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Research Article

Preliminary study of Lauxaniid flies (Diptera: Luxaniidae) of Horand in the East Azerbaijan province with two new records for the Iranian fauna

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Abstract: In order to identify the species of the family Lauxaniidae, a study was conducted in Horand region located in Northern part of East Azerbaijan province, Iran, during 2011-2013. A total of six species belonging to three genera were identified, including *Calliopum caucasicum* (Shatalkin, 1995) and *Minettia lupulina* (Fabricius, 1787) newly reported from Iran. The diagnostic characters, geographical distribution and photos of the studied species are given.

Keywords: Lauxaniidae, New records, Horand, East Azerbaijan province, Iran

Introduction

The Lauxaniidae is one of the largest families of acalyptrate flies (Diptera, Brachycera) containing nearly 2000 described species worldwide (Semelbauer and Kozanek, 2011a, b). They are best represented in the tropics of the Old and New World (except for the Afrotropical region) and their diversity declines strongly towards the more temperate regions. About 180 species are recorded from Europe (Merz, 2003). In the Neotropical region the family comprises a described fauna of nearly 400 species in 62 genera (Amorim *et al*., 2002). Most of the species are found in forests, on shrubs, trees, and leaves. They are less common in dry and wet grasslands. Despite their remarkably high population densities and apparent importance in decomposing plant material, they are insufficiently known (Merz, 2004). The lauxaniids are known to be mainly saprophagous in their larval stage, found in fallen leaves, decaying grasses, under the bark of decomposing trunks, and in nests of birds and mammals. Adults are sedentary and shade loving (Silva and Mello, 2008). This family is recognized by the following characters: medium-sized or small flies, costal vein complete, body mostly yellow, vibrissae absent, postvertical bristles convergent or cruciate, dorsal preapical bristles present on tibiae, second antennal joint with a dorsal cleft (Shtakelberg, 1989).

A first report on Lauxaniidae fauna of Iran was made by Czerny (1932) who described *Sapromyza biordinata* Czerny. Over sixty years later Shatalkin (1996, 1998, 2000) has described additional new species. Gilasian (2008) recorded one genus and two species, and Majnon Jahromi *et al*. (2013) added a subfamily, one genus and three species. Nevertheless, the Lauxaniid flies of Iran are poorly known.

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Materials and Methods

Adult specimens were collected by standard sweep-netting and malaise traps near a river, in forest and grassland habitats of the Horand **(**located in the north west Arasbaran forests) from the east Azerbaijan province located in northern west Iran during 2011-2013. The samples were killed in a killing jar containing potassium cyanide. The species were identified based on Shatalkin (2000), Shtakelberg (1989) and Shewell (1987). Male genitalia were macerated in 10% KOH. Images were obtained using a microscope equipped with a camera. The material examined is deposited in Insect Museum of Tabriz University (IMTU).

Results

In this study, three genera and six species of the family Lauxaniidae are recognized of which two species, *Calliopum caucasicum* (Shatalkin, 1995) and *Minettia lupulina* (Fabricius, 1787) are recorded from Iran for the first time. In addition, all species are recorded for the first time from East Azerbaijan. Species are listed in alphabetic order.

***Calliopum aeneum* (Fallén, 1820) (Figs. 1-3)**

Material examined: East Azerbaijan: Tanbaklo, 38°54' N, 47°13' E, 1367 m a.s.l., 15 June 2011 (moist grassland habitat), 1 ♀, 3 ♂; Gharedarvish, 38°54' N, 47°15' E, 1416 m a.s.l., 5 June 2013 (forest and grassland habitat), 2 ♀, 2 ♂(3 ♀, 5 ♂, IMTU), leg. S. Khaghaninia.

Figure 1-6 Morphological characteristics of Iranian Lauxaniidae; **1.** *Calliopum aeneum* (Fallén, 1820) (lateral habitus, male), **2.** *C. aeneum* (Fallén, 1820) (male genitalia, dorsal view), **3.** *C. aeneum* (Fallén, 1820) (male genitalia, lateral view), **4.** *Calliopum caucasicum* (Shatalkin, 1995) (lateral habitus, male), **5.** *C. caucasicum* (Shatalkin, 1995) (male genitalia, ventral view), **6.** *C. caucasicum* (Shatalkin, 1995) (male genitalia, dorsal view).

Diagnosis: Face entirely black, sometimes dull brown without black spot; entirely black species; hind tibia yellow; 0 + 3 dc (dorsocentral bristle); ac (acrostichal) in 6 rows; male legs with combs of black spinules on hind tibia and on first segment of mid tarsus; In male, genitalia with relatively short surstylus, about half as long as paramere length; length, 4.0-4.5 mm.

Distribution: This species is widely distributed in West Europe, Russia, Caucasus and Sweden (Shatalkin, 2000; Majnon Jahromi *et al*., 2013).

***Calliopum caucasicum* (Shatalkin, 1995) (Figs. 4-6)**

Material examined: East Azerbaijan: Tanbaklo, 38°53' N, 47°19' E, 1439 m a.s.l., 10 July 2012 (forest and grassland habitat), 2 ♀, 3 ♂; Abeshahmad, 38°54' N, 47°24' E, 1355 m a.s.l., 5 June 2011 (grassland habitat), 2 ♂; Gharedarvish, 38°55 N, 47°13' E, 1393 m a.s.l., 22 May 2013 (moist grassland habitat), 1 ♀, 2 ♂ (3 ♀, 7 ♂ IMTU), leg. S. Khaghaninia.

Diagnosis: Face entirely black, sometimes dull brown without black spot; entirely black species; hind tibia yellow; 0 + 3 dc; ac in 6 rows; male legs with combs of black spinules on hind tibia and on first segment of mid tarsus; genitalia in male, with relatively long surstylus, about two-third or more as long as paramere and length, 3.4-4.0 mm.

Distribution: Caucasus (Shatalkin, 2000), **New for the fauna of Iran.**

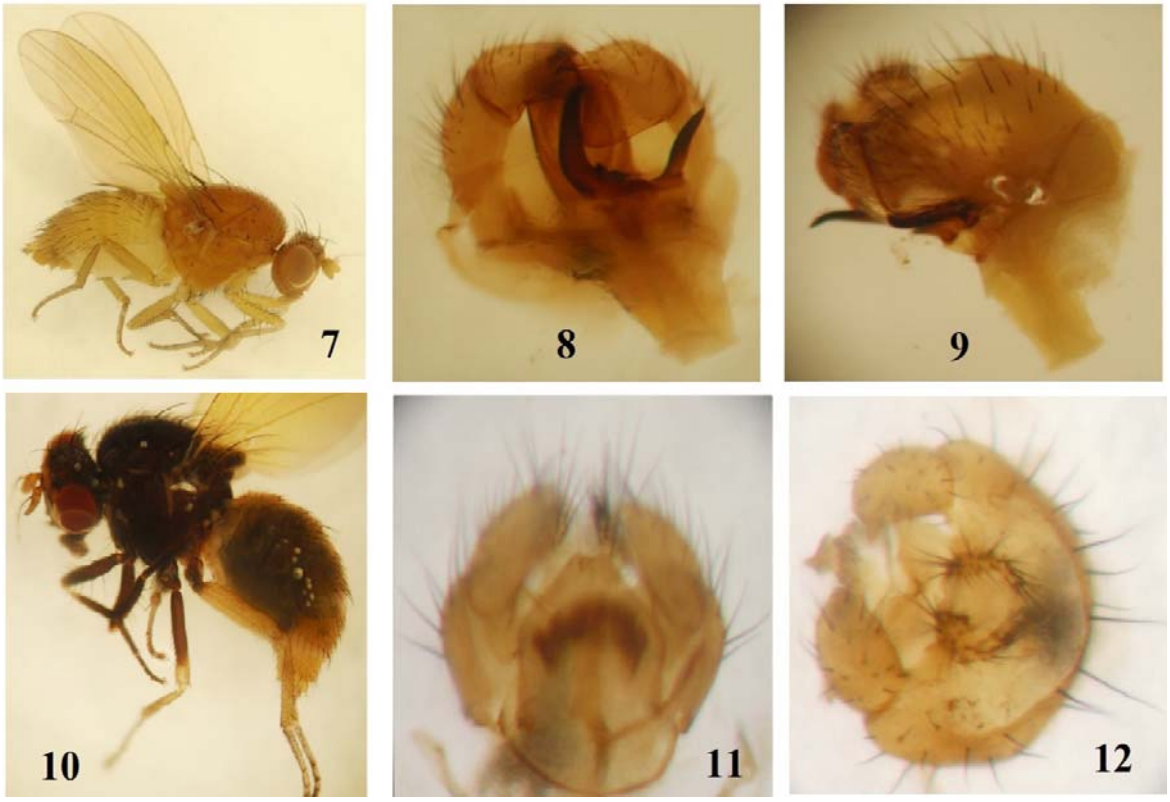

Figure 7-12 Morphological characteristics of Iranian Lauxaniidae; **7.** *Minettia bulgarica* (Papp, 1981) (lateral habitus, female), **8.** *M. bulgarica* (Papp, 1981) (male genitalia, ventral view), **9.** *M. bulgarica* (Papp, 1981) (male genitalia, lateral view), **10.** *Minettia lupulina* (Fabricius, 1787) (lateral habitus, female), **11.** *M. lupulina* (Fabricius, 1787) (male genitalia, ventral view), **12.** *M. lupulina* (Fabricius, 1787) (male genitalia, dorsal view).

***Minettia bulgarica* (Papp, 1981) (Figs. 7-9)**

Material examined: East Azerbaijan: Gharedarvish, 38°59 N, 47°16' E, 1426 m a.s.l., 10 July 2011 (forest), 1 ♂ (1 ♂, IMTU), leg. S. Khaghaninia.

Diagnosis: ac in 6 rows; 0 + 3 or 0 + 2 dc, i.e. presutural dorsocentral bristle absent; postpronotum with one bristle; lateral part of thorax without stripes; angle between frons and face about 135°; halter yellow; length of aristal rays more than width of third antennal segment; thorax mostly yellow; mesonotum entirely yellow; scutellum without spots; palpus partially or entirely black; abdomen yellow, without any spots; male paramere clearly longer than dorsal sclerite and with pointed formation basally on one lobus; abdominal tergite 11 of female not shortened, abdominal tergites III and IV subequal in length; bristles on posterior margin of tergite III short and with same length, 4.2 mm.

Distribution: Ukraine, Bulgaria, Near East (Shatalkin, 2000; Majnon Jahromi *et al.*, 2013).

***Minettia hyrcanica* (Shatalkin, 1998) (Figs. 13-15)**

Material examined: East Azerbaijan: Gharedarvish, 39°02' N, 47°17' E, 1444 m a.s.l., 15 June 2013 (forests habitat), 1 ♂ (1 ♂, IMTU), leg. S. Khaghaninia.

Diagnosis: 0 + 3 or 0 + 2 dc; Postpronotum with one bristle; lateral part of thorax without stripes; angle between frons and face about 135°; halter yellow; length of aristal rays more than width of third antennal segment; thorax mostly yellow; mesonotum entirely yellow; scutellum without spots; palpus yellow; only abdominal tergite V with spots and length, 4.8 mm.

Figure 13-17 Morphological characteristics of Iranian Lauxaniidae; **13.** *Minettia hyrcanica* (Shatalkin, 1998) (lateral habitus, male), **14.** *M. hyrcanica* (Shatalkin, 1998) (male genitalia, ventral view), **15.** *M. hyrcanica* (Shatalkin, 1998) (male genitalia, dorsal view), **16.** *Sapromyza biordinata* (Czerny, 1932) (lateral habitus, female), **17.** *S. biordinata* (Czerny, 1932) (lateral habitus, female).

Distribution: Iran (Shatalkin, 2000; Majnon Jahromi *et al*., 2013).

***Minettia lupulina* (Fabricius, 1787) (Figs. 10-12)**

Material examined: East Azerbaijan: Tanbaklo, 38°56' N, 47°29' E, 1355 m a.s.l., 6 June 2012 (moist grassland habitat), 1 ♀, 1 ♂; Abeshahmad, 38°52 N, 47°22' E, 1478 m a.s.l., 29 July 2013 (forest), 1 ♂(1 ♀, 2 ♂, IMTU), leg. S. Khaghaninia.

Diagnosis: 0 + 3 or 0 + 2 dc, i.e. presutural dorsocentral bristle absent; Postpronotum with one bristle; lateral part of thorax without stripes; angle between frons and face about 135°; scutellum grey with black or dull brown margins; black vitta on scutellum wide, extended over dorsal surface; hind legs yellow; abdomen mostly yellow and length, 3.0-3.5 mm.

Distribution: West Palaearctic, North America (Shatalkin, 2000), **New for the fauna of Iran.**

***Sapromyza biordinata* (Czerny, 1932) (Figs. 16-17)**

Material examined: East Azerbaijan: Abeshahmad, 38°53' N, 47°28' E, 1467 m a.s.l., 6 June 2012 (forest and moist grassland habitat), 1 ♀(1 ♀, IMTU), leg. S. Khaghaninia.

Diagnosis: 0 + 3 (4) dc; usually 2 katepisternal; wing without costal dark area ; head yellow; frons without spots and face yellow; 2 orbital setae; abdomen yellow; basal segments of antenna yellow; third antennal segment black or darkened apically or along apical margin; mesonotum without black vittae; ac at least on anterior part of mesonotum in 2 rows; preapical bristle on hind femur long (more than femur thickness); arista with rays (sometimes very short); gena lower, compound eye about three times as high as gena; fore tarsus yellow; genitalia otherwise; ventral membrane of female sternite VIII triangular; male aedeagus small, not longer than paramere; female tergite III on lateral parts of posterior margin with much shorter bristles (longer than following tergite only) and length, 3.9 mm.

Distribution: Middle Asia and Iran (Czerny, 1932; Shatalkin, 1998, 2000).

Discussion

The genus *Calliopum* was the most species-rich among the studied genera. All of the studied species were collected near rivers in forest and grassland habitats having decomposing plant materials. The studies of Miller (1977b) and Merz (2004) are in agreement of our observations about lauxaniids habitats; they found that the larval alimentary content consists of decomposed plant matter, including rotten trunk material, mold of leaves and peat soil. Hering (1951) considers that although those larvae technically build mines, their behaviour represents specialization of saprophagy rather than phytophagy. Miller and Foote (1976) indicated a possibility that the larvae, in that case, are feeding on the microorganisms such as fungi, yeast and bacteria of the parenchyma in decay. Nevertheless, the majority of that data was obtained from non-Palaearctic regions and focus on less than 1.5% of the known lauxaniid species (Miller 1977a, b; Miller and Foote 1975, 1976). Therefore, it can be anticipated that more species of this family will be found in Iran, particularly in Alborz and Zaghroz's forests which need further studies on the fauna of this family.

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References

Amorim, D. S., Silva, V. C. and Balbi, M. I. P. A. 2002. Estado do conhecimento dos Diptera neotropicais, In: C. Costa; S. A. Vanin; J. M. Lobo and A. Melic (Eds.), Proyecto de Red Iberoamericana de Biogeografia y Entomologia Sistemática PrIBES. Zaragoza: Sociedad Entomológica Aragonesa and Cyted, pp. 29-36.

Czerny, L. 1932. 50. Lauxaniidae (Sapromyzidae). Die Fliegen der Palaearktischen Region, 5: 1-76.

Gilasian, E. 2008. The first report of one genus and two species of Lauxaniidae (Diptera) from Iran. Journal of Entomological Society of Iran, 27 (2): 15-16.

Hering, E. 1951. Biology of the leaf miners. Netherlands, N. V. Drukkerij Hooiberg. 420 p.

Majnon Jahromi, B. Dousti, A. F., Saghaei, N. and Van Der Weele, R. 2013. Iranian Lauxaniidae (Diptera, Brachycera): new records and a preliminary checklist. Linzer Biologische Beitraege., 45 (2): 2005-2009. Linzer Biologische Beitraege.

Merz, B. 2003. The Lauxaniidae (Diptera) described by C. F. Fallén with description of a misidentified species of *Homoneura* van der Wulp. Insect Systematics Evolution, 34: 345-360.

Merz, B. 2004. A revision of the *Minettia fasciata* species group (Diptera, Lauxaniidae). Revue Suisse de Zoologie, 111 (1): 183-211.

Miller, R. M. 1977a. Ecology of Lauxaniidae (Diptera: Acalyptratae), I. Old and new rearing records with biological notes and discussion. Annals of the Natal Museum, 23: 215-238.

Miller, R. M. 1977b. Taxonomy and biology of the Nearctic species of *Homoneura* (Diptera: Lauxaniidae). I. Subgenera *Mallochomyza* and *Tarsohomoneura*. Iowa State Journal of Research, 52: 147-176.

Miller, R. M. and Foote B. A. 1975. Biology and immature stages of eight species of Lauxaniidae (Diptera). I. Biological observations. Proceedings of the Entomological Society of Washington, 77: 308-328.

Miller, R. M. and Foote, B. A. 1976. Biology and immature stages of eight species of Lauxaniidae (Diptera). II. Descriptions of immature stages and discussion of larval feeding habits and morphology. Proceedings of the Entomological Society of Washington, 78: 16-37.

Semelbauer, M. and Kozanek, M. 2011a. Morphology of preimaginal stages of *Minettia longipennis* Fabricius (Diptera: Lauxaniidae). Zootaxa, 3012: 21-30.

Semelbauer, M. and Kozanek, M. 2011b. Morphology of preimaginal stages of *Lauxania* and *Calliopum* (Diptera: Lauxaniidae). Zootaxa, 3346: 1-28.

Shatalkin, A. I. 1996. New and little known species of flies of Lauxaniidae and Strongylophthalmyiidae (Diptera). Russian Entomological Journal, 4 (1-4): 145-157.

Shatalkin, A. I. 1998. New and little-known Lauxaniidae (Diptera) from Asia. Russian Entomological Journal, 7 (3-4): 209-218.

Shatalkin, A. I. 2000. Keys to the Palaearctic flies of the family Lauxaniidae (Diptera). Zoologicheskie Iissledovania, 5: 1-102.

Shewell, G. E. 1987. Manual of Nearctic Diptera, Vol. 2, Research Branch Agriculture Canada, Monograph, 28: 951-964.

Silva, V. C. and Mello, R. L. 2008. Occurrence of *Physoclypeus farinosus* Hendel (Diptera: Lauxaniidae) in Flowerheads of Asteraceae (Asterales). Neotropical Entomology, 37 (1): 92-96.

Shtakelberg, A. A. 1989. Family Lauxaniidae. In: Bei-Beinko, G. Y. (Ed.), Keys to the Insects of the European Part of the USSR, Vol. 5, pp. 318-330.

مطالعه مقدماتی مگس‌های لوکسانید (Diptera: Lauxaniidae) در منطقه هوراند استان آذربایجان‌شرقی همراه با گزارش جدید دو گونه برای فون حشرات ایران

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چکیده: بررسی‌هایی به‌منظور شناسایی گونه‌های خانواده Lauxaniidae طی سال‌های ۱۳۹۰- ۱۳۹۲ در منطقه هوراند جنگل‌های ارسباران استان آذربایجان‌شرقی انجام شد. در مجموع، تعداد شش گونه از سه جنس مورد شناسایی قرار گرفت که در میان آن‌ها، دو گونه *Minettia lupulina* (Fabricius, 1787) و *Calliopum caucasicum* (Shatalkin, 1995) برای اولین‌بار از ایران گزارش می‌شوند. همچنین خصوصیات بارز ریخت‌شناسی، پراکنش جغرافیایی و عکس‌هایی از گونه‌های مورد مطالعه آورده شده است.

واژگان کلیدی: Lauxaniidae، گزارش‌های جدید، هوراند، استان آذربایجان شرقی، ایران