

Records of Some Blood-Sucking Flies from Birds and Bats of Japan (Diptera: Hippoboscidae, Nycteribiidae and Streblidae)

Masahiko SATO¹⁾ and Motoyoshi MOGI²⁾

¹⁾Rishiri Town Museum, Senhoshi, Rishiri Island, Hokkaido 097-0311, Japan

²⁾Takagise-higashi 3-3-23, Saga, 849-0922 Japan

Abstract. Twenty species of blood-sucking flies belonging to Hippoboscidae, Nycteribiidae and Streblidae were recorded from 29 species of birds and bats of Japan. New island records from Rishiri Island (6 species), Kyushu (1 species), Yakushima Island (1 species) and Tokunoshima Island (2 species) were noted.

Keywords: Hippoboscidae, Nycteribiidae, Streblidae, Japan

INTRODUCTION

Faunas of blood-sucking insects parasitic on wild birds and mammals in Japan have not been studied well. As for bed bugs (Cimicidae: Heteroptera), only one species has been recorded from bats without additional records since its description by Usinger (1966). As for flea (Siphonaptera), Sakaguti and Jameson (1962) recorded 69 species mainly from mammals of Japan (excluding Okinawa and Yaeyama), and predicted the discovery of 30 more species from bats and birds. However, little study has been done thereafter, and only a few species were added (Uchikawa, 1975). Information about faunas, distribution and host preference of Diptera Pupipara (Hippoboscidae, Nycteribiidae and Streblidae) has been increased substantially by Mogi *et al.* (2002) but it is still rather fragmentary except for that for bat flies (Nycteribiidae and Streblidae) of cave-roosting bats.

In this note, we present records of specimens of Diptera Pupipara collected from birds and bats in Japan. The majority of the specimens are from the northern part of Hokkaido from where

species of Diptera Pupipara have rarely been recorded. In addition, the collection includes specimens from Kyushu and southerly islands, including those without records of Diptera Pupipara.

MATERIALS AND METHODS

Specimens were collected by one of us (MS) or gifted from collaborators. Birds were inspected during the banding with official permission except for a few accidentally brought under care. Bats were also inspected during faunal and ecological study with official permission. All the specimens except one male of *Nycteribia allotopa mikado* collected by Ta. Segawa are deposited at Rishiri Town Museum.

The format of records generally follows Mogi *et al.* (2002); under each host name, the number and sex of specimens, locality, date, and the name of collectors are presented. Missing data are mentioned as such not to be confused with typographic errors. Scientific names of birds followed Ornithological Society of Japan (2000) and those of bats followed Abe *et al.* (2005).

RECORDS

Hippoboscidae

Ornithoica momiyamai Kishida, 1932

Emberiza spodocephala. HOKKAIDO. 1 ♀, Horonobe, 15 Sep 1993, T. Fujimoto; RISHIRI IS. 1 ♀, Kutsugata, 17 Sep 1994, K. Kosugi.

Emberiza variabilis. RISHIRI IS. 1 ♂, Kutsugata, 8 Sep 1994, K. Kosugi; 1 ♂, id, 15 Sep 1994, K. Kosugi; 1 ♀, id, 23 Sep 1994, K. Kosugi; 1 ♀, id, 28 Sep 1993, K. Kosugi.

Parus ater. RISHIRI IS. 1 ♂ 1 ♀, Kutsugata, 8 Sep 1994, K. Kosugi; 1 ♂, id, 10 Sep 1994, K. Kosugi; 1 ♀, id, 21 Aug 2006, M. Satô.

Passer montanus. RISHIRI IS. 3 ♀, Senhoshi, 22 Aug 2004, R. Sato.

Troglodytes troglodytes. RISHIRI IS. 1 ♀ 1 Gynandromorph, Kutsugata, 29 Aug 1993, K. Kosugi.

Note. New record from Rishiri Island. This is one of the commonest hippoboscids found on passerine birds of Japan. *Ornithoica tridens* Maa, 1966 may be a junior synonym of this species (Maa, 1966). If this is the case, the distribution of the species includes also Taiwan and probably continental China.

Ornithoica unicolor Speiser, 1900

Scolopax rusticola. RISHIRI IS. 1 ♀, Kanezaki, Oniwaki, 3 Oct 1993, M. Satô.

Note. New record from Rishiri Island. Outside Japan, this species distributes widely in the oriental region and has been regarded as an oligoxenous parasite of birds belonging to Strigidae (owls). It seems strange that the reported records from Japan do not include Strigidae as hosts (Maa, 1967; Mogi, 1977; Mogi *et al.*, 2002). This species has also been recorded from Sakhalin and Kazakhstan (Soós and Hürka, 1986) but surprisingly was not found in Taiwan despite extensive inspection of

birds including 6 species of Strigidae (Maa and Kuo, 1965). These facts may be simply due to no or little inspection opportunity of Strigidae in the Palaearctic region, or may suggest the presence of geographical races with different host preference or even sibling species.

Ornithomya avicularia aobatonis Matsumura, 1905

Acrocephalus arundinaceus. HOKKAIDO. 1 ♀, Shimonuma, Horonobe, 8 Aug 1996, T. Sato.

Carduelis sinica. RISHIRI IS. 1 ♀, Senhoshi, 27 Aug 1993, M. Satô.

Cuculus saturatus. RISHIRI IS. 1 ♂, Oniwaki, 23 Aug 2004, Y. Ohno.

Dryocopus martius. RISHIRI IS. 1 ♀, Oshidomari, 28 Aug 1997, K. Kosugi.

Emberiza spodocephala. RISHIRI IS. 1 ♀, Kutsugata, 7 Sep 1994, K. Kosugi; 1 ♀, id, 17 Sep 1994, K. Kosugi; 1 ♀, Fujino, Oshidomari, 13 Oct 2007, M. Satô.

Larus crassirostris. RISHIRI IS. 1 ♂, Tanetomi, Kutsugata, 26 Aug 1997, M. Satô.

Pyrhula pyrrhula. RISHIRI IS. 1 ♀, Senhoshi, 22 Jul 2007, M. Satô.

Saxicola torquata. RISHIRI IS. 1 ♂ 1 ♀, Senhoshi, 6 Jul 2005, M. Satô.

Streptopelia orientalis. RISHIRI IS. 1 ♀, Senhoshi, 27 Aug 1999, M. Satô.

Host unknown. RISHIRI IS. 1 ♂, Senhoshi, 1 Jul 1999, M. Satô & A. Kuromoto; 1 ♀, Fujimi-cho, Kutsugata, 22 Aug 1993, K. Kosugi.

Note. New record from Rishiri Island. This is a common parasite of passerines throughout Japan.

Ornithomya chloropus extensa Maa, 1967

Anthus hodgsoni. RISHIRI IS. 1 ♀, Oniwaki, 1 Oct 1994, M. Satô.

Note. New record from Rishiri Island. This is a common parasite of passerines of the Palaearctic



Figures 1-2. Hippoboscid flies. 1. *Ornithomya avicularia aobatonis* (female, Oshidomari, Rishiri Island, Hokkaido, 13 Oct 2007); 2. *O. fringillina* (female, Kutsugata, Rishiri Island, Hokkaido, 27 Oct 2007).

region.

***Ornithomya fringillina* Curtis, 1836**

Parus ater. RISHIRI IS. 1 ♀, Kutsugata, 28 Oct 2006, K. Kosugi; 1 ♀, id, 27 Oct 2007, K. Kosugi.

Regulus regulus. RISHIRI IS. 1 ♀, Kutsugata, 29 Oct 2000, K. Kosugi; 1 ♀, id, 27 Oct 2007, K. Kosugi & M. Satô.

Note. New record from Rishiri Island. This is a common parasite of passerines of the Palaearctic region.

***Crataerina pacifica* Iwasa, 2001**

Apus pacificus. RISHIRI IS. 1 ♀, Senhoshi, 27 Jul 1993, M. Satô.

Note. New record from Rishiri Island. In Japan, this species is known only from Hokkaido certainly due to no inspection opportunity in other areas.

***Stenopteryx hirundinis* (Linnaeus, 1758)**

Delichon urbica. HOKKAIDO. 1 ♀, Sounkyo, Kamikawa, 5 Sep 2000, N. Yasuda.

Host unknown. HOKKAIDO. 1 ♀, Kutchan, 21 Aug 1998, K. Okazaki.

Note. This is a common parasite of martens throughout the Palaearctic region.

***Icosta maquilgensis* Ferris, 1924**

Bambusicola thoracica. HONSHU. 1 ♀, Higashinarukawa-cho, Nara-ken, 18 Nov 1999, K. Maeda.
Note. Records of this species in Japan are still fragmentary (Shizuoka-ken, Ishikawa-ken, Nagasaki-ken), although it may be a common parasite of Phasianidae.

Nycteribiidae

***Nycteribia allotopa mikado* Maa, 1967**

Miniopterus fuliginosus. HONSHU. 2 ♂, Kawashiri, Nishi-waga-machi, Iwate-ken, 26 Apr 2007, Ta. Segawa; YAKUSHIMA IS. 5 ♂ 3 ♀, 24 Aug 1999, K. Maeda.

Miniopterus fuscus. TOKUNOSHIA IS. 1 ♂ 1 ♀, 16 Oct 2000, K. Maeda; IRIOMOTE IS.. 2 ♂, Otomi-do, 13 Dec 1999, K. Maeda.

Rhinolophus cornutus. TOKUNOSHIA IS. 3 ♂ 1 ♀, 28 Oct 2004, K. Maeda

Note. New record from Tokunoshima Island. Two males from Iwate-ken are the northernmost record of this species in Japan. This is a common parasite of *Miniopterus* bats in east Asia.

***Nycteribia parvula* Speiser, 1901**

Miniopterus fuliginosus. YAKUSHIMA IS. 3 ♂ 2 ♀, 24 Aug 1999, K. Maeda.

Miniopterus fuscus. TOKUNOSHIA IS. 1 ♂ 1 ♀,

16 Oct 2000, K. Maeda.

Rhinolophus cornutus. TOKUNOSHIA IS. 1 ♂ 1 ♀ ,

28 Oct 2004, K. Maeda

Note. New record from Tokunoshima Island and Yakushima Island. This is a common parasite of *Miniopterus* bats in eastern Asia but, in Japan, the density is usually lower than that of *Nycteribia allotopa mikado*.

***Nycteribia pygmaea* (Kishida, 1932)**

Murina ussuriensis. HOKKAIDO. 1 ♀ , Kemomanai, Esashi, 8 Sep 1998, M. Satô & Y. Murayama (reported by Satô (2000) as 10 Sep 1998 for collection date).

Myotis daubentonii. HOKKAIDO. 1 ♀ , Ofun, Utanobori, 15 Jul 2007, M. Satô.

Myotis ikonnikovi. HOKKAIDO. 1 ♂ 1 ♀ , Onnebetsu, Shibetsu, 5 Aug 2005, M. Satô.

Myotis macrodactylus. HOKKAIDO. 1 ♂ 1 ♀ , Imagane, 14 Sep 2003, M. Satô; 1 ♂ , Limestone cave, Nakatonbetsu, 2 Aug 2003, M. Satô; 3 ♀ , id, Aug 4 2004, M. Satô; 3 ♂ 2 ♀ , id, 8 Aug 2004, M. Satô; 1 ♂ 1 ♀ , id, 7 Jul 2002, M. Satô; 1 ♂ 1 ♀ , Shimohorobetsu, Esashi, 7 Nov 1999, M. Satô; 1 ♂ 5 ♀ , Kinkomanai, Esashi, 8 Sep 1998, M. Satô & Y. Murayama (reported by Satô (2000) as 5 ♂ 1 ♀); 2 ♀ , O-numa, Nanae-cho, 17 Sep 1999, K. Kawai; 1 ♀ , Shibiutan, Utanobori, 3 Aug 2003, M. Satô; 1 ♀ , Oguruma, Bifuka, 15 Jul 2007, M. Satô; 2 ♂ 1 ♀ , Esashi, 15 Jul 2007, M. Satô.

Host unknown. HOKKAIDO. 1 ♂ 3 ♀ , Pankenai, Utanobori, 5 Aug 2004, M. Satô; 2 ♂ 1 ♀ , Ofun, Utanobori, 5 Aug 2004, M. Satô,

Note. This is a common parasite of *M. macrodactylus* throughout Japan except for Tsushima Islands. Satô (2000) reported 16 males and 29 females from Nayoro, Esashi and Hamatonbetsu, northern Hokkaido. This species closely resembles *N. pleuralis*, especially in males.

Satô & Mogi (in press) newly describes males of *N. pleuralis* from Japanese specimens and shows differences between two species.

***Basilisa rybini japonica* Theodor, 1973**

Myotis frater. HOKKAIDO. 1 ♀ (reported as *Basilisa rybini* by Satô (2000)), Shin-sei, Toyotomi, 16 Aug 1995, M. Satô.

Myotis pruinosus. KYUSHU. 1 ♂ 1 ♀ , Kawanaka, Aya-machi, Miyazaki-ken, 16 Jul 1998, K. Maeda.

Note. New record from Kyushu. Satô (2000) recorded one female without designation of subspecies, because some characters were more similar to the description of *Basilisa rybini rybini* Hürka from Kazakhstan. Here it is tentatively recorded as subspecies *japonica*. However, the true status of this subspecies would not be determined until more specimens, especially those from the intervening area, are available.

***Basilisa truncata endoi* Mogi, 1979**

Myotis ikonnikovi. HOKKAIDO. 1 ♀ (reported by Satô (2000) as *Basilisa* sp.), Nakagawa, 6 Aug 1998, M. Satô; 2 ♂ 2 ♀ , Onnebetsu, Shibetsu, 5 Aug 2005, M. Satô; 1 ♂ , Pin-ne-shiri, Nakatonbetsu, 21 Aug 2004, M. Satô; 2 ♂ 1 ♀ , Kawanishi, Bifuka, 12 Jul 2007, M. Satô.

Note. Satô (2000) recorded this specimen as *Basilisa* sp., because some key characters were difficult to be observed. In some characters, this specimen is different from the original description of the subspecies based on specimens collected from northern Honshu. For example, the type specimen has the only one long seta at the corner of the abdominal tergite 2, but the present specimen has several long setae. Tergite 6 of additional two female specimens from Shibetsu have a few premarginal spines instead of spines on surface. Validity of the subspecific status might become



Figures 3-4. *Basilia truncata endoi* (Bifuka, Hokkaido, 12 Jul 2007). 3. male; 4. female.

unwarranted if more specimens are examined, especially those from the area intervening between Japan and Mongolia, the type locality of *Basilia truncata* Theodor.

***Penicillidia jenynsii* (Westwood, 1834)**

Miniopterus fuliginosus. HONSHU. 2 ♂, Kawachi-Fūketsu, Taga, Shiga-ken, 15 Dec 2003, K. Maeda; 11 ♂ 9 ♀, Shirahama, Wakayama-ken, 11 Aug 2005, K. Maeda; 4 ♂ 5 ♀, ibd, 27 Jun 2004, K. Maeda; 3 ♂ 8 ♀, id, 11 Aug 2007, K. Maeda.

On bat guanos from *Mi. fuliginosus* and *Myotis macrodactylus*. HONSHU. 1 ♂ 1 ♀, Tagarasuzuido, Wakasa, Fukui-ken, 10 Jul 2005, K. Maruyama & H. Tamura.

Host unknown. HONSHU. 1 ♂ 4 ♀, Issai-cho, Tatsuno, Hyougo-ken, 19 Jun 1968, K. Maeda.

Note. This species is mainly parasitic on *Miniopterus* bats absent in Hokkaido but was found also from *My. macrodactylus*, *Rhinolophus ferrumequinum*, *R. cornutus* and *Plecotus auritus* in Honshu (Mogi *et al.*, 2002). Although these bat species are distributed in Hokkaido, *P. jenynsii* has not been found from Hokkaido.

***Penicillidia monoceros* Speiser, 1900**

Myotis daubentonii. HOKKAIDO. 1 ♀, Komaba, Otofuke, 13 Aug 1999, K. Kawai; 1 ♀, Taiki, 9

Sep 1999, K. Kawai; 2 ♀, Asajino, Sarufutsu, 3 Aug 2005, M. Satō; 1 ♀, Pankenai, Esashi, 7 Aug 2006, M. Satō.

Myotis frater. HOKKAIDO. 1 ♀, Komaba, Otofuke, 22 Aug 1997, K. Kawai.

Myotis macrodactylus. HOKKAIDO. 1 ♀, Pankenai, Utanobori, 9 Aug 2005, M. Satō.

Host unknown. HOKKAIDO. 2 ♀, Pankenai, Utanobori, 5 Aug 2004, M. Satō.

Note. Satō *et al.* (2007) reported this species from two other host species, *Myotis ikonnikovi* and *Myotis nattereri*. This species is almost similar to *Penicillidia dufourii* (Westwood) except for the presence of a long horn at the top of the head and the distribution of the two species is said to be completely overlapping (Theodor, 1967). By these reasons, the independency of *P. monoceros* has often been doubted. However, *P. dufourii* has not been found in Japan. If this is confirmed by more surveys, it could be evidence that they are different species with different distribution ranges.

***Phthiridium hindlei* (Scott, 1936)**

Host unknown. HONSHU. 1 ♀, Yamanoue, Ashimori, Okayama-ken, 14 Apr 1968, K. Maeda; 3 ♀, Issai-cho, Tatsuno, Hyougo-ken, 19 Jun 1968, K. Maeda.

Note. In Japan, this is a parasite of *Rhinolophus ferrumequinum*.

Streblidae

Brachytarsina amboinensis Rondani, 1878

Miniopterus fuscus. IRIOMOTE IS. 18 ♂ 37 ♀ ,
Otomi, 13 Dec 1999, K. Maeda.

Rhinolophus perditus. IRIOMOTE IS. 4 ♂ 5 ♀ ,
Otomi, 13 Dec 1999, K. Maeda.

Note. This is a common parasite of *Miniopterus* bats in the Oriental regions.

Brachytarsina kanoi Maa, 1967

Host unknown. HONSHU. 3 ♂ 3 ♀ , Yamanoue,
Ashimori, Okayama-ken, 14 Apr 1968, K.
Maeda; 4 ♂ 16 ♀ , Issai-cho, Tatsuno, Hyougo-
ken, 19 Jun 1968, K. Maeda.

Note. This is a common parasite of *Rhinolophus ferrumequinum*.

Brachytarsina suzukii Mogi, 1976

Rhinolophus perditus. IRIOMOTE IS. 3 ♂ 2 ♀ ,
Komi, 4 Feb 2002, K. Maeda.

Note. This species is known only from Iriomote Island, the type locality.

Ascodipteron speiserianum Muir, 1912

Miniopterus fuscus. IRIOMOTE IS. 3 ♀ , Otomi, 13
Dec 1999, K. Maeda.

Note. This is a common parasite of *Miniopterus* bats in the Oriental regions.

DISCUSSION

The present material included about a half of species of Diptera Pupipara recorded from Japan (Mogi *et al.*, 2002). Although no species were added to the Japanese fauna, many new island records are added.

No addition to the Japanese fauna was expected from the scope of host species inspected. As well as most preceding collections

in Japan, host species inspected are biased to passerines for birds and cave-roosting species for bats (except for some species inspected in Hokkaido). If bigger birds or others not or rarely included in banding study and forest bats roosting in tree holes are inspected, species hitherto unrecorded from Japan could be found. Facilities that accommodate birds accidentally brought under care may be one of the places where additional species could be found. Maa and Kuo (1965) reported the results of a project undertaken to reveal ectoparasite faunas of Taiwan. In this project, various kinds of birds were collected by shooting and trapping. They reported that positive rates for hippoboscids were higher than or the same as Passeriformes (22%) in Caprimulgiformes (44%), Piciformes (39%), Galiformes (31%), Ciconiiformes (25%), Strigiformes (22%), Falconiformes (22%) and Columbiformes (20%). Hippoboscidae from those birds other than passerines have never or rarely been reported from Japan. Records are especially few in Amami, Okinawa and Yaeyama Islands belonging to the Oriental region.

The present results also reinforce the necessity of survey in the continental Asia. There are many subspecies described from Japan with collection gaps in the continental Asia. For example, *Ornithomya avicularia aobatonis*, *O. chloropus extensa*, *Basilisa rybini japonica* and *B. truncate endoi* have type subspecies in western Asia or Europe. *Nycteribia allotopa mikado* has the type subspecies in the Oriental region south to Taiwan. Examination of specimens from the continental Asia is essential to evaluate the validity of these subspecies.

These points had already been mentioned in Mogi *et al.* (2002). For further advancement in studies of Diptera Pupipara faunas of Japan, it is highly desirable to develop joint projects

involving entomologists, mammalogists and ornithologists of both Japan and neighboring countries.

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REFERENCES

- Abe, H., N. Ishii, T. Itoh, Y. Kaneko, K. Maeda, S. Miura and M. Yoneda, 2005. *A Guide to the Mammals of Japan*. 195 pp., Tokai University Press, Kanagawa.
- Iwasa, M., 2001. A new species of the genus *Crataerina* von Olfers (Diptera, Hippoboscidae) with reduced wings from *Apus pacificus* (Apodiformes, Apodidae) in Japan. *Entomol. Sci.*, 4: 191-194.
- Maa, T. C., 1966. The genus *Ornithoica* Rondani. *Pacific Insects Monogr.*, 10: 10-124.
- Maa, T. C., 1967. A synopsis of Diptera Pupipara of Japan. *Pacific Insects*, 9: 727-760.
- Maa, T. C., 1968. Results of the speleological survey in South Korea 1966 XII. Streblid and nycteribiid flies from South Korea. *Bull. National Sci. Mus.*, 11: 3385-396.
- Maa, T. C. & J. S. Kuo, 1965. A field survey of arthropod parasites of birds in Taiwan. *J. Med. Entomol.*, 4, 395-401.
- Mogi, M., 1977. Notes on Hippoboscidae (Diptera) from the Ryukyu Islands with description of a new Icosta species. *Kontyu*, 45: 395-398.
- Mogi, M., T. Mano & I. Sawada, 2002. Records of Hippoboscidae, Nycteribiidae and Streblidae (Diptera) from Japan. *Med. Entomol. Zool.*, 53, Supl. 2, 141-165.
- Ornithological Society of Japan, 2000. *Check-list of Japanese Birds*, 6th revised ed., 345 pp., The Ornithological Society of Japan, Kyoto.
- Sakaguti, K. & E. W. Jameson, 1962. The Siphonaptera of Japan. *Pacific Insects Monogr.*, 3, 1-169.
- Satô, M., 2000. Some records of bat flies (Diptera: Nycteribiidae) collected in northern Hokkaido. *Rishiri Studies*, (19): 15-17 (in Japanese with English abstract).
- Satô, M. & M. Mogi, (In press). First descriptions of the males of *Ornithomya candida* Maa and *Nycteribia pleuralis* Maa (Diptera: Hippoboscidae and Nycteribiidae). *Medical Entomology and Zoology*.
- Satô, M., M. Nakatani & M. Mogi, 2007. Four bat fly species collected by N. Sasaki from eastern Hokkaido. *Sylvicola*, (25): 59-62. (in Japanese).
- Soós, Á. & K. Hürka, 1986. *Family Hippoboscidae*. In: Catalogue of Palaearctic Diptera II (eds. Soós, A. and Papp, L.), pp. 215-226, Akadémiai Kaidó, Budapest.
- Theodor, O., 1967. *An Illustrated Catalogue of the Rothschild Collection of Nycteribiidae in the British Museum* (Nat. Hist.). 506 pp. Brit. Mus. (Nat. Hist.), London.
- Uchikawa, K., 1975. Notes on fleas collected from bird-nests (II) Description of *Megabothris kubotai* spec. nov. (Siphonaptera: Ceratophyllidae). *Jpn. J. Sanit. Zool.*, 26: 101-103.
- Usinger, R. L., 1966. *Monograph of Cimicidae (Hemiptera: Heteroptera)*. The Thomas Say Foundation VII. 585 pp., Entomological Society of America, Lanham, MD.

日本産鳥類および翼手目から得られた吸血性双翅目の記録 (双翅目: シラミバエ科、クモバエ科、コウモリ

バエ科)**佐藤雅彦(利尻町立博物館)・茂木幹義(佐賀市)**

和文要旨：日本産鳥類および翼手目 29 種から得られ

た、シラミバエ科、クモバエ科、コウモリバエ科に属する 20 種の吸血性双翅目を記録した。その中には利尻島、九州、屋久島、徳之島からの新記録が含まれる。