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First records of the fungus gnats (Diptera: Mycetophilidae) reared from fruiting bodies of agaric fungi in Kermanshah province, Iran

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Abstract A survey was conducted to identify the fungus gnats (Diptera: Mycetophilidae) in Kermanshah province (west of Iran) during 2010-2011. The specimens were collected from nine different localities. Adults were reared from the fruiting bodies of agaric fungi. Five species are recorded for the first time from Iran: *Mycetophila strigatoides* (Lundrock), *Allodia ornaticollis* (Meigen), *Rymosia pseudocretensis* Burghele-Balacesco, *Synplasta gracilis* (Winnertz) and *Sciophila eryngii* Chandler. Eight host associations (gnats-fungi) are also reported for the first time. The diagnostic characters, host range and geographical distribution of each species are given.

Keywords: fauna, fungus gnats, Mycetophilidae, agarical fungi, Kermanshah

Introduction

Fruiting bodies of macrofungi and myxomycetes represent a suitable food source and habitat for the larvae of several insect groups, mainly flies (Diptera) and beetles (Coleoptera), but also tineid moths (Lepidoptera: Tineidae), springtails (Collembola), thrips (Thysanoptera) and even the hymenopteran parasitoids of all these insects. Most of the insects which live in or on fungi (excluding parasitoids) are mycophagous or mycosaprophagous with various degrees of host specificity, while some groups are predaceous or polyphagous, but still more or less associated with fungi (Sevik, 2006). The fungivorus Diptera were sporadically studied in Iran. In a study by Zamani (2001) four species including *Lycoriella auripila* (Winnertz) (Sciaridae), *Coboldia fuscipes* (Meigen) (Scatopsidae), *Megaselia halterata* (Wood) and *M. scalaris* (Loew) (Phoridae) were reared from *Agaricus* spp. also very little information is available on the mycetopholids, as the well known fungi associated gnats. A few species of the genus *Mycetophila* Meigen, 1803 have already been recorded from Iran (Lastovka and Matile, 1969), Portugal Ribeiro, 2003, 2004); Romania (Parvu, 2004) and palaearctic region (Hackman *et al*., 1988).

Mycetophilidae family includes a group of small flies, forming the main part of fungus gnats species. There are approximately 3000 described species in 150 genera, but the true number of species is undoubtedly much greater (Matile, 1999). The fungus gnats are a large and diverse group of Diptera which can be found in various habitats. The immature stages are very often found in the fruiting bodies of the fungi and also in decaying wood (Ribeiro, 2004). The adults are mainly found in wet places in forests and woodlands and can be easily recognized by their humpback body, long coxae and developed tibial spurs (Ribeiro, 2004). Sevcik (2006) provided

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comprehensive lists of diptera that are associated with fungi in Czech and Slovakia Republics where most species recorded belong to the family Mycetophilidae (84 species).

The current study is intended to improve our understanding about the fungus gnats, their fungal hosts and their distribution in Kermanshah province.

Materials and Methods

The fruiting bodies (basidiocarps) of different species of Agaric fungi were collected from April 2010 to August 2011 from different fields in the Kermanshah Province of Iran. A total of 699 samples of fungi infested by Diptera (mainly Mycetophilidae) were collected. Each sample was placed on a piece of damp filter paper in a polyethylene container or paper bag in the field and transferred to the laboratory. Each fungus species was placed on a piece of filter paper on moistened sand in a cylindrical polyethylene container (11 × 11 cm). Another cylindrical plastic container was used as a lid. The containers were kept in the laboratory under natural light conditions at 25 °C and misted regularly to prevent drying. For three months, each container was inspected every 3 or 4 days to check for the emergence of adult insects. The flies that emerged were preserved in 75% ethanol for identification at a later date. The number of individuals of each species and its related host fungus were recorded. Geographical coordinates and altitude of sampling localities are as follows: Biston: 34°23′00″N - 47°25′56″E, 1299m; Kerend-e-Gharb: 34°16′54″N - 46°14′38″E, 1575m; Sarab Qanbar: 34°17′12″N - 47°03′17″E, 1461m; Campus of Agriculture, Razi University: 34°19′27″N - 47°05′56″E, 1323m; Sahneh: 34°29′07″N - 47°41′39″E, 1401m; Paveh: 35°02′38″N - 46°21′00″E, 1471m; Taa village, Kamyaran: 34°45′51″N - 46°55′04″E, 1403m; Kobogar village, Kamyaran: 34°45′53″N - 46°55′04″E, 1404m and Mahidasht: 34°16′13″N-46°48′37″E, 1361m.

The mycetophilid species were identified by J. Sevcik (Department of Biology & Ecology, University of Ostrava, Czech Republic). The host fungi were identified by the third author. All mycetophilid specimens are deposited in the laboratory of Entomology of Razi university, Kermanshah.

Results

During the two years of survey, a total of 199 (out of 699 samples infested by various fungivorous insects) mycetophilid-infested agaric fungi belonging to five genera and nine species were collected and separated in the laboratory. Five genera and five species within the family Mycetophilidae, in total, were reared and identified. All the mycetophilids are new records for the fauna of Iran. The list of species together with a short description of diagnostic characters are presented as follow:

***Allodia ornaticollis* (Meigen, 1818)** (Fig. 1)
Materials examined: 60♀, 42 ♂, ex *Agrocybe dura* (Bolton), 20.iv.2010, Sahneh (34°29′07″N - 47°41′39″E); 1♀, 4♂, ex *Agrocybe bisporus* (Bull.), 30.iv.2010, Taa village, vicinity of Kamyaran (34°45′51″N - 46°55′04″E), Leg. S. Barzegar.
Diagnosis: Antennae filiform, as long as head and thorax; flagellar segments with tiny straight macrotrichia; clypeus ovate, higher than broad; prothorax rather narrow; the angle between the pronotum and scutum around the anterior spiracle rather wide; discal bristles of scutum in two (dorso-central) stripes, sometimes also a median stripe present, scutellum with two strong marginal bristles; two propleural bristles projecting downward; mesopleura rather high; mesanepisternum rounded hexagonal ovate, bare; a pair of very long bristles on the 9th tergite.
Distribution- Holarctic; widely distributed in Europe (Chandler, 2005), new record from Iran.

***Mycetophila strigatoides* (Lundrock, 1927)** (Fig. 2)
Materials examined: 53♀, 44♂, ex *Lentinus tigrinus* (Bull.), 01.v.2010, Biston (34°23′00″N-47°25′56″E); 9♀, 14 ♂, ex *Stropharia coronilla*

(Bull.) Quel., 11.iv.2010, Kerend-e-Gharb (34˚16′54″N - 46˚14′38″E); 18♀, 10♂, ex *L. tigrinus*, 19.v.2011, Sarab Qanbar (34˚17′12″N - 47˚03′17″E); 63♀, 43♂, ex *L. tigrinus,* 13.x.2010, Campus of Agriculture and Natural Resources(34˚19′27″N - 47˚05′56″E), Leg. S. Barzegar.

Diagnosis: Head brown; scape, pedicel and base of first flagellar segment yellow, rest of antennal segments grey; palpi brownish yellow; mesoscutum mainly shining dark brown, clothed with pale hair; anterior margin, broad humeral margins and small postalar patches yellow; prothorax brownish yellow; rest of pleura, metathorax and scutellum brown; three propleurals, four bristles on mesepimeron, two pairs of scutellars; wing length 3.2 mm; halteres yellow; legs entirely yellow except faint darkening at extreme tip of hind femur; anterior setulae of hind tibia dark; hind coxal setae short.

Distribution- Palaearctic, widely distributed in Europe (Chandler, 2009), new record from Iran.

***Rymosia pseudocretensis* Burghele-Balacesco, 1967** (Fig. 3)

Materials examined: 7♀, 6♂, *Pleurotus eryngii* (DC.) Quel., 22.iv.2010, Kobogar village, vicinity of Kamyaran (34˚45′53″N-46˚55′04″E); 17♀, 21♂, ex *Stropharia magnivelaris* (Peck), 17.iv.2010, Mahidasht (34˚16′13″N - 46˚48′37″E); Leg. S. Barzegar.

Diagnosis: Head brown, grey dusted, with black bristling, a row of longer setae above lateral ocellus and eye margin; face and clypeus grey with short dark hair; antenna with scape, pedicel and base of first flagellomere yellow, flagellum otherwise brown, with short grey hairs; flagellomeres about 3 times as long as broad; palpi yellow; thorax brown, thinly grey dusted, with all bristling dark; short weak setae on disc of scutellum; prothorax yellow, with 3 strong setae on pronotal lobe and one strong proepisternal seta; wing yellowish; legs yellow, with all bristling dark.

Distribution – Western Palaearctic. This is a mainly Mediterranean species, recorded from Southern Europe (France), North Africa and the Middle East, but also from central Asian countries (Zaitzev, 1993; Chandler, 2005), new record from Iran.

***Sciophila eryngii* Chandler, 1994** (Fig. 4)

Materials examined: 5♀, 3♂, ex *Agrocybe vervacti,* 14.iv.2011, Sarab-e-Qanbar (34˚17′12″N - 47˚03′17″E); Leg. S. Barzegar.

Diagnosis: Body length 3.5 mm resp. 2.8 mm, the antennae are mainly dark brown; head dark brown, grey dusted; antenna with scape, pedicel and base of first flagellomere yellow, rest of flagellar segments brown, with median flagellomeres about 3 times as long as broad; pulpus yellow; thorax orange yellow, with three vaguely darker stripes on mesonotum; wing length 3.6 mm; legs yellow, with all setae on coxae and femora, tibial setulae and spurs yellow.

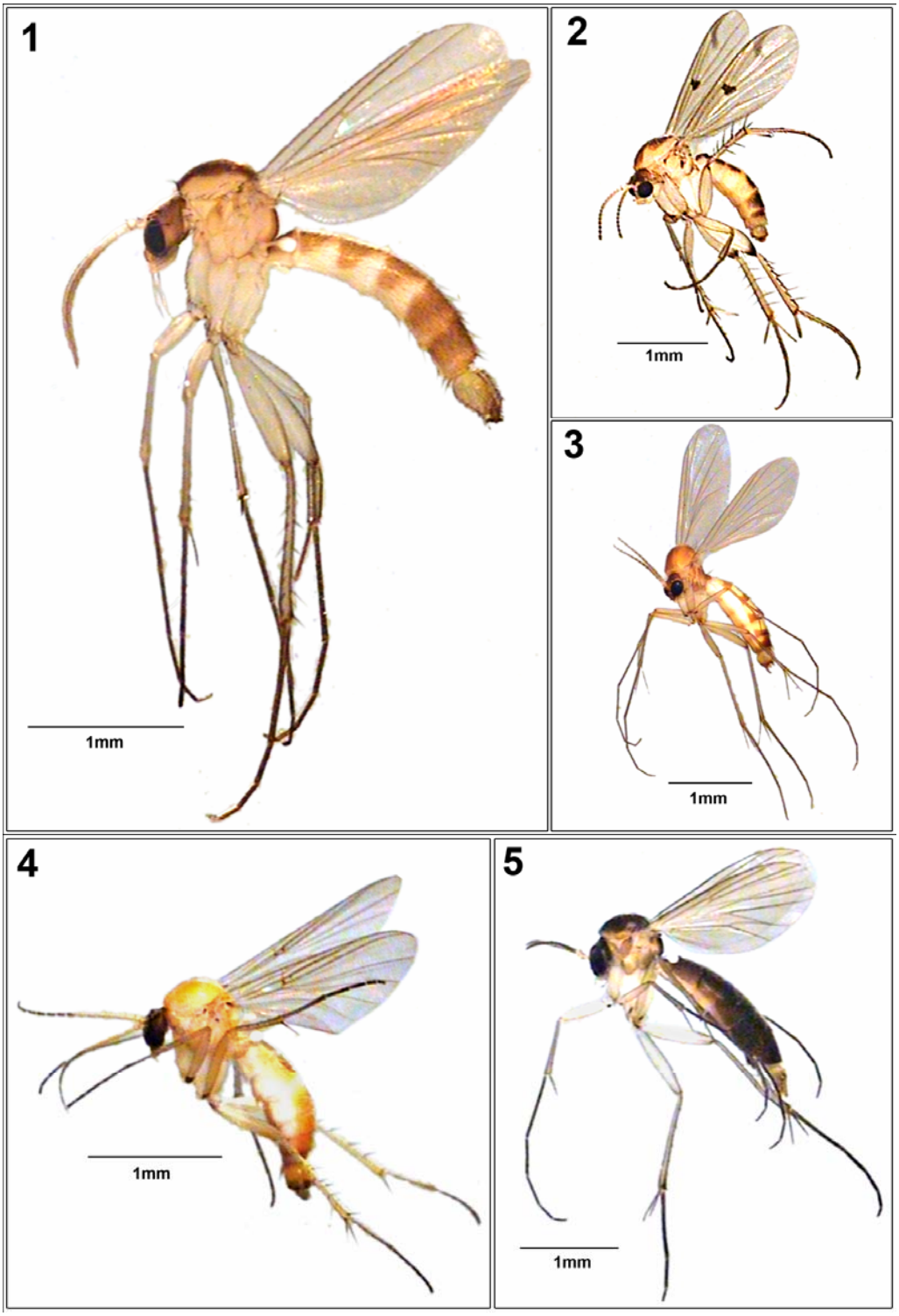
Distribution Palaearctic. Russia and adjacent countries (Sevcik, 2004), Mediterranean (Cyprus, Crete) (Chandler *et al*., 2005), new record from Iran.

***Synplasta gracilis* (Winnertz, 1863)** (Fig. 5)

Materials examined: 3♀, 5♂, ex *Coprinus* sp., 30.iv.2010, Paveh (35˚02′38″N-46˚21′00″E); Leg. S. Barzegar.

Diagnosis: A small dark species with yellow legs; head dark brown with yellow mouth parts; antennae with scape, pedicel and base of first flagellar segment yellow, rest of flagellar segments brown; scutellum dark brown.

Distribution: Western Palaearctic (Chandler, 2009), new record from Iran.



Figures 1-5 Lateral habitus of the adult fungus gnats: 1-*Allodia ornaticollis* (Meigen, 1818); 2-*Mycetophila strigatoides* (Lundrock, 1927); 3-*Rymosia pseudocretensis* Burghele-Balacesco, 1967; 4-*Sciophila eryngii* Chandler, 1994; 5-*Synplasta gracilis* (Winnertz, 1863).

Discussion

This study is contribution to the Iranian Mycetophilidae (Diptera) fauna and their associated host fungi in Kermanshah province. Five species were found in Iran for the first time, which shows the limited knowledge of species composition of fungus gnats in this region. A more comprehensive study of the fungus gnats in the area should result in significant additions to the Iranian list of species, as well as to their distribution. The currently recorded species are widespread and common in Europe. However, less information was presented for fungivorous insects on exotic fungi. This is the first study in Iran.

Various genera of agaric fungi have been recorded as hosts for *A. ornaticollis* (Sevcik, 2006), indicating its extensive host range. Larvae of *R. pseudocretensis* develop in fruit body of fungi of the family Helvellaceae (Zaitzev, 1993). We found larvae of *L. pseudocretensis* in fruiting bodies of two families of Pleurotaceae and Strophariaceae. This species is principally associated with *Polyporus* sp., but there are some other rearing records from unnamed species of *Trametes*, *Polyporus* and *Russula*, which their confirmation is required, especially in the case of *Russula* (Sevcik, 2006).

Mycetophila strigatoides resembles *M. bialorussica* Dziedzicki in many aspects including the fore tarsi thickened in both sexes; apart from genital characters (notably the bifid distal portion of the dististyle), males of *M. strigatoides* have the tarsi less strongly enlarged and the wing markings smaller; the preapical band is less intense and is not always touching the tip of vein R1 (Chandler, 1977). Sevcik (2006) has introduced *Polyporus ciliatus* Fr., *Polyporus melanopus* (Sw.) Fr. and *L. tigrinus* as host fungi for *M. strigatoides*.

Eleven species of the genus *Mycetophila* have already been recorded from Iran. They include *M. trinotata* Staeger, *M. stolida* Walker, *M. pumila* Winnertz and *M. formosa* Lundström (Ribeiro, 2003), *M. dentate* (Lundström), *M. exstincta* Loew and *M. sordid* van der Wulp (Ribeiro, 2004), *M. bialorussica* Dziedzicki (Košel and Laštovka, 1997), *M. alea* Laffoon (Parvu, 2004); *M. curviseta* Lundström (Hackman *et al*., 1988) and *M. formosa* (Lastovka and Matile, 1969). Sevcik (2001) recorded *Fomitopsis pinicola* (Sowerby) as a host fungus for *M. auonsa* Laffoon and *P. ciliates* as a host fungus for *M. strigatoides*.

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References

Chandler, P. J. 1977. Studies of some fungus gnats (Diptera, Mycetophilidae) including nine additions to the British list. Systematic Entomology, 2: 67-93.

Chandler, P. J. 2005. Fauna Europaea: Mycetophilidae. In: Dejong, H. (Ed.): Fauna Europaea: Diptera, Nematocera. Fauna Europaea version 1., 2., Available on: http://www.faunaeur.org.

Chandler, P. J. 2009. The fungus gnats (Diptera: Bolitophilidae, Keroplatidae, Mycetophilidae) of Sardinia, with description of six new species. Zootaxa, 2318: 450-506.

Chandler, P. J., Bechev, D. N. and Caspers, N. 2005. The Fungus Ditomyiidae Gnats (Diptera: Bolitophilidae, Diadocidiidae, Keroplatidae and Mycetophilidae) of Greece, its islands and Cyprus. Studia Dipterologica, 12: 255-314.

Hackman, W., Lastovka, P., Matile, L and Väisänen, R. 1988. Family Mycetophilidae. In: Soós, A and Papp, L. (Eds.). Catalogue of Palaearctic Diptera. Ceratopogonidae–Mycetophilidae, 3: 220-327.

Košel, V. and Laštovka, P. 1997. Faunistic records from the Czech and Slovak republics: Diptera. Mycetophilidae. In Rozkošný R. & Vaňhara J. (Eds.): Dipterologica bohemoslovaca. Vol. 8-Folia

Facultatis Scientiarum Naturalium Universitatis Masarykianae Brunensis. Biologia, 95: 214-215.

Lastovka, P. and Matile, L. 1969. Contribution a la faune de l. Iran. 16. Diptères Mycetophilidae des provinces Caspiennes. 2. Genere *Mycetophila.* Annales de la Societe Entomologique de France, 5: 681-686.

Matile, L. 1999. Family Mycetophylidae. Australasian/Oceanian Diptera Catalog-Web Version. Available on: http://hbs.bishopmuseum.org/aocat/myceto.html.

Parvu, C. 2004. Fungus gnats (Diptera: Mycetophilidae) from Piatra Craiuli national Park, Romania. Travauxa du Museum National d' Histoire Naturelle (Grigore Antipa), pp: 233-239.

Ribeiro, E. 2003. Twenty five new records on Portuguese fungus gnats (Diptera: Scatopsidae), Arrquivos Museu Bocage, pp: 529-550.

Ribeiro, E. N. 2004. New data on some fungus gnats (Diptera, Sciaroidea) in Portugal. Arquivos do Museu Bocage, 23: 573-590.

Sevcik, J. 2001. New records of Diadocidiidae, Keroplatidae and Mycetophilidae (Diptera: Sciaroidea) from the Czech Republics. Casopis Slezskeho Zemskeho Muzea Opava, 50: 159- 169.

Sevcik, J. 2004. New data on Sciaroidea (Diptera) from the Czech and Slovak Republics, with descriptions of seven new species of Mycetophilidae. Casopis Slezskeho Zemskeho Muzea Opava, 53: 49-74.

Sevcik, J. 2006. Diptera associated with fungi in Czech and Slovak Republics. Casopis Slezskeho Zemskeho Muzea Opava, 55: 1-84.

Zaitzev, A. I. 1993. New and little known fungus gnats of the genus *Rymosia* Winn. from Russia and Middle Asia (Diptera, Mycetophilidae), GEIR E. E. SQLI. Greece.

Zamani, A. A. 2001. Identification of injurious dipterean pest of button mushroom (*Agaricus bisporus*) and study on some of their biological characteristics in Karaj, Iran. MSc. Thesis, Tarbiat Modares University, Tehran. 152 pp.

گزارش پنج گونه جدید از دوبالان قارچ‌خوار (Diptera: Mycetophilidae) روی قارچ‌های کلاهک‌دار از استان کرمانشاه

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چکیده: این تحقیق به‌منظور شناسایی دوبالان قارچ‌خوار (Diptera: Mycetophilidae) در استان کرمانشاه (غرب ایران) در سال‌های ۱۳۸۹ و ۱۳۹۰ انجام شد. نمونه‌برداری از ۹ منطقه‌ی مختلف صورت گرفت. حشرات کامل از کلاهک قارچ‌های آگاریک به دست آمدند. پنج گونه برای اولین بار از ایران جمع‌آوری و شناسایی گردید که عبارتند از: *Mycetophila strigatoides* (Lundrock) ، *Allodia ornaticollis* (Meigen)، *Rymosia pseudocretensis* (Burghele-Balacesco)، *Synplasta gracilis* (Winnertz) و *Sciophila eryngii* (Chandler). همچنین هشت گونه‌ی قارچ به‌عنوان میزبان جدید برای این دوبالان گزارش می‌شود. خصوصیات افتراقی گونه‌ها به‌همراه دامنه میزبانی و انتشار جغرافیایی هر گونه ارایه شده است.

کلید واژگان: فون، پشه‌های قارچ‌خوار، Mycetophilidae، قارچ کلاهک‌دار، کرمانشاه