

FIRST RECORD OF *DISEPYRIS* KIEFFER (HYMENOPTERA: BETHYLIDAE) FROM IRAN

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Abstract

Disepyris Kieffer, a small genus of Bethylidae (Hymenoptera), is recorded for the first time from Iran, represented by *D. niveus* Lim & Azevedo. Members of this genus can be easily recognized by the protarsi of females with delicate long spines and forewing with short 2r-rs&Rs vein. The diagnostic characters of species are briefly presented according to the newly collected specimens with reference to the respective illustrations.

KEY WORDS: *Disepyris*, morphology, new record, Sistan, parasitoid

Introduction

Bethylidae Haliday, 1839 are one of the widely distributed families of Chrysidoidea (Hymenoptera), with 2,920 species (Azevedo *et al.*, 2018a). To date, about 30 species of Bethylidae belonging to 11 genera are recorded from Iran (Davatchi & Shojai, 1968; Kadjbafe-Vala & Bayat-Asadi, 1995; Mohajery & Azimi, 1995; Habibpour *et al.*, 2002; Alavi & Gholizadeh, 2008; Samadi-Afshar *et al.*, 2012; Ehteshami *et al.*, 2013; Kamangar & Lotfalizadeh, 2014; Sharifi *et al.*, 2014; Pourhaji *et al.*, 2018).

The Bethylidae has been subdivided into five extant (and two extinct) subfamilies; among them, Epyrinae Kieffer, 1914 with 930 species and 13 genera is considered the second largest group (Azevedo *et al.*, 2018a). Available data on the biology of Epyrinae indicate associations as ectoparasites of wood-boring beetles including Anobiidae, Bostrichidae, Bruchidae, Buprestidae, Cerambycidae, Cleridae, Cucujidae, Curculionidae, Dermestidae, Elateridae, Lyctidae, Ptinidae, Silvanidae, Tenebrionidae and rarely Lepidoptera

(Pyralidae) (Azevedo, 1999). *Disepyris* Kieffer, 1905 is a small genus of the subfamily Epyrinae with 15 validated species, reported from the Oriental, Afrotropical and Palaearctic regions (Azevedo *et al.*, 2018b). Recent taxonomic revisions have led to several changes in the taxonomy of this group. All species of *Lytepyris* Kieffer, 1913 (Terayama, 2004), three species of *Rhabdepyris* Kieffer, 1904 (Barbosa & Azevedo, 2014), as well as *Holepyris semiruber* Kieffer, 1911 (Azevedo *et al.*, 2018b) have been transferred to the genus *Disepyris*. So far, no host data are documented for *Disepyris* species.

Species of the genus *Disepyris* can be recognized by the following characters: protarsi with spine-shaped filament in female and forewing with short 2r-rs&Rs vein (Terayama, 2004). The characters of the protarsi have been considered as an adaptation by fossorial species to walking on sandy ground (Azevedo *et al.*, 2018b). *Disepyris* species are mainly recorded from arid countries (Algeria, Libya, Morocco, United Arab Emirates, Kenya, Mongolia and Yemen) and mesic areas in India (Barbosa & Azevedo, 2014). A few specimens of *Disepyris* were found among material collected from the eastern part of Iran (Sistan-o Baluchestan province), representing a new generic record for the fauna of Iran. The identity and diagnostic characters of the specimens are presented and discussed.

Materials and methods

The specimens examined in this study were collected by Malaise traps from the Hamoon wetlands in the Sistan region (Zabol, Sistan-o Baluchestan province) during 2016–2017 (Fig. 1). The collected specimens were kept in 75% ethanol and then mounted on triangular cards and labeled. The species were identified with a Nikon® SMZ645 Stereomicroscope (Nikon Corporation, Japan). For a more detailed study, the terminal part of the metasoma in a single male specimen was separated and boiled in a 10% KOH solution for 5 min, after rinsing with distilled water. Genitalia were separated from metasoma and placed on microscope slides with glycerin and examined under a Nikon® Eclipse E200 microscope. Line drawings were traced in Adobe® Illustrator CC, ver. 24.3, on the photographs captured directly from the slide specimens using a Canon® IXUS 100 IS camera mounted on the microscope. The morphological terminology applied to the body structures follows Lanes *et al.* (2020). The external morphology of the specimens was imaged using a Canon® EOS 700D digital camera attached to a Hund® Wetzlar Stereomicroscope, under the Dome illumination system proposed in Kawada and Buffington (2016).

The abbreviations used in the text are as follows: AOL – minimum distance between anterior ocellus and posterior ocellus; DAO – diameter of anterior ocellus; HE – height of eye measured laterally; LFW – length of forewing; LH – length of head, from the apical margin of the clypeus to the posterior margin of the head in full dorsal view; OOL – ocelli-ocular distance; POL – distance between the posterior ocelli in full dorsal view; VOL – vertex-ocular distance between eye top to vertex line; WE – minimum width of eye in lateral view; WF – width of frons, minimum distance between eyes in full dorsal view; WH – width of the head measured dorsally; WOT – width of the ocellar triangle; WPV – width between margin of posterior ocellus and vertex in full dorsal view. Measurements for the aspect ratio were taken in TPSDig ver 2.05 (Rohlf, 2006). The examined specimens (2 ♀♀, 6 ♂♂) are deposited in the collection of the Department of Plant Protection, University of Zabol, Iran (DPPZ).



Figure 1. Malaise traps installed among *Tamarix* plants in the Hamoon wetlands.

Results

Family Bethyidae Haliday, 1839

Subfamily Epyrinae Kieffer, 1914

Genus *Disepyrus* Kieffer, 1905

Disepyrus Kieffer, 1905: 115–116. Type species: *Disepyrus rufipes* Kieffer, by original designation.

Lytepyrus Kieffer, 1913: 108. Type species: *Trachepyrus biscrensis* Kieffer, by subsequent designation (Kieffer, 1914). Synonymized by Terayama (2004).

Diagnosis

Eye large engrossing almost all sides of head, lateral clypeal lobe reduced, dorsal pronotal area without transverse foveolate groove posteriorly, notaulus present only on anterior half of anteromesoscutum, mesoscutomesoscutellar suture with sulcus that is at least slightly trabeculate, posterolateral corner of metapectal-propodeal complex without teeth, forewing with pterostigma and prostigma present, 2r-rs&Rs vein short, but longer than RS+M vein, protarsi with spine-shaped filament (Azevedo *et al.*, 2018a).

Disepyrus niveus Lim & Azevedo, 2014 (Figs.2 and 3)

Material examined: 2 ♀♀, 6 ♂♂ (DPPZ), IRAN: Sistan-o Baluchestan province, Zabol (31°04'16.1"N, 61°39'17.4"E, 482 m), Malaise trap, 13.9.2016, leg. N. Khajeh.

Diagnosis

Female. Body length 3.6 mm (Fig. 2E). Head rounded in dorsal view, eye very large, occupying almost the whole side of head, with sparse setae. Mandible with three apical teeth. LH 0.9×WH; WF 0.51×WH; WF 0.53×HE; OOL 0.83×WOT; VOL 0.29×HE; distance of posterior ocellus to vertex crest 0.42×DAO; POL 2.29×DAO (Fig. 2A). Anteromesoscutum with transverse anterior series of foveae, notaulus present on anterior

half; parapsidal signum present, parallel, with transverse groove; anteromesoscutum shorter than mesoscutellum, mesoscuto-scutellar suture with two short longitudinal carinae, metapostnotal median carina complete, first metapostnotal lateral and metapostnotal-propodeal carinae present (Fig. 2C). Forewing with 2r-rs&Rs vein short, about as long as stigma (Fig. 2D). Setae of metasomal tergites giving rise to both regular punctures (Fig. 2E).

Coloration. Head black, antenna dark castaneous with scape and pedicel light castaneous (Fig. 2A), mesosoma black, dorsal pronotal area light castaneous (Fig. 2B), legs castaneous (Fig. 2E), forewing with two large smoky bands (Fig. 2D).

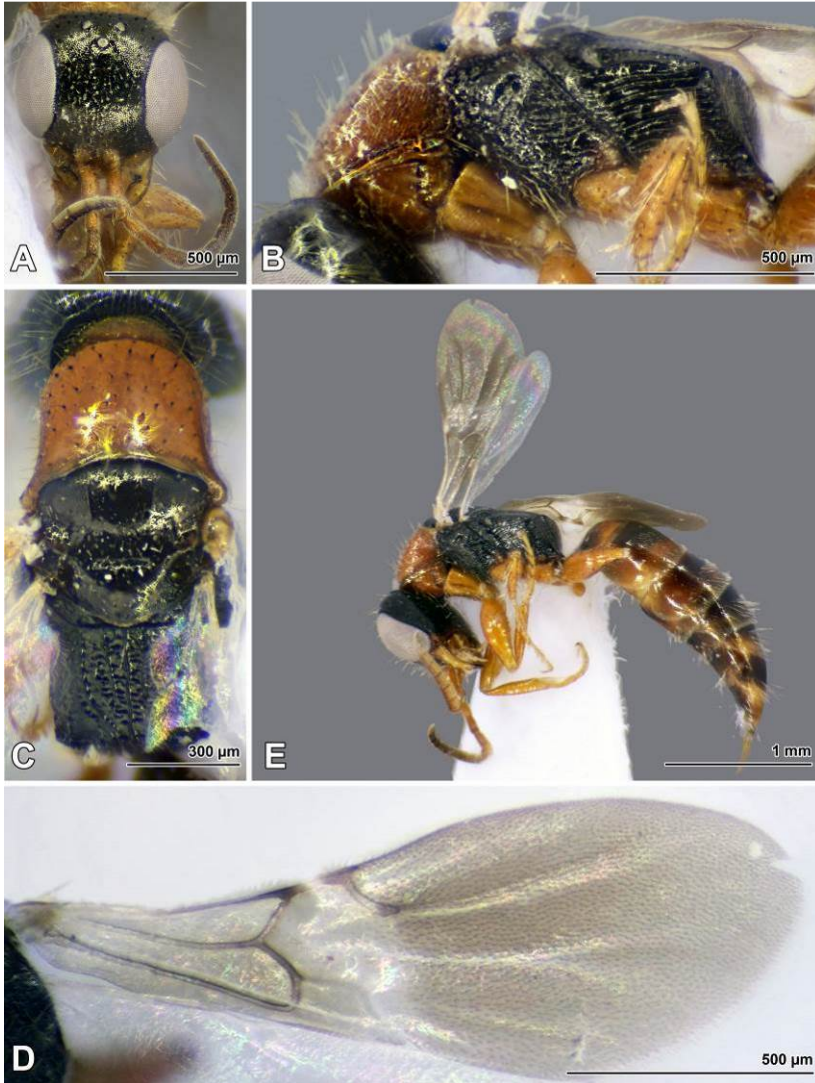


Figure 2. *Disepyris niveus* Lim & Azevedo, 2014 (♀): A. Head, dorsal view; B. Mesosoma, lateral view; C. Mesosoma, dorsal view; D. Forewing; E. General habitus, lateral view.

Male. Length 3.4 mm (Fig. 3A–C). LH 0.82× WH, antenna with scape 3.08× as long as wide, flagellomere I shorter than others, frons and vertex without distinct punctures, WF 0.72× HE; WF 0.4× WH; HE 2.21× WE; WOT 1.06× OOL; VOL 0.31× HE; WPV 1.38× DAO; AOL 0.49× POL. Dorsal pronotal area coriaceous without distinguishable punctures, notaulus carinate, parallel, mesoscuto-scutellar suture with seven short longitudinal carinae, dorsal area of mesopleuron without depressed long setae, metasomal tergite smooth and polished. Forewing with 2r-rs&Rs vein short (Fig. 3B). Genitalia: gonostipes overlapping aedeagus and shorter than harpe, harpe base narrow with distinct setae, wider medially, surface slightly sclerotized with moderate setae, basivolsella narrow, cuspis dividing two branches with erect setae, aedeagus bottle-shaped, genital ring arched in median and cupula present (Fig. 3C).

Distribution: Afrotropical (United Arab Emirates and Yemen (Lim & Azevedo, 2014) and Iran (new record)). Distribution in Iran. Sistan-o Baluchestan province.

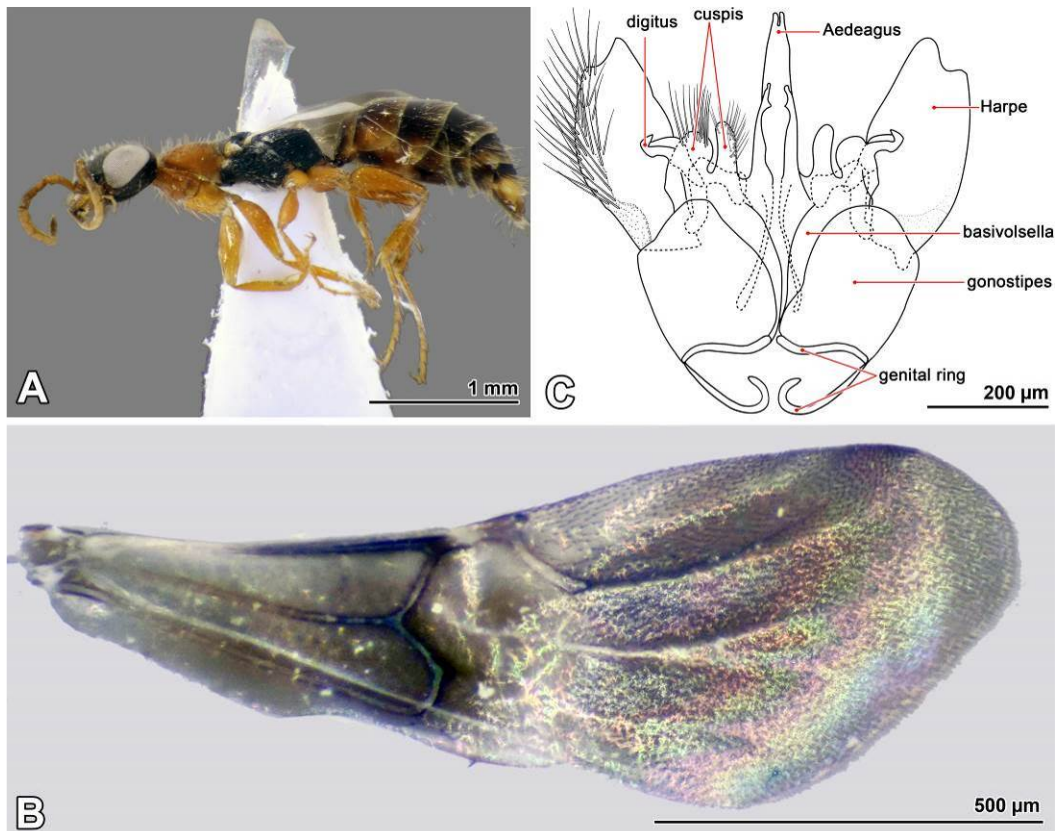


Figure 3. *Disepyris niveus* Lim & Azevedo, 2014 (♂): A. General habitus, lateral view; B. Forewing; C. Line drawing of the male genitalia.

Remarks. Compared with the original description (Lim & Azevedo, 2014), female specimens from Iran differed slightly in the following characters: a) absence of the depressed clump of setae at dorsal area of

mesopleuron; b) shorter head (LH/WH: 0.9, while it is 1.3 in specimen from UAE), and c) narrower face (WF/HE: 0.53, while it is 0.75 in specimen from UAE).

Discussion

This is the first record of the occurrence of the family Bethyridae in Sistan-o Baluchestan as the second largest province of Iran. The genus *Disepyrus* (subfamily Epyrinae) is also recorded for the first time from Iran. The known distribution for *Disepyrus niveus* indicates an Afrotropical realm, represented in the United Arab Emirates and Yemen (Lim & Azevedo, 2014). The occurrence of this species in eastern Iran tentatively indicates the connection line of these areas. Derafshan *et al.* (2016, 2017, 2020); Ghafouri Moghaddam *et al.* (2019) and Heraty *et al.* (2019) also documented a similar pattern of distribution for parasitic Hymenoptera. This pattern of geographic distribution fits better to the zoogeographic regions proposed by Holt *et al.* (2013) than by Wallace (1876). From the biogeographical aspect, the distribution of *Disepyrus* species ranges from wet forests in India to the arid areas of northern Africa and the UAE. Thus, this unusual distribution indicates the adaptability of *Disepyrus* species in terms of ecosystems, varying from arid to wet areas (Barbosa & Azevedo, 2014). Considering the known data about the distribution of Bethyridae in the central and western Asian area (Azevedo *et al.*, 2010; Lim & Azevedo, 2014), many other species of Epyrinae, as well as other subfamilies, are expected to occur in this large territory.

Slight morphological differences were found in the Iranian specimens of *Disepyrus niveus* compared to those described for the type specimens from the UAE (Lim & Azevedo, 2014). Ignoring the differences noted for the aspect ratios of the head, the depressed clump of the setae at the dorsal area of the mesopleuron was already assigned as a diagnostic character for *D. niveus* (Lim & Azevedo, 2014). No function was stated for these setae, but their absence may indicate the plasticity of the character or even the existence of different isolated species/subspecies. Further investigations to assess intraspecific variabilities through the examination of several specimens from the target areas, incorporating molecular data, are necessary to clarify these differences.

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ПРВИ НАЛАЗ *DISEPYRIS* KIEFFER (HYMENOPTERA: BETHYLIDAE) У ИРАНУ

НАХИД КАЈЕХ, ЦЕЛСО О. АЗЕВЕДО и ЕХСАН РАКШАНИ

Извод

Disepyris Kieffer је мали род из породице Bethylidae (Hymenoptera) који је први пут забележен у Ирану са врстом *D. niveus* Lim & Azevedo. Припадници овог рода могу се лако препознати по протарзусима женки са дугим бодљама и предњим крилом са кратким 2r-rs&Rs нервом. Дијагностички карактери врста су укратко приказани према сакупљеним примерцима са освртом на одговарајуће илустрације.

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