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A NEW SPECIES OF *DICRANOCENTROIDES* (COLLEMBOLA: PARONELLIDAE) FROM INDIA

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Abstract: A new species, *Dicranocentroides duduaensis* sp. nov., is described from the Dudhwa Tiger Reserve, Uttar Pradesh, India. A key to the Indian species of the genus is also provided.

Keywords: Brushsetae, chaetotaxy, pigment, patterns.

Abbreviations: Ant. - antennae; Th. - thorax; Abd. - abdomen; NZC/ZSI- National Zoological Collection/Zoological Survey of India.

The genus *Dicranocentroides* was established by Imms (1912) with *Dicranocentroides fasciculatus* Imms, 1912 as its type species. The main characters of this genus include: body with scales, antennae longer than or equal to half the length of trunk, mesothorax not humped, metathorax not strongly bent, eyes 8+8, vertex with macrochaetae, genal and occipital areas of head with three macrochaetae (Mitra, 1993), manubrium without spines, dens with spines, mucro 1.5 times as long as basal width, mucro sharply separated from dens, mucro with more than three teeth. Sexual dimorphisms have been reported in *D. fasciculatus* Imms (Mitra, 1975).

Mitra (1975) synonymised *Paronella travancorica* Imms, 1912 with *Dicranocentroides indica* (Handschin, 1929) and this synonymy is confirmed here. A total of five species in this genus are known from India. There are 19 species of *Dicranocentroides* known from the world. The distribution of the genus outside India is Malaysia, Java, Sumatra and Thailand. Species' habitats are fallen leaves and grasses, surface soil of dried swamps in evergreen forests.

MATERIAL AND METHODS

Specimens were collected by an aspirator and preserved in 70% alcohol. They were cleared in Marc Andre 1 medium. Dark specimens were placed in potassium hydroxide (KOH) to soften the chitin. Softening the chitin is required for 10–15 minutes depending upon the intensity of the pigment. Hoyer's mounting medium was used for slide-mounting of the specimens. Identification of specimens was with a phase contrast compound microscope following Christiansen &



DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
DD	LC	NT	VU	EN	CR	EW	EX

Dicranocentroides duduaensis



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Bellinger (1998). All the specimens examined have been deposited at National Zoological Collection, Zoological Survey of India, Kolkata (NZC/ZSI).

***Dicranocentroides duduaensis* sp. nov.**
(Images 1–2; Figs. 1–17; Table 1)

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Material examined

Holotype: 457/H14, 15.i.2009, 1 male, Kila Forest Rest House campus, Uttar Pradesh, India (28°18'N & 80°28'E), Dudhwa Tiger Reserve, Lakhimpur Kheri District, coll. G.P. Mandal.

Paratypes: 458/H14, 15.i.2009, 32 (12 male & 20 female), Kila Forest Rest House campus, Uttar Pradesh, India (28°18'N & 80°28'E), Dudhwa Tiger Reserve, Lakhimpur Kheri District, coll. G.P. Mandal.

Description

Colour pattern: Ground colour of the body deep yellow in alcohol. Ant. I distally with dark pigment rings, rest devoid of pigment. Ant. II entirely with dark pigment, region of subdivision of each segment of antennae non-pigmented (Images 1–2), Ant. I and Ant. II polychaetotic and with brush-like setae (Figs. 1–2), Ant. II covered with more dense setae in comparison to Ant. I, dorsal margin of Ant. III and Ant. IV light blue pigment, tip of Ant. IV with dark pigment apically. Tibiotarsi with bluish violet pigment, inner margin of each femur with longitudinal dark pigment. Th. II centrally devoid of colour pigment, medially and distally with two blue black patches, both patches fused laterally and forming arrow head like-band one on each side, Th. III with two discontinuous patches on each side, medial patches wider and darker, lateral patches with light pigment.

Abd. I small dot-like sub-medial blue black pigment on both sides (Fig. 3), Abd. II devoid of any colourpatch, Abd. IV with lateral pigment extended to ventro-laterally with the Abd. III, Abd. IV dorso-medially with vertical dark bluish pigment patches one on each side medially diffused with the large lateral patches and extended posteriorly, bluish terminal end of the Abd. IV with dark bluish patches which extend laterally of Abd. V and base of the manubrium, Abd. VI devoid of any pigment. Characteristic head pigmentation as in Fig. 4.

Clothing: Body clothed with dark brown scales and setae.

Chaetotaxy-head: vertex with V_0+V_{1-7} , frontal region with 4+4 setae, sub-dorsal region with 11 setae, ocular region with three macrochaetae, post-ocular region with one macrochaetae, occipital with single macrochaetae (Fig. 5). Cervix of Th. II with several smooth setae, Th. II, III with 32–33/27 macrochaetae. Abd. I with 18, Abd. II, with 8, Abd. III with 2 macrochaetae, Abd. IV medially with transverse row with 13–14 setae and posteriorly with 11+11 setae (Fig. 6). Scales of head, thorax and abdomen are pointed, rounded or truncate and densely covered with striations (Fig. 7).

Head: Pear shaped, two longitudinal parallel rows of ocelli (8+8) covered with dark pigment, G & H ocelli smaller in size than the rest. Antennae as long as trunk of the body, ratio of Ant. segments I–IV as 1.0/1.3–1.0/0.8–1.0/1.4, Ant. IV with apical sense knob and one pin seta with some smooth setae (Fig. 8). Prelabralsetae 4, labral setae 5, 5/4, anterior margin of labrum with 4 tubercles round in shape (Fig. 9).

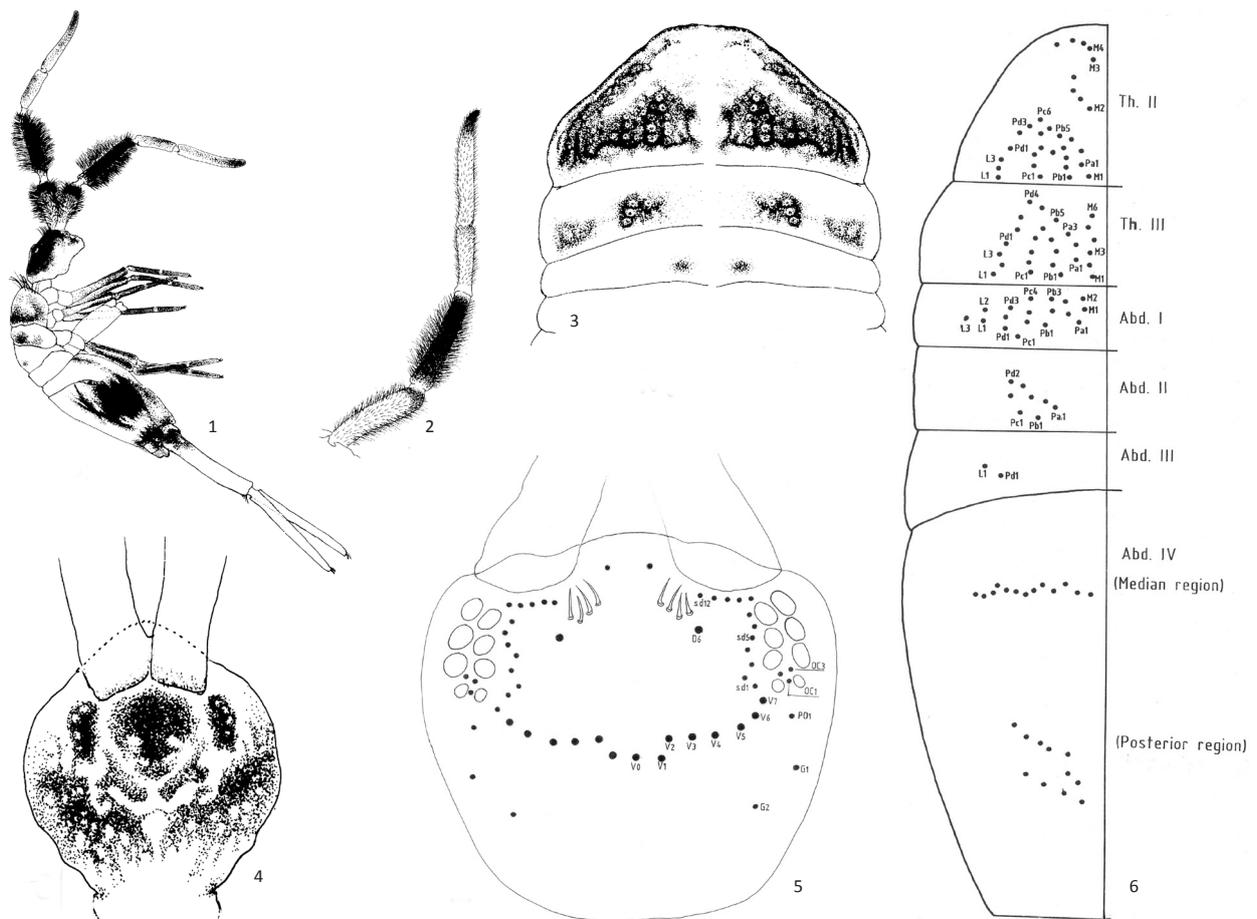
Thorax: Ratio of Th. segments II–III as 1.0–1.0/0.9. Unguis slightly curved with two external baso-lateral teeth 1+1 on each side of unguis, inner margin of unguis with paired inner basal and pair medial teeth, distal



Image 1. *Dicranocentroides duduaensis* sp. nov.



Image 2. *Dicranocentroides duduaensis* sp. nov. - Head and antennae.



Figures 1–6. *Dicranocentroides duduaensis* sp. nov.

1 - habitus showing lateral pigmentation; 2 - antenna; 3 - dorsal pigmentation of Th. II, III, Abd. I; 4 - characteristic pigmentation of head; 5 - dorsal cephalic chaetotaxy; 6 - semi-diagrammatic dorsal chaetotaxy of Th. II–Abd. IV.

tooth unpaired, unguiculus lanceolate, acuminate, without teeth on outer lamella; inner tibio-tarsal lobe conspicuous, tenent hair well developed, slightly clavate (Fig. 10). Trochanteral organ with about 66 strong, short spines (Fig. 11). Tibiotarsus with variable stout, striated spinous setae on inner lateral margin.

Abdomen: Ratio of Abd. segments I–VI as 1.0/1.07–1.0/1.05–1.0/5.5–1.0/0.7–1.0/0.6. Ventral tube long with protrusible vesicle retracted, anterior face anteriorly with several long macrochaetae (Fig. 12), posterior face with short spine like setae as in Fig. 13, rami of retinaculum 4+4 teeth, corpus with a median setae, ratio of manubrium: dens: mucro as 1.0/1.15–1.0/0.5, dens in their inner margin with two rows of closely opposed spines, and stiff, ciliated setae distally (Fig. 14), mucro large with six teeth, lateral tooth long (Fig. 15), outer view of mucronal teeth with light striation (Fig. 16), arrangement of mucronal teeth in other view (Fig. 17). Length without appendages 2.4mm.

Ecology

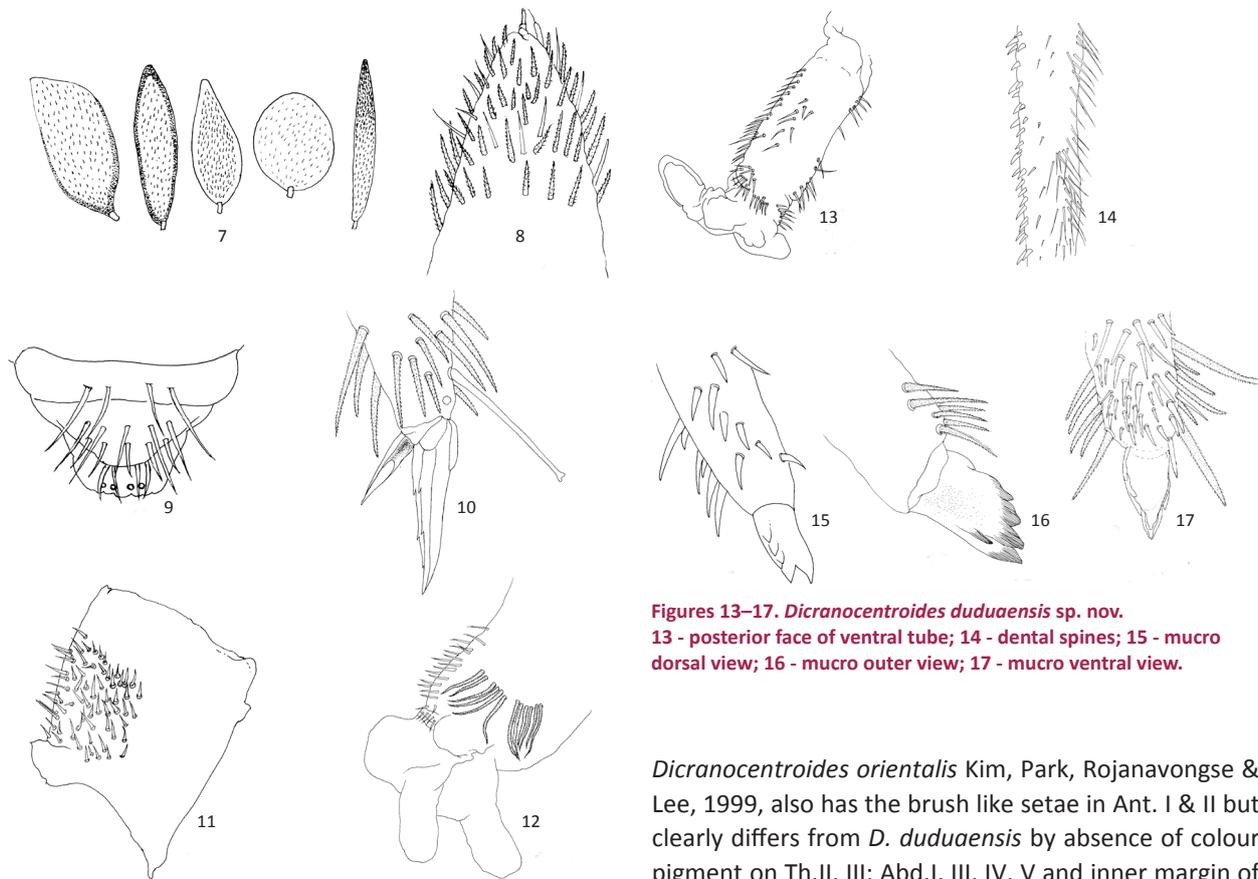
The species was found in large numbers, generally in shady semi-decomposed moist leaf litter in forested regions. It is an active species on the ground in leaf litter of Dudwa Tiger Reserve. The species is abundant in this tropical semi-evergreen forest of upper gangetic alluvial plains. The protection of this habitat will help to conserve the collembolan species.

Etymology

The species is named after the Dudhwa Tiger Reserve, Uttar Pradesh locally known as Dudua, which is the type locality.

DISCUSSION

The new species is similar to *Dicranocentroides gisini* Mitra in having pigment on Th.II and without medial pigment on Abd. III, IV and V but differs from *D. gisini* in the characteristics given in Table 1. The Thai species,



Figures 7–12. *Dicranocentroides duduaensis* sp. nov. 7 - scales; 8 - apex of Ant. IV; 9 - labral chaetotaxy; 10 - hind foot complex; 11 - trochanteral organ; 12 - anterior face of ventral tube

Figures 13–17. *Dicranocentroides duduaensis* sp. nov. 13 - posterior face of ventral tube; 14 - dental spines; 15 - mucro dorsal view; 16 - mucro outer view; 17 - mucro ventral view.

Dicranocentroides orientalis Kim, Park, Rojanavongse & Lee, 1999, also has the brush like setae in Ant. I & II but clearly differs from *D. duduaensis* by absence of colour pigment on Th.II, III; Abd.I, III, IV, V and inner margin of unguis without paired medial teeth.

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Table 1. The differences between *D. gisini*, and *D. duduaensis* sp. nov.

Characters	<i>D. gisini</i>	<i>D. duduaensis</i> sp. nov.
Transverse pigment patches on Th. III	three	four
Blue black dot-like pigment on Abd. I	absent	present
Dot-like three pigment patches on Abd. VI	present	absent
Ant. I, II with brush like polychaetotic setae	absent	present
Inner margin of unguis with paired-medial teeth	absent	present
Serration on outer lamella on unguiculus	five	absent
Cervix with smooth setae	absent	present
Spines on trochanteral organ	53	66
Apex of tenant hair	strongly clavate	clavate
Body length	2–3 mm	2.4–3.5 mm

Key to the species of *Dicranocentroides* from India

- 1 Body without dark pigment patches 2
 - Body with distinct dark pigment patches 3
- 2 Unguiculus with 1–2 external teeth on outer lamella *flavescens* Yosii
 - Unguiculus without external tooth on outer lamella *indica* (Handschin)
- 3 Abds. I, II with dark pigment patches 4
 - Abds. I, II without pigment patches 5
- 4 Abd. III, IV with transverse band *salmoni* Mitra
 - Abd. III, IV without transverse band *fasciculatus* Imms
- 5 Unguis with paired medial teeth; Ant. I, II with brush like setae *duduensis* sp. nov.
 - Unguis with single medial tooth; Ant. I, II without brush like setae *gisini* Mitra

