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A review of the digger wasps (Insecta: Hymenoptera: Scoliidae) of Hong Kong, with description of one new species and a key to known species

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Abstract. We provide keys, descriptions and illustrations for 16 species of Scoliidae Latreille, 1802 found in Hong Kong, of which nine are new records for the territory, one is new to China and one is new to science: *Scolia pakshaoensis* sp. nov. The status of one species (*Megacampsomeris* sp. 1) remains uncertain; it may represent an additional new species.

Keywords. Scolioidea, Scoliini, Campsomerini, taxonomy, morphometrics.

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Introduction

The Scoliidae Latreille, 1802, commonly known as digger wasps, hairy wasps or scarab-hunter wasps, are a cosmopolitan family of relatively large wasps that attack the larvae of scarabaeoid beetles. Female scoliids dig into soil or decaying wood in search of the larvae which they paralyse with a sting and the wasp egg is laid transversely across it (Askew 1971; Naumann 1991). Adults may be observed feeding at flowers. Males commonly perform prenuptial flights, flying in a figure-8 pattern low to the ground in search of emerging females (Gupta & Jonathan 2003; Krombein 1978).

Scoliidae are readily distinguished from other wasp families by the possession of distally pleated fore wings with an array of minute, parallel ridges and grooves ('pseudovenation') in the apical part of the wing, distad from the venation (Naumann 1991), and by laminate expansions on the metasternum covering the bases of the widely separated metacoxae (Goulet & Huber 1993). In the field, scoliids may commonly be distinguished from most other wasps by their large size and hairy habitus, with their wings usually having a more or less iridescent appearance. They may be distinguished from large bees by their more elongate habitus. Whereas some species of Scoliidae found in Hong Kong

might be readily distinguishable by even a casual observer, such as the large black and red species *Megascolia azurea* (Christ, 1791) and *Liacos erythrosoma* Burmeister, 1854, other species prove to be more problematic. Sexual dimorphism in the Scoliidae is extreme and females and males of a single species are often not readily associated. Females are generally more robust and larger than the corresponding males, and the two sexes often differ significantly in colour pattern. Males of a single species may also vary significantly in size. A collection of specimens of *Phalerimeris carinifrons* (Turner, 1909) taken in various parts of southwestern Australia included males varying in length from about 11 to 20 mm (C. Taylor pers. obs.) whereas males of *Megacampsomeris prismatica* (Smith, 1855) recorded herein varied from 13 to 20 mm in length. Species of *Scolia* and representatives of Campsomerini Bartlett, 1912 are also notable for being both very similar in superficial features and potentially variable in appearance, meaning that they require close examination of fine-scale features to be confidently distinguished.

An illustrated key to the Scoliidae of China was published recently by Liu *et al.* (2021a), which identifies eight out of nine genera and 13 out of 16 species found in Hong Kong. However, Liu *et al.* (2021a) do not provide detailed descriptive information on the species covered. Two species we report from Hong Kong are also not recorded by Liu *et al.* (2021a, 2021b). The most recent comprehensive revision of Chinese Scoliidae was by Betrem (1941). Betrem provided a key that may be used to identify some but not all of the species found in Hong Kong but which may prove misleading for more variable species. Betrem's nomenclature also differs significantly from current usage. Many of the taxa recognised by Betrem (1941) as distinct have since been synonymised, and many of those that continue to be recognised have been moved to different genera. The taxonomy of scoliids has historically been chaotic, beset by issues arising from a lack of rigour in taxonomic practice and inconsistencies in the treatment of supraspecific taxa (Elliot 2011). Perhaps the apex of taxonomic confusion is represented by the classification of Argaman (1996) who recognised no less than 143 genera in the family, or about one genus for every four species. Many of these genera were distinguished by characters that not only vary within genera as recognised by other authors but also within a single species (Osten 2005; C. Taylor pers. obs.). Osten (2005) described Argaman's system as "unsinnige und auch von Spezialisten nicht nachvollziehbare" (nonsensical and incomprehensible, even to specialists) and it has generally been disregarded by subsequent authors (Argaman's taxa have been reviewed by Kimsey & Brothers 2016). Osten's (2005) own classification of Scoliidae was presented in the form of a bare checklist with little discussion of the reasons for decisions taken therein. There is thus no single source that can be taken as an authoritative guide for scoliid classification at the generic level. Among those that have been consulted in deciding what nomenclature to use for species found in the Hong Kong region are Krombein (1978), Gupta & Jonathan (2003), and Kim (2009).

Within the Aculeata, Pilgrim *et al.* (2008) proposed classifying the family Scoliidae into the superfamily Scolioidea Latreille, 1802 together with the family Bradynobaenidae de Saussure, 1892. More recent studies (Debevec *et al*. 2012; Branstetter *et al*. 2017) have corroborated a relationship with the Bradynobaenidae. Most recent authors recognise two subfamilies of living Scoliidae, the Proscoliinae Rasnitsyn, 1977 and Scoliinae Latreille, 1802, with the latter divided between two tribes Scoliini Latreille, 1802 and Campsomerini (Day *et al.* 1981; Osten 2005), and we follow here both the higher and tribal classification of Scoliidae. The Proscoliinae are represented in the recent fauna by a single genus *Proscolia* Rasnitsyn, 1977 found only in the eastern Mediterranean and Caucasus regions (Argaman 1996; Gupta & Jonathan 2003). Though fossil members of this subfamily are known from the later Mesozoic of China and Brazil (Zhang 2006), it is unlikely to be found in the modern fauna of Hong Kong. Within the far more diverse Scoliinae, representatives of both Scoliini and Campsomerini are known from the Hong Kong region.

To date, little has been published about the Scoliidae of the Hong Kong SAR. The species *Scolia laeviceps* was described from Hong Kong by Smith (1855) who also recorded the presence there of *'Scolia iris'*, a name used dubiously as we discuss below. Six species were recorded by Dover (1926): *Dielis frimbriata* Fabr. [= *Campsomeriella collaris* (Fabricius, 1775)], *Dielis iris* Lep. [= ?, see Discussion below], *Dielis annulata* Fabr. [= *Campsomeriella annulata* (Fabricius, 1793)], *Discolia cucullata* Bingh. [= *Scolia binotata binotata* Fabricius, 1804], *Discolia laeviceps* Sm. [= *Scolia laeviceps* Smith, 1855] and *Triscolia rubiginosa* Fabr. [= *Megascolia azurea* Christ, 1791].

Of the six scoliid species recorded from Hong Kong by Dover (1926), we have confirmed the presence of five; the sixth species, '*Dielis iris* Lep.' (also recorded by Smith 1855 as *Scolia iris*), requires further consideration. *Colpa iris* Lepeletier, 1845 was originally described from Java and is listed by Osten (2005) as a synonym of *Tristimeris javana* (Lepeletier, 1845). However, the identification of Lepeletier's '*iris*' has historically been confused and specimens that have been described under this name are referable to *Megacampsomeris prismatica* (Smith, 1855), *Campsomeriella collaris* and *Phalerimeris phalerata* (de Saussure, 1858) (Betrem 1941; note that, contra Osten's [2005] listing of them as seemingly separately available names, references to *Elis iris* in de Saussure & Sichel 1864, and Magretti 1892, are redescriptions of Lepeletier's species). *Tristimeris javana* has a more southerly distribution in Asia between Indonesia and Myanmar (Gupta & Jonathan 2003) and we feel it more likely that Dover's (1926) record refers to one of the other species known from Hong Kong with which it has previously been confused.

We provide descriptions of seven species in four genera of the tribe Campsomerini and nine species in five genera of the tribe Scoliini, totalling 16 described species. Nine of these are new records for Hong Kong and one is new to science, more than doubling the number of species known from the territory.

Material and methods

The present work is based primarily on scoliid specimens collected over the course of several years (2006–2019) by C. Barthélémy, together with specimens collected in 2017 and 2018 as part of a survey of mangrove-associated insects by C. Taylor and S.C. Cheung (Hong Kong University) and the examination of specimens in the collection of the Tai Lung Farm Experimental Station, Hong Kong, totalling about 110 specimens.

We have not listed synonymies except for type descriptions and citations directly relevant to Hong Kong. More complete synonymy listings may be found elsewhere (Gupta & Jonathan 2003; Osten 2005; Kim 2009; Elliot 2011). Nomenclature follows Osten (2005) except as indicated. For identification of species, we have used available keys and descriptions of species for the family (e.g., Betrem 1928, 1941; Krombein 1978; Gupta & Jonathan 2003; Kim 2009; Liu *et al.* 2021a) and additional comparison with original type description. Because the historically confused taxonomy of this family can make locating descriptions in the literature challenging, and to facilitate comparison with novel descriptions, we provide full descriptions for all species examined.

Past authors (e.g., Betrem 1928, 1941) have recognised a large number of subspecific taxa within Scoliidae. Many scoliid subspecies have been recognised on the basis of colour variations only with little or no consideration given to whether they represent truly geographically distinct populations. Unfortunately, determining the validity of such subspecific taxa will require a broad revision beyond the scope of the current study. We have therefore foregone subspecific names for cases of historically confused subspecific nomenclature or species that do not key well at subspecific level and new species, but trinomial names are used for specimens that readily keyed to subspecies.

For brevity we have used throughout T1, T2, etc.; S1, S2, etc., to denote metasomal tergites and sternites respectively, and morphological terms follow Betrem (1928, 1941), refer to Figures 5A–F and 6A.

In addition, we have used throughout adjectives such as densely, sparsely and moderately to define density of punctures on the various body parts. These are defined as a. densely: punctures separated by distance equal to their diameter or, often less, b. sparsely: punctures separated by distance 4× or more than their own diameter and, c. moderately: punctures separated by distance 2–3× their own diameter. The reader will be able to decide on these distinctions with the aid of the figures illustrating such body parts.

In the key, references to the 'basal' section of the metasoma indicate the first two segments whereas segments three onwards are referred to as the 'apical' section. Descriptions of coloration refer to the colour of the integument unless otherwise specified.

We provide for morphometric data and a suite of standard measurements to produce ratios/indices for the specimens examined. Not all specimens examined were measured, as some were not accessible at time of measurement or where damaged after examination, we measured 84 specimens in total. Measurement values (except for specimen length) are relative values as measured in the stereo microscope's reticule at various magnifications as indicated below in "[ ]". These measurements are referred to in figures 5A–D and detailed here and, the number of specimens measured is represented by the value "n" in the text:

C_H = Clypeus height, distance between the apical margin of clypeus and frontal area suture [×40], see Fig. 5C
C_L = Clypeus length [×40], see Fig. 5C
H_W = Head width, measured frontally between external margin of the eyes [×40], see Fig. 5A
H_H = Head height, measured frontally between the apical margin of clypeus and the frons [×40], see Fig. 5C
L = Length of specimen in millimetres (mm), this is obtained by adding two measurements in lateral view, the first from frons to posterior apex of propodeum and the second from the petiole attachment to the apical part of the metasoma.
Me_H = Mesosoma height, measured vertically from mesoscutum to ventral side of mesopleuron [×20], see Fig. 5B
Me_L = Mesosoma length, measured medially from pronotal carina to point of insertion of metasoma in propodeum [×20], see Fig. 5B
O_D = Ocular distance, distance between the eyes measured dorsally across posterior ocelli [×60], see Fig. 5D
OOD = Ocular-ocellar distance, distance between posterior ocellus and eye margin [×100], see Fig. 5D
O_W = Occipital width, distance between posterior margins of eyes measured dorsally [×40], see Fig. 5A
POD = Postocellar distance, distance between the two posterior ocelli [×100], see Fig. 4D
T_L = Mesoscutum length [×40], see Fig. 5A
T_W = Mesoscutum width, maximum width of mesoscutum measured dorsally between apices of tegulae [×40], see Fig. 5A
$T2_L$ = Tergum 2 length [× 20], see Fig. 5A
$T2_W$ = Tergum 2 width [× 20], see Fig. 5A
V_D = Vertex distance, distance between posterior side of posterior ocelli to back of head [×60], see Fig. 5D

These dimensions are used to define the following eight ratios:

CLR = Clypeal ratio: $C_L \div C_H$
CR = Cephalic ratio: $H_W \div H_H$
FRR = Frons ratio: $O_D \div V_D$
MER = Mesosomal ratio: $Me_L \div Me_H$
MSR = Mesoscutal ratio: $T_L \div T_W$
OMR = Occipital-mesosomal ratio: $O_W \div T_W$
OOR = Ocellar-ocular ratio: POD ÷ OOD
TER = Tergal ratio: $T2_L \div T2_W$

The photos were obtained using a Leica M205 C stereo microscope and stacking software LAS ver. 4. at increments of 15–50 steps and a Nikon D200 DSLR equipped with a Nikkor 60 mm macro lens and Sunpak D12 ring flash for the larger specimens. On some figures we have added a white arrow that points to some characters used in the key. New records are asterisked (*).

We have not been able to examine type specimens and there is no accessible digital imagery of the same, except *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989 for which an image of the type was sent to us by Girish Kumar (Zoological Survey of India). Our holotype material will be deposited at the Californian Academy of Science, USA.

The acronyms of collections where types and examined material are deposited are as follows:

CAS = California Academy of Science, San Francisco, California, USA
CBC = Christophe Barthélémy's collection, Hong Kong, China
HKBM = Hong Kong Biodiversity Museum, Hong Kong, China
HMS = Heude Museum, Shanghai, China
HNHM = Hungarian Natural History Museum, Budapest, Hungary
MLUH = Martin Luther Universität, Wissenschaftsbereich Zoologie, Halle-Wittenberg, Germany
MNHN = Muséum national d'histoire naturelle, Paris, France
NHMUK = Natural History Museum United Kingdom (formerly British Museum of Natural History), London, UK
NHMW = Naturhistorisches Museum Wien, Vienna, Austria
RMNH = Nationaal Natuurhistorische Museum ("Naturalis") [formerly Rijksmuseum van Natuurlijke Historie], Leiden, the Netherlands
TLFES = Tai Lung Farm Experimental Station, Sheung Shui, Hong Kong, China
UNITO = University of Turin, Turin, Italy
ZMB = Museum für Naturkunde, Humboldt-Universität zu Berlin, Berlin, Germany
ZMUC = Zoological Museum, University of Copenhagen, Copenhagen, Denmark
ZSI = Zoological Survey of India, Kolkata, India

The world distribution maps and the Distribution sections in the text were obtained using all available historical distributional records (Provinces) by the reference authors for the given taxa and the data points on the maps are placed in the approximate geometric centre of the given Provinces. The Hong Kong distribution maps are based on our material, historic records and recent observations posted on the i-Naturalist website at: https://www.inaturalist.org/projects/hong-kong-bees-and-wasps. The base map represents four degree of anthropogenic disturbance of the ecosystems in Hong Kong, these were obtained by using population census data superimposed on 1:100.000 geographic survey of the territory including Country Parks, with the inference that higher population densities equate to higher disturbances.

Results

Species list

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Superfamily Scolioidea Latreille, 1802
Family Scoliidae Latreille, 1802
Subfamily Scoliinae Latreille, 1802
Tribe Campsomerini Bartlett, 1912

Genus ***Campsomeriella*** Betrem, 1941

Campsomeris (*Campsomeriella*) Betrem, 1941: 86 (type species *Scolia thoracica* Fabricius, 1787, by original designation).
Iforborha Argaman, 1996: 203 (type species *Tiphia collaris* Fabricius, 1775 by original designation).
Tetrasciton Argaman, 1996: 204 (type species *Campsomeris aureicollis* Lepeletier, 1845 by original designation).

Notes

The name *Tetrasciton* was attributed by Argaman (1996) to Betrem (1927a). However, Betrem's (1927a) *Tetrasciton* was a nomen nudum, the genus being neither described nor associated with any species name. This name must therefore be attributed to Argaman (1996) himself.

Subgenus ***Annulimeris*** Betrem, 1967

Campsomeris (*Phaleromeris*) Bradley, 1964b: 9 (nomen nudum).
Campsomeriella (*Annulimeris*) Betrem, 1967: 26–29 (type species *Tiphia annulata* Fabricius 1793, by original designation).

Notes

See comments below under genus *Phalerimeris* regarding the status of *Phaleromeris* Bradley, 1964b.

Campsomeriella* (*Annulimeris*) *annulata annulata (Fabricius, 1793)
1A–B, 7A, 9A, 11A, 13A, 15A, 17A, 19A, 21A, 23A, 25A, 27A,
29A, 31A, 33A, 35A, 37A, 39A, 40A, 41A, 42A

Tiphia annulata Fabricius, 1793: 225 (holotype ZMUC, ♀, type locality = China).
Campsomeris servillii Lepeletier, 1845: 501 (holotype UNITO, ♀, type locality = Java).
Elis (*Dielis*) *aglaea* Cameron, 1901: 19–20 (holotype ♂, type locality = "Biserat in Jalor, Malay Peninsula", probably in southern Thailand, Huber *et al.* 2015).

Scolia annulata – Smith 1855: 100.
Elis (*Dielis*) *annulata* – de Saussure & Sichel 1864: 196.
Campsomeris (*Campsomeris*) *annulata* – Rohwer 1921: 88.
Dielis annulata – Dover 1926: 234.
Campsomeris (*Dielis*) *annulata* – Betrem 1928: 94.
Campsomeris (*Dielis*) *annulata servillei* – Betrem 1928: 95 (by implication).
Campsomeris (*Phaleromeris*) *annulata* – Bradley 1964b: 9.
Campsomeriella (*Annulimeris*) *annulata* – Betrem 1967: 29.
Campsomeris (*Campsomeriella*) *annulata* – Tsuneki 1972: 18.

Campsomeris (*Phalerimeris*) *annulata* – Tsuneki 1972: 19 (in synonymy).
Phaleromeris annulata – Argaman 1996: 205 (by implication).

Material examined

CHINA – **Hong Kong** • 1 ♀; no data; HKBM • 1 ♂; Shui Hau; 22°13′15″ N, 113°55′08″ E; 15–29 May 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 2 ♂♂; Tai Lung Farm; 21 Oct. 1981; TLFES • 2 ♂♂; same collection data as for preceding; 22 Oct. 1981; TLFES.

Description

Female

Standard ratios (n = 1). L: 20.1 mm; CR: 1.16; OOR: 0.44; CLR: 0.49; MER: 0.83; OMR: 0.88; FRR: 2.0; MSR: 0.74; TER: 1.79.

Head. Head densely punctate near lateral margins of clypeus, on frontal spatium and lower part of frons outside ocular sinus, punctures contiguous or separated by a distance less that their own diameter (Fig. 15A); declivous part of vertex with dense punctures contiguous or separated by a distance less than their own diameter (Fig. 19A), remainder of head sparsely punctate to impunctate.

Mesosoma. Mesocutum and dorsomedian area of propodeum moderately to densely punctate (Figs 23A, 27A), posterior marginal areas of scutellum and metanotum, sparsely punctate to impunctate (Fig. 27A); rear margin of dorsomedian area of propodeum medially produced into posteriorly directed tubercle (Fig. 23A). Mesopleuron largely densely but minutely punctate anteriorly and posteriorly, narrowly coarsely punctate along sharp median crest only; metapleuron largely densely but minutely punctate with effaced larger punctures on lower panel, with sharp carina dividing upper and lower panels; lateral panel of propodeum largely densely but minutely punctate, becoming more coarsely punctate dorsally and posteriorly. Scutellum and metanotum without median longitudinal carina (Fig. 27A). Dorso-median area of propodeum with distinct tubercule medially (Fig. 27A).

Metasoma. Metasoma with strong division between anterior and ventral faces of S2 in lateral view; tergites broadly impunctate discally, becoming moderately punctate anteriorly and posteriorly (Figs 31A, 35A). Basal elevation of T2 well developed (gradulus) (Fig. 35A).

Wings. Fore wing with two submarginal cells and two recurrent veins; second recurrent vein reaching submarginal cell. Fore wing with very few and minute short hairs in the first submarginal cell

Colour and vestiture. Integument entirely black (Fig. 7A). Vestiture light yellow except black on T5 and T6. Wings mostly yellowish, fore wing darkly infumated with purple reflections anterodistally.

Male

Standard ratios (n = 5). L: 15.3–18.4 mm (mean = 16.5 mm); CR: 1.13–1.22 (mean = 1.17); OOR: 1.10–1.50 (mean = 1.33); CLR: 0.57–0.65 (mean = 0.61); MER: 1.14–1.33 (mean = 1.23); OMR: 1.01–1.08 (mean = 1.04); FRR: 1.72–1.93 (mean = 1.82); MSR: 0.82–0.88 (mean = 0.85); TER: 1.34–1.47 (mean = 1.39).

Head. Head broadly impunctate on disc of clypeus (Fig. 17A); densely punctate on frontal spatium and ocular sinus (Fig. 21A); moderately punctate laterally on frons but broadly impunctate immediately in front of anterior ocellus, moderately punctate on declivous part of vertex; frontal spatium moderately well-defined posteriorly (Fig. 17A); frontal fissura present between posterior margin of frontal spatium and anterior ocellus.

Mesosoma. Dorsum of pronotum with dense but very shallow punctures (Fig. 25A); mesoscutum uniformly moderately punctate (many punctures separated by about their diameter); scutellum and metanotum each moderately punctate anteriorly, broadly impunctate posteriorly (Fig. 25A); dorsum of propodeum mostly densely punctate (Fig. 29A). Lateral panels of mesosoma with punctation mostly obscured by dense appressed pile (Fig. 9A); mesopleuron mostly densely punctate; metapleuron and lateral panel of propodeum largely impunctate, upper and lower panels of metapleuron separated by sharp transverse carina. Scutellum and metanotum without median longitudinal carina (Fig. 29A). Dorso-median area of propodeum without distinct tubercule medially (Fig. 29A).

Metasoma. Metasoma with very weak division between anterior and ventral faces of S2 in lateral view; tergites moderately but shallowly punctate (Figs 33A, 37A). Basal elevation of T2 well developed (gradulus) (Fig. 37A).

Wings. Same as female, but first submarginal cell uniformly setose.

Colour and vestiture. Integument mostly black with following areas yellow: base of mandible; broadly along lateral margin of clypeus; dorsum of pronotum; large paired spots on scutellum (spots may be more or less coalesced medially); disc of metanotum; pronotal callosity; broad yellow lines on all femora, fore and mid tibiae and fore basitarsus; more or less broad apical bands on T1–T5 and apicolaterally on S2–S4 (Figs 9A, 13A). Vestiture yellow or white except black on metasomal segments 6 and 7 (Fig. 9A). Wings lightly infumated.

Genitalia. Ventral side of paramere with sparse setae mainly located on margin (Fig. 40A), dorsal side with denser setae on all its surface (Fig. 39A); volsella with a few long setae mainly on its apical exterior margin (Fig. 40A), cuspis volsellaris with sparse short setae on entire surface (Figs 40A, 41A, 42A); volsella with a few sensory cones medially on its external margin (Fig. 42A) and a wide lamella on inner margins (Fig. 39A). External margin of paramere abruptly angled medially, flattened apically (Fig. 40A); aedeagus with 10 teeth, serrated margin broadly convex

Distribution (Fig. 1A–B)

China (Anhui, Guangdong, Guizhou, Fujian, Hebei, Hong Kong [Kowloon], Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Yunan, Zhejiang); Indonesia (Sumatra, Java, Sulawesi); Philippines (Luzon, Leyte, Panay, Mindanao); Japan (Honshu, Shikoku, Kyushu, Okinawa island); Korea (South, Honam Jeju); Malaysia (Malacca); Myanmar (Tenasserim); Nepal; India (Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, Sikkim, Tripura, Uttarakhand, Uttar Pradesh (Lucknow), West Bengal); Manchuria (?). [Bingham 1897; Betrem 1941; Baltazar 1966; Wang 1992; Gupta & Jonathan 2003; Liu *et al*. 2021b].

Notes

The male illustrated in Figure 9A is deposited at the Tai Lung Experimental Station, HK. As it bears no label it cannot be assumed to have been collected in Hong Kong though most specimens of this collection were collected on the farm grounds. Baltazar (1966: 223) recorded *Leucophilis irrorata* Chevrolat, 1841 (Scarabaeidae: Melolonthinae) as a host for *Campsomeriella annulata*. This host species has not been recorded from Hong Kong but many closely related beetles in the tribes Leucopholini Burmeister, 1855 and Rhizotrogini Burmeister, 1855 are present in the territory (Paul Aston pers. com.).

Subgenus ***Campsomeriella*** Betrem, 1941

Campsomeriella* (*Campsomeriella*) *collaris (Fabricius, 1775)
Figs 1A–B, 7B, 9B, 11B, 13B, 15B, 19B, 23B, 25B, 27B, 29B, 31B, 33B, 35B, 37B, 39B, 40B, 41B, 42B

Tiphia collaris Fabricius, 1775: 354 (holotype ZMUC, ♀, type locality = "ad littora Malabarica", i.e. south part of the western Indian coast).
Scolia quadrifasciata Fabricius, 1798: 255 (holotype ♀, type locality = "in India orientali").
Scolia sericea Klug, 1805: 32 (replacement name for *Tiphia collaris* Fabricius, 1775 [attributed to Fabricius, 1793]).
Campsomeris aureicollis Lepeletier, 1845: 499 (holotype ♀, type locality = Java).
Colpa parvula Lepeletier, 1845: 548 (holotype presumed lost, ♂, type locality = "Inde").
Scolia fimbriata Burmeister 1854: 25 (holotype ♀, type locality = Java).

Scolia senilis (Fabricius 1793) – Burmeister 1854: 24 (in part).
Scolia collaris – Burmeister 1854: 24.
Scolia aureicollis – Smith 1855: 101.
Elis (*Dielis*) *collaris* – de Saussure & Sichel 1864: 163.
Elis (*Dielis*) *fimbriata* – Bingham 1897: 99.
Scolia (*Dielis*) *collaris* – Turner 1911: 621.
Dielis fimbriata – Dover 1926: 234.
Campsomeris (*Campsomeris*) *collaris* – Betrem 1928: 126.
Campsomeris quadrifasciata – Betrem 1928: 336.
Campsomeris (*Campsomeriella*) *collaris* – Betrem 1941: 89.
Campsomeris (*Campsomeriella*) *quadrifasciata* – Betrem 1941: 89.
Campsomeris collaris quadrifasciata – Betrem 1947: 413.
Iforborha collaris – Argaman 1996: 203 (by implication).
Tetrasciton aureicollis – Argaman 1996: 204 (by implication).
Tetrasciton quadrifasciata – Argaman 1996: 204 (by implication).

Material examined

CHINA – **Hong Kong** • 2 ♂♂; no labels; TLFES • 1 ♂; no labels; HKBM • 2 ♀♀; Tsat Sing Kong; 22°26′49.1″ N, 114°05′06.9″ E; alt. 11 m; 7 Apr. 2021; C. Barthélémy leg.; hand net, refs: 0724.U.Hy.1A and 0724.U.Hy.1A; CBC.

Description

Female

Standard ratios (n = 2). L: 15.5–20.8 mm (mean = 18.5 mm); CR: 1.20–1.21 (mean = 1.20); OOR: 0.77–0.82 (mean = 0.79); CLR: 0.41–0.46 (mean = 0.44); MER: 0.80–0.84 (mean = 0.82); OMR: 0.83–0.90 (mean = 0.86); FRR: 1.79–2.0 (mean = 1.89); MSR: 0.70–0.73 (mean = 0.72); TER: 1.90–2.24 (mean = 2.07).

Head. Head densely punctate near lateral margins of clypeus, disc of clypeus impunctate, large punctures on frontal spatium and ocular sinuses (Fig. 15B); gena, frons, intraocular space and vertex mostly impunctate (a few isolated punctures) (Fig. 19B).

Mesosoma. Mesoscutum, with small punctures (diameter of punctures 2–3× the distance between them), much denser on lateroposterior sides, disc with fewer punctures; scutellum evenly punctate with small punctures, posterior margin impunctate; metanotum sparsely punctate medially, impunctate laterally

(Fig. 23B); dorsomedian area of propodeum with large punctures (diameter of puncture 1× the distance between them), dorsolateral area of propodeum, bearing numerous minute punctures (Fig. 27B). Frontal area of mesopleuron with large uniform punctures, dorsal side of upper panel and ventral side of lower panel punctate, large impunctate area medially. Upper and lower panels of metapleuron mostly impunctate (shiny); lateral panels of propodeum with dense large punctures, somewhat becoming impunctate towards the metapleural carina. Scutellum and metanotum without median longitudinal carina (Fig. 27B). Dorso-median area of propodeum without distinct tubercule medially (Fig. 27B).

Metasoma. Metasoma sharp but somewhat reduced crest between anterior and ventral faces of S2 in lateral view (Fig. 31B); tergites broadly impunctate discally, with narrow row of fine punctures apically and small band of spaced punctures basally (Fig. 35B); T2 with no basal elevation (gradulus) (Fig. 35B).

Wings. Fore wing with two submarginal cells and two recurrent veins; second recurrent vein reaching submarginal cell. Fore wings glabrous

Colour and vestiture. Integument entirely black (Fig. 7B). Dense white setae on head (along occipital carina, around antennal sockets), dorsum of pronotum (Fig. 23B), short white appressed setae along anterior margin of mesoscutum; black setae on ventral side of pronotum and on the rest of the body, T2–T6 with apical row of black setae. Wings dark brown/black with bleu iridescence.

Male

Standard ratios (n = 3). L: 14.9–19.3 (mean = 17.1); CR: 1.07–1.24 (mean = 1.18); OOR: 1.50–1.55 (mean = 1.52); CLR: 0.40–0.64 (mean = 0.55); MER: 1.14–1.25 (mean = 1.18); OMR: 1.10–1.17 (mean = 1.13); FRR: 2.17–2.35 (mean = 2.26); MSR: 0.78–0.89 (mean = 0.84); TER: 1.64–1.84 (mean = 1.72).

Head. Disc of clypeus impunctate, lateral sides with sparse punctures (Fig. 17B); large and dense punctures on frontal spatium (distance between punctures less that their diameter) (Fig. 17B); moderately punctate on frons and vertex, punctures becoming denser towards posterior margin of vertex (Fig. 21B); frontal spatium moderately well-defined posteriorly; frontal fissura absent; anterior ocelli in a deep pit, ocellar triangle raised (Fig. 17B).

Mesosoma. Dorsum of pronotum with dense but very shallow setae-bearing punctures; mesoscutum, scutellum, metanotum uniformly moderately punctate (many punctures separated by about their diameter (Figs 25B, 29B); dorsum of propodeum mostly densely punctate (Fig. 29B). Lateral panel of mesosoma with punctation mostly obscured by dense appressed pile (Fig. 9B); mesopleuron mostly densely punctate; metapleuron and lateral panel of propodeum largely impunctate, upper and lower panels of metapleuron separated by sharp transverse carina. Scutellum and metanotum without median longitudinal carina (Fig. 29B). Dorso-median area of propodeum without distinct tubercule medially (Fig. 29B).

Metasoma. Metasoma with very weak division between anterior and ventral faces of S2 in lateral view (Fig. 33B); tergites moderately but shallowly punctate (Figs 33B, 37B). T2 with no basal elevation (gradulus) (Fig. 37B).

Wings. Same as female, but fore wing with dense short setae on the anterior half

Colour and vestiture. Integument mostly black with following areas yellow: base of mandible; broadly along lateral margin of clypeus (Fig. 17B); anterior margin of pronotal lobe (Fig. 25B), a small spot on pronotal callosity (Fig. 9B); a small line on fore femur, the apical dorsal side of mid femur and a small thin line on hind femur, the whole dorsal surface of fore and mid tibiae, dorsal side of fore basitarsus (Fig. 9B); more or less broad apical bands on T1–T5 (Figs 13B, 37B), bands reduced to small triangle

on S2 and S3 (Figs 9B, 33B). Vestiture yellowish white except black on metasomal segments 6 and 7 (Fig. 9B). Wings lightly infumated.

Genitalia. Ventral side of paramere with sparse setae mainly located on margin (Fig. 40B), dorsal side with denser setae on all its surface (Fig. 39B); volsella with a few long setae mainly on its exterior margin (Fig. 40B), cuspis volsellaris with dense long setae on entire surface (Figs 40B, 41B, 42B); volsella with a few sensory cones basally on its external margin (Fig. 42B) and a wide lamella on inner margins (Fig. 39B). External margin of paramere not angled medially, flattened/subrounded apically (Fig. 40B); aedeagus with eight teeth, serrated margin broadly convex.

Distribution (Fig. 1A–B)

China (Fujian, Guangdong, Guangxi, Hainan, *Hong Kong, Jiangxi, Yunan); Bhutan; Sri Lanka; India (Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh, West Bengal); Indonesia; Malaysia; Myanmar; Philippines; Thailand. [Krombein 1978; Gupta & Jonathan 2003; TIGER project 2008; Nidup *et al.* 2017; Liu *et al.* 2021b].

Notes

The male specimens from TLFES bear no labels and cannot be ascertained to come from Hong Kong (although more than likely in view of the history/mission of the insect collection at TLFES).

Campsomeriella collaris is a widely distributed species that has been divided between five subspecies (Gupta & Jonathan 2003) with *C. c. quadrifasciata* (Fabricius 1798) being the subspecies previously recorded from southeast China (Betrem 1941). This subspecies has been distinguished from the nominotypical subspecies of India and Sri Lanka by the presence of fulvous reddish vestiture on the anterior part of the body in the female and the absence of yellow maculations on the mesosoma in the male (Gupta & Jonathan 2003). Male specimens examined in this study conform to *C. c. quadrifasciata* but females, with white vestiture on the anterior part of the body, resemble the nominotypical subspecies. Without being able to resolve this discrepancy, we avoid the use of subspecies herein.

One of the females of this study bear phoretic mites (Fig. 27B).

Genus ***Megacampsomeris*** Betrem, 1928

Campsomeris (*Megacampsomeris*) Betrem, 1928: 138 (type species *Tiphia grossa* Fabricius, 1804, by original designation).
Fiharbuxa Argaman, 1996: 212 (type species *Scolia prismatica* Smith, 1955, by original designation).

***Megacampsomeris* sp. 1**

Figs 1A–B, 9C, 13C, 17C, 21C, 25C, 29C, 33C, 37C, 39C, 40C, 41C, 42C

Diagnosis

This species can be readily differentiated with other Campsomerini in its possession of long, coarse hairs recumbent over most of the metasoma, and by its distinctive colour pattern with the metasomal tergites iridescent and the apical bands fading medially and the presence of conspicuous yellow spots on the scutellum.

Material examined

CHINA – **Hong Kong** • 1 ♂; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 12 Apr. 2004; C. Barthélémy leg.; hand net, ref.: 0109.A.Hy.1; CBC.

Description

Male

Standard ratios (n = 1). Genitalia were dissected and total length not acquired; CR: 1.09; OOR: 1.69; CLR: 0.65; MER: 1.28; OMR: 1.03; FRR: 2.20; MSR: 0.83; TER: 1.44.

Head. Head with clypeus largely impunctate except with some punctures along the lateral margins (Fig. 17C); frontal spatium mostly densely punctate, becoming impunctate dorsally; frons moderately punctate laterally, sparsely punctate around frontal fissura; vertex sparsely punctate, a few punctures separated by distance 2–3× their own diameter (Figs 17C, 21C); frontal spatium well defined posteriorly; frontal fissura present between anterior of frontal spatium and anterior ocellus (Fig. 21C).

Mesosoma. Dorsum of pronotum, mesoscutum, scutellum and metanotum with punctures separated by distance 3–4× their own diameter (Fig. 25C), punctures on mesoscutum more widely spaced posteromedially, scutellum with broad impunctate band near posterior margin (Fig. 25C), posterior margin of metanotum slightly raised medially; dorsum of propodeum densely punctate, punctures on dorsolateral area subcontiguous (Fig. 29C). Lateral panels of mesosoma with punctation mostly obscured by dense appressed pile; mesopleuron moderately punctate medially; metapleuron largely impunctate; lateral panel of propodeum moderately punctate. Scutellum and metanotum without median longitudinal carina (Fig. 29C). Dorso-median area of propodeum without distinct tubercule medially (Fig. 29C).

Metasoma. Metasoma with moderately strong angle between anterior and ventral faces of S2 in lateral view; tergites moderately and uniformly punctate, punctures becoming denser on apical tergites (Figs 33C, 37C). T2 with no basal elevation (gradulus) (Fig. 37C).

Wings. Fore wings with two submarginal cells and two recurrent veins, the second recurrent vein reaching the submarginal cell. Fore wings with dense short setae on most of the anterior half.

Colour and vestiture. Integument mostly black (Fig. 9C) except antennal flagellum reddish, base of mandible yellow, clypeus yellow except for small anteromedian black patch, scrobe yellow; dorsum of pronotum and margin of pronotal lobe, tegula, and lateral spots on scutellum yellow (Fig. 25C) (minute yellow mark also present at apex of metanotum); pronotal callosity yellow (Fig. 9C); legs with anterior panels of coxae yellow, ventral yellow lines on all femora (those on fore femur present on distal half only), dorsal yellow line on distal half of fore femur, and dorsal yellow lines on fore and mid tibiae; metasoma with broad apical yellow bands on T1–T4 (Figs 39C, 33C, 37C), those on T3 and T4 broadly interrupted medially (Fig. 37C), and medially interrupted apical yellow bands on S2–S4. Vestiture mostly yellow to whitish except mostly black on metasomal segments 5–7, with interspersed yellow and black hairs present on T5 and T6; vestiture on metasoma mostly noticeably long and decumbent (Fig. 37C). Wings yellowish with slight infumation anteriorly.

Genitalia. Ventral side of paramere with sparse setae mainly located on margin (Fig. 40C), dorsal side dense setae on all its surface (Fig. 39C); volsella uniformly covered in shorter setae (Fig. 40C), cuspis volsellaris with dense long setae on entire surface (Figs 40C, 41C, 42C); volsella with a few sensory cones medially on its external margin (Fig. 42C) and a wide lamella on its inner margin (Fig. 39C). External margin of paramere weakly angled medially, rounded apically (Fig. 40C); aedeagus with 11 teeth, serrated margin substraight, convex basally (Fig. 42C).

Notes

A single male specimen collected at Pak Sha O cannot be identified as any previously known species of Scoliidae. However, with no associated female and considering the difficulty in identifying isolated males of Campsomerini, we refrain; for now, from formally designating it as a new species. This individual can

be distinguished from other scoliids by its remarkable vestiture, long and thick even by the standards of Scoliidae. The genital morphology is close to that of *Megacampsomeris prismatica*, with the parameres similar in overall shape but apically broader. The specimen keys to *Megacampsomeris farrenwhitei* (Betrem, 1928) in Liu *et al.* (2021a) but differs from the male illustrated therein in the presence of conspicuous yellow spots on the scutellum and the elongate metasomal vestiture. Betrem's (1928, 1941) descriptions of *M. farrenwhitei* are of the female only.

Megacampsomeris formosensis chinensis Betrem, 1941
Figs 1A–B, 7C, 9D, 11C, 13D, 15C, 17D, 19C, 21D, 23C, 25D, 27C, 29D, 31C, 33D, 35C, 37D, 39D, 40D, 41D, 42D

Campsomeris (*Megacampsomeris*) *formosensis chinensis* Betrem, 1941: 73–74 (holotype HMS, ♀, type locality = Zhenjiang, China).

Material examined

CHINA – **Hong Kong** • 1 ♂; Mang Kung Wo; 22°22′06″ N, 114°15′12″ E; alt. 60 m; 18 Oct. 2020; C. Barthélémy leg.; hand net, ref.: 0721.A.Hy.1; CBC • 1 ♀; same collection data as for preceding; 13–26 Sep. 2020; Malaise trap, ref.: M515.C.Hy.1; CBC.

Description

Female

Standard ratios (n = 1). L: 17.1 mm; CR: 1.15; OOR: 0.57; CLR: 0.47; MER: 1.21; OMR: 0.96; FRR: 1.86; MSR: 0.76; TER: 1.54.

Head. Head densely punctate near lateral margins of clypeus, on frontal spatium and lower part of frons including ocular sinuses (Fig. 15C), impunctate in front of median ocellus, a row of large puncture in an arc behind lateral ocelli, median dorsal area of vertex impunctate, lateral and declivous area of vertex heavily punctate (Fig. 19C).

Mesosoma. Mesoscutum, with large punctures laterally and on frontal half (diameter of punctures larger than distance between them) and a large rectangular impunctate area in the centre (Fig. 23C); scutellum with a large impunctate area centrally, punctate laterally (Fig. 27C); metanotum punctate medially, impunctate laterally; dorsomedian area of propodeum heavily punctate (diameter of punctures larger than distance between them) (Fig. 27C). Mesopleuron and metapleuron minutely punctate on all surfaces (punctures so small that surfaces seem smooth); metapleuron with evanescent carina separating upper and lower panels. Scutellum and metanotum without median longitudinal carina (Fig. 27C). Dorsomedian area of propodeum without distinct tubercule medially (Fig. 27C).

Metasoma. Metasoma with no division between anterior and ventral faces of S2 in lateral view; tergites broadly punctate, denser punctures apically (Figs 31C, 35C); T2 with basal elevation (gradulus) distinct (Fig. 35C).

Wings. Fore wings with two submarginal cells and two recurrent veins, the second recurrent vein reaching the submarginal cell. Fore wing with a few short setae in the anterior part of the first submarginal cell.

Colour and vestiture. Integument entirely black (Fig. 7C), expect tegulae dark yellow (Fig. 23C) and T1 and T2 with evanescent yellow maculae on lateroapical sides (Fig. 35C). Vestiture light yellow/orange, densely erect on dorsum of pronotum, posterior side of vertex and frons, long erect yellow/orange setae on lateral sides of mesoscutum and median surface of metanotum, vestiture black on T5

and T6 (Fig. 7C). Wings mostly yellowish, with no maculae apically on fore wing, first marginal cell of fore wing bearing minute setae distally.

Male

Standard ratios (n = 1). Genitalia were dissected and total length not acquired; CR = 1.13; OOR = 2.0; CLR: 0.64; MER: 1.40; OMR: 1.0; FRR: 1.52; MSR: 0.79; TER: 1.42.

Head. Head with clypeus impunctate on the medial basal part, bearing large spaced punctures above and near lateral margins, clypeus with long sparse pale setae (Fig. 17D); frontal spatium densely punctate, punctures separated by less than their diameter; frons moderately punctate, punctures separated by more than their diameter, impunctate on the area between hind ocelli and eyes (Fig. 21D); vertex heavily punctate, punctures separated by less than their diameter (Fig. 21D); frontal spatium well defined; frontal fissura absent.

Mesosoma. Dorsum of pronotum and mesoscutum bearing numerous small punctures separated by more than their diameter (Fig. 25D), becoming less dense posteriorly on mesoscutum; scutellum moderately punctate, becoming less dense posteriorly and towards lateral margins (Fig. 25D); metanotum with dense punctures (Fig. 29D); posterior margin of metanotum slightly raised medially (Fig. 25D); propodeum dorsomedian and dorsolateral areas densely punctate, punctures separated by less than their own diameter (Fig. 29D). Lateral panels of mesosoma, including mesopleuron and metapleuron with punctures mostly obscured by dense appressed pile. Scutellum and metanotum with evanescent median longitudinal carina (Fig. 29D). Dorso-median area of propodeum without distinct tubercule medially (Fig. 29D).

Metasoma. Tergites moderately and uniformly punctate (Figs 33D, 37D). S1 with large punctures, except V-shaped area posteriorly. T2 with no basal elevation (gradulus) (Fig. 37D).

Wings. Same as female but, fore wing with numerous short setae in the anterior half

Colour and vestiture. Integument mostly black except the following yellow (Figs 9D, 13D): clypeus, basal part of scape, base of mandibles (Fig. 17D), scapulae, anterior part of tegula, small spots on posteriolateral area of mesoscutum and scutellum (Fig. 25D); anterior panels of coxae of fore legs, ventral part of fore, mid and hind femurs, ventral part of fore and mid tibiae; metasoma with broad apical yellow bands on T1–T4 (Figs 33D, 37D), and medially interrupted apical yellow bands on S2–S4 (Fig. 33D). Vestiture pale yellow on entire body except black on metasomal segments 5–7 (Fig. 9D); vestiture on metasoma mostly noticeably long and decumbent (Fig. 37D). Wings yellowish.

Genitalia. Ventral side of paramere bearing a few setae on inner margin (Fig. 40D), dorsal side with dense long setae on most of its surface (Fig. 39D); volsella and cuspis volsellaris with dense setae on entire surfaces (Figs 40D, 42D); volsella bearing numerous sensory cones on its external margin (Fig. 42D) and a lamella on its inner margin (Fig. 39D). External margin of paramere moderately angled medially and subrounded apically, serrated margin substraight, convex basally (Fig. 42D).

Distribution (Fig. 1A–B)

China (Anhui, Fujian, *Hong Kong, Hubei, Hunan, Jiangsu, Zhejiang). [Betrem 1928, 1941; Wang 1992; Liu *et al.* 2021b].

Notes

This taxon was omitted from Osten's (2005) list. It differs from the nominotypical subspecies in the metasomal vestiture which is uniformly reddish brown in *Megacampsomeris formosensis formosensis*

Betrem, 1928 (Betrem 1941). Liu *et al.* (2021b) also noted potential differences between the subspecies in the relative lengths of the hind tarsomeres and in the pilosity of the spiracular angles, but felt that further research on their distinction was required.

Megacampsomeris prismatica (Smith, 1855)
Figs 1A–B, 9E, 13E, 17E, 21E, 25E, 29E, 33E, 37E, 39E, 40E, 41E, 42E

Scolia prismatica Smith, 1855: 102 (holotype NHMUK, ♀, type locality = Shanghai).
Campsomeris (*Megacampsomeris*) *prismatica* var. *quinquefasciata* Betrem, 1928: 153 (holotype ♀, type locality = Mussoorie, Uttarakhand, India).
Campsomeris (*Megacampsomeris*) *prismatica* var. *fulvoanalis* Betrem, 1928: 153 (holotype ♀, type locality = Shueisheliao, Taiwan) (name spelt as *C. prismatica* var. *fulvoapicata* on p. 70).
Campsomeris prismatica f. *shibatai* Uchida, 1934: 259 (holotype ♀, type locality = Laiyi Township, Taiwan).

Elis (*Dielis*) *prismatica* – de Saussure & Sichel 1864: 199.
Campsomeris (*Megacampsomeris*) *prismatica* – Betrem 1928: 152.
Fiharbuxa prismatica – Argaman 1996: 212 (by implication).

Material examined

CHINA – **Hong Kong** • 1 ♂; Tai Tam; 22°14′45″ N, 114°13′23″ E; 28 Jun.–12 Jul. 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♂; New Territories; May–Jul. 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♂; Tai Tam; 29 Mar. 1998; C. Barthélémy leg.; hand net, ref.: X046.Z.Hy.1; CBC • 1 ♂; same collection data as for preceding; 27 Jul.–10 Aug. 2019; C. Barthélémy leg.; Malaise trap, ref.: M429.C.Hy.1; CBC • 1 ♂; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 19–26 Apr. 2004; C. Barthélémy leg.; Malaise trap, ref.: M011.C.Hy.31; CBC • 1 ♂; same collection data as for preceding; 21–26 Jun. 2006; C. Barthélémy leg.; Malaise trap ref.: M044.C.Hy.12; CBC • 1 ♂; same collection data as for preceding; 7 Aug.–3 Sep. 2011; C. Barthélémy leg.; Malaise trap ref.: M097.C.Hy.4; CBC • 1 ♂; same collection data as for preceding; 10–24 Aug. 2018; C. Barthélémy leg.; Malaise trap ref.: M432.C.Hy.1; CBC.

Description

Male

Standard ratios (n = 9). L: 13.02–19.4 mm (mean = 15.72 mm); CR: 1.08–1.18 (mean = 1.13); OOR: 1.53–2.08 (mean = 1.71); CLR: 0.66–0.78 (mean = 0.71); MER: 1.17–1.33 (mean = 1.21); OMR: 0.99–1.06 (mean = 1.04); FRR: 1.63–1.92 (mean = 1.78); MSR: 0.67–0.83 (mean = 0.78); TER: 1.46–1.71 (mean = 1.59).

Head. Head mostly densely punctate except clypeus impunctate medially and anteriorly (Fig. 17E); frontal spatium well defined posteriorly; front fissura present between posterior margin of frontal spatium and anterior ocellus.

Mesosoma. Dorsum of pronotum densely punctate (Fig. 25E); mesoscutum and scutellum mostly moderately punctate (Fig. 25E); metanotum and dorsomedian area of propodeum densely punctate (Fig. 29E). Lateral panels of mesosoma with punctation largely obscured by dense, appressed pile; mesopleuron moderately punctate medially; upper panel of metapleuron impunctate; lower panel of metapleuron and lateral panel of propodeum moderately punctate. Scutellum and metanotum without median longitudinal carina (Fig. 29E). Dorso-median area of propodeum without distinct tubercule medially (Fig. 29E).

Metasoma. Metasoma with moderately strong angle between anterior and ventral faces of S2 in lateral view (Fig. 33E); tergites uniformly and moderately punctate (Figs 33E, 37E), punctures becoming denser on apical tergites. T2 with no basal elevation (gradulus) (Fig. 37E).

Wings. Fore wings with two submarginal cells and two recurrent veins; second recurrent vein reaching submarginal cell. Anterior half of fore wings with numerous short setae.

Colour and vestiture. Integument mostly black (Figs 9E, 13E) with antennal flagellum ventrally more or less reddish, base of mandible yellow, clypeus yellow laterally and basally, scrobe sometimes with yellow mark ventrally (Fig. 17E); dorsum of pronotum and tegula yellow (Fig. 25E), scapula sometimes in part black, lateral yellow spots sometimes present on scutellum; pronotal callosity more or less yellow; legs with anterior plate of fore coxa yellow, ventral yellow stripes on all femora and dorsally on fore and mid tibiae; metasoma with narrow, transverse yellow bands on apical margins of T1–T4 (band on T4 may be interrupted medially) (Figs 33E, 37E) and shortly and laterally on apical margins of S2 and S3 (triangular apicolateral yellow spot may also be present on S4). Vestiture golden yellow on head and mesosoma (Fig. 9E), yellow to whitish on metasomal segments 1–4 (Fig. 37E), black on metasomal segments 5–7. Wings yellow, may be slightly infumated apically.

Genitalia. Ventral side of paramere mostly glabrous, a few setae on the lateral side (Fig. 40E), dorsal side with sparse long setae on most of its surface (Figs 39E, 41E); volsella and cuspis volsellaris with dense setae on entire surfaces (Figs 40E, 42E); volsella bearing dense sensory cones on most of its external margin (Fig. 42E) and lamella on its inner margin (Fig. 39E). External margin of paramere moderately angled medially, rounded apically (Figs 39E, 40E); aedeagus with 10 teeth, the first apical tooth much reduced, serrated margin with shallow convex curvature (Fig. 42E).

Distribution (Fig. 1A–B)

China (Anhui, Fujian, Gansu, Guangdong, Guizhou, Heilongjiang, Henan, *Hong Kong, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Taiwan, Zhejiang,); Japan (Kagoshima, Tokyo, Honshu, Shikoku, Kyushu); Russia (Amur) (?); Indonesia (Java, Lombok, Sulawesi, Sumatra); Malaysia (Malacca, Perak, Pahang, Sarawak); India (Arunachal Pradesh, West Bengal, Sikkim, Uttarakhand [Kausani], Himachal Pradesh, Meghalaya, Jammu and Kashmir, Manipur, Odisha, Nagaland, Delhi); Nepal; Korea (Jeju); Myanmar (Tenasserim); Philippines. [Bingham 1897; Betrem 1928, 1941; Uchida 1934; Baltazar 1966; Wang 1992; Gupta & Jonathan 2003; Kumar & Kazmi 2008, Liu *et al.* 2021b].

Notes

Osten (2005) lists "*Elis iris* Magretti, 1892" as a synonym of *Megacampsomeris prismatica*. Magretti (1892) usage of this name is for a redescription of *Colpa iris* Lepeletier, 1845 and is not an available name. Osten (2005) lists two subspecies of *Megacampsomeris prismatica*, the nominotypical subspecies and *M. p. shibatai* Uchida 1934 (NB. Despite Uchida's [1934] usage of the notation "f." in association with *shibatai*, it may be considered an available name as Uchida consistently used this notation for all subspecific forms – ICZN Art. 45.6.4). Betrem (1941) distinguished these two forms by the more reddish coloration of the vestiture in the latter but regarded them as overlapping in distribution. Until the relationship between these forms is better established, we refrain from using subspecific names for this species.

The record of this species by Betrem (1928 and 1941) in the Amur region of Far East Russia is somewhat dubious.

Genus ***Phalerimeris*** Betrem in Bradley & Betrem, 1967

Campsomeris (*Phalerimeris*) Betrem in Bradley & Betrem, 1967: 294 (type species *Elis phalerata* de Saussure, 1858, by original designation).
Batalanga Argaman, 1996: 205 (type species *Elis phalerata* de Saussure, 1858, by original designation).

Notes

Bradley (1964b) listed the name "*Phaleromeris*" as a subgenus for *Campsomeris annulata* (now *Campsomeriella annulata*). No description was provided, making the name a nomen nudum, and Bradley noted that one would appear in a forthcoming paper by Betrem. Subsequently, Betrem (in Bradley & Betrem 1967) described the subgenus *Phalerimeris* with *Elis phalerata* de Saussure, 1858 designated as type species. Argaman (1996) incorrectly regarded *Phaleromeris* as available from Bradley (1964b), with *Phalerimeris* as a subsequent spelling variation, and proposed the unnecessary name *Batalanga* for *E. phalerata*.

Phalerimeris phalerata phalerata (de Saussure, 1858)
Figs 2A–B, 7D, 9F, 11D, 13F, 15D, 17F, 19D, 21F, 23D, 25F, 27D, 29F, 31D, 33F, 35D, 37F, 39F, 40F, 41F, 42F

Elis (*Campsomeris*) *phalerata* de Saussure, 1858: 233 (holotype ZMUC, ♀, type locality = Java).
Campsomeris (*Campsomeris*) *albopilosa* Rohwer, 1911: 480 (holotype USNM, ♂, type locality = Puli Township, Taiwan).

Campsomeris (*Dielis*) *phalerata* – Betrem 1928: 103.
Campsomeris (*Phalerimeris*) *phalerata* – Bradley & Betrem 1967: 294.
Batalanga phalerata – Argaman 1996: 205 (by implication).

Material examined

CHINA – **Hong Kong** • 1 ♂; Tai Lung Farm; 21 Sep. 1981; hand net; TLFES • 5 ♀♀; same collection data as for preceding; TLFES • 1 ♂; Sha Tau Kok (Hoi Pui Leng); 22°31′47″ N, 114°12′28″ E; 10–24 May 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♀; Tsim Bei Tsui (Sha Kiu Tsuen); 22°29′21″ N, 113°59′55″ E; 14–28 May 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♀; Sheung Pak Nai; 22°27′07″ N, 113°57′45″ E; 14–28 May 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♀; Sheung Pak Nai; 22°27′05″ N, 113°57′44″ E; 28 May–11 Jun. 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♂; Tung Chung; 22°16′55″ N, 113°55′43″ E; 29 May–12 Jun. 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♀; Hang Mei; 22°15′11″ N, 113°52′08″ E; 9–23 May 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♀; Hang Mei; 22°15′07″ N, 113°52′06″ E; 23 May–6 Jun. 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 2 ♂♂; To Kwa Peng; 22°25′45″ N, 114°20′00″ E; 8–25 May 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♂; Yim Tin Tsai; 22°22′31″ N, 114°18′02″ E; 1–15 Jun. 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 3 ♂♂; New Territories; May–Jul. 2018; HKBM • 2 ♂♂; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 27 Sep.–4 Oct. 2004; C. Barthélémy leg.; Malaise trap, ref.: M024.C.Hy.2; CBC • 2 ♂♂; same collection data as for preceding; 12–27 Nov. 2008; C. Barthélémy leg.; Malaise trap, ref: M056.C.Hy.1; CBC • 1 ♂; same collection data as for preceding; 14–31 May 2009; C. Barthélémy leg.; Malaise trap, ref.: M062.C.Hy.3; CBC • 1 ♂; Lin Tong Mei; 22°28′56″ N, 114°06′37″ E; alt. 15 m; 23 Jul. 2006; C. Barthélémy leg.; hand net, ref.: 0226.L.Hy.5; CBC • 1 ♂; Ping Shan Chai; 22°29′14″ N, 114°11′06″ E; alt. 140 m; 18 Nov.–30 Dec. 2017; C. Barthélémy leg.; Malaise trap, ref.: M323.D.Hy.3; CBC • 1 ♂; Mang Kung Wo; 22°22′06″ N, 114°15′12″ E;, alt. 60 m; 26 May–7 Jun. 2018; C. Barthélémy leg.; Malaise trap, ref.: M349.C.Hy.3; CBC • 1 ♂; same collection data as for preceding; 25 Jul. 2018; C. Barthélémy

leg.; hand net, ref.: 0660.C.Hy.3; CBC • 1 ♀; Tai Tam; 29 Mar. 1998; C. Barthélémy leg.; Malaise trap, ref.: X045.Z.Hy.1; CBC • 1 ♀; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 15 Sep.–1 Oct. 2008; C. Barthélémy leg.; Malaise trap, ref. : M053.C.Hy.3; CBC • 1 ♀; same collection data as for preceding; 7 Mar.–3 Apr. 2011; C. Barthélémy leg.; Malaise trap, ref.: M088.C.Hy.2; CBC • 1 ♀; same collection data as for preceding; 8–21 Jul. 2018; C. Barthélémy leg.; Malaise trap, ref.: M352.C.Hy.11; CBC • 1 ♀; same collection data as for preceding; 2 Apr. 2010; C. Barthélémy leg.; hand net, ref.: 0389.A.Hy.1; CBC • 1 ♀; same collection data as for preceding; 29 Sep. 2018; C. Barthélémy leg.; Malaise trap, 0669.C.Hy.3; CBC • 1 ♂; Mang Kung Wo; 22°22′06″ N, 114°15′12″ E; alt. 60 m; 14 Mar. 2020; C. Barthélémy leg.; Malaise trap, ref.: 0711.A.Hy.1; CBC.

Description

Female

Standard ratios (n = 8). L: 13.9–20.5 mm (mean = 16.97 mm); CR: 1.13–1.21 (mean = 1.16); OOR: 0.55–0.65 (mean = 0.62); CLR: 0.40–0.47 (mean = 0.43); MER: 0.97–1.35 (mean = 1.17); OMR: 1.05–1.10 (mean = 1.08); FRR: 1.84–1.95 (mean = 1.90); MSR: 0.75–0.79 (mean = 0.77); TER: 1.81–2.04 (mean = 1.89).

Head. Head with clypeus broadly impunctate medially (Fig. 15D), densely punctate laterally; frontal spatium and scrobe mostly densely punctate (Fig. 15D), frontal spatium with narrow impunctate band medially; frons mostly sparsely punctate with narrow curved band of dense punctures in front of anterior ocellus (Fig. 19D) and densely punctate lateral band alongside eye; vertex moderately punctate (Fig. 19D); frontal spatium not well defined posteriorly; frontal fissura visible on frontal spatium only.

Mesosoma. Dorsum of mesosoma in large part densely and subcontiguously punctate (Fig. 23D), scutellum and metanotum with large punctures (Fig. 27D). Mesopleuron densely punctate medially along sharp mesopleural crest, broadly impunctate anteriorly and posteriorly; metapleuron largely impunctate with sparse small punctures on lower panel; lateral panel of propodeum moderately but shallowly punctate. Scutellum and metanotum without median longitudinal carina (Fig. 27D). Dorso-median area of propodeum without distinct tubercule medially (Fig. 27D).

Metasoma. Metasoma with weak transition between anterior and ventral faces of S2 in lateral view; T1–T3 uniformly and moderately punctate (Figs 31D, 35D); T4–T6 densely punctate. T2 with no basal elevation (gradulus) (Fig. 35D).

Wings. Fore wing with two submarginal cells and two recurrent veins; second recurrent vein reaching submarginal cell. Fore wing with short setae in the first submarginal cell.

Colour and vestiture. Integument mostly black (Figs 7D, 11D) except mandibles reddish; legs with tibiae and tarsi reddish; metasoma with narrow apical yellow bands on T1–T3 (that on T3 may be narrowly interrupted medially) (Fig. 35D) and triangular apicolateral yellow spot on S2 and sometimes S3 (Fig. 31D). Vestiture mostly golden except black on metasomal segments 5 and 6 (Figs 7D, 11D). Wings yellowish with distinct infumated subapical spot near anterior margin of fore wing.

Male

Standard ratios (n = 10). L: 9.8–15 mm (mean = 13.1 mm); CR: 0.94–1.19 (mean = 1.09); OOR: 1.46–1.67 (mean = 1.52); CLR: 0.50–0.68 (mean = 0.61); MER: 1.11–1.47 (mean = 1.25); OMR: 0.94–1.12 (mean = 1.04); FRR: 1.46–1.94 (mean = 1.76); MSR: 0.68–0.86 (mean = 0.79); TER: 1.30–1.91 (mean = 1.54).

Head. Head largely sparsely punctate to impunctate except densely punctate on frontal spatium and sparsely on lateral sides of clypeus (Figs 17F, 21F); frontal spatium well defined posteriorly; frontal fissura obsolete (Fig. 17F).

Mesosoma. Dorsum of pronotum densely but very shallowly punctate (Fig. 25F); mesoscutum, scutellum and metanotum mostly moderately punctate with sparsely punctate discal area on mesoscutum and triangular impunctate area posteriorly on scutellum (Fig. 25F); propodeum with dorsomedian area densely but shallowly punctate, dorsolateral area anteriorly impunctate and posteriorly densely but shallowly punctate (Fig. 29F). Lateral panels of mesosoma with punctation largely obscured by dense appressed pile; mesopleuron medially densely punctate, anteriorly and posteriorly broadly impunctate; metapleuron largely impunctate except with some effaced punctures anteroventrally; lateral panel of propodeum moderately but shallowly punctate. Scutellum and metanotum without median longitudinal carina (Fig. 29F). Dorso-median area of propodeum without distinct tubercule medially (Fig. 29F).

Metasoma. Metasoma with weak division between anterior and ventral faces of S2 (Fig. 33F); tergites moderately but shallowly punctate (Figs 33F, 37F). T2 with no basal elevation (gradulus) (Fig. 37F).

Wings. Same as female, but fore wing with numerous short setae on anterior half.

Colour and vestiture. Integument mostly black (Figs 9F, 13F); base of mandible yellow; clypeus and scrobe yellow with more or less triangular or teardrop-shaped median black spot on clypeus (Fig. 17F); gena partially yellow (Fig. 9F); dorsum of pronotum and tegula yellow (Fig. 25F); paired yellow spots present at posterolateral corner of mesoscutum and on scutellum (scutellar spots may be coalesced medially) (Figs 13F, 25F); medial yellow spot on metanotum; pronotal callosity yellow; legs with anterior face of fore coxa yellow, ventral yellow stripes on all femora, and dorsal yellow stripe on fore and mid tibiae; metasoma with apical yellow bands on T1–T4 (Figs 13F, 33F, 37F) and S1–S4 or S2–S4 (Fig. 33F), those on S2–S4 may be medially interrupted. Vestiture mostly whitish, black on metasomal segments 5–7. Wings lightly and evenly infumated.

Genitalia. Ventral side of paramere with long setae on lateral side (Fig. 40F), dorsal side with sparse long setae on most of its surface (Figs 39F, 41F); volsella and cuspis volsellaris with sparse setae on entire surfaces (Figs 40F, 42F); volsella bearing a few sensory cones on medial external margin (Fig. 42F) and a narrow lamella on its inner margin (Fig. 39F). External margin of paramere uniformly rounded, moderately acute apically (Figs 39F, 40F) and swollen medioapically (Fig. 41F); aedeagus serrated margin with shallow convex curvature.

Distribution (Fig. 2A–B)

China (Fujian, Guangdong, Hainan, Hong Kong, Hunan, Jiangxi, Taiwan, Yunnan); Indonesia (Sumatra, Java, Sulawesi); Malaysia (Kuala Lumpur, Perak, Selangor); Thailand; Nepal; India (Meghalaya**,** Uttarakhand, Sikkim, Arunachal Pradesh, Assam, Bihar, Jharkhand, Himachal Pradesh, Uttar Pradesh, West Bengal, Mizoram, Tripura); Bhutan; Myanmar (Tenasserim). [de Saussure 1858; Bingham 1897; Betrem 1928, 1941; Gupta & Jonathan 2003; Kumar & Pham 2015; Nidup *et al.* 2017; TIGER project 2008; Liu *et al.* 2021b].

Notes

Osten (2005) lists "*Elis iris* de Saussure & Sichel, 1864" as a synonym of *Phalerimeris phalerata*; de Saussure & Sichel's (1864) usage of this name is for a redescription of *Colpa iris* Lepeletier, 1845 and is not an available name.

This is the most commonly collected scoliid species in the Hong Kong SAR. Females may readily be distinguished from other scoliids by the dark subapical spot on the wings, and males by the distinct yellow stripe on the gena.

In Hong Kong, individuals are seen on the wing for most of the year, however, during the few weeks of relatively "cold" weather; between December and February, individuals retreat and it has been observed that females seek shelter underground, burrowing themselves at about 25cm depth in sandy agricultural soils. The same soils contained numerous larvae of Scarabaeidae Latreille, 1802 (white grubs).

Genus ***Sericocampsomeris*** Betrem, 1941

Campsomeris (*Sericocampsomeris*) Betrem, 1941: 91 (type species *Scolia quadriguttulata* Burmeister, 1854, by original designation [= *Sericocampsomeris stygia* (Illiger, 1802)]).

Sericocampsomeris flavomaculata Gupta & Jonathan, 1989
Figs 2A–B, 9G, 13G, 17G, 21G, 25G, 29G, 33G, 37G, 39G, 40G, 41G, 42G

Sericocampsomeris flavomaculata Gupta & Jonathan, 1989: 55, figs 1–2 (holotype ZSI, ♂, type locality = Meghalaya, India).

Material examined

CHINA – **Hong Kong** • 1 ♂; Pak Sha O; 22°26′59″ N, 114°19′04″ E; 70 m; 7–13 Jun. 2004; C. Barthélémy leg.; Malaise trap, ref.: M018.C.Hy.17; CBC.

Description

Male

Standard ratios (n = 1). Genitalia were dissected and total length not acquired; CR: 1.25; OOR: 1.67; CLR: 0.58; MER: 1.01; OMR: 0.95; FRR: 1.68; MSR: 0.82; TER: 1.65.

Head. Head with clypeus broadly impunctate anteriorly and medially, densely punctate posteriorly (Fig. 17G); frontal spatium densely and finely punctate (Fig. 17G); frons moderately sparsely punctate, not distinctly impunctate in front of anterior ocellus, more densely punctate in ocellar sinuses; declivous part of vertex densely punctate (Fig. 21G); frontal spatium well defined posteriorly (Fig. 17G); frontal fissura present between anterior of frontal spatium and anterior ocellus; anterior ocellus distinctly larger than posterior ocelli and set in a shallow pit (Fig. 21G).

Mesosoma. Dorsum of pronotum, mesoscutum and scutellum moderately densely punctate, punctures on mesoscutum becoming more widely separated medially, scutellum with narrow triangular impunctate region present posteriorly (Fig. 25G); metanotum and dorsolateral and median areas of propodeum densely and finely punctate with narrow sparsely punctate to impunctate medial band through both (Fig. 29G). Mesopleuron densely and finely punctate medially, broadly impunctate anteriorly and posteriorly; metapleuron largely impunctate; lateral panel of propodeum moderately but finely impunctate. Scutellum and metanotum without median longitudinal carina (Fig. 29G). Dorso-median area of propodeum without distinct tubercule medially (Fig. 29G).

Metasoma. Metasoma with distinct angle between anterior and ventral faces of S2 in lateral view (Fig. 33G); tergites uniformly and moderately punctate, punctures more widely spaced on disc of T2 and T3 (Figs 33G, 37G). T2 with no basal elevation (gradulus) (Fig. 37G).

Wings. Fore wing with two submarginal cells and two recurrent veins; second recurrent vein reaching submarginal cell. Fore wing with short setae mainly in the marginal and first submarginal cells.

Colour and vestiture. Integument mostly black (Figs 9G, 13G), with scapula yellow; metasoma with broad yellow bands across apical margins of T1–T5 (very faint yellowish band also visible on T6), those of T1, T2 and T5 occupying more than half tergite length (Figs 9G, 33G, 37G); band on T5 broadly interrupted medially, those on remaining tergites constricted medially and may be narrowly interrupted; lateral triangular yellow patches also present on S2–S6 (Fig. 33G). Vestiture on head, mesosoma and metasomal segments 1–5 mostly white with apical fringes of T4 and T5 partially black (Figs 9G, 13G), vestiture on T6 black, that on T7 and S6 and S7 interspersed pale (off-white or pale reddish) or black. Wings yellowish.

Genitalia. Ventral side of paramere mostly glabrous, a few setae on the lateral side (Fig. 40G), dorsal side with dense long setae on most of its surface (Fig. 39G, 41G); volsella and cuspis volsellaris with sparse setae on entire surfaces (Figs 40G, 42G); volsella bearing a few sensory cones on basal margin (Fig. 42G) and a narrow lamella on inner margin (Fig. 39G). External margin of paramere moderately angled medially, rounded apically (Figs 39G, 40G); aedeagus with six teeth, the first apical teeth much reduced, serrated margin substraight, (Fig. 42G).

Distribution (Fig. 2A–B)

Nepal; India (Meghalaya), *China (Hong Kong). [Gupta & Jonathan 1989].

Notes

This species was not listed by Osten (2005). The identity of this specimen with *Sericocampsomeris flavomaculata* has been confirmed by comparison with a photograph of the holotype supplied by P. Girish Kumar (Zoological Survey of India). This species has previously been recorded in northeastern India (Meghalaya State) and Nepal, and its collection in Hong Kong represents a significant increase in range.

In its bright yellow rather than reddish-yellow maculations and overall robust habitus, *S. flavomaculata* is readily distinguished from other *Sericocampsomeris* species known from China (Liu *et al.* 2021a, 2021b). Unfortunately, the female of this species remains unknown. *Sericocampsomeris* has been included in our key based on females of other species of the genus but the provided details require confirmation.

Tribe Scoliini Latreille, 1802

Genus ***Austroscolia*** Betrem, 1927b

Scolia (*Austroscolia*) Betrem, 1927b: xcviii (type species *Scolia ruficeps* Smith, 1855, by original designation).

Austroscolia ruficeps (Smith, 1855)
Figs 4A–B, 7E, 11E, 15E, 19E, 23E, 27E, 31E, 35E

Scolia capitata Guérin-Méneville, 1838: 248 (holotype MNHN, ♂, type locality uncertain [reported as either “Indes orientales” or Senegal]; preoccupied by *Scolia capitata* Fabricius, 1804).
Scolia ruficeps Smith, 1855: 111 (syntypes NHMUK, ♀, ♂, type locality = Philippines).
Scolia westermanni de Saussure, 1858: 212 (holotype ♀, type locality = Java).
Triscolia nigropilosa Micha, 1927: 100 (holotype ZMB, ♂, type locality = Sikkim).
Triscolia tenggerana Micha, 1927: 100 (holotype ZMB, ♂, type locality = Tenggeran, Java).
Triscolia viridiaenea Micha, 1927: 100 (holotype ZMB, ♂, type locality = Batu Batu, Aceh Province, Indonesia).

Triscolia ruficeps impressifrons Micha, 1927: 100 (holotype ZMB, ♂, type locality = Tenasserim, Myanmar).

Scolia (*Triscolia*) *capitata* – de Saussure & Sichel 1864: 47.
Triscolia ruficeps – Micha 1927: 96.
Scolia (*Austroscolia*) *ruficeps* – Betrem 1927b: xcviii.
Austroscolia ruficeps – Bradley & Betrem 1967: 319.

Material examined

CHINA – **Hong Kong** • 1 ♀; Kwan Tei; 22°30′40″ N, 114°09′33″ E; alt. 15 m; 24 Aug. 2007; C. Barthélémy leg.; hand net, ref.: 0279.U.Hy.4; CBC • 1 ♀; Mai Po Nature Reserve; 22°29′11″ N, 114°02′14″ E; alt. 1 m; 20 Sep.–18 Oct. 2014; C. Barthélémy leg.; Malaise trap, ref.: MPNR-M025.G.Hy.8; CBC.

Description

Female

Standard ratios (n = 2). L: 22.7–22.9 mm (mean = 22.80 mm); CR: 1.06–1.07 (mean = 1.06); OOR: 0.75–0.76 (mean = 0.76); CLR: 0.48; MER: 1.39–1.40 (mean = 1.39); OMR: 1.04–1.05 (mean = 1.04); FRR: 1.76–1.88 (mean = 1.82); MSR: 0.79–0.83 (mean = 0.81); TER: 1.53–1.73 (mean = 1.63).

Head. Head mostly sparsely punctate except for frontal spatium, along a transverse furrow running between eyes behind posterior ocelli, and on declivous portion of vertex (Figs 15E, 19E); frontal spatium not defined posteriorly, frontal fissura present on frontal spatium only (Fig. 15E).

Mesosoma. Dorsum of mesosoma mostly densely and strongly punctate except for posteromedially on mesoscutum and anteriorly on dorsolateral panel of pronotum (Fig. 23E). Mesopleuron densely punctate except near anterior margin and posteriorly; upper panel of metapleuron densely punctate dorsally, impunctate ventrally; lower panel of metapleuron mostly densely punctate; lateral panel of propodeum densely punctate. Scutellum and metanotum without median longitudinal carina (Fig. 27E). Dorso-median area of propodeum without distinct tubercule medially (Fig. 27E).

Metasoma. Metasoma with strong angle between anterior and ventral faces of S2 in lateral view; tergites mostly densely punctate, becoming more so posterolaterally (Figs 31E, 35E). T1 with small tubercule at angle between anterior and dorsal faces (Fig. 35E) T2 with basal elevation weekly developed (gradulus) (Fig. 35E).

Wings. Fore wing with three submarginal cells and one recurrent vein, first submarginal cells with numerous short setae

Colour and vestiture. Head, including antennae, entirely red except mandible with black margins (Fig. 15E), labium and maxilla red; remainder of body black (Figs 7E, 11E). Vestiture red on head (Fig. 15E), black on mesosoma and metasoma (Figs 27E, 31E). Wings dark brown with bronze reflections.

Distribution (Fig. 4A–B)

China (Anhui, *Hong Kong, Hunan, Jiangsu, Yunnan); Indonesia (Java, Sulawesi, Flores, Lombok, Sumatra, Sumba); Philippines (Luzon, Panay); Myanmar; Malaysia (Malaka); India (Karnataka, Manipur, Sikkim, West Bengal,), Vietnam. [Smith 1855; Bingham 1897; Betrem 1928, 1941; Baltazar 1966; Wang 1992; Liu *et al.* 2021b].

Notes

The male of this species closely resembles the female (Betrem 1941; Gupta & Jonathan 2003). *Austroscolia ruficeps* can readily be distinguished from other scoliids in Hong Kong by its distinctive coloration with an entirely red head but black mesosoma and metasoma.

Genus ***Carinoscolia*** Betrem, 1927b

Scolia (*Carinoscolia*) Betrem, 1927b: xcvii (type species *Scolia opalina* Smith, 1858, by original designation).

Carinoscolia junnanensis (Betrem, 1928)
Figs 4A–B, 7F, 10A, 11F, 14A, 15F, 18A, 19F, 22A, 23F, 26A, 27F, 30A, 31F, 34A, 35F, 38A, 39H, 40H, 41H, 42H

Scolia (*Carinoscolia*) *junnanensis* Betrem, 1928: 188 (holotype NHMW, ♀, type locality = Yunnan, China).
Scolia (*Carinoscolia*) *yunnanensis tibetensis* Betrem, 1941: 116 (holotype Cornell University, ♀, type locality = Tibet).

Scolia (*Carinoscolia*) *yunnanensis* – Betrem 1941: 116.

Material examined

CHINA – **Hong Kong** • 1 ♀; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 6–20 Jun. 2020; C. Barthélémy leg.; Malaise trap, ref.: M494.C.Hy.1; CBC • 1 ♂; same collection data as for preceding; 17 Aug.–1 Sep. 2020; C. Barthélémy leg.; Malaise trap, ref.: M510.C.Hy.1; CBC • 2 ♂♂; same collection data as for preceding; 19–26 Apr. 2004; C. Barthélémy leg.; Malaise trap, ref.: M011.C.Hy.30A and 30B; CBC • 1 ♂; same collection data as for preceding; 21 Sep.–5 Oct. 2019; C. Barthélémy leg.; Malaise trap, ref.: M440.C.Hy.3; CBC • 2 ♂♂; same collection data as for preceding; 6–20 Jun. 2020; C. Barthélémy leg.; Malaise trap, refs: M494.C.Hy.2A and 2B; CBC.

Description

Female

Standard ratios (n = 2). L: 18.2–18.3 mm (mean = 18.25 mm); CR: 1.13–1.14 (mean = 1.14); OOR: 0.66–0.74 (mean = 0.70); CLR: 0.39–0.41 (mean = 0.40); MER: 1.25–1.28 (mean = 1.26); OMR: 1.02–1.03 (mean = 1.03); FRR: 1.61–1.69 (mean = 1.62); MSR: 0.78–0.80 (mean = 0.79); TER: 1.51–1.64 (mean = 1.58).

Head. Head mostly punctured except on disc of clypeus (impunctate) (Figs 15F, 19F); frontal spatium not well defined dorsally; frontal furrow not well defined; frontal fissura present on anterior portion of frontal spatium only (Fig. 15F).

Mesosoma. Scapulae, mesoscutum, scutellum, metanotum and propodeum dorsomedian area densely and strongly punctate (Figs 22A, 26F), punctures separated by less than their own diameter; dorsolateral area of propodeum somewhat less densely punctate anteriorly (Fig. 27F), puncture separate by at least their own diameter. Mesopleuron densely punctate medially, broadly impunctate posteriorly and anteriorly; upper panel of metapleuron densely punctate dorsally, impunctate ventrally; upper and lower panels of metapleuron with a few faint punctures; lateral panel of pronotum minutely punctate. Scutellum and metanotum without median longitudinal carina (Fig. 27F). Dorso-median area of propodeum without distinct tubercule medially (Fig. 27F).

Metasoma. Metasoma with weak division between anterior and ventral faces of S2 in lateral view (Fig. 31F); S1 mostly impunctate (shiny) with only a few large punctures laterally, tergites mostly uniformly densely punctate, tergites with a less densely punctured area on the medial apical part (Figs 31F, 35F). T2 with basal elevation weekly developed (gradulus) (Fig. 35F).

Wings. Fore wing with two submarginal cells and one recurrent vein. Anterior half of fore wing with numerous short setae.

Colour and vestiture. Head red/orange on frontal spatium, vertex except area between eyes, and scapulae (Figs 15F, 19F), remainder of body black. Vestiture black on entire body (Fig. 7F), except on frontal spatium, clypeus and scapulae where it is pale orange (Fig. 15F). Wings dark brown, infumated with faint iridescence.

Male

Identical to female, except for the presence of a conspicuous ridge (carina) on the frons below median ocellus, clypeus with punctures on disc and the short frontal fissura (Figs 18A, 22A). Ocellar sinuses entirely and most of interantennal space orange.

Standard ratios (n = 5). L: 13.4–15.7 mm (mean = 14.3 mm); CR: 1.07–1.13 (mean = 1.09); OOR: 1.18–1.50 (mean = 1.37); CLR: 0.61–0.65 (mean = 0.63); MER: 1.25–1.35 (mean = 1.31); OMR: 0.87–0.95 (mean = 0.91); FRR: 1.71–1.92 (mean = 1.83); MSR: 0.76–0.83 (mean = 0.79); TER: 1.67–1.79 (mean = 1.72).

Genitalia. Ventral and dorsal side of paramere with sparse long setae (Figs 39H, 40H); volsella with long setae on its entire surface (Fig. 42H), cuspis volsellaris densely setose. Volsella bearing a few sensory cones on its external margin, acutely rounded apically (Fig. 40H); External margin of paramere strongly rounded medially, paramere broadened medially; aedeagus with 12 teeth, the last apical tooth very reduced, serrated margin substraight apically, sharply convex medially and substraight/concave basally (Fig. 42H).

Distribution

China (Fujian, *Hong Kong, Xizang, Yunnan); Japan; South Vietnam. [Betrem 1941; Liu *et al.* 2021b].

Notes

Following its original description (Betrem 1928) as *Scolia junnanensis*, the name of this species has subsequently been spelt by Betrem (1941) and Liu *et al.* (2021b) as '*yunnanensis*'. However, ICZN Art. 32 requires the original spelling be maintained. The spelling '*yunnanensis*' cannot be regarded as a justified emendation under Article 32.5, as Betrem (1928) also spells the name of the species' collection location as 'Jünnan' (evidently intending the German reading of this spelling). Contra Liu *et al.* (2021b), Betrem's (1928) usage does not represent a nomen nudum as a full description is provided.

Previous descriptions of this species (Betrem 1941; Liu *et al.* 2021a) refer to yellow/orange markings on T3 and sometimes T4 that are absent in specimens from Hong Kong. Nevertheless, all other characters are identical to these earlier accounts. Betrem (1941) recognized two subspecies, *C. j. junnanensis* and *C. j. tibetensis* Betrem, 1941, distinguished on the basis of coloration. Specimens from Hong Kong are not attributable to either subspecies. However, in light of the extreme colour variability in Scoliidae and the absence of a systematic review of variation within *C. junnanensis*, we refrain from designating a new subspecies for the Hong Kong population. *Carinoscolia junnanensis* is the only representative of this small genus in Hong Kong; with eight species worldwide.

Genus ***Liacos*** Guérin- Méneville, 1838

Scolia (*Liacos*) Guérin-Méneville, 1838: 246 (type species *Scolia* (*Liacos*) *dimidiata* Guérin-Méneville, 1838, by monotypy [=*Liacos analis* (Fabricius, 1804)]).
Liacos (*Triliacos*) de Saussure & Sichel, 1864: 33 (type species *Scolia analis* Fabricius, 1804, by effective original designation [see below]).
Tetrascolia Ashmead, 1903: 8 (type species *Campsomeris urvillii* Lepeletier, 1845, by original designation [=*Liacos analis* (Fabricius, 1804)].

Notes

De Saussure & Sichel (1864) established *Triliacos* as a subgenus of *Liacos* including three species, without explicitly citing a type species. However, they did note that *Triliacos* represented "*Liacos* proprie dicta" and included the type species of *Liacos* therein (as a synonym of *L. analis*). *Triliacos* may therefore be regarded as a nomen novum for *Liacos*, meaning that it automatically has the same type species (ICZN Art. 67.8). Betrem (1928) thought a type species had not been established for *Triliacos* but also designated *Scolia dimidiata*. Argaman's (1996) designation of *Scolia erythrosoma* Burmeister, 1854 as type species of *Triliacos* seems unwarranted.

Liacos erythrosoma (Burmeister, 1854)
Figs 4A–B, 5C–D, 7G, 10B, 11G, 14B, 15G, 18B, 19G, 22B, 23G, 26B, 27G, 30B, 31G, 34B, 35G, 38B, 39I, 40I, 41I, 42I

Scolia erythrosoma Burmeister, 1854: 15 (holotype MLUH, ♂, type locality = Padang, Sumatra, Indonesia).
Scolia (*Scolia*) *penangensis* de Saussure, 1855: 39 (holotype ♀, type locality = Penang, Malaysia).
Liacos (*Triliacos*) *fulvo picta* [sic] Cameron, 1892: 2 (holotype Oxford Museum, ♀, type locality = Barrackpore, India).
Liacos erythrosoma f. *rufocoronata* Micha, 1927: 58 (holotype ZMB, ♀, type locality = Penang, Malaysia).
Liacos erythrosoma f. *vulpes* Micha, 1927: 59 (holotype ZMB, ♂, type locality = Kambang, Sumatra, Indonesia).
Liacos erythrosoma sikkimensis Micha, 1927: 59 (syntypes ZMB, ♀, ♂, type localities = Sikkim and Assam, India; Myanmar).
Liacos erythrosoma borneensis Micha, 1927: 59 (syntypes ZMB, ♀, ♂, type locality = Kalimantan, Borneo, Indonesia).
Liacos erythrosoma hainana Micha, 1927: 60 (holotype ZMB, ♀, type locality = Hainan, China).
Liacos erythrosoma formosana Micha, 1927: 61 (holotype ♀, type locality = Gangkou, Taiwan).
Liacos erythrosoma aurantiaca Micha, 1927: 62 (syntypes ZMB, ♀, ♂, type locality = Nicobar, India).
Scolia (*Liacos*) *erythrosoma* f. *chosensis* Uchida, 1934: 241 (holotype ♀, type locality = Suigen, South Korea).
Scolia (*Liacos*) *erythrosoma sikkimensis* var. *michai* Betrem, 1941: 123 (unavailable infrasubspecific name).

Liacos (*Triliacos*) *analis* (Fabricius, 1804) – de Saussure & Sichel 1864: 34.
Liacos (*Triliacos*) *erythrosoma* – de Saussure & Sichel 1864: 35.
Liacos (*Triliacos*) *dimidiata* (Guérin-Méneville, 1838) – Magretti 1892: 235
Liacos erythrosoma fulvopicta – Micha 1927: 63.
Scolia (*Liacos*) *erythrosoma* – Betrem 1928: 168.
Scolia (*Liacos*) *erythrosoma sikkimensis* – Betrem 1928: 168 (non *Scolia* (*Discolia*) *sikkimensis* Bingham, 1896).

Scolia (*Liacos*) *erythrosoma sikkimensis* var. *hainana* – Betrem 1928: 169.
Scolia (*Liacos*) *erythrosoma formosana* – Betrem 1928: 171.
Scolia (*Liacos*) *erythrosoma aurantiaca* – Betrem 1928: 171.
Scolia (*Liacos*) *erythrosoma fulvopicta* – Betrem 1928: 171.
Liacos erythrosoma chosensis – Tsuneki 1972: 20.

Material examined

CHINA – **Hong Kong** • 1 ♀; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 6 Aug.–5 Sep. 2009; C. Barthélémy leg.; Malaise trap, ref.: M065.C.Hy.3; CBC • 1 ♀; Mang Kung Wo; 22°22′06″ N, 114°15′12″ E; 60 m; 18 Aug.–1 Sep. 2018; C. Barthélémy leg.; Malaise trap, ref.: M362.C.Hy.11; CBC • 1 ♀; same collection data as for preceding; 1–15 Sep. 2018; C. Barthélémy leg.; Malaise trap, ref.: M365.C.Hy.2; CBC • 1 ♂; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 21 May 2009; C. Barthélémy leg.; hand net, ref.: 0338.C.Hy.1; CBC • 1 ♂; same collection data as for preceding; 29 Sep. 2018; C. Barthélémy leg.; hand net, ref.: 0669.C.Hy.2; CBC • 1 ♂; Sha Lo Tong; 22°28′54″ N, 114°10′49″ E; alt. 160 m; 31 Jun. 2017; C. Barthélémy leg.; hand net, ref.: 0635.B.Hy.3; CBC • 3 ♂♂; Tai Lung Farm; TLFES.

Description

Female

Standard ratios (n = 3). L: 17.7–22.1 mm (mean = 20.06 mm); CR: 1.13–1.29 (mean = 1.20); OOR: 0.62–0.71 (mean = 0.67); CLR: 0.41–0.42 (mean = 0.41); MER: 1.20–1.41 (mean = 1.31); OMR: 1.03–1.15 (mean = 1.10); FRR: 1.52–1.59 (mean = 1.55); MSR: 0.69–0.75 (mean = 0.75); TER: 1.53–1.81 (mean = 1.63).

Head. Head mostly sparsely punctate with denser punctation on frontal lamina and scrobe (Fig. 15G); frontal spatium well defined by posterior furrow, frontal fissura distinct between anterior of frontal spatium and anterior ocellus (Fig. 15G).

Mesosoma. Dorsum of mesosoma with scapulae, anterior of mesoscutum, scutellum, metanotum and dorsomedian area of propodeum densely punctate (Fig. 23G); disc of mesoscutum sparsely punctate to largely impunctate (Fig. 23G); dorsolateral area of propodeum anteriorly impunctate, posteriorly densely punctate (Fig. 27G). Mesopleuron mostly densely punctate except near anterior and posterior margins, becoming less so around mesopleural crest; upper plate of metapleuron densely punctate near upper margin, otherwise impunctate; lower plate of metapleuron densely punctate anteroventrally, becoming impunctate near upper and posterior margins; lateral panel of propodeum densely and sub contiguously punctate above lateral carina, otherwise sparsely and minutely punctate. Scutellum with median longitudinal groove, metanotum without median longitudinal carina (Fig. 27G). Dorso-median area of propodeum without distinct tubercule medially (Fig. 27G).

Metasoma. Metasoma with strong angle between anterior and ventral faces of S2 in lateral view (Fig. 31G); tergites becoming more densely punctate posteriorly than anteriorly (Fig. 35G). T2 with basal elevation distinct (gradulus) (Fig. 35G).

Wings. Fore wing with three submarginal cells and two recurrent veins; second recurrent vein merging with first before reaching submarginal cells. Fore wing galbrous except along the costal vein being dense setae.

Colour and vestiture. Head and mesosoma black (Figs 7G, 11G); metasoma with T1 varying from entirely black to red with transverse black apical band, T2 red anteriorly with varying amounts of black posteriorly and laterally, remaining tergites red (Figs 11G, 23G); S1 black, remaining sternites more or

less red with varying amounts of median black patches, particularly on S2 (Figs 7G, 31G). Vestiture black on head, mesosoma and basal segments of metasoma (apical fringes of segment 2 may be red) (Figs 7G, 11G, 23G, 35G), red on apical segments of metasoma (black vestiture may be present on black patches of integument). Wings dark brown with purple reflections.

Male

Male as female, except head somewhat more punctate, particularly densely on frontal spatium; more or less distinct transverse carina running between ocular sinuses behind posterior margin of frontal spatium (Fig. 18B). Disc of mesoscutum sparsely but strongly punctate (Fig. 26B). Occiput bearing short, dense, whitish hair. Mesosoma also with fringes of short, dense, whitish pile present posterolaterally on scutellum and metanotum (Fig. 26B), and at posterolateral corners and laterally on propodeum.

Standard ratios (n = 5). L: 14–21.2 mm (mean = 16.9 mm); CR: 1.15–1.20 (mean = 1.17); OOR: 1.04–1.24 (mean = 1.15); CLR: 0.60–0.64 (mean = 0.62); MER: 1.27–1.40 (mean = 1.32); OMR: 0.89–0.99 (mean = 0.96); FRR: 1.46–1.81 (mean = 1.67); MSR: 0.72–0.80 (mean = 0.75); TER: 1.55–1.74 (mean = 1.62).

Genitalia. Ventral side of paramere with a few setae on the lateral side (Fig. 40I) and dense setae on basal part, dorsal side with sparse long setae on most of its surface (Figs 39I, 41I); volsella and cuspis volsellaris with sparse setae on entire surfaces (Figs 40I, 42I); volsella bearing a few sensory cones on basal margin (Fig. 42I), no lamella on inner margin (Fig. 39I). External margin of paramere not angled medially (lateral side parallel), flattened apically (Figs 39I, 40I), volsella acute apically (Fig. 39I); aedeagus with 10 teeth, the first two apical teeth much reduced, serrated margin straight, convex apically (Fig. 42I).

Distribution (Fig. 3A–B)

Indonesia (Sumatra, Kalimantan); Singapore; Malaysia (Sarawak); China (Anhui, Beijing, Guangdong, Hainan, Hebei, *Hong Kong, Jiangsu, Taiwan, Yunnan,); India (Arunachal Pradesh, Assam, Kerala, Manipur, Sikkim, West Bengal); Thailand; Nepal; Bhutan; Japan; Myanmar (Tenasserim). [Bingham 1897; Betrem 1928, 1941; Gupta & Jonathan 2003; Terayama & Nagase 2007; TIGER project 2008; Nidup *et al.* 2017; Liu *et al.* 2021b].

Notes

This species can readily be distinguished from all other scoliids in Hong Kong by its wing venation with the second recurrent vein present but merging with the first. Subspecies of *Liacos erythrosoma* have been distinguished by the extent of red coloration on the metasoma (Betrem 1941; Gupta & Jonathan 2003). Specimens from Hong Kong show a wide range of variation in the amount of red integument on the basal tergites and sternites, and in the corresponding extent of red vestiture. The recognition of distinct subspecies seems unwarranted.

Genus ***Megascolia*** Betrem, 1928

Scolia (*Triscolia*) sectio *Megascolia* Betrem, 1928: 239 (type species *Scolia procer* Illiger, 1802, by original designation).

Subgenus ***Regiscolia*** Betrem & Bradley, 1964

Megascolia (*Regiscolia*) Betrem & Bradley, 1964: 441 (type species *Scolia flavifrons* Fabricius, 1775, by original designation).

Guigliana Argaman, 1996: 196 (type species *Sphex azurea* Christ, 1791, by original designation; preoccupied by Betrem in Bradley & Betrem, 1967).

Notes

In a similar circumstance to that described under *Phalerimeris* above, Argaman (1996) regarded the name *Guigliana* as having been established by Bradley (1964a) despite appearing therein as a nomen nudum only. Argaman's (1996) usage can be taken as establishing a new available name, but by then it was long preoccupied by Betrem's (in Bradley & Betrem 1967) usage of it for a different taxon.

Megascolia* (*Regiscolia*) *azurea (Christ, 1791)
Figs 4A–B, 7H, 10C, 11H, 14C, 15H, 18C, 19H, 22C, 23H, 26C, 27H, 30C, 31H, 34C, 35H, 38C, 39J, 40J, 41J, 42J

Sphex azurea Christ, 1791: 256 (holotype lost, ♀, type locality unknown).
Scolia rubiginosa Fabricius, 1793: 230 (holotype ♂, type locality = "in India orientali).
Scolia ornata Lepeletier, 1845: 517 (holotype ♀, type locality = Java).
Scolia magnifica de Saussure, 1859: 175 (holotype ♀, type locality = Java).
Scolia (*Triscolia*) *rubiginosa* var. *intermedia* Betrem, 1928: 231 (unavailable infrasubspecific name).
Scolia azurea christiana Guiglia & Betrem, 1958: 96 (holotype ♀, type locality = "monti dei Catein Cauri", Myanmar?).

Scolia (*Triscolia*) *rubiginosa* – Magretti 1892: 236.
Triscolia azurea – Micha 1927: 117.
Scolia (*Triscolia*) *azurea* – Betrem 1928: 230.
Scolia (*Triscolia*) *azurea rubiginosa* – Betrem 1928: 231.
Scolia (*Triscolia*) *azurea rubiginosa* var. *magnifica* – Betrem 1928: 232.
Megascolia (*Regiscolia*) *azurea christiana* – Betrem & Bradley 1964: 443.

Material examined

CHINA – **Hong Kong** • 2 ♀♀; Mai Po Nature Reserve; 22°29′14″ N, 114°02′00″ E; alt. 1 m; 13 Apr. 2014; C. Barthélémy leg.; hand net, ref.: 0514.G.Hy.4; CBC • 1 ♂; same collection data as for preceding; C. Barthélémy leg.; hand net, ref.: 0514.G.Hy.5; CBC • 1 ♂; same collection data as for preceding; 22°29′44″ N, 114°02′35″ E; alt. 1 m; C. Barthélémy leg.; hand net, ref.: 0514.G.Hy.2; CBC • 1 ♀; Mang Kung Wo; 22°22′06″ N, 114°15′12″ E; alt. 60 m; 17 Apr. 2016; C. Barthélémy leg.; hand net, ref.: 0578.C.Hy.3; CBC • 1 ♂; same collection data as for preceding; 31 Mar.–14 Apr. 2018; C. Barthélémy leg.; Malaise trap, ref.: M339.C.Hy.3; CBC • 1 ♀; same collection data as for preceding; 12–26 May 2012; C. Barthélémy leg.; Malaise trap, ref.: M348.C.Hy7; CBC • 1 ♀; same collection data as for preceding; 29 Sep.–12 Oct. 2018; C. Barthélémy leg.; Malaise trap, ref.: M371.C.Hy.2; CBC • 4 ♀♀, 4 ♂♂; same collection data as for preceding; TLFES.

Description

Female

Standard ratios (n = 3). L = 22.5–36.0 mm (mean = 29.8 mm); CR = 0.83–1.07 (mean = 0.99); OOR = 0.48–0.62 (mean = 0.57); CLR: 0.35–0.36 (mean = 0.36); MER: 1.23–1.50 (mean = 1.34); OMR: 0.99–1.14 (mean = 1.07); FRR: 1.47–1.61 (mean = 1.53); MSR: 0.73–0.76 (mean = 0.75); TER: 1.60–1.70 (mean = 1.66).

Head. Largely sparsely punctate to impunctate except laterally on frontal spatium and clypeus and on scrobe (Fig. 15H); frontal spatium not defined posteriorly; frontal fissura weakly present from anterior of frontal spatium to anterior ocellus, may be obsolete (Fig. 15H).

Mesosoma. Dorsum of pronotum densely and finely punctate medially, becoming sparsely punctate on scapula (Fig. 23H); mesoscutum densely punctate near anterior margin, moderately punctate near lateral and posterior margins, broadly impunctate on disc (Fig. 23H); scutellum moderately punctate laterally, sparsely punctate medially (Fig. 27H); metanotum and dorsum of propodeum densely and finely punctate (Fig. 27H). Mesopleuron densely and finely punctate; metapleuron mostly more moderately punctate except for impunctate area in lower half of upper panel and uppermost part of lower panel; lateral panel of propodeum moderately and finely punctate. Scutellum with shallow median longitudinal groove, metanotum without median longitudinal carina (Fig. 27H). Dorso-median area of propodeum without distinct tubercule medially (Fig. 27H).

Metasoma. Metasoma with moderately strong angle between anterior and ventral faces in lateral view; T1 mostly densely and finely punctate with prominent impunctate tubercle at angle between anterior and dorsal faces (Fig. 35H); T2–T5 finely and densely punctate near posterior margins (and near anterior margin on T2) with disc largely impunctate (Fig. 35H), apical bands of punctures and their associated vestiture narrowing medially on T3–T5; T6 densely and strongly punctate. T2 with basal elevation weekly developed (gradulus) (Fig. 35H).

Wings. Fore wing with three submarginal cells and one recurrent vein. Fore wing galbrous except along the costal vein being dense setae.

Colour and vestiture. Head red on frons, vertex and behind eye (Fig. 15H); broad transverse, medially interrupted red band on T3 (Fig. 35H), sometimes also on T4 and T5; remainder of body black. Vestiture black except mostly red on apical segments of metasoma (interspersed with black hairs on sternites) (Fig. 7H); vestiture relatively long and semi-decumbent on posterior half of mesosoma and on metasoma (Fig. 7H). Wings dark brown with purple reflections.

Male

Standard ratios (n = 4). L: 23.8–26.5 mm (mean = 24.9 mm); CR: 1.07–1.13 (mean = 1.09); OOR: 1.43–1.76 (mean = 1.60); CLR: 0.54–0.63 (mean = 0.59); MER: 0.96–1.37 (mean = 1.21); OMR: 0.95–1.05 (mean = 1); FRR: 1.38–1.79 (mean = 1.54); MSR: 0.76–0.81 (mean = 0.78); TER: 1.53–1.76 (mean = 1.63).

Head. Mostly densely punctate except small impunctate area on frons immediately in front of anterior ocellus (Fig. 18C).

Mesosoma. Dorsum of mesosoma mostly densely punctate (Fig. 26C), scutum with small impunctate medioapical area (Fig. 26C). Lateral panels of mesosoma as for female. Scutellum without shallow median longitudinal groove (Fig. 30C).

Metasoma. Metasoma with weak angle between anterior and ventral faces of S2 in lateral view (Fig. 33C); tergites mostly densely and finely punctate except T2–T4 with sparsely punctate to impunctate areas in centre of disc (may be absent on T2) (Fig. 38C); T1 with anterior tubercle as in female.

Wings. Same as female.

Colour and vestiture. Coloration as in female except head entirely black (Figs 10C, 14C); red bands may not be interrupted on T4 and T5.

Genitalia. Ventral side of paramere mostly glabrous, a few setae on the lateral side (Fig. 40J), dorsal side with sparse long setae on most of its surface (Figs 39J, 41J); volsella and cuspis volsellaris with sparse setae on entire surfaces (Figs 40J, 42J); volsella bearing sparse sensory cones on most of its

external margin (Fig. 42J) and with a narrow lamella on the inner margin (Fig. 39J). External margin of paramere not angled medially (lateral side parallel), subrounded apically (Figs 39J, 40J); aedeagus with 10 teeth, the first two apical teeth much reduced, apical margin serrated with minute teeth (Fig. 41J), serrated margin straight, flattened apically (Fig. 42J).

Distribution (Fig. 4A–B)

China (Fujian, Guangdong, Hong Kong, Anhui, Hainan, Hunan, Guangxi, Guizhou, Yunnan); Indonesia (Java, Sumatra, Krakatau); Malaysia (Selangor); Bangladesh (Chittagong); Thailand; India (Sikkim, Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Tripura, Uttarankhand, West Bengal, Mizoram, Odisha, Andaman and Nicobar, Nagaland); Vietnam (North and South Vietnam); Myanmar; Laos; Nepal; Bhutan. [Betrem 1928, 1941; Dover 1926; Wang 1992; Gupta & Jonathan 2003; Kumar 2009; Kumar & Pham 2015; Nidup *et al.* 2017; Liu *et al.* 2021b].

Notes

By far the largest and most impressive scoliid species in Hong Kong. While it is common and widely distributed in the territory, it is seasonal and rarely seen after June, but also has a short activity period in September, the taxon being probably bivoltine in Hong Kong (pers. obs.) Betrem (1928: 42) reports both *Xylotrupes gideon* (Linnaeus, 1767) and *Oryctes rhinoceros* (Linnaeus, 1758) (Coleoptera) as hosts of this taxon. Betrem (1941) assigned specimens of this species from southern China to the subspecies *Scolia azurea rubiginosa* Fabricius, 1793 but Guiglia & Betrem (1958) later synonymised this name with the type subspecies while providing the new name *Scolia azurea christiana* for the form previously known as *rubiginosa*. Fabricius (1793) described his *Scolia rubiginosa* on the basis of a male of uncertain origin (type locality "in India Orientali"), describing its coloration as "Abdominis segmentum primum secundumque atra, tertium atrum maculis duabus, dorsalibus, fulvis, reliquis omnibus ferrugineo hirtis" ("abdominal segments 1 and 2 black, 3 black with two dorsal yellow spots, remainder with entirely red hairs"). Guiglia & Betrem (1958) interpreted this to mean that the apical fringe of T3 was entirely black in Fabricius' specimen (as in specimens from Indonesia) whereas specimens from northern India and southern China more typically have a mostly red fringe on T3. However, it might be questioned whether Fabricius' description should be seen as more ambiguous in this regard. No type material is currently available for *Scolia rubiginosa* (Guiglia & Betrem 1958) and until its identity can be more confidently determined we eschew the use of subspecies names in *M. azurea*.

Genus ***Scolia*** Fabricius, 1775

Scolia Fabricius, 1775: 355 (type species *Scolia quadripunctata* Fabricius, 1775, by subsequent designation by Latreille 1810 [=*Scolia sexmaculata* (Müller 1766)]).

Subgenus ***Discolia*** de Saussure, 1863

Scolia (*Discolia*) de Saussure, 1863: 18 (type species *Scolia nobilitata* Fabricius, 1804, by subsequent designation by Betrem & Bradley 1964).

Scolia (*Scolioides*) Guiglia & Capra, 1934: 115 (type species *Apis hirta* Schrank, 1781, by original designation).

Hangasorna Argaman, 1996: 197 (type species *Scolia quadripustulata* Fabricius, 1782, by original designation).

Notes

All species of *Scolia* found in Hong Kong, including *S. pakshaoensis* sp. nov., can be assigned to the subgenus *Discolia* de Saussure, 1863, distinguished from the type subgenus by the less extensive setation at the base of the volsella in males (Gupta & Jonathan 2003; Liu *et al.* 2021a).

Scolia* (*Discolia*) *binotata Fabricius, 1804
Figs 3A–B, 8A–B, 10D, 12A–B, 14D, 16A–B, 18D, 20A–B, 22D, 24A–B, 26D, 28A–B, 30D, 32A–B, 34D, 36A–B, 38D, 39K, 40K, 41K, 42K

Scolia binotata Fabricius, 1804: 244 (holotype ZMUC, ♂, type locality = "Tranquebariae" [south-western coast of India]).
Scolia bipunctata Klug, 1805: 36 (holotype ♂, type locality = "aus Ostindien").
Scolia (*Discolia*) *humeralis* de Saussure & Sichel, 1864: 321 (holotype NHMW, ♂, type locality = Singapore).
Scolia quadripustulata var. *humeralis* subvar. *bipustulata* Magretti, 1892: 241 (unavailable infrasubspecific name).
Scolia quadripustulata subvar. *sexpustulata* Magretti, 1892: 242 (unavailable infrasubspecific name).
Scolia barmanica Magretti, 1892: 242 (syntypes ♀, type locality = Yangon, Myanmar).
Scolia cucullata Bingham, 1897: 82 (syntypes NHMUK, ♀♀, type localities = Sikkim and Bengal, India).
Scolia (*Scolia*) *quadripustulata formosensis* Betrem, 1928: 316 (type localities = China, Taiwan, Japan).
Scolia (*Scolia*) *quadripustulata kanasarensis* Betrem, 1928: 318 (holotype ♂, type locality = Kanaser Range, Uttarakhand, India).
Scolia (*Scolia*) *quadripustulata* f. *sexpustulata* Uchida, 1934: 247 (holotype ♀, type locality = Changhua, Taiwan; preoccupied by *Scolia sexpustulata* Klug, 1805).
Scolia (*Scolia*) *quadripustulata* var. *uchidai* Betrem, 1941: 156 (intended as replacement name for *S. quadripustulata* f. *sexpustulata* Uchida, 1934; unavailable infrasubspecific name).
Scolia (*Scolia*) *quadripustulata birmanica* var. *octopustulata* Betrem, 1941: 157 (unavailable infasubspecific name).

Scolia burmanica – Dalla Torre 1897: 150 (*lapsus* for *S. barmanica*).
Scolia quadripustulata var. *binotata* – Bingham 1908: 352.
Scolia (*Scolia*) *quadripustulata* (Fabricius, 1782) – Betrem 1928: 314.
Scolia (Scolia) quadripustulata var. *bipunctata* – Betrem 1928: 316.
Scolia (*Scolia*) *quadripustulata humeralis* – Betrem 1928: 316.
Scolia (*Scolia*) *quadripustulata barmanica* – Betrem 1928: 317.
Scolia (*Scolia*) *quadripustulata barmanica* var. *bipustulata* – Betrem 1928: 318.
Scolia (*Discolia*) *quadripustulata* var. *bipunctata* – Guiglia 1965: 322.
Scolia (*Discolia*) *quadripustulata formosensis* – Tsuneki 1972: 39.
Scolia (*Discolia*) *binotata* – Krombein 1978: 41.

Material examined

CHINA – **Hong Kong** • 1♀; Lau Fau Shan; Jun. 1970; A. Sommerville leg.; HKBM • 1 ♀; no data; HKBM • 1 ♀; New Territories; May–Jul. 2018; C. Taylor and Cheung Shun Chi leg.; Malaise trap; HKBM • 1 ♂; Tai Lung Farm, Sheung Shui; 18 May 1982; R. Winney leg.; TLFES • 1 ♂; no label; TLFES • 1 ♂; Che Keng Tuk; 22°22.324′ N, 114°15.910′ E; 30 m; 3 Aug. 2005; John X.Q. Lee leg.; hand net, ref.: 0684.N.Hy.1; CBC.

Description

Female

Standard ratios (n = 3). L: 14.8–17.4 mm (mean = 16.4 mm); CR: 1.14–1.18 (mean = 1.16); OOR: 0.61–0.76 (mean = 0.70); CLR: 0.35–0.40 (mean = 0.38); MER: 1.22–1.36 (mean = 1.30); OMR: 1.03–1.11 (mean = 1.08); FRR: 2.19–2.36 (mean = 2.26); MSR: 0.78–0.81 (mean = 0.79); TER: 1.41–1.74 (mean = 1.62).

Head. Head sparsely punctate to impunctate except densely punctate on lateral margins of frontal spatium and on scrobe (Fig. 16A–B).

Mesosoma. Scapula, mesoscutum and scutellum in large part sparsely punctate to impunctate, mesoscutum and scutellum each more densely punctate near anterior margin (Fig. 24A–B); metanotum moderately punctate medially, densely punctate laterally (Fig. 28A–B); dorsomedian area of propodeum densely punctate, dorsolateral area largely impunctate except moderately punctate laterally (Fig. 28A–B). Mesopleuron densely punctate medially, broadly impunctate anteriorly and posteriorly; metapleuron largely impunctate except with small, effused punctures anteroventrally; lateral panel of propodeum largely impunctate anteriorly, moderately punctate posteriorly. Scutellum and metanotum without median longitudinal carina (Fig. 28A). Dorso-median area of propodeum without distinct tubercule medially (Fig. 28A).

Metasoma. Metasoma with no obvious angle between anterior and ventral faces of S2 in lateral view (Fig. 32A–B); tergites sparsely punctate discally, more densely punctate anteriorly and posteriorly (Fig. 36A–B). T1 with weak tubercle at angle between anterior and dorsal faces (Fig. 36A). T2 with basal elevation weekly developed (gradulus) (Fig. 36A).

Wings. Fore wing with two submarginal cells and one recurrent vein. Fore wing galbrous except along the costal vein being dense setae.

Colour and vestiture. Black form; integument mostly black except following orange (Figs 8A, 12A): metasoma with large lateral spots on T3–T4 (Figs 8A, 36A). Orange form; Head mostly red except large black maculation on frons covering ocellar triangle and reaching eye margins, frontal spatium and clypeus black (Figs 16B, 20B). Mesosoma entirely black; metasoma black except large lateral orange spots on T2–T5 (Fig. 36B). In both forms vestiture white on head (Fig. 16A–B), largely black on mesosoma with white vestiture laterally and ventrally, interspersed black and white vestiture on metasoma (Fig. 36A–B); wings dark brown with purple reflections.

Male

Standard ratio (n = 3). L: 11.8–14.4 mm (mean = 13.4 mm); CR: 1.13–1.14 (mean = 1.13); OOR: 1.33–1.73 (mean = 1.52); CLR: 0.58–0.71 (mean = 0.66); MER: 1.28–1.39 (mean = 1.32); OMR: 0.97–1.04 (mean = 0.99); FRR: 2.0–2.29 (mean = 2.15); MSR: 0.77–0.80 (mean = 0.79); TER: 1.52–1.72 (mean = 1.62).

Head. Head mostly moderately punctate, densely punctate on frontal spatium (Fig. 18D).

Mesosoma. Dorsum of mesosoma more heavily punctate than female but punctures on mesoscutum more widely spaced posteromedially than marginally, many medial punctures on mesoscutum separated by about their own diameter (Fig. 26D); dorsolateral area of propodeum largely impunctate in anterior half (Fig. 30D). Mesopleuron and metapleuron as in female; lateral panel of propodeum moderately punctate.

Metasoma. Metasomal tergites uniformly and moderately punctate (Figs 34D, 38D).

Wings. Same as female.

Colour and vestiture. Only black form examined. Integument black except following orange (Figs 10D, 14D): inner part of ocular sinus, line behind upper lobe of eye; scapula; large paired lateral spots on T3 and T4 (Fig. 14D). Vestiture mostly white (Figs 10D, 18D), black on much of dorsum of mesosoma

(except on pronotum and anterior of mesoscutum) (Fig. 26D) and on apical fringes and laterally on metasoma (always white on orange areas of integument).

Genitalia. Ventral side of paramere mostly glabrous, a few setae on the lateral side (Fig. 42K), dorsal side with sparse long setae on most of its surface (Figs 39K, 41K); volsella and cuspis volsellaris with sparse setae on entire surfaces (Fig. 39K); volsella bearing sparse sensory cones basally on the external margin, no lamella on its internal margin. External margin of paramere uniformly rounded, broadly rounded apically, (Figs 39K, 40K); cuspis volsellaris acute apically (Fig. 40K); aedeagus with eight teeth, serrated margin convex apically, concave basally (Fig. 42K).

Distribution (Fig. 3A–B)

China (Anhui, Beijing, Fujian, Hong Kong, Jiangsu, Jilin, Shandong, Shanghai, Sichuan, Taiwan, Zhejiang); India (Arunachal Pradesh, Delhi, Himachal Pradesh, Karnataka, Kerala, Manipur, Rajasthan, Tamil Nadu, Uttarakhand, West Bengal, Sikkim, Assam); Sri Lanka; Japan (Okinawa); Bhutan; Myanmar (Pegu Hills, Rangoon, Tenasserim); Malaysia (Malacca, Pahang); Laos; Vietnam (South and North [Cochinchina and Tonkin]; Singapore. [Betrem 1928; Uchida 1934; Krombein 1978; Gupta & Jonathan 2003; Kumar & Pham 2015; Nidup *et al*. 2017; Liu *et al*. 2021b].

Notes

This species is extremely variable in coloration according to Betrem (1941) and Krombein (1978): in both sexes, the head, scapulae and metasomal tergites may be marked with red or entirely black. *Scolia binotata* is therefore most reliably distinguished from its congeners in Hong Kong by its sparsely punctate mesoscutum which is broadly impunctate medially in the female and has most punctures separated by about their own diameter in the male (in other species of *Scolia* the mesoscutal punctures are more uniform and closely placed).

Scolia binotata has a history of being confused with *S. quadripustulata* Fabricius 1782 and specimens from Hong Kong were described by Betrem (1941) under the latter name. True *S. quadripustulata*, which may not occur outside the Indian subcontinent, differs from *S. binotata* in having the dorsum of the mesosoma more extensively punctate and hairs on the head mostly black rather than white (Krombein 1978; Gupta & Jonathan 2003). Subspecies and infrasubspecific varieties recognised by Betrem (1941) to represent colour variants are not geographically distinct and hence probably not worthy of recognition. These include *Scolia sexpustulata* Klug, 1805, *Scolia humeralis* de Saussure in de Saussure & Sichel, 1864 and *Scolia quadripustulata birmanica* var. *octopustulata* Betrem, 1941, specifically used to refer to variants recorded from Hong Kong.

Scolia* (*Discolia*) *clypeata pseudovollenhoveni Betrem, 1933
Figs 3A–B, 5A, 8C, 12C, 16C, 20C, 24C, 28C, 32C, 36C

Scolia (*Scolia*) *clypeata pseudovollenhoveni* Betrem, 1933: 258–259 (holotype HNHM, ♀, type locality = Kaohshiung, Taiwan).
Scolia (*Scolia*) *clypeata* f. *horaiensis* Uchida, 1934: 250 (holotype ♀, type locality = Taipei, Taiwan).
Scolia (*Scolia*) *clypeata* f. *sonani* Uchida, 1934: 250 (holotype ♀, type locality = Orchid Island, Taiwan).
Scolia kanoi Yasumatsu, 1937: 123 (type locality = Orchid Island, Taiwan).

Scolia (*Scolia*) *clypeata pdeudovollenhoveni* – Betrem 1941: 145 (*lapsus* for *S. clypeata pseudovollenhoveni*).
Scolia (*Scolia*) *clypeata pseudovollenhoveni* var. *horaiensis* – Betrem 1941: 145.
Scolia (*Discolia*) *clypeata pseudovollenhoveni* – Tsuneki 1972: 36.

Material examined

CHINA – **Hong Kong** • 1 ♀; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 4–18 May 2013; C. Barthélémy leg.; Malaise trap, ref.: M130.C.Hy.2; CBC • 1 ♀; Mang Kung Wo; 22°22′06″ N, 114°15′12″ E; alt. 60 m; 11–25 Apr. 2020; C. Barthélémy leg.; Malaise trap, ref.: M483.C.Hy.6; CBC • 1 ♀; same collection data as for preceding; 20 Apr. 2020; C. Barthélémy leg.; hand net, ref.: 0713.A.Hy.1; CBC • 1 ♀; same collection data as for preceding; 26 Apr. 2020; C. Barthélémy leg.; hand net, ref.: 0714.A.Hy.1; CBC.

Description

Female

Standard ratios (n = 4). L: 19.1–22.0 mm (mean = 20.4 mm); CR: 1.10–1.17 (mean = 1.13); OOR: 0.58–0.76 (mean = 0.66); CLR: 0.39–0.42 (mean = 0.40); MER: 1.15–1.33 (mean = 1.21); OMR: 0.99–1.05 (mean = 1.03); FRR: 1.86–2.12 (mean = 2.05); MSR: 0.76–0.87 (mean = 0.83); TER: 1.63–1.73 (mean = 1.69).

Head. Head more or less impunctate on disc of clypeus and across vertex behind posterior ocelli; remainder of head extensively but not deeply punctate; frontal spatium not defined posteriorly (Figs 16C, 20C); frontal fissura present on frontal spatium only (Fig. 16C).

Mesosoma. Dorsum of mesosoma more or less strongly punctate (Fig. 24C), subcontiguously so on metanotum and dorsum of propodeum (Fig. 28C). Mesopleuron mostly densely punctate except impunctate posteriorly; upper panel of metapleuron densely punctate dorsally, impunctate ventrally; lower panel of metapleuron densely but shallowly punctate anteroventrally, broadly impunctate posterodorsally; lateral panel of propodeum densely punctate. Scutellum and metanotum without median longitudinal carina (Fig. 28C). Dorso-median area of propodeum without distinct tubercule medially (Fig. 28C).

Metasoma. Metasoma with moderately strong angle between anterior and ventral faces of S2 in lateral view (Fig. 32C); basal tergites with differentiated apical bands of dense, minute punctures contrasting with less densely punctate remainder of tergite; apical tergites densely punctate. T2 with basal elevation distinct (gradulus) (Fig. 36C).

Wings. Fore wing with two submarginal cells and one recurrent vein. Fore wings uniformly covered in short setae.

Colour and vestiture. Head red on disc of clypeus, frons including frontal spatium, and behind eye (Fig. 32C); mesosoma with scapula mostly red (Fig. 24C); metasoma with obscure pair of lateral red spots on each of T2 and T3 (Fig. 36C); remainder of body black. Vestiture pale on head and mesosoma (yellow on head, grading to grey on propodeum), grey and black on basal metasomal segments and black on apical metasomal segments; vestiture on sides of mesosoma and on metasoma semi-decumbent, giving distinctly ‘shaggy’ appearance (Fig. 8C). Wings dark brown with bronze reflections.

Distribution (Fig. 3A–B)

China (Fujian, *Hong Kong, Jiangsu, Taiwan, Sichuan). [Betrem 1933, 1941; Uchida 1934].

Notes

This species is variable in coloration and was consequently divided into a number of subspecies and varieties by Betrem (1941). The specimens we have seen from Hong Kong correspond in their possession of red spots on the metasoma to Betrem’s (1941) concept of *Scolia clypeata pseudovollenhoveni* var. *horaiensis* Uchida, 1933. This variant overlaps in range with *S. c. pseudovollenhoveni* sensu stricto (Betrem 1941) which differs only in the absence of the metasomal spots and so does not warrant distinct

recognition. The scapulae marked with orange/red will distinguish this species from most other scoliids in Hong Kong except *Carinoscolia junnanensis* and some individuals of *Scolia binotata*. It may be distinguished from these species by the distribution of punctures on the metasomal tergites which possess a distinct band of dense, minute punctures towards the apical margin. The female of *S. clypeata* that we have seen from Hong Kong possesses a pair of very obscure reddish spots on each of T2 and T3 and it is possible that other females of this species may possess more distinct metasomal spots like those seen in *S. binotata*.

Scolia* (*Discolia*) *laeviceps Smith, 1855
3A–B, 10E, 14E, 18E, 22E, 26E, 30E, 34E, 38E

Scolia laeviceps Smith, 1855: 91 (holotype NHMUK, ♀, type locality = Hong Kong).

Scolia (*Discolia*) *laeviceps* – de Saussure & Sichel 1864: 118.
Scolia leviceps – Dalla Torre 1897: 167 (unnecessary emendation of *S. laeviceps*).
Scolia (*Scolia*) *laeviceps* – Betrem 1928: 265.

Material examined.

CHINA – **Hong Kong** • 1 ♂; Lau Fau Shan; Jun. 1970; A. Sommerville leg; HKBM.

Description

Male

Standard ratios (n = 1). L: 13.5 mm; CR: 1.03; OOR: 0.74; CLR: 0.61; MER: 1.31; OMR: 0.98; FRR: 2.04; MSR: 0.78; TER: 1.64.

Head. Head largely sparsely punctate to impunctate except frontal spatium densely punctate (Figs 18E, 22E); frontal spatium well defined posteriorly; frontal fissura present from anterior of frontal spatium to anterior ocellus.

Mesosoma. Dorsum of mesosoma mostly densely punctate (Fig. 26E) except dorsolateral area of propodeum broadly impunctate anteriorly (Fig. 30E). Mesopleuron densely punctate medially, broadly impunctate anteriorly and posteriorly; metapleuron largely impunctate; lateral panel of propodeum moderately punctate. Metasoma with weak division between anterior and ventral faces of S2 in lateral view (Fig. 34E); tergites densely punctate (Fig. 38E). Scutellum and metanotum without median longitudinal carina (Fig. 30E). Dorso-median area of propodeum without distinct tubercule medially (Fig. 30E).

Metasoma. Metasoma with moderately strong angle between anterior and ventral faces of S2 in lateral view (Fig. 38E); tergites uniformely punctate, punctures separated by a little more than their own diameter. T2 without basal elevation (gradulus) (Fig. 38E).

Wings. Fore wing with two submarginal cells and one recurrent vein. Anterior half of fore wings with short setae.

Colour and vestiture. Integument entirely black (Figs 10E, 14E). Vestiture on head white; on mesosoma and metasoma black. Wings dark brown with purple reflections.

Genitalia. Not dissected, collection specimen (HKBM).

Distribution (Fig. 3A–B)

China (Guangdong, Hainan, Hong Kong); India (Sikkim); Myanmar (Tenasserim); Thailand. [Smith 1855; Betrem 1928; Gupta & Jonathan 2003; Liu *et al.* 2021b].

Notes

We have not seen a female of this species but a description is provided by Gupta & Jonathan (2003); it is very similar in appearance to the male but has dense white setae on the scapulae. To date, this small species is the only entirely black scoliid (*Scolia*) known from Hong Kong.

Scolia* (*Discolia*) *pakshaoensis sp. nov.
urn:lsid:zoobank.org:act:F74C96DE-B8E5-4D04-AA3B-7E8CB7922620
Figs 3A–B, 5B, 6, 8D, 10F, 12D, 14F, 16D, 18F, 20D, 22F, 24D, 26F, 28D, 30F, 32D, 34F, 36D, 38F, 39L, 40L, 41L, 42L

Diagnosis

Female

This species can be differentiated from other black bodied and red headed scoliids, including *Scolia rugifrons* Betrem, 1928 with which it is probably closely allied, by its entirely black antennae, including scape; clypeus with large punctures medially; frontal spatium with large punctures, frontal fissura short; mesoscutum uniformly punctured, lacking the distinct impunctate V-shaped area posteriorly; metanotum with large and uniform punctures; mesopleuron and metapleuron with extensive deep punctures; sternites punctured uniformly except first sternite which is smooth centrally and bears large punctures laterally. The male is almost identical to the female.

Etymology

The specific name refers to the type locality.

Material examined

Holotype

CHINA – **Hong Kong** • 1 ♀; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 7–13 Jun. 2004; C. Barthélémy leg.; Malaise trap, ref.: M018.C.Hy.18; CAS.

Paratype

CHINA – Hong Kong • 1 ♂; same collection data as for holotype; 14–31 May 2009; C. Barthélémy leg.; Malaise trap, ref.: M062.C.Hy.4; CBC.

Description

Female

Standard ratios (n = 1). L: 14.5 mm; CR: 1.16; OOR: 0.83; CLR: 0.33; MER: 1.22; OMR: 1.07; FRR: 2.0; MSR: 0.78; TER: 1.61.

Head. Clypeus impunctate medially densely punctate laterally and along anterior margin; frontal area sparsely punctate medially, densely punctate laterally; scrobe densely punctate; frons sparsely punctate medially, largely impunctate laterally (Fig. 16D); vertex largely impunctate, moderately punctate in rear of declivous portion (Fig. 20D); frontal spatium not defined posteriorly; frontal fissura mostly obsolete except for short length on frontal spatium (Fig. 16D); ocelli slightly depressed with depressed area extending laterally from posterior ocellus about half of distance to eye (Fig. 16D).

Mesosoma. Dorsum of mesosoma deeply punctate; dorsum of pronotum densely punctate without distinct impunctate posterior margin, punctures becoming more widely spaced anterior to tegula (Fig. 24D); mesoscutum densely punctate, punctures becoming subcontiguous near posterior margin, less densely punctate outside parapsides (Figs 24D, 28D); tegulae punctate near anterior and inner margins, otherwise impunctate; scutellum densely punctate anteriorly, more widely punctate in posterior half; metanotum moderately punctate medially, densely punctate laterally (Fig. 24D); propodeum densely punctate on dorsomedial area and on posterior declivity, more sparsely punctate on dorsolateral area (Fig. 28D). Pronotal callosity sparsely punctate; mesopleuron mostly densely punctate, sparsely punctate on dorsal crest, with impunctate areas anteriorly and posteriorly; upper panel of metapleuron densely punctate posterodorsally, impunctate anterolaterally; lower panel of metapleuron impunctate dorsally, with shallow, effaced punctures ventrally; lateral panel of propodeum moderately punctate (Fig. 8D). Scutellum and metanotum without median longitudinal carina (Fig. 28D). Dorso-median area of propodeum without distinct tubercule medially (Fig. 28D).

Metasoma. S1 with strong median tubercle anteriorly (Fig. 32D); S2 weakly bulging anteriorly with weak transition between anterior and ventral faces in lateral view (Fig. 32D); tergites each uniformly moderately punctate, becoming more densely punctate on apical tergites (Figs 32D, 36D), without differentiation of punctures towards posterior margin of tergite. T2 with basal elevation distinct (gradulus) (Fig. 36D).

Wings. Fore wing with two submarginal cells and one recurrent vein. Fore wing with costal, first submarginal and marginal cells with short setae.

Colour and vestiture. Head red on frons, vertex except for spot around ocellar triangle, and behind upper lobe of eye (Figs 16D, 20D); remainder of body black (becoming reddish distally on each tarsal segment) (Fig. 8D). Vestiture brown on head, absent on frons and vertex, black on mesosoma and metasoma. Wings dark brown with bronze reflections.

Male

Standard ratios (n = 1). Genitalia were dissected and total length not acquired; CR: 1.13; OOR: 1.27; CLR: 0.58; MER: 1.30; OMR: 0.96; FRR: 1.74; MSR: 0.79; TER: 1.80.

Head. As for female, except head moderately punctate on clypeus, frons and vertex, punctures on frons and vertex relatively shallow, giving head a wrinkled appearance (Figs 18F, 22F).

Mesosoma. As for female, except lower panel of metapleuron and lateral panel of propodeum more densely punctate than in female.

Metasoma. As for female, but T2 without basal elevation (gradulus) (Fig. 38F).

Wings. Same as female but fore wing uniformly covered in short setae

Genitalia. Ventral side of paramere sparsely setose (Fig. 40L), dorsal side with dense long setae on most of its surface (Fig. 39L); volsella with sparse setae apically, cuspis volsellaris with a cluster of short hairs apically and a row/cluster of long hairs basally (Fig. 42L); volsella bearing a few sensory cones on its external margin, acute apically and with no lamella (Figs 39L, 42L). External margin of paramere angled medially, rounded apically (Figs 39L, 40L); aedeagus with nine teeth (Fig. 42L), serrated margin convex apically, straight medially and subconcave basally (Fig. 42L).

Notes

This species is very similar to *S. rugifrons* Betrem, 1928 of northeastern India and Myanmar from which it may be distinguished by the features described above. Among other species previously recorded from China (Liu *et al.* 2021a, 2021b), it comes closest to *S. laeviceps* from which it is readily distinguished by its red frons.

Scolia* (*Discolia*) *superciliaris de Saussure & Sichel, 1864
Figs 3A–B, 8E, 10G, 12E, 14G, 16E, 18G, 20E, 22G, 24E, 26G, 28E, 30G, 32E, 34G, 36E, 38G, 39M, 40M, 41M, 42M

Scolia (*Discolia*) *superciliaris* de Saussure & Sichel, 1864: 322 (holotype ZMB, ♂, type locality = Shanghai, China).
Scolia (*Scolia*) *sauteri* Betrem, 1928: 277 (holotype ♀, type locality = Dalin, Taiwan).
Scolia (*Scolia*) *sauteri staudingeri* Betrem, 1928: 278 (holotype ♀, type locality = Assam).
Scolia (*Scolia*) *sauteri kreyenbergensis* Betrem, 1941: 137 (nomen nudum).

Scolia (*Scolia*) *superciliaris* – Betrem 1941: 136.
Scolia (*Scolia*) *superciliaris sauteri* – Betrem 1941: 137.

Material examined

CHINA – **Hong Kong** • 1 ♀; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 12–28 Jul. 2014; C. Barthélémy leg.; Malaise trap, ref.: PSO-M167.C.Hy.2; CBC • 1 ♂; Tai Tam; 22°14′45” N, 114°13′23″ E; 28 Jun.–12 Jul. 2018; Malaise trap; C. Taylor and Cheung Shun Chi leg.; HKBM • 1 ♀; no locality or date; ref.: IIE 21973, CSK, Lau leg.; TLFES • 1 ♂; Kwan Tei; 22°30′40″ N, 114°09′33″ E; alt. 15 m; 27 Jun. 2007; C. Barthélémy leg.; hand net, ref.: 0265.U.Hy.5; CBC • 1 ♂; Pak Sha O; 22°26′59″ N, 114°19′04″ E; alt. 70 m; 29 Jun.–6 Jul. 2008; C. Barthélémy leg.; Malaise trap, ref.: M048.C.Hy.4; CBC • 1 ♂; same collection data as for preceding; 31 May–6 Jun. 2004; C. Barthélémy leg.; Malaise trap, ref.: M017.C.Hy.19; CBC • 1 ♂; Ping Shan Chai; 22°29′14″ N, 114°11′06″ E; alt. 140 m; C. Barthélémy leg.; Malaise trap, ref.: M044.A.Hy.3; CBC.

Description

Female

Standard ratios (n = 1). L: 21.5 mm; CR: 1.19; OOR: 0.61; CLR: 0.41; MER: 1.27; OMR: 1.04; FRR: 2.02; MSR: 0.77; TER: 1.60.

Head. Head mostly impunctate except on frontal lamina and scrobe; frontal spatium not well defined dorsally (Figs 16E, 20E); frontal fissura present from anterior of frontal spatium to anterior ocellus (Fig. 16E).

Mesosoma. Dorsum of mesosoma densely and strongly punctate on scapula, mesoscutum (slightly less so dorsomedially on disc) and scutellum (Fig. 24E); metanotum mostly sparsely punctate, punctures on median area (Fig. 28E); dorsum of propodeum with numerous but small punctures, many of them separated by more than their own diameter (Fig. 28E). Mesopleuron densely punctate medially, broadly impunctate posteriorly and laterally; upper panel of metapleuron densely punctate dorsally, impunctate ventrally; lower panel of metapleuron with numerous faint punctures mostly effaced by vestiture; lateral panel of pronotum sparsely, minutely punctate. Scutellum and metanotum without median longitudinal carina (Fig. 28E). Dorso-median area of propodeum without distinct tubercule medially (Fig. 28E).

Metasoma. Metasoma with weak division between anterior and ventral faces of S2 in lateral view (Fig. 32E); tergites mostly uniformly but not very densely punctate, T2 with paired round impunctate areas laterally (Figs 32E, 36E). T2 without basal elevation (gradulus) (Fig. 36E).

Wings. Fore wing with two submarginal cells and one recurrent vein. Costal, first submarginal and marginal cells with short setae.

Colour and vestiture. Head red on antennae, frons above frontal spatium, vertex except for ocellar triangle, and behind upper lobe of eye (Figs 16E, 20E); remainder of body black (Fig. 8E). Vestiture pale on front of head (albeit almost absent above frontal spatium), darker brown on occiput, black on mesosoma and metasoma with dense, appressed, white pile present posterolaterally on mesosoma. Wings dark brown with purple reflections.

Male

Standard ratios (n = 4). L: 14.8–18.0 mm (mean = 16.9 mm); CR: 1.07–1.13 (mean = 1.10); OOR: 1.62–1.83 (mean = 1.71); CLR: 0.61–0.76 (mean = 0.67); MER: 1.27–1.33 (mean = 1.30); OMR: 0.93–1.03 (mean = 0.97); FRR: 1.73–2.04 (mean = 1.86); MSR: 0.79–0.85 (mean = 0.82); TER: 1.45–1.54 (mean = 1.50).

Head. Head densely punctate on frontal area and spatium, frons and vertex moderately but shallowly punctate (Figs 18G, 22G).

Mesosoma. Dorsum of mesosoma more or less densely punctate, punctures becoming sparser and/or shallower on dorsum of propodeum (Fig. 26G). Lateral panels of mesosoma as for female. Scutellum and metanotum without median longitudinal carina (Fig. 30G). Dorso-median area of propodeum without distinct tubercule medially (Fig. 30G).

Metasoma. Metasoma with weak division between anterior and ventral faces of S2 in lateral view (Fig. 33G); tergites uniformly and densely punctate (Figs 34G, 38G). T2 without basal elevation (gradulus) (Fig. 38G).

Wings. Same as female.

Colour and vestiture. Antennal flagellum brown/red to varying extent (Fig. 10G); head yellow on frons above frontal spatium, vertex except spot of varying size around ocellar triangle, and behind upper lobe of eye (Figs 18G, 22G); remainder of body black. Vestiture pale (whitish or yellow) on head, mesosoma and T1–T3 with black apical fringe on T4–T6 (Fig. 10G). Wings dark brown with bronze reflections.

Genitalia. Ventral side of paramere sparsely setose (Fig. 40M), dorsal side with sparse long setae on most of its surface (Fig. 39M); volsella with a few long setae apically, cuspis volsellaris with a few hairs apically and a row/cluster of long hairs basally (Fig. 42M); volsella bearing sparse sensory cones on its external margin and a very narrow lamella on its internal margin (Figs 39M, 40M). External margin of paramere subparallel, rounded apically (Figs 39M, 40M); aedeagus with nine teeth, the last apical one much reduced (Fig. 42M), serrated margin straight and sharply flattened apically (Fig. 42M).

Distribution (Fig. 3A–B)

China (Fujian, *Hong Kong, Hunan, Guangdong, Shandong, Shanxi, Jiangsu, Jiangxi, Taiwan, Zhejiang); Vietnam (South); India (Assam, Meghalaya, Uttarakhand); Nepal; Vietnam; Thailand, Myanmar. [Betrem 1928, 1941; Wang 1992; Gupta & Jonathan 2003; TIGER project 2008; Liu *et al.* 2021b].

Notes

This species is most reliably distinguished in Hong Kong by the punctation on the dorsomedian area of the propodeum which is notably faint and/or sparse when compared to other *Scolia* species. The uniform absence of red coloration on the mesosoma and metasoma may also distinguish it from *Sc. binotata* and *Sc. clypeata*. The female of *Sc. superciliaris* is also much larger than other *Scolia* females we have seen from the region. Subspecies of *Sc. superciliaris* have been distinguished on the basis of the amount of red vs black coloration on the male antennae (Chinese *Sc. s. superciliaris* is supposed to have the antennae almost entirely black), but Hong Kong specimens range from having the flagellum almost entirely black to almost entirely red. Recognition of separate subspecies is therefore probably not warranted.

Identification key

Their striking appearance has made scoliids a popular subject for photographers, both amateur and professional. With this in mind, we have attempted to arrange this key with a focus on features likely to be visible in photographs of live specimens. Unfortunately, this has not always been feasible; some species will simply not be readily distinguishable without close examination under a microscope. Groups of particular concern in this regard include the red-fronted *Scolia* species (*Sc. clypeata*, *Sc. superciliaris*, *Sc. pakshaoensis* sp. nov. and some colour variants of *Sc. binotata* Fabricius, 1804 as well as *Carinoscolia junnanensis* (Betrem, 1928)) and male Campsomerini.

Photographs taken in Hong Kong and uploaded to the iNaturalist website (www.inaturalist.org/observations/42073499; www.inaturalist.org/observations/42444275; and, www.inaturalist.org/observations/72987049) show an unidentified species of *Scolia*. It may be *Sc. formosicola* Betrem, 1928 but confirmation of identity would require examination of specimens. It should be distinguishable from other scoliids in the region by its coloration: T2 mostly yellow with the remainder of the body predominantly black. Another photograph uploaded on the same website (https://www.inaturalist.org/observations/73932862) shows a male *Scolia* that we have not examined, it comes closest to *Sc. clypeata pseudovollenhoveni* Betrem, 1933 but confirmation would also require examination of specimens.

1. Fore wing with one recurrent vein or with second recurrent vein merging with first before reaching submarginal cell (Fig. 5F); mesopleural crest directed towards fore wing and forming distinct large horizontal area dorsally; fore wing invariably dark with bronze or purple reflections; metasoma always lacking transverse apical yellow bands on tergites (brighter coloration, if present, as lateral spots or covering most of tergite[s]) ..... 2, **Scoliini** Latreille, 1802
– Fore wing with two recurrent veins reaching submarginal cell (Fig 5E); mesopleural crest directed towards posterior corner of pronotum and not forming large horizontal area dorsally; fore wing often pale yellowish or hyaline, more rarely dark; metasoma with or without prominent yellow bands .... 15, **Campsomerini** Betrem, 1972

2. Fore wing with two discal cells (1M and 2M) (Fig. 5F) .....***Liacos erythrosoma*** (Burmeister, 1854)
– Fore wing with one discal cell (1M) 3

3. Forewing with three submarginal cells (Fig. 5F) 4
– Forewing with two submarginal cells (Fig. 5E) 5

4. Large wasp (30–36 mm in females, 25–26 mm in males), T1 with a conspicuous tubercule before slope (Fig. 35H); apical metasomal tergites red (T1 always black), with prominent fringes of dense orange/red setae (Figs 7H, 10C) .....***Megascolia azurea*** (Christ, 1791)
– Smaller wasp (23 mm max. in females, no males recorded), tubercule on T1 much reduced (Fig. 35E); metasomal tergites entirely black, with apical tergites fringed with short black setae (Fig. 7E) .... ***Austroscolia ruficeps*** (Smith, 1855)

5. Males, antenna with 13 segments; metasoma with seven visible tergites 6
– Females, antenna with 12 segments; metasoma with six visible tergites 11

6. Frons with transverse ridge (carina) basad from mid ocellus (Figs 18A, 22A) ....***Carinoscolia junnanensis*** (Betrem, 1928)
– Frons without transverse ridge (carina) basad from mid ocellus ..... 7, ***Scolia*** Fabricius, 1775

7. Medial area of mesoscutum with punctures separated by their own diameter or more (Fig. 26D) ....***Sc. binotata*** Fabricius, 1804
– Medial area of mesoscutum with punctures denser, mostly separated by less than their own diameter (Fig. 26E–G) 8

8. Scapulae marked with red; T1–T3 with differentiated band of much smaller, finer punctation posteriorly (Fig. 36C) ..... ***Sc. clypeata pseudovollenhoveni*** Betrem, 1933
– Mesosoma entirely black; T1–T3 without clear posterior band of differentiated punctation 9

9. Dorsomedian area of propodeum with a few punctures, diameter of punctures much smaller than the distance between them (Fig. 28E) .....***Sc. superciliaris*** de Saussure & Sichel, 1864
– Dorsomedian area of propodeum with heavy punctures, diameter of punctures greater than the distance between them (Fig. 28D) 10

10. Frons with scattered punctures medially; frontal fissura short, stopping at level with dorsal end of frontal lamina (Fig. 16D); frons and vertex mostly red/orange .....***Sc. pakshaoensis*** sp. nov.
– Frons impunctate except for few punctures around ocelli; frontal fissura well developed, extending to anterior ocellus; head entirely black .....***Sc. laeviceps*** Smith, 1855

11. Frons and vertex with numerous large punctures mostly separated by less than their own diameter (Figs 15F, 19F); head red/orange except clypeus, ocular sinuses, frontal area and large maculae over ocellar triangle reaching eye .....***Carinoscolia junnanensis*** (Betrem, 1928)
– Frons and/or vertex mostly sparsely punctured with broad areas impunctate or with punctures separated by more than their own diameter (Fig. 16A–E); head black or variously red/orange .... 12, ***Scolia*** Fabricius, 1775

12. Disc of clypeus red (Fig. 16C); T2–T3 with small orange maculae mediolaterally (Fig. 36C); scapulae orange/red (Fig. 24C); vertex, pronotum, anterior part of mesopleuron and dorsal part of femurs bearing dense erect yellow/orange setae (Fig. 8C); T1–T3 with differentiated band of much smaller, finer punctation posteriorly (Fig. 36C) ..... ***Sc. clypeata pseudovollenhoveni*** Betrem, 1933
– Clypeus entirely black (Fig. 16A–B, D–E); T2–T3 without orange maculae; scapulae black; vestiture variable in length and density but always black; T1–T3 without clear posterior band of differentiated punctation 13

13. Medial area of mesoscutum broadly impunctate (Fig. 24A) .....***Sc. binotata*** Fabricius, 1804
– Medial area of mesoscutum with punctures separated by their own diameter or less 14

14. Dorsomedian area of propodeum with weak, shallow punctures, punctures well separated from each other (Fig. 30G) .....***Sc. superciliaris*** de Saussure & Sichel, 1864
– Dorsomedian area of propodeum with strong, deep punctures, edges of many punctures closely abutting (Fig. 30E–F) 15

15. Frontal fissura short, stopping at level with dorsal end of frontal lamina (Fig. 18F); disc of clypeus uniformly punctate, punctures separated by less than their own diameter; frons and vertex mostly red/orange ..... ***Sc. pakshaoensis*** sp. nov.
– Frontal fissura well developed, extending to anterior ocellus; disc of clypeus sparsely punctate, punctures separated by greater than their own diameter, head entirely black ..... ***Sc. laeviceps*** Smith, 1855

16. Antennae twelve-segmented, shorter than head and thorax combined, usually held in a close coil; metasoma with six visible tergites (females) 17
– Antennae thirteen-segmented, longer than head and thorax combined, usually held in long arc; metasoma with seven visible tergites (males) 22

17. Upper panel of metapleuron with uppermost dorsal section separated from lateral section by strong angle marked by a sharp carina; lateral carina of propodeum not or barely extending beyond spiracle; metasomal integument entirely black 18
– Upper panel of metapleuron with transition between uppermost dorsal section and lateral section often gradual, never marked by a sharp carina; lateral carina of propodeum extending well beyond spiracle; metasomal tergites may bear yellow spots or bands 19

18. Wings dark brown with blue or purple reflections; dense white erect setae on dorsum of pronotum; vestiture of metasoma black ..... ***Campsomeriella collaris*** (Fabricius, 1775)
– Wings yellowish basally, fore wing darker brown with purple reflections apically; sparse white setae on dorsolateral sides of pronotum; vestiture of metasoma pale ..... ***Campsomeriella annulata annulata*** (Fabricius, 1793)

19. Apical fringes of metasomal tergites 1–4 black; upper panel of metapleuron with transition between uppermost dorsal and lateral sections sharp (albeit not marked by a carina) ..... ***Sericocampsomeris*** Betrem, 1941 (see comments under *Sericocampsomeris flavomaculata*)
– Apical fringes of metasomal tergites 1–4 pale; upper panel of metapleuron with transition between uppermost dorsal and lateral sections more or less gradual 20

20. Fore wing mostly yellow with round subapical spot near anterior margin; legs with tibia and tarsi mostly reddish-brown; frons with cluster of deep punctures immediately in front of anterior ocellus (Fig 15D), mesoscutum largely punctate (small round impunctate area on disc), scutellum deeply punctate ..... ***Phalerimeris phalerata phalerata*** (de Saussure, 1858)
– Fore wing apically infuscate but said infuscation not forming round spot; legs entirely black; frons largely smooth in front of anterior ocellus, mesoscutum with large rectangular impunctate area medially, scutellum impunctate on median area 21

21. T1–T2 with evanescent lateroapical yellow bands interrupted medially, T3–T6 black (Fig. 31C) .... ***Megacampsomeris formosensis chinensis*** Betrem, 1941
– Metasoma entirely black ..... ***Megacampsomeris prismatica*** (Smith, 1855)

22. Clypeus entirely black (Fig. 17G); apical yellow bands on T1–T3 very broad laterally, medially widely interrupted on T1 and narrowing considerably on T2 and T3 (Fig. 37G) ..... ***Sericocampsomeris flavomaculata*** Gupta & Jonathan, 1989
– Clypeus in part yellow; apical yellow bands complete on T1 and T2 23

23. Head 1.17–1.18 × wider than high; anterior plate of fore coxa black 24
– Head 1.08 × wider than high; anterior plate of fore coxa yellow 25

24. Scutellum and metanotum entirely black (Figs 9B, 13B); S6 and S7 with long, dense setae forming copulatory brushes, external margin of paramere strongly angled (Fig. 39B), cuspis volsellaris with dense setae (Fig. 42B) ..... ***Campsomeriella collaris collaris*** (Fabricius, 1775)
– Scutellum and metanotum broadly marked with yellow (Figs 9A, 13A); apical sternites without copulatory brushes, external margins of paramere not strongly angled (straight) (Fig. 39A), cuspis volsellaris with sparse setae (Fig. 42A) ..... ***Campsomeriella annulata annulata*** (Fabricius, 1793)

25. Gena with distinct yellow stripe (Fig. 9F); metasoma with division between anterior and ventral faces of S2 in lateral view relatively weak .. ***Phalerimeris phalerata phalerata*** (de Saussure, 1858)
– Gena entirely black; metasoma with distinct division between anterior and ventral faces of S2 in lateral view 26

26. S2 without anteromedian tubercle; S2 and S3 with broad, medially interrupted yellow apical bands (Fig. 33D); paramere broadly ovate, outer distal margin convex (Figs 39D, 40D) .... ***Megacampsomeris formosensis chinensis*** Betrem, 1941
– S2 often with distinct anteriomedian tubercle; yellow apical bands on S2 and S3 restricted to small lateral triangles (Fig. 33E; paramere narrowly trapezoidal, outer distal margin straight to concave (Figs 39E, 40E) ..... ***Megacampsomeris prismatica*** (Smith, 1855)

Discussion

The Hong Kong fauna is relatively rich with 16 species described in this work, and we add some remarkable species to the Chinese and local fauna (e.g., *Scolia pakshaoensis*, *Carinoscolia junnanensis*, *Sericocampsomeris flavomaculata*). An additional species, that is close to *Scolia formosicola*; posted on i-Naturalist website is pending the obtention of a specimen(s) for positive identification. In addition, the status of *Megacampsomeris* sp. 1 remains uncertain as we have only collected one male specimen that nevertheless differs substantially from the known representatives of the genus.

While some species are extremely common (e.g., *Phalerimeris phalerata* or *Sc. superciliaris*), many others are rarely seen or found (e.g., *Car. junnanensis*, *Sc. pakshaoensis*). Among the material examined for this study, two species are represented by females only (*A. ruficeps* and *Sc. clypeata pseudovollenhoveni*) and four only by males (*Megacampsomeris* sp. 1, *Megacamp. prismatica*, *Sericocampsomeris flavomaculata* and *Sc. laeviceps*). It is possible that our use of Malaise traps as the primary means of collection may have biased our sample towards males. Females often remain closer to the ground while searching for potential hosts and may avoid above-ground trapping.

Many of the scoliid species found in Hong Kong, including those most commonly collected, are widespread in eastern and southern Asia. Of interest, however, is the presence of a number of species (*Sericocampsomeris flavomaculata*, *Carinoscolia junnanensis*, *Scolia pakshaoensis*) with more distinctly 'northern Oriental' range, either being found or closely related to species found in a more restricted band over northern India and southern China.

Liu *et al.* (2021b) list a number of species of Scoliidae found in neighbouring regions of China that may yet prove to occur in Hong Kong. Notable among these is *Micromeriella marginella* (Klug, 1810), representing a genus as yet unknown in the Hong Kong SAR. Further investigation of the Hong Kong scoliid fauna is doubtless required.

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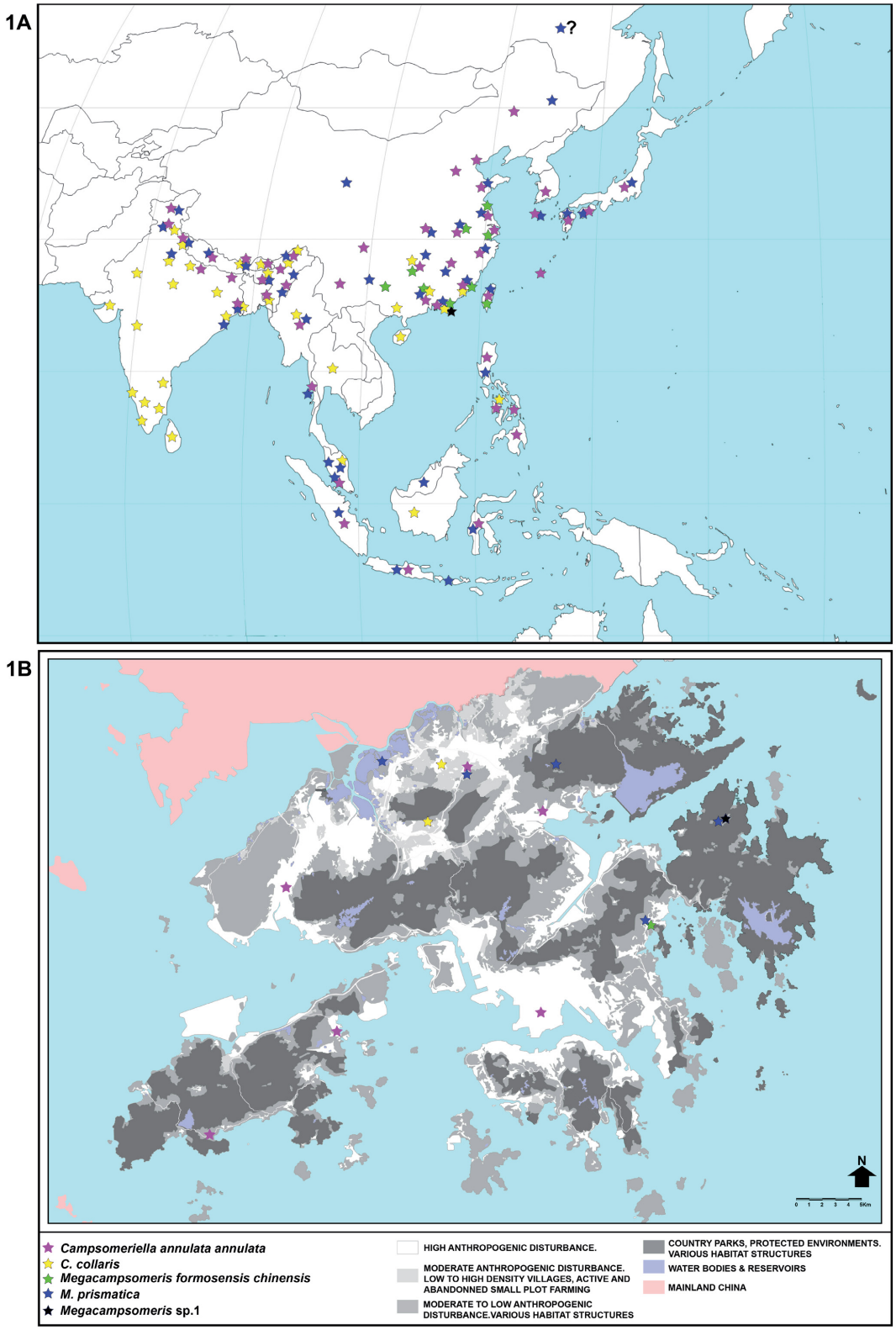

Fig. 1. Distribution of four species in the tribe Campsomerini Bartlett, 1912: *Campsomeriella annulata annulata* (Fabricius, 1793), *Camps. collaris* (Fabricius, 1775), *Megacampsomeris formosensis chinensis* Betrem, 1941, *Megacam. prismatica* (Smith, 1855) and *Megacampsomeris* sp. 1. **A**. World distribution. **B**. Hong Kong distribution.

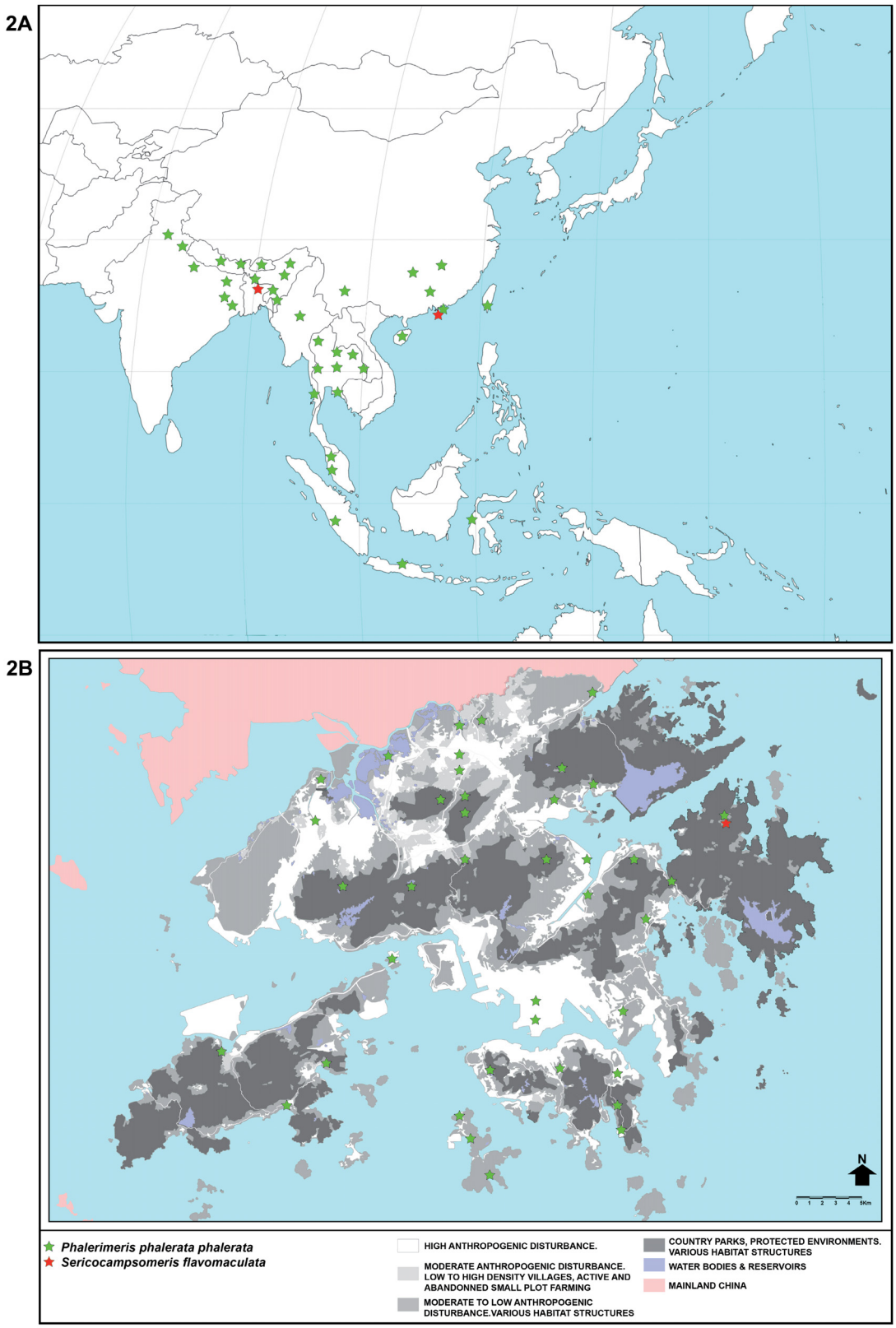

Fig. 2. Distribution of two species in the tribe Campsomerini Bartlett, 1912: *Phalerimeris phalerata phalerata* (de Saussure, 1858) and *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989. **A**. World distribution. **B**. Hong Kong distribution.

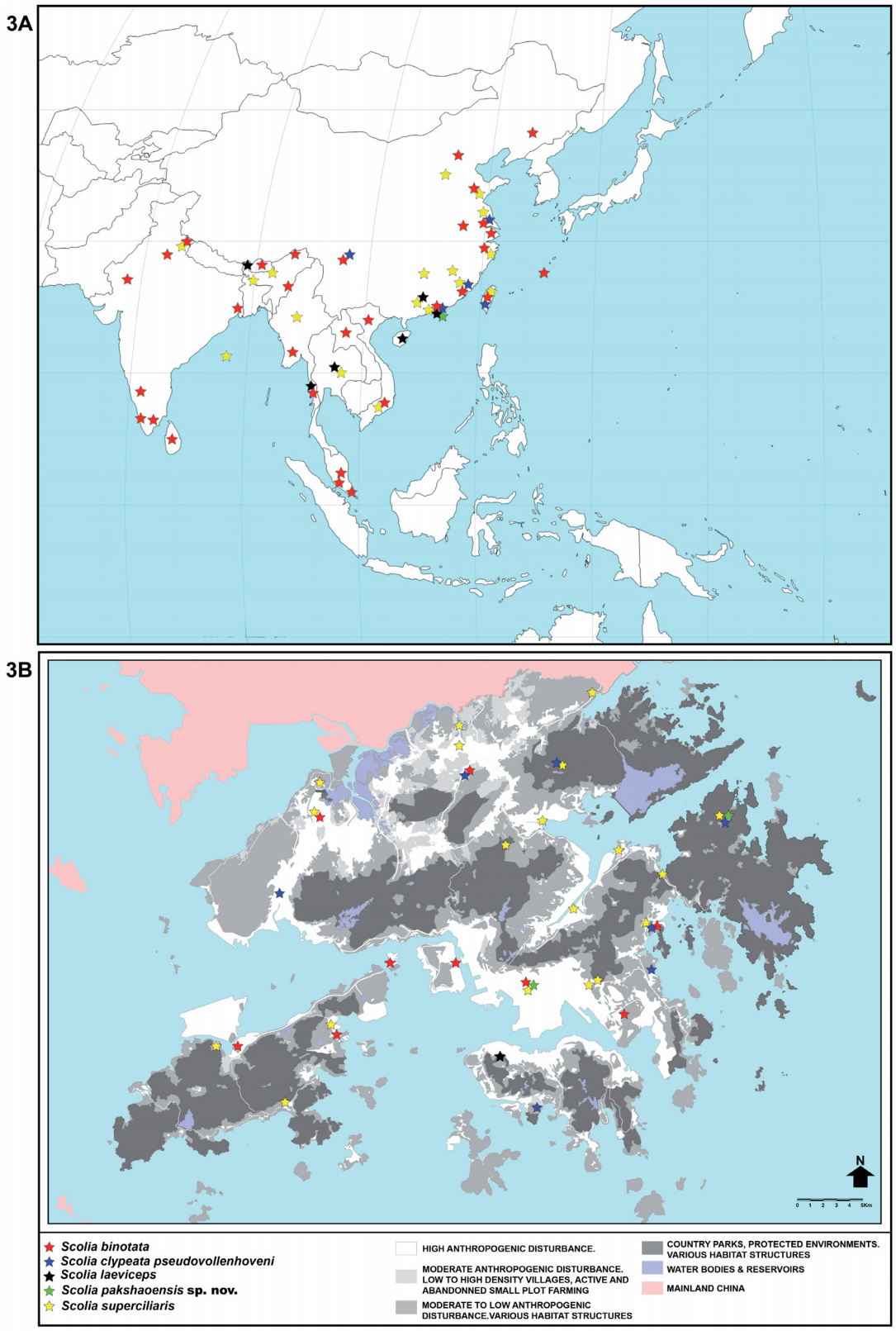

Fig. 3. Distribution of five species of *Scolia* Fabricius, 1775: *Sc. binotata* Fabricius, 1804, *Sc. clypeata pseudovollenhoveni* Betrem, 1933, *Sc. laeviceps* Smith, 1855, *Sc. pakshaoensis* sp. nov. and *Sc. superciliaris* de Saussure & Sichel, 1864. **A**. World distribution. **B**. Hong Kong distribution.

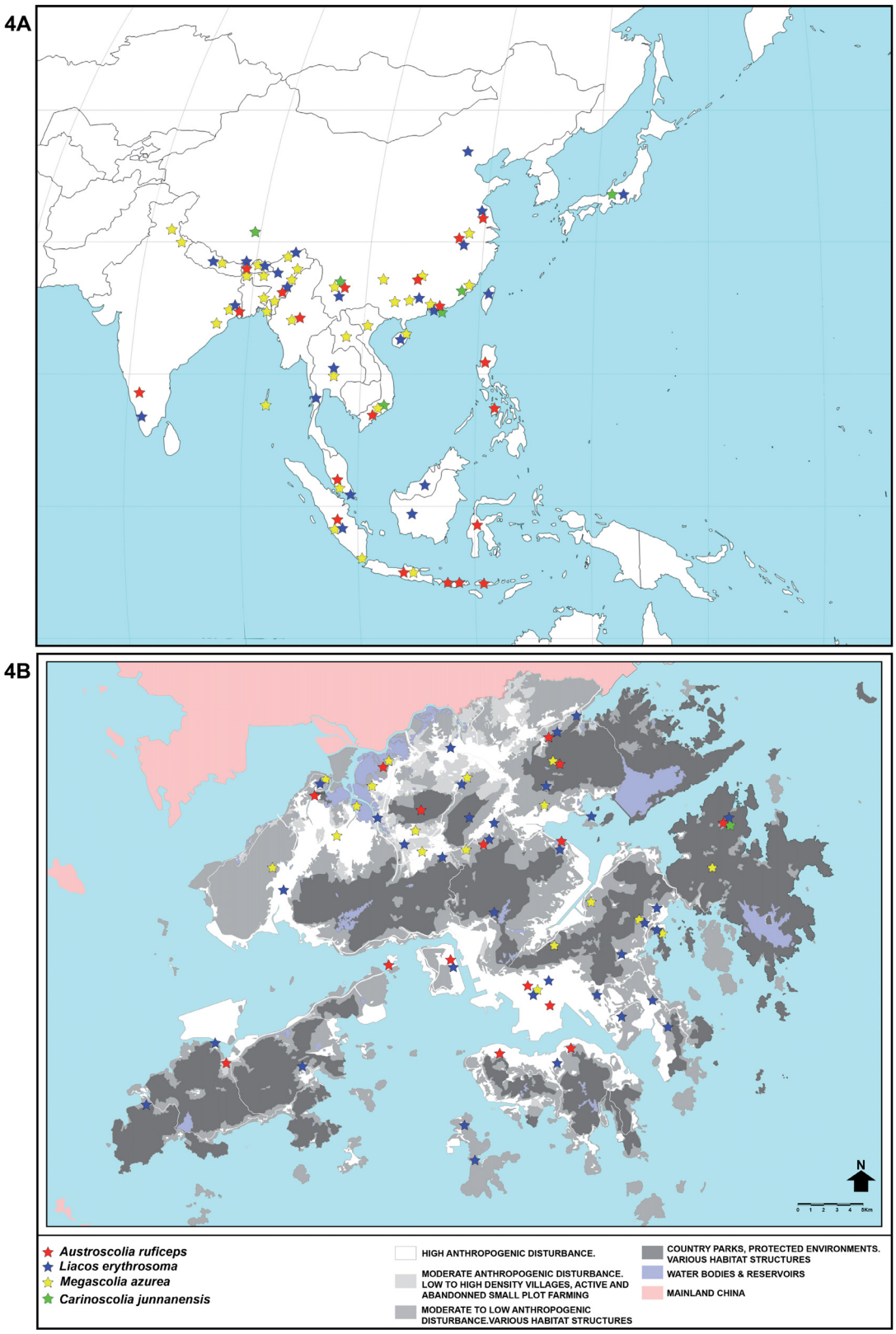

Fig. 4. Distribution of three species in the tribe Scoliini Latreille, 1802: *Austroscolia ruficeps* (Smith, 1855), *Liacos erythrosoma* (Burmeister, 1854), *Megascolia azurea* (Christ, 1791) and *Carinoscolia junnanensis* (Betrem, 1928). **A**. World distribution. **B**. Hong Kong distribution.

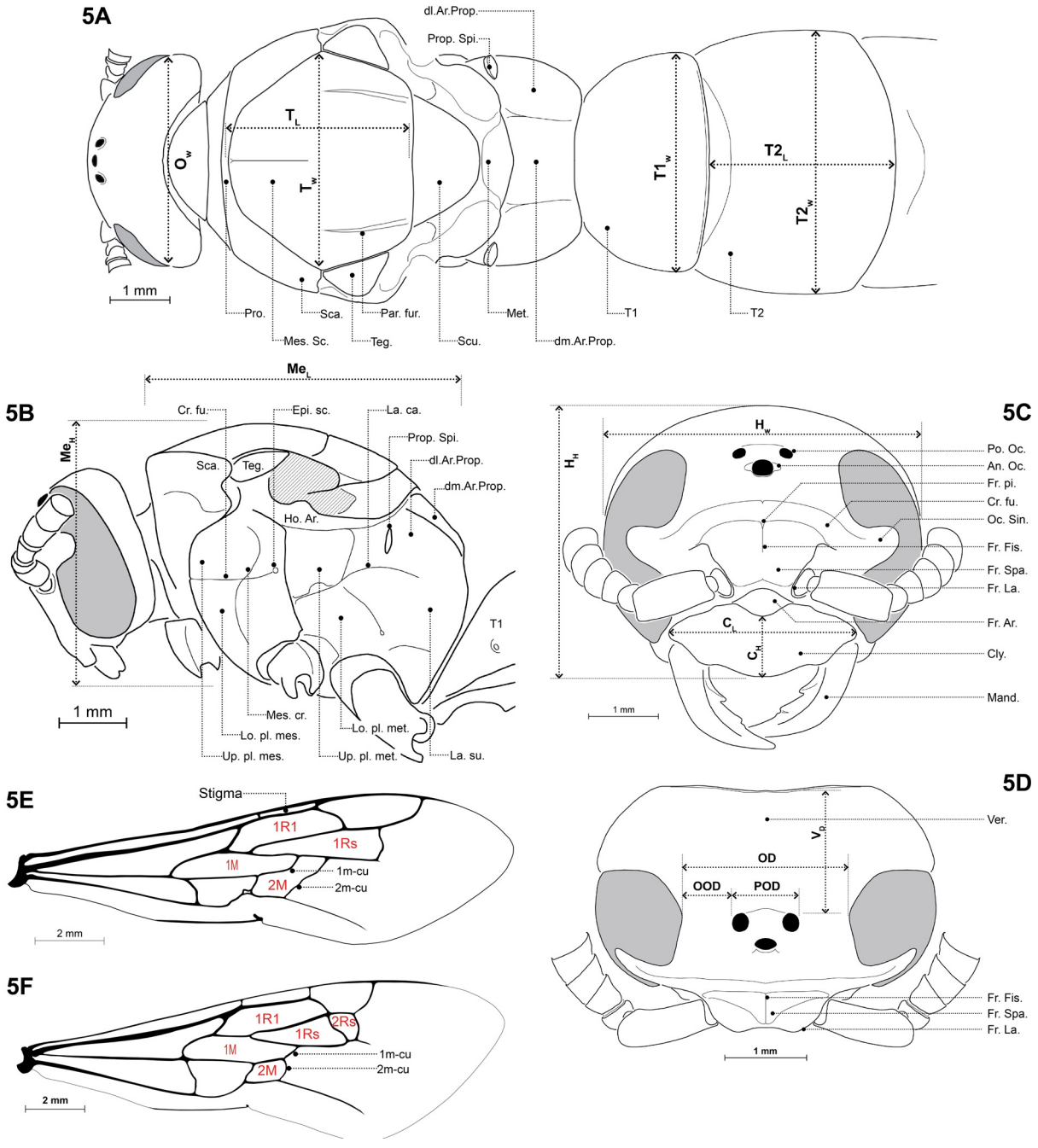
5A
dl.Ar.Prop.
Prop. Spi.
T_L
O_W
T_W
$T1_W$
$T2_L$
$T2_W$
1 mm
Pro.
Sca.
Par. fur.
Met.
T1
T2
Mes. Sc.
Teg.
Scu.
dm.Ar.Prop.
5B
Me_L
Cr. fu.
Epi. sc.
La. ca.
Me_H
Prop. Spi.
Sca.
Teg.
dl.Ar.Prop.
dm.Ar.Prop.
Ho. Ar.
T1
1 mm
Mes. cr.
Lo. pl. mes.
Lo. pl. met.
Up. pl. mes.
Up. pl. met.
La. su.
5C
H_W
H_H
Po. Oc.
An. Oc.
Fr. pi.
Cr. fu.
Oc. Sin.
Fr. Fis.
Fr. Spa.
Fr. La.
C_L
Fr. Ar.
C_H
Cly.
Mand.
1 mm
5D
Ver.
V_D
OD
OOD
POD
Fr. Fis.
Fr. Spa.
Fr. La.
1 mm
5E
Stigma
1R1
1Rs
1M
1m-cu
2M
2m-cu
2 mm
5F
1R1
2Rs
1Rs
1M
1m-cu
2M
2m-cu
2 mm

Fig. 5 (previous page). Scoliidae Latreille, 1802, measurements and morphological terms. For measurements refer to definitions in Material and methods section, body morphological terms follow Gupta & Jonathan (2003) and the wing terminology follows Goulet & Huber (1993). **A**. *Scolia clypeata pseudovollenhoveni* Betrem, 1933, ♀, dorsal view of head, mesosoma, T1 and T2. **B**. *Sc. pakshaoensis* sp. nov., paratype, ♂ (CBC), lateral view of head and mesosoma. **C**. *Liacos erythrosoma* (Burmeister, 1854), ♀, face fontal view. **D**. *L. erythrosoma*, ♀, vertex dorsal view. **E**. Fore wing cells and venation of *Megacampsomeris prismatica* (Smith, 1855), ♂. **F**. Fore wing of *L. erythrosoma*, ♂. Abbreviations: An. Oc. = Anterior ocellus; Cly. = Clypeus; Cr. fu. = Cross-furrow of mesopleuron; Cr. fu. = Frontal cross-furrow; dl. Ar.Prop. = dorso-lateral area of Propodeum; dm.Ar. Prop. = dorso-median area of Propodeum; Epi. sc. = Episternal scrobe; Fr. Ar. = Frontal area; Fr. Fis. = Frontal fissure; Fr. La. = Frontal lamina; Fr. pi. = Frontal pit; Fr. Spa. = Frontal spatium; Ho. Ar. = Horizontal area of mesopleuron; La. ca. = Lateral carina; La. su. = Lateral Surface; Lo. pl. mes. = Lower plate of mesopleuron; Lo. pl. met. = Lower plate of metapleuron; Mand. = Mandible; Mes. cr. = Mesopleural crest; Mes. sc. = Mesoscutum; Met. = Metanotum; Oc. Sin. = Ocular sinus; Par. fur. = Parapsidial furrow; Po. Oc. = Posterior ocellus; Pro. = Pronotum; Prop. Spi. = Propodeal spiracle; Sca. = Scapula; Scu. = Scutellum; T1 = Tergum 1; T2 = Tergum 2; Teg. = Tegula; Up. pl. mes. = Upper plate of mesopleuron; Up. pl. met. = Upper plate of metapleuron; Ver. = Vertex. Wing cells names: 1M = First medial (1st discal cell); 1m-cu = 1st recurrent vein; 1R1 = 1st submarginal cell; 1Rs = First radial sector (2nd submarginal); 2M = Second medial (2nd discal); 2m-cu = 2nd recurrent vein; 2Rs = Second radial sector (3rd submarginal cell).

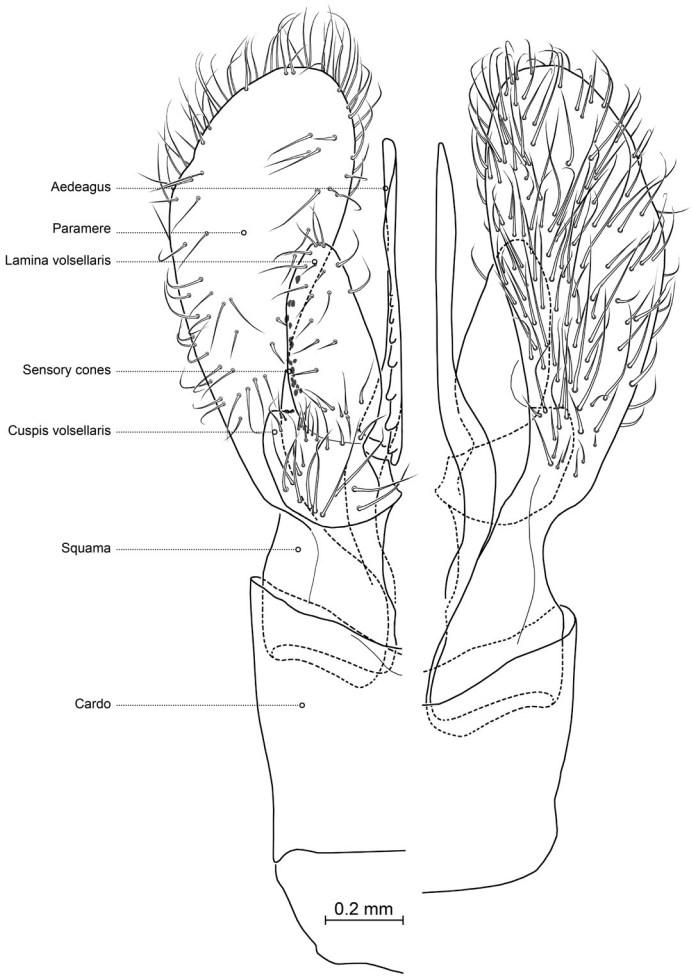

Fig. 6. *Scolia pakshaoensis* sp. nov., paratype, ♂ (CBC), genitalia. Ventral aspect at left, dorsal aspect at right.

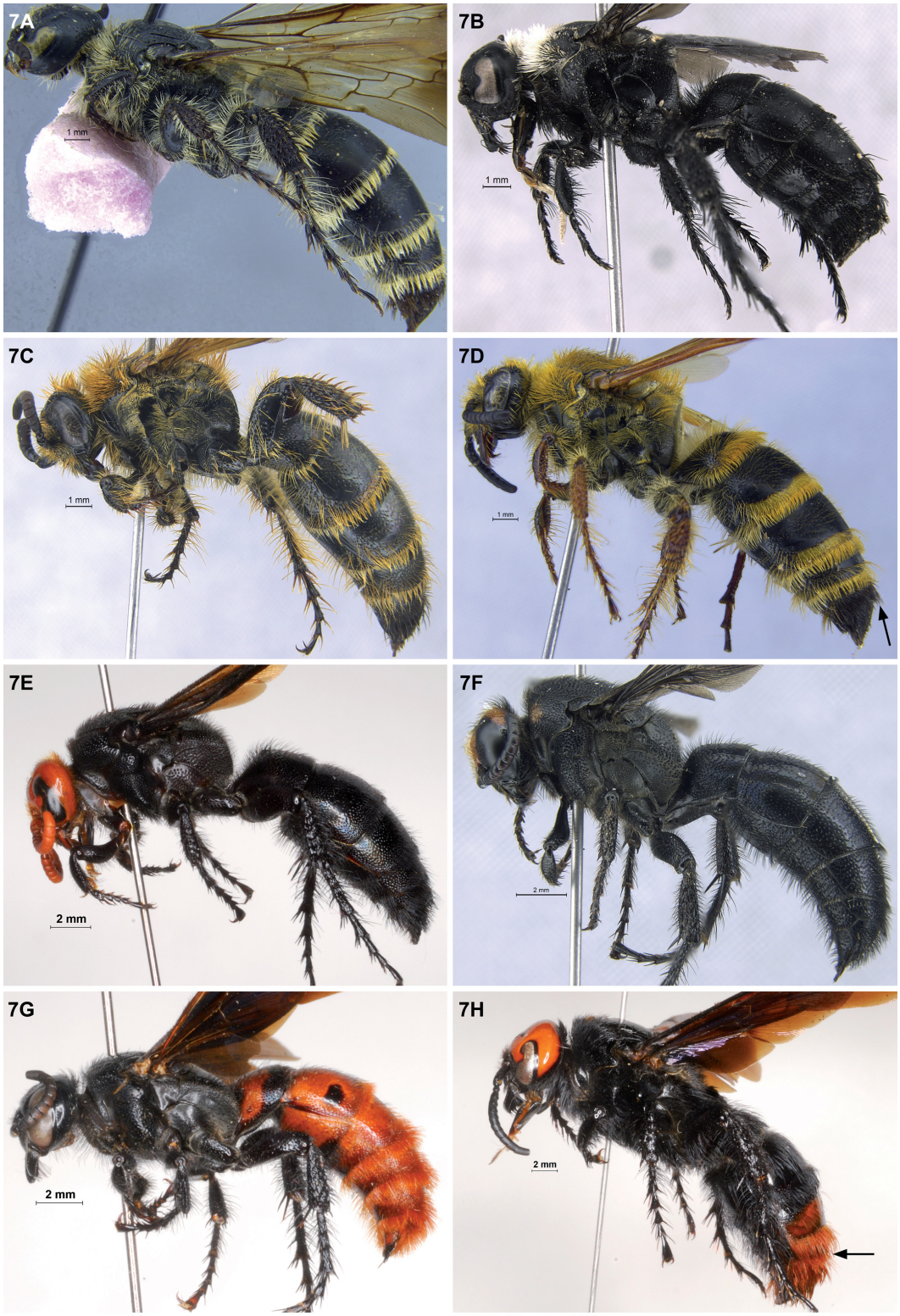

Fig. 7. Females, lateral habitus. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris formosensis chinensis* Betrem, 1941. **D**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **E**. *Austroscolia ruficeps ruficeps* (Smith, 1855). **F**. *Carinoscolia junnanensis* (Betrem, 1928). **G**. *Liacos erythrosoma* (Burmeister, 1854). **H**. *Megascolia azurea* (Christ, 1791).

Fig. 8. Females, lateral habitus. **A**. *Scolia binotata* Fabricius, 1804. **B**. *Sc. binotata* orange var. **C**. *Sc. clypeata pseudovollenhoveni* Betrem, 1933. **D**. *Sc. pakshaoensis* sp. nov., holotype (CAS) **E**. *Sc. superciliaris* de Saussure & Sichel, 1864.

Fig. 9. Males, lateral habitus. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989.

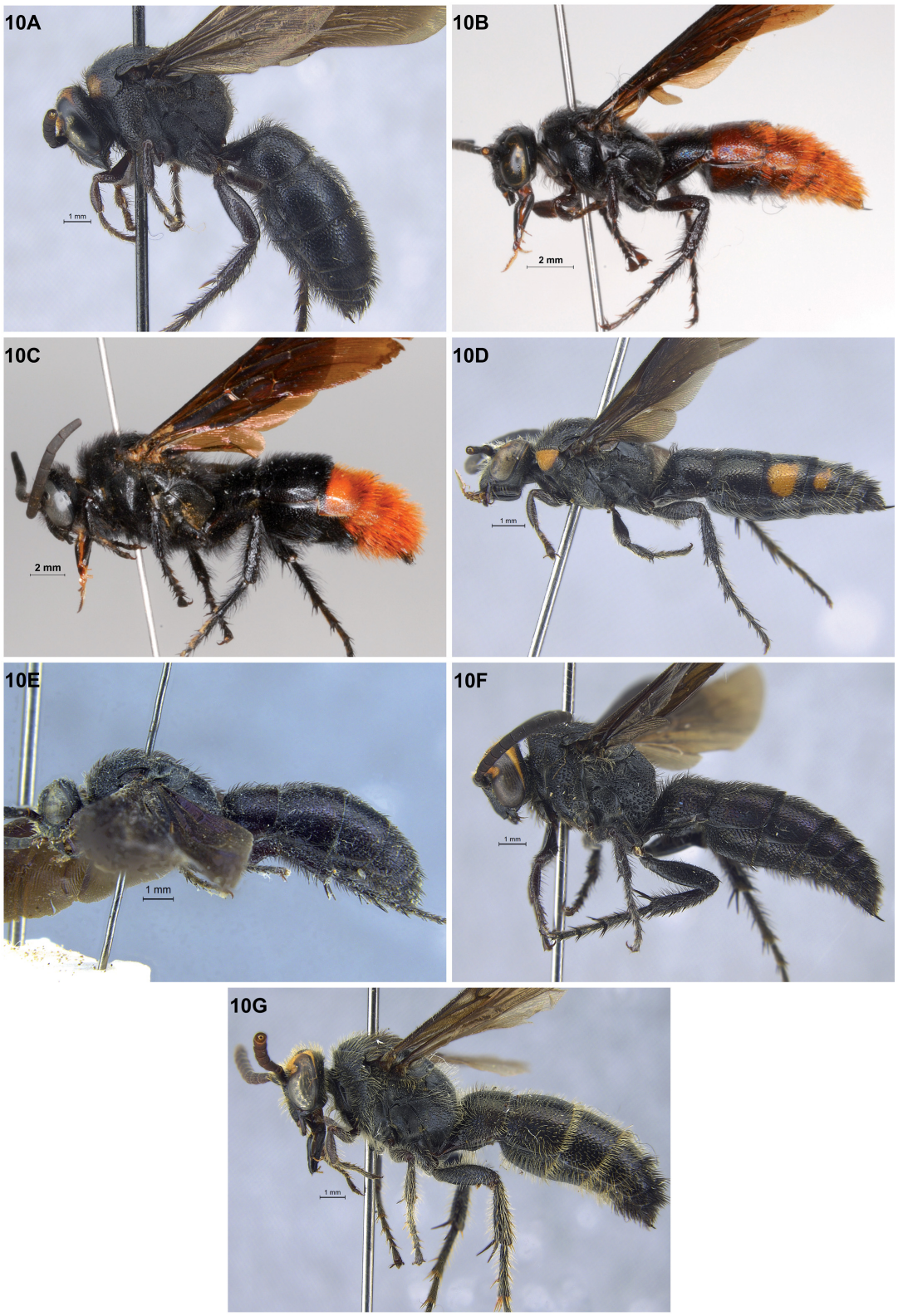

Fig. 10. Males, lateral habitus. **A**. *Carinoscolia junnanensis* (Betrem, 1928). **B**. *Liacos erythrosoma* (Burmeister, 1854). **C**. *Megascolia azurea* (Christ, 1791). **D**. *Scolia binotata* Fabricius, 1804. **E**. *Sc. laeviceps* Smith, 1855. **F**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **G**. *Sc. superciliaris* de Saussure & Sichel, 1864.

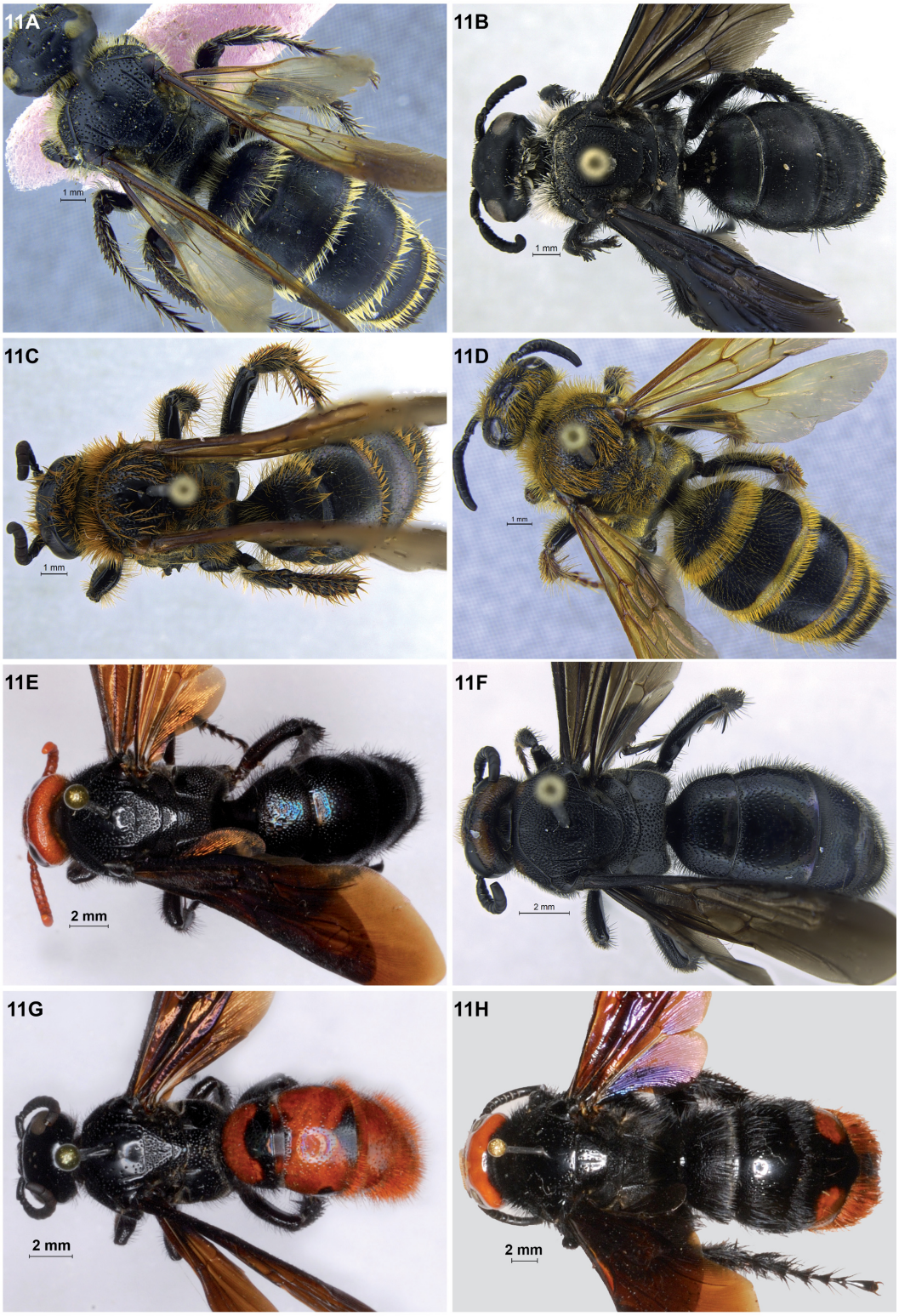

Fig. 11. Females, dorsal habitus. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris formosensis chinensis* Betrem, 1941. **D**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **E**. *Austroscolia ruficeps ruficeps* (Smith, 1855). **F**. *Carinoscolia junnanensis* (Betrem, 1928). **G**. *Liacos erythrosoma* (Burmeister, 1854). **H**. *Megascolia azurea* (Christ, 1791).

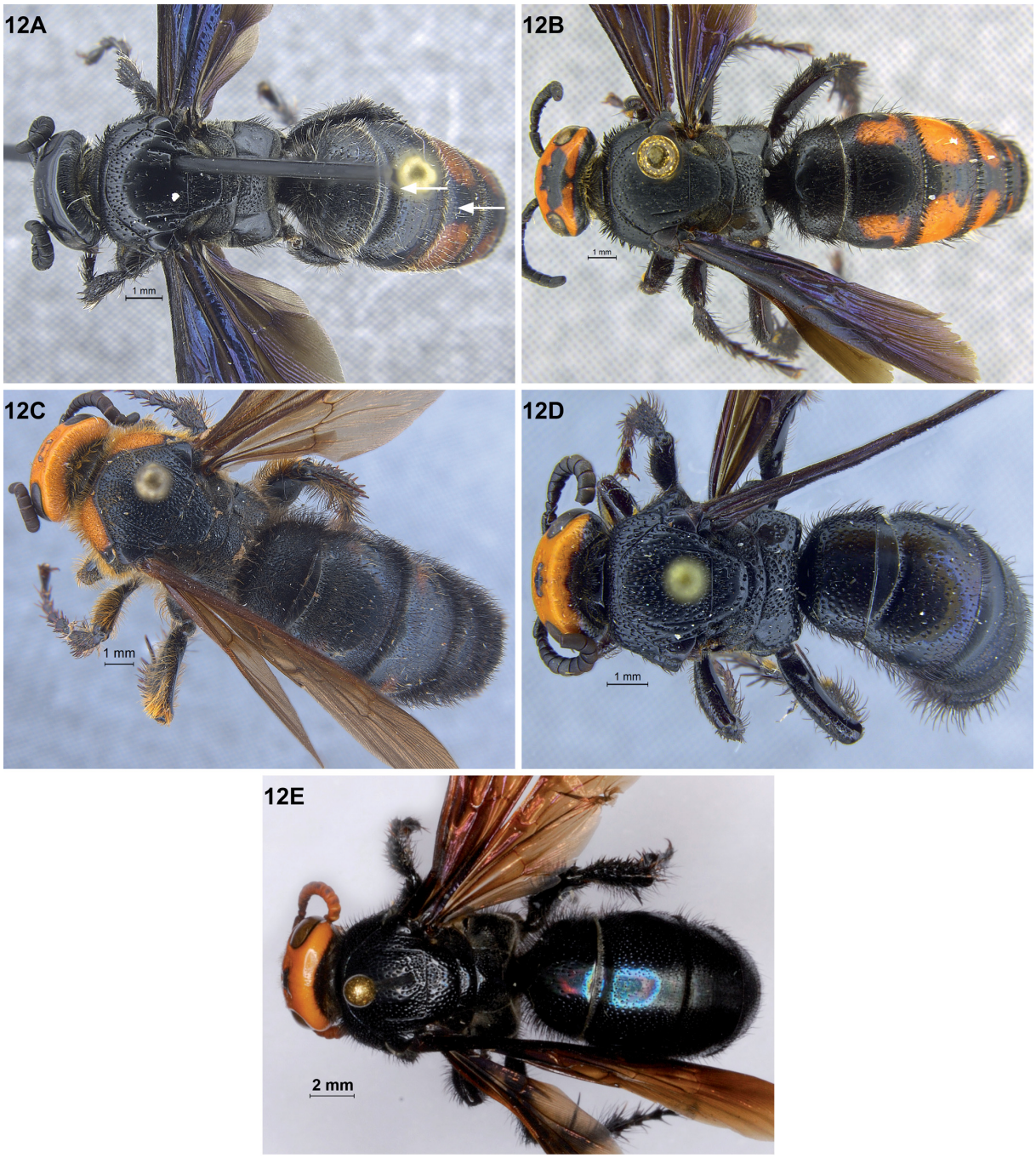

Fig. 12. Females, dorsal habitus. **A**. *Scolia binotata* Fabricius, 1804. **B**. *Sc. binotata* orange var. **C**. *Sc. clypeata pseudovollenhoveni* Betrem, 1933. **D**. *Sc. pakshaoensis* sp. nov., holotype (CAS), **E**. *Sc. superciliaris* de Saussure & Sichel, 1864.

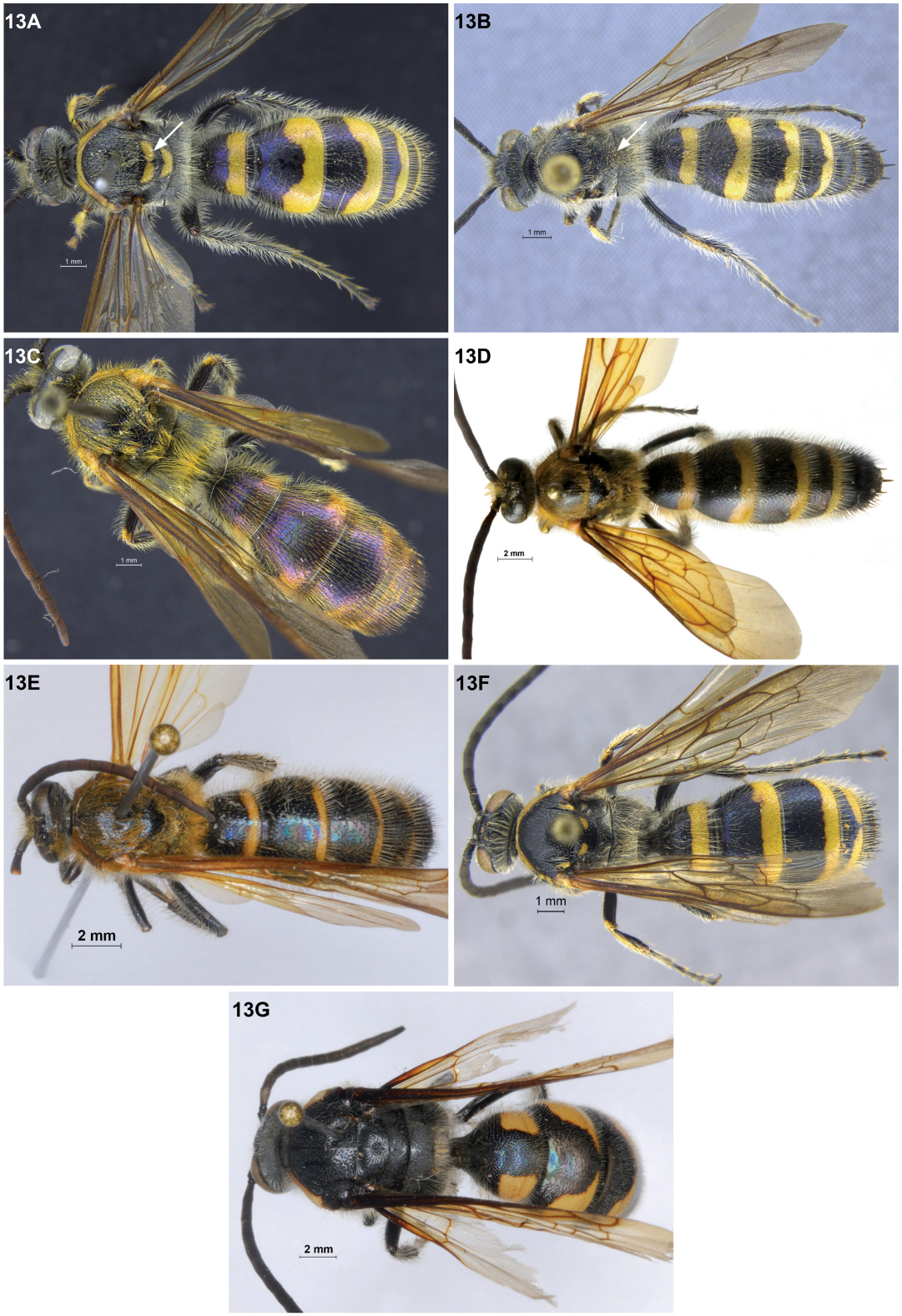

Fig. 13. Males, dorsal habitus. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989.

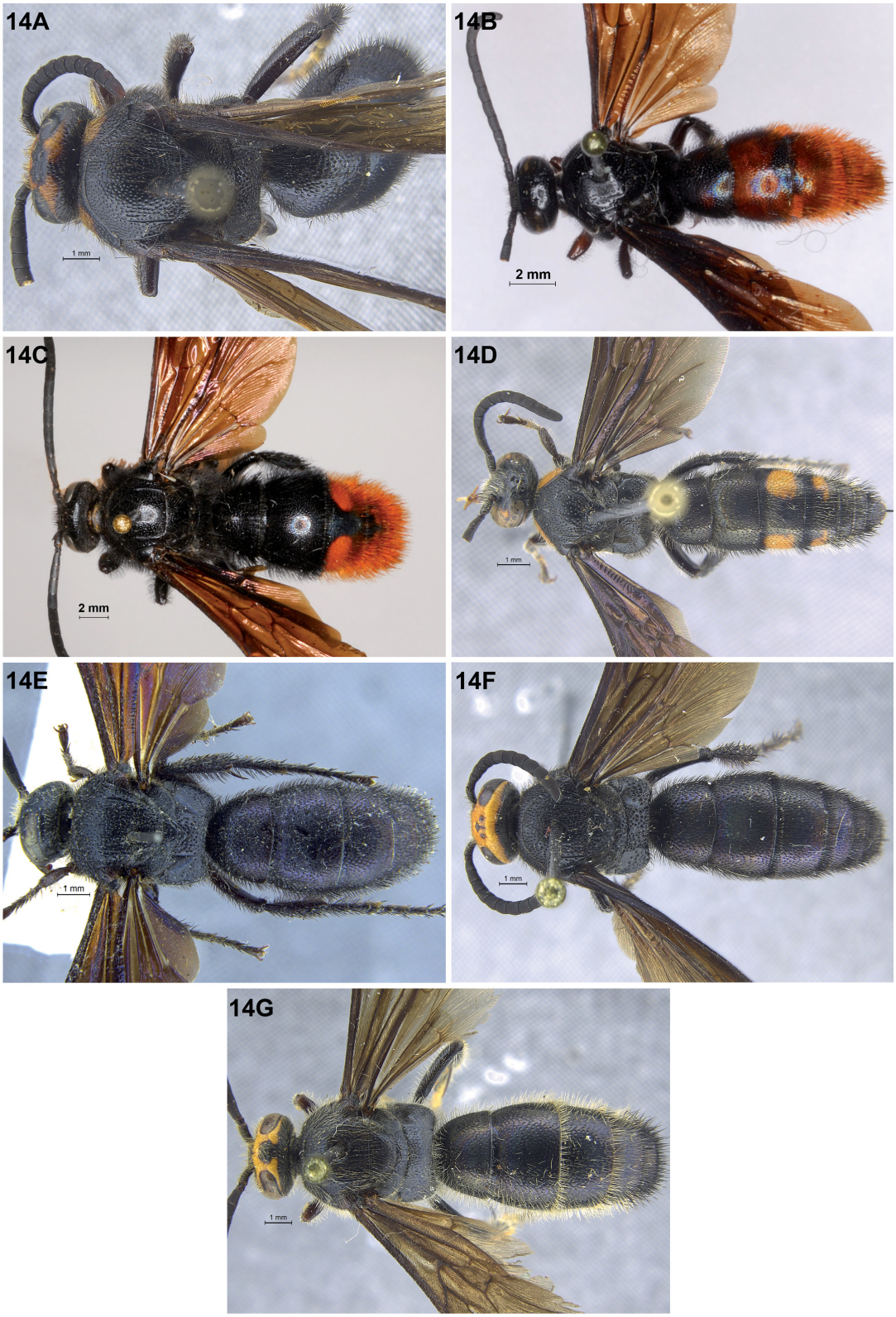

Fig. 14. Males, dorsal habitus. **A**. *Carinoscolia junnanensis* (Betrem, 1928). **B**. *Liacos erythrosoma* (Burmeister, 1854). **C**. *Megascolia azurea* (Christ, 1791). **D**. *Scolia binotata* Fabricius, 1804. **E**. *Sc. laeviceps* Smith, 1855. **F**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **G**. *Sc. superciliaris* de Saussure & Sichel, 1864.

Fig. 15. Females, face. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris formosensis chinensis* Betrem, 1941. **D**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **E**. *Austroscolia ruficeps ruficeps* (Smith, 1855). **F**. *Carinoscolia junnanensis* (Betrem, 1928). **G**. *Liacos erythrosoma* (Burmeister, 1854). **H**. *Megascolia azurea* (Christ, 1791).

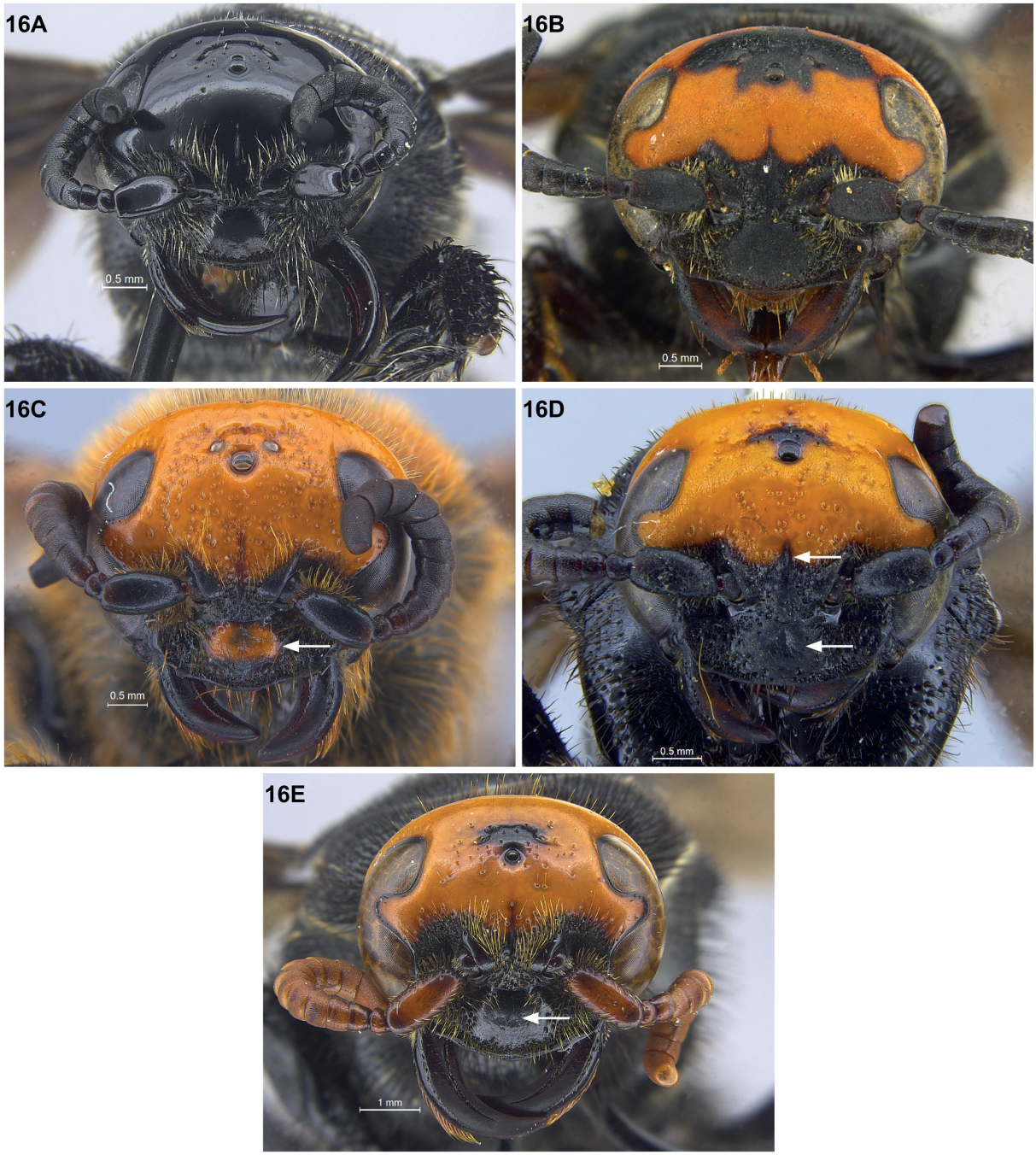

Fig. 16. Females, face. **A**. *Scolia binotata* Fabricius, 1804. **B**. *Sc. binotata* orange var. **C**. *Sc. clypeata pseudovollenhoveni* Betrem, 1933. **D**. *Sc. pakshaoensis* sp. nov., holotype (CAS). **E**. *Sc. superciliaris* de Saussure & Sichel, 1864.

Fig. 17. Males, face. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989.

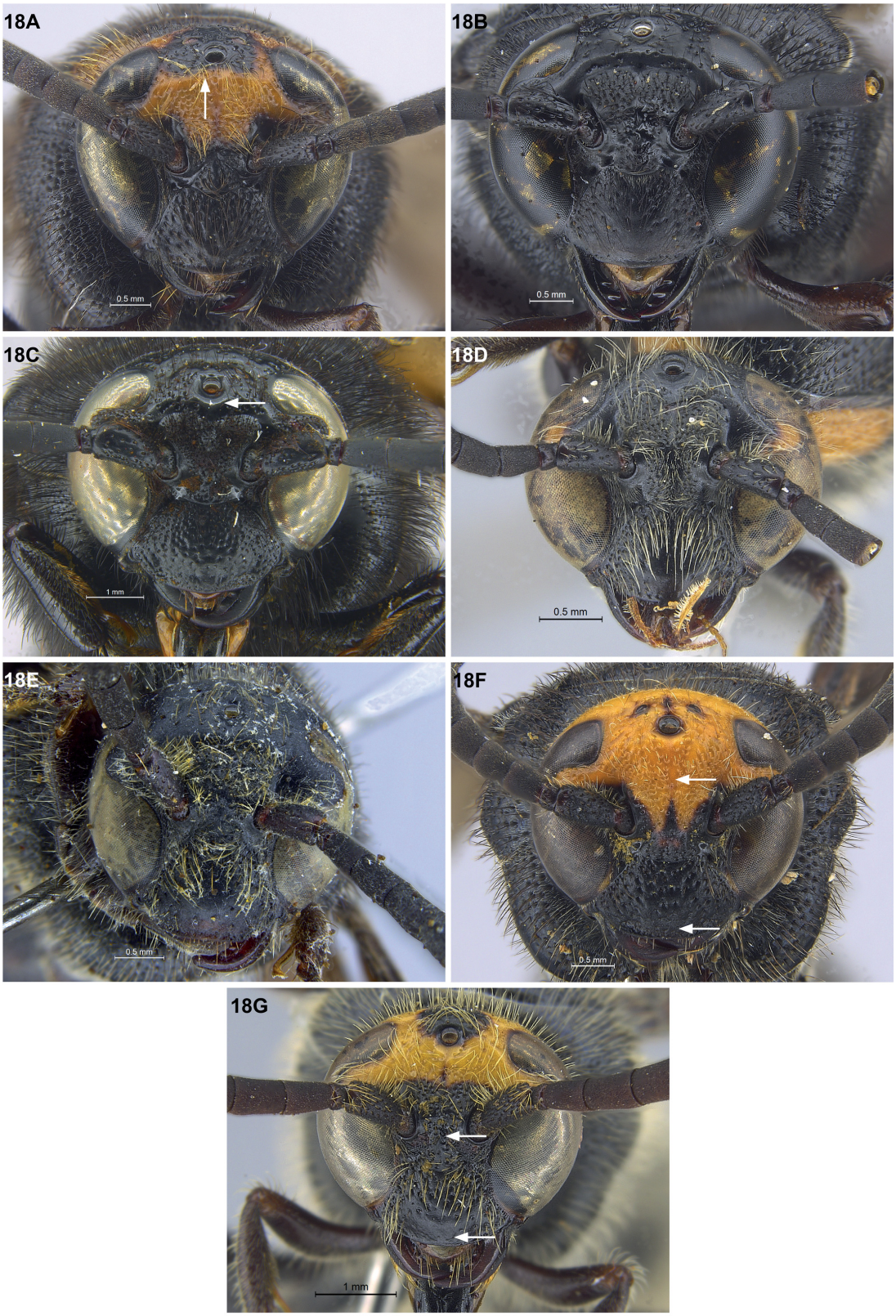

Fig. 18. Males, face. **A**. *Carinoscolia junnanensis* (Betrem, 1928). **B**. *Liacos erythrosoma* (Burmeister, 1854). **C**. *Megascolia azurea* (Christ, 1791). **D**. *Scolia binotata* Fabricius, 1804. **E**. *Sc. laeviceps* Smith, 1855. **F**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **G**. *Sc. superciliaris* de Saussure & Sichel, 1864.

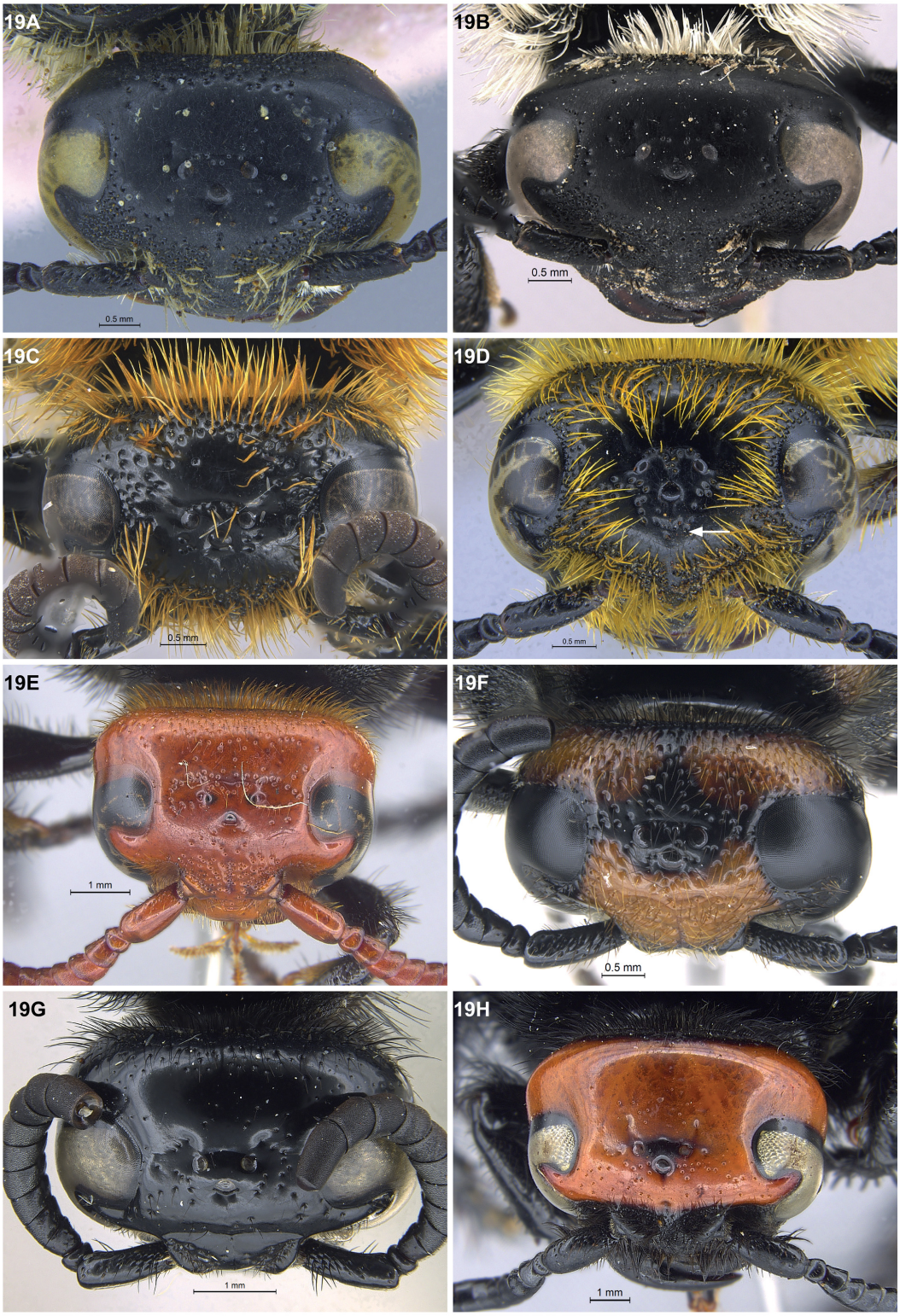

Fig. 19. Females, vertex. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris formosensis chinensis* Betrem, 1941. **D**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **E**. *Austroscolia ruficeps ruficeps* (Smith, 1855). **F**. *Carinoscolia junnanensis* (Betrem, 1928). **G**. *Liacos erythrosoma* (Burmeister, 1854). **H**. *Megascolia azurea* (Christ, 1791).

Fig. 20. Females, vertex. **A**. *Scolia binotata* Fabricius, 1804. **B**. *Sc. binotata* orange var. **C**. *Sc. clypeata pseudovollenhoveni* Betrem, 1933. **D**. *Sc. pakshaoensis* sp. nov., holotype (CAS). **E**. *Sc. superciliaris* de Saussure & Sichel, 1864.

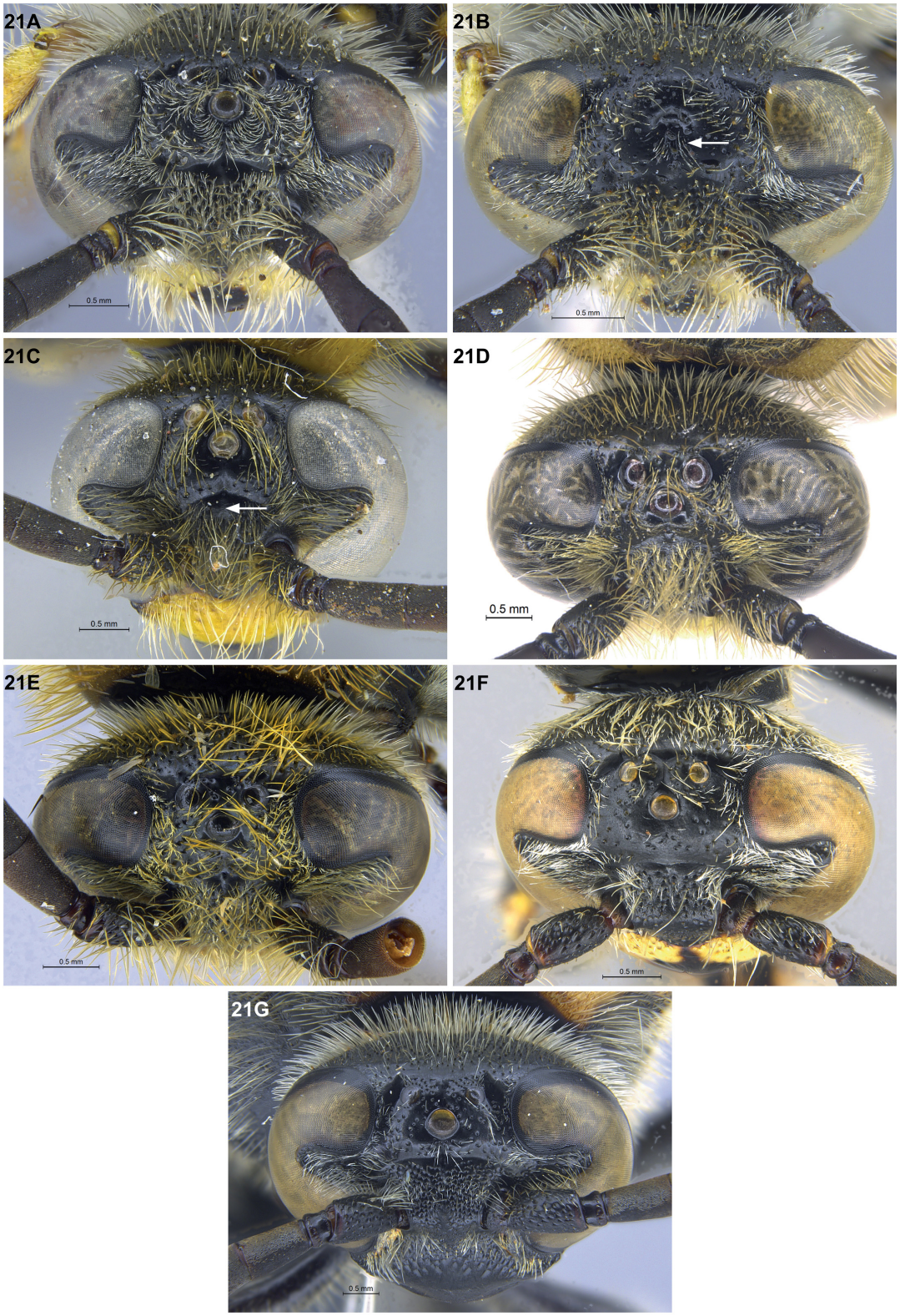

Fig. 21. Males, vertex. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989.

Fig. 22. Males, vertex. **A**. *Carinoscolia junnanensis* (Betrem, 1928). **B**. *Liacos erythrosoma* (Burmeister, 1854). **C**. *Megascolia azurea* (Christ, 1791). **D**. *Scolia binotata* Fabricius, 1804. **E**. *Sc. laeviceps* Smith, 1855. **F**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **G**. *Sc. superciliaris* de Saussure & Sichel, 1864.

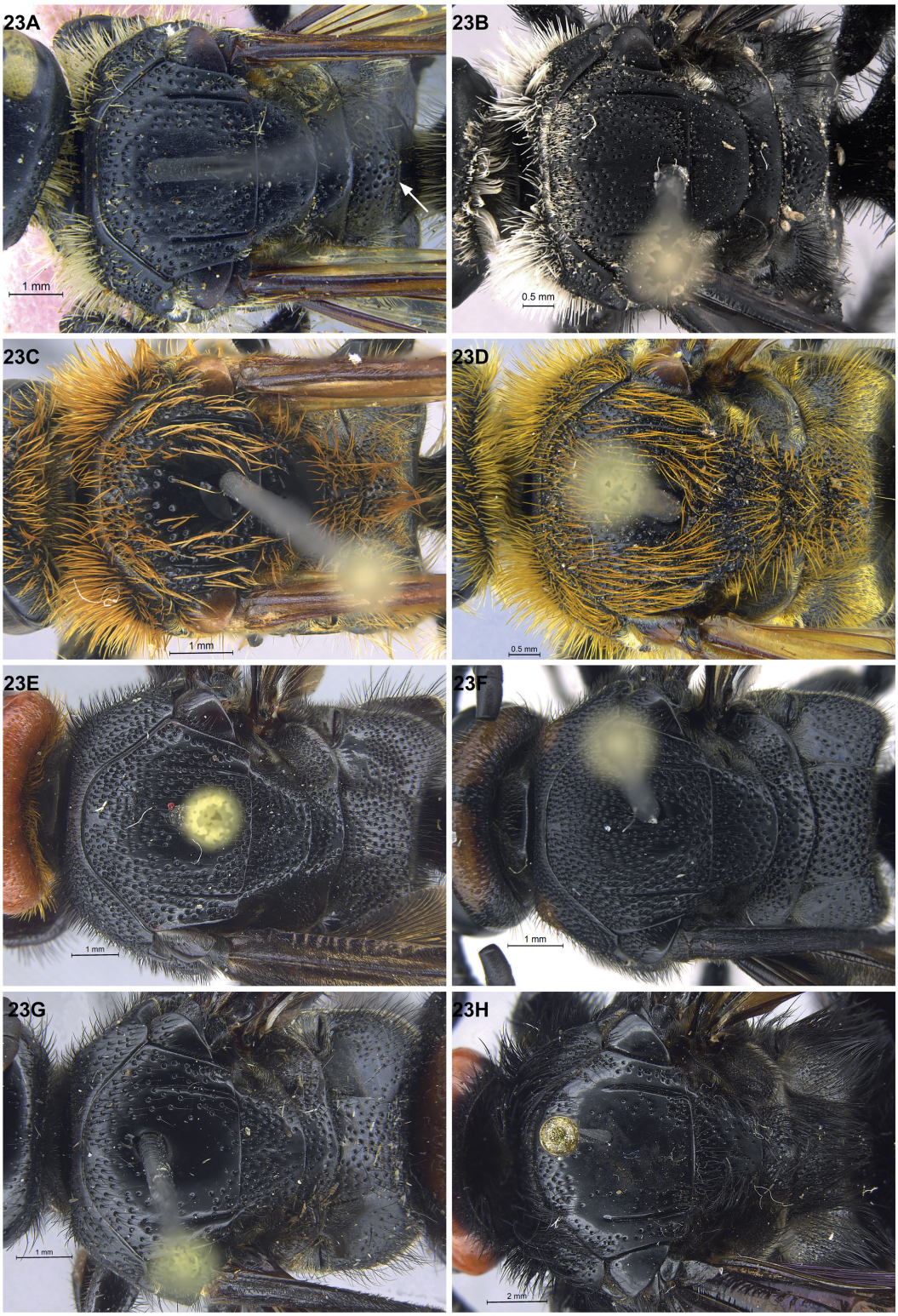

Fig. 23. Females, mesoscutum. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris formosensis chinensis* Betrem, 1941. **D**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **E**. *Austroscolia ruficeps ruficeps* (Smith, 1855). **F**. *Carinoscolia junnanensis* (Betrem, 1928). **G**. *Liacos erythrosoma* (Burmeister, 1854). **H**. *Megascolia azurea* (Christ, 1791).

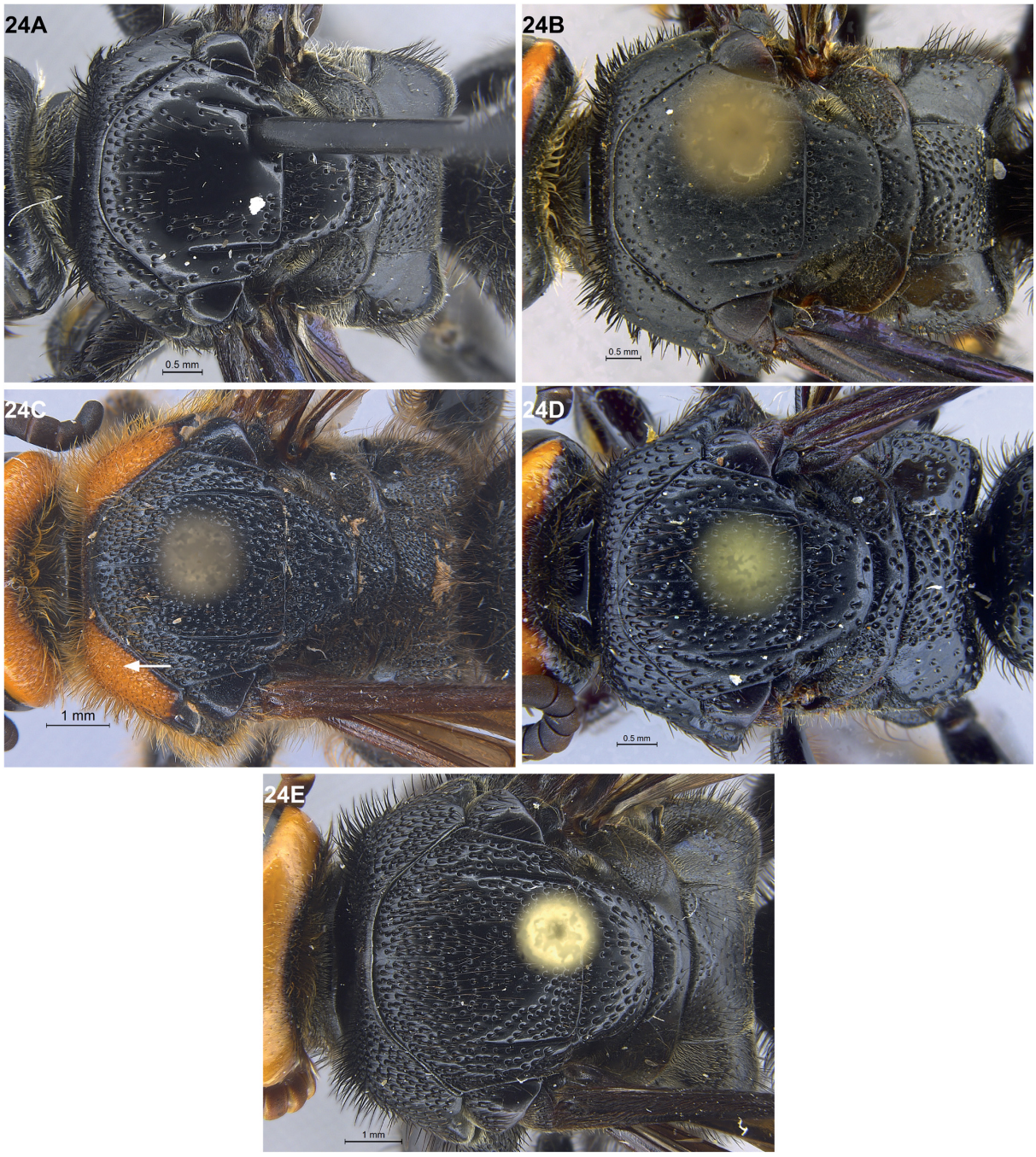

Fig. 24. Females, mesoscutum. **A**. *Scolia binotata* Fabricius, 1804. **B**. *Sc. binotata* orange var. **C**. *Sc. clypeata pseudovollenhoveni* Betrem, 1933. **D**. *Sc. pakshaoensis* sp. nov., holotype (CAS). **E**. *Sc. superciliaris* de Saussure & Sichel, 1864.

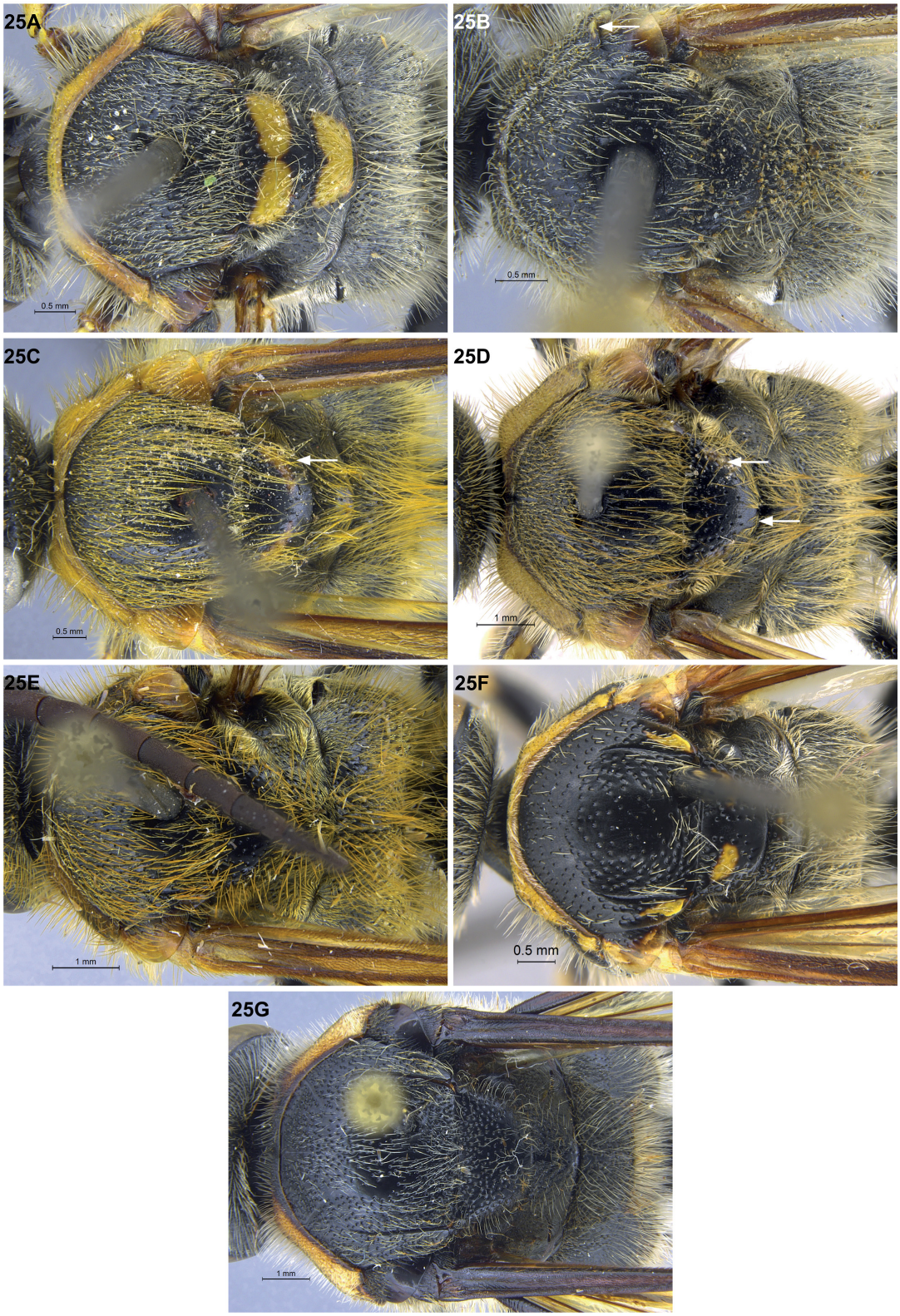

Fig. 25. Males, mesoscutum. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989.

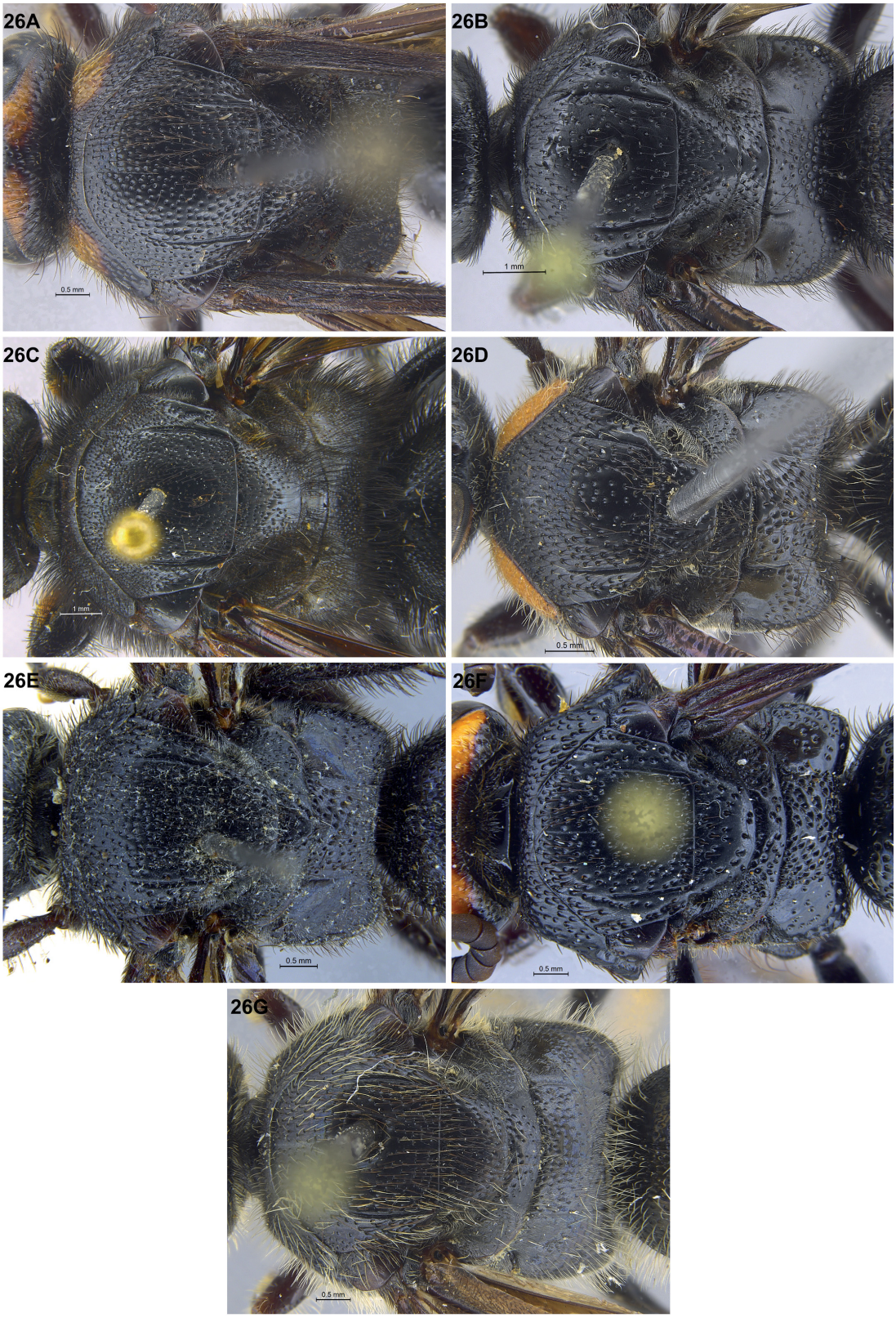

Fig. 26. Males, mesoscutum. **A**. *Carinoscolia junnanensis*. **B**. *Liacos erythrosoma* (Burmeister, 1854). **C**. *Megascolia azurea* (Christ, 1791). **D**. *Scolia binotata* Fabricius, 1804. **E**. *Sc. laeviceps* Smith, 1855. **F**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **G**. *Sc. superciliaris* de Saussure & Sichel, 1864.

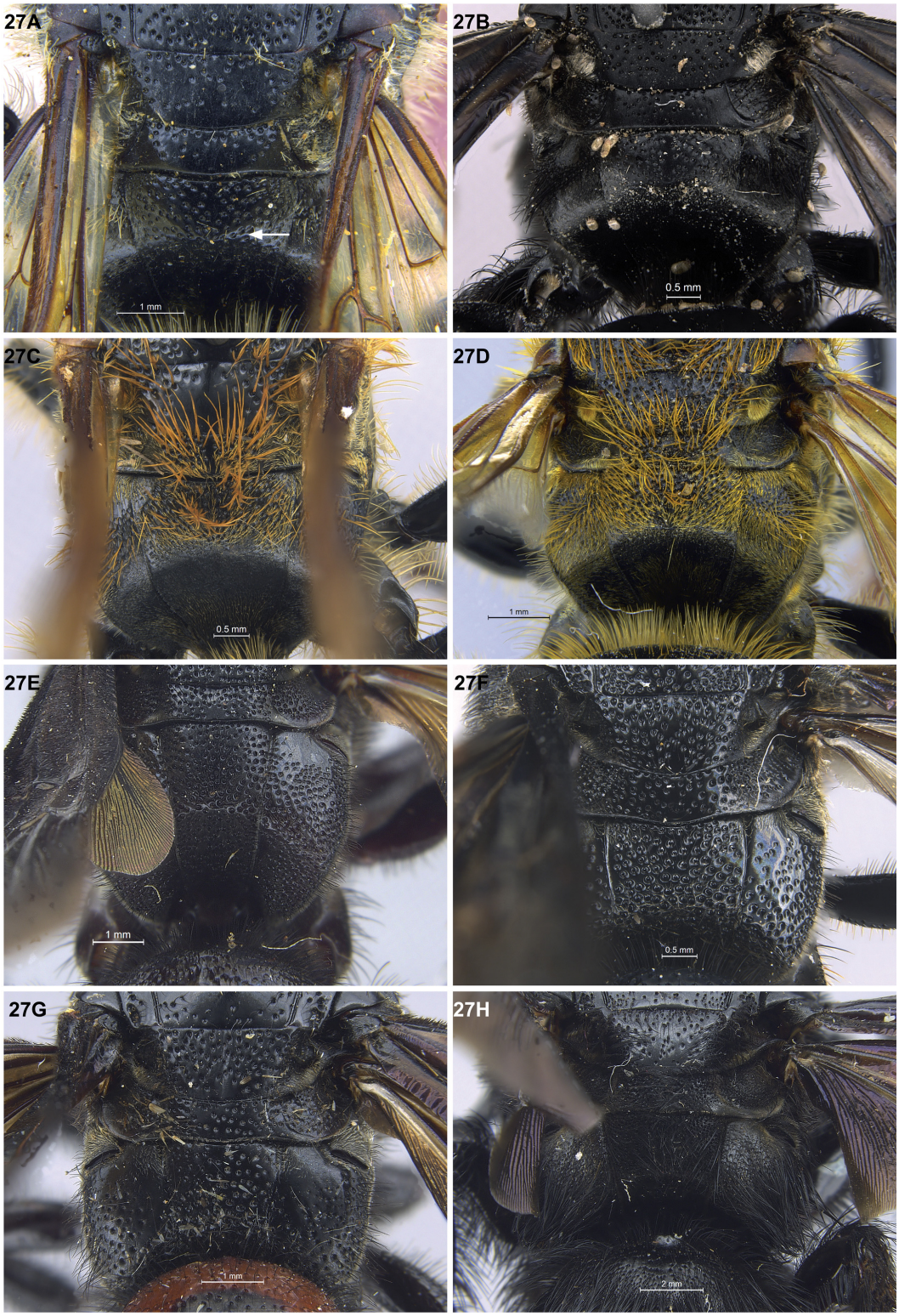

Fig. 27. Females, propodeum. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris formosensis chinensis* Betrem, 1941. **D**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **E**. *Austroscolia ruficeps ruficeps* (Smith, 1855). **F**. *Carinoscolia junnanensis* (Betrem, 1928). **G**. *Liacos erythrosoma* (Burmeister, 1854). **H**. *Megascolia azurea* (Christ, 1791).

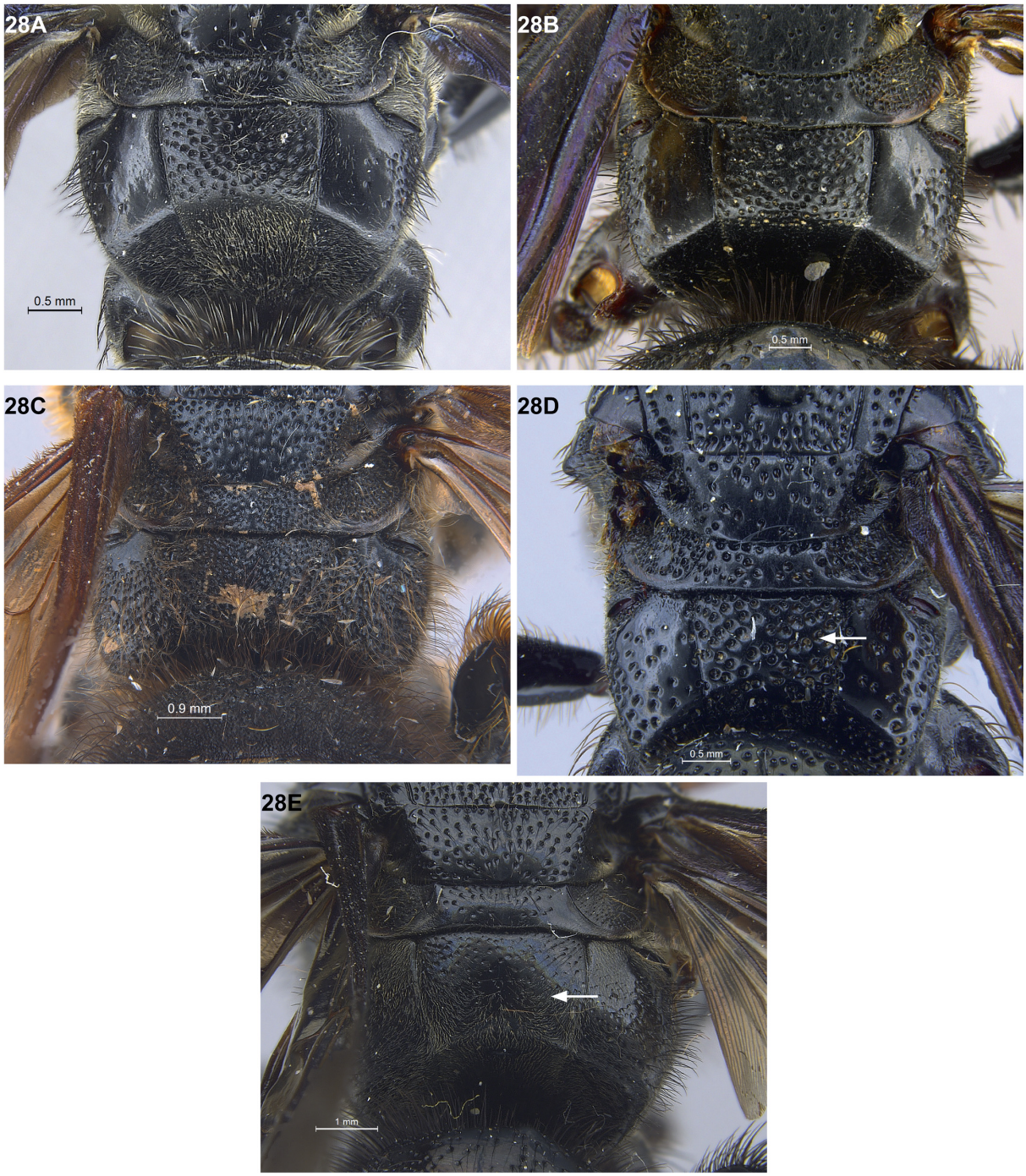

Fig. 28. Females, propodeum. **A**. *Scolia binotata* Fabricius, 1804. **B**. *Sc. binotata* orange var. **C**. *Sc. clypeata pseudovollenhoveni* Betrem, 1933. **D**. *Sc. pakshaoensis* sp. nov., holotype (CAS). **E**. *Sc. superciliaris* de Saussure & Sichel, 1864.

Fig. 29. Males, propodeum. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989.

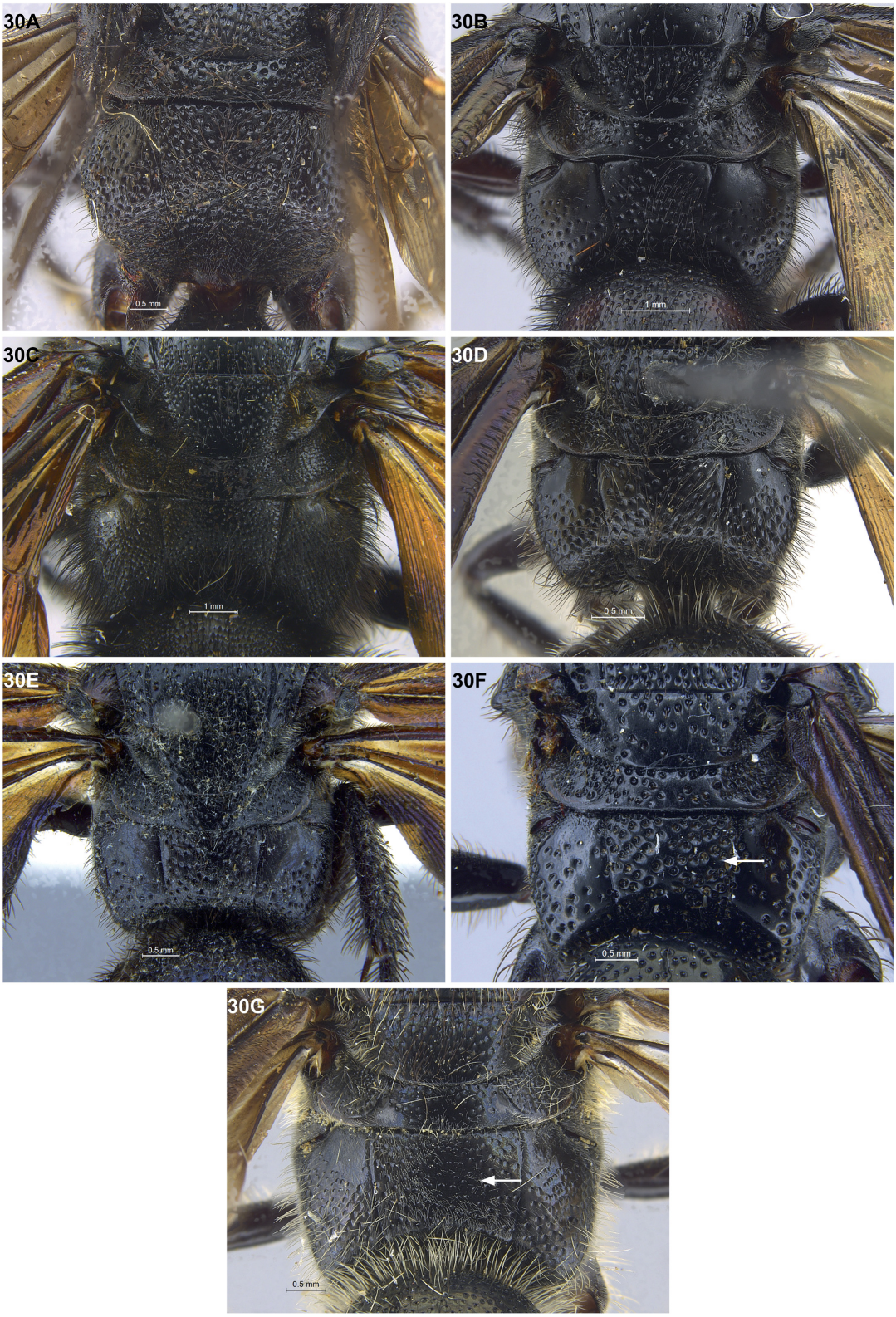

Fig. 30. Males, propodeum. **A**. *Carinoscolia junnanensis* (Betrem, 1928).. **B**. *Liacos erythrosoma* (Burmeister, 1854). **C**. *Megascolia azurea* (Christ, 1791). **D**. *Scolia binotata* Fabricius, 1804. **E**. *Sc. laeviceps* Smith, 1855. **F**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **G**. *Sc. superciliaris* de Saussure & Sichel, 1864.

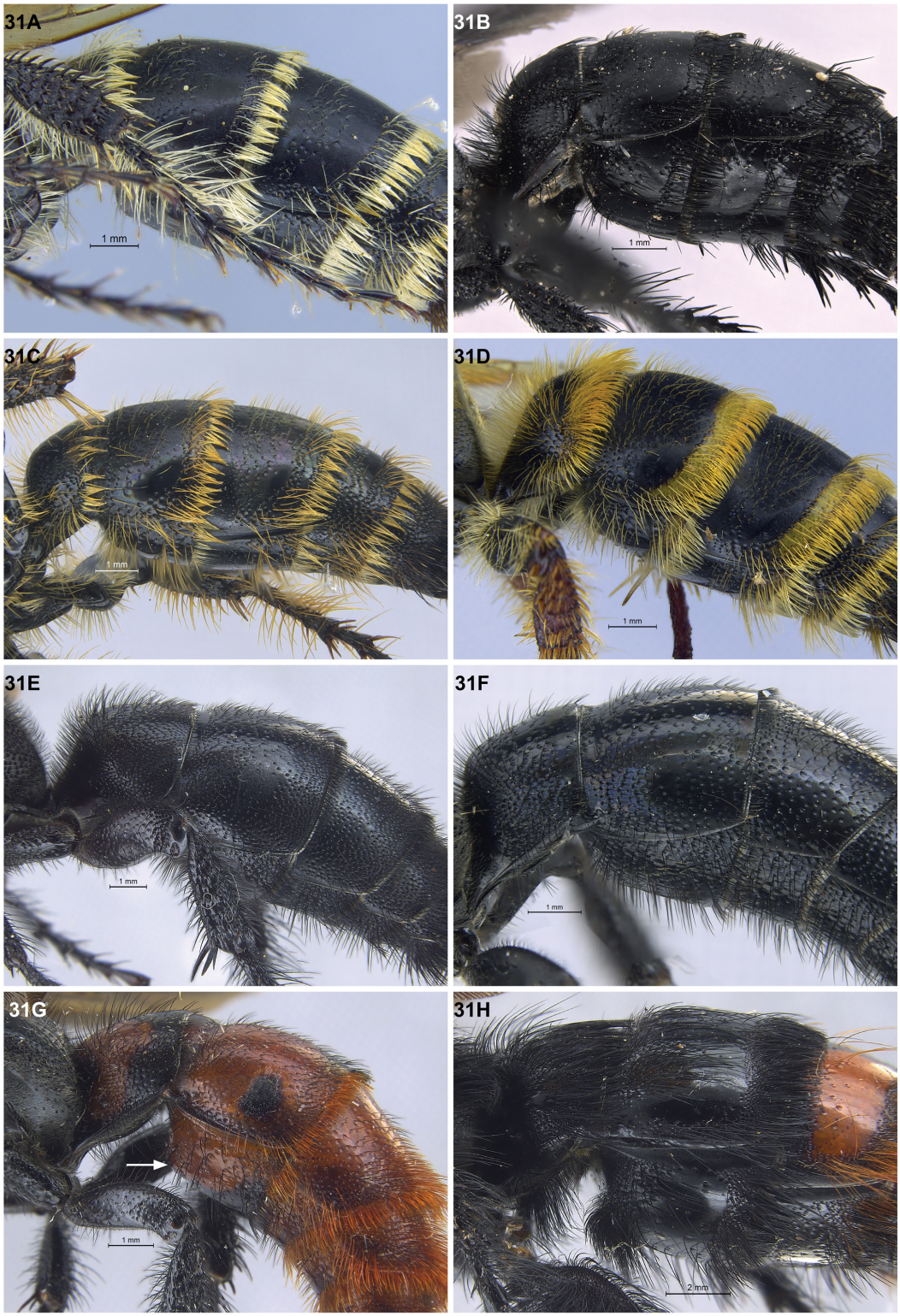

Fig. 31. Females, T1–T3, lateral view. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris formosensis chinensis* Betrem, 1941. **D**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **E**. *Austroscolia ruficeps ruficeps* (Smith, 1855). **F**. *Carinoscolia junnanensis* (Betrem, 1928). **G**. *Liacos erythrosoma* (Burmeister, 1854). **H**. *Megascolia azurea* (Christ, 1791).

Fig. 32. Females, T1–T3, lateral view. **A**. *Scolia binotata* Fabricius, 1804. **B**. *Sc. binotata* orange var. **C**. *Sc. clypeata pseudovollenhoveni* Betrem, 1933. **D**. *Sc. pakshaoensis* sp. nov., holotype (CAS). **E**. *Sc. superciliaris* de Saussure & Sichel, 1864.

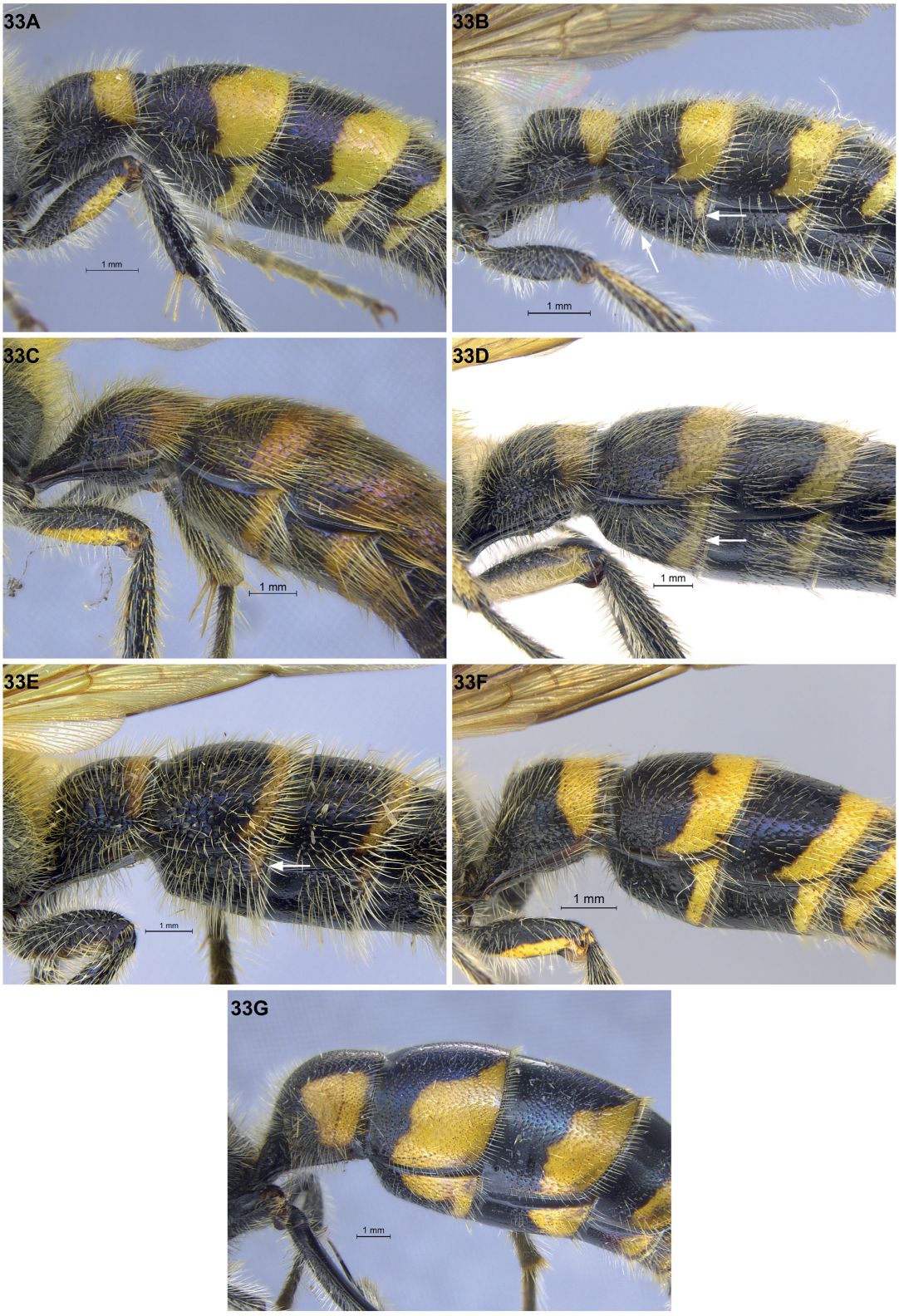

Fig. 33. Males, T1–T3, lateral view. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989.

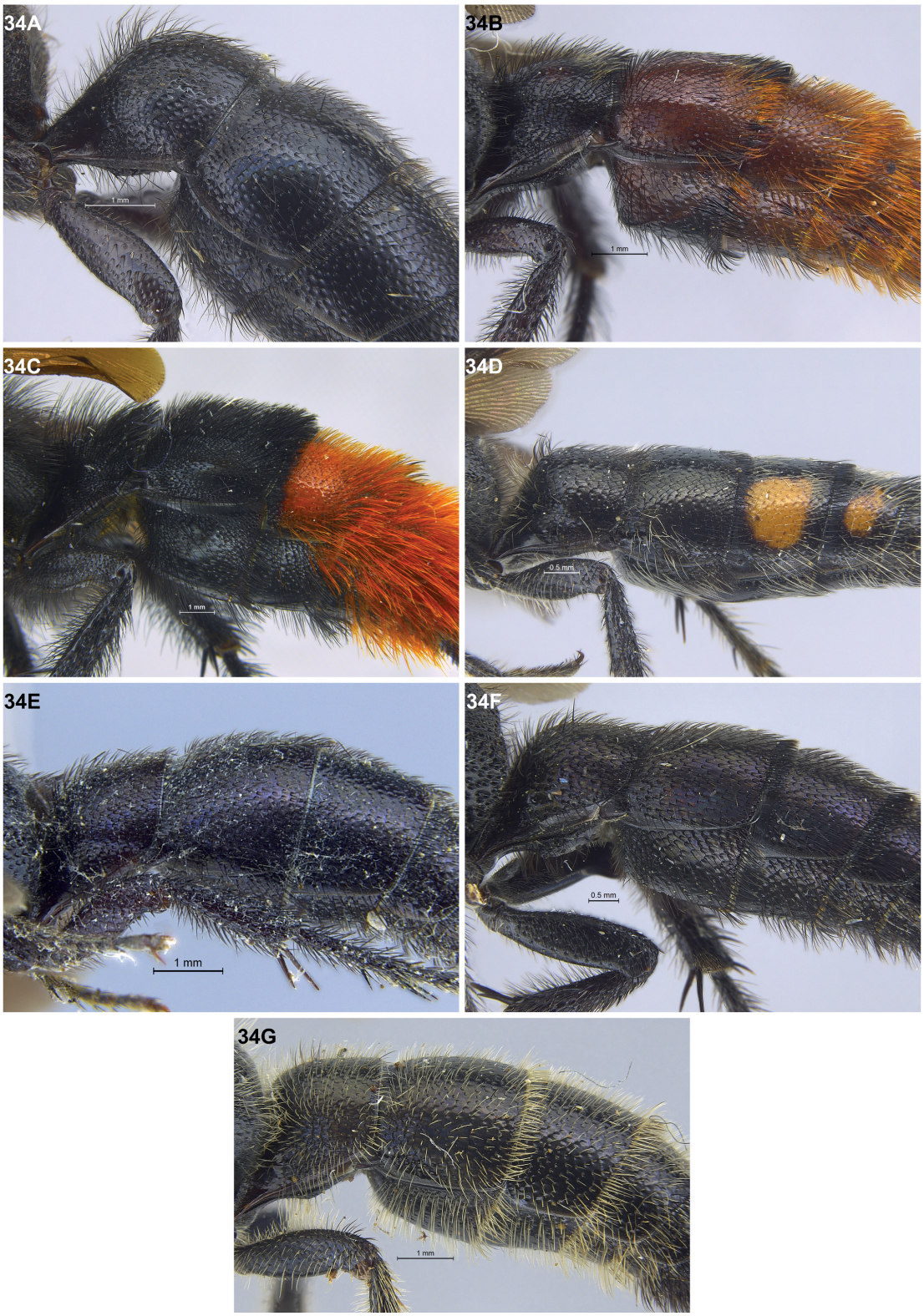

Fig. 34. Males, T1–T3, lateral view. **A**. *Carinoscolia junnanensis* (Betrem, 1928). **B**. *Liacos erythrosoma* (Burmeister, 1854). **C**. *Megascolia azurea* (Christ, 1791). **D**. *Scolia binotata* Fabricius, 1804. **E**. *Sc. laeviceps* Smith, 1855. **F**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **G**. *Sc. superciliaris* de Saussure & Sichel, 1864.

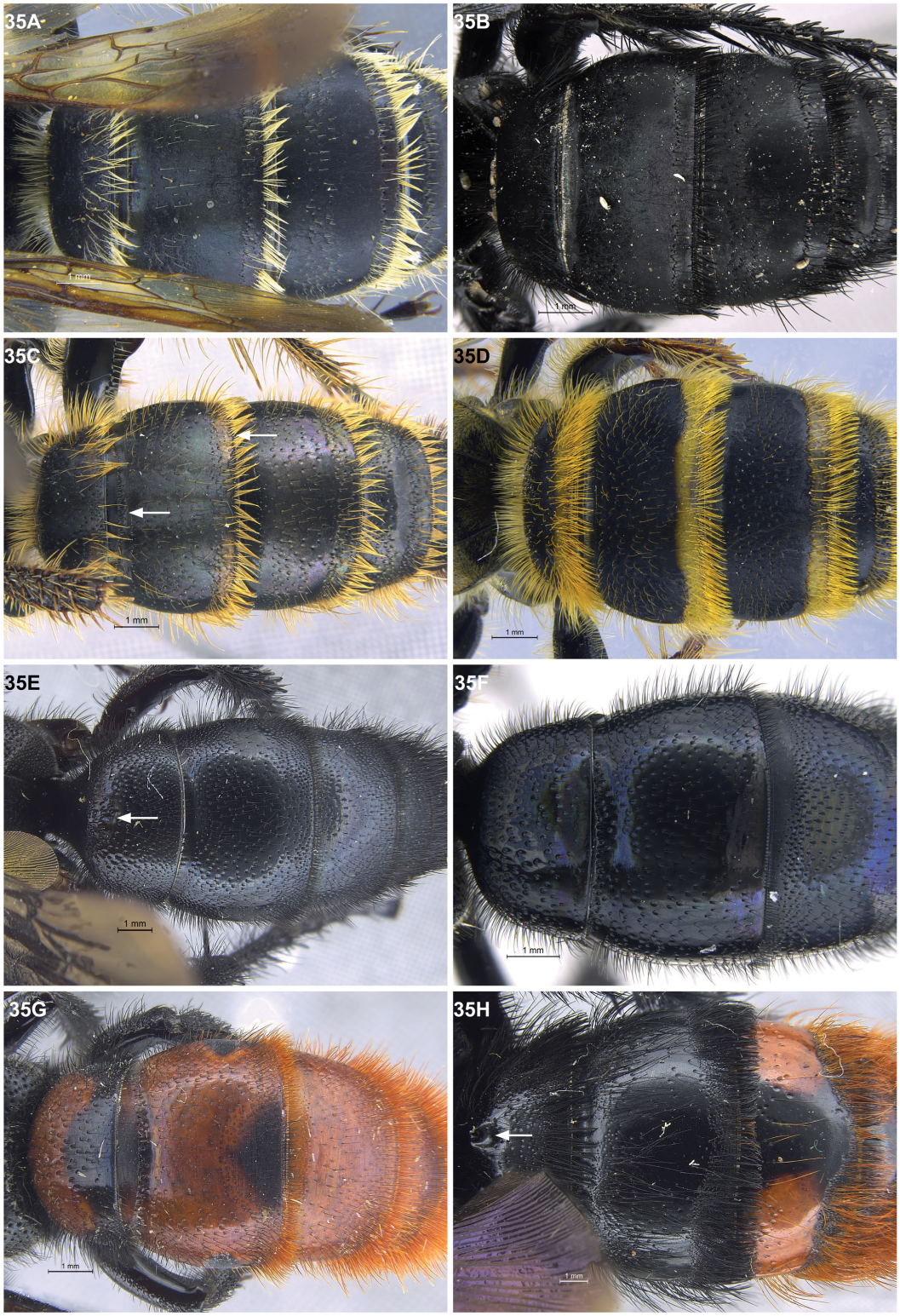

Fig. 35. Females, T1–T3, dorsal view. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris formosensis chinensis* Betrem, 1941. **D**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **E**. *Austroscolia ruficeps ruficeps* (Smith, 1855). **F**. *Carinoscolia junnanensis* (Betrem, 1928). **G**. *Liacos erythrosoma* (Burmeister, 1854). **H**. *Megascolia azurea* (Christ, 1791).

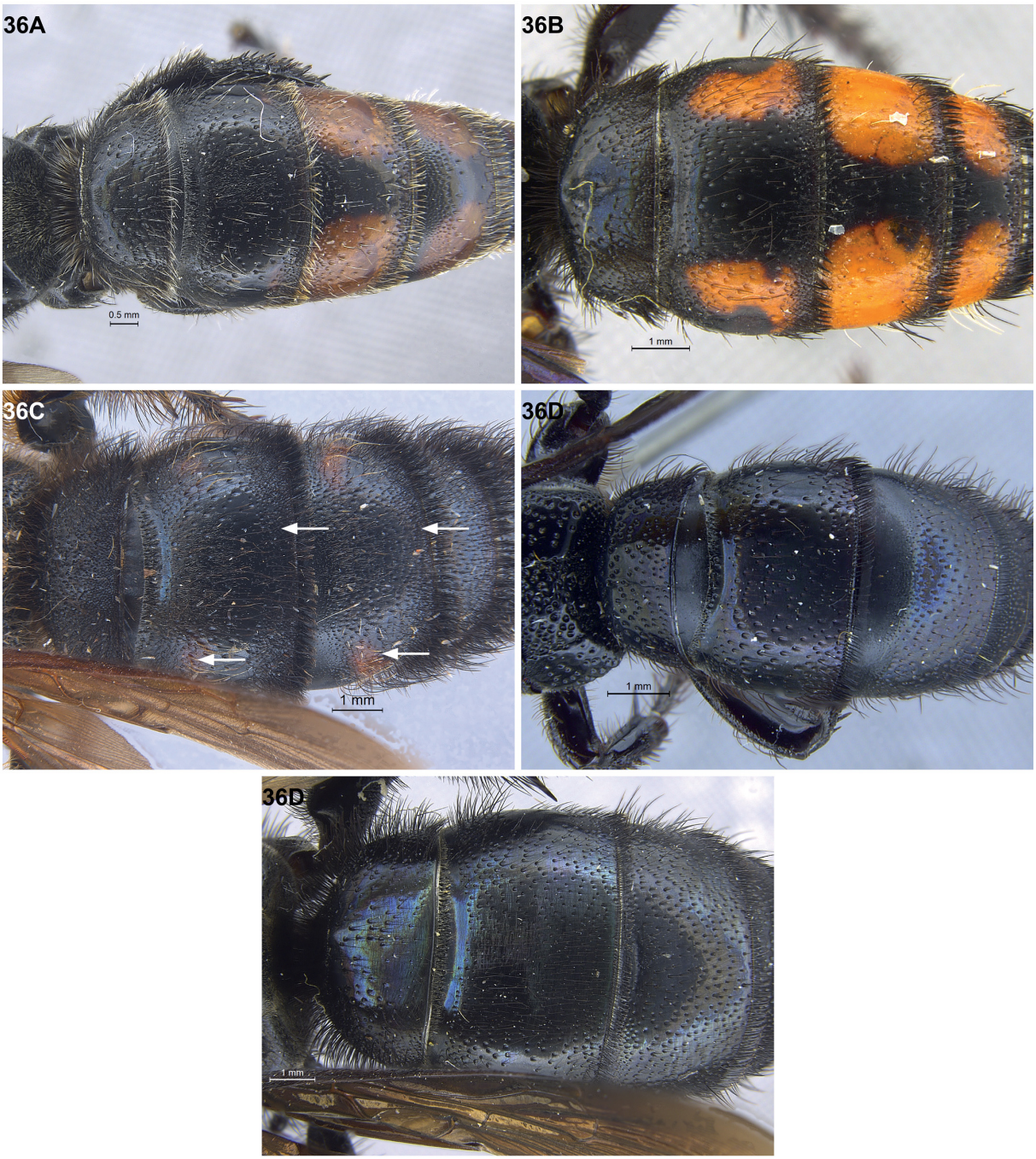

Fig. 36. Females, T1–T3, dorsal view. **A**. *Scolia binotata* Fabricius, 1804. **B**. *Sc. binotata* orange var. **C**. *Sc. clypeata pseudovollenhoveni* Betrem, 1933. **D**. *Sc. pakshaoensis* sp. nov., holotype (CAS). **E**. *Sc. superciliaris* de Saussure & Sichel, 1864.

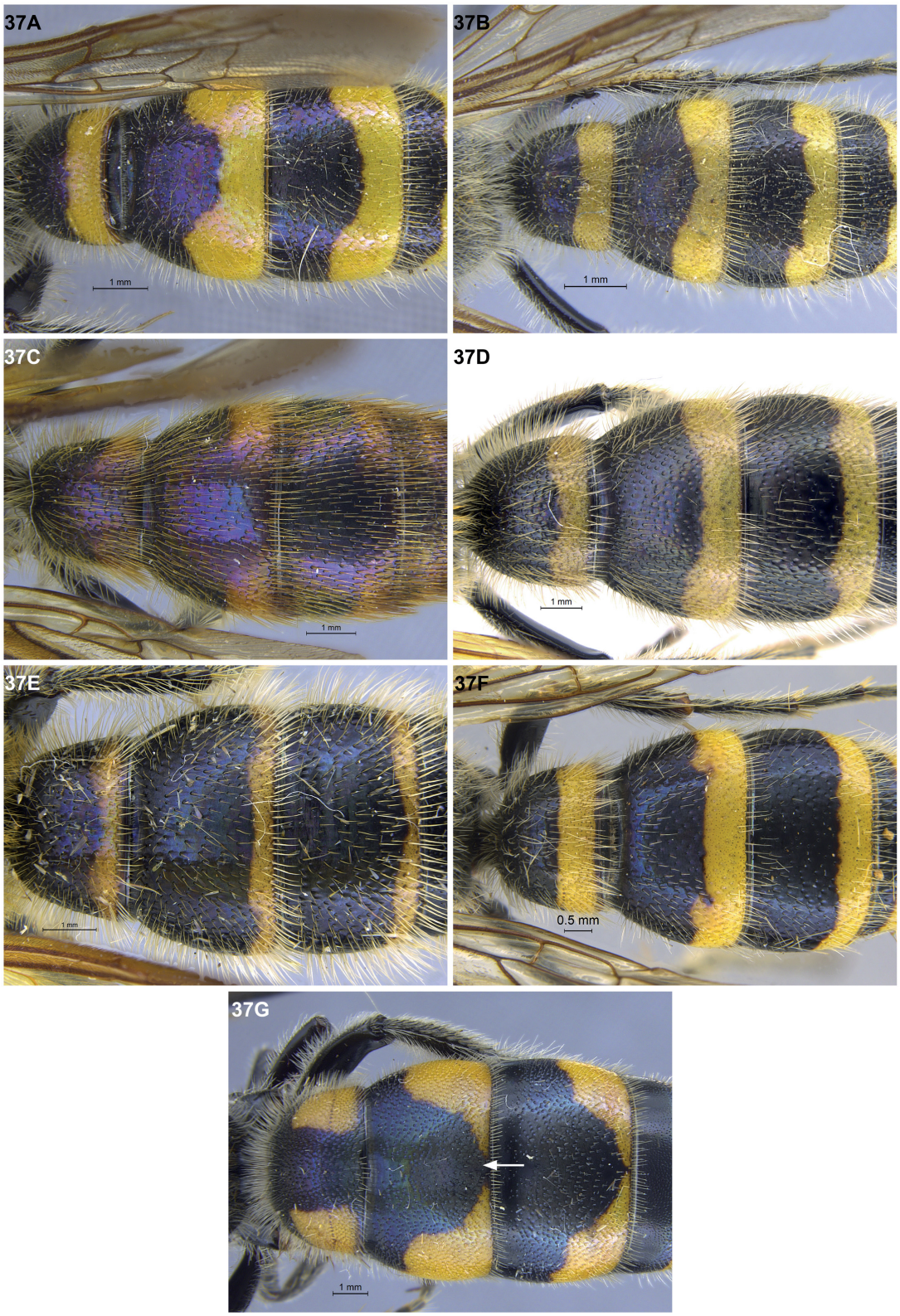

Fig. 37. Males, T1–T3, dorsal view. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989.

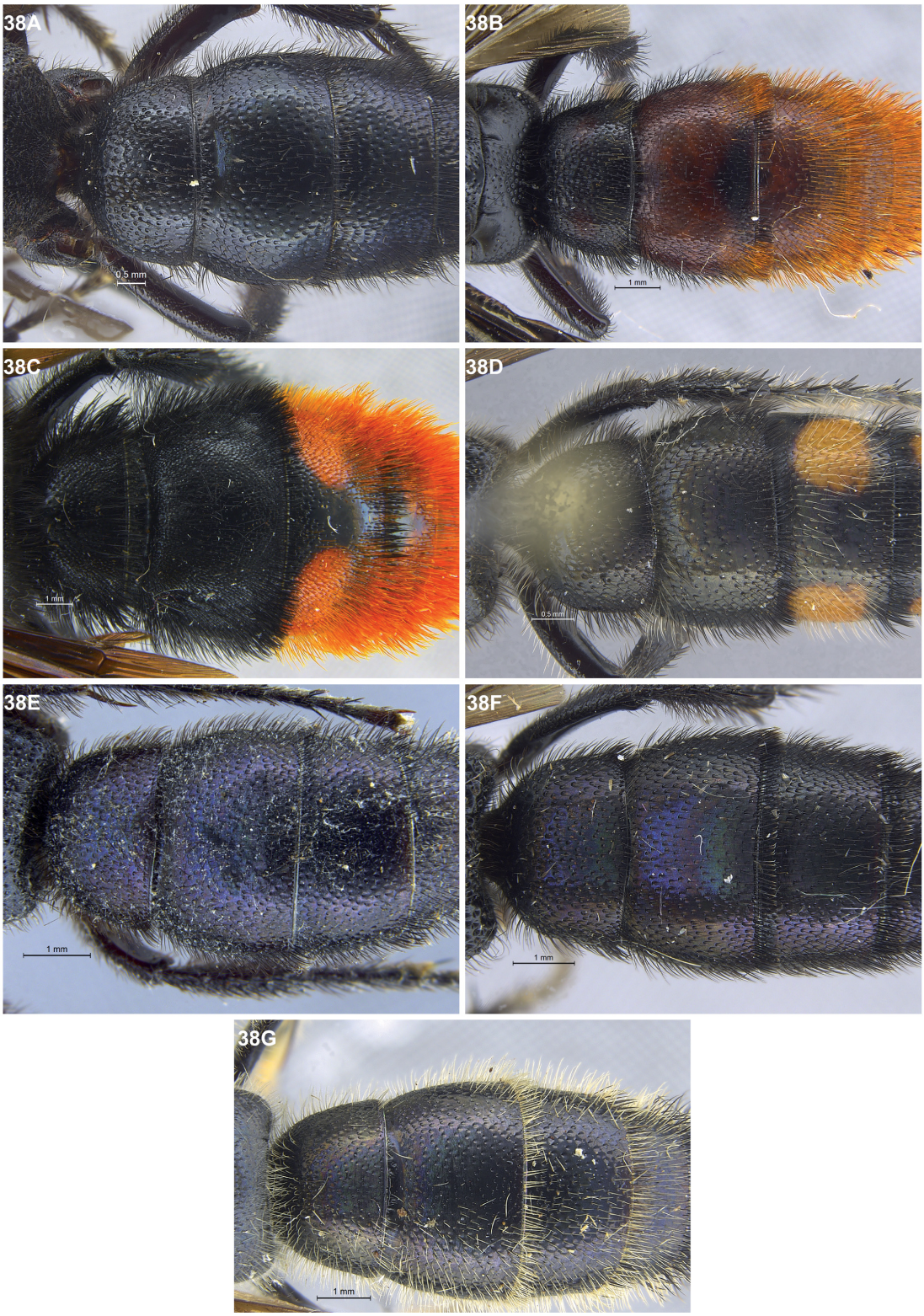

Fig. 38. Males, T1–T3, dorsal view. **A**. *Carinoscolia junnanensis* (Betrem, 1928). **B**. *Liacos erythrosoma* (Burmeister, 1854). **C**. *Megascolia azurea* (Christ, 1791). **D**. *Scolia binotata* Fabricius, 1804. **E**. *Sc. laeviceps* Smith, 1855. **F**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **G**. *Sc. superciliaris* de Saussure & Sichel, 1864.

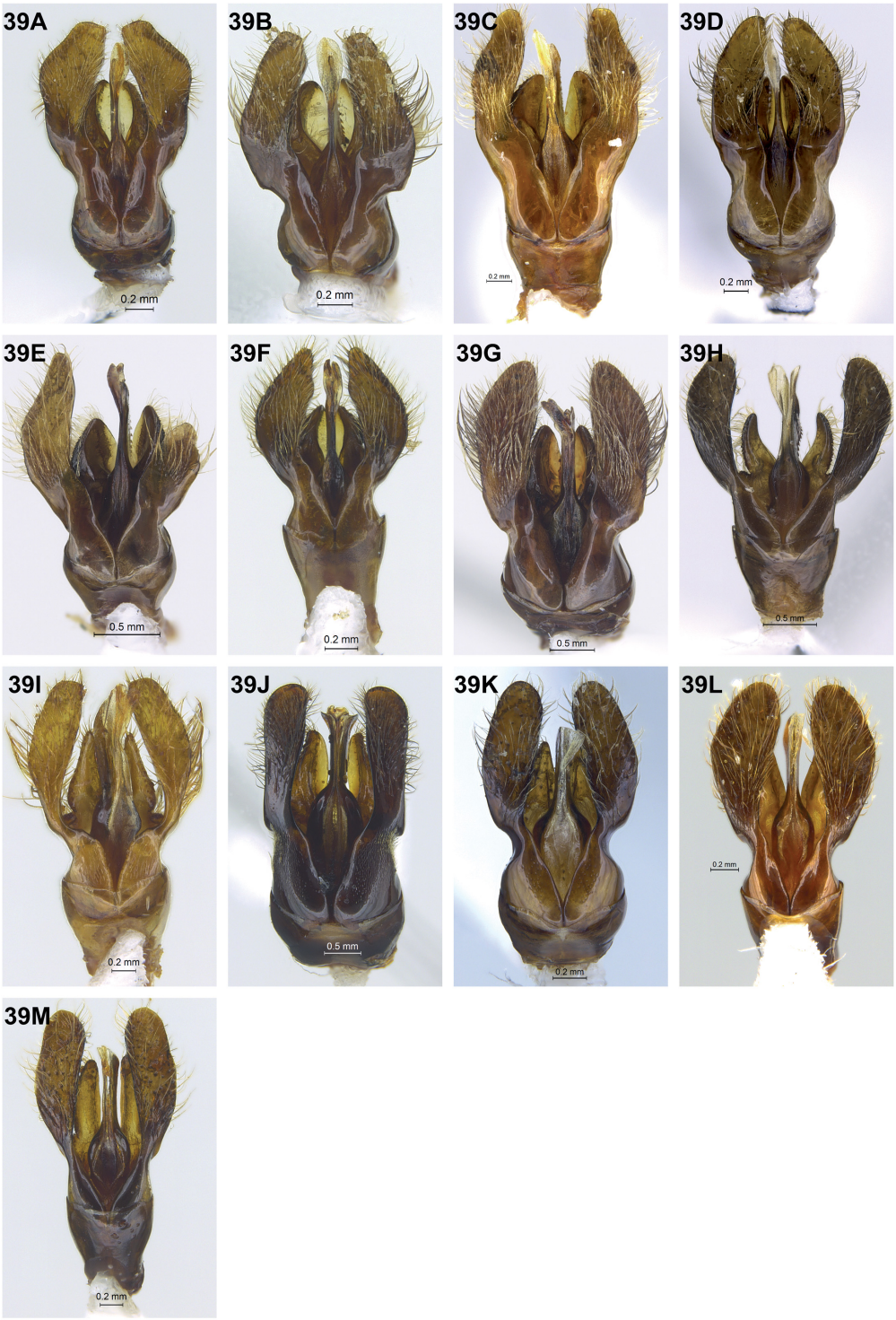

Fig. 39. Males genital capsule, dorsal view. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989. **H**. *Carinoscolia junnanensis* (Betrem, 1928). **I**. *Liacos erythrosoma* (Burmeister, 1854). **J**. *Megascolia azurea* (Christ, 1791). **K**. *Scolia binotata* Fabricius, 1804. **L**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **M**. *Sc. superciliaris* de Saussure & Sichel, 1864.

Fig. 40. Males genital capsule, ventral view. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989. **H**. *Carinoscolia junnanensis* (Betrem, 1928). **I**. *Liacos erythrosoma* (Burmeister, 1854). **J**. *Megascolia azurea* (Christ, 1791). **K**. *Scolia binotata* Fabricius, 1804. **L**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **M**. *Sc. superciliaris* de Saussure & Sichel, 1864.

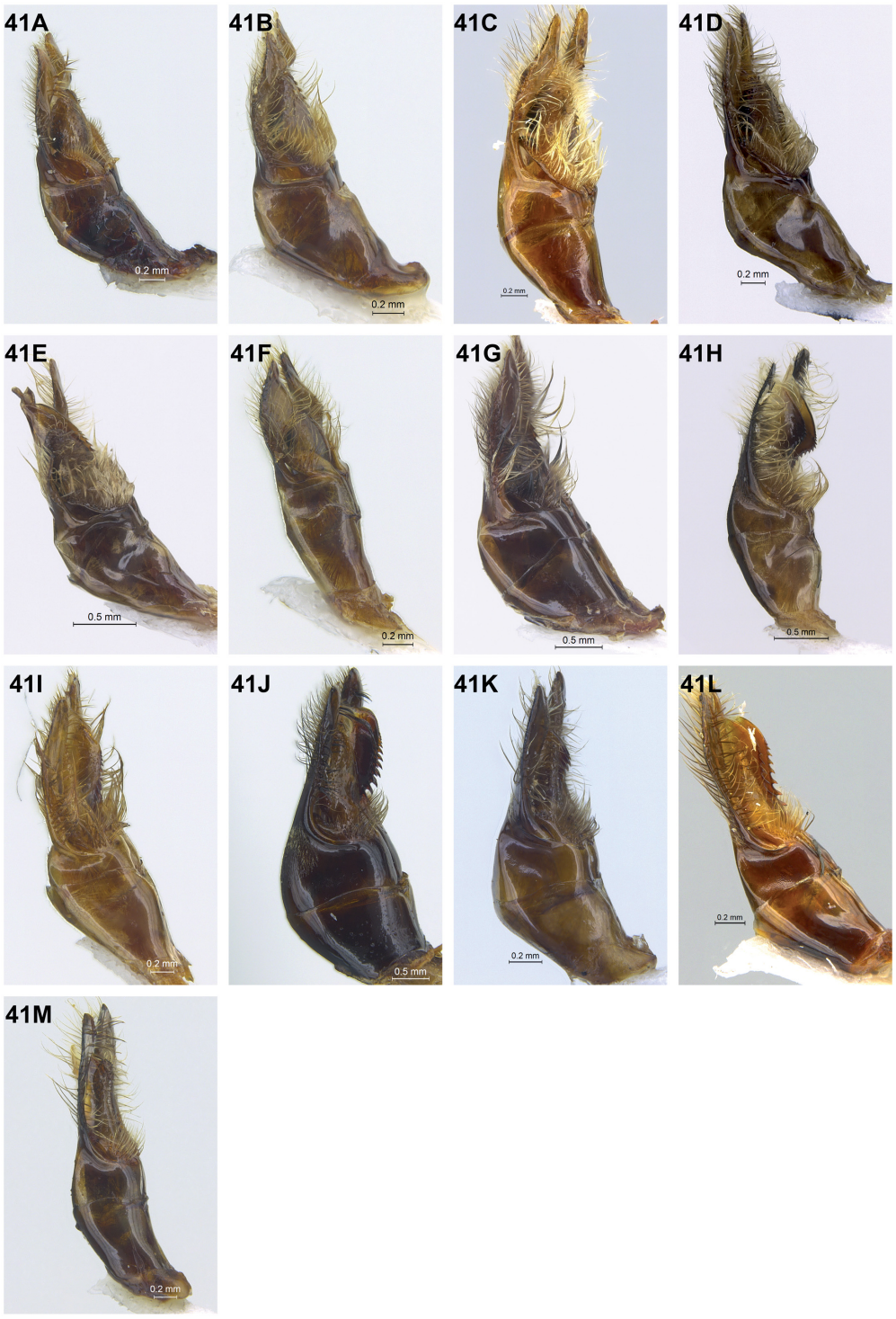

Fig. 41. Males genital capsule, lateral view. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989. **H**. *Carinoscolia junnanensis* (Betrem, 1928). **I**. *Liacos erythrosoma* (Burmeister, 1854). **J**. *Megascolia azurea* (Christ, 1791). **K**. *Scolia binotata* Fabricius, 1804. **L**. *Sc. pakshaoensis* sp. nov. **M**. *Sc. superciliaris* de Saussure & Sichel, 1864.

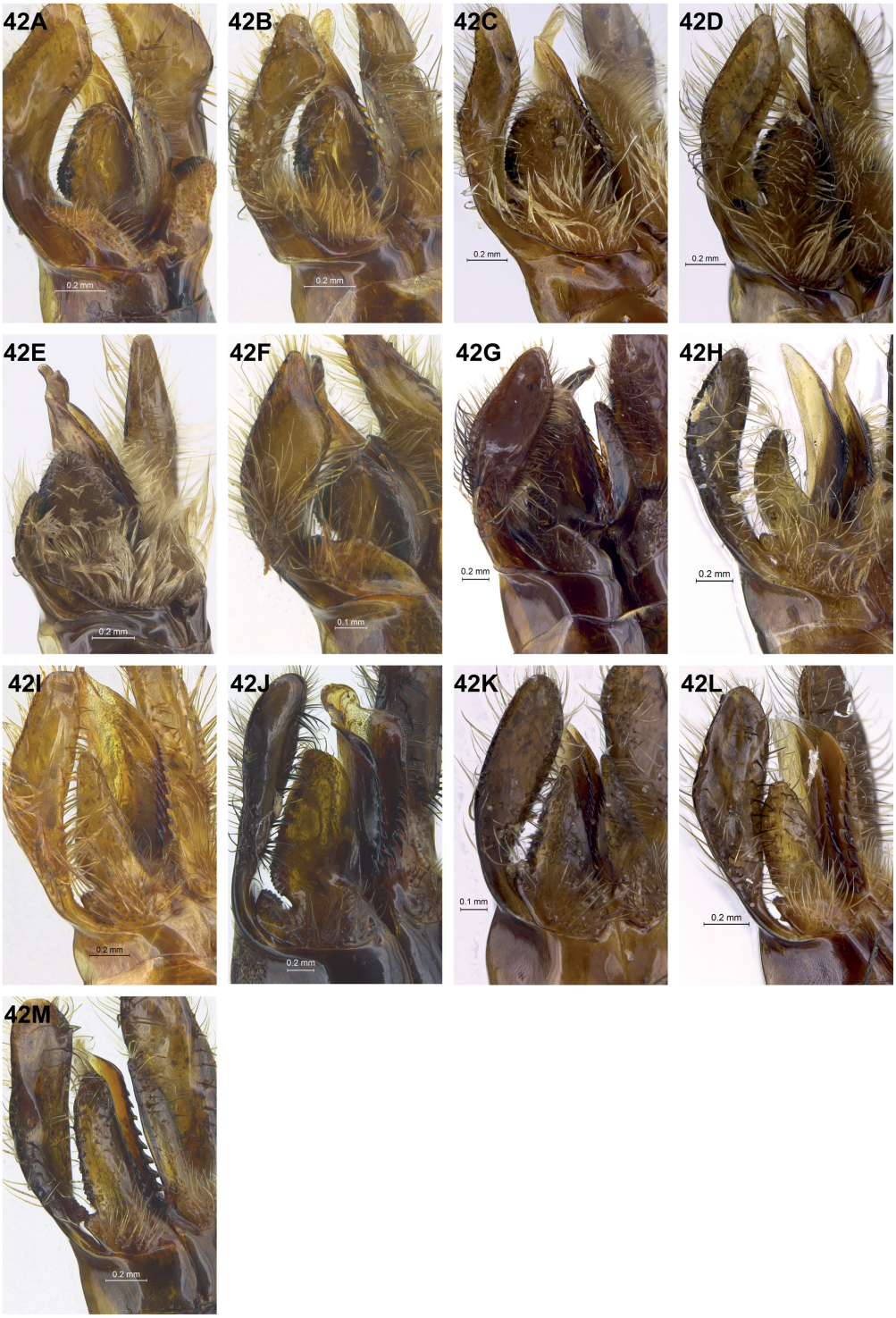

Fig. 42. Males genital capsule, ¾ view ventral side. **A**. *Campsomeriella annulata annulata* (Fabricius, 1793). **B**. *Camps. collaris* (Fabricius, 1775). **C**. *Megacampsomeris* sp. 1. **D**. *Megacam. formosensis chinensis* Betrem, 1941. **E**. *Megacam. prismatica* (Smith, 1855). **F**. *Phalerimeris phalerata phalerata* (de Saussure, 1858). **G**. *Sericocampsomeris flavomaculata* Gupta & Jonathan, 1989. **H**. *Carinoscolia junnanensis* (Betrem, 1928). **I**. *Liacos erythrosoma* (Burmeister, 1854). **J**. *Megascolia azurea* (Christ, 1791). **K**. *Scolia binotata* Fabricius, 1804. **L**. *Sc. pakshaoensis* sp. nov., paratype (CBC). **M**. *Sc. superciliaris* de Saussure & Sichel, 1864.