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## A NEW SPECIES OF *HENDRELLA* (DIPTERA, TEPHRITIDAE) FROM SOUTH-EASTERN IRAN

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**A New Species of *Hendrella* (Diptera, Tephritidae) from South-Eastern Iran. Mohamadzade Namin, S., Moeinadini, A., Madjdzadeh, S. M.** — The genus *Hendrella* Munro, 1938 hitherto was known to include 8 species occurring in the Palaearctic Region. All species of known biology are associated with *Artemisia* spp. (Asteraceae). An additional species with similar biology, *H. kermanensis* sp. n., recently discovered in Iran is described. It is very similar to *H. caloptera* in the coloration of antenna and femora, as well as presence of one hyaline spot in cell  $r_3$ , but differs from it by the shape of the first flagellomere and also by the wing pattern details. Larvae of *H. kermanensis* sp. n. induce stem galls in *Artemisia aucheri* Boiss. of the tribe Anthemideae (Asteraceae).

Key words: Diptera, Tephritidae, Dithrycini, *Hendrella*, Asteraceae.

### Introduction

The Tephritidae is one of the largest families of the acalyprate Diptera (Norrbom et al., 1999). The family includes many fruit-infesting species of economic importance; several species are beneficial and effectively used in biological control programs against weeds (White, Elson-Harris, 1992). Most tephritids occurring in the Palaearctic Region are associated with asteraceous plants (Asteraceae) and the majority of species infest flower heads, often inducing galls; some larvae are stem-borers. A few species, such as *Oedaspis multifasciata* (Loew, 1850), *Hendrella sordida* Korneyev, 1989, and *Dithryca guttularis* (Meigen, 1826) (Korneyev, 1999; Korneyev et al., 2004) induce stem or rhizome galls.

*Hendrella* Munro, 1938 is a small genus including eight species occurring mostly in the Central Asian part of the Palaearctic Region; six Oriental and Australasian species that were included in the catalogue of fruit flies (Norrbom et al, 1999) belong elsewhere (Hancock, 2001; V. Korneyev, pers. comm.). The genus name was proposed by Munro (1938) for four Palaearctic species previously misplaced by Hendel (1927) under *Tephrella* Bezzi, 1913 (now considered as *Hendrella basalis* (Hendel, 1927), *H. caloptera* (Loew, 1850), *H. ibis* (Hendel, 1927), and *H. winnertzii* (Frauenfeld, 1864)). Korneyev (1989) reviewed the genus and described *Hendrella sordida* Korneyev, 1989 and *H. quinquincisa* Korneyev, 1989, transferred here *H. adila* (Richter, 1975), and provided a key to known species of *Hendrella*. Wang (1998) described *H. sinensis* from South-Eastern China (Sichuan) based on a single male. None of the described *Hendrella* species has been recorded from the Middle East region.

Recently, a hitherto undescribed species of *Hendrella* was reared from stem galls of *Artemisia aucheri* (Asteraceae) in South-Eastern Iran. This species is described and figured below.

### Material and methods

Specimens were double-mounted from alcohol onto minuten and deposited in the Insect Collection of the Zoological Museum of Shahid Bahonar University of Kerman, Iran (ZMSBUK).

Genitalia were macerated in 10 % KOH, washed, placed into glycerol, photographed and stored in a microvial pinned underneath the specimen.

Morphological terminology generally follows White et al. (1999). Measurements of wing body are given in mm.

## Results and discussion

### Subfamily Tephritinae, tribe Dithricini

#### *Hendrella* Munro, 1938

Type species: *Trypeta caloptera* Loew, 1850.

*Tephrella*: Hendel, 1927: 113 (misidentification). — *Hendrella* Munro, 1938: 117; Foote, 1984: 93 (catalogue); Korneyev 1989: 87 (key and revision of 7 species); Norrbom et al., 1999: 157 (catalogue).

**Description.** Head in profile slightly higher than long. Frons narrowing from ocellar triangle to lunule and with fine yellowish setulae on anterior half. Eye oval. Gena narrower than length of antenna. Antenna somewhat shorter than face, first flagellomere rounded or pointed apicodorsally, less than twice as long as wide, arista with short pubescence. Proboscis capitate, palp unmodified. Two pairs of dark and rarely an additional white frontal and two orbital setae present; posterior orbital seta whitish yellow and reclinate; medial vertical seta brown to black; lateral vertical seta white, shorter than anterior orbital seta. Postocular setae mixed long and short.

**Thorax.** Ground color yellowish brown to dark brown with notopleural area yellow. Dorsocentral setae situated near transverse suture; posterior notopleural seta concolorous with anterior one. Scutellum microtrichose, with one pair of setae. Anepimeral seta black, brown or yellow. Scutal setulae white.

**Wing.** *Aciura*-type pattern including yellowish brown to dark brown pattern with several hyaline spots. Vein  $R_1$  dorsally with a gap in row of setulae at level of Sc apex. Costal vein with 1–2 strong setae before costal break, costal setae not more than 1.5 times as long as width of costa; cell  $r_1$  with 1–2 marginal hyaline spots. Distance between crossveins r-m and dm-cu slightly longer than r-m crossvein. Cell bcu with short posteroapical extension.

**Abdomen.** Yellowish brown to completely black. Epandrium oval with non-modified surstyli; two pairs of prenisetae present; preglans area of phallus bare; subapical lobe of glans neither sclerotized nor trumpet-like; glans with conspicuously sclerotized basal part; apical membranous lobes shorter than basal sclerotized part. Dorsal side of eversible membrane with a medial bare groove between two rows of scales; scales on ventral side of eversible membrane forming narrow isolated stripe. Aculeus pointed apically.

**Diagnosis.** *Hendrella* is similar to *Tephrella* sharing similar wing pattern and presence of 2–3 frontal and two orbital and only one scutellar setae, differing from it by having two frontal setae (sometimes a short white seta anterior to them) and posterior orbital seta whitish yellow (2–3 large frontal setae in *Tephrella* and posterior orbital seta is brown). In *Hendrella*, dorsocentral setae are situated at suture, whereas in *Tephrella* they are closer to supraalar setae.

**Taxonomic position.** Norrbom et al. (1999) classified the tribe Tephritini into six main groups and included *Hendrella* in *Spathulina* group of the Tephritini. Korneyev (1999) studied cladistic relationships of Tephritinae and placed the genera allied to *Oedaspis*, *Hendrella*, *Dithryca* and *Eurosta* in Dithrycini. Monophyly of Dithrycini is supported by a unique pattern of scales on the eversible membrane and similarity of aculeus shape (Korneyev, 1999). In addition, all known host plants of Dithrycini belong to the tribe Anthemideae (*Achillea*, *Artemisia* and *Santolina*).

Molecular studies based on mitochondrial 16S rDNA showed that Nearctic *Eurosta* and *Aciurina* are not closely related to the genus *Oedaspis* and the Dithrycini (Han et al., 2006), but most diagnostic characters of *Hendrella* still support its placement in Dithrycini (Korneyev, 1999; Korneyev et al., 2004). Hancock (2001) assigned *Oedaspis* and related genera to the subtribe Platensina and noted that *Hendrella* had been included in the subtribe Dithrycina by Korneyev (1999).

**Biology.** Most species of *Hendrella* have been collected by sweeping from *Artemisia* (Asteraceae, Anthemideae) stands. The only hitherto reared species, *H. sordida* V. Korneyev,

1989 was reared from monothalamic galls on branches of *Artemisia proceraeformis* Krasch.; adults emerge in late July or August and apparently overwinter (Basov, Korneyev, 1987: fig. 1, 2; Korneyev, 1989; V. Korneyev, pers. comm.). In addition, *H. caloptera* was collected by sweeping on *Artemisia* sp. near *limonifolia* (Korneyev et al., 2004). The life history of other *Hendrella* species remains almost unknown but they are suspected to induce stem or rhizome galls in other *Artemisia* species.

***Hendrella kermanensis*** Mohamadzade Namin, Madjzadeh & Moeinadini, **sp. n.** (figs 1–2)

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**Material.** Type: Holotype ♂: Iran: Kerman Province, Dalfard, 29°36'00.8" N, 056°30'23.0" E, reared from stem galls of *Artemisia aucheri*, 20.05.2016 (Moeinadini leg.) (ZMSBUK).

The specimen is pinned from alcohol. Left antenna, anterior frontal, both anterior and left posterior orbital, median vertical, ocellar, dorsocentral and right scutellar setae missing.

**Diagnosis.** The new species can be easily differentiated from other Palearctic *Hendrella* species by having only one large hyaline spot in cell  $r_1$  in combination with entirely dark costal cell. It is similar to *H. caloptera* sharing yellow antenna and femora and similar wing pattern (basal part of wing brown, cell  $r_1$  with only one large triangular hyaline spot that is restricted to width of the cell, cell  $cu_2$  with one large hyaline spot), differing in having completely brown costal cell as shown by arrow on fig. 2, 1 (in *H. caloptera* with hyaline area reaching posterior margin of the wing — fig. 2, 2). First flagellomere of antenna in *H. kermanensis* sp. n. is pointed apicodorsally, the latter character is unique in *Hendrella* and among Dithricini.

**Description.** Head (fig. 1, 1) yellow, silvery microtrichose. Length: height: width ratio = 1: 1.59: 1.76. Face gently concave as seen in direct lateral view. Frons above lunule with white setulae. Two brown and an additional white frontal and two orbital seta present.

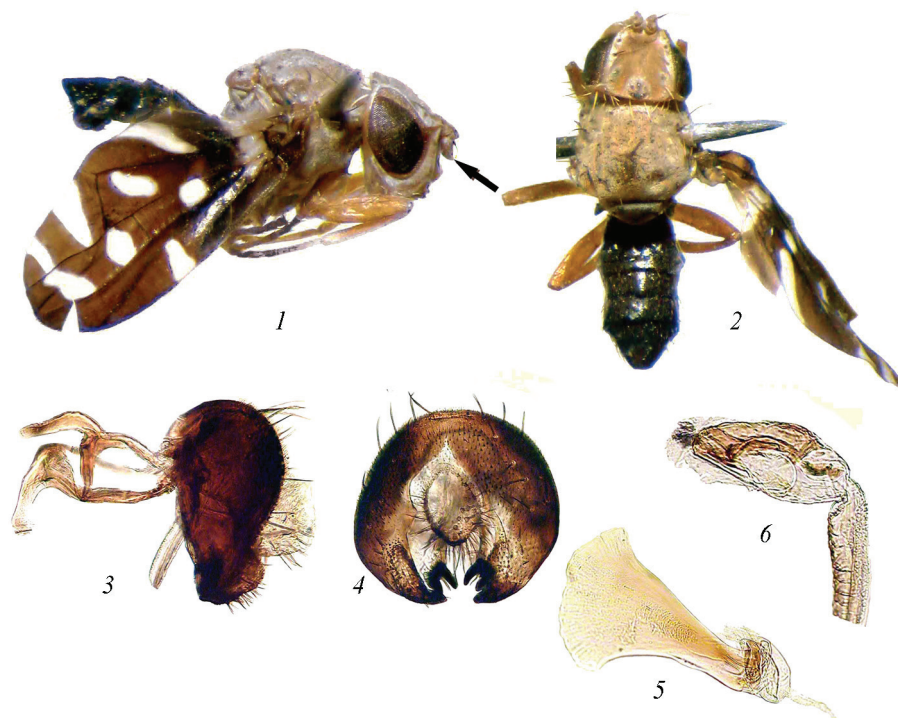


Fig. 1. *Hendrella kermanensis* sp. n.: 1 — holotype, male, habitus, left; 2 — same, dorsal view; 3 — epandrium and hypandrium, lateral left view; 4 — epandrium, posterior view; 5 — ejaculatory apodeme; 6 — glans of phallus, dorsolateral view.

Postocular setae and setulae whitish-yellow. Frons rather broad, subquadrate, about as wide as long and 1.6 as wide as eye. Compound eye about 1.6 times as high as long. Gena about 0.55 times length of flagellomere 1. Flagellomere 1 yellowish brown, 1.8 times as long as wide, pointed at apicodorsal angle; arista basally yellow, distal two-thirds black.

Thorax (figs 1, 1–2). Ground color yellowish brown; scutum silvery microtrichose. All setae brownish yellow; setulae white. Scutellum yellow with semi-triangular brown spot basally, silvery microtrichose, bearing one pair of strong scutellar setae, about 0.8 mm in length. Dorsocentral setae situated slightly posterior of suture. Subscutellum and mediotergite dark brown, silvery microtrichose. Calypteres white. Haltere yellow.

Legs yellowish brown, fore femur with 2 rows of brownish yellow posterodorsal and one row of brownish yellow posteroventral setae; legs with brownish setae and setulae (fig. 1, 1).

Wing (fig. 2, 1). Cell bc completely brown, humeral crossvein dark brown. Cell c and pterostigma brown without any hyaline spots, cell  $r_1$  hyaline at very base; dark brown, with one large marginal triangular hyaline spot beyond pterostigma that touches vein  $R_{2+3}$ . Cell  $r_{2+3}$  completely brown without any hyaline spot; br hyaline from the level of humeral crossvein to radial fork; brown at very base and in apical two thirds; in apical brown part, only one large round hyaline spot as wide as cell present posterior to pterostigma. Cell  $r_{4+5}$  with large hyaline spot as wide as cell anterior to dm-cu crossvein, and long preapical transverse hyaline spot starting at the level of end of  $R_{2+3}$  and penetrating into cell m and ending in wing margin. Cell bm and bcu brown only in apical one third. Cell dm completely brown, with one large oval hyaline spot posterior to hyaline spot in  $r_1$ . Cell m with two hyaline spots, the proximal triangular one is as wide as cell and distal one extending into cell  $r_{4+5}$ ; cell  $cu_2$  brown with one large hyaline spot extending into anal lobe and ending in wing margin. Anal lobe mostly brown; hyaline at very base and apex of vein  $A_1+Cu_2$ . Vein  $R_{4+5}$  with 1 setula ventrally.

Abdomen with tergites completely black, grayish microtrichose, tergite 5 subshining black, about as long as preceding two abdominal tergites; setae and setulae brown.

Male genitalia as in other species of the genus: epandrium oval (figs 1, 3–4); glans moderately long (fig. 1, 6), ejaculatory apodeme as in fig. 1, 5.



Fig. 2. *Hendrella kermanensis* sp. n. (1, 3) and *H. caloptera* (2): 1, 2 — wing (arrows show difference in coloration of costal cell); 3 — galls on *Artemisia aucheri* (collected together with flies).

Measurements. Body length 3.25 mm, wing length 3.25 mm.

Etymology. The new species name refers to Kerman Province, in which this species was found.

Host plant. This species has been reared from stem galls on *Artemisia aucheri* (fig. 2, 3) along with *Oedaspis ragdai* Hering. As all stem galls on *A. aucheri* were of similar size and shape and placed in the same container, it is not clear which one of them actually belonged to *H. kermanensis* sp. n.

Key to species of *Hendrella* in the Palaearctic Region (translated from Korneyev (1989), with changes)

- |     |  |                                    |
|-----|--|------------------------------------|
| 1   | Wing base dark; subapical hyaline spot in cell $r_{4+5}$ elongate, entering into cell m as a hyaline bar ( <i>caloptera</i> group of species). .....   | 2                                  |
| —   | Wing base hyaline or yellowish. Hyaline subapical spot in cell $r_{4+5}$ isolated, round, not entering into cell m ( <i>basalis</i> group of species). .....   | 7                                  |
| 2   | Antenna and femora yellow. ....  | 3                                  |
| —   | Antenna and femora black. ....   | 6                                  |
| 3   | Cells $r_1$ and $cua_1$ each with single hyaline spot. ....  | 4                                  |
| —   | Cells $r_1$ with two hyaline spots. ....   | 5                                  |
| 4   | Costal cell completely dark brown without any hyaline spots (fig. 2, 1); first flagellomere of antenna pointed apicodorsally (fig. 1, 1). ....   | <i>H. kermanensis</i> sp. n.       |
| —   | Hyaline area in costal cell reaching posterior margin of the wing (fig. 2, 2); first flagellomere of antenna rounded. ....   | <i>H. caloptera</i> (Loew)         |
| 5   | Cell $cua_1$ with 3 hyaline spots. ....  | <i>H. winnertzi</i> (Loew)         |
| —   | Cell $cua_1$ with one large hyaline spot, rarely with a small hyaline spot in its distal corner (Korneyev, 1989: fig. 2, 2–3). ....  | <i>H. quinquincisa</i> V. Korneyev |
| 6   | Distal hyaline spot of cell $r_1$ reaching posteriorly only to vein M. Cell $cua_1$ with small additional hyaline spot at apex. ....   | <i>H. ibis</i> (Hendel)            |
| —   | Distal hyaline spot of cell $r_1$ reaching posteriorly to vein $CuA_1$ . Apex of cell $cua_1$ entirely black. ....   | <i>H. adila</i> (V. Richter)       |
| 7   | Males. ....  | 8                                  |
| —   | Females (not known for <i>H. sinensis</i> ). ....  | 10                                 |
| 8   | Wing brownish yellow; cells $r_{4+5}$ (distal of dm-cu), dm and m each with two hyaline spots. Abdomen yellow. ....  | <i>H. basalis</i> (Hendel)         |
| —   | Wing dark brown to black (other characters variable). Abdomen black. ....  | 8                                  |
| 9   | Cell dm without hyaline spots, cell $r_{4+5}$ with one spot distal of dm-cu; cell m and usually $cua_1$ each with single large hyaline spot (Korneyev (1989): fig. 3, 3). ....   | <i>H. sordida</i> V. Korneyev      |
| —   | Cell dm with one small hyaline spot, cell $r_{4+5}$ with one spot distal of dm-cu and small hyaline spot in distal portion; cell m and $cua_1$ each with one large and one small hyaline spot (Wang, 1998: Pl. XXXIII, Fig. 325). .... | <i>H. sinensis</i> Wang            |
| 10. | Cell dm with 1 or 2 hyaline spots. ....  | <i>H. basalis</i> (Hendel)         |
| —   | Cell dm entirely black. ....   | <i>H. sordida</i> V. Korneyev      |

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