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Trichopsomyia ochrozona (Stackelberg, 1952) (Diptera: Syrphidae) recorded from Iran for the first time with a key to the West Palaearctic Trichopsomyia Williston, 1888 species

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The hoverfly Trichopsomyia ochrozona (Stackelberg, 1952) (Diptera: Syrphidae) is recorded for the first time from Iran. An illustrated key to the West Palaearctic species of Trichopsomyia is presented. Illustrations of the puparium of Trichopsomyia joratensis Goeldlin, 1997 and the larva and puparium of T. ochrozona are given and their larval and adult habitats are described. A short discussion is given on the known larval habitat of other West Palaearctic Trichopsomyia species. Some of the synonyms have been evaluated and Pipiza melancholica Meigen, 1822 is withdrawn from synonymy of Trichopsomyia flavitarsis (Meigen, 1822) and is considered as a junior synonym of Musca viduata Linnaeus, 1758 syn. nov.

Keywords: Hoverfly; predatory larvae; Hemiptera gall formers; taxonomy; new synonym

Introduction

The genus Trichopsomyia Williston, 1888 consists of small sized and predominantly black species. They occur in the Palaearctic (9 species), Nearctic (9 species) and Neotropical regions (12 species) with four of them in the West Palaearctic: T. flavitarsis (Meigen, 1822), T. joratensis Goeldlin, 1997, T. lucida (Meigen, 1822) and T. ochrozona (Stackelberg, 1952), see Pape & Thompson (2013). Several Neotropical species (among which is T. politus Williston, 1888, the type species of the genus Trichopsomyia) are considered mimics of stingless bees (Meliponidae) and sweat bees (Halictidae) and their habitats differ from the Palaearctic species.

The genus Trichopsomyia is a member of the tribe Pipizini whose members are characterised by the following combination of features: a pilose postpronotum; a flat face, without either frontal prominence or central knob; an oval to elongate basoflagellomere; pilose eyes; a bare metasternum; cross-vein r-m located on wing basal to the point where the vein Sc meets the costa (Vujić, Ståhls, Ačanski, Bartsch, Bygebjerg, & Stefanović, 2013).

The developmental stages of the Palaearctic Trichopsomyia species are unknown, so far, except for the larva of T. flavitarsis, described by Rotheray (1997). We give here notes and illustrations on the puparia of T. joratensis and T. ochrozona for the first time, and describe the larval biology of T. ochrozona and the presumed larval habitat of T.
joratensis. The biology of all known species of the genus seems to be connected to gall-forming Psyllidae (Homoptera).

As part of a larger review of the hoverflies of Iran (e.g. Dousti & Hayat, 2006; Kazerani, Talebi, & Gilasian, 2013; Hoseini, Khaghaninia & Lotfalizadeh, 2014; Gilasian, Vujic, Hauser & Parchami-Araghi, 2017) new material of Trichopsomyia was collected in 2005. Khaghaninia, Shakeryari, and Hayat (2012) recorded T. flavitarsis (Meigen, 1822) and T. lucida (Meigen, 1822) as new to Iran; we add here another species, T. ochrozona (Stackelberg, 1952), based on reared specimens, and provide an illustrated key to the West Palaearctic species of the genus. The key is based on van der Goot (1981), Verlinden (1991) and Goeldlin (1997) and own observations on the specimens studied here.

Material and Methods

The terminology used in this paper is based on Thompson (1999). Although van der Goot (1981), Verlinden (1991) and Goeldlin (1997) figured the male genitalia of several Trichopsomyia species, new genitalia drawings are provided for all species in order to ensure an accurate identification based especially on features of the apex of the hypandrium and its appendages. The genitalia were macerated in a 10% KOH solution and drawn in, and after that also stored in glycerol. The drawings were made with the aid of a drawing tube attached to a Wild M10 microscope. The photos of the adults in dorsal view were made with a Nikon D7100 equipped with a Laowa 60 mm ultra macro lens. Photos were digitally edited with PIXLR Editor (www.pixlr.com). The photos of the heads were made with a Canon MP-E 65mm 1–5x macro lens mounted on a Canon EOS D6 camera body. Several photos for each picture were made using a Cognisys StackShot macro rail and the photos were stacked into one photo with a large depth of field with Zerene Stacker 1.04. These photos and the drawings were further edited with GNU Image Manipulation Program (GIMP 2.8.14). SEM figures were made with a Zeiss DSM 950.

The material studied is deposited in the following collections, with its acronyms in parentheses: private collection of André van Eck, Tilburg, The Netherlands (AET); Research Center for Agriculture and Natural Resources, Qazvin, Iran (ANRS); Ferdowsi University, Mashhad, Iran (FUM); private collection of Gerard Pennards, Amersfoort, the Netherlands (GPA); Plant Protection Research Department, Ilam Agricultural and Natural Resources Research and Education Center, Ilam, Iran (IANRRE); private collection of Jeroen van Steenis, Amersfoort, the Netherlands (JSA); Muséum National d’Histoire Naturelle, Paris, France (MNHN); Naturalis Biodiversity Center, Leiden, The Netherlands (NBC); Natuur Museum Brabant, Tilburg, The Netherlands (NMB); University Teheran, Iran (UTI); the private collection of Wouter van Steenis, Breukelen, The Netherlands (WSB); Zoological Institute Russian Academy of Sciences, St Petersburg, Russia (ZISP). The label information for the specimens studied here is provided for the first time, the exact label information is given in which each label is indicated by parentheses and each line is separated by a slash. The records from the Netherlands have been incorporated into the distribution maps and phenology charts in Reemer et al. (2009), without exact label information.

Results

Trichopsomyia Williston, 1888: 259


Diagnosis. Trichopsomyia is differentiated from the other genera of the Pipizini by the following combination of characters: the anterior anepisternum pilose; metanotum partly microtrichose and dull (entirely bare and shiny); antero-lateral surface of metafemur with microtrichia and setae sub-basally, differentiated from the other setae on the femur
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(setae not differentiated); vein M₁ slightly to strongly oblique (Thompson, 1972; Hippa & Ståhls, 2005). Molecular data and wing morphometry strongly support the validity of consigning the genus *Trichopsomyia* to the Pipizini (Vujić et al., 2013).

Larvae of the tribe Pipizini are characterised by the angular posterior respiratory process without dorsal spurs but with a central depression at its apex; long and conspicuous interspiracular setae and the apex of the anal segment with a pair of short, rounded projections. *Trichopsomyia* larvae are whitish coloured; with a smooth integument not coated in setae or papillae (Kuznetsov, 1992; Rotheray, 1993; Rotheray & Gilbert, 1999).

### Key to the West-Palaearctic species of the genus *Trichopsomyia*

<table>
<thead>
<tr>
<th></th>
<th>Eyes holoptic (males)</th>
<th>Eyes dichoptic (females)</th>
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<tr>
<td>1</td>
<td>Eyes holoptic (males)</td>
<td>Eyes dichoptic (females)</td>
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<td></td>
<td>Basoflagellomere black, elongate, 1.7–2.3 times longer than broad; face about 2/5 times as wide as width of head; vein M₁ almost perpendicular/strongly oblique to vein R₄+₅</td>
<td>Basoflagellomere orange-brown to dark-brown, oval, no more than 1.5 times longer than broad; face half as wide as width of head; vein M₁ almost perpendicular to vein R₄+₅</td>
</tr>
<tr>
<td>2</td>
<td>Vein M₁ strongly oblique to vein R₄+₅; basoflagellomere 1.7–1.9 or 2.0–2.2 times longer than broad; thoracic pile either predominantly black or entirely white; in dorsal view first tarsomere of metatarsus 2.6–2.9 times longer than wide, with long pile on anterior margin</td>
<td>Vein M₁ only slightly oblique to vein R₄+₅; basoflagellomere 2.0–2.3 times longer than broad; thoracic pile mixed black and white; in dorsal view first tarsomere of metatarsus 3.1–3.7 times longer than wide, with only short pile</td>
</tr>
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<td>3</td>
<td>Basoflagellomere 1.7–1.9 times longer than broad; pile on thorax and scutum mixed black and white; wing membrane covered with microtrichia, except on basal 1/5–1/4 of cell c, basal 1/4–1/3 of cell br and basal 1/2–2/3 of cell bm; vein M₁ weakly bent, not distinctly angulate medially; legs more extensively black; pro- and mesotibia yellow on basal 1/5 at most; protarsus black to dark-brown; mesotarsus with 1st and 2nd tarsomeres brown to black</td>
<td>Basoflagellomere 2.1–2.3 times longer than broad; pile on thorax and scutum white; wing membrane covered with microtrichia to a lesser extent, bare on basal 1/4–1/3 of cell c, basal 1/3–1/2 of cell br and basal 3/5–3/4 of cell bm; vein M₁ abruptly angled near the mid-point of its length; legs more extensively yellow; pro- and mesotibia at least yellow on basal 1/4–1/3; protarsus with apical 1/4 and entire 2nd tarsomere light-brown to light-yellow; mesotarsus with 1st and 2nd tarsomeres yellow</td>
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<td>4</td>
<td>Basoflagellomere 1.7–1.9 times longer than broad; pile on thorax and scutum mixed black and white; wing membrane covered with microtrichia, except on basal 1/5–1/4 of cell c, basal 1/4–1/3 of cell br and basal 1/2–2/3 of cell bm; vein M₁ weakly bent, not distinctly angulate medially; legs more extensively black; pro- and mesotibia yellow on basal 1/5 at most; protarsus black to dark-brown; mesotarsus with 1st and 2nd tarsomeres brown to black</td>
<td>Basoflagellomere 2.1–2.3 times longer than broad; pile on thorax and scutum white; wing membrane covered with microtrichia to a lesser extent, bare on basal 1/4–1/3 of cell c, basal 1/3–1/2 of cell br and basal 3/5–3/4 of cell bm; vein M₁ abruptly angled near the mid-point of its length; legs more extensively yellow; pro- and mesotibia at least yellow on basal 1/4–1/3; protarsus with apical 1/4 and entire 2nd tarsomere light-brown to light-yellow; mesotarsus with 1st and 2nd tarsomeres yellow</td>
</tr>
<tr>
<td>5</td>
<td>Basoflagellomere black, sometimes with yellow macula baso-ventrally, elongate, more than 1.7 times longer than broad; width of face about 2/5 as wide as width of head; wing hyaline, basally with extensive areas bare</td>
<td>Basoflagellomere black, sometimes with yellow macula baso-ventrally, elongate, more than 1.7 times longer than broad; width of face about 2/5 as wide as width of head; wing hyaline, basally with extensive areas bare</td>
</tr>
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of microtrichia; tergum II black, nearly always with yellow maculae; vein M₁ almost perpendicular to strongly oblique to vein R₄+₅ ......................................................... 6

- Basoflagellomere orange-brown to dark-brown, oval, no more than 1.5 times longer than broad; width of face half as wide as width of head; wing with brownish tinge, almost entirely covered with microtrichia; tergum II entirely black; vein M₁ almost perpendicular to vein R₄+₅ ....... T. joratensis Goeldlin

6 Vein M₁ strongly oblique to vein R₄+₅; frons with small, triangular, white pollinose macula medially, along eye margin; metatibia predominantly white pilose; first tarsomere of metatarsus 2.4–2.9 times longer than wide, with long pile on anterior margin; tergum II nearly always with two large, triangular, orange-yellow maculae or with broad yellow fascia ........................................ 7

- Vein M₁ perpendicular to vein R₄+₅; frons without pollinose macula medially, along eye-margin; metatibia predominantly black pilose; first tarsomere of metatarsus 3.1–3.4 times longer than wide, without long pile; tergum II with two small, rounded, orange-yellow maculae, which are sometimes vague ................................................................. T. flavitarsis (Meigen)

7 Basoflagellomere slightly elongate, 1.7–2.0 times longer than broad; tergum II with two large, triangular, yellow maculae, which are sometimes very vague and reduced; wing membrane covered with microtrichia, except on basal 1/4–1/3 of cell c, basal 1/2–3/5 of cell br, basal 2/3–4/5 of cell bm and basal 1/8–1/5 of cell cup; legs more extensively black; mesotibia with at least subapical 1/3 black; mesotarsus with 3rd tarsomere brown to black; metatarsus with 2nd and 3rd tarsomere brown to black ......................................................................................... T. lucida (Meigen)
– Basoflagellomere elongate, 2.3–2.6 times longer than broad; tergum II with broad yellow fascia; wing membrane covered with microtrichia to a lesser extent, bare on basal 3/8–1/2 of cell c, basal 3/5–2/3 of cell br, basal 4/5–7/8 of cell bm and basal 1/4–1/3 of cell Cup; vein M₁ with a distinct angle in the medial part of its length; legs more extensively yellow; mesotibia with at most subapical 1/4 black; mesotarsus with 3rd tarsomere yellow; metatarsus with 2nd and 3rd tarsomeres yellow ... T. ochrozona (Stackelberg)

The West-Palaearctic species of Trichopsomyia

Trichopsomyia flavitarsis (Meigen, 1822) (Figures 1A, 1B, 2A, 2B, 3A–D)

Pipiza flavitarsis Meigen, 1822: 248. Type locality: Germany [Lectotype ♀, Paralectotype ♂, MNHN], designated Goeldlin.


Diagnostic characters. Male: length 5.6–7.3 mm, wing length 4.5–5.8 mm; female: length 5.8–6.4 mm, wing length 4.2–5.0 mm. Basoflagellomere elongate, 2.0–2.4 times longer than broad, black, arista black. Frons in female with at most very narrow white pollinose vitta medially along eye-margin. Pile on scutum and pleurae mixed white and black to predominantly black. Wing hyaline with basal cells extensively bare of microtrichia in females, in male more microtrichose. Vein M₁ almost perpendicular to vein R₄+₅. Tergum II in female with a pair of small, rounded yellow to red-brown maculae medially. Male genitalia (Figures 3A–D): Epandrium basally rounded with short and rather broad apex; cerci oval shaped, short pilose; post-anal lamella membranous, elongate, almost evenly broad throughout and with 4 longitudinal, weakly chitinised ridges; surstyli basally rounded, apically long and narrow, pile confined to the basal part; hypandrium rectangular with narrower apical part and constricted ventro-apically; superior lobe with apico-ventral sharp dens; dorsal gonocercus circular with short, irregular dens ventrally; ventral gonocercus with a curved and sharp-tipped dens apico-ventrally.

Larval morphology (Rotheray, 1997; Rotheray & Gilbert, 1999). Length 9–11 mm, height 1.5–2.0 mm. creamy-white, translucent, with a smooth integument and posterior respiratory process (prp) without dorsal spurs. The other diagnostic characters of the
larva and puparium are: body without vestiture, although each segment has a vertical row of selerotized sensillae; prp 2 times longer than broad, with rounded apex and dorsal spur not extended; central plates circular, medially divided by a shallow cleft; interspiracular setae on prp rather long, more than half the length of the opening itself.

**Distribution.** Palaearctic, throughout Europe from Northern Norway to the Mediterranean region and from Ireland eastwards through Siberia and on to the Pacific Ocean and also recorded in Iran, Kazakhstan and Mongolia (Mutin & Barkalov, 1999; Bartsch, Binkiewicz, Klintbjer, Rådén & Nasibov, 2009; Khaghaninia et al., 2012; Speight, 2017).

**Biology.** The preferred habitat is wet heath- and grasslands, along fens, streams and peat bogs along edges of wet forest. Flying through low vegetation and feeding mostly on yellow flowers like *Potentilla* spp. and *Caltha palustris*; males are sometimes seen hovering in small groups (Goeldlin, 1997; van Steenis, 1998, 2011; Reemer et al., 2009; Ball & Morris, 2013; van Steenis et al., 2015; Speight, 2017). The larvae are known to be predators of gall-forming Psyllidae (*Livia juncorum*) on sedges (*Juncus articulatus*) (Rotheray, 1997) and easily distinguished from larvae of the other genera of hoverflies in the field by the distinctive overall creamy-white body colour.

**Trichopsomyia joratensis Goedlind de Tiefenau, 1997** (Figures 1C–D, 2C–D, 4A–C, 7A–C)

*Trichopsomyia joratensis* Goedlind de Tiefenau, 1997: 195. Type locality: Chalet a Gobet, Vaud, Switzerland [Holotype ♂, Lausanne], not studied here.

Figure 4. Male genitalia *Trichopsomyia joratensis*, Spier, The Netherlands. A. Genitalia, lateral view. B. Epandrium and appendages, dorsal view. C. Superior lobe and appendage, lateral view. a = apico-dorsal part of post anal lamella, b = baso-ventral part of post anal lamella c = membranous apico-ventral part of aedeagus, d = dorsal gonocercus.


**Diagnostic characters.** Male: length 8.5 mm, wing length 6.5 mm; female: length 5.8–8.3 mm, wing length 4.5–6.6 mm. Basoflagellomere short, 1.2–1.5 times longer than broad, brownish coloured. Arista black. Face wide, half as wide as width of head. Frons in female with a pair of small, triangular, white pollinose maculae medially along eye-margin. Pile on scutum and pleurae predominantly black. Wing with brownish tinge, nearly entirely microtrichose. Vein M₁ almost perpendicular to vein R₄+₅. Mesotarsus with tarsomeres 1–3 yellow. Metatibia and first tarsomere of metatarsus with long mixed black and white seta-like pile. Abdomen relatively broad. Tergum II entirely black. Male genitalia (Figures 4A–C): epandrium basally slightly rounded with rather long and rather broad apex; cerci oval shaped, short pilose; post anal lamella consists of two parts, the more ventral part is weakly sclerotized and rectangular, the dorsal part is chitinous and narrowly elongate, extended more apically and apex broadly triangularly shaped; surstyli large, trapezoid, pilose on most of surface; hypandrium rectangular, gradually narrowing towards apex and very slightly constricted ventro-apically; dorsal gonocercus rounded with dens like structures on ventro-lateral margin; ventral gonocercus sharply dens shaped; apex of aedeagus consists of a sharp dens and a membranous, broadly triangular part.

**Puparial morphology** (Figures 7A–C). Length 7.7 mm, height 3.5 mm. The puparium is oval and, due to covering of resin, from the *Picea* tree it was found on, no other features are visible except for the apex of the posterior respiratory process. The posterior respiratory process is at most 2 to 2.5 times longer than broad and with a triangularly pointed apex; interspiracular setae rather long, almost as long as diameter of central plate; dorsal spur long, sharply triangular; central plates circular, medially divided by a deep cleft; spiracular openings positioned laterally, not visible due to resin.

**Distribution.** Predominantly central European, with scattered records from Scandinavia and the Netherlands, locally more common in the central European hill sides and south-eastwards into Italy and Bulgaria (Bartsch et al., 2009; Reemer et al., 2009; Speight, 2017).

**Biology.** The preferred habitat comprises herbaceous open areas in, or near, moist deciduous and coniferous forest on nutrient-poor, preferably acid soil. The adult insect is found flying through low vegetation on sunlit places, settling on leaves or stems (Reemer et al., 2009; Speight, 2017). Females are often seen feeding on *Crataegus* spp.
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Figure 5. Male genitalia Trichopsomyia lucida, Echt, The Netherlands. A. Genitalia, lateral view. B. Epandrium and appendages, dorsal view. C. Superior lobe and appendage, lateral view. a = ventral gonocercus, b = baso-ventral triangle of membranous apical part of aedegus.

(JvS, unpubl.). In collections with material from Europe there is a sex ratio of 6–10 females for each male (Goeldlin, 1997; Reemer et al., 2009). Larvae feeding on tree gall forming lice is possibly more common in this genus as one T. joratensis pupa was found in Belgium (Libin, 20-v-2006 see under material examined) on Picea abies (L.) H. Karst (misidentification of Abies spp. as mentioned on the label and written down in Reemer et al., 2009) at 1.5 m above ground, stuck on dried resin. It is highly possible the larva has been feeding on Adelgis abietis Linnaeus, 1758 (Hemiptera: Adelgidae) further up in the tree. Adelgis abietis causes pineapple-shaped galls on Picea and has a complex life cycle (Havill & Foottit, 2007). The scarcity of males in collections (Goeldlin, 1997; Reemer et al., 2009) could be explained by the fact that males may defend a territory high up in the trees close to the galls and possibly seldom descend to feed on flowers.

Trichopsomyia lucida (Meigen, 1822) (Figures 1E–F, 2E–F, 5A–C)


Diagnostic characters. Male: length 6.1–7.6 mm, wing length 5.2–6.0 mm; female: length 5.6–7.0 mm, wing length 4.3–5.8 mm. Basoflagellomere 1.7–2.0 times longer than broad, baso-ventrally with elongate yellow macula. Arista with basal 1/4–1/3 yellow. Frons in female with a pair of small triangular, white, pollinose maculae medially along eye-margin. Pile on scutum and pleurae mixed black and white. Wing hyaline with basal cells extensively bare of microtrichia in the female, in male more microtrichose. Vein M₁ strongly oblique to vein R₄+₅; vein M₁ weakly bent, not clearly angulate medially. Mesotarsus with tarsomeres 1 and 2 at most brown to dark-brown, not yellow. Metatibia and first tarsomere of metatarsus with long, mixed black and white seta-like pile. First tarsomere of metatarsus 2.4–2.9 times longer than wide. Tergum II in female
with large, triangular, yellow maculae separated from the lateral margin. Genitalia (Figures 5A–C): Epandrium basally rounded with long and rather narrow apex; cerci oval shaped, short pilose; post anal lamella membranous, elongate with broad apex and with 6 longitudinal weakly sclerotised ridges; surstyli basally rounded, apically elongate, rather broad, with dorsally curved apex, pile confined to the basal part; hypandrium semi-triangular with long and narrower apical part and slightly constricted ventro-apically; dorsal gonocercus circular with several short irregular dens ventrally; ventral gonocercus with elongate and sharp tipped dens apico-ventrally and with clear bulge (Figure 5C, a) on apical margin; membranous apical appendage of aedeagus baso-ventrally with very broad triangle (Figure 5C, b).

**Distribution.** Restricted to Central Europe and known from southern England, Germany, Belgium, the Netherlands, France, central Spain, Switzerland and Serbia (Vujić, Šimić & Radenković, 2001; Speight, 2006; Reemer et al., 2009; Ball & Morris, 2013; Speight, 2017). The records from Turkey (Goeldlin, 1997) probably do not refer to this species (see for more discussion under *T. ochrozona*).

**Biology.** The preferred habitat is open areas in or near moist deciduous forest, where it flies low through the vegetation; visits flowers of *Potentilla* species (Goeldlin, 1997; Marcos-García, Isidro, Rojo & Pérez-Bañón, 1998; Reemer et al., 2009). Larval biology unknown.

**Remarks.** Specimens of *Trichopsomyia* collected in Iran, and initially thought to belong to *T. lucida*, proved to differ from *T. lucida* in several characters. From examination of the type of *T. ochrozona* (Stackelberg, 1952) we conclude that the Iranian specimens we have seen belong to this latter species. The published records of *T. lucida* from Iran provided by Khaghaninia et al. (2012) also require verification. The figures of antennae, wings and abdominal terga given in Khaghaninia et al. (2012) show features which correspond more closely to *T. flavitarsis* than to *T. lucida*. The antenna of *T. lucida* is short, while the one in their Figure 2f is very long, indicating it is either *T. flavitarsis* or *T. ochrozona*, the small maculae on tergum II and the perpendicular and weakly bent vein M₁ (their Figures 2d and 2e) are characters of *T. flavitarsis* instead of *T. ochrozona*. The male (their Figure 2a) shows a slightly oblique vein M₁ which is weakly bent corresponding with our Figure 1A of *T. flavitarsis* which is clearly different from the strongly oblique vein M₁ in our Figures 1E and 1G of *T. lucida* and *T. ochrozona*. The antenna in their Figure 2c is not well visible and seems to be shrivelled or photographed at a certain angle making it look shorter than it actually is. This leaves the presence of *T. lucida* in Iran in doubt.
Figure 7. Pupal posterior breathing tube of *Trichopsomyia joratensis*, Libin, Belgium. A. posterior view. B. dorsal view. C. lateral view. a = dorsal spur, b = interspiracular setae, c = central plates, d = spiricular opening, e = cleft.

*Trichopsomyia ochrozona* (Stackelberg, 1952) (Figures 1G–H, 2G–H, 6A–B, 8A–D)

*Pipizella ochrozona* Stackelberg, 1952: 352. Type locality: Kondara, Tajikistan [Holotype ♀, ZISP]


*Diagnostic characters*. Male: length 5.6–6.1 mm; wing length 4.6–5.4 mm; female: length 5.4–5.8 mm; wing length 4.6–4.8 mm. Basoflagellomere elongate, 2.1–2.7 times longer than broad, baso-ventrally with elongate yellow macula. Arista with basal 1/4–1/3 yellow. Frons in female with a pair of small triangular white pollinose maculae medially along eye-margin. Pile on scutum and pleurae white. Wing hyaline, in female with basal cells extensively bare of microtrichia, in male more microtrichose. Vein M1 strongly to very strongly oblique to vein R4+5; vein M1 with abrupt angle in medial part. Mesotarsus with tarsomeres 1 and 2 yellow. Metatibia and first tarsomere of metatarsus with long, mixed black and white, seta-like pile. First tarsomere of metatarsus 2.4–2.9 times longer than wide. Tergum II in female with two broad yellow fascia not reaching the lateral margin. Male genitalia (Figures 6A–B) similar to those of *T. lucida*, differing in: a more evenly curved ventral gonocercus, apical margin concave (Figure 6B, a) smoothly rounded towards pointed ventral apex (in *T. lucida* apical margin bulged and strongly narrowed towards pointed ventral apex); membranous apical part of aedeagus with baso-ventral triangle (Figure 6B, b) narrow (in *T. lucida* with baso-ventral triangle very broad).
Figure 8. Immature stages of *Trichopsomyia ochrozona*, Ghazvin, Iran. A. Larva, ventral view. B. Pupa, lateral view. C. Posterior respiratory process, lateral view. D. Posterior respiratory process, posterior view.

**Larval and puparial morphology.** The larva (Figure 8A) is sub-cylindrical in shape with a translucent light brown colour; each segment has a vertical row of sclerotized sensilla. The puparium (Figures 8B–D) is oval, with a creamy colour and has a regular row of sclerotized sensilla on each of its segments; integument otherwise bare; posterior respiratory process about 3 times longer than broad, with its basal half slightly wider than its apical half and the surface of the basal part rougher; dorsal spur weakly developed, rounded; cleft between central plates shallow; interspiracular setae rather long, about half as long as diameter of central plate.

**Distribution.** Only known from the type specimen (Kondara, Tajikistan) and the material from Ghazvin province, Iran.

**Biology.** Activity of *T. ochrozona* starts about early June and larvae feed on nymphs of *Camarotoscena hoberlandti* Vondráček (Hemiptera: Liviidae) until late August when formation of the puparium occurs. The specimens from Ghazvin were collected at the flood control station, between Sahrain and Garah-Charyian rivers, 36°56'32"N, 48°20'59" E, 1800 m a.s.l.

**Remarks.** Larvae and adults were collected in a *Populus nigra* plantation in northern Iran by the Ilam Research Center (IANRRE). The larva and puparium are deposited in the collections of this research centre. Pictures of the larva and pupa have been taken, but could not be further examined. The exact label information and a precise description are therefore not possible to give here. However, the figures and short description given here make identification possible.
Populus nigra is economically important in Iran and some 150,000 hectares are planted with this tree species. It is grown widely, especially in northern parts of the country. The plantation along the Zanjan-Rood River (Zanjan province), from which the developmental stages of T. ochrozona were collected, is in the region with optimal climatic conditions for this tree (Bagheri, Namiranian, Zobeiry & Modir-Rahmati, 2003). The tree is subject to various pest infestations in Iran, among them two species of jumping plant bugs in the genus Camarotoscena (Psyllidae: Homoptera), C. fulgidipennis Loginova and C. hoberlandti Vondracek. Comarotoscena fulgidipennis has a wider tree host range (occurring on various Populus and Salix species) and wider distribution in Iran than C. hoberlandti (Burchardt & Lauterer, 1993) and its infestations reduce tree vigour and cause leaf-gall formation. These galls form in June. Both Comarotoscena species are important pests and pesticide sprays are used against them. The galls caused by C. fulgidipennis on P. nigra leaves involve leaves folding along longitudinal veins, making protected microhabitat in which the psyllids can feed. The psyllids are nonetheless subject to predation. Recorded predators include Anthocoris nemorum (L.) (Anthocoridae: Heteroptera), Chamaemyiidae (Diptera) and some syrphid species (Rojo, Gilbert, Marcos-García, Nieto, & Mier Durante, 2003), but this is the first data of psyllid predation by T. ochrozona.

Goeldlin (1997) mentioned two Trichopsomyia specimens from Turkey with white pile and a yellow fascia on tergum II, pointing out that they corresponded with the description of T. ochrozona. But he did not find differences in the male terminalia between these specimens and T. lucida, leading him to suggest the synonymy of T. ochrozona with T. lucida. The males from Iran have different genitalia and the females have longer basoflagellomere compared with European specimens of T. lucida. The females from Iran are identical with the type of T. ochrozona and it is concluded that the Iranian specimens belong to T. ochrozona. The specimens from Turkey seem to be similar to the Iranian species making the occurrence of T. ochrozona in Turkey likely. However, as no precise label data are available and the depository collection of the Turkish specimens is not known, it is not yet possible to confirm the presence of T. ochrozona in Turkey. On the other hand specimens of T. lucida from south-east France seem to be closer to T. ochrozona than to the here studied T. lucida (M. Speight, pers. comm.) and possibly these could be intermediate specimens. An extended review incorporating specimens from a wider geographical range and including DNA analysis is needed to resolve this problem.

Species excluded from the genus Trichopsomyia

Peck (1988) and others mention Pipiza melancholica Meigen, 1822 as synonym of Trichopsomyia flavitarsis. The female holotype (“Meigen”, “Pipiza / melancho / ica / ♀”, Holotype ♀ / Pipiza / melanholica / Meigen, 1822 / det J. van Steenis” (red label), “Pipizella / viduata L. / det J. van Steenis”, MNHN) has been studied by the first author and identified as Pipizella viduata (Linnaeus, 1758), based on the slightly elongate basoflagellomere; bare anterior anepisternum; metatibia with normal sized white pile; vein M₁ perpendicular to vein R₄+₅ and entirely black abdomen, corresponding to the female of Pipizella viduata sensu van Steenis & Lucas (2011) and hence Pipiza melancho / icica Meigen, 1822 syn. nov. is proposed as a junior subjective synonym of Musca viduata Linnaeus, 1758.
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