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LOPHOSICYADIPLOSTOMUM BILQEESAE SP.N. (TREMATODA: DIPLOSTOMIDAE POIRIER, 1886) FROM THE INTESTINE OF *PHALACROCORAX CARBO* (GREAT CARMORANT) IN LARKANA, SINDH, PAKISTAN

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ABSTRACT

During survey of helminths fauna *Lophosicyadiplostomum bilqeesae* sp.n. was reported in *Phalacrocorax carbo* (great cormorant) from District Larkana, Sindh, Pakistan. The new species is characterized by having: body divided into forebody and hindbody, oral sucker larger than acetabulum, prepharynx absent, pharynx oval in shape, acetabulum rounded and centered the middle of the body, holdfast organ is present in the forebody, testes are tandem, unequal, post ovarian and are present in front of hind body, ovary rounded, median and touches the anterior testis posteriorly, seminal vesicle reniform, present in the posterior end of hindbody, Vitellaria follicle shaped, starts below the intestinal bifurcation, scarcely dispersed in lateral fields and middle of forebody and reaches to the posterior end of hind body, Bursa wide, reduced without sucker.

Key-words: *Lophosicyadiplostomum bilqeesae* sp.n Diplostomidae, *Phalacrocorax carbo*, Larkana, Sindh, Pakistan.

INTRODUCTION

The present specimens belongs to family Diplostomidae Poirier, 1886, Subfamily Diplostominae Poirier, 1886 and genus *Lophosicyadiplostomum* Dubois, 1936. The available literature reveals only three species of the genus reported from all over world in avian hosts; *Pitangus sulphuratus* from South America; *Pyroderus scutatus* from Brazil and *Ardeola grayii* from Pakistan. The present specimens were recovered in *Phalacrocorax carbo* Linnaeus, 1758, great cormorant from Larkana, Sindh, Pakistan. This is the second record of the genus from Pakistan and first record of *Lophosicyadiplostomum bilqeesae* sp.n. from new host *Phalacrocorax carbo* and Locality Larkana, Sindh, Pakistan.

Phalacrocorax carbo belongs to family Phalacrocoracidae. It is cosmopolitan and commonly known as great cormorant. They mostly feed on fishes and rarely eat crustacean.

MATERIALS AND METHODS

Fourteen *Phalacrocorax carbo* were shot down from different areas of district Larkana. Trematodes were prepared according to the methods described by Garcia and Ash, 1979 and Schmidt, 1988. Birds autopsied, visceral organs removed and sealed in white plastic bags separately. These bags were kept in ice-bag box and transported to parasitological laboratory, university of Sindh, Jamshoro for study. In laboratory the frozen visceral organs were kept under electric bulb light for melting. After melting the visceral organs were cut gently and kept separately in petri dishes for examination of helminths. During examination of visceral organs seventeen mature, egg bearing flukes were collected from the small intestine of nine hosts. Live specimens were kept in 70 % hot ethanol to die and expand. Then Specimens were kept between two slides, gently and slightly knotted with thread and placed in Formalin Acetic Acid solution for twenty four hours. Later specimens stained with Mayer's carmalum and dehydrated in a series of ethanol for removal of extra stain. After that specimens were dipped in clove oil and xylene for clearing purpose and finally permanent slides made with Canada balsm. Line drawings were prepared with Camera Lucida. Body measurements were taken in millimeters (mm) and eggs in micrometers (µm). The genus was identified using the descriptions and keys given by Yamaguti,1971, McDonald. 1981 and Gibson *et al*., 2001. Permanent slides of specimens are in possession of Prof. Dr. Sanjota Nirmal Das, Sectional head Parasitology at Department of Zoology, University of Sindh, Jamshoro.

RESULTS

***LOPHOSICYADIPLOSTOMUM BILQEESAE* SP.N.**
(Fig.1.a-b)

Host:	*Phalacrocorax carbo* Great cormorant
Location:	Small intestine
Locality:	Larkana, Sindh, Pakistan
No. of host examined/ infected:	14/09
Number of specimens:	17
Prevalence:	64.28%
Intensity:	1.88
Density of Infection:	1.21

DESCRIPTION IS BASED ON SEVENTEEN MATURE, EGG BEARING STAINED AND PERMANENTLY MOUNTED SPECIMENS:

Body divided into two segmented fore body and hind body, and measured 1.23 by 0.52 in size. Fore body broader elongated, longer than hind body, measured 0.67 by 0.52 in length. Hind body ballon shaped and much smaller than fore body and measured 0.47 by 0.39 in size. Oral sucker is elliptical to truncate conical shaped and 0.07 by 0.07 in diameter. Pre-pharynx absent. Pharynx prominent, oval- shaped and smaller than oral sucker measured 0.05 by 0.04 in size. Acetabulum round-shaped, located towards the middle of body and smaller than oral sucker and 0.05 by 0.05 in diameter. Holdfast organ present in the fore body is rounded, median and postacetabular and 0.19 by 0.12 in diameter. Testes tandem, unequal post-ovarian located in anterior of the hind body. Anterior testis oblique and touches the ovary and 0.17 by 0.12 in diameter. Posterior testis bi-lobed with deep median groove and measured 0.15 by 0.34 in size. Ovary rounded, sub median, posteriorly touches the anterior testis and 0.08 by 0.08 in diameter. Seminal vesicle is reniform in shape and present in the posterior end of hind body and 0.05 by 0.06 in diameter. Vitellaria starts below the intestinal bifurcation, follicle in shape, scarcely dispersed in lateral fields and in the middle of fore body and reaching to posterior end of the hind body. Bursa reduced, wide without sucker with terminal opening. Eggs are few in number and 99 by 76 in diameter (Fig.1).

Table 1. Comparison between different species of genus *Lophosicyadiplostomum* reported from globe.

	L. nephrocystis (Lutz, 1928) Dubois, 1937	***L. saturnium*** Dubois, 1936	***L. rizwanae*** Mukhtiar *et al.*, 2011	**Present Specimens**
Hosts	*Pitangus sulphuratus*	*Pyroderus scutatus*	*Ardeola grayii*	*Phalacrocorax carbo*
Location	South America	Brazil	Jamshoro, Sindh	Larkana, Sindh
Locality	Kidney	__	Intestine	Intestine
Body length	2.2	1.50 -1.83	0.823 by 0.385	1.23 by 0.52
Oral Sucker	Cone shaped	Round shaped 0.110-0.137 by 0.100-0.053	Slightly elliptical with equatorial ring 0.025 by 0.032	Elliptical to conical 0.07 by 0.07
Pre-pharynx	––	Present	Absent	Absent

Pharynx	__	Small, narrow oval shaped	Oval shaped and overlap the posterior part oral sucker 0.047 by 0.038	Oval smaller than oral sucker 0.05 by 0.04
Esophagus	__	Small, narrow 0.030-0.053	Not prominent	Very small,
Intestinal bifurcation	Two branched caeca extend to posterior end	Below the esophagus	Beneath the pharynx	Below the esophagus
Ventral Sucker	smaller than oral sucker	Oval shaped, smaller than Oral sucker 0.077-0.091 by 0.093-0.112	Rounded, smaller than Oral Sucker 0.047 by 0.052	Rounded smaller than Oral sucker 0.05 by 0.05
Genital pore	Terminal to posterior end of body	__	Sub-terminal in the posterior end of body	Terminal in the posterior end of body
Holdfast organ	One fifth size of fore body	Round with a median groove of variable shape, anterior end touches the acetabulum 0.160-0.225 by 0.17-0.23	Rounded, posterior to acetabulum and occupy one fifth of forebody 0.095 by 0.080	Round, Median, post acetabular 0.19 by 0.12
Ovary	__	Elliptical shape, median or sub-median, touches the anterior testis 0.072-0.095 by 0.090-0.115	Rounded,Median, posterior end touches the anterior testis 0.047 by 0.047	Rounded, Sub median, more toward the right side and touches the anterior testis 0.08 by 0.08
Testes	__	Testes tandem Ant: Testis kidney shape 0.160-0.215 by 0.190-0.250 Post: testis bi-lobed, larger 0.170-0.235 by 0.215-0.285	Testes Tandem Ant: Testis oblique shaped 0.090 by 0.085 Post: Testis divided into two lobed by deep median grove 0.085 by 0.285	Testes tandem Ant: Testis oblique shaped 0.17 by 0.12 Post: testis bilobed with a groove.
Vitelline Follicles	Dense in the fore body	Starts below the intestinal bifurcation, distributed in lateral fields and middle of hind body extends in hind body overlap the posterior testis and reached to posterior end of hind body.	Commence at some distance below the intestinal bifurcation, mostly present in the middle of fore body extend posteriorly in hind body and are very few and reaches to bursa fabricii	Starts below the intestinal bifurcation distributed in the forebody and hindbody and reaches to posterior end of body.
Eggs	Oval 0.03 by 0.01	Few, oval 0.091-0.102 by 0.052-0.065	Few, oval 87 by 56	Few, oval 99 by 76

DISCUSSION

Present specimens belong to Family Diplostomidae Poirier, 1886, Subfamily Diplostominae Poirier, 1886 and to the genus *Lophosicyadiplostomum* Dubois, 1936 recovered from the small intestine of *Phalacrocorax carbo* (Great cormorant).

Available literature indicates only three species of the genus reported from the different avian hosts around the globe.

Two species were reported by Yamaguti, 1971 and Gibson *et al*., 2001: *Lophosicyadiplostomum nephrocystis* (Lutz, 1928) Dubois, 1937 reported in *Pitangus sulphuratus* from South America and *Lophosicyadiplostomum saturnium* Dubois, 1936 reported in *Pyroderus scutatus* from Brazil and one species *Lophosicyadiplostomum rizwanae* Mukhtiar *et al*., 2011 in *Ardeola grayii* reported from Jamshoro, Sindh, Pakistan.

The specimens recorded during the present study are different from *L. nephrocystis* in general body features. In *L. nephrocystis* the body size is larger, oral sucker is cone shaped and larger than the ventral sucker, position of pre-pharynx, pharynx and esophagus is not visible, holdfast organ occupy the one fifth of fore body, two branched caeca extend to posterior end, vitelline follicles are dense in the fore body; shape, size and position of ovary and testis is not available and eggs are few and oval shaped and recovered from the kidney of *Pitangus sulphuratus* in South America, while in present specimens the body size is smaller, oral sucker is Elliptical to conical shaped, pre-pharynx is absent, pharynx is oval shaped, esophagus very small, Ventral sucker is rounded and smaller than oral sucker as in *L. nephrocystis*, holdfast organ round, median and post acetabular and smaller than *L. nephrocystis*, caeca extend below the esophagus, vitelline follicles scarcely are distributed in fore body and middle of body and reaches to posterior end in hind body, testis tandem, anterior testes oblique and posterior testes is bi-lobed with deep groove, ovary rounded, more towards the right side and touches the anterior testis, eggs are oval and few as in *L. nephrocystis* and recovered from the small intestine of *Phalacrocorax carbo* (Great cormorant) in Larkana, Sindh, Pakistan.

Present specimens are also differ from *Lophosicyadiplostomum saturnium* in having smaller body size 1.23 x 0.52 while in *L. saturnium* the bod size is 1.50-1.83. In present specimens oral sucker is Elliptical to conical shaped while in *L. saturnium* it is rounded in shape. In present specimens the pre-pharynx is absent while in *L. saturnium* it is present. The size of oral sucker, pharynx and esophagus is smaller in present specimens than *L. saturnium.* In present specimens ventral sucker is rounded as in *L. saturnium.* In present specimens the holdfast organ is smaller in size as compared to *L. saturnium.* In present specimens the ovary is Rounded, Sub median, touches the anterior testis while in *L. saturnium it* is Elliptical shape, median or sub-median and touches the anterior testis. In present specimens the testis are tandem, anterior testis is oblique and posterior testis is bi-lobed and larger than anterior one while in *L. saturnium* testes are tandem, anterior testis is kidney shaped and posterior testis is bi-lobed. The size of ovary and testis is smaller than *L. saturnium*. In present specimens vitelline follicles Starts below the intestinal bifurcation distributed in the fore body and hind body and reaches to posterior end of body while in *L. saturnium* commence below the intestinal bifurcation, distributed in lateral fields and middle of hind body extends in hind body overlap the posterior testis and reached to posterior end of hind body. The present specimens recovered in the small intestine of *Phalacrocorax carbo* from Larkana, Sindh Pakistan, while *L. saturnium* was recovered in *Pyroderus scutatus* from Brazil (site of infection not available in the literature).

The present specimens are also different from *L. rizwanae* in general body features. In *L. rizwanae* the body size is smaller (0.823 x 0.385), oral sucker Slightly elliptical with equatorial ring, pharynx oval shaped and overlap the posterior part of oral sucker, esophagus not prominent, intestinal bifurcation starts below the pharynx, ventral sucker rounded and smaller than oral sucker, holdfast organ occupy the one fifth of fore body, ovary rounded to median and touches the anterior testis, anterior testis oblique shaped and posterior testis is bi-lobed with deep groove, vitelline follicles starts at some distance below the intestinal bifurcation, mostly present in the middle of fore body extend posteriorly in hind body and are very few and reaches to bursa fabricii and genital pore is sub-terminal, while present specimens has larger body size and different shape, larger oral sucker, pharynx followed by oral sucker, very short esophagus present, intestinal bifurcation starts below the pharynx, acetabulum and holdfast organ rounded as in *L. rizwanae* but larger in size, ovary rounded, sub-median towards the right side and touches the border of anterior testis, anterior testis oblique and posterior testis is bi-lobed shaped as in *L.rizwanae* but larger in size, vitelline follicles starts below the esophagus distributed in lateral fields and in middle of the body and reaches to posterior end of the hind body and genital pore is terminal (Table 1).

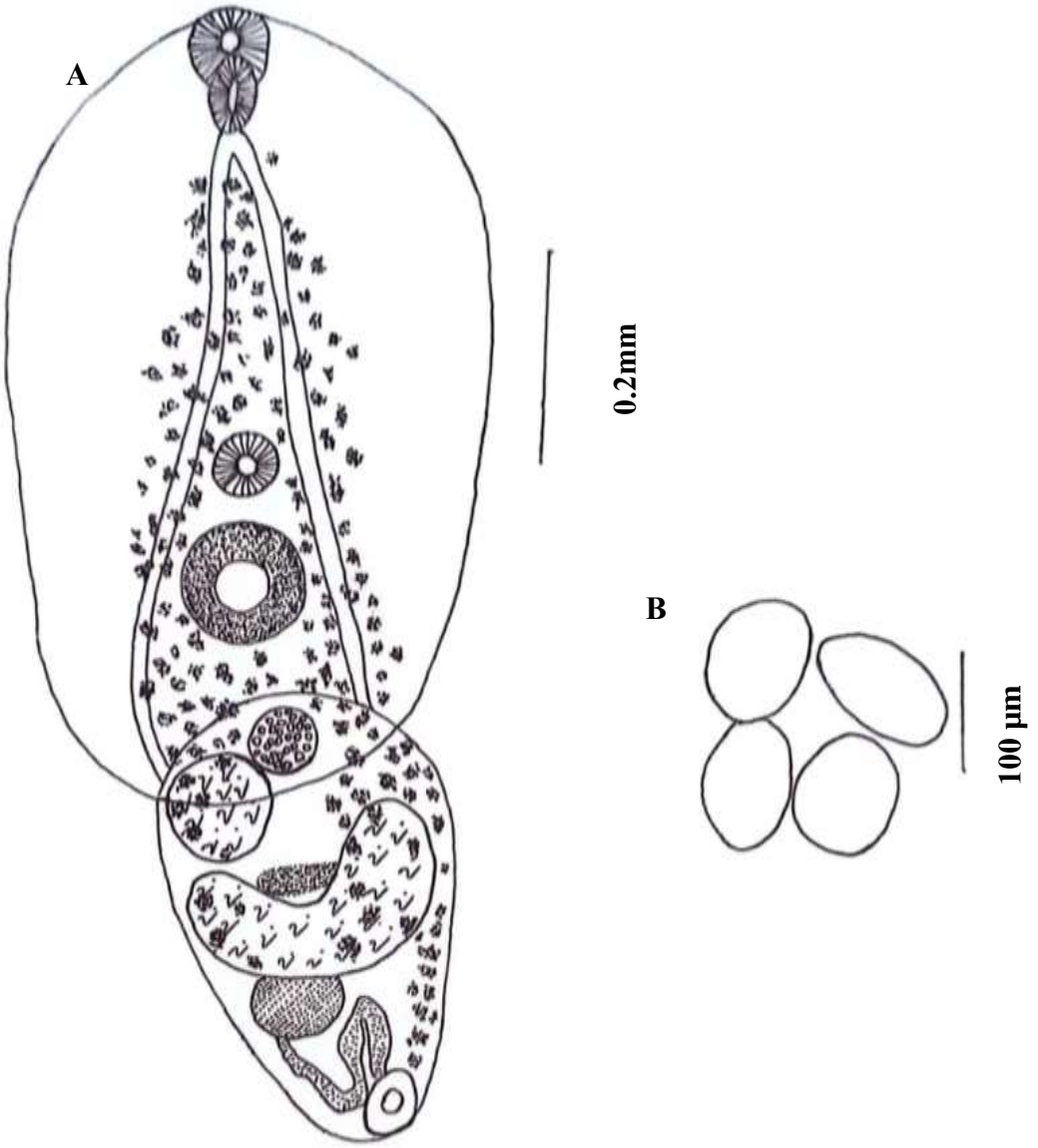

Fig.1. *Lophosicyadiplostomum bilqeesae* sp.n. (A-B)

A. *Lophosicyadiplostomum bilqeesae* sp.n., entire worm (holotype)
B. Eggs enlarged

CONCLUSION

The specimens understudy do not resemble to any known species in specific characteristics, therefore this species is proposed as new to science and named as *Lophosicyadiplostomum bilqeesae* sp.n The species name refers to Late Prof. Dr. Bilqees Fatima Mujeeb, a distinguished Parasitologist from the University of Karachi in Sindh, Pakistan.

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