

A new species of mining bee (Hymenoptera: Andrenidae: *Andrena*) from northern Thailand

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ABSTRACT

A new species of mining bee, *Andrena* (*Cnemidandrena*) *igali* sp. n., is described from the mountainous province of Mae Hong Son in northern Thailand, near the border with Myanmar. The species represents a rare and unusual penetration of the subgenus *Andrena* (*Cnemidandrena*) into subtropical–tropical climate areas, with a characteristic shift in the flight period. *Andrena igali* sp. n. is a part of an eastern clade of *A.* (*Cnemidandrena*) known as the *mephistophelica* species group, which exhibits distinctive adaptations for pollen transport, with almost nothing known about its foraging biology. It is the third species of *Andrena* reported from Southeast Asia, which constitutes the southeasternmost edge of the distribution of the genus.

KEYWORDS: Apoidea, biodiversity, *Cnemidandrena*, Indomalayan realm, *mephistophelica* group, new species, Oriental realm, solitary bee, Southeast Asia.

บทคัดย่อ

มีการค้นพบผึ้งขุดดินชนิดใหม่ *Andrena* (*Cnemidandrena*) *igali* sp. n. จากจังหวัดแม่ฮ่องสอนในภาคเหนือของประเทศไทย ใกล้ชายแดนเมียนมาร์ ผึ้งชนิดนี้แสดงให้เห็นถึงการแพร่กระจายที่หายากและแตกต่างจากปกติของสกุลย่อย *Andrena* (*Cnemidandrena*) ในพื้นที่ภูมิอากาศกึ่งเขตร้อน-เขตร้อน โดยมีลักษณะเฉพาะคือช่วงเวลาการบินที่เปลี่ยนแปลงไป *Andrena igali* sp. n. เป็นส่วนหนึ่งของกลุ่มสายพันธุ์ทางตะวันออกเฉียงของ *A.* (*Cnemidandrena*) ที่รู้จักกันในชื่อกลุ่มสายพันธุ์ *mephistophelica* ซึ่งแสดงให้เห็นถึงการปรับตัวที่โดดเด่นสำหรับการขนส่งละอองเรณู โดยแทบไม่มีข้อมูลเกี่ยวกับชีววิทยาการหาอาหารของมัน ผึ้งชนิดใหม่นี้เป็นชนิดที่สามของสกุล *Andrena* ที่พบในเอเชียตะวันออกเฉียงใต้ ซึ่งเป็นขอบเขตตะวันออกเฉียงใต้สุดของการกระจายตัวของผึ้งสกุลนี้

คำสำคัญ: อะโปidea, ความหลากหลายทางชีวภาพ, อาณาจักรอินโดมาลายัน, กลุ่ม ชนิดใหม่ ผึ้งเดี่ยว, เอเชียตะวันออกเฉียงใต้

INTRODUCTION

Andrena Fabricius, 1775 is the second largest genus of bees after *Lasioglossum* Curtis, 1833, with ca. 1750 species distributed mostly throughout the Holarctic realm (Michener 2007; Ascher & Pickering 2025; Wood 2025). Most species of *Andrena* thrive in desert, semi-arid or temperate habitats, whereas in the tropical regions they are usually confined to the more temperate highland areas (Corlett 2004; Dubitzky 2006). Accordingly, the genus becomes very rare and depauperate in the Neotropical, Afrotropical and Oriental realms, and south of the equator only a handful of species are known, all in sub-Saharan Africa (Gusenleitner & Schwarz

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2002; Corlett 2004). Only two species are known from Southeast Asia (excluding southeast China): *A. (Malayapis) chrysochersonesus* Baker, 1995 from Malaysia and *A. (incertae sedis) tenasserima* Wood, 2024 from Myanmar and Thailand. The current paper describes a new species of *A. (Cnemidandrena)* Hedicke, 1933 from the northernmost region of Thailand near the border with Myanmar, the same area from which *A. tenasserima* was described. This is a mountainous region lying at the interface between the subtropical and tropical climate regions situated to the north and south, respectively. This finding adds to our knowledge of this huge genus at one the extreme limits of its global distribution.

MATERIALS AND METHODS

Body length was measured in lateral view to the nearest 0.5 mm, as the sum of distances from the antennal sockets to the posterior end of the propodeum and from the latter to the tip of the metasoma. The vein separating the first and second cubital cells of the forewing (cu-v in Michener 1944) is referred to here as the nervulus. Other morphological terms follow Michener (2007). Photographs were taken using a Touptek XCAM4K8MPB colour camera through a Leica M125 stereomicroscope with a Leica Plan APO 1.0x M Series objective and a Leica LED5000 HDI dome illuminator. Raw photographs were stacked using Helicon Focus 8.2.15 (Helicon Soft Ltd., Ukraine) and edited in Adobe Photoshop 24.6.0.

A leg from one specimen was removed for barcode analysis of the COI mitochondrial gene, and processed as specified in Pisanty *et al.* (2022). The resulting barcode sequence is published on the Barcode of Life Database (BOLD) website. Subsequent searching on the BOLD database revealed three more specimens from Thailand with matching barcodes deposited in other institutions, including the single known male, but unfortunately these could not be obtained for study.

Specimen depositories are listed under the following acronyms:

RMNH – Naturalis Biodiversity Center, Leiden, the Netherlands;

SMNHATAU – The Steinhardt Museum of Natural History, Tel Aviv, Israel.

TAXONOMY

Genus *Andrena* Fabricius, 1775

Subgenus *Cnemidandrena* Hedicke, 1933

Andrena (Cnemidandrena) igali sp. n.

Fig. 1

LSID: [urn:lsid:zoobank.org:act:5A398565-F67C-4C56-9E83-DF3F7DCB216A](https://zoobank.org/act:5A398565-F67C-4C56-9E83-DF3F7DCB216A).

Etymology: Named after oncologist Igal Kushnir, the author's beloved partner for the last twenty years.

Diagnosis: *Andrena igali* sp. n. can be confidently placed in the subgenus *A. (Cnemidandrena)* based on the broad facial foveae (Fig. 1C, H), complete propodeal corbicula (Fig. 1F), apically broadened hind tibia (Fig. 1G), medially raised area on



Fig. 1. *Andrena (Cnemidandrena) igali* sp. n., female: (A) habitus; (B) metasoma (bright variant); (C) head and mesosoma; (D) metasoma (dark variant); (E) clypeus; (F) propodeal corbicula; (G) mid and hind legs; (H) head.

the pygidial plate, and late activity season, although it lacks the humeral angle of the pronotum that is usually typical for the subgenus (Tadauchi & Xu 2002; Wood 2024a). This finding is corroborated by phylogenomic analysis (S. Bossert, T.J. Wood, M. Branstetter and G. Pisanty, unpubl. results). Within *Cnemidandrena*, it can be further placed within the *mephistophelica* group of species (a.k.a. the *kishidai* group, Wood 2024a, see subsequent nomenclatural change by Wood 2025), based on the apically flattened hind tibia with short scopal hairs (Fig. 1G), strong ‘cascading’

dorsoposterior fringe vs. weak anterior fringe of the propodeal corbicula (Fig. 1F), and impunctate terga (Fig. 1B, D) (Wood 2024a). The species can be diagnosed against all other East Asian *Cnemidandrena* based on the combination of small body size (8.0–8.5 mm), rounded pronotum and mostly orange-coloured tergum 1 (Fig. 1B, D). The four other smallest species of East Asian *Cnemidandrena*, namely the *mephistophelica*-group members *A. granulitergorum* Tadauchi & Xu, 2002 and *A. tatrix* Wood, 2024, and the other two species *A. gusenleitneri* Tadauchi & Xu, 2002 and *A. maetai* Hirashima, 1964, all measure at least 9 mm long, and all possess a distinct pronotal humeral angle. *Andrena granulitergorum* is the morphologically closest species, but it further differs in the presence of a distinct impunctate midline on the clypeus. *Andrena tatrix* further differs in its triangular labral process, longer flagellomere 1, narrower foveae, longer ocellocipital distance, uniformly brown scutal hairs, and dull scutellum. *Andrena gusenleitneri* and *A. maetai* further differ as they lack the characteristic features of the *mephistophelica* group, and possess a completely dark tergum 1.

Description: Female. Body length: 8.0–8.5 mm.

Colour: Head and thorax dark brown to black (Fig. 1A, C, E, H). Anterior side of flagellomeres 3–10 orange (Fig. 1C, H). Legs mostly brown, with some blackish areas (Fig. 1A, G). Tergum 1 mostly orange, with large transverse dark strip near apical margin. Terga 2–3 centrally black, often with orange margins basally and apically. Tergum 4 black, often with narrow orange basal margin. Tergum 5 black (Fig. 1B, D). Apical rims of tergal marginal zones 1–2 yellowish-hyaline, of 3 and 4 progressively darker. Wings hyaline, veins brown, stigma centrally tannish (Fig. 1A).

Pubescence: Body pubescence largely tannish, with dark hairs concentrated mostly around facial foveae and metasomal apex. Lower half of face, including clypeus, supraclypeal area, lower part of paraocular area, and area around antennal sockets, with brightly coloured, off-white to tannish hairs, thin and inconspicuous on clypeus, thicker and denser around antennal sockets (Fig. 1E, H). Upper part of paraocular area with dark hairs bordering facial foveae, and bright, tannish hairs near antennal sockets. Facial foveae covered with dense short hair, appearing brown in dorsal view and black in anterior view. Frons with dark hairs. Vertex with dark hairs anteriorly and longer tannish hairs posteriorly. Upper part of genal area with golden hairs, lower part with whitish hairs (Fig. 1C, H). Dorsal part of mesosoma with erect tannish-golden hairs, on center of scutum interspersed with some black hairs (Fig. 1A, C). Upper part of mesepisternum with golden hairs, lower part with whitish hairs (Fig. 1A). Propodeal corbicula more or less complete, dorsoposterior fringe composed of extremely long, strongly plumose golden hairs curving downwards, overlaid by few long, weakly plumose, straight black hairs; anterior fringe weakly developed, composed of few long, simple yellowish hairs. Internal corbicular surface hairless (Fig. 1F). Coxae and trochanters with whitish hair, flocculus incomplete. Femora, tibiae and tarsi with whitish to brown and some blackish hairs. Outer side of hind tibia with moderately dense short hair, on

lower half of tibia brown and simple, on upper posterior part black and plumose, on upper anterior part brown and plumose (Fig. 1A, G). Tergum 1 and center of tergum 2 with long, erect to semi-erect yellowish-golden hairs. Tergal discs 2–4 with short inconspicuous hairs, black on surface of disc and yellowish on lateral margins. Tergal marginal zones 2–4 with strong, complete narrow bands of dense, short yellowish hair. Terminal fringe black (Fig. 1B, D). Sternal marginal zones with long, semi-erect whitish-yellowish hair (Fig. 1A, G).

Head: 1.15–1.30× broader than long (Fig. 1H). Mandibles bidentate, moderately crossed. Galea shiny, finely shagreened and impunctate. Glossa short and thick, about 2× longer than broad. Mouthparts otherwise normally developed. Malar area short, 0.2× as long as basal width of mandible. Labral process narrow trapezoidal, basal part transversely wrinkled, apical part thickened, apical margin concave. Clypeus weakly domed, basal part shagreened and occasionally transversely striated, apical part smooth, punctation dense and distinct, distance between punctures 0–1 puncture diameter, punctures becoming larger and sparser apicolaterally. An impunctate midline is not developed, except for some irregular impunctate smooth areas on apical $\frac{1}{3}$ (Fig. 1E). Lower part of paraocular area polished-smooth, strongly and densely punctate. Frons strongly longitudinally striated, punctation hardly discernible. Flagellomere 1 1.5× longer than 2. Flagellomeres 2, 3 and 4 of equal lengths. Facial foveae long and broad, weakly depressed, $\frac{2}{3}$ × as broad as antennocular distance, extending from level of upper end-middle of lateral ocellus to slightly below lower end of antennal socket, weakly tapering ventrally, separated from compound eye by thin cuticular strip. Distance of fovea from lateral ocellus slightly less than 1 ocellus diameter. Ocelloccipital distance equals 1 ocellus diameter (Fig. 1C, H). Vertex weakly carinate, genal area rounded posteriorly, 0.9× as broad as compound eye.

Mesosoma: Pronotum rounded, at most with hint of humeral angle. Scutum mostly shagreened and dull, posterior half with centrally smooth area of varying extent, scutal punctation shallow, distance between punctures about 1 puncture diameter. Disc of scutellum mirror-smooth and impunctate (Fig. 1C). Mesepisternum shagreened and dull, fine shallow punctation is apparent mostly on anterior half, distance between punctures about 1 puncture diameter. Propodeal corbicula large, extending posteriorly almost to propodeal triangle, dorsoposterior region of propodeum hardly developed (Fig. 1C). Surface of propodeal corbicula reticulated, impunctate. Basal half of propodeal triangle with fine areolation overlaid by strong radial rugae, apical half dull and sculptureless. Inner side of hind femur rounded, normally developed. Inner hind tibial spur straight and of uniform width. Hind tibia strongly broadened apically, outer surface flattened apically (Fig. 1G). Hind pretarsal claw with strong inner tooth. Recurrent vein 1 meeting submarginal cell 2 anywhere between $\frac{1}{3}$ – $\frac{2}{3}$ of marginal cell length. Nervulus antefurcal (Fig. 1A).

Metasoma: Tergal disc 1 finely punctured, distance between punctures 1–2 puncture diameters, basal half of disc shiny and weakly shagreened, apical part becoming

fully shagreened and dull. Tergal discs 2–4 fully shagreened and dull, essentially impunctate, tergal marginal zones poorly developed and hardly discernible, very slightly depressed, sculpturing similar to discs. Tergal disc 5 shagreened and dull, with strong, dense hair-bearing punctures (Fig. 1B, D). Pygidial plate triangular, with strongly developed, elevated triangular internal zone.

Male. The single known male specimen was unfortunately unavailable for study.

Holotype: ♀ Thailand: Kiew Lom Viewpoint, Rt.1095, 19°26'N 98°19'E, 1660 m a.s.l., 17.xi.2012, A. Freidberg, BOLD accession no. ANDGP026-25 (SMNHTAU In.162152).

Paratypes: Thailand: 1♀, Kiew Lom Viewpoint, Rt.1095, 19°26'N 98°19'E, 1660 m a.s.l., 17.xi.2012, A. Freidberg (SMNHTAU In.162151); 2♀, same data, 25.xi.2012 (SMNHTAU In.162689, In.162690); 1♀, same data (RMNH).

Material not examined: Thailand: 1♂, Chiang Mai, Doi Phahompok NP, 20.059°N 99.143°E, 2174 m a.s.l., 21.xii.2007, P. Wongchai, BOLD accession no. COFC220-10; 2♀, Chiang Mai, Phahompok NP, 20.058° N 99.143° E, 2112 m a.s.l., 21.xi.2007, P. Wongchai, BOLD accession nos. BOFTW587-10, BOFTW588-10. These three specimens had been originally deposited in L. Packer's Lab, York University, Toronto, Canada, were gifted to O. Tadauchi, and hence are presumably deposited now in the Entomological Laboratory of Kyushu University collection, Fukuoka, Japan.

DISCUSSION

Members of *Andrena* (*Cnemidandrena*) typically occupy temperate habitats across the Holarctic, and are active in late summer and autumn (Donovan 1977; Tadauchi & Xu 2002; Wood 2024a). The finding of *A. igali* in northern Thailand represents a rare and unusual penetration of this taxonomic group into subtropical–tropical climate areas, with a characteristic shift in the flight period even later in the season, which would coincide with the start of winter in the more typical temperate areas of the northern hemisphere. The entire *mephistophelica* group of *Cnemidandrena* constitutes an unusual derivation from the typical subgenus, exhibiting distinctive adaptations for pollen transport, and with almost nothing known about its foraging biology. More research on *Andrena* in remote parts of its range such as Southeast Asia are fundamentally needed to shed more light on these peculiar taxa, where such a mega-diverse genus reaches the very limit of its dispersal capacity. □

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