

## Two new species of the genus *Chironomus* MEIGEN (Diptera: Chironomidae) from India

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**Abstract:** Adult male, pupa and larva of *Chironomus* (*Chironomus*) *securis* sp. n. and only adult male of *Chironomus* (*Chironomus*) *uncinus* sp. n. are described and illustrated from India. Till date the number of species so far described from India is 41 and 70 from the Oriental Region.

**Key Words:** *Chironomus*, India, life stages, new species.

### Introduction

The genus *Chironomus* MEIGEN (1803) is one of the most perplexed genera. The cosmopolitan genus comprises quite a good number of worldwide species distributed occurring in all continents from the high Arctic to the tropics except Antarctica (EPLER et al., 2013). The larvae occur in highly variable environments preferring lentic water while a few rarely in lotic water. Some species are either halophilous or halobiontic while others are acidophilic. It includes numerous groups of cryptic species which may be differentiated through cytogenetical and molecular analyses. So far 72 species from the Oriental Region and 36 from India are recorded under the genus (HAZRA et al., 2016).

The genus *Chironomus* is divided into four subgenera, viz, *Chironomus* s. str., *Chaetolabis* TOWNES (1945), *Lobochironomus* RYSER, WÜLKER & SCHOLL (1985) and *Austrochironomus* YAMAMOTO (2002). The male imago of the subgenus *Chironomus* s. str. is separable by the following characters: superior volsella small, indistinct, macrotrichiose lobe with abrupt transition into bare, variably digitiform apex. Likewise, the male imago of the subgenus *Chaetolabis* has the following distinguishing characters: superior volsella broad,

setose and microtrichiose, with short, differentially sclerotized, apically pointed apical or apicomedial extension. Similarly, the male imago of the subgenus *Lobochironomus* can be separated from other subgenera by the following combination of characters: superior volsella large, broad, setose and microtrichiose lobe tapered apically into bare, elongate, digitiform apex. The subgeneric diagnostic characters well fit the new species *Chironomus securis* sp. n., and *Chironomus uncinus* sp. n. into the subgenus *Chironomus*. The present paper describes two new species of the genus *Chironomus* under subgenus *Chironomus* from the Oriental region.

### Material And Methods

The live larvae taken out of soft mud of different lotic systems had been subjected to rearing following EPLER (1995). The individual larvae were reared in separate glass vials containing water and small amount substrate. The specimens have been microslide-mounted after phenol-balsam technique of WIRTH & MARSTON (1968). However, the larval and pupal exuviae of the one species got damaged due to improper mounting and is not suitable for study. The general terminology mostly follows SÆTHER (1980) and EPLER et al. (2013). Measurements of parts of all the life stages are

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expressed in micrometer ( $\mu\text{m}$ ) and the total length, length and breadth of wing of the adults, wing sheath of pupalexuviae in millimeter (mm) with ranges suffixed

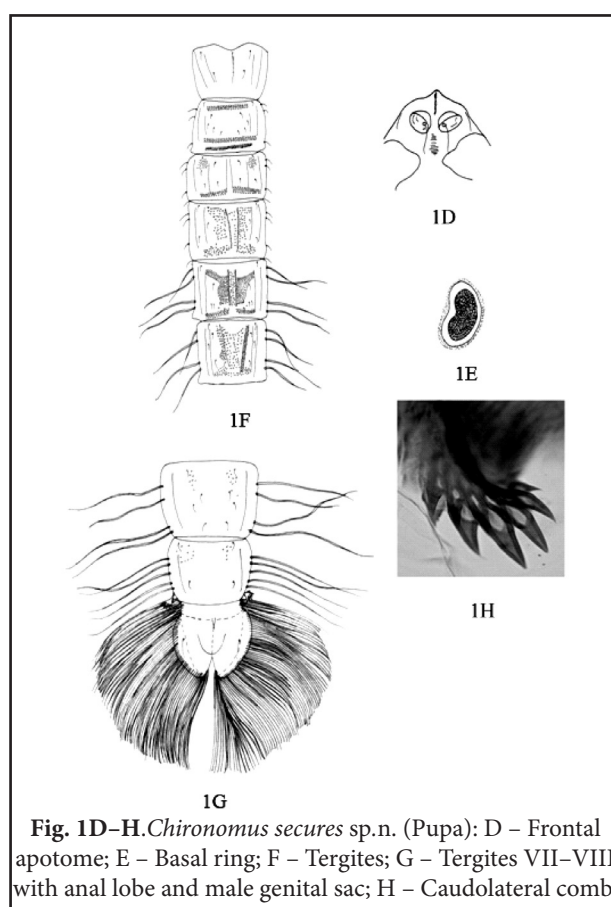
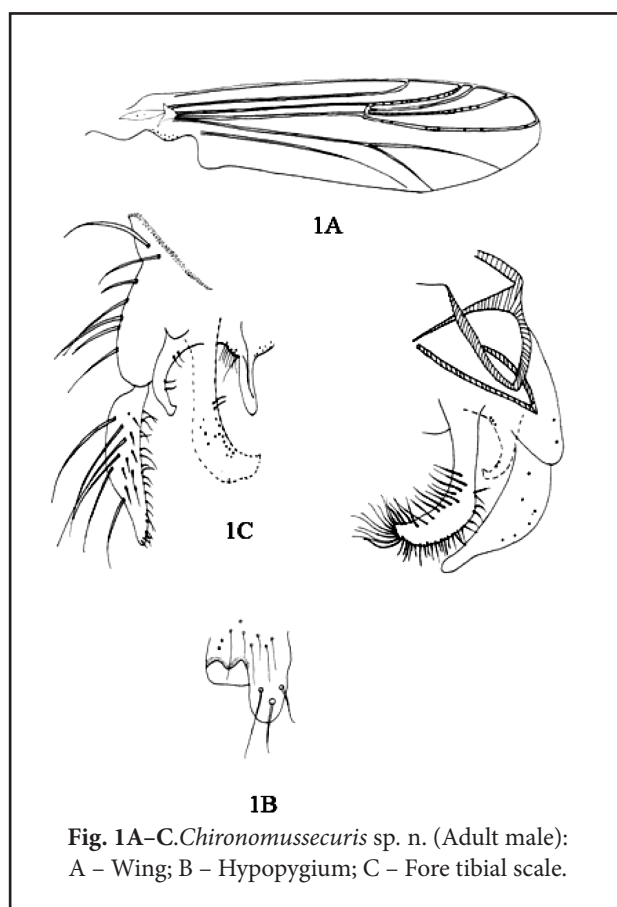
by “n” denoting the number of specimens measured in parentheses.

Table 1. Lengths ( $\mu\text{m}$ ) and proportions of leg segments of *Chironomussecuris* sp. n. (Adult male).

	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>	53–55	50–53	73–76	43–46	40–42	37–39	18–21	1.43–1.46	1.24–1.27	1.41–1.42	1.77–1.79
P <sub>2</sub>	60–63	65–69	30–33	20–22	16–19	10–13	08–11	0.46–0.47	2.53–2.87	4.00–4.16	2.00–2.02
P <sub>3</sub>	72–77	77–83	43–46	28–31	27–32	16–19	11–14	0.55–0.56	2.14–2.34	3.46–3.48	2.27–2.29

Table 2. Lengths ( $\mu\text{m}$ ) and proportions of leg segments of *Chironomusuncinussp.n.* (Adult male).

	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>	57–61	52–54	62–65	40–43	37–40	32–35	16–19	1.19–1.20	1.31–1.37	1.75–1.76	2.33–2.40
P <sub>2</sub>	54–57	52–55	25–27	20–23	15–18	10–13	09–11	0.48–0.49	2.14–2.42	4.15–4.24	1.25–1.32
P <sub>3</sub>	61–64	64–68	38–40	25–29	23–25	15–19	09–13	0.58–0.59	2.00–2.26	3.28–3.30	3.66–3.70



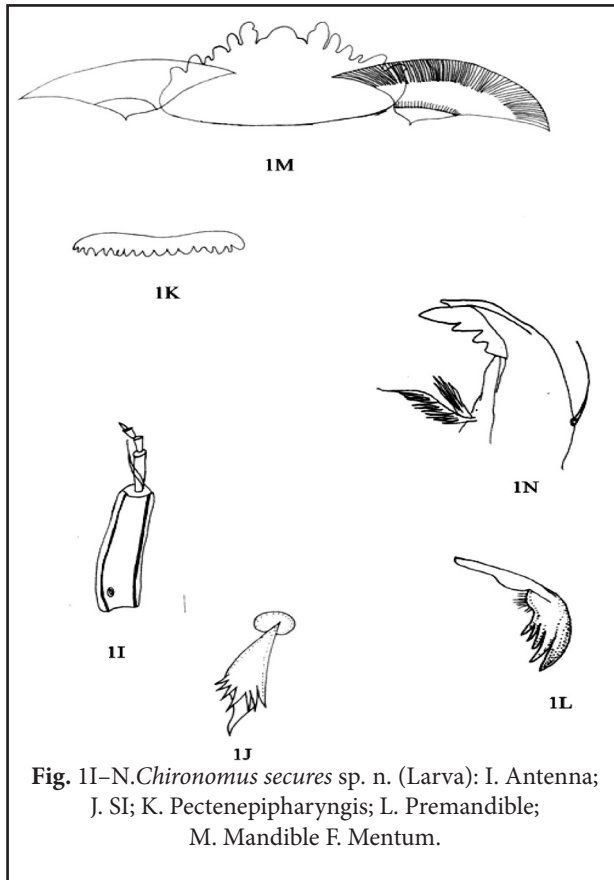


Fig. 1I–N. *Chironomus securis* sp. n. (Larva): I. Antenna; J. SI; K. Pectenepipharyngis; L. Premandible; M. Mandible; N. Mentum.

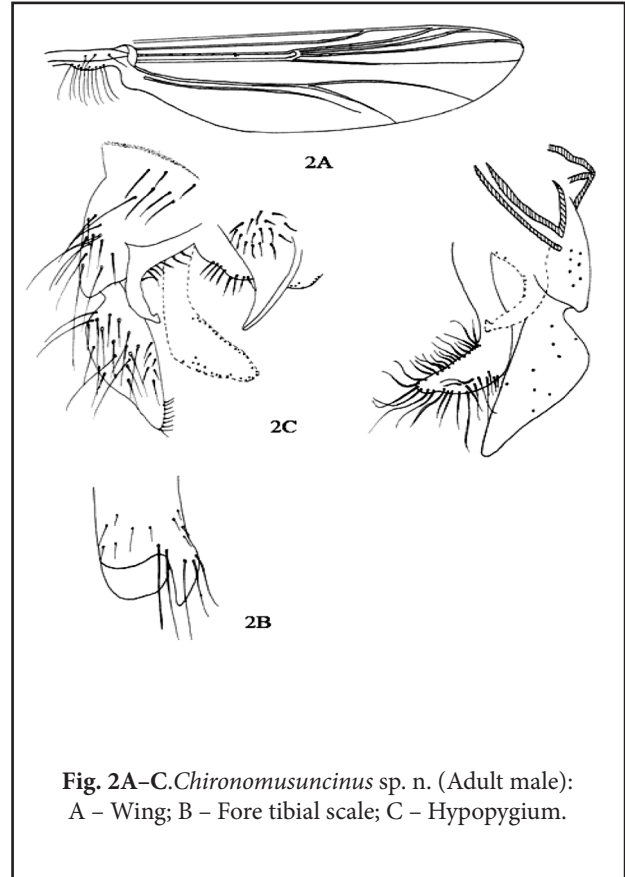


Fig. 2A–C. *Chironomus uncinus* sp. n. (Adult male): A – Wing; B – Fore tibial scale; C – Hypopygium.

All material examined are now retained with the collection of insects in the Entomology Division, Department of Zoology, The University of Burdwan, West Bengal, India and will be deposited to the National Zoological Collections (NZC), Kolkata.

## Results

### *Chironomus (Chironomus) securis* sp. n.

(Figs 1A–C, 1D–H, 1I–N)

**Material examined:** Holotype male with larval and pupalexuviae [reared] (Type no. B. U. Ent. 290), West Bengal: Kangsabati River, Narajole [22°29'N, 87°19'E], 23.III.2014, coll. S. Konar. Paratypes 6 males, same as holotype.

### Remarks

The new species bears similarity with *Chironomus apicatus* JOHANNSEN (1932) in the structure of the superior volsella but differs in the anal point and inferior volsella.

It resembles *Chironomus bipunctus* JOHANNSEN (1932) in anal point but both the volsellae are quite distinct from the above species. Similarly, the new species shows affinity with *Chironomus circumdatus* (KIEFFER, 1916) in the anal point and gonostylus but the structures of both volsellae segregate each other. The combinations of characters which propose the present species as a new member of the genus are: **Male imago.** i) Squama fringed with 11–14 setae, ii) inferior volsella chopper like extending well beyond the anal point with swollen apex, and iii) superior volsella digitiform inwardly curved with 4 setae at its inner margin; **Pupa.** i) Cephalic tubercle parabolic, ii) caudolateral comb on segment VIII with 3–4 stronger spines, 1–2 smaller subsidiary spines extending from the base of  $L_5$ , iii) anal lobe uniseriably fringed with 72–81 taeniae on each side; **Larva.** i) Pectenepipharyngis with 17 teeth, ii) mentum with trifold median teeth and 6 pairs of lateral teeth, and iii) ventromental plate with well-developed posterior lobes.

## Description

### Male imago (n = 7) (Figs 1A–C)

Total length 6.4–6.9 mm; wing length 2.20–2.26 mm. Total length/wing length 2.90–3.05; wing length/length of profemur 2.56–2.59.

**Coloration:** Golden brown. Anteprenotum brown. Pedicel golden yellow. Flagellum except base light dark brown. Maxillary palp light yellow. Legs brownish towards apices. Hypopygium golden brown.

**Head:** Eyes bare with 112–120  $\mu\text{m}$  long dorsomedian parallel sided extension. Temporal setae 14–15 (IV 2–4, OV 8–10, Po 3–5). Clypeus with 19–21 setae on each side. Tentorium 152–159  $\mu\text{m}$  long and 38–44  $\mu\text{m}$  wide at sieve plate. AR 5.4–5.6; ultimate flagellomere 1080–1085  $\mu\text{m}$  long; total antennal length 1280–1309  $\mu\text{m}$ . Length ratio of palpomeres (I–V) ( $\mu\text{m}$ ): 40–44: 92–96: 120–126: 72–78: 140–144. CA 0.42–0.45, CP 1.69.

**Thorax.** Acrostichals 10–12, irregularly biserial; dorso-centrals 12–14, uniserial; prealars 4–6, uniserial; scutellars 18–20, biserial; anteprenotals 3.

**Wing:** (Fig. 1A). Wing transparent without any markings. Anal lobe almost rounded. Squama with 11–14 setae. Brachiolum with 2 setae.  $R_{2+3}$  well separated from  $R_1$ . Number of setae at R 8–10,  $R_1$  13–17,  $R_{2+3}$  17–20 and  $R_{4+5}$  6–8. CR 0.96–0.98, VR 1.07–1.10.

**Legs:** Fore tibial scale (Fig. 1B) semicircular, 134–143  $\mu\text{m}$  long and 8–10  $\mu\text{m}$  wide with 3 setae. Mid tibia with 19–23  $\mu\text{m}$  long and 85–91  $\mu\text{m}$  wide closely approximated combs with two unequal spurs 43–48  $\mu\text{m}$  and 26–31  $\mu\text{m}$  long and 12–16  $\mu\text{m}$  and 15–19  $\mu\text{m}$  wide respectively; hind tibial comb 12–17  $\mu\text{m}$  long and 72–79  $\mu\text{m}$  wide with 26–31  $\mu\text{m}$  and 21–26  $\mu\text{m}$  long and 13–17  $\mu\text{m}$  and 15–19  $\mu\text{m}$  wide two unequal spurs respectively. Pulvilli of fore, mid and hind legs 22–26  $\mu\text{m}$ , 17–21  $\mu\text{m}$  and 20–23  $\mu\text{m}$  long, claw of fore, mid and hind legs 30–39  $\mu\text{m}$ , 27–29  $\mu\text{m}$  and 29–31  $\mu\text{m}$  long. Lengths ( $\mu\text{m}$ ) and proportions of leg segments as in table 1.

Hypopygium: (Fig. 1C). Anal point elongated, slender 116–118  $\mu\text{m}$  long with 8–10 basolateral setae. Anal crest U and anal tergite band V shaped. Sternapodeme 180–184  $\mu\text{m}$  long, phallapodeme 192–200  $\mu\text{m}$  long, and coxapodeme 92–97  $\mu\text{m}$  long. Gonocoxite 184–190  $\mu\text{m}$  long with 7–8 setae at outer side. Gonostylus 200–212

$\mu\text{m}$  long, stout, bulbous basally rather abruptly tapering to narrower apex, medially bearing 6–7 stout setae and 5–6 inner apical setae. Superior volsella 144–152  $\mu\text{m}$  long, digitiform, inwardly curved with 4 setae at inner margin. Inferior volsella 224–232  $\mu\text{m}$  long inwardly curved, more or less like a chopper extending well beyond the anal point with wider apex with 46–50 apical and subapical setae. HR 0.89–0.92, HV 3.2–3.3.

**Female:** Unknown.

### Pupa (n = 4) (Figs 1D–H)

Total length of exuviae 6.8–7.4 mm.

**Coloration:** Pale brown. Pale yellow margin at wing sheath, origin of antenna and margin of tergites.

**Cephalothorax:** Frontal apotome (Fig. 1D) triangular, 23–27  $\mu\text{m}$  long and 15–19  $\mu\text{m}$  wide. Parabolic shaped cephalic tubercles 72–84  $\mu\text{m}$  long and base 48–51  $\mu\text{m}$  wide, with 0.05–0.07  $\mu\text{m}$  long subapical frontal setae. Frontal warts absent. Thoracic horn plumose arising from oval basal ring (Fig. 1E), 192–197  $\mu\text{m}$  long and 94–98  $\mu\text{m}$  wide. Antennal sheath 0.99–1.22 long. Wing sheath 1.63–1.79 long.

**Abdomen** (Fig. 1F). Tergite I bare. T II with anterior and posterior transverse band of shagreen. T III with a posterior transverse band of shagreen, two anterior patches of shagreen. T IV–VI with continuous median longitudinal field of shagreen, T VII and T VIII with anterior pair of patches of fine shagreen. T II with hookrow consisting of ca 43–47 hooklets occupying 0.57–0.59 of segment width. Pedespurii B present. T II with 3 pairs of L setae placed at 0.2, 0.4 and 0.6 of segment length. T III with 4 pairs of L setae placed at 0.2, 0.4, 0.8 and 1.0 of segment length. T IV with 4 pairs of L setae placed at 0.2, 0.4, 0.8 and 1.0 of segment length. T V with 4 pairs of LSsetae placed at 0.21–0.23, 0.35–0.36, 0.78–0.80 and 0.89–0.90 of segment length. T VI with 4 pairs of LSsetae placed at 0.25–0.27, 0.40–0.41, 0.77–0.79 and 0.87–0.88 of segment length. T VII (Fig. 1G) with 4 pairs of LSsetae placed at 0.28–0.30, 0.40–0.42, 0.77–0.80 and 0.93–0.95 of segment length. T VIII (Fig. 1G) with 5 pairs of LSsetae placed at 0.36–0.39, 0.45–0.47, 0.69–0.70, 0.87–0.90 and 0.93–0.94 of segment length. Caudolateral comb (Fig. 1H) deep brown with 3–4 stronger spines, none dominant, 1–2 smaller subsidiary spines extending from  $L_5$  setal base. 72–81 taeniae

on anal lobe (Fig. 1G) and dorsal seta absent.

#### Larva (n = 2) (Figs 1I–N)

Total length 5.79–6.88. Head capsule 0.96–0.99 mm long and 0.64–0.68 mm wide.

**Color:** Mentum, mandible and postoccipital margin slightly dark brown in color.

**Antenna** (Fig. 1I). Basal antennal segment 106–116  $\mu\text{m}$  long, blade 64–67  $\mu\text{m}$  long, the length ratio of antennal segments (I–V) ( $\mu\text{m}$ ): 88–91: 36–38: 24–25: 23–24: 8–10 long respectively. AR 1.22–1.32. **Labro–epipharyngeal complex:** S1 (Fig. 1J) 15–21  $\mu\text{m}$  long, apically pointed, basally plumose, SII 38–42  $\mu\text{m}$  long, slender and with pointed tip. **Pectenepipharyngis** (Fig. 1K) with 16–19 teeth. **Premandible** (Fig. 1L) 73–77  $\mu\text{m}$  long, dark and with 5 teeth. **Mentum** (Fig. 1M). 208–211  $\mu\text{m}$  wide with trifold median teeth and 6 pairs of lateral teeth; ventromental plate 14–15  $\mu\text{m}$  wide, striae fine, straight and distance between plates 72–80  $\mu\text{m}$  with well–developed posterior lobes. **Mandible** (Fig. 1N) 244–256  $\mu\text{m}$  long with 4 teeth of different sizes and one dorsal tooth.

#### Etymology

The name, “*securis*”, refers to the Latinized version of chopper like inferior volsella of male hypopygium.

#### Distribution

Known only from Narajole, Mednipur, West Bengal, India.

#### *Chironomus* (*Chironomus*) *uncinussp. n.*

(Figs 2A–C)

#### Type material

Holotype male (Type no. B. U. Ent. 291), West Bengal: Kaligram, Gour River [23°19'N, 87°56'E], 10.V.2014, coll. S. Konar. Paratypes 4 males, data same as holotype.

#### Remarks

The new species shows closeness to *Chironomus-costatus* JOHANNSEN (1932) in anal point but differs in structure of inferior and superior volsellae. It resembles *Chironomus niger* CHAUDHURI, DAS & SUBLETTE (1992) in anal point and gonostylus but the shape of inferior and superior volsellae differ from each other. The species *Chironomus cyclus* DAS, MAJUMDAR,

MAZUMDAR & HAZRA (2015) and the present species are more or less similar in structure of curved anal point and presence of anal tergite setae while structure of inferior and superior volsellae disagrees in the above species. The adult male of the new species may be distinguished from all other species of *Chironomus* with the following combination of characters: **Male imago.** i) Anal tergite band V shaped with 15–18 setae, ii) anal point basally broad and apically pointed, iii) superior volselladigitiform, inwardly curved with 6 setae at base, and iv) inferior volsella hook shaped.

#### Description

##### Male imago (n = 5) (Figs 2A–C)

Total length 4.16–4.30 mm; wing length 1.92–1.98 mm; width of wing 0.66–0.69. Total length / wing length 2.16–2.17; wing length/length of profemur 2.03–2.10.

**Color:** Golden brown. Pedicel light brown. Flagellum light dark brown. Maxillary palp light yellow. Legs brownish towards apices. Hypopygium light brown.

**Head:** Eyes bare, with 192–208  $\mu\text{m}$  long dorsomedial parallel sided extension. Temporal setae 7–9 setae (IV 3–4, OV 4–5, Po 0). Clypeus with 20–22 setae on each side. Tentorium 142–147  $\mu\text{m}$  long and 35–38  $\mu\text{m}$  wide at sieve plate. AR 2.28–2.97; ultimate flagellomere 1120–1168  $\mu\text{m}$  long; total antennal length 1496–1680  $\mu\text{m}$ . Length ratio of palpomeres (I–V) ( $\mu\text{m}$ ): 9–10: 9–10: 17–18: 25–26: 27–28. CA 0.52–0.54, CP 2.26–2.34.

**Thorax:** Acrostichals 10–12, uniserial; dorsocentrals 7–9, uniserial; prealars 3–4, uniserial; scutellum with 4–5 setae, anteprenotals 2–4.

**Wing** (Fig. 2A). Wing transparent without any markings. Anal lobe almost indistinct. Squama fringed with 9–11 setae. Brachiolum with 2–3 setae.  $R_{2+3}$  well separated from  $R_1$ . Number of setae at R 7–8,  $R_1$  2–3,  $R_{2+3}$  4–5 and  $R_{4+5}$  3–5 setae. VR 1.02–1.03, CR 0.91–0.92.

**Legs:** Fore tibial scale (Fig. 2B) triangular, 127–133  $\mu\text{m}$  long and 7–10  $\mu\text{m}$  wide with 5–6 setae. Mid tibial comb 17–21  $\mu\text{m}$  long and 73–80  $\mu\text{m}$  wide with two unequal spurs 38–42  $\mu\text{m}$  and 21–29  $\mu\text{m}$  long and 11–15  $\mu\text{m}$  and 13–18  $\mu\text{m}$  wide respectively; hind tibia comb 14–19  $\mu\text{m}$  long and 62–70  $\mu\text{m}$  wide with two unequal spurs 40–50  $\mu\text{m}$  and 20–30  $\mu\text{m}$  long and 9–11  $\mu\text{m}$  and 14–16  $\mu\text{m}$  wide respectively. Pulvilli of fore, mid and hind legs

22–30 µm, 17–20 µm and 21–23 µm long, claw of fore, mid and hind legs 30–43 µm, 25–27 µm and 27–31 µm long. Lengths (µm) and proportions of leg segments as in table 2.

**Hypopygium** (Fig. 2C). Anal point broad basally, pointed toward apex, 148–153 µm long with 6–8 basolateral setae. Anal tergite band V shaped with 15–18 setae. Sternapodeme 168–172 µm long, phallapodeme 192–200 µm long and coxapodeme 120–125 µm long. Gonocoxite 240–245 µm long with 17–20 setae. Gonostylus 216–221 µm long, stout, bulbous with 9–10 setae on inner apex and 20–24 setae on outer margin. Superior volsella 132–137 µm long, with 6–7 basal setae, pointed inwardly bent apex. Inferior volsella 216–219 µm long extending well beyond the anal point with 30–38 apical and subapical setae. HR 1.10–1.11, HV 1.92–1.95.

**Female.** Unknown.

#### Etymology

The name, ‘*uncinus*’ refers to the Latinized version of hook like apex of inferior volsella of male hypopygium.

#### Distribution

Known only from Kaligram, Burdwan, West Bengal, India.

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