

RESEARCH PAPER

# The cleptoparasitic bee genus *Euaspis* in Vietnam (Hymenoptera: Megachilidae)

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**Abstract.** The cleptoparasitic bee genus *Euaspis* Gerstäcker, 1858 is reviewed from Vietnam, with four species recognized. A new species, *Euaspis flavorotundata* Tran & Engel sp. nov. from Northern and Central Highlands, Vietnam is described and figured. The distribution area of *E. aequicarinata* Pasteels, 1980 and *E. polynesia* Vachal, 1903 in the country is updated. Notes on the female morphology variation of *E. diversicarinata* Pasteels, 1980 are provided along with an illustrated key to *Euaspis* species from Vietnam.

**Key words.** Hymenoptera, Megachilidae, Anthidiini, cleptoparasitic bee, habitat, morphology, new species, taxonomy, Vietnam, Oriental Region

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## Introduction

*Euaspis* Gerstäcker, 1858 is a widespread albeit little studied genus of cleptoparasitic bees of the tribe Anthidiini of the family Megachilidae. Although the genus ranges extensively across sub-Saharan Africa (from Senegal east to Uganda, Kenya, and Tanzania and then southward to South Africa), the majority of the species are Asian, distributed from Pakistan to Japan and southward in India, Sri Lanka, Southeast Asia, and the Indomalayan and western Papuan regions (Table 1). Host records are rare and the biology of the genus is in need of extensive study but it seems to attack species of the Megachilini and Lithurgini, perhaps also the Anthidiini but this latter association is merely speculative for now. In Southeast Asia, eight species have been recorded historically, among them, *E. polynesia* Vachal, 1903 is the most common species (GHOSH et al. 2023, NALINRACHATAKAN et al. 2023, SOH et al. 2016). Three species have been documented for the Vietnamese bee fauna by TRAN et al. (2016) including *E. aequicarinata* Pasteels, 1980, *E. diversicarinata* Pasteels, 1980, and *E. polynesia* Vachal, 1903.

Here we provide a review of the species of *Euaspis* occurring in Vietnam based on newly collected material as well as those conserved in the Institute of Biology, Hanoi, Vietnam. As a result of this work, we provide the

description of a new species and remarks on the platform shape of the female sternum VI of *E. diversicarinata* in Southeast Asian populations. We also present an updated key to the Vietnamese species of the genus. Additionally, the distribution, potential hosts, and floral association of all recognized species of the genus are synthesized based on results of previous studies and this paper.

## Material and methods

Specimens examined are deposited in the collection of Hymenoptera of the Institute of Biology (IB), Hanoi, Vietnam and the Division of Invertebrate Zoology, American Museum of Natural History, New York, USA (AMNH). Adult morphological and color characters were examined with a Nikon SMZ745 stereomicroscope, while photographs were taken with a Nikon SMZ800N stereomicroscope and an attached ILCE-5000L/WAP2 digital camera. Stacked-focus images were prepared using Helicon Focus 7 and all files were processed with Adobe Photoshop CS6. Male terminalia were dissected from relaxed specimens and then treated with Proteinase K to remove tissue and partially clear the integument. The morphological terminology used in the descriptions follows ENGEL (2001) and MICHENER (2007), with the following body metrics: body length: measured from the base of the antennal torulus to



metasomal apex (in dorsal view), head length: measured from the medioapical margin of the clypeus to the upper margin of the vertex (in facial view), head width: measured at the widest point of the head across the compound eyes (in facial view), eye width: the greatest width of the compound eye (in profile), genal width: the greatest width of the gena (in profile), intertegular distance: measured between the inner rims of the tegulae (in dorsal view). Arabic numbers indicate quantitative values (e.g., metrics, number of elements), while Roman numerals indicate the identity of a particular element in a series. For example, ‘10 flagellomeres’ refers to a collective group of 10 flagellomeres, while ‘flagellomere III’ refers to the third flagellomere of a series (following the example of TRAN et al. 2024).

## Taxonomy

### Tribe Anthidiini Ashmead, 1899, *nomen protectum*

#### Subtribe Stelidina Schenck, 1860

#### Genus *Eusaspis* Gerstacker, 1858

*Eusaspis* Gerstacker, 1857: 460. Type species: *Thynnus abdominalis* Fabricius, 1793, by original designation.

*Dilobopeltis* Fairmaire, 1858 in THOMSON (1858: 266). Type species: *Dilobopeltis fuscipennis* Fairmaire, 1858 (= *Thynnus abdominalis* Fabricius, 1793), monobasic. Isotypic with *Eusaspis* through synonymy.

*Parevaspis* Ritsema, 1874: lxxi. Type species: *Parevaspis basalis* Ritsema, 1874, by designation of SANDHOUSE (1943: 585).

**Diagnosis.** Body black, sometimes faintly bluish, and typically lacking yellow maculations. Metasoma red, sometimes black. Interantennal area with a strong, curved juxtantennal carina mesal to each antennal torulus and also with a smooth, longitudinal, median ridge or carina. Preoccipital carina present laterally, behind genal area, but not behind vertex. Pronotal lobe and omaulus carinate. Metacoxa with strong longitudinal carina on inner margin; outer surface strongly expanded laterally to form a projecting lobe. Mesoscutellum strongly produced posteriorly, overhanging propodeum, forming a thick lamella, punctate, and setose in Asiatic species, but thinner in African species. Scopa absent. Tergum VII of male trilobed, small, extending little beyond tergum VI; gonostylus slender basally, enlarged and flattened beyond base; volsellar lobe of gonocoxite large.

**Species included.** In this paper, the number of species of *Eusaspis* in Vietnam and the world has expanded to four and thirteen, respectively (Table 1).

#### *Eusaspis aequicarinata* Pasteels, 1980

(Figs 1, 2)

**Material examined.** VIETNAM: CAO BANG: 1 ♀, Tra Linh District, Thang Hen lake, 22°45'48"N, 106°17'38"E, alt. 611 m, coll. Ngat Thi Tran, 3.viii.2022 (IB).

**Remarks.** In Vietnam, this species has been recorded previously in the northern region (Hoa Binh Province) and Central Highlands (Kon Tum Province) (BAKER 1995, TRAN et al. 2016). The occurrence of this species from Cao Bang Province (northern Vietnam) reported here is a new record.

**Distribution.** China, Indonesia, Laos, Malaysia, Thailand, and Vietnam (Northern and Central Highlands) (BAKER

1995, NALINRACHATAKAN et al. 2023, SOH et al. 2016, TRAN et al. 2016, this work).

#### *Eusaspis diversicarinata* Pasteels, 1980

(Figs 3, 4)

**Variation.** After carefully reexamining the Vietnamese populations of *E. diversicarinata* mentioned in TRAN et al. (2016), it was discovered that the shape of the female sternum VI differs significantly from that of the eastern Malaysia populations. The Malaysian population has the apical margin of the raised platform of metasomal sternum VI convex (BAKER 1995: fig. 25), while that of the Vietnamese population is distinctively straight, giving the platform a strongly rectangular appearance (Fig. 4F). Additionally, in the Malaysian population the apical width of the platform is slightly narrower than the space from the lateral edge of the platform to the lateral margin of the sternum (BAKER 1995: fig. 25), while in the Vietnamese population the width of the platform is subequal to that of the lateral space (Fig. 4F). Vietnam is the furthest north that the species is recorded and the only occurrences in Southeast Asia, with the nominotypical populations occurring in eastern Malaysia (BAKER 1995). In this case, rather than describe the Vietnamese population as a distinct subspecies or new species, we temporarily consider this is to be mere variation pending the discovery of the male for those in Southeast Asia as well as to sampling more females or performing a phylogeographic analysis for all recorded species of *Eusaspis* to elucidate their classification.

**Distribution.** Eastern Malaysia (Sabah) (BAKER 1995) and Vietnam (Northern) (TRAN et al. 2016).

#### *Eusaspis flavorotundata* Tran & Engel sp. nov.

(Figs 5, 6)

**Type material.** HOLOTYPE: ♀, VIETNAM: SON LA: Sop Cop District, Dom Cang Commune, Sop Cop special use forest, 20°58'57"N, 103°35'11"E, alt. 812 m, coll. Lien Thi Phuong Nguyen, Ngat Thi Tran, Cuong Quang Nguyen, 25.vi.2022 (IB). PARATYPES: VIETNAM: DIEN BIEN: 1 ♀, 21°26'43"N, 103°02'42"E, coll. Lien Thi Phuong Nguyen, Saito F, Kojima J, 24.viii.2006 (IB). SON LA: 1 ♀, Moc Chau District, Chieng Nua Commune, 20°43'18"N, 104°45'28"E, alt. 550 m, coll. Lien Thi Phuong Nguyen, Cuong Quang Nguyen, Ngat Thi Tran, Thai Van Mai, 23.vi.2020 (IB). KON TUM: 1 ♀, Sa Thay District, Chu Mom Ray National Park, Ro Koi Ranger Station, 14°27'25"N, 107°36'22"E, alt. 267 m, coll. Lien Thi Phuong Nguyen, Ngat Thi Tran, 25.iv.2022 (AMNH).

**Diagnosis.** The female of this species superficially resembles that of smaller individuals of *E. polynesia* but can be distinguished from the latter by the dorsally exposed portion of sternum VI broadly rounded, not medially lobed; sternum VI with discal surface faintly raised basally, apical margin laterally straight until concave before basolateral tubercle (sternum VI with noticeable swelling of discal surface basally, apical margin laterally wavy before basolateral tubercle in *E. polynesia*); punctures on mesoscutellum denser (punctures on mesoscutellum sparser in *E. polynesia*); axilla and mesoscutellum with yellow maculations apicolaterally (axilla and mesoscutellum wholly black in typical *E. polynesia*).

**Description.** *Female.* Body length 7.5–9.5 mm (holotype = 8.5 mm), forewing length 6.5–8.5 mm (holotype = 7.5 mm).

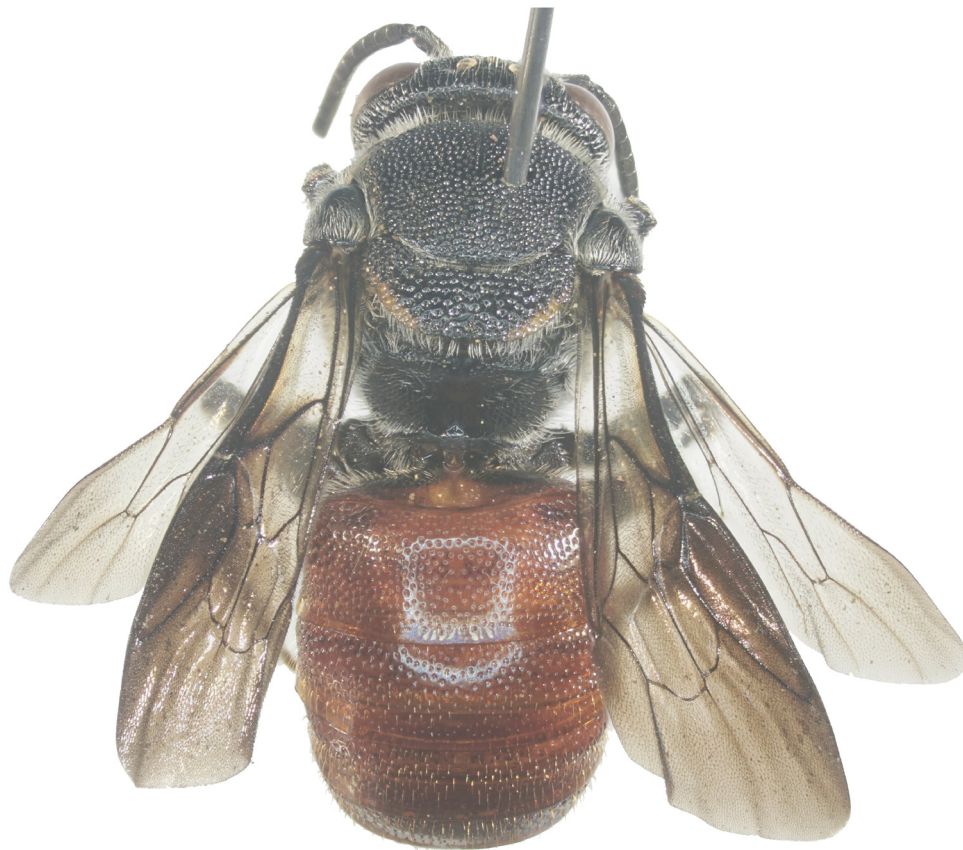


Fig. 1. *Euaspsis aequicarinata* Pasteels, 1980, female from Cao Bang Province. A – habitus, lateral view; B – habitus, dorsal view. Scale bars = 1.0 mm.

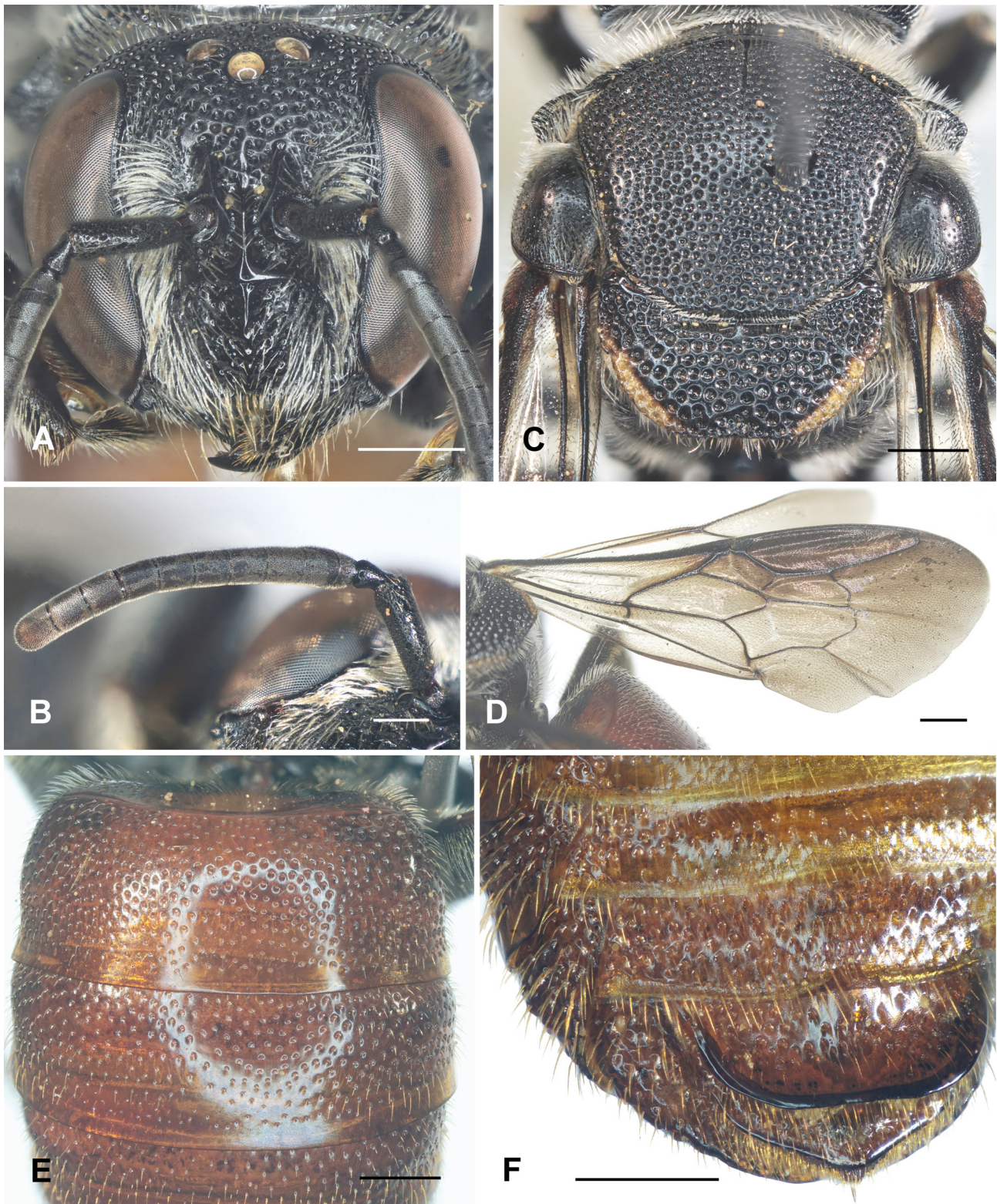


Fig. 2. *Euspis aequicarinata* Pasteels, 1980, female from Cao Bang Province. A – head, frontal view; B – right antenna; C – mesosoma, dorsal view; D – right wing; E – metasomal terga I–II, dorsal view; F – metasomal sternum VI, ventral view. Scale bars = 1.0 mm (A), 0.5 mm (C–F).

**Structure.** Head broader than long, approximately  $1.2\times$  as broad as long. Compound eyes about  $2.7\times$  as long as broad, about  $1.5\times$  genal width. Mandible tridentate, interspace between first two teeth broad, about  $1.3\times$  interspace between second and third teeth (Fig. 6A). Clypeus slightly convex medially in dorsal view, broader than long, about  $2\times$

as broad as long. Supraclypeal area slightly convex medially, with a median longitudinal keel. The interantennal area with a strong, curved juxtantennal carina (Fig. 6A). Scape slender, about  $3.5\times$  as long as broad; pedicel approximately as broad as long and  $1.1\times$  flagellomere I; flagellomere I shortest, about  $1.3\times$  as broad as long; flagellomeres II–IX

subequal in lengths; flagellomere X longest, about  $1.2\times$  as long as broad (Fig. 6B). Metascutellum strongly produced posteriorly, overhanging the propodeum and rounded apical margin (Fig. 6C). Forewing with two submarginal cells, second submarginal cell broader than first submarginal cell, 2m-cu exceeding apical margin of second submarginal cell (Fig. 6E). Dorsally exposed portion of sternum VI broadly rounded, not lobed medially; sternum VI with discal surface faintly raised basally, apical margin laterally straight until concave before basolateral tubercle (Fig. 6G).

**Sculpture.** Clypeus with elongate, dense, contiguous punctures laterally and minute, dense, contiguous apically, punctures on lateral area much larger than those on apical area, punctures on median area with round, rather sparser, smaller than those on lateral area and separated by  $0.1\text{--}0.3\times$  puncture widths (Fig. 6A). Supraclypeal area with elongate, dense, nearly contiguous punctures except impunctate on medio-apical area, puncture sizes generally smaller than those on lateral area of clypeus. Frons with dense, contiguous, wrinkled punctures on interspace antennal toruli and round, dense, nearly contiguous punctures on remainder, size of punctures equal to those on clypeus. Vertex with round, sparse punctures, punctures of unequal sizes and separated by  $0.2\text{--}1.0\times$  puncture widths. Punctures on inner space between ocelli distinct, smaller, denser than those on vertex. Mesoscutum with round, dense, distinct punctures, punctures relatively uniform in size and separated by  $0.2\text{--}0.5\times$  puncture widths; punctures on mesepisternum similar as those on mesoscutum; axilla and mesoscutellum with larger, dense, coarser punctures except on basal and apical margins with small punctures (Fig. 6C). Terga I–V with round, minute, sparse punctures and separated by  $2\text{--}3\times$  puncture widths except denser, wrinkled punctures on lateral area, tergum VI with dense, contiguous, wrinkled punctures (Figs 5B, 6F). Sterna I–V with nearly impunctate punctures on medio-basal, sparse punctures on apical area and dense, wrinkled punctures on lateral area, sternum VI with round, dense, distinct punctures except sparse punctures to impunctate on medio-basal area and smaller, contiguous punctures on apical margin (Fig. 6G).

**Colour.** Body black except as follows: mandible apical half brownish red (Fig. 6A); ventrally on 2/3 apical flagellomere II and flagellomeres II–X brownish black to brown (Fig. 6B); proboscis, distitarsi, pretarsal claws basally with yellowish brown (Fig. 5A); tegulae brownish on apical margin, axilla and mesoscutellum apicolaterally with yellow maculations on apicolateral margins (Fig. 6C); forewing subhyaline basally and dark on remainder (Fig. 6E); metasoma red (Figs 5A, B).

**Pubescence.** Clypeus with dense, white plumose setae intermixed with some simple setae on lateral area and shorter, white plumose setae intermixed with some long, yellow simple setae on apical margin. Outer surface of mandible with short, dense, white setae basally, then sparse, yellow setae on remainder; posterior margin of clypeus with short, dense, white setae basal half and shorter, sparser, yellow setae intermixed with some long setae on remainder. Paraocular area with long, dense, white plumose setae; above antennal torulus with long, white plumose setal

tuft. Supraclypeal area, frons and vertex with short, sparse, white setae (Fig. 6A). Gena from below compound eyes to halfway up with relatively dense, white plumose setae, and from there to near top of eye with sparser, white setae. Pronotum with dense, white, plumose setae (Fig. 5A). Mesoscutum and mesoscutellum with short, sparse, white setae. Tegulae with short, sparse, white setae except tuft of white plumose setae apically. Pronotal lobe with sparse, white setae except tuft of white plumose setae apically and shorter, white, plumose setae band on outer margin (Fig. 5A). Mesepisternum with short, sparse, white setae. Metanotum with dense, white, plumose setae laterally. Above propodeal spiracle with dense, white, plumose setae (Figs 5A, 6D). Beneath procoxa, protonchanter, and profemur with dense, white setae; setae ventrally on meso- and metacoxae, mesotrochanter, and mesofemur sparser than those on foreleg. Outer surface of all tibiae with short, yellowish setae; outer surface of all basitarsi with dense, yellowish setae and inner surfaces of these podites with stiff, dense, yellowish orange setae. Terga I–III with short, sparse, yellowish to yellowish orange setae; terga IV–V with short, little denser, orange setae; terga VI with dense, orange setae. Sterna I–VI with sparse, yellowish orange setae except bands of yellowish orange setae on apical margins of sterna I–V.

**Male.** Unknown.

**Etymology.** The specific epithet is a combination of the Latin adjectives *flāvus*, meaning, “yellow”, and *rotundātus* (*-a, -um*), meaning, “rounded”, and refers to the yellow maculations of the mesoscutellum and the distinctive shape of the apex of sternum VI of the female when viewed dorsally.

**Remarks.** It is of significance that the shape of sternum VI and the yellow maculations apicolaterally on the axilla and mesoscutellum of an undescribed female from Laos (SOH et al. 2016: figs 8A, C) are extremely similar to those of *E. flavorotundata* sp. nov. Moreover, these character states are also observed in two individuals collected from Thailand (NALINRACHATAKAN et al. 2023: fig. 11), which were identified as “*Euaspsis* aff. *wegneri*”, and are nearly identical to that of the Vietnamese specimens. The specimens recorded from Vietnam, Laos, and Thailand differ significantly from *E. wegneri* in the following character states: punctures on mesoscutellum sparser and not contiguous (punctures on mesoscutellum dense, contiguous in *E. wegneri*, see BAKER 1995: fig. 31); the presence of yellow maculations apicolaterally on the axilla and mesoscutellum (yellow maculations absent apicolaterally on the axilla and mesoscutellum in *E. wegneri*, see BAKER 1995: fig. 31); sternum VI relatively rounded (sternum VI subacute in *E. wegneri*, see BAKER 1995: fig. 24). Therefore, we attribute the new species to occurring in these neighboring countries.

Individuals of this species were collected around wooden houses, an ideal habitat for finding individuals of *Euaspsis*, as well as other solitary bees that live inside wood or are cleptoparasitic on these same bees (Fig. 12A). Similar to *E. polynesia*, the size of *E. flavorotundata* is variable, likely owing to host size. The complexities of host-cleptoparasite associations and development require

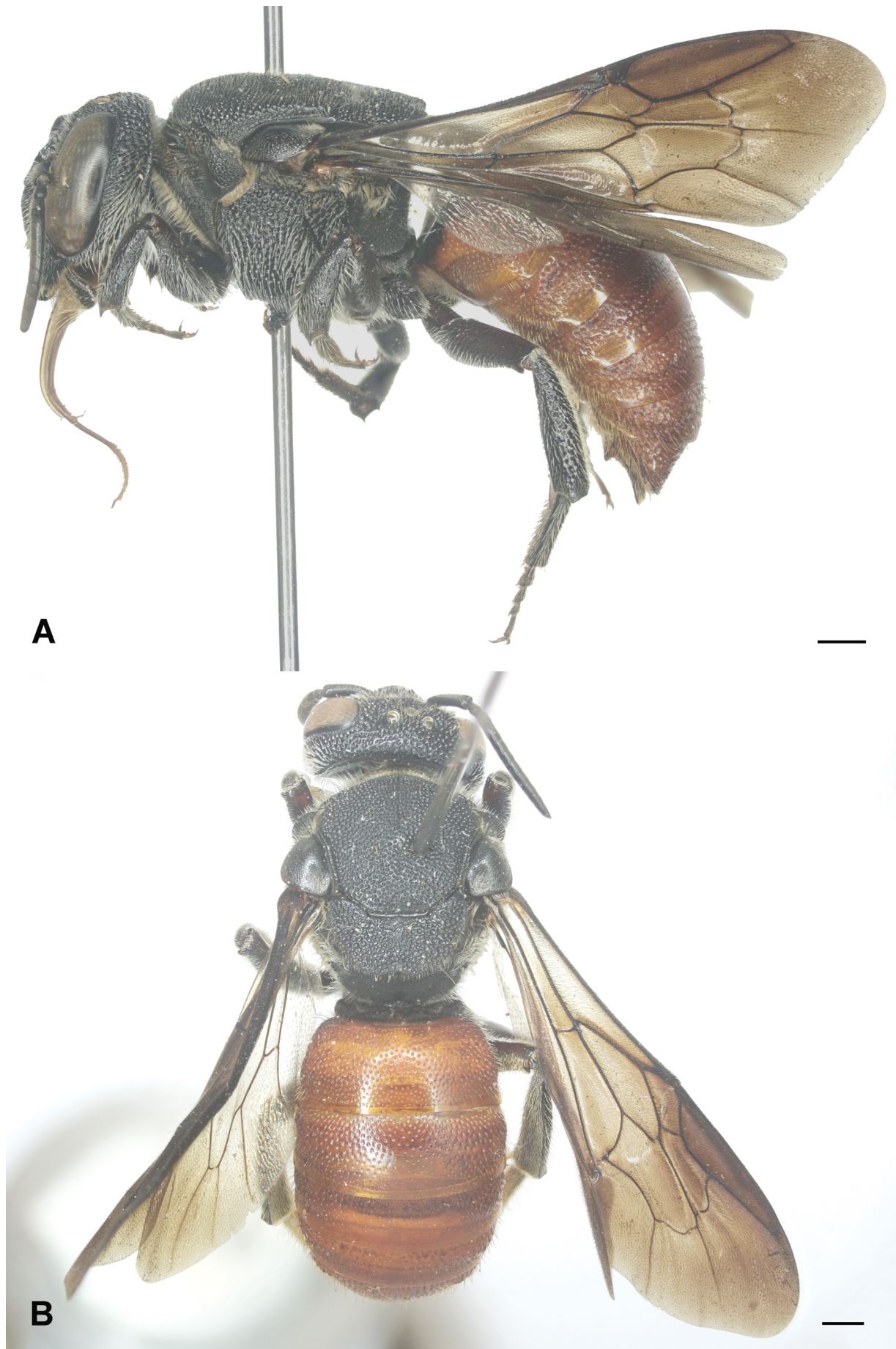


Fig. 3. *Euaspis diversicarinata* Pasteels, 1980, female from Bac Giang Province. A – habitus, lateral view; B – habitus, dorsal view. Scale bars = 1.0 mm.

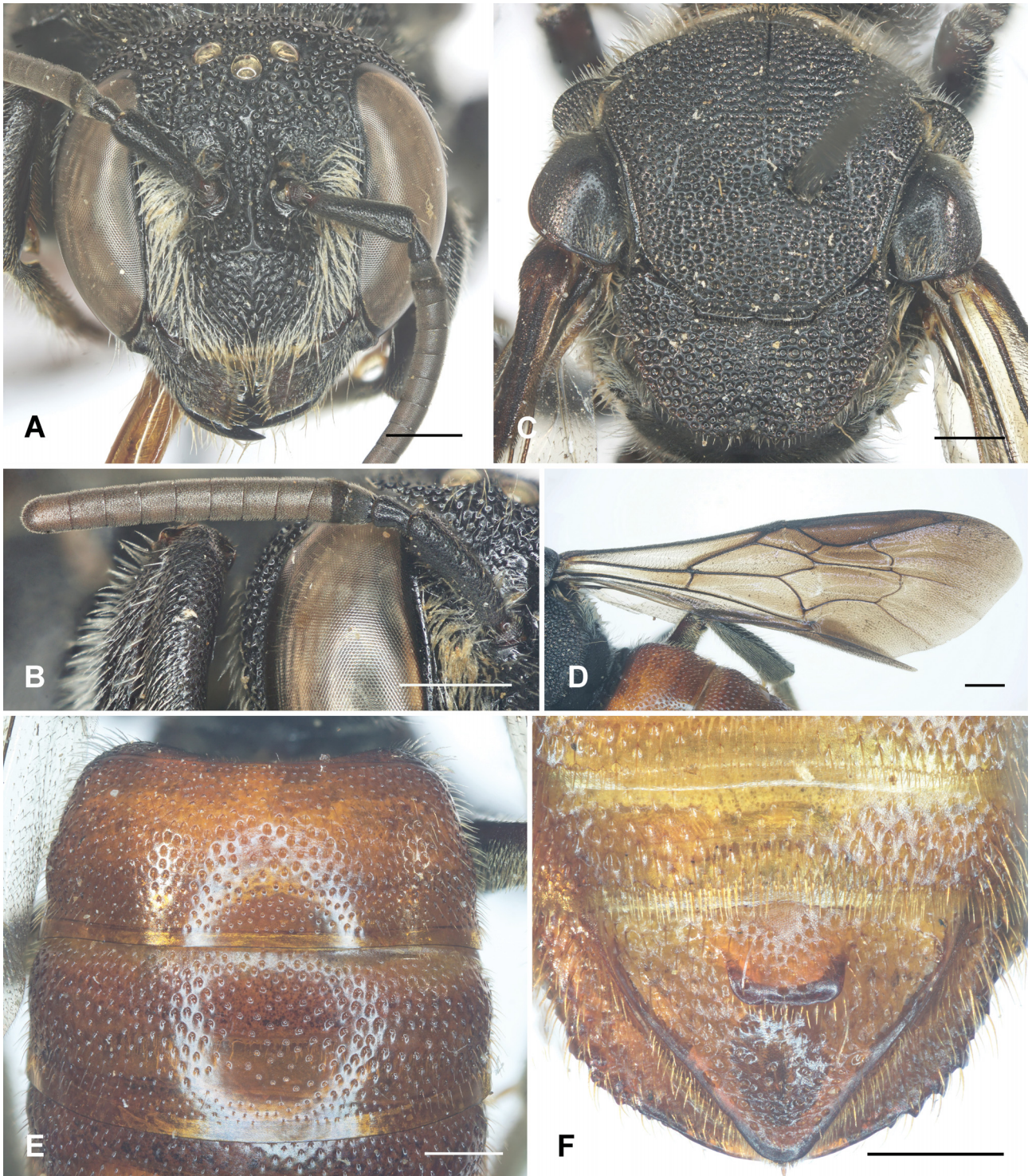


Fig. 4. *Euaspis diversicarinata* Pasteels, 1980, female from Bac Giang Province. A – head, frontal view; B – right antenna; C – mesosoma, dorsal view; D – right wing; E – metasomal terga I–II, dorsal view; F – metasomal sternum VI, ventral view. Scale bars = 1.0 mm.

further study.

Symbiotic mites of the family Acaridae (Astigmata) are present on the holotype of *E. flavorotundata*, as well as on some individuals of *E. polynesia* (Figs 6D, 8D). A detailed taxonomic study of the mites remains to be completed.

**Distribution.** Laos ((SOH et al. 2016, as *Euaspis* nov. sp.?), Thailand (NALINRACHATAKAN et al. 2023, as *Euaspis* aff. *wegneri*), and Vietnam (Northern and Central Highlands) (this work).

### *Euaspis polynesia* Vachal, 1903

(Figs 7–11)

**Material examined.** VIETNAM: CAO BANG: 1 ♂, Nguyen Binh District, Tinh Tuc Commune, Phia Oac – Phia Den National Park, 22°35'03"N, 105°51'40"E, alt. 944 m, coll. Lam Xuan Truong et al., 9.vi.2020 (AMNH); 1 ♂, Nguyen Binh District, Thanh Cong Commune, 22°34'18.3"N, 105°52'34"E, alt. 1052 m, coll. Ngat Thi Tran, 22.vii.2024 (AMNH). DIEN BIEN: 2 ♀♀, Dien Bien District, Pa Thom Commune, Pa Xa La Village, 21°17'19"N, 102°56'60"E, alt. 475 m, coll. Ngat Thi Tran, 2.iii.2023 (IB). LANG SON: 1 ♀ 2 ♂♂, Huu Lung District, Huu

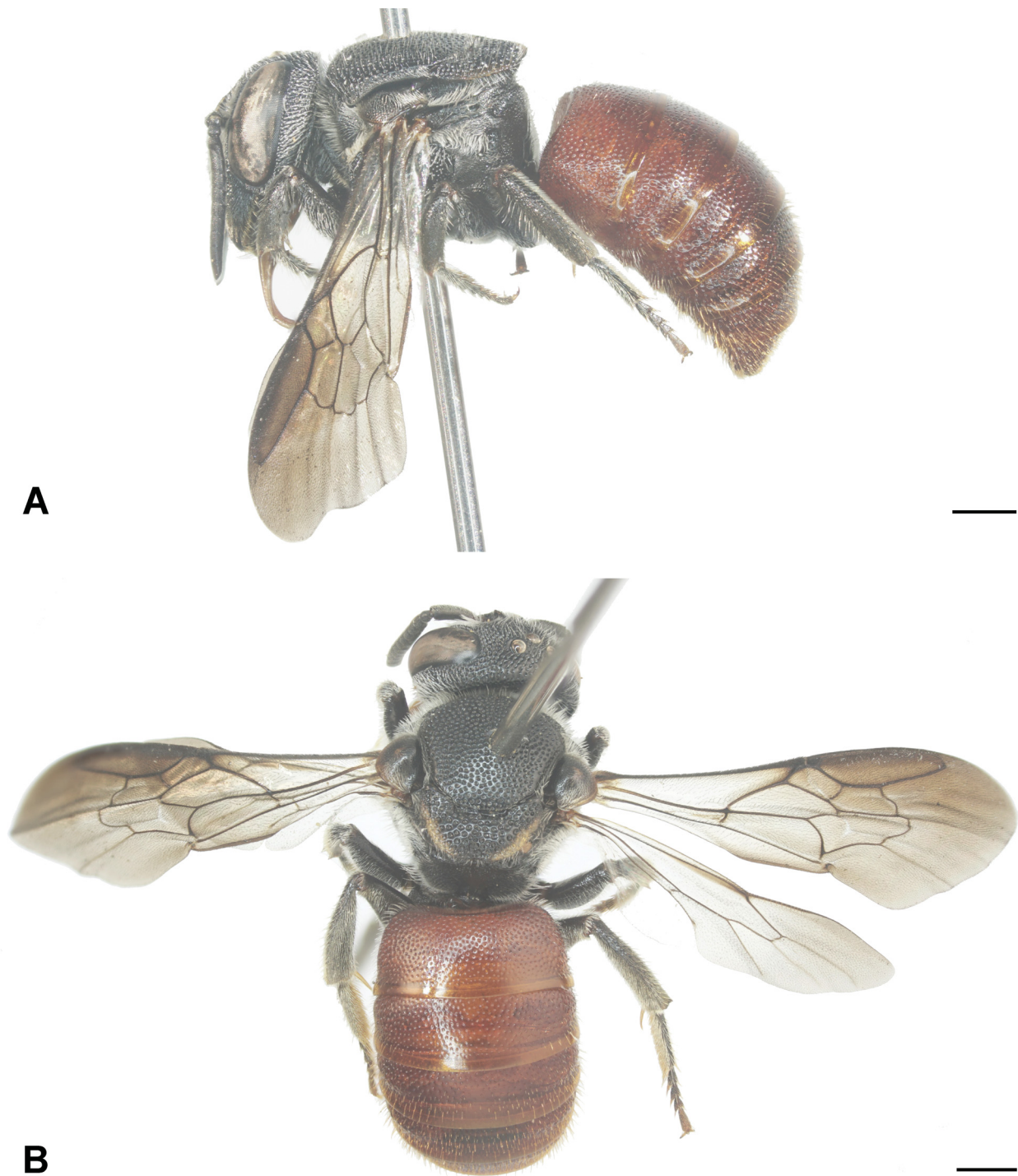


Fig. 5. *Euaspis flavorotundata* sp. nov., female from Son La Province. A – habitus, lateral view; B – habitus, dorsal view. Scale bars = 1.0 mm.

Lien Natural Reserve, Lan Chau, 21°44'30"N, 106°22'43"E, alt. 345 m, coll. Lien Thi Phuong Nguyen, Ngat Thi Tran, 22.vii.2022 (IB). **SON LA:** 2 ♀♀, Moc Chau District, sub-zone 8, 20°44'15"N, 104°37'34"E, alt. 550 m, coll. Lien Thi Phuong Nguyen, Cuong Quang Nguyen, Ngat Thi Tran, Thai Van Mai, 22.vi.2020 (IB); 1 ♀, Moc Chau District, Chieng Nua Commune, 20°43'18"N, 104°45'28"E, alt. 550 m, coll. Lien Thi Phuong Nguyen, Cuong Quang Nguyen, Ngat Thi Tran, Thai Van Mai, 23.vi.2020 (IB); 1 ♀, Van Ho District, Chieng Xuan Commune, Po Hong Village, coll. Phong Huy Pham, 13.–17.vi.2018 (IB); 1 ♀ 2 ♂♂, Sop Cop District, Dom Cang Commune, Sop Cop special use forest, 20°58'57"N, 103°35'11"E, alt. 812 m, coll. Lien Thi Phuong Nguyen, Ngat Thi Tran, Cuong Quang Nguyen, 25.vi.2022 (1 ♀ 1 ♂ in IB; 1 ♂ in AMNH); 1 ♂,

Son La City, Chieng Den Commune, coll. Dai Dac Nguyen, 6.v.2017 (IB); 1 ♂, Muong La District, Nam Pam Commune, Muong La Natural Reserve, coll. Duong Dinh Tran, 24-26.vii.2024 (IB). **HANOI:** 1 ♀, Chuong My District, Tan Phu Commune, 20°48'44.2"N, 105°37'58.5"E, coll. Hoa Thi Dang, 8.vii.2024 (IB). **HOA BINH:** 1 ♀ 1 ♂, Luong Son District, coll. Hoa Thi Dang, 30.ix.2024 (IB). **THANH HOA:** 1 ♀, Trung Son District, coll. Lien Thi Phuong Nguyen, 1.x.2017 (IB). **NGHE AN:** 1 ♂, Con Cuong District, Pu Mat National Park, Khe Choang Ranger Station, 18°57'44.8"N, 104°41'08"E, alt. 142 m, coll. Ngat Thi Tran, 31.viii.2020 (AMNH). **HA TINH:** 3 ♀♀, Vu Quang District, Vu Quang National Park, Khe Che Ranger Station, 18°24'33"N, 105°18'39"E, alt. 32 m, coll. Lien Thi Phuong Nguyen, Ngat Thi Tran, 20.iv.2022 (1 ♀ in IB, 2 ♀♀ in

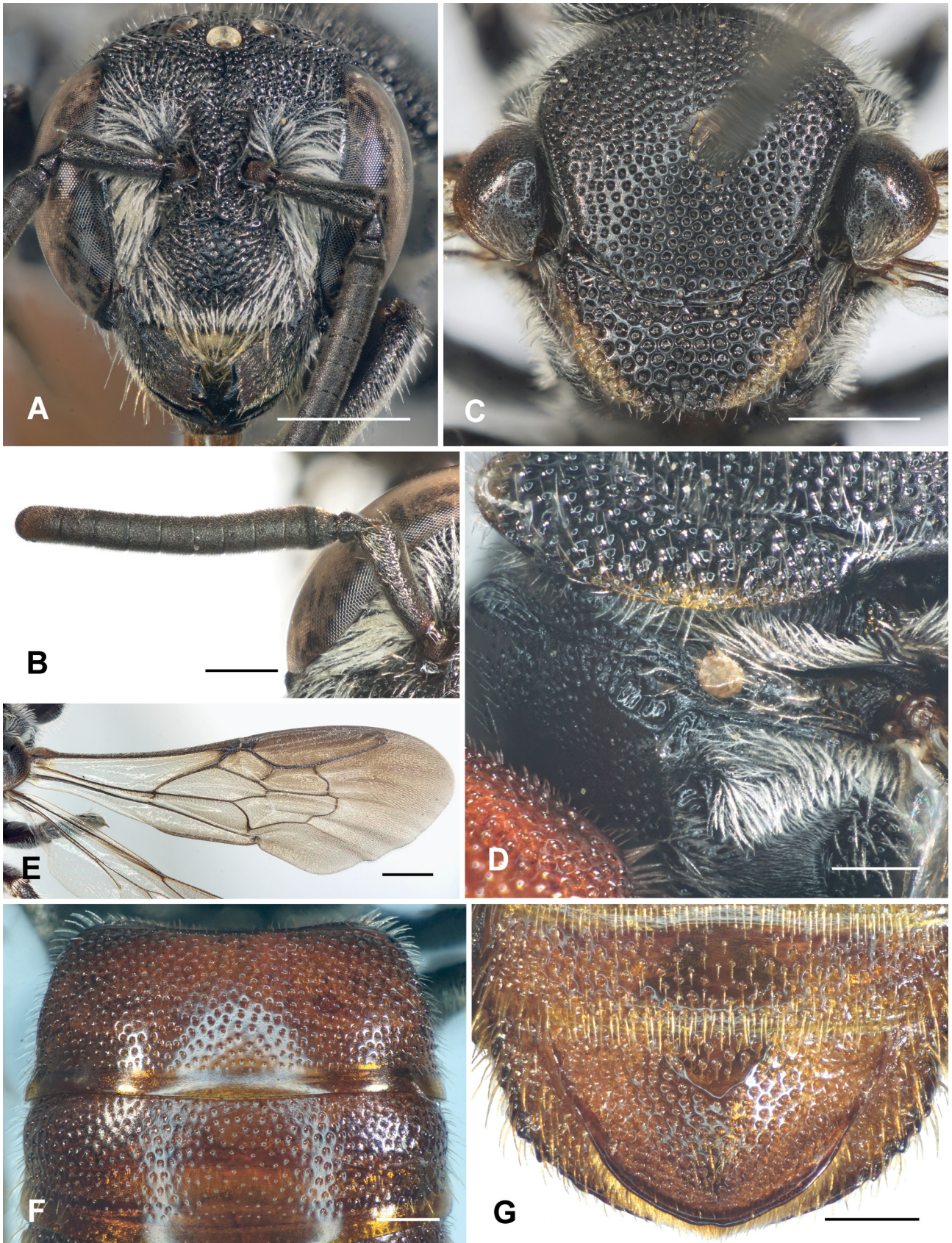


Fig. 6. *Euaspis flavorotundata* sp. nov., female from Son La Province. A – head, frontal view; B – right antenna; C – mesosoma, dorsal view; D – propodeum, lateral view showing symbiotic associations with mites; E – right wing; F – metasomal terga I–II, dorsal view; G – metasomal sternum VI, ventral view. Scale bars = 1.0 mm (A, C, E), 0.5 mm (B, D, F–G).

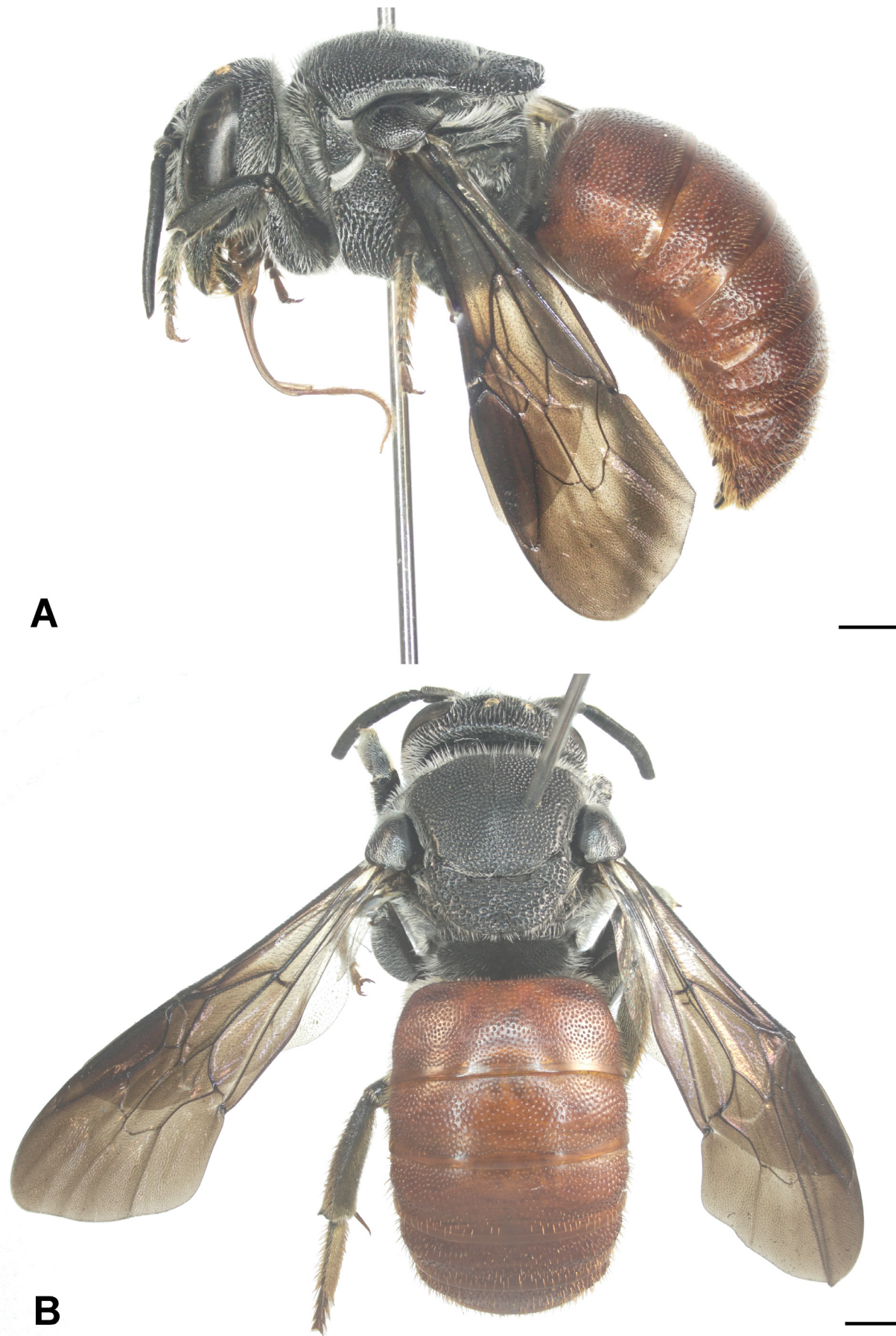


Fig. 7. *Euspis polynesia* Vachal, 1903, female from Kon Tum Province. A – habitus, lateral view, female; B – habitus, dorsal view, female. Scale bars = 1.0 mm.

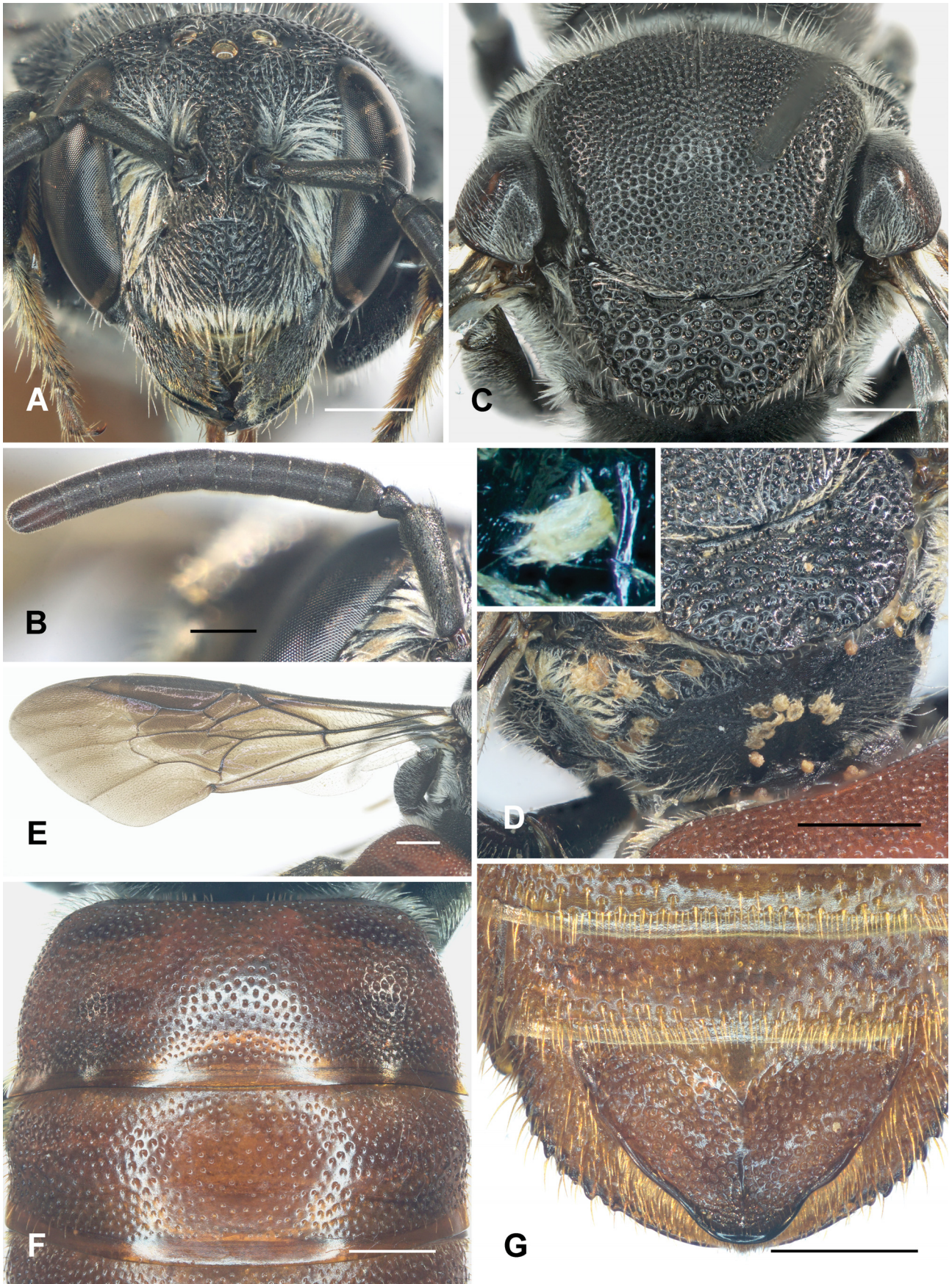


Fig. 8. *Euaspis polynesia* Vachal, 1903, female from Kon Tum Province. A – head, frontal view; B – right antenna; C – mesosoma, dorsal view; D – propodeum, lateral view showing symbiotic associations with mites; E – right wing; F – metasomal terga I–II, dorsal view; G – metasomal sternum VI, ventral view. Scale bars = 1.0 mm (A, C–G), 0.5 mm (B).

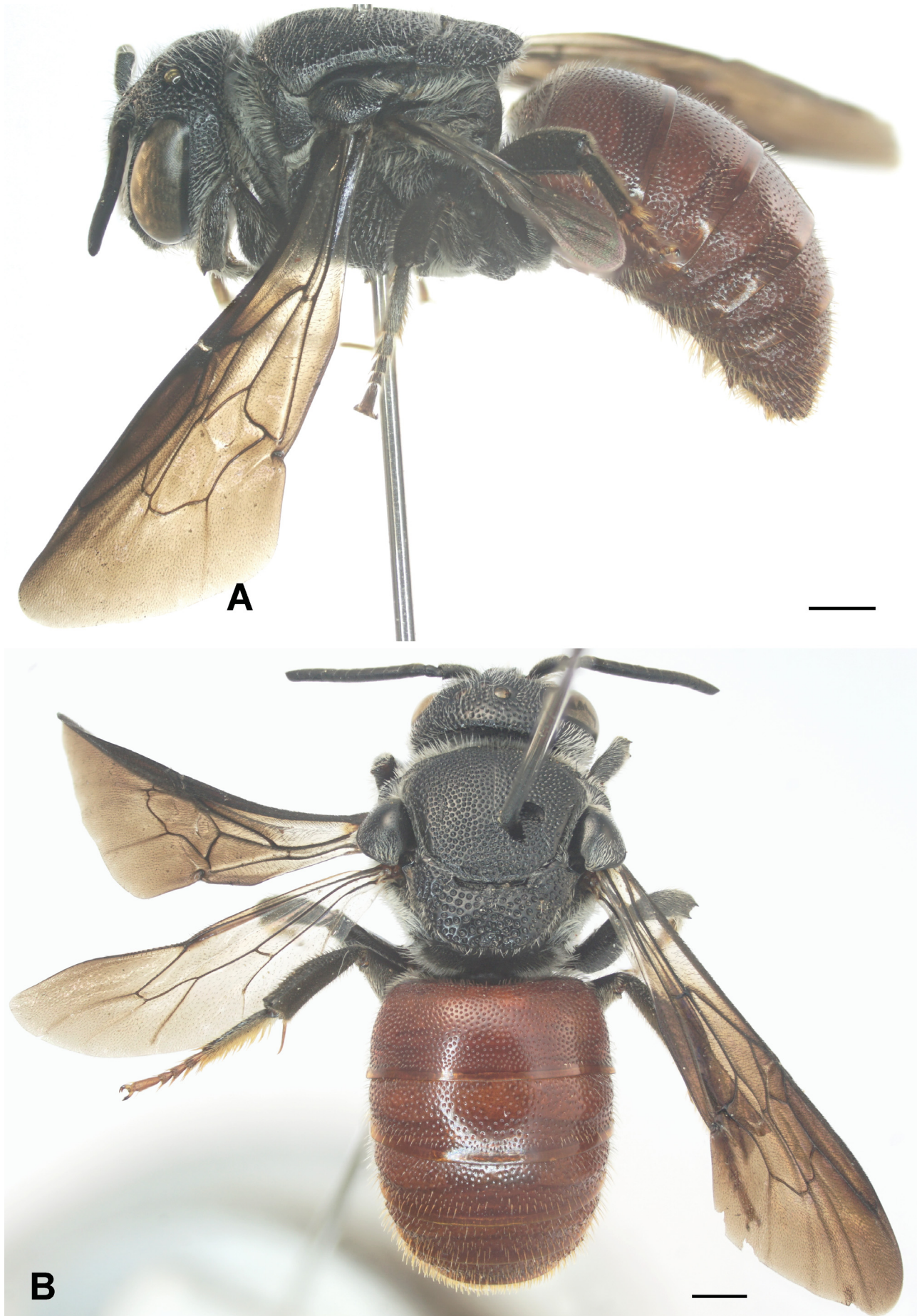


Fig. 9. *Euaspsis polynesia* Vachal, 1903, male from Kon Tum Province. A – habitus, lateral view, male; B – habitus, dorsal view, male. Scale bars = 1.0 mm.

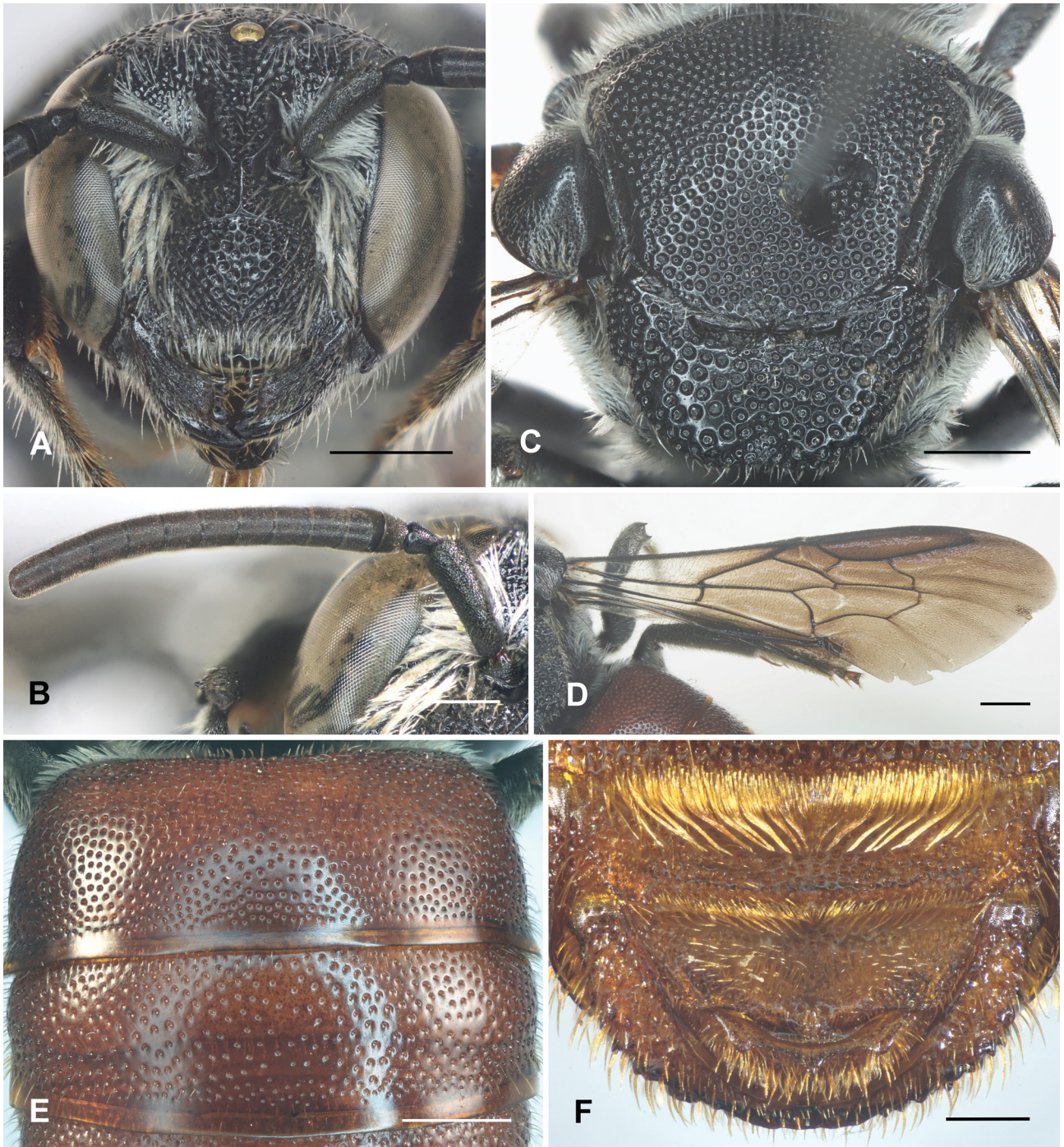


Fig. 10. *Euaspsis polynesia* Vachal, 1903, male from Kon Tum Province. A – head, frontal view; B – right antenna; C – mesosoma, dorsal view; D – right wing; E – metasomal terga I–II, dorsal view; F – metasomal sternum VI, ventral view. Scale bars = 1.0 mm (A, C–E), 0.5 mm (B, F).

AMNH); 1 ♀, Vu Quang District, Vu Quang National Park, Co Ranger Station, 18°17'45"N, 105°22'30"E, alt. 78 m, coll. Lien Thi Phuong Nguyen, Ngat Thi Tran, 21.iv.2022 (IB). **KON TUM:** 2 ♀♀, Sa Thay District, Xa Son Commune, Chu Mom Ray National Park, 14°25'19"N, 107°43'54"E, alt. 653 m, coll. Lien Thi Phuong Nguyen, Ngat Thi Tran, 24.iv.2022 (AMNH); 1 ♀ 2 ♂♂, Sa Thay District, Chu Mom Ray National Park, Ro Koi Ranger Station, 14°27'25"N, 107°36'22"E, alt. 267 m, coll. Lien Thi Phuong Nguyen, Ngat Thi Tran, 25.iv.2022 (IB). **GIA LAI:** 1 ♀, Kbang District, Ranger Station No. 5, Kon Ka Kinh National Park, 14°17'46"N, 108°27'01"E, alt. 525 m, coll. Lien Thi Phuong Nguyen, Ngat Thi Tran, 28.iv.2022 (IB). **KIEN GIANG:** 1 ♀, U Minh Thuong District, U Minh Thuong National Park, coll. Lam Xuan Truong et al., 10.x.2023 (IB); 1 ♀, U Minh Thuong District, U Minh Thuong National Park, coll. Lam Xuan Truong et al., 19.xi.2023 (IB).

**Biology.** *Euaspsis polynesia* is the most common species in the country. Individuals are often encountered around local people's homes near the forest and collected when flying out from inside old wooden pillars. The diameter of such entrances are about 4–5 mm (Figs 12B, C). Interestingly, at localities where *E. polynesia* is collected one can often find potter wasps of the genus *Okinawepipona* Yamane, 1987 (Vespidae), cuckoo wasps of the genus *Chrysis* Linnaeus, 1761 (Chrysididae), and many kinds of crabronid wasps. Some female individuals of this species have yellow maculation on the mesoscutellum apicolaterally. It would be

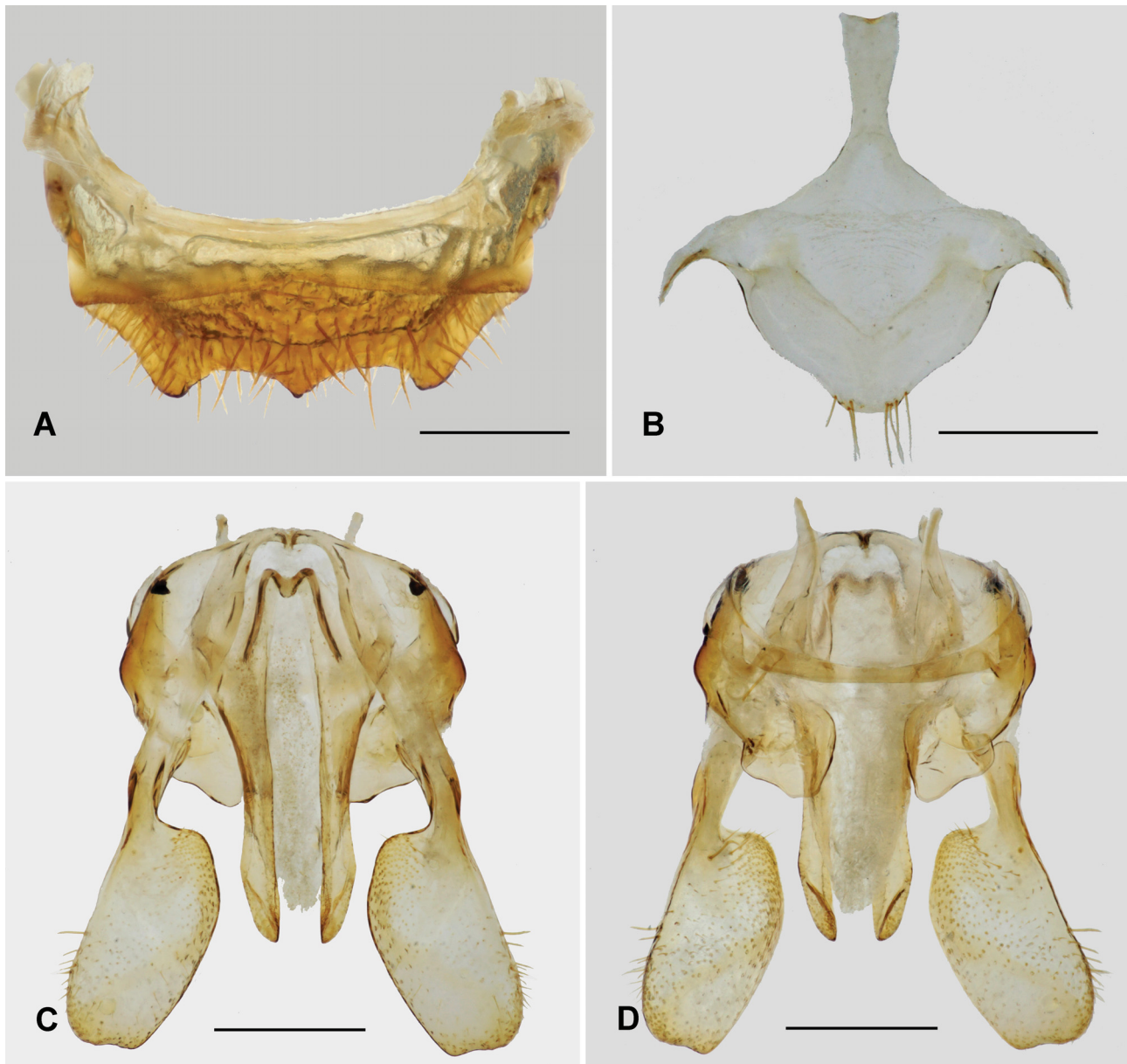


Fig. 11. *Euaspsis polyesia* Vachal, 1903, male from Kon Tum Province. A – tergum VII, dorsal view; B – sternum VIII; C – male genitalia, dorsal view; D – male genitalia, ventral view. Scale bars = 0.5 mm.

interesting to collect and dissect males from populations across the entire range of the species to determine if this is a complex of cryptic taxa.

This species was recorded on flowers of many families: Asteraceae, Lythraceae, Oxalidaceae, Orchidaceae, Muntingiaceae, Lamiaceae, Boraginaceae, Polygonaceae, while some others were collected on flowers of Fabaceae, Lamiaceae, and Verbenaceae (Table 1). Further research is required on the relationship between these bees and their host plants to protect their bee hosts, the hosts' pollen sources, the nectar sources for *Euaspsis*, and their habitats generally.

**Distribution.** This species has a widespread distribution throughout Eastern Asia (BAKER 1995), GHOSH et al. (2023), NALINRACHATAKAN et al. (2023), SOH et al. (2016), this work). A phylogeographic study of this common species would be of considerable significance for under-

standing the biogeographic history of its populations and whether or not it is maintaining specific integrity across its considerable range.

#### Key to species of *Euaspsis* in Vietnam

(males of *E. flavorotundata* and *E. aequicarinata* unknown)

- 1 Females. .... 2
- Males. .... 5
- 2 Metasomal sternum VI with prominent, raised platform (Figs 2F, 4F). .... 3
- Metasomal sternum VI without raised platform (Figs 6G, 8G). .... 4
- 3 Raised platform of sternum VI large, encompassing nearly entire surface of sternum (Fig. 2F); mesoscutellar punctation noticeably coarser than that of mesoscutum (Fig. 2C); clypeus with strong mediolongitudinal carina (Fig. 2A), sometimes carina weak in apical

Table 1. Summary of species currently in the genus *Euasps* Gerstacker, 1858

Taxon	Gender	Distribution	Potential host	Floral association	Source
<i>Euasps abdominalis</i> (Fabricius, 1793)	♀♂	Widely distributed in sub-Saharan Africa	<i>Chalicodoma cincta</i> (Fabricius, 1781)	<i>Cassia</i> sp. (Fabaceae), <i>Duranta erecta</i> L. (Verbenaceae)	EARDLEY & URBAN (2010), NKULU et al. (2023)
<i>Euasps aequicarinata</i> Pasteels, 1980	♀♂	China, Indonesia, Laos, Malaysia, Thailand and Vietnam	Unknown	<i>Coleus scutellarioides</i> (L.) Benth. (Lamiaceae)	BAKER (1995), NALINRACHATAKAN et al. (2023), SOH et al. (2016), TRAN et al. (2016), this work
<i>Euasps basalis</i> (Ritsema, 1874)	♀♂	Japan, Korean Peninsula, China, Taiwan	Unknown	Unknown	BAKER (1995)
<i>Euasps carbonaria</i> (Smith, 1854)	♀♂	India	Unknown	Unknown	BAKER (1995)
<i>Euasps diversicarinata</i> Pasteels, 1980	♀♂	Malaysia, Vietnam	Unknown	<i>Acacia</i> sp. (Fabaceae)	BAKER (1995), TRAN et al. (2016)
<i>Euasps edentata</i> Baker, 1995	♀♂	India, Sri Lanka	<i>Lithurgus</i> sp.	<i>Vitex</i> sp. (Verbenaceae)	BAKER (1995)
<i>Euasps erythros</i> (Meunier, 1890)	♂	Democratic Republic of the Congo, Mozambique, Namibia, Zimbabwe	Unknown	<i>Acacia horrida</i> (L.) Willd. (Fabaceae)	EARDLEY & URBAN (2010)
<i>Euasps flavorotundata</i> sp. nov.	♀	Laos, Thailand, Vietnam	Unknown	Unknown	NALINRACHATAKAN et al. (2023), SOH et al. (2016), this work
<i>Euasps lorenzae</i> Baker, 1995	♂	Philippines	Unknown	Unknown	BAKER (1995)
<i>Euasps polynesia</i> Vachal, 1903	♀♂	Widely distributed in Eastern Asia	<i>Megachile disjuncta</i> (Fabricius, 1781)	<i>Ageratum conyzoides</i> L. and <i>Bidens pilosa</i> (L.) Benth. (Asteraceae), <i>Cuphea hyssopifolia</i> K. (Lythraceae), <i>Averrhoa carambola</i> L. (Oxalidaceae), <i>Grammatophyllum speciosum</i> Blume (Orchidaceae), <i>Muntingia calabura</i> L. (Muntingiaceae), <i>Premna serratifolia</i> L. (Lamiaceae), <i>Cordia cylindristachya</i> (Ruiz & Pav.) Roem. & Schult. (Boraginaceae), <i>Antigonon leptopus</i> Hook. & Arn. and <i>Fagopyrum esculentum</i> Moench (Polygonaceae)	BAKER (1995), GHOSH et al. (2023), NALINRACHATAKAN et al. (2023), SOH et al. (2016), this work
<i>Euasps strandi</i> Meyer, 1922	♀♂	China, Philippines, Thailand	Unknown	<i>Sindora siamensis</i> Teijsm. ex Miq. (Fabaceae)	BAKER (1995)
<i>Euasps trilobata</i> Pasteels, 1980	♀♂	Indonesia	Unknown	Unknown	BAKER (1995)
<i>Euasps wegneri</i> Baker, 1995	♀	Indonesia	Unknown	Unknown	BAKER (1995)

third; axilla and mesoscutellum with yellow maculations apicolaterally (Fig. 2C). .....

..... *E. aequicarinata* Pasteels, 1980

- Raised platform of sternum VI smaller, occupying less than half of exposed sternal surface (Fig. 4F); mesoscutellar punctation similar to that of mesoscutum (Fig. 4C); clypeus without strong mediolongitudinal carina (Fig. 4A), at most faint, weak ridge in basal half; axilla and mesoscutellum wholly black (Fig. 4C). .....

..... *E. diversicarinata* Pasteels, 1980

- 4 Axilla and mesoscutellum with yellow maculations apicolaterally (Fig. 6C); dorsally exposed portion of sternum VI broadly rounded (Fig. 6G), not medially lobed; sternum VI with discal surface faintly raised basally, apical margin laterally straight until concave before basolateral tubercle (best seen in profile: Fig. 6G). .....
- Axilla and mesoscutellum wholly black (Fig. 8C); dorsally exposed portion of sternum VI extended as medial lobe (Fig. 8G); sternum VI with noticeable

- swelling of discal surface basally, apical margin laterally wavy before basolateral tubercle (best seen in profile: Fig. 8G). ..... *E. polynesia* Vachal, 1903
- 5 Metasomal sternum VI impunctate and glabrous laterally, sparsely punctate, and weakly setose mesally. Apical half of male gonostylus slightly expanded and apical margin relatively rounded, inner corner sharp, inner margin slightly concave (BAKER 1995: fig. 14). ..... *E. diversicarinata* Pasteels, 1980
- Metasomal sternum VI densely punctate with abundant, erect setae (setae particularly easily seen in profile: Fig. 10A). Male gonostylus cleaver-shaped, apical half much expanded, and apical margin nearly straight, inner corner rounded, inner margin slightly convex (Figs 11C, D). ..... *E. polynesia* Vachal, 1903



Fig. 12. Habitat of *Euaspsis* from Vietnam. A – habitat of *Euaspsis flavorotunadata* sp. nov.; B – habitat of *Euaspsis polynesia* Vachal, 1903; C – the entrance of *Euaspsis polynesia* in outside view.

## Discussion

The results of this study contribute to supplementing some data on *Euaspis* species in Vietnam. The field trips should continue to be conducted in the country as well as neighboring countries (Laos and Thailand) to find males of the new species. Moreover, a comprehensive survey through Southeast Asia aims to discover the associated sex of the remaining species and compare the difference in species composition between mainland and island countries. The combination of morphological and molecular analysis also needs to be more strongly promoted to clarify the taxonomic position as well as the phylogenetic relationships within this genus.

The flight season and altitudinal distribution of *Euaspis* species along with floral association, and potential host are also interesting aspects that should be concerned to fill the gap in knowledge about their biology.

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