

A Helminthological Survey on Tancho, *Grus japonensis*, in Hokkaido, Japan

Yuko OSHIMA¹⁾, Tomoo YOSHINO^{2,3)}, Ai MIZUO²⁾, Ryouji SHIMURA³⁾, Yuko IIMA³⁾, Akiko UEBAYASHI³⁾, Yuichi OSA⁴⁾, Manabu ONUMA⁵⁾, Koichi MURATA⁶⁾ and Mitsuhiro ASAKAWA^{2)*}

1) Kyoto Aquarium, Kyoto, Kyoto 600-8855, Japan

2) School of Veterinary Medicine, Rakuno Gakuen University, Ebetsu, Hokkaido 069-8501, Japan

3) Kushiro Zoo, Kushiro, Hokkaido 085-0201, Japan

4) Institute of Environmental Sciences, Hokkaido Research Organization, Sapporo, Hokkaido 060-0819, Japan

5) Center of Environmental Biology and Ecosystem Studies, National Institute for Environmental Studies, Tsukuba, Ibaraki, 305-8506 Japan.

6) College of Bioresource Sciences, Nihon University, Fujisawa, Kanagawa 252-8510, Japan.

[Received 6 April 2012; accepted 8 December 2013]

ABSTRACT

A helminthological survey was performed on 75 individuals of Tancho, *Grus japonensis*, from Hokkaido, Japan. A total of seven helminth species, including five nematode (*Baruscapillaira* sp., *Contraecaecum* sp., *Paracuaria adunca*, *Syncuaria* sp., *Viktorocara* sp.) and two trematode (*Echinostoma gotoi*, *Apatemon gracilis*) species were obtained from 57.3% of the cranes, and *E. gotoi* was the most common encountered. Among the above helminths, all helminths except for *E. gotoi* were the first host records for *G. japonensis* worldwide, and *Syncuaria* sp. was the first geographical record from Japan. Since the acuariid nematodes including the genera *Paracuaria*, *Syncuaria* and *Viktorocara* are known to cause ulcerative enteritis and/or enteritis in bird alimentary tracts, monitoring of helminths is recommended in this endangered crane species.

Key words: *Grus japonensis*, new geographical record, new host record, parasitic helminths

— *Jpn. J. Zoo. Wildl. Med.* 19(1) : 31-35, 2014

The Tancho, *Grus japonensis* (Muller, 1766), is distributed in Northeast part of China, Russia, Korea, and Hokkaido, Japan [1]. In Japan, it is a resident species and is assigned as Endangered II (VU: Vulnerable) in the Japanese Red Data Book and is designated as a special natural monument of Japan [1,2]. Current estimates suggest a population size of about 1200 individuals [3]. Several biological and ecological studies on wild and captive Tancho have been conducted, including the studies of their food habits, behavior, reproduction, genetic diversity, toxicology, viral diseases and avian coccidiosis [1,3-10]. However, there is little information regarding the pathogenic agents in this species, particularly the helminths. Recent contractions of the available habitat for Tancho in Hokkaido

have greatly increased the risk of infectious disease outbreaks, such as fatal helminthiasis [11,12]. We therefore investigated the parasites of Tancho.

A total of 75 carcasses of the Tancho were collected between 2000 and 2009 in several sites (Bekkai, Ikeda, Kushiro, Shibecheya, Shiranuka, Taiki, Tsurui, Urahoru) of Hokkaido and taken to Kushiro Zoo for postmortem. Alimentary tracts removed from the cranes stored at -20°C or fixed 10% formalin solution, and taken to the Wild Animal Medical Center (WAMC) of Rakuno Gakuen University, Japan for helminthological examination. The helminths obtained from the alimentary tracts were preserved in 70% ethanol and identified. Nematodes were cleared in lacto-phenol solution, and trematodes were stained with Heidenhain's iron haematoxylin solution for microscopic observation. Morphological and biometric data were recorded using a camera lucida (OLYMPUS Model DP20). All helminth specimens are preserved in the WAMC (WAMC-AS-Nos.

* Corresponding author :

Mitsuhiro ASAKAWA(E-mail: askam@rakuno.ac.jp)

Table 1 Helminths obtained from *Grus japonensis*

Species	Site	Number of Infected	Prevalence (%)	Mean intensity	SE	Range	
Nematoda							
Enoplida							
Trichocephaloidea Capillariidae	<i>Baruscapillaria</i> sp.	si	1	1.3	9	0.12	9
Ascaridida							
Ascaridoidea Toxocaridae	<i>Contraecum</i> sp.	gi	2	2.7	1	0	1
Spirurida							
Acuarioidea	<i>Paracuaria adunca</i>	gi	5	6.7	1.2	0.405	1-2
Acuariidae	<i>Syncuaria</i> sp.	gi	12	16.0	3.4	0.45	1-12
	<i>Viktorocara</i> sp.	gi	5	6.7	1.2	0.045	1-2
Trematoda							
Echinostomida							
Echinostomatidae	<i>Echinostoma gotoi</i>	si	33	44.0	6.5	1.45	1-58
Strigeitida							
Strigeidae	<i>Apatemon gracilis</i>	si	1	1.3	1	0.01	1

*Abbreviation of site: gi; gizzard, si; small intestine

9321-9337).

A total of seven helminth species were obtained, including five nematode (*Baruscapillaria* sp., *Contraecum* sp., *Paracuaria adunca* (Creplin, 1846), *Syncuaria* sp. *Viktorocara* sp.) and two trematode (*Echinostoma gotoi* Ando and Ozaki, 1923, *Apatemon gracilis* (Rudolphii, 1819)) species (Table 1). 57.3% of cranes (43 individuals) were infected with at least one helminth species. Among the above, the trematode, *E. gotoi* was the most common (44.0% in prevalence).

In the previous studies, one nematode (*Tetrameres grusi* (Shumakovich, 1946) from hooded crane *G. monacha* Temminck, 1835) and one trematode (*E. gotoi* from Tancho) were recorded from the birds belonging to the family Gruidae in Japan [13, 14], and Sarashina et al. [7] reported two types of nematode eggs (they assumed the types as Trichuridae and Acuariidae) in the fecal samples of Tancho. Thus, all the present helminths except for *E. gotoi* are the first records for Tancho. As well, *Syncuaria* sp. is the first geographical record from Japan.

The nematode genera *Paracuaria*, *Syncuaria* and *Viktorocara* (Fig. 1) are of the acuariid nematodes and include several species, which parasitize birds of Procellariiformes, Ciconiiformes and Charadriiformes around the world [15-18]. Several species belonging to the genus *Paracuaria* has previously been reported from the wild birds in Japan; *P.*

adunca from ancient murrelet, *Synthliboramphus antiquus* (Gmelin, 1789), slaty-backed gull, *Larus schistisagus* Stejneger, 1884, herring gull, *L. argentatus* Pontoppidan, 1763 and black-tailed gull, *L. crassirostris* Vieillot, 1818, and *Viktorocara* sp. from northern fulmar *Fulmars glacialis* [19-22]. There were several species belonging to the genera *Syncuaria* and *Viktorocara* has been recorded from worldwide [16,17, 23], we could not give the present *Syncuaria* sp. and *Viktorocara* sp. definitive name because of the present specimens heavily

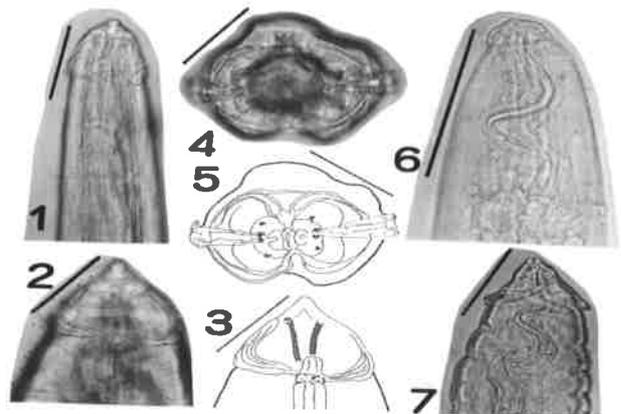


Fig. 1 Acuariid nematodes obtained from *Grus japonensis* (Bar=100µm)

- 1 to -3, *Paracuaria adunca*;
- 4 to -6, *Syncuaria* sp.;
- 7, *Viktorocara* sp.

degenerated. Although the genera *Paracuaria*, *Syncuaria* and *Viktorocara* are known to often cause severe ulcerative ventriculitis and/or enteritis [11,12,15], we did not find any indicative glossy region in the digestive tract of Tancho in this study.

The capillariid nematode of the genus *Baruscapillaria* has been recorded from several wild and domestic birds [24]. In Japan, three species belonging to this genus have been recorded: *B. obsignata* (Medsen, 1945) have been found in rock dove *Columba livia domestica* Gmelin, 1789 and domestic chicken, *B. falconis* (Goeze, 1782) in crested serpent eagle *Spilornis cheela* (Latham, 1790), and *B. mergi* (Medsen, 1945) in green-winged teal *Anas crecca* Linnaeus, 1758, greater scaup *Aythya marila* Linnaeus, 1761, tufted duck *Ay. fuligula* (Linnaeus, 1758), whooper swan *Cygnus cygnus* (Linnaeus, 1758) and common merganser *Mergus merganser* Linnaeus, 1758 [19, 25, 26]. In this study, *Baruscapillaria* specimens could not be identified to species as the present specimens were highly degenerated. Also the genus *Contraecaecum* has been recorded from several wild and captive birds and mammals [15]. In Japan, five species belonging to this genus, namely *C. rudolphii* Hartwich, 1864, *C. microcephalum* Yamaguti, 1961, *C. variegatum* (Rudolphi, 1809), *C. spiculigerum* (Rudolphi, 1809), *C. himeu* Yamaguti, 1941 and *C. milvi* Yamaguti, 1935, have been recorded from Gaviiformes, Pelecaniformes, Ciconiiformes, Falconiformes, Anseriformes and Charadriiformes [20, 25, 27]. In this study, *Contraecaecum* specimens could not be identified to species as only one immature female was obtained.

The digenetic trematode, *A. gracilis*, mainly parasitizes in the small intestine of the Anseriformes and Charadriiformes of the world [15], and has been reported from spot-billed duck *A. zonorhyncha* Swinhoe, 1866, common merganser *M. merganser* and the domestic duck in Japan [20, 28, 29]. In this survey, only one gravid specimen was obtained from the host. However, it is not sure that the infection of *A. gracilis* on Tancho is accidental or not. Although several species belonging to the genus *Echinostoma* including the zoonotic species such as *E. revolutum* (Froelich, 1802) have been recorded in Japan [20,30], we could not find other echinostomatid species.

Although no evidence of pathogenicity or mortality directly attributed to the helminth infections was found in the present survey, stress factors (e.g., capture, deterioration of habitat) seem to be related to a susceptibility to parasitic infection

[11,12]. And, fatal helminthiases caused by gastrointestinal nematodes and/or acanthocephalans were reported in the wild and captive cranes [31, 32]. Because some highly pathogenic helminths were found from the Tancho in Japan, attention is needed for the parasite infections in considering the conservation of them.

ACKNOWLEDGEMENT

The present survey was supported in part by the Supported Program for the Strategic Research Foundation at Private Universities (2013-2017) of the Ministry of Education, Culture, Science and Technology, Japan, and by the Hokkaido Sough Kenkyu Kikoh Juten Kenkyu 2011. We also thank to Y. Ito and C. Hashimoto, for their assistance in sampling.

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タンチョウの寄生蠕虫類調査

大島由子¹⁾, 吉野智生^{2,3)}, 水尾 愛²⁾, 志村良治³⁾, 飯間裕子³⁾,
上林亜紀子³⁾, 長 雄一⁴⁾, 大沼 学⁵⁾, 村田浩一⁶⁾, 浅川満彦²⁾

1) 京都水族館 〒600-8855 京都府京都市下京区観喜寺町 35-1

2) 酪農学園大学獣医学群 〒069-8501 北海道江別市文京台緑町 582

3) 釧路市動物園 〒085-0201 北海道釧路市阿寒町仁々志別 1182

4) 北海道総合研究機構環境科学研究センター 〒060-0819 北海道札幌市北区北 19 条西 12 丁目

5) 独立行政法人国立環境研究所生物・生態系環境研究センター環境遺伝情報解析研究室 〒305-8506 茨城県つくば市小野川 16-2

6) 日本大学生物資源科学部動物資源科学科 〒252-8510 神奈川県藤沢市亀井野 1866

[2012年4月6日受領, 2013年12月8日採扱]

要 約

2000年から2009年の間に北海道内各地で傷病個体として回収された後、斃死したタンチョウ75個体の寄生蠕虫類保有状況を調査した。57.3%から線虫5種 (*Baruscaphillaria* sp., *Contraecaecum* sp., *Paracuaria adunca*, *Syncuaria* sp., *Viktorocara* sp.) および吸虫2種 (*Echinostoma gotoi*, *Apatemon gracilis*) の計7種の蠕虫類のいずれかが検出された。*E. gotoi*を除く6種はタンチョウから初記録であり, *Syncuaria* sp. は日本初記録であった。得られた蠕虫類の中には *Paracuaria* 属, *Syncuaria* 属および *Viktorocara* 属など, 消化管潰瘍や腸炎の原因となる線虫が含まれたため, 絶滅危惧種であるタンチョウの保護管理上, 今後寄生虫のモニタリングが必要であると考えられた。

キーワード: タンチョウ, 新産地記録, 新宿主記録, 寄生蠕虫類

— 日本野生動物医学会誌 19(1): 31-35, 2014