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NEW SPECIES OF THE GENUS *LYTOCESTUS* (CARYOPHYLLIDEA LYTOCESTIDAE) FROM CATFISH IN LATUR DIST. (M.S.) INDIA.

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ABSTRACT
The present paper deals with the new caryophyllaeid species of the genus *L. manjaraensis* Sp.Nov., from the freshwater catfish *Clarias batrachus* L. from Latur Dist. (M.S.) India. The differentiating characters of *L. manjaraensis* Sp.Nov., are body is long, big, cylindrical head, ovary is large, distinctly bilobed, testes are 460-470 (467) in number.

KEY WORDS: Caryophyllaeid, *Clarias batrachus, L. manjaraensis* Sp.Nov., Latur.

INTRODUCTION

Cohn 1908 erected the genus *Lytocestus* with its type species *L. adhaerens* from *Clarias fuscus* in Hong-Kong. This genus was first confirmed by Woodland, 1926 that included four more species in addition to the type species. They are *L. filiformes* Woodland, in *Mormynus caschive,* Egypt Sudan; *L. chalmersius* Woodland, 1926; *L. cunningtoni* (Furhmann *et.al.*, 1925) and *L. indicus* (Moghe, 1925) (Syn. *Caryophyllaeces indicus*) from *Clarias batrachus* in India. Mehra, 1930 recorded the same species from *Clarias magur* and from *clarias batrachus* in India. Hunter (1927) placed the genus in sub-family *Lytocestinae* and retained only three species i.e. *L. adhaerens, L. filiformis* and *L. indicus.* He put the species *L. cunningtoni* and *L. chalmersius* in the genus *Monobothrioides*. Subsequent works (Gupta, 1961) have adhered to these changes. Wardle *et. al.,* (1974) followed Hunter's classification but raised the status of *Lytocestinae* from Sub family to family. Wardle *et. al*., (1974) suggested a new system of classification of cestodes, which used the term Cotyloda as a class and order Caryophyllidea is kept in this class (Mackiewicz, 1972.) and included the species *L. javanicus* (Bovien, 1926). Here considered *L. alestesi* as Syn. of *L. birmanicus* (Furtado, 1963; Lynsdale, 1956). But Mackiewicz, (1962) after examination of original material *L. alestesi* (Lynsdale, 1956) concluded that it should be considered as synonym of *L. filiformis* (Woodland, 1923). *L. longicollis* (Ramadevi, 1973) described from *clarias batrachus* in India. Later on *L. marathwadensis* isolated from *clarias batrachus* from India (Shinde *et. al.,* 1988). Later two species added to this genus i.e. *L. alii* and *L. clariasae* (Jadhav *et. al.,* 1991), from *Clarias batrachus. L. naldurgensis* (Kadam *et. al.,* 1998) from *Clarias batrachus*, *L. teranaensis* (Khadap *et. al.,* 2004) recovered from *Clarias batrachus* and *L. chalisgaonesis* (Kalse *et. al.,* 1999) in *Clarias batrachus*. *L. kopardaensis* (Shinde *et. al.* 1999), *L. govindae* (Patil *et. al.,* 2002), *L. batrachusae* (Pawar *et. al.,* 2002), *L. shindei* (Khadap *et. al.,* 2004) and *L. nagapurensis* (Lakhe et. al., 2004) were recovered from *Clarias batrachus*. Later on four new species *L. clariae, L. allenuateus, L. assamensis* in *Clarias batrachus* and *L. heteropneustii* in *Heteropneusteus fossils* (Tandon *et. al.,* 2005). Two species added *L. mujumdari, L. bokaroensis* (Poonam 2007) from *Clarias batrachus*. Later on number of species added like *L. paithanesis* (Shelke, 2007), *L. jagati* (Tripathi *et. al.,* 2007), *L. subhapradhi* (Jawalikar *et. al.,* 2008), *L. punensis* (Jadhav *et. al.,* 2008), *L. follicularae, L. osmanabadensis* (Bhure *et. al.,* 2010), *L. shindei* (Surayawanshi *et. al.,* 2010), *L. murhari* (Kaul *et. al.,* 2010), *Lytocestus gariepinusae* (Kadam *et. al.,* 2011) were added to this genus and lastly *L. khami* (Jawale *et. al.,* 2011) selected from a fresh water fish *Clarias batrachus* at Kham river, Teesgaon, Aurangabad (M.S.) India.

MATERIALS AND METHODS

The present specimens were recovered from the intestine of the freshly killed fish *Clarias batrachus* from various places of Aurangabad District in the year of 2010-2011. These fishes were dissected opened up dorso-ventrally and the internal organs examined. The entire digestive system was removed and placed in a Petri dish with physiological saline. Infection of each group of parasites was treated as follows: collected single segmented tapeworms were first relaxed and then fixed in 4% formalin and stained with Harris haematoxyline. Stained parasites were washed in distilled water, dehydrated in ascending grades of alcohol, cleared in xylene, mounted in D.P.X. Drawings were made using a camera lucida. All measurements are taken in millimeter. The identification is made with the help of "Systema Helminthum" by (Yamaguti, 1959). Measurements are in millimeters.

***Lytocestus manjaraensis* Sp. Nov. (Figure 1)**

DESCRIPTION

Specimen was collected from the intestine of a freshwater fish *Clarias batrachus* from the river Manjara, at Latur, Tq., Dist. Latur, (M.S.) India in the month of August, 2010.

The specimens are long, buff coloured, single segmented. The head is big in size, cylindrical in shape, markedly narrow anteriorly, broad posteriorly, slightly curved, which measures 2.692 – 2.760 in length and 0.749-1.067 in width. The neck is short, broader than long, narrow anteriorly, becomes broad posteriorly, with irregular lateral margins and measures 1.272-1.4372 in length and 1.112-1.128 in width.

The testes are numerous, medium to large in size, oval in shape, 460-470 (467) in number, pre ovarian, in a single field, unevenly distributed, scattered throughout the body, except the head and neck region and measures 0.022-0.090 in length and 0.022-0.079 in width. The cirrus pouch is medium in size, cylindrical in shape, globular and big in size, broad in the middle, narrow anteriorly and posteriorly, pre-ovarian, ventrally placed, extends, opens laterally, by a separate pore and measures 0.236-0.281 in length and 0.034-0.136 in width. The cirrus is thin, tubular, curved, contained within the cirrus pouch and measures 0.181 in length and 0.011 in width. The vas deferens is wide, coiled, long and measures 0.737 in length and 0.011 in breadth.

The ovary is large in size, distinctly bilobed, each lobe having loose ovarian follicles, with irregular margins, connected by an isthmus, situated near the posterior end of the worm and measures 1.372 in length and 0.488-0.670 in breadth. The ovarian lobes are large in size, oval or triangular in shape, narrow anteriorly or posteriorly and measures 0.304-0.647 in length and 0.225-0.270 in breadth. The isthmus is long, a wide tube, at the middle of the ovary and measures 0.431-0.476 in length and 0.113-0.204 in breadth. The vagina is long, thick, wide, runs posteriorly, in the middle of the worm, slightly curved, reaches and opens into the ootype, posterior to cirrus pouch, opens separately, by a female pore and measures 0.965 in length and 0.0223-0.034 in breadth. The ootype is large in size, oval in shape, post-ovarian, obliquely placed, situated just posterior to the isthmus and measures 0.079-0.113 in length and 0.045-0.090 in breadth.

The uterus is a long, a wide tube, coiled starts from the ootype, extends anterior to the isthmus, loop shaped in arrangement, pre ovarian, opens separately by an uterine pore, in the centre of the worm and measures 4.612 in length and 0.045-0.136 in breadth. The uterine pore is large in size, oval in shape, double walled, central and measures 0.181 in length and 0.034-0.045 in breadth.

The vitellaria are granular, thin strips, corticular in position, on each lateral side of the worm and from middle region to posterior extremity of the worm.

DISCUSSION

Cohn 1908 established the genus *Lytocestus* with its type species *L. adhaerens* from *Clarias fuscus* at Hong-Kong. The present worm comes closer to all the known species of the genus *Lytocestus* in general topography of organs but differs due to some characters from following species.

The present worm differs from *L. adhaerens* (Cohn, 1908), in having body elongated, tapering anteriorly, head undifferentiated, testes in broad medium field of preuterine medulla, ovary bilobed, lateral lobes outside of inner longitudinal muscles, cirrus pouch with strongly muscular and uterus looped, behind shell gland, and reported from *Clarias fuscus*, in Hong Kong. The present cestode differs from *L. filiformis* (Woodland, 1923) in having body long, head short, testes numerous, large, scattered in central medulla, ovary bilobed, small, containing 6-11 large follicles, cirrus pouch small and uterus convoluted, tubular, pre ovarian, vitellaria numerous, follicular and rounded.

The present worm differs from *L. indicus* (Moghe, 1925) in having body elongated, head short, bluntly rounded, testes 230-270 in numbers rounded up to cirrus sac, ovary with numerous follicles connected by big pipe like isthmus, cirrus pouch oval, vas deferens followed by ductus ejaculates, uterus convoluted, vitellaria follicular. The present cestode differs from *L. biraminicus* (Lynsdale, 1956) in having body elongated, head short, testes medullary, extend up to genital pore, ovary wing like, with numerous follicles, cirrus pouch medullary in position, uterus consist of number of loose cells, vitellaria up to the utero vaginal pore. The present tapeworm differs from *L. alestesi* (Lynsdale, 1956) in having body elongated, head short, testes more or less spherical, ovary bilobed, to the posterior half of the body, cirrus pouch oval in medullary region, uterus short, vitellaria extend from short distance from most anterior part to the tip of ovary.

The present parasite differs from *L. longicollis* (Ramadevi, 1973) in having body elongated, head short, the testes 100-105 in number, arranged in two layers, ovary 'H' shaped, corticular with closely packed follicles, cirrus pouch oval, vas deferens much convoluted, uterus convoluted tube, vitellaria corticular, rounded and extending to anterior tip of ovary. The present worm differs from *L. fossilis* (Shingh, 1975) in having head stumpy, testes numerous, ovary follicular 'H' shaped, cirrus pouch ovoid, and uterus compactly coiled tube. The present cestode differs from *L. marathwadensis* (Shinde *et.al.*, 1988) in having head stumpy, testes oval, arranged in 2 or 3 rows in central medulla, ovary 'H' shaped, uterus saccular, and vitellaria small and oval, single row on lateral side.

The present tapeworm differs from *L. alii* (Jadhav *et.al.*, 1991) in having head bluntly rounded, cirrus pouch small, oval, uterus convoluted tube, vitellaria small, follicular, corticular, 5-6 rows on each side. The present worm differs from *L. clariasae* (Jadhav *et.al.*, 1991) in having head bluntly rounded, testes 700-750 in numbers, ovary bilobed bunch of grapes, uterus convoluted tube, vitellaria follicular and rounded, 5-6 rows on each side.

The present cestode differs from *L. naldurgensis* (Kadam *et.al.*, 1998) in having head long, conical, blunt, spatulate, testes 500-600 in numbers scattered in medullary region, cirrus pouch small, oval, vertical, obliquely placed, uterus wide, convoluted, coiled anteriorly, vitellaria small, follicular in 3-4 rows on each side. The present parasite differs from *L. teranaensis* (Kolpuke1999) in having head long, conical, blunt, testes 1200-1500 in numbers, ovary bilobed, large each lobe triangular, anteriorly broad and posteriorly narrow, cirrus pouch small, oval, transversely placed, pre ovarian, uterus wide tube, convoluted, coiled loops shaped, pre and post ovarian, vitellaria follicular, smaller, in 4-5 rows.

The present parasite differs from *L. chalisgaonensis* (Kalse *et. al.*, 1999) in having head bluntly rounded, marked narrower than the body, testes 1500-1600 in numbers, ovary bilobed, large, cirrus pouch large, elongated, pre ovarian, uterus wide, convoluted with coiled tube. The present parasite differs from *L. kopardaensis* (Shinde *et. al.*, 1999) in having head long, testes 1650 in numbers, ovary distinctly bilobed with irregular margin, cirrus pouch large, elongated, uterus wide, coiled loop shaped and vitellaria follicular, corticular in position, 2–3 rows. The present parasite differs from *L. govindae* (Patil *et. al.*, 2002) in having head long, well-marked off from body, testes numerous, 1425-1475 in numbers, pre-ovarian, evenly distributed, cirrus pouch small, oval obliquely placed, uterus wide convoluted, transversely situated and filled with eggs.

The present cestode differs from *L. batrachusae* (Pawar *et. al.*, 2002) in having head spatulate, testes medium, 3800-4000 in numbers, medium, round, pre ovarian, scattered centrally, uterus medium, convoluted, coiled and transversely placed, and vitellaria small, oval arranged in two rows. The present parasite differs from *L. shindei* (Khadap *et. al.*, 2004) in having head long, testes 350-360 in numbers, cirrus pouch small, oval, pre ovarian, obliquely placed, uterus wide convulated, transversely situated and filled with numerous eggs. The present cestode differs from *L. nagapurensis* (Lakhe *et. al.*, 2004) in having head spatulate, bluntly rounded, testes 1100-1150 in numbers, oval, scattered all over the segment except head and neck region, ovary bilobed, 'H' shaped, with numerous oval follicles, cirrus pouch medium, medullary pre ovarian, uterus wide, long forming transverse tube, pre ovarian.

The present worm differs from *L. clariae* in having body elongated and flat, head undifferentiated, smooth, unarmed, testes oval, 270-495 in numbers, ovoid, ovary 'H' shaped, cirrus pouch compact, bulbus, uterus glandular, vitellaria ovoid and pre ovarian, arranged in 2 rows. The present cestode differs from *L. attenuatus* in having body thin, slender, elongated, head undifferentiated, smooth, unarmed, testes 195-398 in numbers, ovary bilobed inverted 'A' shaped follicular, cirrus pouch medullary, uterus glandular, vitellaria ovoid and pre ovarian, arranged in 2 rows. The present worm differs from *L. assamensis* (Tandon *et. al.*, 2005) in having head undifferentiated, smooth, unarmed, testes 266-565 in numbers, large, ovary inverted 'A' shaped, cirrus pouch prominant, uterus glandular, vitellaria follicular and corticular.

The present parasite differs from *L. heteropneustii* (Tandon *et. al.*, 2005) in having body elongated and flat, head undifferentiated, smooth, unarmed, and conical, testes 235-340 in numbers, ovoid, and large, ovary bilobed, cirrus pouch prominant, uterus glandular, vitellaria follicular, oviod and spherical, corticular in the position. The present parasite differs from *L. paithanesis* (Shelke *et. al.*, 2007)in having head long, elongated, testes oval, 1550 in numbers, ovary big, distinctly bilobed, cirrus pouch medium, cylindrical and uterus coiled tube. The present worm differs from *L.mujumdari* (Poonam, 2007) in having head undifferentiated, testes numerous, ovary bilobed 'H' shaped, and uterus saccular. The present worm differs from *L.bokaronensis* (Poonam, 2007) in having head undifferentiated, testes having testicular follicles, ovary bilobed inverted 'A' shaped, cirrus pouch prominent, and uterus glandular.

The present cestode differs from *L. punensis* (Jadhav *et. al.*, 2008) in having head long, testes 1400-1500, and uterus saccular. The present parasite differs from *L. follicularae* (Bovien, 1926) in having head differentiated, smooth, unarmed, testes 400-500 in number, large, ovary 'H' shaped, uterus saccular, vitellaria follicular in 2-3 rows. The present worm differs from *L. osmanabadensis* (Bhure *et. al.*, 2010) in having head blunt, testes 300-350, ovary 'V' shaped, cirrus pouch small, oval transversely placed, uterus saccular, and vitellaria follicular in 2 rows. The present worm differs from *L. shindei* (minor) (Surayawanshi *et. al.*, 2010) in having head medium, testes oval 1580, ovary distinctly bilobed, with irregular lateral margin, cirrus pouch medium, transversely placed, uterus wide, convoluted tube and vitellaria granular corticular and subcorticular in position.

The present worm differs from *L. murhari* (Kaul *et. al.*, 2010) in having head blunt, elliptical, elongated, testes 600-650, ovary distinctly bilobed, each lobe triangular, cirrus pouch long with strong muscular wall, uterus wide, convoluted tube. The present worm differs from *L. gariepinusae* (Kadam *et. al.*, 2011) in having head short elongated, testes 1375-1385, cirrus pouch small, oval, flask shaped, uterus large, irregular. The present worm differs from *L. khami* (Jawale *et. al.*, 2011) in having body elongated, bluntly tapering at both side, head differentiated, bluntly pointed, testes are 1350-1400 in numbers, cirrus pouch oval, ovary butterfly shaped, and uterus large saccular.

In above aforesaid discussion on the present parasite deserves status of a new species and named *Lytocestus manjaraensis* Sp.Nov. is proposed, after the name of locality of the river Manjara Dist. Latur.

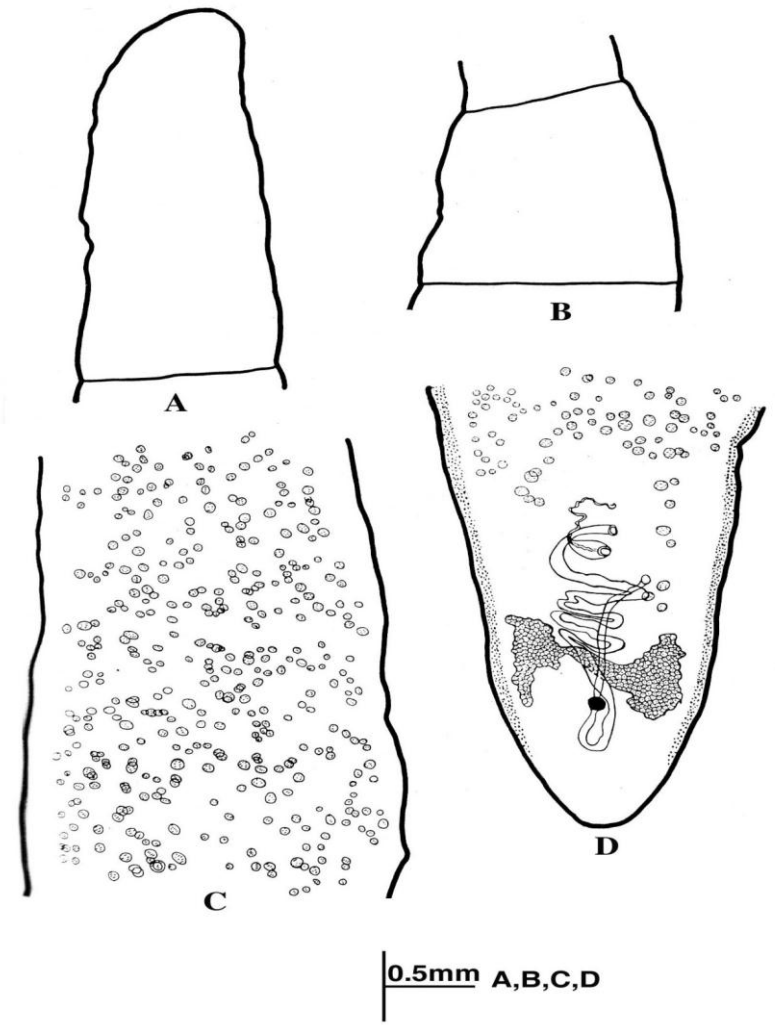

Figure- 1. *Lytocestus manjaraensis* Sp. Nov.

A Key to the Species of the genus *Lytocestus*, (Cohn, 1908)

Testes in between 100-105 in numbers	- *L. longicollis* [28]
Testes in between 230-270 in numbers	- *L. indicus* [22]
Testes in between 300-350 in numbers	- *L. osmanabadensis* [1]
Testes in between 350-360 in numbers	- *L. shindei* [15]
Testes in between 460-480 in numbers	- 1
Testes in between 500-600 in numbers	- *L. naldurgensis* [11]
Testes in between 600- 650 in numbers	- *L. murhari* [14]
Testes in between 700-750 in numbers	- *L. clariasae* [8]
Testes in between 1100-1150 in numbers	- *L. nagapurensis* [17]
Testes in between 1350-1400 in numbers	- *L. khami* [34]

Uterus looped, behind shell gland	- *L. adhaerens* [3]
Uterus short	- *L. alestesi* [18]
Uterus wide, coiled, loop shaped	- 2
Uterus glandular	- *L. heteropneustii* [35]
Uterus convoluted	- 3
Ovary 'A' Shaped	- 4
Ovary butterfly shaped	- 5
Ovary 'H' shaped	- 6
Ovary wing like	- *L. biraminicus* [18]
1) vitellaria granular	- ***L. manjaraensis* Sp.Nov.**
vitellaria follicular	- *L. alii* [8]
2) Testes 1650	- *L. kopardaensis* [31]
Testes 1550	- *L.paithenesis* [29]
3) Head short	- *L. filiformis* [39]
Head medium	- *L. shindei* (minor) [33]
Head long conical	- *L. teranaensis* [16]
Head bluntly rounded	- *L. chalisgaonensis* [12]
4) Neck absent	- *L. bokaroensis* [27]
Neck long narrow	- *L. attenuates* [35]
Neck short	- *L. assamensis* [35]
5) Head spatulate	- *L. batrachusae* [25]
Head short	- *L. gariepinusae* [13]
Head long	- 7
6) Neck short	- *L. clariae* [35]
Neck absent	- 8
7) Uterus saccular	- *L. punensis* [9]
Uterus wide convoluted	- *L. govindae* [24]
8) Head undifferentiated	- *L.majumdari* [26]
Head differentiated	- *L. follicularae* [2]
Head stumpy	- 9
Uterus coiled	- *L. fossilis* [32]
Uterus saccular	- *L. marathwadadensis* [30]

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