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New species of cestode parasite *Senga jadhavii* Sp. Nov from freshwater fish *Mastacembelus armatus* from Godavari basin M.S. (India)

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Abstract

The present communication deals with the description of a new species of genus *Senga jadhavii* from fresh water fish *Mastacembelus armatus* from Godavari basin provided new data on their morphology. The present worm differ from the known species of the genus in the shape and size of the scolex, number of hooks and arrangement of rostellum, shape of Segment, number of testes, position of cirrus pouch and arrangement of vitellaria.

Keywords: Godavari basin, *Mastacembelus armatus*, *Senga jadhavii* Sp. Nov

1. Introduction

The genus *Senga* was established by Dollfus, 1934^[25] with its type species *S. besnardi* from *Betta splendens* at Vinecunes, France. *S. ophiocephalina* Tseng, 1933^[24] as *Anchistrocephalus ophiocephalina* from *Ophiocephalus argus* at Taimen, China and identified with a form previously recorded by Southwell, 1913^[22] as *Anchitrocephalus polyptera* (*Anchitrocephalus*) Monticelli, 1890^[29] Syn. *Anchitrocephalus* Luhe, 1899^[31] from *Ophiocephalus striatus* in Bengal, India *S. pcynomera* Woodland, 1924^[30] as *Bothriocephalus pcynomera* from *Ophiocephalus marulius* at Allahabad, India. *S. lucknowensis*. Johri, 1956^[10] from *Mastacembelus armatus* in India. Fernando and Furtado, 1963^[4] recorded *S. malayana* from *Channa striata*, *S. parva* and *S. filiformis* from *Channa micropeltes* at Malacca. Ramadevi and Hanumantha Rao, 1966^[19] reported the plerocercoid of *Senga* sp. from *Panchax panchax*. Tadros, 1968^[5] synonymised the genus *Senga* with the genus *Polyonchobothrium* and proposed new combinations for the species. Furtado and Chauhan, 1971^[5] reported *S. pahangensis* from *Channa micropeltes* at Tesak Bera. Shinde, 1972^[20] redescribed *S. besnardi* from *Ophiocephalus gachua* in India. Ramadevi and Rao, 1973^[33] reported another species of *S. visakhapatanamensis* India. Ramadevi (1976) described the life cycle of *S. visakhapatanamensis* from *Ophiocephalus punctatus* in lake at Kondakaria, Andhra Pradesh, India. But they do not agree with Tadros statements. Wardle, McLeod and Radinovsky, 1974^[26] 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^[21] reported *S. godavarii* from *M. armatus* at Nanded, M.S. India. One more species *S. aurangabadensis* was added by Jadhav and Shinde, 1980^[21] from *M. armatus* at Aurangabad M.S. India. A new addition made by Kadam *et al.* 1981^[11] as *S. paithaensis* from host *M. armatus*. Majid *et al.*, 1984^[12] added *S. raoi* and *S. jagannathae* from *Channa punctatus*. Two more new species erected by Jadhav *et al.* 1991^[8] as *S. maharashtrii* and *S. gachuae* from the intestine of *M. armatus*. Monzer Hasnain, 1992^[14] added *S. chauhani* from *Channa punctatus*. Tat and Jadhav, 1997^[23] added *S. mohekarae* from the intestine of the *M. armatus*, at Parli, Dist. Beed, M.S. India. Patil and Jadhav added *S. tappi* from *M. armatus* in 2003^[17]. Jadhav, 2005^[7] made the review article of the genus *Senga* from freshwater fishes from Maharashtra state, India. Pande *et al.*, 2006^[16] added two new species i.e. *S. ayodhensis* from *Amphinuous cuchia* and *S. baughi* from *Rita rita*. Kalse A. T, 2009^[12] added one new species *senga panzarensis* from *Mastacembelus armatus*. Bhure *et al.*, 2010^[17] added one new species *S. madhavii* from *Mastacembelus armatus*. Lastly Pardeshi P.R, 2011^[32] added one new species *Senga rupchandensis* from *Channa striatus*.

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2. Material and Methods

The present specimens were recovered from the intestine of the freshly killed fresh water fish *Mastacembelus armatus* from Godavari Basin during the period of June 2009-May 2011. Each fish was dissected and examined in all parts like fins, gills, scales, and visceral organs under a microscope. Fishes were 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 parasites were first relaxed and then fixed in hot 4% formalin and stain using Harris haematoxylin. 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.

3. Description

Seven mature, specimens were collected from the intestine of fresh water fish *Mastacembelus armatus* (Lacepede, 1800) from Dist. Nashik in the month October, 2010.

The worm were flattened, preserved in 4% formalin, stained with Harris haematoxylin, passed through various alcoholic grades, cleared in xylene, mounted in D.P.X. Whole mount slides were prepared for further anatomical studies. Drawing was made with the aid of Camera Lucida. All measurements are given in millimeters.

All the cestodes were long, consisting of scolex, immature, mature and gravid proglottids.

The scolex is large well developed cylindrical and much elongated and measures 6.98(6.94-7.01) mm in length and 1.8(1.7-1.9) mm in breadth, anterior part of scolex contains rostellum with rostellar hooks, 54 in number. Hooks are arranged in semicircle and measures 0.071(0.009-0.072) mm in length and 0.009(0.005-0.013) mm in breadth. The scolex bears two bothria spatulate in shape and measures 7.74(7.70-7.78) mm in length and 1.10(0.76-1.44) mm in breadth.

Neck is present, short measures 1.65(1.6-1.7) mm in length and 1.08(1.0-1.14) mm in breadth.

Mature segment is small and rectangular in shape, seven times broader than long measures 0.99(0.95-1.03) mm in length and 7.23(14.19-10.27) mm in breadth. The testes are oval, medium in size. 70 in number, spread in the segments at each side of ovary and measures 0.076(0.038-0.114) mm in length and 0.028(0.019-0.038) mm in breadth.

The cirrus pouch is oval, medium in size, anterior to ovary and measures 0.20(0.19-0.22) mm in length and 0.019 mm in breadth. The cirrus is thin tube and measures 0.057(0.038-0.076) mm in length and 0.038 mm in breadth.

Ovary is bilobed, dumbbell shape; isthmus is much larger to separate each ovarian lobe. It measures 1.52(1.44-1.60) mm in length and 0.43(0.38-0.49) mm in breadth. Situated in the middle of the segment. The vagina is thin coiled tube, starts from genital pore posterior to cirrus pouch and measures 0.028(0.019-0.038) mm in length and 0.057 mm in breadth. Genital pore small, rounded and measures 0.028 in length and breadth.

The vitellaria are granular arranged in two rows at each lateral margin of the segment.

4. Discussion

The genus *Senga* was established by Dollfus, 1934^[25] with the type species *Senga besnardi* from *Betta splendens*. The present worm comes closer to all the known species of the genus *Senga* Dollfus, 1934^[25] in general topography of organs. But differs due to some characters from following species.

1. The present worm differs from *S. besnardi* Dollfus, 1934

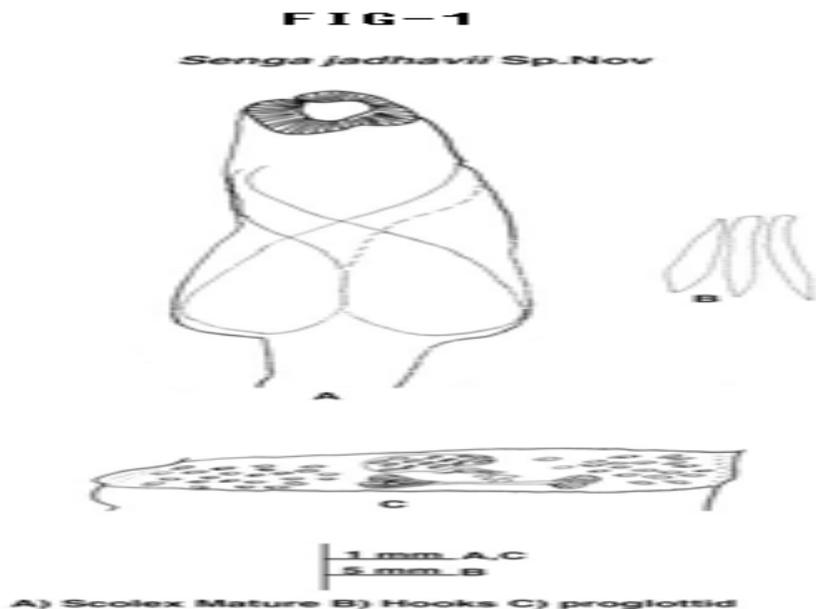
^[24] in the shape of scolex which is triangular, hooks 50 in numbers, testes 160-175 in numbers, ovary compact and reported from *Betta splendens* in France.

2. The present cestode differs from *S. ophiocephalina* Teseng, 1933 in having hooks 47-50 in numbers, testes 50-55 in numbers, ovary bilobed but equatorial in position, vitellaria lobate and reported from *Philocephalus argua argua* in China.
3. The present tapeworm differs from *S. pcyonera* Woodland, 1924^[29] in having scolex elongated, hooks 68 in numbers, mature segments are indistinct, ovary discontinuous into two groups and reported from *Philocephalus marulius* in India.
4. The present parasites differs from *S. lucknowensis* Johri, 1956^[10] in having hooks 36-48 in numbers, ovary post equatorial, vitellaria lobulate and discontinuous in two groups.
5. The present cestode differs from *S. malayana* Furnando and Furtado, 1964^[4] in having scolex circular, hooks 60 in numbers, ovary slightly bilobed, post equatorial, vitellaria lobate, discontinuous in two groups and reported from *Channa striata*, in Malacca
6. The present tapeworm differs from *S. parva* Furnando and Furtado, 1964^[4] in having hooks 38-40 in numbers, testes 150-180 in numbers and reported from *Channa micropeltis*, in Malacca.
7. The present cestode differs from *S. pahangensis* Furtado et al., 1971^[5] in having triangular scolex, hooks 52 in numbers, neck short, segmentation clear, testes laterally situated in the proglottids, vitellaria lobulated and reported from *Channa micropeltis*, in Tasek, Bera.
8. The present tapeworm differs from *S. visakhapatnamensis* Ramadevi et al., 1973^[19] in having circular scolex, hooks 46-52 in numbers, testes 50-55 in number, vitellaria lobulated and reported from *Ophiocephalus punctatus*, in India.
9. The present worm differs from *S. khami* Deshmukh and Shinde, 1980^[9] having scolex rectangular, oval, shallow bothria, hooks 55-57 in numbers, short neck, testes rounded, 155 in numbers and arranged in two fields, cirrus pouch is elongated, vitellaria follicular and reported from *Ophiocephalus marulius*, in India.
10. The present cestode differs from *S. aurangabadensis* Jadhav et al., 1980^[9] in having oval scolex, hooks 50-52 in numbers; in two half rows, overlapping on each other, mature segment broader than long, testes 240-260 in numbers and vitellaria follicular.
11. The present tapeworm differs from *S. godavarii* Shinde et al., 1980^[21] in having hooks 40-42 in numbers, arranged in two half rows, testes rounded, 220-230 in numbers, cirrus pouch is oval, situated in anterior half of the segment and vitellaria follicular.
12. The present worm differs from *S. paithanensis* Kadam et al., 1981^[11] which shows prominent, large, triangular scolex, hooks 54 in numbers, neck present, testes oval to rounded, 130-135 in numbers, arranged in two lateral groups, vagina posterior to cirrus pouch and vitellaria follicular.
13. The present cestode differs from *S. raoi* Majid and Shinde, 1984^[12] in having hooks 46 in numbers, testes 65-170 in numbers, vagina posterior to cirrus pouch and reported from *Channa punctatus*, in India.
14. The present cestode differs from *S. jagannathae* Majid and Shinde, 1984^[12] in having hooks 44 in numbers, testes 240-250 in numbers, ovary compact, vagina anterior to cirrus pouch and reported from *Channa punctatus*, in

- India.
15. The present parasite differs from *S. gachuae* Jadhav *et al.*, 1991^[8] in having hooks 22-25 in numbers, neck present, testes 60-70 in numbers, vitellaria follicular and reported from *Channa gachua*, in India.
 16. The present cestode differs from *S. maharashtrii* Jadhav *et al.*, 1991^[8] which shows muscular scolex, hooks 45-46 in numbers, large, arranged in two half crowns, testes oval 80-90 in numbers and vitellaria follicular.
 17. The present worm differs from *S. chauhani* Monzer Hasnain, 1992^[14] in having scolex oval, hooks 40-44 in numbers and testes 200-210 in numbers, vitellaria non lobate and reported from *Channa punctatus*, in India.
 18. The present cestode differs from *S. mohekarae*, Tat and Jadhav, 1997^[23] which shows elongated scolex, hooks 151 in numbers, neck short and broad, testes 300-310 in numbers and vitellaria follicular.
 19. The present parasite differs from *S. armatusae* Hiware, 1999^[6] in having scolex triangular, hooks 32-40 in numbers, vagina anterior to cirrus pouch and vitellaria follicular.
 20. The present cestode differs from *S. tappi* Patil *et al.*, 2003 which is having triangular scolex, hooks 42-44 in numbers, neck is very short and squarish, testes 285-295 in numbers, small, rounded, distributed in 2 fields, vagina anterior to cirrus pouch and vitellaria follicular.
 21. The present parasite differs from *S. ayodhensis* Pande *et al.*, 2006^[16] in having conical scolex, hooks 29 in numbers, testes numerous, vitellaria follicular and

- reported from *Amphinuous cuchia*, in India.
22. The present cestode differs from *S. baughi* Pande *et al.*, 2006^[16] in having hooks 28 in numbers, neck present, testes 40-50 in numbers, ovary compact, vitellaria follicular and reported from *Rita rita*, in India.
23. The present worm differs from *S. panzarensis* *et al.* 2008^[15], having scolex triangular, no. of hooks 58, neck absent, testes 40-45, ovary compact, vitellaria 4-5 lateral side reported from *Mastacembelus armatus* in India.
24. The present worm differs from *S. madhavii* Bhure *et al.* 2010 having scolex triangular, no. of hooks 40-42, testes 200-225 in numbers, ovary bilobed, reported from *Mastacembelus armatus* in India.
25. The present worm differs from *S. rupchandensis* Pardeshi *et al.* 2011^[32] having scolex tubular, neck absent, testes 350-370 in numbers, ovary bilobed reported from *Channa striatus* in India.
26. The present worm differs from *S. mastacembelusae* Sp. Nov. Having scolex triangular, hooks 20-22 in numbers, neck absent, ovary bilobed, testes 100-130 in numbers, vitellaria follicular reported from *Mastacembelus armatus* in India.
27. The present worm differs from *S. madhukarii* Sp. Nov. Having no. of hooks 45, neck absent, testes 130 in numbers, ovary bilobed, vitellaria follicular reported from *Mastacembelus armatus* in India.

The above noted characters are valid enough to erect a new species hence the name *S. jadhavii* Sp. Nov. Is proposed in honour of well-known helminthologist late Prof. B.V. Jadhav.



Key to the species of the genus *Senga* Dollfus, 1934

	Neck present	-	1
	Neck absent	-	2
1)	Scolex circular	-	<i>S. malayana</i> , Furnando and Furtado, 1964.
	Scolex rectangular	-	<i>S. khami</i> , Deshmukh and Shinde, 1980.
	Scolex cylindrical	-	<i>Senga jadhavii</i> Sp. Nov.
	Scolex triangular	-	3
	Scolex pear shaped	-	4
	Scolex oval	-	5
2)	Scolex circular	-	<i>S. visakhapatnamensis</i> , Ramadevi <i>et al.</i> 1973.
	Scolex conical	-	<i>S. ayodhensis</i> , Pande <i>et al.</i> 2006.
	Scolex tubular	-	<i>S. rupchandensis</i> Pardeshi 2011.

	Scolex elongated	-	<i>S. pcynomera</i> , Woodland 1924.
	Scolex oval	-	6
	Scolex pear shaped	-	7
	Scolex triangular	-	8
3)	Vitellaria follicular	-	9
	Vitellaria lobulated	-	<i>S.pahangensis</i> , Furtado <i>et al.</i> 1971.
4)	Testes below 50	-	<i>S.baughi</i> , Pande <i>et al.</i> 2006
	Testes above 50	-	<i>S. gachuae</i> , Jadhav <i>et al.</i> 1999
	Testes in bet ⁿ 100-200	-	<i>S.parva</i> , Furnando and Furtado, 1964
	Testes in bet ⁿ 200-300	-	<i>S.jagannathae</i> , M.A.Majid & G.B.Shinde, 1984.
5)	Hooks below 100	-	<i>S.chauhani</i> , Monzer Hasnain, 1992
	Hooks above 100	-	<i>S.mohekarae</i> , Tat and Jadhav, 1997
6)	Testes below 100	-	<i>S.maharashtrii</i> , Jadhav and Tat 1991
	Testes above 100	-	<i>S. aurangabadensis</i> , Jadhav <i>et al.</i> 1980
7)	Vitellaria lobulated	-	10
	Vitellaria follicular	-	<i>S.godavarii</i> , Shinde <i>et al.</i> 1980.
	Vitellaria granular	-	<i>S.raoi</i> , M. A. Majid and Shinde 1984
8)	Testes below 100	-	<i>S. panzaraensis</i> , Kalse. A. T 2009.
	Testes in bet ⁿ 100-150	-	11
	Testes in bet ⁿ 150-200	-	<i>S. besnardi</i> , Dollfus, 1934
	Testes in bet ⁿ 200-250	-	12
9)	Hooks below 50	-	<i>S. tappi</i> , D. N. Patil 2003.
	Hooks above 50	-	<i>S. paithanensis</i> , Kadam <i>et al.</i> 1981.
10)	Hooks below 50	-	<i>S. luknowensis</i> , Johri, 1956
	Hooks above 50	-	<i>S. ophiocephalina</i> , T seng, 1933
11)	Hooks below 50	-	<i>S. mastacembelusae</i> Sp.Nov.
12)	Vitellaria follicular	-	<i>S. armatusae</i> , C. J. Hiware, 1991
	Vitellaria granular	-	<i>S. madhavii</i> , Bhure <i>et al.</i> 2010

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