

## Description of a new species with three new records of *Tomocerus* Nicolet (Collembola: Tomoceridae) from India

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**ABSTRACT.** One new species and three new records of *Tomocerus* have been reported for the first time from India. The new species *Tomocerus sikkimensis* sp. nov. discovered from Gangtok, Sikkim (India) has been illustrated and described here. The new species differs from others in dental spine number, arrangement and mucro teeth number. *Tomocerus* (*Ocreatomurus*) *qinae* Yu, Yan & Liu, 2016, *Tomocerus* (*Tomocerus*) *minor* (Lubbock, 1862) and *Tomocerus* (*Ocreatomurus*) *paraspinulus* Gong, Qin & Yu, 2018 are the first time reported from the Indian states Arunachal Pradesh and West Bengal respectively. A key to the Indian species of *Tomocerus* has also been provided.

**Keywords:** Eastern Himalayas, fauna, key, new species, *Tomocerus sikkimensis*

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## INTRODUCTION

The genus *Tomocerus* was erected by Nicolet (1842), with *Macrotoma minor* Lubbock, 1862, as the type species, by designation under the Plenary Powers, Opinion 239. The members of the family Tomoceridae (Collembola) are very easily recognised due to their distinguishing features such as large body size (usually larger than 3 mm) metal coloured scales on the body, four segmented antennae usually longer than the body with 3<sup>rd</sup> segment longest and annulations on 3<sup>rd</sup> and 4<sup>th</sup> antennal segment. *Tomocerus ocreatus* complex members favour habitats rich in leaf litter, decaying wood and trees. Species of the *T. ocreatus* complex are more active and show the ability to jump or climb vertical

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surfaces due to its relatively large appendages, strong spines and mucro (Yu et al., 2017). Worldwide there are 65 species and 20 species under the subgenera *Tomocerus* and *Ocreatomurus* respectively, altogether nearly 213 species are found under the family Tomoceridae (Bellinger et al., 1996–2024). Presently, India represents only five species of *Tomocerus*, one of which is endemic (Mandal, 2018).

*Tomocerus (Striatomurus) vulgaris* (Tullberg, 1871) collected from Indian states Jammu and Kashmir, Uttar Pradesh, Uttarakhand. *Tomocerus (O) ocreatus* was described by Denis (1948) from Vietnam, later on, the species was reported by Yosii (1966) from the Himalayan range of Ladakh. *Tomocerus (T.) petalospinus* Salmon, 1969 reported from Himachal Pradesh, Jammu & Kashmir, Ladakh and Sikkim; *Tomocerus (T.) serratospinus* Salmon, 1969 found from Ladakh and Sikkim. *Tomocerus (T.) mitrai* Prabhoo & Muraleedharan, 1980, is endemic to India with distribution in Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Ladakh, Sikkim, Uttarakhand, Uttaranchal and West Bengal. After the present work, the species count of the genus *Tomocerus* from India will reach up to nine.

## MATERIAL AND METHODS

Specimens were collected from the field directly using an entomological aspirator and stored in 70% ethyl alcohol. Photographs were taken under a Leica® M205A stereomicroscope attached to a Leica® DMC6200 camera. For detailed observation specimens were de-pigmented using Nesbitt's solution and mounted on glass slides using Hoyer's Media (Walter & Krantz, 2009), further, morphological identification was carried out under Leica® DM 2500 attached to Leica DFC 295 camera, following the standard key of Bellinger et al. (1996–2024). Species-level identification for new records was done following the head chaetotaxy by Yu et al. (2014), tergal chaetotaxy named after Christiansen (1964), Dental spine formula followed that of Folsom (1913), spines are arranged from basal to distal in which each similar set of chaetae row separated by a comma, basal and middle section separated by a slash and remarkably large spines are denoted by bold numbers. Identifying morphological parts and chaetotaxy are drawn digitally using CorelDRAW® Suite 2021, version 23.1.0.389. SEM studies for further minute details of morphological parts were performed under a ZEISS® EVO 18 special edition. All the materials are deposited in NZC of Apterygota section, Zoological Survey of India, Kolkata.

**Abbreviations.** a.s.l.: Above sea level, **Abd. I–VI:** Abdominal segment I–VI, **Ant. I–IV:** antennal segment I–IV, **mac:** macrochaeta/-ae, **mic:** microchaeta/-ae, **Md:** Mandible, **Mx:** Maxillae, **NZC:** National Zoological Collection, **psp:** pseudopore, **PAO:** Postantennal organ, **Th. I–III:** Thoracic segment I–III, **Tita:** Tibiotarsus, **VT:** Ventral Tube, **ZSI:** Zoological Survey of India.

## RESULTS

### *Taxonomic hierarchy*

**Phylum Arthropoda Latreille, 1829**

**Class Collembola Lubbock, 1871**

**Order Entomobryomorpha Börner, 1913**

**Family Tomoceridae Schäffer, 1896**

**Subfamily Tomocerinae Schäffer, 1896**

**Genus *Tomocerus* Nicolet, 1842**

**Type species.** *Macrotoma minor* Lubbock, 1862

**Diagnosis.** Average adult body length ranges 3 mm or more, moderate-sized Tomocerinae, body colour pale grey to deep brown with deep purple pigment patches and covered with shiny deep blue or brown scales. Eyes 6+6, PAO sometimes present; trochanteral organ reduced to a trochantero-femoral organ with 1, 1 pointed slender seta; dens basal portion with many simple or complex spines and distal portion with ciliated, fathered chaetae; mucro elongated with numerous chaetae of elongated sockets, paired basal teeth with corner toothlet present, outer lamella with a varying (usually from 3–11) number of intermediate teeth.

***Tomocerus* (s. str.) *sikkimensis* Mandal, Kumari & Mandal sp. nov.** (Figs 1–5, Table 1)

<https://zoobank.org/urn:lsid:zoobank.org:act:A8B98863-1BB2-4177-AC17-9CFE7663A838>

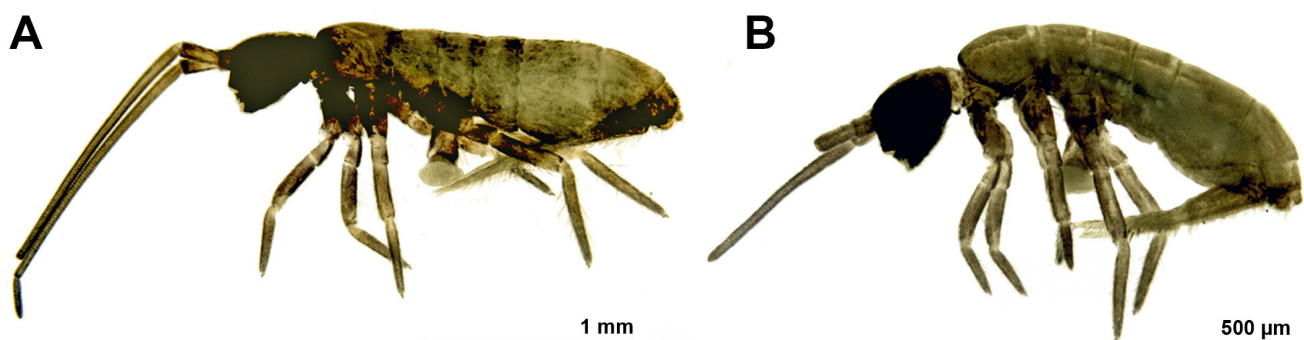
**Materials examined. Holotype:** 1 ♀ on slide, INDIA, Sikkim, Gangtok district, Lachen, 27°42'34"N, 88°33'43"E, 3248 m a.s.l., 9.ix.2022, G. P. Mandal leg., Reg. no- 3399/H14. **Paratypes:** 1 ♀ on slide, 12 specimens in alcohol, same data as holotype. Reg. no- 3585/H14; all materials are deposited at NZC, ZSI.

**Etymology.** The species name is given on its collection state name.

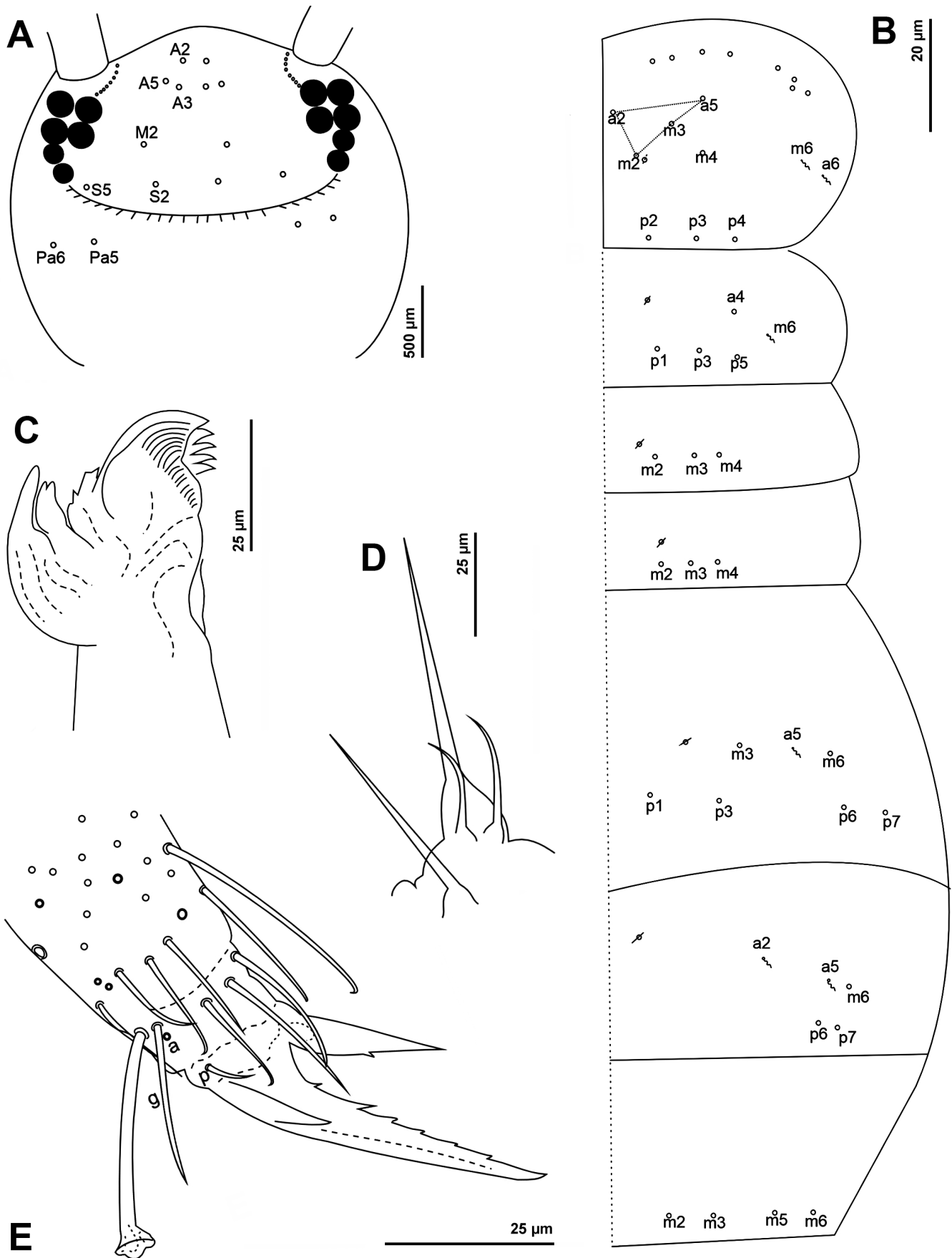
**Description.** — Average adult body length about 4.1 mm (without appendages). Body with brown scales, Ant. I–II all over-scaled, no scales on Ant. III–IV. Ant. III–IV with distinct annulations.

**Colouration.** (Fig. 1A–B) Body ground colour pale yellow/gray, anterior part of the mouth with purple pigmentation. Ant. I–II distally with a slight purple patch; pigment gradually darker from Ant. III–IV. Eyes in dark purple patches. Diffuse pigment patches present in lateral side of head and abdomen; legs coloured up to claw.

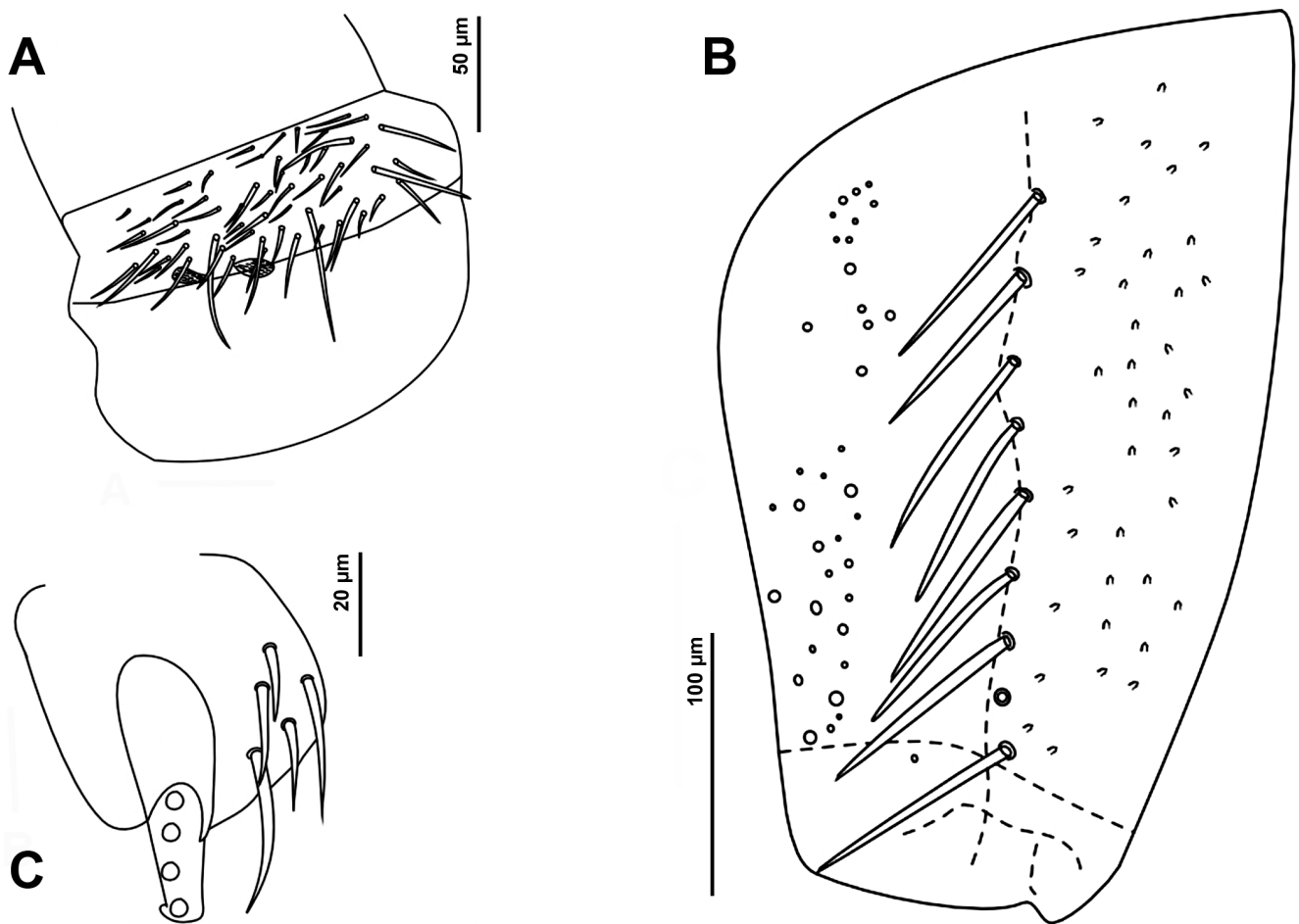
**Head.** Head with 6+6 eyes, PAO absent. Antennae: Cephalic diagonal ratio= 3.3: 1. Ant. I: II: III: IV ratio as 1:1.7:9.7:2.7. Cephalic dorsal macrochaetotaxy as Fig. 2A, anterior area each side 3, 3; interocular area each side 2, 4; post ocular area 2+2; posterior area 2+2. Posterior margin with numerous small chaetae. Labral formula 4/5, 5, 4; Md. with four apical and five basal teeth. Mx. general type (Fig. 2C) Outer lobe of maxillary palp with 1 large, 1 median and 2 small basal chaetae (Fig. 2D). Lateral process of labial palp not reaching the base. **Thorax.** Th. II bordered with a row of dense mac and few antero-lateral mac. Five central mac arranged in a triangle on Th. II (a2, m2, m3, m4, a5) and two bothriotracha (m6, a6) present on each side. 3+3 posterior mac present on both Th. II (p2–p4) and Th. III (p1, p3, p5) (Fig. 2B). Trochanterofemoral organ with 1, 1 slender chaeta. Ventral strong chaetae formula of Tita. I–III as 6–7, 5, 6–7. Unguis slender with baso-internal ridging visible, pointed paired lateral teeth present. Inner edge of unguis with basal tooth and 6 inner distal teeth, distal ones smaller. Unguiculus lanceolate with a single inner tooth. Tenent hair strong, clavate and slightly longer than inner edge of unguis; base of unguis with two-minute accessory chaetae; two thin and long guard chaetae (Figs 2E, 4A). **Abdomen.** Pattern of body chaetotaxy as in Fig. 2B. Two median mac on Abd III (m3, m6) and Abd. IV with one medio-lateral mac (m6). Abd. I–V posterior row mac formula- 3 (m2–m4), 3 (m2–m4), 4 (p1, p3, p6, p7), 2 (p6, p7), 4 (m2, m3, m5, m6). Abd. VI with numerous moderate-size chaetae, most of them on the lateral and posterior side. Formula of midline pseudopores of terga as 1, 1, 1, 1, 0, 0. Abd. III and Abd. IV with one and two bothriotracha respectively. Ventral tube scaled with numerous posterior and 57–60 lateral flap chaetae (Fig. 3A). Rami of tenaculum with 4+4 teeth, anterior face of corpus with 5 chaetae (Fig. 3B). Ratio of manubrium: dens: mucro 3.5: 4.2: 1. Manubrium ventrally scaled, lateral side with 10–11 strong spinous chaetae (Fig. 3C). Dental spines with numerous denticles, total 19 spines arranged as 2, 5, 5/ 5(6), II (Figs 4B, 5A–B); proximal part with three distinct rows (Figs 4C, 5C). Mucro elongated with paired basal and 4 intermediate teeth; numerous smooth chaetae with elongated sockets present (Figs 4D, 5D).



**Figure 1.** *Tomocerus* (s. str.) *sikkimensis* sp. nov., A–B. Paratypes, lateral view of habitus.



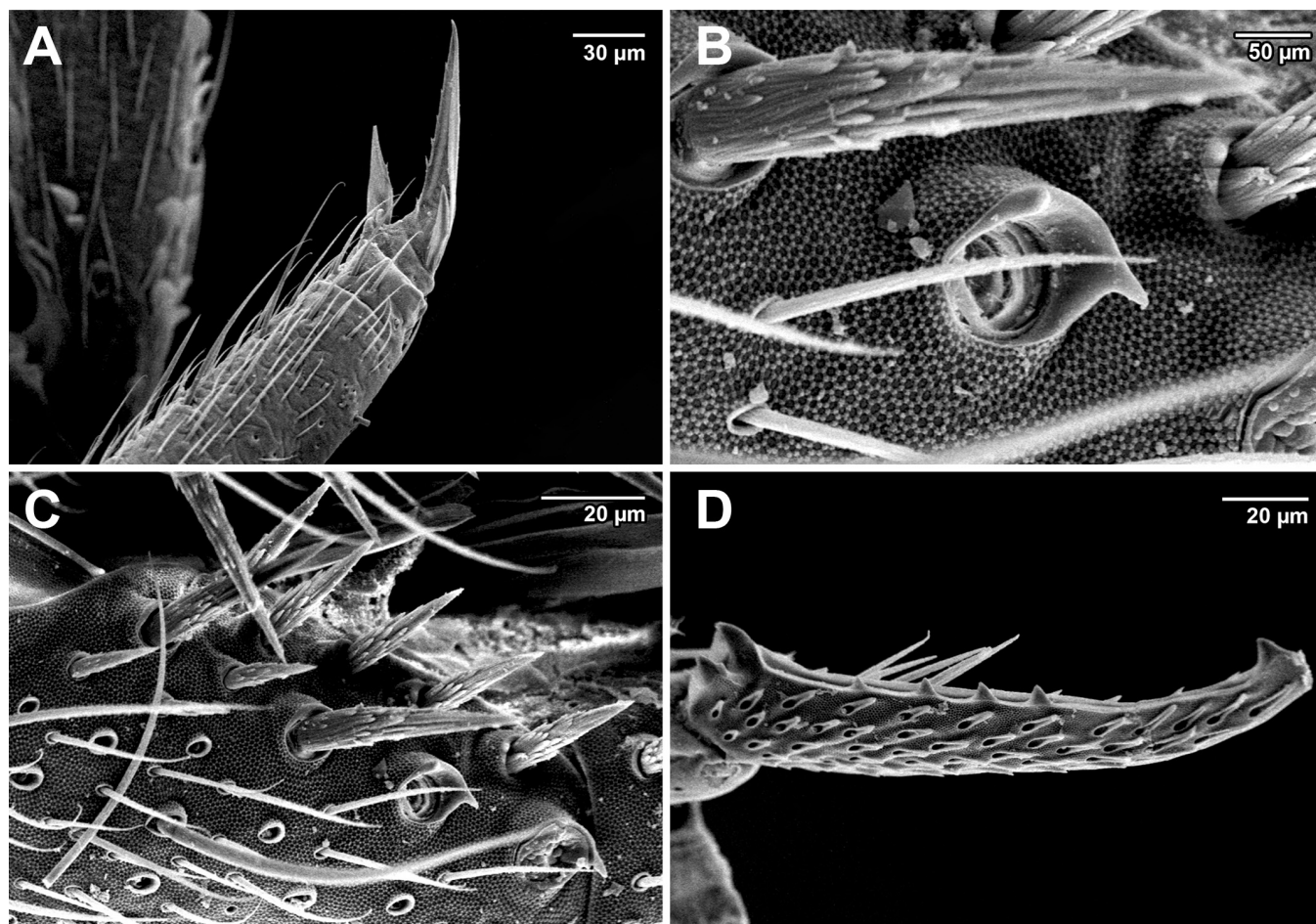
**Figure 2.** *Tomocerus* (*s. str.*) *sikkimensis* sp. nov., **A.** Chaetotaxy of the head; **B.** Chaetotaxy of thorax and abdomen; **C.** Maxilla; **D.** Outer lobe of maxillary palp; **E.** Fore claw.



**Figure 3.** *Tomocerus* (*s. str.*) *sikkimensis* sp. nov., **A.** Ventral tube; **B.** Tenaculum, **C.** Manubrial chaetotaxy.

**Table 1.** Comparison of the new species with closely related species of *Tomocerus* (*s. str.*) in the world.

Characteristics	<i>T. sikkimensis</i> sp. nov.	<i>T. conagenesis</i> Sun, Liang & Huang, 2006	<i>T. nepalicus</i> Yosii, 1971	<i>T. zayuensis</i> Huang & Yin, 1909	<i>T. asoka</i> Yosii & Ashraf, 1965
No. Dental spines	19	10-15	13-15	11-12	9
Proximal dental spine rows	3 with two strong and big dental spines at the distal part of the dens	2-3 with 1 strong and big dental spine at the distal part of the dens	2 with 2-3 strong and big dental spines at the distal part of the dens	1 with two strong and big dental spines at the distal part of the dens	1 with one strong and big dental spine at the distal part of the dens
Dental spine formula	2, 5, 5 / 5, II	7-9/ 3-6, II	7-8/ 3, II-III	5-6/ 4, II	4/ 4, I
Shape of dental spines	Simple with evenly distributed numerous small denticles.	Simple with evenly distributed numerous small denticles.	Simple with evenly distributed numerous small denticles	Simple with evenly distributed numerous small denticles	Finally ciliated equally upon their whole length
Intermediate teeth of mucro	4	5	6	5	7
Unguis teeth	6	5	5-6	4-6	4
Unguiculus	Lanceolate with 1 inner tooth	Lanceolate with 1 inner tooth	Acuminate, with or without inner tooth	Lanceolate, with 0-1 very minute tooth	Lanceolate, untoothed
Ventral tube scale	Scaled	Unscaled	Unscaled	Scaled	-



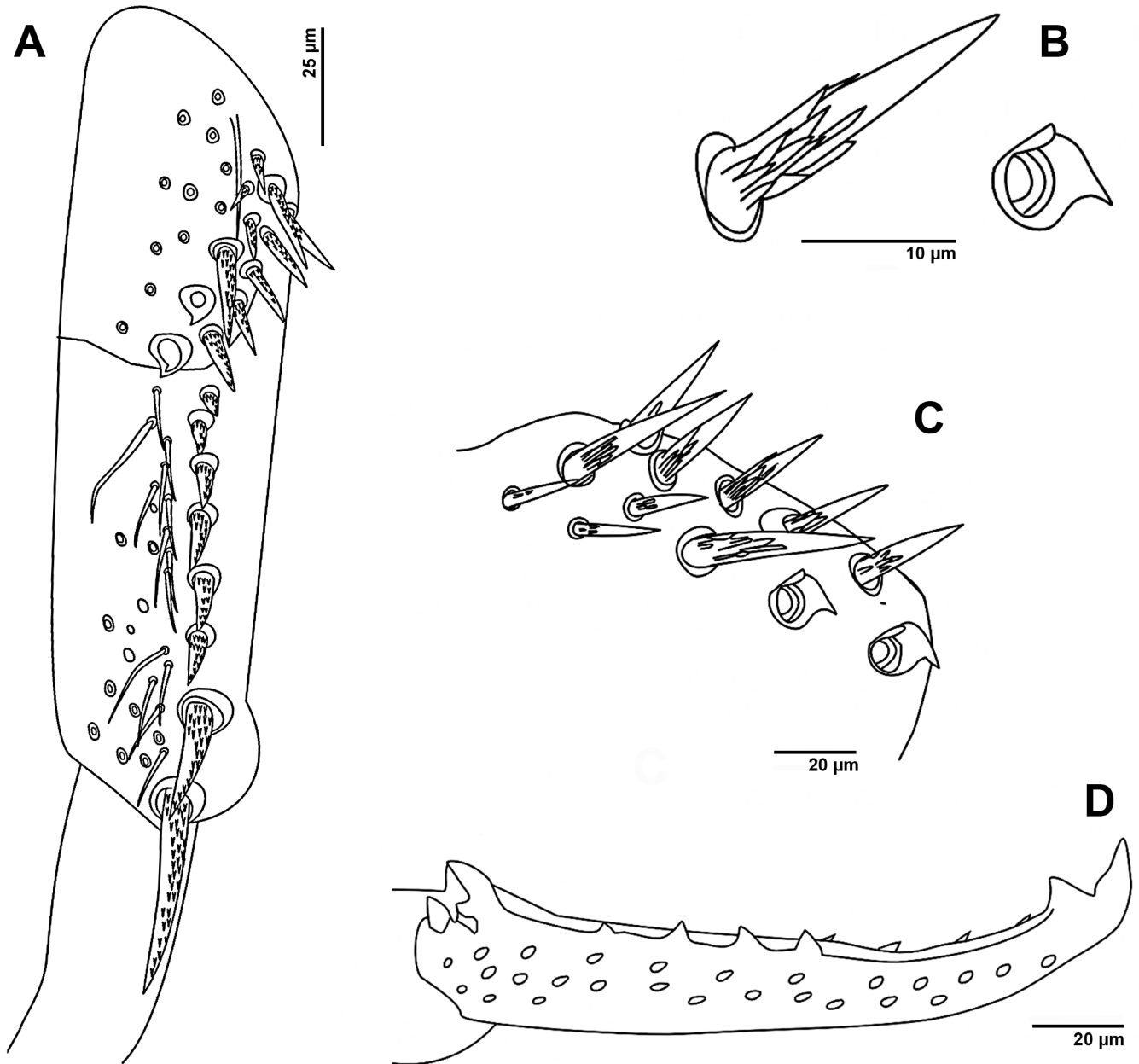
**Figure 4.** *Tomocerus* (*s. str.*) *sikkimensis* **sp. nov.** SEM images of **A.** Fore claw; **B.** Socket of dental basal spine; **C.** Arrangement of dental basal spine; **D.** Mucro.

**Remarks.** *Tomocerus* (*s. str.*) *sikkimensis* **sp. nov.** is characterised by the presence of three rows of proximal dental spines and two large distal dental spines, 4 mucronal teeth, scaled ventral tube, 6 unguis teeth, this species is closely related to the species *Tomocerus* (*s. str.*) *conagensis* Sun, Liang & Huang, 2006. The new species also has a similarity with *T.* (*s. str.*) *nepalicus* Yosii, 1971 in dental basal spine arrangement but dissimilar in mucro teeth number. Details of other differential characters of the new species with other related species are reflected in [Table 1](#).

***Tomocerus* (*Tomocerus*) *minor* (Lubbock, 1862) (Fig. 6A–D)**

**Material examined.** 2 specimens, INDIA, West Bengal, Darjeeling district, Singalila National park, 1 km North-East from Gairibas WB Govt. Rest House, 27°03'04.54"N, 88°01'59.91"E, 2577 m a.s.l., 28.ii.2021, K. K. Suman leg., Reg no.– 3056/H14.

**Description.** Ground colour of body pale yellow with antennal joining pigmented and gradually darken from Ant. III–Ant. IV. Purple patches extended on lateral side of Th. II–Abd. II, coxa and femur of foreleg sometimes with dark purple patch (Fig. 6A). Ant. I: II: III ratio as 1: 1.9: 7.6, Ant. IV missing. Antenna: head diagonal ratio 3.18: 1. Ocelli 6+6 dark purple coloured, PAO absent. Prelabral chaetae 4, labral chaetae formula 5, 5, 4; all smooth. Md. with four apical and seven basal teeth. Labial palp with four chaetae, apex of lateral process not reaching the base. Brown-coloured scales present on all over the body. Trochanteral-femoral organ with 1, 1 chaeta. Strong chaetae formula of fore to hind tita as 6, 6, 7. Tenet hair clavate, small accessory chaetae, and guard chaetae almost equal lengths of tenet hair.

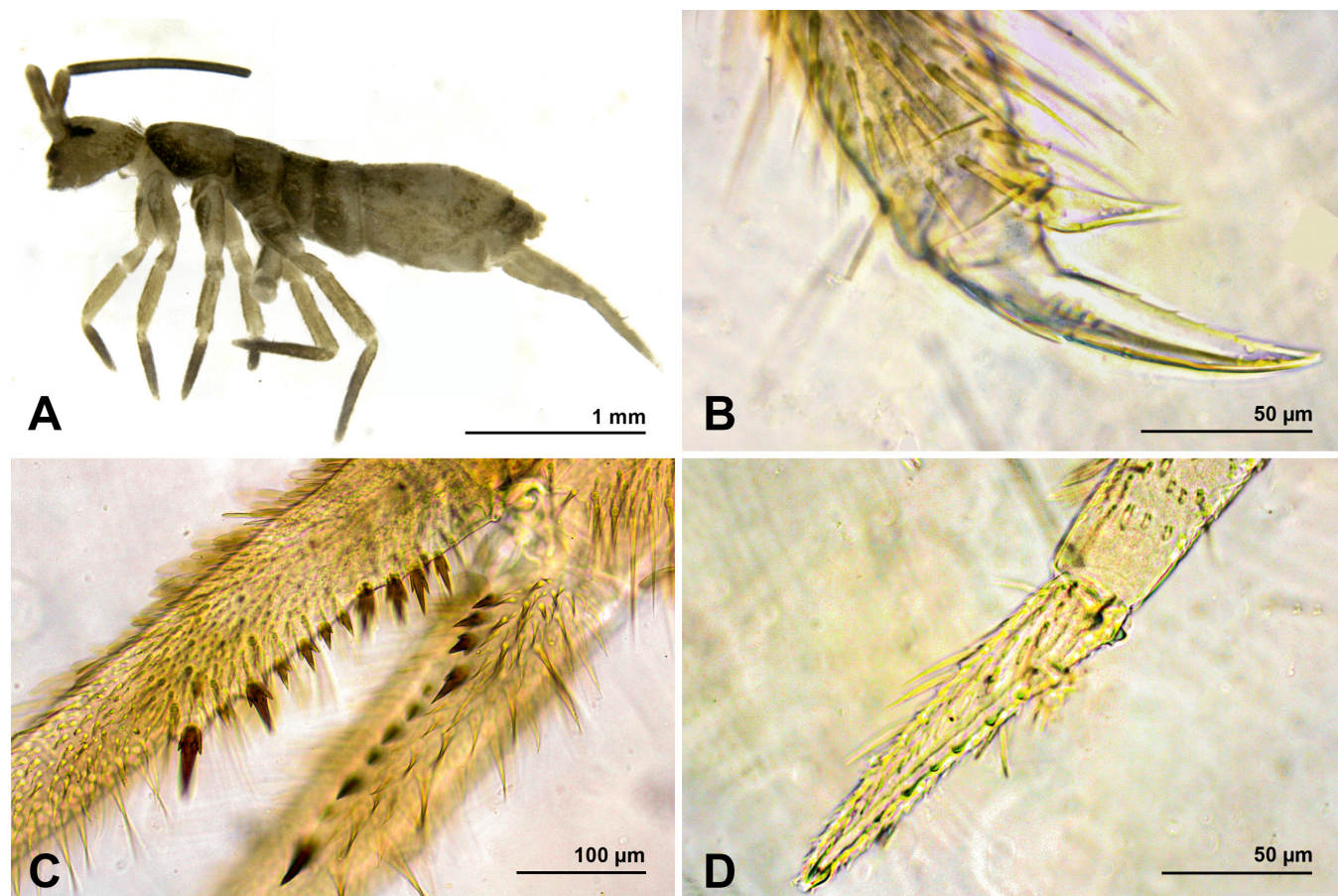


**Figure 5.** *Tomocerus* (*s. str.*) *sikkimensis* **sp. nov.** Diagram of **A.** Furcula; **B.** Dental spine and socket; **C.** Basal part of dens with spine; **D.** Mucro.

Unguis slender with distinct basal paired, 6 distal pointed inner and paired lateral teeth present. Unguiculus lanceolate with one-minute inner tooth (Fig. 6B). Corpus of tenaculum with 11 chaetae and rami with 4 teeth, scales absent. Ratio of manubrium: dens: mucro 10.7: 14: 1. Manubrium laterally with large round scales, 1-2 large chaetae on proximal side and 9 spinous chaetae. Dorsal dental basal part with a prominent pointed dorsal chaetae and simple and plumose chaetae. 12 tridentate dental spines arranged as 5/3-4, I, 1-2, I (Fig. 6C). Mucro with paired basal tooth with toothlet, outer lamella with 6 intermediate teeth and small apical and subapical teeth (Fig. 6D).

**Differential diagnosis.** *Tomocerus minor* is characterised by tridentate denticles of dental spine arranged in a single row with two large distal spines with 1-2 intermediate small spines.

**Habitat and distribution.** Found under moss vegetation surrounding leaf litter on the way to Gairibas Hill Stream, Singalila National Park, India. The species is common in all parts of Europe.



**Figure 6.** *Tomocerus (Tomocerus) minor* (Lubbock, 1862). **A.** Specimen in alcohol; **B.** Fore claw; **C.** Dens; **D.** Mucro.

*Tomocerus (Ocreatomurus) paraspinulus* Gong, Qin & Yu, 2018 (Fig. 7A–B)

**Material examined.** 1 specimen on slide, INDIA, West Bengal, Darjeeling district, Singalila National Park, Gairibas, Red Panda Site, collected from leaf litter, 27°09'3.6"N, 87°13'58.8"E, 909 m a.s.l., 28.ii.2021, K.K. Suman leg., reg. no.- 3101/ H14.

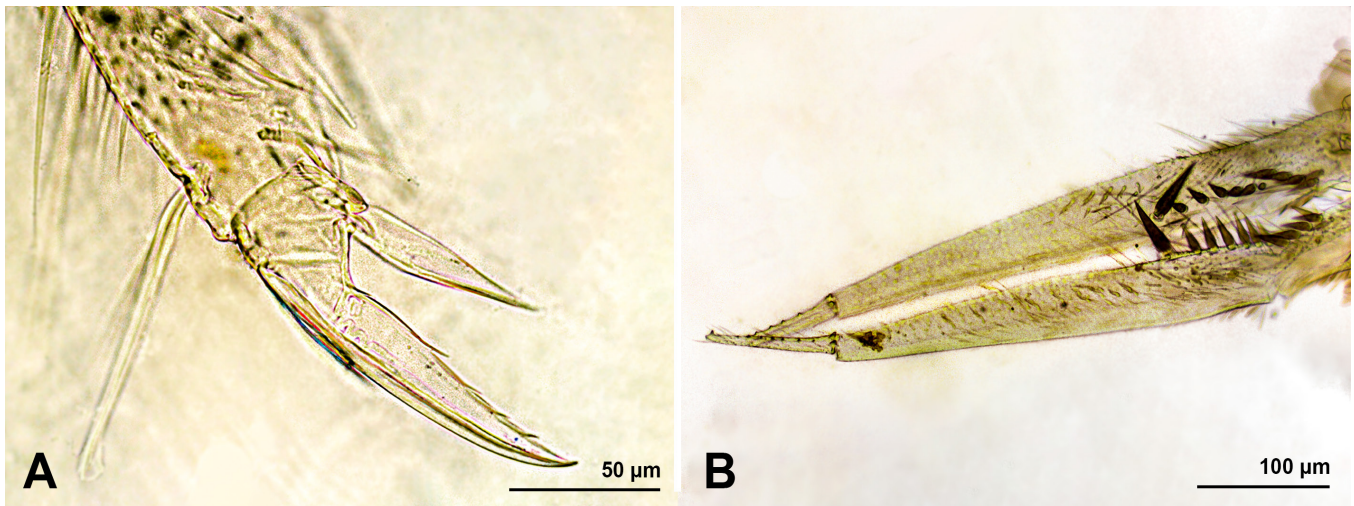
**Description.** Adult body length about 1.12 mm. Ground colour pale yellow to light brown (in alcohol), Ant. I–II distally purple pigmented, Ant. III–IV missing. Eye patches black and frontal area of head with purple pigment. Rest of body without any pigment. Body covered with distinctly striated rounded or truncated scales. Ratio of Ant. I: II: III – 1: 1.19: 5.23. Eyes 6+6, head diagonal: body length– 1: 4.47. Head chaetotaxy same as per Gong et al., 2018. Labral formula as 4/5, 5, 4; all smooth, anterior portion with four curved denticles. Labial palp with 4 chaetae, tip of lateral process not reaching the base. Unguis with basal paired, two lateral, one external and 4–5 internal teeth. Unguiculus lanceolate with an inner tooth, sometimes absent on fore claw (Fig. 7A). Trochantero-femoral organ with 1+1 chaetae. Tita I–III with 8, 8, 7 spine-like chaetae respectively on its ventral side. Tenent hair clavate. Mac and bothriotracha of abdomen not very different from the original description. Retinaculum quadridentate with 19 chaetae on corpus. Manubrium: dens: mucro ratio as 2.87: 4.11: 1.

Manubrium with large corner chaetae and 10 spines like chaetae laterally. Dental spine formula– 5/6, I; serrated spines with evenly distributed small denticles, basal spines gradually increase in length. Mucro setaceous with paired basal, 6–7 intermediate, large apical and slightly small subapical tooth (Fig. 7B).

**Distribution in India.** West Bengal (Darjeeling).

**General distribution.** Sino-Japanese region.





**Figure 7.** *Tomocerus paraspinulus* Gong, Qin & Yu, 2018. **A.** Fore claw, **B.** Furcula.

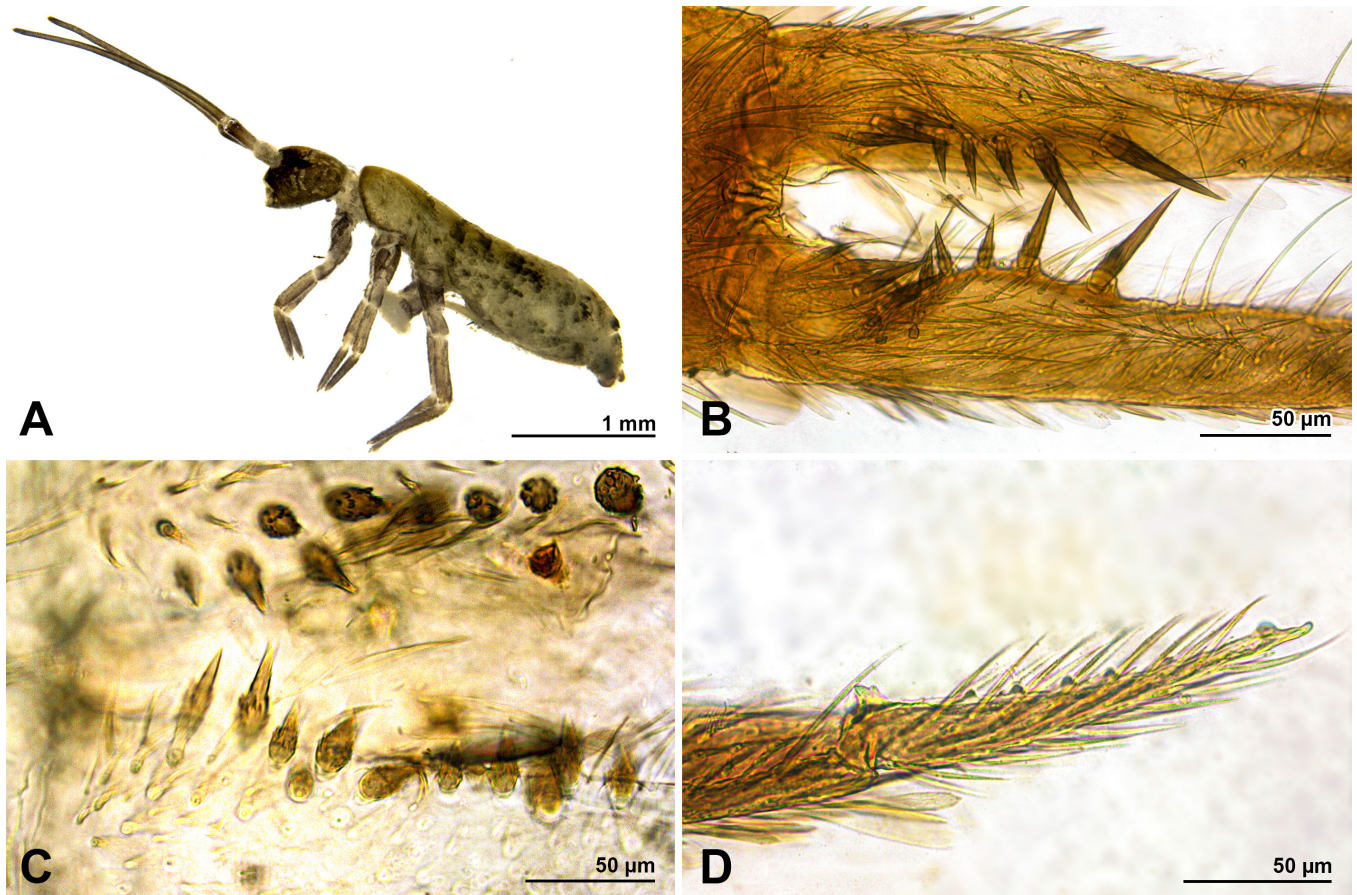
**Remarks.** The species is first time reported from India as well as the state of West Bengal. *T. paraspinulus* has close similarity with *T. spinulus* Chen & Christiansen, 1998 and *T. pseudospinulus*, though differs from them in having a blunt prominent chaeta on manubrium.

***Tomocerus (Ocreatomurus) qinae* Yu, Yao & Hu, 2016 (Fig. 8A–D)**

**Material examined.** 12 specimens, INDIA, Arunachal Pradesh, Tawang district, Tawang, collected from moss and leaf litter surrounding snowflakes. 27°36.918'N, 91°51.913'E, 3417 m a.s.l., 01.iv.2023, G.P. Mandal leg., Reg no. 3536/H14, deposited in NZC of ZSI.

**Description.** Body length about 3.15 mm. Body scaled. Ground colour–yellow with diffused light purple pigmentation on the anterior part of the head. Ant. I–II have slight purple infusion, Ant. III is gradually darker from base to tip continuing to Ant. IV. Eyes in purple patches. Th. II and Th. III with purple pigment on the lateral side (Fig. 8A). PAO absent, 6+6 eyes present. Ant. I: II: III: IV ratio as 1: 1.4: 8.5. Ant. I and Ant. II with scales. Ant. III–IV with annulations instead of scales. Antenna: cephalic diagonal ratio 3.9: 1. Labral chaetae formula as 4/5, 5, 4. Dorsal cephalic chaetotaxy– anterior area: 2, 4; interocular area: 2, 7 and with central chaeta; postocular area: 2+2; posterior area; 2+2. Numerous small chaetae present on posterior head margin. Bothrioticha arrangement from Th. II–Abd V: 2, 1, 0, 0, 1, 2, 0. Body macrochaetae arrangement formula as Th. II–Abd V: 3, 3, 3, 3, 4, 2, 4. Th. II–Abd V each segment with one pseudopore. Trochantero-femoral organ with 1, 1 slender chaetae. Strong ventral chaetae formula of tita I–III as 6, 6, 7. Tenent hair clavate; 2 minute accessory chaetae, 2 thin and long guard chaetae present. Unguis with a basal toothlet, 5 inner distal teeth. One internal tooth present on unguiculus. VT scaled with numerous chaetae. Tenaculum quadridentate, anterior face of corpus with 5–6 chaetae. Ratio of Manubrium: dens: mucro– 2.95: 4.05: 1. Manubrium with large round scales and 9–10 stout spinous chaetae. Dental spine formula–5/4, II; moderate size numerous denticles present, distal spine strongest (Fig. 8B). Outer lamella of mucro with with 4–5 intermediate teeth (Fig. 8D).

**Remarks.** In our collection, one specimen has one side of the dens with a malfunctioned arrangement (Fig. 8C) of dental spines in a zig-zag row. The species has similarity with *T. ocreatus* Denis, 1948, *T. leyensis* Yu & Deharveng, 2018, *T. virgatus* Yu, Qin, Ding, Hu, Zhang & Liu, 2018, *T. yueluensis* Yu, Qin, Ding, Hu, Zhang & Liu, 2018, in shape of dental spines, but differs from them in number of dental spines, mucronal intermediate teeth and unguis inner teeth number.



**Figure 8.** *Tomocerus (Ocreatomurus) qinae* Yu, Yao & Hu, 2016. **A.** Habitus; **B.** Dental spine; **C.** Malformed dental spine arrangement; **D.** Mucro.

### Key to the Indian species of *Tomocerus* Nicolet, 1842

- |   |   |   |
|---|---|---|
| 1 | Dental spines complex with 3 or more large denticles. ....  | 2   |
| – | Dental spines simple or smooth; finely striated. ....       | 3   |
| 2 | Dental spines with more than three petaloid denticles. .... | <i>T. (T.) petalospinus</i> Salmon, 1969            |
| – | Dental spines with three large denticles. ....              | <i>T. (T.) minor</i> (Lubbock, 1862)                |
| 3 | Corpus of tenaculum with 2 chaetae. ....                    | <i>T. (T.) mitrai</i> Prabhoo & Muraleedharan, 1980 |
| – | Corpus of tenaculum with more than 4 chaetae. ....          | 4   |
| 4 | Mucro with three prominent intermediate teeth. ....         | <i>T. (T.) serratospinus</i> Salmon, 1969           |
| – | Mucro with more than three intermediate teeth. ....         | 5   |
| 5 | Dens with single distal stout, large spine. ....            | <i>T. (O.) paraspinulus</i> Gong, Qin & Yu, 2018    |
| – | Dens with two distal stout, large spines. ....              | 6   |
| 6 | Distal dental spine arranged as 1, 1–3, 1. ....             | <i>T. (S.) vulgaris</i> (Tullberg, 1871)            |
| – | Distal dental spine arranged as 1, 0, 1. ....               | 7   |
| 7 | Mucro with 4 intermediate teeth. ....                       | <i>T. (s. str.) sikkimensis</i> sp. nov.            |
| – | Mucro with 5–9 intermediate teeth. ....                     | 8   |
| 8 | Dental basal part with 3 spines. ....                       | <i>T. (O.) ocreatus</i> Denis, 1948                 |
| – | Dental basal part with 4–5 spines. ....                     | <i>T. (O.) qinae</i> Yu, Yao & Hu, 2016             |

## DISCUSSION

*Tomocerus* comes under the subfamily Tomocerinae Schäffer, 1896 which is one of the earliest derived collembolan lineages (Sun et al., 2020) characterized by distinctly large body size (3–8 mm), strong dental spine and elongated, hairy mucro (Yu et al., 2021). Unlike other Collembola groups, *Tomocerus* has relatively less taxonomic characters and more constant body chaetotaxy (Zhang et al., 2019; Potapov, 2001). However, in recent years more detailed observation and potential characters such as bothriotricha of mesothorax (Yu et al., 2016), strong spinous chaetae of inner tita (Felderhoff et al., 2010), shape and arrangement of denticle of dental spines (Zhang et al., 2014) have been taken into consideration for supra-specific and specific level of classification. *Tomocerus* (*s. str.*) *sikkimensis* **sp. nov.** holds its novelty in dental spine number and arrangement on dens, intermediate teeth of mucro which discriminate it from the other related species like *T. (s. str.) conagenesis*, *T. (s. str.) nepalicus* and *T. asoka*. *Tomocerus qinae* of our collection has relatively short Ant. III and difference in colour pattern to that of the species described from China. Presently family Tomoceridae possesses 213 species worldwide and genus *Tomocerus* has 99 species distributed among five sub-genera (Bellinger et al., 1996–2024). India enlisted five species of *Tomocerus* under two sub-genera (Mandal, 2018), after the present finding additional four species will be added to that list. Although two species namely *Tomocerus bajalis* Mehra, Verma, Verma & Vyas, 2009 and *Tomocerus neuceratus* Verma & Yadav, 2019 were described from India, we are excluding them as they are not described properly [following the ICZN - Articles no. 72 & 73] (Mehra et al., 2009; Verma & Yadav, 2019). India encompasses 30% of the land area covered with mountains and the members of this family are commonly found in higher altitudes so more habitat exploration and taxonomic investigation are needed.

## AUTHOR'S CONTRIBUTION

The authors confirm their contribution to the paper as follows: G.P. Mandal: Survey and project supervisor, reviewer, identifier of specimen; S. Kumari: Manuscript preparation and Identification. P. Mandal: Identifier and revised the manuscript; K.K. Roy and K.K. Suman: Specimen collection and reviewing; K.K. Bhattacharya: Review of manuscript; All authors approved the final version of the manuscript.

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## AVAILABILITY OF DATA AND MATERIAL

The specimens described in this study are deposited in the National Zoological Collections of ZSI (Zoological Survey of India) and are available from the curator, upon request.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study only included plants and arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

## CONSENT FOR PUBLICATION

Not applicable.

## CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

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## توصیف یک گونه جدید و معرفی سه گزارش گونه از جنس *Tomocerus* Nicolet (Collembola: Tomoceridae) از هند

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**چکیده:** یک گونه جدید و سه گزارش گونه از جنس *Tomocerus* برای اولین بار از هند ثبت شدند. گونه جدید به نام *Tomocerus sikkimensis* sp. nov. از منطقه گانگتوک، سیکیم (هند) کشف و در این مقاله تصویربرداری و توصیف شد. این گونه جدید از نظر تعداد خار دندان، ترتیب و تعداد دندانهای mucro از دیگر گونه‌ها متمایز می‌شود. سه گونه دیگر شامل *Tomocerus (Ocreatomurus) qinae* Yu, Yan & Liu, 2016، *Tomocerus (Ocreatomurus) paraspinulus* Gong, Qin & Yu, 2018 و *(Tomocerus) minor* (Lubbock, 1862) برای اولین بار از ایالت‌های آروناچال پرادش و بنگال غربی گزارش شدند. کلید شناسایی گونه‌های جنس *Tomocerus* در هند نیز ارائه شد.

**واژگان کلیدی:** هیمالیای شرقی، فون، کلیدشناسایی، گونه جدید، *Tomocerus sikkimensis*