

Original article

Three new species of *Nanomis* Lugo-Ortiz and McCafferty, 1999 (Ephemeroptera: Baetidae) from Colombia

Tres nuevas especies de *Nanomis* Lugo-Ortiz and McCafferty, 1999 (Ephemeroptera: Baetidae) de Colombia

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Abstract

We describe three new species of *Nanomis* based on nymphs from Colombia using the characteristics that distinguish them from other species of the genus: *Nanomis antoniae* Salinas, sp. nov.: left mandible with incisors fused with 7 denticles; right mandible with an outer set of incisors with 3 denticles, inner set with 8 denticles; labial palp with segment III elongated and rounded; the outer margin of the fore femur with a row of 18–19 clavate setae; the inner margin of the fore tarsus with a row of spine-like setae, the most basal setae serrate; posterior margin of terga I-IV smooth, with spines on terga V-X. *Nanomis mariquitensis* Salinas, sp. nov.: left mandible with incisors fused with 9 denticles; right mandible with an outer set of incisors with 4 denticles and inner set with 9 denticles; labial palp with segment III elongated and rounded; outer margin of the fore femur with row of 8–9 clavate setae; inner margin of the fore tarsus with a row of spine-like setae, the two most basal setae serrate; posterior margin of terga I-IX smooth with spines on tergum X. *Nanomis quindiensis* Salinas, sp. nov.: left mandible with incisors fused with 7 denticles; right mandible with an outer set of incisors with 3 denticles, inner set with 9 denticles; maxillae with one small simple setae near medial hump; labial palp with segment III wide and rounded; outer margin of the fore femur with row of 14–15 clavate setae; posterior margin of terga I-II smooth, with spines on terga III-X.

Keywords: Andean region; mayflies; Neotropic; taxonomy.

Resumen

Se describen tres nuevas especies de *Nanomis* basadas en ninfas de Colombia y se presentan las características morfológicas que las separan: *Nanomis antoniae* Salinas, sp. nov.: mandíbula izquierda con incisivos con 7 denticulos; mandíbula derecha con incisivos externos con 3 denticulos e internamente con 8 denticulos; palpo labial con segmento II elongado y redondeado; margen externo del fémur anterior con hilera de 18 a 19 cerdas clavadas; margen interna del tarso anterior con hilera de cerdas como espinas, la más basal serrada; margen posterior de los tergos I-IV liso, espinas sobre los tergos V-X. *Nanomis mariquitensis* Salinas, sp. nov.: mandíbula izquierda con incisivos fusionados con 9 denticulos; mandíbula derecha con incisivos externos con 4 denticulos e internamente con 9 denticulos; palpo labial con segmento II elongado y redondeado; margen externo del fémur anterior con hilera de 8–9 cerdas clavadas; margen interno del tarso anterior con hilera de cerdas como espinas, las dos más basales son serradas; margen posterior de los tergos I-X lisos con espinas sobre el tergo X. *Nanomis quindiensis* Salinas, sp. nov.: mandíbula izquierda con incisivos con 7 denticulos; mandíbula derecha con seta externa de incisivos con 3 denticulos e internamente con 9 denticulos; maxila con seta simple cerca a la joroba medial; palpo labial con segmento III ancho y redondeado; margen externo del fémur anterior con hilera de 14 a 15 cerdas clavadas; margen posterior de los tergos I-II lisos, espinas en los tergos III-X.

Palabras clave: moscas de mayo; neotrópico; región andina; taxonomía.

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Introduction

Nanomis Lugo-Ortiz & McCafferty is a Neotropical genus of Baetidae (Ephemeroptera) erected by Lugo-Ortiz & McCafferty (1999) based only on nymphal stages. The imaginal stage of *Nanomis* was subsequently described by Salles & Nieto (2008) based on specimens from Argentina. To date, only two species are known: *Nanomis galera* Lugo-Ortiz & McCafferty 1999 from Argentina, Bolivia, Colombia, Ecuador, and Perú (Domínguez *et al.*, 2006; Salinas *et al.*, 2017) and *Nanomis rasmusseni* Chacón, Pescador & Segnini, 2013 from Venezuela and Colombia (Chacón *et al.*, 2013; Salinas *et al.*, 2018). In Colombia, *Nanomis* species are widely distributed in the departments of Antioquia, Caldas, Cauca, Cundinamarca, Meta, Quindío, Nariño, Risaralda, Tolima, and Valle del Cauca in the Andean region (Lugo-Ortiz & McCafferty, 1999; Dias *et al.*, 2009; Salinas *et al.*, 2017; Salinas *et al.*, 2018). The present paper aims to describe three new species of *Nanomis* based on nymphs from Colombia.

Materials and methods

Nymphs were collected using a Surber aquatic entomological net (250 µm) and a manual sieve. The material was fixed in 96% ethanol. The drawings were made from photographs and the Adobe Illustrator®CS6 and Adobe Photoshop®CS6 programs as proposed by Coleman (2003, 2006). We used an optical microscope Zeiss Primo star and Leica M-205C stereomicroscope with a Leica MC-170HD coupled camera for the pictures. Nymphs were photographed with a stereoscopic Zeiss Stemi 2000c with an Axio Cam ERc 5s camera and edited with the Zen 2 lite; we combined the pictures using the COMBINEZP (Hadley 2010) open software. We prepared the slides with Euparal®. The material examined was deposited in the Entomological Collection of the Biology program at Universidad de Caldas (CEBUC), Manizales, Colombia, and the Collection of Invertebrates of the Ichthyology Laboratory at Universidad del Quindío (MIUQ), Armenia, Colombia. We produced the map using the free QGIS software version 3.34.6 and the Instituto Geográfico Agustín Codazzi (IGAC) layers.

Results

Nanomis antoniae Salinas, sp. nov. (Figures 1-3)

Diagnosis

1) Left mandible with incisors fused with 7 denticles. 2) Right mandible with an outer set of incisors with 3 denticles and an inner set with 8 denticles, approximately. 3) Maxillae with small frayed setae near medial hump. 4) Labial palp with segment III elongated (longer than broad) and rounded. 5) Outer margin of the fore femur with a row of 18–19 clavate setae. 6) Inner margin of the fore tarsus with a row of spine-like setae, the most basal spine-like setae serrate. 7) Posterior margin of terga I-IV smooth, with spines on terga V-X.

Body length (mm). Male mature nymph. Body: 7.4–7.5. Cerci: 4.5. Antennae broken (Figure 1).

Head. Reddish on the upper half of frons and whitish on the lower half, area between the ocelli tinged with brown.

Labrum (Figure 2A). Semicircular, broader than longer; length about 0.8× maximum width, dorsally with scattered short setae on lateral areas, a submedial pair of long setae near midline, and five subapical long setae laterally; distal margin with two sets of setae branched apically on lateral regions and bifid near midline.

Hypopharynx (Figure 2B). Lingua subequal in length to superlingua, longer than broad; distal margin pointed; medial tuft of apical setae present. Superlinguae broader than longer with small lateral spines concentrated near the midregion; distal margin pointed; medial tuft of setae present.

Left mandible (Figure 2C). Incisors fused with 7 denticles. Robust prosthema, apically denticulate. Margin between prosthema and mola straight; subtriangular process narrow.

Right mandible (Figures 2 D-E). Outer set of incisors with 3 denticles; inner set with 8 denticles approximately (3 most outer very small, three medial much larger than the others and two most inner small and pointed), prosthema bifid.

Maxillae (Figure 2F). Seven long simple setae with small frayed setae near the medial hump and three subapical ventral simple setae proximal to the base of denticles; palpi with segment I $0.7\times$ length of segment II; segment II apically narrow.

Labium (Figure 2G). The glossa equal in length to the paraglossa; the apex with robust spine-like setae; the outer margin with a row of long spine-like setae increasing in length distally; ventrally with a row of spine-like setae on the inner margin. Paraglossa: apex with spine-like setae; outer margin with a row of long simple setae; a dorsomedial row with 5 subapical spine-like setae and a ventromedial row with 9 subapical spine-like setae. Labial palp with segment I $0.7\times$ length of segments II and III combined; outer margin of segment I with fine simple setae; segment II of palpi with a slight distomedial projection, ventrally with 10 fine simple setae in the outer margin and fine simple setae in the inner margin, a dorsomedial row with 5 fine spine-like setae; dorsally with fine simple setae on the inner margin. Segment III elongated (longer than broader) and rounded, length of about $1.3\times$ maximum width, apex with spine-like setae.

Thorax. Dark brown pro, meso, and metanotum. Fore leg (**Figure 3A**). Yellowish-brown femur, tibia, and tarsi. Fore femur. Length about $2.8\times$ maximum width; the outer margin with a row of 18–19 clavate setae; the inner margin with short spine-like setae. Fore tibia. Length $0.8\times$ length to the fore femur. The outer margin with short simple setae and a short clavate seta; the inner margin a row of short, spine-like setae and a row of short simple setae, the most apical setae biserrate (**Figure 3B**). Fore tarsus. Length $0.46\times$ length to the fore femur. The outer margin with fine, simple setae; the inner margin a row of spine-like setae, the most basal spine-like setae serrate (**Figure 3B**). Tarsal claw with a row of 8–9 denticles (**Figure 3C**).



Figure 1. *Nanomis antoniae* sp. nov (dorsal view)

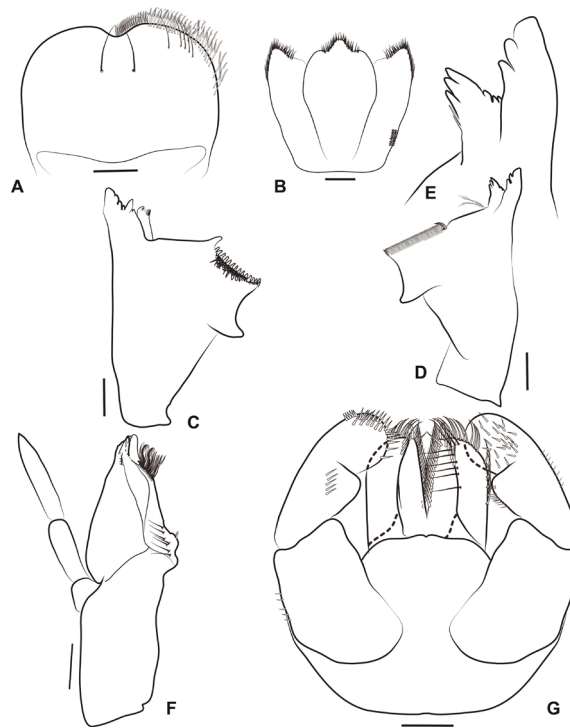


Figure 2. *Nanomis antoniae* sp. nov., nymph. **A.** Labrum. **B.** Hypopharynx. **C.** Left mandible. **D.** Right mandible. **E.** Right mandible incisors. **F.** Maxilla. **G.** Labium (left d.v., right v.v). Scale bars = 0.05 mm

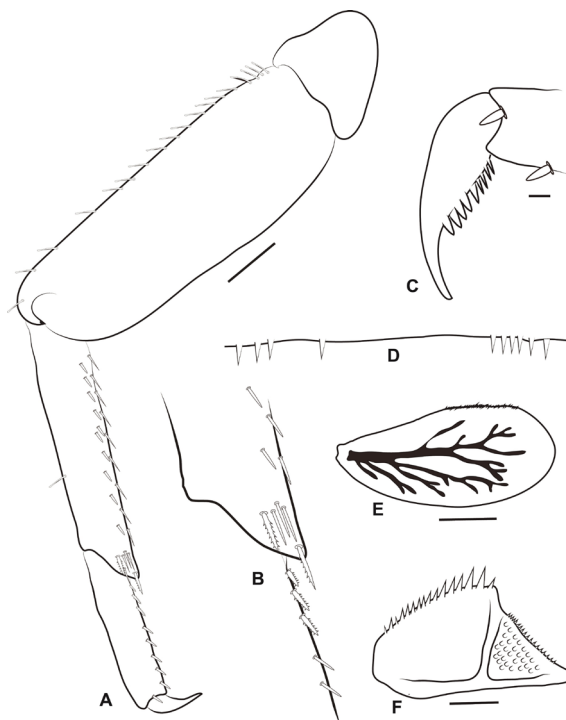


Figure 3. *Nanomis antoniae* sp. nov., nymph. **A.** Fore-leg. **B.** Detail of serrate spine-like setae on tibia and tarsus. **C.** Tarsal claw. **D.** posterior margin of terga V-X. **E.** gill IV. **F.** paraproct. Scale bars: A, C = 0.1 mm; E, F = 0.05 mm

Abdomen. Terga variably tinged with brown, pattern as in **figure 1A**, tergum I, yellowish, terga II, extensively white with dark-brown central region, tergum III broadly dark-brown with whitish central region, tergum IV broadly whitish with anterior margin tinged with brown, tergum V with whitish central region and dark-brown lateral region, tergum VI dark-brown with white spots in the anterolateral margin, tergum VII-X lighter. Posterior margin of terga I-IV smooth, with spines on terga V-X (**Figure 3D**). Gills (**Figure 3E**) slightly asymmetrical, translucent-whitish, with the central region along the main trachea shaded with brown; tracheae pigmented, marginal setae of uniform size, the outer margin more serrate than the inner margin. Paraproct (**Figure 3F**) with 14–17 spines on the inner margin. Light brown cerci.

Adults. Unknown

Etymology. The specific epithet is an arbitrary combination of letters referring to the daughter (Antonia) of Luis Salinas. The name is in the genitive.

Discussion. As in *N. galera* and *N. quindiensis* sp. nov., nymphs of *N. antoniae* sp. nov. also possess a left mandible with incisors fused with 7 denticles. However, this new species can be distinguished from *N. galera* and *N. quindiensis* sp. nov. by the presence of serrate spine-like setae on tarsus and the shape of the segment III of the labial palp, elongated in *N. antoniae* and wide in *N. galera* and *N. quindiensis*.

Type material. Holotype male mature nymph (mouthparts, legs, gills, and paraproct on a single slide; abdomen in alcohol), Colombia: Tolima: Cajamarca, Quebrada La Colosa, 4.46751N, 7548826W, 2817m, 30/IV/2013; Ana Maria Meza, Camilo Llano, Alejandro Villareal, cols (CEBUC). Paratypes. Eight mature nymphs (two on slides), same data as holotype (4 CEBUC and 4 MIUQ).

Distribution (Figure 10). Colombia: Tolima, Cajamarca, Magdalena river basin.

Nanomis mariquitensis Salinas, sp. nov. (Figures 4-6)

Diagnosis

1) Left mandible with incisors fused with 9 denticles. 2) Right mandible with the outer set of incisors with four denticles and the inner set with nine denticles approximately. 3) Maxillae with small simple setae near the medial hump. 4) Labial palp with segment III elongated (longer than broader) and rounded. 5) Outer margin of the fore femur with a row of 8–10 clavate setae alternating with a row of simple setae. 6) Inner margin of the fore tarsus with a row of spine-like setae, the most basal spine-like setae serrate. 7) Posterior margin of terga I-IX smooth, with spines on tergum X.

Body length (mm). Male mature nymph. Body: 5.1–5.2. Cerci: 2.5. Antennae broken (**Figure 4**).

Head. Reddish on upper half of frons and whitish on lower half, area between ocelli tinged with brown.

Labrum (Figure 5A). Semicircular broader than longer; length about 0.8× maximum width, dorsally with scattered short setae on lateral areas, a submedial pair of long setae near midline, and five subapical long setae laterally; distal margin with two sets of setae branched apically on lateral regions and bifid near midline.

Hypopharynx (Figure 5B). The lingua subequal in length to the superlingua. Longer than broader; distal margin pointed; medial tuft of apical setae present. The superlinguae broader than longer with small lateral spines concentrated near the midregion; the distal margin pointed; the medial tuft of setae present.

Left mandible (Figure 5C). Incisors fused with 9 denticles (the inner side with one very small denticle). Prosthema robust, apically denticulate. Margin between the prosthema and the mola straight; subtriangular process narrow.

Right mandible (Figures 5D-E). The outer set of incisors with four denticles; the inner set with nine denticles approximately (the outer four very small, the three medial much larger than the others, and the inner two very small), bifid prosthema.



Figure 4. *Nanomis mariquitensis* sp. nov (dorsal view).

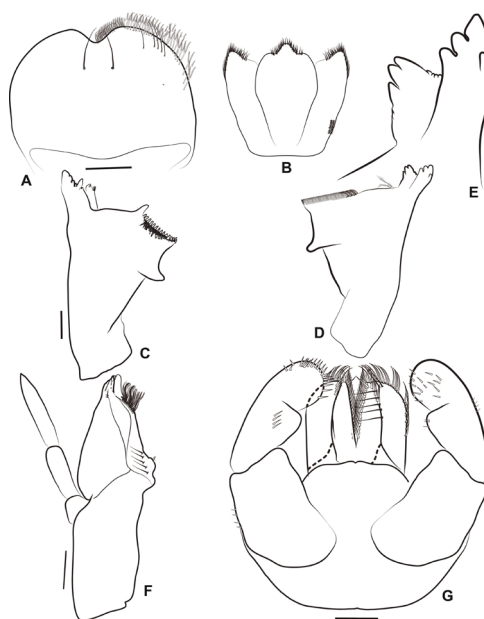


Figure 5. *Nanomis mariquitensis* sp. nov., nymph. **A.** Labrum. **B.** Hypopharynx. **C.** Left mandible. **D.** Right mandible. **E.** Right mandible incisors. **F.** Maxilla. **G.** Labium (left d.v., right v.v). Scale bars = 0.05 mm

Maxillae (Figure 5F). Five to six long simple setae and a small simple seta near the medial hump and two subapical ventral simple setae proximal to the base of denticles; palpi with segment I $0.7\times$ the length of segment II; segment II apically narrow.

Labium (Figure 5G). The glossa equal in length to the paraglossa; the apex with robust spine-like setae; the outer margin with a row of long spine-like setae increasing in length distally; ventrally with a row of spine-like setae on the inner margin. Paraglossa: apex ventrally with spine-like setae; outer margin with a row of long simple setae; a dorsomedial row with 4 spine-like setae and a ventromedial row of 7 subapical spine-like setae. Labial palp with segment I $0.7\times$ the length of segments II and III combined; dorsal surface of segment I with 4 fine simple setae; segment II of palpi with a slight distomedial projection with 2 fine simple setae, ventrally with 4 fine simple setae in outer margin and a fine simple seta in the inner margin, a dorsomedial row with 4 fine spine-like setae; dorsally with one fine simple seta on the inner margin. Segment III elongated (longer than broad) and rounded, length of about $1.3\times$ the maximum width, apex with spine-like setae.

Thorax. Yellowish-brown pro, meso, and metanotum. Fore leg (**Figure 6A**). Yellowish-brown femur, tibia, and tarsi. Fore femur. Length of about $4.3\times$ the maximum width; the outer margin with a row of 8–10 clavate setae alternating with a row of simple setae; inner margin with short spine-like setae. Fore tibia. Length of $0.9\times$ the length to the fore femur. The outer margin with short simple setae and a short clavate seta; the inner margin with a row of short, spine-like setae and a row of short simple setae, the most apical setae biserrate (**Figure 6B**). Fore tarsus. Length of $0.45\times$ the length to the fore femur. The outer margin with fine, simple setae; the inner margin with a row of spine-like setae, the most basal of spine-like setae serrate (**Figure 6B**). The tarsal claw with a row of 10–11 denticles (**Figure 6C**).

Abdomen. Terga variably tinged with yellowish-brown, pattern as in **figure 4**, tergum I, yellowish, terga II-III broadly brownish with white laterally, tergum VI extensively white with brownish central region, terga V-VI broadly brownish with white laterally, tergum VII yellowish and tinged with brown only on the posterior margin, tergum VIII lighter, terga

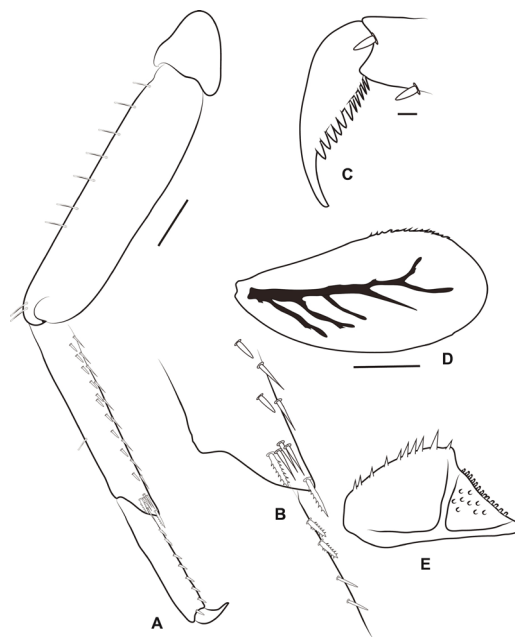


Figure 6. *Nanomis mariquitensis* sp. nov., nymph. **A.** Fore-leg. **B.** Detail of serrate spine-like setae on tibia and tarsus. **C.** Tarsal claw. **D.** Gill IV. **E.** Paraproct. Scale bars: Scale bars: A, C = 0.1 mm. D, E = 0.05 mm

IX and X brownish. The posterior margin of terga I-IX smooth, with spines on tergum X. Slightly asymmetrical gills (**Figure 6D**), translucent-whitish, with central region along the main trachea shaded with brown; the tracheae pigmented, marginal setae of uniform size, the outer margin more serrate than the inner margin. The paraproct (**Figure 6E**) with 9–10 spines on the inner margin. Cerci light brown.

Adults. Unknown

Etymology: The specific epithet is an adjective formed by Mariquita and the suffix –ensis referring to the Colombian locality where the species was found.

Discussion. *Nanomis mariquitensis* sp. nov. resembles *N. rasmusseni* and *N. antoniae* sp. nov. by presenting segment III of labial palp elongated and rounded. *N. mariquitensis* sp. nov. differs from these species by presenting the right mandible with an outer set of incisors with four denticles (*N. rasmusseni* and *N. antoniae* sp. nov. present the right mandible with an outer set of incisors with three denticles), besides, the terga I-IX in *N. mariquitensis* sp. nov. are smooth.

Type material. Holotype male mature nymph (mouthparts, legs, gills, and paraproct on a single slide; abdomen in alcohol), Colombia: Tolima: Mariquita, Río Medina, 5°14'41.08"N, 74°53'6.98"W, 391m, 09/II/2016; Lucimar Gomes Dias, Paula Souto, and Luis Salinas cols (CEBUC). Paratypes. Eight mature nymphs (two on slides), same data as holotype (4 CEBUC and 4 MIUQ).

Distribution (Figure 10). Colombia, Tolima, Gualí River basin.

***Nanomis quindiensis* Salinas, sp. nov. (Figures 7-9)**

Diagnosis

1) Left mandible with incisors fused with 7 denticles. 2) Right mandible with the outer set of incisors with 3 denticles; the inner set with 7 denticles approximately. 3) Maxillae with a small simple seta near the medial hump. 4) Labial palp with segment III wide (broader than longer) and rounded. 5) Outer margin of the fore femur with a row of 14–15 clavate setae alternating with a row of simple setae. 7) Posterior margin of terga I-II smooth, with spines on terga III-X.

Body length (mm). Female mature nymph. Body: 6.9–7.1. Cerci broken. Antennae: 3 (**Figure 7**).

Head. Reddish on the upper half of frons and whitish on the lower half, the area between ocelli tinged with brown. Antennae whitish, slightly shaded with brown.

Labrum (Figure 8A). Semicircular, broader than longer; length of about 0.68× the maximum width, dorsally with scattered short setae on lateral areas, a submedial pair of long setae near the midline, and five subapical long setae laterally; distal margin with two sets of setae branched apically on lateral regions and bifid near the midline.

Hypopharynx (Figure 8B). The lingua subequal in length to the superlingua, longer than broader; the distal margin pointed; the medial tuft of apical setae present. The superlinguae broader than longer with small lateral spines concentrated near the midregion; the distal margin pointed; the medial tuft of setae present.

Left mandible (Figure 8C). Incisors fused with 7 denticles. Robust prosthema, apically denticulate. Margin between the prosthema and the mola straight; subtriangular process narrow.

Right mandible (Figures 8 D-E). With the outer set of incisors with 3 denticles; the inner set with 7 denticles approximately (the outer very small, the three medial much larger than the others, and the three inner small and pointed), the prosthema bifid.

Maxillae (Figure 8F). With five to six long simple setae and a small simple seta near the medial hump, two subapical ventral simple setae proximal to the base of the denticles; palpi with segment I 0.5× the length of segment II; segment II apically narrow.

Labium (Figure 8G). The glossa equal in length to the paraglossa; the apex with robust spine-like setae; the outer margin with a row of long spine-like setae increasing in length distally; ventrally with a row of spine-like setae on the inner margin. Paraglossa: apex with spine-like setae; the outer margin with a row of long simple setae; a dorsomedial



Figure 7. *Nanomis quindiensis* sp. nov (dorsal view).

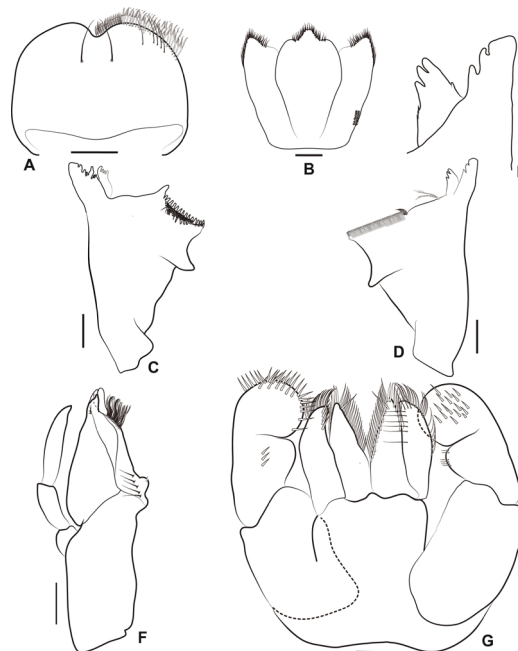


Figure 8. *Nanomis quindiensis* sp. nov., nymph. **A.** Labrum. **B.** Hypopharynx. **C.** Left mandible. **D.** Right mandible. **E.** Right mandible incisors. **F.** Maxilla. **G.** Labium (left d.v., right v.v). Scale bars = 0.05 mm

row with 4 subapical spine-like setae and a ventromedial row with 9 subapical spine-like setae. Labial palp with segment I $0.97\times$ the length of segments II and III combined; dorsal surface of segment I with 4 fine simple setae; segment II of palpi with a slight distomedial projection with 2 fine simple setae, ventrally with 4 fine simple setae in the outer margin and fine simple setae in the inner margin, a dorsomedial row with 3 fine spine-like setae; dorsally with a fine simple seta on the inner margin. Segment III wide (broader than longer) and rounded, length of about $0.9\times$ the maximum width, the apex with spine-like setae.

Thorax. Yellowish-brown pro, meso, and metanotum. Fore leg (**Figure 9A**). Yellowish-brown femur, tibia, and tarsi. Fore femur. Length of about $3.9\times$ maximum width; the outer margin with a row of 14–15 clavate setae alternating with a row of simple setae; inner margin with short spine-like setae. Fore tibia. Length of $0.74\times$ the length to the fore femur. The outer margin with short simple setae and a short clavate seta; the inner margin with a row of short, spine-like setae and a row of short simple setae, the most apical spine-like setae biserrate (**Figure 9A**). Fore tarsus. Length of $0.45\times$ the length to the fore femur. The outer margin with fine, simple setae; the inner margin with a row of spine-like setae. The tarsal claw with a row of 8–9 denticles (**Figure 9B**).

Abdomen. Terga variably tinged with yellowish-brown, pattern as in **figure 7**, tergum I, brownish, terga II-III broadly brownish with white laterally, tergum VI extensively white with central region brownish, terga V-VI broadly brownish with white laterally, tergum VII yellowish and tinged with brown only on posterior margin, tergum VIII lighter, terga IX and X brownish. Posterior margin of terga I-II smooth, with spines on terga III-X (**Figure 9C**). Slightly asymmetrical gills (**Figure 9D**), translucent-whitish, with the central region along the main trachea shaded with brown; the tracheae pigmented, marginal setae of uniform size, the outer margin more serrate than the inner margin. The paraprot (**Figure 9E**) with 9–13 spines on the inner margin. Cerci broken.

Adults. Unknown

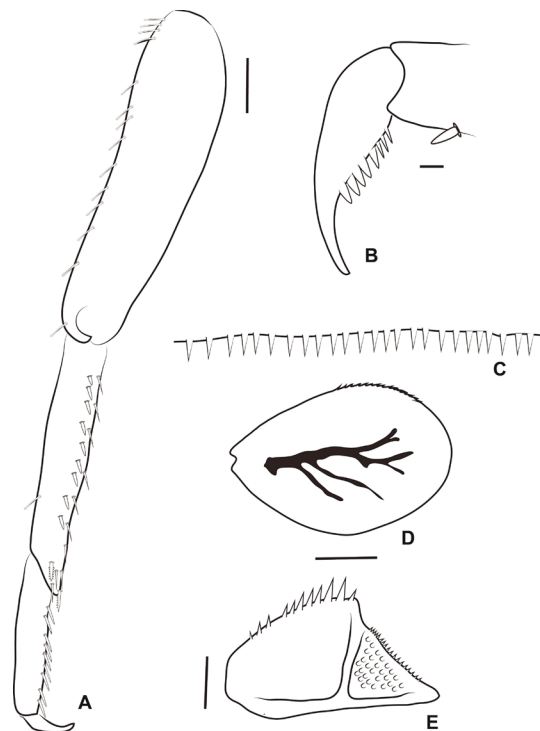


Figure 9. *Nanomis quindiensis* sp. nov., nymph. **A.** Fore-leg. **B.** Tarsal claw. **C.** Posterior margin of terga III-X. **D.** Gill IV. **E.** Paraproct. Scale bars: A, B = 0.1 mm. D, E = 0.05 mm

Etymology: The specific epithet is an adjective formed by Quindío and the suffix –ensis referring to the Colombian department where the species was found.

Discussion. *N. quindiensis* sp. nov. shows some similarities with *N. galera*. Both species possess the segment III of labial palp wide and rounded. However, the new species can be distinguished from *N. galera* by the number of incisors in the right mandible, 10 in *N. quindiensis* sp. nov. and 7 in *N. galera*. Besides, *N. quindiensis* sp. nov. has the posterior margin of terga I-II smooth and the terga III-IX with spines while in *N. galera* the terga I-V are smooth, and the terga VI-X have spines.

Type material. Holotype female mature nymph (mouthparts, legs, gills, and paraproct on a single slide; abdomen in alcohol), Colombia: Quindío: Calarcá, Río Santo Domingo, 04°30'45.2" N, 75°36'47.1" W, 1626m, 12/07/2016; Paola Villegas col (MIUQ). Paratypes. Four mature nymphs (two on slides), same data as holotype (4 MIUQ).

Distribution (Figure 10). Colombia, Quindío, La Vieja River basin, Alto Cauca.

KEY TO THE NYMPHS OF *Nanomis* SPECIES FROM SOUTH AMERICA

- 1 Segment III of labial palp wide (broader than longer) and rounded.....2
 - 1' Segment III of labial palp elongated (longer than broader) and rounded.....3
 - 2 Posterior margin of terga I-II smooth with spines on tergum III-X, right mandible with outer set of incisors with three denticles.....*Nanomis quindiensis* Salinas, sp. nov.
 - 2' Posterior margin of terga I-V smooth, with spines on tergum VI-X (those of terga VI-VIII, very small), right mandible with outer set of incisors with four denticles.....
.....*Nanomis galera*
 - 3 Outer margin of fore femur with row of 8–10 clavate setae posterior margin of terga I-IX smooth.....*Nanomis mariquitensis* Salinas, sp. nov.
 - 3' Outer margin of fore femur with more of 10 clavate setae.....4
 - 4 Outer margin of fore femur with row of 18–19 clavate setae posterior margin of terga I-IV smooth with spines on tergum V-X.....*Nanomis antoniae* Salinas, sp. Nov.
 - 4' Outer margin of fore femur with row of 11–15 clavate setae, posterior margin of terga I-VIII smooth, with spines on terga IX-X.....*Nanomis rasmusseni*

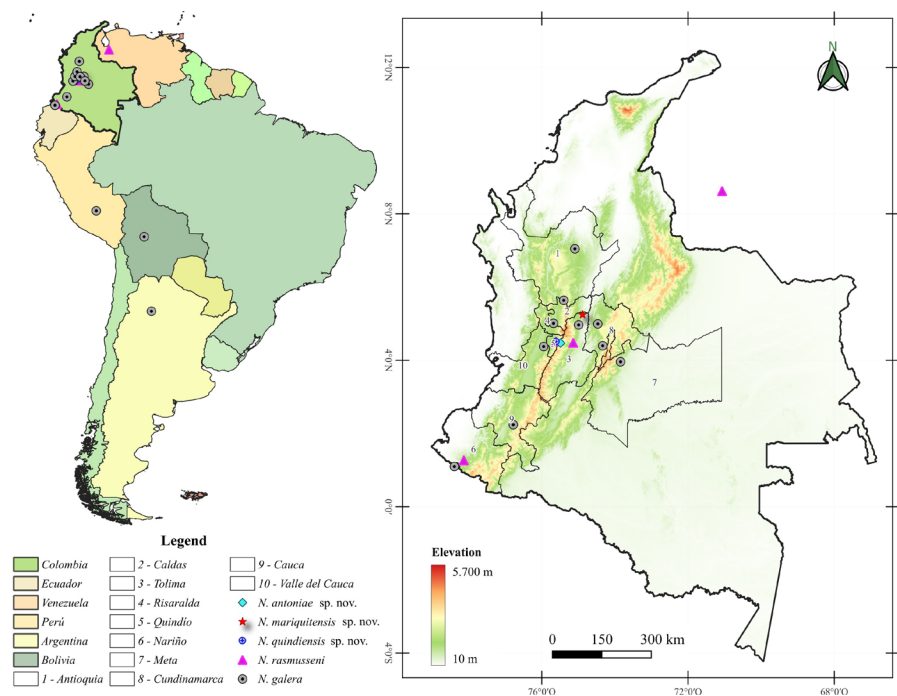


Figure 10. Distribution of the *Nanomis* species in Colombia and South America

General discussion

Intraspecific variation plays an important role in ecology and evolution (**Gentile *et al.*, 2021**) but information on how species and populations vary remains scarce, particularly for insects (**Gentile *et al.*, 2021**). Here, the individuals of the three different species described do not present a marked intraspecific variation and the analyzed nymphs are morphologically homogeneous.

The abdominal coloration patterns of *Nanomis* species can be useful in the identification process, for example, *N. galera* and *N. quindiensis* sp. nov. have a relatively uniform coloration, the first one with entirely yellowish-red body (**Chacon *et al.*, 2015**) and the latter with yellowish brown body. In contrast, *N. antoniae* sp. nov., *N. rasmusseni*, and *N. mariquitensis* sp. nov. present a coloration pattern with contrasting brown spots and other markedly lighter areas. The general brown coloration is darker in *N. antoniae* sp. nov. compared to the other species, but the head of *N. rasmusseni* is markedly darker than the rest of the body (**Chacon *et al.*, 2013**). Although they have conspicuous coloration patterns, we observed that nymphs may present variations, and, therefore, we recommend using other characters described in the key we present to differentiate between species: the spines of the posterior margin of terga, the segment II of the labial palp, and the clavate setae on the outer margin of the fore femur.

Chacon *et al.* (2013) mentioned that *N. galera* and *N. rasmusseni* are adapted to different environmental conditions, but it is necessary to expand the sampling effort of the new species we describe here to confirm their distribution pattern and tolerance to environments with anthropogenic alteration. Based on the information available to date, *N. galera* is the most widely distributed species of the genus (**Lugo-Ortiz & McCafferty, 1999; Domínguez *et al.*, 2006; Chacón *et al.*, 2013; Salinas *et al.*, 2017**).

Conclusion

The new species we describe here increase the number of species in the genus to five, thus contributing to the knowledge of *Nanomis* for Colombia and South America and improving its diagnosis with the addition of character states.

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Authors' contributions

LGSJ: Conceptualization; LGSJ, CRV, LGD: Methodology, writing of the original draft; visualization and research. LGSJ, CRV, LGD: Writing, review, and editing of the manuscript. CRV: Funding acquisition. LGD: Supervision. All authors actively participated in the discussion of the results and they reviewed and approved the final version of the paper.

Conflicts of interest

The authors declare there are no conflicts of interest.

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