.

Pro-, meso- and metathorax short and moderately wide. Pro- and mesothorax armed with a median pair of short tubercles, lateral margins armed with one simple tubercle.

Lateral margins of abdominal tergite with a simple tubercle. Segment I medially armed with one pair of divergent short tubercles directed backward. Segments V, VI and VIII with a short tubercle medially.

THIRD INSTAR (FIG. 3B)

MATERIAL EXAMINED. — **Argentina**. La Pampa, Gral. Acha, 12.III.2008, Dellapé, 16 nymphs (MLP); 10 nymphs (MNHN).

Description

Body broad. Antennae, head and thorax brown; abdomen yellowish brown. Body length: 1.00; width: 0.45. Antennal segment I slightly longer than II, III longer than other segments, IV stout and fusiform, with a few long, scattered setae. Antennal segment measurements: I: 0.06; II: 0.04; III: 0.35; IV: 0.21. Head length: 0.25, width: 0.31. Cephalic spines with same characteristics as previous instar. Occipital pair divergent.

Pro- and mesothorax medially armed with one pair of tubercles. Pro- and mesothorax lateral margins armed with one simple tubercle directed backward, anterior margins of prothorax with an additional small tubercle on each side of the head. Metathorax medially armed with one pair of very short tubercles. Length of wing pads: 0.12.

Abdominal segments with same characteristics as previous instar. Segment II armed with one pair of divergent very short tubercles directed backward.

FOURTH INSTAR (FIG. 3C)

MATERIAL EXAMINED. — **Argentina**. La Pampa, Gral. Acha, 12.III.2008, Dellapé, 19 nymphs (MLP); 10 nymphs (MNHN).

Description

Body broad; general color yellowish brown; antennae, head, thorax, lateral tubercles, unpaired median abdominal tubercles and median abdominal spot on segments IV and V brown; cephalic spines, median paired tubercles, lateral margins of pronotum

yellowish. Body length: 1.4; width: 0.7. Antennal segment measurements: I: 0.11; II: 0.07; III: 0.57; IV: 0.27. Head length: 0.25, width: 0.4. Cephalic tubercles with the same characteristics as previous instar.

Thorax with same characteristics as previous instar. Pro- and mesothorax may have one or two additional small spines anteriorly on lateral margins. Length of wing pads: 0.30.

Abdominal segments with same characteristics as previous instar, tubercles longer than in previous instar.

FIFTH INSTAR (FIG. 3D)

MATERIAL EXAMINED. — **Argentina**. La Pampa, Gral. Acha, 12.III.2008, Dellapé, 21 nymphs (MLP); 10 nymphs (MNHN).

Description

Body broad; general colour yellowish brown; antennal segments I, II and IV, head, thorax, lateral tubercles, unpaired median abdominal tubercles and median abdominal spot on segments IV and V brown; antennal segment III, cephalic spines, median paired tubercles, lateral margins of pronotum and carinal and hood initial outlines yellowish. Wing pads with a median dark spot and posteriorly dark brown. Last abdominal segments dark brown. Body length: 2.12; width: 0.97. Antennal segments with a few long, scattered setae. Antennal segment measurements: I: 1.75; II: 1; III: 0.74; IV: 0.37. Head length: 0.30, width: 0.42. Cephalic spines with the same characteristics as previous instar. Occipital pair convergent.

Prothorax dorsally with lateral carinae and a median carina the latter of which is swollen and projected forward into a hood, posteriorly it develops the posterior process, all other characteristics same as previous instar. Anterior margin of prothorax serrated. Meso- and metathorax with same characteristics as previous instar. Length of wing pads: 0.85. Lateral margins of wing pads with minute spines.

Abdominal segments with same characteristics as previous instar. Without second pair of median abdominal tubercles.

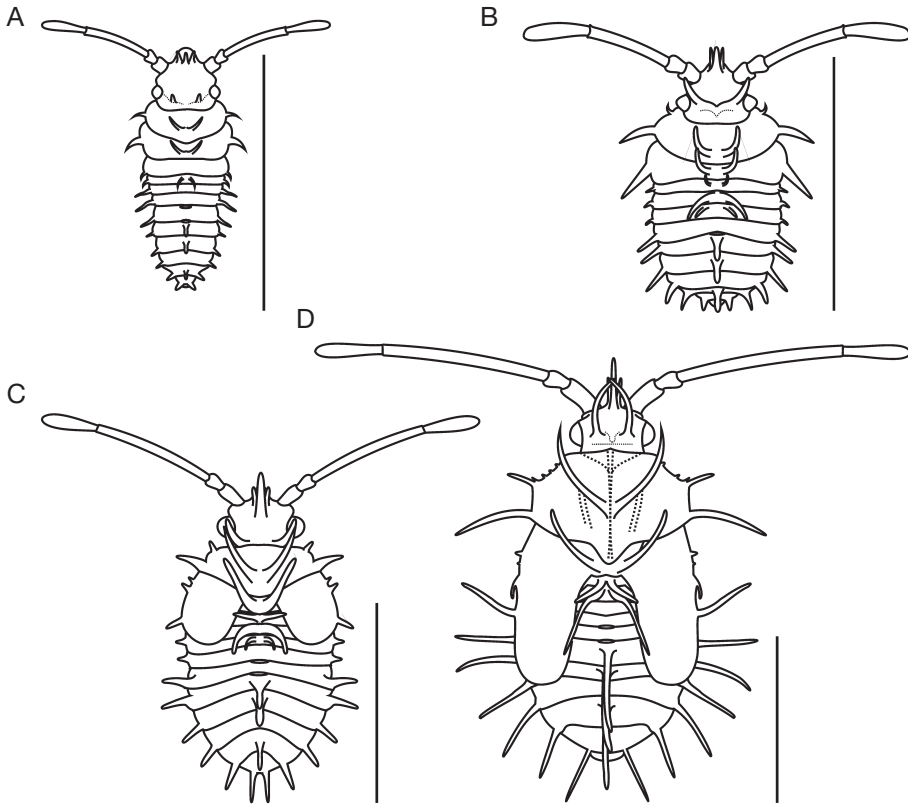


FIG. 3. — *Gargaphia bergi* Monte, 1940: **A**, second instar; **B**, third instar; **C**, fourth instar; **D**, fifth instar. Scale bars: 1 mm.

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