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ORIGINAL ARTICLE

NEW RECORDS OF PANURGINE BEES (HYMENOPTERA, ANDRENIDAE, PANURGINAE) FROM IRAQ

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ABSTRACT

In the current study, the panurgine bee *Camptopoeum* Spinola, 1843 is represented as a single species *Camptopoeum frontale* (Fabricius, 1804) (Family Andrenidae), which is reported as a new record for the Iraqi hymenoptera checklist. Additionally, the species is clearly described and illustrated, and the taxonomic status of the taxa is provided.

Keywords: *Camptopoeum*, *Epimethea*, Mining bees, Panurgine, Wild bees.

INTRODUCTION

The species classified within the subfamily Panurginae are recognized as key pollinators of numerous cultivated crops and wild plant species. Their ecological and economic importance is evident through their role in improving agricultural productivity, increasing economic returns, and contributing to the conservation and sustainability of plant biodiversity (Winfree *et al*., 2011; Forcella *et al*., 2023). Panurginae has seven tribes including Protandrini, Nolanomelissini, Melitturgini, Protomeliturgini, Perditini, Callopsini, and Panurgini; the last tribe has four genera: *Panurginus* Nylander, 1848, *Avpanurgus* Warncke, 1972, *Panurgus* Panzer, 1806, *Camptopoeum* Spinola, 1843 (Michener, 2007).

Some species are distributed in the Western Palearctic and parts of Africa (Michiner, 2007; Wood *et al*., 2022; Wood and Monfared, 2022). Panurgine bees Panurgine bees occurring in the Palearctic, Nearctic, and Afrotropical Regions are chiefly found in species within the genera *Camptopoeum*, *Panurginus* and *Panurgus* with the greatest diversity in the Near and Middle East Regions (Scheuchl and Hazir 2008; Wood, 2023).

Panurgini can be recognized by their black coloration or by species with extensive yellow markings, the body shape is similar to Protandrenini, the forewing has two submarginal cells, male gonocoxites are often longer than those of other those of species in other tribes, and the inner margin of the penis valve usually has small transverse edges. Episternal groove is

lacking, small, or bent to connect with the scrobal groove. T2-T5 of the males with marginal zones typically pilose, the foramen of the male genitalia is in a deep cavity at the base of gonocoxite; the shape of S7 in the males differs from one genus to another, so it is considered important in the identification of the genera belong to this tribe (LaBerge, 1967; Rozen, 1988).

Camptopoeum is characterized by yellow spots on the head, thorax and usually metasoma, with the base color is often red (Tomozei, 2003; Patiny, 2006). S7 is the most important feature in the male, somewhat narrow, with an apically produced disc taking a wide apical notch, apodemal arms long, and much narrowed near the bases. This genus is divided into two subgenera *C*. (*Camptopoeum*) Spinola, 1843 and *C.* (*Epimethea*) Morawitz, 1876 (Patiny, 1999; Michener, 2007; Fidalgo, 2021). *Camptopoeum* is includes 31 species distributed throughout Europe, N. Africa, Central Asia and China (Michener, 2007; Ascher and Pickering, 2024). Additionally, there were 18 species within this genus distributed in the West Palearctic Region (Kuhlmann and Williams, 2012).

In this publication, *Camptopoeum* with *C. frontale* (Fabricius, 1804) are newly recorded in Iraq, with provision of description, identification and illustration.

MATERIALS AND METHODS

Collection and identifying specimens: Specimens were collected using the sweeping nets from the flowers of the plant *Centaurea sinaica* DC., 1838 (Asteraceae) (Pl.1) which included localities of the Wasit, Babylon and Anbar Provinces. Taxa were identified based on the keys, designed by Patiny (1999), Tomozei and Patiny (2006), Michener (2007), Wood and Cross (2017), and Monks (2023).

Dissecting and photographing: Male tergites and sternites were dissected using fine forceps and pins to acquire the genitalia in addition to extract the mouthparts. Photographs were taken using Mc500 camera (China) and a Sony a7riv camera (Thailand) with a Canon mp-e 65mm 2.8 macro lens. Image stacking was done by Helicon focus 8.1.0, and brightness, sharpness, and color were corrected using Adobe Photoshop CC 2024, and used a camera Lucida with a Zeiss microscope (Germany) to draw the morphological characters.

Classification and terminology: Terms and classification ranks follow Michener (2007). The specimens are deposited in the collection of insects at the Iraqi Natural History Research Center and Museum (INHRCM), University of Baghdad, under the museum number (H.An.43.25).

Abbreviations: The following abbreviations are provided according to Michener (2007):
2r: second radial vein
1r-m: First radio– medial vein
1m-cu: First medio– cubital vein
Cu-v: Cubitio -vannal vein
SMC1: Submarginal cell 1
SMC2: Submarginal cell 2

F: Antennal flagellomere (F1-F11)
INHRCM: Iraq Natural History Research Center and Museum
Rs-m: Radial –medio vein
T: tergite (T1-T7)
S: sternites (S1-S8)

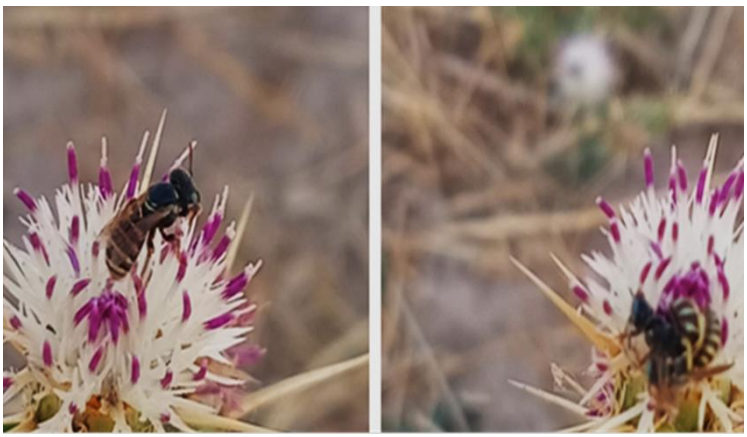

Plate (1): The presence of *Camptopoeum frontale* on the plant flowers.

RESULTS AND DISCUSSION

Taxonomy
Family, **Andrenidae** Latreille, 1802
Subfamily, **Panurginae** Leach, 1815
Tribe, **Panurgini** Leach, 1815
Genus, ***Camptopoeum*** Spinola, 1843
Camptopoeum frontale (Fabricius, 1804)
Synonym: *Prosopis frontalis* Fabricius, 1804

Materials (28 specimens): 4♂♂, Anbar Province, Fallujah City, Halabsa District, 33°19'47.2"N 43°43'48.0"E, 24.v.2024; 1♀, Wasit Province, Aziziyah District, 32°54'41.0"N 44°59'59.3"E, 17.v.2024; 13♂♂, 10♀♀, Babylon Province, Barakiya District, 32°23'23.1"N 44°46'39.5"E, 24.v.2025.

Diagnosis of the genus: *Camptopoeum* was diagnosed based on different characters, including: yellow spots on the head, thorax and usually the metasoma, with the basis color often red. S7 is the most important feature in the male, somewhat narrow, apically produced disc taking a wide with an apical notch, apodemal arms long, and much narrowed near the base.

Morphology of *Camptopoeum frontale* (Fabricius, 1804)
Male description: Body length 7.0-7.5 mm (Pl. 2A-C). Basic colour reddish-black, with some areas on the head, thorax and abdomen showing yellow coloration. Punctures large, concave with shiny surface; hair dense on vertex. Head: (Pl.3 A) rounded, wider than the

prothorax; slightly shining. Superclypeal area, clypeus, labrum, paraocular area and subantennal area yellow, with the outer edges of the labrum with dark yellow-brown. Interocellar distance equal to ocellocular distance, facial fovea weak, and clypeus protuberant. Antennal socket black and spherical-shaped; scape shiny, yellow anteriorly and black posteriorly, covered with scattered yellow hairs. Pedicel spherical and blackish-brown in colour; F1 with cup-shaped, and equal to one-third of the scape length; F2 and F3 small; F11 the longest segment with a rounded end. Labrum (Fig1.A) semi-rectangular, raised medially, apical margin slightly rounded with a row of setae of unequal length. Mandibles brown-black in colour (Fig.2A), twice the labrum length, broadly at base, pointed ending and covered with branched hairs.

Mesosoma (Pl.4 A): Scutum wider than other parts and equal to the width of head, black with dense brown hairs; punctures scattered, dense and smaller than those on head surface; parapsidal lines clear glossy. Scutellum with two large yellow and kidney-shaped maculae, punctures as those found on the scutum. Forewing transparent (Pl.2 A), stigma yellowish to ferruginous, prestigma thin and yellow; length of MC equal to 1.25 times the length of the SMC1, rounded apically; SMC1 longer than SMC2, R2 vein transparent at its point of contact with R1 vein; radial cell equal in length to MC1 and MC2; basal vein almost straight. Hind wing translucent (Pl.5 A), cubital cell with two-thirds of the length of the claval lobe; jugal lobe curved at basal third part, length equal to three-fourths of the claval lobe; costal margin with 8 hamuli.

Fore legs (Pl.6 A): Coxa yellow and spherical-shaped; inner surface of trochanter yellow, black dorsally, twice the length of the coxa; femur slightly swollen, twice length of trochanter, inner surface yellow, most of the outer surface black; tibia hairy, yellow, narrow basally and expanded apically, apex yellow, with a pale pearly area on the side; basitarsus with a yellow notch, elongated, equal to tarsomeres 2-4 together, tarsomere 5 conical in shape and longer than the preceding one, and bearing similar hairs; claws bifid, arolium present, rounded and black. Mid legs (Pl.6 B) as fore legs, except that they are slightly longer, spur pointed, basitarsus without a notch. Hind legs (Pl.6 C) are as the mid legs, except the apex of tibiae has a pair of straight spurs that are denticulate on inner sides.

Metasoma (Pl.7A): Pregradular area on T1 black, disc whitish, marginal zone yellow, with lateral hairs somewhat elongated and scattered; and has regular median punctures with pubescence. T2 as T1, but differs in that the pregradular black colour overlaps with the surface of the disc, and hair increases relatively on the marginal zone. T3-T5 as T2 with the density of hair increasing gradually at marginal zone. T6 has a pregradular area of blackish-pale colour, apodeme small and rounded ending, the marginal zone has dense hair. T7 semi-triangular shaped, with a long apodeme rounded apically, and densely covered with hair on marginal zone. S1 with semi-triangular-shaped (Pl.7 C), pregradular area with black-brown, disc yellowish, apodeme is tapered in shape, marginal zone yellowish with lateral yellowish and scattered hairs somewhat long and regular small puncture with pubescence. S2 semi-oval shaped and the same as S1, but differs by being convex on the anterior pregradular, elongated apodeme, with a straight ending, hair densely that increas relatively on marginal zone. S3-S5

are as S2, with hair gradually increasing at the marginal zone. S6 semi-square-shaped (Fig.3 A), with a large apodeme that has a rounded end, marginal zone with dense hair. S7 (Fig.3 B) resembles a Y- shaped, somewhat narrow, with an apically produced disc featuring a wide apical notch, apodemal arms elongated, and much narrowed at the base. Disc of S8 (Fig.3 C) semi-wing shaped and has two lateral processes, a long apodemal lobe with a rounded end, and hair densely on the marginal zone.

Genitalia (Pl.9 A): Gonocoxite semi-oval shaped, convex backward, equal to 1.5 times the length of gonostyle; gonostyle articulated with gonocoxite, head rounded with a notch on the inner side, with scattered and equal-length hairs; volsella (Pl.9 B) with two flat heads and covered with yellowish and variant hairs. Penis valve slightly longer than gonostyles, broad basally, narrowing toward the middle, apex thin and pointed on the inner side.

Female description: Body length 8-9 mm (Pl.2 B, D); head length (Pl.3 B) approximately equal to its width; upper part of face black; superclypeal area, clypeus, and labrum with yellow colour. Paraocular contains irregular yellow spots, shiny and has different punctate that are distinct by regular margins, and covered with gray pubescence. Facial fovea oval-shaped, wide at upper and narrow toward lower part, smooth and shiny, and extends from posterior ocelli to antennal socket. Vertex transverse, dull black and clothed with sparse and gray pubescence, with punctures having unequal edges; interocellar distance like the ocellocular distance. Front with various punctures, clothed with pubescence, frontal line complete, and shiny black medially. Antennae black with a brown and dark yellow tinge; scape cylindrically shaped, and equal in length to F1; pedicel cylindrical in shape, extending from the middle to apex, and length equal to length of F1, and its width is similar to the basal quarter of scape. Labrum (Fig.1 B) with triangular in shape, and has two distinct parts, basal area and apical process; basal area has a medial depression when viewed from above; apical process has a longitudinal keel continuous with transverse carina that separates these parts; keel and carina consist of a Y-shaped; free margin of apical process with a row of various setae. Clypeus and labrum are dome-shaped and protuberant forward (Pl.2 D). Mandibles (Fig.2 B) as in the male, but shorter and basally wider.

Mesosoma (Pl.4 B): scutum is black with irregular punctures; pubescence gray on anterior and posterior parts, the remaining space glabrous. Parapsidal lines obvious and shiny black. Scutellum covered with gray-colored hairs laterally and divided into three parts according to colour, anterior part black with a large area, its surface has large punctures; second medial area yellow and narrow, with circular, irregular and scattered puncture edges and scattered, surface covered by scattered and gray hairs; third area characterized by a thin strip-shaped black posteriorly, clothed with fine and scattered hairs. Forewing veins (Pl.1 B) are yellowish-brown in colour; The length and width of the stigma are equal to half length and width of marginal cell; The prestigma is small, and other parts of wings as in male, as long as wide to one-third length and width of marginal cell. In the hind wing (Pl.5 B), there are 9 hamuli, M vein slightly concave and jugal equal to vannal lobe. Legs (Pl.6 D-F) as in the male, but the tarsal claw has small teeth basally, blackish in color with some yellow markings; hind tibia with densely hair, long, and non-branched.

Metasoma (Pl.7 B): Pregradular area of T1-T5 black in colour and coarse surface that consists of small, dense, circular, and irregular punctures; and is also covered with short, scattered, fine, and gray pubescence. The discal area differs medially in color and shape from previous area, appearing yellow and expanded dorsolaterally over the convex areas area. T1, T4 and T5 with dark orange, whereas T2 and T3 are lighter; T4 with circular black spot between disc and marginal zones at the middle of the dorsal surface. Lateral sides of T2-T4 with brown circular foveae. Prepygidial fimbria on T5 and a fimbria on T6 with goldish-yellow colour; pygidial plate similar to a semi- triangular shape and brown. S1-S6 (Pl.7 D) characterized by a black to brown color with scattered white to gray hairs. S1- S5 have a clear pregradular area, with a surface containing sculpture composed of fine wavy lines, mixed with scattered and fine punctures; disc with various punctures and indistinct from the marginal zone, although the latter can be characterized by a coarse surface composed of scattered and different punctures. Central of marginal zone of S1-S3 with yellow patches. S6 (Pl.8) brown- black and consists of triangular plate pointed posteriorly and black.

Plate (2): *C. frontale*, dorsal and lateral view respectively; (A, C) ♂, (B, D) ♀.

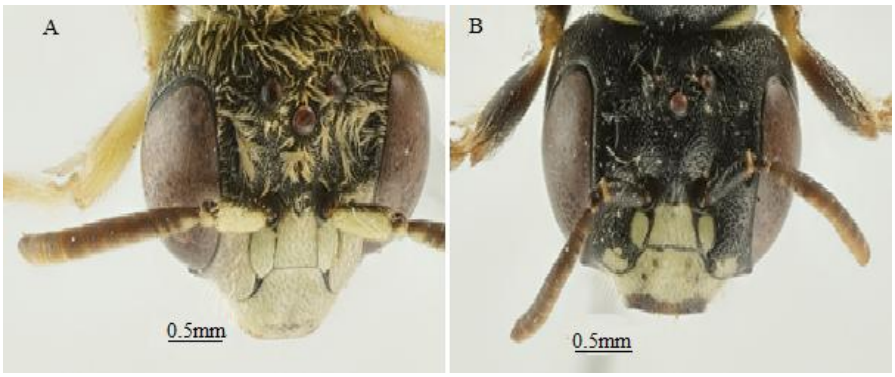

Plate (3): Head of *C. frontale*; (A) Male, (B) Female.

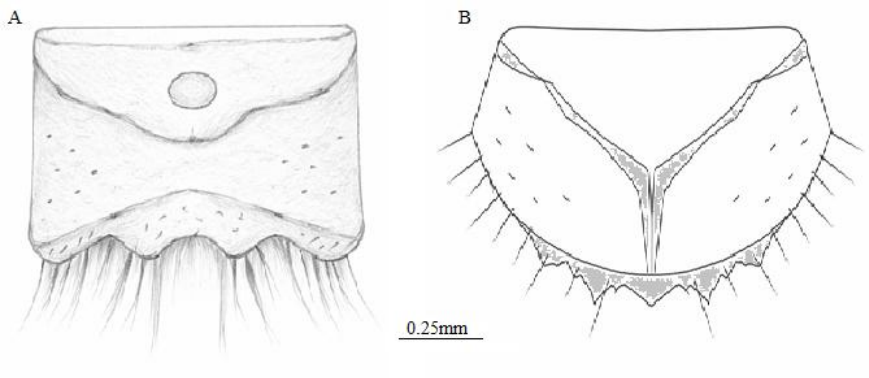

Figure (1): Labrum of *C. frontale*; (A) Male, (B) Female.

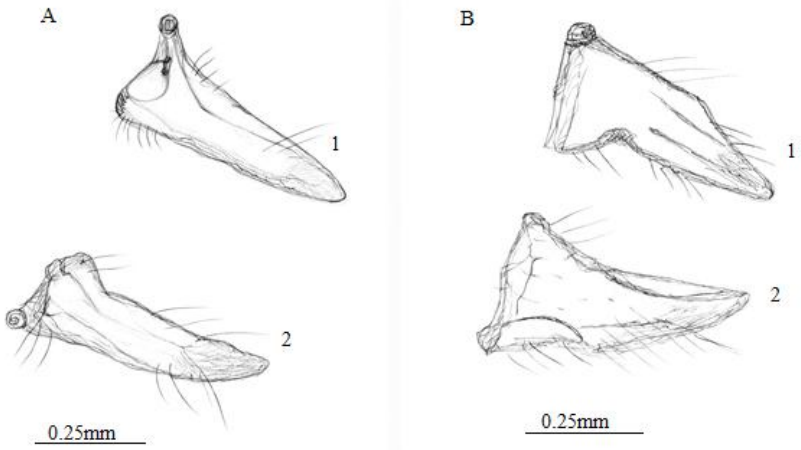

Figure (2): Mandibles of *C. frontale*; (A) Male, (B) Female. [1. Anterior, and 2. Posterior view].

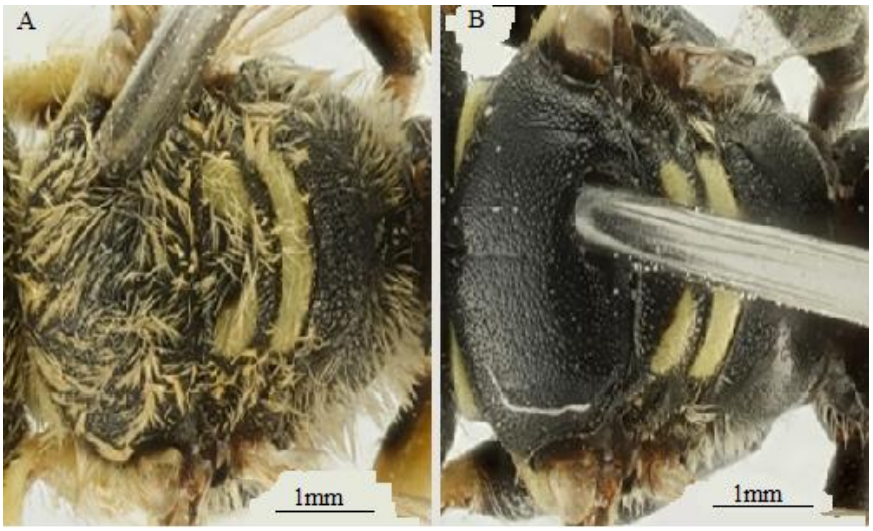

Plate (4): Mesonotum of *C. frontale*; (A) Male, (B) Female.

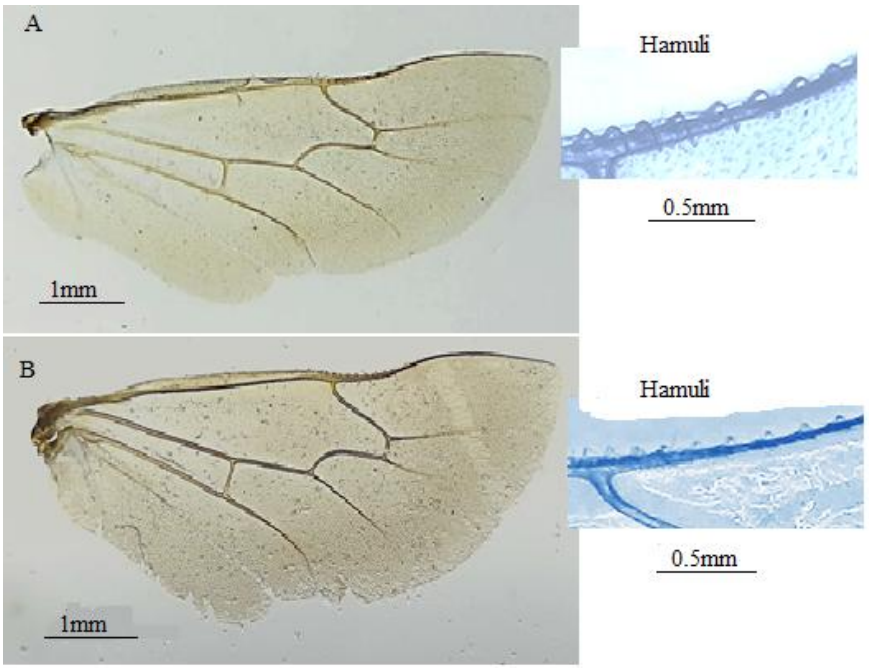

Plate (5): Hind wing of *C. frontale*; (A) ♂, (B) ♀.

Plate (6): Legs of *C. frontale*; (A-C) ♂, (D-F) ♀ [(A, D) Fore leg, (B, E) Mid leg (C, F) Hind leg].

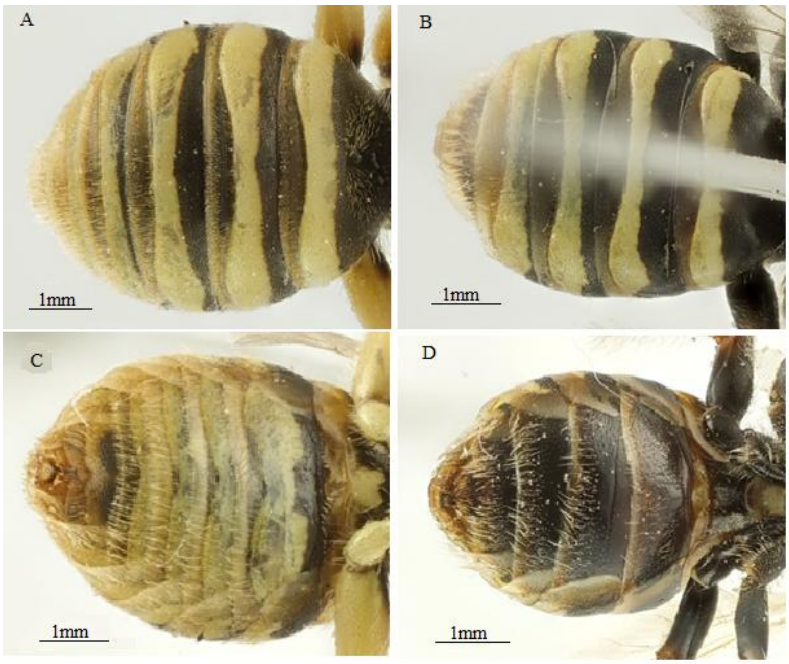

Plate (7): Metasoma of *C. frontale*; (A, C) ♂, dorsal and ventral view, (B, D) ♀, dorsal and ventral view, respectively.

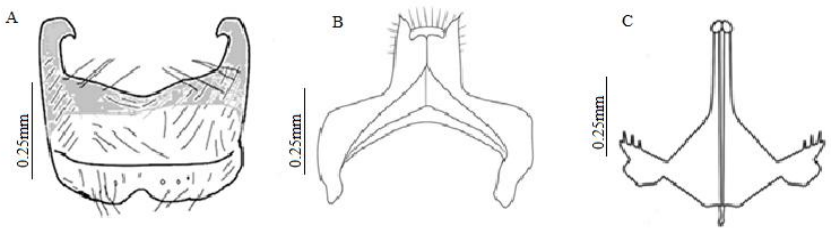

Figure (3): Terminal sternites of *C. frontale* (♂); (A) S6, (B) S7, (C) S8.

Plate (8): Pygidial plate of *C. frontale* (♀).

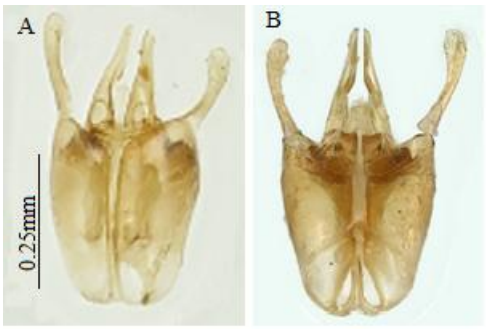

Plate (9): Male genitalia of *C. frontale*; (A) Dorsal, (B) Ventral view.

CONCLUSIONS

The taxa, including genus, subgenus, and species represented a new addition to the local fauna of Iraq. The expansion of the distribution of genus *Camptopoeum*, was previously recorded in the Palearctic Region, including Saudi Arabia, the UAE, Türkiye, and Iran. This finding highlights the biogeographic relations between Iraq and its neighboring regions.

The current study states the significance of the morphological characters in identifying the taxa mentioned above, particularly features of the antennae and legs, hair and punctuation, the

terminal sternite and genitalia in males; these findings are consistent with Tomozei and Patiny (2006). Furthermore, this addition to the insect fauna of Iraq highlights the need for further studies on bee diversity, an issue that calls for more investigation. In addition, this species was associated with the flowers of Asteraceae throughout our survey, this indicates its environmental importance as a good pollinator for a wide range of plants.

ACKNOWLEDGMENTS

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CONFLICT OF INTEREST STATEMENT

The current study is a part of the requirements of the Ph.D. in Entomology submitted to Department of Plant Protection, College of Agriculture Engineering Sciences, University of Baghdad for the first author. Also, we confirm and declare the absence of any relationship or conflict of interest with any other party.

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سجلات جديدة من نحل بانورجين (Hymenoptera, Andrenidae, Panurginae) من العراق

ضرغام دريد فرحان و راضي فاضل الجصاني

قسم وقاية النبات- كلية علوم الهندسة الزراعية/ جامعة بغداد، بغداد، العراق.

الاستلام: 2025/10/14، المراجعة: 2026/1/27، القبول: 2026/1/30، النشر: 2026/6/20

الخلاصة

خلال الدراسة الحالية، سُجِّلَ الجنس *Camptopoeum* Spinola, 1843 والنوع العائد له *Canptopoeum frontale* (Fabricius, 1804) ضمن رتبة غشائية الاجنحة Hymenoptera عائلة Andrenidae و عويلة نحل البانورجين , كإضافة جديدة الى قائمة رتبة غشائية الاجنحة (Hymenoptera في العراق. تم وصف النوع وتوضيحه بشكل مفصل، مع بيان وضعه التصنيفي.