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Two new records of digenetic trematode genus *Allocreadium* Looss, 1900 from fresh water fishes of Lucknow, India

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ABSTRACT: Although some encouraging studies have been done on the helminth parasites of fresh water fishes of India but there are serious deficiencies in present knowledge with regard to helminth parasites. The present study was carried out in Gomti river, is an important fresh water body in Daliganj at Lucknow, Uttar Pradesh. The present study was aimed to investigate the unknown fresh water piscine digenean trematode parasites, on the basis of description of morphological as well as morphometrical analysis. Genus *Allocreadium* Looss, 1900 (Trematoda: Allocreadiidae (Stossich, 1903) Odhner, 1910) is one of the most important digenean trematode parasite with wide geographic distribution range in the world. We have recovered large number of digenean parasites which belong to above genus, during the survey 2010 to 2012 and collected forty trematodes of the genus *Allocreadium* Looss, 1900, out of these two are new species, another are redescribed to show certain variation, the new parasite was obtain from the intestine of fish *Channa punctatus* (Bloch., 1785) and *Mystus tengara* (Ham., 1822).

Keywords: Digenea; Fresh water fishes; *Channa punctatus*; *Mystus vittatus*; Parasite; India.

1. INTRODUCTION

In India, water system surrounded by three directions and have rich network of fresh water bodies like rivers and their tributaries. Fresh water fishes are commonly found in river, different ponds and lakes. Fresh water fishes are the common shelter for various species of digenetic trematode parasites in Lucknow (Uttar Pradesh). Fishes carry heavy infection of helminth parasites and serve as the potent source of these parasites. Lucknow is capital of Uttar Pradesh (India). Digeneans are important group of helminth parasites, usually invade gastro-intestinal tract of fresh water as well as marine Piscean hosts [1]. Fishes are important due to its high nutritional value, medicinal value and economic value, thus we can call it gold coin of the aquatic

environment [2]. Fresh water fishes are the common host for various species of digenetic trematode parasites in Lucknow (Uttar Pradesh), abundantly found in river Gomti (26° 51' 30" N, 80° 56' 14" E), Lucknow. Majority of fresh water fishes carry heavy infection of digenean parasites which cause deterioration in the food value of fish and may even result in their mortality [3]. Besides these, there are a number of helminth parasites, which are transmitted to human beings only through fishes due to weak association of host and parasites called zoonotic parasites [3]. These parasites use the fish for their shelter, food and destruct more or less each and every organ resulting deformities in external as well as internal morphological changes. Parasites also interfere physiological function of hosts. In this paper we are adding to a new species of *Allocreadium* collected from the fresh water fish *Mystus tengara* (Ham. 1822). Many researcher from all over the world collected more efficient and adequate knowledge about the genus *Allocreadium*. During the helminth parasite survey, we have found 40 infected fish with this genus; two forms are new to science while other forms are rediscrised. The present investigation was undertaken to reveal the taxonomical status of the genus *Allocreadium* Looss, 1900.

2. MATERIALS AND METHODS

2.1. Collection and sampling site

The host fishes were collected in the month of January to December, 2012 from the river Gomti, Daliganj at Lucknow (26° 51' 30" N, 80° 56' 14" E). During the examination of the fresh water fishes specimens for above genus, we were recovered fish *Channa punctatus* (Bloch., 1785) and *Mystus tengara* (Ham., 1822). These specimens were collected and identified by standard fish books [12] and cut open and thoroughly examined for digenetic helminth parasites, were separated in Petri dish containing normal saline solution (0.89 g NaCl/100 ml distilled water). The parasite were flattened with slight pressure of cover glass and fixed in A.F.A. fixative (50% alcohol, formalin and acetic acid in ratio of 100: 6: 2.5). They were stained in acetoalum carmine, differentiated in acid alcohol and dehydrated through ascending grade of ethanols. These were cleared in xylol and mounted in Canada balsam or DPX. This revised staining protocol adopted from thesis. All measurements in millimeters: unless otherwise stated. The Voucher of specimens submitted into the depository of the Helminthological Society of India of Late Prof. S.P. Gupta, University of Lucknow, India.

2.2. Identification and morphological description

Observation, drawings and measurements of specimens were done by using following microscopes such as Olympus, Dissecting Microscope (Model No. H.S.A Germany and Model No.62397), Camera Lucida (H.S.A Germany and Model No.62397) and Nikon Microscope attached with Photographic SLR Camera (Model No. Eclipse E2000 Japan). All diagrams were made with the help of camera Lucida and the species identification was based on the Standard book *Systema Helminthum* and other available taxonomic related literatures database.

3. RESULTS

Family: Allocreadiidae (Stossich, 1903) Odhner, 1910

Sub-family: Allocreadiinae Looss, 1902

Genus: *Allocreadium* Looss, 1900

3.1. *Allocreadium gontioensis* sp. nov. (Figure 1)

Body elongated, aspinose, anterior end broad while posterior end narrow, 2.05-3.00 mm long, 0.09-0.33 mm wide. Oral sucker spherical, sub-terminal, 0.16-0.18 mm long, 0.17-0.19 mm wide. Ventral sucker median, sub-spherical, pre-equatorial, larger than oral sucker 0.19-0.22 mm long, 0.20-0.22 mm wide, at 0.69-0.90 mm from anterior extremity. Pre-pharynx absent. Pharynx globular, muscular 0.10-0.12 mm long, 0.08-0.11 mm wide. Oesophagus tubular, 0.05-0.07 mm long, 0.02-0.04 mm wide. Intestinal caeca simple extending up to hind end of bod. Excretory bladder tubular, excretory pore terminal. Genital pore sub-median, present between intestinal bifurcation and ventral sucker opens at left intestinal caecum, at 0.50-0.55 mm from anterior extremity. Testes oval, directly tandem, post-ovarian, subequal, intercaecal. Anterior testis pear shape, equatorial, 0.23-0.25 mm long, 0.15-0.18 mm wide, at 1.06-1.08 mm from anterior extremity. Posterior testis post-equatorial, 0.24-0.27 mm long, 0.14-0.17 mm wide, at 0.77-0.79 mm from posterior extremity. Cirrus sac coiled, flask shape present just anterior to ventral sucker, 0.30-0.32 mm long, 0.05-0.07 mm wide.

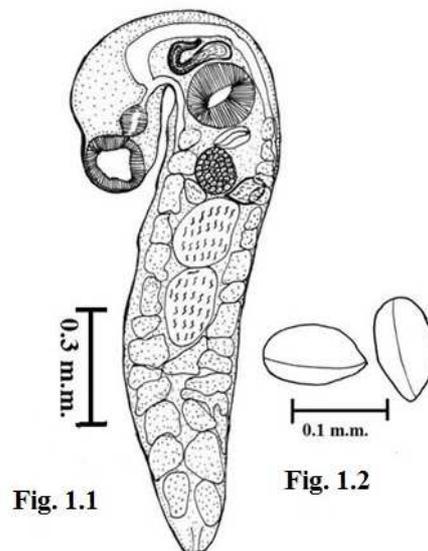


Figure 1. *Allocreadium gontioensis* sp. nov.; 1.1: Ventral view of adult; 1.2: Eggs.

Vesicula seminalis bipartite, 0.10-0.12 mm long, 0.04-0.07 mm wide. Pars-prostatica tubular, 0.14-0.16 mm long, 0.01-0.011 mm wide, surrounded by large number of prostate gland cells. Ovary entire, spherical, median, pre-testicular, pre-equatorial, post-acetabular 0.12-0.14 mm long, 0.11-0.12 mm wide, at 0.85-0.88 mm from anterior extremity. Receptaculum seminis oval, post-ovarian, 0.11-0.12 mm long, 0.06-0.07 mm wide. Vitellaria follicular, extending from hind end of ventral sucker up to hind end of body, distributed over both sides around the caeca. Uterus present between genital pore and pre-ovarian space. Eggs oval,

operculated, 0.011-0.012 mm long, 0.05-0.06 mm wide.

Host: *Channa punctatus* (Bl., 1785)

Location: Intestine

Locality: Lucknow

Prevalence: Two specimens from one host out of eighteen examined.

3.2. *Allocreadium ramai* sp. nov. (Figure 2)

Body elongated, aspinose with anterior end blunt and posterior end pointed, 2.47-2.50 mm long, 0.45-0.47 mm wide. Oral sucker sub-terminal, sub-spherical, larger than ventral sucker, 0.23-0.25 mm long, 0.12-0.14 mm wide. Pre-pharynx short, tubular 0.07-0.08 mm long, 0.04-0.06 mm wide. Pharynx muscular, rounded, 0.10-0.11 mm long, 0.11-0.12 mm wide. Oesophagus absent. Intestinal caeca extending upto hind end of the body. Ventral sucker, median, pre-equatorial, pre-ovarian, sub-spherical, intercaecal 0.22-0.24 mm long, 0.15-0.16 mm wide, at 0.40-0.42 mm from anterior extremity. Excretory pore terminal; excretory bladder tubular bulbous. Genital pore, sub-median, open at left intestinal caeca, at 0.35-0.39 mm from anterior extremity. Testes equal, entire, median, oval, tandem. Anterior testis equatorial, 0.27-0.28 mm long, 0.19-0.20 mm wide, at 1.25-1.27 mm from anterior extremity. Posterior testis post-equatorial, 0.27-0.28 mm long, 0.18-0.19 mm wide, at 1.49-1.50 mm from posterior extremity. Cirrus sac flask shape, present between intestinal bifurcation and ventral sucker, 0.20-0.25 mm long, 0.11-0.15 mm wide. Vesicular seminalis saccular, 0.19-0.20 mm long, 0.09-0.10 mm wide. Parsprostatica tubular, 0.020-0.025 mm long, 0.010-0.011 mm wide, surrounded by large number of prostate gland cells. Ovary small entire, oval, sub-median, pre-equatorial, pre-testicular, preacetabular, 0.21-0.24 mm long, 0.11-0.13 mm wide, at 0.65-0.68 mm from anterior extremity. Receptacula seminalis cone shape, much smaller than ovary present between ventral sucker and ovary, 0.11-0.13 mm long, 0.02-0.03 mm wide. Vitellaria extending from mid level of ovary upto hind end of the body. Eggs are large, oval, operculated 0.03-0.032 mm long, 0.017-0.19 mm wide.

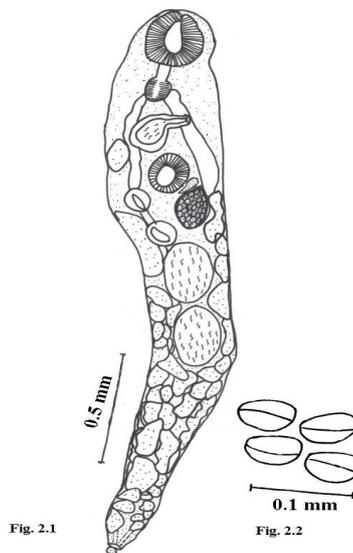


Figure 2. *Allocreadium ramai* sp. nov.; 2.1: Ventral view of adult; 2.2: Eggs.

Host: *Mystus tengara* (Ham., 1822)

Location: Intestine

Locality: Lucknow

Prevalence: Two specimens from one host out of twenty examined.

4. DISCUSSION

4.1. *Allocreadium gomtioensis* sp. nov.

A new discussion with other following forms viz. *A. handiai* Pande, 1937; *A. thapari* Gupta, 1950; *A. nemachilus* Kaw, 1950; *A. ophiocephali* Srivastava 1960; *A. ophiocephali* Srivastava 1960; *A. mukundi* Gupta, 1962; *A. heteropneustusius* Agarwal, 1964; *A. mrigalai* Gupta and Verma, 1976; *A. saranai* Gupta and Verma, 1976; *A. saranai* Gupta and Verma, 1976; *A. jaini* Khan, 1981; *A. fotedari* Dhar and Kharoo, 1985; *A. bimaculatusi* Singh, 2009 and *A. punctatai* Sen and Siddiqui, 2010 are known so far. The present form differs from all the known species except *A. handiai*; *A. thapari*; *A. nemachilus*; *A. makundi*; *A. mrigalai*; *A. saranai*; *A. heteropneustusius*; *A. fotedari*; *A. jaini* and *A. punctatai* in having absence of pre-pharynx and ovary pre-equatorial.

The present form differs from *A. handiai* in presence of oval shape receptaculum seminalis instead of conical shape [4] and from *A. makundi* [5] and *A. thapari* [6] in having ventral sucker small and intercaecal instead of large and extracaeca; from *A. heteropneustusius* in having receptaculum seminalis oval shape and ovary median instead of receptaculum seminalis elongated and ovary sub-median [7]; from *A. fotedari* in extension of vitellaria from hind end of ventral sucker, receptaculum seminalis post-ovarian instead of extension of vitellaria from pharynx and receptaculum seminalis diagonal to ovary [8]. The present form further differs from *A. punctatai* in having receptaculum seminalis pre-ovarian instead of receptaculum seminalis post-ovarian [9]; *A. jaini* and *A. thapari* in having non-operculated eggs instead of operculated [6, 10]; *A. mrigalai* and *A. jaini* in extension of vitellaria from pharynx upto hind end of body [10, 11]; from *A. saranai* in having coiled large tubular cirrus sac, conical shape receptaculum seminalis instead of small, coiled tubular cirrus sac and oval shape receptaculum seminalis and in relative shape and size of various organs [11].

Thus on account of above mentioned differences as against all those described earlier, the present form deserves the status of a new species with the specific name *Allocreadium gomtioensis* sp. nov.

4.2. *Allocreadium ramai* sp. nov.

A new discussion with other authors form with present form differs from all known species except *A. ophiocephali* in absence of oesophagus, pre-ovarian receptaculum seminalis, cone shape vesicula seminalis and genital pore just above the intestinal caeca instead of presence of oesophagus, post-ovarian receptaculum seminalis, bipartite vesicula seminalis and genital pore intercaecal [12] and from *A. bimaculatusi* in extension of vitellaria from mid level of ovary, genital pore just above the intestinal caeca, absence of oesophagus, conical cirrus sac and saccular vesicula seminalis instead of extension of vitellaria from mid level of anterior

testis, genital pore intercaecal, presence of oesophagus, elongated, tubular cirrus sac and tubular vesicula seminalis and in relative shape and size of the various organs [13].

Thus on account of above-mentioned differences as against all those described earlier, the present form deserves the status of a new species with the specific name *Allocreadium ramai* sp. nov.

5. CONCLUSION

With this research study, we have reported two new digenean parasites were first recorded from *Allocreadium gontionensis* sp. nov. and *Allocreadium ramai* sp. nov. from *Channa punctatus* (Bloch., 1785) and *Mystus tengara* (Ham., 1822) respectively.

Author Contributions: SC and NY contributed in collecting fish and identification, running the laboratory work and analysis of the data. SC contributed to helminthological studies and analysis of the data. SC contributed to critical reading of the manuscript. AMS designed the study, supervised the laboratory work and wrote manuscript. All authors read and approved the final manuscript.

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