

New species of the genus *Lytocestus* (*Caryophyllidea lytocestidae*) from catfish in Aurangabad dist (M.S.), India

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Abstract

Two new *caryophyllidean* species of the genus *Lytocestus* from catfish *Clarias batrachus* (L.) from Aurangabad District is described. The differential characters of *Lytocestus khami* Sp. Nov. has elongated body bluntly tapering at both side, differentiated head, large saccular uterus.

Keywords: Caryophyllaeid, *Clarias batrachus*, Aurangabad

INTRODUCTION

Cohn [3] erected the genus *Lytocestus* with its type species *L. adhaerens* from *Clarias fuscus* in Hong-Kong. This genus was first confirmed by Woodland [40] that included four more species in addition to the type species. They are *L. filiformes* Woodland, in *Mormyrus caschive*, Egypt Sudan; *L. chalmersius* Woodland [35]; *L. cunningtoni* [4] and *L. indicus* [22] (Syn. *Caryophyllaece indicus*) from *Clarias batrachus* in India. Mehra [21] recorded the same species from *Clarias magur* and from *Clarias batrachus* in India. Hunter [7] 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 [41, 6] have adhered to these changes. Wardle and McLeod [35] followed Hunter's classification but raised the status of *Lytocestinae* from Sub family to family. Wardle, McLeod and Radinovsky [37] suggested a new system of classification of cestodes, which used the term Cotyloda as a class and order Caryophyllidea is kept in this class [20] and included the species *L. javanicus* [2]. Here considered *L. alestes* as Syn. of *L. birmanicus* [5, 18]. But Mackiewicz [19] after examination of original material *L. alestes* [18] concluded that it should be considered as synonym of *L. filiformis* [38]. *L. longicollis* [28] described from *Clarias batrachus* in India. Later on *L. marathwadensis* isolated from *Clarias batrachus* from India [30]. Later two species added to this genus i.e. *L. alii* and *L. clariasae* [8] from *Clarias batrachus*. *L. naldurgensis* [11] from *Clarias batrachus*, *L. teranaensis* [15] recovered from *Wallago attu* and *L. chalisgaonesis* [12] in *Clarias batrachus*. *L. kopardaensis* [31], *L. govindae* [24], *L. batrachusae* [25], *L. shindei* [15] and *L. nagapurensis* [17] were recovered from *Clarias batrachus*. Later on four new species *L. clariae*, *L. allenuateus*, *L. assamensis* in *Clarias batrachus* and *L. heteropneustii* in *Heteropneustus fossilis* [34]. Two species added *L. mujumdari*, *L. bokaroensis* [26, 27] from *Clarias batrachus*. Later on number of species added like *L.*

paithanesis [29], *L. jagati* [35], *L. subhpradhi* [10], *L. punensis* [9], *L. follicularae* and *L. osmanabadensis* [1], *L. shindei* [33], *L. murhari* [14] were added. And lastly *Lytocestus gariepinusae* [13] selected from a fresh water fish *Clarias gariepinus* at Makani dam, Makani, Tq. Lohara, Dist. Osmanabad 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 2009-2010. 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 [41]

Description

The parasite was collected from the intestine of freshwater fish *Clarias batrachus* at Teesgaon, Aurangabad Dist. in the month of December, 2009.

The mature specimens are long, elongated, and single segmented, broad at middle and narrow at both the ends and measures 22.35 (21.44-22.77) in length and 4.02 (3.96-4.09) in width. The head is long, well marked off from the body and measures 2.64 (2.31-2.97) in length and 1.4 (1.32-1.48) in width. The testes are medium in size, round to oval, 1350-1400 in number, pre-ovarian, scattered in central medulla and measures 0.14 (0.13-0.16) in length and 0.11(0.09-0.13) in width. The cirrus pouch is small, elongated, pre-ovarian, transversely placed and measures 0.51(0.46-0.56) in length and 0.29 (0.26-0.33) in width. The cirrus is thin, straight tube within cirrus pouch and measures 0.73 (0.72-0.75) in length and 0.04 (0.03-0.06) in width. The vas deferens is thin, short tube and measures 0.19 (0.16-0.23) in length and 0.03 in width. The vagina and cirrus pouch open a common pore known as genital pore, which is small, oval and measures 0.06 in length and 0.03 in width. The ovary is bilobed, butterfly shaped, situated near the posterior region of the body and measures 0.79(0.66-0.92) in length and 0.57(0.49-0.66) in width. The vagina is long, thin tube, arises from genital pore

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and runs posterior to forms receptaculum seminis and measures 1.7(1.74-1.84) in length and 0.03 in width. The receptaculum seminis is thin tube, it open into the ootype. The ootype is small oval and measures 0.36 (0.33-0.39) in length and 0.19(0.13-0.23) in width. The uterus is saccular, filled with numerous eggs and measures 4.30(3.96-4.65) in length and 1.33(1.15-1.51) in width. The eggs are non-operculated, oval in shape and measures 0.13 in length and 0.06 in width. The vitellaria are granular, arranged in 2-3 rows at each lateral margin in the posterior half of the body.

DISCUSSION

The present worm differs from *L. adhaerens* [3] in having 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* [38] in having 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* [22] in having head short, bluntly rounded and testes 230-270 in numbers rounded up to cirrus sac., ovary with numerous follicles connected by big pipe like isthmus, vas deferens followed by ductus ejaculates, uterus convoluted, vitellaria follicular. The present cestode differs from *L. biraminicus* [18] in having 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. alestesii* [18] in having 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* [28] in having head short, the testes 100-105 in number, arranged in two layers, ovary 'H' shaped, corticular with closely packed follicles, vas deferens much convoluted, uterus convoluted tube, vitellaria corticular, rounded and extending to anterior tip of ovary. The present worm differs from *L. fossilis* [32] 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* [30] in having head stumpy, testes oval, arranged in 2 or 3 rows in central medulla, ovary 'H' shaped, vitellaria small and oval, single row on lateral side. The present tapeworm differs from *L. alii* [8] in having head bluntly rounded, testes 460-480 in numbers, cirrus pouch small, oval, uterus convoluted tube, vitellaria small, follicular, corticular, 5-6 rows on each side. The present worm differs from *L. clariasae* [8] in having head bluntly rounded, testes 700-750 in numbers, ovary bilobed bunch of grapes, cirrus pouch medium, uterus convoluted tube, vitellaria follicular and rounded, 5-6 rows on each side. The present cestode differs from *L. naldurgensis* [11] 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* [16] 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* [12] 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* [31] 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* [24] 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* [25] 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* [15] in having head long, testes 350-360 in numbers, cirrus pouch small, oval, pre ovarian, obliquely placed, uterus wide convoluted, transversely situated and filled with numerous eggs. The present cestode differs from *L. nagapurensis* [17] 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 follioles, cirrus pouch medium, medullary pre ovarian, uterus wide, long forming transverse tube, pre ovarian. The present worm differs from *L. clariae* [34] in having 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* [34] in having 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* [34] in having head undifferentiated, smooth, unarmed, testes 266-565 in numbers, large, ovary inverted 'A' shaped, cirrus pouch prominent, uterus glandular, vitellaria follicular and corticular. The present parasite differs from *L. heteropneustii* [34] in having head undifferentiated, smooth, unarmed, and conical, testes 235-340 in numbers, ovoid, and large, ovary bilobed, cirrus pouch prominent, uterus glandular, vitellaria follicular, ovoid and spherical, corticular in the position. The present parasite differs from *L. paitanensis* [29] 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* [26] in having head undifferentiated, testes numerous, ovary bilobed 'H' shaped. The present worm differs from *L. bokaronensis* [26] 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* [9] in having head long, testes 1400-1500. The present parasite differs from *L. follicularae* [1] in having head differentiated, smooth, unarmed, testes 400-500 in number, large, ovary 'H' shaped, vitellaria follicular in 2-3 rows. The present worm differs from *L. osmanabadensis* [1] in having head blunt, testes 300-350, ovary 'V' shaped, cirrus pouch small, oval transversely placed, and vitellaria follicular in 2 rows. The present worm differs from *L. shindei*(minor) [33] 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* [14] in having head bluntly, elliptical, elongated,

testes 600-650, ovary distinctly bilobed, each lobe triangular, cirrus pouch long with strong muscular wall, uterus wide, convoluted tube and vitellaria granular cortical in position. The present worm differs from *L. gariepinusae* [13] in having head short elongated, cirrus pouch small, oval, flask shaped, and uterus large, irregular.

The distinct characters as noted above, justify the recognition of the worm, as a new species and hence the name *Lytocestus khami* Sp.Nov. is proposed, after the name of locality of the river Kham.



Lytocestus khami Sp. Nov.

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

- | | | |
|--|---|------------------------------|
| Testes in between 100-105 in numbers | - | <i>L. longicollis</i> , [28] |
| Testes in between 190-400 in numbers | - | <i>L. attenuates</i> [34] |
| 2005 | | |
| Testes in between 230-270 in numbers | - | <i>L. indicus</i> [22] |
| Testes in between 230-340 in numbers | - | <i>L. heteropneustii</i> |
| [34] | | |
| Testes in between 260-570 in numbers | - | <i>L. assamensis</i> |
| [34] | | |
| Testes in between 270-500 in numbers | - | <i>L. clariae</i> [34] |
| Testes in between 300-400 in numbers | - | 1 |
| Testes in between 400-500 in numbers | - | <i>L. follicularae</i> [1] |
| Testes in between 460-480 in numbers | - | <i>L. alii</i> [8] |
| Testes in between 500-600 in numbers | - | <i>L. naldurgensis</i> |
| [11] | | |
| Testes in between 600-700 in numbers | - | <i>L. murhari</i> [14] |
| Testes in between 700-800 in numbers | - | <i>L. clariasae</i> [8] |
| Testes in between 1000-1200 in numbers | - | <i>L. nagpurensis</i> |
| [17] | | |
| Testes in between 1200-1500 in numbers | - | 2 |
| Testes in between 1400-1500 in numbers | - | <i>L. punensis</i> [9] |
| Testes in between 1500-1600 in numbers | - | 3 |
| Testes in between 1600-1700 in numbers | - | <i>L.</i> |
| <i>Kopardaensis</i> [31] | | |
| Testes numerous (uncountable) | - | 4 |
| 1) Ovary 'V' shaped | - | <i>L. osmanabadensis</i> [1] |
| Ovary butterfly shaped | - | <i>L. shindei</i> [15] |
| 2) Uterus loop shaped | - | <i>L. teranaensis</i> [16] |

- | | | |
|-----------------------------------|---|--------------------------------|
| Uterus convoluted | - | <i>L. govindae</i> [24] |
| Uterus large, irregular | - | <i>L. gariepinusaei</i> , [13] |
| Uterus saccular | - | <i>L. khami</i> Sp. Nov. |
| 3) Head bluntly rounded | - | <i>L. chalisgaonensis</i> [12] |
| Head long elongated | - | <i>L. paiithenesis</i> [29] |
| Head medium | - | <i>L. shindei</i> [33] (minor) |
| 4) Uterus coiled | - | <i>L. fossilis</i> [32] |
| Uterus loop shaped | - | <i>L. adhaerens</i> [3] |
| Uterus tubular | - | <i>L. filliformis</i> [38] |
| Uterus convoluted | - | 5 |
| Uterus Saccular | - | 6 |
| 5) Ovary wing shaped | - | <i>L. biraminicus</i> [18] |
| Ovary butterfly shaped | - | <i>L. batrachusae</i> [25] |
| Ovary bilobed 'H' shaped | - | <i>L. alestes</i> [18] |
| 6) Receptaculum seminis absent | - | <i>L. marathwadensis</i> |
| [30] Receptaculum seminis present | - | <i>L. mujumdari</i> , [26] |

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