

The family Mymaridae (Hymenoptera, Chalcidoidea) in the Kingdom of Saudi Arabia – II: new records, and description of a new species of *Erythmelus* Enock

Shahid Bin Zeya

Department of Zoology, Aligarh Muslim University, Aligarh – 202002, India.

✉ drsبز1966@gmail.com

<https://orcid.org/0000-0003-1594-0372>

Prince Tarique Anwar

Department of Zoology, Aligarh Muslim University, Aligarh – 202002, India.

✉ ta.friday@gmail.com

<https://orcid.org/0000-0002-1682-0033>

Zubair Ahmad

Research Center for Advanced Materials Science (RCAMS), King Khalid University, P.O. Box 9004, Abha 61413, Saudi Arabia.

Unit of Bee Research and Honey Production, Faculty of Science, King Khalid University, P.O. Box 9004, Abha 61413, Saudi Arabia.

Biology Department, Faculty of Sciences and Arts, Dhahran Al Jounub, King Khalid University, Saudi Arabia.

✉ dzubair@gmail.com

<https://orcid.org/0000-0002-5286-026X>

Hamed A. Ghramh

Research Center for Advanced Materials Science (RCAMS), King Khalid University, P.O. Box 9004, Abha 61413, Saudi Arabia.

Unit of Bee Research and Honey Production, Faculty of Science, King Khalid University, P.O. Box 9004, Abha 61413, Saudi Arabia.

Biology Department, Faculty of Science, King Khalid University, P.O. Box 9004, Abha 61413, Saudi Arabia.

✉ hamedsa@hotmail.com

<https://orcid.org/0000-0001-7995-0663>

Farmanur Rahman Khan

Department of Biology, Deanship of Educational Services, Qassim University, Buraidah – 51452, Al-Qassim, Kingdom of Saudi Arabia.

✉ insectqh11@gmail.com

<https://orcid.org/0000-0001-8906-709X>

Farhat S. Khan

Biology Department, Faculty of Sciences and Arts, Dhahran Al Jounub, King Khalid University, Saudi Arabia.

✉ fshafi@kku.edu.sa

<https://orcid.org/0000-0002-2312-540X>

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ABSTRACT. Three genera are recorded for the first time in Saudi Arabia: *Alaptus* Westwood, *Anagrus* Haliday, and *Polynema* Haliday. A new species, *Erythmelus* (*Erythmelus*) *irba* sp. nov. Zeya & Anwar & Ahmad is described. Four known species are recorded for the first time: *Erythmelus* (*E.*) *flavovarius* (Walker), *Erythmelus* (*Parallelaptera*) *rex* (Girault), *Polynema* (*Polynema*) *brevicarinae* Annecke & Doult and *Stephanodes* *reduvioli* (Perkins).

Key words: Fairy fly, Egg parasitoids, New species, New records, KSA

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INTRODUCTION

Species belonging to the family Mymaridae (Hymenoptera: Chalcidoidea) are mostly egg parasitoids, with only two known exceptions (Huber et al., 2006). They are distributed worldwide and are found in almost all types of habitats including fields of crops where they may help regulate agricultural pests

Corresponding author: Ahmad, Z., E-mail: dzubair@gmail.com

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belonging to the Auchenorrhyncha (Hemiptera) (Huber, 1986). The Mymaridae (Hymenoptera: Chalcidoidea) of the Arabian Peninsula are represented by 55 species in 13 genera (Huber et al., 2009; Zeya et al., 2018; Zeya & Amer, 2019), which is approximately 3.4% and 11% respectively of the total number of species and genera known world-wide. The present paper is the second to treat the Mymaridae of Saudi Arabia. In the first article five species of *Lymaenon* Walker, 1846 were described and some other known species and genera were recorded (Zeya et al., 2018). We add here more mymarid taxa to the fauna of Saudi Arabia and, describe a new species.

MATERIAL AND METHODS

The specimens were collected using sweep net from various localities of Saudi Arabia. Collected specimens were mounted on rectangular cards and for their further identification slides were prepared following the methods described in Noyes (1982) with modifications as mentioned in Anwar et al. (2020). Terms used follow Zeya & Hayat (1995) and Gibson (1997). All the measurements are in micrometers (μm). The body lengths and colour of the species were noted from card-mounted specimens. Photographs of slide-mounted parts were taken with a Leica® DFC295 digital camera attached to a Leica® DM 2500 compound microscope. The habitus images of the specimens were photographed under the stereozoom binocular microscope Nikon® SMZ25. Photographic plates were prepared using Adobe Photoshop® 7.0. The following abbreviations are used in the text: F1, F2, Fx = Funiclar segments 1, 2, etc.; mps = multiporous plate sensillum on flagellomeres. The following acronym is used for the depository: ZDAMU = Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, India.

RESULTS

Taxonomy and records

Genus *Alaptus* Westwood, 1839

Alaptus sp.

Material examined. 1♀ (on card, ZDAMU), SAUDI ARABIA: AL-QASSIM: Bukeria, 24.xi.2018, Coll. F.R. Khan.

Diagnosis. Body size, less than 500 μm . Antenna with funicle 5-segmented; mandible with 2-teeth. Body without petiole; mesophragma projecting into gaster; fore wing with posterior margin behind venation excised. Tarsi 5-segmented (Lin et al., 2007; Anwar & Zeya, 2014; Anwar et al., 2015; Triapitsyn, 2017).

Distribution. Cosmopolitan. Saudi Arabia (**new record**).

Genus *Anagrus* Haliday, 1833

Anagrus sp.

Material examined. 7♀♀, 2♂♂ (on cards, ZDAMU), SAUDI ARABIA: AL-QASSIM: Bukeriyah, 24.xi.2018, Coll. F.R. Khan.

Diagnosis. Body size, less than 500 μm . Antenna with funicle 6-segmented. Mesosoma with frenum divided longitudinally, with lobes shorter than wide; mesophragma projecting into gaster. Gaster sessile. Fore wing with posterior margin behind venation lobed. Tarsi 4-segmented (Chiappini et al., 1996; Triapitsyn, 2001, 2015; Triapitsyn & Berezovskiy, 2004; Lin et al., 2007).

Distribution. Cosmopolitan. Saudi Arabia (**new record**).

Genus *Erythmelus* Enock, 1999 (Figs 1–3)

Erythmelus (Erythmelus) flavovarius (Walker, 1846) (Fig. 1)

Material examined. 2 ♀♀ (each on slide under 4 coverslips, slide No. MYM.603, MYM.605, ZDAMU), SAUDI ARABIA: AL-QASSIM: Bukeriyah, 24.xi.2018, Coll. F.R. Khan.

Diagnosis. *Erythmelus (Erythmelus) flavovarius* (Walker) belongs to the ‘*flavovarius*’ species group of *Erythmelus* s. str. based on short ovipositor hardly extending beyond the base of gaster. The combination of features that is used to separate this species from others in the group are: body length 516–600 µm. Body and antennal colour largely brown to dark brown except gaster in basal third pale yellow. Occiput with fine striations. Antenna with scape 5× as long as broad, funicular segments all longer than broad and increasing in length towards apex (F1 the shortest segment); clava subequal to F3–F6 (Fig. 1B). Mesoscutum, scutellum and frenum with fine striations. Fore wing disc near venation bare, medially with a few microtrichia and apically setose; longest marginal seta as long as maximum wing width (Fig. 1C). Metasoma as long as mesosoma; ovipositor with a narrow basal loop, 1.5–2× as long as metatibia (Fig. 1D) (Triapitsyn, 2003; Triapitsyn et al., 2007; Hu & Triapitsyn, 2013).

Distribution. Worldwide. Saudi Arabia (new record).

Erythmelus (Erythmelus) irba Zeya, Anwar & Ahmad sp. nov. (Fig. 2)

<https://zoobank.org/NomenclaturalActs/486C85CA-2F7A-41F9-A3FB-8AF01737514D>

Material. Holotype ♀ (on slide under 3 coverslips, ZDAMU, registration No. HYM.CH.853), SAUDI ARABIA: ASIR: Abha, Raidah, vi.2011, Coll. Z. Ahmad.

Diagnosis. *Erythmelus (Erythmelus) irba* belongs to the ‘*helopeltidis*’ species group of *Erythmelus* s. str. based on long ovipositor extending beyond the base of gaster. It is most similar to *E. angelovi* Donev 1985 in having quite similar antennal configurations but differs by having fore wing disc bare in basal half, setose in apical half and, with brownish tinge in middle whereas in the latter species fore wing disc with a few setae near posterior margin of basal half and apically, and, without brownish tinge.

It can be distinguished from all other species in the group are: apex of pedicel, scape and F1 with thick setae; pedicel 1.5× as long as F1; fore wing with brownish tinge medially, 4.2× as long as broad with longest marginal seta 0.9× maximum wing width.

Description. Female. Body length 770 µm. Body largely dark brown except for gaster in basal third pale yellow; ovipositor sheath brown. Antenna brown. Fore wing infumate, darker behind submarginal vein except for two narrow longitudinal clear areas, more hyaline just beyond apex of venation. Hind wing hyaline medially, otherwise faintly infumate. Fore leg with coxa dark brown to yellowish-brown apically, femur pale brown, tibia and tarsus yellow; mid leg with coxa dark brown, femur brown to dark brown, tibia and tarsus brown; hind leg with coxa yellowish-brown to dark brown apically, femur basally pale yellow, otherwise dark brown, tibia in basal half or so pale yellow, rest dark brown, tarsus brown.

Head. Head almost quadrate. Antenna with scape 7.5× as long as broad; pedicel distinctly longer than F1–F5 individually; funicular segments all at least 2× as long as broad; F3 the shortest; F6 with 2 mps; clava 3.5× as long as broad, slightly longer than F4–F6 combined, with 5 mps (Fig. 2A).

Mesosoma. Scutellum with faint transversely-curved reticulations; frenum with fine, longitudinal striations. Fore wing 5× as long as broad; longest marginal seta 1.2× greatest wing width (Fig. 2B). Hind wing 17× as long as broad, disc with a row of microtrichia near anterior margin in addition to marginal row of microtrichia; longest marginal seta 3.5× as long as greatest wing width (Fig. 2B).

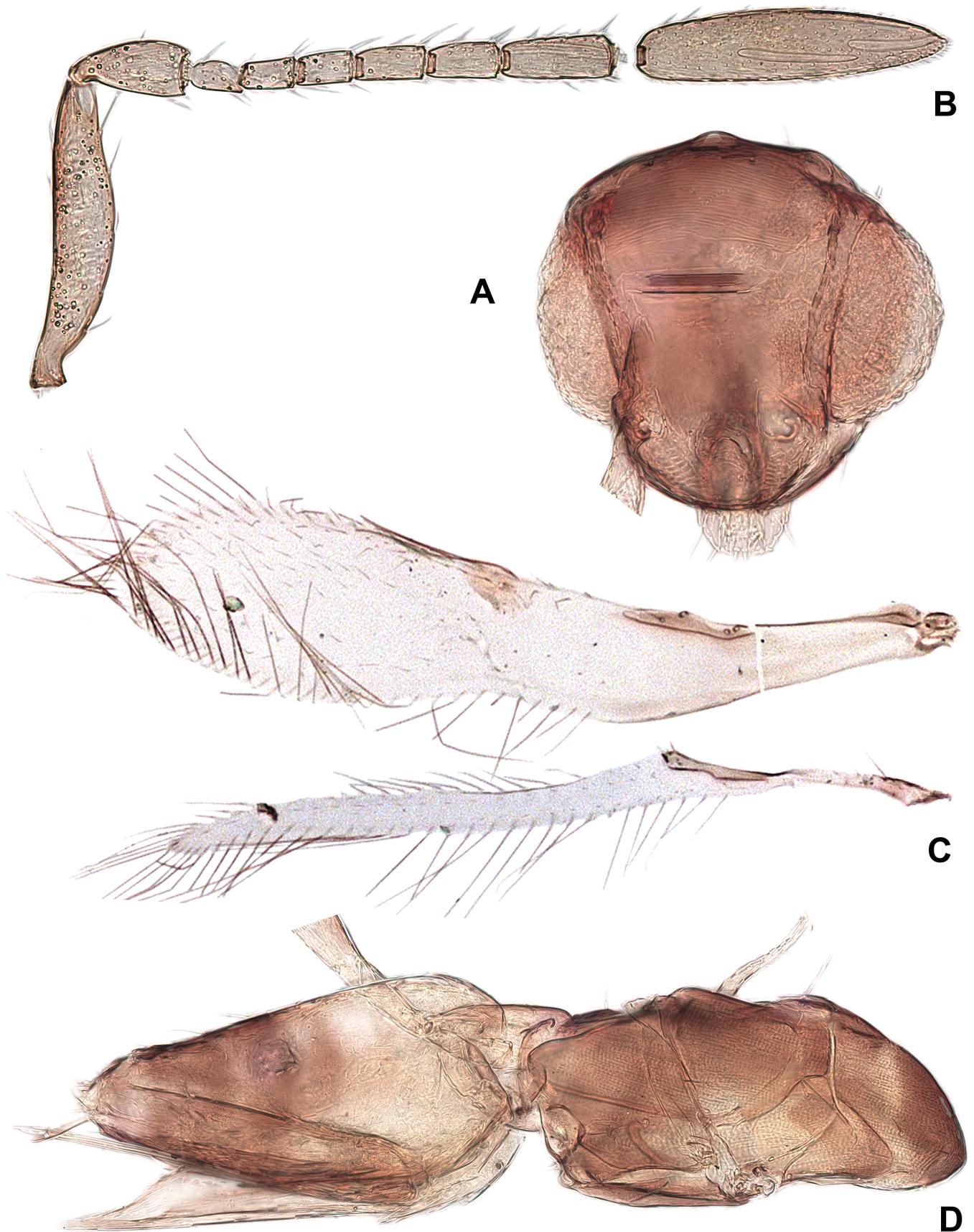


Figure 1. *Erythmelus (Erythmelus) flavovarius* (Walker, 1846). Female: **A.** Head, frontal view; **B.** Antenna; **C.** Wings; **D.** Mesosoma and metasoma, dorso-lateral view.

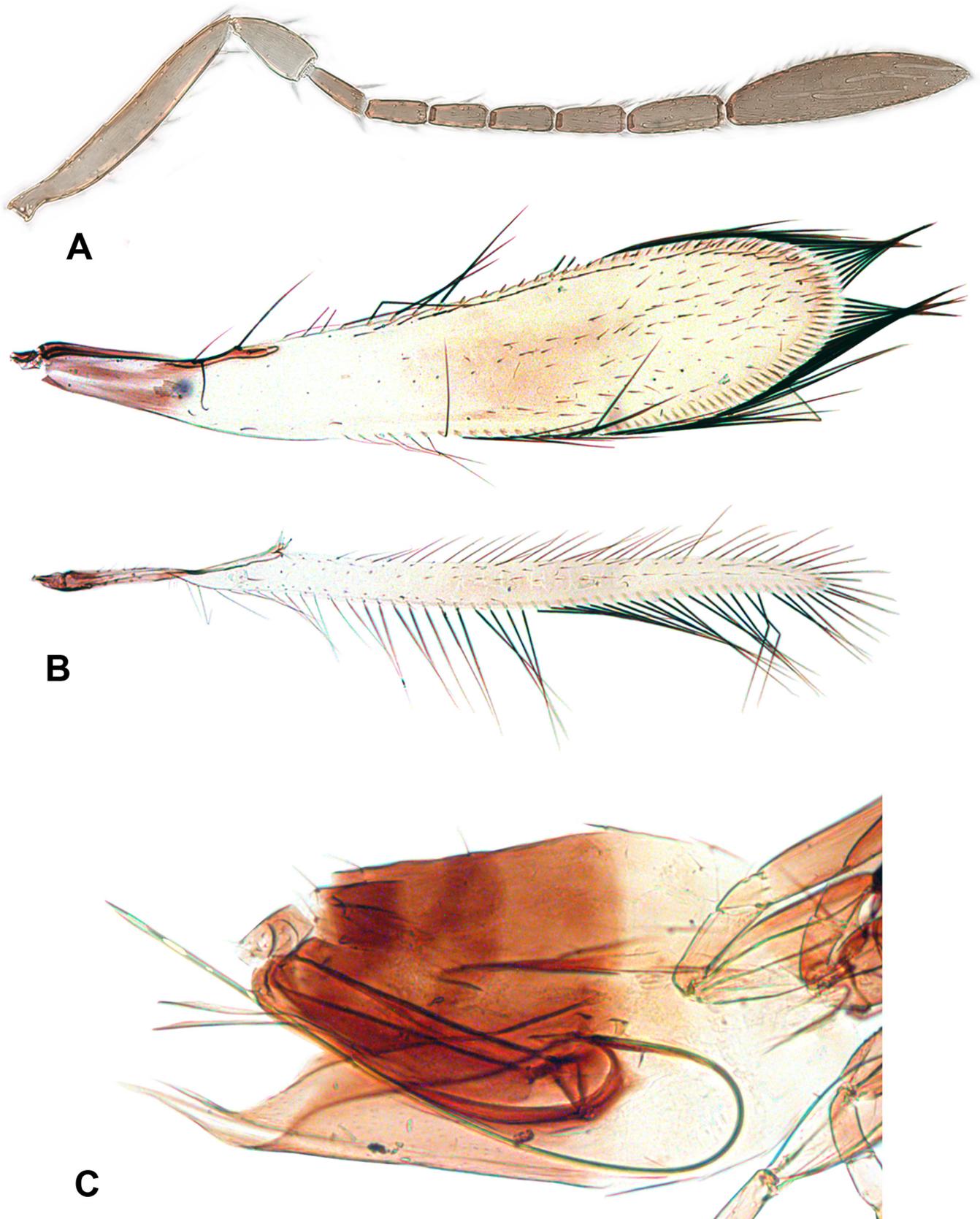


Figure 2. *Erythmelus (Erythmelus) irba* Zeya, Anwar & Ahmad **sp. nov.** Female holotype: **A.** Antenna; **B.** Wings; **C.** Metasoma, lateral view.

Metasoma (Fig. 2C). Metasoma slightly longer than mesosoma; ovipositor 1.1× as long as gaster, strongly exerted beyond gastral tergum and hypopygium, 1.8× as long as mesotibia and 1.7× as long as metatibia.

Measurements (µm). head width/height, 200/200; antennal segments length/width – scape including radicle, 205/28; pedicel, 65/33; F1, 50/15; F2, 43/16; F3, 35/16; F4, 40/18; F5, 48/20; F6, 68/23; clava, 178/50; mesosoma, 488; mesoscutum, 213; scutellum, 45; frenum, 125; metanotum, 25; propodeum, 80; fore wing length/width, 900/183; longest marginal seta, 225; hind wing length/width, 850/50; longest marginal seta, 175; protibia, 225; mesotibia, 313; metatibia, 325; metasoma, 500; ovipositor, 550.

Male. Unknown.

Distribution. Saudi Arabia.

Etymology. The species name is an arbitrary combination of letters and is treated as a noun in apposition.

Erythmelus (Paralleleptera) rex (Girault, 1911) (Fig. 3)

Material examined. 1♀ on slide under 4 coverslips, slide No. MYM.604, ZDAMU), SAUDI ARABIA: AL-QASSIM: Bukeriyah, 24.xi.2018, coll. F.R. Khan.

Diagnosis. Body largely dark brown except gaster in basal third pale yellow. Head almost quadrate. Antenna with scape 5.3× as long as broad; pedicel longer than all funicular segments individually except F5; F1 the shortest; F5 the longest slightly longer than the combined length of F3 and F4; clava 4× as long as broad, slightly longer than F4–F5, with 5 mps (Fig. 3A). Fore wing disc is almost bare, with a few microtrichia in middle (Fig. 3B). Metasoma as long as mesosoma; ovipositor with narrow basal loop, 1.3× as long as metatibia (Fig. 3C) (Triapitsyn, 2003; Triapitsyn et al., 2007; Hu & Triapitsyn, 2013).

Distribution. Worldwide. Saudi Arabia (new record).

Genus *Gonatocerus* Nees, 1834

Gonatocerus aegyptiacus Soyka, 1950 (Fig. 4A)

Material examined. 1♀ (on slide, ZDAMU), 2♂♂ KSA: AL-BAHA: Al-Qunfudhah, vi.2012, Coll. Zubair Ahmad.

Diagnosis. Combination of features that used to distinguish this species from others in the genus are: fore wing narrow, 4.2–4.4× as long as broad, disc bare behind the entire submarginal vein; ovipositor 1.4× as long as mesotibia (Zeya & Hayat, 1995; Triapitsyn, 2013; Huber, 2015; Zeya & Amer, 2018).

Distribution. Egypt, Saudi Arabia.

Genus *Mymar* Curtis, 1829

Mymar taprobanicum Ward, 1875 (Fig. 4B)

Material examined. 3♀♀ (on same slide, ZDAMU), KSA: AL-QASSIM: Bukeriyah, 24.xi.2018, coll. F.R. Khan; 1♀ (on slide, ZDAMU), ASIR: Abha, King Khalid University Campus, vi.2012, coll. Zubair Ahmad; 3♀♀ (on slides, ZDAMU), AL-BAHA: Al-Qunfudhah, 1.iv.2011, Malaise trap, coll. S. Qahtani.

Diagnosis. This is apparently a highly variable species, and is distributed in almost all the zoogeographical realms. Its main diagnostic features are: funicle F3–F5 less than 3× as long as broad individually; fore wing blade with apical dark patch covering less than half length of wing expansion; hind wing filamentous; ovipositor 0.7–0.8× mesotibia and 0.6–0.7× metatibia (Annecke, 1961; Hayat et al., 2008; Triapitsyn & Berezovskiy, 2001; Amer et al., 2016).

Distribution. Worldwide. Saudi Arabia (new record).

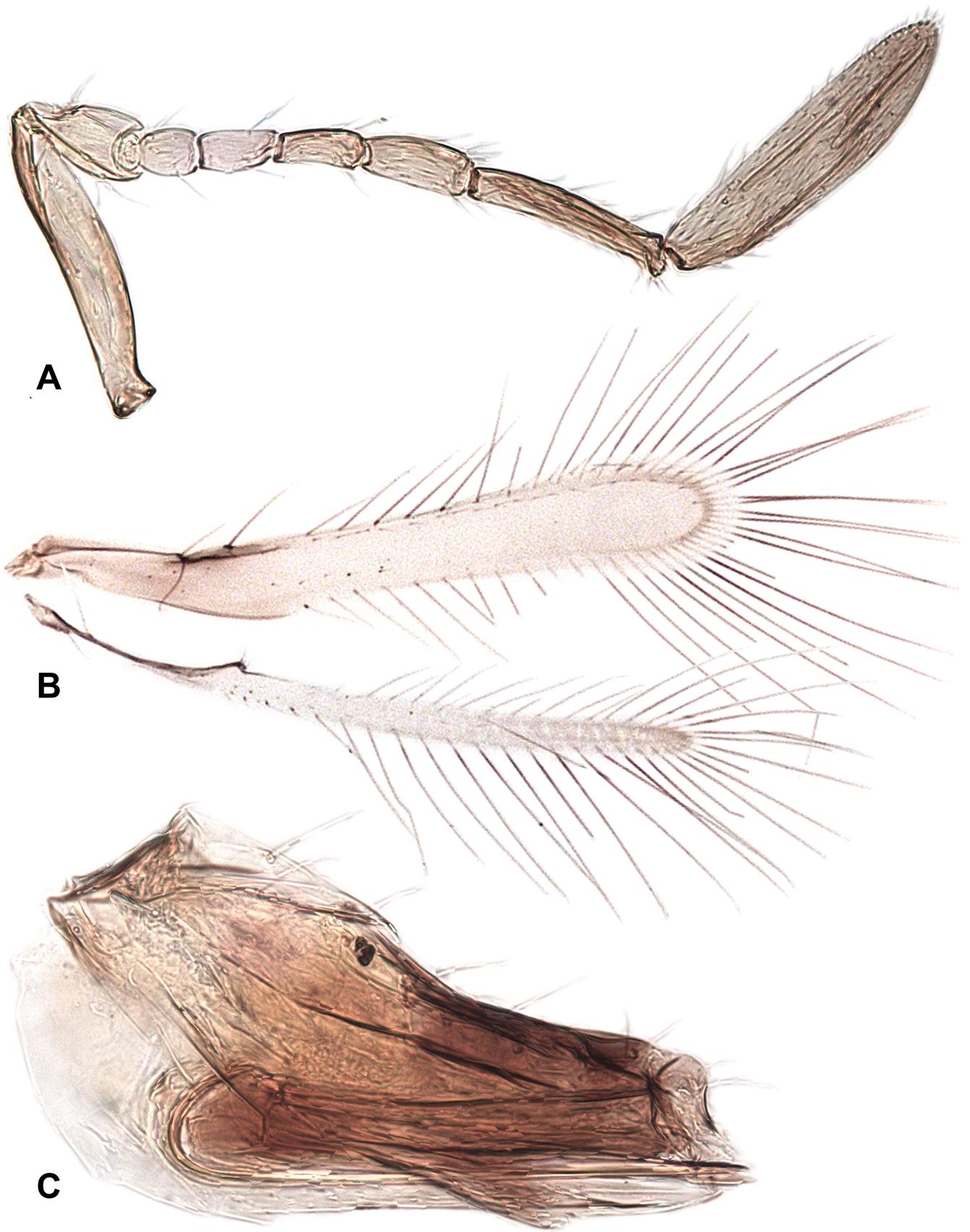


Figure 3. *Erythmelus (Parallelaptera) rex* (Girault, 1911). Female: **A.** Antenna; **B.** Wings; **C.** Metasoma, lateral view.

Genus *Polynema* Haliday, 1833

Polynema (Polynema) brevicarinae Annecke & Doutt, 1961 (Figs 4C, D)

Material examined. 6♀♀, 3♂♂ (2♀♀ on same slide, 4♀♀, 3♂♂ on cards, ZDAMU), SAUDI ARABIA: AL-QASSIM: Bukeriyah, 24.xi.2018, Coll. F.R. Khan; 1♀ (on slide, ZDAMU), AL-BAHA: Al-Qunfudhah, i-iv.2011, Coll. Zubair Ahmad.

Diagnosis. Combination of features that used to distinguish this species from others in the genus are: body brown to dark brown; antenna dark brown except scape, pedicel, F1-F3 pale yellow; scape with cross-ridges on inner surface; fore wing disc behind venation without infuscation (Hayat & Anis, 1999; Rehmat & Anis, 2015).

Distribution. India, South Africa. Saudi Arabia (new record).

Remark. Both the genus and species are newly recorded here from Saudi Arabia.

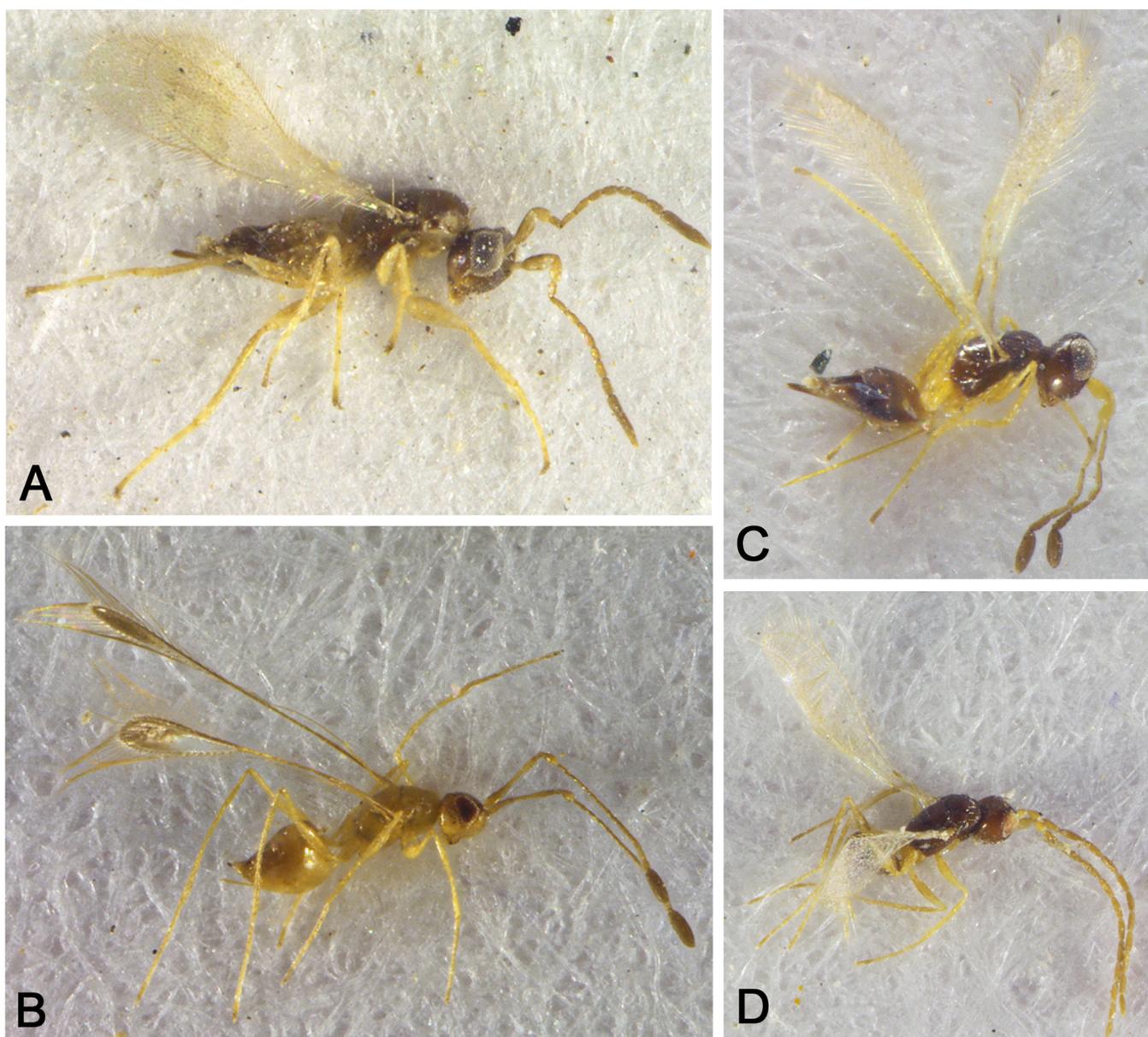


Figure 4. Habitus, (A-C). Females; (D). Male: A. *Gonatocerus aegyptiacus* Soyka (1950); B. *Mymar taprobanicum* Ward (1875); C & D. *Polynema (Polynema) brevicarinae* Annecke & Doutt (1961).

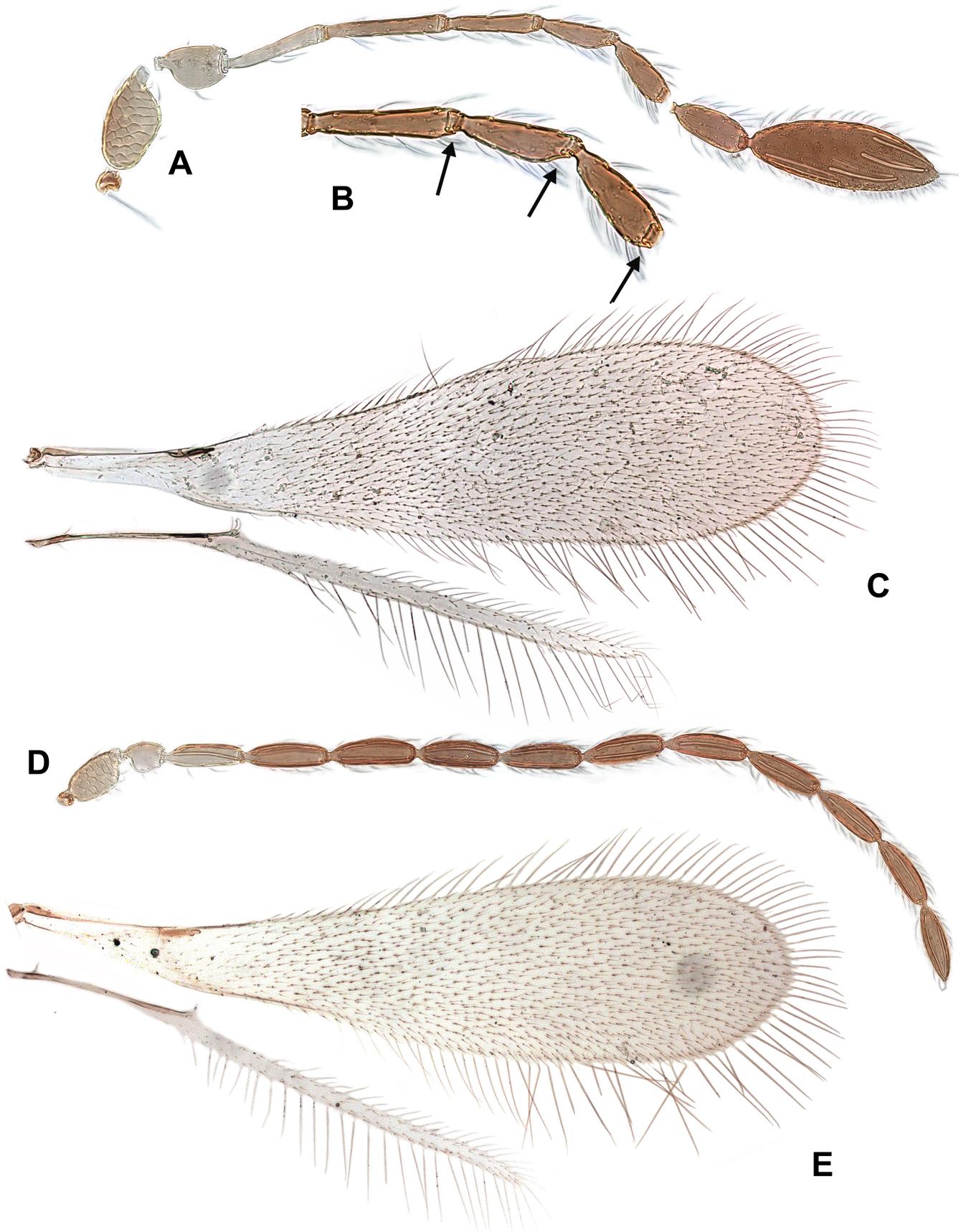


Figure 5. *Stephanodes reduvioli* (Perkins, 1905), (A–C). Female (D & E). Male: A. Antenna; B. Funicular segments 3–5 enlarged, arrow indicates sickle-like sensilla; C. Wings; D. Antenna; E. Wings.

Genus *Stephanodes* Enoch, 1909

Stephanodes reduvioli (Perkins, 1905) (Fig. 5)

Material examined. 1♀, 1♂ (on slides, ZDAMU), SAUDI ARABIA: AL-BAHA: Al-Qunfudhah, vi.2011, coll. Zubair Ahmad.

Diagnosis. Body size, less than 1000 µm. Body colour dark brown; petiole pale brown; antenna with scape, pedicel, and F1 pale brown, rest brown. Antenna with F3–F6 with at least one sickle-like sensilla (Figs 5A–B) (Huber & Fidalgo, 1997).

Distribution. Worldwide except Africa and Antarctica. Saudi Arabia (**new record**).

DISCUSSION

The present study is based on mymarid specimens collected mainly from a single locality of the three provinces of the Kingdom of Saudi Arabia i.e., Asir, Al-Qassim and Al-Baha. Based on their taxonomic features we have identified and reported seven genera, three subgenera, two species-group and, seven species (including a new species). Of the reported species, *Erythmelus rex* (Girault), *Gonatocerus aegyptiacus* Soyka and *Stephanodes reduvioli* (Perkins) are new to the fauna of Afrotropical region. Though the Mymaridae (Hymenoptera, Chalcidoidea) of the Arabian Peninsula is represented by 61 species (including six new records and a new species described here in this paper) in 13 genera, which is more than double when we compare it with that of the nearby country i.e., Iran which has 27 species belonging to eight genera (Lotfalizadeh, 2015) but, still the mymarid fauna of the Kingdom of Saudi Arabia is poorly known. One of the probable reasons for this is their small size which needs special care for sorting and mounting, the other being lack of taxonomic work which primarily includes collection from different zoogeographic zones. However, because of the biodiversity richness of the region, many more mymarid wasp species are expected to be found here. Therefore, future collecting trips and studies are needed to explore this family in different zoogeographical zones of this large country that occupies the major part of Asia.

AUTHOR'S CONTRIBUTION

The authors confirm contribution in the paper as follows: S.B. Zeya: Conceived idea, preparing the manuscript; P.T. Anwar: Slide preparation, identification, photography, and preparing the manuscript; Z. Ahmad: Collection of specimens, preparing the manuscript; H.A. Ghramh: Designing sample collecting sites, assistance in collecting of specimens, sorting and preservation of wet samples; F.R. Khan: Collecting of the specimens, preparing the manuscript; F.S. Khan: Designing sample collecting sites, assistance in collecting of specimens, sorting and preservation of wet samples; all authors approved the final version of the manuscript.

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AVAILABILITY OF DATA AND MATERIAL

Not applicable.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

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خانواده (Hymenoptera: Chalcidoidea) Mymaridae در عربستان سعودی - گزارش‌های جدید و توصیف یک گونه جدید از جنس *Erythmelus* Enock

شاهد بن ضیاء^۱، پرنس طارق انور^۱، زبیر احمد^{۲*}، حامد قرام^۳، فرمان الرحمن خان^۴ و فرحت خان^۴

۱ گروه جانورشناسی، دانشگاه اسلامی آلیگار، آلیگار، اوتار پرداش، هند.

۲ مرکز تحقیقات علوم مواد، دانشگاه ملک خالد، ابها، عربستان.

۳ واحد تحقیقات زنبور عسل و تولید عسل، دانشکده علوم، دانشگاه ملک خالد، ابها، عربستان.

۴ گروه زیست‌شناسی، دانشکده علوم و هنر، ظهران الجنوب، دانشگاه ملک خالد، عربستان.

۵ گروه زیست‌شناسی، دانشکده علوم، دانشگاه ملک خالد، ابها، عربستان.

۶ گروه زیست‌شناسی، رئیس خدمات آموزشی، دانشگاه القصیم، القصیم، عربستان.

* پست الکترونیکی نویسنده مسئول مکاتبه: dzubair@gmail.com

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چکیده: سه جنس *Alaptus* Westwood، *Anagrus* Haliday و *Polynema* Haliday برای اولین بار از عربستان گزارش شدند. یک گونه جدید به نام *Erythmelus irba* sp. nov. Zeya & Anwar & Ahmad توصیف شد. چهار گونه *Erythmelus (Parallelaptera) rex*، *Erythmelus (E.) flavovarius* (Walker) و *Polynema (Polynema) brevicarinae* Annecke & Doutt (Girault) برای اولین بار گزارش شدند.

واژگان کلیدی: Fairy fly، پارازیتویید تخم، گونه جدید، گزارش جدید