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A NEW SPECIES OF THE GENUS *TEPHRITIS* (DIPTERA, TEPHRITIDAE) WITH SHINING ABDOMINAL TERGITES FROM KYRGYZSTAN

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A New Species of the Genus *Tephritis* (Diptera, Tephritidae) with Shining Abdominal Tergites from Kyrgyzstan. Korneyev, S. V. — *Tephritis heringinella* sp. n. associated with *Helichrysum* sp. (Asteraceae) in Kyrgyzstan is described. The new species share shiny black abdominal tergites with species of *Tephritis corolla-sauterina* group and the species currently assigned to *Heringina* Aczél, differing from the *Tephritis corolla-sauterina* group by the details of wing pattern and from *Heringina* spp. also with the aculeus shape. Possible phylogenetic relationships of *Tephritis heringinella* and *Heringina* are discussed.

Key words: Diptera, Tephritidae, *Tephritis*, new species, *Helichrysum*, *Heringina*, Kyrgyzstan.

Introduction

Tephritis Latreille, 1804 includes over 160 described species and is one of the largest genera of the family Tephritidae, with its greatest diversity in the Palearctic and Nearctic Regions (Norrbom et al., 1999), and is widespread in most climatic zones and altitudes, with the exception of the tundra, the tropics and polar deserts. Larvae of *Tephritis* species usually feed in flower heads of asteraceous plants of the tribes Anthemideae, Astreae, Cardueae, Cichorieae, Inuleae, and Senecioneae.

Tephritis species of North America, Europe and Far East Asia have been recently revised and keyed by several authors (Foote et al., 1993; Merz 1994; Freidberg, Kütük 2002; Korneyev, Ovchinnikova 2004; Kütük et al., 2012; Korneyev 2013; Mohamadzade et al., 2015). The Central Asian region is one of the highest diversity centers of the genus *Tephritis* (Korneyev, 2013; Korneyev & Mohamadzade, 2013), but many species remain undescribed, and their biology and host-plant relationships are largely unknown.

While identifying material from Middle Asian countries collected during the expeditions of the I. I. Schmalhausen Institute of Zoology in the 1980–90s, a series of an undescribed new species with shining abdominal tergites was found among untreated specimens. Shining abdominal tergites had previously only been recorded for a few species assigned to the *Tephritis corolla-sauterina* species group as well as the genus *Heringina*.

Material and methods

The material is deposited in the I. I. Schmalhausen Institute of Zoology, National Academy of Science of Ukraine, Kyiv (SIZK).

The morphological terminology follows that of White et al. (1999). Additional abbreviations used: AL — aculeus length; WL — wing length; BL — body length.

Genitalia were prepared for study using the following procedure: abdomen was excised from a relaxed specimen and cleared in NaOH (20 %) for 2 hours at 90–95 °C, then washed in distilled water. Genitalia were placed on a microscope slide in a drop of glycerin under the cover slip for examination. Prepared structures were stored in microvials with glycerin and pinned together with the specimen.

Morphological structures were measured with an ocular micrometer. Photographs of genitalia were taken using a Nikon Coolpix P50 through the ocular of a Wild M11 light microscope, and habitus and wing photos

were taken with Canon PowerShot A640 connected to Zeiss Stemi C-2000 dissecting microscope. Digitized photographs were stacked using CombineZM® (Hadley, 2007).

Results

Tephritis heringinella sp. n. (figs 1–2)

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Type material: **Holotype** ♀: **Kyrgyzstan**: Chon-Aryk prope Bishkek, h = 1200 m; 5.06.1994 (V. Korneyev leg.) (SIZK).

Paratypes: 4 ♂, 2 ♀, same label as for the holotype; 1 ♀, idem, 29.06.1996; 7 ♂, 6 ♀, Chon-Aryk prope Bishkek, 42°43.2' N 74°34.4' E, h = 1060–1100 m, 20.06.1998; 1 ♂, Talas valley, 10.3 km from Kok-Sai, steppe, 42°26.5' N 71°00.0' E, h = 1700–1850 m, 24.06.1998 (V. Korneyev & Kameneva leg.); 2 ♂, Talas ridge, Chatkal flood plain, 76.0 km from Jangy-Bazar, 42°04.0' N 71°35.8' E, h = 2210 m, 28.06.1998 (V. Korneyev & Kameneva leg.); 1 ♀, Chatkal River valley, 15.3 km from Jangy-Bazar, 41°41.1' N 70°39.7' E, h = 1400–1700 m, 1.07.1998 (V. Korneyev & Kameneva leg.) (SIZK).



Fig. 1. *Tephritis heringinella* sp. n. (1–3 — holotype, 4, 6–7 — paratypes): 1–2 — habitus (1 — left, 2 — dorsal view); 3 — head and thorax, left view; 4 — wing; 5 — head, anterior view; 6–7 — abdomen (6 — ♂; 7 — ♀).

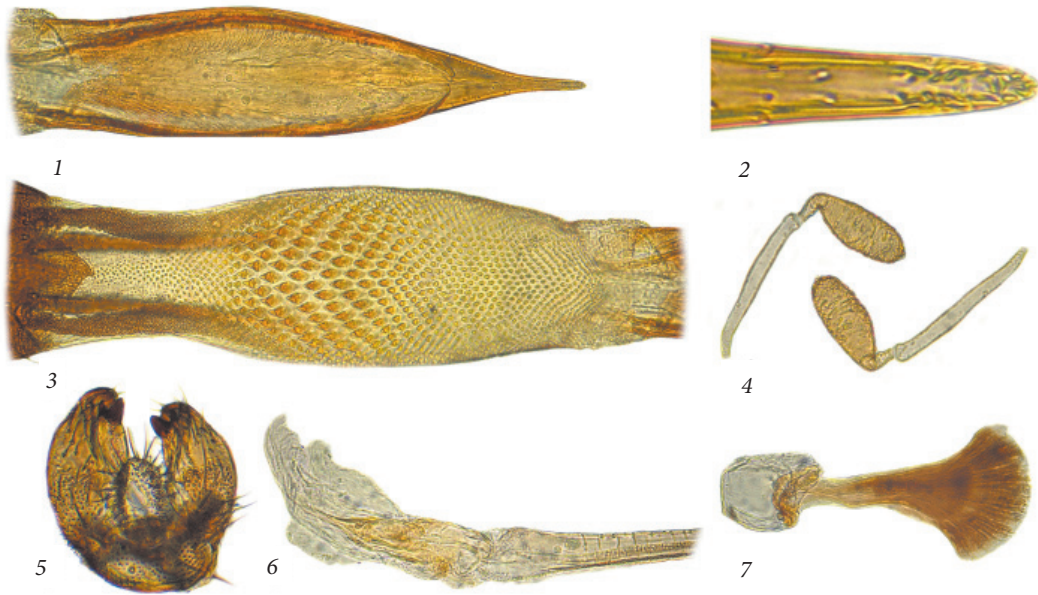


Fig. 2. *Tephritis heringinella* sp. n. (paratypes, 1-4 — ♀, 5-7 — ♂): 1 — aculeus, ventral view; 2 — aculeus tip, ventral view; 3 — eversible membrane, ventral view; 4 — spermathecae; 5 — epandrium; 6 — glans of phallus; 7 — ejaculatory apodeme.

Diagnosis. Greyish flies, differing from most known species of the genus *Tephritis* that have entirely white microtrichose and setulose tergites by the shiny black, brown or black setulose abdominal tergites 4-5(6) and pointed aculeus (fig. 3, 3), characters shared only with *T. corolla* Richter, 1975 and *T. sauterina* Merz, 1994. These species can be differentiated by wing pattern details: in *T. heringinella* the wing is widely dark with a few isolated round spots, including only one in cell R_{2+3} anterior of r-m and dm-cu crossveins (two to three in *T. corolla* and *T. sauterina*, with one usually proximal to r-m crossvein), and only two to four hyaline spots in cell dm (four to seven in *T. corolla* and *T.*

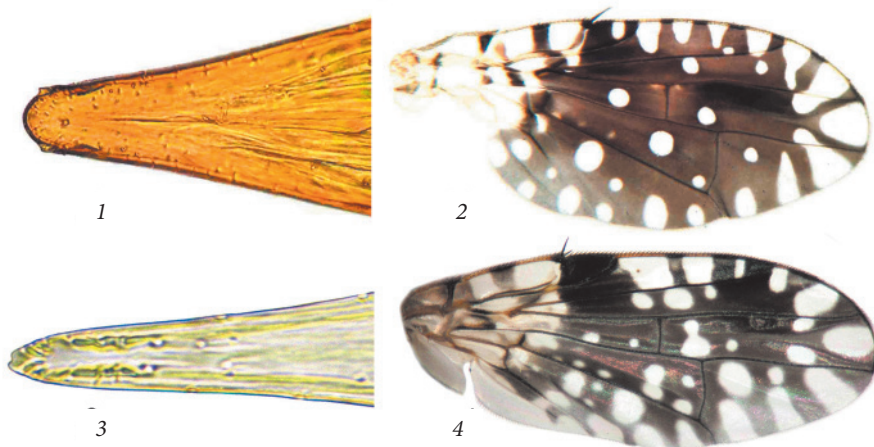


Fig. 3. *Heringina guttata* (1-2) and *T. sauterina* (3-4). 1, 3 — aculeus tip, ventral view; 2, 4 — wing.

sauterina — fig. 3, 4). The new species is very similar to the species currently assigned to *Heringina*: *H. guttata* (Fallén, 1814) and *H. arezoana* Mohamadzade & S. Korneyev, 2015 in the wing pattern (brown with isolated round hyaline spots: one in R_{2+3} anterior of r-m and dm-cu intersection, one in the dark distal field of cell br, one in basal half of cell r_{4+5} , and one posterior of r-m crossvein, and four narrow brown rays at wing apex separating large subtriangular hyaline spots — as on fig. 1, 4), readily differing from them by having three (rarely two) isolated round hyaline spots in cell r_1 (four to five spots in *H. guttata* and *H. arezoana* — as on fig. 3, 2, the absence of a thickening (“bulla”) in the distal third of the wing (present in *H. guttata* and *H. arezoana*), and by the tip of aculeus being pointed (fig. 2, 2) (bluntly truncated in *H. guttata* and *H. arezoana*).

Description. Medium-sized flies (BL = 3.8–4.1 mm (♀); 3.4–3.7 mm (♂)) with a few separated round hyaline spots in the wing disk and five large subtriangular incisions separated by four narrow brown rays at wing apex, shining abdominal tergites 4–5(6) and apically acute aculeus.

Head: shape as in most other *Tephritis* species (fig. 1, 3, 5), in profile, 1.1–1.3 times as high as long, gena below eye 0.13–0.20 times eye height. Frons matte yellow to ochreous, with white or light grey dorsal and lateral margins, 0.5–0.6 mm wide at vertex, and narrowing to 0.45 mm at antennal bases, and 0.4 mm long. Ocellar, medial vertical, anterior orbital and frontal setae dark brown to black; other setae including posterior orbital white to yellowish white; postocular row of setulae is black, except white one, genal setae is black, setulae on distal part of palp and on pedicel black. Antenna is yellow to dark ochreous, sometimes reddish; flagellomere 1 pointed; arista brown except reddish base.

Thorax: scutum, scutellum and pleural sclerites gray pollinose over black ground color (fig. 1, 1–3). Scutellum black medially, yellowish laterally and ventro-laterally. Thoracic setae usual for *Tephritis*, all dark brown or black (posterior anepisternal and anepimeral setae brown), except posterior notopleural seta white and lanceolate. Apical scutellar seta 1/3 as long as basal scutellar seta. Calypters white, with whitish fringe; upper calypter conspicuously lobate, almost as long as wide, lower calypter narrow. Halter yellow.

Legs: mostly entirely light to ochreous yellow, sometimes femora with light brown ventrolateral longitudinal streak (fig. 1, 3). Fore femur with two rows of posterodorsal setae, basal 3–5 white, others brown to black, and one row of longer postero-ventral setae, basal half (5–7 setae) white and apical half (6–7 setae) brown. Hind tibia with parallel rows of yellow to dark brown or black setulae and distinct anterodorsal row of dark brown to black setae on basal two-thirds, longest seta about as long as width of tibia; hind femur with black setulae dorsally.

Wing (fig. 1, 4): Cell bc hyaline. Cell c hyaline, with small brown spot at middle. Pterostigma entirely dark brown. Cell r_1 hyaline at base, posterior to pterostigma brown, with three, rarely two (2 males) rounded hyaline spots widely separated from each other (one at r-m, two others at dm-cu and apical portion of cell). Cell r_{2+3} entirely dark from base to r_1 , with small round hyaline spot between r-m and dm-cu; preapical brown area (posterior to cell r_1 apex) with some two large trapeziform hyaline spots at the apex separated by narrow dark rays coming from r_{4+5} cell. Cell br hyaline in basal half and dark in apical half, with single small round hyaline spot. Area adjacent to r-m entirely dark, without hyaline dots. Cell r_{4+5} with round hyaline spot near vein M at dm-cu level, and long apical spot bordered by 2 narrow apical rays extending to apices of veins R_{4+5} and M, two anterior and posterior subapical hyaline spots in r_{4+5} extending into cells r_{2+3} and m cells respectively. Cell bcu hyaline; cell bm with brown pattern in apical part. Cell dm brown, with three to four small spots (one at base, one in the middle (level with r-m) and one or two at the apex). Cell m with two large hyaline spots, the most distal extending into cell r_{4+5} , and two small and round spots at base of the cell. Cell cu_2 brown with one proximal, one central (at the end of Sc level) and three marginal hyaline spots. Anal lobe with three little brown spots. Vein R_{4+5} without setulae dorsally and rarely one-two setula ventrally in the basal part of vein.

Abdomen (fig. 1, 6, 7): black, tergites 1–4 entirely grey microtrichose, other tergites shiny. Setulae on syntergite 1–2 mostly white and on tergites 3–6 mostly black. Oviscape slightly lesser than abdominal tergites 5 and 6 combined, shiny black, black setulose.

Terminalia. Male. Epandrium (fig. 2, 5) similar to that of other *Tephritis* species. Glans of phallus as in Fig. 2,6. Ejaculatory apodeme (fig. 2, 7) as in other species of the genus.

Female. Eversible membrane with two pairs of taeniae 0.35–0.4 times as long as membrane itself; ventral side of membrane with dentate scales, moderately large in anteromedial portion (fig. 2, 3). Aculeus 4 times as long as wide, sharply pointed to apex, with small apical incision (figs. 2, 1, 2). Two papillose short spermathecae 3 times as long as wide (fig. 2, 4).

Measurements. WL = 3.0–3.25 (σ , n = 7), 3.25–3.75 (φ , n = 7); AL = 0.43–0.45 mm (n = 5); BL = 3.8–4.1 mm (φ , n = 7); 3.4–3.7 mm (σ , n = 7).

Host plants: Specimens swept from *Helichrysum* sp., which possibly is its host plant.

Distribution. Kyrgyzstan.

Etymology. The species name *heringinella* is diminutive from the name *Heringina*, reflecting the similarity with the species assigned to the latter genus, along with the smaller size of the new species (“a little *Heringina*”). Also, it is named in honour of Prof. Erich Martin Hering (1893–1967), who greatly contributed to the study of fruit flies, particularly of the genus *Tephritis*.

Conclusion

Tephritis heringinella sp. n. has shiny abdominal tergites and dark wing with widely isolated hyaline spots, characters making it very similar to the species currently assigned to the genus *Heringina*, but otherwise showing the combination of characters typical for *Tephritis* (whereas the characters separating *Heringina* — 4 spots in cell r_1 , setulose vein R_{4+5} , bluntly truncated aculeus are not present in *T. heringinella* sp. n.). *Tephritis heringinella* sp. n. and *Heringina guttata* (Fallén, 1814) were collected in the mountains of Kyrgyzstan in association with *Helichrysum* sp., a possible host plant of both species.

The taxonomic status of *Heringina* remains unclear (Mohamadzade, Korneyev, 2015), but based on the analysis of COI sequences (Smit et al., 2013), *H. guttata* apparently belongs in a monophyletic lineage together with other *Tephritis* species. Possible phylogenetic relationships of *T. heringinella* sp. n. with *Heringina guttata* and *H. arezoana* are supported by the combination of the polished black, black setulose tergites 4–5(6), four round isolated spots in the brown field of the wing disk as described in diagnosis, four narrow brown rays at wing apex, and the absence of a hyaline spot in cell r_{2+3} proximally of r-m level, which are believed to be synapomorphies of the three species. However, it contradicts the status of *Heringina* as a separate genus, needing inclusion of it into *Tephritis*. Further molecular studies of *T. heringinella* sp. n. could be of a key importance to solve taxonomic position of the genus *Heringina*.

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