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Research note

Corrections to description of *Cardiofilaria dubia* (Nematoda) parasitizing Australian parrot

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Summary

The species *Cardiofilaria dubia* (Johnston et Mawson, 1940) parasitizing Australian parrot (*Cacatua* sp.) were morphometrically studied and redescribed. The original description was corrected in some morphological details (male head, structure of oesophagus, number of cloacal papillae). Evidence of errors in the original description of cloaca – tail distance (0.7 versus 0.086 mm) and spiculae length (0.01 mm versus 0.069 – 0.075 mm) were documented. Differentiation of *C. dubia* from other species of the genus *Cardiofilaria* was discussed.

Key words: *Cardiofilaria dubia*; morphometry; *Cacatua* sp.; redescription

Introduction

There are sixteen species arranged in the genus *Cardiofilaria* Strom, 1937 (family Splendidofilariidae) specialized parasites of avian hosts (Anderson & Bain, 1976; Anderson & Freeman, 1969; Bartlett & Anderson, 1980; Chabaud & Bain, 1990; Sonin, 1968, 1977). Only two species of this genus parasitizing in psittacine birds (Psittaciformes) are known. Pinto *et al.* (1993) and Baruš & Tukač (1997) repeatedly reported the presence of *C. pyrrhurae* (Freitas et Mendonça, 1952) from South American psittacine birds. Johnston & Mawson (1940) described the *C. dubia* from Australian parrot. Dharma *et al.* (1985) reported non-exactly determined taxon *Cardiofilaria* sp. from two non-exactly determined species of cockatoos and two *Eos bornea* (Linnaeus, 1758) from the Eastern Islands of Indonesia. Sonin (1961, 1968) put this taxon, originally arranged into genus *Carinema* (Pereira et Vaz, 1933), into the genus *Cardiofilaria* and alerted to possible errors in the original description (tail length of male, spiculae length).
Our specimens of nematodes obtained from *Cacatua* sp. were evaluated as conspecific with *C. dubia* and in this note we specified its determinative features.

Material and Methods

During the years 2002 – 2004, 143 psittacine birds of thirty species kept in captivity in the Czech Republic were investigated post-mortem for the infection with nematodes. In one specimen from *Cacatua* sp., which died soon after import from Australia, four adult nematodes (1 male and 3 females) were found in the abdominal cavity. All nematodes were fixed in 4 % formalin and purified in glycerine-water solution. The nematodes were examined by light microscope with differential interference contrast (DIC) and measured by digital image analysis system (ProPlus 1.3 for Windows 95). Drawings were made by the camera lucida and dimensions were given in millimetres.

Results

The morphology of the examined nematodes fully resembles to the genus *Cardiofilaria* and the morphometry (see Table 1, and discussion) is very similar or identical with taxon *Cardiofilaria dubia* (Johnston et Mawson, 1940).

Description (Fig.1): There is medium-sized nematode, widest at about middle, with smooth cuticle, lacking bosses or conspicuous striae. The head of male is narrower; head of the female is widely rounded (Fig. 1A, B, D). Mouth is round or dorsovenraly elongated, leading by 0.005 – 0.007 long funnel-shaped vestibule to oesophagus. The base of this tiny vestibule is surrounded by slightly sclerotized ring. The head has four papillae in outer circle; four in inner circle, and all are very small. Amphidial pores are conspicuous (Fig.1A). Oesophagus is very narrow, not divided and muscular throughout (Fig.1B, D) with nerve ring in about anterior one-third. There is an excretory pore at the level of nerve ring; deirids and alae are absent.

Male: Tail is rounded; spiculae are slightly unequal in lenght, distally tapering. Papillae are very small and distributed around the cloacal opening in number eight, two

pairs are near the top of tail (Fig. 1E). Gubernaculum is absent.

Female: Tail is rounded; anus is atrophied (Fig. 1C) and situated 0.18 – 0.20 from posterior end. Vulva with non-salient lips is founded behind the oesophagus. Microfilariae are present.

Cardiofilaria dubia described originally by Johnston and Mawson (1940) from host *Geofroyus geoffroyi mclennani* (MacGillivray, 1913) (locality North Queensland).

The head of our male nematode is mildly narrower and slightly obtuse (in original description rounded only). Division of the oesophagus into two parts (division is more clearly indicated in some specimens than others, the distinction being that of cell structure, not of size - according to Johnston & Mawson, 1940) is not clear in our nematode, which responds to the genus *Cardiofilaria* (oesophagus undivided). The difference in the number and distribution of cloacal papillae could not be applied to species differentiation within this genus. The papillae in nematode species from the genus *Cardiofilaria* are small and not clear. In our nematodes, the group of eight papillae was found around cloacal opening and two pairs on the tail. Johnston and Mawson (1940) described two pairs (4) of not clear papillae only around cloaca. We also found the metric differences (Table 1) in the length of spiculae and tail length of males. We suppose, that in the original description by Johnston & Mawson (1940), the press mistake had been done, because according to picture (p. 356; fig. 7) of posterior end of male and attached scale (0.050 mm), the tail is slightly longer than spiculae (tail length 0.070 – 0.080 mm and spiculae length 0.060 – 0.070 mm), which corresponds to our results. Therefore we consider our nematodes to be conspecific with taxon *C. dubia.*

The species *C. dubia* differs from other species of the genus *Cardiofilaria* in body length of male (> 15.0 mm; the other are smaller < 13.5 mm). Male from this genus has narrow range of the spiculae length 0.060 – 0.122 mm (except *C. pyrrhurae*, left 0.126 – 0.190 mm, right 0.108 – 0.150 mm) and tail is shorter than spiculae (0.044 – 0.090 mm) (Baruš & Tukač, 1997; Freitas & Mendonça, 1952). The body length of female from the genus *Cardiofilaria* is also characteristic sign, but for differentiation of taxons less significant. Species *C. dubia, C. pyrrhurae* and *C. stepheni* (Schmidt et Neiland, 1973) from host of order Passeriformes (Formicariidae) from Nicaragua and *C. micropenis* (Travassos, 1926) from Piciformes (Rhamphastidae) from Brazil have the body longer than 20 mm. The specimen *Cardiofilaria* sp. from Indonesian parakeets (Dharma *et al.*, 1985) belongs to this sized group of cardiofilariids, because of the body length of male 20 – 25 mm (other data are not showed).

Table 1. Comparative features of *Cardiofilaria dubia*. Measurements in mm.

Dimension	Male		Female	
Authors (number of specimens)	1	2 (n=1)	1	2 (n=3)
Body length	15	17.08	25	18.0 – 25.3
Body width	0.184	0.290	0.32	0.33 – 0.35
Oesophagus length	0.38	0.35	0.45	0.55 – 0.59
Distance cloaca - tail	0.7	0.086	–	–
Spiculae length	0.010	0.069 – 0.075	–	–
Distance head - vulva	–	–	1.7	1.73 – 1.74

1 – according to Johnston & Mawson (1940); 2 – our data

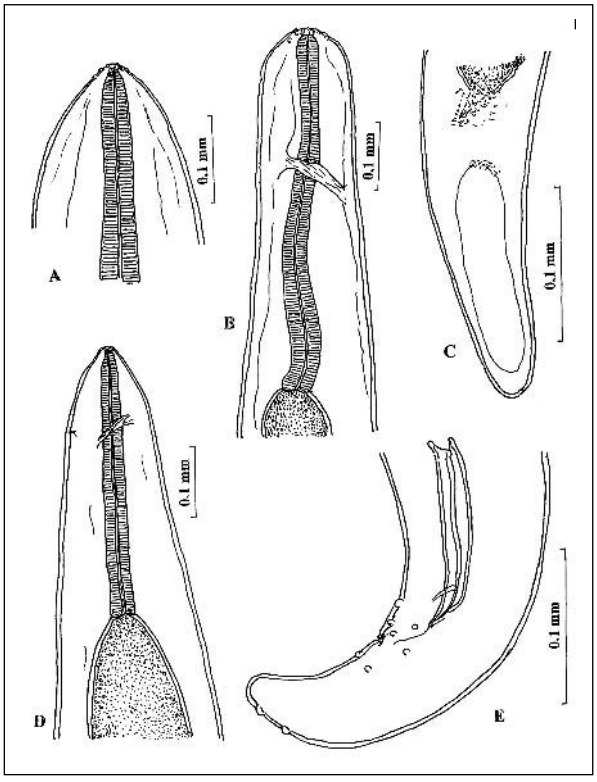

Fig. 1. *Cardiofilaria dubia* from the host *Cacatua* sp.
A – male head end (detail); B – female anterior extremity (total view); C – female tail (latero-ventral view); D – male anterior extremity (total view); E – male caudal end (lateral view). Original.

Discussion

By the comparison of morphological signs, we found small differences in the shape of the head end in our nematode specimens from *Cacatua* sp. (imported from Australia) and

Reppas *et al.* (1995) during investigation of microfilaraemia in Australian native birds found one positive case in the Western Rosella (*Platycercus icterotis* (Kuhl, 1820)). But no adult filarioid worm was found in this host. In parakeets, as in other bird hosts with blood microfilariae (namely by *Cardiofilaria* and other genera), have not yet been correlated the presence with adult nematode parasites (Berdyev, 1979; Dharma *et al.*, 1985; Reppas *et al.*, 1995). Adult filarioid worms often are not found at routine necropsy in birds in which microfilariae have been detected (Campbell, 1988). Careful dissection may be required to locate adult filarioid nematodes in birds in generalls (Anderson & Bain, 1976). Petrak (1982) suggested that infection with adult filarioid worms and microfilariae may be an important contributing cause of death in some birds.

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