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Short Communication

Two New Species of the Genus *Pallisentis* Van Cleave, 1928 (Acanthocephala: Quadrigyridae) from the Intestine of *Channa punctatus* (Bloch, 1793) from the River Gomti at Lucknow, India

Rahul GUPTA [1], Ramakant MAURYA [2], *Anand Murari SAXENA [2]

1. *Amity Institute of Biotechnology, Amity University Uttar Pradesh, Lucknow-226028, India*
2. *Department of Zoology, University of Lucknow, Lucknow-226007, Uttar Pradesh, India*

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***Correspondence Email:**
anandmsaxena@rediffmail.com

Abstract

Background: 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 was to explore and assign taxonomical status to *Pallisentis* species prevalent in food fishes of river Gomti, Lucknow, India.

Methods: A survey of fishes of river Gomti was carried out during the year 2011-2013. Acanthocephalans recovered from the intestine of *Channa punctatus* were kept in refrigerator for eversion of proboscis, fixed in A.F.A. fixative (50% alcohol, formalin and acetic acid in ratio of 100: 6: 2.5) for 24 hours further preserved in 70% ethanol. Camera Lucida diagrams of acetoalum carmine stained permanent mounts were made for morphometric studies.

Results: Two new species of genus *Pallisentis* were identified and named as *P. channai* n. sp. and *P. vinodai* n. sp., their taxonomical status is based on major characters of proboscis hooks, spines of collar and trunk region, cement gland nuclei. On average 9 fishes were found infected with *Pallisentis* spp. out of 60 fishes examined randomly.

Conclusion: *Pallisentis* spp. are important parasitic infection in Channidae fishes with the prevalence rate of 15%. Two new species of *Pallisentis* recognized from *Channa punctatus* of river Gomti, Lucknow, India and diagnostic features of genus are given.

Introduction

Acanthocephalans are intestinal parasites of fishes, amphibians, birds, reptiles, and mammals. When a large number of parasites are found, cause occulation of the lumen of stomach and intestine, and even death of the fish host (1). Fishes infested with high intensity of Acanthocephalans deeply penetrating into their intestinal wall without showing pronounced symptoms of infection and its complications (2). At present limited knowledge is available about the acanthocephalans of fresh water fishes of the world. Earlier, H.J. Van Cleave created the genus *Pallisentis* with *P. umbellatus* as its type species from a fresh water fish from China (3). Accordingly, at present genus *Pallisentis* consists of the following known species viz., *P. allahabadii* (4), *P. basiri* (5), *P. buckleyi* (6), *P. clupei* (7), *P. colisai* (8), *P. guntei* (9), *P. guptai, P. mehrai* (10), *P. ophiocephali* (11,12), *P. nagpurensis* (13), *P. nandai* (14), *P. pandei* (15), *P. fotedari* (16), *P. jagani* (17), *P. garuai* (18, 19), *P. gomtii, P. fasciati*, *P. cavasii* (20), *P. croftoni, P. indica* (21), *P. vancleavei* (22) from freshwater and marine fishes of India. The genus *Pallisentis* was grouped under class Eoacanthocephala (23), order Gyracanthocephala (24), family Quadrigyridae (25) and subfamily Pallisentinae (26).

A survey the fresh water food fishes of river Gomti (Lucknow, India), infected with acanthocephalan parasites was carried out. During our study, we have found that Acanthocephalans are injurious group of parasites frequently found in the gut of freshwater Channidae fishes. In this paper, we have described two new species of genus *Pallisentis* recovered from the intestine of *Channa punctatus* (27).

Materials and Methods

Parasite collection

A survey of Channidae fishes of River Gomti at Lucknow region was carried out during the year 2011-2013. Fishes were captured from Kudiya Ghat and Nishatganj Pul, Lucknow with the help of local fishermen. Fishes were dissected and Acanthocephalan parasites were recovered from alimentary canal under stereoscopic dissecting microscope. On average 9 *Channa punctatus* fishes were found infected with *Pallisentis* out of 60 fishes examined randomly with the prevalence rate of 15%. Collected parasites were thoroughly washed with saline and kept in refrigerator for 5 minutes to facilitate complete eversion of the proboscis. Further, parasites kept over glass slides were flattened under slight pressure of cover glass, fixed in A.F.A. fixative (50% alcohol, formalin and acetic acid in ratio of 100: 6: 2.5) and after 24 hours preserved in glycerified 70% alcohol.

Morphometric study

Diagrams of permanent acetoalum carmine stained D.P.X. mounts were prepared under Camera Lucida. For correct count of Hooks and spines, parasites were observed under Phase Contrast Microscope (Olympus BX 51, Japan) and photographs were taken with camera-attached microscope (Nikon E200, Japan). Measurements of parasites were taken with the help of calibrated ocular micrometer. Voucher specimens kept in Depository of Department of Zoology, University of Lucknow. Assigned taxonomical status of acanthocephalan parasites is based on number and arrangement of proboscis hooks, spines of collar region, spines of trunk and number of cement gland nuclei. Taxonomical part of work was done with the help of "Handbook on Indian Acanthocephala" (28) and "Systema Helminthum Vol V Acanthocephala" (29) and other literature specified in this paper.

Results

Two new species of *Pallisentis* have been identified and described as follows:

Taxonomic summary

Host: Fresh water fish *Channa punctatus*; *Location:* Intestine; *Locality:* Kudiya Ghat, Lucknow (26°52'29.3"N 80°54'41.9"E); *Prevalence:* 20 Specimens from 04 hosts out of 25 examined; *Accession No.:* UGC/2011-2012/06. Description is based on Male specimens.

Description

Body 4.14mm long, 0.35mm wide. Proboscis large, globular, 0.18mm long, 0.21mm wide, armed with 4 circles of 10 fine recurved hooks, similar in shape but different in size. Hooks of first circle stouter and largest 0.16mm long and of basal row smallest 0.05mm long. Each hook consists of a recurved blade, a horizontally directed root, handle sunk in proboscis wall and posteriorly directed guard also embedded in proboscis wall. Neck longer, 0.26mm long. Proboscis receptacle sac like, single layered, 0.39mm long and 0.10mm wide. Lemnisci tubular, equal, longer than proboscis receptacle, Both Lemniscus are 0.42mm long and 0.03mm wide. Body consists of collar and trunk spines. Collar spines arranged in 16 transverse circles, each with 16 spines. Collar spines 0.03mm in size. Distance between non-spiny area situated between collar spine and a trunk spine is 0.11mm. Trunk spines start after a short non-spiny area having 21 circlets, each with 14-18 spines. Trunk spines 0.03mm in size.

Anterior testis 0.36 mm long, 0.15 mm wide. Posterior testis 0.32 mm long, 0.15 mm wide. Seminal vesicle 0.36mm long, 0.07 mm wide. Cement gland single, syncytial, cylindrical mass with 18 nuclei lying just behind testes, 0.34mm long, 0.14mm wide. Cement reservoir 0.28mm long, 0.11mm wide. From each testis a vas deferens runs down in close association with cement gland, cement reservoir, and joins bursa. Saefftigen's pouch elongated sac, 0.22mm long, 0.06mm wide, opening by a narrow tubular duct, which runs down in to bursa, where duct of cement reservoir open into it.

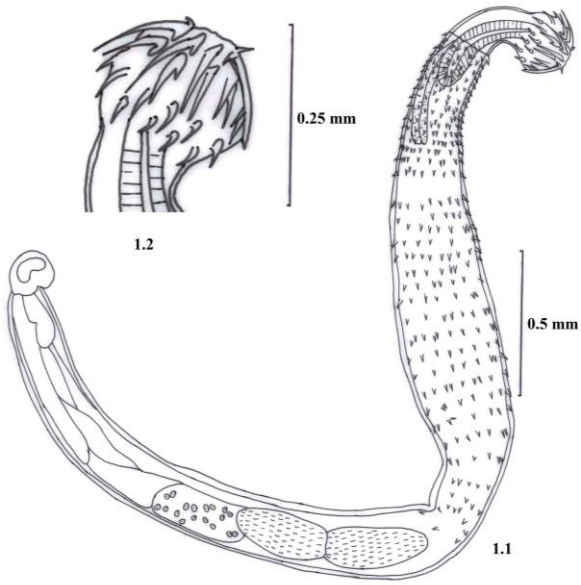

Fig. 1: *Pallisentis channai* n. sp.; 1.1 entire view of Male; 1.2 enlarged view of proboscis

Remarks

The present form is referred to the genus *Pallisentis* and differs from all the above mentioned forms except *P. allahabadii*, *P. buckleyi*, *P. colisai*, *P. guntei*, *P. mehrai*, *P. nagpurensis*, *P. pandei*, *P. fotedari* in having proboscis armed with 4 circles of hooks, each with 10 hooks. It further differs from all known species except *P. allahabadii*, *P. buckleyi*, *P. colisai*, *P. pandei* in having collar spines arranged in 16 closely set rings, each with 16 hooks.

It differs from all known species except *P. allahabadii*, *P. mehrai*, *P. pandei*, *P. jagani* in having trunk spines arranged in 21 circlets, each with 14-18 spines. It further differs from all known species of genus *Pallisentis* in having Cement gland synctial with strictly 18 nuclei.

All these differences are sufficient to create a new species with specific name *P. channai* n. sp. The new species is named on its host.

Taxonomic summary

Host: Fresh water fish *Channa punctatus*; *Location:* Intestine; *Locality:* Nishatganj Pul, Lucknow (26°51'46.8"N 80°57'21.8"E); *Prevalence:*

16 Specimens from 05 hosts out of 35 examined; *Accession No.:* UGC/2011-2012/07. Description is based on Male specimens.

Description

Body 4.15mm long, 0.38mm wide. Proboscis subglobular, 0.15mm long, 0.17mm wide, armed with 4 circles of 8 recurved hooks, similar in shape but different in size. Hooks of first circle stouter and largest, 0.110mm long and of basal row smallest 0.03mm long. Each hook consists of a recurved blade, a horizontally directed root, handle sunk in proboscis wall and posteriorly directed guard also embedded in proboscis wall. Neck longer 0.31mm long, 0.15mm wide. Proboscis receptacle sac like, single layered, 0.54mm long, 0.10mm wide. Lemnisci small, cylindrical, unequal, longer than proboscis receptacle, first one is 0.62mm long, 0.04mm wide and other one is 0.50mm long, 0.04mm wide.

Body spination consists of collar and trunk spines. Collar spines arranged in 14 transverse circles each with 16 spines. Collar spines were 0.03 mm in size. Distance between non-spiny area situated between collar spine and a trunk spine is 0.14mm. Trunk spines start after a short non-spiny area having 27 circlets each with 16-18 spines. Trunk spines were 0.040mm in size.

Anterior testis 0.49mm long, 0.18mm wide. Posterior testis 0.47mm long, 0.19mm wide. Seminal vesicle 0.41mm long, 0.12mm wide. Cement gland single, syncytial, cylindrical mass with 8 nuclei lying just behind testes, Cement gland 0.52mm long, 0.19mm wide. Cement reservoir 0.42mm long, 0.14mm wide. From each testis a vas deferens runs down in close association with cement gland, cement reservoir, and joins bursa. Saefftigen's pouch elongated sac, 0.18mm long, 0.05mm wide, open by a narrow tubular duct which runs down in to bursa, where duct of cement reservoir open into it.

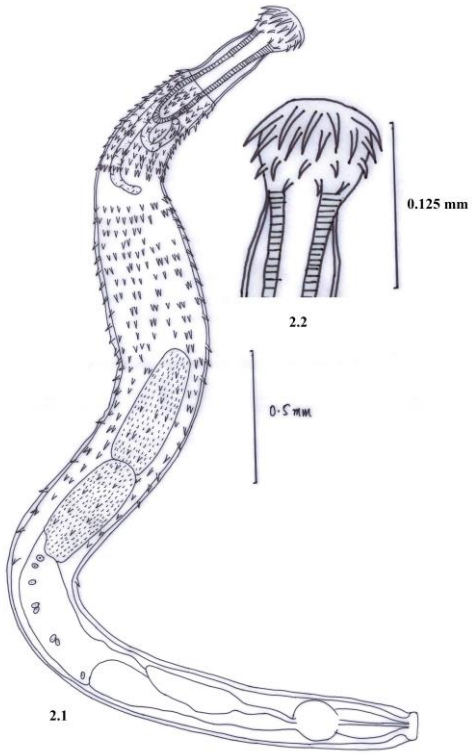

Fig. 2: *Pallisentis vinodai* n. sp.; 2.1 entire view of Male; 2.2 enlarged view of proboscis

Remarks

The present form is referred to the genus *Pallisentis* and differs from all the above-mentioned forms except *P. clupei*, *P. guntei*, *P. guptai*, *P. ophiocephali*, *P. nagpurensis* in having proboscis armed with 4 circles of hooks, each with 8 hooks. It further differs from all known species except *P. guptai*, *P. nagpurensis*, *P. pandei*, *P. garuai*, *P. vancleavei* in having collar spines arranged in 14 closely set rings, each with 16 hooks.

It differs from all known species except *P. buckleyi*, *P. pandei*, *P. vancleavei* in having trunk spines arranged in 27 circlets, each with 16-18 spines. It further differs from all known species of genus *Pallisentis* except *P. colisai*, *P. pandei* in having Cement gland synctial with strictly 8 nuclei.

All these differences are sufficient to create a new species with specific name *P. vinodai* n. sp. The new species is named in honour of Retd.

Prof. Vinoda Gupta, Helminthologist, Deptt. of Zoology, University of Lucknow for her significant contribution in taxonomy of Acanthocephala.

Discussion

In view of present study we have proposed following diagnostic key Characters of genus *Pallisentis* Van Cleave, 1928 (Synonyms *Neosentis* Van Cleave, 1928; *Farzandia* Thapar, 1931; *Saccosentis* Tadross, 1966; *Devendrosentis* Sahay et al., 1971). Trunk with a collar of spines arranged in 6-16 closely set rings near anterior extremity. Posterior to this an unspined zone is followed by 20-40 widely spaced rings of spines, remaining part devoid of spines. Proboscis short, cylindrical to globular, with 4 circles of 6-10 hooks each. Proboscis receptacle cylindrical to saccate, with single layered muscular walls reaching to second spinose region when proboscis is introverted; ganglion near base of proboscis receptacle. Lemnisci long, slender, cylindrical. Testes oval to cylindrical, contiguous. Cement gland long, cylindrical, syncytial, containing a number of nuclei. Usually parasites of fresh water fishes, occasionally found in marine fishes.

Conclusion

In this study, we have found *Pallisentis* spp. as injurious parasites of freshwater Channidae fishes with the prevalence rate of 15%. Two new species of acanthocephalan parasites namely, *Pallisentis channai* n. sp. and *Pallisentis vinodai* n. sp. have been identified and established from fish *Channa punctatus* of river Gomti, Lucknow, India.

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The authors declare that there is no conflict of interests.

References

1. Fatima H. Seasonal variation and histopathology of nematodes and Acanthocephalan of some edible fishes of Karachi coast. PhD Thesis, Department of Zoology, University of Karachi, Pakistan; 1988. p. 1-516.
2. Taraschewski H. Host-parasite interaction in Acanthocephala: a morphological approach. Adv Parasitol. 2000; 46:1-179.
3. Van Cleave HJ. Acanthocephala from China. I. New species and new genera from Chinese fishes. Parasitol. 1928; 20(1): 1-9.
4. Agarwal SC. A new species of the genus *Pallisentis* (Acanthocephala). Curr Sci. 1958; 27(3): 107.
5. Farooqi HU. A new species of the genus *Pallisentis* from a freshwater eel. Z Parasitk. 1958; 18: 457-464.
6. Tadross G. On three new acanthocephala of the genera *Pallisentis* Van Cleave, *Saccosentis* gen. nov. and *Acanthocephalus* Koelreuther, from fish. J Helminthol. 1966; 40(1-2): 155-180.
7. Gupta SP, Gupta RC. On six new Acanthocephalan parasites from marine fishes of Arabian sea at Quilon, Kerala. Indian J Helminthol. 1979; 31(2): 135-156.
8. Sarkar HL. On a new acanthocephalan *Pallisentis colisai* from the fish *Colisa fasciatus* with a note on *Acanthogyrus acanthogyrus* Thapar, from the fish *Labeo rohita*. Rec Indian Mus. 1956; 52(2): 349-362.
9. Sahay U, Nath A, Sinha A. On an Acanthocephalan from a hill stream fish *Lepidocephalicthys guntea* (Hamilton). Zool Anz. 1967; 178(5): 348-353.
10. Gupta V, Fatma S. On some Acanthocephalan parasites (Family Quadrigyridae Van Cleave, 1920) from fishes of Uttar Pradesh and Tamilnadu. Indian J Helminthol. 1985; 37(2): 149-180.
11. Thapar GS. On *Farzandia*, a new genus of Acanthocephalid worms, from the intestine of *Ophiocephalus marulius*. Ann Mag Nat Hist. 1930; Ser.10, 9: 76-81.
12. Baylis HA. On some parasitic worms from Java with remarks on the acanthocephalan ge-

nus *Pallisentis*. Ann Mag Nat Hist. 1933; Ser.10, 12: 559-573.
13. Bhalerao GD. On a new species of acanthocephalan from *Ophiocephalus striatus*. Ann Mag Nat Hist. 1931; Ser.10, 10: 569-573.
14. Sarkar HL. On a new acanthocephalan, *Pallisentis nandai* from the fish *Nandus nandus* with notes on the other species of the genus. Proc Zool Soc Bengal. 1953; 6(2): 139-147.
15. Rai P. On four acanthocephalan genera parasitic in freshwater fishes with description of three new species. Indian J Helminthol. 1967; 19(1): 27-44.
16. Gupta V, Sinha G. On a new Acanthocephalan parasite *Pallisentis fotedari* sp. nov. from the intestine of a marine fish *Clupea longiceps* Gunther, from Puri Coast. Indian J Helminthol. 1991; 43(1): 19-26.
17. Koul PL, Raina MK, Bambroo P, Koul U. *Pallisentis jagani* sp. nov. from *Channa channa* in Jammu. Indian J Helminthol. 1991; 43(2): 124-128.
18. Sahay U, Sinha A, Ghosh AK. On *Devendrosentis garuai* gen. et. sp. nov. (Neoechinorhynchidae Southwell et Macfie, 1925, Quadrigyridae Van Cleave, 1920), Acanthocephala from a fresh water Indian fish, *Clupisoma garuai* (Ham). Ann Parasitol Hum Comp. 1971; 46: 69-80.
19. Jain M, Gupta NK. On two already known species of the genus *Pallisentis* Van Cleave, 1928 (Acanthocephala) and discussion on the validity of *Pallisentis buckleyi* Tadross, 1966 and genus *Devendrosentis* Sahay et al., 1971. Helminthol. 1979; 16(3): 173-183.
20. Gupta SP, Verma SL. On three new Acanthocephalan parasites of the genus *Pallisentis* Van Cleave, 1928 from fresh water fishes of Lucknow. Helminthol. 1980; 17(4): 269-282.
21. Mital RP and Lal SS. Two new acanthocephalan worms *Pallisentis croftoni* n. sp. and *P. indicus* n. sp. (Family Pallisentidae) from fresh water fishes of the genus *Ophiocephalus*. Indian J Zool. 1981; 17: 165-175.
22. Saxena AM, Johri S. Systematic Study on a new species of *Pallisentis vancleavei*, from a marine fish *Psenes indicus* (Cuv. & Val.) Deegha, West Bengal. Proc ENPARACOHI; 2007. p. 81-83.
23. Van Cleave HJ. Expanding horizons in the recognition of a phylum. J Parasitol. 1948; 34(1): 1-20.
24. Van Cleave HJ. The recognition of a new order in the Acanthocephala. J Parasitol. 1936; 22(2): 202-206.
25. Van Cleave HJ. Notes on life cycle of two species of Acanthocephala from fresh water fishes. J Parasitol. 1920; 6(4): 167-172.
26. Amin OM. Biology of Acanthocephala: Classification, Cambridge University Press, Cambridge, U.K.; 1985.
27. Bloch ME. Naturgeschichte der Ausländischen Fische, Berlin. Naturg Ausl Fische. 1793; 7: 325-360.
28. Bhattacharya SB. Handbook on Indian Acanthocephala, Zoological Survey of India, Kolkata, India; 2007.
29. Yamaguti S. Systema Helminthum, Volume V, Acanthocephala, Interscience Publication, New York; 1971.