

A New Pseudophyllidian Worm From A Freshwater Fish At Velhane, Parola, Jalgaon, M.S., India

Kalse AT and Patil JR

P.G. & Helminth Research Laboratory, Department of Zoology,
Nanasaheb Y. N. Chavan ASC College, Chalisgaon, Dist. Jalgaon, (M.S.), India
Email-dr.ajit.kalse@yahoo.co.in

Manuscript details:

Available online on
<http://www.ijlsci.in>

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:

Kalse AT and Patil JR (2019) A New Pseudophyllidian Worm From A Freshwater Fish At Velhane, Parola, Jalgaon, M.S., India, *Int. J. of Life Sciences*, Special Issue, A13: 299-304.

Copyright: © Author, This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

ABSTRACT

Senga besnardi was the type species obtained from the aquarium fish *Betta splendens* and included under the genus *Senga* established by Dollfus (1934). From then till present, 43 new species have been added to it. The present communication deals with the description of a new species, viz. *Senga mastacembelae sp.nov.* collected from the small intestine of the fresh water fish *Mastacembellus armatus* obtained from Velhane, Tq. Parola Dist. Jalgaon. *S. mastacembelae sp. nov.* is characterized by a distinctly triangular scolex which is broad posteriorly and narrows anteriorly. The rostellum at the narrow end is quadrangular and bears 57 to 59 hooks arranged in 4 quadrants. The hooks are stout, single pronged and pointed at both ends. They are of unequal length. A distinct neck lies below the scolex. The mature segments are two times as broad as their length. The testes are large and rounded, 18 to 21 in number, distributed densely on either side of the ovary. The ovary is large, distinctly bilobed, placed antero-posteriorly, in the posterior region of the segment. The eggs are oval in shape

Keywords: *Senga mastacembelae n.sp.*, *Mastacembellus armatus*, Velhane..

INTRODUCTION

Dollfus, 1934 established the genus *Senga* based on the type species *S. besnardi* from *Betta splendens* of France. *S. ophiocephalina* Tseng, 1933 from *Ophiocephalus argus* at Taimen, China and by Southwell, 1913 from *Ophiocephalus striatus* in Bengal, India. *S. pcynera* Woodland, 1924 as *S. pcynera* from *ophiocephalus marulius* at Allahabad, India. *S. lucknowensis* from *Mastacembellus armatus* reported from India by Johri, 1956 at Malacca, Fernando and Furtado, 1963 recorded *S. malayana* from *Channa striata*, *S. parva* and *S. filiformis* from *Channa micropeltes*. RamaDevi and Rao, 1966 reported the presence of pluroceroid of *Senga sp.* From *Panchax panchax*. Tardos synonymised the genus *Senga* with the genus *Polyonchobothrium* and proposed a new combination for the species. Furtado and Chauhan, 1971 reported *S. pahangensis* infecting *Channa micropeltes* at Tesak Bera. *S. besnardi* was redescribed by Shinde in 1972 from *Ophiocephalus gachua* in India. Rama Devi and Rao, 1973 reported another species of *S. visakhapatnamensis* from India. RamaDevi and Rao, 1973 also described

the life cycle of *S. visakhapatnamensis* from *Ophiocephalus punctatus* collected from Andhra Pradesh, India. But they did not agree with Tadros. Wardle et.al., 1974 McLeod and Radinovsky placed *Senga* as a distinct genus in the family Ptychobothridae. Deshmukh and Shinde, and Deshmukh, 1980 reported the presence of *S. khami* from *Ophiocephalus marulius*, a fresh water fish from Kham River at Aurangabad. Jadhav and Shinde, 1980 reported *S. godavarii* infecting *M. armatus* at Nanded, M.S. India. One more species i.e. *S. aurangabadensis* was added by Jadhav and Shinde, 1980 from *M. armatus* at Aurangabad M.S. India. An addition was made by Kadam et al. 1981 to the genus *Senga* as *S. paithanensis* from *M. armatus*. *S. mastacembali* and *S. indica* were reported by Gupta and Sinha, 1980 and Gupta and Parmar, 1985 respectively from *M. armatus* at Lacknow. *S. raoi* and *S. jagannathae* were added to the genus by Majid and Shinde, 1984 from *Channa punctatus*. Jadhav et al., 1991 erected two new species namely *S. maharashtrii* and *S. gachuae* from the intestine of *M. armatus*. M. Hasnain, 1992 added *S. chauhani* from *Channa punctatus* at Jamshedpur. Tat and Jadhav, 1997 added *S. mohekarai* from the intestine of the *M. armatus* from M.S. India. Wongsawad and Jadhav, 1998b added *S. chaingmaiensis* from the intestine of the *M. armatus*. Patil and Jadhav, 2003 reported *S. tappi* from *M. armatus* at Shirpur M.S. India. Hiware 1999 added *S. armatusae* from the intestine of the *M. armatus* at Pune. Jadhav et al. 2005 made a review article on the genus *Senga* infecting the freshwater fishes of Maharashtra, India. Pande et al., 2006 identified two new species *S. ayodhensis* from *Amphinuus cuchia* and *S. baugi* from *Rita rita*. Khadap et al., 2007 added *S. chandikapurensis* from *M. armatus*. Shrivastav et al., 2007 identified *S. ticto* from *Puntius ticto* at Jhansi. Kankale, 2008 describe *S. nathsagarensis* from freshwater fish *M. armatus*. Wankhede and Reddy, 2009 reported *S. kaigaonensis* from freshwater fish *M. armatus*. Mulla and Kharde, 2009 added *S. bhauraoae* from freshwater fish *M. armatus* at Kolhapur, M.S. India. Bhure & Nanware, 2011 describe *S. sataraensis* from *M. armatus*. Dhole et al., 2011 identified two new species *S. rostellariae* and *S. chandrashekhari* from freshwater fish *M. armatus*. Jadhav et al., 2012 reported *S. govindii* from *M. armatus*. Sawarkar, 2012 describe *S. maharashtrii* from freshwater fish *M. armatus* in Chandrabhaga River at Daryapur, M.S. India. Nanware et al., 2016 describe *S. triangulata* from *M. armatus* at Hadgaon, Dist. Nanded, M.S. India. Ruma Koiri and B. Roy, 2017 added *Senga* sp. in *Monopterus cuchia* from Tripura. Recently Kaul and Kalse, 2018 identified two new species of the genus

Senga i.e. *S. shindei* from *Ophiocephalus punctatus* in Pawana river and *S. oreochromisae* from *Oreochromis mozambica* in Pashan Lake of Pune region respectively.

Fish is an excellent and cheap source of protein having low in saturated fats and high in essential minerals and vitamins. The amount of protein in fish muscles ranges between 15% and 20% and that of carbohydrate content between 18% and 21%. However, the progress in the fish production is hindered by the parasitic infections, mainly in the tropical region. The parasites of edible fishes affect the economy of decreasing or rejection of the edible fish products leading to subsequent loss of interest in the aquaculture industries.

This communication reports the occurrence of the cestode parasites in the fresh water fish *Mastacembellus armatus* collected from Velhane, Tq. Parola Dist. Jalgaon.

MATERIALS AND METHODS

The cestodes were collected from the intestine of fresh water fish *Mastacembellus armatus* at Velhane Tq. Parola, Dist. Jalgaon, M.S., India, in the month of February, 2018. Parasites were washed in saline solution. Some of them were flattened and preserved in 70% ethanol while others were preserved in 10% formalin. The flattened specimens were stained in Harris-Haematoxylin, dehydrated and processed for whole mount preparations. Drawings are made with the aid of camera lucida. Microphotographs were taken by using the digital camera. All measurements are in millimeters. The detailed observation from the above aids was recorded for the purpose of determining the taxonomical status of the cestode worms under study. "Systema Helminthum" by Yamaguti (1959) was used for the purpose of identification.

RESULTS

All the cestodes are medium to long in size and with scolex, immature, mature and some gravid proglottides. The scolex is triangular, narrow anteriorly broad posteriorly and measures 0.680 to 0.756 in length and 0.234 to 0.611 in breadth. The scolex bears, overlapping two bothria, which extend from the anterior end to the posterior end of the scolex. The bothria measure 0.54 to 0.638 in length and 0.079 to 0.186 in breadth. The anterior end of scolex terminates in quadrangular shape of rostellum, which is armed and measures 0.132 to 0.159 in length and 0.138 to 0.164 in breadth. The

rostellum bears circularly arranged hooks and they are 57 to 59 in number. The hooks are stout, single pronged of unequal length, pointed at both ends. The longer hooks measure 0.5 in length and 0.12 in breadth while shorter hooks measure 0.175 in length and 0.075 in breadth. The neck is short. The mature segments are broader than long, about two times broader than long and measure 0.29 to 0.33 in lengths and 0.59 to 0.61 in breadth. The testes are large in size, rounded in shape 18 to 21 in number, and distributed densely on the either side of the ovary and measure 0.079 to 0.132 in diameter. The cirrus pouch is medium, elongated, obliquely placed, in middle to anterior half of the segment and measures 0.74 in length and 0.026 in breadth. It opens at its distal end by common genital opening at the middle of the segment. The cirrus is thin, present within the cirrus pouch and measures 0.079 in length and 0.007 in breadth. The vas deferens is short, thin extends anteriorly and measures 0.053 in length and 0.007 in breadth. The genital pore is small in size, oval in shape; it opens in middle of the segment and measures 0.014 in length and 0.007 in breadth. The ovary is large in size, distinctly bilobed, placed antero-posteriorly, in the posterior region of the segment and measures 0.159 to 0.170 in length and 0.053 to 0.063 in breadth. The vagina is thin tube, slightly curved, arises from the genital pore runs posteriorly, obliquely and opens into the ootype and measures 0.106 in length and 0.010 in breadth. The ootype is medium in size, round in shape, present between the ovarian lobes and measures 0.021 in diameter. The vitellaria are granular, on each lateral side from anterior to posterior margin of the segment, arranged in 5 to 6 rows on lateral side. The eggs are oval in shape, the larger eggs measure 0.94 in length and 0.5 in breadth, smaller eggs measure 0.72 in length and 0.32 in breadth.

Genus - *Senga mastacembelae* n.sp.

Host- *Mastacembellus armatus*

Habitat - Intestine

Locality - Velhane, Tq. Parola, Dist. Jalgaon. M.S., India.

No of specimens - 09 in 9 slides

Holotype- Deposited in Helminth Research Laboratory

Paratype - P.G. & Helminth Research Laboratory, Department of Zoology,

Nanasaheb Y. N. Chavan ASC College, Chalisgaon, Dist. Jalgaon, (M.S.), India

Date - 16 February, 2018.

Etymology - *Senga mastacembelae* n.sp. is proposed after the genus name of the host.

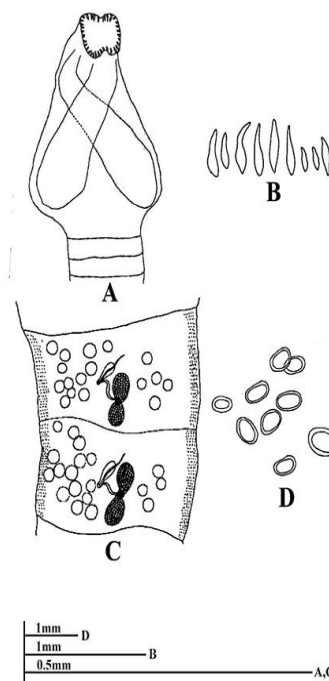


Fig. 1: Camera Lucida sketch of *Senga mastacembelae* n.sp. **A:** Scolex; **B:** Hooks; **C:** Mature segments; **D:** Eggs

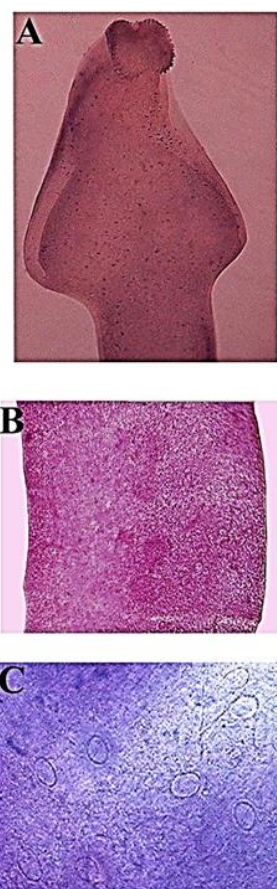


Fig. 2: Microphotographs of *Senga mastacembelae* n.sp. **A:** Scolex (X 150); **B:** Mature segments (X 600); **C:** Eggs (X 600)

DISCUSSION

The triangular shaped scolex of the parasite shows resemblance with *Senga pahangensis*, Furtado and Chaulan, 1971; *S. paithanensis*, Kadam and Shinde, 1981; *S. chaingmaiensis*, Wongsawad and Jadhav, 1998; *S. armatusae*, Hiware, 1999, *S. tappi*, Patil and Jadhav, 2003; *S. baughi*, Pande et al., 2006; *S. kaigaonensis*, Wankhede and Reddy, 2009; *S. panzaraensis*, Mangale and Kalse, 2009; *S. madhavae*, Bhure et al., 2010; *S. govindii* Jadhav et al., 2012 and *S. triangulate* Nanware et al., 2016 in its shape i.e. being triangular shaped however the same differs from *Senga pahangensis* in the number of hooks (57 to 59 vs. 52), in vitellaria (granular vs. lobulated and in host (*M. armatus* vs. *C. micropeltes*)).

The present form differs from, *S. paithanensis* in the number of hooks (57 to 59 vs. 54) and in the number of testes (18 to 21 vs. 130 to 135).

The present parasite differs from, *S. chaingmaiensis*, in the number of hooks only (57 to 59 vs. 28).

The present tapeworm differs from, *S. armatusae*, in the number of hooks (57 to 59 vs. 32 to 40); in the neck (present vs. absent); in the number of testes (18 to 21 vs. 230 to 240) and in the vitellaria (granular vs. follicular).

The present worm is differs from, *S. tappi* , in the number of hooks (57 to 59 vs. 42 to 44); in the number of testes (18 to 21 vs. 285 to 295) and in the vitellaria (granular vs. follicular).

The present form differs from, *S. baughi*, in the number of hooks (57 to 59 vs. 50 to 54); in the number of testes (18 to 21 vs. 310 to 320); in the shape of ovary (bilobed vs. unilobed) and in the vitellaria (granular vs. follicular).

The present parasite differs from, *S. kaigaonensis*, in the number of testes only (18 to 21 vs. 285 to 295). The present worm differs from, *S. panzaraensis* in the mature segment (2 times broader than long vs. 5 times broader than long) and in the number of testes (18 to 21 vs. 40 to 45).

The present tapeworm differs from *S. madhavae* in the number of hooks (57 to 59 vs. 40 to 44); in the mature segment (2 times broader than long vs. 5-6 times

broader than long) and in the number of testes (18 to 21 vs. 200 to 225).

The present form differs from *S. govindii* in the number of hooks (57 to 59 vs. 45 to 50); in the mature segment (2 times broader than long vs. 3 times broader than long) and in the number of testes (18 to 21 vs. 100 to 130).

The present parasite differs from *S. triangulate* in the number of hooks (57 to 59 vs. 28 to 30); in the neck (present vs. absent); in the mature segment (2 times broader than long vs. 4-5 times broader than long); in the number of testes (18 to 21 vs. 50 to 60) and in the vitellaria (granular vs. follicular).

Granular vitellarium of the present parasite resembles *S. besnardi*, Dollfus, 1934 , *S. jagennathae*, Majid and Shinde, 1984 , *S. raoi*, Majid and Shinde, 1984 , , , , *S. sataraensis*, Bhure & Nanware, 2011 , *Senga sp.* Ruma Koiri and B. Roy, 2017 and *S. shindei* Kaul and Kalse, 2018. however, different from *S. besnardi* in the shape of the scolex (triangular vs. Rectangular); in the number of hooks (57 to 59 vs. 44 to 47); in the neck (present vs. absent); in the number of testes (18 to 21 vs. 160 to 175) and in the host (*M. armatus* vs. *B. splendens*).

The present worm differs from *S. jagennathae* in the shape of the scolex (triangular vs. pear shaped); in the number of hooks (57 to 59 vs. 44); in the number of testes (18 to 21 vs. 240 to 250) and in the host (*M. armatus* vs. *C. punctatus*)

The present parasite differs from *S. raoi* in the shape of the scolex (triangular vs. pear shaped); in the number of hooks (57 to 59 vs. 46); in the neck (present vs. absent); in the number of testes (18 to 21 vs. 65 to 70) and in the host (*M. armatus* vs. *C. punctatus*)

The present cestode differs from *S. sataraensis* in the shape of the scolex (triangular vs. pear shaped); in the number of hooks (57 to 59 vs. 28 to 30); in the neck (present vs. absent) and in the number of testes (18 to 21 vs. 175 to 200).

The present tapeworm differs from *Senga sp.* in the shape of the scolex (triangular vs. pear shaped); in the number of hooks (57 to 59 vs. 53 to 131); in the number of testes (18 to 21 vs. 200 to 300) and in the host (*M. armatus* vs. *M. cuchia*).

The host *Mastacembellus armatus* is similar to most of the members of the genus except, *S. ophicephaliana*, having host *Channa arga*; *S. pycnomera*, having host *Channa marulius*; *S. malayana*, having host *Channa striata*; *S. filiformis*, and *S. parva*, having host *Channa micropeltes*; *S. visakhapatnamensis*, having host *Ophiocephalus punctatus*; *S. khami*, having host *Ophiocephalus marulius*; *S. gachuae*, having host *Channa gachua*; *S. chauhani* having host *Channa punctatus*, *S. ayodhensis* having host *Ophiocephalus marulius*; *S. ticto*, having host *Puntius ticto*; *S. rupchandensis*, having host *Channa striatus* *S. shindei* having host *Ophiocephalus punctatus* and *S. oreochromisae* having host *Oreochromis mozambica*.

Conflicts of interest: The authors stated that no conflicts of interest.

REFERENCES

- Banerjee S, Chaubey, Ak & Malhotrask (1990) Cestode fauna of hill stream fishes in Garhwal Himalayas, India IX. *Senga teleostei* n. sp. from *Channa punctatus*. Indian Journal of Parasitology, 14 (2): 153-156.
- Banerjee S, Manna B & Sanyal Ak (2017) Description of four new species of *Senga* (Platyhelminthes: cestodea) from freshwater fishes of India. Flora and Fauna, 23 (1):189-214.
- Bhure Db.& Nanaware Ss (2011) Systematic observation of new Pseudophyllidean tapeworm *Senga satarensis* from *Mastacembelus amatus*. International Multidisciplinary Research Journal, 1 (10): 25-28.
- Bhure Db. Nanaware Ss, Pathandm & Dhondge Rm (2010) Morphotaxonomic observation of new pseudophyllidean tapeworm *Senga* (Dollfus 1934) from *Mastacembelus amatus* Asian J. Animal Sci.,5(2):149-152.
- Bhure Db, Padwal N D & Jadhav Bv (2007) A new tapeworm *Senga Jadhavae* n.sp. (Cestoda: Pseudophyllidea) from *Mastacembelus amatus* at Augangabad. Proceeding of the Zoological Society of India, 6 (2): 45-52.
- Chincholikar Ln & Shinde Gb (1977) Studies on Indian Cestodes redescription of *Senga ophiocephalina* Tseng, 1933. Nat. Sci. J. Mara. Univ. Vol.16 Sci. 9:181-182.
- Dhole Js, Sonune Bv, Reddy Yr & Chavan Rj (2011) Two Pseudophyllidean Tapeworms from Fresh Water Fish, *Mastacembelus armatus* of Maharashtra State (India) with Revised Key to Species of Genus *Senga*. Acta Parasitologica Globali, 2(2):25-33.
- Dollfus R Ph (1934) Sur un cestode pseudophyllidae parasite de poisson. Bull.Soc. Zool. France, 69: 476-490.
- Duggal Cl & Bedi H (1989) On *Senga pathankotensis* sp. Nov. and *S. lucknowensis* Johri 1956 (Cestoda: Ptychobothriidae) infecting freshwater fishes of Punjab, India. Research Bulletin of the Panjab University Science, 40(12):35-37.
- Fernando Ch & Furtado Ji (1963) Helminth parasites of some Malayan freshwater fishes. Bull. Nat. Mus. Singapore., 32:45-71.
- Fernando Ch & Furtado Ji (1963) A study of some Helminth parasites of fresh water fishes in Ceylon. Zeit. F.Parasitenkunde 23, 141-163.
- Furtado Ji & Chaulan L (1971) Two new helminth species from the fish *Channa micropeltes* Cuvier (Ophiocephalidae) of Malasiya. Folia Parasitol. (Prana) 18(4): 365-372.
- Gairola D & Malhotra Sk (1986) Cestode fauna of fishes in River Ganges around an Indian subhumid region I. *Senga gangesii* n.sp. from *Mystus vittatus*. Japanese J. Of Para., 35(6) 471-474.
- Gairola D & Malhotra Sk (1987) Cestode fauna of fishes in river Ganges in a subhumid region of India *Senga vittati* n.sp. from *Mystus vittatus*, Acta. Parasitologia Lutaanica 22, 93-96.
- Gupta Sp & Sinha N (1980) Two new species of *Senga* Dollus, 1934 (Cestoda: Ptychobothriidae) from fresh water fishes of Lucknow. Ind. Joum. Helminth. 32(2): 124-128.
- Gupta V & Parmar S (1985) On a new cestode *Senga indica* sp. Nov. from the intestine Of a freshwater fish, *Mastacembelus armatus* (Lacepede 1800) from Lucknow. Indian J. Helminth., 37 (2): 96-99.
- Hasnain M (1992) On a new cestode *Senga chauhani* n.sp. from fish host *Channa punctatus* from Jamshedpur. National J. Helminthol. 44(1): 123-127.
- HIWARE CJ (1999) On A New Tape Worm *Senga Chauhani* N.Sp. From Freshwater fish, *Mastacembelus armatus* at Pune (M.S) India. Riv.Di Parasitol., 16(LX): N1: 9-12.
- JADHAV BV (1980) *Senga Paithanensis* (Cestoda: Ptychobothriidae) from *Mastacembellus armatus*. Bioresearch 5(1):95-96.
- Jadhavbv, Bhure Db & Padwal, (2005) A survey of cestode parasites of freshwater fishes from Pune and Ahmadnagar District (M.S.) India. Proceedings of the Recent Trends in Parasitology, 30, 48-51.
- Jadhav Bv Deshmukh Sb & Gavhane Ab (1991) A New tapeworm *Senga gachua* n.sp. from the fish *Channa gachua* at Aurangabad, India. J. Inv. Zool and Aqua Biol.3(1): 39-41
- Jadhav Bv Gavahne Ab & Jadhav Ap (1991) On a new Pseudophyllidean cestode from *Mastacembelus armatus* at Daryapur (M.S.) India. Rivista Di Parasit Vol.VIII (1): 19-22.
- Jadhav Bv & Shinde Gb (1980) On a new cestode *Senga aurangabadensis* n.sp. from the fish *Mastacembelus armatus*, Bioresearch, 43(2) : 25-27.
- Jadhav S, Borde S, Jadhav D & Humbe A (2012) Occurrence of a new piscine tapeworm *Senga govindii* in *Mastacembelus armatus* (Lacepede, 1800) from Sina Kolegaon Dam. Journal of Experimental Sciences, 3 (5): 1- 4.
- Johri Gn (1956) A new cestode *Senga lucknowensis* from *Mastacembelus armatus*(Lacep).Curr. Sci., 25(6): 193-195.
- KADAM SS, JADHAV BV & SHINDE GB (1981) On a new cestode *Senga paithanensis* sp.(Cestoda:Ptychobothriidae) from *Mastacembelus armatus*, Bioresearch, 5(1): 95-96.

- Kankale Nm (2008) A New Species Of The Genus *Senga Nathasagarensis* From Freshwaterfish, *Mastacembelus Armatus*. National J. Life Sci., 5 (3): 81-84.
- Kaul S & Kalse At (2018) Morphotaxonomic Observation Of Two Pseudophyllidean Cestodes, From Fresh Water Fishes Of Pune Region, (Ms), India. Aayushi International Interdisciplinary Research Journal Special Issue No. 26 445-453
- Khadap Rm, Jadhav Bv & Suryawanshi Nv (2007) Anew Species Of The Genus *Senga* (Dollfus, 1934 (Cestoda: Ptychobothridae) From Fresh Water Teleost *Mastacembelus Armatus*. Nat. J. Of Life Sci 4(3):77-79.
- Majid Ma & Shinde Gb (1984) Two New Species Of The Genus *Senga* Dollfus, 1934 (Cestoda:Pseudophyllidea) From Fresh Water Fishes At Jagannathpuri, Orissa. Indian J. Parasitology. 8(1): 169-172.
- Malhotra Sk (1988) Cestode Fauna Of Hill Stream Fishes In Garhwal Himalayas, India. Vi *Senga Nayari* Sp. Nov. From *Mastacembelus Armatus* (Lacep). Ind. Journ. Helminth., 40 (1): 55-57.
- Mangale A J & Kalse A T (2009) On A New Cestode *Senga Panzarensis* From *Mastacembelus Armatus* At Dhule, India. Uttar Pradesh J Zool. 29(1): 105-108.
- Monzee H (1992) On A New Cestode *Senga Chauhani* N.Sp. From Fish Host, *Channa Punctatus* From Jamshedpur. National Journal Of Helminthology, 34(1), 123-127.
- Nanware Ss, Deshmukh Vs & Bhure Db (2016) Bio-Systematic Studies On Cestode Genus *Senga* (Dollfus, 1934) Ptychobothridae, Luhe, 1902) From *Mastacembelus Armatus* (Lacepede, 1800) With Description Of A New Species. World Scientific News 45(2): 224-238.
- Pande Pn Mamta Tripathi And Neetu Mittal (2006) On Two New Species Of Genus *Senga* Dollfus, 1934 (Family-Ptychobothridae, Luhe, 1902) From The Intestine Of Freshwater Fishes. India J. Hel. (N.S.) Vol. 24 Pp 6-10.
- Pande Pn Mittal N & Singh S R (2006) On A New Cestode Of The Genus *Senga* Dollfus, 1934 From The Intestine Of Freshwater Fish *Mastacembelus Armatus* (Lacepede) From Kanpur, U.P. India. Journal Of Helminthology 17, 5-8.
- Pardeshi Pr & Hiware Cj (2011) A New Pseudophyllidean *Senga Rupchandensis* N. Sp. From *Channa Striatus* (Bloch, 1973) At Jalna District (M.S.) India. Rec. Res. Sci Tech, 3(12):17-22.
- Patil Dn & Jadhav Bv (2003) On A New Species Of *Senga* Dollfus, 1934 Cestoda Ptychobothridae Luhe, 1902 As *S. Tappi* N.Sp. From Shirpur Dist. Dhule (M.S.) India. J. Comparative Toxicol. Physiol. 1(1):68-72.
- Ramadevi P (1973) On *Senga Vishakhapatnamensis* N.Sp. (Cestoda: Pseudophyllidae) From The Intestine Of Fresh Water Fish, *Opheocephalus Punctatus* (Bloch.). Rivista Di Parasitol., 34(4): 281-286.
- Ramadevi P & Rao Kh (1966) Plerocercoid Of *Senga N.Sp.* (Pseudophyllidea Ptychobothriidae) From Freshwater Fish, *Panchax Panchax* (Ham And Buch). Current Sci. 35(247):626-627.
- Ruma Koiri & Broy (2017) The Occurrence Of A New Piscine Tapeworm *Senga Dollfus*, 1934 (Pseudophyllidea: Bothriocephalidae) In *Monopterus Cuchi* (F. Hamilton, 1822) From Tripura. Imperial Journal Of Interdisciplinary Research Vol. 3(2): 864-870.
- Sawarkar Bw (2012) Occurrence Of Pseudophyllid Cestode, *Senga Maharashtrai* N.Sp. In *Mastacembellus Armatus* From Chandrabhaga River At Daryapur In Maharashtra. International Journal Of Scientific And Research Publications, Vol. 2(11):1-3.
- Shinde Gb (1972) Studies On Indian Cestode, Redescription Of *Senga Besnardi* Dollfus, 1934, Marathwada University Journal Of Sci. 11(4): 39-40.
- Shinde Gb & Deshmukh Ra (1980): On A New Cestode *Senga Khami* N.Sp. (Cestoda: Ptychobothridae) From A Fresh Water Fish. India. J. Zool., 8(1): 28-32.
- Shinde Gb & Jadhav Bv (1980): A New Tapeworm *Senga Godavarii* N.Sp. From *Mastacembelus Armatus* At Aurangabad India. Biology, 2(4): 46-48.
- Southwell T (1913) On Some Indian Cestoda, I, Rec. Ind. Mus. 9:279-300.
- Srivastavak, Kharek, Sahu Vk & Singh Ra (2007): A New Species Of Genus *Senga* Dollfus (1934) From *Puntius Ticto* At Jhansi (U.P.). National Journ. Life Sci., 4(3):129-132.
- Tat Mb & Jadhav Bv (1997) *Senga Mohekarai* N.Sp. (Cestoda: Ptychobothridae) From *Mastacembelus Armatus* At Pune (M.S.) Riv. Di Para., Vol. Xvii (Lviii) N 2:203-296.
- Tseng's (1933) Study On Some Cestode From Fishes. J. Of Sci. National Univ. Shantuma. Tsingtao, Chiina (2): 1-21.
- Wankhede H & Reddy Y (2009) On A New Species Of Genus *Senga* (Dollfus 1934) (Cestode Ptychobothridae Luhe, 1902) From Freshwater Fish *Mastacembelus Armatus*. Environmental Conservation J. 10(3):63-66.
- Wardle R A, Mcleod J A & Radinovskiy S (1974) Advances In The Zoology Of Tapeworms, 1950-1970. University Of Minnesota, Minnesota Press, Minneapolis, 1-274
- Wongsawad C, Marayong T & Jadhav Bv (1998b) A New Ptychobothriidae Tapeworm From Maesa Stream, Chiang Mai, Thailand. Rivista Di Parasitol. Vol. Xv No.3:295-298.
- Yamaguti S (1934) Studies On The Helminth Fauna Of Japan, Part Iv. Cestodes Of Fishes. Jap. J. Zool 6:1-112.