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New Records of Bloodsucking Flies Associated with Wild Birds of Haftad-Gholleh Protected Area, Iran (Diptera: Hippoboscidae, Calliphoridae)

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Abstract

We have studied the parasitic flies of wildlife of Haftad-Gholleh Protected Area, Iran, for the first time and report here the three hematophagous fly species of birds: the louse fly *Ornithophila metallica* (Schiner) (Hippoboscidae), and bird nest flies *Trypocalliphora braueri* (Hendel) and *Protocalliphora azurea* (Fallen) (Calliphoridae). The genera and species *O. metallica* and *T. braueri* are new to Iran.

Keywords: Avian myiasis; Louse flies; *Ornithophila metallica*; *Trypocalliphora braueri*; Protocalliphora azurea; Blow flies

Introduction

Avian myiasis-causing flies and bird's blood-feeding ectoparasite flies mainly belong in the family's Calliphoridae and Hippoboscidae. The family Hippoboscidae, commonly known as louse flies, consists of 213 hematophagous species of birds and mammals worldwide [1]. This family is known in Iran only by the single species *Pseudolynchia canariensis* (Macquart), pigeon fly that has been repeatedly recorded from various cities across the country [2-5]. Aside from being a nuisance to their hosts, hippoboscids are capable transmitters of pathogenic and parasitic agents, including avian trypanosomes and mammals' bacteria, causing serious diseases in wild birds [6] and ruminant animals [7,8]. They are also the only known vectors of apicomplexan parasites of the genus *Haemoproteus* to birds and transmitters of filarial nematodes to domestic and wild mammals [9,10].

The majority of myiasis-inducing species belong to the family Calliphoridae, esp. subfamily Chrysomyinae, whose members are known as important facultative and obligatory parasites. Bird myiasis records are not as frequent as mammals' most likely due to the inaccessibility of the hosts. With respect to Iran, the reports of avian myiases have been poorly documented [11,12], mainly because of difficulties in larval identification. Although the said technical problem often necessitates the rearing of the maggots for a reliable identification at adult stage, in a recent case of avian wound myiasis in southwestern Iran the myiatic agent was successfully identified at larval stage [13]. The genera *Protocalliphora* Hough and *Trypocalliphora* Peus contain specialist bird nest parasites whose larvae feed on the blood of nestling birds through tunneling under their skin, causing a type of myiasis called subcutaneous myiasis, and eventually leading to heavy damages to the tissues or death of young birds [14]. The species *P. azurea* (Fallen) is widely spread in the Palaearctic region and remains the only species of birds' subcutaneous myiasis agents that has been recorded from Iran so far [15].

Material and Methods

Haftad-Gholleh Protected Area covers an estimated area of 97,400 hectares (240,680 acres) and is home to a large number of vulnerable mammal and bird species (Figure 1). Using Malaise traps, the specimens were collected in 75% ethyl alcohol and preserved at the Hayk Mirzayans Insect Museum (HMIM), Tehran, Iran. In case of the examination of male genitalia, we detached the whole abdomen to clear it in hot 10% KOH and then washed it lightly in glacial acetic acid

Figure 1: A general view of Chekab valley, Haftad-Gholleh protected area, Iran.

to remove the base. After dissecting the male genitalia, the abdomen was glued back to its original place and the genitalia transferred to a microvial and pinned below the associate specimen.

Specimen data: 1♂ 1♀ *Ornithophila metallica*; 2♂♂ 3♀♀ *Protocalliphora azurea*; 1♀ *Trypocalliphora braueri*; Iran: Markazi province, Amr-abad village, Haftad-Gholleh Protected Area, Chekab valley, 2219 m, 34°07′05.3"N 050°16′25.3"E, 28 May-15 June, 2016, Malaise trap near pool, E. Gilasian & M. Parchami-Araghi.

Birds of haftad-gholleh protected area

Hafted-Gholleh is home to an estimated 71 species within 26

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families of wild birds and serves as a sanctuary for a number of migrating birds as well. We have listed the following common avian taxa of this area to underline the impact of hematophagous flies on the bird fauna: *Monticola solitarius* (L.) (blue rock thrush), *Accipiter* spp. (hawks), *Falco* spp. (falcons and kestrels), *Coturnix* spp. (quails), *Columba* spp. (pigeons), *Cuculus* spp. (cuckoos), *Coracias* spp. (rollers), *Merops* spp. (bee-eaters), *Upupa* spp. (hoopoes), *Galerida* spp. (larks), *Hirundo* spp. (passerines), *Muscicapa striata* (Pallas) (spotted flycatcher), *Emberiza melanocephala* Scopoli (black-headed bunting), *E. cia* (L.) (rock bunting), *E. citrinella* L. (yellowhammer), *Turdus* spp. (true thrushes), *Motacilla* spp. (wagtails), *Lanius* spp. (typical shrikes), *Parus* spp. (tits), *Passer* spp. (sparrows.), *Sturnus* spp. (starlings), *Corvus* spp. (crows), *Pica pica* (L.) (Eurasian magpie), *Ammoperdix* spp. (partridges), *Gypaetus* spp. (vultures), *Aquila* spp. (eagles), *Athene noctua* (Scopoli) (little owl), swifts (Apodidae) and woodpeckers (Picidae) [16].

Results and Discussion

We, for the first time, collected three species of bloodsucking flies from Haftad-Gholleh Protected Area where strictly feed on wild birds. The recorded fly species are as follows: *Ornithophila metallica* (Schiner), *Protocalliphora azurea* (Fallen) and *Trypocalliphora braueri* (Hendel). Both *O. metallica* and *T. braueri* are new genus and species records for the Iranian fauna.

Ornithophila metallica (Schiner)

Both sexes of the hippoboscid *O. metallica* are hematophagous ectoparasites and ingest blood from a wide variety of birds (Figures 2 and 3). Maa [17] listed the host birds for the two Palaearctic members of *Ornithophila* Rondani, *O. metallica* and *O. gestroi* Rondani, and categorized the former as a species with "having high population density and very wide host and distributional ranges" and found the latter to be a species with "low population density and much more restricted host/or distributional ranges." *O. metallica* is widely distributed in the Old World including Iran's neighboring countries of Pakistan, Afghanistan and Turkey (Figures 4-10) [17].

These species are commonly known as bird blow flies or bird nest flies. *Trypocalliphora* is a monotypic genus, with a single Holarctic species *T. braueri* which differs from its closest related genus *Protocalliphora* in having additional notopleural setae. Although some Dipterists consider *Trypocalliphora* a subgenus within *Protocalliphora* [18], other calliphorid taxonomists argued that *Trypocalliphora* is to be considered as a valid genus [19-21]. These species display different types of parasitic strategies as the larvae of *P. azurea* feed on the blood of young birds of the order Coraciiformes and remain on the surface of the birds, but the hematophagous larvae of *T. braueri* infest nestlings of the order Falconiformes and burrow beneath the skin of their hosts, causing a form of parasitism called subcutaneous myiasis [18].

Figure 2: *Ornithophila metallica* (Schiner): Dorsal view.

Figure 3: *Ornithophila metallica* (Schiner): Lateral view.

Figure 4: *Protocalliphora azurea* (Fallen): Dorsal view.

Figure 5: *Protocalliphora azurea* (Fallen): Lateral view.

Figure 6: *Protocalliphora azurea* (Fallen): Male genitalia, lateral view.

Figure 7: *Protocalliphora azurea* (Fallen): Male genitalia, posterior view.

Figure 8: *Protocalliphora azurea* (Fallen): Male sternite.

Figure 9: *Trypocalliphora braueri* (Hendel): Dorsal view.

Figure 10: *Trypocalliphora braueri* (Hendel): Lateral view.

Conclusion

Haftad-Gholleh Protected Area, like most of Iranian natural habitats, has been experiencing destructive interventions from illegal human activities, including poaching, that aggravating the vulnerability of its wildlife to epidemics and parasites as an ovine rinderpest epidemic heavily emaciated the population of wild goats of this area in 2015. In terms of birds, the sprawling build-up areas, power lines and transmission towers pose significant threats to migrating birds of the area and nearby parks. In a framework of a faunistic project, we are working to document the insect diversity of Haftad-Gholleh Protected Area to underscore the need for improving the conservation measures and policies towards a standard protection of the area and its fauna and flora.

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