Record of a new host for *Carnus hemapterus* (Diptera: Carnidae)

Nana Ushine\(^1\), Shin-ichi Hayama\(^1\), Tatsuo Sato\(^2\), Masaki Nonagase\(^2\) and Takeo Yamachi\(^*\), \(^3\)

\(^*\) Corresponding author: tyamauchi@obihiro.ac.jp
\(^1\) Laboratory of Wildlife Medicine, Nippon Veterinary and Life Science University, 1–7–1 Kyonan-cho, Musashino-shi, Tokyo 180–8602, Japan
\(^2\) The Friends of the Gyotoku Bird Observatory NPO, 4–22–14 Fukuei, Ichikawa-shi, Chiba 272–0137, Japan
\(^3\) Laboratory of Entomology, Obihiro University of Agriculture and Veterinary Medicine, Inada-cho Nishi 2–11, Obihiro, Hokkaido, 080–8555, Japan

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**Abstract:** *Carnus hemapterus* Nitzsch (Diptera: Carnidae) was collected from a white-cheeked starling, *Sturnus cineraceus* Temminck in Chiba Prefecture, Honshu, Japan. Here, we report the white-cheeked starling as a new host for *C. hemapterus*.

Key words: Carnidae, *Carnus hemapterus*, ectoparasite, *Sturnus cineraceus*, zoonosis

**Introduction**

The carnid fly (Diptera: Carnidae) is approximately 2 mm in length; so far 108 species have been recorded in the world (Walter and Hudde, 1987; Clayton et al., 2010; Stuke and Bachli, 2015; Carles-Tolra, 2016). Flies of the genus *Carnus* usually infest and suck the blood of avian chicks, especially the nestling and fledgling chicks (Papp, 1998; Valera et al., 2006). One of them, *Carnus hemapterus* Nitzsch loses its wings when the fly locates a host bird (Roulin, 1998). Previous studies have reported 49 bird species from 19 families as hosts for *C. hemapterus*; these flies are considered to have low species specificity (Grimaldi, 1997; Iwasa et al., 2000; Valera et al., 2003). In Japan, two species of *Carnus* (*C. hemapterus* and *C. orientalis* Maa), three host species (*Corvus corone* Linnaeus, *Eurystomus orientalis* Linnaeus, and *Dendrocopos major* Linnaeus) for *C. hemapterus*, and one host species *Otus elegans* Cassin for *C. orientalis* have been reported (Iwasa et al., 2000, 2008, 2014). However, the ecology and distribution of *Carnus* species in Japan is not well-understood. Herein, we report a case of parasitization of *C. hemapterus* on a white-cheeked starling, *Sturnus cineraceus* Temminck.

**Materials and Methods**

The host is a juvenile white-cheeked starling (sex unknown) that could not fly. It was rescued from a private house in Funabashi, Chiba Prefecture, Japan on June 25, 2016. The juvenile bird was transported to the wild bird rehabilitation center in Ichikawa, Chiba. When a veterinarian tried some initial treatments for the bird, she detected three flies in the left side of the bird’s body. The flies were collected using forceps and stored in 70% ethanol.

**Results and Discussion**

According to Grimaldi (1997), these flies were identified as *C. hemapterus* based on the body length, and shape of the sternum and abdomen. All three flies were dealate. One of them was a male, and others were females, with a distended abdomen (Fig. 1).

*Sturnus cineraceus* is a new host for *C. hemapterus*. *Carnus hemapterus* has been reported as ectoparasites from *Sturnus unicolor* Temminck and *Sturnus vulgaris* Linnaeus belonging to the same genus as the white-cheeked starling (Avilés et al., 2009; Wolfs et al., 2012; Fairn et al., 2014; Tomás et al., 2017).

White-cheeked starlings are commonly observed in the urban areas of Japan, particularly nesting in rain gutters and door pockets (Kuroda, 1960; Sato et al., 2010). In the present case, although no evidence of attack by *C. hemapterus* was found on humans, such as the rehabilitation staff and the citizens who rescued the starling, caution must be exercised because this bird-specific parasitic fly has been reported to affect humans (Iwasa et al., 2000, 2008; Kosone et al., 2018). Therefore, dissemination of information about this species, not only to veterinarians and hunters who interact with wildlife, but also to the staff of rehabilitation centers and the general citizens who may rescue injured wildlife, is necessary.
Fig. 1. *Carnus hemapterus* (Diptera: Carnidae) in white-cheeked starling *Sturnus cineraceus*. (a) male (lateral view); (b) female with distended abdomen (lateral view); (c) male (ventral view); (d) female with distended abdomen (ventral view); (e) male (dorsal view); (f) female with distended abdomen (dorsal view).
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**References**

Avilés, J. M., Pérez-Contreras, T., Navarro, C. and Soler, J. I. 2009. Male spotless starlings adjust feeding effort based on egg spots revealing ectoparasite load. *Anim. Behav.*, 78: 993–999.

Carles-Tolra, M. 2016. Two acalyptrate species new for science and a new record for Spain (Diptera: Carnidae, Sphaeroceridae, Trioxoscelididae). *Bol. SEA*, 58: 53–56.

Clayton, D. H., Koop, J. A. H., Harbison, C. W., Moyer, B. R. and Bush, S. E. 2010. How birds combat ectoparasites. *Open Ornithol.*, 3: 41–71.

Fairn, E. R., Hornsby, M. A. W., Galloway, T. D. and Barber, C. A. 2014. Ectoparasites of nestling European starlings (*Sturnus vulgaris*) from a nest box colony in Nova Scotia, Canada. *J. Acad. Entomol. Soc.*, 10: 19–22.

Grimaldi, D. 1997. *The bird flies, genus Carnus*: species revision, generic relationships, and fossil Meoneura in amber (Diptera: Carnidae). *Am. Mus. Novit.*, 3190: 1–30.

Iwasa, M., Mori, S., Furuta, O.,Komatsu, T., Iida, T., Nakamori, J. and Kataoka, N. 2008. Bird-parasitic *Carnus hemapterus* Nitzsch (Diptera, Carnidae) in Japan: avian hosts infestation and a case of human dermatitis caused by adult. *Med. Entomol. Zool.*, 59: 47–53.

Iwasa, M., Sakamoto, H. and Asahi, K. 2014. Discovery of a bird-parasitic fly, *Carnus orientalis* (Diptera: Carnidae), in Japan, with bionomic remarks and a key to *Carnus* species. *J. Med. Entomol.*, 51: 484–488.

Iwasa, M., Sanada, M. and Ito, T. 2000. *Carnus hemapterus* Nitzsch (Diptera, Carnidae) found from the external auditory meatus of human, new to Japan. *Med. Entomol. Zool.*, 51: 265–268.

Kosone, K., Ito, M., Usuku, S., Tanaka, N., Murata, S. and Iwasa, M. 2018. Invasion of *Carnus hemapterus* (Diptera: Carnidae) into the human external ear canal in Yokohama City. *Med. Entomol. Zool.*, 69: 177–179.

Kuroda, N. 1960. Field studies on the grey starling, *Sturnus cineraceus* Temminck three roosting behaviors from summer to autumn. *ESJ*, 10: 148–153 (In Japanese).

Papp, L. 1998. Family Carnidae. In *Contributions to a manual of palearctic Diptera*. Vol. III. (eds. Papp, L. and Darvas, B.), pp. 211–217, Science Herald, Budapest.

Roulin, A. 1998. Cycle de reproduction et abondance du diptère parasite *Carnus hemapterus* dans les nichées de chouettes effraies *Tyto alba*. *Alauda*, 66: 265–272.

Sato, S., Kimura, H., Hirata, S. and Okai, Y. 2010. A record of interspecific hybridization of the grey Starling *Sturnus cineraceus* and the red-billed starling *Sturnus sericeus* in Sukumo, Kochi Prefecture. *Ipn. J. Ornithol.*, 59: 76–79.

Stuke, J.-H. and Bachli, G. 2015. Faunistical data of Carnidae (Diptera) from Switzerland and additional countries with the description of three new Meoneura species. *Mitt. Schweiz. Entomol. Ges.*, 88: 379–401.

Tomás, G., Martín-Gálvez, D., Ruiz-Rodríguez, M. and Soler, J. J. 2017. Intraspecific avian brood parasites avoid host nests infested by ectoparasites. *J. Ornithol.*, 158: 561–567.

Valera, F., Casas-Criville, A. and Hoi, H. 2003. Interspecific parasite exchange in a mixed colony of birds. *J. Parasitol.*, 89: 245–250.

Valera, F., Martín-Vivaldi, M. and Carles-Tolra, M. 2006. Life-history variation in three coexisting species of carnid flies (Diptera: Carnidae), *Carnus hemapterus*, *Hemeromyia anthracina* and *Hemeromyia longirostris*. *Eur. J. Entomol.*, 103: 347–353.

Walter, G. and Hude, H. 1987. *Carnus hemapterus* (Milichiidae, Diptera), an ectoparasite of nestlings. *J. Ornithol.*, 128: 251–255.

Wolfs, P. H. J., Lesna, I. K., Sabelis, M. W. and Komdeur, J. 2012. Trophic structure of arthropods in starling nests matter to blood parasites and thereby to nestling development. *J. Ornithol.*, 153: 913–919.