

Gizzard Spirurid Nematode *Acuaria skrjabini* in Japanese Tree Sparrows and a Gray Starling from Tokyo

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ABSTRACT. Gastrointestinal helminths were collected from 49 Japanese tree sparrows (*Passer montanus saturatus*) in Tokyo, Japan. In 16 sparrows, 1–9 (average, 3.5) gizzard spirurid nematodes (*Acuaria skrjabini* Ozerskaya, 1926) were found embedded in the mucosa of the gizzard. In addition, *Capillaria* sp., *Platynosomum passeri* Yamashita et Tsumura, 1962, and a hymenolepidid cestode were collected from 1, 2, and 1 sparrows, respectively. A sexually mature *A. skrjabini* female and 3 males were found also in a young gray starling (*Sturnus cineraceus*) that was found dead in the same area after failure to leave the nest. Starlings are a new host record for this spirurid species. Until this study, this gizzard spirurid species has not been recorded in this country or the Far East region.

KEY WORDS: *Acuaria skrjabini*, Japan, sparrow.

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Tree sparrows (*Passer montanus*) are common wild birds worldwide, but information about their parasitic fauna is limited. Particularly from the Far East region including Japan, few works have been conducted on parasites in sparrows; 4 trematode species (*Gigantobilharzia sturniae*, *Plagiorchis muris*, *Platynosomum passeri*, and *Pseudobilharzia corvi*), and 1 cestode species (*Choanotaenia passerina*), and no nematode species have been documented to date [1, 4, 10, 11, 13]. Under current environmental protection policies, research on protected animal species is often difficult, and sometimes we know little or nothing about the normal fauna or pathogens that they carry. A special permission to collect wild birds including tree sparrows was obtained from the Tokyo Metropolitan Government for an epidemiological survey on *Chlamydia psittaci* in wild birds along with parasitological survey. This program enabled us to determine the parasitic fauna of sparrows in the Far East.

Forty-nine Japanese tree sparrows (*P. montanus saturatus*) were collected at Hamura City, Tokyo, during March, 2004 under a permission of Tokyo Metropolitan Government. The proventricle, gizzard and part of the intestine from each sparrow were transported at cool condition (4°C) to the Parasitology Laboratory. Helminthological examinations were usually conducted about one day after collection. One young gray starling (*Sturnus cineraceus*), which died after failure to leave the nest, was collected at the same location on 5 July, 2004. The viscera of this bird were submitted for parasitological examination using a similar process. The collected parasites were fixed in hot 10% neutral-buffered formalin, and drawings for measurements were made with the aid of a camera lucida. One gizzard from a sparrow, known to be parasitized with the worms, was fixed in formalin, dehydrated in a series of alcohol, cleaned in xylene, and embedded in paraffin. Histological sections (5 µm thick) were stained with hematoxylin-eosin using a standard method.

Collected parasites from sparrows included 2 nematode, 1 trematode, and 1 cestode species (Table 1). *Acuaria skrjabini* Ozerskaya, 1926 was localized in the mucosa of the gizzard. By peeling off the surface layer from the underlying mucosa and tunica muscularis, the embedded worms in zigzag trails in the pellicle were easily detected (Fig. 1). There was no inflammation around the parasite (Fig. 2). Unisexual parasitism was found in 8 of 16 sparrows, even when the collected parasites were not single. Three male and one female nematodes collected from the gizzard of a starling had an identical morphology with *A. skrjabini* recovered from tree sparrows in the same location. *Acuaria skrjabini* had two small triangular lips, and four short straight cordons, which started in pairs from the angles of the mouth (Fig. 3). Male worms had asymmetric caudal alea and 11 pairs of pedunculated caudal papillae, of which four pairs are pre-anal and seven pairs post-anal (Fig. 4). Sometimes abnormal arrangement of these papillae was found in individual worms. Measurements are shown in Table 2, coincident well with the previous reports [6, 8, 9].

Trematodes collected from the intestine of 2 sparrows were *Platynosomum passeri* Yamashita et Tsumura, 1962 recorded originally from the gall bladder. One female *Cap-*

Table 1. Gastrointestinal helminth parasites from 49 Japanese tree sparrows collected in Tokyo

	No. of infected sparrows	Infection intensity
Nematode		
<i>Acuaria skrjabini</i>	16	1–9 (3.5 ± 1.2)*
<i>Capillaria</i> sp.	1	1 female
Trematode		
<i>Platynosomum passeri</i>	2	23 and 1
Cestode		
Hymenolepididae gen. sp.	1	9

* Range with mean ± SD in parenthesis.

Table 2. Morphological features of *Acuaria skrabini* Ozerskaya, 1926 collected from Japanese tree sparrows and a gray starling in Tokyo*

Sex of worm	Male			Female		
Host	Sparrows	Sparrows	Starling	Sparrows	Sparrows	Starling
Number of examined worms	3	13	3	4	11	1
Reference	Ozerskaya, 1926[9]	The present study	The present study	Ozerskaya, 1926[9]	The present study	The present study
Body Length	9.1 ± 0.3 (8.8–9.2)	5.5 ± 0.8 (3.6–6.7)	4.4 ± 0.2 (4.2–4.6)	25.5 ± 3.1 (22.3–28.3)	20.3 ± 2.5 (17.8–24.6)	10.0
Max. body width	0.17 ± 0.02 (0.15–0.19)	0.12 ± 0.01 (0.11–0.13)	0.11 ± 0.01 (0.10–0.12)	0.18 ± 0.05 (0.14–0.22)	0.19 ± 0.02 (0.17–0.22)	0.13
Length of pharynx	0.175 ± 0.017 (0.160–0.194)	0.13 ± 0.02 (0.10–0.15)	0.14 ± 0.01 (0.14–0.15)	0.21 ± 0.03 (0.18–0.23)	0.16 ± 0.03 (0.13–0.20)	0.16
Length of muscular esophagus	0.43 ± 0.03 (0.40–0.46)	0.34 ± 0.05 (0.26–0.41)	0.29 ± 0.04 (0.25–0.31)	0.64 ± 0.06 (0.59–0.68)	0.56 ± 0.10 (0.43–0.66)	0.42
Length of glandular esophagus	1.00 ± 0.08 (0.93–1.08)	0.70 ± 0.09 (0.51–0.83)	0.64 ± 0.08 (0.55–0.71)	1.25 ± 0.03 (1.17–1.31)	1.02 ± 0.15 (0.70–1.18)	0.90
Max. width of esophagus	—**	0.064 ± 0.010 (0.049–0.085)	0.052 ± 0.006 (0.048–0.059)	—	0.097 ± 0.010 (0.085–0.119)	0.065
Length of cordons	0.25–0.28	0.18 ± 0.04 (0.13–0.26)	0.21 ± 0.02 (0.18–0.23)	0.23–0.38	0.29 ± 0.07 (0.20–0.39)	0.30
Nerve ring from anterior end	—	0.151 ± 0.016 (0.132–0.170)	0.156 ± 0.023 (0.130–0.174)	—	0.149 & 0.191 (2 specimens)	0.187
Cervical papilla from anterior end	—	—	0.152 ± 0.028 (0.121–0.174)	—	—	0.187
Excretory pore from anterior end	—	—	0.229 ± 0.031 (0.200–0.261)	—	—	0.235
Spicule	Unequal	Unequal	Unequal	—	—	—
Left	0.228 ± 0.020 (0.205–0.239)	0.184 ± 0.005 (0.174–0.191)	0.180 ± 0.005 (0.174–0.183)	—	—	—
Right	0.140 ± 0.013 (0.125–0.148)	0.129 ± 0.008 (0.117–0.147)	0.115 ± 0.015 (0.104–0.132)	—	—	—
Vulva from anterior end	—	—	—	11.97 ± 1.01 (11.11–13.11)	9.16 ± 1.78 (6.68–12.19)	4.78
Tail	0.20 (1 specimen)	0.211 ± 0.021 (0.184–0.247)	0.173 ± 0.017 (0.154–0.185)	0.208 ± 0.035 (0.17–0.25)	0.158 ± 0.025 (0.120–0.210)	0.200
Size of eggs	—	—	—	46 (43–48) µm × 28–29 µm	39 (38–42) µm × 25 (24–26) µm	38 (37–41) µm × 22 (21–23) µm

* Data are mean ± SD (range) in mm except for egg size. ** No data.



Fig. 1. *Acuaria skrabini* in the gizzard pellicle peeled off from the underlying mucosa of the gizzard from a sparrow.

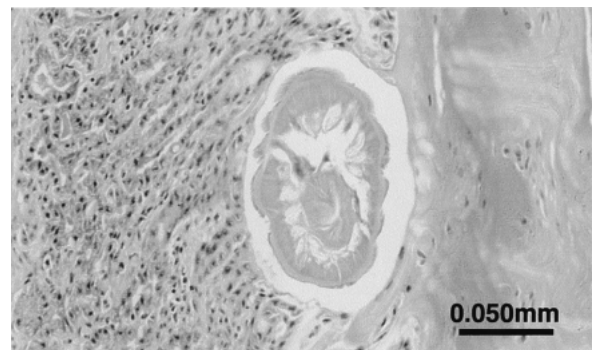


Fig. 2. A transverse section of *A. skrabini* at the border between the pellicle (right side of the figure) and the secretory region (left side) of mucosa of the gizzard taken from a sparrow. Note the lack of inflammation around the parasite.

illaria and 9 hymenolepidid worms with a rudimentary rostellum were detected from 2 different sparrows. One hymenolepid with a rudimentary rostellum was collected from a starling as well. Cestodes from either a sparrow or a starling were too degenerated to identify the species.

In Japan, *Acuaria anthuris* (Rudolphi, 1819) Railliet,

Henry et Sisoff, 1912 from *Corvus corone orientalis* is the only known acuariid species from wild passerine birds until this study [11, 12]. *Acuaria skrabini* is distinct from the former species in several points such as cordon length, arrangement of caudal papillae, length and rate of two

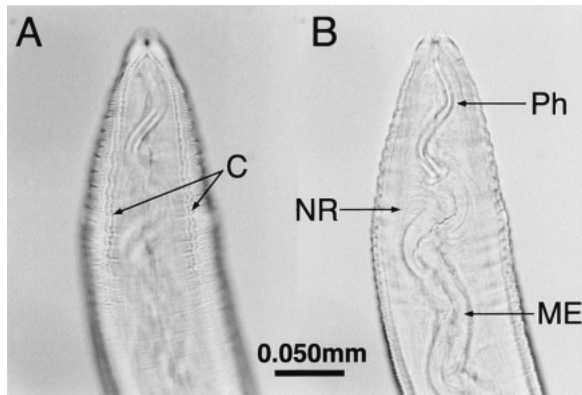


Fig. 3. The anterior end of *A. skrjabini* from a sparrow. The identical worm is seen at different focuses; (A) the superficial cuticle structure, and (B) the internal structures. C, cordon; ME, muscular esophagus; NR, nerve ring; Ph, pharynx.

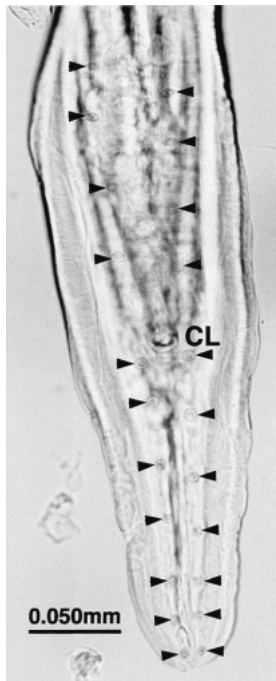


Fig. 4. The caudal end of male *A. skrjabini* from a sparrow. Arrowheads indicate pedunculated caudal papillae; 4 pre-anal pairs and 7 post-anal pairs. CL, cloaca.

unequal spicules, and a variety of measurable features [6, 9]. *Acuaria skrjabini* was recorded from house sparrows (*Passer domesticus*) and tree sparrows in Russia and India [8, 9] along with Australia and New Zealand mentioned below, and no distributional records are available on this species in the Far East before this study. Therefore, the present record of *A. skrjabini* from Japanese tree sparrows provides the basis for speculation that this acuariid species parasitizes sparrows distributing widely in the Far East as well, or a wide range of Eurasia. Furthermore, *A. skrjabini* is recorded for the first time from a new host, *Sturnus ciner-*

aceus, but it is uncertain how much starlings play a role for its natural life cycle. Gupta and Jehan [2] recorded heavy infection of *A. anthuris* in a common starling, *Sturnus vulgaris*, which died in a zoological garden in India. In Australia and New Zealand where sparrows are recent invasive species, fatal *A. skrjabini* infection with severe gizzard lesions were occasionally recorded from a variety of exotic and endemic (Australian) aviary finches [3, 5–7]. We speculate that a minor proportion of sparrows and other wild passerine birds at any location are killed by a heavy load of this acuariid species.

The dicrocoellid trematode species, *Platynosomum passeri*, was originally obtained from the gall bladder of 9 of 48 Japanese tree sparrows in the western part of the mainland Japan, and recorded as a new species [13]. After this report, the trematode was found in 7 of 46, and 78 of 140 Japanese tree sparrows in the Kyushu island of Japan [10] and Kanagawa Prefecture near Tokyo [1], respectively. Although we did not examine the gall bladder and therefore we did not provide the actual infection rate, it is possible that *P. passeri* is a common trematode in tree sparrows at least in Japan.

Kawano [4] and Fukase *et al.* [1] recorded a single cestode species, *Choanotaenia passerina*, in 40 of 130, or 10 of 120 Japanese tree sparrows in Tokyo and Kanagawa Prefecture, respectively. Interestingly, the cestode showed marked seasonal variation in the infection rate; no parasites were collected from November to April [4]. This was ascribed to a) the active period of intermediate hosts, b) seasonal variations of feeding habitat of the host, and c) the short life span of the cestode [4]. Since sparrows examined in this study were collected in March, it is not strange that no *C. passerina* was found in them.

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