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The First Detection of *Ceratophyllus* Fleas and an Ischnocera Louse on the Great Cormorant *Phalacrocorax carbo* in Mongolia

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The first detection of *Ceratophyllus* fleas and an Ischnocera louse on the Great Cormorant *Phalacrocorax carbo* in Mongolia[1]

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Abstract

There are summarized data on ectoparasites of Mongolian birds. The Mongolian-German Biological Expeditions found first records for the flea *Ceratophyllus vagabundus* and the Ischnocera louce *Pectinopygus gyricornis* at the host *Phalacrocorax carbo.*

Key words: Great Cormorant, *Phalacrocorax carbo*, Mongolia, ectoparasites

1. Introduction

In Mongolia, there are 502 species of birds (GOMBOBAATAR & LEAHY 2018). Bird ectoparasites (fleas, ticks and lice) from 321 nests of 38 bird taxa were described. A total of 41 Siphonaptera species from birds and in their nests were found.

Most ectoparasite studies have been extensively focusing on land birds for last decades. However, were taken data into this issue particularly with regard of their medical importance of the parasites since 2005. Since this time, the situation has been dramatically changed (KIEFER et al. (2017).

Very few references on ectoparasites of Great Cormorant has been published at global level so far. However, this species has been considered as one of the major host of the flea *Ceratophyllus vagabundus vagabundus* and louse Ischnocera *Pectinopygus gyricornis.*

The detection of pathogens with medical importance from Mongolian water birds has led the intense research on this topic. In this study were analyzed ecto- and endoparasites of these birds concerning their tremendous impacts on the persistence and distribution of the corresponding pathogens.

Other migratory birds such as Northern (*Oenanthe oenanthe*) and Isabelline Wheatears (*Oenanthe isabellina*) with the significant medical importance should be considered as vectors of severe zoonotic pathogens. We would also consider raptors due to their enormous hunting areas.

Records of known geographical distribution of flea host in Mongolia and their distribution were described by various studies such as by: BAVAASAN (1974, 1978), BAVAASAN et al. (1977), BYAMBA et al. (2007), CYPRICH et al. (1978, 2001), DARSKAYA (1950), DOVTSCHIN et al. (1978), GONCHAROV et al. (1989), M. KIEFER (1979), M. KIEFER et al. 1984 1986), D. KIEFER et al. (2006, 2009, 2010, 2017), LABUNETS (1971), LAZAREVA et al. (1975), and SCALON (1966).

2. Study area and materials

Field biologists collected Fleas Siphonaptera *Ceratophyllus vagabundus dimi* and *C. vagabundus insularis* from birds in different parts of Mongolia. Locations are shown in table 1 and fig. 1.

From the nests and juvenile specimens of *Phalacrocorax carbo*:

Three females and three males of *Ceratophyllus vagabundus dimi* Mikulin, 1958 were collected from juveniles of Great Cormorants in the,nests, acquired on 24 June 2016, leg.by V. Neumann at Böönca gaan-nuur (45°39’59,0‘‘ N/99°10 ’11,3“ E). The fleas were challenging because they were very active and rapidly infested the clothes the collecting scientists from which they had to be removed afterwards.

[1] Ergebnisse der Mongolisch-Deutschen Biologischen Expeditionen seit 1962, Nr. 359.

Table 1: Location of samples of Fleas Siphonaptera *Ceratophyllus vagabundus dimi* and *C. vagabundus insularis* from birds in Mongolia

No.	Coordinates	Sum and place name	Province name
1	093°51' E; 49°56' N	Zuungobi sum	Uvs
2	096°36‘ E; 47°30‘ N	Aldarkhaan sum	Zavkhan
3	096°51‘ E; 47°41‘ N	Uliastai sum	Zavkhan
4	099°18‘ E; 51°18‘ N	Dood Tsagaan-nuur	Khuvsgul
5	099°54‘ E; 47°10‘ N	Egijn davaa	Bayankhongor
6	102°47‘ E; 47°48‘ N	Ugij-nuur	Arkhangai
7	103°36‘ E; 49°15' N	Inget Tolgoi	Bulgan
8	104°06‘ E; 46°30‘ N	Bayan-Öndör Sum	Övörkhangai
9	106°38‘ E; 48°12‘ N	Tsagany ovoo, 10 km N Ulaanbaatar	Tuv
10	106°54' E; 47°57' N	Ulaanbaatar	Ulaanbaatar
11	106°18‘ E; 47°42‘ N	70 km SW of Ulaanbaatar	Tuv
12	106°32' E; 47°30‘ N	Altanbulag Sum	Tuv
13	104°05' E; 43°56' N	Zosijn davaa	Ömnögobi
14	099°10' E; 45°40' N	Bööncagaan-nuur	Bayankhongor

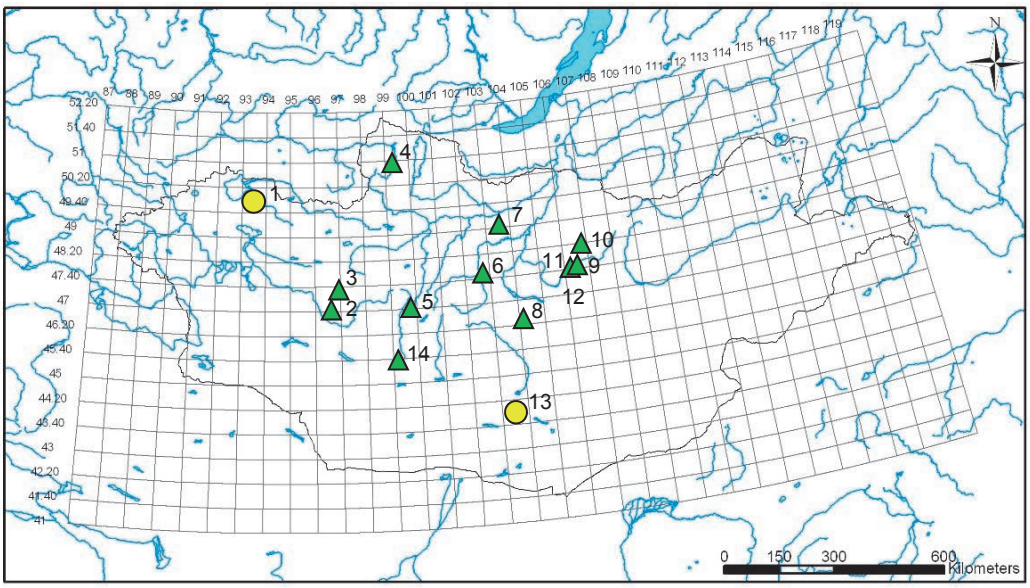

Fig. 1: Distribution of *Ceratophyllus vagabundus dimi* and *C. vagabundus insularis* in Mongolia.

▲ *Ceratophyllus vagabundus dimi*

● *Ceratophyllus vagabundus insularis.*

The second significant collection (16 July 2017) by M. Stubbe was five Ischnocera lice, *Pectinopygus gyricornis* (Denny, 1842) from Great Cormorants at Telmen-nuur (48°46' N/97°14' E), specific to this bird species.

3. Results and Discussion

Two subspecies of *Ceratophyllus vagabundus* are known in Mongolia: *Ceratophyllus vagabundus dimi* Mikulin, 1958 in Central and probably Eastern Mongolia, and *Ceratophyllus vagabudus insularis* Rothshild, 1906 in Central- and Western Mongolia. Their distribution and taxonomic traits are shown in fig. 1, table 1 and fig. 2; after CYPRICH et al. (2001).

***Ceratophyllus vagabundus dimi* Mikulin, 1958**

Identification characteristics: Male: b-movable process; d-fixed process P1; f-distal arm of sternum VIII. Female: g-i-sternum VII (Ugii Lake, Mongolia), fig. 2; after CYPRICH et al. (2001).

***Global Distribution*:** Caucasus, Central Asia, S Siberia,,and CW Mongolia.

Host Bird species of the ectoparasite in Mongolia: Starling *Sturnus* spec., Barn Swallow *Hirundo rustica*, Red-billed Chough *Pyrrhocorax pyrrhocorax*, and Common Sand Martin *Riparia riparia* in Mongolia.

***Ceratophyllus vagabudus insularis* Rothshild, 1906**

Identification characteristics: Male: a-fixed process P1; c-movable process; e-distal arm of sternum VII. Female: j and k -sternum VII (Egiin Davaa, Mongolia), fig. 2; after CYPRICH et al. (2001).

Global Distribution: Scandinavia, Mediterranean, Caucasus, Central Asia, Afghanistan, Tyan Shan, West China, and Central Mongolia to far East; and from Morocco to Atlas Mountains in the South.

Host species of the ectoparasite in Mongolia: Rock Dove *Columba livia*, Hill Pigeon *Columba rupestris*, *Emberizia* spec., Wheatear *Oenenthe* spec., Common Magpie *Pica pica*, Red-billed Chough *Pyrrhocorax pyrrhocorax*, Stonechat *Saxicola* spec. Known from a variety of bird species, but mainly on Corvidae.

3.1. Medical importance of bird fleas

The importance of birds as transmitters of ectoparasites is a well-known fact since a long time. HOOGSTRAAL (1963, 1964) analyzed Ixodidae as disease vectors in the Mediterranean area during spring- and autumn migrations in the NAMRU 3 project. ROSICKY (1957) analyzed birds and their ectoparasites as possible disease transmitters over long distances. Special attention was paid to birds as transmitters of fleas and ticks in the publications from GUSEV & BEDNYI (1960), GUSEV et al. (1962), KUNICKIJ & GAUZSTEIN (1963), TER-VARTANOV et al. (1956), and SHIRANOVICH & CHUMAKOVA (1961).

The study of VÍCHOVÁ et al. (2016) shows data about the occurrence of bacterial and protozoan pathogens in 32 Great cormorants (*Phalacrocorax carbo sinensis*), representing approximately 20 % of the population nesting in the surroundings of water basin Liptovská Mara (northern part of Central Slovakia). A survey revealed the presence of tick-borne bacteria *Anaplasma phagocytophilum* (6.25 %) and parasitic protozoa *Toxoplasma gondii* (3.1 %). These data indicate an infectious status of the Great cormorant population nesting in Slovakia. They might suggest a degree of environmental contamination by infectious agents and demonstrate the role of migratory seabirds in the circulation and dispersal of pathogens with zoonotic potential.

SEIMON et al. (2008) describe avian haemosporidial parasites in Mongolia being present in four bird species, the Bar-headed Goose (*Anser indicus*), the Ruddy Shelduck (*Tadorna ferruginea*), the Great Cormorant (*Phalacrocorax carbo*) and the Mongolian Gull (*Larus mongolicus*).

GILBERT et al. (2012) detected highly pathogenic avian influenza virus among wild birds in Mongolia, one of this bird species was *Phalacrocorax carbo*.

3.2. Discussion

According to the data available so far, the presence of the flea *Ceratophyllus vagabundus dimi* and the louse Ischnocera *Pectinopygus gyricornis* can be confirmed for *Phalacrocorax carbo* in Mongolia. Since the only available material covers rarely the western Parts of Mongolia, material from Middle- and Eastern Mongolia are of significant value for this research. So two subspecies of *Ceratophyllus vagabundus* are known from Monolia: *C.vagabundus insularis* from Central and probably Eastern Mongolia, and *C.vagabundus dimi* from Central- and Western Mongolia.

Further research on water birds like *Phalacocorax carbo* is necessary in order to elucidate these assumptions.

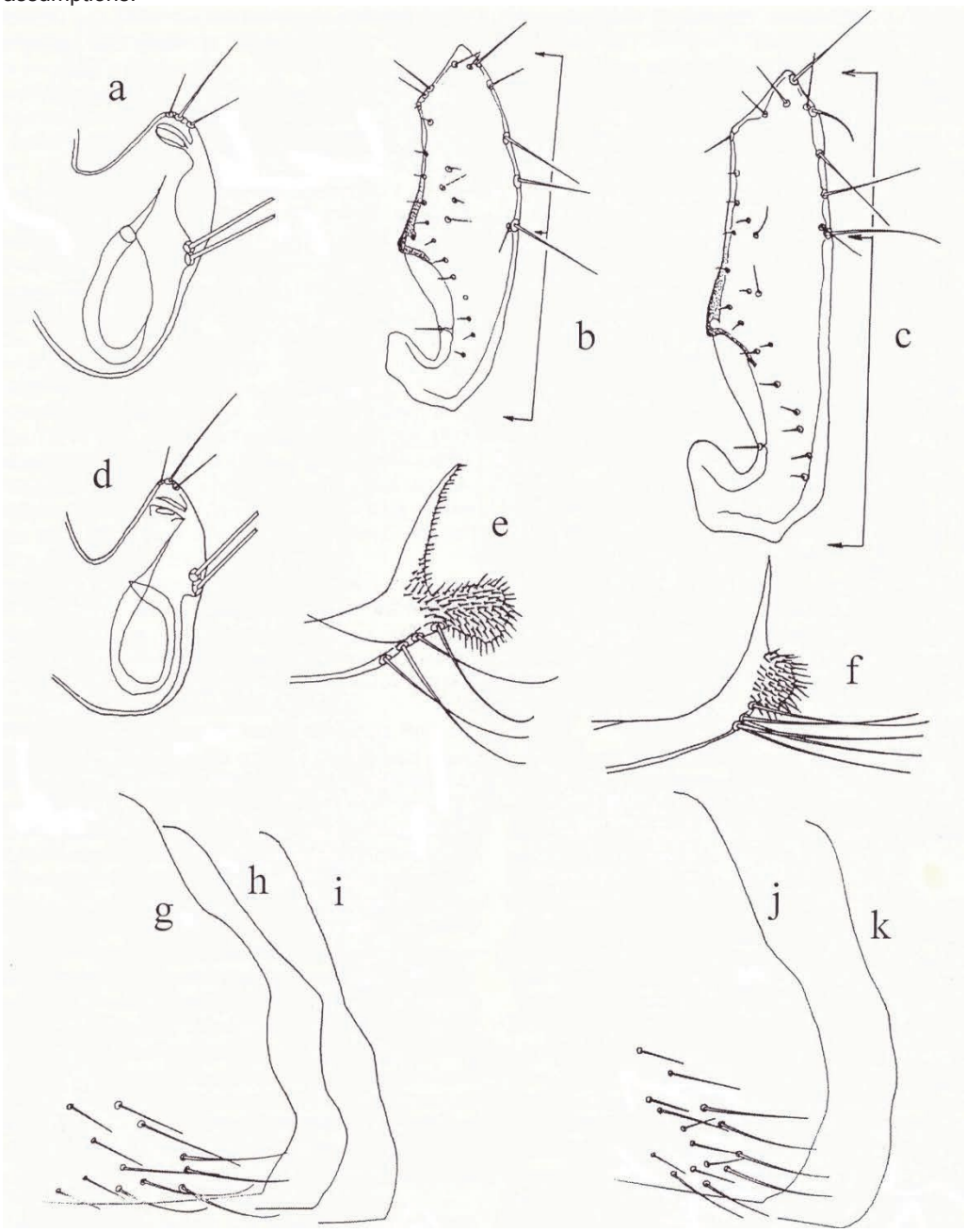

Fig. 2: *Ceratophyllus vagabundus dimi* Mikulin, 1958: Male: b - movable process, d - fixed process P1, f - distal arm of sternum VIII; female: g-i - sternum VII (Ugij-nuur, Mongolia). *Ceratophyllus vagabundus insularis* Rothschild, 1906: Male: a - fixed process P1, c - movable process, e - distal arm of sternum VII; female j-k - sternum VII (Egijn davaa, Mongolia); after CYPRICH et al. (2001).

MØLLER et al. (2005) confirmed fleas *Ceratophyllus vagabundus vagabundus*, *Mioctenopsylla t. kuriensis* and *Mioctenopsylla t. traubi* from Great Cormorant. Further field research on these two subspecies of *Ceratophyllus vagabundus* in Mongolia is crucial.

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