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A Review of the Genus *Pseudoproleptus* (Nematoda: Physalopteridae) with Description of New Species *Pseudoproleptusbhartii* sp. nov. from Fresh Water Fish *Notopterusnotopterus* (Pallas)

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Email: sadhanagupta076@gmail.com, Contact No. 9807414555**Abstract**

*Nematodes are the most specifically diversified group next to insect. To get acknowledge of role of nematodes in biodiversity a sound knowledge and understanding of its taxonomy together with details of its biology is essential. Because of difficulties in studying fish nematodes, associated with their morphological and biological peculiarities, most species of these parasites are poorly known. The present study is one step ahead to disclose the existence of new species of *Pseudoproleptus* collected from fresh water fish *Notopterusnotopterus* (Pallas) from U.P. (India) characterised due to the presence of cephalic cuticular helmet like structure, described as a cuticular fold or collar is distinguish itself from its conspecifics on the basis of position of caudal papillae (4 pairs preanal, one pair adanal and 4 pairs postanal), absence of transverse cuticularisation in left spicule and spicule length ratio 1:4.2.*

Keywords: Biosystematics, Nematode, *Pseudoproleptus*, Physalopteridae Taxonomy.

1. Introduction

Body elongated, cylindrical tapering towards posterior extremity. Mouth bounded by two lateral lips each bearing a tooth and submedian papillae are present. Anterior end encircled by “cuticular fold” or “cuticular cephalic collar”. Mouth followed by a distinct long cylindrical vestibule. Oesophagus long divided anteriorly as muscular oesophagus and posteriorly as glandular oesophagus. Cuticle thick, transversely striated in some regions. Cuticular striations are 0.03-0.05 apart in male and 0.04- 0.06 apart in female.

2. Material and Method

Fishes procured for the present investigation were mostly collected from fishing sites caught by nets. Fishes were examined for parasitic infection. The recovered nematodes washed in physiological saline and then fixed in hot 4% formaldehyde solution. For light microscopical examination, the nematodes were cleared with glycerine. Drawings

were made with the aid of camera lucida. All the measurements are in millimetres. The specimen has been deposited to co-ordinator of All India Project on Taxonomy (AICOPTAX) sponsored by Ministry of Environment and Forest, Govt. of India, New Delhi.

Description of male

Body 6.42-7.68 long, 0.18-0.22 wide. Head 0.07-0.08 in diameter. Vestibule 0.06- 0.08 long, 0.01-0.02 wide. Anterior muscular oesophagus 0.18-0.21 long, 0.04-0.06 wide. Posterior glandular oesophagus 1.32-1.39 in length, 0.08-0.10 in width. Entire oesophagus 1.50-1.60 long. Nerve ring at 0.13-0.19 and excretory pore 0.27-0.31 from anterior end. Spicules unequal, left long, tubular 0.42-0.44 long, right small 0.10- 0.11 long. Caudal alae well developed extending upto the tip of tail, surrounded by nine pairs of pedunculated caudal papillae of which four pairs

are preanal, one pair adanal and four pairs postanal. Tail ventrally curved 0.19-0.21 long.

Description of Female

Body 9.89-11.46 long, 0.32-0.41 wide near the middle of body. Head 0.11-0.12 in diameter. Vestibule 0.08-0.09 long and 0.01-0.015 wide. Muscular oesophagus 0.21-0.28 long and 0.04-0.06 wide. Entire oesophagus 1.21-1.39 long. Nerve ring 0.18-0.19 and excretory pore 0.35-0.41 from anterior end. Vulva post equatorial 6.89-8.23 from anterior end. Tail 0.11-0.18 long abruptly narrow towards middle and ending in a short blunt knob like or digitate process with a spine at the end. Eggs 0.03-0.04 long, 0.02-0.03 wide.

Host - *Notopterusnotopterus* (Pallas)

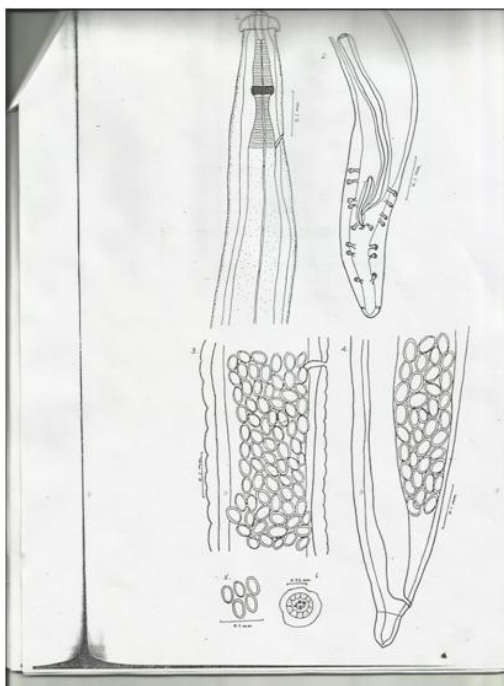
Location - Small intestine

Locality - Lucknow

Prevalence - 13 male and 22 female specimens from 25 hosts out of 206 examined.

PLATE-1 Fig. 1-6

1. Anterior end of Body. Lateral view.
2. Posterior end of male. Ventral view
3. Vulvar region. Lateral view
4. Posterior end of female. Lateral view
5. Eggs.
6. End on view.



3. Discussion and Results

The genus *Pseudoproleptus* was erected by Khera (1953) for the reception of a new species *Pseudoproleptus vestibulus* recovered from a fresh water fish *Mastacembelusarmatus* (Lacep.) from Lucknow, India. The genus is characterised by the presence of mouth bounded by two simple lateral lips each with two sub median papillae, a single truncated tooth, anterior end surrounded by cuticular cephalic collar described by Khera as “a circular fold or collar of cuticle, which may be turned back like an umbrella or forward so as to surround the anterior end like a cup and presence of prominent vestibule (= stoma, buccal cavity or pharynx)

Karve and Naik (1951) described a new nematode *Metabronemanopteri* recovered from the stomach of the Indian fresh water fish *Notopterusnotopterus* (Pallas) described its anterior end as “the cuticle in the head region in almost all specimens of both sexes. On account of this reflected cuticle the anterior end appeared to be fitted with a cap. In an end on view this cuticle appears like a girdle at the base of lips. In few specimens the cuticle is not reflected back but is directed forward and forms a funnel shaped cover surrounding the two lips.

Karve and Naik (1951) wrongly kept his specimens under the genus *Metabronema* Yorke and Maplestone, 1926 because the characters for differentiating the genera are not consistent. Their findings were overlooked by Khera, 1953. It appears that except papillae number, divided oesophagus and presence of caudal alae, all the descriptions of *Metabronemanopteri* Karve and Naik (1951) are similar to *Pseudoproleptus vestibulus* Khera (1953) as opined by Soota (1983) and Sahay and Prasad (1993). On account of this similarity, Margolis (1975) in his noteworthy review considered *Pseudoproleptus* and *Metabronema* as congeneric and transferred *Metabronemanopteri* Karve and Naik, 1951 to *Pseudoproleptusnotopteri* (= *Metabronemanopteri* Karve and Naik, 1951) valid. Soota (1983) gave a key to the species of the genus

Pseudoproleptus and held *Pseudoproleptus-notopteri* (= *Metabronemanopteri* karve and Naik, 1951) and *Pseudoproleptus vestibulus* khera (1953) valid. The author also agrees with Margolis (1975).

Chakarvarty and Majumdar (1962) created another new genus *Notopteroides* to accommodate *Notopteroides notopteri* recovered from the fish *Notopterus notopterus* from Kolkata, India. These specimens were described only on the basis of female worms and were placed under the subfamily Acuariinae Raillet, Henery and Sisof, 1912 as they showed two simple lateral lips, cylindrical pharynx, divided oesophagus, a short vagina and no lateral cuticular flanges. They in their observations presumably accepted the helmet like structure (Collar of Khera) at the most anterior end homologous with the cordons or epaulets, encouraged by the view of Baylis, 1926.

Johnson and khera (1966) and Sahay (1966) considered *Notopteroides notopteri* a synonym of *Pseudoproleptus*. Sahay and Prasad (1993) considered that the homology of helmet like structure and cordons of Baylis is questionable unless embryological testimony of these structures are confirmed along with their biochemical studies.

The author agrees with Johnson and Khera (1966) and Sahay (1966) in considering *Notopteroides notopteri* a synonym of *Pseudoproleptus*. Author further agrees in considering the homology of helmet like structure is questionable as suggested by Sahay and Prasad (1993).

Majumdar (1965) added *Notopteroides alatae* recovered from a fresh water fish *Mastacembelus armatus* (Lacep) from Kolkata. Johnson and Khera (1966) having placed *Notopteroides* in synonymy with *Pseudoproleptus* transferred *Notopteroides* to the genus as *Pseudoproleptus* (new comb. *Pseudoproleptus alatae*) Majumdar, 1965. Apparently unaware of Johnson and Khera's paper (1966) Sahay et al. (1970) transferred *Notopteroides alatae* to *Pseudoproleptus* as *Pseudoproleptus alatae*. However later in their paper, in violation of the rules of Zoological

nomenclature, Sahay et al. renamed *Pseudoproleptus armati*. Singh (1970) whose paper preceded Sahay et al. in the same journal this species issue also used the name *P. alatae* for this species.

Margolis (1975) in his review, referred the characteristic features of *P. alatus* as absence of spicules, presence of only three pairs of preanal papillae in the male, the presence of cervical alae and condition of viviparity. Present author is also in agreement with Margolis to consider *P. alatus* as an independent species because the genus *Notopteroides* under which Majumdar originally described his species has oviparous forms and spicules were present, opined also by Gupta and Massodi (1986).

Sahay (1966) added another species *Pseudoproleptus satendri* from *Notopterus notopterus* in which he observed collar, vestibule and oesophagus divided into two distinct parts, possession of cervical and caudal alae. The name *P. satendri* has been emended by Margolis (1975) as *P. satendrai* because "satendri" is an incorrect latinization in accordance with the International Code of Zoological Nomenclature (Article-31 and Appendix-D-III). Johnson and Khera (1966) did not include *P. satendrai* in the key proposed by them possibly on account of the clash of the publication year.

Singh (1970) reported *Pseudoproleptus satendrai* from a new host *Notopterus schitala* (Ham.) from Ranchi lake. Singh pointed out certain differences from the original species of *Pseudoproleptus satendrai* such as the length of the glandular oesophagus in both sexes, position of vulva, length of the tail in the female, ratio of the spicules, size of the eggs and arrangement of caudal papillae in male. Margolis (1975) interpreted that very slight differences exist between the two accounts of *P. satendrai* and it is even closer to the other nominal Indian species of *Pseudoproleptus* except *P. alatus*.

The occurrence of *Pseudoproleptus* outside India has been documented by various authors namely Le-van Hoa and Lien- Huong (1969) and Khalil

(1973). Le-van Hoa and Lien-Huong described *Pseudoproleptuslamyi* from *Notopteruschitala* (Ham.) in Viet-Nam differentiating it from *P. vestibules* Khera(1953), *P. notopteri* Chakarvarty and Majumdar (1962) and *P. alatusmajumdar* (1965). They did not include *Metabronemanotoptrii* (Karve and Naik, 1951) and *Pseudoproleptussatendrai* Sahay (1966) in their comparisons. Margolis (1975) considered *P. lamyi* similar to all nominal Indian species of the genus except *Pseudoproleptusalatus* in having longer oesophagus, particularly the glandular region. The other unique character that Margolis observed was the existence of a pair of cuticular teeth like structure on each of the mouth in *P. lamyi*. The larger size, arrangement of caudal papillae on male tail, the size and shape of the spicules, larger sized eggs distinguish it from all the species described but Margolis did not agree with all of the distinguishing characters. Khalil (1973) described *Pseudoproleptu safricanus* from *Mormyrops* sp. Zaire.

Gupta and Bakshi (1984) added two more species to the existing list namely *Pseudoproleptusgomtii* recovered from *Notopterusnotopterus* (Pallas) from Lucknow and *Pseudoproleptus macrognathus* from *Macrognathusacculeatum* (Lacep) from Dehradun. They considered *P. satendrai* Sahay (1966) to be synonym of *P. notopteri* Chakarvarty and Majumdar (1962).

Gupta and Masoodi (1986) added *Pseudoproleptus sprenti* from *Notopteruschitala* from Chilkalake, Puri, Odisha, India. Gupta and Jaiswal (1988) while describing two additional species viz. *Pseudoproleptus mastacembeli* and *Pseudoproleptus fotedari* from the intestine of *Mastacembelusarmatus* (Lacep.) and *Xenentodoncancila* (Ham.) respectively from Lucknow , gave key to all the valid species except *P. satendrai* and *P. africanus*. Gupta and Naiyer (1992) added *P. thapari* from *Notopterusnotopterus* (Pallas) from Lucknow.

Margolis (1975) in his review did not agree with the synonymization of *Pseudoproleptus* and *Collarinematriglae* described by Sey (1970) from

a marine fish *Triglalyra* and the transference of *Metabronemanotopteri* Karve and Naik , 1951 to *Collarinema* as *Collarinemanotopteri*. Instead he preferred to keep *Metabronemanotopteri* under *Pseudoproleptus* and doubtful in the possibility of *Collarinema* with *Pseudoproleptus* and it will pend until comparison of an enface preparation of the type species of these two genera can be made. Gupta and Masoodi (1986) opposed Margolis view and considered *Collarinemato* be identical with *Pseudoproleptus* and assigned *C. triglae* as *P. triglae* on account of the similarity of cephalic region. Present author is in agreement with Margolis in leaving the synonymy until the original or type species will be studied thoroughly.

Further Margolis agreed with the synonymy of *Ascarophiscollaris* Petter, 1973 with *Collarinema*. If *Collarinema* loses its independent status in favour of *Pseudoproleptus* then *A. collaris* would become a member of the later genus but refrained to remove *A. collaris* from *Ascarophis* until relationship of *Pseudoproleptus* and *Collarinema* is clarified. The present author agrees with Gupta and Masoodi (1986) in with holding the view of synonymy of *Collarinema* and *Ascarophis* until the original literature on *Ascarophis* will be available to the author.

Certain larval *Pseudoproleptus* have been described by Maravec and Santos (2008). Moravec, Pachanawan and Kamcho (2016) redescribed *Pseudoproleptusnotopteri* (Karve and Naik,1951) from *Notopterusnotopterus* (Pallas) (Notoptridae: Osteoglossiformes) and added detailed structure of the cephalic end, the presence of bifurcate deirids and a ventral median caudal protuberance in male.

Present author has also added a new species under the genus *Pseudoproleptus* that is *Pseudoproleptusbhartii* differentiated from all the species of the genus on the basis of position of caudal papillae, absence of transverse cuticularisation in left spicule and spicule length ratio 1:4.2.

The present specimen differs from all species of the genus *Pseudoproleptus* Khera, 1955 except *P. sprengi* in having a spine on female tail. It further differs from *P. sprengi* in having four pairs preanal caudal papillae, one pair adanal and four pairs postanal papillae instead of four pairs preanal and five pairs postanal, absence of transverse cuticularisation in left spicule instead of its presence and further differs in possessing spicule length ratio 1:4.2 instead of 1: 2.8.

Considering all these differences it is justified to erect a new species with a specific name *Pseudoproleptusbhartii* sp. nov.

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