



A NEW SPECIES OF *Procamallanus* (BAYLIS, 1923) FROM *Mastacembalus armatus* FROM IRIL RIVER, IMPHAL EAST, MANIPUR, INDIA

N. PENGKI DEVI^{1*}, T. H. BIDYALAKSHMI¹ AND R. K. GAMBHIR¹

¹Parasitology Laboratory, Department of Life Sciences, Manipur University, 795003, Canchipur, India.

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author PDN provide the concept and design the study and performed the statistical analysis, literature searches. Author BDTH wrote the protocol and also wrote the first draft of the manuscript. Author RKG guided, managed and revising the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

Article Information

Editor(s):

(1) Dr. Telat Yanik, Professor, Atatürk University, Turkey.

Reviewers:

(1) Jasmeet Singh, Kamdhenu Vishwavidyalaya, India.

(2) Guermah Dyhia, Mouloud Mammeri University of Tizi-Ouzou, Algeria.

Received: 06 May 2020

Accepted: 12 July 2020

Published: 25 July 2020

Original Research Article

ABSTRACT

A new species of parasitic nematode *Procamallanus* Baylis, 1923 (Camallanidae) is described from the intestine of freshwater fish *Mastacembalus armatus* from Iril River, Imphal East, Manipur, India, collected during April-May, 2018. It has many different characters from known species which included the presence of faded lateral spiral ridges in the buccal cavity, a well developed lumen, extended upto the middle of the buccal cavity, 16 pairs of caudal preanal papillae in an arrangement of 8 pairs of subventral papillae, 2 pairs of ventral sessile papillae at cloacal opening and 6 pairs of post anal papillae with 1st and 3rd pair are pedunculated and 2nd, 4th and 6th pairs are ventrally sessile in male. The present specimen resembles with *Procamallanus guptae* (Arya, 1978), *Procamallanus berdii* (Khan and Yaseen, 1969) and *Procamallanus aspiculus* Khera, 1955 by the absence of spicules, but also differs in shape of buccal capsule, number of caudal papillae in males, presence of caudal alae, and shape of the tail in both sexes.

Keywords: Iril River; *Procamallanus*; *Mustacembalus armatus*; Manipur.

1. INTRODUCTION

In India, fishes are traditionally and economically important, hence they are always in high demand in different sections of population. Fishes are subjected to many parasitic infections due to their diverse

feeding habits and habitats in both freshwater as well as marine systems [1]. During April- May, 2018, 2 hosts were examined and found to be infected by multiple parasites. Among the 8 parasites, some were found to be closely related to *Procamallanus guptae* (Arya, 1978) [2,3,4]. The genus *Procamallanus* was

*Corresponding author: Email: nongthombampinky123@gmail.com;

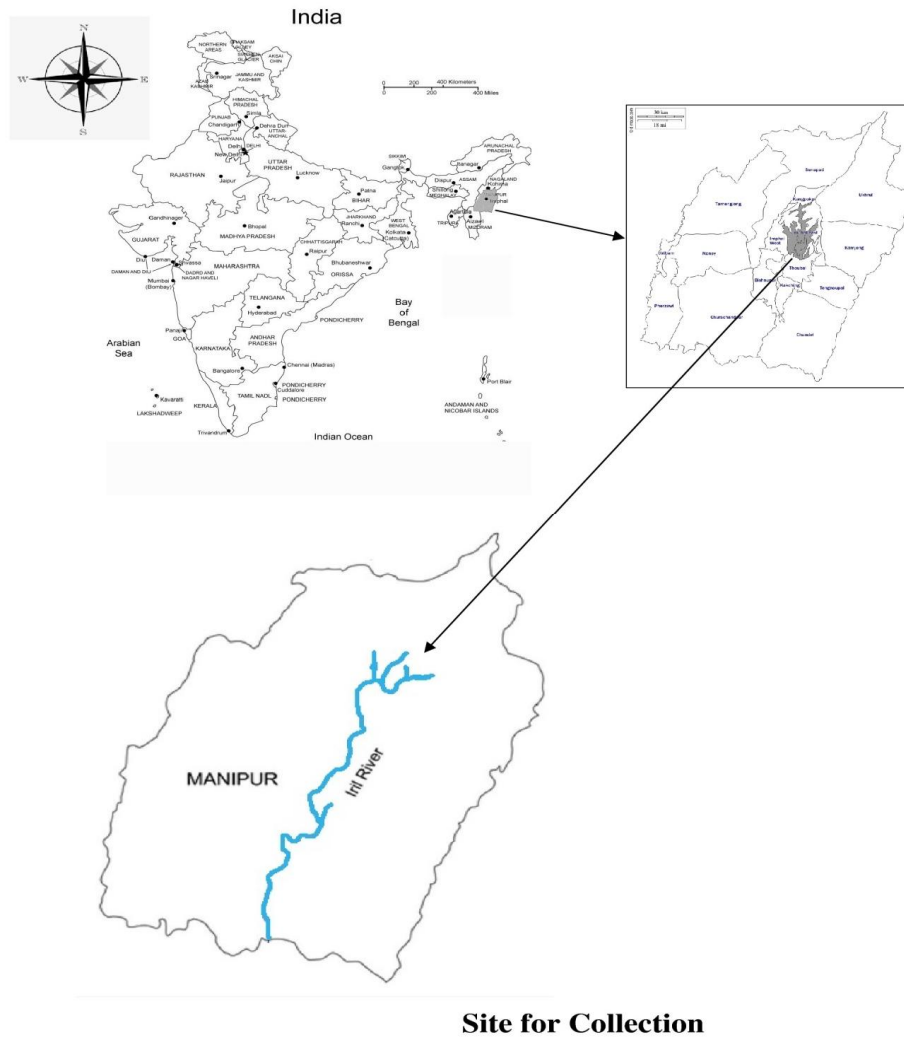
created by Baylis, [5] and consists of approximately 40 known species world- wide at present.

From Manipur there has been a report of known species *P. lucknowensis* (Rafia and Rehena, 1976) from *Heteropneustes fossilis* from Senapati district, 2006 [6] and new report of *P. jiriensis n. sp.* from Jiribam district from *Aorichthys aor* (Hamilton, 1822) [1] The purpose of the present study is to discover and investigate the previously unknown piscine - parasite of the region.

2. MATERIALS AND METHODS

Fish hosts (*Mastacembalus armatus*) were collected from Irii River located in Imphal-East districts, Manipur, North- east India during April- May, 2018. Fishes were brought to the lab and narcotised (by

keeping in water containing formaline) and dissected to examined for the presence of parasites. The recovered parasites including 6 females and 2 males were washed in 0.7% normal saline solution. The specimens were fixed in A.F.A. (Alcohol- Formalin- Acetate) and dehydrated in G.A. (Glycerine Alcohol). After preparation of permanent slide, specimens were examined under Olympus CH20i light binocular microscope and photomicrographs were taken by Nikon model no. SMZ1270 and Olympus CH20i. Diagrams were drawn with the help of Camera Lucida and measurements were taken using ocular micrometer. All measurements are given in millimetre unless otherwise stated. Other type specimens were deposited in the Museum of Parasitology Section, Department of Life Sciences, Manipur University and few paratypes were deposited in the Zoological Survey of India, Kolkata.



Map 1.

3. RESULTS

The morphological analysis of specimens i.e., (2 male and 6 females) allowed the identification of the genus *Procamallanus* (Baylis, 1923) [5] but they could not be assigned to a known species due to presence of different morphological structures. Therefore, the present specimen is described - herein as *a new species giving the name P. irilensis* n. sp.

3.1 Description

Body was medium sized, slender, red in colour when alive. Mouth was truncated and buccal capsule was yellowish-brown, barrel in shaped, not divided into two lateral valves and had well developed basal ring. Inner surface of capsule was provided with faded lateral spiral ridges. Excretory pore was approximately at mid-way between nerve ring and posterior end of muscular oesophagus. Club-shaped muscular portion of oesophagus is shorter than glandular portion of oesophagus. Cuticle is thick and fairly striated. Tail was conoid, long and bluntly rounded at tip.

3.1.1 Male

Length of body 6.86-7.25 mm and 0.06- 0.07 mm in width. Buccal capsule including basal plate 0.08 mm in length from anterior end. Length of Muscular oesophagus 0.48- 0.79 mm. and glandular oesophagus 0.69- 0.73 mm. The entire length of oesophagus 1.09- 1.40 mm Nerve ring and excretory pore at 0.16- 0.20 mm and 0.36- 0.44 mm respectively from anterior extremity. Posterior end of body ventrally bent, provided with wide caudal alae supported by caudal pedunculate papillae. Preanal papillae: 8 pairs of sub-ventral papillae and 2 pairs of ventral sessile papillae situated to cloacal opening. Post - anal papillae; there are 6 pairs. Out of which, 1st and 3rd pairs pedunculated and 2nd and 4th-6th pairs ventrally sessile papillae. Gubernaculum is small and V- shaped. Spicule absent. Tail conical, bearing a minute spikes and measures 0.06- 0.15 mm in length and anal body diameter 0.05- 0.09 mm. Males considerably smaller than females.

3.1.2 Female

Head truncated with a dimension of 0.07- 0.09 mm in width and rounded mouth. Buccal capsule rounded in shape including basal ring 0.05- 0.07 mm in length. Cephalic papillae absent. Length of body 12.16- 15.84 mm. Cephalic papillae absent. Length of muscular oesophagus 0.15- 0.60 mm. Nerve ring and excretory pore at 0.24- 0.29 and 0.41 respectively from anterior end. Vulva distinctly post-equatorial with well-developed globular lips, situated at 4.34- 7.34 mm from posterior end. Muscular vagina directed

posteriorly. Ovo- viviparous, uterus packed with numerous eggs and larvae (Figs. 1 & 2). Eggs are having thin-walled and oval in shaped. Body of larva slender and measures 0.27- 0.37 mm in length.

Tail conical, terminally rounded, finely striated and measures 0.10- 0.23 mm in length and anal body diameter 0.06- 0.07 mm with well develop caudal muscle. A feeble band of muscle of rays present near the anus.

3.1.3 Taxonomic Summary

Genus: *Procamallanus*

Species: *Irilensis* n. sp.

Host: *Mastacembalus armatus*, local name Ngaril

Site of infection: Intestine

No of host examined: 2

No of parasite infected: 8

Locality: Iril River, Imphal East District, Manipur

Holotype: MUPLM23/5/181

Allotype: MUPLM24/5/182

Paratypes: MUPLM25/5/183

Etymology: The specific name of this species relates to the geographical region where it has been recovered i.e. 'Iril'.

4. DISCUSSION

Depending on the comparative and morphometric analysis, the present specimen is identified as new and given the name as *P. irilensis* n. sp. The described species come closer to *P. guptae* (Arya, 1978) of the genus *Procamallanus* [5]

The family camallanidae was established for species with a prominent sclerotized buccal capsule (Railliet and Henry, 1915) for species with the buccal capsule divided into 2 halves and the new species with its barrel-like buccal capsule composed of its two lateral halves and identified as a member of Procamallaninae [7].

The present specimen resembles with *P. berdii* (Khan and Yaseen, 1969) and *P. aspiculus* (Khera, 1955) [2,3,4] by absence of spicule in male tail but it differs by having different position of vulva and size of eggs.

The present specimen resemble with *P. gubernaculus* [8] in the morphology of the buccal capsule, oral opening circular and presence of well developed caudal alae of males, but differs by the presence of finger like projection in the buccal cavity, extended from the anterior end of the muscular oesophagus, the presence of 6 post- cloacal papillae and absence of spicule.

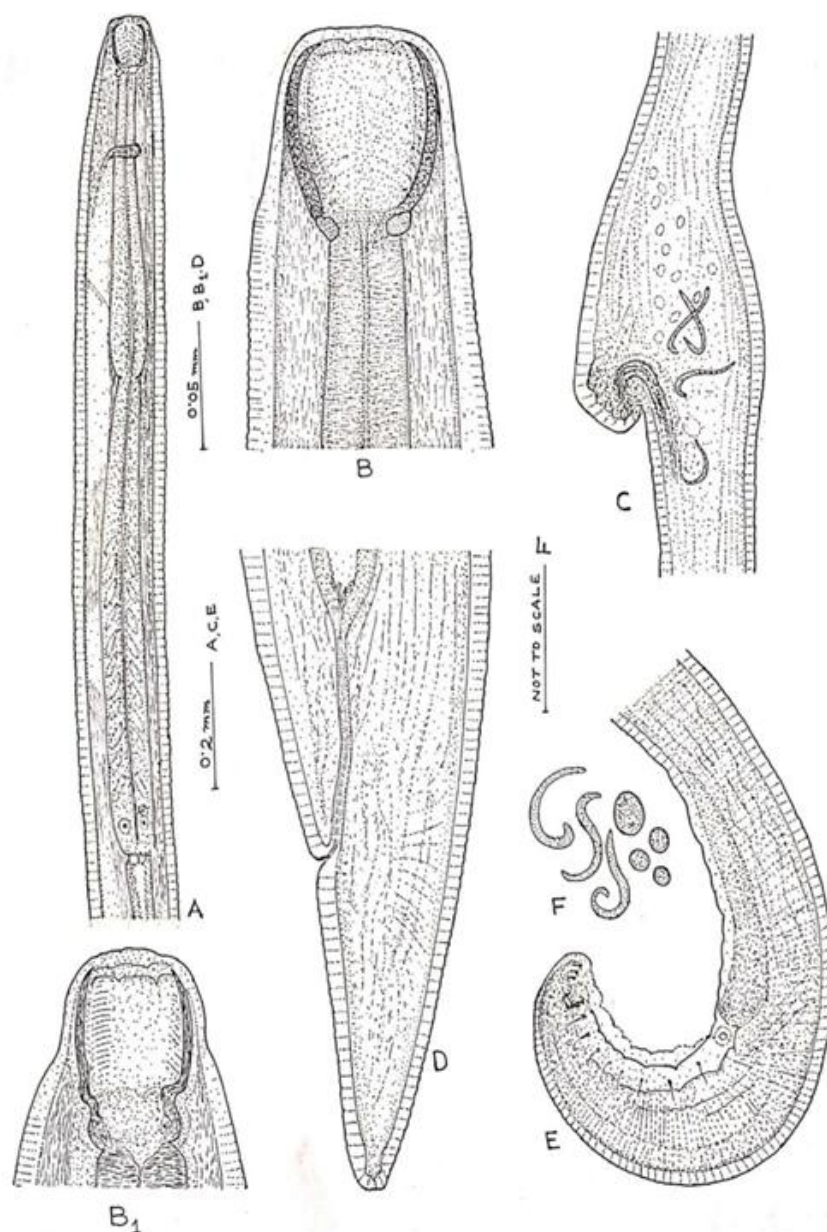


Fig. 1: *Procamallanus irilensis* n. sp.

A) Anterior end of male, B) Anterior end of female, B1) Anterior end of female of another specimen, C) Vulva, D) Tail of female, E) Tail of male, F) Larvae.

Table 1. Comparison of present specimen male with its closest relative

Characters	<i>P. guptae</i> (Arya,1978)	<i>P. irilensis</i> n. sp. (Present specimen)
Body	7.5	6.86- 7.25
Cephalic papillae	A pair- present	Not visible
Caudal papillae	4+0+1= 5	8+2+6= 16
Spicule	Absent	Absent
Gubernaculum	Absent	Present
Tail	Tapering with blunt tip	Conical, bearing a minute spike

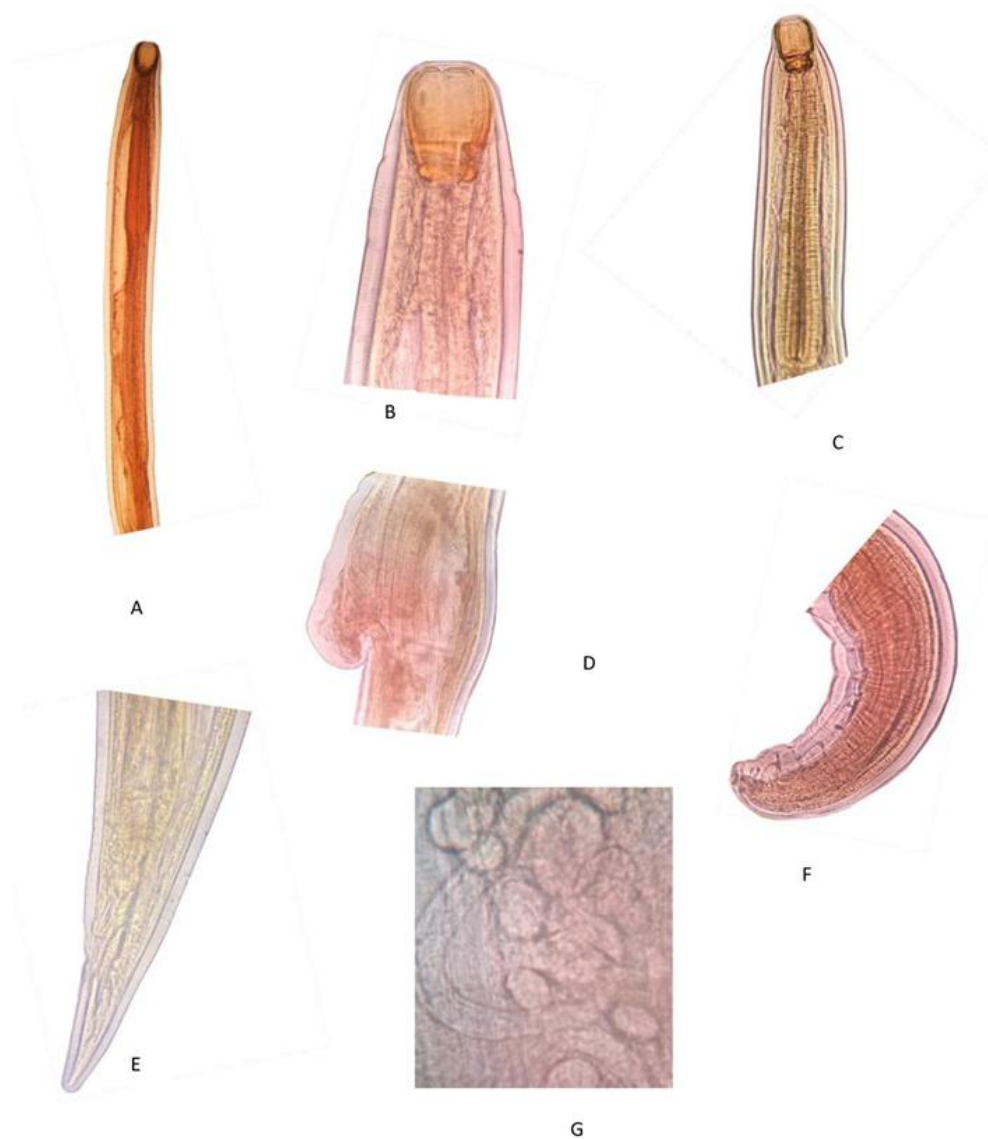


Fig. 2: Photomicrograph of *Procammallanus irilensis* n. sp.

A) Anterior end of male, B) Anterior end of female, C) Anterior end of female of another specimen, D) Vulva, E) Tail of female, F) Tail of male, G) Larva and eggs.

Beside, the present specimen differs from *P(S).saccobranchi* (Karve, 1952) recovered from Awangsoi Lake, Manipur and Chatla Haor, Silchar, Assam [9] by having a size of the buccal capsule, presence of faded lateral spiral ridges, a well developed lumen, extended upto the buccal cavity, shape of tail in female and presence of a feeble band of muscle rays near the anus in present specimen.

Again, the present specimen differs from *P(S).similis* n. sp. (Thanapon Yooyen, František Moravec and Chalobol Wongsawad, 2011) [10] recovered from

marine fish in gulf of Thailand by having a well developed lumen, extended upto the buccal cavity and number of papillae present in male tail.

In addition, the present specimen differs from *P(S).jiriensis* n.sp (Sanachaoba, and Gambhir, 2018) [1] which have been found from Barak River, Jiribam district Manipur by having a well developed lumen, extended upto the buccal cavity, shape of the buccal capsule, well developed prominent vulvar and presence of faded lateral spiral ridges in present specimen.

Table 2. Comparison of present specimen female with its closest relative

Characters	<i>P. guptae</i> (Arya,1978)	<i>P. irilensus</i> n. sp (Present specimen)
Body	8.0	12.16-15.84
Cephalic papillae	A pair present	Absent
Vulva position	Post-equatorial, at 2.8 from posterior end.	Post-equatorial, at 4.34-7.34 from posterior end.
Tail	Tapering with a pair of bubble- shaped small swelling at tip	Rounded tip
Eggs	Thin- walled, oval, embryonated	Thin-walled, oval.
Larvae	Slender, serpentine.	Slender

Furthermore, a well developed lumen, extended upto the buccal cavity in the present species which is absent in *P. guptae* (Arya, 1978), *P. gubernaculus* (Khera,1955) [2,3,4] *P. ditcheli* (Gupta and Garg, 1976) [11] *P. balenensis*, *P. jalicensis*, *P. mexicanus* Moravec et al. (2000) [12]

In spite of many similarities, the present specimen differs from *P. guptae* (Arya,1978) [2,3,4] in many aspects showing in Tables 1 and 2 like absence of cephalic alae, shape and size of eggs, vulva position and tail conical in shape bearing a minute spike.

5. CONCLUSION

Considering all the above characters, this species is easily distinguishable from all congeneric species. From the above discussed characteristics of the present species, it has become necessary to erect a new species and named it as *P. irilensus* n. sp.

ETHICAL APPROVAL

All the procedures and protocols performed in research studies using animal species like fishes were in accordance with the ethical standards of the Institutional Animal Ethics Committee of Manipur University (M.U/D. L.Sc./IAEC/1/19).

ACKNOWLEDGEMENT

The authors are thankful to the Head, Department of Life Sciences, Manipur University for providing necessary laboratory facilities. The cooperation and valuable support from colleagues and friends are also gratefully acknowledged.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Sanachaoba RK, Gambir RK. A new species of *Camallanidae* (Railliet and Henry, 1917) from a siluroid catfish in Barak River, Jiribam, Manipur (India). 2018;42(2):182-186. DOI: 10.1007/s12639- 018- 0980- 4 [Epub 2018 Feb 15]
- Sood ML. Fish nematodes of South Asia. Kalyani Publishers, New Delhi-Ludhiana, India. 1989;389.
- Soota TD. Studies on nematode parasites of Indian vertebrates. Zoological Survey of India, Kolkata. 1983;165.
- Yamaguti S. Systema helminthum. The nematodes of vertebrates. Part I & II. Indian Reprint International Books & Periodical Supply Service. 1961;III:1125.
- Baylis HA. Report on a collection of parasitic nematodes mainly from Egypt. Part I. Ascaridae and Heterakidae Part II. Oxyuridae Part III. Camallanidae etc., with a note on Prostmayria and an appendix on Acanthocephala. Parasitology. 1923;15(1):1-3, 14-23,24-38.
- Gyaneswori I. Parasites of certain vertebrate animals with special references to Acanthocephala. Ph.D thesis, M.U. 2007;84-88.
- Railliet, Henry. On a reconstruction of the genus *Camallanus*. Journal of Helminthology. 1960;34(34):117-124.
- Khera S. On some species of *Procamallanus Baylis*, 1923 from India. Anales de la Escuela Nacional de Ciencias Biologicas. 1955;8:243-252. [Google Scholar]
- Puinyabati DH, Kar Devashish. Studies on helminth parasites of the fishes of Silchar Assam and Bishnupur District Manipur. Ph. D Thesis, Assam University. 2012;126.
- Yooyen Th, Moravec F, Wongsawad Ch. Two new sibling species of *Procamallanus* (*Spirocamallanus*) (Nematoda: Camallanidae)

- from marine fishes in the gulf of Thailand. J of Parasitology. 2011;97(5):931-938.
11. Gupta NK, Garg VK . On Indian species of the genus *Spirocamallanus* Olsen, 1952 with description of *S. ditchelli* n. sp. Journal of Helminthol. 1976;28(1):1-16.
12. Moravec F, Salgado-Maldonado G, Caspeta-Mandujano J .Three New *Procamallanus* (*Spirocamallanus*) species from Freshwater Fishes in Mexico. J Parasitol. 2000;86(1):119-127.