

## **EPISTHMIMUM SINDHENSIS SP.N. (TREMATODA:ECHINOSTOMATIDAE) FROM THE BIRD EGRETTE GARZETTA (LITTLE EGRET) IN SINDH, PAKISTAN**

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### **ABSTRACT**

A new species, *Episthmium sindhensis*, is described. It is characterized by having different: shape and size of body, acetabulum, testes, size and position of ovary, arrangement of vitelline follicles, and size of eggs.

**Keywords:** *Episthmium, sindhensis*, new trematode species, *Egretta garzetta*, Jamshoro, Sindh, Pakistan.

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### **INTRODUCTION**

Comparatively few species of the genus *Episthmium* Luhe, 1909 have been reported from Avian hosts from Africa, Europe, Siberia, Asia, Brazil, India, Pakistan and Argentina (Yamaguti, 1971). Bhutta and Khan (1975) have reported *E. bursicola* (Creplin, 1837) from the intestine of *Bubulcus ibis* from Punjab, Pakistan. *E. egrettae* have been reported from *Egretta garzetta* in Sindh, Pakistan (Unar *et al.*, 2008).

Present study revealed occurrence of a new species of the genus *Episthmium* Luhe, 1909 *E.sindhensis* sp.n. from *Egretta garzetta* from Jamshoro, Sindh, Pakistan.

Five birds *Egretta garzetta* were examined and one was found infected with five trematodes. Out of five trematodes, three are proposed as new to science. These are *E. jamshorensis*; *E. bilqeesae* Bushra *et al.*, 2016 and *E. sindhensis* sp.n. (Present specimen).

### **MATERIALS AND METHODS**

Five birds *Egretta garzetta* were shot down from Jamshoro District, Sindh, Pakistan at random intervals. The birds were autopsied in the laboratory for collection of intestinal Helminth parasites. Five specimens of a trematode genus *Episthmium* Luhe, 1909 were recovered from the small intestine of the host. The specimens were thoroughly washed in saline solution to get rid of mucus. Later they were fixed in 70% ethanol. The specimens were gently placed over a clean glass slide, pressed lightly with another slide, tied with thread and placed in F.A.A. solution for twenty-four hours. The specimens were stained with Mayer's carmalum, dehydrated in graded series of alcohol, cleared in clove oil, rinsed with xylene and permanently mounted in preserva media. Drawings were made with the aid of a Camera Lucida, measurements were given length by width in millimeters and photomicrograph was prepared through Olympus Digital microscope MIC-D at SARC/ PARC, Karachi University campus 75270. Specimen is deposited in senior author's collection, Department of Zoology, University of Sindh, Jamshoro, Sindh, Pakistan.

Family: Echinostomatidae Loss, 1899

Subfamily: Echinochasminae Odhner, 1910

Genus: *Episthmium* Luhe, 1909

*Episthmium sindhensis* sp.n. (Figs.1-5)

Host: Little egret (*Egretta garzetta*)

Locality: Jamshoro, Sindh, Pakistan.

Site of infection: Small intestine

No. of hosts examined / infected: 5/01

No. of specimen recovered: 01

Etymology: Species name refers to host province.

The description is based on one mature, permanently mounted specimen.

The body of the worm is elongate, spinose, smaller in size with well-developed head collar at anterior extremity, the posterior extremity is narrower. Total body measure 0.99 by 0.41 maximum with is attained at acetabular level. Tegumental spines start from below the oral sucker in densely alternating transverse rows, up to the hind body, all the body spines are approximately equal in size.

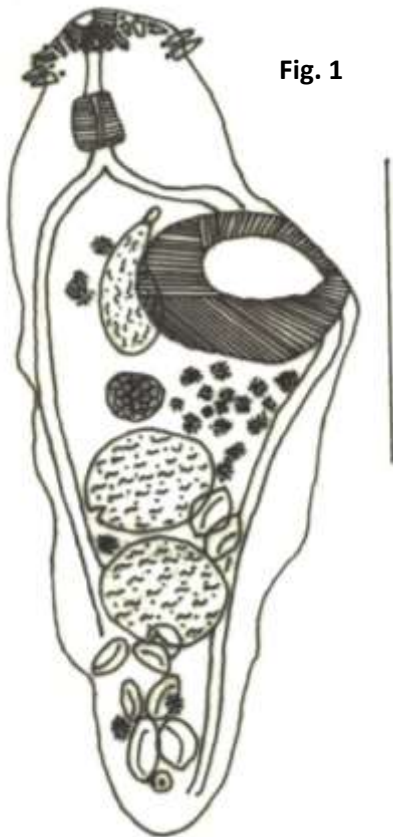


Fig. 1

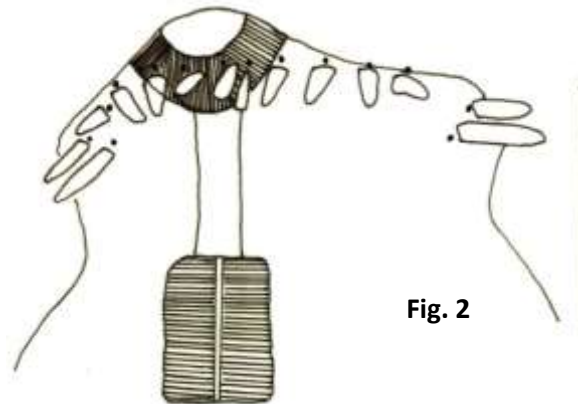


Fig. 2

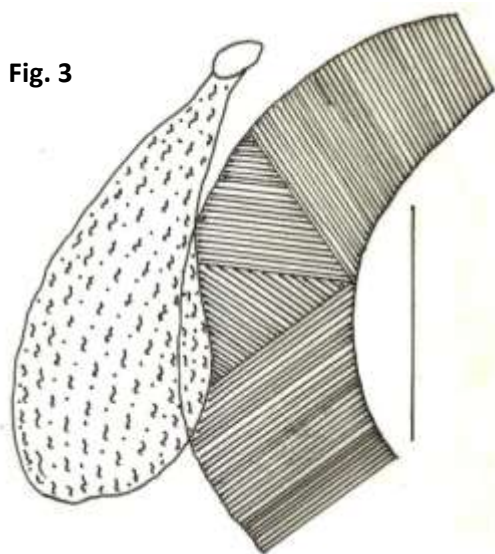


Fig. 3

Fig. 4

Fig. 5



Fig. 1. *Episthmium indhensis* sp. n., holotype, entire worm.

Fig. 2. Head collar spines enlarged with oral sucker, pre-pharynx and part of muscular pharynx.

Fig. 3. Cirrus sac and post bi-furcal genital opening.

Fig. 4. Body spines enlarged.

Fig. 5. Eggs enlarged.

Scale. Fig. 1. 0.5mm, Figs. 2-3. 0.05mm, Figs. 4-5. 0.1mm

Head collar bears 28 spines arranged in single row, not interrupted dorsally. Lateral spines are larger in size 0.03 by 0.1 posterior spines are smaller than lateral spines 0.15 by 0.1

The oral sucker is terminal measure 0.04 by 0.06. Pre-pharynx long 0.06 by 0.02. Pharynx muscular 0.06 by 0.05. Esophagus short, bifurcates into long intestinal caeca which extend up to the posterior extremity.

Ventral sucker well developed lie at a distance of 0.25 from anterior extremity, much larger than oral sucker. It is oval shaped, wider than long, situated in the 2<sup>nd</sup> quarter of the body at the extreme lateral corner 0.18 by 0.26 in size.

Ovary pre-testicular, rounded, 0.05 by 0.07 situated just above the anterior testis.

Testes are indented, tandem, situated at the third quarter of the body, both are transversely elongated, approximately same in size, situated in posterior half of hind body. Anterior testis is 0.13 by 0.17 and posterior testis is 0.13 by 0.16 in size.

Cirrus sac is pyriform, overlapped by acetabulum 0.23 by 0.08. Genital pore situated above the acetabulum and below the intestinal bifurcation.

Vitellaria commence from below the intestinal caeca just above the acetabulum, profuse between acetabulum and anterior testis.

Uterus short with few eggs below the testes at the end of the body.

The eggs are double walled measure 0.06-0.07 by 0.03-0.04. Excretory vesicle is not obvious.

Table.1 Comparative body measurements of the genus *Episthium* Luhe 1909, recovered in Sindh, Pakistan.

| S.No species        | <i>Episthium egrettae</i><br>Unar <i>et al.</i> , 2008                                 | <i>Episthium jamshorensis</i><br>Bushra <i>et al.</i> , 2016  | <i>Episthium bilqeesae</i><br>sp.n. (submitted for<br>publication)   | <i>Episthium</i> sp.<br>Present species  |
|---------------------|--|---|--|--|
| Hosts               | <i>Egretta garzetta</i>  | <i>Egretta garzetta</i>   | <i>Egretta garzetta</i>  | <i>Egretta garzetta</i>  |
| Locality            | Jamshoro, Sindh,<br>Pakistan   | Jamshoro, Sindh, Pakistan   | Jamshoro, Sindh, Pakistan  | Jamshoro, Sindh, Pakistan  |
| Body size           | 1.84   | 1.67 by 0.55  | 1.45 by 0.29   | 0.99 by 0.41   |
| Collar spines       | 26   | 28  | 24   | 28   |
| Oral sucker         | 0.07 by 0.06   | 0.06 by 0.05  | 0.07 by 0.04   | 0.04 by 0.06   |
| Pre pharynx         | 0.06 by 0.01   | 0.07 by 0.02  | 0.06 by 0.03   | 0.06 by 0.05   |
| Pharynx             | 0.09 by 0.10   | 0.06 by 0.06  | 0.07 by 0.06   | 0.06 by 0.05   |
| Esophagus           | _____  | 0.15 long   | Very short   | Very short   |
| Ventral sucker      | 0.34 by 0.27   | 0.24 by 0.3   | 0.21 by 0.17   | 0.18 by 0.26   |
| Sucker ratio        |  | 1:2.6   |  |  |
| Genital pore        | Situated b/w the<br>intestinal bifurcation<br>and acetabulum                           | Situated b/w the intestinal<br>bifurcation and acetabulum   | Situated b/w the intestinal<br>bifurcation and<br>acetabulum   | Situated b/w the intestinal<br>bifurcation   |
| Cirrus sac          | 0.71 by 0.14   | 0.24 by 0.8   | 0.23 by 0.08   | 0.23 by 0.08   |
| Ovary               | 0.15 by 0.14   | 0.08 by 0.08  | 0.1 by 0.09  | 0.05 by 0.07   |
| Testes              | Ant:0.37 by 0.35<br>Post:0.33 by 0.31  | Ant:0.2 by 0.27<br>Post:0.25 by 0.24  | Ant:0.22 by 0.17<br>Post:0.19 by 0.17  | Ant:0.13 by 0.17 Post:<br>0.13 by 0.16   |
| Vitelline follicles | Commence from<br>below the pharynx<br>and extend up to<br>posterior region of<br>body. | Vitellaria extends from<br>pharynx in the anterior region<br>up to the posterior end of the<br>body, arranged in lateral fields<br>and meet behind the uterus at<br>of tip of the posterior region of<br>the body | Vitelline follicles few in<br>lateral fields, commence<br>from below the pharynx<br>between intestinal<br>bifurcation, extend<br>laterally up to the<br>posterior extremity meet<br>behind the uterus. | Commence from below<br>the intestinal bifurcation<br>just above the acetabulum,<br>few in number |
| Eggs                | 76 by 30   | 0.08-0.09 by 0.04-0.06  | 0.08-0.09 by 0.04-0.05   | 0.06-0.07 by 0.03-0.04   |

Table.2 Comparative account of species of the genus *Episthmius* Luhe, 1909 reported worldwide from Avian hosts.

|    | Name of species   | Locality                   | Host  | Location                 | Body size                 | Collar spines |
|----|---|----------------------------|---|--------------------------|---------------------------|---------------|
| 1  | <i>E. bursicola</i><br>(Creplin, 1837)<br>Lühe, 1909                                | Europe, Siberia and Egypt. | <i>Circaetus gallus</i> ,<br><i>Ardea cinerea</i> ,<br><i>Circus cyaneus</i> , <i>Botaurus</i> ,<br><i>Bubulcus</i> | Intestine Bursa fabricii | 2.9 by 0.75               | 22            |
| 2  | <i>E. africanum</i><br>(Stiles, 1901)<br>Lühe, 1909                                 | Africa.                    | <i>Milvus parasiticus</i> <i>Numida pitlorhyncha</i> , <i>Bubulcus</i>  | Intestine Bursa fabricii | 3.3-4.0 by 0.7-0.8        | 22            |
| 3  | <i>E. prosthovittellatum</i><br>(Nicoll, 1914)                                      | N. Queensland              | <i>Hieracidea sp</i>  | Intestine                | 2.0-2.4 by 0.75-0.9       | 24            |
| 4  | <i>E. intermedium</i><br>Skrjabin, 1919   | White Nile                 | <i>Botaurus aeruginosus</i> ,<br><i>Phalacrocorax carbo</i>   | Bursa Fabricii           | 2.68-3.48 by 0.88-1.04    | 24            |
| 5  | <i>E. proximum</i><br>Travassos, 1922   | Brazi                      | <i>Ardea Coci</i> ;<br><i>Euxenura maguari</i> ,<br><i>Nycticorax naevius</i>                                       | Bursa Fabricii           | 7x2                       |               |
| 6  | <i>E. oscar</i><br>Travassos, 1922  | Brazil                     | <i>Gallus domesticus</i> , <i>Aramides</i> ,<br><i>Ardea Butorides</i> , <i>Tigrisoma</i> ,                         | Intestine                | 6x2                       |               |
| 7  | <i>E. corvus</i> (Bhalero, 1926)<br>Price, 1931                                     | Rangoon                    | <i>Corvus insolens</i>  | Intestine                | 1.06-1.08 by 0.46-0.49    |               |
| 8  | <i>E. reniovarum</i><br>(Lal, 1939) Rai, 1963                                       | India                      | <i>Corvus splendens</i> , <i>Cinnyris zeylanicus</i>  |                          | 1.17 by 0.425             | 24            |
| 9  | <i>E. wernickii</i><br>(Marco del pont, 1926)<br>Yamaguti, 1958                     | Argentina                  | <i>Podiciper americanos</i>   | Intestine                | 3.0                       | 10-12         |
| 10 | <i>E. gallinum</i><br>Tubangui et Masilungan, 1941                                  | Philippines.               | <i>Gallus gallus domesticus</i>   | Intestine                | 1.1x0.4                   |               |
| 11 | <i>E. skrjabini</i><br>(Oshmarin in Skrjabin, 1947)<br>Skrjabin et Bashkirova, 1956 | Buriata Mongoliia          | <i>Colymbus stellatus</i>   | Intestine                | 0.79 by 0.306             | 22            |
| 12 | <i>E. matherossianae</i><br>(Shakhtakhtinskaia, 1958)<br>Sulgotowska, 1960          | Azerbaizhan                | <i>Colymbus cristatus</i>   | Bursa Fabricii           | 1.65-1.85 by 0.56-0.58    |               |
| 13 | <i>E. chauhani</i><br>Rai, 1962   | India.                     | <i>Bubulcus ibis</i>  | Bursa Fabricii           |                           | 24            |
| 14 | <i>E. ghanense</i><br>Hodasi, 1967  | Ghana                      | <i>Gallus gallus domesticus</i>   | Intestine                | 1.4-2.2 by 0.4-0.5        |               |
| 15 | <i>E. solanensis</i><br>Shuvajit Chakrabarti and Anindita Ghosh 2012                | India                      | <i>Bubulcus ibiscoromondus</i>  | Intestine                | 2.688-4.64 by 0.656-1.194 | 24            |

## DISSCUSSION

A good number of species of the genus *Episthmius* are reported from Africa, Europe, Siberia, Egypt, India, Philippines, Berlin, Ghana, Nile river, Azerbizhan, Georgia, Poland, Brazil, North Queensland, Magnolia, Argentina and Pakistan (Yamaguti, 1971).

Present specimen is described and reported from the avian host *Egretta garzetta* in Jamshoro, Sindh, Pakistan. In present form the body size is 0.99 by 0.41, maximum width attained at acetabular region. Head collar spines are 28 in number, esophagus very short, acetabulum is oval shaped at lateral corner side (Fig.1). Ovary small, rounded just above the anterior testis in the middle of the body. Both testes indented, approximately same in size. Cirrus sac pyriform, overlaps the acetabulum. Uterus short with few number of eggs. Vitelline follicles commence from the below intestinal bifurcation and not confluent (Table 1).

*E. egrettae* Unar et al., 2008 differ from present form in having comparatively larger body size, maximum width attained at testicular region, 26 collar spines, acetabulum located at center of 2<sup>nd</sup> quarter of the body, ovary

larger and situated slightly towards right side above the anterior testis. Testes (both) are larger and elongated, cirrus sac is rounded, anterior to acetabulum, eggs are larger in size. Vitelline follicles start from upper level of intestinal bifurcation, profusely, extend up to the posterior region of the body and meet behind the uterus (Table. 1).

*E. jamshorensis* Bushra *et al.*, 2016 (recorded and studied during present study from the same host and locality) is also different from present specimen having larger body size, longer oral sucker and esophagus, larger and rounded acetabulum, situated at center of 2<sup>nd</sup> quarter of the body. Larger ovary, located just below the ventral sucker. Testes larger in size, anterior testis is spherical, and posterior testis is vertically elongated, uterus well developed, eggs are larger in size, vitelline follicles start from pharynx, confluent, extend in lateral fields up to the posterior extremity and meet behind the uterus (Table. 1).

Present specimen resembles with *E. bilqeesae* Bushra *et al.*, (recorded and described during present study from the same host and locality) in having approximately same size of pre-pharynx and pharynx, short esophagus, same size and shape of cirrus sac, but it is distinguished by having larger and elongated body curved at middle the region, maximum width at testicular region, acetabulum larger in length by lesser in width. Larger ovary, located below the acetabulum, testes larger, smooth and spherical, cirrus sac above the acetabulum, not overlapped by ventral sucker, larger eggs and vitelline follicles start just below the acetabulum (Table 1).

Species of the genus reported from India are *E. chauhani* Rai, 1962 from Fabricii of *Bubulcus ibis*; *E. corvus* (Bhalero, 1924) Price, 1931, Gupta and Pande, 1963; *E. solanensis* Shuvajit Chakrabarti and Anindita Ghosh 2012, are also different from present form (Table 2).

Present specimen is also different from type species. *Episthmium africanum* (Stiles, 1901) Luhe 1909 recovered in *Milvus parasiticus*. Also in *Numida Ptilorhyncha*, *Theristicus hagedash*, *Ardea*, *Botaurus*, *Circaetus*, *Falco* in Africa. Other species *E. prosthovitelatum* (Nicoll, 1914); *E. intermedium* Skrjabin, 1919; *E. oscari* Travassos, 1922; *E. proximum* Travassos, 1922; *E. wernickii* (Marco del pont, 1926); *E. corvus* (Bhalero, 1924) Price, 1931; *E. gallinum* Tubangui et Masilungan, 1941; *E. skrjabini* (Oshmarin in Skrjabin, 1947); *E. suspensus* (Braun, 1901) Travassos, 1922; *E. colymbi* Shigin in Skrj. et Bashkistrova, 1956; *E. matherossiana* (Shakhtakhtinskaya, 1958) Sulgotowska, 1960; *E. chauhani* Rai, 1962; *E. ghanense* Hodasi, 1967 (Table2).

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(Accepted for publication August 2016)