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New Locality and Host Record of the Genus *Cotylurus* Szidat, 1928 (Trematoda: Strigeidae) from the bird *Bubulcus ibis* (Cattle egret) in Nausharo Feroze, Sindh, Pakistan

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ABSTRACT: During a survey of helminth parasites of bird *Bubulcus ibis* (Cattle egret) of Naushro Feroze District, Sindh Pakistan. More than 150 specimens were recovered from the small intestine of 10 hosts. Present specimens are closer to the type species *Cotylurus cornutus* (Rudolphi, 1808; Szidat, 1928) in specific characters such as general body shape including fore body and hind body, position and shape of suckers, position of tri-bocytic organ, position of gonads and arrangement of vitelline follicles.

Key words: *Cotylurus cornutus*, *Bubulcus ibis*, Nausharo Feroze, Sindh, Pakistan.

INTRODUCTION

The genus *Cotylurus* is cosmopolitan and was created by (Szidat, 1928) as synonym of *Cotylurostrigea* (Sudarikov, 1961). The genus belongs to the family Strigeidae (Railliet, 1919) and subfamily Strigeinae (Railliet, 1919).

(Yamaguti, 1971) reported 22 species of the genus *Cotylurus* type species as *Cotylurus cornutus* (Rudolphi, 1808; Szidat, 1928). Species reported from the India are *C. orientalis* (Vidyarth, 1937) from *Anas crecca*and *C. intermedicus* (Gupta et Gupta, 1962) from *Hydrophasianus chirurgus.*

Species reported from Pakistan are *C. cornutus* (Rudolphi, 1808; Szidat, 1928; Bhutta and Khan, 1975) from *Circus aeruginosus*; *C. sindhense* (Birmani *et al*., 2009) from *Fulicaatra* and *C. fuscicollisi* (Sanjota *et al*., 2012) from *Phalacrocorax fuscicollis.*

However, the present study represents a first record and new locality of the genus *Cotylurus* from *Bubulcus ibis* (Cattle egret) from Naushro Feroze, Sindh, Pakistan.

MATERIAL AND METHODS

Fourteen bird's *Bubulcus ibis* (Cattle egret) belonging to the family Ardeidae were shot down from Nausharo Feroze at random intervals 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 more than 150 mature specimens were collected from small intestine of ten 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). Photomicrograph was prepared through Olympus Digital microscope MIC-D at SARC/ PARC, Karachi University campus. Specimens are deposited in senior author's collection, Department of Zoology, University of Sindh, Jamshoro.

RESULT

Cotylurus cornutus **(Rudolphi, 1808) Szidat, 1928; Bhutta and Khan, 1975** (Fig. A-C)
Host: *Bulbulcus ibis* (Cattle egret)
Locality: Nausharo Feroze, Sindh, Pakistan

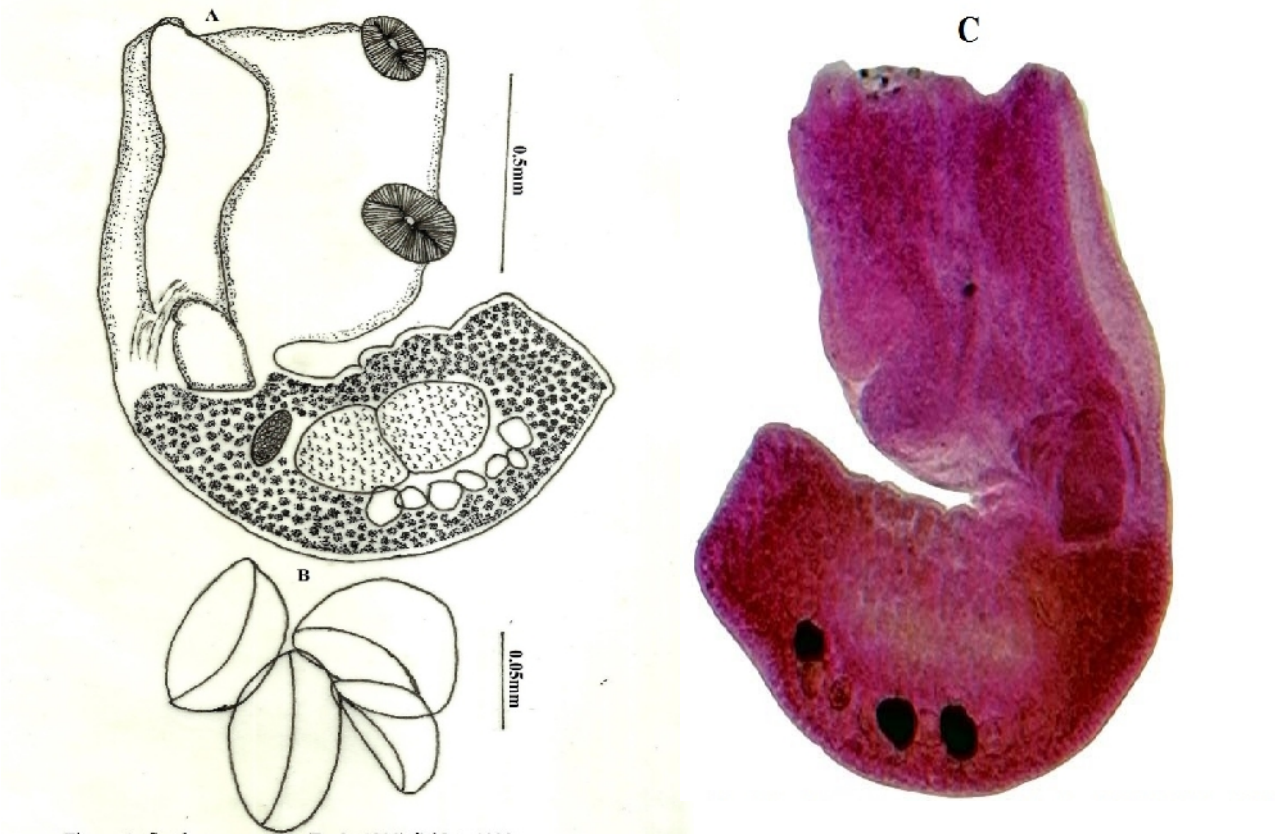

Fig. 1. *Cotylurus cornutus* (Rud., 1808) Szidat, 1928 (A) Entire worm, (B) Enlarged eggs and (C) *Cotylurus cornutus* Photomicrograph (181x).

No. of hosts examined/ infected: 14/10
No. of specimens recovered: 155

Description is Based upon Fifty, Stained, Permanently Mounted, Egg Bearing, Mature Specimens

Body of the worm is small, reniform, divided into shorter fore body and larger hind body, maximum width attained at the level of anterior fore body. Total body length is1.71-2.17.

Fore body utricular long 0.82-0.87 by 0.53-0.71with well-developed cylindrical tribocytic organ. The hind body is sub-cylindrical, dorsally arched and longer than fore body 0.89-1.30 by 0.42-0.51. In some specimens, fore body is larger than hind body.

Oral sucker terminal, elongated to rounded, smaller in width than ventral sucker 0.11-0.19 by 0.06-0.13.In some specimen's oral sucker is placed in the middle of fore body. Ventral sucker rounded 0.19-0.26by 0.12-0.1lies at 0.31-0.39 from anterior end of the fore body. Pharynx is not conspicuous. Intestinal caeca are not obvious due to profuse uterus.

Testes are tandem, sub-spherical, with smooth surface, inter-caecal, touching each other and situated in the mid of the hind body. Anterior testis is 0.15-0.26 by 0.20-0.27, posterior testis is 0.17-0.27 by 0.19-0.24 in size.

Ovary oval, pre-testicular, much smaller than testes, 0.02-0.06 by0.87-0y.15, situated near the anterior end of hind body.

Vitellaria profuse, follicular, restricted to the hind body, extending from near the ovary and proceed up to the end of hind body.

Eggs are oval, but in some specimens, these are rounded 0.061-0.08 by 0.03-0.062.

DISCUSSION

Available literature indicates a good number of species of the genus *Cotylurus* (Szidat, 1928) Synonym of *Choanodiplostomum* (Vigueras, 1944); *Cotylurostrigea* (Sudarikov, 1961), reported throughout the world including Pakistan and India.

Species reported from Pakistan are *Cotylurus cornutus* (Rudolphi, 1808; Szidat, 1928; Bhutta and Khan, 1975) from *Circus aeruginosus*; *C. sindhense* (Birmani *et al*., 2009) from *Fulica atra* and *C. fuscicollisi* (Sanjota *et al*., 2012) from *Phalacrocorax fuscicollis.*

Species reported from India are *C. intermedicus* (Gupta et Gupta, 1962) from *Hydrophasianus chirurgus* and *C. orientalis* (Vidyarth, 1937) from *Anascrecca.*

Present specimens are recovered from *Bubulcus ibis* (Cattle egret), while type species *Cotylurus cornutus* have been reported from *Charadrius pulvialis* etc and other species are reported from different hosts throughout the globe (Table 1).

Table 1: Comparative body measurements of various species of genus *Cotylurus* (Rudolphi, 1808) Szidat, 1928 from avian hosts.

Species	Host	Locality	Body size	Egg size
Cotylurus pileatus (Rud., 1802) Dubois, 1937	*Chlidonias nigra, Sterna, Alca, Uria, Osmerus, Phalacrocorax*	Europe, Asia.	2.6-3.75 2.58-3.0 Dubois (1964) 4.0- Dubois (1968)	82-99 × 50-68 83-94 × 55-67 82-126 × 50-78
C. cornutus (Rudolphi, 1808) Szidat, 1928	*Charadrius pulvialis, Gallinago gallinago, Numenius arquata, Turdus* birds *etc*	Asia, Africa, Europe, N. & S. America	2.75	
C. erraticus (Rud., 1809) Szidat, 1928	*Colymbus* spp. *Mergus, Somateria, Nyroca, Uria, Tadorna, Vanellus, Scolopax, Capella, Spheniscus, Larus, Phalacrocorax, Gavia, Sterna*	Europe, Siberia, N. America.	2.0-4.2 × 0.54-1.13	80-115 × 50-74
C. platycephalus (Crepl., 1825) Szidat, 1928	*Rissa tridactyla, Stercorarius spp. Thalasseus bengalensis* (*=Sterna media*), *Alcatorda, Uriagrylle, Colymbus rufogularis, C. stellatus, Anas* spp., *Pelecanus onocrotalus, Podiceps cristatus, Phalacrocorax carbo, Haliaetus albicilla, Larus schistosagus*	Europe and West Siberia.	4.0-12	100-125 × 63-77
C. flabelliformis (Faust, 1917) Van Haitsma, 1931	*Bucephala, Nyroca, Spatula, Mareca Querquedula, Nettion, Glacionetta, Marila, Dafila*.	N. America, Volga delta	0.56-0.85	80-100 × 40-60
C. aquavis (Guberlet,1922) Szidat, 1928	*Colymbus immer* and *Larus delawarensis*	U.S.A and Canada.	2.5-3.5 × 0.6-0.9	86-99 × 56-71
C. communis (Hughes, 1928) La Rue, 1932	*Larus argentatus, Percopsis omiscomaycus,* also in *Larus* sp.	N. America	Fore body 2.25-3.25 Hind body 2.75-4.5	100-123 × 62-75
C. gallinulae (Lutz, 1928) Dubois, 1937	*Gallitos de agua* also in *Gallinula chloropus, galeata*	Brazil, also in Venezuela, S. America.	2.23-3.11	106-125 × 66-74
C. japonicas Ishii, 1932	*Anasplatyrhyncha, A. p. domestica, Gallus domesticus* Also in *Anasboschas dom.*	Japan also in Madras	1.3-2.0	106-115 × 74-78
C. herbraicus Dubois, 1934	*Fulicaatra* also in *Anas Platyrhyncha, Nyroca ferina*	Syria, Tadzhikistan, Astrakhan, Italy also in Europe, W. Siberia.	2.7	65-96 × 45-66
C. syrius Dubois, 1934	*Mareca Penelope, Cygnus olro*	Syria, Holand.	2.085	120-137 × 68-84
C. orientalis Vidyarthi, 1937	*Anas crecca*	India		117 × 66

Species	Host	Locality	Body size	Egg size
C. ban Yamaguti, 1939	*Gallinula chloropus indicus*	Japan.	1.8-1.9 1.32 × 0.38-0.43	90-100 × 57-63
C. strictus Endrigkeit, 1940	*Cygnus olor, Nordenburger*	-	-	-
C. lintoni (Perez vigueras, 1944) Dubois *et* Vigeuras, 1949	*Gallinla chloropus*	Cuba	1.53	80-89 × 53-63
C. medius Dubois *et* Rausch, 1950	*Sterna hirundo*	Ohio	2.1-3.75 × 0.5-0.84	96-126 × 53-78
C. brevis Dubois *et* Rausch, 1950	*Charadrius apricarius, Gallinago gallinago, Numenius arquata, Scolopax rusticola, Nyroca, Aixm, Somateria mollissima*	N. America, Switzerland.	1.17-1.8 × 0.33-0.54	92-103 × 63-70
C. strigeoides Dubois, 1958	*Anasacuta tzitzihoa*	California	1.82-1.9 × 0.6-0.69	85-99 × 55-70
C. cumulitestis Dubois, 1962	*Spheniscus humboldti*	Amsterdam	4.16-5.95	90-120 × 57-71
C. intermedius Gupta *et* Gupta, 1962	*Hydrophasianus chirurgus*	India.	Fore body 0.538-0.644 × 0.57-0.659 Hind body 0.937-1.232 × 0.584-0.7	100-114.8 × 49.5-72.6
C. vitellosus Lumsden *et* Zischke, 1963	*Gallinula chloropus cachinnans, Florida gallinule*	Louisiana	1.345-1.734 × 0.46-0.7	92-106 × 56-59
C. sindhensis Birmani *et al*., 2009	*Fulicaatra*	Pakistan	0.890-1.292	55-100 × 32-65
Cotylurus fuscicollisi Sanjota *et al*., 2012	*Phalacrocorax fuscicollis*	Pakistan	2.02−2.12 × 0.62−0.68	0.092−0.12 × 0.05−0.06

In present specimen's body size is 1.71-2.17, while the body size in *C. pileatus* (Rud., 1802; Dubois, 1937); *C. cornutus* (Rudolphi, 1808; Szidat, 1928); *C. erratics* (Rud., 1809; Szidat, 1928); *C. platycephalus* (Crepl, 1825; Szidat, 1928); *C. aquavis* (Guberlet, 1922; Szidat, 1928); *C. communis* (Hughes, 1928); *C. gallinulae* (Lutz, 1928; Dubois, 1937); *C. medius*(Dubois *et* Rausch, 1950); *C. cumulitestis* (Dubois, 1962) and are larger in size; while in *C. flabelliformis* (Faust, 1917; Van Haitsma, 1931); *C. japonicas* (Ishii, 1932); *C. herbraicus* (Dubois, 1934); *C. syrius* (Dubois, 1934);*C. ban* (Yamaguti, 1939); *C. lintoni* (Perez vigueras, 1944; Dubois *et* Vigeuras, 1949); *C. brevis* (Dubois *et* Rausch, 1950); *C. strigeoides* (Dubois, 1958); *C. intermedius* (Gupta *et* Gupta, 1962); *C. vitellosus* (Lumsden *et* Zischke, 1963) and *C. sindhensis* (Birmani *et al*., 2009) it is smaller in size. The body size of *C. fuscicollisi* (Sanjota *et al*., 2012) approximately match with present specimens (body size of reported species is mentioned in Table 1).

C. pileatus have are multi-lobed testes, ovary rounded, egg size is 82-99 × 50-68, vitellaria extends from base of fore body, while in present specimen's ovary is oval and testes are rounded in shape and smaller size of eggs and vitellaria is confined in hind body.

Present specimens are closer to *C. cornutus* in having general body shape including fore body and hind body, position and shape of suckers, position of tri-bocytic organ, position of gonads and arrangement of vitelline follicles but differ in having smaller size of suckers, shape and size of testes, also different host and locality.

C. erraticus are closer to present specimens in having similar position of oral sucker. In *C. erraticus* the ventral sucker is rounded lie approximately in the middle of fore body, testes are with three or four elongated lobes situated in posterior most region of the hind body, vitellaria extends from base of the fore body, while present specimens differ in having position of acetabulum, shape, position and size of gonads, arrangement of vitelline follicles and different host and locality.

Present specimens resemble *C. platycephalus* in having vitellaria confined to hind body. The testes of *C. platycephalus* are with numerous, crowded lobes, oral sucker is deeply situated in the fore body, while present specimens are different in having shape and size of gonads, smaller size of eggs and different host and locality.

C. flabelloformis have very small body, suckers sub-equal in size, fore body fixed, posterior end rounded, ovary rounded, testes roughly rounded and eggs size is 80-100 × 40-60. The present specimens differ in shape, position, and size of suckers, shape and position of gonads and different size of eggs.

C. syrius have suckers are approximately same in size, ovary rounded, anterior testis roughly oval and posterior testis is with lobe, while in present specimen's shape of gonads are different, larger eggs size than present forms but closer to *C. syrius* in having vitellaria confined in hind body.

The present specimens are also different from *C. rabbei* Bazubik, 1958, where *C. rabbei* oral sucker is sub terminal, testes are with two lobes, vitellaria extends into the fore and hind body, while in present forms the oral sucker is terminal, testes are rounded and vitellaria is confined in the hind body, hosts and locality are also different.

C. gallinulaehebraicus Dubois, 1934 is cylindrical in shape, oral sucker is sub-terminal, acetabulum lie at anterior part of fore body, ovary is rounded, testes are bi-lobed, while present specimens are different from it in having fore body utricular, hind body reniform, oral sucker terminal, ovary oval, testes rounded and different host and locality.

C. sindhensis oral sucker sub-terminal, spherical0.040-0.071 × 0.071-0.076, pharynx rounded 0.062-0.068 × 0.065-0.070, acetabulum spherical, overlapped by tribocytic organs 0.076-0.081 × 0.065-0.095. Gonads are in posterior part of hind body, anterior testis is 0.103-0.11 × 0.114-0.139, posterior testis 0.092-0.111 × 0.092-0.125, ovary is pear shaped 0.075- 0.88 × 0.049-0.072, eggs are 55-100 × 32-65, while present specimens differ in having: shape, position and larger size of suckers, larger size, shape and position of gonads, different eggs size, host and locality.

C. fuscicollisi oral sucker is 0.044−0.045 × 0.05−0.0510, acetabulum 0.14−0.15 × 0.13−0.14 situated above the large ovary, vitellaria present in both fore and hind body, Testes tandem, anterior testis larger 0.16−0.18 by 0.29−0.3, posterior testis is 0.16−0.17 (0.16) by 0.25−0.26 in size. Ovary rounded, situated at the junction of hind and fore body 0.3−0.32 by 0.29−0.30 in size, eggs are 0.092−0.12 (0.10) by 0.05−0.06 (0.055) in size, while present specimens are differ in having: larger size and position of suckers, smaller size and shape of ovary, larger size of testes, smaller size of eggs and arrangement of vitelline follicles and also different host and locality.

CONCLUSION

In all essential features, present specimens appear to match the reported species in having general body structures, position of oral and ventral suckers, position of gonads, position of tribocytic organ but variations are noted in some species, general body shapes and sizes, position, sizes of oral and ventral suckers, size and shapes of gonads.

Species identification is attempted at present and re-described as *C. cornutus* (Rudolphi, 1808) Szidat, 1928, Bhutta and Khan, 1975 with new host *Bubulcus ibis* and new locality Nausharo Feroze, Sindh, Pakistan.

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