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Research Article

New trematode *Psilochasmus platyrhynchosi* (Trematode: Psilochasmidae) from Mallard *Anas platyrhynchos* (Anseriformes: Anatidae) in Sindh province of Pakistan

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Abstract
During helminthological studies of Mallard *A. platyrhynchos* of Hamal Lake, Sindh, Pakistan, twenty-seven birds were examined. The gut contents revealed 32 trematodes belonging to genus *Psilochasmus*. The morphological features of present specimens differ from congeners in the distribution of vitellaria which is densely arranged in hind body, presence of seminal receptacle, the shape of ovary and size of eggs. Based on these differentiating characters, a new species *Psilochasmus platyrhynchosi* is proposed.

Keywords: *Anas platyrnhnychos;* Anatidae; *Psilochasmus platyrhnchosi*; Pakistan; Sindh

Introduction

Sindh province, with splendid wetlands and lakes, have been always considered as welcoming grounds for lots of birds who migrate to Pakistan from Russia and Siberia during the winters **[1]**. Mallard *A. platyrhynchos* is the migratory bird who come from Siberia to Pakistan in winter from October- March. Mallard is a member of order Anseriformes (ducks, geese and swans), generally bound to open waters and wetland habitats. Mallard is migratory in nature and depends upon a variety of food items during migration from Siberia to Asian states. During its stopover habitats, it shares a variety of food items including small invertebrates, tadpoles, small fishes and all type of plant materials **[2]**, Genus *Psilochasmus* is widespread and cosmopolitan **[3]**. This genus has been reported from the Greylag Goose *Anser anser* Linnaeus, 1758 and white-cheeked Pintail *Anas bahamensis* of Brazil **[4]**. Brown-hooded gull *Larus maculipennis* of Argentina **[5]**, Common Brahminy duck, *Casarca rutile* **[6]**, Common Whistling Teal, *Dendrocygna javanica* of India, **[7]** and *A. platyrhynchos* **[8]** of Pakistan. There is an absence of extensive investigation on helminth parasites of Mallard. Only a few investigations have

been done but there is a lack of detailed study on helminth parasite of Mallard *A. platyrhynchos*. The main objective of this investigation was to undertake a systematic study to find out the helminth fauna in Mallard, *A. platyrhynchos* of Hamal Lake. Mallard is an edible bird, it might possible to harbour helminths of medical importance.

Materials and methods

Live twenty-seven Mallard *A. platyrhynchos* were collected from Hamal lake Sindh, Pakistan during the winter season from October to March 2018 and examined for the endo-helminths. During the inspection of visceral organs and gut content, a total of 32 flukes of genus *Psilochasmus* were gathered from the intestine of nineteen positive birds. Flukes were placed in saline 0.9% solution for a few minutes after that they were put in hot water for relaxing them. Trematodes were then fixed under slight cover glass pressure in alcohol–formalin–acetic acid, borax carmine were used for staining, dehydrated in series of graded ethanol solutions, clove oil and xylol were used for clearing of specimens and Canada balsam was used for mounting. Diagrams were drawn with help of Camera Lucida and photographs were taken with the help of Nikon D700 **[9, 10]**. All the measurements were taken in millimetre (mm).

Results

Family Psilochasmidae Loss, 1900

Genus *Psilochasmus* Luhe, 1909

Psilochasmus platyrhnychosi n.sp.

Description

Body of fluke (Fig. 1) is muscular, elongated with slightly round anterior and tapering posterior end, measuring 3.72- 5.289 X 0.61-1.052 in size. Fore body is 0.8-1.447 and hind body 1.6-3.210 in size. Well-developed, muscular, subterminal, laterally elongated oral sucker (Fig. 2) 0.12- 0.342 X 0.11-0.394 in size. Prepharynx short and 0.026 in size. Pharynx round, muscular and almost half of the size of oral sucker 0.06-0.264 X 0.04-0.263 in size. Esophagus long, diverticulate into intestinal ceca measuring0.43 - 0.657 long. Ventral sucker muscular (Fig. 2), well developed, cup-shaped 0.31-0.605 X 0.41-0.710 in size.

Testes (Fig. 3) contiguous, tandem, oval and median in shape; anterior testis longitudinally elongated 0.40 -0.605 X 0.31-0.473 and posterior testis irregular 0.34-0.657 X 0.32-0.473 in size. Long and tubular cirrus sac 0.61-1.052 X 0.11-0.263 in size. Vitellaria (Fig. 3) dense, starting from ventral sucker's posterior margins reaching up to the post-testicular region, ending in between posterior testis and posterior end of the body, confluent posterior. The ovary (Fig. 3) oval-shaped, pre-testicular smaller than testis 0.11-0.236 X 0.12-0.236 in diameter. Seminal receptacle oval in shape 0.01-0.184 X 0.013-0.223 in size. Distance between the ovary and ventral sucker 0.736, Post-testicular space is0.5-0.842 in size and eggs (Fig. 3) small 0.078-0.118 X 0.005-0.026 in size.

Taxonomic summary

Type Host: Mallard *A. platyrhynchos* (Anseriformes: Anatidae)

Type locality: Hamal Lake, Sindh, Pakistan

Site of infection: intestine

Number of hosts examined: twenty-seven

Number of specimens recovered: thirty two

Etymology: Species name refers to the name of the host bird.

Discussion

The family Psilostomidae Looss, 1900 is one of the little groups of Echinostomatoid digenetic trematodes existing in mammals and aves. Psilostomidae has been erected by Looss (1900) to incorporate Psilostomum Looss, 1899 involving three species from birds **[9]** its taxonomic content, structure and constituent genera have been reviewed **[11]**.

Species of Genus *Psilochasmus* includes *P. oxyurus* (Creplin.,1825) Luhe **[12]** were collected from *A. marila*, *Phoenicopterusroseus*, *Botaurusstellaris* and *A. platyrhynchos* of Germany, and from other

anatids of Europe, U.S, W. Siberia, China, India, Egypt, Azerbaidzhan and Pakistan varies from present specimen having body bluntly round from anterior extremity and pointed posterior extremity, prepharynx absent, esophagus smaller, ventral sucker rounded, seminal receptacle absent, Vitellaria is in the form of large follicles, arranged mainly in extra-caecal field, testis irregular in shape and smaller size of eggs.

P. singhi Jaiswal and Humayun **[7]** collected from Common Whistling Teal, *Dendrocygnajavanica* differs from present specimen in having bluntly rounded anterior end and sharply marked off retractile tail bearing a terminal spine and larger size of body, oral sucker spherical, larger size of pre-pharynx, oval and larger size of pharynx, ventral sucker round, ovary oval, cirrus sac tubular, seminal receptacle absent, testis notched and larger eggs.

P. aglyptorchis Loos-Frank **[13]** collected from European herring gull, *Larusargentalus* differs from the present specimen in having bluntly round anterior extremity slightly posterior tapering, Prepharynx absent, seminal receptacle absent, Vitellaria extends behind the Ventral Suckerto almost posterior half of body, both testes are rounded in shape and smaller eggs.

P. indicus Gupta **[6]** collected from common Brahminy duck, *Casarca rutile* varies from present specimen having posterior extremity with spike, maximum length at testicular level and body larger in size, ovary spherical, Vitellaria extend behind the Ventral sucker to almost posterior half of the body, both testes Constricted in the middle, seminal receptacle absent and smaller eggs size. The comparison of present species with its congener's species is given in (Table 1).

Figure 1. *Psilochasmus platyrhynchosi* n. sp. Entire worm Diagram. Scale bar: 0.5mm

Figure 2. ***Psilochasmus platyrhynchosi*** **n. sp. Photographs of anterior region**

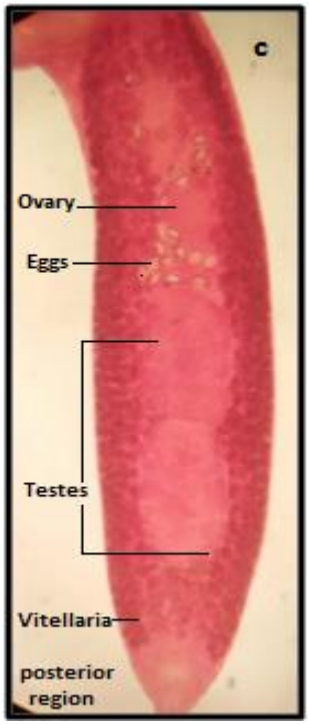

Figure 3. ***Psilochasmus platyrhynchosi*** **n. sp. Photographs of posterior region**

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Table 1. Comparative morphological measurement and features of *Psilochamus* species

Species	Present species	*P. oxyurus* Bhutta and Khan, 1975	*P. indicus* Gupta, 1956	*P. aglyptorchis* Loos- Frank, 1968	*P. singhi* Jaiswal and Humayun, 1971
Body size	Slightly rounded anterior and tapering posterior, end3.72-5.289 X 0.61-1.052.	body has bluntly round anterior extremity and pointed posterior extremity, 3.666- 4.484 X 0.666- 0.878	Anterior rounded posterior with spike, maximum width at testicular level, 6.688X0.912	Body has bluntly round anterior extremity slightly posterior tapering, 2.875X0.675	Bluntly rounded anterior end and sharply marked off retractile tail bearing a terminal spine, 4.806-6.083X0.8399-1.258
Fore body	0.8 -1.447	0.833	1.727	0.825	1.441
Hind body	1.6-3.210	2.533	4.545	1.75	3.8235
Oral sucker	Laterally elongated 0.12-0.342 X 0.11-0.394	Round 0.284- 0.343 X 0.245- 0.303	Round 0.352X0.384	Round 0.225X 0.225	Round 0.303-0.322X0.296-0.303
Prepharhynx	Very short 0.026	absent	Short narrow 0.144	absent	Well developed 0.194-0.232
Pharynx	Slightly oval 0.06-0.264 X 0.04-0.263	Oval 0.235-0.245X0.196-0.245	Slightly rounded 0.176X0.192	Slightly oval 0.15X0.125	Oval 0.245-0.277X0.168-0.187
Esophagus	0.43- 0.657	short 0.294- 0.374	long 1.36	Short 0.175	Long 0.439- 0.568
Ventral sucker	Cup-shaped 0.31- 0.605 X 0.41 - 0.710	Round 0.490-0.676X0.529-0.598	Oval 0.768X0.640	Oval 0.275X0.55	round 0.477- 0.658X0.465-0.580
Ovary	Oval 0.11- 0.236 X 0.12-0.236	Round 0.156-0.176X0.127-0.176	Round 0.224X0.240	Round 0.162X0.162	Round 0.174 - 0.213 X 0.168 – 0.206
Cirrus sac	tubular 0.61-1.052 X 0.11-0.263	Tubular 0.966X0.1	Tubular 1.95X 0.227	Tubular 0.85X 0.125	Tubular 1.411 X 0.088
Seminal receptacle	Oval 0.01 -0.184 X 0.013-0.223	absent	Absent	absent	absent
Ant: testis	Irregular 0.40- 0.605 X 0.31-0.473	Lobed and irregular 0.392-0.450X0.245-0.372	Rounded 0.480X0.352	Slightly rounded 0.375X0.3	Notched 0.458-0.529 X 0.258 - 0.374
Post: testis	Longitudinally elongated 0.34-0.657 X 0.320.473	Lobed and irregular 0.470-0.490X0.196-0.372	Oval 0.496X0.288	Oval 0.375X0.3	Notched 0.490 – 0.664 X0.264 – 0.348
Vitellaria	dense, commencing from posterior margins of ventral sucker reaching up to the post-testicular region	In the form of large follicles, arranged mainly in extra-caecal field.	extend behind the V.S to almost posterior half of the body	extend behind the V.S to almost posterior half of the body	extend behind the V.S to almost posterior half of the body
Eggs	0.078 - 0.118 X 0.005 - 0.026	long 0.078-0.109X0.056-0.078	Short 0.080-0.096X0.046-0.064	Short 0.05-0.075 X0.0125X0.025	Long 0.09 – 0.12 X 0.07 – 0.072
Host	*Anasplatyrhynchos*	*Anasplatyrhynchos*	*Casarcarutila*	*Larusargentalus*	*Dendrocygnajavanica*
Location	Small intestine	Intestine	Intestine	Intestine	intestine
Locality	Hamal lake	Ballokiheadworks area	India	Helogoland	India

Conclusion

Genus *Psilochasmus* recorded for the second time from avian host Mallard, *A. platyrhynchos*. New report will help to understand diversity of trematodes in avian fauna of Pakistan.

Authors' contributions

Conceived and designed the experiments: SA Buriro & NA Birmani, Performed the experiments: SA Buriro, Analyzed the data: SA Buriro & NA Birmani, Contributed materials/ analysis/ tools: SA Buriro, NA Birmani & AM Shaikh, Wrote the paper: SA Buriro.

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