INT. J. BIOL. BIOTECH., 15 (3): 581-586, 2018.

A NEW TREMATODE *EPISTHMIUM DALERI* N.SP. (ECHINOSTOMAHDAE: ECHINOSTOMINAE) FROM A BIRD HOST, SNIPE (*GALLINAGO STENURA* L.) IN SINDH, PAKISTAN

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ABSTRACT

Here we describe a new species *Episthmium daleri* (Trematoda: Digenea) from the bird snipe (*Gallinago stenura* L.) from Sindh, Pakistan. The new species is characterized in having 28–32 collar spines, acetabulum much larger than oral sucker, esophagus more than five times the length of pharynx; testes large indented, smooth transversely elongated, ovary pretesticular almost round vitelline follicles in lateral fields confluent anterior to caecal bifurcation and extending up to anterior testis. Eggs small oval extending up to mid of ovary.

Keywords: *Episthmium daleri*, new species, bird, snipe, Sindh, Pakistan

INTRODUCTION

In a survey of helminth parasites of common snipe (*Gallinago stenura* L.) from Sindh, Pakistan during summer of 2017, thirteen trematodes were recovered from the small intestine of four birds. Snipes feed mainly on insect larva (Carroll and Krementz, 2014). They also eat ant, cricket, beetle, dragonfly, mayfly, butterfly, grasshopper, moth, crustaceans, worms and snails. The trematodes recovered are being described as *Episthmium daleri* which are new to science.

MATERIALS AND METHODS

Sixteen birds *Gallinago stenurai* L. were shot down at Oderolal Station, district Matiari (25.7519°N, 68.4770°E) at random intervals.

The birds were dissected and investigated in the laboratory. The visceral organs including digestive and respiratory with the liver, spleen and kidneys were opened in petri dishes containing normal saline solution. Thirteen specimens of digenean trematodes were fixed in alcohol acidic acid solution (70% ethanol, 92 mL; formaldehyde 6 ml; acetic acid 2 mL) under tolerable pressure of cover glasses dehydrated in alcohol series (30 percent to 70 percent), stained with Mayer's carmalum; again dehydrated in ethanol series (70 to 100%, clarified in xylol and mounted in Canada balsam for detail study. Illustrations were made with the aid of camera Lucida and photomicrographs were prepared using Olympus Digital microscope MIC-D at Department of Zoology, University of Karachi, Karachi-75270. Measurements are given in millimeters. Specimens are in possession of the senior author (A.K).

RESULTS

Genus *Episthmium* Lühe, 1909
***Episthmium daleri* sp. n.**
(Fig. 1–3)

Host: Common snipe (*Gallinago stenura* L.)
Locality: Oderolal Station, district Matiari, Sindh, Pakistan
No. of hosts examined/infected: 16/4
No. of specimen recovered: 13

Etymology: Species is named in honour of late Dr. Daler Khan, Department of Zoology, University of Punjab, Lahore.

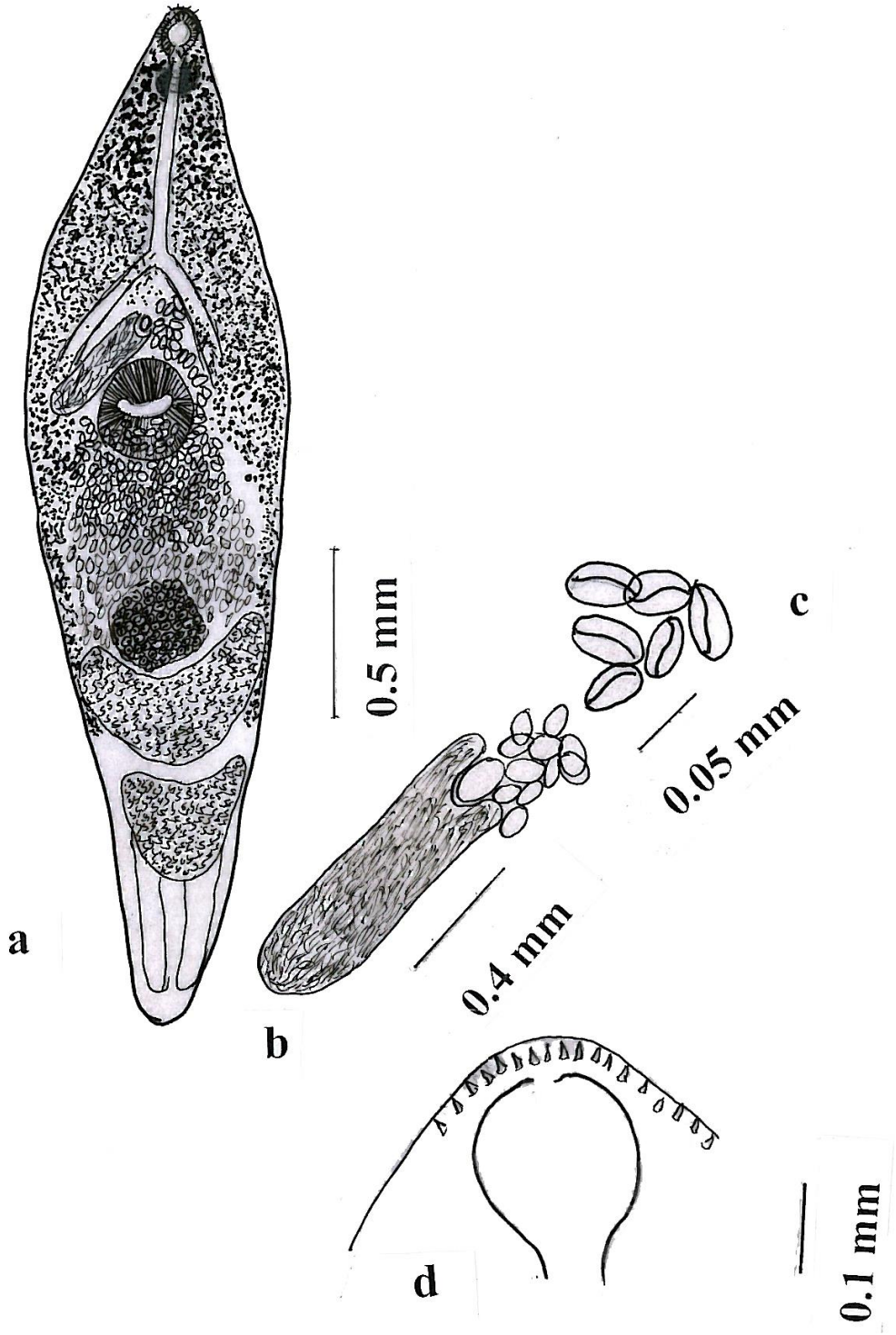

Fig. 1. *Episthmium daleri* n.sp. **a.** Holotype, entire worm **b.** Cirrus sac enlarged **c.** Eggs **d.** Head collar spines enlarged.

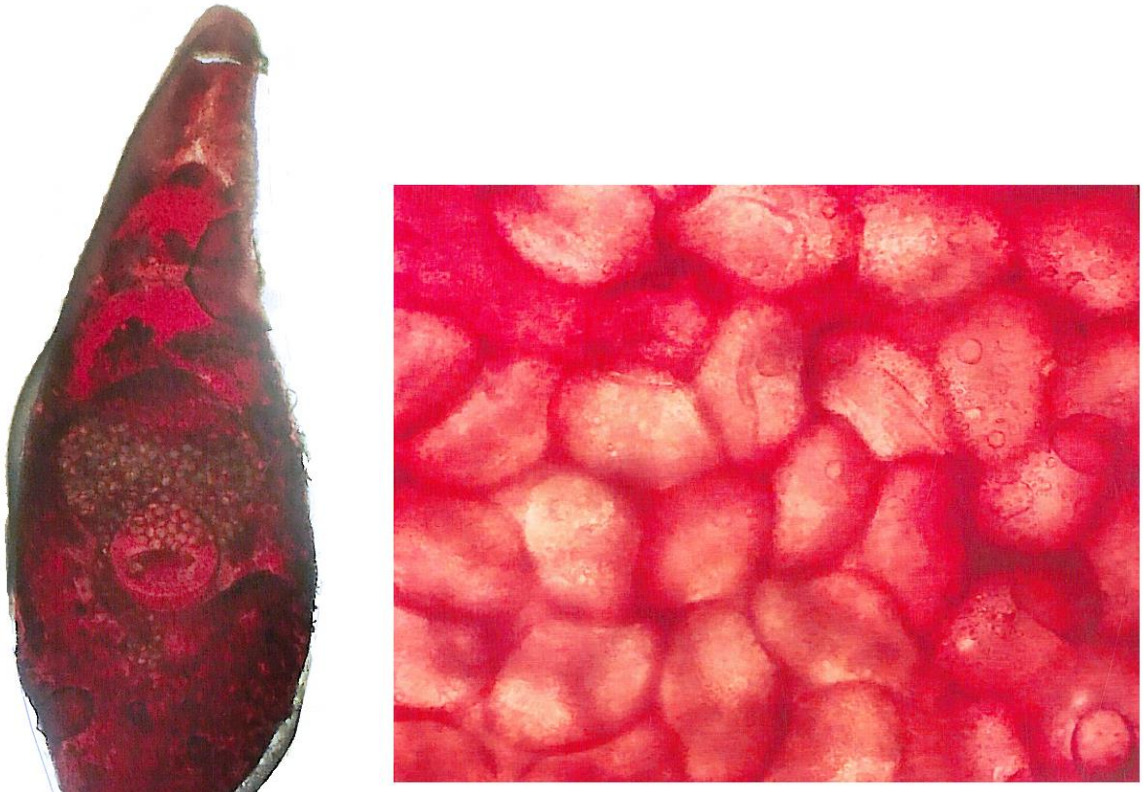

Fig.3. Photomicrograph of eggs.

Fig. 2. *Episthmium daleri* n.sp. entire worm photomicrograph.

Description

The body of the worm is elongate plump, small to medium sized measuring 3.0 – 3.80 by 0.64 – 0.86. Maximum body width at the level of the acetabulum. Anterior end slightly narrower as compared to posterior end. Entire tegument with minute spines starting from the oral sucker up to the posterior end of the body. Oral sucker small, almost round, measuring 0.10 – 0.14 by 0.10 – 0.13 having 28–32 collar spines. Prepharynx very small 0.050 – 0.056 by 0.029 – 0.038. Pharynx 0.080 – 0.084 by 0.076 – 0.080. Esophagus more than five times the length of pharynx measuring 0.50 – 0.58 by 0.029 – 0.050. Acetabulum well developed at a distance of 0.90 – 0.98 from anterior extremity, much larger than oral sucker in the anterior half of the body measuring 0.28 – 0.33 by 0.29 – 0.33. Testes large indented, smooth, transversely elongated the anterior testes larger than the posterior, at a distance of a 0.60 – 0.74 from the acetabulum. The anterior testes measures 0.25 – 0.39 by 0.68 – 0.74 while the posterior 0.25 – 0.36 by 0.36 – 0.40. Distance between the two testis 0.062 – 0.082. Ovary pretesticular, almost round measuring 0.28 – 0.32 by 0.28 – 0.32. The caeca are not obvious in most of the body and end at a short distance from posterior end. Vitelline follicles in lateral fields confluent anterior to caecal bifurcation and extending up to anterior testis. Cirrus sac large muscular elongated, not overlapping acetabulum measuring 0.40 – 56 by 0.20 – 0.38. Genital opening situated between caecal bifurcation and acetabulum. Eggs small, oval extending up to mid of the ovary, measuring 0.046 – 0.052 by 0.022 – 0.026.

Table 1. Comparision of the species of the genus *Episthmium* Lühe 1909, recovered from Pakistan.

S.No	***Episthium bursicola*** **(Creplin, 1837) Bhutia and Khan, 1975**	***E. egrettae*** **Umar *et al.*, 2008**	***E. jamshoroensis*** **Bushra *et al.*, 2016**	***E. bilqeesae*** **sp.n. Bushra *et al.*, 2016**	***E. sindhensis*** **Saujota *et al.*, 2016**	***E. daleri*** **present species**
1. Host	*Bubulcus ibis*	*Egretta garzetta*	*Egretta garzetta*	*Egretta garzetta*	*Egretta garzetta*	snipe (*Gallinago sterna* L.)
2. Locality	Panjnad Headworks area. Punjab	Jamshoro. Sindh. Pakistan	Jamshoro. Sindh. Pakistan	Jamshoro. Sindh. Pakistan	Jamshoro. Sindh. Pakistan	Oderolal station, dist. Matiari, Sindh
3. Body size	2.78 - 3.51 by 0.72 – 0.90	1.84	1.67 by 0.55	1.45 by 0.29	0.99 by 0.41	3.300 – 3.380 by 0.64 – 0.86
4. Collar spines	24	26	28	24	28	28 - 32
5. Oral sucker	0.127 – 0.147 by 0.127 – 0.156	0.07 by 0.06	0.06 by 0.05	0.07 by 0.04	0.04 by 0.06	0.10 – 0.14 by 0.10 – 0.13
6. Ventral sucker	0.44 – 0.49 by 0.39 – 0.49	0.06 by 0.01	0.07 by 0.02	0.06 by 0.03	0.06 by 0.05	0.28 – 0.33 by 0.29 – 0.33
7. Prepharynx	0.078 – 0.098	0.09 by 0.10	0.06 by 0.06	0.07 by 0.06	0.06 by 0.05	0.050 – 0.056 by 0.029 – 0.038
8. Pharynx	0.147 – 0.176 by 0.137 – 0.158	-	0.15 long	Very short	Very short	0.080 – 0.084 by 0.076 – 0.080
9. Esophagus	0.117 – 0.186	0.34 by 0.27	0.24 by 0.3	0.21 by 0.17	0.18 by 0.26	0.50 – 0.58 by 0.029 – 0.050
10. Cirrus sac	moderately long	0.71 by 0.14	0.24 by 0.08	0.23 by 0.08	0.23 by 0.08	0.40 – 0.56 by 0.20 – 0.38
11. Genital porc	postbifurcal	Situated between the intestinal bifurcation and acetabulum	Situated between the intestinal bifurcation and acetabulum	Situated between the intestinal bifurcation and acetabulum	Situated between the intestinal bifurcation	Between acetabulum and caecal bifurcation
12. Ovary	0.147 – 0.196 by 0.147 – 0.245	0.15 by 0.14	0.08 by 0.08	0.1 by 0.09	0.05 by 0.07	0.28 – 0.32 by 0.28 – 0.32
13. Testes	Ant. 0.32 – 0.49 by 0.36 – 0.50 Post. 0.5 – 0.58 by 0.30 – 0.44	Ant. 0.37 by 0.35 Post 0.33 by 0.31	Ant. 0.2 by 0.27 Post 0.25 by 0.24	Ant. 0.22 by 0.17 Post 0.19 by 0.17	Ant. 0.13 by 0.17 Post 0.13 by 0.16	Ant. 0.25 – 0.39 by 0.68 – 0.74 Post 0.25 – 0.36 by 0.36 – 0.40
14. Eggs	0.076 – 0.089 by 0.045 – 0.056	0.076 by 0.030	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	0.046 – 0.052 by 0.022 – 0.026
15. Vitelline follicles	Vitelline follicles extend from posterior margin of pharynx to the post. end of the body confluent in esophageal and post-testicular region.	Vitelline follicles commence from below the pharynx and extend up to posterior region of the body.	Vitellaria extend from pharynx in the anterior region up to the posterior end of the body, arranged in lateral fields and meet behind the uterus at tip of post. region of the body.	Vitelline follicles few in lateral fields, commence from below the pharynx between intestinal bifurcation, extend laterally up to the posterior extremity meet behind the uterus.	Commence from below the intestinal bifurcation just above the acetabulum, few in numbers.	Vitelline follicles in lateral fields anterior to caecal bifurcation and extending up to anterior testis.

DISCUSSION

Lühe, 1909 erected the genus *Episthmium* with *E. africanum* (Stiles, 1901) Lühe, 1909 as its type specie in *Milvus parasiticus*. Also in *Numida ptilorhyncha*, *Theristicus* (*Ibis*) *hagedash*, *Ardea*, *Botaurus*, *Bubulcus*, *Circaetus* and *Falco*. The genus *Episthmium* is worldwide in distribution and a fairly good number of species have been reported from avian hosts in Africa, Europe, Pakistan, Siberia, Egypt, India, Philippines, Ghana, Germany, Egypt, Azerbaijan, Georgia, Mongolia, Argentina, North Queensland, Brazil and Poland.

Five species have been reported from Pakistan namely *E. bursicola* (Creplin, 1837) Bhutta and Khan, 1975, *E. egretta* Unar *et al.*, 2008, *E. jamshorensis* Bushra *et al.*, 2016, *E. sindhensis* Sanjota *et al.*, 2016 and *E. bilqeesae* Bushra *et al.*, 2016a. This is the sixth species being reported from snipe (*Gallinago stenura* L.) from Sindh, Pakistan.

The present species in larger in length as compared to *E. bursicola* (Creplin, 1837) (2.96 by 0.75), *E. colymbi* Shigin in Skrjabin *et al.*, 1947 (2.37 by 0.725), *E. corvus* (Bhalerao, 1926) Price, 1931 (1.06 – 1.08 by 0.46 – 0.49), *E. gallinum* Tubangui *et* Masilungan, 1941, *E. ghanense* Hodasi, 1967 *E. metherossianae* (Shakhtakhtinskaia, 1958) Sulgotowska, 1960 (1.65 – 1.85 by 0.56 – 0.5.8), *E. prosthoritellanatum* (Nicoll, 1914) Price, 1931 (2.0 – 24 by 0.75 – 0.9), *E. reniovasum* (Lal, 1939) Rai, 1963 (1.17 by 0.425) and *E. skrjabini* (Oshmarin in Skrjabin, 1947) (0.79 by 0.306). As compared to the species reported from Pakistan the present species (3.30 – 3.38 by 0.64 – 0.86) is larger as compared to *E. egrettae* (1.84), *E. jamshorensis* Bushra *et al.*, 2006, *E. bilqeesae* 1.45 by 0.29 and *E. sindhensis* (0.99 by 0.41). Furthermore, *Episthmium colymbi* Shigin in Skrjabin *et al.*, 1947 differs from the present species in shape of testes, ovary overlapping acetabulum position of the cirrus sac and in having vitelline follicle up to caecal end.

E. bursicola (Creplin, 1837) Lühe, 1909 differs from present species in shape of cirrus sac, shape of testes, length of esophagus, position of ovary and in having vitelline follicles up to caecal end. The shape of testes is different from all the reported species from Pakistan and elsewhere. *E. africanum* (Stiles, 1901) differs from the present species in shape of testes and position of vitellaria.

The eggs in the present species (0.046 – 0.052 by 0.022 – 0.026) are smaller as compared to *E. bursicola* (0.076 – 0.089 by 0.045 – 0.056), *E. egrettae* (0.076 – 0.030), *E. jamshorensis* (0.08 – 0.09 by 0.04 – 0.06), *E. bilqeesae* (0.08 – 0.09 by 0.04 – 0.05), *E. sindhensis* (0.06 – 0.07 by 0.03 – 0,04), *E. africanum* (0.10 – 0.12 by 0.06 – 0.08), *E. bursicola* (0.073 – 0.086 by 0.047), *E. chauhani* Rai (0.056 – 0.085 by 0.032 – 0.056), *E. colymbi* (0.089 – 0.097 by 0.055 by 0.032 – 0.058), *E. corvus* (0.070 – 0.085 by 0.045 – 0.060), *E. gallinum* (0.082 – 0.098 by 0.049 – 0.056), *E. ghanense* (0.099 – 0.11 by 0.069 – 0.083), *E. intermedium* (0.064 – 0.073 by 0.047 – 0.051), *E. oscari* (0.12 by 0.056), *E. prosthoritellatum* (0.085 – 0.091 by 0.049 – 0.055), *E. proximum* (0.120 by 0.071) and *E. reniovarum* (0.077 by 0.045).

The collar spines in the present specimens are 28 – 32 while in *E. bursicola* (24), *E. egrettae* (26), *E. bursicola* (22), *E. chauhani* (24), *E. intermedium* (24), *E. prosthoritellatum* (24), *E. reniovarum* (24), *E. skrjabini* (22) and *E. wernickii* (Marco del Pont, 1926 (10 – 12). The present species differs from the earlier reported species in combination of characters body size, shape of cirrus sac and position, number of collar spines, shape and position of ovary, testis and vitelline follicles and size of eggs thus regarded as a new species *Episthium daleri*.

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(*Accepted for publication June 2018*)