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Kriechbaumerella Dalla Torre, 1897 (Hymenoptera, Chalcididae), a rarely found chalcid genus in Iran

Negar Fakharzadeh[1], Shahram Mirfakhraie[1] & Hossein Lotfalizadeh[2]

1. Department of Plant Protection, Urmia University, Urmia, Iran
2. Insect Taxonomy Research Department, Iranian Research Institute of Plant Protection (IRIPP), Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran

✉ *fakhrzadehn@yahoo.com*
✉ *sh_mirfakhraie@yahoo.com* *https://orcid.org/0000-0002-8148-4136*
✉ *hlotfalizadeh@gmail.com* *https://orcid.org/0000-0002-7927-819X*

Abstract. *Kriechbaumerella* Dalla Torre, 1897 is a relatively small genus of the family Chalcididae and it is rarely collected in Iran. The current paper presents new data on the occurrence and distribution of the *Kriechbaumerella* species in Iran, representing three species, including *Kriechbaumerella hofferi* Bouček, 1952, *K. gracilis* Nikolskaya, 1952 and *K. similis* (Bouček, 1956), of which, *K. similis* is a new record for the Iranian fauna. Some diagnostic characters, as well as the geographical distribution of these species, are provided and an identification key to Iranian species has been prepared.

Keywords: Iran, fauna, distribution, Chalcididae, Palaearctic, taxonomy

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Introduction

Chalcids (Hymenoptera: Chalcididae) are one of the largest groups of wasps which have significant economic importance due to their role in biological control and even being plant pests. These wasps are morphologically, ecologically, biologically and taxonomically diverse. The family Chalididae Latreille, 1817 contains 5 subfamilies, 96 genera and 1469 species distributed in the world (Noyes, 2020; Fakhrzadeh *et al*., 2021). To date, Falahatpisheh *et al*. (2018) have listed around 68 species in 18 genera from different regions of Iran.

Halticellinae Ashmead, 1904 is an important subfamily within Chalcididae that contains a great number of biological control agents. This subfamily is the most diverse and morphologically much more varied, in the Old World (Steffan, 1957; Noyes, 2020).

The subfamily includes 13 genera in Iran *Antrocephalus* Kirby, 1883; *Belaspidia* Masi, 1916; *Bucekia* Steffan, 1951; *Euchalcis* Dufour, 1861; *Haltichella* Steffan, 1955; *Hockeria* Walker, 1834, *Kriechbaumerella* Dalla Torre, 1897; *Lasiochalcidia* Masi, 1929; *Neochalcis* Kirby, 1883; *Neohybothorax* Nikol'skaya, 1960; *Proconura* Dodd, 1915; *Psilochalcis* Kieffer, 1905 and *Tanycoryphus* Cameron, 1905 (Lotfalizadeh *et al*., 2012; Falahatpisheh *et al.,* 2018). Within these genera, *Kriechbaumerella* is the most morphologically and ecologically important genus of the family. It was known as biological control agent of the Microlepidopteras of the families Limacodidae, Lasiocampidae and Saturniidae (Delvare, 2017).

Morphologically, *Kriechbaumerella* and *Antrocephalus* are two closely-related genera having horseshoe-like carina on the head and frons with deep and wide scrobal depression but differ from each other by the following characters: in the genus *Kriechbaumerella,* pronotal carina restricted to sides, not visible on dorsum of pronotum but it is directed toward the posterior margin of the pronotum where they often form submedian protrusions in *Antrocephalus;* mesoscutellum in *Kriechbaumerella* ending as submedian lobes, which sometimes form projecting teeth separated by a deep incision; while mesoscutellum in *Antrocephalus* with two rounded lobes which are directed toward lateral part of pronotum and frenal carina lobes generally less expanded*;* serrulate margin of metafemur forming three lobes but it is wavy, at most with a small tooth at mid-length in *Antrocephalus* (Delvare, 2017).

Corresponding author: Shahram Mirfakhraie (E-mail: sh_mirfakhraie@yahoo.com)

The genus *Kriechbaumerella* Dalla Torre, 1897 is only distributed in the Old World and includes 25 valid species (Narendran, 1989). The Oriental species were revised by Narendran (1989). One species was collected in the UAE, identified as *K. destructor* (Waterston, 1922) (Delvare, 2017). The same species has also been collected from India by Kazmi (2003). Two species of the genus were recorded from Iran (Lotfalizadeh *et al.*, 2012; Falahatpisheh *et al.*, 2018).

This research aims to review the genus *Kriechbaumerella* in Iran based on recently collected materials from northwestern Iran.

Materials and methods

The specimens studied in the current paper have been collected from northwestern Iran by Malaise trap, pan trap, and rearing from the hosts. The most specific locations examined were Khosrowshah, East-Azarbaijan (37°58'28"N, 46°02'55"E, 1346 m a.s.l.) and Kahriz, West- Azarbaijan (37°53'357"N, 45°02'52"E, 1321 m a.s.l.). Specimens were card-mounted and identified. Examination of the external morphology of dry-mounted specimens was done using an Olympus™ SZH. Morphological terminology and abbreviations follow that of Delvare (2017) and Delvare & Bouček (1992).

Identifications were done using the keys and original descriptions made by Nikolskaya (1952, 1960), Bouček (1952), Narendran (1989, 2016), Roy & Farooqi (1984), Delvare (2017), Lotfalizadeh *et al.* (2012) and Kazmi (2003).

Photographs from the newly recorded species were taken using a Keyence digital microscope (VHX-5000) and then optimized in Photoshop® CS4. Specimens were deposited in the HMIM (Hayk Mirzayans Insect Museum, Iranian Research Institute of Plant Protection, Tehran, Iran).

Results

Kreichbaumerella Dalla Torre, 1897

Diagnosis. Frons with distinct scrobal depression and head with horseshoe-like carinae; anterior cainae of pronotum absent or restricted to lateral third only; mesoscutellum ending as submedian lobes which sometimes form projecting teeth separated by a deep incision and is usually bidanted; ventral margin of metafemur forming 3 lobes; membrane of fore wing sometimes infumated and with hyaline spots or bands but always bearing dark setation; postmarginal vein always much longer than stigma; metasoma sessile (Narendran, 1989; Narendran & van Achterberg, 2016; Delvare, 2017).

1-*Kriechbaumerella gracilis* Nikolskaya, 1952

Diagnosis. Lotfalizadeh *et al.* (2012) summarized its morphological characteristics and compared them with a closely related species *Kriechbaumerella mansues* (Nikol'skaya, 1952).

It is characterized by reddish legs (except black coxae and brownish hind tarsus), scape, pedicel, annulus and first funicular; fore wing with infumation not reaching wing apex and with a large pale spot on fore wing, reaching postmarginal vein; bare basal cell, with a row of setae behind submarginal vein; coriaceous and dull intrinsic of mesonotum; shape of mesoscutellum and length of gaster.

Distribution: *Kriechbaumerella gracilis* has been recorded from Tabriz East-Azarbaijan and its distribution is still limited to Iran (Nikol'skaya, 1952).

Biological association. Unknown.

2-*Kriechbaumerella hofferi* Bouček, 1952

Diagnosis. A brief diagnosis was provided by Lotfalizadeh *et al.* (2012) for this species. Its characteristics and discriminant features from the rest species of Iran were provided in the key.

Distribution. *Kriechbaumerella hofferi* is distributed from Europe to Central Asia. It has been reported from Kazakhstan, Iran, Afghanistan, Turkmenistan, Croatia, Czechoslovakia, Hungary, Slovakia, China and the former USSR (Noyes, 2020).

Biological association. Sheng (1986) reported *K. hofferi* as a parasitoid of *Caligula japonica* Moore (Lep.: Saturniidae) in China.

3- *Kreichbaumerella similis* (Bouček, 1956) (Figs 1-3)

Materials examined. Iran, East-Azarbaijan province, Khosrowshah, 1346 m, 37°58'28"N & 46°02'55" E, 18 July 2010, H. Lotfalizadeh leg., 2♂♂ & 1♀ (HMIM). Same locality, 30 July 2009, H. Lotfalizadeh leg., 1♀ (HMIM). West-Azarbaijan province, Kahriz, 1321 m, 37°53'357"N & 45°02'52" E, 22 July 2014, N. Fakhrzadeh leg., 1♂ (HMIM).

Diagnosis. In female body black, with reddish-brown legs, scape, pedicel, anellus, Fu1-Fu3; antenna filiform, funiculars longer than broad; fore wings (Figs 3G-H) extensively infuscate in female, basally hyaline, and with a hyaline spot under stigmal vein; mesoscutellar teeth roundelay obtuse angled apically; gaster slender more than 2.5 times as long as broad. In male funiculars robust and as long as broad; fore wing entirely hyaline.

Description. Body length of female (Fig. 1A) 5.5-8.2 mm. Head (Figs 2C-E) sparsely and very shortly pubescent, coarsely punctured. Head indistinctly wider than thorax anterior to tegula (63:59), seen from above. Head three times wider than long dorsally (63:21). Head wider than long in frontal view (63:54). A curved carina presents between toruli and eyes bent upwards to lower margin of eyes. Fronto-genal suture is carinate distinctly. Inner ocular distance shorter than eye height (30:35). Eye longer than broad in frontal view (35:25). Eye longer than broad in lateral view (35:22). Eye 2.3 times longer than subocular area (35:15). POL more than 10 times longer than OOL (35:3). Clypeus very narrow, smooth.

Antenna (Fig. 2A) with all funiculars uniformly silvery pubescent. Scrobe very finely, horizontally, reticulately wrinkled. All funiculars filiform, longer than broad, except preclaval funicle.

Mesosoma (Figs 3A-B) dorsally distinctly punctuate, bearing white setae. Interspaces about one third of diameter of each puncture, distinctly reticulate. Mesoscutellum as long as wide. Apical teeth roundelay obtuse angled. Lower margins of axillae with tufts of short silvery hairs. Long silvery pubescence on sides of propodeum posteriorly. Lateral teeth of propodeum very obtuse, two on each side. Pronotum four times wider than long (60:15). Mesosoma 1.5 times longer than broad dorsally (90:60). Mesoscutellum wider than long (40:35). Mesonotum wider than long (55:32). Mesosoma 1.5 times longer than high (90:60). Propodeum laterally with tufts of white setae.

Fore wings (Figs 3G-H) extensively infuscate, basal half hyaline, with a hyaline spot under stigmal vein, bearing white setae. Transverse infuscate band under parastigmal and marginal veins dark brown.

Legs with hind femora (Fig. 2G) more or less shiny, coarsely reticulated. Hind femora 1.8 times longer than broad (58:31). The size of the teeth of hind femora same, all rounded and finely serrulate.

Metasoma (Figs 3C-D) more than 1.5 times longer than mesosoma (142:90). Abdomen pyriform, shorter than head and thorax combined. Relatively maximum length of abdomen 32, first tergite 9, from petiole to hind margin of fifth tergite 16, second to fifth tergite 1.7: 1.4: 1: 1, sixth tergite 4.5, syntergum 6, exposed part of ovipositor 5.5.

Color. Body black, except legs, scape, pedicel, anellus, Fu1 to Fu3 that are reddish- brown. Abdomen ventrally reddish-brown. Gt 7 and ovipositor reddish-brown. Tegula and mandibles are brown. Hind coxae distally reddish-brown.

Male (Fig. 1B) Body size varies from 4.4 to 5.5. Body color the same as female, scape, clava reddish brown. Antennal fulicules not slender, distincly wider than female (Fig. 2B). Wings (Fig. 3I) hyaline. Other characters are as defined above in female.

Distribution: *Kriechbaumerella similis* is a new record for Iran, and has been previously reported from Israel (Bouček, 1956).

Biological association. Unknown.

Key to the species of *Kriechbaumerella* in Iran

1. Female antennae black. Hind femur black, contrasting with the relevant tibia which is reddish
…….. *K. hofferi*
- Basal four antennomeres of female reddish, rest of antenna dark brown to black (Fig. 2A). Legs reddish except black coxae and brownish hind tarsus (Fig. 1A, 2G)
…….. 2
2. Infuscation reaching apex of fore wing (Fig. 3G); basal cell hairy, with several rows of setae behind submarginal vein; pale spot on fore wing small, below stigma vein, not reaching apex of postmarginal vein. Gaster slender more than 2.5 times as long as broad (Fig. 3D)
…… *K. similis*
- Infuscation of fore wing not reaching its apex; basal cell mostly bare except one row of setae behind submarginal vein; pale spot on fore wing larger, reaching apex of postmarginal vein. Gaster slender, but not more than 2.5 times as long as broad
…….. *K. gracilis*

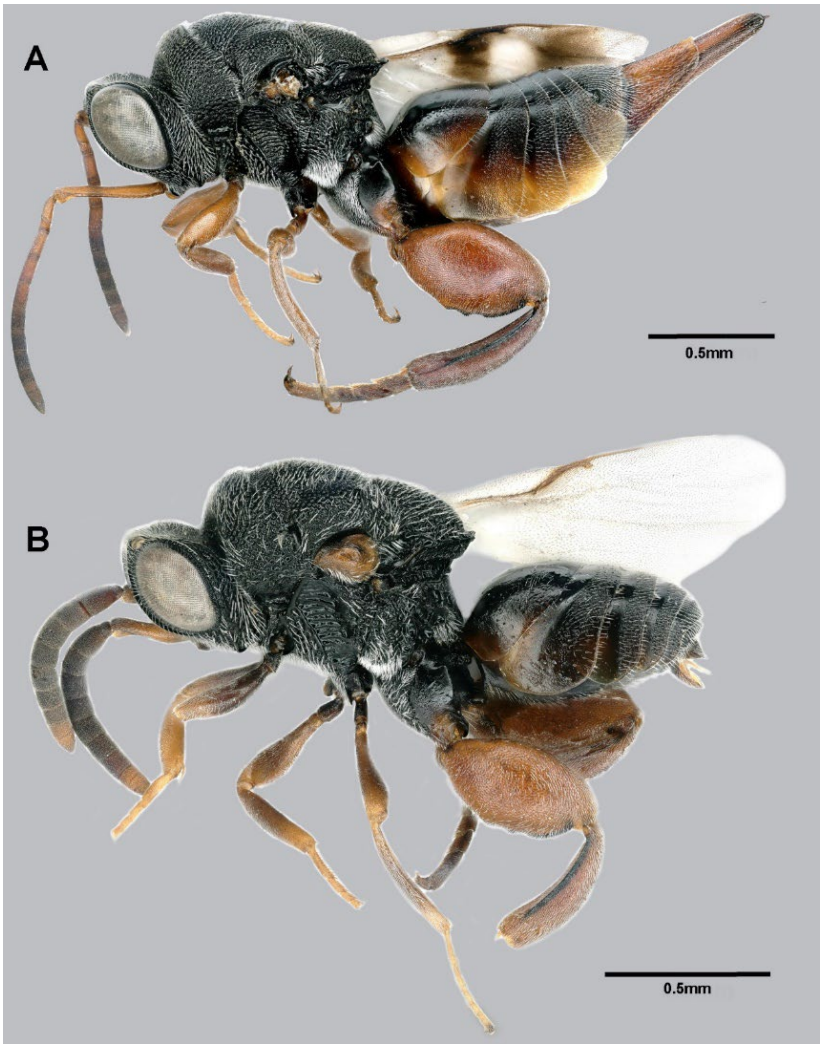

Fig.1. *Kriechbaumerella similis*: A- Female, lateral habitus; B- Male lateral habitus.

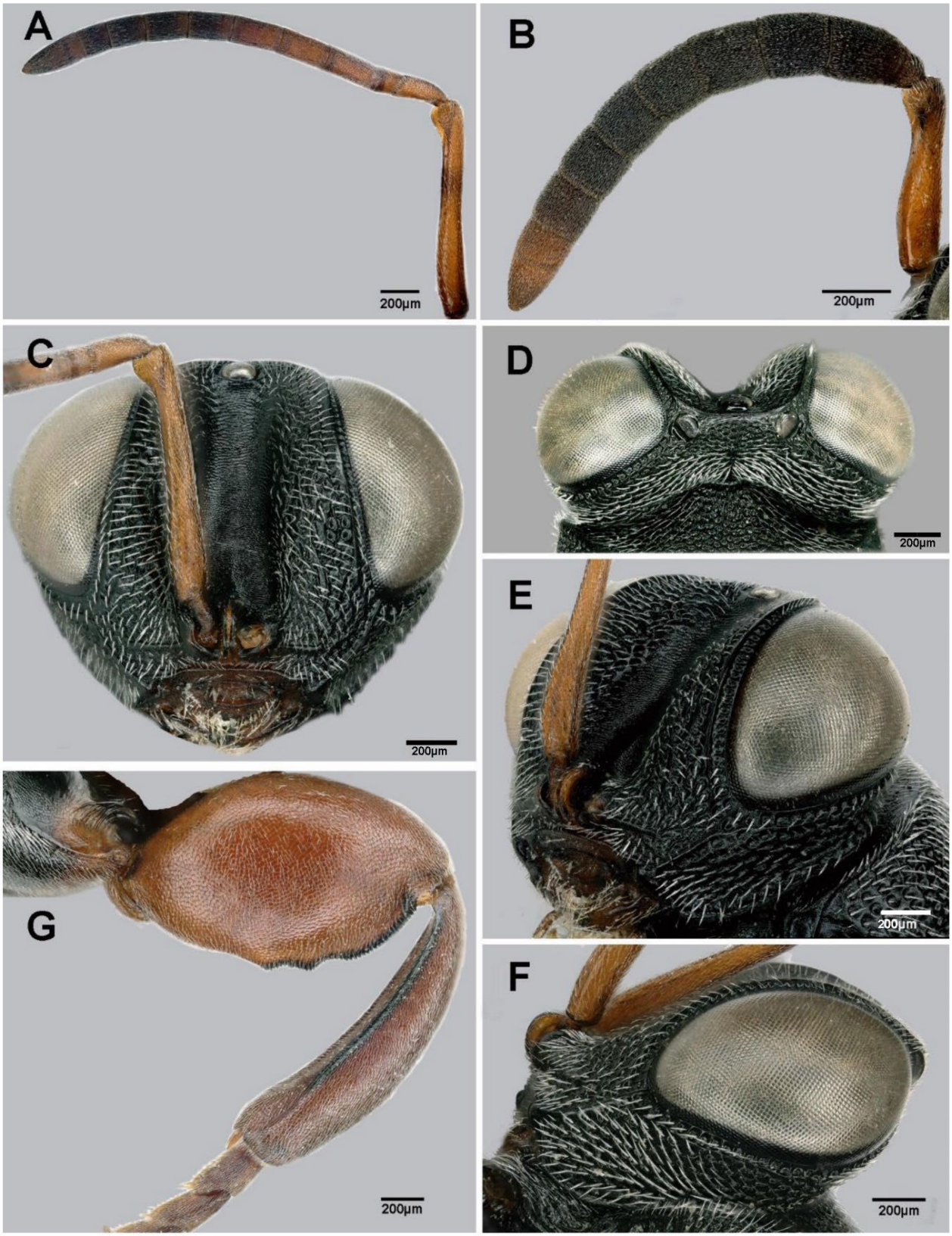

Fig. 2. *Kriechbaumerella similis*: A- Female antenna; B- Male antenna; C-Head in frontal view; D- Head in dorsal view; E- Head in fronto-lateral view; F- Head in lateral view; G- Hind leg in ventral view.

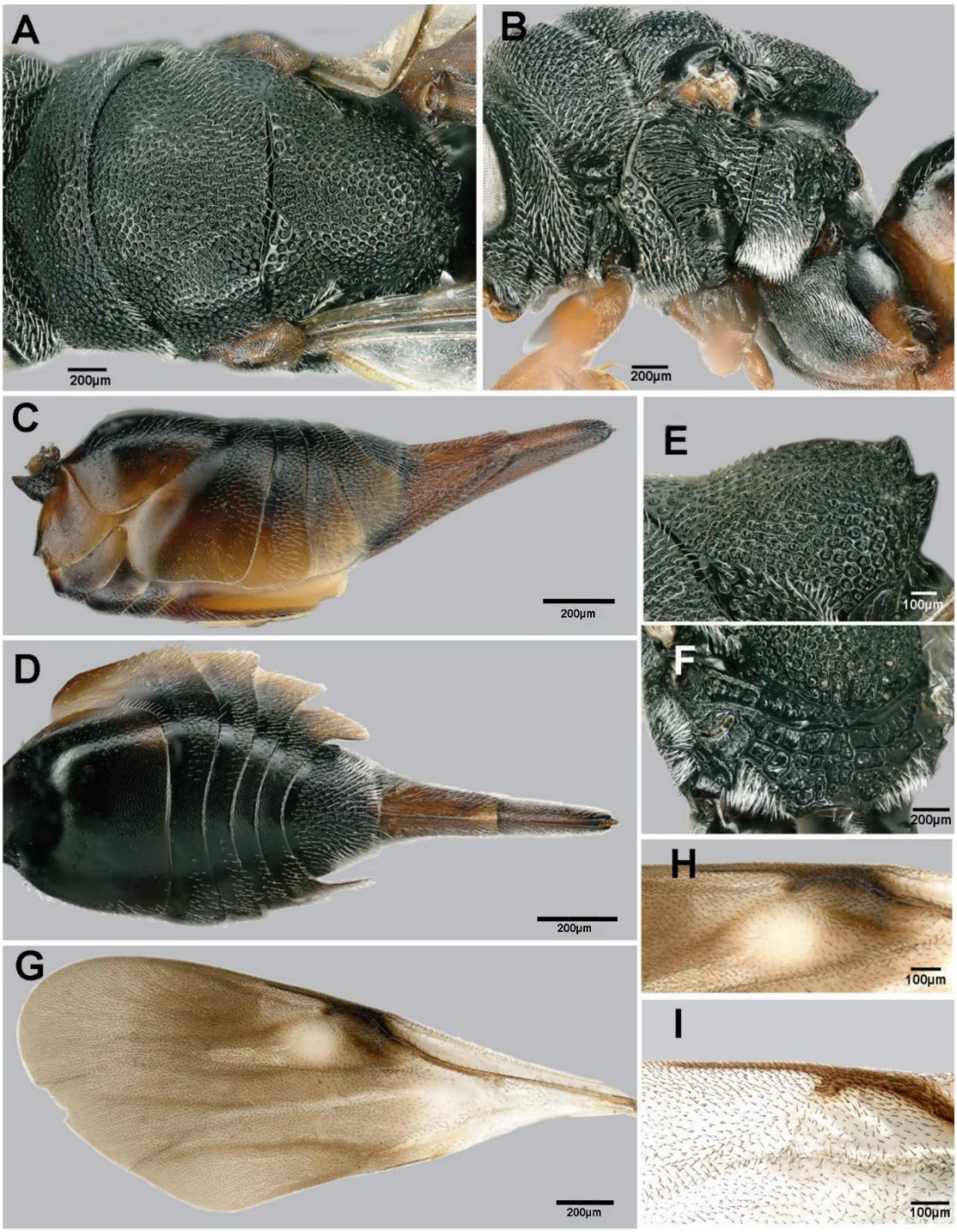

Fig. 3. *Kriechbaumerella similis*: A- Mesosoma in dorsal view; B- Mesosoma in lateral view; C- Metasoma in lateral view; D- Mesosoma in dorsal view; E- Mesoscutellum in latero-dorsal view; F- Propodeum in dorsal view; G- Fore wing, female; H- Wing venation in female; I-Wing venation in male.

Discussion

Kriechbaumerella species have variable distribution. This genus has the largest distribution, being present in Oriental, Palearcticand Afrotropical regions (Bouček, 1956; Narendran, 1989; Delvare, 2017). Discovery of *Kriechbaumerella* in Iran is not surprising, as it had been previously collected from the Palaearctic region. Among the two species recorded from Iran, i.e *K. gracilis* and *K. hofferi*, the latter has a large distribution, being present in many countries such as Afghanistan, China, Croatia, Hungary, Kazakhstan, Slovakia, and USSR (Noyes, 2020) but *K. gracilis* is endemic and until now only known from Iran (Nikol'skaya, 1952; Lotfalizadeh *et al.*, 2012).

Species of the genus *Kriechbaumerella* are rarely collected in the Middle East and it is represented by three species in Iran, one species in Iraq (Bouček, 1956), one species in Turkey (Bouček, 1956), one species in Egypt (Bouček, 1956) and three species in Israel (Bouček, 1956).

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جنس *Kriechbaumerella* Dalla Torre, 1897 (Hymenoptera, Chalcididae)، یک جنس کمیاب در ایران

نگار فخرزاده[۱]، شهرام میرفخرایی[۱] و حسین لطفعلی‌زاده[۲]

۱- گروه گیاهپزشکی، دانشگاه ارومیه، ایران

۲- بخش تحقیقات رده بندی حشرات، موسسه تحقیقات گیاهپزشکی کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی، تهران، ایران

✉ *fakhrzadehn@yahoo.com*
✉ *sh_mirfakhraie@yahoo.com* https://orcid.org/0000-0002-8148-4136
✉ *hlotfalizadeh@gmail.com* https://orcid.org/0000-0002-7927-819X

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چکیده

جنس *Kriechbaumerella* Dalla Torre, 1897 (Hymenoptera, Chalcididae)، یک جنس نسبتا کوچک در خانواده Chalcididae است که در ایران کمیاب است. در این مقاله اطلاعات جدیدی از انتشار گونه‌های این جنس در ایران که شامل سه گونه هست، آورده شده است. این سه گونه شامل *Kriechbaumerella hofferi* Bouček, 1952، *K. gracilis* Nikolskaya, 1952 و *K. similis* (Bouček, 1956) می‌باشد. از بین اینها، گونه *K. similis* برای نخستین بار از ایران گزارش می‌شود. مشخصات تفکیکی و پراکنش جغرافیایی این گونه‌ها فراهم گردید. همچنین کلید شناسایی این سه گونه تهیه شد.

کلمات کلیدی: ایران، فون، پراکنش، خانواده Chalcididae، پاله آرکتیک، تاکسونومی

نویسنده مسئول: شهرام میرفخرایی (پست الکترونیک: sh_mirfakhraie@yahoo.com)

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