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THREE NEW SPECIES OF VELVET ANTS FROM THE TRIBE SMICROMYRMINI (HYMENOPTERA: MUTILLIDAE) WITH UNUSUAL COLOR SYNDROME

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Summary. *Ephucilla hejunhuai* sp. n. (China: Guangdong), *Promecilla ovtchinnikovi* sp. n. (Pakistan: Khyber Pakhtunkhwa), and *Smicromyrme (Eremotilla) burgeri* sp. n. (India: Karnataka) are described and illustrated. These new species have second metasomal tergum with ferruginous-red cuticle, color pattern which approximates Eastern mimicry ring in North America.

Key words: Hymenoptera, Mutillidae, taxonomy, new species, color syndrome, mimicry rings, aposematism, Oriental Region.

А. С. Лелей. Три новых вида ос-немок из трибы Smicromyrmini (Hymenoptera: Mutillidae) с необычной цветовой окраской // Дальневосточный энтомолог. 2020. N 421. С. 1-9.

Резюме. Описываются *Ephucilla hejunhuai* sp. n. (Китай: Гуандун), *Promecilla ovtchinnikovi* sp. n. (Пакистан: Хайбер-Пахтунхва) и *Smicromyrme (Eremotilla) burgeri* sp. n. (Индия: Карнатака). Эти новые виды имеют второй метасомальный тергит с ржаво-красной кутикулой, цветовой синдром, который напоминает Восточное кольцо мимикрии в Северной Америке.

INTRODUCTION

The Smicromyrmini is one of the abundant in species tribe in the subfamily Mutillinae and includes 26 genera (Brothers & Lelej, 2017). The females of these genera have different coloration and setal markings. Repeated color patterns in velvet ants have recently been used to establish the World's largest recognized Müllerian mimicry complexes (Wilson *et al.*, 2012, 2015, 2018). To this point, at least 330 North American and 250 African taxa have been found to belong to eight and four mimicry rings, respectively. Of the 247 East Asian mutillid species 224 expressed the Black-headed Color Syndrome (BHCS) and 14 expressed the Red-headed Color Syndrome (RHCS) and nine have other color patterns (Okayasu *et al.*, 2018). Females with BHCS and RHCS have a reddish mesosoma and a blackish metasoma with whitish markings. The BHCS is also common in the Palaearctic and Neotropical fauna of the Mutillidae, while the RHCS is less common. Three new species from the tribe Smicromyrmini with reddish second metasomal tergum and mesosoma have unusual in the Oriental fauna color syndrome.

MATERIAL AND METHODS

The following abbreviations are used for material discussed in this study: **IBSS** – Federal Scientific Center of the East Asia Terrestrial Biodiversity (formerly Institute of Biology and Soil Science), Vladivostok, Russia; **MZUF** – Università di Firenze, Museo Zoologico "La Specola", Florence, Italy; **ZIN** – Zoological Institute of Russian Academy of Sciences, St Petersburg, Russia.

The classification of the Mutillidae follows Brothers and Lelej (2017). The following abbreviations are used: S1, S2, S3, etc., to denote the first, second, third, etc. metasomal sterna; T1, T2, T3, etc., to denote the first, second, third, etc. metasomal terga. Photographs were taken with an Olympus SZX16 stereomicroscope and an Olympus DP74 digital camera, and then stacked using Helicon Focus software. The final illustrations were post-processed for contrast and brightness using Adobe® Photoshop™ software.

DESCRIPTION OF NEW SPECIES

Genus *Ephucilla* Lelej, 1995

Ephucilla Lelej, 1995: 3, 10.

Type species: *Mutilla naja* Zavattari, 1913, ♂, by original designation.

SPECIES INCLUDED. The genus includes 13 species in Oriental Region (Pagliano *et al.*, 2020). A new species *E. hejunhuai* sp. n. is described here.

Ephucilla hejunhuai Lelej, sp. n.

<http://zoobank.org/NomenclaturalActs/BB574DEA-C989-429C-974A-FBB37AF053C6>

Figs 1–3

TYPE MATERIAL. Holotype – ♀, **China**: Guangdong, Xiang Tai Shan near Guangzhou, near wood house, 7.VIII 2016, A. Lelej & V. Loktionov [IBSS].

DIAGNOSIS. FEMALE. Mesosoma long, $1.40 \times$ maximal width, with more or less parallel sides. Scutellar scale distinct, nail-like. T2 except black transverse preapical band and T3 with ferruginous-red cuticle. Pygidial area slightly convex, glabrous, weakly carinated laterally. T2 posterad and T3 with band of yellowish setae. MALE unknown.

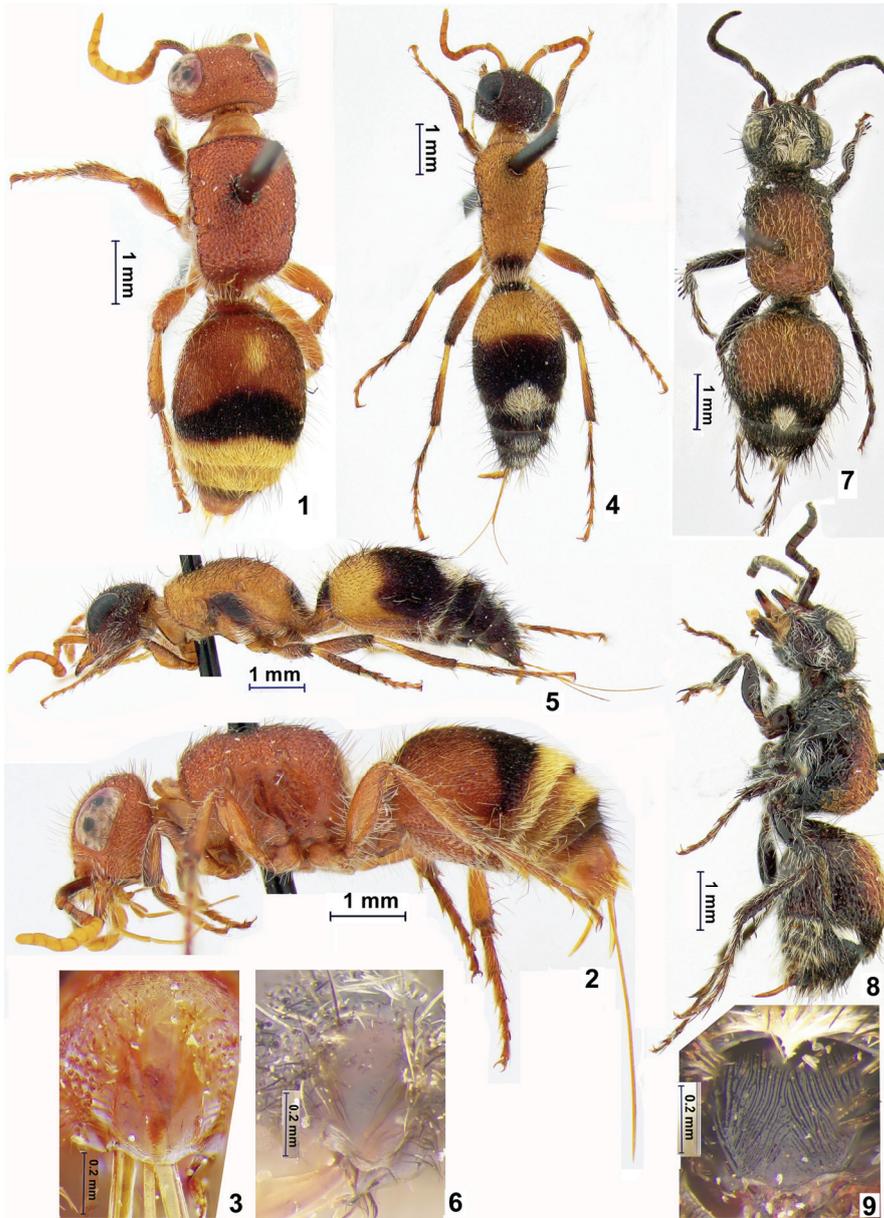
DESCRIPTION. FEMALE. Body length 7.5 mm. Ratio of head width and pronotal maximal width 90:90. Ratio of mesosoma length and pronotal maximal width 125:90. Inner margin of mandible with two weak teeth near apex. Clypeus with strong transverse setose carina which limit anterior concave shiny part, basally subtriangular, elevated, with median tubercle. Antennal tubercle carinated above; first flagellomere $0.9 \times$ as long as its maximal width, $1.1 \times$ as long as flagellomere 2. Genal carina distinct, forming small tooth at hypostomal carina junction. Frons, vertex and gena with dense coarse punctures. Humeral angle of mesosoma prominent. Ratios of width at humeral angle, widest point of pronotum, anterior spiracle, propodeal spiracle and narrowest point of propodeum dorsally 80:90:90:80:75. Scutellar scale distinct, nail-like. Mesosoma dorsally slightly convex, with dense coarse punctures larger than on head. Mesopleuron smooth with vertical row of large punctures along mesopleural carina; metapleuron smooth shiny with few punctures along metapleuro-propodeal suture. Propodeum laterally smooth with few shallow punctures. Lateral and posterior propodeal faces separated by wavy carina. Metacoxa carinated mesally. Meso- and metatibia each with two rows of 4–5 weak fuscous spines. Metatibio-tarsal ratios of 75:32:21:16:12:16. T2 with dense small separate punctures, posteriorly smaller and not visible under dense setae. T3–5 with fine dense small punctures. S1 with simple longitudinal carina. S2 with large dense separate punctures. S3–5 posteriorly with fine dense punctures. Pygidial area slightly convex, glabrous, weakly carinated laterally.

Color and setation. Head ferruginous-red, clypeus, mandible, except brownish apex, and antennae, except brownish scape, pedicel and flagellomere 1, ferruginous-red; palps pale brown. Mesosoma totally ferruginous-red. Legs ferruginous. Tibial spurs whitish. T1 ferruginous-red. T2, except black transverse preapical band, and T3 with ferruginous-red cuticle. S1–6 ferruginous-red. Frons and vertex with sparse suberect and erect yellowish setae; gena with sparse recumbent yellowish setae. Mesosoma dorsally with sparse suberect blackish setae. Posterior propodeal face with sparse suberect whitish setae. Meso- and metapleuron with few suberect white setae, without supracoxal spot of dense recumbent silver setae. T1 with sparse erect whitish setae. T2 medially with small subbasal spot of yellowish recumbent setae. T2 posterad and T3 with band of yellowish setae. T2, except yellowish spot and band, and T4–5 with sparse recumbent black setae. T6 laterally with long, sparse erect whitish to brownish setae. Lateral felt line on T2 rufous. Metasomal sterna with sparse whitish setae, which form apical fringe on S2–5.

DISTRIBUTION. China (Guangdong).

REMARKS. In having most part of T2 with ferruginous-red cuticle, this species differs from other known *Ephucilla*.

ETYMOLOGY. The specific name is dedicated to Prof. He Jun-hua (Zhejiang University, Hangzhou, China), for his valuable contribution to the study of Hymenoptera in China.



Figs 1–9. 1–3 – *Ephucilla hejunhuai* sp. n., holotype; 4–6 – *Promecilla ovtchinnikovi* sp. n., ♀, holotype; 7–9 – *Smicromyrme burgeri* sp. n., ♀, paratype. 1, 2, 4, 5, 7, 8 – habitus (1, 4, 7 – dorsal view; 2, 5, 8 – lateral view); 3, 6, 9 – T6, pygidial area.

Genus *Promecilla* André, 1902

Promecilla André, 1902: 14, 40.

Type species: *Mutilla regia* Smith, 1855, ♀, by original designation.

SPECIES INCLUDED. The genus includes 28 species, 21 of them are known from Oriental Region, five from Afrotropical and two (*Promecilla primana* Skorikov, 1935, ♀ ♂, Tajikistan, Uzbekistan and *P. vinuta* (Nagy, 1972), ♂, Afghanistan) from Palaearctic Region (Pagliano *et al.*, 2020). A new species *P. ovtchinnikovi* sp. n. is described here.

Promecilla ovtchinnikovi Lelej, sp. n.

<http://zoobank.org/NomenclaturalActs/9052B540-92A5-440F-9199-F73D2424110E>

Figs 4–6

TYPE MATERIAL. Holotype – ♀, **Pakistan**: NWF [currently Khyber Pakhtunkhwa] Province, Peshawar, Forestry Campus of Agricultural University, 17.VIII 2005, S.V. Ovtchinnikov [ZIN].

DIAGNOSIS. FEMALE. Mesosoma long, $1.8 \times$ maximal width, convergent posterad; scutellar scale lacking. T2 in basal half and S2 with orange cuticle. Pygidial area shiny matt, slightly convex, not carinated laterally. T2 posterad with large median spot of white setae, T4–5 with median smaller spot of grayish setae. MALE unknown.

DESCRIPTION. FEMALE. Body length 8.0 mm. Ratio of head width and pronotal maximal width 80:75. Ratio of mesosoma length and pronotal maximal width 135:75. Mandible with distinct basal widening beneath. Clypeus with strong transverse setose carina which limit anterior concave shiny part, basally subtriangular, elevated, with median tubercle. Antennal tubercle carinated above; first flagellomere $1.1 \times$ as long as its maximal width, $1.2 \times$ as long as flagellomere 2. Genal carina weak, forming small tooth at hypostomal carina junction. Frons, vertex and gena with dense punctures. Humeral angle of mesosoma rounded. Ratios of width at humeral angle, widest point of pronotum, anterior spiracle, propodeal spiracle and narrowest point of propodeum dorsally 60:75:75:67:60. Scutellar scale lacking. Mesosoma dorsally and posterior propodeal face with dense punctures larger than on head. Mesopleuron smooth with vertical row of large punctures along mesopleural carina, propodeum laterally with few shallow punctures. Lateral and posterior propodeal faces separated by wavy carina. Meso- and metatibia each with two rows of 4–5 weak fuscous spines. Metatibio-tarsal ratios of 85:40:27:20:15:20. T2 with dense small elongate separate punctures, posteriorly smaller and denser. T3–5 with fine dense small punctures. S1 with simple longitudinal carina. S2 with sparse large punctures. S3–5 posteriorly with fine dense punctures. Pygidial area slightly convex, not carinated laterally, glabrous matt.

Color and setation. Head brownish-red, clypeus, mandible except apex and antennae ferruginous-red; palps pale brown. Mesosoma ferruginous-red with blackish

upper part of meso- and metapleuron. Legs ferruginous with apex of femur and most tibia brownish. Tibial spurs whitish. T1 ferruginous-red, brownish posteromedially. T2 in basal half ferruginous-red, S2 ferruginous-red, T2 in apical half, T3–6 black; S3–6 tinted reddish. Frons and vertex with sparse suberect and erect black setae; gena with sparse recumbent whitish setae. Mesosoma dorsally except pronotum with sparse suberect black setae. Pronotum and posterior propodeal face with sparse suberect whitish setae. Meso- and metapleuron with supracoxal spot of dense recumbent silver setae. T1 with sparse erect whitish setae. T2 medially with small subbasal patch of whitish recumbent setae. T2 posterad with large median spot of white setae and fringe of whitish setae. T4–5 with median smaller spot of grayish setae. T2–5 with sparse suberect and recumbent black setae. T6 with long, sparse erect grayish to black setae. Lateral felt line on T2 rufous. Metasomal sterna with sparse whitish setae, which form apical fringe on S2–5.

DISTRIBUTION. Pakistan (North-West Frontier [currently Khyber Pakhtunkhwa] Province).

REMARKS. In having basal half of T2 with ferruginous-red cuticle, this species differs from other known *Promecilla*. This female may be the opposite sex of the *P. vinuta* (Nagy, 1972), male, described from the Eastern Afghanistan (Nagy, 1972).

ETYMOLOGY. This species is named in honor of tragically died Sergey V. Ovtchinnikov (1958–2007), who collected the holotype.

Genus *Smicromyrme* Thomson, 1870

Smicromyrme Thomson, 1870: 208.

Type species: *Mutilla rufipes* Fabricius, 1787, ♀, by original designation.

SPECIES INCLUDED. There are five subgenera including nominotypical and 266 valid species and 23 valid subspecies which are recognized from the Palearctic, Afrotropical, and Oriental regions (Pagliano *et al.*, 2020). The Palearctic fauna are well-divided into subgenera based on characters from both sexes, but especially in males. A new species, *S. burgeri* sp. n. from the subgenus *Eremotilla* Lelej, 1985, is described here.

***Smicromyrme (Eremotilla) burgeri* Lelej, sp. n.**

<http://zoobank.org/NomenclaturalActs/041D8CF1-ADF1-4CE5-B354-DB19943B2532>

Figs 7–9

TYPE MATERIAL. Holotype – ♀, **India:** S-India, [Karnataka], 15 km SE Bangalore, KT [Käfer trap], 25.VII [19]96, [K.] Werner, [L.] Lorenz leg. [MZUF]. Paratype: S-India, [Karnataka], 15 km N Bangalore, KT, 23–24.VII [19]96, 1 ♀, [K.] Werner, [L.] Lorenz leg. [IBSS].

DIAGNOSIS. FEMALE. First flagellomere 1.4 × as long as its maximal width, 1.55 × as long as flagellomere 2. Postgenal bridge with median tubercle and transverse

microstriae. T2 disc ferruginous-red, laterally and posteriorly brownish to black. Head dorsally with large spot of silver setae, T2 medially with small subbasal spot of golden recumbent setae. T2 posterad with median and lateral spots of silver setae. T4–5 with median spot of silver setae. MALE unknown.

DESCRIPTION. FEMALE. Body length 5.6(holotype)–6.4 mm. Ratio of head width and pronotal maximal width 87:85. Ratio of mesosoma length and pronotal maximal width 120:85. Inner margin of mandible without weak teeth near apex. Clypeus with transverse carina which limit anterior concave shiny part, basally subtriangular, elevated, with median tubercle. Antennal tubercle carinated above; first flagellomere $1.4 \times$ as long as its maximal width, $1.55 \times$ as long as flagellomere 2. Genal carina weak, forming small tooth at hypostomal carina junction. Postgenal bridge with median tubercle and transverse microstriae. Frons and vertex with dense coarse punctures, gena with dense punctures. Humeral angle of mesosoma prominent. Ratios of width at humeral angle, widest point of pronotum, anterior spiracle, propodeal spiracle and narrowest point of propodeum dorsally 75:85:80:83:70. Scutellar scale distinct, nail-like. Mesosoma dorsally with dense coarse punctures larger than on head. Mesopleuron smooth with distinct mesopleural carina; metapleuron with fine dense punctures. Propodeum laterally with shallow dense punctures. Lateral and posterior propodeal faces separated by wavy carina. Metacoxa carinated mesally. Meso- and metatibia each with two rows of 4–5 strong fuscous spines. Metatibiotarsal ratios of 70:32:22:18:12:12. T2 with large dense coarse punctures, smaller posteriorly and sparser laterally. T3–5 with dense smaller punctures. S1 with longitudinal carina highest posteriorly. S2 with large dense separate punctures; S3–5 posteriorly with smaller dense punctures. Pygidial area well developed, widened basally, carinated laterally, with divergent striae.

Color and setation. Head black, mandible basally brownish; antennae black, brownish ventrally; palps brownish. Mesosoma black, dorsally ferruginous-red, pronotum brownish; posterior propodeal face ferruginous-red. Legs black. Tibial spurs whitish. T1 brownish. T2 disc ferruginous-red, laterally and posteriorly brownish to black. T3–6 black. S1–6 brownish. Head dorsally with large spot of silver setae, gena with recumbent silver setae. Mesosoma dorsally and posterior propodeal face with sparse suberect yellowish setae, pronotum with sparse recumbent brownish setae. Meso- and metapleuron in lower part with dense recumbent silver setae. T1 with apical median tuft of silver setae. T2 medially with small subbasal spot of golden recumbent setae. T2 posterad with median and lateral spots of silver setae. T4–5 with median spot of silver setae. T2, except golden subbasal and three apical silver spots, with sparse recumbent and suberect yellowish setae; T2 posteriorly, T3, T4–6 laterally with suberect black setae. Lateral felt line on T2 rufous. Metasomal sterna with sparse whitish setae, which form apical fringe on S2–5.

DISTRIBUTION. India (Karnataka).

REMARKS. In having most part of T2 with ferruginous-red cuticle, this species differs from other known *Smicromyrme*.

ETYMOLOGY. The specific name is dedicated to Frank Burger who collected mutillids in the Indian subcontinent.

DISCUSSION

Of the nine East Asian mutillid taxa with other color patterns than BHCS and RHCS, three species from the genus *Taiwanomyrme* (tribe Trogaspidiini) (Tu *et al.*, 2015; Lelej, 2020) have a body entirely black, except for the second metasomal segment which is reddish. The latter pattern approximates Texan mimicry ring in North America (Wilson *et al.*, 2015). The discovered three Oriental new species from the tribe Smicromyrmini with reddish second metasomal segment and mesosoma have the color syndrome, which approximates Eastern mimicry ring in North America. These similarly colored insects from disparate continents cannot be treated as members of the same mimicry rings. The color patterns that define these mimicry rings, however, are significant indicators of aposematism, and potentially mimicry (Okayasu *et al.*, 2018).

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