

Chewing Lice Found on Captive Tufted Puffin, *Fratercula cirrhata*

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ABSTRACT

During the postmortem of tufted puffin chicks (*Fratercula cirrhata*), who died a few days after hatching in the aquarium, a large number of chewing lice were collected. These lice were identified as *Quadraceps helgovauki* (Phlopterae) based on morphological characteristics. This is the first record of *Q. helgovauki* from *F. cirrhata* and in Japan.

Key words: captive breeding, chewing lice, *Fratercula cirrhata*

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The tufted puffin, *Fratercula cirrhata*, is a medium-sized seabird belonging to the family Alcidae and is widely distributed throughout the North Pacific Ocean. It breeds mainly on islands and cliffs in the Sea of Okhotsk, the Bering Sea, the Kuril Islands, Alaska, and the coast of California, and, in Japan, a small number of birds breed on islands in eastern Hokkaido. *F. cirrhata* is classified as 1A in the endangered species list, i.e., critically endangered, in the Japanese Red Data Book [1]. For species protection, research, and conservation, they are bred in captivity in aquariums in Japan. We have observed a case of concentrated parasitism by chewing lice on captive tufted puffins, and we report it as basic data for the captive breeding of this bird.

In August 2020, a tufted puffin chick died on 3 days after hatching at an aquarium. A large number of chewing lice were found on the body surface during autopsy and were collected. The specimens were fixed in 70% ethanol and taken to the Wild Animal Medical Center (WAMC) of Rakuno Gakuen University for taxonomical examination. The lice were mounted in 70% ethanol for microscopic observation, and morphological and biometric data were recorded using a lucida

camera (OLYMPUS DP20). The lice specimens are preserved in the WAMC (Accession No. AS18180).

Of these specimens, five adult males and 10 females were studied (Table 1; Fig. 1). The lice belonged to the family Phlopterae of the suborder Ischnocera, which was based on the following features: the snout did not extend from the head (Fig. 2), there were two claws on each leg, and the antennae were elongated and filiform with five sections. In addition, the abdominal length was greater than the width, the frontal tergum was conspicuous, and the frontal edge was flat and transparent but did not reach the ridge of the antennal anterior edge. There was a groove on the antennal anterior dorsal side, single genitalia, and there were no aneurysms with bristles on the external genitalia at the abdominal end of the female (Fig. 3). The specimens were identified as being of the genus *Quadraceps* according to Price et al. [2]. Based on the measurements and the shape of the male paramere [3,4], the lice were identified as *Q. helgovauki* (Timmermann, 1974).

The genus *Quadraceps* mainly parasitizes birds of the order Charadriiformes, and approximately 120 *Quadraceps* species are currently known [2]. Eight of these species, namely *Q. aethereus* (Giebel, 1874), *Q. alcae* (Denny, 1842), *Q. ambestrix* (Timmermann, 1974), *Q. antiquus* (Timmermann, 1974), *Q. helgovauki*, *Q. maritima* (Kellogg and Chapman, 1899), *Q. obliquus* (Mjöberg, 1910), and *Q. pacificus* (Kellogg and

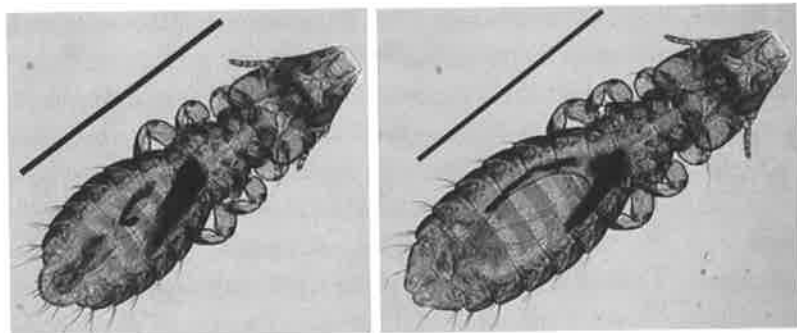
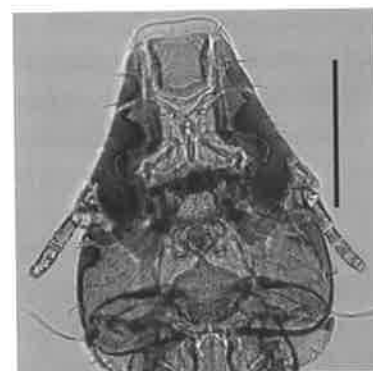
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Table 1 Measurements of chewing lice found from *Fratercula cirrhata* (size in mm)

Host	Present specimen	<i>Quadraceps helgovauki</i> [4]	<i>Quadraceps pacificus</i> [3]
	<i>Fratercula cirrhata</i>	<i>Fratercula arctica</i>	<i>Fratercula cirrhata</i> <i>Cepphus grylle</i>
N	5	8	2
Male	Total Length	1.54 (1.50-1.59)	1.46
	Body Width	0.48 (0.47-0.49)	0.5
	Head Length	0.52 (0.51-0.53)	0.49 (0.48-0.50)
	Head Width	0.39 (0.38-0.40)	0.37 (0.36-0.38)
	Thorax Length	0.25 (0.23-0.27)	
	Thorax Width	0.27 (0.26-0.28)	
	Length of Genital Organ		0.34 (0.31-0.36)
Length of Paramere	0.14 (0.13-0.15)	0.14 (0.14-0.15)	
N	10	10	1
Female	Total Length	1.82 (1.84-1.92)	1.75
	Body Width	0.53 (0.38-0.58)	0.6
	Head Length	0.56 (0.54-0.56)	0.53 (0.49-0.54)
	Head Width	0.44 (0.42-0.45)	0.40 (0.38-0.41)
	Thorax Length	0.23 (0.21-0.26)	
	Thorax Width	0.29 (0.29-0.30)	

**Fig. 1** Male (left) and female (right) of *Quadraceps helgovauki* (Philopteridae) from captive tufted puffin, *Fratercula cirrhata* (Bar=1mm)**Fig. 2** Head of female of *Quadraceps helgovauki* (Philopteridae) from captive tufted puffin, *Fratercula cirrhata* (Bar=0.5mm)

Chapman, 1899), have been known to parasitize members of the family Alcidae [2-6]. *Q. helgovauki* was described by Timmermann [4] based on a specimen obtained from the Atlantic puffin *Fratercula arctica* collected in the Orkney Islands.

We have observed this species for the first time in Japan, and the tufted puffin became a new recorded host. Although *Q. pacificus* has been recorded infesting tufted puffin in North America, the morphology was different from the present specimen, Kellogg & Chapman [3] did not mention a male paramere, and therefore it will be necessary to compare it to

more specimens in the future. There has also been a report of *Actornithophilus ochraceus* (Nitzsch, 1818) on tufted puffins [5], but it was not observed this time.

It is established that chewing lice have adverse effects on host birds, such as feather wear, increased energy consumption, and decreased reproductive performance [7-9]. Alcid birds, including the tufted puffin, spend most of their lives in the open ocean and only contact land during the short breeding season to nest in places, such as cliffs, that

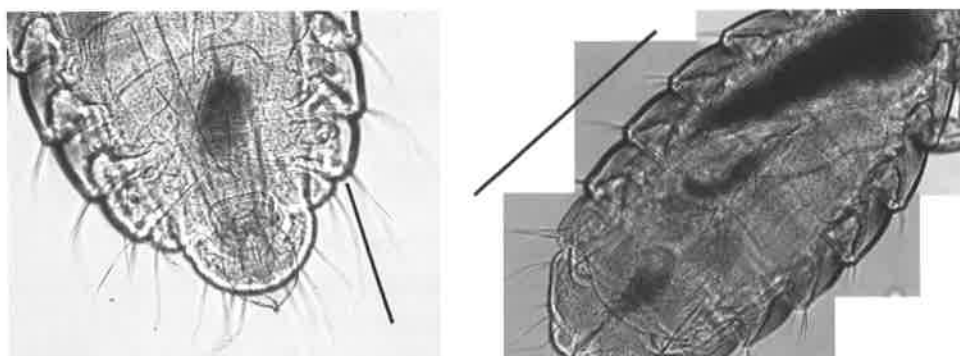


Fig. 3 Posterior part of male (left, Bar=0.2mm) and female (right, Bar=0.5mm) of *Quadraceps helgovauki* (Philopteridae) from captive tufted puffin, *Fratercula cirrhata*

their natural enemies find difficult to reach [1]. Therefore, the parasitization of alcid birds by lice is known to be seasonal, and it severely impacts chicks because of the particular increase in incidence during the breeding and brooding period [6,10]. The tufted puffin found to be heavily parasitized in this case was a chick on 3 days after hatching and we believe that lice transmitted from the parent bird proliferated and affected the survival of the chick. Although a visual examination for ectoparasite infection on the body surface was performed when the bird was introduced from another breeding facility to the aquarium on July 2018 (Ito, T., unpublished), it seems that some lice were missed at that time. Another seabird, the black noddy, *Anous minutus*, is known to be parasitized more often by *Q. hopkinsi* Timmermann, 1952, and individuals actively sunbathe even when the temperature is high because sunlight and high temperatures suppress the growth of lice [11]. Therefore, to avoid the risk of parasites to chicks in the future, we aim to carry out control measures, such as regular deworming, and facilitate health management behaviors, such as sunbathing.

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エトピリカ (*Fratercula cirrhata*) から得られたハジラミ類

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要約

国内水族館で飼育され、孵化後3日で死亡したエトピリカ (*Fratercula cirrhata*) のヒナの剖検において、多数のハジラミ類が採集された。ハジラミは形態学的にニシツノメドリから報告のある *Quadriceps helgovauki* と同定された。本種はエトピリカから初めて記録され、また国内初記録であった。

キーワード：エトピリカ，飼育下繁殖，ハジラミ

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共同筆頭