Diplotriaena falconis* (Connal, 1912) (Filariidae, Nematoda) from a Red-Legged Falconet, *Microhierax caerulescens

Soichi IMAI, Sei-ichi IKEDA, Toshio ISHII, and Kazuyoshi UEMATSU¹⁾

Department of Parasitology, Nippon Veterinary and Zootechnical College, Musashino-shi, Tokyo 180, and ¹⁾Nagano Zoo, Shinonoi Utabi, Nagano 388, Japan

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A red-legged falconet, *Microhierax caerulescens*, was imported unlawfully from Thailand into Japan in July 1987, and died at Nagano Zoo in October. When the pathological examination of it was done, four nematodes were collected from the air sac with the findings as engorgement of the lung and dropsical swelling of the lower part of right groin articulation. Then two individuals of the nematodes, one male and one female, were examined with light and scanning electron microscopes for the purpose of its identification.

Materials first fixed in 35% (V/V) ethanol were immersed in glycerol alcohol consisting of 95 parts of 70% (V/V) ethanol and 5 parts of glycerol for one night, and then cleared in glycerol. After the cleared materials were examined by light microscopy, the same materials were treated as scanning electron microscopical specimens. According to the method of Párducz [4], the nematode specimens were refixed in Párducz's fixative, dehydrated in a graded ethanol series, dried in a liquid CO₂ critical point dryer, sputter-coated with a thin layer of gold, and observed by a JSM-25S III model (JEOL) scanning electron microscope.

Both nematodes examined were white and threadlike. Under the observation with low magnification, no characteristic structures, such as lips, spines and folds, were recognized. Esophagus was relatively long, and consisted of two parts, anterior muscular and posterior glandular esophagus. Two tridents, three-forked chitinous structures, were situated at anterior end of body. The apex of each trident was blunt (Figs. 1 and 2). In scanning electron microscopy, two lateral and four submedial papillae were observed around the mouth (Figs. 7 and 8). Other characteristics of the male and female are as follows:

Male: Cuticle was smooth. Both head and tail

were rounded without caudal alae (Fig. 3). Caudal end was relatively broad with lateral expansions, and many caudal papillae were observed on it (Fig. 9). Spicules were unequal, measuring 1,250 μ m and 750 μ m in length, respectively. The longer spicule was almost straight but the shorter one had 7 twists (Fig. 3).

Female: Cuticle was smooth. Round head and tail with caudal papillae were recognized as well as in the male (Fig. 10). Vulva opened at the region of lateral side of the glandular esophagus (Figs. 4 and 5). Uterus contained many eggs. The eggs presenting near the vulva were ovoid with thick shell, and including larvae (Fig. 6).

The schematic drawings of the male and female are shown in Fig. 11 and the measurements in Table 1.

From the morphological features, measurements, host and parasitic region, these nematodes were identified as *Diplotriaena falconis* (Connal, 1912) of Filariidae [1].

Filariid nematodes belonging to the genus *Diplotriaena* have been widely detected from the air sac and subcutaneous tissues of various birds, such as Anseriformes, Falconiformes, Galliformes, Charadriiformes, Columbiformes, Piciformes and Passeriformes [5]. Yamaguti [5] has listed 78 species, of which 3 from Japan, of this genus, but afterward Anderson [1] has revised the list into 47 species. *Diplotriaena falconis* identified in the present examination has been only described from the falcons, *Falco* spp., in Africa [1, 5]. Neither life cycle of this species has been known nor in the present examination, but that of one of the related species, *Diplotriaena agelaius*, parasitic in *Seiurus aurocapillus* has been reported [3]. According to the reference, excreted eggs in the host feces are taken by a grass hopper, and grow to 3rd stage larvae. When the larvae are intaken by the bird as final host, they migrate in blood or lymph stream, and develop to adults in the lung and/or air sac of the host [3]. The red-legged falconet inhabits the lower slopes of the Himalayas, and feeds mainly

Figs. 1-6. Optical micrographs of *Diplotrriaena falconis*. 1 and 2. Heads of the male (1) and female (2). Two tridents (arrows) are shown in respective figure. 1. $\times 160$. 2. $\times 200$. 3. Posterior part of the male. Two spicules, straight (sp 1) and twisted (sp 2) ones, are shown. $\times 60$. 4. Anterior part of the female. Esophagus is divided into muscular-(me) and glandular-(ge) esophagus. Vulva (v) opens at the anterior region of the glandular esophagus. Eggs (e) are included in the uterus in a line. $\times 32$. 5. Vulva of female. $\times 150$. 6. Eggs with thick shells. $\times 410$.

on insects [2], so that the present nematode species seems to have a similar life cycle to *D. agelaius*. Though the pathogenicity of *D. falconis* has been remained unexplained, this species may cause inflammatory lesion to the lung and/or air sac of host, in which the parasites infect, if *D. falconis* has the life cycle similar to it of *D. agelaius*. Thus, the engorgement found in the lung of the present material may be due to the parasitism by *D. falconis*. However, the pathogenicity of the species of *Diplotrriaena* seems to be not so strong because these species have widely and commonly distributed in various birds [5]. So that it is difficult to consider that the death of the present red-legged falconet was caused by *D. falconis*.

Table 1. Measurements of *Diplotrriaena falconis* collected from a red-legged falconet

	Male	Female
Body length (mm)	29	61
Body width (mm)	0.56	0.64
Muscular esophagus (mm)	0.21	0.33
Glandular esophagus (mm)	1.50	2.50
Mouth-vulva (mm)	—	0.60
Trident (μm)	150	120
Spicule 1 (μm)	1,250	—
Spicule 2 (μm)	750	—
Egg (μm)	—	62 $\times$ 44

Figs. 7–10. SEM of *Diplotriaena falconis*. 7 and 8. Anterior ends of the male (7) and female (8). Poorly developed mouth (m), two lateral papillae (lp) and four submedial papillae (arrows) are shown in each individual. 7. $\times 560$. 8. $\times 700$. 9 and 10. Posterior ends of the male (9) and female (10). Many caudal papillae are indicated in respective figure. 9. $\times 430$. 10. $\times 310$.

Fig. 11. Schematic diagram of *Diplotriaena falconis* (Connal, 1912). a. Anterior part of male. b. Anterior part of female. c. Posterior part of male. d. Egg.

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要 約

モモアカヒメハヤブサより得られた *Diplotrinaena falconis* (短報)：今井壮一・池田聖一・石井俊雄・植松一良¹⁾ (日本獣医畜産大学, ¹⁾長野市茶臼山動物園)——タイより不正輸入されたのち斃死したモモアカヒメハヤブサ *Microhierax caerulescens* の胸部気嚢内より回収された線虫を、光顕および走査電顕で観察した結果、これまでアフリカのみから報告のある *Diplotrinaena falconis* と同定した。