

Completion Report

On

Minor Research Project Entitled

**“SYSTEMATIC STUDY CESTODE PARASITE IN FISHES FROM OMERGA
REGION.”**

Submitted by

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PROJECT REPORT

A brief final report of minor research project entitled **“Systematic study Cestode Parasite in Fishes from Omerga Region.”** Sanctioned to **Dr. R.S.Madle**, Assistant Professor, Department of Zoology, Shrikrishna Mahavidyalaya, Gunjoti (M.S.) India.

INTRODUCTION

Parasitism is a natural way of life among a large number of organism and parasitic disease are the major public health problem leading to morbidity and mortality in India. Helminthic infection are major parasitic disease in India. It cause anaemia, dysentery, diarrhea and illness. They adversely affect the general health and productivity of adults while mental and physical growth of children, especially suffering from malnutrition, there is no estimate of population suffering from helminthes infection in India but are very common in people eating uncooked or inadequately cooled meat, unhygienic habits and poor sanitation.

The study on cestode parasites in India started in the year 1906. Yamaguti, Woodland, Baylis, Southwell, Moghe, Singh, Gupta and Johri are the Pioneers who gave more emphasis on systematic and Morphology of the cestodes. Among the recent workers working on Taxonomy, Histochemistry, Histopathology and Histomorphology are Pandey, Capoor, Fotedar, Gupta, Chisti, Siddiqui, Nama, Hafeezullah, Shinde, Deshmukh and Jadhav.

The infection of cestode parasites are found plenty of fishes, which reduces the food value of these hosts and decrease in their production and result in mortality, so the study of cestode parasites is necessity today. The human beings consume the fishes as one of the nutritious food. If the flesh is not properly cooked, the cestode parasites cause dangerous diseases to human beings. Keeping in the view, the economical value and importance to human survival through fishes, the author has undertaken the work on **“Systematic study Cestode Parasite in Fishes from Omerga Region.”**

SIGNIFICANCE OF STUDY

Fishes are economically important they also stands on important position in biological or ecological chain, fishery industry suffer a great loss every year due to problem of cestode parasites infection fishes. It reduces the productivity keeping in view important of biological or ecological chain and reduction of population of fishes in chain system many more researchers have concentration on helminthes studies at the instance the taxonomy of cestode from fishes has been investigated.

OBJECTIVES

The present investigation was started with the following principle objectives.

The most important Aquatic water bodies in Tq. Omerga, Dist. Osmanabad (M.S.) the reservoir and Dam is used for fishing irrigation, drinking purpose as, well as pisciculture by the local communities, so for no scientific work is done on cestode parasite of fish, the tropic has assumed so for no scientific work is done on this fishes and public health.

MATERIALS AND METHODS

The major collection was done by the author from different locality of Omerga District Osmanabad of Maharashtra State during the period of June, 2009 to June, 2010. The collected live parasites were preserved in 4% formalin. These cestode parasites were stained with Harris Haematoxylin, dehydrated, cleared in Xylene and mounted in D.P.X. for the systematic study.

The drawings are made with the aid of camera lucida. All the measurements are in millimeters, unless otherwise indicated.

The seasonal variations are studied from June, 2009 to June, 2010.

The system of classification is used in the thesis is based on “ Advances in the Zoology of Tapeworms 1950-1970” by Wardle, Mcleod and Radinovsky, 1974 and “ Systema Helminthum” Vol. II by S. Yamaguti, 1931.

RESULT AND DISCUSSION

This study has been carried out over a period of 24 months. The PI has conducted many tours in Osmanabd District for the collection of cestode parasites of freshwater fishes.

A) TAXONOMIC STUDY:

Significant finding including four genera/ species have been erected which are new to science. The identified Cestode parasites infecting freshwater fishes from Osmanabad District M.S. are given below.

1. *Lytocestus purnesis* Kasar et. al.,2011.
2. *Senga satarensis* Bhure et.al.,2011
3. *Cicumoncobothrium gunjotensis* Sp.Nov..

| | |
|-------------------|--|
| Cotyloda | Wardle, McLeod and Radinovsky, 1974. |
| Caryophyllidea | Benden in Olsson, 1893. |
| Lytocestidae | Wardle and McLeod. (Sub family Lytocestinae, Hunter 1927) |
| <i>Lytocestus</i> | Cohn, 1908. |

***Lytocestus purnesis*, Kasar et.al., 2011**

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, 1923 in *Mormynus caschive*, Egypt Sudan; *L. chalmersius* Woodland, 1924; *L. cunningtoni* Fuhrmann and Baer, 1925 and *L. indicus* Moghe, 1925 (Syn. *Caryophyllaeces indicus*) from *Clarias batrachus* in India. Mehra, 1930 recorded the same species from *Clarias magur* and Ramadevi, 1973 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 work of Gupta, 1961 and Murhar, 1963 have adhered to these changes. Wardle and McLeod, 1952 followed Hunter's classification but raised the status of Lytocestinae from Sub family to family. Wardle, McLeod and Radinovsky, 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 included the species *L. javanicus* (Bovien, 1926). Furtado, 1963 and Lynsdale, 1950 considered *L. alestesi* as Syn. of *L. barmanicus*, Lynsdale (1956). But Mackiewicz, 1962 after examination of original material *L. alestesi* (Lynsdale, 1956) concluded that it should be considered as syn. of *L. filiformis* (Woodland, 1923). Ramadevi, 1973 described *L. longicollis* from *Clarias batrachus* in India.

Later on Shinde and Phad, 1988 erected *L. marathwadensis* from *Clarias batrachus* from India. Jadhav and Gavhane, 1991 added two species to this genus i.e. *L. alii* and *L. clariasae* from *Clarias batrachus*. *L. naldurgensis* erected by Kadam et. al., 1998 in *Clarias batrachus*. *L. teranaensis* was erected in 1999 by Kolpuke and Shinde from *Wallago attu*. D.N. Patil and B.V. Jadhav, 2002 added *L. govindae* from *Clarias batrachus*. In 2002, Shinde and Pawar added *L.*

batrachusae from *Clarias batrachus*. Later on 2004, *L. shindei* was erected by Khadap et.al. from *Clarias batrachus*. Tandom et.al., 2005 erected four new species *L.clariae*, *L. allenuateus*, *L. assamensis* in *Clarias batrachus* and *L.heteropneustii* in *Heteropneusteus fossils*. Poonam, 2007 added *L. mujumdari* from *Clarias batrachus*. Jadhav B.V., Bhure D.B. and Padwal N.D., 2008 added *L. punensis* from *Clarias batrachus*. Bhure et. al., 2010 added two species to this genus viz. *L. follicularae* and *L. osmanabadensis* from *Clarias batrachus*. Recently Kasar et. al.,2011 added *Lytocestus purnesis* from *Clarias batrachus*.

MATERIALS AND METHODS

The single segmented three cestodes were collected from *Clarias batrachus* (Linneus, 1758), preserved in hot 4% formalin, stained with Harris Haematoxylin, passed through various alcoholic grades, cleared in xylene, mounted in D.P.X. and drawings are made with the aid of camera lucida. All measurements are given in millimeters.

RESULTS

The mature specimens are long, single segmented, tapering at both ends and measures 15 mm in length and 2.9 mm in width, head is long, conical and measures (1.256-2.022) in length and (0.432-0.854) in width, testes are rounded, small, 800-900 in number, pre-ovarian, placed central medula and measures (0.123-0.145) in length and (0.098-0.113) in width, cirrus pouch small, oval, elongated, pre-ovarian, obliquely placed and measures (0.194-0.265) in length and (0.103-0.136) in width, cirrus thin, straight, within the cirrus pouch and measures (0.227-0.245) in length and (0.007-0.015) in width, vas deferens short, thin, straight and measures (0.293-0.376) in length and (0.015-0.022) in width, vagina and cirrus pouch open a common pore known as genital pore, which is small, oval and measures (0.030 -0.035) in length and (0.022-0.030) in width, vagina long, thin, coiled tube, starts from genital pore and runs posteriorly to cirrus pouch and measures (3.249-4.253) in length and (0.036-0.038) in width, ootype small, rounded to oval, situated in between two lobes and measures (0.090-0.118) in length and (0.072-0.088) in width. From the ootype ovarian lobes start, ovary is bilobed, butterfly shaped, situated near the posterior region of the worm and measures (0.462-0.625) in length and (0.324-0.358) in width, uterus is wide, convoluted tube, filled with numerous eggs and measures (1.110-1.230) in length and (0.342-0.976) in width, eggs are operculated, oval in shape and measures (0.030-0.040) in length and (0.007-0.014) in width, vitellaria are granular.



Anterior Region



Middle Region



Posterior Region

DISCUSSION

Cohn established the genus *Lytocestus* in 1908 with its type species *L. adhaerens* from *Clarias fuscus* at Hong-Kong. Later on many species are added by different workers in this genus.

The present form comes closer to *Lytocestus purnesis*, Kasar et.al., 2011 in having body long, elongated, testes numerous, cirrus pouch oval, obliquely placed, ovary butterfly shaped, vagina long coiled tube, uterus wide, convoluted tube, and vitellaria granular, but the same differs from it in the following character.

- 1) The size of body (15 mm in length and 2.9 mm in breadth vs. 17mm in length & 3 mm in breadth)
- 2) Number of testes (800-900 vs. 1000-1200)

As the characters are minor, it is redescribed here as *Lytocestus purnesis*, Kasar et.al., 2011.

Taxonomic Summary

| | | |
|-----------------------|---|--|
| Genus | - | <i>Lytocestus</i> Cohn, 1908 |
| Species | - | <i>Lytocestus puranensis</i> Kasar et.al., 2011 |
| Type host | - | <i>Clarias batrachus</i> (Linneus, 1758) |
| Habitat (Site) | - | Intestine |
| Type locality | - | Omerega District Osmanabad, Maharashtra State India. |
| Deposition | - | Shrikrishna Mahavidyalaya, Gunjoti. |

| | |
|-----------------|--------------------------------------|
| Cotyloda | Wardle, McLeod and Radinovsky, 1974. |
| Pseudophyllidea | Carus, 1863. |
| Ptychobothridae | Luhe, 1902. |
| <i>Senga</i> | Dollfus, 1934. |

***Senga satarensis* Bhure et.al.,2011**

INTRODUCTION

The genus *Senga* was established by Dollfus (1934) with its type species, *S. besnardi* from *Betta splendens*. The siamese fighting fish in an aquarium at Vincennes; France; *S. ophiocephalina* Tseng (1933) as *Anchistrocephalus ophiocephalina* from *Ophiocephalus argus* at Taimen, China and identified with a form previously recorded by Southwell (1913) as *Anchistrocephalus polyptera* (*Anchistrocephalus*) *Monticelli* 1890 – Syn. *Anchistrocephalus*, Luhe (1999), from *Ophiocephalus striatus* in Bengal, India, *S. pycnomerus* Woodland (1924) as *Bothriocephalus pycnomerus* from *Ophiocephalus marulins* at Allahabad, India. *S. lucknowensis*. Johri (1956) from *Mastacembellus armatus* in India, Fernando and Furtado (1963) recorded *S. malayana* from *Channa striata*, *S. parva* and *S. filiformis* from *Channa micropeltes* at Malacca. Ramadevi and Hanumantrao (1966) reported the *plerocercoid* of *Senga* sp. from *Panchax panchax*. Tadros (1968) synonymised the genus *Senga* with the genus *Polyonchobothrium* and proposed new combinations for the species, Furtado and Chauhan (1971) reported *S. pahangensis* from *Channa micropeltes* at Tesak Bera, Shinde (1972)- redescribed *S. besnardi* from *Ophiocephalus gachua* in India and recently Ramadevi and Rao, (1973) reported another species of *S. vishakapatnamensis* India. Ramadevi (1976) described the life cycle of *S. vishakhapatnamensis* from *Ophiocephalus punctatus* in a lake at Kondakaria, Andhra Pradesh, India. But they do not agree with Tadros Statements, Wardle, McLeod and Radinovsky (1974) put *Senga* as a distinct genus in the family

Ptychobothridae, Deshmukh (1980) reported *S.khami* from *Ophicephalus marulius*, a fresh water fish from Kham river at Aurangabad, Jadhav and Shinde (1980) reported *S. godavari* from *M. armatus* at Nanded, M.S. India. One more species *S. aurangabadensis* was added by Jadhav and Shinde (1980) from *M. armatus* at Aurangabad M.S. India. A new addition made by Kadam et al (1981) as *S. paithaniensis* from host *M. armatus* Majid et. al,(1984) added *S. raoi* and *S. jagannathae* from *Channa punctatus* Two more new species erected by Jadhav et. al. (1991) as *S. maharashtrii* and *S.gachuae* from the intestine of *M. armatus* Monzer Hasnain(1992) added *S. chauhani* from *Channa punctatus*. Tat and Jadhav (1997) added new species to the genus as *S. mohekarae* from the Intestine of the *M. armatus*, at Pali, Dist. Beed, M.S. India. Patil & Jadhav added new species to this genus as *Senga tappi* from *M. armatus* in 2003.

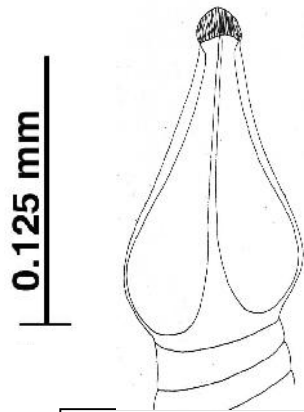
Recently Pande et. al,(2006) added two new species i.e.*S. ayodhensis* from *Amphinuous cuchia* and *S. baghui* from *Rita rita*.

DESCRIPTION

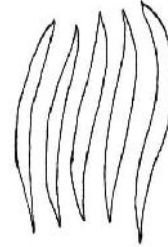
Seven cestode parasites were collected from the intestine of fresh water fish *Mastacembelus armatus* at Omerga, Dist. Osmanabad (M.S.) India.

These cestodes are preserved in 4% formalin and two specimens were stained with Harris haematoxylin, passed through various alcoholic grades, cleared in xylene, mounted in D.P.X. and whole mount slides were prepared for anatomical studies.

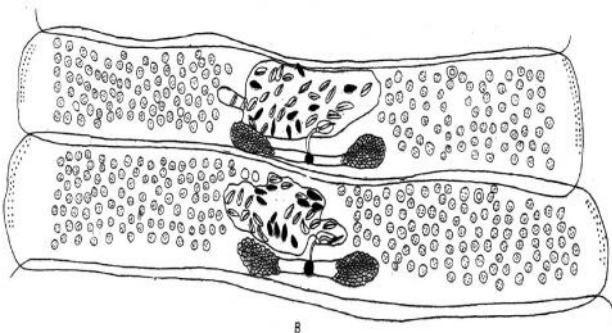
All the cestodes are long, consisting of scolex, immature, mature and gravid proglottids. The scolex is triangular, tapering anteriorly and broad posteriorly and measures 0.538-622 in length and 0.201-0.438 in breadth. The scolex having pair of sessile bothria, which extends from the anterior end to posterior end of the scolex and measures 0.625-0.708 in length and 0.044-0.082 in breadth. The anterior end of the scolex terminates in a rostellum, which is oval to rounded in shape and measures 0.022-0.034 in length and 0.061-0.082 in breadth. The rosetellum is armed with 26-28 hooks, which are two types i.e. short and long . The neck is absent.



Scolex



Hooks



**Mature
Proglottids**



Eggs

***Senga satorensis* Bhure**

The mature proglottids are about 4-5 times broader than long and measures 0.288-0.348 in length and 1.532-1.612 in breadth. The testes are small, oval in shape, 170-180 in number, scattered throughout the segment and measures 0.019-0.024 in length and 0.014-0.018 in breadth. The cirrus pouch is elongated in shape, pre-ovarian in position, situated in the centre of the segment and measures 0.048-0.067 in length and 0.0014-0.022 in breadth. The cirrus is short, thin, present within the cirrus pouch and measures 0.034-0.048 in length and 0.004-0.012 in breadth. The vas deferens is short, thin, straight tube and measures 0.014-0.022 in length and 0.004-0.0012 in breadth. The vagina and cirrus pouch open a common pore known as genital pore, which is small in size, oval in shape and measures 0.09 - 0.012 in length and 0.04 - 0.012 in breadth.

The vagina is a thin tube, slightly curved, arises from the genital pore, runs posteriorly and forms receptaculum seminis and measures 0.054-0.064 in length and 0.004-0.012 in breadth. The receptaculum seminis is straight tube open into ootype and measures 0.016 - 0.022 in length and 0.006 - 0.012 in breadth, which is oval, medium in size, present between the ovarian lobes and measures 0.058 in diameter. From the ootype ovarian lobes start. The ovary is large, distinctly bilobed, transversely placed at posterior margin of the proglottids and measures 0.454-0.524 in length and 0.030-0.072 in breadth. The vitellaria are granular, on each lateral side from anterior to posterior margin of the proglottids. The uterus is saccular, filled with eggs and measures 0.102-0.178 in length and 0.208-0.458 in breadth. Eggs are elongated, tapering at both ends and measures 0.032-0.041 in length and 0.012-0.016 in breadth. The uterine pore is rounded, to words anterior region of the proglottids and measures 0.024 in diameter.

DISCUSSION

The genus *Senga* was established by Dollfus with the type species *Senga besnardi* from *Betta splendens*. The present worm comes closer to *Senga satarensis* Bhure et.al.,2011 in general topography of organs. But the same differs from it in the following character.

- 1) Scolex (Triangular vs. Pear shaped).
- 2) Number of Rostellar Hooks (26-28 vs. 28-30)
- 3) Mature Proglottids (4-5 times broader than long vs. 6-7 times broader than long).

- 4) Number of Testes (170-180 vs. 175-200).
- 5) Cirrus pouch (elongated vs. oval)

As the characters are minor, it is redescribed here as *Senga satarensis*, Bhure et.al., 2011.

| | | |
|-----------------------|---|--|
| Genus | - | <i>Senga</i> Dollfus,1934 |
| Species | - | <i>Senga satarensis</i> Bhure et.al.,2011. |
| Type host | - | <i>Mastacembelus armatus</i> |
| Habitat (Site) | - | Intestine |
| Type locality | - | Omerga Dist Osmanabad M.S.India. |
| Deposition | - | Department of Zoology, Shrikrishna Mahavidyalaya, Gunjoti Dist. Osmanabad (M.S.) |

| | |
|---------------------------|--------------------------------------|
| Cotyloda | Wardle, McLeod and Radinovsky, 1974. |
| Psuedophyllidea | Carus, 1863. |
| Ptychobothridae | Luhe, 1902. |
| <i>Circumoncobothrium</i> | Shinde, 1968. |

***Circumoncobothrium gunjotensis* Sp.Nov.**

INTRODUCTION

The genus *Circumoncobothrium* is erected by Shinde G.B., (1968). From the intestine of fresh water fish *Ophiocephalus leuconpunctatus* as a type species *C. ophiocephali*.

Jadhav and Shinde (1976) added two new species of this genus viz., *C. aurangabadensis* and *C. raoii* from *Mastacembelus armatus*. Jadhav and Shinde, 1976 reported *C. gachuai* from *Ophiocephalus gauchua*.

Chincholikar and Shinde (1976) described two new species of this genus *C. Shindei* from fresh water fish *Mastacembelus armatus* and *C. bagariusi* from *Bagarius* species. Shinde (1977) reported *C. khami* from *Ophiocephalus striatus*. Jadhav et.al, (1990) described *C. yamaguti*, from *Mastacembelus armatus* Shinde et.al, 1994 created *C. alii* from *Mastacembelus armatus*. Patil et al (1998) added *C. vadgaonensis* as a new species to this genus. Wongsawad and Jadhav, (1998) added *C. baimaii* from *C.punctatusi* Kalse and Shinde, 1999 *Mastacembelus armatus*, Shinde et. al. (2002) described *C. mastacembelusae* as a new species from *Mastacembelus armatus*. Pawar et. al. (2002) reported *C. armatusae* (minor))from *Mastacembelus armatus* to this genus. Tat and Jadhav, (2004) reported *C. manjari* from *Ophiocephalus gachuva*. Later on

Supugade et al added *C.vitellariensis* from *C. armatusae* Shinde et. al *Mastacembelus armatus* in 2005.

Later on no. species is added to this genus.

DESCRIPTION

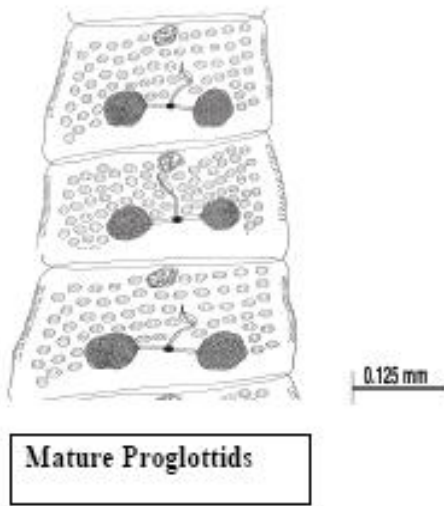
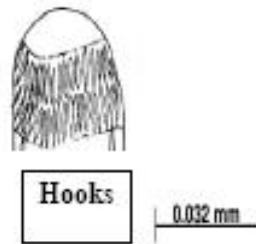
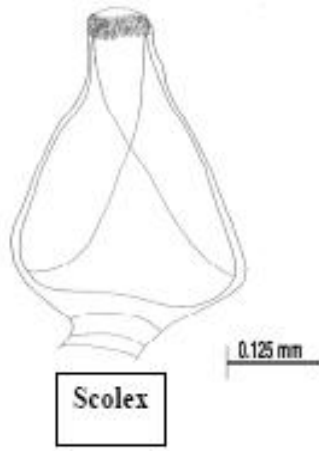
Eleven cestode parasites were collected from fresh water fish *Mostacembelus armatus* at Gunjoti Tq. Omerga, Dist. Osmanabad (M.S.) India.

Out of them four parasites are taken for taxonomical studies. The parasites are considerably long, preserved in 4% formalin and five of them stained with Harris haematoxylin, mounted in D.P.X. for anatomical studies.

Scolex is triangular in shape, tapering at apex and broad at base, marked off from the strobila and measures 2.210- 2.435 in length and 1.203-1.424 in width. Scolex bears two bothridia, large sac like, start from the rostellum, extends posteriorly almost towards the posterior margin of the scolex, anteriorly narrow, tube like and broad posteriorly, overlapping with each other and measures 1.411-1.632 in length and 0.274-0.349 in width. The scolex bears rostallum, which is median in size, oval to rounded in shape and measures 0.126-0.198 in length and 0.294-0.304 in width.

The rostellar hooks are 34-36 in numbers, arranged in two rows, hooks are of two types i.e. long and short. Long hooks measures 0.082-0.084 in length and 0.008-0.014 in width and short hooks measures 0.062-0.064 in length and 0.005-0.007 in width respectively. Neck is absent.

Mature proglottids are two to three times broader than long with slightly convex lateral margins and measures 0.834-0.872 in length and 1.839-1.980 in width.



Testes are oval to rounded in shape, 58-65 in numbers, pre-ovarian, placed centrally and measures 0.003-0.004 in length and 0.004-0.006 in width.

Cirrus pouch is small, oval, elongated, placed longitudinally, pre -ovarian, near the anterior side of the proglottids and measures 0.082-0.98 in length and 0.031-0.048 in width. Cirrus pouch open at the distal end by a common genital pores, which is small, oval and measures 0.012 diameter. The cirrus is thin, straight, within the cirrus pouch and measures 0.087-0.090 in length and 0.004-0.007 in width. The vas deferens is short, thin extends posteriorly and measures 0.032-0.036 in length and 0.004-0.006 in width.

The vagina arises from the gonopore, runs towards anterior side of the cirrus pouch, curved slightly and measures 0.152 -0.162 in length and 0.014-0.018 in width. Ootype is small, oval to round in shape and measures 0.156-0.163 in length and 0.012-0.015 in width.

The ovary is distinctly bilobed, large in size, dumbbell shaped, transversely placed, near the posteriorly margin of the segment and measures 0.214-0.224 in length and 0.238-0.257 in width.

The uterine port is large, oval, touching to the anterior side of the segment and measures 0.118-0.128 in length and 0.130-0.142 in width. The vitellaria are follicular, large, oval placed laterally from anterior and posterior margin of the segment, arranged in a single row.

DISCUSSION

The genus *Circumoncobothrium* is erected by Shinde in 1968 as a type species *C. ophiocephali*. Later on the following species are added to this genus.

01} *C. ophiocephali*, Shinde, 1968.

02} *C. aurangabadensis*, Jadhav and Shinde, 1976.

- 03} *C. raoii*, Jadhav et. al., 1976.
- 04} *C. gachuai*, Jadhav and Shinde, 1976.
- 05} *C. shindei*, Shinde and Chincholikar, 1976.
- 06} *C. bagariusi*, Chincholikar and Shinde, 1976.
- 07} *C. khami*, Shinde, 1977.
- 08} *C. yamaguti*, Jadhav et al, 1990.
- 09} *C. alii*, Shinde et al, 1994.
- 10} *C. vadgaonensis*, Patil et al, 1998.
- 11} *C. baimaii*, Wongsawad and Jadhav, 1998.
- 12} *C. punctatusi* Kalse and Shinde, 1999.
- 13} *C.armatusae* Shinde et. al. 1999
- 14} *C. mastacembelusae*, Shinde et. al. 2002.
- 15} *C. armatusae*, (minor) Pawar et. al. 2002.
- 16} *C. manjari*, Tat and Jadhav, 2004.
- 17} *C. vitellariensis*, Supugade et. al. 2005.

The present parasite under discussion is having the scolex triangular, broad at the base tapering at apex, rostellar hooks 34-36 small in numbers, neck short, mature proglottids 2-3 times broader than long, testes 58-65 in numbers, ovary dumbbell shaped and vitellaria follicular but differs from the following species in many characters as follows.

1} The present cestode differs from *C. ophiocephali*, in having distinct scolex, broad in the middle and tapering at both the ends, rostellar hooks 80 in number, testes 70-80 in numbers and ovary conical mass to irregular shaped band.

2} The present worm differs from *C. aurangabadensis* in having the scolex broad in the middle, narrow at both the ends, the rostellar hooks 42 in numbers, testes 135-145 in numbers, scattered throughout the segment, rounded and ovary bilobed with 3-4 acini.

3} The present tapeworm differs from *C. raoii* in having scolex broad in the middle, narrow at both the ends rostellar hooks 46 in numbers, rod shaped in single circle, testes 210-215 in numbers, rounded and arranged densely in two fields.

4} The present parasite differs from *C. gachuai* in having the scolex pear shaped, rostellar hooks 46 in number, mature segments squarish and testes 375-400 in numbers.

5} The present tapeworm distinguish from *C. shindei*, in having the scolex narrow anteriorly, broad posteriorly, rostellar hooks 49 in number, testes 260-275 in numbers, evenly distributed, ovary bilobed, dum-bell shaped and vitellaria granular.

6} The present worm differs from *C. bagariusi*, in having the scolex narrow anteriorly, broad posteriorly, rostellar hooks 55 in numbers, rod shaped, neck absent, testes 275-285 in numbers arranged in two lateral fields, ovary bilobed, each lobe with 5-6 globular acini.

7} The present parasite differs from *C. khami*, in having the scolex cylindrical, rostellar hooks 48 in numbers, lancet shaped, neck absent, mature segments squarish, testes 190-200 in numbers, evenly distributed and ovary bilobed, each lobe compact.

8} The present cestode differs from *C. yamaguti*, in having the scolex distinct, narrow anteriorly, broad posteriorly, testes 130-150 in numbers, and granular vitellaria.

9} The present worm differs from *C. alii*, in having the scolex triangular, rostellar hooks 34 in numbers and testes 230-240 in numbers.

10} The present tapeworm differs from *C. vadgaonensis*, in having the scolex triangular, mature segments slightly broader than long, testes 490-510 in numbers and vitellaria follicular.

11} The present cestode differs from *C. baimaii* in having the scolex pear shaped, rostellar hooks 48 in numbers in single circle, testes 88-100 in numbers, ovary compact and vitellaria granular in lateral field from anterior to posterior margin of the segment.

12} The present worm differs from *C. punctatusi* in having scolex rectangular in shape, rostellar hooks 40-50 in number and testes 140-150 in number, mature segment squarish 6-7 times broader than long.

13} The present worm differs from *C. armatusae*, in having scolex triangular, rostellar hooks 58 in numbers, testes 190-200 in numbers, ovary bilobed, vitellaria follicular, oval, 2-3 rows on lateral side of the segments.

14} The present parasite differs from *C. mastacembelusae*, in having scolex pear shaped, rostellar hooks 30 in numbers, testes 130-140 in numbers, ovary bilobed, compact, vitellaria follicular, rounded and arranged in 2-3 rows on each lateral side.

15} The present cestode differs from *C. armatusae* (minor) in having scolex triangular, rostellar hooks 58 in number, testes 190-200 in number, ovary distinctly bilobed, neck absent.

16} The present form differs from *C. manjari*, in having the scolex triangular, rostellar hooks 48 in numbers in single circle, neck present, testes 128-145 in number, rounded.

17} The present parasite differs from *C. vitellariensis*, in having scolex large, triangular, rostellar hook 48 in numbers, neck absent, testes 250-260 in numbers, vitellaria follicular, follicles small round arranged in 3-4 rows on each lateral side.

In view of the above differences, it is regarded as a new species for which the name *Circumoncobothrium gunjotensis* n.sp. proposed locality.

| | |
|--------------|--|
| Type species | <i>Circumoncobothrium gunjotensis</i> n.sp. |
| Host | <i>Mastacembelus armatus</i> . |
| Habitat | Intestine. |
| Locality | Gunjoti Dist. Osmanabad |
| Deposition | Department of Zoology, Shrikrishna Mahavidyalaya, Gunjoti Dist. Osmanabad (M.S.) |

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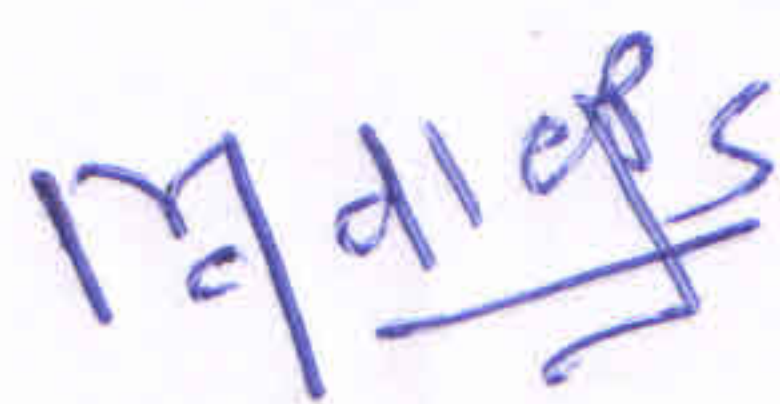
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