

# Description of a New Leaf-Cutter Bee of the Genus *Megachile* Latreille, 1802 (Hymenoptera: Megachilidae) from Vietnam

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**Abstract** The leaf-cutter bee *Megachile (Aethomegachile) vietnamica* sp. nov. from Vietnam is described and illustrated. A map showing its distribution is presented.

**Key words:** Pollination, taxonomy, *Aethomegachile*, Apoidea, Southeastern Asia

## Introduction

Bees of the family Megachilidae play an important role in the pollination of the angiosperms, including both leaf cutter and resin bees. This family consists of both solitary and cleptoparasitic species and is noteworthy for its astonishing diversity of nesting habits and floral relationships, which are collectively more diverse than any other bee group (Müller, 1996; Michener, 2007).

Megachilidae is one of the seven extant bee families containing more than 4100 described species in about 76 genera worldwide (Michener, 2007; Ascher & Pickering, 2021). The higher-level phylogeny and classification of the Megachilidae based on adult morphology of extinct and extant taxa were revised by Gonzalez *et al.* (2012). Four subfamilies and nine tribes were recognized, of these nine, three are extinct (Ctenoplectrellini, Glyptapini, and Protolithurgini).

*Megachile* Latreille, 1802

(Megachilidae: Megachilini) is one of the three hyperdiverse bee genera, with more than 1480 described, valid species worldwide placed in 63 subgenera (Archer & Pickering, 2021). Currently more than 150 Southeast Asian species of *Megachile* in a dozen subgenera are recognized as valid, but the taxonomy and distribution of these species require much additional study (Ascher *et al.*, 2016).

Engel and Baker constructed *Aethomegachile* as a subgenus of *Megachile* in 2006. This subgenus consists of 17 species known worldwide, the majority of these species distributed in

the Oriental region and many recorded in Southeastern Asia. In Vietnam, two bee species of the subgenus have, up to date, been recorded, they including *M. (Aethomegachile) conjuncta* Smith, 1853 and *M. (Aethomegachile) laticeps* Smith, 1853 (Khuat *et al.*, 2012; Ascher & Pickering, 2021). In the present study, we describe and illustrate a new species of the genus *Megachile (Aethomegachile)*.

## Material and Methods

The sampling was carried out using trap nests which were made of hollow reed and bamboo trunks, at My Tan, Tan Thanh, Luong Son, Hoa Binh (Fig. 1). Diameter of tubes varied from 0.5 to 1.5 cm and tube length were 5–30 cm. Tubes either were tied up horizontal branches, open holes oriented easterly or southeasterly, or were put in desolated houses. The tubes were checked every 15 days and picked up if they were occupied by bees. Nests were intactly put in plastic boxes after the collection. Adult bees emerged from them were taken, pinned, and stored in wooden boxes.

The specimens examined in the present paper including the holotype and the paratypes of the new species were deposited in the Institute of Ecology and Biological Resources (IEBR), Vietnam Academy of Science and Technology (VAST), Cau Giay, Ha Noi, Vietnam.

The external morphological characters were observed and described from pinned and dried specimens with the aid of a stereoscopic microscope. Engel and Baker (2006)

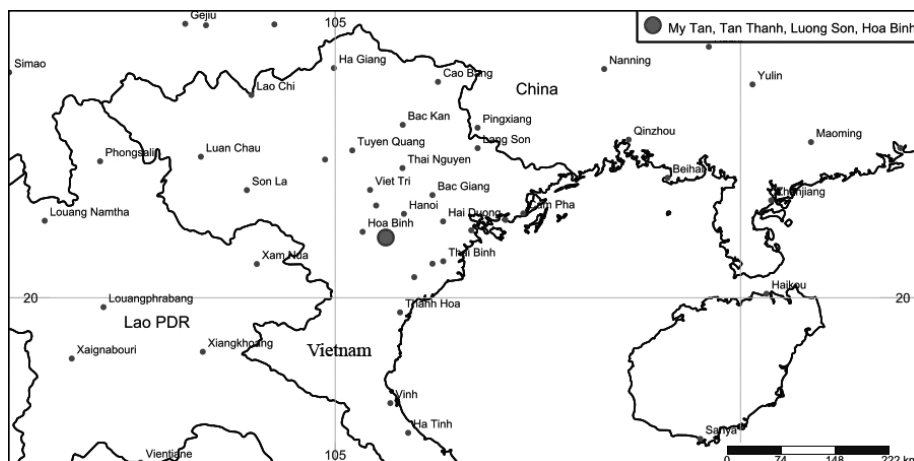


Fig. 1. Map showing the sampling location and distribution of *Megachile (Aethomegachile) vietnamica* sp. nov. in Vietnam.

and Michener (2007) were used for the identification of the subgenus *Aethomegachile*. The photographic images were taken using a Nikon SMZ800N microscope camera.

The abbreviations used in the text are as follows: HL = head length (measured from the upper margin of the vertex to the median margin at the apex of the clypeus); HW = head width (measured at the widest median point of the head across the eyes); T = metasomal tergum, S = metasomal sternum, MW = metasomal width (measured at the widest median point of T2); ML = metasomal length (in female: measured from the anterior median margin of T1 to the apical median margin of T6, in male: measured from the anterior median margin of T1 to the apical median margin of T5).

### Taxonomic Accounts

#### Genus *Megachile* Latreille

*Megachile* Latreille, 1802: 413, 433. Type species: *Apis centuncularis* Linnaeus, 1758, by designation of Curtis, 1828, pl. 218.

#### Subgenus *Aethomegachile* Engel & Baker, 2006

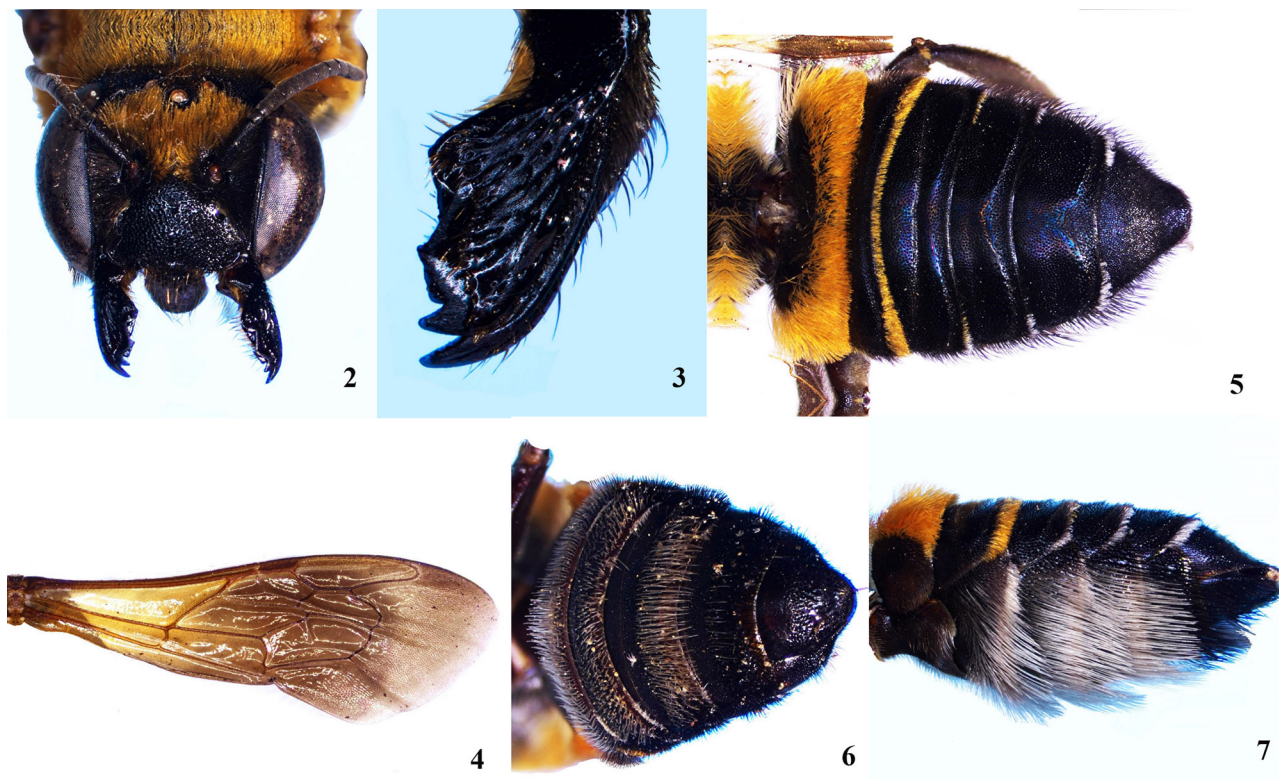
*Megachile* (*Aethomegachile*) Engel & Baker, 2006: 70. Type species: *Megachile* (*Aethomegachile*) *trichorhysisma* Engel, 2006, by original designation.

#### *Megachile* (*Aethomegachile*) *vietnamica*

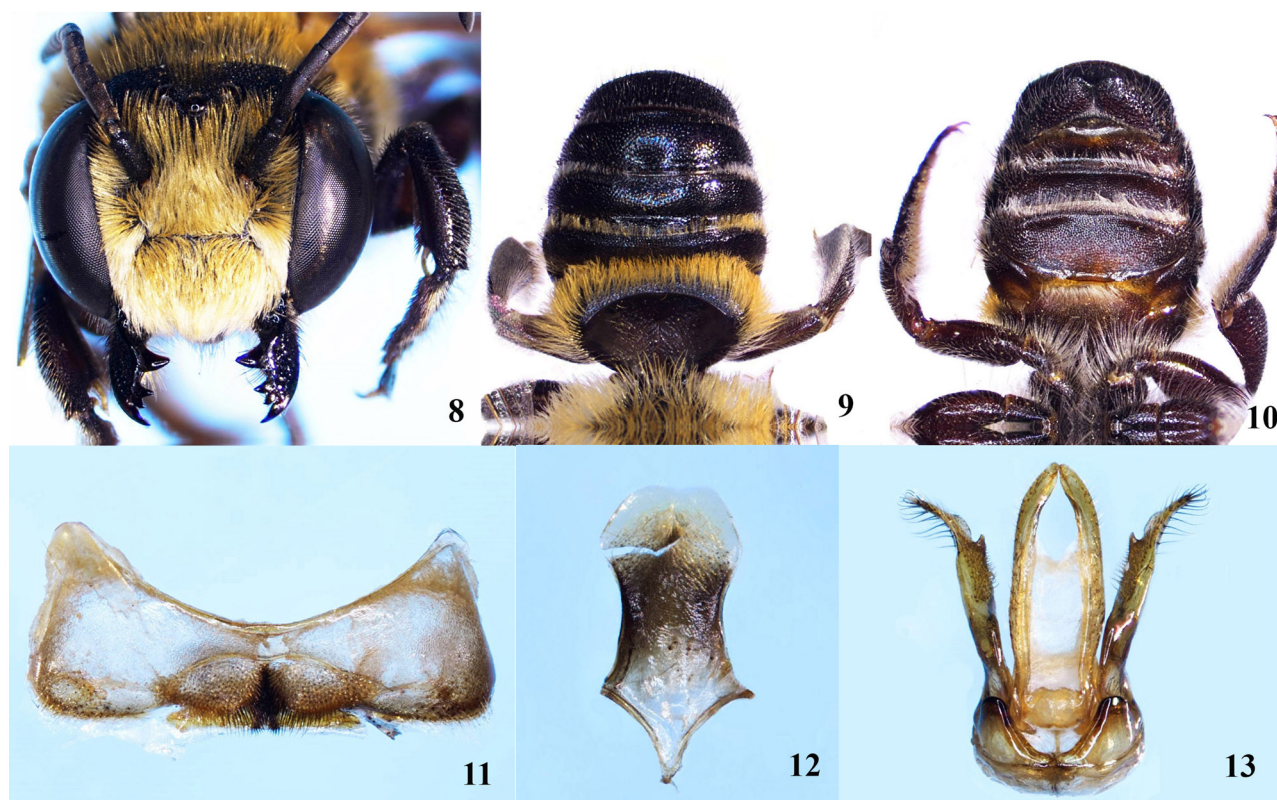
Pham and Terayama sp. nov.

*Type material.* Holotype: ♀, pinned (deposited in IEBR in VAST), Vietnam: Hoa Binh, My Tan, Tan Thanh, Luong Son, 4.x.2019, trap nest No.1, emerged from a trap nest collected on 13.ix.2019, Col. Han Bac Tran. Paratypes (IEBR in VAST): Vietnam: Hoa Binh; 4♀, 10♂, My Tan, Tan Thanh, Luong Son, 1–4.x.2019, 20–24.ix.2019, trap nest No. 2, 4, 5, 6, and 7, emerged from trap nests collected on 13.ix.2019, Col. Han Bac Tran.

*Diagnosis.* This new species can be distinguished from the other species (17 spp.) of the subgenus *Aethomegachine* by having the combination of characters as follows: In female: Mandible with four teeth, third interspace larger than other interspaces, cutting edges present in second and third interspaces; metasoma about 2/3 times as wide as long; head, mesosoma, and T1 covered with dense long yellow hairs; apex of T2 with narrow band of short yellow hairs; T3 laterally with apical band of white and short yellow hairs; S2–S4 medially with fringe of dense long white hairs, S5–S6 medially with fringe of dense long black hairs. In male: Mandible with four teeth; third interspace much larger than other interspaces; fourth tooth sharpened and much larger than other teeth; dorsal surface of T1 strongly narrowed mesially; lateral apex of T3–T4 with narrow band of short white hairs; S5 retracted and less hairy than S1–S3; posterolateral lobe of S6 obviously produced, without hook, apical margin moderately produced in median third, with rather dense black and brown hairs; S8 elongate, apically rounded with weak median excision, marginally without hairs, discal hairs moderately long, laterally without small hamate processes.



Figs. 2–7. *Megachile* (*Aethomegachile*) *vietnamica* sp. nov., holotype (♀). – 2, Head, frontal view; 3, mandible; 4, fore wing; 5, metasoma, dorsal view; 6, three posterior metasomal sterna; 7, metasoma, lateral view.



Figs. 8–13. *Megachile (Aethomegachile) vietnamica* sp. nov., paratype, ♂. – 8, Head, frontal view; 9, metasoma, dorsal view; 10, metasoma, ventral view; 11, sixth metasomal sternum; 12, eighth metasomal sternum, 13, genitalia, dorsal view.

**Description.** Holotype, Female (Figs. 2–7). Body length 12.0 mm, forewing length 8.5 mm.

**Head** (Figs. 2–3). Broader than long, HW : HL = 97 : 71 (Fig. 2); clypeus broader than long, with two lobes at apical margin, lobe with tooth at near apex; gena narrower than eye in lateral view; ocellus round, large; inner orbit margins in frontal view near parallel anteriorly; distance between hindocelli equivalent to that from hindocellus to inner margin of eye on the vertex; mandible with four teeth, apical tooth longest and shaped, third and fourth larger and blunt, large cutting edges on second and third interspaces, outer cutting edge rectangular, sulcus on mandible markedly elongated (Fig. 3); scape as long as first three flagella; pedicel shorter than flagellum 1, flagellum 2 longer than flagellum 1; dorsal surface of mandible with sparse, coarse, elongate punctures; punctures on clypeus and vertex coarse, dense; gena covered with sparse white hairs; vertex with sparse yellow hairs, clypeus mixed moderately dense black hairs and scattered white hairs; frons part along inner orbit margins with rather dense black hairs; frons above antennal sockets with dense yellow hairs and scattered, long black setae; outer surface of mandible with short black setae.

**Mesosoma** (Fig. 4). Pronotal lobe carinate, lateral surface of pronotum remarkably grooved; axilla not prominent posteriorly; metanotum narrow, without spine medially; dorsal propodeum triangular; middle and hind basitarsi distinctly shorter and narrower than corresponding tibiae, fore and middle tibiae with one spine on inner side apically, outer side of hind tibia without spine, outer surface of tibiae without tubercles; claws simple, without inner median tooth; fore wing with two submarginal cells, first submarginal cell as

long as second submarginal cell; prestigma and stigma longer than wide and near equal to each other in length; wing veins yellowish brown; 1/3 basal area of fore wing hyaline, yellow; median area fuscous, about 1/3 apical area lighter (Fig. 4); pronotum, mesoscutum, scutellum, mesopleuron densely filled with fine uniform punctures, size of punctures on mesoscutum and scutellum smaller than that on pronotum and mesopleuron; dorsal tibiae with dense punctures; mesosoma covered with dense long yellow hairs; coxa, trochanter, femur of legs with white hairs; tibia and tarsus of middle and hind legs with dense, yellow and white hairs.

**Metasoma** (Figs. 5–7). Longer than wide, ML : MW = 142 : 107; regularly tapering towards apex; anterior surface of T1 strongly concave (Fig. 5); T2–T4 with strong postgradular grooves, not fasciate; T6 apically rounded in dorsal view; small punctures on metasoma remarkably separated; T1 covered with dense long yellow hairs, T2 with apical band of short yellow hairs; T3 filled with short, yellow and white hairs on laterally apical margin; T4–T5 with short white hairs on laterally apical margin; lateral margin of T2–T6 with shorter black hairs (Fig. 5); S2–S4 with median fringes of obviously long white hairs (Fig. 7), S5–S6 with median fringe of long black hairs (Figs. 6–7).

Body black exception basal surface of mesopleuron, all legs, T1–T3 blackish brown, S1 and narrow apical band of S2 red brown.

**Variation.** The females vary in body length from 11.5 to 13.0 mm, and forewing length from 8.5 to 9.0 mm.

**Male** (Figs. 8–13). Body length 8–10 mm, forewing length 7–8 mm.

**Head** (Fig. 8). Subcircular in frontal view, broader than long,

HW : HL = 104 : 84; gena narrower than eye in lateral view; clypeus broader than long, with two lobes at apical margin, lobe without tooth at near apex; inner orbit margins anteriorly divergent in frontal view; ocellus round, simple; distance between hindocelli shorter than that from hindocellus to inner margin of eye on the vertex; mandible strong with four teeth, apical tooth longer than second and third, shorter than fourth; inner tooth largest, rather sharpened; third interspace largest; flagellum 11 flat at apex, longer than flagella 1–10; flagellum 1 much shorter than flagellum 2; flagella 3–10 equivalent each other in length; scape as long as flagellum 1; pedicel as long as scape + flagellum 1 + flagellum 2; dorsal surface of mandible with sparse, coarse, elongate, deep punctures; punctures on clypeus, frons, vertex, and gena coarse, denser; gena covered with dense long white hairs; vertex filled with scattered, long yellowish hairs; yellow hairs on frons and clypeus dense. Outer surface of mandible with short black setae.

Mesosoma. Pronotal lobe carinate, lateral surface of pronotum remarkably grooved; axilla not prominent posteriorly; metanotum without spine medially; dorsal propodeum triangular; middle and hind basitarsi distinctly shorter and narrower than corresponding tibiae, fore and middle tibiae apically with one spine on inner side, outer side of hind tibia without spine, outer surface of tibiae without tubercles; claws apically bifurcated, without inner median tooth; fore wing with two submarginal cells, first submarginal cell as long as second submarginal cell; prestigma and stigma longer than wide and near equal to each other in length; wing veins yellow brown; 1/2 basal area of fore wing hyaline, yellowish; 1/2 apical area fuscous; pronotum, mesoscutum, scutellum, mesopleuron with remarkably dense punctures; propodeum without punctures; mesosoma covered with dense long yellow hairs; coxa, trochanter, femur of legs with white hairs; tibia and tarsus of middle and hind legs with dense yellow and white hairs.

Metasoma (Figs. 9–12). As long as wide, ML : MW = 87 : 87; anterior surface of T1 strongly concave, dorsal surface of T1 strongly narrowed mesially (Fig. 9); T2–T4 with strong postgradular grooves; T6 bent to ventral surface, in dorsal view, apical margin of T6 with strongly median concave and weakly lateral convex; in ventral view, T6 with carina, not toothed, carina triangular medially, median concave weakly emarginated (Fig. 10); metasoma only five sterna exposed, with obviously separated, small punctures (Fig. 10); S3–S4 with near straight, strong carinae postgradularly; punctures on sterna smaller than those on terga; T1 covered with dense long yellow hairs, T2 with apical band of sparse short yellow hairs;

T3–T4 laterally with short white hairs on apical margins. T2–T6 with sparse black hairs (Fig.9); S3–S4 with apical fringes of long white hairs (Fig.10); S6 with obviously produced posterolateral lobes, apical margin moderately produced in median third, with rather dense black and brown hairs (Fig. 11); S8 elongate, apically rounded with weak median excision, without marginal hairs, distal hairs moderately long, laterally without small hamate processes (Fig. 12); genitalia as in Fig. 13.

Body colour as in female.

*Etymology.* The specific name of this new bee species refers to the type country, Vietnam. Floral association. The new bee species was recorded visiting flowers of cobbler pegs, *Bidens pilosa* Linnaeus.

*Distribution.* Vietnam: Hoa Binh (Fig. 1).

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