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Review of the genus *Pallisentis* (Acanthocephala: Quadrigyridae) with the erection of new species *Pallisentis lucknowensis* sp.nov. from the intestine of *Channa marulius* (Hamilton) and *Channa punctatus* (Bloch) (Channidae)

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Abstract

The genus Pallisentis is an endoparasitic acanthocephalan inhabiting the intestinal walls. Hooks and spines are significant taxonomical and adaptive tools in leading a parasitic life successfully. Pallisentis lucknowensis n. sp. is a freshwater fish parasite found from the intestine of two hosts i.e. Channa marulius and Channa punctatus inhabiting Gomti river. Present specimen is distinguished solely by the extension of trunk spines upto middle region of anterior testis, equal leminsci and having preequatorial anterior testis which proved to be a variable trait.

Key Words:- Acanthocephala, Quadrigyridae, Pallisentis, Channa

Introduction

Acanthocephalans are fish parasites of worldwide distribution, penetrate their thorny proboscis into the intestinal wall of host and absorb nutrients. No diagnostic tool is available except postmortem investigations and identification by parasitologists. The aim of present study is to explore and assign taxonomical status to *Pallisentis* species.

The genus *Pallisentis* was created by Van Cleave(1928) with the description of *Pallisentis umbellatus* Van Cleave (1928) as a type sp. The diagnostic morphological characteristic of the genus included number of proboscis hook, no. of rows of collar and trunk spines, distribution of trunk spines, position of testes and no. of giant nuclei of cement gland. Unfortunately with the addition of more sp. in the course of time these traits were observed to exhibit a lot of variability creating difficulty in the taxonomic evaluation. Amin et al (2000) revised the genus adding some stable morphological parameters like 6-12 proboscis hooks arranged in 4 circles each , two sets of trunk spines separated by a spineless region, single walled proboscis receptacle , syncytial cement gland as the distinctive features of the genus.

MATERIALS AND METHODS: Live specimens of the host fishes measuring 10-15 cm. in total length were examined for acanthocephalans. The fishes were procured from river Gomti, lucknow Uttar Pradesh, India. Freshly collected specimens were extended in water until proboscis everted, then fixed in 70 percent ethanol. Worms were punctured with a fine needle and subsequently stained in Mayer's acid carmine , destained in 4% hydrochloric acid in 70% ethanol, dehydrated in ascending concentration of ethanol and cleared in 100% xylene then mounted in Canada balsam. Measurements are in mcrometres. Drawings were made with the aid of camera lucida. Further specimens were fixed and processed for SEM following standard methods (Lee, 1992). These included critical point drying in sample baskets and mounting on SEM sample mounts(stubs) using conducive double-sided carbon tape. It was then sputter coated by a thin coating (100-150 Avogadro) of gold palladium alloy in a sputter-coater (Polaron SEM coating unit E 5000) using Argon gas. Specimens were then examined with a JEOL JSM- T330 Scanning electron microscope and microphotographs have been taken.

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DESCRIPTION: Body elongated, ,spinose with anterior end slightly curved. Males smaller than females. Proboscis globular, armed with four rows of recurved hooks. Each similar in shape but different in size. . Each circle having 10 hooks. Hooks of the first circle are stouter and largest than the rest of second circle slightly smaller than those of first ,of third circle much smaller than those of second circle and hooks of basal ring smallest. Each hook consists of recurved blade, a horizontally directed root, the handle, sunk in the proboscis wall and a posteriorly directed process the 'guard' embedded in the proboscis wall. Proboscis receptacle single layered muscular sac. A pair of long cylindrical, equal lemnisci projecting from the base of proboscis hang in trunk pseudocoel and terminate far from the upper margin of anterior testis in male . Body spination consist of collar spines and trunk spines. Collar spines or anterior girdle starts a little posterior to proboscis, arranged in 15 transverse circles in males & 14-16 in females. Trunk spines more widely separated than collar spines start after a non spiny area 0.14-0.16 in males & 0.16-0.18 in females. Trunk spines 19-23 in males & 25-28 in female. Trunk spines extend less than half the trunk region. In the trunk spination the intervals between each circlet in male is same whereas in female trunk spination become wider posteriorly and the number of spines decreases in both males and females until there are only one or two in the posterior terminal circles. Each spine consists of a proximal root like structure and distal spiny part.

Male: Body 5.36-5.89 long 0.23-0.28 wide. Proboscis 0.09-0.011long, 0.15-0.18 wide. Proboscis hooks of first circle 0.06-0.07 long, of second circle 0.05-0.06 long, of third circle 0.03 long and of fourth circle 0.02 long. Proboscis receptacle 0.75-0.81 long, 0.06-0.08 wide. Lemnisci equal, 1.03-1.09 long. Testes elongated cylindrical , subequal, overlapping, equatorial. Anterior testis larger than posterior testis 0.76-0.85 long, 0.16-0.18 wide. Posterior testis 0.69-0.71 long and 0.16-0.18 wide. Anterior testis 1.38-1.40 from anterior end and posterior testis 2.20-2.25 from posterior end. Cement gland elongated, syncytial overlapping posterior testis 0.89-0.93 long, 0.22-0.24 wide with 12 cement gland nuclei. Cement reservoir 0.28-0.32 long,0.19-0.22 wide opening by duct 0.50-0.55 long into bursa. Saefftigen's pouch ('Markbeutal' of Saefftigen's) elongated pyriform 0.57-0.61 long , 0.10-0.12 wide opening by a narrow tubular duct0.15-0.17 long which runs down and opens into bursaat a point where duct of cement reservoir open. Seminal vesicle 0.48-0.52 long, 0.10-0.12 wide. Bursa eversible, muscular 0.30-0.33 long, 0.15-0.16 wide.

Female: Body 7.12-9.52 long, 0.24-0.31 wide. Proboscis hooks of first circle 0.07-0.08, of second circle 0.06-0.07, of third circle 0.03-0.04 and of fourth circle 0.02-0.03 long. Proboscis receptacle 0.72-0.80 long. 0.16-0.18 wide. Body cavity filled with spherical or oval ovarian balls, 0.05-0.06 long, 0.02-0.03 wide. Uterine bell funnel shaped 0.20-0.25 long, 0.06-0.09 wide opening into uterus through uterine tube which consist of guard cells. Vagina muscular surrounded by sphincter muscles, 0.06-0.08 long, 0.03-0.04 wide. Genital pore terminal.

DISCUSSION: The present form is referred to the genus *Pallisentis* erected by Van Cleave 1928 with *Pallisentis umbellatus* as its type species. Tadross 1966 discussed the work of Golvan ,1959 who divided the genus *Pallisentis* into three subgenera based on the no. of hooks in each of the proboscis hook circles i.e. Farzandia Thapar 1931 with 4 circles of 10 hooks , *Neosentis* Van Cleave,1928 with 8 hooks per circle and *Pallisentis* van Cleave, 1928 with 6 hooks per circle. However due to inconsistency in the number of hooks per circle even within the same species ,this system was not accepted universally by different researchers of taxonomical field. Only the number of hooks can not be considered as the valid reason for the erection of subgenera so other characters such as size of the cement gland ,the no. of giant nuclei, difference in the size of proboscis hooks in subsequent circles, the shape and distribution of trunk spines and the presence and absence of Seafftigen's pouch were

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regarded to be more valid criteria to differentiate the subgenera. Author is in agreement with Amin et al.2000 in differentiation of subgenera according to above discussed criteria. They differentiated three subgenera i.e. *Demidueterospinus* Amin et al ,2000 with proboscis hooks in circle 2 about half long as hooks in circle 1, cement gland usually small with few giant nuclei; *Brevitritospinus* Amin et al,2000 with proboscis hooks in circle 3 about half as long as hooks in circle 2, cement gland usually small with few giant nuclei; *Pallisentis* Van Cleave 1928 sensu stricto with proboscis hooks gradually declining in size towards the posterior body, cement glands usually long with many giant nuclei. The characters of the present species falls under *Pallisentis* and is placed under this sub genus.

Genus *Pallisentis* comprises of the following valid species viz. *Pallisentis umbellatus* Van Cleave 1928; *Pallisentis gaboes* (Me Callum, 1918) Van Cleave,1928; *Pallisentis cleatus* (Van Cleave,1928) Harda 1935; *Pallisentis ophiocephali* (Thapar,1931) Bilquees,1976; *Pallisentis nagpurensis*(Bhalerao1931) Baylis 1933; *Pallisentis nandai* Sarkar,1953; *Pallisentis colisai* Sarkar,1956; *Pallisentis basiri* Farooqi,1958; *Pallisentis allahabadi* Agrawal,1958; *Pallisentis buckleyi* Tadros,1966; *Pallisentis pandei* Rai,1967; *Pallisentis magnum* Saeed and Bilquees,1971, Khan and Bilquees 1984; *Pallisentis clupei* Gupta and Gupta 1979; *Pallisentis fasciati, Pallisentis gomtii*, *Pallisentis cavassii* Gupta and Verma,1980; *Pallisentis kalrai* Khan and Bilquees,1985; *Pallisentis guptai*, *Pallisentis mehrai* Gupta and Fatma, 1985; *Pallisentis fotedari* Gupta and Sinha,1991; *Pallisentis rexus* Wongkham and Whitfield 1999; *Palliisentis channai* Gupta, Mauya and Saxena, 2015 and *Pallisentis paranandai* Amin et al 2021.

The present taxa differ from all the above mentioned species except *Pallisentis basiri, Pallisentis buckleyi, Pallisentis pandei,Pallisentis clupei ,P.cavasii, P. fasciati , P. gomtii, P. guptai , P. mehrai, P. fotedari and P. rexus* in the possession of well developed saefftigen's pouch. Further present taxa differ from *P. basiri* and *P. mehrai* in having 10 hooks in each circle of proboscis armature instead of 9 and 8 hooks respectively. Present taxa differ from *P. pandei* in not having outer egg shell instead of having a delicate irregularly shaped flattened and somewhat membranous outer shell with a filamentous structure at one pole ,from *P. clupei* and *P. fasciati* in having equal lemnisci instead of unequal and preequatorial anterior testis, equatorial posterior testis instead of both postequatorial , from *P. cavasii* in having long and anterior testis preequatorial and posterior testis equatorial instead of small and postequatorial , from *P. gomtii* and *P. guptai* in having equal lemnisci instead of unequal and in the extension of lemnsci upto anterior margin of anterior testis instead of far above the anterior testis. Further it differs from *P. fotedari* in having 15-16 rows of collar spines instead of 6-10 , anterior testis preequatorial and posterior testis equatorial instead of both the testis postequatorial, from *P. rexus* in having 10 hooks in each circle of proboscis , unequal distance between four rows of proboscis hooks instead of their equidistant position and 12 hooks in each circle.

The present form stand close to *P. buckleyi* in having elongated testis, equatorial posterior testis, long bursa, extension of lemnisci but differs from it in having equal lemnisci instead of subequal, extension of trunk spines upto middle region of anterior testis instead of upto anterior border of cement gland and in having preequatorial anterior testis instead of equatorial. All these differences are sufficient to create a new species with specific name *Pallisentis lucknowensis* sp. nov. after the name of locality.

Emended generic diagnosis of *Pallisentis:*

Trunk with a collar of spines arranged in 6-17 closely set rings near anterior extremity. Posterior to this collar of spines is an unspined region which is followed by 20-48 widely spaced rings of spines.

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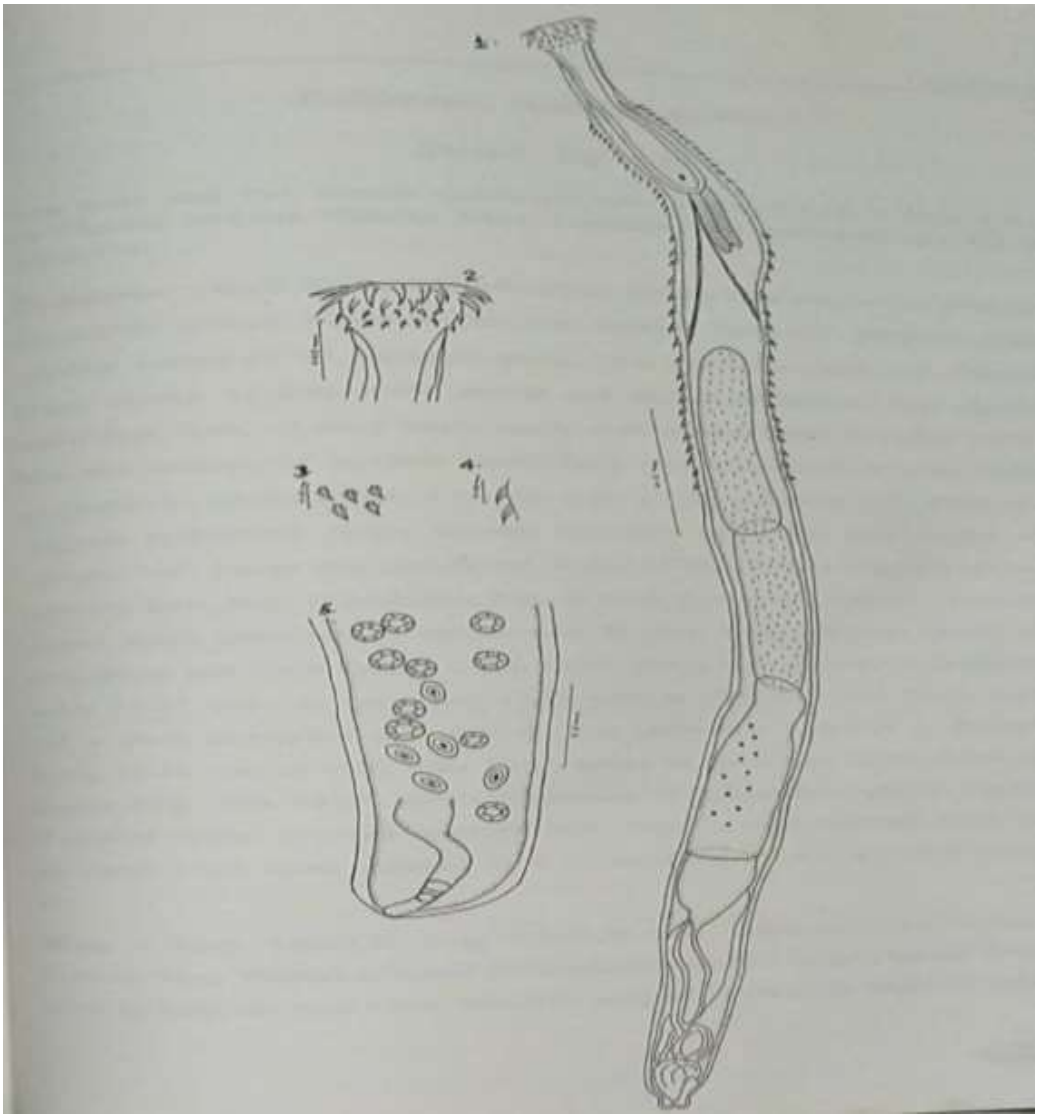
Proboscis short, cylindrical to globular, with four circles of 6-12 hooks each. Proboscis receptacle cylindrical to saccate, with single layered muscular walls, reaching to second spinose region when the proboscis is introverted , ganglion near base of proboscis receptacle. Lemnisci long, slender, cylindrical. Testes oval to cylindrical. Saefftigen's pouch ('Markbeutel' of Saefftigen's) present or absent, cement gland long, cylindrical, syncytial, containing a number of nuclei. Parasites of fresh water and marine fishes.

Pallisentis lucknowensis sp. nov.

Fig. 1-5

1. Entire body of male
2. Proboscis enlarged
3. Collar spines enlarged
4. Trunk spines enlarged
5. Posterior end of female



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