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First Report of *Capillaria anatis* (Nematoda: Capillariidae) from *Corvus* Species of Kashmir- India

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Abstract: During the present study, three species of birds belonging to the genus *Corvus* (*C. monedula*, *C. splendens* and *C. macrorhynchos*) were collected from different localities of Kashmir and investigated for the presence of helminthes. *Capillaria anatis* was recovered from *C. monedula* and *C. splendens* for the first time from the study area. However, no specimen of this nematode was obtained from *C. macrorhynchos* in the present study. The specimens were identified and redescribed as *Capillaria anatis* on the basis of various morphological and morphometric characters when compared to the known species of genus *Capillaria.* However, some intraspecific variations were observed. The prevalence, mean intensity and abundance of the parasite were determined.

Key words: *Capillaria* · *Corvus* · Nematode · Helminth · Kashmir

INTRODUCTION

The present study was the part of helminthological investigation carried on three *Corvus* species (*C. monedula*, *C. splendens* and *C. macrorhynchos*) of Kashmir from November 2007 to May 2009. *C. monedula* Linnaeus, 1758 (Jackdaw) is a black-plumaged passerine bird with distinctive white irises; sexes and ages are alike [1]. It is omnivorous and feeds on plant material and invertebrates [2]. *C. splendens* Vieillot, 1817 (House crow) is about 40 cm in length with lighter grey-brown neck and breast. The wings, tail and legs are black. It appears to be associated with humans and no populations are known to exist independently of humans [3]. *C. macrorhynchos* Wagler, 1827 (Jungle crow) is large-billed crow with black glossy wings, tail, face and throat.

The groups of parasites which infect birds and cause diseases include: viruses, bacteria, protozoans and helminthes besides some arthropod ectoparasites. *Capillaria* Zeder, 1800 forms a large genus of nematoda and parasitizes almost all organs of vertebrates [4, 5]. However, *Capillaria* species are very difficult to collect due to their extreme slenderness and lack of movement, which make them difficult to detect in infected tissues and lumen of infested organs like intestine.

The species of *Capillaria* reported earlier from the Kashmir valley include *Capillaria kashmirensis* Raina and Kaul, 1982 from the stomach of bat, *Myotis muricola* [6]; *Capillaria minuta* from the esophagus of shrew, *Crocidura* sp. [7]; *Capillaria annulata* Molin, 1858 from the crop and esophagus and, *Capillaria caudinflata* Molin, 1858 from small intestine of domestic fowl, *Gallus gallus domesticus* [8].

However, systematic knowledge of nematode parasites from birds of Kashmir including *Corvus* is still represented through a few references as is obvious by tracing the historical review of nematodes from aves of Kashmir [8, 9-16]. *Syngamus trachea* from the trachea of *C. splendens* is the only nematode reported from any *C.* species in Kashmir so far [14].

The present paper gives redescription of *C. anatis* collected from the intestine of *C. monedula* and *C. splendens,* caught from different localities in Kashmir.

MATERIALS AND METHODS

Study Area: Kashmir valley is a temperate North West Himalayan region of Jammu and Kashmir state in India. It lies between 33°20' and 34°54'N latitudes and 73°55' and 75°35'E longitudes, covering an area of about

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15,948 sq km. It is a deep bowl shaped valley bounded by lofty mountains of the Pir Panjal and the great Himalayan ranges. The floristic and faunal diversity of the valley is considerably rich owing to its unique topography, temperate climate and geographical isolation from the surrounding plains [17].

Collection and Processing of Nematode Specimens: During the present study, 65 birds belonging to three species of the genus *Corvus* (*C. monedula* Linnaeus, 1758; *C. splendens* Vieillot, 1817 and *C. macrorhynchos* Wagler, 1827) were caught alive with the help of nylon net traps, locally known as "*Walwash*" from different localities of Kashmir using suitable baits. The hosts were slaughtered and dissected for parasitological investigation. The nematode parasites thus collected were fixed in hot 70% alcohol, cleared in lactophenol and mounted in glycerine jelly [18]. The drawings of the specimens were made with the help of prism type camera lucida. Measurements were taken with objective and stage micrometers and expressed in mm. The specimens were identified on the basis of various morphological and morphometric characters following Schrank [19], Travassos [20], Todd [21] and Yamaguti [22]. Photomicrography was done with the help of Digital Olympus Camera. For prevalence, intensity and abundance, the nomenclature given by Bush *et al.,* 1997 was followed [23].

RESULTS

Capillaria anatis (Schrank, 1790) Travossos, 1915 recovered from two species of crows, (*C. monedula* and *C. splendens*) collected from Kashmir valley is redescribed here. Of the 65 hosts examined during the study, a total of 91 specimens of this nematode were recovered from 18 hosts with an overall prevalence of 27.07%. The prevalence, mean intensity and abundance of the parasite were recorded as 43.33%, 5.76%, 2.5% and 21.74%, 3.2% and 0.09% in *C. monedula* and *C. splendens* respectively. However, no specimen of this parasite was obtained from *C. macrorhynchos* during the present study (Table 1).

A detailed morphological and morphometric study of the parasite revealed some intraspecific variations (Table 2). The following redescription of *Capillaria anatis* is based on 20 female and 10 male specimens:

Nematode : *Capillaria anatis* (Schrank, 1790) Travossos, 1915.
Hosts : *C. monedula, C. splendens.*
Locality : Kashmir.
Site : Intestine.
Synonymy : *Capillaria brevicollis* Walton 1935

Female: Female nematodes measure 9.42-16.5 mm in length and 0.030- 0.064 mm in diameter. Length of esophagus is 4.10-6.05 mm. The vulva is situated at about

Table 1: Prevalence, mean intensity and abundance of *Capillaria anatis* in three *Corvus* species of Kashmir

Host spp.	NE	NI	NP	P	MI	AB
C. monedula	30	13	75	43.33	5.76	2.5
C. splendens	23	5	16	21.74	3.2	0.09
C. macrorhynchos	12	0	0	0	0	0
Total	65	18	91	27.7	5.05	1.4

(NE=Number examined; NI=Number infected; NP =Number of parasites P=Prevalence; MI= mean intensity; Ab=Abundance)

Table 2: Comparative measurements of *C. anatis* (Schrank, 1790) with the Present material (measurements in mm)

Particulars	*C. anatis* (Schrank, 1790)	Present material
SEX	FEMALE	FEMALE
Body length	8.11-18.34	9.42-16.50
Body diameter	0.044-0.060	0.030-0.064
Length of esophagus	-	4.10-6.05
Position of vulva from anterior end	-	4.46-6.12
Vaginal length	-	0.026-0.46
Egg size	0.055-0.062x0.022-0.029	0.048-0.057x0.024-0.027
SEX	MALE	MALE
Body Length	6.70-13.14	8.20-13.5
Body diameter	-	0.028-0.06
Length of esophagus	-	4.46-5.85
Length of spicule	0.017-0.026	0.48-0.65
Width of spicule	-	0.013-0.024
Proximal end of spicule (Width)	0.014-0.022	0.018-0.024
Spicule sheath length	-	0.14-0.18

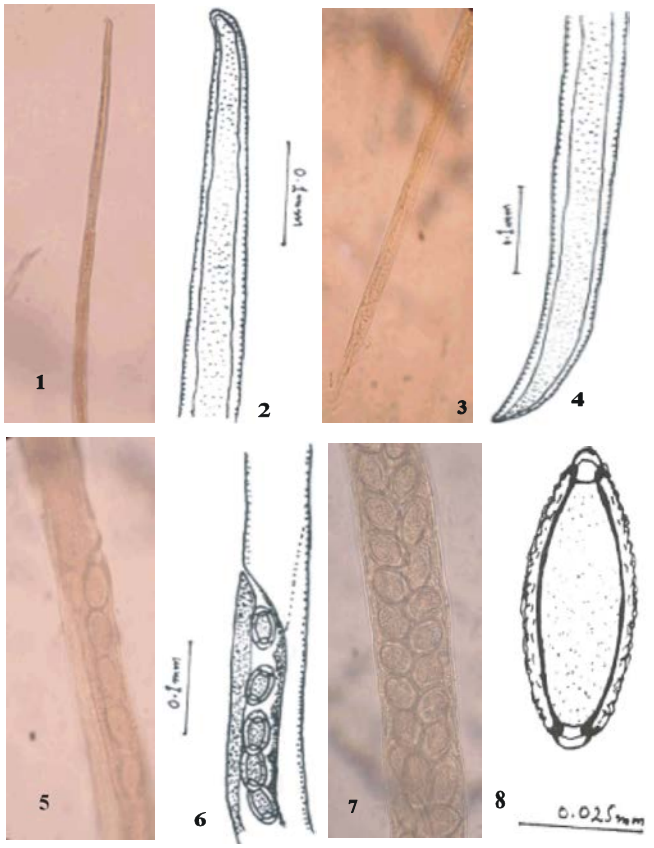

Fig. 1-8: Capillaria anatis (Schrank, 1790) Travassos, 1915 (Female)
Fig. 1, 2. Anterior end; Fig. 3, 4. Posterior end Fig. 5, 6. Vulval region in lateral view, Fig. 7 Uterus full of eggs and Fig. 8 Egg.

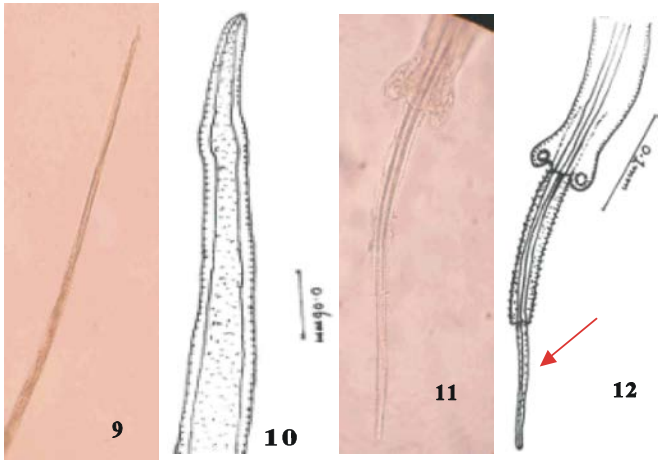

Fig. 9-12: Capillaria anatis (Schrank, 1790) Travassos, 1915 (Male)
Fig. 9, 10 Anterior end of male Fig. 11, 12 Posterior end of male showing spicule

one third of the body length, 4.46-6.12 mm from the anterior end; it does not bear any appendage and appears as a transverse slit. The vagina is long, measuring 0.026-0.46 mm in length. The caudal end of the body is blunt. The anus is sub terminal. Eggs measure about 0.048-0.057 mm in length and 0.024-0.027 mm in width. Eggs are with characteristic thick rogues outer shell layer. The inner layer curls at the poles and form a wide collar (Fig. 1-8).

Male: Body elongated, thread-like measuring 8.20-13.50 mm in length and 0.028-0.06 mm in diameter. Length of esophagus is 4.46-5.85 mm. Length of spicule varies from 0.48-0.65 mm and its width varies from 0.013-0.024 mm. The spicule has three longitudinal thickenings and is only slightly expanded proximally, measuring 0.018-0.024 mm. Distally the spicule ends in a rounded tip and has internal thickenings. The spicule sheath bears spines which are directed towards the anterior end of the worm. Spicular sheath measures about 0.14-0.18 mm. At the caudal end of the body, there are two lateral lobes. The cloaca opening is terminal (Fig. 9-12).

C. anatis was recovered for the first time in *C. monedula* and *C. splendens* from this region. Thus it forms the first report and new distribution record in Kashmir. In addition to *Capillaria anatis* redescribed in this paper, concurrent infestation with other helminth parasites such as *Echinostoma revolutum, Dilepis undula, Mayhewia kavini, Anomotaenia galbulae* and *Choanotaenia micracantha* was also observed in some of the hosts during the investigation.

DISCUSSION

A few species of *Capillaria* have been reported previously from the birds belonging to the genus *Corvus* in different parts of the world. They include *Capillaria contorta* in *C. brachyrhnchos brachyrhychos* Brehm from southern Wiscosin and Iowa [24]; *Capillaria contorta* and *Capillaria anatis* in *C. brachrynchos* Brehm from Ohio [25]; *Capillaria madseni* and *Capillaria tridens* in *C. macrorhynchus colonorum* Swinhoe, 1864 from Taiwan [26]; *Capillaria annulata* and *Capillaria caudinflata from C. frugilegus* in Iran [27]. A few species of *Capillaria* have also been reported previously from other birds [28-31].

Capillaria anatis differs from the above mentioned species in many characteristic morphological features of taxomomic importance. *C. anatis* differs from *C. annulata* (Molin, 1858) Cram, 1926 in the absence of a bulbous swelling of the cuticle immediately posterior to the anterior end and wavy transverse folds on the cervical region which are distinguished characters in *C. annulata*. *C. anatis* differs from C. *caudinflata* in the absence of lateral caudal alae and a heart-shaped bursa in male and muscular ovejector in female characteristic of *C. caudinflata. C. anatis* differs from *Capillaria tridens* in the absence of undivided median lobe at the caudal end and the ventral papillae on the lateral lobes in male and vulval appendage in female characteristic of *C. tridens.* The present specimens of *C. anatis* also show some interspecific variations in various morphological and morphometric characters such as body size; spicule size, spicular sheath structure and size; location of cloacal, vulval and anal apertures; size and structure of eggs on comparision with other species of *Capillaria* such as *C. contorta, C. madseni* recovered from different *Corvus* hosts in different localities [24-26].

The present specimens of *Capillaria* agree in all the morphological and morphometric characters with *Capillaria anatis* (Schrank, 1790) Travossos, 1915 when compared with the known species of the genus *Capillaria* Zeder, 1800. The differentiating characters of the present specimens are the presence of the rugous outer shell layer of eggs and the spines of the spicule sheath which are directed towards the anterior end as in *C. anatis.*

CONCLUSION

The present study revealed that *C. anatis* is of common occurrence in two species of *Corvus* (*C. monedula* and *C. splendens* of Kashmir. However, no specimen of this nematode parasite was obtained from *C. macrorhynchos* in the present study. *C. anatis* was recorded for the first time from *C. monedula* and *C. splendens* from this region.The results of this study may prove helpful for the future research on helminthes of birds.

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REFERENCES

1. Goodwin, D., 1983. Crows of the World. Queensland University Press, St Lucia, Qld.
2. Lockie, J.D., 1956. The Food and Feeding Behaviour of the Jackdaw, Rook and Carrion Crow. The Journal of Animal Ecology, 25(2): 421-428.
3. Nyari, A., C. Ryall and A.T. Peterson, 2006. Global invasive potential of the house crow *Corvus splendens* based on ecological niche modeling. J. Avian Biol., 37: 306-311.

4. Roberts, L.S. and J.J. Janovy, 2005. Gerald D. Schmidt and Larry S. Roberts' Foundation of Parasitology. 7th Ed., The Mc Graw-Hill Companies, pp: 399.
5. Zeder, J.G.H., 1800. Erister nachtrag zur Naturgeschichte der Eingeweiddewurmur mit zusassen und. *Ameskungen horauseg. geben*. 20: 320 Leipzig.
6. Raina, M.K. and R.K. Kaul, 1982. On a new species of *Capillaria* (Nematoda) from a bat in Kashmir. Angew Parasitol., 23: 28-31.
7. Raina, M.K. and Raina Phoola, 1985. On two capillarid nematodes from shrew in Kashmir, with a note on the synonymy of *Skrjabino capillaria* Skarbovitsch, 1946. Indian J. Helminthol., 37(1): 109-115.
8. Pandit, B.A., A.S. Mir, M.A.A. Banday and R.A. Shahardar, 1991. Prevalence of helminth parasites in indigenous fowls of Kashmir Valley. Poultry Adviser, 24(10): 37-39.
9. Fodedar, D.N. and L. Kaw, 1965. New Diplotriaenid nematode from the body cavity of *Acridotheres tristis* (Linnaeus). Kmr. Sci., 2: 125.
10. Gupta, S.P., 1967. Helminthic-fauna of Kashmir. Kmr. Sci., 4(12): 56-61.
11. Fotedar, D.N., M.K. Raina, R. Mahajan and R.L. Dhar, 1972. Redescription of *Contracaecum milivi* Yamaguti 1940 from *Milvus migrans lineatus* from Kashmir. Ind. J. Helm., 24(1&2): 1-4.
12. Chishti, M.Z., 1978. A new record of *Acuaria skrjabini* Czerskaya 1962 from *Passer domesticus* in Kashmir. J. Sci. Univ. Kmr., 3(1-2): 109-112.
13. Fotedar, D.N. and M.Z. Chishti, 1980. *Streptocara indica* n. sp. (Acuariodea, Sobolev, 1949: Nematoda) from *Gallus domesticus* in Kashmir, India. Ind. J. Helm., 32(1): 4-7.
14. Chishti, M.Z., 1981. On a new record of *Syngamus trachea* (Montagu, 1811) Chapin, 1925 (*Syngamidae* Leiper, 1912: Nematoda) from *Corvus splendens* in Kashmir. Kashmir University Research Journal, 1(1): 53-55.
15. Fotedar, D.N. and N.G. Khateeb, 1986/1987. Occurrence and seasonal variation of helminth parasites of domestic fowl in Kashmir. Indian J. Helminthol., 38(1): 49-54.
16. Dar, J.A. and S. Tanveer, 2013. Prevalence of cestode parasites in free-range backyard chickens (*Gallus gallus domestics*) of Kashmir, India. Agric. Biol. J. N. Am., 4(1): 67-70.
17. Dar, G.H., R.C. Bhagat and M.A. Khan, 2002. *Biodiversity of the Kashmir Himalaya,* Ist Edn. Valley Book House, Kashmir University Road, Srinagar-190006 (India). ISBN 81-86592-12-1.
18. Meyer, C.M. and W.O. Olsen, 1975. Essentials of Parasitology. WM. C. Brown Company Publishers, Dubuque, Iowa (USA).
19. Schrank, F. and P. Von, 1790. Fortecking Panagra hittills obeskrifne intestinal-prak. K. Svenska Vetersk. Akd. Handl., 11: 118-26.
20. Travassos, L., 1915. Contribucoes para o conhecimento da fauna helmintolojica brasileira. Sobre as especies brasileiras do genero Capillaria Zeder, 1800. Memorias do Instituto Oswaldo Cruz., 7: 146-172.
21. Todd, A.C., 1946. On the genus *Capillaria* Zeder, 1800, in Tennessee chickens. Trans. Amer. Micr. Soc., 65: 228-236.
22. Yamaguti, S., 1961. Systema Helminthum. Vol 3. The Nematodes of Vertebrates. *Interscience Publisher,* John Wiley and Sons, New York.
23. Bush, A.O., K.D. Lafferty, J.M. Lotz and W. Shostok, 1997. Parasitology meets ecology on its own terms. J. Parasitol., 83(4): 575-583.
24. Morgan, B.B. and E.F. Waller, 1941. Some parasites of the Eastern crow, *Corvus brachyrhynchos brachyrhynchos* Brehm. Bird-Banding, 12(1): 16-22.
25. Jones, J. Jr., 1968. Some parasites of common crow, *Corvus brachyrhynchos* Brehm, from Ohio. The Ohio Journal of Science, 68(1): 25-31.
26. Wakelin, D., G.D. Schmidt and R.E. Kuntz, 1970. Nematode parasites of Oceanica IX. Capillariids from Passeriform hosts collected in Taiwan. Parasitology, 61: 465-474.
27. Eslami, A., B. Meshgi, S. Rahbari, P. Ghaemi and R. Aghaebrahimi-Samani, 2007. Biodiversity and prevelance of parasites of rook (*Corvus frugilegus*) in Iran. Iranian J. Parasitol., 2(4): 42-43.
28. Graybill, H.W., 1924. *Capillaria columbae* from the chicken and turkey. J. Parasitology, 10: 205-207.
29. Morgan, D.O., 1932. On three species of the genus *Capillaria* from the English domestic fowl. J. Helminth, 10: 183-194.
30. Madsen, H., 1945. The species of *Capillaria* (Nematodes, Trichinelloidea) parasitic in the digestive tract of Danish gallinaceous and anatine birds, with a revised list of species of *Capillaria* in birds. Danish Rev. Game Biol., 1: 1-112.
31. Read, C.P., 1949. Studies on North American helminths of the genus *Capillaria* Zeder, 1800 (Nematoda): III. Capillarids from the lower digestive tract of North American birds. J. Parasit., 35: 240-249.