

## Three new Neotropical species of *Nilothauma* Kieffer, 1921 (Diptera: Chironomidae)

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**Abstract** – *Nilothauma canaima* n. sp. from Bolívar State in southeastern Venezuela, *Nilothauma granma* n. sp. from Granma Province in eastern Cuba and *Nilothauma soka* n. sp. from Amazonas State in Brazil are described and figured as males. *N. canaima* can be grouped with Nearctic *Nilothauma verrucum* Adam and Sæther, but can be separated based on its small size as it has a wing length <1.3 mm and an AR = 0.13. *N. granma* can be grouped with Nearctic *Nilothauma babyi* (Rempel) and Neotropical *Nilothauma matogrossense* Mendes and Andersen, but can be separated from both as it has a wing with distinct, dark areas. *N. soka* can be grouped with Neotropical *Nilothauma aripuanense* Mendes and Andersen, but can be separated based on the shape of the superior volsella as it has a boot-shaped superior volsella with microtrichia only. A key is given to the males of *Nilothauma* from the New World.

**Key words:** Chironomidae / *Nilothauma* / new species / Neotropical / taxonomy

### Introduction

The genus *Nilothauma* was erected by Kieffer (1921) based on *Nilothauma pictipenne* Kieffer, 1921 from Africa. The larvae inhabit littoral and sublittoral soft sediments of lakes and flowing waters (Epler *et al.*, 2013). Adam and Sæther (1999) revised the genus and recognized 25 species. Later, Mendes and Andersen (2009) placed *Paranilothauma* Sponis, 1987 and *Neelamia* Sponis 1987 as synonyms of *Nilothauma* and described 13 new species from the Neotropical region. A further five new species have been described from eastern China by Yan *et al.* (2005) and Qi *et al.* (2014, 2016), and recently Niitsuma (2016) added one new species from Japan and placed *Nilothauma sasai* Adam and Sæther (1999) as a synonym of *Nilothauma hibaratertium* Sasa, 1993.

The genus is distributed in all biogeographical regions except Antarctica. So far, 20 species are recorded from the New World; four species from the Nearctic Region and 16 from the Neotropical Region (Adam and Sæther, 1999; Mendes and Andersen, 2009). Below we describe and

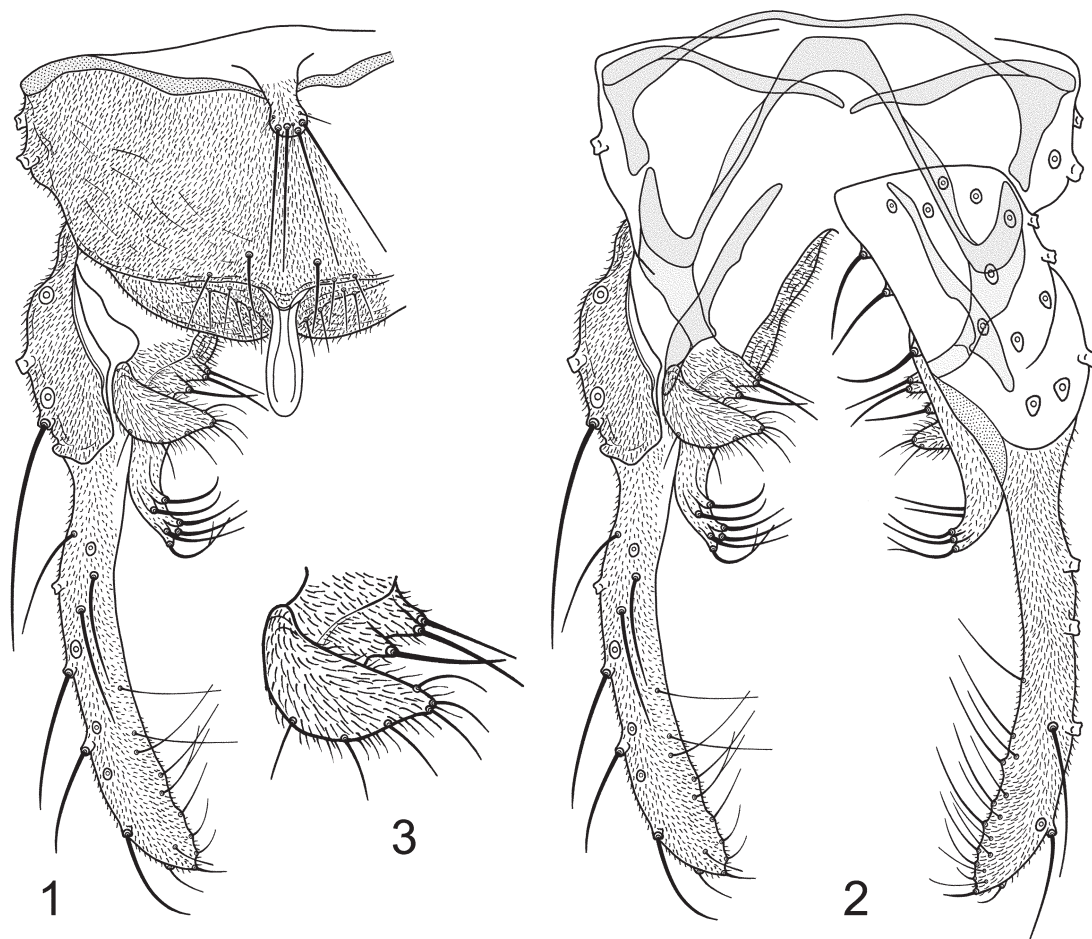
figure an additional three new Neotropical species based on males from Brazil, Cuba and Venezuela, raising the number of species known from the Neotropical region to 19. A key to the males of *Nilothauma* from the New World is also provided.

### Materials and methods

The specimens were mounted in Canada balsam or Euparal following the procedure outlined by Sæther (1969). The general morphology follows Sæther (1980). Measurements are given as ranges when more than one specimen was measured.

The holotype of *N. canaima* is kept in the Museo del Instituto de Zoología Agrícola (MIZA), Facultad de Agronomía, Universidad Central de Venezuela, Maracay, Venezuela. The holotype of *N. granma* is kept in the Department of Natural History, University Museum of Bergen (ZMBN), University of Bergen, Norway. The holotype of *N. soka* is kept in the Invertebrate collection at the Instituto Nacional de Pesquisas da Amazonia (INPA), Manaus, Brazil; the paratypes at ZMBN.

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**Figs 1–3.** *Nilothauma canaima* n. sp. male. 1. Hypopygium, dorsal view. 2. Hypopygium with anal point and tergite IX removed, dorsal aspect to the left and ventral aspect to the right. 3. Superior and median volsella, dorsal view.

## Results

### *Nilothauma canaima* n. sp.

(Figs 1–4)

*Type material.* Holotype male: Venezuela, Estado Bolívar, Parque Nacional de Canaima, Gran Sabana, Quebrada Santa Elena, 04°54'00"N, 61°05'25"W, 28.v.2007, light trap, leg. N. Hamada *et al.* (MIZA0031084).

*Etymology.* The species is named after Parque Nacional de Canaima. The name is to be regarded as a noun in apposition.

*Diagnostic characters.* The species is characterized by having a single, median anal tergite projection with few strong setae, a spatulate anal point, a pediform, microtrichiose superior volsella and an apically split median volsella. It can be separated from Nearctic *Nilothauma verrucum* Adam and Sæther by having a wing length < 1.3 mm and an AR = 0.13, and by having a brown thorax, while the thorax in *N. verrucum* is greenish with brown vittae.

### Description

*Adult male* ( $n = 1$ )

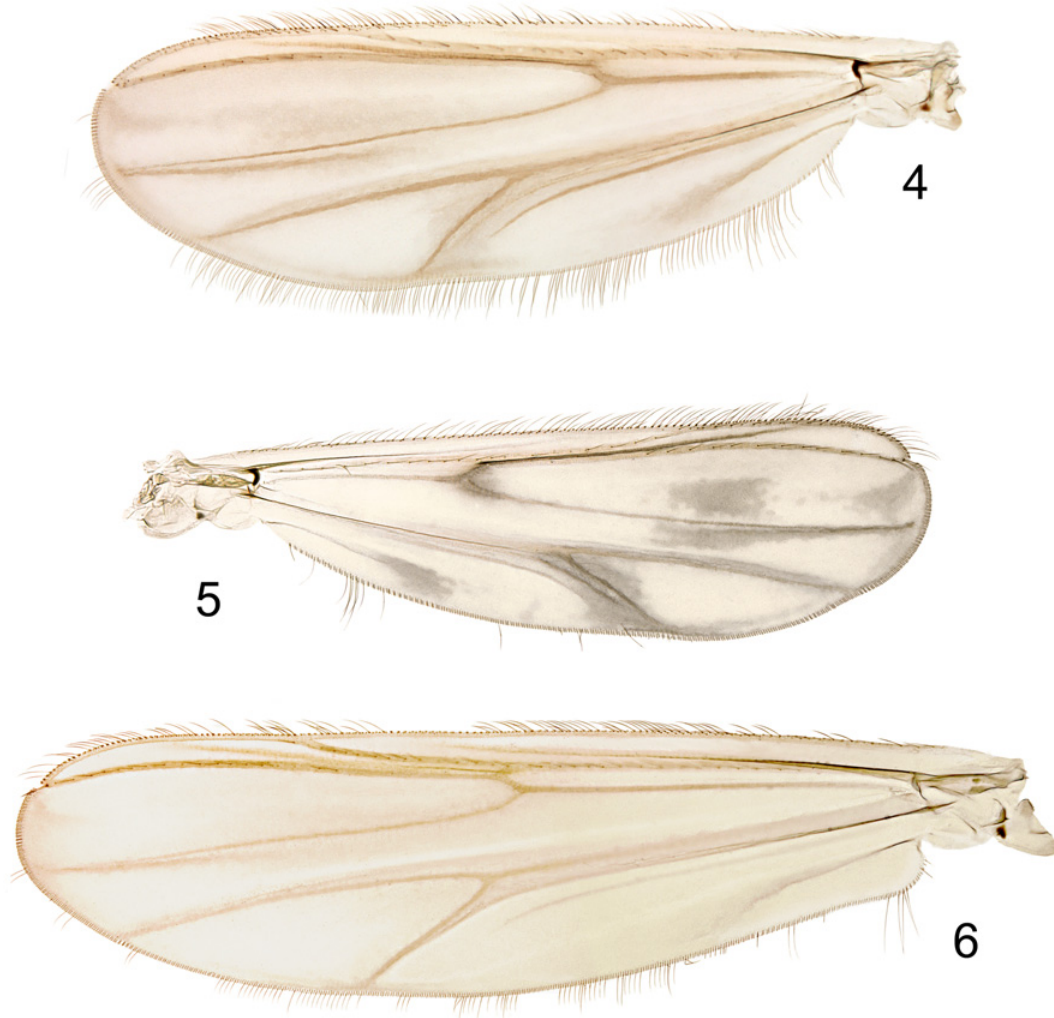
Total length 2.76 mm. Wing length 1.28 mm. Total length/wing length 2.16. Wing length/length of profemur 2.21.

*Coloration.* Head, thorax and legs brown; abdomen with tergites I–VI light brown, tergites VII–VIII and hypopygium brown. Wing membrane (Fig. 4) hyaline with faint, dark areas.

*Antenna.* AR = 0.13. Thirteenth flagellomere 97  $\mu$ m long; stout subapical seta 66  $\mu$ m long.

*Head.* Temporal setae 10 in single row including 3 inner verticals, 3 outer verticals and 4 postorbitals. Frontal tubercles indicated. Clypeus with 12 setae. Tentorium 84  $\mu$ m long, 17  $\mu$ m wide. Stipes 104  $\mu$ m long. Palp segment lengths (in  $\mu$ m): 23, 30, 79, 87, 150. Third palpomere with 3 sensilla clavata subapically, longest 15  $\mu$ m long. Fifth palpomere/third palpomere 1.91.

*Thorax.* Dorsocentrals 9 in single row, acrostichals 9, prealars 3. Scutellum apparently without setae.



**Figs 4–6.** *Nilothauma* spp., wings. 4. *N. canaima* n. sp. male. 5. *N. granma* n. sp. male. 6. *N. soka* n. sp. male.

**Table 1.** Lengths (in  $\mu\text{m}$ ) and proportions of legs of *Nilothauma canaima* n. sp., male ( $n = 1$ ).

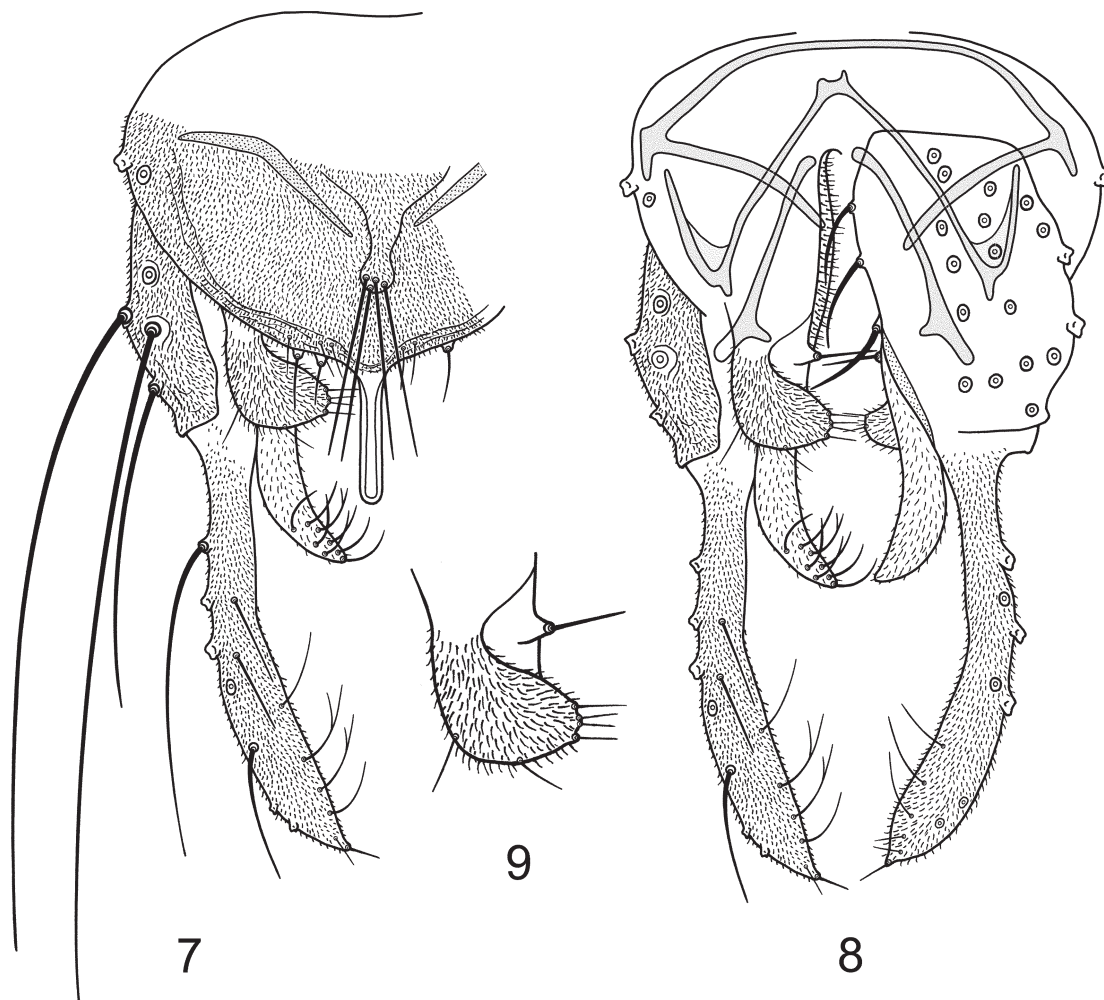
	fe	ti	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>	ta <sub>5</sub>	LR	BV	SV	BR
p <sub>1</sub>	572	384	629	302	221	147	57	1.64	2.18	1.64	–
p <sub>2</sub>	564	433	286	123	98	65	49	0.66	3.83	3.49	4.4
p <sub>3</sub>	637	605	368	180	155	106	65	0.61	3.18	3.78	–

*Wing* (Fig. 4). VR = 1.42. Brachiolum with 1 seta, R with 11 setae, R<sub>2+3</sub> with 9, R<sub>4+5</sub> with 13 setae in apical 1/2, remaining veins bare.

*Legs.* Spur of foretibia 54  $\mu\text{m}$  long including 23  $\mu\text{m}$  long scale. Midtibia with 1 spur, 17  $\mu\text{m}$  long; hind tibia with 2 spurs, 29 and 36  $\mu\text{m}$  long. Combs of midtibia 14  $\mu\text{m}$  long, of hind tibia 19  $\mu\text{m}$  long. Width at apex of foretibia 40  $\mu\text{m}$ , of midtibia 41  $\mu\text{m}$ , of hind tibia 52  $\mu\text{m}$ . Sensilla chaetica 1 at 0.56 of ta<sub>1</sub> of midleg. Lengths and proportions of legs as in Table 1.

*Hypopygium* (Figs 1 and 2). Tergite IX with broadly rounded posterior margin; with 5–6 weak setae along posterior margin to each side of base of anal point and 2 stronger setae proximal to base of anal point; with

median dorsal, wart-like lobe with 4 strong setae, about 55  $\mu\text{m}$  long, and 3 weaker setae; and distinct anal tergite bands. Anal point spatulate, 43  $\mu\text{m}$  long, 17  $\mu\text{m}$  wide at base, 7  $\mu\text{m}$  wide medially, 10  $\mu\text{m}$  wide subapically. Laterosternite IX with 3 setae. Phallapodeme 79  $\mu\text{m}$  long; transverse sternapodeme 23  $\mu\text{m}$  long. Gonocoxite 106  $\mu\text{m}$  long. Inferior volsella curved, 59  $\mu\text{m}$  long, 10  $\mu\text{m}$  wide medially, with microtrichia and 6 strong setae apically, of which at least 1 apically split. Superior volsella (Fig. 3) pediform, tapering towards apex, 41  $\mu\text{m}$  long, 10  $\mu\text{m}$  wide at base, densely covered with microtrichia and with 6 marginal setae. Median volsella (Fig. 3) consisting of 3 tubercles, each about 11  $\mu\text{m}$  long, with microtrichia and 1 strong apical seta. Gonostylus 139  $\mu\text{m}$  long, weakly



**Figs 7–9.** *Nilothauma granma* n. sp. male. 7. Hypopygium, dorsal view. 8. Hypopygium with anal point and tergite IX removed, dorsal aspect to the left and ventral aspect to the right. 9. Superior and median volsella, dorsal view.

curved; at least 1 seta along inner margin apically split. HR = 0.76. HV = 1.99.

#### Distribution

Known from Quebrada Santa Elena in Parque Nacional de Canaima, Venezuela only.

#### *Nilothauma granma* n. sp.

(Figs 5 and 7–9)

*Type material.* Holotype male: Cuba, Granma Province, Bartolomé Masó, Rancho Claro, Río Nagüas, Brazo Mayor, 20°04'03"N, 76°50'48"W, 560 m a.s.l., 16.vi.2015, light trap, leg. Orestes Bello Gonzalez (ZMBN, chi25139).

*Etymology.* The species is named after Granma Province, Cuba. The name is to be regarded as a noun in apposition.

*Diagnostic characters.* The species is characterized by having a single, median anal tergite projection with few strong setae, a parallel-sided anal point, a pediform,

microtrichiose superior volsella and a median volsella consisting of a single, conical projection with apical, strong seta. It can be separated from Nearctic *N. babi* (Rempel) and Neotropical *N. matogrossense* Mendes and Andersen by having a wing with distinct, dark areas.

#### Description

*Adult male* ( $n = 1$ )

Total length 2.28 mm. Wing length 1.15 mm. Total length/wing length 1.98. Wing length/length of profemur 2.27.

*Coloration.* Head and thorax brown with darker scutum and postnotum; abdomen and legs lighter brown. Wing membrane (Fig. 5) hyaline with dark areas at RM and FCu, in cells  $r_{4+5}$  and  $m_{1+2}$ , and along apical 1/2 of An.

*Antenna.* Missing.

*Head.* Temporal setae 8 in single row including 3 inner verticals, 1 outer vertical, and 4 postorbitals. Frontal tubercles indicated. Clypeus with 11 setae. Tentorium 88  $\mu$ m long, 11  $\mu$ m wide. Stipes 99  $\mu$ m long. Palp segment

**Table 2.** Lengths (in  $\mu\text{m}$ ) and proportions of legs of *Nilothauma granma* n. sp., male ( $n = 1$ ).

	fe	ti	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>	ta <sub>5</sub>	LR	BV	SV	BR
p <sub>1</sub>	515	286	–	–	–	–	–	–	–	–	–
p <sub>2</sub>	482	319	245	106	74	53	40	0.76	3.82	3.27	3.5
p <sub>3</sub>	539	498	319	163	155	89	57	0.63	2.91	3.26	4.2

lengths (in  $\mu\text{m}$ ): 23, 26, 73, 87, 83. Third palpomere with 2 sensilla clavata subapically, longest 13  $\mu\text{m}$  long. Fifth palpomere/third palpomere 1.13.

**Thorax.** Dorsocentrals 8 in single row, acrostichals 13, prealars 2. Scutellum with 2 setae.

**Wing** (Fig. 5). VR = 1.55. Brachiolum with 1 seta, R with 11 setae, R<sub>2+3</sub> with 9, R<sub>4+5</sub> with 16 setae in apical 2/3, remaining veins bare.

**Legs.** Spur of foretibia 51  $\mu\text{m}$  long including 23  $\mu\text{m}$  long scale. Midtibia with 1 spur, 32  $\mu\text{m}$  long; hind tibia with 2 spurs, 31 and 42  $\mu\text{m}$  long. Combs of midtibia 21  $\mu\text{m}$  long, of hind tibia 23  $\mu\text{m}$  long. Width at apex of foretibia 39  $\mu\text{m}$ , of midtibia 40  $\mu\text{m}$ , of hind tibia 45  $\mu\text{m}$ . Sensilla chaetica 1 at 0.49 of ta<sub>1</sub> of midleg. Lengths and proportions of legs as in Table 2.

**Hypopygium** (Figs 7 and 8). Tergite IX with broadly rounded posterior margin; with 3–5 weak setae along posterior margin to each side of base of anal point; with median dorsal, wart-like lobe with 4 strong setae, about 40  $\mu\text{m}$  long and distinct anal tergite bands. Anal point nearly parallel-sided, 36  $\mu\text{m}$  long, 7  $\mu\text{m}$  wide at base, 6  $\mu\text{m}$  wide at apex. Laterosternite IX with 2 setae. Phallapodeme 55  $\mu\text{m}$  long; transverse sternapodeme 5  $\mu\text{m}$  long. Gonocoxite 90  $\mu\text{m}$  long. Inferior volsella curved, tapering towards apex, 65  $\mu\text{m}$  long, 11  $\mu\text{m}$  wide medially, 5  $\mu\text{m}$  wide subapically, with microtrichia and 8 setae in apical 1/3, of which at least 2 apically split. Superior volsella (Fig. 9) pediform with broadly rounded apex, 35  $\mu\text{m}$  long, 11  $\mu\text{m}$  wide at base, 17  $\mu\text{m}$  wide subapically, densely covered with microtrichia and with 6 weak, marginal setae. Median volsella (Fig. 9) 7  $\mu\text{m}$  long, with 1 strong apical seta. Gonostylus 113  $\mu\text{m}$  long, weakly curved, slightly wider in apical 1/2; at least 2 setae along inner margin apically split. HR = 0.80. HV = 2.02.

#### Distribution

Known from Río Nagüas in Granma Province, Cuba only.

#### *Nilothauma soka* n. sp.

(Figs 6, 10 and 11)

**Type material.** Holotype male: Brazil, Amazonas State, Manaus, Reserva Soka Gakkai, lake, 12–14.ii.2008, Pennsylvania trap, leg. N. Hamada *et al.* (INPA). Paratypes: 2 males as holotype (ZMBN, chi25140, chi25141).

**Etymology.** The species is named after Reserva Soka Gakkai. The name is to be regarded as a noun in apposition.

**Diagnostic characters.** The species is characterized by lacking dorsal projection(s) on the anal tergite, having a spatulate anal point, a boot-shaped superior volsella with microtrichia only and an apically split median volsella. It can be separated from the Neotropical *N. aripuanense* Mendes and Andersen on the shape of the superior volsella as this species has a narrow, weakly sinuous volsella with microtrichia and few apical setae.

#### Description

**Adult male** ( $n = 2$ –3, except when otherwise stated).

Total length 3.63–4.02 mm. Wing length 1.50–1.71 mm. Total length/wing length 2.35–2.45. Wing length/length of profemur 2.09–2.24.

**Coloration.** Head, thorax and abdomen brown, legs uniformly light brown. Wing membrane (Fig. 6) hyaline.

**Antenna.** AR = 0.74–0.82. Thirteenth flagellomere 412–496  $\mu\text{m}$  long; stout subapical seta 32–44  $\mu\text{m}$  long.

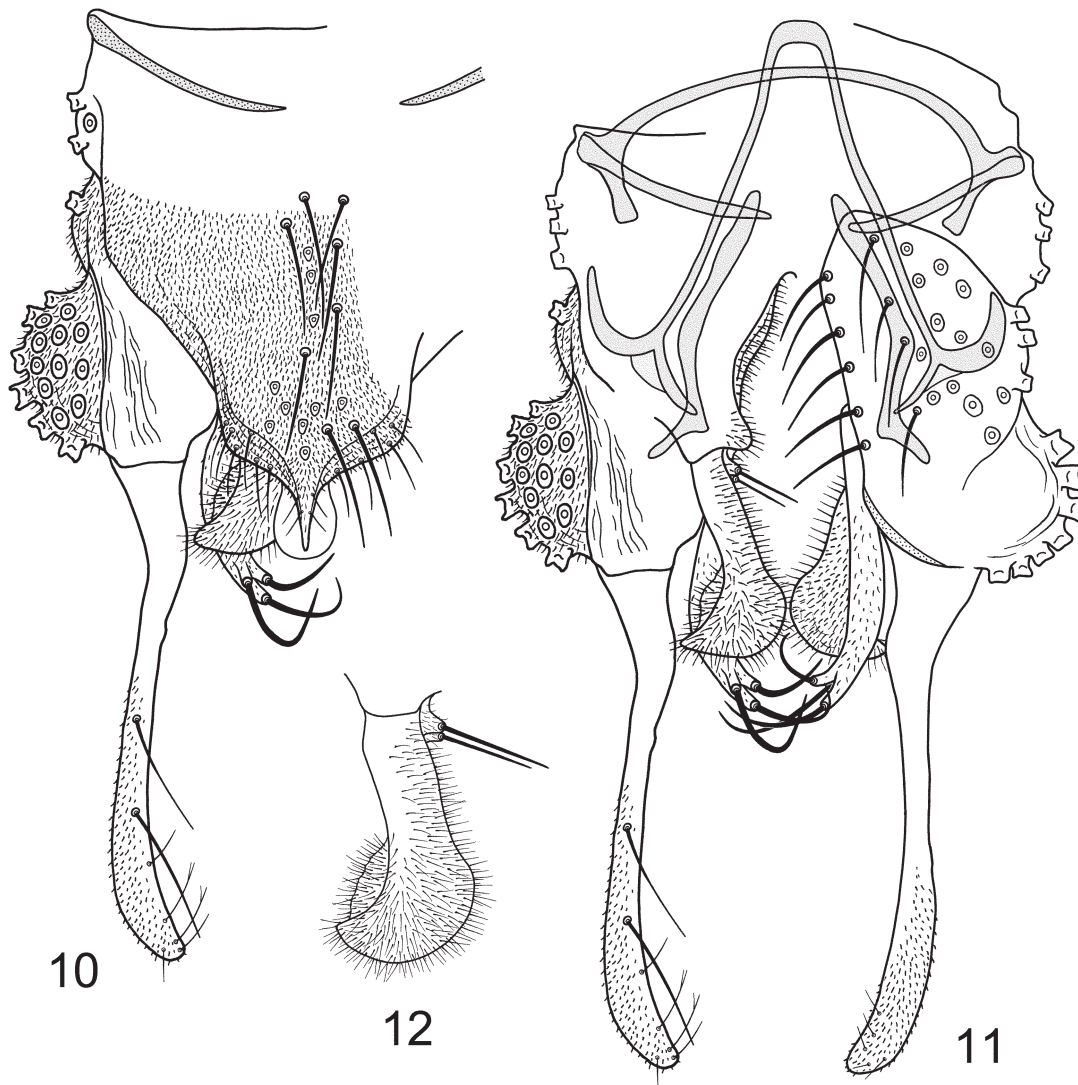
**Head.** Temporal setae 9–10 in single row including 2 inner verticals, 3 outer verticals and 4–5 postorbitals. Clypeus with 29–40 setae. Tentorium 87–98  $\mu\text{m}$  long, 28–33  $\mu\text{m}$  wide. Stipes 126–141  $\mu\text{m}$  long. Palp segment lengths (in  $\mu\text{m}$ ): 35–41, 33–39, 129–141, 148–166, 199(1). Third palpomere with 4–6 sensilla clavata subapically, longest 19–21  $\mu\text{m}$  long. Fifth palpomere/third palpomere 1.54(1).

**Thorax.** Dorsocentrals 11–14 in single row, acrostichals 16–19, prealars 2–4. Scutellum with 8 setae.

**Wing** (Fig. 6). VR = 1.11–1.14. Brachiolum with 1 seta, R with 16–19 setae, R<sub>1</sub> with 12–14 setae, R<sub>4+5</sub> with 21–23 setae in apical 1/2, remaining veins bare.

**Legs.** Spur of foretibia 63–73  $\mu\text{m}$  long including 29–37  $\mu\text{m}$  long scale. Midtibia with 1 spur, 47–54  $\mu\text{m}$  long; hind tibia with 2 spurs, 49–52 and 63–68  $\mu\text{m}$  long. Combs of midtibia 19–25  $\mu\text{m}$  long, of hind tibia 19–23  $\mu\text{m}$  long. Width at apex of foretibia 46–50  $\mu\text{m}$ , of midtibia 50–52  $\mu\text{m}$ , of hind tibia 54–57  $\mu\text{m}$ . Sensilla chaetica 2–3 at 0.49, 0.74–0.83 and 0.90–0.95 of ta<sub>1</sub> of midleg. Lengths and proportions of legs as in Table 3.

**Hypopygium** (Figs 10 and 11). Posterior margin of tergite IX with shoulders; with 17–21 strong, dorsal setae and 5–6 weaker setae along posterior margin to each side of the anal point, and with distinct anal tergite bands. Anal point broadly oval, 26–30  $\mu\text{m}$  long, 11–14  $\mu\text{m}$  wide at base, 18–23  $\mu\text{m}$  wide medially. Laterosternite IX with 3 setae. Phallapodeme 86–98  $\mu\text{m}$  long; transverse sternapodeme 10–16  $\mu\text{m}$  long. Gonocoxite 117–128  $\mu\text{m}$  long. Inferior volsella weakly curved, 80–89  $\mu\text{m}$  long, 12–15  $\mu\text{m}$



**Figs 10–12.** *Nilothauma soka* n. sp. male. 10. Hypopygium, dorsal view. 11. Hypopygium with anal point and tergite IX removed, dorsal aspect to the left and ventral aspect to the right. 12. Superior and median volsella, dorsal view.

**Table 3.** Lengths (in  $\mu\text{m}$ ) and proportions of legs of *Nilothauma soka* n. sp., male ( $n = 3$ ).

	fe	ti	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>
p <sub>1</sub>	694–776	507–547	842–956	482–539	368–400	270–319
p <sub>2</sub>	637–703	433–474	327–368	155–172	106–114	65–74
p <sub>3</sub>	727–817	727–825	466–539	229–261	204–229	131–147
	ta <sub>5</sub>	LR	BV	SV	BR	
p <sub>1</sub>	114–139	1.63–1.75	1.62–1.70	1.38–1.44	2.50–2.65	
p <sub>2</sub>	40–45	0.75–0.76	3.71–3.82	3.20–3.28	5.50–5.67	
p <sub>3</sub>	65–76	0.64–0.65	3.00–3.06	3.05–3.12	7.69–8.30	

wide subapically, with microtrichia and 3–4 stout setae apically. Superior volsella (Fig. 12) boot-shaped, projecting posteriolaterally, 61–69  $\mu\text{m}$  long, 11–15  $\mu\text{m}$  wide at base, with microtrichia. Median volsella (Fig. 12) 7–9  $\mu\text{m}$  long, apically split, with microtrichia and 2 strong apical setae. Gonostylus 159–173  $\mu\text{m}$  long, weakly curved, slightly wider in apical 1/2, at least 2 subapical setae

along inner margin apically split. HR = 0.67–0.77. HV = 2.17–2.43.

*Distribution*

Known from Reserva Soka Gakkai in Amazonas State, Brazil only.

**Key to males of *Nilothauma* Kieffer from the New World**

1. Tergite IX without setose dorsal lobe(s). ..... 2
  - Tergite IX with one or two setose dorsal lobes. ... 9
2. Anal point present. .... 3
  - Anal point absent. .... 4
3. Superior volsella narrow, weakly sinuous, projecting posteriomediaally, with 1–3 apical setae. Brazil. .... *Nilothauma aripuanense* Mendes and Andersen, 2009
  - Superior volsella boot-shaped, projecting posteriolaterally, with microtrichia only. Brazil. .... *Nilothauma soka* n. sp.
4. Inferior volsella simple. .... 5
  - Inferior volsella branched subapically. Brazil. .... *Nilothauma complicatum* Mendes and Andersen, 2009
5. Superior volsella pediform or subquadrangular, without ventral transverse fold, with setae and microtrichia. .... 6
  - Superior volsella diamond-shaped, with ventral transverse fold, with microtrichia only. .... 8
6. Superior volsella pediform; median and superior volsellae fused; AR < 0.40; abdomen without dark bands. .... 7
  - Superior volsella subquadrangular; median volsella distinct; AR > 1.00; abdominal segments with dark, oral bands. Brazil. .... *Nilothauma longissimum* Mendes and Andersen, 2009
7. Wing vein  $R_1$  with setae; gonostylus nearly parallel-sided in apical 1/2. Brazil, Ecuador. .... *Nilothauma fittkaui* (Soponis, 1987)
  - Wing vein  $R_1$  bare; gonostylus widest in apical 1/3. Brazil. .... *Nilothauma reissi* (Soponis, 1987)
8. Apex of superior volsella projecting caudad. Brazil. .... *Nilothauma sooretamense* Mendes and Andersen, 2009
  - Apex of superior volsella projecting mesad. Brazil. .... *Nilothauma involucrum* Mendes and Andersen, 2009
9. Anal point lacking or rudimentary and completely covered by microtrichia. .... 10
  - Anal point present, with microtrichia at most in basal 1/2. .... 13
10. Median volsella distinct and separated from superior volsella; superior volsella digitate, curved, with or without lateral spine. .... 11
  - Median volsella fused with superior volsella; superior volsella broadly pediform. Brazil. .... *Nilothauma fazzariense* Mendes and Andersen, 2009
11. Dorsal lobes of tergite IX not extended beyond posterior margin of tergite. .... 12
  - Dorsal lobes of tergite IX overreaching posterior margin of tergite. Brazil. .... *Nilothauma roquei* Mendes and Andersen, 2009
12. Superior volsella with lateral spine; laterosternite IX with thorn; inferior volsella with simple stout setae; posterior margin of tergite IX broadly rounded. Brazil. .... *Nilothauma calori* Mendes and Andersen, 2009
  - Superior volsella without lateral spine; laterosternite IX without thorn; inferior volsella with some apically split setae; posterior margin of tergite IX subrectangular. Costa Rica. .... *Nilothauma strebulosum* (Adam and Sæther, 1999)
13. Tergite IX with single, median setose dorsal lobe. .... 14
  - Tergite IX with two setose dorsal lobes. .... 18
14. Median lobe on tergite IX small, with < 15 strong setae; superior volsella pediform or club-shaped, with microtrichia. .... 15
  - Median lobe on tergite IX large, with > 40 strong setae; superior volsella L-shaped, without microtrichia. Brazil. .... *Nilothauma matogrossense* Mendes and Andersen, 2009
15. Anal point spatulate. .... 16
  - Anal point parallel-sided or tapering. .... 17
16. Wing length > 2.4 mm; AR = 0.28; median volsella of 2 tubercles, each with strong, apical seta. Canada. .... *Nilothauma verrucum* Adam and Sæther, 1999
  - Wing length < 1.3 mm; AR = 0.13; median volsella of 3 tubercles, each with strong, apical seta. Venezuela. .... *Nilothauma canaima* n. sp.
17. Wing with distinct dark areas at RM, FCu, along apical 1/2 of An and in cells  $r_{4+5}$  and  $m_{1+2}$ . Cuba. .... *Nilothauma granma* n. sp.
  - Wing without dark areas. Canada, USA. .... *Nilothauma babyi* (Rempel, 1937)
18. Anal point well developed, lanceolate or parallel-sided; gonostylus nearly parallel-sided in apical 1/2. .... 19
  - Anal point short, digitiform, with microtrichia in basal 1/2; gonostylus distinctly widened in apical 1/3. Brazil. .... *Nilothauma zitoi* Mendes and Andersen, 2009
19. Projections on tergite IX different, both placed medially; anterior projections bearing plumose setae, posterior weak setae and microtrichia. .... 20
  - Projections on tergite IX similar, placed laterally on tergite. .... 21
20. Anterior projection on tergite IX completely divided, broader than long. Canada, USA. .... *Nilothauma mirabile* (Townes, 1945)
  - Anterior projection on tergite IX not divided, longer than broad. USA. .... *Nilothauma bicorne* (Townes, 1945)
21. Anal point lanceolate; laterosternite IX without thorn. .... 22
  - Anal point parallel-sided; laterosternite IX with thorn. Chile. .... *Nilothauma spiesi* Mendes and Andersen, 2009
22. Inferior volsella and gonostylus with apically split setae; median volsella curved, tapering, with

microtrichia and setae. Brazil. .... *Nilothauma jaraguense* Mendes and Andersen, 2009

- Inferior volsella and gonostylus with simple setae only; median volsella short, parallel-sided, with 2 apical setae, without microtrichia. Brazil. .... *Nilothauma amazonense* Mendes and Andersen, 2009

## Discussion

Most *Nilothauma* species can be recognized as the males have a distinct anal point and at least one dorsal, setose projection on tergite IX. Adam and Sæther (1999) proposed four species groups in *Nilothauma*, the *duminola*-, *babiyi*-, *brayi*- and *pictipenne* groups, separated mainly on hypopygial features. The *duminola*- and *babiyi* groups have one dorsal projection only, while two projections are found in the *brayi*- and *pictipenne* groups. In the *pictipenne* group the wing has dark areas, while in the other groups the wing lacks dark spots or markings. The *duminola*- and the *babiyi* groups can be separated as the superior volsella is narrowly L-shaped and all apical setae on the inferior volsella are unbranched in the *duminola* group, while in the *babiyi* group the superior volsella is pediform and covered with microtrichia and the inferior volsella has at least some apically split setae.

Of the six species described from China and Japan, *N. quatuorlobum* Yan *et al.*, 2005; *N. pandum* Qi *et al.*, 2014; *N. aristatum* Qi *et al.*, 2016; *N. bilobatum* Qi *et al.*, 2016; and *N. niidaense* Niitsuma, 2016 all belong to the *brayi* species group as the wings lack dark markings and the anal tergites have two dorsal projections. *Nilothauma angustatum* Qi *et al.*, 2016 has wings with dark markings and belongs to the *pictipenne* species group.

When placing the genera *Paranilothauma* Sponis, 1987 and *Neelamia* Sponis, 1987 as junior synonyms of *Nilothauma*, Mendes and Andersen (2009) broadened the generic diagnosis considerably. Species without the anal point and dorsal, setose projections on tergite IX were included in *Nilothauma*, while all species treated by Adam and Sæther (1999) had at least one dorsal, setose projection and all species except *N. insolitum* Adam and Sæther, 1999 (*pictipenne* group) from Ghana had anal points. Another distinct difference is that all the species treated by Adam and Sæther (1999) had the dorsal, setose projection(s) on tergite IX placed medially, while most species from the Neotropical Region with setose projections on tergite IX have two projections placed laterally on the tergite. The exception is *N. matogrossense* Mendes and Andersen, 2009 from Brazil, which has a single, large, median projection with about 45 strong setae. The variation in most other characters is large and the combination of characters used by Adam and Sæther (1999) to delimit their four species groups cannot be used to include most of the Neotropical species. Mendes and Andersen (2009) therefore refrained from grouping the Neotropical species.

All the new species described above have anal points. In addition, both *N. canaima* n. sp. and *N. granma* n. sp. have a single median, setose projection on tergite IX, a pediform superior volsella covered with microtrichia and apically split setae on the inferior volsella. Thus, on hypopygial features, they both fit in the *babiyi* group of Adam and Sæther (1999) together with the North American species *N. babiyi* (Rempel, 1937) and *N. verrucum* Adam and Sæther, 1999. However, *N. granma* n. sp. has distinct, dark areas on the wing and also in *N. canaima* n. sp. the wing has faint, dark areas. Wings with dark areas or spots are elsewhere only found in the *pictipenne* group, but the species in this group all have two dorsal projections on tergite IX. The species in this group is distributed in Africa and in Japan; no *Nilothauma* species with dark areas in the wing has so far been recorded from the New World.

*Nilothauma soka* n. sp. lacks dorsal projection(s) on tergite IX and can thus not be placed in any of the species groups suggested by Adam and Sæther (1999). The only other described *Nilothauma* species with the anal point, but without dorsal projection(s) on tergite IX is *N. aripuanense* Mendes and Andersen from Brazil. However, the two species are very different in several other hypopygial features. For instance, *N. soka* n. sp. has a boot-shaped superior volsella with microtrichia only, while in *N. aripuanense*, the superior volsella is narrow and weakly sinuous with microtrichia and a few apical setae.

Based on the males, the Neotropical *Nilothauma* species appear to be an aggregate of species with rather unique character combinations. Some of the species can be placed in the species groups proposed by Adam and Sæther (1999), but most of the species do not fit in any of the four groups. DNA sequencing should thus be attempted to develop a better understanding of the phylogeny of the genus.

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