INT. J. BIOL. BIOTECH., 17 (4): 745-751, 2020.

CENTRORHYNCHUS CRIBBI SP.N. (ACANTHOCEPHALA: CENTRORHYNCHIDAE) IN *CENTROPUS SINENSIS*, (PHEASANT CROW) FROM NAUSHARO FEROZE, SINDH, PAKISTAN

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ABSTRACT

A new species of Acanthocephala genus *Centrorhynchus* (Luhe, 1911) is being reported from the intestine of *Centropus sinensis* (Pheasant crow) in Nausharo Feroze District, Sindh, Pakistan. The new species is characterized by having: large body size the male measuring 23-24.12 by 1.12-1.34; female measuring 39.72-43.14 by 1.60-1.88, rows of hooks on proboscis, each having12-14 hooks in each row; size of proboscis receptacle 1.20-1.46 by 0.56-0.57; size of right lemnisci 2.96-3.04 by 0.16 and the left 3.0-3.14 by 0.16-0.17; anterior testis 1.24-1.32 by 0.04-0.80, posterior testis 0.96-1.20 by 0.80-0.84; size of bursa 1.24-1.48 by 1.20-1.34 and eggs oval, numerous without polar prolongation of middle shell measuring 0.020-0.028 by 0.011-0.014.

Key words: Acanthocephala, *Centrorhynchus cribbi* n.sp., *Centropus sinensis*, Nausharo Feroze, Sindh, Pakistan.

INTRODUCTION

Birds are important component of ecosystem; important from ecological and economical point of view. Humans use many birds for food purpose. Birds also produce important products like meat, eggs, and beautiful feathers. The infection of helminths is found in birds and common in people who are eating poorly cooked or undercooked meat, polluted habitats, and poor sanitation. Although the morbidity and mortality due to such infection is not alarming, they harmfully effect on general health, physical and mental health, growth of children and productivity of an adult. (Nanware *et al*., 2011)

The present study is a part of Helminthological investigation on *Centropus sinensis* (Greater coucal or pheasant crow). It is a member of the Cuckoo order of the Cuculiformes. A widespread inhabitant in Asia, India, China, Nepal, and Indonesia. *Centropus sinensis*is found in wide range of habitats from jungle to cultivated areas near canals, rivers, and urban gardens. Parasitic fauna of *Centropus sinensis* is largely unknown (Amin *et al*., 2015). Present specimens of the genus *Centrorhynchus* (Luhe, 1911) are collected from *Centropus sinensis,* (Pheasant crow) in Nausharo Feroze, Sindh, Pakistan.

The genus *Centrorhynchus* is worldwide in distribution and was mainly recovered from birds, but few species are reported from mammals, reptiles, and amphibians. (Yamaguti, 1961) have listed fifty-seven species of the genus *Centrorhynchus*.

Six species of the genus reported from avian hosts in Pakistan are: *Centrorhynchus migrans* (Zubairi and Farooq, 1974) recovered from *Milvus migrans*; *C. nickoli* (Khan *et al*., 2001) in *Coracias garrulous*; *C. gibsoni* (Khan *et al*., 2002) reported from *Corvus splendens*; *C. fasciatum* (Weastrum, 1821; Bilqees and Khan, 2005) re-described from *Butastur teesa* (Eagle) in Karachi; *C. amini* (Khan *et al*., 2010) reported from *Corvus splendens* in Karachi and *C. globirostris* (Amin *et al*., 2015) was recovered from *Centropus sinensis* and *C. fahmidae* (Soomaro *et al.,* 2016) was found from *Acridotheres tristis.*

MATERIALS AND METHODS

Ten birds *Centropus sinensis* (Pheasant crow) were collected from Nausharo Feroze and brought to the Parasitology laboratory, Department of Zoology, University of Sindh, Jamshoro, Pakistan. The birds were dissected and examined for collection of internal helminth parasites. During examination of gut contents and visceral organs sixty mature specimens were collected from small intestine of birds. Later these specimens were fixed in hot steaming 70% ethanol, where trematodes expand and instantly die. Later the specimens were gently placed over clean glass slide, pressed lightly with another, tied with thread and fixed in F.A.A. solution (Formalin, Acetic acid

and 70% ethanol) prepared in a ratio of 6: 2.5: 100, for twenty-four hours, stained with Mayer's carmalum, dehydrated in graded series of ethanol, cleared in clove oil and rinsed with xylene. Finally, the specimens were permanently mounted in Canada balsam for further study. Line drawings were prepared with the aid of a camera Lucida. Body measurements (Length and width) are given in millimeters (mm). Photomicrographs were prepared with the courtesy Department of Zoology Karachi University Campus, Karachi. Specimens are in possession of the senior author at Parasitology laboratory, University of Sindh, Jamshoro, 76080.

RESULTS

***Centrorhynchus cribbi* sp.n.**

Host: *Centropus sinensis* (Greater coucal or Pheasant crow)
Locality: Nausharo Feroze, Sindh, Pakistan
Location: Small intestine
No. of hosts examined/infected:10/07
No. of specimens recovered: 56 males and 4 females from seven hosts.

Description:

Male: Present study is based on 25 male mature specimens. Body elongated much smaller as compared to females, slender, slightly curved in some specimens with antero-dorsal hump measuring 23.0-24.12 by 1.12-1.34. Proboscis small, globular not divided into anterior and posterior parts measuring 1.0-1.12 by 0.32-0.36. Proboscis with 14-16 rows of hooks, each row has 12-14 hooks. Anterior hooks simple and long, while the posterior are gradually smaller. Neck short broader as compared to longer, measuring 0.10-0.12 by 0.32-0.39. A large number of nuclei are present in the trunk region of varying sizes. Proboscis receptacle double walled, elongated inserted at the middle of the proboscis with a cephalic ganglion measuring 1.20-1.46 by 0.56-0.57. Lemnisci two, long, slightly sub-equal the right measuring 2.96-3.04 by 0.16 and the left 3.0-3.14 by 0.16-0.17 with many small nuclei. Testes 2 in the anterior half of the body, the anterior measuring 1.24-1.32 by 0.64-0.80 while the posterior measuring 0.96-1.20 by 0.80-0.84. Cement glands four elongated tubular measuring 11.10-12.80 by 0.36-0.40. The cement reservoir measures 2.60-3.00 by 0.48-0.52. Saefftigen's pouch prominent, elongated measure 2.60-2.82 in length. Bursa well developed in most specimens protruded out 1.24-1.48 by 1.20-1.34.

Female: Based on four mature females. Body elongated slightly curved in a few specimens with antero-dorsal hump measuring 39.72-43.14 by 1.60-1.88. Proboscis measuring 1.08-1.23 by 0.33-0.37. The hooks arrangement and size are similar to male specimens. Neck 0.12-0.13 by 0.32-0.40. Proboscis receptacle 1.20-1.40 by 0.58-0.68. Lemnisci, the right measuring 2.96-3.04 by 0.16 and the left measuring 3 by 0.16. Gonospore sub-terminal, uterus long, vagina complex. Eggs oval, numerous, without polar prolongation of middle shell, extending from proboscis receptacle reaching almost to the posterior end, filling most of the body, measuring 0.020-0.028 by 0.011-0.014.

Table 1. Comparison of longitudinal rows of hooks and their number in each row in species of the genus *Centrorhynchu s*Luhe, 1911reported from Pakistan.

Species	Host	Spines
C. migrans (Zubairi and Farooq, 1974)	*Milvus migrans*	NOT MENTIONED
C. nickoli (Khan *et al*., 2001)	*Coracias garrulous*	16 longitudinal rows with 20-24 hooks in each row
C. gibsoni (Khan *et al*., 2002)	*Corvus splendens*	14 longitudinal rows with 20 hooks in each row.
C. fasciatum (Weastrum, 1821; Bhutta and Khan 2005)	*Butastur teesa* (Eagle)	12-13 longitudinal rows with 6-8 hooks in each row
C. amini (Khan *et al*., 2010)	*Corvus splendens*	16 longitudinal rows with 8-10 hooks in each row
C. globirostris (Amin *et al*., 2015)	*Centropus sinensis* (Pheasent crow)	24-26 longitudinal rows with 10-11 hooks in each row
C. fahmidae (Soomaro *et al.*, 2016)	*Acridotheres tristis* (Common myna)	13 longitudinal rows with 11-13 hooks in each row
C. cribbi n.sp. Present specimens	*Centropus sinensis* (Pheasent crow)	14-16 longitudinal rows with 12-14 hooks in each row.

Table 2. Comparative body measurements of species of the genus *Centrorhynchus* Luhe, 1911 reported in Pakistan.

Species		*C. migrans* (Zubairi and Farooq, 1974)	*C. nickoli* (Khan *et al*., 2001)	*C. gibsoni* (Khan *et al*., 2002)	*C. fasciatum* (Weastrum, 1821) Bilqees and Khan 2005)	*C. amini* (Khan *et al*., 2010)	*C. globirostris* (Amin *et al*., 2015)	*C. fahmidae* (Soomaro *et al*., 2016)	*C. cribbi* n.sp. Present specimens
Male	Body size	----	Not recovered	Not recovered	10.10-11.1 by 1.2-1.5	Not recovered	12.50-23-75 trunk long by 0.47-0.95	1.493-1.38 by 0.041 -0.03	23.0-24.12 by 1.12-1.34
Proboscis size		----	----	----	0.72-0.74 by 0.18-0.19	----	603-700 by 364-368	0.123-0.012	1.0-1.12 by 0.32-0.36
Proboscis receptacle		----	----	----	0.91-0.92 by 0.21-0.22	----	1.16- 1.50 by 0.17-0.32	0.50-0.30 by 0.068-0.054	1.20-1.46 by 0.56-0.57
Neck		----	----	----	Absent	----	187-302 by 281-343	0.061-0.05 by 0.095-0.08	0.10-0.12 by 0.32-0.39
Lemnisci		----	----	----	5.46-9 long	----	1.51-2.37 by 0.12-0.32	0.212-0.110 by 0.109-0.105	Right: 2.96-3.04 by 0.16 Left: 3.0-3.14 by 0.16-0.17
Testes		----	----	----	0.05-0.5 by 0.04-0.42	----	Ant: 0.60-1.50 by 0.27-0.45 Post: 0.57-1.40 by 0.19-0.62	Ant: 0.205-0.202 by 0.130-0.127 Post: 0.198-0.197 by 0.157-0.155	Ant: 1.24-1.32 by 0.64-0.80 Post: 0.96-1.20 by 0.80-0.84
Bursa		----	----	----	0.32-0.62 by 0.63	----	1.22-1.75 by 0.70-1.50	----	1.24-1.48 by 1.20-1.34
Female	Body size	----	4.86-5.00 by 1.104	14.6-16.3 by 3.08-3.64	14.5-15.6 by 0.5-1.1	16.48-16.56 by 2.28-2.40	16.75- 43.75trunk by 0.45-1.12	----	39.72-43.14 by 1.60-1.88
Proboscis		----	0.70-0.74 by 0.45	0.50-0.57 by 0.30-0.32	1.5 by 0.2 at tip 1.17 by 0.3 at base	0.54-0.61 by 0.33-0.37	666-759 by 385-168	----	1.08-1.23 by 0.33-0.37
Proboscis receptacle		----	0.56-0.58 by 0.74-0.76	0.31-1.4 by 0.30-0.32	----	1.20-1.24 by 0.43-0.45	1.22-1.89 by 0.27-0.39	----	1.20-1.40 by 0.58-0.68
Neck		----	0.06-0.09 by 0.040	0.03-0.13 by 0.27-0.28	----	0.015-0.030	----	----	0.12-0.13 by 0.32-0.40
Lemnisci		----	1.56-1.60 by 0.322	2.26-2.30 by 0.21-0.48	Same size as in male	2.24-0.20 by 2.28 -0.18	1.70-2.87 by 0.13-0.37	----	Right: 2.96-3.04 by 0.16 Left: 3 by 0.16
Eggs		----	0.015-0.017 by 0.0057-0.0076	0.026-0.027 by 0.0083-0.009	0.004-0.005 by 0.05-0.06	0.0354-0.019 by 0.110-0.019	45-60 by 25-28	----	0.02-0.028 by 0.011-0.014

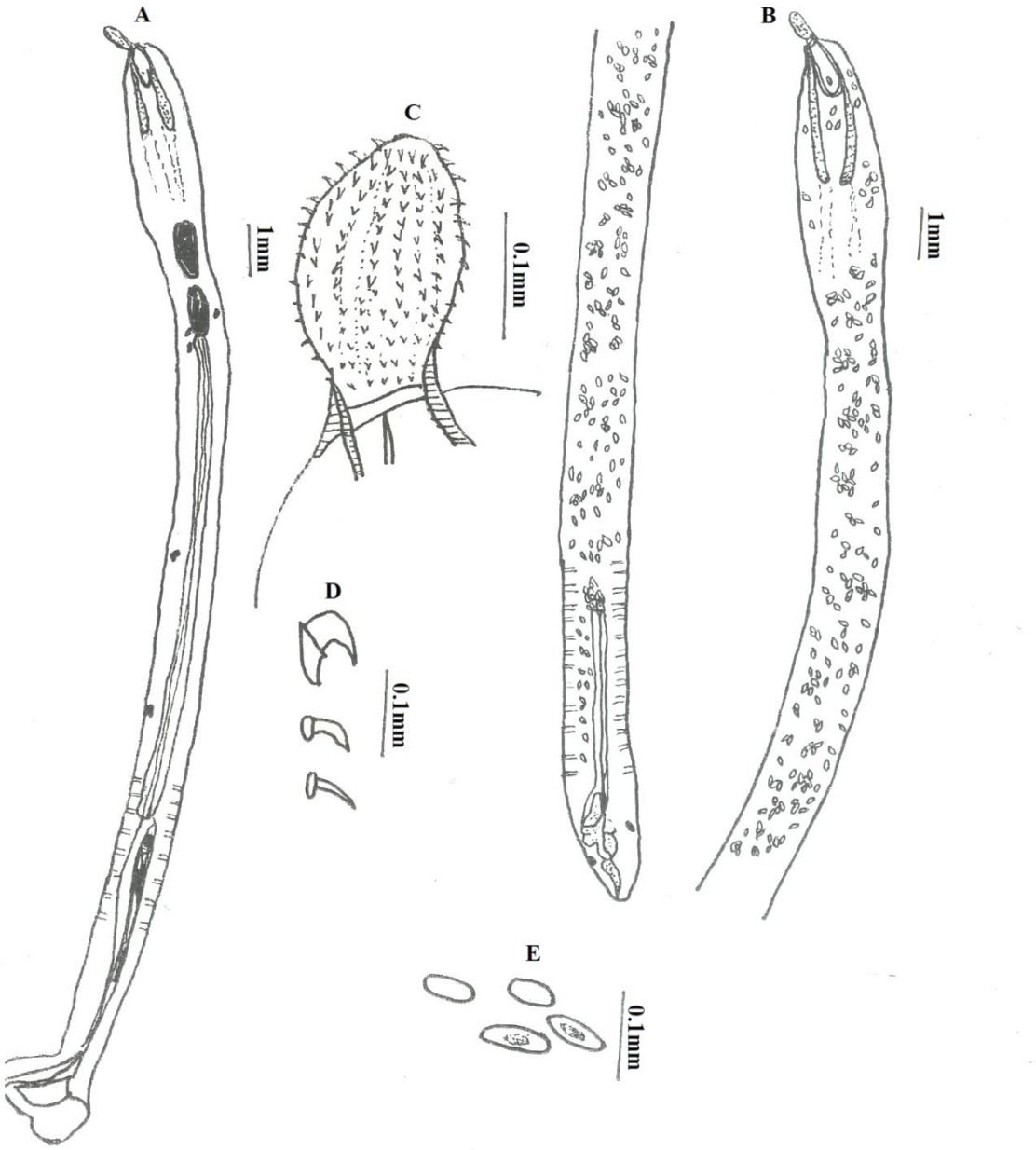

Fig.1. *Centrorhynchus cribbi* sp.n., A: Entire male, holotype; B: Entire female, paratype; C: Proboscis enlarged; D: Hooks enlarged; E: Eggs.

DISCUSSION

Species of the genus *Centrorhynchus* (Luhe, 1911) are widely distributed all over the globe (Yamaguti, 1961), they are mainly reported from birds, but some species are known from amphibians, reptiles and mammals.
Species of the genus reported from Pakistan are: *Centrorhynchus migrans* (Zubairi and Farooq, 1974) from *Milvus migrans* (Black kite); *C. nickoli* (Khan *et al*., 2001) from *Coracias garrulous* (Roller); *C. gibsoni* (Khan *et al*., 2002) from *Corvus splendens* (House crow); *C. fasciatum* (Weastrum, 1821; Bilqees and Khan, 2005) re-described from *Butastur teesa* (White-eyed-buzzard) in Karachi; *C. amini* (Khan *et al*., 2010) reported from *Corvus splendens* (House crow) in Karachi, Sindh with a key to the species in Pakistan; *C. globirostris* (Amin *et a*l., 2015) reported from the Pheasant crow (*Centropus sinensis*) in Pakistan with gene sequence analysis and emendation of the family diagnosis; (Heckmann *et al*., 2015) carried out Histopathology of *C. globirostris* infecting the intestine of the

Centropus sinensis (Pheasant crow) in Pakistan and *C. fahmidae* (Soomaro *et al.,* 2016) found in *Acridotheres tristis* (Common myna) in District, Larkana Sindh, Pakistan. While Present species is described from *Centropus sinensis* (Greater Coucal or Pheasant crow) from Nausharo Feroze, Sindh, Pakistan.

Fig.2. Anterior of male (10x20).

Fig.3. Proboscis region enlarged (10x10).

Fig.4. Bursal region (10x10).

Fig.5. Posterio region of female showing uterus almost extending upto end, filled with eggs (10x10).

The body size of male in present specimens 23.0-24.12 by 1.12-1.34, and in female 39.72-43.14 by 1.60-1.88, While in *C. nickoli* (male not recovered) female is 4.86-5.00 by 0.11-1.04; in *C. gibsoni* male is not recovered, whereas female is 14.6-16.3 by 3.08-3.64; in *C. fasciatum* male is 10.10-11.1 by 1.2-1.5 and female is 14.5-15.6 by 0.5-1.1; in *C. amini* male specimens were not recovered and female body size is 16.48-16.56 by 2.28-2.40; in *C. globirostris* male is 12.50-23.75 by 0.47-0.95, whereas female 16.75-43.75 by 0.45-1.12 and in *C. fahmidae* male is 1.38-1.493 by 0.03-0.04 (female not recovered) (Table 2).

The specimens recovered during present study have larger body size than all reported species of the genus *Centrorhynchus* in Pakistan.

In present specimens the proboscis have 14-16 rows of hooks in each row there are 12-14 hooks, while in *C. gibsoni* proboscis has14 rows of 20 hooks each; in *C. nickoli* proboscis has16 rows of 20-24 hooks each; *C. fasciatum* has12-13 rows of hooks, each having 6-8 hooks; in *C. amini* proboscis has with 16 longitudinal rows of hooks, each row contain 8-10 hooks; in *C. globirostris* the proboscis has with 24-25 longitudinal rows of hooks, each row having 10-11 hooks and in *C. fahmidae* proboscis has 13 longitudinal rows of hooks and each row contains 11-13 hooks (Table 1).

In present specimens, the size of proboscis in male is 1.0-1.12 by 0.32-0.36, where as in female it is 1.08-1.23 by 0.33-0.37, while in *C. nickoli; C. gibsonii; C. amini; C. fasciatum* and in *C. fahmidae* proboscis is smaller in length; in *C. globirostris* it is larger in size.

The proboscis armature and size of proboscis in the present specimens does not match with the reported species in Pakistan.

In present specimen's proboscis receptacle in male is 1.20-1.46 by 0.56-0.57, whereas in female it is1.20-1.40 by 0.58-0.68, while in *C. nickoli* (male not recovered) female proboscis receptacle smaller in length but wider than present specimens; in *C. gibsoni* it is smaller in size; in *C. fasciatum* both (male and female) proboscis receptacle are smaller in size; in *C. amini* (male not recovered) female receptacle nearly equal in size; in *C. globirostris* male proboscis receptacle approximately equal in length but less in width, in female it is larger in size and in *C. fahmidae* (female not recovered) male proboscis receptacle smaller in size than present specimens (Table 2).

In present specimens, right lemnisci in male measure 2.96-3.04 by 0.16 and the left 3.0-3.14 by 0.16-0.17 and in female right lemnisci measure 2.96- 3.04 by 0.16 and the left measure 3 by 0.16, while in *C. fasciatum* both male and female lemnisci are larger in size and in all rest of species size of lemnisci is smaller in size (Table 2).

The size of Proboscis receptacle and size of lemnisci in present specimens also do not match with other reported species.

In present specimens, the size of anterior testis is 1.24-1.32 by 0.64-0.80 and posterior testis 0.96-1.20 by 0.80-0.84. While in *C. fasciatum* the testes are smaller in size than present form; in *C. globirostris* and *C. fahmidae* both testes are also different in size; in *C. nickoil; C. gibsoni* and *C. amini* the male specimens are not recovered.

In present specimen's bursa is 1.24- 1.48 by 1.20-1.34, while in *C. fasciatum* the bursa is smaller in size and in *C. globirostris* it is larger in size (Table 2).

In present specimens the eggs size is 0.020-0.028 by 0.011-0.014, while in *C. nickoli* they are smaller, in *C. gibsoni* they are almost equal to the ones in present species; in *C. fasciatum*, *C.amini* and *C. globirostris* the eggs are larger in size (Table 2).

The present specimens come closest to *C. globirostris* but differ in proboscis hooks armature, size of lemnisci, size of eggs and locality of the host.

CONCLUSION

As the present specimens (both male and female) do not match exactly with the reported species in Pakistan in having larger body size; number of rows of hooks on the proboscis and number of hooks in each row; size of proboscis receptacle, size of lemnisci; size of testes; size of bursa and different size of eggs. (Table 1-2). Therefore, a new species *C. cribbi* is proposed. The species is named in the honour of Dr. Thomas H. cribb, University of Queensland, Brisbane, Australia.

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(*Accepted for publication September 2020*)