



## A new sub species and first host record of *Procamallanus (Spirocamallanus) Bagarii lanceolata* N. SSP. (Karve and Naik, 1951) in freshwater fish, *Mastacembelus armatus* from Seer Khad, Himachal Pradesh, India

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### Abstract

Helminthological examination of the freshwater fish, *Mastacembelus armatus* revealed the presence of *Procamallanus (Spirocamallanus) Bagarii lanceolata* N. SSP. from Seer Khad, district Bilaspur, Himachal Pradesh. It is characterized by diagnostic features such as buccal capsule is not separated into two halves, internally having discontinuous spiral thickenings; presence of a basal lancet in buccal capsule and additional four sessile lateroventral papillae (3 preloacal and 1 postloacal). The present finding represents a new host.

**Keywords:** *Procamallanus (Spirocamallanus) Bagarii lanceolata* N. SSP. *Mastacembelus armatus*, Seer Khad

### Introduction

Fishes are indigenously and economically important in India as it provides high nutritional value and serves as an essential food for the different section of the human population. Fishes are prone to many parasitic infections due to diverse feeding habits and habitats. During the careful examination of nematode infection in 11 hosts (*Mastacembelus armatus*) from Seer Khad, 32 nematodes of the genus *Procamallanus* Baylis, 1923 recovered from the intestine. Nematodes of genus *Procamallanus* with well developed, orange-brown and highly sclerotized buccal capsule mainly parasitizes freshwater fish (Baylis, 1923; Moravec and Scholz, 1991; Moravec and Thatcher, 1997). Moravec and Thatcher (1997) [4, 1, 1], presented a key in which *Procamallanus*, *Spirocamallanus*, *Spirocamallanoides*, *Punctocamallanus* and *Denticamallanus* were considered as a subgenus of *Procamallanus*. Out of these, the only representative of the first two subgenera has been reported from freshwater fishes of Himachal Pradesh, India. Although many authors consider *Spirocamallanus* a distinct genus, we agree with Moravec and Sey (1988) [2]; Rodrigues *et al.* (1991) [3]; Moravec and Thatcher, 1997 [1]; Gibbons, 2010 in considering *Spirocamallanus* a subgenus of *Procamallanus* recognized by the presence of buccal capsule with internal spiral thickening in both sexes (Moravec and Thatcher, 1997) [1]. The present finding observed a new host record of these parasite species.

### Materials and Methods

#### Collection

The collection of nematode parasites from freshwater fish was done from Seer Khad at Jhanduta in Bilaspur district of Himachal Pradesh, India during the month of June and September 2020. Fishes were purchased from the local fishermen at Seer Khad in district Bilaspur during the months of June and September 2020. About 35 specimens of *Mastacembelus armatus* were thoroughly examined for the recovery of parasites. To remove debris the recovered

nematodes from gut were washed in saline (0.7% solution).

#### Fixation and preservation

Recovered nematodes were killed and fixed in boiling 70% alcohol. This step helps to straighten the nematodes.

The fixed nematodes were then preserved in fresh 70% alcohol and labeled for the date, name of the host and locality.

#### Preparation for microscopic studies

For microscopical examination, the nematodes were first cleared in lactophenol (The nematodes are bulk cleared in lactophenol (Glycerine: 2 parts; Distilled water: 1 part; Lactic acid: 1 part & Phenol crystal (melted): 1 part) or glycerine (involving a series of upgrading mixture of 70% alcohol & glycerine) for the preparation of temporary mounts.

Table 1

Sr. No.	Type of treatment	Time
1.	70% Alcohol: Glycerine:: 3:1	12-17 hrs
2.	70% Alcohol: Glycerine:: 1:1	Overnight
3.	70% Alcohol: Glycerine:: 1:3	Overnight
4.	Pure Glycerine	Preserved

Since a prolonged action of lactophenol caused the bursting of specimens, the nematodes after studies were washed in 70% acid alcohol before preserving them back in 70% alcohol.

#### Identification

'CIH Keys to the Nematode Parasites of Vertebrates (Vol. 1-10)' (Ed. Roy C. Anderson, Alain G. Chabaud & Sheila Willmott, 2009) and 'Keys to the Nematode Parasites of Vertebrates: Supplementary volume' (Ed. Lynda M. Gibbons, 2010) were used for the generic diagnosis of the worms, followed by the consultation of the relevant literature available worldwide, for the validation of the species.

### Figures and photomicrographs

The line diagrams were made with the help of 'Camera Lucida' and photomicrographs using 'Leica DML S2-Camera DFC 320'.

### Measurements

All measurements are given in millimeters and were taken by an ocular and stage micrometer.

### Results

Family Camallanidae Railliet and Henry, 1915 Genus *Procamallanus* Baylis, 1923<sup>[4]</sup> Subgenus *Procamallanus* (*Spirocamallanus*) (Olsen, 1952) Moravec and Sey, 1988<sup>[2]</sup> *Procamallanus* (*Spirocamallanus*) *bagarii* Karve & Naik, 1951<sup>[5]</sup> Syn. *Procamallanus aspiculus* Khera, 1955 *Procamallanus* (*Spirocamallanus*) *bagarii lanceolata* N. SSP. nov..

### Description

These nematodes are medium-sized, with cuticle striated transversely and spherical mouth opening. Buccal capsule well developed, orange-brown, continuous, not separated into two valves, anterior margin formed by six transverse sclerotized plates, inner surface with discontinuous spiral thickenings, mostly oblique, its base having a basal ring and provided with three, one dorsal and two sub ventral, forwardly directed sclerotized fold like projections and a large recurved basal lancet (Figs.1, 6, 7); esophagus divisible into muscular and glandular portions (Figs.1, 2).

**Male:** Body 5.35-6.741 long and with maximum width 0.149; buccal capsule 0.074 - 0.107 x 0.085; esophagus 1.134 - 1.219 x 0.074 - 0.107 long, muscular esophagus 0.502 - 0.535 x 0.085 - 0.107, glandular esophagus 0.559 - 0.695 x 0.074 - 0.085, the ratio of two parts 1:0.8 - 1:1; nerve ring, cervical papillae and excretory pore 0.192 - 0.246, 0.139 - 0.171 and 0.727 - 0.963 respectively from the anterior extremity; cloacal papillae 19 pairs, precloacal

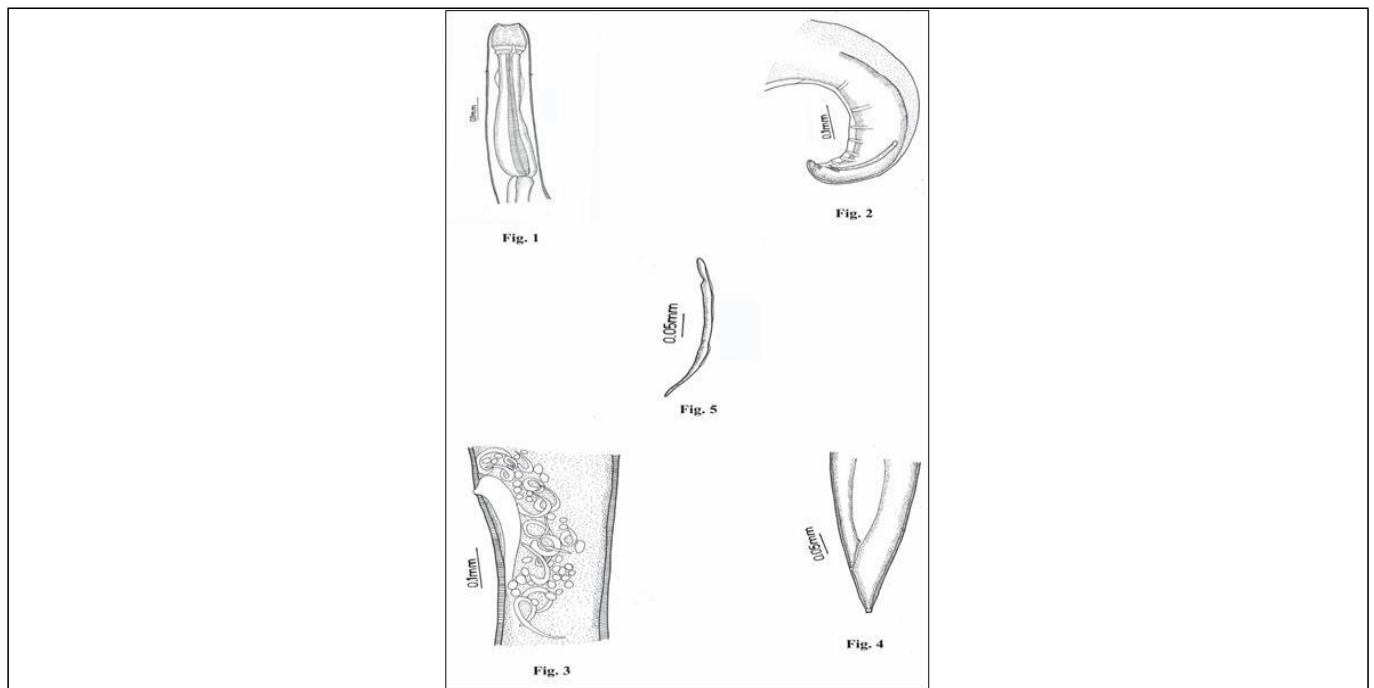
papillae 11 pairs (8 pairs lateroventral with 7 pairs pedunculated and last pair just in front of the cloaca of sessile papillae) and postcloacal papillae 8 pairs (4 pairs pedunculated lateroventral papillae bunched in the middle third of the tail, two pairs of sessile lateroventral papillae in the posterior third of tail, one pair of sessile lateroventral papillae just before the bunch of pedunculated papillae and last pair of sessile subterminal papillae) (Figs. 2,8,9); cloacal opening surrounded by two minute, slightly sclerotized plates; spicules unequal, similar, both poorly sclerotized (especially left one), left 0.160 - 0.192 long and right 0.117 to 0.171 spicular ratio 1:1.25 - 1:1.36 (Figs. 2,10); tail 0.321 - 0.064 long with a rounded tip (Figs. 2,8,9,10).

**Female:** Body 8.613-14.873 long with maximum width 0.235; buccal capsule 0.139 x 0.117; esophagus 1.733 - 1.283 x 0.085 - 0.139 long, muscular esophagus 0.734 - 0.877 x 0.096 - 0.139, glandular esophagus 0.642 - 0.995 x 0.085 - 0.128, the ratio of two parts 1:0.8 - 1:1.2; nerve ring, cervical papillae and excretory pore 0.256 - 0.342, 0.256 - 0.331 and 0.406 - 0.642 respectively, from the anterior extremity (Figs.1,6); vulva post-equatorial, 4.494 - 7.276 from posterior extremity (Figs. 3,11); vagina directed posteriorly; uterus amphidelphic containing numerous first-stage larvae (Fig. 3,12); larva 0.331x0.021 with long, slender tapering tail (Figs. 5,16); tail 0.107 long, conical with three small processes at its tip (Figs. 4,12,13,14).

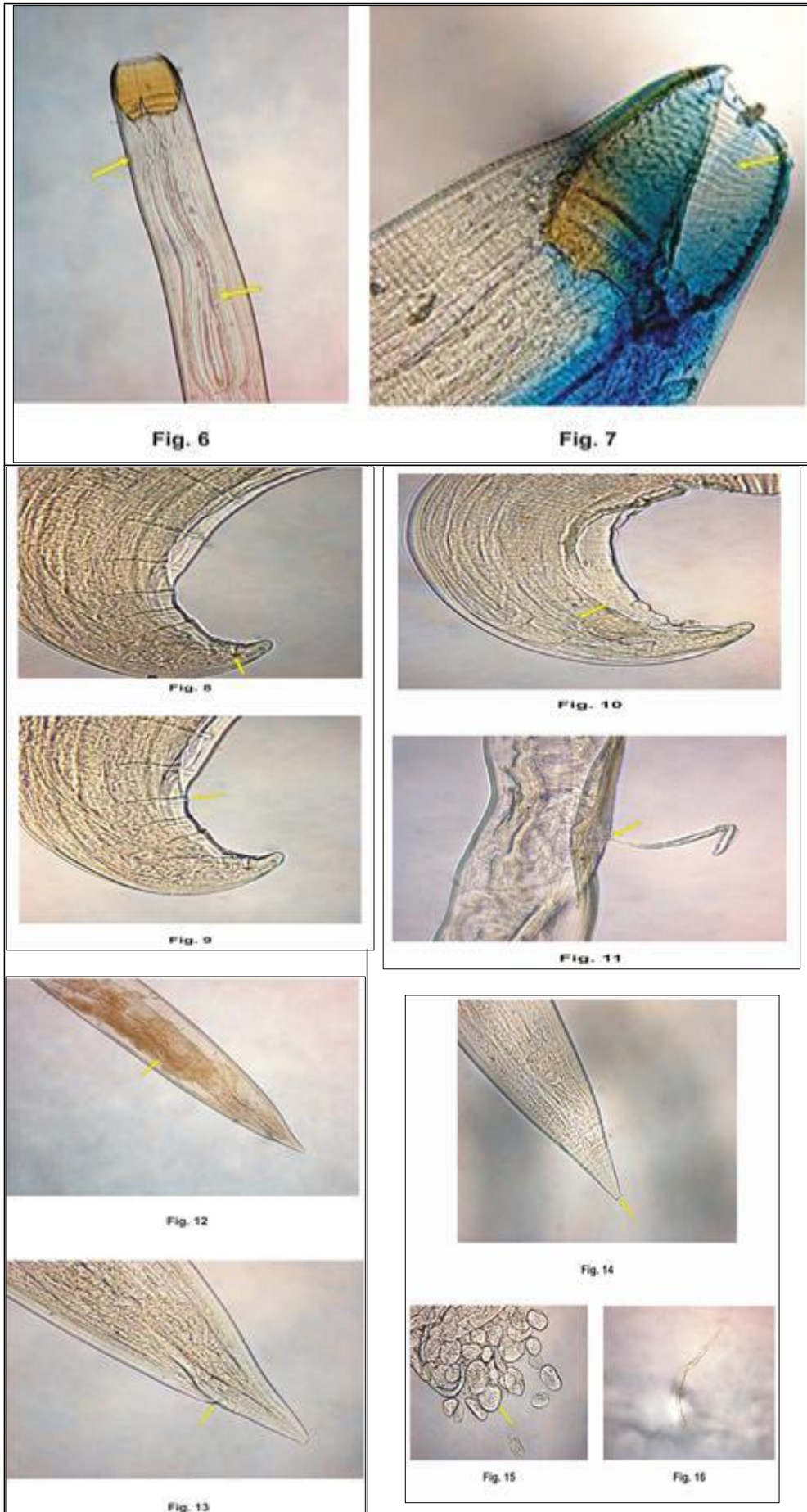
**Type host:** *Mastacembelus armatus* (Lacepede)

**Site of infection:** Intestine

**Type locality:** Seer Khad at Jhanduta, district Bilaspur (HP), India No. of specimens: Twenty-one nematodes (8 males and 13 females) from 13 out of 35 fishes examined.



**Fig 1-5:** *Procamallanus* (*Spirocamallanus*) *bagarii lanceolata* N. SSP. nov. from *Mastacembelus armatus*. 1- Anterior end of female, dorsolateral view; 2- Caudal end of male, lateral view; 3- Vulvar region lateral view; 4- Posterior end of female, lateral view; 5- Larva, lateral view.



**Fig 6-16:** *Procammallanus (Spirocammallanus) Bagarii lanceolata* N. SSP. nov. From *Mastacembalus armatus*. Leica photomicrographs 6- Anterior end of female, dorsolateral view; 7- Buccal capsule of female; 8,9-Caudal end of male, lateral view; 10- Caudal end of male, lateral view; 11-Vulvar region, lateral view; 12- Posterior end of female, lateral view; 13- Female tail, lateral view; 14- Female tail tip, lateral view; 15- Eggs; 16- Larva.

### Remarks

A total number of 79 specimens were collected from 32 male and 35 female hosts from Seer Khad. The present specimen in having continuous buccal capsule, not separated into two valves is assigned to the genus *Procamallanus* Baylis, 1923 and with spiral thickenings on the internal surface of the buccal capsule in both the sexes has been assigned to the sub-genus *Procamallanus* (*Spirocamallanus*) (Olsen, 1952) Moravec and Sey, 1988<sup>[2]</sup>, in agreement with Gibbons (2010), and buccal capsule wide, orange brown, formed by transverse sclerotized plates and having three forwardly directed fold like projections have been assigned to the species *Procamallanus* (*Spirocamallanus*) *bagarii* Karve and Naik, 1951<sup>[5]</sup>, a parasite recorded from India, on previous occasions by Gupta and Garg (1976) and Gupta and Masoodi (1988), whereas its offshore account being provided by Moravec and Sey (1988)<sup>[2]</sup> from North Vietnam, except for the presence of a basal lancet in buccal capsule and the observation of additional four (3 precloacal and 1 postcloacal) sessile lateroventra papillae (in comparison to the already observed and described two pairs of sessile lateroventral postcloacal papillae in the posterior third of tail), with 1<sup>st</sup> and 2<sup>nd</sup> pair lodging the 6<sup>th</sup> pedunculate papillae and third one following the 7<sup>th</sup> precloacal and one pair of postcloacal sessile papillae just before the bunch of the post-cloacal pedunculated papillae, has been found new to science and named as *Procamallanus* (*Spirocamallanus*) *bagarii lanceolata* new subspecies.

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