



Reports on cestode genus *Senga* (Dollfus, 1934) (Ptychobothridae, Luhe, 1902) of *Mastacembelus armatus* from Marathwada region Maharashtra, India

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Abstract

The present investigation deals with biosystematic studies of Pseudophyllidean tapeworm *Senga* i.e. *S. satarensis*, *S. madhavae*, *S. mangalbai* and *S. microrostellata* collected from intestine of a *Mastacembelus armatus* at various places of Marathwada Region (M.S.) India during the period of May, 2012 to Oct., 2013. The worm of present study come closer to all known species of this genus in general topography of organ but differs due to morphometric measurements and morphological characteristics. The *Senga satarensis* (Bhure *et al.*, 2011) comes closer to known species of the genus *Senga* Dollfus, 1934 in general topography of organ but differs due to taxonomic characters as scolex pear shaped, rostellum bearing 28-30 rostellar hooks, neck absent, testes 175-200 in numbers, cirrus pouch oval, ovary bilobed, vagina runs posteriorly, genital pores oval, vitellaria granular, uterus saccular and egg elongated. The *Senga madhavae* (Bhure *et al.*, 2010) comes closer to known species of this genus in general topography of organ but differs due to scolex triangular, rostellum bearing 40-44 rostellar hooks, neck absent, mature proglottids five to six times broader than long, testes 200-220 in numbers, cirrus pouch oval, ovary dumb-bell shaped, genital pores oval in shape, vitellaria granular, uterus saccular and egg elongated. The *Senga mangalbai* (Bhure *et al.*, 2011) comes closer to all the known species of this genus in general topography of organ but differs due to scolex conical, hooks 38-42 in numbers, absence of neck, testes 70-80 in numbers, ovary bilobed, each lobe nut shaped and vitellaria granular. The *Senga microrostellata* (Bhure *et al.*, 2014) comes closer to all known species of this genus in general topography of organ but differs due to scolex triangular, bothria sessile, rostellum armed with 18-20 hooks which is single circled, absence of neck, mature proglottids 8-9 times broader than long, testes 250-300 in numbers, cirrus pouch elongated, vagina runs posteriorly, ovary dumb-bell shaped, uterus sacular filled with non-operculated eggs and Vitellaria follicular.

Keywords: Cestode, *Mastacembelus armatus*, Marathwada region, Ptychobothridae, *Senga*

Introduction

Parasites are extremely abundant and diverse in nature, representing a substantial portion of global biodiversity. Fishes are important components of ecosystem from ecological, medicinal, nutritional and economical point of view. Man uses many fishes as delicious and nutritious food. These fishes are parasitized by helminth parasites, which reduce the food value, as they provide the highly nutritious food. The study of helminth parasites is therefore an urgent necessity today. Because fishes are said to be gold from water, which play an important role in nation's economy of as nutritional point of view, fishes gives high content of proteins, to the deadly growing poor population, which is facing the problems of malnutrition. As a medicinal point of view fishes provides Vitamin-A and Vitamin-D and

as a commercial or economical point of view, fishes are useful for preparation of soup, liver oil, skin, other oils etc. Infections are very common in people who are eating poorly cooked or uncooked meat, unhygienic habits and poor sanitation, infection leads to anemia. Parasitic diseases are among the major public health problems of tropical countries including India. Keeping the view in mind the nutritional, economical and medicinal value of fishes the present work is done. Genus *Senga* was established by Dollfus, (1934) with its type species *S. besnardi* in *Betta splendens* aquarium at Vincennes, France. Later on cestode species of the genus *Senga* are added in the genus by Tseng, 1933, Woodland, (1954), Johri, (1956), Fernando and Furtado, (1963), Ramadevi and Rao, (1966), Tadros, (1968), Shinde, (1972), Ramadevi and Rao, (1973), Wardle, McLeod and Radinovsky, (1974), Jadhav and Shinde, (1980), Kadam *et al.*, (1981), Majid *et al.*, (1984), Jadhav *et al.*, (1991), Tat and Jadhav, (1997), Patil and Jadhav, (2003), Jadhav, (2005), Pande *et al.*, (2006), Bhure *et al.*, (2007),

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Srivastav *et al.*, (2007) and Bhure *et al.*, (2010,2011,2014).

Materials and Method

Cestodes of the genus *Senga* were collected from the intestine of freshwater fish, *Mastacembelus armatus* from various places of Marathwada Region (M.S.) India during the period of May, 2012 to Oct., 2013. These cestodes are preserved in hot 4% formalin and stained with Harris haematoxylin and Borax carmine, 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 unless otherwise stated. The collected parasites were prepared for identification by standard methods (Schmidt, 1934; Yamaguti, S., 1959; Wardle, *et al.* 1974; Khalil *et al.*, 1994 and Hiware, *et al.*, 2003)

Results and Discussion

The present investigation deals with biosystematic studies of Pseudophyllidean cestode parasites of genus *Senga* viz. *S. satarensis*, *S. madhavae*, *S. mangalbai* and *S. microrostellata* collected from intestine of a *Mastacembelus armatus* at various places of Marathwada Region (M.S.) India during the period of May, 2012 to Oct., 2013. The worms of present study come closer to all known valid species of this genus in general topography of organ but differ due to morphometrics and morphological characteristics.

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

Cestodes are long, consisting of scolex, immature, mature and gravid proglottids. Scolex is pear shaped, tapering anteriorly and broad posteriorly and measures 0.635 mm in length and 0.410 mm in breadth. Scolex having pair of sessile bothria, which extends from the anterior end to posterior end of the scolex and measures 0.684 mm in length and 0.067 mm in breadth. Anterior end of scolex terminates in a rostellum, which is oval to rounded, measures 0.030 mm in length and 0.070 mm in breadth. Rostellum armed with 28-30 hooks, arranged in two semicircle unequal length i.e. short and long. Long hooks measures 0.083 mm in length and 0.009 mm in breadth, while short hooks measures 0.071 mm in length and 0.009 mm in breadth. Neck is absent. Mature proglottids 6-7 times broader than long and measures 0.337 mm in

length and 1.618 mm in breadth. Testes are small, oval, 175-200 in number, scattered throughout the segment and measures 0.024 mm in length and 0.019 mm in breadth. Cirrus pouch is oval, pre-ovarian and measures 0.065 mm in length and 0.021 mm in breadth. Cirrus short, thin, present within the cirrus pouch and measures 0.046 mm in length and 0.009 mm in breadth. Vas deferens short, thin, straight tube and measures 0.019 mm in length and 0.009 mm in breadth. Vagina and cirrus pouch open a common genital pore, which is small, oval and measures 0.012 mm in length and 0.09 mm in breadth. Vagina is thin tube, slightly curved, arises from the genital pore, runs posteriorly and forms receptaculum seminis and measures 0.065 mm in length and 0.009 mm in breadth. Receptaculum seminis is straight tube open into ootype and measures 0.021 mm in length and 0.014 mm in breadth, which is oval, medium in size, present between the ovarian lobes and measures 0.053 mm in diameter. From the ootype ovarian lobes start. Ovary is large, distinctly bilobed, transversely placed at posterior margin of the proglottids and measures 0.497 mm in length and 0.055 mm in breadth. Vitellaria granular, on each lateral side from anterior to posterior margin of the proglottids. Uterus saccular, filled with eggs and measures 0.145 mm in length and 0.342 mm in breadth. Eggs are elongated, tapering at both ends and measures 0.040 mm in length and 0.015 mm in breadth. Uterine pore rounded, to words anterior region of the proglottids and measures 0.028 mm in diameter.

Host-*Mastacembelus armatus*

Habitat-Intestine

Locality-Latur, M.S.India

The *Senga satarensis* Bhure *et al.*, (2011) comes closer to known species of the genus *Senga* Dollfus, 1934 in general topography of organ but differs due to taxonomic characters as scolex pear shaped, tapering anteriorly and broad posteriorly, rostellum medium, rounded, bearing 28-30 rostellar hooks, neck absent, mature proglottids six to seven times broader than long, testes 175-200 in numbers, scattered throughout the segment, cirrus pouch oval, ovary distinctly bilobed, vagina thin, runs posteriorly, genital pores oval in shape, vitellaria granular, uterus saccular and egg elongated.



2. *Senga madhavae* Bhure *et al.*, 2010:

The present worm consisting scolex, immature, mature and gravid proglottids. Scolex triangular, tapering anteriorly and broad posteriorly and measures 0.910 mm × 0.519 mm in length and breadth. Scolex having pair of bothria, which extends from the anterior end to posterior end of the scolex and measures 0.958 mm × 0.106 mm in length and breadth. Anterior end of scolex terminates in a rostellum, which is rounded in shape and measures 0.101 mm × 0.247 mm in length and breadth. Rosetellum armed with 40-44 hooks, which are arranged in two semicircle unequal length i.e. short and long. Long hooks measures 0.108 mm × 0.010 mm in length and breadth, while short hooks measures 0.85 mm × 0.006 mm in length and breadth. Neck is absent. Mature proglottids 5-6 times broader than long and measures 0.271 mm × 2.199 mm in length and breadth. Testes small, oval, 200-220 in number, scattered throughout the segment and measures 0.021 mm × 0.031 mm in length and breadth. Cirrus pouch oval, pre-ovarian, situated in the centre of the segment and measures 0.058 mm × 0.024 mm in length and breadth. Cirrus short, thin, present within the cirrus pouch and measures 0.046 mm × 0.009 mm in length and breadth. Vas deferens is short, thin, straight tube and measures 0.019 mm × 0.007 mm in length and breadth. Vagina and cirrus pouch open a common pore known as genital pore, which is small in size, oval in shape and measures 0.012 mm × 0.09 mm in length and breadth. Vagina is a thin tube, slightly curved, arises from the genital pore, runs posteriorly and forms receptaculum seminis and measures 0.094 mm × 0.009 mm in length and breadth. Receptaculum seminis is straight tube open into ootype and measures 0.029 mm × 0.009 mm in length and breadth. Ootype oval, medium in size and measures 0.024 mm in diameter; from the ootype ovarian lobes start and form the ovary, which is large, distinctly bilobed, dumb-bell shaped and measures 0.992 mm × 0.116 mm in length and breadth. Vitellaria granular, on each lateral side from anterior to posterior margin of the proglottids. Uterus saccular, filled with eggs and measures 0.065 mm × 0.538 mm in length and breadth. Eggs elongated, tapering at both ends and measures 0.043 mm × 0.012 mm in length and breadth.

Uterine pore is rounded, to words anterior region of the proglottids and measures 0.024 mm in diameter.

Host-*Mastacembelus armatus* **Habitat-**Intestine

Locality-Osmanabad, M.S.India

The *Senga madhavae* Bhure *et al.*, 2010 comes closer to known species of this genus in general topography of organ but differs due to scolex triangular, tapering anteriorly and broad posteriorly, rostellum medium, rounded, bearing 40-44 rostellar hooks, neck absent, mature proglottids five to six times broader than long, testes 200-220 in numbers, scattered throughout the segment, cirrus pouch oval, ovary distinctly bilobed, dumb-bell shaped vagina thin, runs posteriorly, genital pores oval in shape, vitellaria granular, uterus saccular and egg elongated.

3. *Senga mangalbai* Bhure *et al.*, 2011 :

All the cestodes are long, consisting of scolex, immature, mature and gravid proglottids. Scolex conical, tapering at the apex and broad at the base, distinctly marked off from the strobila and measures 2.038 mm in length and 0.878 mm in width. Scolex is having two fleshy bothria, which extends from the anterior end to posterior end of scolex and measures 1.662 mm in length and 0.349 mm in width. Anterior end of scolex bears rostellum, which is armed, oval to rounded and measures 0.116 mm in length and 0.266 mm in width. Rostellum armed with 38-42 hooks, which are of two types i.e. long and short. Long hooks measure 0.093 mm in length and 0.010 mm in width while short hooks measures 0.064 mm in length and 0.008 mm in width respectively. Neck absent. Mature proglottids are 2-3 times broader than long and measures 0.449 mm in length and 1.084 mm in width. Testes are oval to rounded, 70-80 in numbers, scattered lateral side of the segment on either side of ovary and cirrus pouch and measures 0.024 mm in length and 0.019 mm in width. Cirrus pouch small, oval, transversely placed, pre – ovarian and measures 0.080 mm in length and 0.041 mm in width. Cirrus is thin, straight within the cirrus pouch and measures 0.084 mm in length and 0.009 mm in width. Vas deferens short, thin tube and measures 0.024 mm in length and 0.012 mm in width. Vagina and cirrus pouch open at the distal end by a common genital pores, which is small, oval and measures 0.019 mm in length and 0.012 mm in width. Vagina arises from the gonopore, which is thin tube, runs towards



posterior side, forms receptaculum seminis and measures 0.050 mm in length and 0.007 mm in width. Receptaculum seminis is thin, short tube, it opens into ootype and measures 0.031 mm in length and 0.012 mm in width. Ootype is small, oval to round in shape and measures 0.029 mm in diameter. From Ootype, ovarian lobes start. Ovary large, distinctly bilobed, each lobe like a nut shaped, situated near the posterior margin of the segment and measures 0.439 mm in length and 0.077 mm in width. Uterus saccular, filled with numerous egg and measures 0.196 mm in length and 0.415 mm in width. Eggs are oval, non-operculated and measures 0.034 mm in length and 0.016 mm in width. The uterine port is rounded, touching to the anterior side of the segment and measures 0.034 mm in diameter. Vitellaria are granular, arranged in 2-3 rows, on each lateral side from anterior to posterior margin of proglottids.

Host-*Mastacembelus armatus* **Habitat-**Intestine

Locality-Nanded, M.S.India

The *Senga mangalbai* Bhure *et.al.*,2011 comes closer to all the known species of this genus in general topography of organ but differs due to shape of scolex (conical), hooks 38-42 in numbers, absence of neck, size of mature proglottids(2-3 times broader than long), number and arrangement of testes (70-80 in numbers and scattered lateral side of the proglottids on either side of ovary and cirrus pouch), length of vagina {0.050 mm}, shape of ovary (distinctly bilobed, each lobe nut shaped) and vitellaria granular.

4. *Senga microrostellata* Bhure *et al.*, 2014:

Cestodes are long, consisting of scolex, immature, mature and gravid proglottids. Scolex triangular, tapering at apex and broad at the base, distinctly marked off from strobila and measures 1.218 mm in length and 0.686 mm in width. Scolex is having two sessile bothria, which extends from anterior end to posterior end of scolex and measures 1.072 mm in length and 0.266 mm in width. Anterior end of scolex bears rostellum, which is armed, oval in shape and measures 0.109 mm in length and 0.206 mm in width. Rostellum armed with 18-20 hooks, arranged in a circle, which are of two types i.e. long and short. Long hooks measure 0.097 mm in length and 0.009 mm in width, while short hooks measures 0.085 mm in length and 0.007 mm in width respectively. Neck absent. Mature proglottids are 8-9 times broader than long and measures 0.211

mm in length and 3.407 mm in width. Testes small, oval to rounded in shape, 250-300 in numbers, scattered lateral side of the segment on either side of ovary and cirrus pouch and measures 0.016 mm in length and 0.019 mm in width. Cirrus pouch small, elongated, transversely placed, pre-ovarian and measures 0.060 mm in length and 0.029 mm in width. Cirrus thin, short, straight, within the cirrus pouch and measures 0.038 mm in length and 0.012 mm in width. Vas deferens short, thin tube and measures 0.016 mm in length and 0.009 mm in width. Vagina and cirrus pouch open at the distal end by a common genital pore, which is small, oval and measures 0.016 mm in length and 0.012 mm in width. Vagina arises from gonopore, which is thin tube, runs towards posterior side, forms receptaculum seminis and measures 0.055 mm in length and 0.012 mm in width. Receptaculum seminis is thin, short tube, opens into ootype and measures 0.021 mm in length and 0.012 mm in width. Ootype is small, oval to rounded in shape and measures 0.019 mm in diameter. From ootype ovarian lobes start. Ovary large, distinctly bilobed, dumb-bell shaped, situated near the posterior margin of segment and measures 0.538 mm in length and 0.041 mm in width. Uterus is saccular, filled with numerous egg and measures 0.050 mm in length and 0.40 mm in width. Eggs oval, non-operculated and measures 0.044 mm in length and 0.019 mm in width. Uterine pore rounded, touching to anterior side of segment and measures 0.032 mm in diameter. Vitellaria are follicular, arranged in a line, on each lateral side from anterior to posterior margin of proglottids.

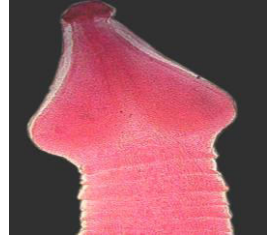
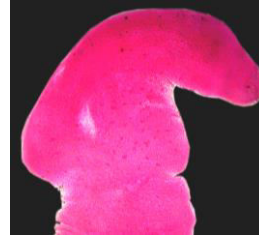
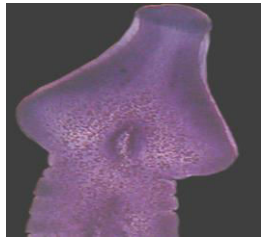
Host-*Mastacembelus armatus* **Habitat-**Intestine

Locality-Parbhani, M.S.India

The *Senga microrostellata* Bhure *et.al.*,2014 comes closer to all known species of this genus in general topography of organ but differs due to scolex triangular, tapering at apex and broad at the base, bothria sessile, rostellum armed with 18-20 hooks which is single circled, absence of neck, mature proglottids 8-9 times broader than long, testes 250-300 in numbers, scattered lateral side of the proglottids, cirrus pouch elongated, vagina runs posteriorly, ovary dumb-bell shaped, uterus saccular filled with non-operculated eggs and vitellaria follicular.



Reports on cestode genus *Senga*

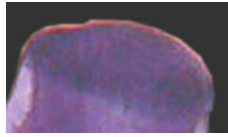


Scolex of S. satarensis Bhure et al., 2011,

S. madhavae Bhure et al., 2010,

S. mangalbai Bhure et al., 2011

S. microrostellata Bhure et al., 2014

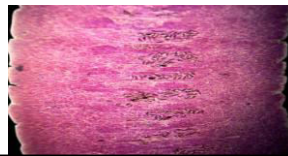
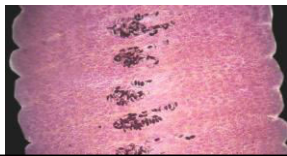


Rostellum of S. satarensis Bhure et al., 2011,

S. madhavae Bhure et al., 2010,

S. mangalbai Bhure et al., 2011

S. microrostellata Bhure et al., 2014



Mature Proglottids of S. satarensis Bhure et al., 2011,

S. madhavae Bhure et al., 2010,

S. mangalbai Bhure et al., 2011

S. microrostellata Bhure et al., 2014

Figure 1- Micro-photograph of *S. satarensis* Bhure et al., 2011,, *S. madhavae* Bhure et al., 2010, *S. mangalbai* Bhure et al., 2011 and *S. microrostellata* Bhure et al. 2014

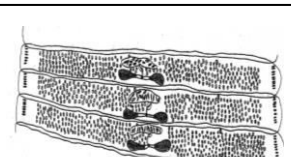
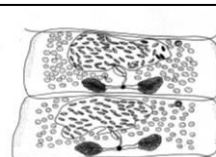
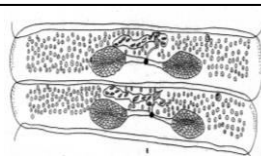
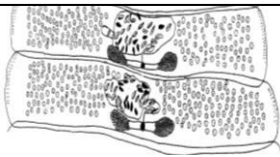


Scolex of S. satarensis Bhure et al., 2011,

S. madhavae Bhure et al., 2010,

S. mangalbai Bhure et al., 2011

S. microrostellata Bhure et al., 2014

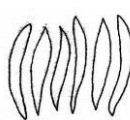


Mature Proglottids of S. satarensis Bhure et al., 2011,

S. madhavae Bhure et al., 2010,

S. mangalbai Bhure et al., 2011

S. microrostellata Bhure et al., 2013



Hooks of S. satarensis Bhure et al., 2011,

S. madhavae Bhure et al., 2010,

S. mangalbai Bhure et al., 2011

S. microrostellata Bhure et al., 2014



Eggs of S. satarensis Bhure et al., 2011,

S. madhavae Bhure et al., 2010,

S. mangalbai Bhure et al., 2011

S. microrostellata Bhure et al., 2014

0.125 mm

Figure 2- Camera lucida diagram of *S. satarensis* Bhure et al., 2011, *S. madhavae* Bhure et al., 2010, *S. mangalbai* Bhure et al., 2011 and *S. microrostellata* Bhure et al., 2014

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