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Records of Hippoboscidae from Mongolian Birds of Prey with Checklist, Update

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Records of Hippoboscidae from Mongolian birds of prey with checklist-update[1]

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Abstract

The hippoboscid species *Ornithophila gestroi* has been rediscovered from Mongolia. It is the easternmost of all the known occurrences. Specimens were collected from Amur Falcon *Falco amurensis*, Saker Falcon *Falco cherrug*, Lesser Kestrel *Falco naumanni*, Eurasian Hobby, *Falco subbuteo*, Common Kestrel *Falco tinnunculus* Linnaeus, 1758 and Black Kite *Milvus migrans* in a breeding area located in southern Mongolia. Amur Falcon, Eurasian Hobby and Black Kite were identified as hosts of *O. gestroi* for the first time.

Key words: Diptera, Hippoboscidae, *Ornithophila gestroi*, *Falco amurensis*, *Falco cherrug*, *Falco naumanni*, *Falco subbuteo*, *Falco tinnunculus*, Mongolia

1. Introduction

Louse flies belong to the order of Diptera. They are obligate blood-feeding ectoparasites of mammals and birds. Some of them have a very broad host range; others are specialized in only one or a few host species. The easiest way to collect them is the examination of their hosts. More recently, several publications have been published about Mongolian ectoparasites of warm-blooded animals (KIEFER et al. 2012, MUNKHZUL et al. 2018, SCHEFFLER et al. 2016). However, these referred to other species groups. Especially the fauna of Hippoboscidae of Mongolia have not been studied well. MAA (1963, 1967, 1969) and THEODOR & OLDROYD (1964) mentioned records of louse flies from this country without locating them more closely, while MINÁŘ & HŮRKA (1980) and KRIŠTOFÍK & KIEFER (1983) published data from several German-Czech expeditions (1973-1980) to Mongolia with references to the localities. NARTSHUK & MATYUKHIN (2019) added two records from the beginning of the 20th century. Until then, the Mongolian louse fly fauna included only ten species and no further investigations have been published. Target of the work on hand is to evaluate recent studies, to give a current survey of the louse fly fauna of Mongolia and to complement notes about the hosts.

2. Material and methods

The Hippoboscids were collected in the southern provinces Ömnögov and Dornogov in the years 2004 and 2005 during banding of raptors and were stored in tubes with 70 % alcohol. Scientific names follow the checklist of the world Hippoboscidae (DICK 2018). The determination was made according to MAA (1969) and THEODOR & OLDROYD (1964). Special sampling sites are presented in table 1. All places were located at a height between 914 and 1272 meters above sea level. A total of 25 males and 25 females of *Ornithophila gestroi* (alcohol material) were measured with the digital microscope VHX-5000 (Keyence) to evaluate the different biometric characteristics by using boxplot diagrams afterwards.

These characteristics are: body length, prescutum length, postscutum length, scutellum length, scutellum basis width, head width, antennae length, minimal distance between ocular margins, wing length, hind femur length, hind tibia length, hind tarsus length, hind claw 1 (large) length, hind claw 2 (small) length.

[1] Ergebnisse der Mongolisch-Deutschen Biologischen Expeditionen seit 1962, Nr. 360.

Table 1: List of sampling sites, date of sampling and host species with louse flies
(F. a. = *Falco amurensis*; F. c. = *Falco cherrug*; F. n. = *Falco naumanni*; F. s. = *Falco subbuteo*; F. t. = *Falco tinnunculus*; M. m. = *Milvus migrans*; * 6 specimens; ** 11 specimens)

Site	Coordinates	Date of sampling	Host
Bajan-gol, 70 km S from Somon Manlaj	43°54'22,6" N, 107°43'41,4" E	21.07.04	*F. n.*
Bajan-gol, 70 km S from Somon Manlaj	43°54'22,6" N, 107°43'41,4" E	21.07.04	*F. n.*
Bordzongijgn-gobi	42°07' N, 105°11' E	07.07.05	*F. n.*
Bordzongijgn-gobi	42°07' N, 105°11' E	07.07.05	*F. t.*
Bordzongijgn-gobi	42°15'24,8" N, 105°11'51,3" E	28.06.09	*F. c.*
Bordzongijgn-gobi	42°13'14,0" N, 105°05'53,1" E	28.06.09	*F. n.*
Bordzongijn-gobi	42°13'21.7" N, 105°08'37,0"	07.07.05	*F. t.*
Bordzongijn-gobi	42°13'24.4" N, 105°09'56,8"	07.07.05	*F. t.*
Bordzongijn-gobi	42°13'40,2" N, 105°05'55,1"	07.07.05	*F. t.*
Bordzongijn-gobi	42°36'08,3" N, 105°15'39,5"	10.07.05	*F. t.*
Galbyn-gobi	42°37'48,2" N, 105°53'21,0"	09.07.04	*F. n.*
Galbyn-gobi	42°37'57,1" N, 105°52'06,1"	09.07.04	*F. n.*
Galbyn-gobi	42°34'11,3" N, 105°57'36,4"	10.07.04	*F. n.*
Galbyn-gobi	42°34'50,6" N, 106°21'14,4"	10.07.04	*F. n.*
Galbyn-gobi	42°35'41,6" N, 106°46'52,6"	11.07.04	*F. t.*
Galbyn-gobi	42°33'35,2" N, 106°47'37,0"	12.07.04	*F. t.*
Galbyn-gobi	42°59'15,9" N, 107°59'48,6"	16.07.04	*F. t.*
Galbyn-gobi	42°59'36,3" N, 107°59'56,3"	16.07.04	*F. t.*
Galbyn-gobi	42°35'08,9" N, 105°47'46,9"	12.07.05	*F. n.*
Galbyn-gobi	42°37'48,1" N, 105°52'21,3"	12.07.05	*F. t.*
Galbyn-gobi	42°38'46,1" N, 105°49'46,5"	12.07.05	*F. n.*
Galbyn-gobi	42°40'10,5" N, 106°57'38,6"	16.07.05	*F. t.*
Galbyn-gobi	43°11'16,4" N, 107°17'09,0"	17.07.05	*F. s.*
Galbyn-gobi	43°08'12,8" N, 107°19'59,0"	18.07.05	*F. n.*
Galbyn-gobi	43°98'46,7" N, 107°22'30,3"	18.07.05	*F. n.*
Galbyn-gobi	42°42'33,1" N, 107°47'53,1"	20.07.05	*F. t.*
Galbyn-gobi	42°42'47,4" N, 108°06'00,1"	21.07.05	*F. t.*
Galbyn-gobi	42°37'48,7" N, 108°56'58,6"	04.07.09	*F. t.*
Galbyn-gobi/Undagijn-gol	42°37'48,4" N, 105°56'58,8"	15.07.05	*F. t.*
Öšijn-gobi	43°05'56,5" N, 107°29'39,2"	14.07.04	*F. a.*
Öšijn-gobi	43°08'50,9" N, 107°22'50,4"	14.07.04	*F. n.*
Öšijn-gobi	42°56'39,8" N, 108°21'14,3"	17.07.04	*F. a.*
Öšijn-gobi	43°11'31,4" N, 108°55'11,6"	23.07.05	*F. n.*
Ikh Nart Nature Reserve	45°41'49,6“ N, 108°40'42,7“	12.07.09	*F. n.*
Somon Chanbogd, 12 km ESE	43°08'51,5" N, 107°22'56,8"	14.07.04	*F. n.*
Somon Cogt-Ovoo, 12 km SE	44°19'31,3" N, 105°25'58,8"	02.07.04	*M. m.*
Šutegijn Bajan-gol (Somon Manlaj)	43°54'25,9" N, 108°43'28,9"	25.07.05	*F. n.*
Šutegijn Bajan-gol (Somon Manlaj)	43°53'58,8" N, 107°40'00,4"	25.07.05	*F. n.*
Sajr Doolony chooloi, 2 km E Somon Cogt-Ovoo	44°24'27,1" N, 105°21'21,5" E	29.06.04	*F. n.**
Sajr Doolony chooloi, 2 km E Somon Cogt-Ovoo	44°24'27,1" N, 105°21'21,5" E	01.07.04	*F. n.***
Šutegijn Bajan-gol (Somon Manlaj)	43°54'23,0" N, 107°43'29,7" E	21.07.04	*F. n.*

3. Results

3.1. Faunistic records

A total of 147 Louse flies (80 ♂♂, 76 ♀♀) was collected from altogether 55 birds of the following bird of prey species: Amur Falcon *Falco amurensis* Radde, 1883; Saker Falcon *Falco cherrug* Gray, 1834; Lesser Kestrel *Falco naumanni* Fleischer, 1818; Eurasian Hobby *Falco subbuteo* Linnaeus, 1758; Common Kestrel *Falco tinnunculus* Linnaeus, 1758; and Black Kite *Milvus migrans* (Boddaert, 1783); for number of birds per species see table 2. All birds were infested with the species *Ornithophila gestroi* (Róndani, 1878). This is a rediscovery of this parasite after 76 years for Mongolia (see NARTSHUK & MATYUKHIN 2019). Amur Falcon, Eurasian Hobby and Black Kite were identified as hosts of *O. gestroi* for the first time. The largest number of these parasites showed a Lesser Kestrel with 14 specimens. The distribution among the different hosts is shown in table 2.

Table 2: Overview of the infestation of bird of prey species with *Ornithophila gestroi* (*O. g.*) from Mongolia (brackets = number of birds with louse flies)

host	*O. g.* ♂♂	*O. g.* ♀♀	*O. g.* total	maximum number of louse flies/bird	references
Falco amurensis (2)	3		3	2	First record!
Falco naumanni (32)	53	51	103	14	BEAR & FREIDBERG (1995), MUÑOZ et al. (1993), NARTSHUK & MATYUKHIN (2019)
Falco subbuteo (1)	1		1	1	First record!
Falco tinnunculus (15)	23	15	38	8	BEAUCOURNU et al. (1985), DOSZHANOV & GVOZDEV (2003), MAA (1969), MUÑOZ et al. (1993), NARTSHUK & MATYUKHIN (2019)
Milvus migrans (1)		1	1	1	First record!

3.2. Biometric data of Ornithophila gestroi

Measures taken in the 50 flies are exposed in fig. 1-3. The different biometric structures show differences between male and female but with clearly overlapping values. In most cases, the body length of the males is smaller, but single body parts (head width, minimal distance between ocular margins, scutellum basis, and length of the both hind claws) can well be larger than those of females may. Also noteworthy are individual strongly deviating measurement results. In one female, the length of the tarsus was twice as long as the average.

3.3. Phoresy

The louse flies collected from the Saker Falcon were used by mites as phorents.

4. Checklist and Discussion

So far, seven publications with indications to louse flies in Mongolia are available. These affect ten species only. The overview shows table 3. More localities that are precise are available for five species. Whether *Crataerina obtusipennis* belongs to the louse fly fauna of Mongolia is notwithstanding the various references doubtful. MAA (1963) described these doubts about the labeling of the only preparation in detail: “The locality Mongolia might be incorrect and it seems

advisable to restrict Penang as the only type locality of *obtusipennis*. In the British Museum of Naturel History (London), there is one female of *Ornithoctona plicata* also labeled as from Mongolia #75.38, purchased from Whitely. Basically, *plicata* is a Palaeotropic species and its occurrence in Mongolia is quite improbable." MAA (1969) and THEODER & OLDROYD (1964) ignored that in their later publication without giving reasons. If there is no proven evidence, the species should not be assigned to the Mongolian fauna. One more question, whether *Ornithomya chloropus extensa* is a separate species or only a subspecies of *Ornithophila metallica*, is not yet completely clear (KRIŠTOFÍK & KIEFER 1983, THEODOR & OLDROYD 1964).

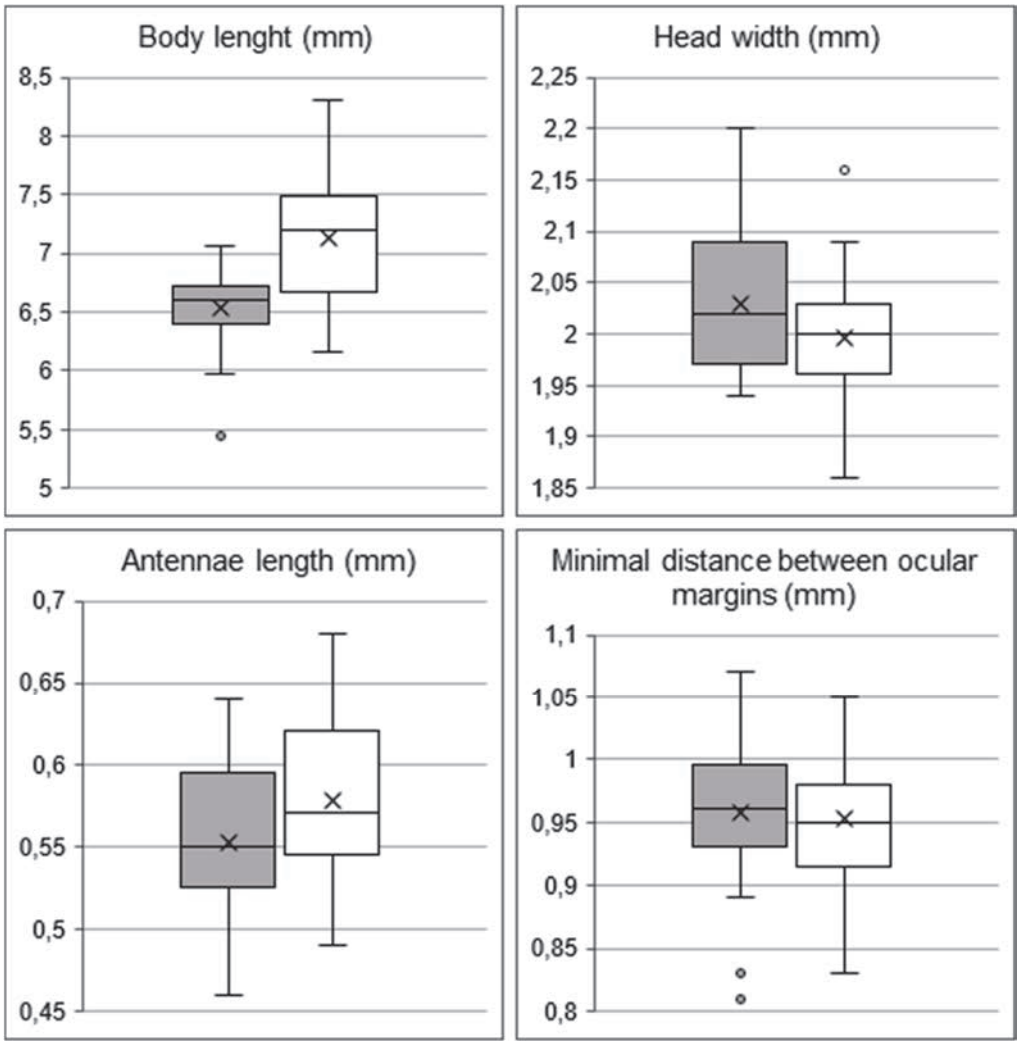

Fig. 1: Measurements of *Ornithophila gestroi* (grey – males, white: femals, x – average): body length, head width, antennae length and minimal distance between ocular margins.

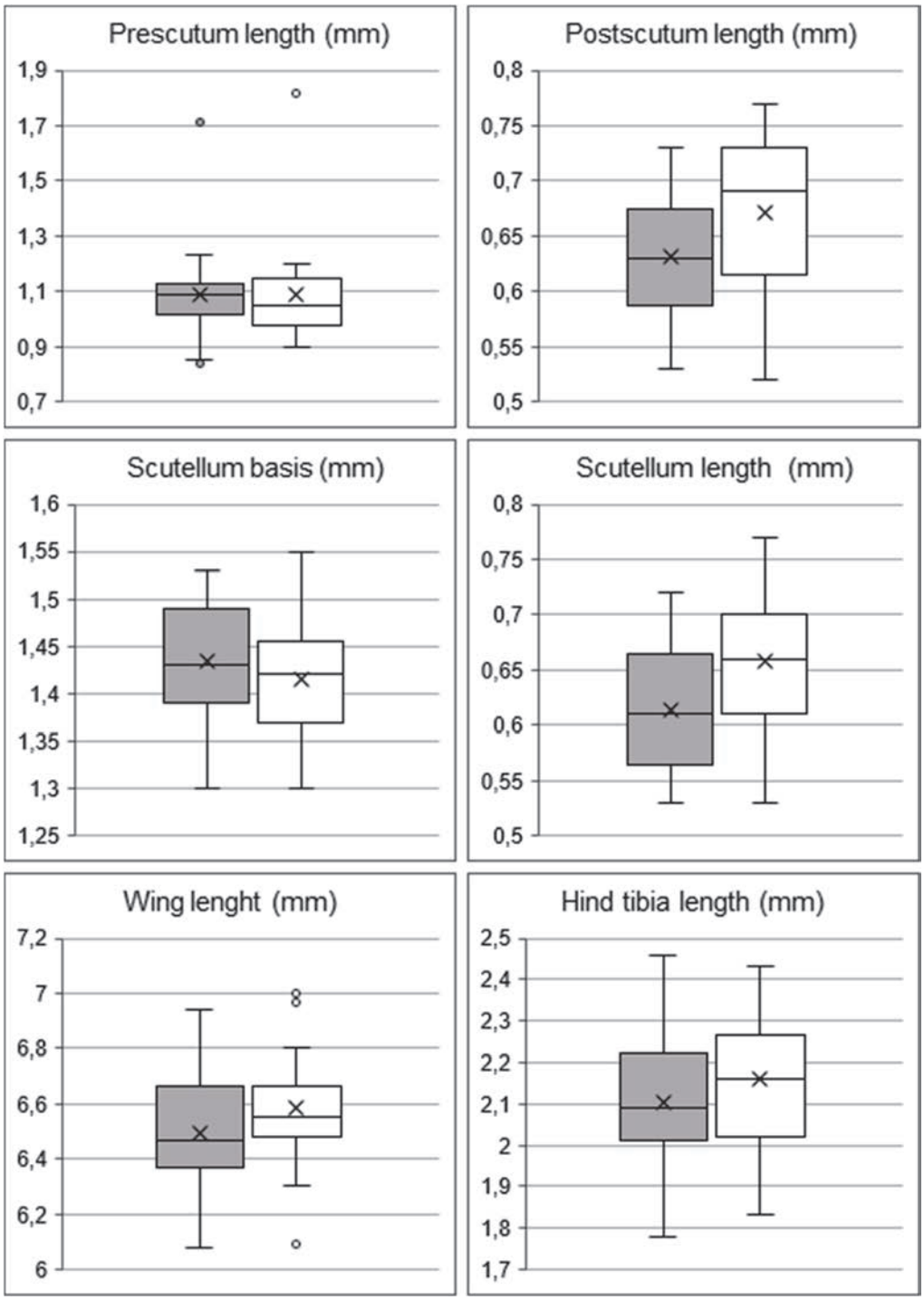

Fig. 2: Measurements of *Ornithophila gestroi* (grey – males, white: females, x – average): pre- and postscutum length, scutellum basis and length, wing and tibia length.

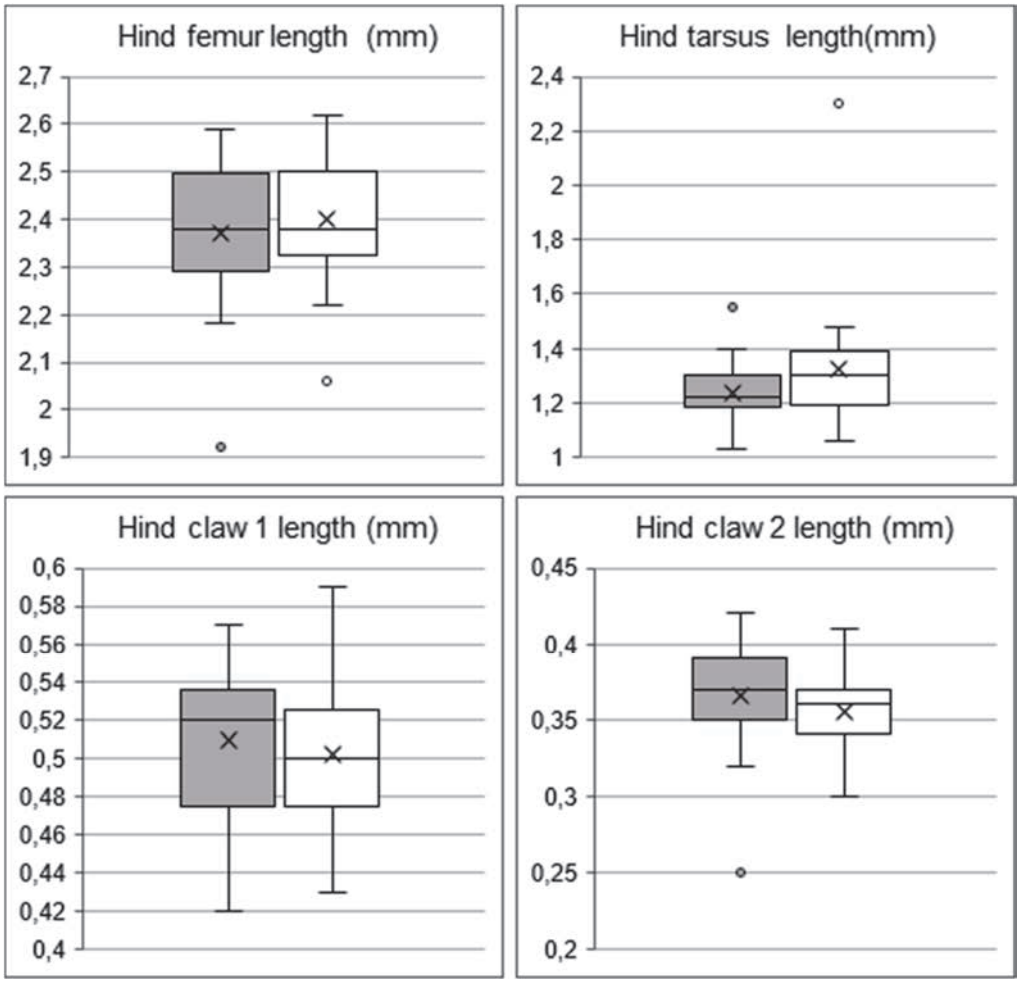

Fig. 3: Measurements of *Ornithophila gestroi* (grey – males, white: females, x – average): hind femur length, hind tarsus length, and length of hind claws 1 and 2.

Based on the collection of the Zoological Institute of the Russian Academy of Science in St. Petersburg, NARTSHUK & MATYUKHIN (2019) published historical data of *Ornithophila gestroi* from Mongolia. Beyond the Mediterranean region, the Near East (Israel), Crimea and parts of Central Asia (Kazakhstan, Turkmenia) (BEAR & FREIDBERG 1995, DOSZHANOV & GVOZDEV 2003, FREDERIK & PETERSEN 2013, GRUNIN 1988), expanded the knowledge of the distribution area of this species to the East. The study presents now current records of *Ornithophila gestroi* from Mongolia.

So far, comparatively little was known about the hosts of this louse fly. MAA (1963) suggested an oligoxenious parasitism on Falconidae, but did not name any specific host species. To date, according to this assumption the fly has been found on Amur Falcon (this investigation), Common Kestrel (BEAUCOURNU et al. 1985, DOSZHANOV & GVOZDEV 2003, MAA 1969, MUÑOZ et al. 1993, this investigation), Eleonora's falcon (*Falco eleonorae*) (BEAUCOURNU et al. 1985, GUTIÉRREZ-LÓPEZ et al. 2015, MAA 1969, WINK et al. 1979), Eurasian Hobby (this investiga-

tion), Lesser Kestrel (BEAR & FREIDBERG 1995, MUÑOZ et al. 1993, NARTSHUK & MATYUKHIN 2019, this investigation), and Saker Falcon (*Falco cherug*) (DOSZHANOV & GVOZDEV 2003, this investigation). DOSTHANOV & GVOZDEV (2003) also mentioned Great Bustard (*Otis tarda*), Mew Gull (*Larus canus*) and Grey Partridge (*Perdix perdix*) being hosts, and in this study was found *Ornithophila gestroi* moreover on a Black Kite. Unless the latter were erroneous approaches, the range of hosts is therefore obviously broader than MAA (1963) had suspected.

Table 3: Knowledge about louse fly records from Mongolia: (1) MAA (1963), (2) MAA (1967), (3) MAA (1969), (4) THEODOR & OLDROYD (1964), (5) MINÁŘ & HŮRKA (1980), (6) KRIŠTOFÍK & KIEFER (1983), (7) NARTSHUK & MATYUKHIN (2019), (8) this paper, ! = with more information on localities, d = doubtful

Species	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crataerina hirundinis (L., 1758)						x!		
Crataerina obtusipennis Austen, 1926	d		x	x				
Lipoptena cervi (L., 1758)	x							
Melophagus antilopes (Pallas, 1777)	x			x	x!	x		
Melophagus ovinus (L., 1758)			x					
Ornithoctona plicata von Olfers, 1816		x	x					
Ornithomya chloropus extensa Maa, 1967						x!		
Ornithomya fringillina Curtis, 1836						x!		
Ornithophila gestroi (Róndani, 1878)							x!	x!
Ornithophila metallica Schiner, 1864						x!		

Nevertheless, the knowledge of the louse fly fauna of Mongolia continues to rely only on a few and selective investigations. Certainly, more species are to be expected. For this purpose, especially more passerine birds as hosts should examined.

Ornithophila gestroi shows a sexual dimorphism already by considering the external features. For example, the tergit plates are larger sclerotized in the male, and the last tergit plate interrupted in the female (fig. 4). This phenomenon is also visible, albeit less clearly, in the measurements of several parts of the body. Whether such differences have physiological reasons is still unclear. They would be conceivable, for example, in the case of longer claws in males, which could serve to cling better to the females during copulation. MUÑOZ et al. (1993) presented measurement results each of four males and females from Spain. In the larger amount of data from Mongolia exanimated now, was found approximate agreement of the body length (both sexes), the head width (male), the prescutum length (both sexes), scutellum length (both sexes) and the minimal distance between ocular margins (male). The wings and female minimal distance between ocular margins, however, were shorter, antennae and female head width larger on average than in results given by MUÑOZ et al. (1993). The differences could be based on the large geographic distance between the both examined groups. For reliable statements, however, large series of measurements would be required, if possible, from different populations of the distribution area of *Ornithophila gestroi*.

Fig. 4: *Ornithophila gestroi* (left male, right female).

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