

Research Article

## Faunistic study of the subfamily Conopinae (Diptera: Conopidae) in Arasbaran forests, with two new records for Iranian fauna

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**Abstract:** The present paper deals with the fauna of the subfamily Conopinae in northwestern Iran. Specimens were collected, using insect net, from Arasbaran forest during 2010-2013. In total, six species belonging to two genera were identified, of which the two species, *Conops longiventris* Kröber, 1916 and *Physocephala laticincta* (Brulle, 1833), are new records from Iran. The diagnostic characters and supplementary photographs of the species are provided.

**Keywords:** Northwestern Iran, Conopinae, Conopidae, New records

### Introduction

The subfamily Conopinae is divided into 11 tribes: Asiconopini, Brachyceraeini, Caenoconopini, Conopini, Gyroconopini, Microconopini, Neoconopini, Physocephalini, Pleurocerinellini, Siniconopini and Tropicomyiini (Gibson *et al.*, 2012). The known larvae of all species are internal parasitoids of aculeate Hymenoptera. The female flies usually attack and deposit eggs on their hosts in flight (Clements, 1997). The adults are pollen and nectar feeder, and often bear a striking resemblance to certain vespid wasps and flower flies (Smith and Petterson, 1987).

The members of the subfamily Conopinae are usually of medium size with black and yellow coloration with waisted abdomens; elongated antennae with apical stylus; basally geniculate haustellum; long and acute cell cup; presence of female genital plate; with weakly developed ovipositor and anteroventrally directed terminalia.

Chvála (1961) reviewed Czechoslovak species of the subfamily Conopinae and Stuke (2005)

studied the *Physocephala rufipes* species-group within Palearctic region. A contribution to the fauna of Conopinae in Iran was written by Hüttinger (1978) with the description of *Leopoldius pontifex*. Becker and Stein (1913) described 7 species of the genus *Physocephala* from the Iranian provinces of Sistan-Baluchistan, Kerman and Khorasan. Kröber (1927) described *Melanosoma bella* Kröber, 1927 from Iran and also reported *Physocephala vittata* (Fabricius, 1794) from northern Iran (Kröber, 1939). Three more species of *Brachyceraea brevicornis* (Loew, 1847), *Physocephala zaitzevi* Zimina, 1979 and *Tropicomyia aureifacies* Kröber, 1915 were reported from this region (Stuke *et al.*, 2008).

As the fauna of this subfamily in Iran has been poorly studied, the aim of the present work is a preliminary discussion on the zoogeography and fauna of Iranian conopids.

### Materials and Methods

All specimens were collected by hand-netting from Arasbaran forest of East-Azerbaijan province during 2010-2013. In order to prepare the male genitalia, the post abdomen was removed and boiled in 10% KOH (potassium hydroxide) solution for 45-60 seconds, then

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transferred into acetic acid for 10-20 seconds and later washed in distilled water. The genitalia was stored in 0.5 ml microvials containing glycerin. Morphological terminology mainly follows Chvála (1961) and Stuke (2005). All specimens are deposited in the Insect Museum of Tabriz University (IMTU). The general distribution for each species follows Pape and Thompson (2011) and Bei-Bienko (1988).

## Results

In total six species belonging to two genera of the subfamily Conopinae were identified, of which *Conops longiventris* Kröber, 1916 and *Physocephala laticincta* (Brulle, 1833) are newly recorded from Iran. The species are listed alphabetically within genera.

### Key to the studied species, adapted from Chvála, 1961:

- 1- Anterior cross vein (r-m) beyond middle of discal cell (dm), first posterior cell ( $r_{4+5}$ ) long; abdomen only slightly narrowed at base, second and third abdominal segments equal in length (*Conops* L.) (Figs. 1-12).....2  
 - Anterior cross vein (r-m) beyond second third of discal cell (dm), first posterior cell ( $r_{4+5}$ ) short; male abdomen clearly narrowed at base, second abdominal segment longer than third (*Physocephala* Schiner) (Figs. 13-24).....4  
 2- Body completely black with silvery marks, humeri and scutellum black, small species, usually 7-8 mm (Figs. 5-8).....*C. longiventris* Kröber  
 - Body yellow or brownish, humeri yellow or reddish brown, usually larger species, 8mm.....3  
 3- Body reddish brown with black marks; frons reddish yellow with reddish-brown marks (Figs. 9-12).....*C. vesicularis* Linnaeus  
 - Body yellow with black marks; frons entirely yellow, with only small blackish spot above antennae (Figs. 1-4) .....*C. insignis* Loew  
 4- Pleura with silvery dusted stripe; face entirely yellow, first arista segment obviously elongated; dark wing band occupies whole cell  $r_{1+2}$  (Figs. 13-16).....*P. chrysorrhoea* (Meigen)  
 -Pleura without any silvery coloration.....5

- 5- Face and frons entirely yellow, without any black mark; antennae longer than head; first arista segment not elongated; femora entirely brown (Figs. 21-24).....*vittata* (Fabricius)  
 - Face with black stripe extending from base of antennae for one-half its length, not interrupted; first arista segment on the lower side elongated; femora with black ring at base (Figs. 17-20).....*P. laticincta* (Brulle)

## Conopinae

### Genus: *Conops* Linnaeus 1758

**Type species:** *Conops flavipes* Linnaeus, 1758

**Note.** The genus *Conops* has traditionally been divided into a number of subgenera, including *Conops s. s.* Linnaeus, 1761 and *Asiconops* Chen, 1939; the species *C. vesicularis* belongs to the subgenus *Conops* and the species *C. insignis* Loew, 1848 and *C. longiventris* Kröber, 1916 belong to the subgenus *Asiconops*. *Asiconops* has recently been elevated to genus status (Gibson and Skevington, 2013).

***Conops insignis* Loew, 1848** (Figs. 1-4)

**Material examined:** (1♂): East Azerbaijan province, Aynali region (located just west of Arasbaran forests), 38°30' N, 46°37' E, 391m, 25.vi.2010; leg. S. Khaghaninia.

**Distribution:** Europe, North Africa, Turkey, Mongolia, Iran.

**Diagnostic characters:** Antennae dark brown, first segment yellowish brown (Fig. 4); face and frons entirely yellow, with small blackish spot above antennae (Fig. 4); proboscis about 1/5 times length of head, black, in middle part brown; wings hyaline, frontal margin with brownish band (Fig. 3); legs yellow (Fig. 2); tergites 1-4 with yellowish silver pollinose, margins black, other segments with gold yellow pollinose throughout (Fig. 1).

***Conops longiventris* Kröber, 1916** (Figs. 5-8)

**Material examined:** (1♀): East Azerbaijan province, Chichekli (located in west part of Arasbaran forests), 38° 30.425" N, 46° 37.0452" E, 1689m, 07.vi.2012; leg. S. Khaghaninia.

**Distribution:** Europe, **New to Iran.**

**Diagnostic characters:** Face and frons yellow (Figs. 5 & 8); Antennae black, 1<sup>st</sup> and 3<sup>rd</sup> segments on lower side slightly brownish (Fig.

8); proboscis shining black, about twice the length of head (Fig. 8); Thorax black, humeri and pleura silvery pollinose (Figs. 5 & 6); Legs light brown, apical tibiae dark brown, tarsi black (Fig. 6); wings hyaline (Fig. 5); abdomen black, tergites with silvery pollinose distal margins (Fig. 5); theca large, shining black (Fig. 7).

***Conops vesicularis* Linnaeus, 1761** (Figs. 9-12)

**Material examined:** (1♂): East Azerbaijan province, Chichekli (located in west part of Arasbaran forests), 38°37' N, 46° 26' E, 1534m, 21.viii.2012; leg. S. Khaghaninia.

**Distribution:** Europe, Russia, Middle East, North Africa, China, Iran.

**Diagnostic characters:** Frons reddish yellow in some parts reddish brown (Fig. 12); antennae reddish brown (Fig. 12); proboscis strong, only a little longer than head, blackish brown; mesonotum black, scutellum reddish brown (Fig. 9); legs reddish brown (Fig. 10); wings faintly yellowish, front margin with yellowish brown band (Fig. 9); abdomen predominantly gold yellow, only basal tergites with dark brown front margins (Fig. 9); male genitalia as Fig. 11.

***Physocephala chrysorrhoea* (Meigen, 1824)** (Figs. 13-16)

**Material examined:** (2♀): East Azerbaijan Province, Mekidi valley (located almost in center of Arasbaran forests), 38°50' N, 46°54' E, 1656m, 19.vi.2011; leg. S. Khaghaninia.

**Distribution:** Europe, North Africa, Russia (to East Siberia), Middle East, Mongolia, China, Iran.

**Diagnostic characters:** Face entirely yellow, antennae black, 2<sup>nd</sup> and 3<sup>rd</sup> segment brownish at base, first arisal segment obviously extended (Fig. 15); proboscis dark brown (Fig. 15); dark wing band occupies whole cell  $r_{1+2}$  (Fig. 16); Legs yellowish brown, tarsi greyish brown, tibiae with silvery luster (Fig. 14); Pleura with silvery stripe (Fig. 14); abdominal tergites black with brown and silver coloration (Fig. 13).

***Physocephala laticincta* (Brulle, 1833)** (Figs. 17-20)

**Material examined:** (2♂): East Azerbaijan province, Mekidi valley (located almost in

center of Arasbaran forests), 38°50' N, 46°54' E, 1656m, 19.vi.2011; leg. S. Khaghaninia.

**Distribution:** Europe, North Africa, Turkey, Russia, Middle Asia, **New to Iran.**

**Diagnostic characters:** Face with black stripe extending from base of antennae for one-half its length, not interrupted (Fig. 19); antennae dark brown or black, first arisal segment on lower side prolonged (Fig. 19); proboscis black (Fig. 19); pleura without any silvery coloration; femora with black ring at base (Fig. 18); wings with brown marginal band (Fig. 17); abdomen black, posterior margins yellowish silvery pollinose, 2<sup>nd</sup> segment large and brownish, last segments nearly all yellowish pollinose (Figs. 17 & 18); male genitalia as in Fig. 20.

***Physocephala vittata* (Fabricius, 1794)** (Figs. 21-24)

**Material examined:** (2♀♀ & 2♂♂): East Azerbaijan province, Oskulu region (located near center of Arasbaran forests), 38° 53' N, 46° 48' E, 1859m, 20.viii.2013; leg. S. Khaghaninia.

**Distribution:** Europe, North Africa, Middle East to Mongolia, China, Iran.

**Diagnostic characters:** Face and frons entirely yellow, without any black design (Fig. 23); antennae black, 3<sup>rd</sup> segment and distal part of second segment brownish longer than head (Fig. 23); proboscis slender, shining black (Fig. 23); wings with dark brown marginal band that do not reach end of cell  $R_2$  (Fig. 21); pleura without any silvery coloration (Fig. 22); abdominal tergites brownish with silvery pollinose (Figs. 21 & 22); male genitalia as in Fig. 24.

**Note.** specimens of *Physocephala vittata* seem to be var. *abdominalis* Kröber, which is very common in southern Europe and the Middle East.

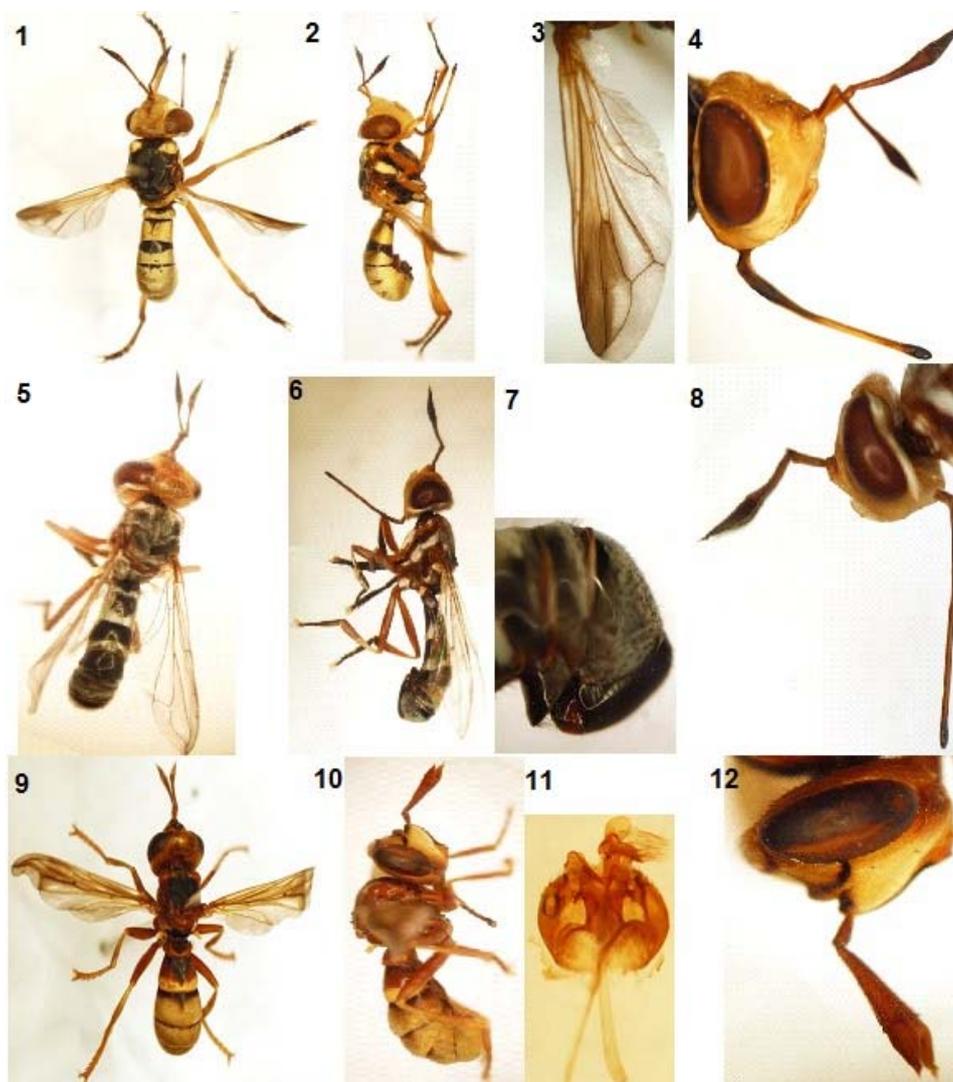
Kröber (1939) collected this species from Shakhkouh village located in northern Iran. This area is covered by forests and has much the same conditions as the forests in the northwest of Iran.

## Discussion

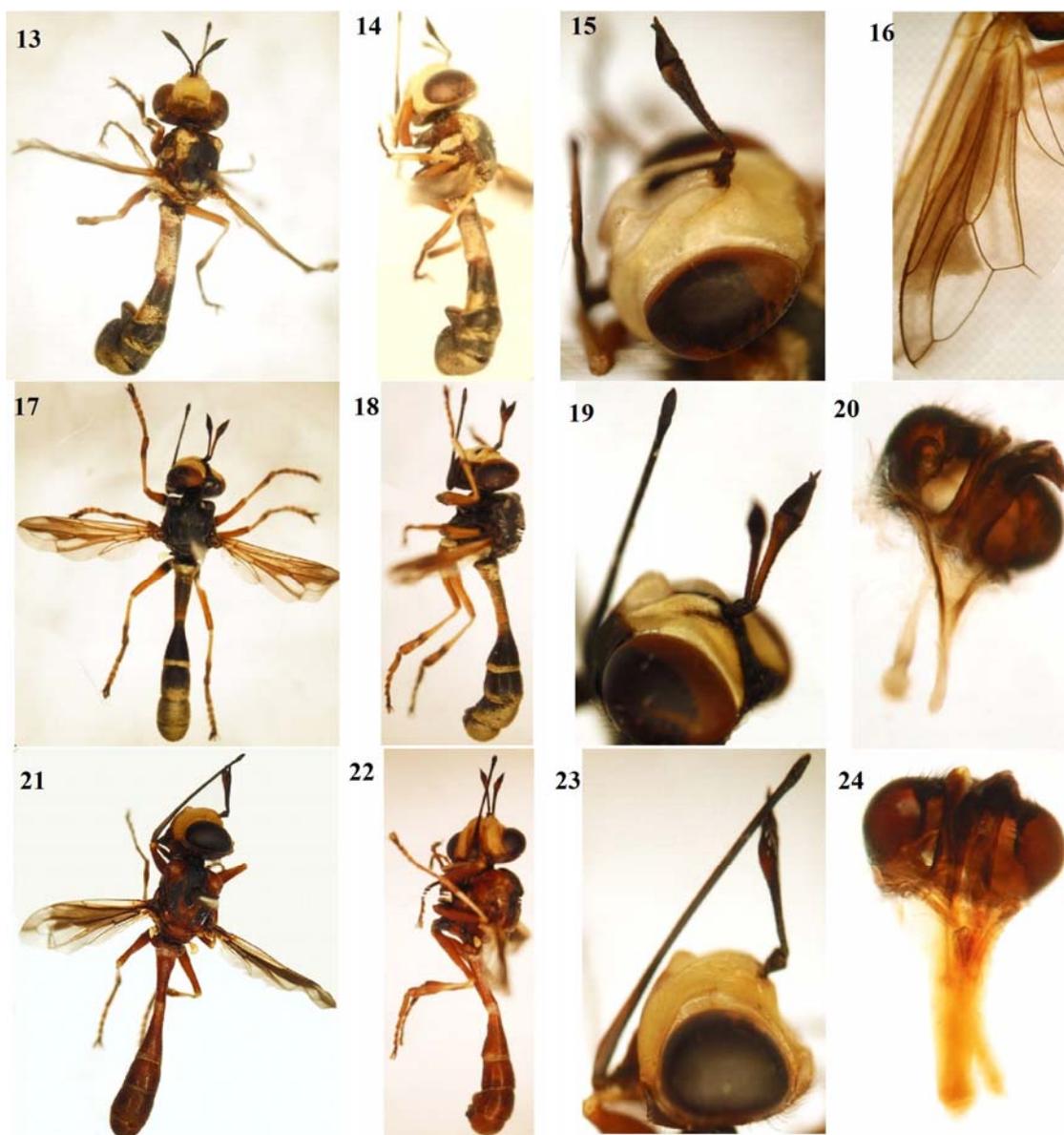
All of the studied species were collected from a forestry area that has rich a fauna of Hymenoptera, so conopid flies as an agent of insect

endoparasitism could potentially have important economic and ecological impacts in such areas (Freeman, 1966; Mei, 1999). Further studies on the host range and biology of conopids should be made in this area, similar to the studies of Smith (1969), who gave details of the biology and hosts of British species, and also Schmid-Hempel and Schmid-Hempel (1990) in Switzerland who have published extensively on the relationships between Conopidae and bumble-bees (Hymenoptera: Apidae, *Bombus* spp.).

About 127 species of the genus *Phyocephala* and 154 species of the genus *Conops* have been recognized in the world (Pape and Thompson, 2011). Nineteen species of this subfamily have been recorded to date from nearby Turkey (Stuke *et al.*, 2008). Therefore it can be anticipated that many more species of this subfamily will be found in Iran, necessitating further studies on the fauna of this subfamily.



**Figures 1-12.** Morphological characters of the genus *Conops*; 1-4. *Conops insignis* Loew, 1848, (male): 1. Dorsal view, 2. Lateral view, 3. Wing, 4. Lateral view of head; 5-8. *Conops longiventris* Kröber, 1916, (female): 5. Dorsal view, 6. Lateral view, 7. Theca, 8. Lateral view of head; 9-12. *Conops vesicularis* Linnaeus, 1761, (male): 9. Dorsal view, 10. Lateral view, 11. male genitalia, 12. Lateral view of head.



**Figures 13-24.** Morphological characters of the genus *Physocephala*; 13-16. *Physocephala chrysorrhoea* (Meigen, 1824) (female), **13.** Dorsal view, **14.** Lateral view, **15.** Lateral view of head, **16.** wing; **17-20.** *Physocephala laticincta* (Brulle, 1833) (male), **17.** Dorsal view, **18.** Lateral view, **19.** Lateral view of head, **20.** Male genitalia; **21-24.** *Physocephala vittata* (Fabricius, 1794) (male), **21.** Dorsal view, **22.** Lateral view, **23.** Lateral view of head, **24.** Male genitalia.

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## مطالعه مگس‌های زیرخانواده Conopinae (Diptera: Conopidae) در جنگل‌های ارسباران به همراه گزارش جدید دو گونه از ایران

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**چکیده:** این تحقیق به مطالعه فون مگس‌های زیرخانواده Conopinae در شمال غرب ایران می‌پردازد. نمونه‌ها توسط تور حشره‌گیری در طی سال‌های ۱۳۸۹-۱۳۹۱ از جنگل‌های ارسباران واقع در استان آذربایجان شرقی جمع‌آوری شدند. در کل ۶ گونه متعلق به دو جنس شناسایی شدند که از آن‌ها، ۲ گونه *Conops longiventris* Krober, 1916 و *Physocephala laticincta* (Brulle, 1833) برای اولین بار از ایران گزارش می‌شوند. مشخصات افتراقی همراه با عکس‌های گونه‌های مطالعه شده ارائه شده‌است.

**واژگان کلیدی:** شمال غرب ایران، Conopidae، Conopinae، اولین گزارش