



Occurrence of *Andreimyrmex substriolata* (Chen, 1957) and *Odontomutilla fletcheri* Lelej, Terine & Girish Kumar, 2020 (Hymenoptera, Mutillidae) in India, with note on their geographical affinities

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ABSTRACT. *Andreimyrmex substriolata* (Chen, 1957) and *Odontomutilla fletcheri* Lelej, Terine & Girish Kumar, 2020 (Hymenoptera, Mutillidae) are newly reported from India. *O. fletcheri* was only recorded from Sri Lanka till now & *A. substriolata* was only known from various Southeast Asian countries (China, Taiwan, Indonesia, Japan, Laos, Malaysia, Thailand and Vietnam), in the present study these species are discovered from India which pronounce the geographical affinities of India with Sri Lanka and Southeast Asian countries and vice versa. Diagnosis, figures, distribution maps and remarks of these species are provided.

Key words: Chhattisgarh, Meghalaya, Mutillinae, Odontomutillinae, Oriental, velvet ants

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INTRODUCTION

Mutillids are commonly referred to as “velvet ants” due to their hairy bodies. They are known for their extremely painful stings (Evans & Schmidt, 1990). Mutillids exhibit strong sexual dimorphism. In India, with the addition of *Andreimyrmex substriolata* (Chen, 1957) and *Odontomutilla fletcheri* Lelej, Terine & Girish Kumar, 2020 there are 239 species under 45 genera. The genus *Andreimyrmex* Lelej, 1995 consists of 20 valid species, one is subdivided into two subspecies. It is distributed mainly in the Oriental Region, but two species penetrate the Eastern Palaearctic Region, 15 species are known from females only and five species from males only (Lelej & Williams, 2023). The genus *Odontomutilla* Ashmead, 1899 is widely spread mainly in the Afrotropical and Oriental regions, with a few species in the Australasian and Palaearctic Regions (Pagliano et al., 2020); of these 31 species and two subspecies are distributed in the Oriental Region (Lelej et al., 2020; Pagliano et al., 2020; Lelej, 2023). According to Waldren et al. (2023), the genus *Odontomutilla* belong to the subfamily Odontomutillinae Lelej, 1983; and was previously in the subfamily Mutillinae Latreille, 1802 (Lelej, 2005; Brothers & Lelej, 2017; Pagliano et al.,

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2020; Lelej et al., 2020 and Lelej, 2023). In this paper *Andreimyrmex substriolata* (Chen, 1957) and *Odontomutilla fletcheri* Lelej, Terine & Girish Kumar, 2020 are newly recorded from India.

MATERIAL AND METHODS

This study is based on specimens collected during the faunal surveys conducted in the Meghalaya and Chhattisgarh states of India. The specimens were studied using a LABOMED® CZM6 microscope. Photographs were taken with a LEICA® DFC 450 camera and images were stacked using LEICA V3.80. The images were post-processed to improve contrast and brightness using Adobe® Photoshop CS6 software. The specimens are deposited in the National Zoological Collections at the Western Ghat Regional Centre, Zoological Survey of India, Kozhikode (ZSIK).

The terminology mostly follows the Yoder et al. (2010). We use the following abbreviations T1, T2, T3, etc. to denote the first, second, third, etc., metasomal terga, S1, S2, S3 etc., to denote the first, second, third, etc., and metasomal sterna.

RESULTS

Taxonomic hierarchy

Class Insecta Linnaeus, 1785

Order Hymenoptera Linnaeus 1758

Family Mutillidae Latreille, 1802

Subfamily Mutillinae Latreille, 1802

Genus *Andreimyrmex* Lelej, 1995

***Andreimyrmex substriolata* (Chen, 1957) (Figs 1, 2A)**

Smicromyrmex substriolata Chen, 1957:209, holotype ♀ (Kuling [= Guling], Kiangsi [= Jiangxi], China) [TARI]; *Smicromyrmex tridentiens* Chen, 1957:213, holotype ♀ (Tachulan [= Dazhulan], Shaowu, Fukien [= Fujian], China) [TARI]; Synonymized by Okayasu (2020:58) under *Andreimyrmex substriolata* (Chen, 1957); *Andreimyrmex tridentiens*: Lelej, 1995:8, holotype ♀, Lelej, 2005:38; Okayasu et al., 2018:303, ♀; Pagliano et al., 2020:169; *Andreimyrmex substriolata*: Lelej, 1995:9, ♀; Lelej, 2002:50; Lelej, 2005:38; Lo Cascio, 2015:544; Okayasu et al., 2018:303, ♀; Okayasu, 2020:58, ♀; Pagliano et al., 2020:169; Okayasu et al., 2021:22.

Diagnosis. Female. Head (Figs 1A–1C) black. Antennal tubercles ferruginous. Scape, flagellomeres and mandibles brownish. Mesosoma (Fig. 1A) ferruginous. Metasoma (Fig. 1D) black. T2 with basal elongate pale yellowish spot and an apical band of same colour. T3 also with a band of pale yellowish setae. T1, T4 and T5 black. Pygidial plate laterally with pale yellowish setae. S2–S6 (Fig. 1E) with a fringe of pale yellowish setae. Legs brown except coxa, coxa ferruginous, legs clothed with pale yellowish setae. Head (Fig. 1B) coarsely punctured, vertex with medial longitudinal carina, slightly extending to frons. Mesosoma dorsum (Fig. 1B) with large confluent punctures except propodeum, propodeal face reticulo-punctured, lateral face of mesosoma with minute dense punctures. Legs punctate, dense in coxa. T1–T5 (Fig. 1D) with confluent punctures. S2 (Fig. 1E) with large punctures, S3–S6 with small punctures throughout. Pygidial plate (Fig. 1F) finely longitudinally rugose laterally on basal 1/3, medially and apically smooth.

Male. Unknown.

Material examined. 1♀, INDIA, Meghalaya, East Garo Hills district, Songsak, 25°33'44.05"N, 90°31'1.72"E, 350 m, 05.V.1979, J.K. Jonathan & party, ZSI/WGRC/IR/INV. 24693 [ZSIK].

Distribution (Fig. 2A). India (Meghalaya) [New record], China (Anhui, Fujian, Jiangxi, Zhejiang), Taiwan (Kaohsiung, Nantou, Taipei), Indonesia (Sumatra Utara), Japan (Amami Islands, Okinawa Islands), Laos (Houa Phan, Xiengkhouang), Malaysia (Terengganu), Thailand (Chiang Mai, Nakhon Si Thammarat, Phetchabun), Vietnam (Gia Lai, Hanoi, Hoa Binh, Thua Tien-Hue) (Okayasu et al., 2021).

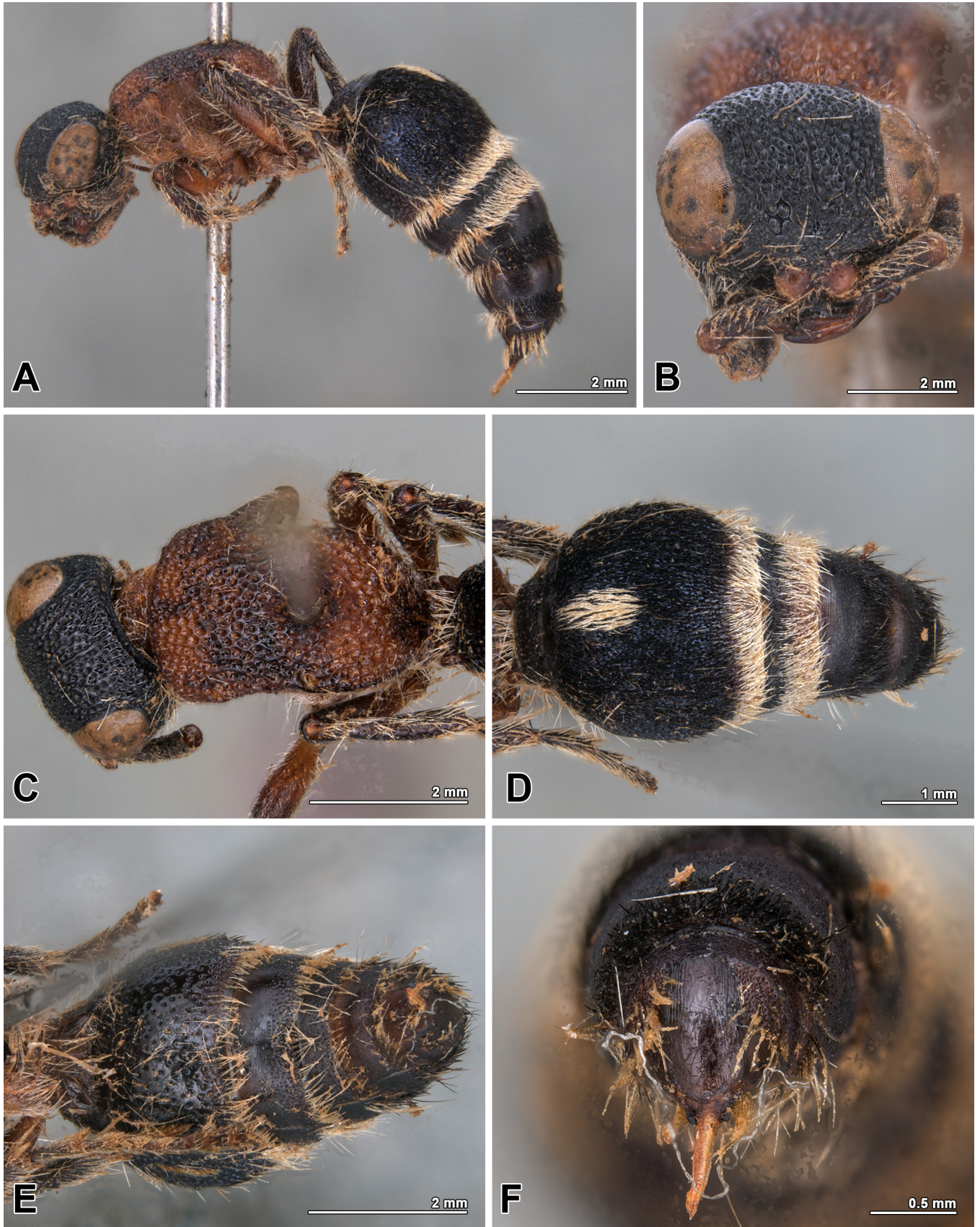


Figure 1. *Andreimyrmex substriolatus* (Chen, 1957), female. **A.** Habitus, lateral view; **B.** Head, frontal view; **C.** Head and mesosoma, dorsal view; **D.** Metasoma, dorsal view; **E.** Metasoma, ventral view; **F.** Pygidial plate.

Variations. According to Okayasu (2020), the body length of *A. substriolata* 5.85–9.74 mm, the specimen from India (Meghalaya) fits this with a body length of 9.66 mm. Okayasu also points out the variations between the specimens of *A. substriolata* from Taiwan and other places as in Taiwanese specimens legs are black and the pale spot on T2 is larger, while the specimens from other places have legs more or less red and T2 with smaller spots. From this, we compared the specimen from India, which varies from these two in having patches of brownish tint in mesosoma dorsum and propodeum (mesosoma fully ferruginous in Taiwanese and specimens from other places) but it agrees with Taiwanese specimen in having a larger spot and agrees with females of other localities in having legs more or less red.

Subfamily Odontomutillinae Lelej, 1983

Genus *Odontomutilla* Ashmead, 1899

Odontomutilla fletcheri Lelej, Terine & Girish Kumar, 2020 (Figs 2B, 3)

Odontomutilla trichocondyla: Lelej, 2005:117, ♀, part. (Sri Lanka); *Odontomutilla fletcheri* Lelej, Terine & Girish Kumar, 2020 in Lelej et al., 2020:194, ♀, ♂, Holotype ♀ (Sri Lanka) [NMC].

Diagnosis. Female. Head and mesosoma (Figs 3A–3C) brownish red. T1 (Fig. 3D) without any spots. T2 in basal half without pale spots or band of setae. T2 apically with a widely interrupted band of setae. T2 length equal to its maximum width. Width of apico-lateral spot of golden setae of T2 equal to or less than distance between spots. Head and mesosoma (Figs 3A–3C) dorsum deeply punctate. Mesopleuron punctate sparsely, vertical carina extends to a prominent tooth. Propodeum postero-laterally with shallow sparse punctures. Scutellar scale lacking. Posterior propodeal face abrupt. T1 (Fig. 3D) wide with distinct anterior and dorsal faces. T1 with small dense punctures. T2 wider than T1. T2 with antero-lateral pubescent fovea. T2 and S2 with large coarse punctures. T4–T5 (Fig. 3D) and S3–S5 (Fig. 3E) with small dense punctures. Pygidial plate (Fig. 3F) with weak transverse striae.

Male. See Lelej et al. (2020).

Material examined. 1♀, INDIA, Chhattisgarh, Koriya district, Guru Ghasidas National Park, Mari Nala, 23°47'5.67"N, 82°0'56.56"E, 724 m, 10.V.2012, Sunil & party, ZSI/WGRC/IR/INV. 24694 [ZSIK].

Distribution (Fig. 2B). India (Chhattisgarh) [New record], Sri Lanka (Southern Province) (Lelej et al., 2020).

Variations. The specimen studied from India varies from Sri Lankan specimens in the following respects: body length 15.8 mm (specimens from Sri Lanka 12.0–13.6 mm); the colour on head and mesosoma is brownish-ferruginous (ferruginous in Sri Lankan specimen); and mesopleuron is dark brownish (ferruginous in Sri Lankan specimen).

DISCUSSION

The geographical affinities of India with Sri Lanka and Southeast Asian countries are pronounced with the discoveries of species from the bordering countries of India and vice versa. *Odontomutilla fletcheri* was only recorded from Sri Lanka till now, in the present study it is discovered from the Chhattisgarh state in India. *Andreimyrmex substriolata* was known in various Southeast Asian countries (China, Taiwan, Indonesia, Japan, Laos, Malaysia, Thailand and Vietnam), and is now discovered in India (Meghalaya). The floristic-faunistic components of the Northeastern regions of India are Asiatic derivatives, the Peninsular isolates and Australian-Gondwana outliers (Mani, 1995). This area showcases a convergence of them. The Eastern borderlands, acting as a transition zone, witness the dynamic exchange of flora and fauna, along two major routes: westward along the wooden slopes of the Himalayas and Southwards into the Peninsular, this intricate exchange, as described by Mani (1995), underpins the current distribution of species, effectively contributing to the remarkable biodiversity in this region. During the Mesozoic era about 180 Ma, the Western half of Gondwana (Africa and South America) separated from the Eastern half (Madagascar, India, Australia and Antarctica) (Dissanayake & Chandrajith, 1999; Dittus, 2017). During the late Cretaceous period, India broke apart from Madagascar, Antarctica and Australia and rifted away to collide with Eurasia (50 Ma) which in turn resulted in the formation of the Himalayan Mountains.

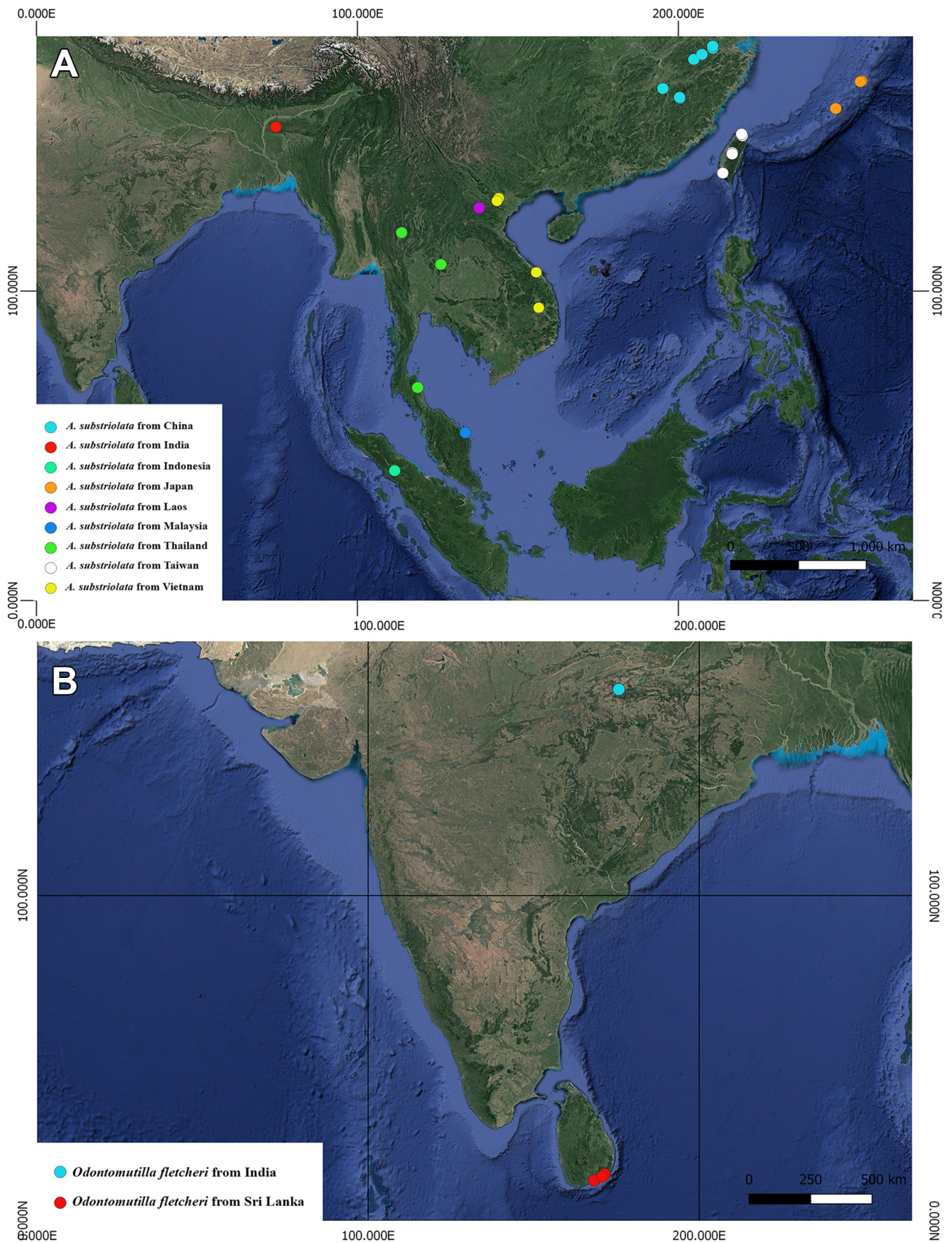


Figure 2. Distribution map of the newly recorded species. **A.** *Andreimyrmex substriolata* (Chen, 1957). **B.** *Odontomutilla fletcheri* Lelej, Terine & Girish Kumar, 2020.

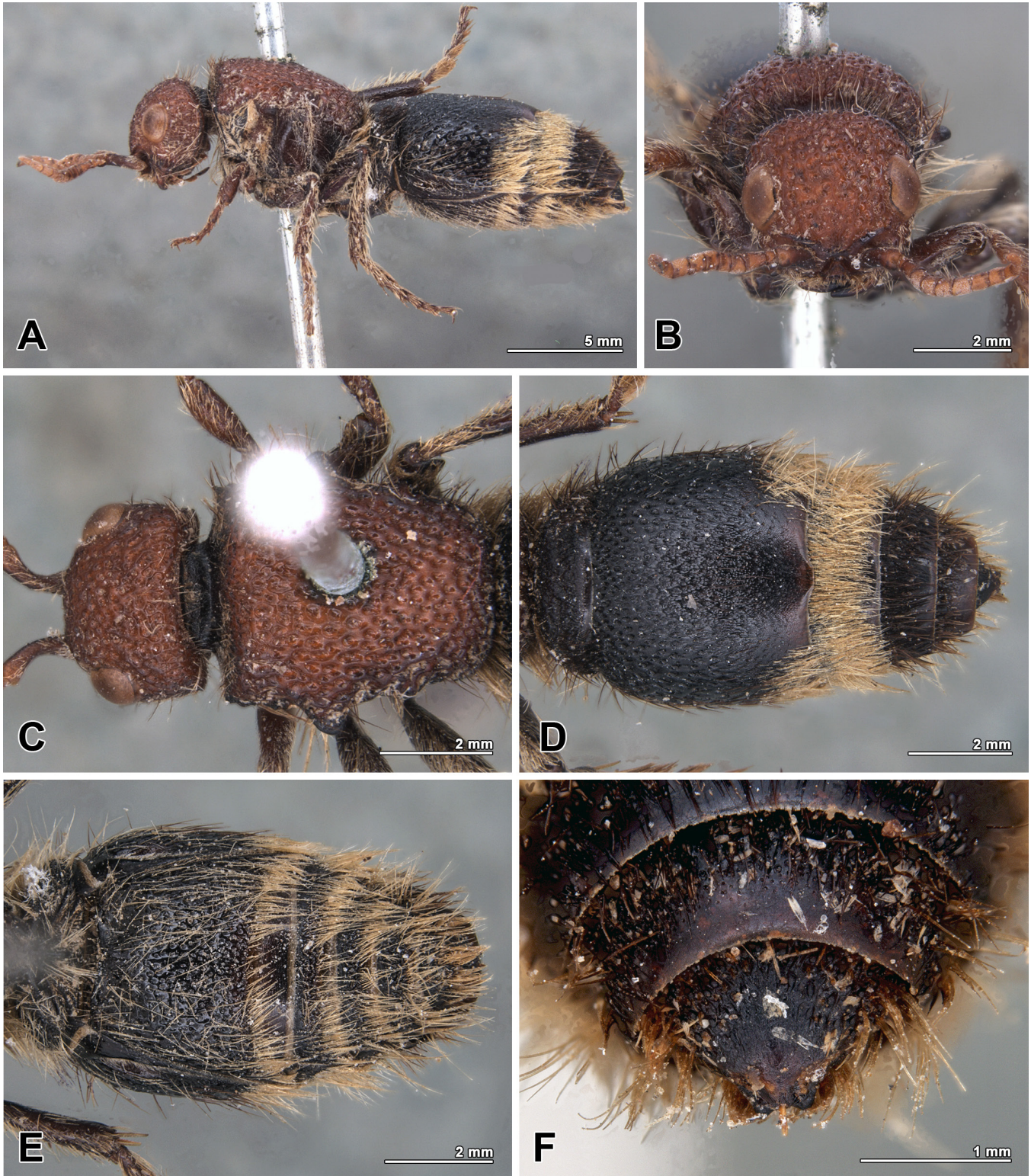


Figure 3. *Odontomutilla fletcheri* Lelej, Terine & Girish Kumar, 2020, female. **A.** Habitus, lateral view; **B.** Head, frontal view; **C.** Head and mesosoma, dorsal view; **D.** Metasoma, dorsal view; **E.** Metasoma, ventral view; **F.** Pygidial plate.

Sri Lanka was geologically connected to India till the pre-Pleistocene due to the low sea levels in the Pleistocene which provided the land connection to India and facilitated two-way dispersion across the Palk Strait (Cooray, 1984). There is a high probability of finding the Sri Lankan species in India and vice-versa (Terine & Girish Kumar, 2023) and also in Southeast Asian countries in India and vice-versa.

AUTHOR'S CONTRIBUTION

The authors confirm their contribution in the paper as follows: T.J.B. and D.D. designed the methodology and wrote the manuscript with the support of P.G.K. The authors read and approved the final version of the manuscript.

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AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited in the National Zoological Collections at the Western Ghat Regional Centre, Zoological Survey of India, Kozhikode and are available from the curator, upon request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

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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گزارش انتشار *Odontomutilla fletcheri* Lelej, Terine & *Andreimyrmex substriolata* (Chen, 1957) و *Andreimyrmex substriolata* (Chen, 1957) و *Odontomutilla fletcheri* Lelej, Terine & Girish Kumar, 2020 (Hymenoptera, Mutillidae) از هند و نکاتی از ارتباط جغرافیایی آنها

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چکیده: دو گونه از زنبورهای مورچه‌مخملی شامل *Andreimyrmex substriolata* (Chen, 1957) و *Odontomutilla fletcheri* Lelej, Terine & Girish Kumar, 2020 (Hymenoptera, Mutillidae) برای اولین بار از هند گزارش شدند. گونه *O. fletcheri* پیش از این تاکنون از کشور سری‌لانکا گزارش شده بود، اما گونه *A. substriolata* در تعداد زیادی از کشورهای جنوب شرق آسیا (چین، تایوان، اندونزی، ژاپن، لائوس، مالزی، تایلند و ویتنام) انتشار دارد. در این تحقیق، این دو گونه زنبور از کشور هند گزارش شدند که بر ارتباط جغرافیایی این منطقه با سری‌لانکا و دیگر کشورهای جنوب شرق آسیا (و بالعکس) تاکید دارد. خصوصیات افتراقی، تصاویر، نقشه مناطق انتشار و جزئیات دیگری از این دو گونه ارائه شد.

واژگان کلیدی: چتیسگر، مگالایا، Mutillinae، Odontomutillinae، خاورزمین، مورچه‌مخملی