

First record of *Neognophomyia* (Diptera: Limoniidae) in Mexico with the description of a new species

Primer registro de *Neognophomyia* (Diptera: Limoniidae) en México con la descripción de una nueva especie

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ABSTRACT

The genus *Neognophomyia* comprises 30 known species in Central and South America, without records from Mexico. *Neognophomyia mexicana* **sp. nov.** is described based on male and female specimens collected in Veracruz state, in central-eastern Mexico. This description represents the first record of the genus from the country and extends its known distribution. An identification key for adults of all known species of *Neognophomyia* is included.

Keywords: Chioneinae, *mexicana*, new record, taxonomy, Veracruz.

RESUMEN

El género *Neognophomyia* comprende 30 especies conocidas en el centro y sur de América, sin registros en México. *Neognophomyia mexicana* **sp. nov.** es descrita basada en especímenes machos y hembras colectados en el estado de Veracruz, en el centro-este de México. Esta descripción representa el primer registro del género para el país y extiende su distribución. Se incluye una clave de identificación para adultos de todas las especies conocidas de *Neognophomyia*.

Palabras clave: Chioneinae, *mexicana*, nuevo registro, taxonomía, Veracruz.

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INTRODUCTION

The Limoniidae genus *Neognophomyia* was first proposed by Alexander in 1926 as a subgenus of *Gnophomyia* Osten Sacken, 1860, with *Gnophomyia immaculipennis* Alexander, 1926 designated as the type species, including another four species. Later, *Neognophomyia* was elevated to genus (Alexander 1947).

Neognophomyia belongs to a group of small limoniids characterized by a reduced meron, with the mid and hind coxae positioned closer together than in other groups (Alexander 1947), a similar condition to that found in the Oriental genus *Dasymallomyia* Brunetti, 1911 (Alexander 1926). The most distinctive characteristic is the significant discrepancy in the length of vein R_3 compared to R_4 and R_5 , with the latter two being very long and strongly curved posteriorly. This results in the segment of the costal margin between R_3 and R_4 being several times longer than the segment of costal margin between R_4 and R_5 . Additionally, it is characterized by the presence of tergal spines in the posterior border of the epandrium in males (Alexander 1947).

This genus includes 30 species restricted to the Neotropical region, all described by Charles Paul Alexander (Gelhaus 2009, Oosterbroek 2022, Table 1). The immature stages and biology remain unknown, and the original descriptions are the only references, except for a few records of certain species from various countries.

The highest number of reported species comes from Peru (thirteen species; Alexander 1914, 1926, 1943, 1944a, 1945b, 1949, 1952, 1967), followed by Ecuador (six species; Alexander 1942, 1944b, 1945a, 1949), Bolivia (three species; Alexander 1962), Brazil (three species; Alexander 1913, 1920, 1926), Costa Rica (two species; Alexander 1944c, 1945d), Panama (two species; Alexander 1945c, 1930), and only one species in Colombia (Alexander 1931), Paraguay (Alexander 1926), Trinidad and Tobago (Alexander 1927) and Venezuela (Alexander 1941), with no records from the Nearctic Region. The northernmost records in America are *N. heliconiae* Alexander, 1945c and *N. panamensis* Alexander, 1930 in Panama, and *N. productissima* Alexander, 1944c and *N. schildi* Alexander, 1945d in Costa Rica.

No species were previously known from Mexico. Therefore, this study aims to describe a new species, *Neogno-*

phomyia mexicana **sp. nov.**, representing the first species described from material collected in Mexico, and the northernmost record in America. In addition to the description, an identification key for the adult characteristics of all *Neognophomyia* species is included.

MATERIALS AND METHODS

Specimens were collected using Malaise traps in a coffee plantation located in Plan de Arroyos in the municipality of Atzalan, and Paso Blanco in the municipality of Misantla. Plan de Arroyos is located 45.8 km southwest of Atzalan, in the central region of Veracruz, Mexico (19°53' North, 97°06' West), at an elevation of 777 m above sea level. The prevailing climate in this region is semihumid-humid, with an average temperature of 22 °C and an annual rainfall of 2600 mm. Paso Blanco is located 6.7 km southwest of Misantla, in the central region of Veracruz, Mexico (19°52' North, 96°52' West), at an elevation of 422 m above sea level. The prevailing climate in this region is warm-humid, with an average temperature of 22.7 °C and an annual rainfall is 2036 mm. Both locations are situated in the Neotropical region, within the Veracruz province (Morrone *et al.* 2022).

The collections were preserved in 70 % ethanol. Specimens of tipulomorphs were separated, and genera were determined using the taxonomic key by Gelhaus (2009). Subsequently, a complete review of the literature and original descriptions (Alexander 1913, 1914, 1920, 1926, 1942, 1943, 1944a,b,c, 1945a,b,c,d, 1949, 1952, 1962, 1967) for all species of *Neognophomyia* was conducted, as there are no identification keys available for the species of this genus.

The terminal abdominal segments of male specimens were dissected, hydrated with soap-water, macerated with 10 % sodium hydroxide (10 % NaOH) for tissue disintegration, rinsed in distilled water, and preserved in 70 % ethanol. For microscopic observation, the segments were dehydrated in ethanol at three concentrations (70 %, 96 %, and 100 %), and finally diaphanized with eugenol to depigment soft tissues and balance the refractive index of light inside and outside the structure. After observation, description and photography, they were stored in microvials with the adult sample in 96 % ethanol. Photomicrographs were captured with a Nikon Digital Sight DS-2Mv camera using NIS-Elements F 3.0, and later edited for clarity using Helicon Focus v. 6.0. Measurements are given in millime-

ters. The type specimens are deposited in the Entomological Collection of the Instituto de Ecología, A.C. (IEXA), in Xalapa, Veracruz, Mexico. Morphological terms follow the guidelines proposals by Cumming and Wood (2017) and de Jong (2017).

RESULTS

Family Limoniidae

Subfamily Chioneinae

Neognophomyia Alexander, 1926

Neognophomyia mexicana Rivera-García and Ibáñez-Bernal new species

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Holotype. MEXICO. Veracruz: one ♂ with associated terminalia preserved in ethanol, Atzalan, Plan de Arroyos (19°53' North, 97°06' West), 777 m.a.s.l., 3 Sep 2008, C. "Brigada Entom.", deposited in IEXA.

Paratypes. MEXICO. Veracruz: eight ♀ preserved in ethanol, three ♂ with associated terminalia preserved in ethanol, Atzalan, Plan de Arroyos (19°53' North, 97°06' West), 777 m a.s.l., 3 Sep 2008, C. "Brigada Entom.". two ♀ preserved in ethanol, one ♂ with associated terminalia preserved in ethanol, Misantla, Paso Blanco (19°51' North, 96°52' West), 439 m a.s.l., 4 Sep 2008, C. "Brigada Entom.". one ♂ with associated terminalia preserved in ethanol, Atzalan, Plan de Arroyos (19°53' North, 97°06' West), 777 m a.s.l., 3 Sep 2009, C. "Brigada Entom.", deposited in IEXA.

Diagnosis. *Adult:* Thorax with four stripes on the prescutum-scutum: two in the middle of the scutum and two wider on the sides, originating after the prescutal suture and ending before the scutellum; scutellum pale yellow; pleuron with a conspicuous dark-brown stripe extending from the cervical sclerites, through the anepisternum, the upper half of the anepimeron, to the anatergite; fore and mid femora and tibiae with dark-brown apices; terga one–three with lateral margins brown, wider at the apex, terga six and seven completely pale brown; tergum eight completely pale yellow (Figs. 1, 5, 6); wing with a dark-brown area on R_1 , R_2 , the bifurcation of R_s , and $r-m$; Sc vein end-

ing just beyond R_2 ; $sc-r$ located at midlength of R_s ; R_{2+3+4} short, about 4.2 times of R_4 ; R_2 about two times of R_3 ; R_3 about 4.7 times of R_4 (Fig. 2). *Male terminalia:* Tergal spines long, curved at a right angle in the middle in dorsal view, and twisted in lateral view, with apex acute; gonocoxite longer than wide; outer gonostylus mesally curved beyond the middle, with one or two preapical and one apical dorsally setae, and a row of three setae ventrally; inner gonostylus "thumb-shaped", laterally curved, with four or five setae and a "scoop-shaped" structure at the base, with seven stronger setae ventrally; aedeagus thin and straight in ventral view, sigmoid in lateral view, covered by a broad, oval parameral sheath in ventral view (Figs. 3, 4).

Description. *Male* (Figs. 1, 2). Body length about 4.8–5 mm (head-abdomen). *Head:* Pale yellow (appears discolored after prolonged time in ethanol). Rostrum short, less than twice the width of the head, with small and pale inconspicuous setae. Antenna with fourteen globular flagellomeres (scape + pedicel = 16 segments), slightly longer than wide, with the last three flagellomeres smaller than the rest, all with conspicuous brown setae. Dichoptic. Vertex and occiput without dark spots, with small pale setae (Fig. 1). *Thorax:* Thorax pale yellow (dark areas appear discolored), slightly darker than the head. Anteprenotum pale yellow (similar to the head); postpronotum pale yellow in the middle, and light brown on the sides. Prescutum-scutum with four dark-brown stripes: two very close to each other in the middle of the dorsal part of prescutum-scutum, originating from the anterior part of prescutum, and not reaching the transverse suture, and two additional stripes (one on each side) slightly wider than the middle stripes of prescutum-scutum, originating after the prescutal suture and reaching the transverse suture, slightly widening near the base of the wing, posteriorly slightly interrupted and directed toward the middle without reaching the scutellum (Fig. 1c). Scutellum pale yellow. Mediotergite pale yellow, with only the posterior lateral areas dark-brown (Fig. 1a). Pleuron with a conspicuous dark-brown stripe from the cervical sclerites to the anatergite, slightly interrupted by pale yellow delineated areas. Cervical sclerites dark-brown; prosternum light brown; propleuron dark-brown; anterior basalar pale yellow, posterior basalar dark-brown; anepisternum dark-brown; katapisternum pale yellow; upper half of anepimeron dark-brown, lower half pale yellow; katepimeron pale yellow; meron pale yellow; anatergite dark-brown, katatergite pale yellow; metanepisternum with

a small light brown spot on the superior part, just below the halter; metakatepisternum pale yellow; metepimeron light brown (Fig. 1a). Ventral sclerites pale yellow (Fig. 1b). *Legs*: Coxae and trochanters pale yellow. Fore leg slightly dark yellow. Femur and tibia of fore leg with about 0.20 of their apices dark-brown; tarsomere one of fore leg slightly darkened in the apical 0.50, with the rest of tarsus pale brown (Fig. 1a). Femur and tibia of mid leg with about 0.20 of their apices dark-brown; tarsomeres one and basal

half of two of mid leg pale yellow, apical 0.50 of tarsomere two pale brown, tarsomeres three–five pale brown. Hind leg pale yellow, with only the last two tarsomeres slightly darkened. *Halter*: Pale yellow (Fig. 1a,c). *Wing*: Length about 5 mm. Transparent-yellow with brown veins, with a prominent but diffuse brown area (stigma) extending from the origin of R_1 to the apex of the wing and posteriorly on the cross-vein R_2 to the bifurcation of R_s , fading to the vein r-m, and ending before cell dm; no other dark area.

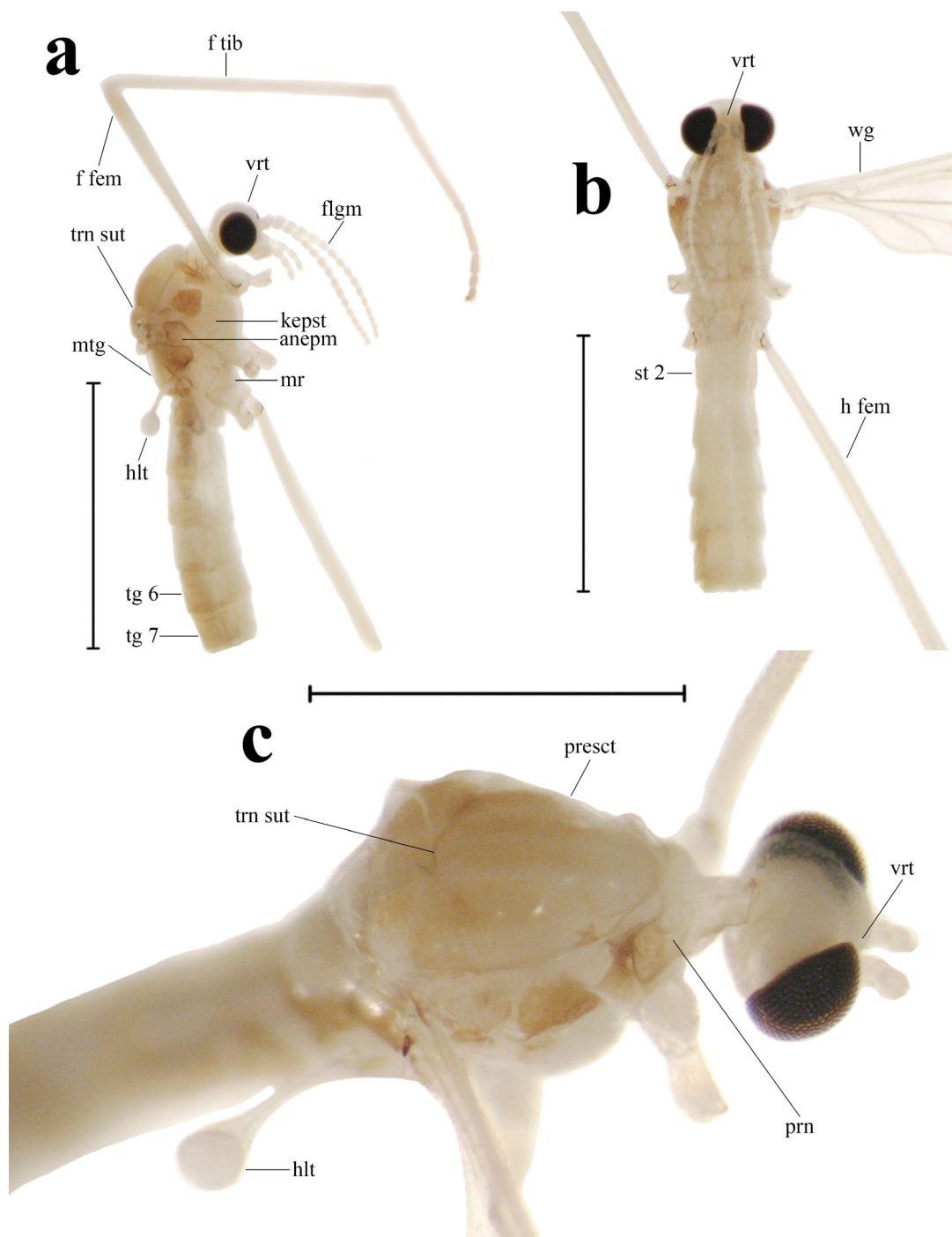


Figure 1. Male holotype of *Neognophomyia mexicana* sp. nov. **a.** Lateral view, scale bar= 2.5 mm; **b.** ventral view, scale bar= 2.5 mm; **c.** dorsolateral view, scale bar= 1 mm. anepm= anepisternum, f fem= fore femur, f tib= fore tibia, flgm= flagellum, h fem= hind femur, hlt= halter, kepst= katepisternum, mr= meron, mtg= mediotergite, presct= prescutum, prn= pronotum, st= sternite, tg= tergum, trn sut= transverse suture, vrt= vertex, wg= wing.

Venation: Sc vein ending just beyond R_2 ; sc-r located at midlength of R_s ; R_{2+3+4} (petiole of cell r_3) short, about 4.2 times of R_4 ; R_2 about two times of R_3 ; R_3 about 4.7 times of R_4 ; m-cu located about one-third of dm cell (Fig. 2). **Abdomen:** Abdomen with terga pale yellow; terga one and two with lateral margins pale brown, more restricted at the base and widening towards the apical part, giving the appearance of an inverted trapezoid-shaped pale yellow stripe in the middle; tergum two with brown lateral margins relatively straight and not widened as in tergum one; tergum three with lateral margins pale brown with a more pronounced widening in the middle of the segment, with the dark areas at the apical part almost meeting to form a more evident inverted trapezoid-shaped pale yellow stripe than in terga one and two; tergum four with a slight pale brown widening of the lateral margins beyond the middle of the segment, joining completely to form a narrow band that occupies the apical 0.20 of the segment; tergum five almost completely pale; terga six and seven completely pale brown; tergum eight completely pale yellow (Fig. 1a). All sterna pale yellow without marks (Fig. 1b).

Male terminalia (Figs. 3, 4). Hypopygium yellow (Fig. 3). Epandrium trapezoidal in dorsal view, posterior margin straight with small triangular sclerotized corners, laterally

with a long tergal spine curved mesally at a right angle at level of the distal margin of the gonocoxite, with both spines crossing at midline and ending in a sharp tip (Figs. 3, 4a). Gonocoxite longer than wide, about two times its basal width (Figs. 3, 4a,b). Gonostylus bifid, with a maximal length about 0.40 times the length of the gonocoxite (Figs. 3, 4a,b); outer branch of the gonostylus digitiform, mesally curved beyond the middle, with one or two ($n = 6$) preapical setae and one apical seta dorsally, and a longitudinal row of three setae ventrally (Figs. 3, 4a,b); inner branch more sclerotized, thumb-like, laterally curved at the apex, ending in two small lobes and four or five small setae, and one or two stronger setae; with a scoop-shaped reinforcement at the base with a longitudinal row of seven stronger setae ventrally (Figs. 3, 4a,b). Aedeagus long and thin, straight, about two times the length of the ejaculatory apodeme (Figs. 3, 4d); hypoproct subovoidal (Fig. 4d); ventral plate (adminiculum, in Frommer 1963) shaped like a sclerotized horseshoe (Figs. 3, 4d). Parameres lanceolate, curved in the apical half, apparently reinforcing the aedeagus, and attached to an ovoidal parameral sheath (Figs. 3, 4c,d).

Female (Figs. 5, 6). Body length about 5–5.2 mm (head-abdomen). Similar to Male. **Thorax:** Prescu-

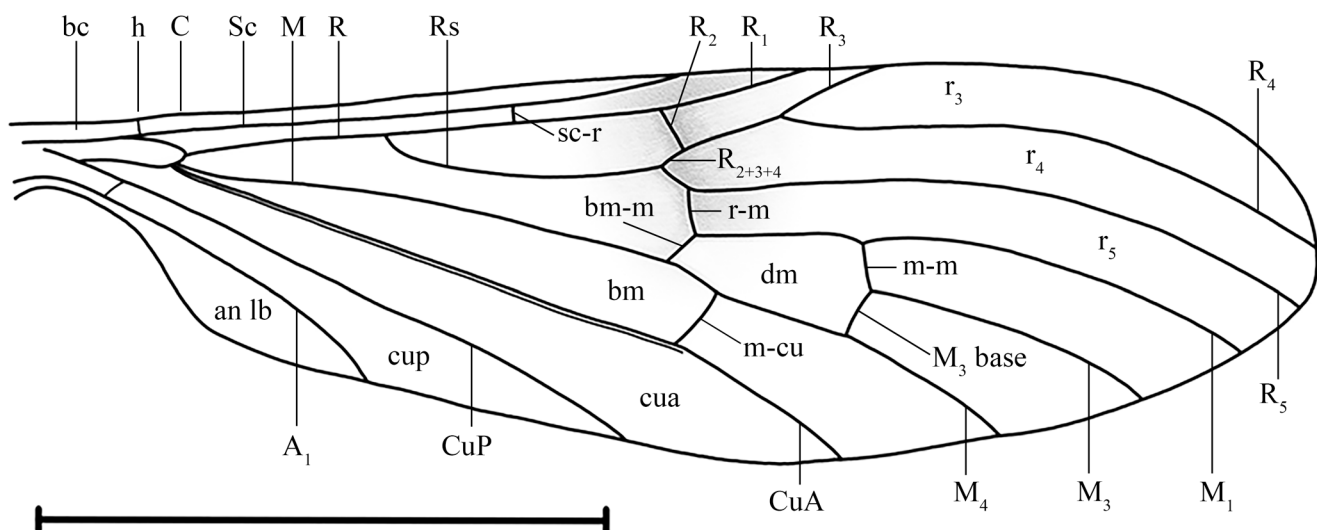


Figure 2. Wing of male holotype of *Neognophomyia mexicana* sp. nov., scale bar= 2.0 mm. A= anal vein, an lb= anal lobe, bc= basal costal cell, bm= basal medial cell, bm-m= basal medial crossvein, C= costal vein, CuA= anterior branch of cubital vein, cua= anterior cubital cell, CuP= posterior branch of cubital vein, cup= posterior cubital cell, dm= discal medial cell, h= humeral crossvein, M= medial vein, M_3 base= base of M_3 vein, m-cu= medial-cubital crossvein, m-m= medial crossvein, R= radius vein, R_1 = anterior branch of radius, R_2 = upper branch of second branch of radius, R_{2+3+4} = upper branch of radial section, R_3 = lower branch of second branch of radius, R_4 = upper branch of third branch of radius, R_5 = lower branch of third branch of radius, r= radial cell, r-m= radial-medial crossvein, Rs= radial sector, Sc= subcostal vein, sc-r= subcostal-radial crossvein.

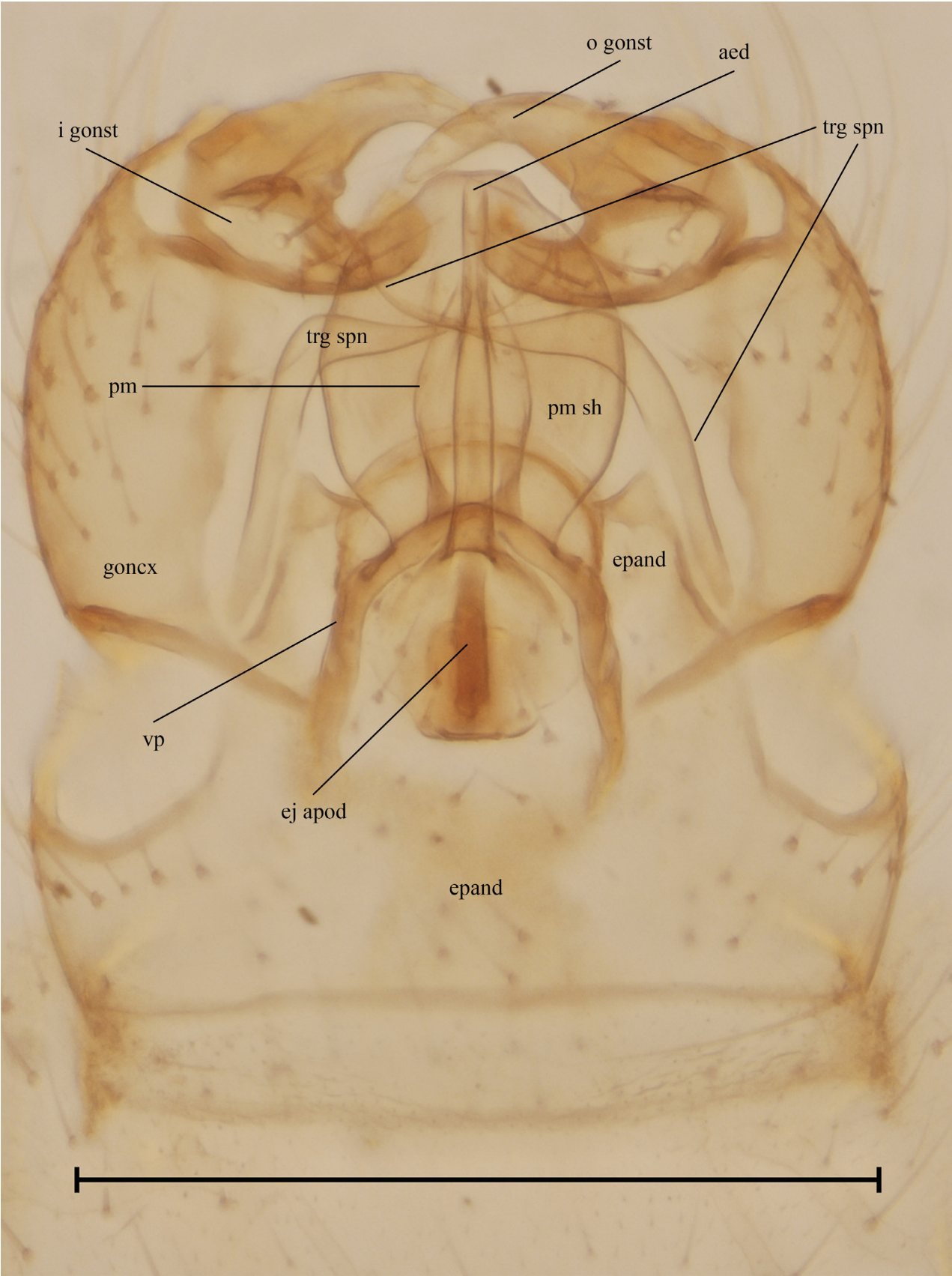


Figure 3. Terminalia of male holotype of *Neognophomyia mexicana* sp. nov., dorsal view, scale bar= 0.40 mm. aed= aedeagus, ej apod= ejaculatory apodeme, epand= epandrium, goncx= gonocoxite, i gonst= inner gonostylus, o gonst= outer gonostylus, pm= paramere, pm sh= parameral sheath, trg spn= tergal spine, vp= ventral plate.

tum-scutum with four dark-brown stripes, the central ones are less pronounced than in the male (Fig. 5b). *Legs*: Apices of femora and tibiae are more pronounced (Figs. 5a, 6). *Wing*: Length about 4.5 mm. *Abdomen*: Tergum four with a slight brown widening of the lateral margins beyond the middle of the segment, which does not join to form a band at the apex or is very inconspicuous. Female specimens have an expanded abdomen full of eggs (Fig. 5).

Type locality. MEXICO. Veracruz: Atzalan, Plan de Arroyos.

Etymology. The species name refers to the country where it was collected.

Biology. Unknown.

Distribution. Mexico (Veracruz).

Remarks. *Neognophomyia mexicana* **sp. nov.** is the northernmost recorded species of the genus in America and represents the first record of the genus in Mexico.

Key to the neotropical adults of *Neognophomyia* species

(Based on the characteristics described in the original descriptions of adults)

- 1 Vein R_3 long, about times 0.50 the length of vein R_4 , outer margin of cell r_2 almost as long as vein R_3 (Bolivia, Peru) *N. paprzyckiana*
- Vein R_3 short about or less than 0.25 times the length of vein R_4 , outer margin of cell r_2 less than 0.5 the length of vein R_3 2
- 2(1) Prescutum-scutum with reddish, dark, brown or black stripes or a disc on anterior or posterior area 3
- Prescutum-scutum homogeneous in color (yellow, reddish, brown or dark) without stripes or disc on anterior or posterior area 16
- 3(2) Anterior or posterior area of prescutum-scutum with a reddish, dark, brown or black disc 4
- Prescutum-scutum with weak or highly developed reddish, dark, brown or black stripes 7

- 4(3) Pronotum with homogeneous yellow color (Peru) *N. cuzcoensis*
- Pronotum yellow in the middle and dark-brown on the sides or dark-brown in the middle and yellow on the sides; mediotergite with homogeneous color, without dark-black areas 5
- 5(4) Wing with two brown areas, one on radial sector and one on base; vertex-occiput with a dark spot (Costa Rica) *N. schildi*
- Wing with one dark area on cord; vertex-occiput yellow without a dark spot 6
- 6(5) Pronotum infusate in the middle and yellow on the sides; femora brownish yellow, tibiae darker, with homogeneous color; mediotergite dark-brown; abdominal terga dark-brown (Peru) *N. obtusilamina*
- Pronotum yellow in the middle and dark on the sides; femora and tibiae with infusate apex; mediotergite yellow with brownish-black spots on the sides; abdominal terga dark-brown, pale in the middle forming a stripe, more conspicuous in the basal segments (Peru) *N. scaphoides*
- 7(3) Prescutum-scutum with a dark-brown stripe (Brazil) *N. bisecta*
- Prescutum-scutum with two or more reddish, dark, brown or black stripes 8
- 8(7) Mediotergite with homogeneously yellow, reddish, brown or black 9
- Mediotergite with anterior or posterior dark areas on the sides 13
- 9(8) Wing with two or more dark areas, on cord, base or apex 10
- Wing with one dark area on radial sector 11
- 10(9) Wing with two brown areas, one on radial sector and one on base; vertex-occiput brown; femora and tibiae yellow with dark-brown apices; ab-

	dominal terga yellow (except V) (Brazil) <i>N. hirsuta</i>		vertex brownish (Peru) <i>N. pervicax</i>
-	Wing with two dark-brown areas, one on radial sector and one on apex; vertex-occiput yellow with an infuscate spot; femora and tibiae yellow; all abdominal terga dark-brown (Peru) <i>N. latifascia</i>	-	Prescutum-scutum with four dark-brown stripes; sc-r is located at the middle of Rs; pronotum yellow in the middle and dark-brown on the sides; fore and mid femur and tibia with dark-brown apex; vertex yellow (Mexico) <i>N. mexicana</i> sp. nov.
11(9)	Pronotum homogeneously yellow; prescutum-scutum with three developed reddish stripes; palpus pale with dark apex (Ecuador) <i>N. interrupta</i>	16(2)	Wing without conspicuous dark areas 17
-	Pronotum yellow in the middle and dark-brown on the sides or dark-brown in the middle and yellow on the sides 12	-	Wing with one or more dark areas 18
12(11)	Pronotum black in the middle and yellow on the sides; prescutum-scutum with three developed black-brownish stripes; scutellum yellow in the middle and dark on the sides; femora and tibiae with infuscate apices (Panama) <i>N. panamensis</i>	17(16)	Abdominal terga dark-brown; pleuron with a conspicuous dark stripe, from cervical sclerites to wing base; mediotergite yellow with two posterior dark-brown areas (Brazil, Paraguay) <i>N. immaculipennis</i>
-	Pronotum yellow in the middle and dark-brown on the sides; prescutum-scutum with weak reddish-brown stripes; scutellum yellow; femora and tibiae yellow (Costa Rica) <i>N. productissima</i>	-	Abdominal terga brownish-yellow medially, dark on the sides; pleuron with two black spots, on the anepisternum and posterior part of laterotergite black; mediotergite fulvous, homogeneous (Peru) <i>N. setilobata</i>
13(8)	Pleuron with two brownish-black spots, one on anepisternum and one on laterotergite; abdominal terga dark-brown (Ecuador) <i>N. adara</i>	18(16)	Wing with one dark area on radial sector 19
-	Pleuron with a conspicuous dark stripe from cervical sclerites to wing base; basal abdominal terga yellow, darker on the sides 14	-	Wing with two dark areas, one on radial sector and one on base, cell m or the origin of Rs 29
14(13)	Wing with two dark-brown areas, one on radial sector and one on base; mediotergite mostly dark (Colombia) <i>N. colombicola</i>	19(18)	Mediotergite with homogeneous color, yellow, reddish, dark or brown 20
-	Wing with one dark area on cord; mediotergite with two posterior dark areas 15	-	Mediotergite yellow with two posterior dark areas 28
15(14)	Prescutum-scutum with three brown stripes; sc-r is located before the middle of Rs; pronotum yellow; femora and tibiae yellow with brown apex;	20(19)	Pleuron with a dark-black spot on anepisternum or on laterotergite 21
		-	Pleuron with two dark-black spots, one on anepisternum and one on laterotergite or with a conspicuous dark stripe 22
		21(20)	Pleuron with a black spot on laterotergite; femora and tibiae orange, tibiae with black apices; abdominal terga two, four and five with basal black

- band; vertex yellow with a dark-brown spot (Peru) *N. citripes*
- Pleuron with a dark spot on anepisternum; femora and tibiae yellow; abdominal terga five and six dark; vertex yellow without a dark spot (Peru) *N. debilitata*
- 22(20) Pronotum homogeneously yellow 23
- Pronotum yellow in the middle and dark-brown on the sides 27
- 23(22) Vertex yellow with a dark spot; scape base pale, the rest of segment, pedicel and flagellum dark (Bolivia) *N. pinckerti*
- Vertex-occiput yellow without a dark spot 24
- 24(23) Pleuron with a conspicuous brownish-black stripe; femora and tibiae yellow (Peru) *N. bisetosa*
- Pleuron with two dark spots, one on anepisternum and one on laterotergite 25
- 25(14) Abdominal terga one and four yellow, two and three black on the sides, five and six brownish-black; palpus yellow with infusate apex (Panama) *N. heliconiae*
- At least the basal abdominal terga yellow medially, infusate or dark on the sides 26
- 26(15) Palpus brown with bases of each segment yellow; all abdominal terga yellow medially, dark on the sides (Trinidad and Tobago) *N. trinitatis*
- Palpus brown; subterminal abdominal terga weakly dark (Venezuela) *N. monophora*
- 27(22) Femora yellow with infusate apices (Ecuador) *N. scapha*
- Femora yellow (Peru) *N. sparsiseta*
- 28(19) Basal abdominal terga yellow medially, dark-brown on the sides, the rest dark; palpus yellow with brown apex (Peru) *N. hostica*
- All abdominal terga yellow medially, dark-brown on the sides; palpus testaceous with brown apex (Peru) *N. crassistyla*
- 29(18) Wing with two dark-brown areas, on radial sector and on cell m; pronotum reddish brown (Ecuador) *N. consociata*
- Wing with dark area on radial sector and on base; pronotum yellow in the middle and dark-brown on the sides 30
- 30(29) Wing with two brown areas, one on radial sector and one on base; tibiae yellow; mediotergite yellow with two posterior infusate areas; vertex-occiput yellow (Bolivia, Ecuador) *N. cochlearis*
- Wing with three dark-brown areas, one on cord, one base and one on the origin of Rs; tibiae yellow with black apices; mediotergite brownish-dark; vertex with a brown spot (Ecuador) *N. spectralis*

DISCUSSION

According to the description of the 30 species of *Neognophomyia*, differences between adults are mainly based on the coloration patterns of the body, legs, wing and wing venation. Of these, male terminalia of 26 species are known (although the description of *N. colombicola* is uninformative), however, a significant number of these species are partially described, with an emphasis on tergal spines and gonostylus. These limitations restrict the identification of unique characteristics in male terminalia and hinder necessary comparisons between species. Additionally, these limitations have impeded the development of taxonomic keys for male terminalia in this study, necessitating the re-description of most genital structures.

Based on the coloration pattern of the body, legs and wing, only *N. latifascia* (Alexander, 1926) and *N. hirsuta* (Alexander, 1913) share with *N. mexicana* the presence of four stripes on the prescutum-scutum and a complete dark stripe on the pleuron; however, they differ from *N. mexicana* mainly in the coloration pattern of the abdominal terga and wing. Other species similar to *N. mexicana* are *N. pervicax* (Alexander, 1914) and *N. panamensis*, but they differ in the number of stripes on the prescutum-scu-

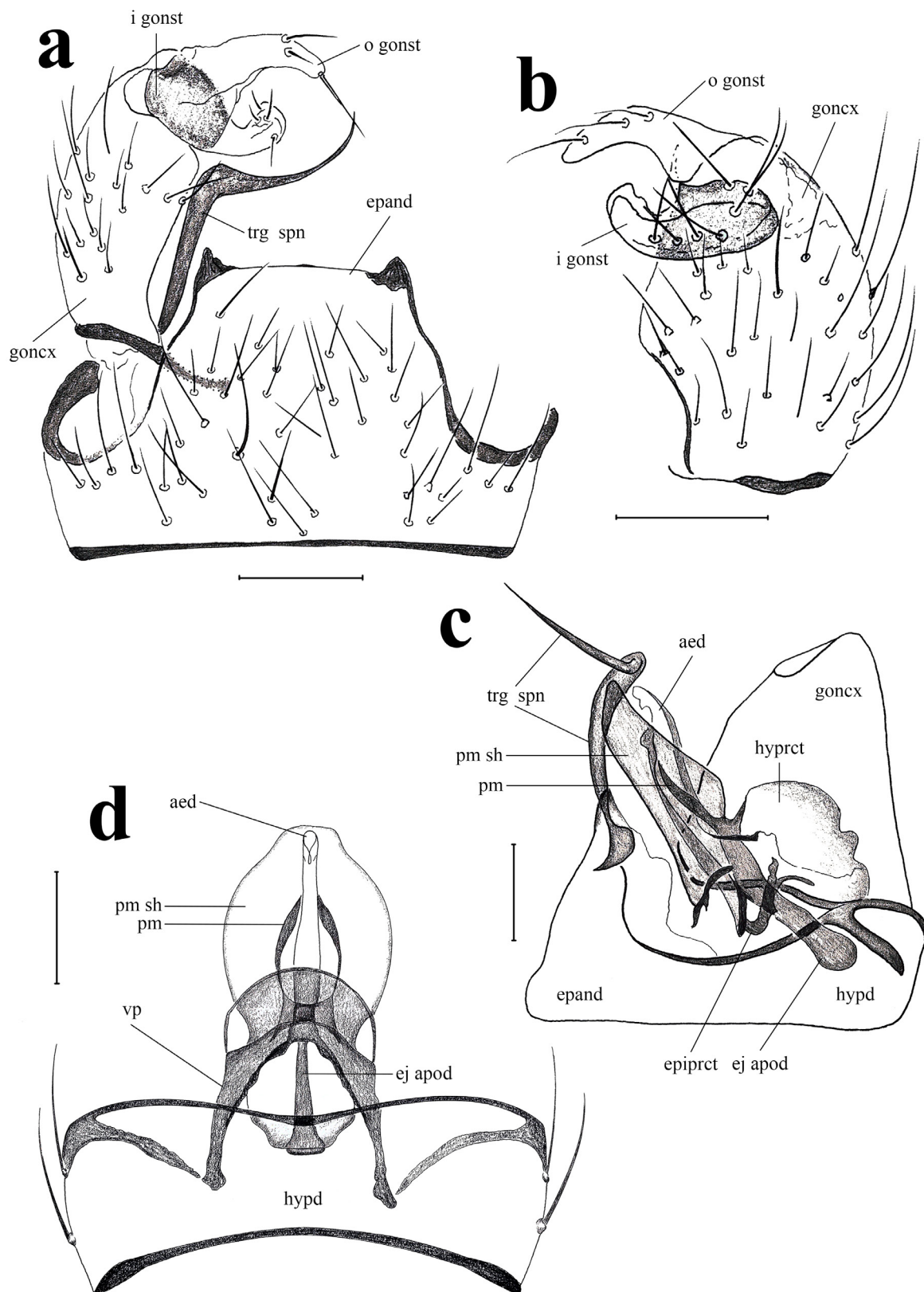


Figure 4. Terminalia of male of *Neognophomyia mexicana* sp. nov., scale bar= 0.10. **a.** Epandrium, gonocoxite, gonostylus and tergal spines, dorsal view; **b.** gonocoxite and gonostylus, ventral view; **c.** male terminalia, lateral view; **d.** aedeagus, paramere and ventral plate, dorsal view. aed= aedeagus, ej apod= ejaculatory apodeme, epand= epandrium, epiprct= epiproct, goncx= gonocoxite, hypprct= hypoproct, i gonst= inner gonostylus, o gonst= outer gonostylus, pm= paramere, pm sh= parameral sheath, trg spn= tergal spine, vp= ventral plate.

TABLE 1. Described species of *Neognophomyia*, their distribution and sex of the holotype.

	Species	Distribution	Holotype
1	<i>Neognophomyia adara</i> Alexander, 1949	Ecuador	Male
2	<i>Neognophomyia bisecta</i> (Alexander, 1920)	Brazil	Female
3	<i>Neognophomyia bisetosa</i> Alexander, 1944a	Peru	Male
4	<i>Neognophomyia citripes</i> Alexander, 1945b	Peru	Female
5	<i>Neognophomyia cochlearis</i> Alexander, 1945a	Bolivia, Ecuador	Male
6	<i>Neognophomyia colombicola</i> Alexander, 1931	Colombia	Male
7	<i>Neognophomyia consociata</i> Alexander, 1942	Ecuador	Male
8	<i>Neognophomyia crassistyla</i> Alexander, 1967	Peru	Male
9	<i>Neognophomyia cuzcoensis</i> Alexander, 1967	Peru	Male
10	<i>Neognophomyia debilitata</i> Alexander, 1949	Peru	Male
11	<i>Neognophomyia heliconiae</i> Alexander, 1945c	Panama	Male
12	<i>Neognophomyia hirsuta</i> (Alexander, 1913)	Brazil	Female
13	<i>Neognophomyia hostica</i> Alexander, 1943	Peru	Male
14	<i>Neognophomyia immaculipennis</i> (Alexander, 1926)	Brazil, Paraguay	Male
15	<i>Neognophomyia interrupta</i> Alexander, 1944b	Ecuador	Male
16	<i>Neognophomyia latifascia</i> (Alexander, 1926)	Peru	Male
17	<i>Neognophomyia monophora</i> Alexander, 1941	Venezuela	Male
18	<i>Neognophomyia obtusilamina</i> Alexander, 1952	Peru	Male
19	<i>Neognophomyia panamensis</i> Alexander, 1930	Panama	Male
20	<i>Neognophomyia paprzyckiana</i> Alexander, 1944a	Bolivia, Peru	Male
21	<i>Neognophomyia pervicax</i> (Alexander, 1914)	Peru	Male
22	<i>Neognophomyia pinckerti</i> Alexander, 1962	Bolivia	Male
23	<i>Neognophomyia productissima</i> Alexander, 1944c	Costa Rica	Male
24	<i>Neognophomyia scapha</i> Alexander, 1945a	Ecuador	Male
25	<i>Neognophomyia scaphoides</i> Alexander, 1952	Peru	Male
26	<i>Neognophomyia schildi</i> Alexander, 1945d	Costa Rica	Male
27	<i>Neognophomyia setilobata</i> Alexander, 1949	Peru	Male
28	<i>Neognophomyia sparsiseta</i> Alexander, 1945b	Peru	Male
29	<i>Neognophomyia spectralis</i> Alexander, 1944b	Ecuador	Male
30	<i>Neognophomyia trinitatis</i> Alexander, 1927	Trinidad and Tobago	Male
31	<i>Neognophomyia mexicana</i> sp. nov. Rivera-García & Ibáñez-Bernal, 2024	Mexico	Male

tum and the coloration pattern of the legs. Additionally, according to wing venation, in *N. adara* Alexander, 1949, *N. bisecta* (Alexander, 1920), *N. cochlearis* Alexander, 1945a, *N. hirsuta*, *N. pervicax* and *N. pinckerti* Alexander, 1962, vein Sc_1 ends just after or beyond R_2 , similar to *N. mexicana*; and in *N. panamensis* vein Sc_2 is located in the middle of Rs , as in *N. mexicana*. Therefore, *N. mexicana* shares more similarities with *N. panamensis* and *N. pervicax*, differing in the coloration of the vertex, pronotum, scutellum,

mediotergite, hind tibia, and especially in the number of stripes on the prescutum-scutum, but they share the coloration pattern of the fore- and mid legs, wing and abdominal segments. It should be mentioned that it is impossible to compare *N. productissima*, *N. colombicola* Alexander, 1931 and *N. interrupta* Alexander, 1944b with *N. mexicana* because the descriptions of the first two species do not mention the number of prescutum stripes, but they differ

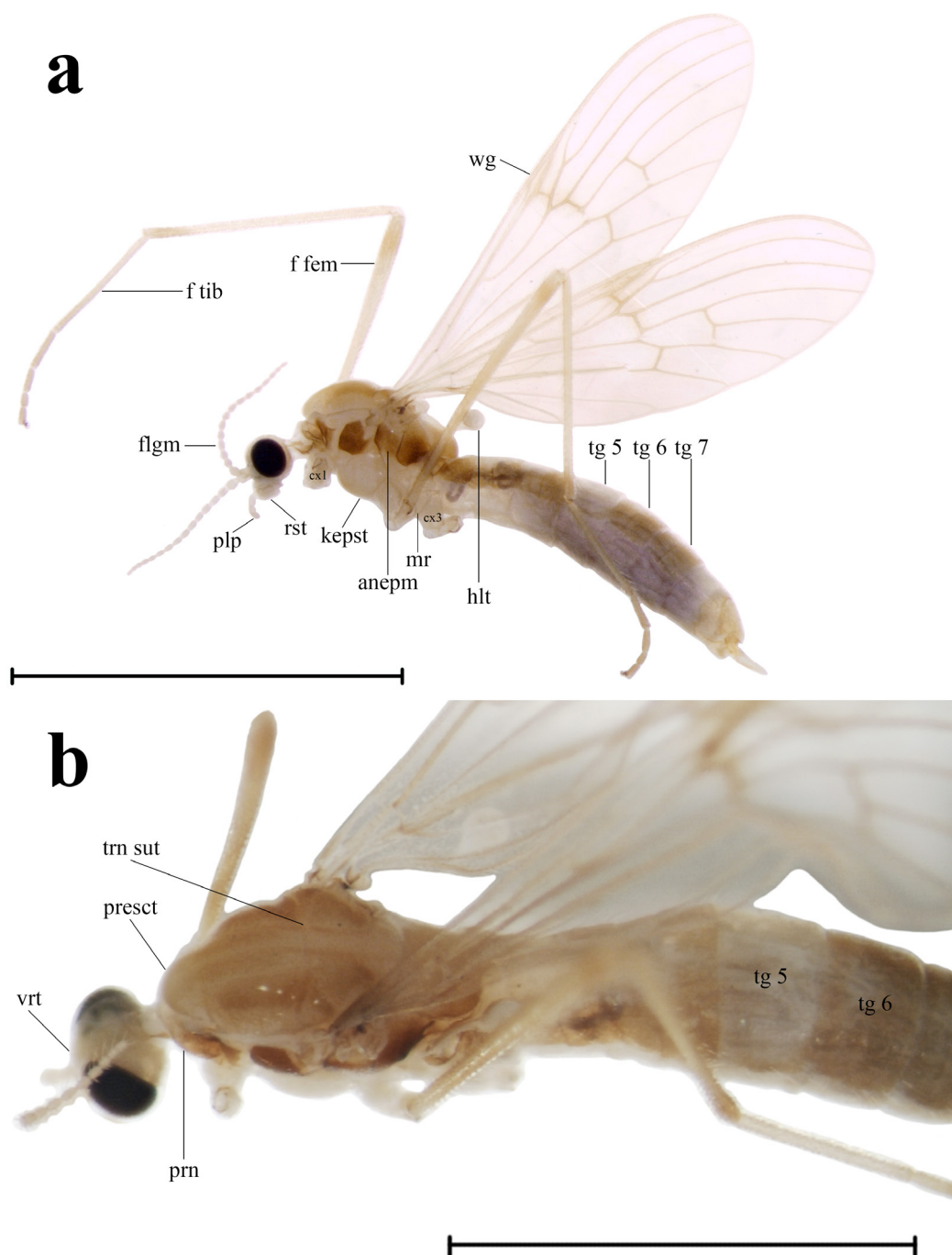


Figure 5. Female paratype of *Neognophomyia mexicana* sp. nov. **a.** Lateral view, scale bar= 3.0 mm; **b.** dorso-lateral view, scale bar= 2.0 mm. anepm= anepisternum, cx= coxa, f fem= fore femur, f tib= fore tibia, flgm= flagellum, hlt= halter, kepst= katepisternum, mr= meron, presct= prescutum, plp= palpus, prn= pronotum, rst= rostrum, tg= tergum, trn sut= transverse suture, vrt= vertex, wg= wing.

in leg coloration pattern compared to the species described here, and the legs of the last species were not described.

Based on the male terminalia, especially the length of tergal spines and the shape of the gonostylus and aedeagus (although it is possible that what was described as “aedeagus” corresponds to the parameral sheath), the species that share the most characteristics with *N. mexicana* are *N. cochlearis*, *N. bisetosa*, *N. pinckerti* and *N. panamensis*. The first species is similar only in the unusual “scoop-shaped” base of the inner gonostylus, the next two species share similarities with *N. mexicana*, in the shape of tergal spines and aedeagus (probably the parameral sheath); while the last one, shares more characteristics with *N. mexicana*, including the tergal spines, outer gonostylus and aedeagus (probably parameral sheath), being the most similar, and coinciding

with the similarities in the coloration patterns of the adults of both species. It is also important to mention that it was not possible to compare *N. mexicana* with *N. pervicax* (one of the most similar species to *N. mexicana* based on adult characteristics) because it was not documented in the original description. Type material of *N. pervicax* was requested to Diptera Collection of the Hungarian Natural History Museum [Budapest, Hungary], but we were informed that the material is not available and may no longer exist.

According to the above, *N. panamensis* and *N. pervicax* are the most similar to *N. mexicana* based on adult characteristics, with *N. panamensis* also sharing similarities in male terminalia, confirming the resemblance between these species. Although the description of the male terminalia of *N. pervicax* is necessary (new specimen, neotype), we consider that the aforementioned adult characteristics and the geographic distance from its type locality (Callanga, Peru, about 1214 m above sea level) to Mexico, are enough to distinguish them. However, it is important to note that the available information on species within this genus is limited, and their known distribution is based solely on the original descriptions by Alexander. Therefore, the geographic distance between *N. mexicana* and *N. pervicax* is considered a potential barrier to gene flow, among other factors, until further information on the distribution of both species becomes available.

Neognophomyia mexicana belongs to a group of species characterized by stripes on the prescutum-scutum, dark apices on the femora and tibiae, a dark area on radial sector of the wing, and heterogeneity in the coloration pattern of abdominal segments in adults; it also belongs to a group of species with long and pale tergal spines, an outer gonostylus curved and an inner “scoop-shaped”, and a parameral sheath broad, oval, and non-darkened apex. Finally, this species represents the first record of the genus *Neognophomyia* in Mexico and is the northernmost record of the genus on the continent.

AUTHORS CONTRIBUTION

KDRG: Conception and design, material and data curation, description, illustrations, photographs and writing.
SIB: Resources, description, illustrations and writing.

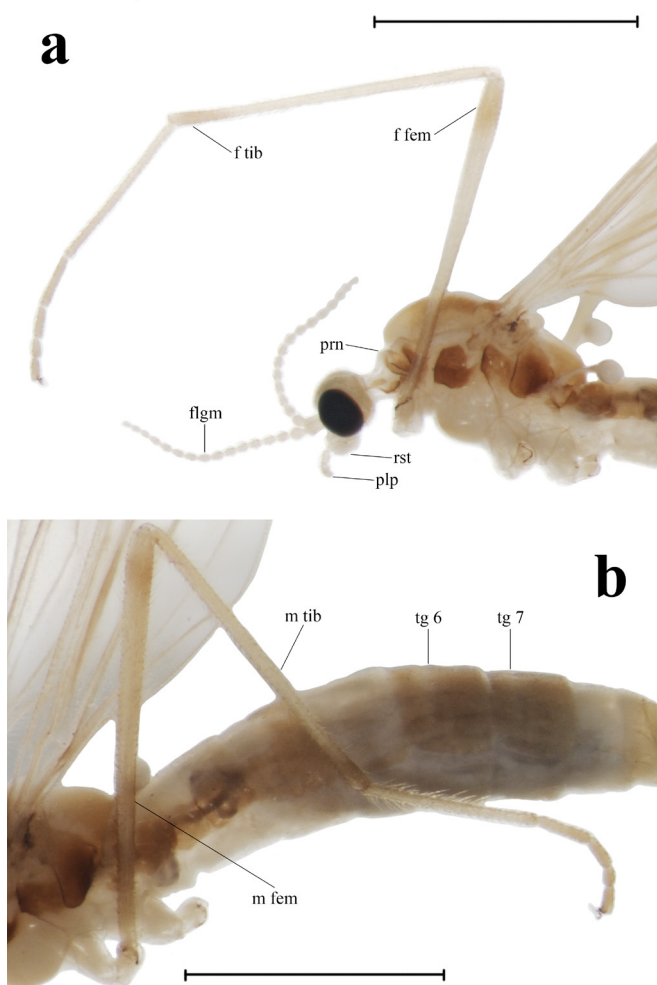


Figure 6. Female paratype of *Neognophomyia mexicana* sp. nov., scale bar= 2.0 mm. **a.** Fore leg; **b.** mid leg. f fem= fore femur, f tib= fore tibia, flgm= flagellum, m fem= mid femur, m tib= mid tibia, plp= palpus, prn= pronotum, rst= rostrum, tg= tergum.

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CONFLICT OF INTEREST

The authors declare that they do not have conflict of interest.

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