



Notes on Genus *Chondromorpha* Silvestri, 1897 (Diplopoda: Polydesmida: Paradoxosomatidae) with New Distributional Records

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Abstract: This paper reports three species of the genus *Chondromorpha* Silvestri, 1897 namely, *C. mammifera* Attems, 1936, *C. kelaarti* (Humbert 1865) and *C. xanthotricha* (Attems 1898) from the eastern and north-eastern regions of India. Among these, *C. mammifera* is recorded for the first time from Assam and West Bengal, and *C. kelaarti* is newly documented from Nagaland, India.

Keywords: *Chondromorpha*, Gonopod, India, Millipede, New state record

The class Diplopoda is the largest of the four myriapod classes (Blower 1985). This group of terrestrial arthropods comprising approximately 11,000 described species distributed across more than 2,000 genera, over 140 families, and 16 extant orders, occurring on all continents except Antarctica (Golovatch 2025). Millipedes fauna in India currently includes 287 recognized species, classified into 95 genera, 26 families, and 12 orders (Subramanian and Senraj 2024).

The millipede genus *Chondromorpha* Silvestri, 1897 is South Asian in origin (Sankaran and Sebastian 2017) and belongs to the family Paradoxosomatidae, which is one of the largest and most diverse families in the class Diplopoda, dominating the millipede fauna of the Indo-Australian region (Likhitrakarn et al., 2015). The genus *Chondromorpha* comprises eight described species, six of which are found in India. The type species *C. severini* Silvestri, 1897 was originally described from Tamil Nadu (Sankaran and Sebastian 2017). *C. kelaarti* (Humbert, 1865) has been recorded from Gujarat, Kerala, Tamil Nadu, West Bengal, and other parts of southern India and Sri Lanka (Bhakat 1989, Sankaran and Sebastian 2017, Dave and Sindhav 2025). *C. mammifera* Attems, 1936 occurs in Gujarat, Jharkhand, Maharashtra, Odisha, Karnataka and Kerala (Sankaran and Sebastian 2017). *C. kalmura* Turk, 1947 is known to occur from the Kaimur Plateau in Bihar (Turk 1947). The recently described *C. lakraoda* Dave and Sindhav, 2025 contributes to the genus diversity of Gujarat (Dave and Sindhav 2025). *C. xanthotricha* Attems, 1898 is considered a pantropical species native to South India and Sri Lanka, but it is also found in Central and North America, the Caribbean and northern South America, and Southeast Asia (Almeida et

al., 2022). Although Golovatch and Wesener (2016) considered the records of *C. xanthotricha* in India to be dubious, a recent report from Gujarat by Dave and Sindhav (2025) confirmed its occurrence in India. In addition to India, *C. greke* Golovatch, 2023 has been reported in Nepal (Golovatch 2023), and *C. stadelmanni* (Verhoeff, 1930), which is endemic to Sri Lanka, is considered doubtful because it is known only from a female holotype (Dave and Sindhav 2025). This study is the first to report, the presence of the millipede species *C. mammifera* in Assam and West Bengal, and *C. kelaarti* in Nagaland.

MATERIAL AND METHODS

The millipede specimens were collected from Assam, Nagaland, Odisha, and West Bengal (Fig. 1) using the hand-picking method (Blower 1985) and preserved in 70% ethanol, and deposited at the Museum and Taxidermy section, Zoological Survey of India, Kolkata, and assigned registration numbers as well. The specimens were subsequently studied in the laboratory using a Leica EZ4 educational stereo microscope. Photographs of the preserved specimens were captured under a Leica M205A stereomicroscope using a Leica DMC-4500 camera. The photographs were processed using LAS V4.12 software. The photographs were edited using Adobe Photoshop 7.0 software, and the map was mapped using QGIS 3.40 Bratislava (QGIS Development Team 2025). Identification was carried out based on published literature, including works by Almeida et al., 2022, Attems 1936, Bano and Murthy 1997, Dave and Sindhav 2025, Deker and Tertilt 2012, Golovatch 2023, Likhitrakarn et al., 2017, Sankaran and Sebastian 2017, Sankaran 2023 and Turk 1947.

RESULTS AND DISCUSSION

TAXONOMY

Class -Diplopoda de Blainville in Gervais, 1844**Order** -Polydesmida Pocock, 1887**Family** -Paradoxosomatidae Daday, 1889**Genus** -*Chondromorpha* Silvestri, 1897**Type species** - *Chondromorpha severini* Silvestri, 1897, type by monotype.

Diagnosis: The genus is distinguished from other genera by a unique combination of characteristics. It has 20 body segments; well-developed paranota, often identifiable by their shape, which may or may not bear an anterolateral tooth, a feature used to differentiate between species. The metazona is typically granulated with setae (small hairs) and the pleural keels are indistinct. Male legs lack tarsal brushes and sternal lamellae are present between the fourth pair of male coxae. In addition, the gonopodal femorite is notably short. A comparative table (Table 1) was prepared to display the distinguishing characteristics of the three species in the genus *Chondromorpha*.

***Chondromorpha mammifera* Attems, 1936 (Fig. 2)**

Material examined: 1 ♂ (ZSIK-TM112), Nischintapur, Purulia, West Bengal, India; 23°13'11" N, 86°00'14" E, Coll. U. K. Chaudhary, 4 Aug. 2024; 1 ♂ (ZSIK-TM113), Bhursu, Purulia, West Bengal, India 23°12'59" N, 85°59'06" E, Coll. U. K. Chaudhary, 5 Aug. 2024; 2 ♂ (ZSIK-TM114 and ZSIK-TM115), Tarafeni Dam, Jhargram, West Bengal, India, 22°40'44" N, 86°47'15" E, Coll. U. K. Chaudhary, 7 Aug. 2024; 9 ♂ (ZSIK-TM116, ZSIK-TM117, ZSIK-TM118, ZSIK-TM119, ZSIK-TM120, ZSIK-TM121, ZSIK-TM122, ZSIK-TM123 and ZSIK-TM124), Kuldiha, Jhargram, West Bengal, India, 22°39'13" N, 86°44'37" E, Coll. U. K. Chaudhary, 9 Aug. 2024; 1 ♂ (ZSIK-TM125), forest opposite of Jhargram Zoological Park, Jhargram, West Bengal, India, 22°26'56" N, 87°01'13" E, Coll. U. K. Chaudhary, 10 Aug. 2024; 1 ♂ (ZSIK-TM126), Kangsabati ghat, West Midnapore, West Bengal, India, 22°24'23" N, 87°18'13" E, Coll. U. K. Chaudhary, 11 Aug. 2024; 1 ♂ (ZSIK-TM127), Gopalpur, West Midnapore, West Bengal, India, 22°24'49" N, 87°17'42" E, Coll. U. K. Chaudhary, 12 Aug. 2024; 1 ♂ (ZSIK-TM128), Chaupahari Jangal, Burdwan, West Bengal, India, 23°37'55" N, 87°34'27" E, Coll. D. Mondal, 26 Sept. 2023; 1 ♂ (ZSIK-TM129), Barbil, Keonjhar, Odisha, India, 22°06'40" N,

85°23'09" E, Coll. S. Mitra, 31 Aug. 2023 and 1 ♂ (ZSIK-TM130), Tukura, Goalpara, Assam, India, 26°10'34" N, 90°37'30" E, Coll. S. Mukherjee, 2 Oct. 2024.

Diagnosis: *C. mammifera* can be identified by presence of sternal lamella between male coxae 4 as paired, globular prominences (Fig. 2H). It shares a close relationship with *C. kaimura* Turk, 1947, which is characterized by paired, rectangular prominences. Prefemur long and dense setose. The femorite was short, sub-cylindrical, and showed no evidence of torsion (Fig. 2D-F). The solenophore is moderately long and mesally curved. The solenomere was simple and long, with a broad base, gradually tapering to a filiform shape, and smoothly curved distolaterally. Length mostly 26-35 mm (♂) and width of mid body 3.5-4.0 mm (♂). Colouration greyish black. Angular part of paranota yellowish orange. The anterior angle of the lateral keels is notably rounded, whereas the posterior angle is acute and extends beyond the border.

Distribution: India: Gujarat, Jharkhand, Karnataka, Kerala, Maharashtra and Odisha (Sankaran and Sebastian 2017), Assam, and West Bengal.

Remarks: *C. mammifera* is recorded for the first time in Assam and West Bengal. This species is abundant in West Bengal.

***Chondromorpha kelaarti* (Humbert 1865) (Fig. 3)**

Material examined: 1 ♂ (ZSIK-TM109), Triple Falls Seithekema, Dimapur, Nagaland, India, 25°48'23" N, 93°48'59" E, Coll. P. G. S. Sethy & Party, 5 Dec. 2024; 1 ♂ (ZSIK-TM046), Beside Damodar River, Tirat, Paschim Burdwan, West Bengal, India, 23°37'03" N, 87°02'28" E, Coll. U. K. Chaudhary, 3 Aug. 2024; 2 ♂ (ZSIK-TM047 and ZSIK-TM048), Pogrodi Aambagan near Tunturi, Purulia, West Bengal, India, 23°12'26" N, 85°55'07" E, Coll. U. K. Chaudhary, 5 Aug. 2024; 3 ♂ (ZSIK-TM049, ZSIK-TM050 and ZSIK-TM051), Bhunighra, Purulia, West Bengal, India, 23°13'41" N, 86°16'19" E, Coll. U. K. Chaudhary, 6 Aug. 2024; 1 ♂ (ZSIK-TM110), 46 Rajni Mukherjee Road, New Alipore, Kolkata, West Bengal, India, 22°30'26" N, 88°19'54" E, Coll. U. K. Chaudhary, 7 June 2024; and 1 ♂ (ZSIK-TM111), FPS Building, Indian Museum Campus, Kolkata, West Bengal, India, 22°33'24" N, 88°21'06" E, Coll. S. Mukherjee, 21 Mar. 2025.

Diagnosis: *C. kelaarti* can be identified by the presence of a

Table 1. Distinguishing characters of the species of *Chondromorpha* Silvestri, 1897

Species	Sternal lamella between male coxae 4	Gonopods
<i>C. mammifera</i> (Attems 1936)	Paired, juxtaposed globular prominences (Fig. 2H)	Simple with short femorite. (Fig. 2D-F)
<i>C. kelaarti</i> (Humbert 1865)	Trapezoid having two short anterior processes (Fig. 3H)	Simple with elongated femorite. (Fig. 3D-F)
<i>C. xanthotricha</i> (Attems 1898)	Paired, conical in shape (Fig. 4H)	Simple with stout femorite. (Fig. 4D-F)

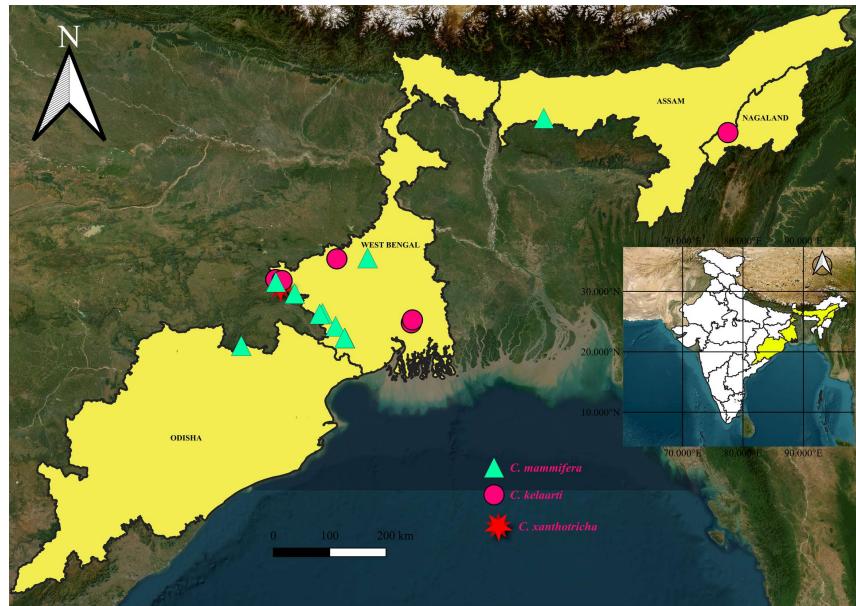


Fig. 1. Distribution of species of the genus *Chondromorpha* Silvestri, 1897 across Assam, Nagaland, Odisha, and West Bengal, India

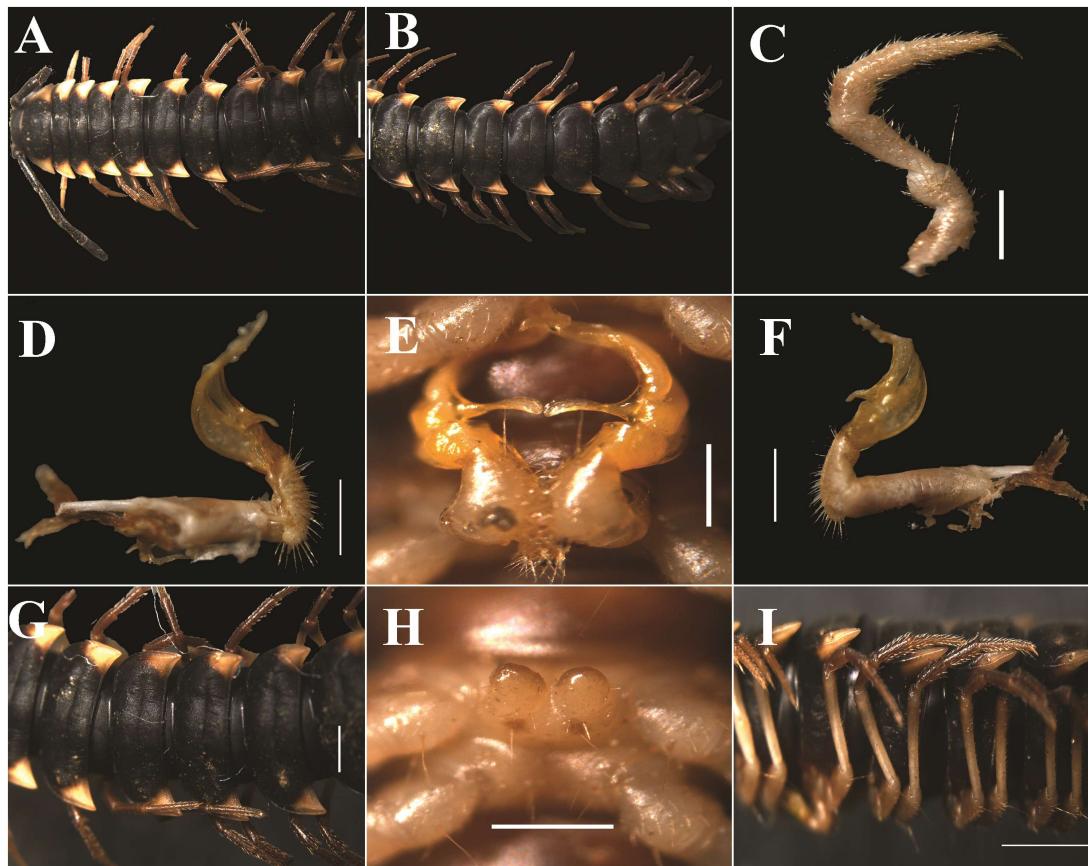


Fig. 2. *Chondromorpha mammifera*, male **A**) Anterior part of body, dorsal view; **B**) Posterior part of body, dorsal view; **C**) Anterior left leg I, mesal view; **D**) Left gonopod, mesal view; **E**) Gonopods, ventral view; **F**) Left gonopod, prolateral view; **G**) Body segments 8-10, dorsal view; **H**) Sternal lamella between male coxae 4, ventral view; **I**) Body segments 8-10, lateral view. Scale bars: A - B, I = 2 mm; G = 1 mm; C - F, H = 0.5 mm

sternal lamella between the male coxae 4, which is trapezoidal in shape, with two short, paired anterior processes (Fig. 3H). It shares a close relationship with *C. severini* Silvestri, 1897, which is characterized by globular prominence without processing. The prefemur was elongated and densely setose with long, stiff setae. The femorite was short and subcylindrical, with a median fold, and the seminal groove ran along the medial side of the femorite (Fig. 3D-F). Solenophore long and mesally curved, with distal lappet having triangular mesal process. Solenomere elongated. Length mostly 22-25 mm (♂) and width of mid body 2.5-3.2 mm (♂). Colour brownish-black. The angular part of the paranota is yellowish. The anterior angle of the lateral keels is nearly rounded, while the posterior angle forms broad triangles in the anterior body segments and acute triangles in the posterior segments.

Distribution: India: Gujarat, Kerala, Tamil Nadu, and West Bengal (Bhakat 1989, Sankaran and Sebastian 2017, Dave and Sindhab 2025), Nagaland.

Remarks: *C. kelaarti* is recorded for the first time in Nagaland. This species is abundant in the west Bengal.

***Chondromorpha xanthotricha* (Attems 1898) (Fig. 4)**

Material examined: 2 ♂ (ZSIK-TM132 and ZSIK-TM133), Andhra Alias Hathinada, Purulia, West Bengal, India, 23°13'24" N, 86°06'02" E, Coll. U. K. Chaudhary, 5 Aug. 2024.

Diagnosis: *C. xanthotricha* can be identified by the presence of sternal lamella between male coxae 4 as paired, conical in shape (Fig. 4H). It resembles *C. kelaarti* (Humbert 1865), which is characterized by trapezoidal prominence with two short paired anterior processes (Fig. 3H). Prefemur densely setose. The femorite was stout with a distolateral sulcus that demarcated it from the postfemorite (Fig. 4D-F). The solenophore comprises a conspicuous trifid lamina that supports a long flagelliform solenomere. Length mostly 20-27 mm (♂) and width of mid body 2.3-3.0 mm (♂). Coloration blackish. Metaterga granular with setae. Sterna sparsely setose. Paranota yellowish in colour.

Distribution: India: Gujarat, West Bengal (Chakraborty 2018, Dave and Sindhab 2025).

In the present study, millipede species belonging to the genus *Chondromorpha* were recorded in the Indian states of Assam, Nagaland, Odisha, and West Bengal. Three species

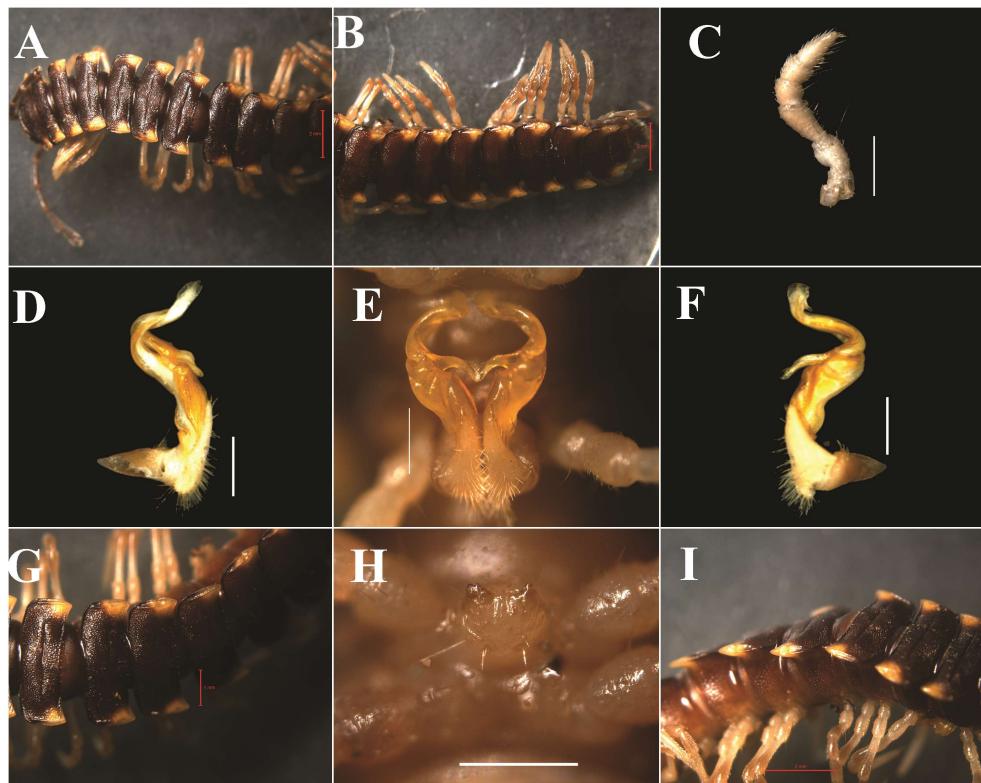


Fig. 3. *Chondromorpha kelaarti*, male **A**) Anterior part of body, dorsal view; **B**) Posterior part of body, dorsal view; **C**) Anterior left leg I, mesal view; **D**) Left gonopod, mesal view; **E**) Gonopods, ventral view; **F**) Left gonopod, prolateral view; **G**) Body segments 8-10, dorsal view; **H**) Sternal lamella between male coxae 4, ventral view; **I**) Body segments 8-10, lateral view. A-B, I = 2 mm; G = 1 mm; C-F, H = 0.5 mm

have been identified like, *C. mammifera*, *C. kelaarti*, and *C. xanthotricha*. *C. mammifera*. Attems (1936) has been observed at altitudes ranging from as low as 12 m near Mumbai, Maharashtra to approximately 919 m in the vicinity of Bangalore, Karnataka. In addition to these regions, the species is distributed across Kerala, Odisha, and Jharkhand (Sankaran and Sebastian 2017). In the present study, *C. mammifera* was recorded in the Keonjhar district of Odisha. This species was reported for the first time in Goalpara, Assam, and has also been reported in Burdwan, Jhargram, Purulia, and West Midnapore districts in West Bengal. These records indicate that *C. mammifera* is extending its distribution range from the southern India to northeast India.

C. kelaarti (Humbert, 1865) was originally described as *Polydesmus kelaarti* (Humbert 1865) from Sri Lanka. Subsequently, Sankaran and Sebastian (2017) synonymized several species and subspecies of *C. kelaarti*, including *C. atopus* (Chamberlin, 1920), *C. indus* (Chamberlin, 1920), *C. kelaarti kelaarti* (Humbert, 1865), *C. kelaarti longipes* (Verhoeff 1936) and *C. kelaarti valparaiensis* Carl, 1932. This species is widely distributed across India, with confirmed records from Gujarat, as recently reported by Dave and

Sindhav (2025), Kerala, Tamil Nadu (Sankaran and Sebastian 2017), and West Bengal (Bhakat 1989). Additionally, *C. kelaarti* has been recorded in Great Britain as an introduced species (Pocock 1906). Although Bhakat (1989) reported the presence of *C. kelaarti* in the Birbhum district of West Bengal, it was based solely on ecological characteristics. In the present study, *C. kelaarti* was recorded in the Kolkata, Paschim Burdwan, and Purulia districts of West Bengal. This study also documents the first confirmed record of this species from Dimapur, Nagaland. These findings suggest that in addition to *C. mammifera*, *C. kelaarti* expands its distributional range to northeast India.

C. xanthotricha (Attems, 1898) was originally described as *Prionopeltis xanthotrichus* Attems, 1898. According to Golovatch and Wesener (2016), the occurrence of the pantropical species, *C. xanthotricha* in India was previously considered doubtful. However, a recent study by Dave and Sindhav (2025) described the species from Gujarat, thereby confirming its presence in India. Previously, Chakraborty (2018) reported *C. xanthotricha* from West Midnapore (Paschim Medinipur), West Bengal; however, no taxonomic description of the species was provided at the time.

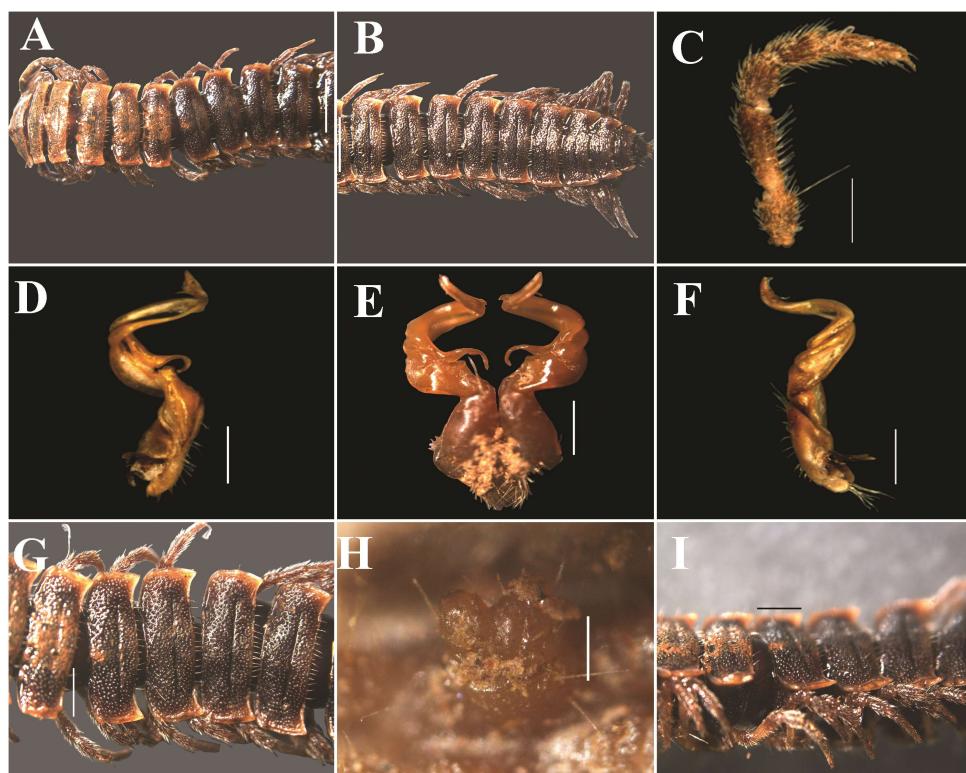


Fig. 4. *Chondromorpha xanthotricha*, male **A**) Anterior part of body, dorsal view; **B**) Posterior part of body, dorsal view; **C**) Anterior left leg I, mesal view; **D**) Left gonopod, mesal view; **E**) Gonopods, ventral view; **F**) Left gonopod, prolateral view; **G**) Body segments 8-10, dorsal view; **H**) Sternal lamella between male coxae 4, ventral view; **I**) Body segments 8-10, lateral view. A - B = 2 mm; G, I = 1 mm; C - F = 0.5 mm; H = 0.2 mm

Millipedes, particularly *Chondromorpha* species remain insufficiently documented across India, especially in the northeastern states, resulting in significant knowledge gaps. This also underscores the need for further exploration of millipede diversity in these relatively underexplored areas of Northeast India..

CONCLUSIONS

The species of the genus *Chondromorpha* was recorded in states of Assam, Nagaland, Odisha, and West Bengal, India. Notably, *Chondromorpha mammifera* is reported for the first time from Assam and West Bengal, while *C. kelaarti* is recorded for the first time from Nagaland. These findings indicate a range extension of the genus into the northeastern regions of India beyond its previously known distribution in the southern and western parts of the country. This highlights the need for further exploration in northeastern India, which may lead to the discovery of additional *Chondromorpha* species as well as other millipede taxa.

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AUTHOR'S CONTRIBUTION

UKC collected the specimens, performed identification, photographed the specimens and drafted the manuscript. SD confirmed the identification and edited the manuscript. MDA helped with the literature. PGSS collected specimens and edited the manuscript. AP assisted in photography of specimens and edited the manuscript.

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