UTTAR PRADESH JOURNAL OF ZOOLOGY

42(19): 69-72, 2021
ISSN: 0256-971X (P)

METAZOAN PARASITES OF *Mystus cavasius* (HAMILTON) OF RIVER GOMTI WITH DESCRIPTION OF A NEW SPECIES OF ACANTHOCEPHALA *Raosentis cavasii* sp. nov.

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AUTHOR'S CONTRIBUTION

The sole author designed, analysed, interpreted and prepared the manuscript.

Article Information

Editor(s):
(1) Dr. Osama Anwer Saeed, University of Anbar, Iraq.
Reviewers:
(1) Emelio Barjau González, Universidad Autónoma de Baja California Sur, México.
(2) Kartikeya Tiwari, Management and Science University, Malaysia.

Received: 10 April 2021
Accepted: 16 June 2021
Published: 16 September 2021

Original Research Article

ABSTRACT

The growing awareness that biodiversity is a precious global asset to present and future generation and that species's survival and the integrity of habitats and ecosystems are at serious risk , has increased significantly the importance of biodiversity related research. Biodiversity can be defined as the variability among living organism from all sources, including terrestrial, marine and other aquatic ecosystem and the ecological complexes of which they are part; this includes diversity within species between species and of ecosystems.The diversity of life on earth is nearly unimaginable. There is such a wealth of organism that it's a continuous need to keep trace of the diversity and there is always a provision for the discovery of new ones as it is a well-known fact that changing environmental conditions, habitat food and other ecological factors are more than enough to bring out certain definite changes and the accumulation of small changes give rise to a new species. With covid-19 we have seen the damage the diseases can do not only to human health but also to the global economy.By protecting biodiversity in Earth's ecosystem, countries could save lives and money while helping to prevent future pandemics.

The present findings add one new species of an acanthocephalan parasite i.e. *Raosentis cavasii* from fresh water fish *Mystus cavasius*. It differs from *R. thapari* in presence of 20 rows of trunk spines instead of 9 rows, in having unequal lemnisci instead of being equal and in their extension upto proboscis receptacle and in the number of hypodermic nuclei 2-3 pairs dorsal and 1 ventral instead of 3 pairs on both sides.

Keywords: *Raosentis*; acanthocephala; *Mystus cavasius*; biodiversity.

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1. INTRODUCTION

Occurrence of disease conditions particularly due to parasites has become a major constraint in aquaculture [1]. Besides the direct losses caused by mortality, parasites have considerable impact on growth, resistance to other stressing factors, susceptibility to predation , marketability and pave way for secondary infection [2] Parasitic diseases spread by acanthocephalan parasites poses great threat in the culture and captive maintenance of fresh, marine and brackish water fishes. Acanthocephalans worms are identified by their retractable and invaginable proboscis. These are ivory coloured, unsegmented,cylindrical sac like worms measuring less than 1mm to over 1m. The acanthocephalans also known as spiny headed or thorny headed worms are necrotrophic worms that live as adults exclusively in the vertebrate's small intestine and exhibit an indirect life cycle, which utilizes an arthropod as intermediate host. Acanthocephala attach to the intestine of their host with their retractable and invaginable proboscis and the histopathological changes that occur in fish intestine is due to acanthocephalan parasites are depending to the depth of penetration of the proboscis. Acanthocephalans lack an alimentary canal and hence uptake of nutrients, derived both from leakage of host tissues and from dietary contents in the intestinal lumen of the host, is through the tegument. Hydrolytic enzyme activity at the tegumental surface probably assists in obtaining nutrients and in rapid penetration by the worm. Mucosal tissue is damaged at the attachment site, resulting in fibroplasia. Occasionally perforation of gut wall occurs. Destruction of intestinal villi, necrotic and degenerative changes in mucosal epithelium almost reduce the absorptive efficiency of the fish intestine. Extensive inflammation peritonitis due to perforation of the gut and systemic clinical changes occur in massive infection, most often in farmed fishes.(Bullock 1963; Baur 1959) so it become utmost requirement to identify different species of parasites to fix the problems created by these tiny parasites.

2. MATERIALS AND METHODS

In the survey of food fishes of river Gomti at Lucknow we have dissected out and examined a number of fishes for possible infection of acanthocephalan parasites. Fishes were identified with the help of keys given for fishes of U.P. by Gopal Ji Srivastava (2002). From the intestine of *Mystus cavasius* (Hamilton) recovered acanthocephalan parasites. Parasites were thoroughly washed and kept on ice to relax the parasite and facilitate complete eversion of their proboscis. Parasites were flattened on glass slide under slight pressure of coverglass and fixed in freshly prepared A.F.A. (ethanol,formalin and glacial acetic acid solution) for 24 hrs. For the permanent preparations parasites were hydrated in descending series of alcohol and after thorough washing in distil water , stained in acetoalum carmine , differentiated in acid water and dehydrated through ascending series of alcohol ,cleared in xylene and mounted in D.P.X. Camera Lucida diagrams of parasites were made under Light microscope. For accurate count of hook and spines Parasites were observed and photograph were taken with the help of Phase Contrast Microscope (Olympus BX51) Japan and Nikon Microscope (Eclipse E200) Japan. All measurements are given in mm. For revealing taxonomical status of parasites male specimens were considered and the number and arrangement of proboscis hooks, body spines and no. of cement gland nuclei are considered major key character. Taxonomical part of work was done with the help of Handbook on Indian Acanthocephala [3] and (Systema helminthum vol.V Acanthcephala) Yamagutti, [4].

3. DESCRIPTION

The Acanthocephalan are intestinal parasites of vertebrates which often cause severe damage to intestinal wall , and may even result in the death of the host.

The Acanthocephala were first distinguished from other intestinal worms in the late eighteenth century (Koelreuther, 1771). They have occupied an uncertain phylogenetic and systematic position for many years, having been included with the flat worms called "Intestinaux parenchymatoux" by Cuvier Now it is generally accepted that the Acanthocephala constitute a separate phylum. Over 1100 species [5] of the Acanthocephala have been described. More species occur in fishes than in birds and mammals, and a few species are found in amphibians and reptiles. Acanthocephalans require vertebrate animals for definitive hosts and arthropods for intermediate hosts. Isopods, amphipods, and ostracods are the usual intermediate hosts for aquatic species. Infection occurs when a definitive host consume the infective cystacanth stage contained in an arthropod or in a paratenic host. In some cases post cyclic transfer of adult worms from fish to fish can occur as a result of predation. Worms are typically recruited into fish populations during the spring, with maturation ,egg production and transmission to intermediate hosts in the summer and early autumn. Adult worms usually live about one season.

Acanthocephala of genus *Raosentis* (Datta 1928) are intestinal parasites of fresh water fishes. Subfamily

Pallisentinae of order Gyracanthocephala includes four genera namely *Acanthocentis* (Verma and Datta, 1929), *Acanthogyrus* (Thapar, 1927), *Pallisentis (*Van Cleave, 1928) and *Raosentis* [6]. The genus *Raosentis* was established by Datta [6] with *Raosentis podderi* as its type species from a fresh water fish *Mystus cavasius* from Kolkata. The genus *Raosentis* differs from all the above genus in having proboscis armed with anterior two circle of hooks longer than posterior two circle with hooks, less space between second and third circle of hooks. The present study deals with the description of *Raosentis cavasii* n. sp.

Body small fusiform, spindle shaped. Hypodermic nuclei small, 2-3 pairs dorsally and 1 ventrally placed. Lacunar vessels dorsal and ventral connected by transverse anastomoses. Proboscis slightly elongated with four circles of 6,6,8,8 hooks per row. Hooks of anterior two circles stouter and larger than posterior two circles, there is a free space of 0.015 devoid of spines between second and third circles of hooks. Proboscis receptacle single layered with ganglion at base. Lemnisci unequal and small in size. Trunk region bears rose thorn shaped hooks in 20 rows extending behind the proboscis receptacle upto the middle of posterior testis in males. Genital pore terminal.

Male: Body2.77-2.93 long, 0.46 -0.54 wide. Proboscis 0.12-0.14 long, 0.12-0.15 wide. Proboscis hooks of first circle 0.06-0.07 long, of second circle 0.04-0.05 long, of third and fourth circle 0.015-0.02 long. Proboscis receptacle 0.21-0.32 long. Testis spherical to ovoid, contiguous , overlapping and pre-equatorial. Anterior testis 0.46-0.52 long , 0.26-0.31 wide. Posterior testis either smaller or larger than the anterior testis. Smaller lemniscus 0.14-0.16 long and larger lemniscus 0.23-0.27 long. Cement gland oval in shape 0.49-0.58 long, 0.28-0.39 wide with 10 giant nuclei, opening into bursa through its narrow tubular duct. Cement gland reservoir spherical to pear shaped. Seminal vesicle pear shaped 0.35-0.42 long, 0.08-0.13 wide. Bursa muscular, bell shaped 0.47- 0.50 long, 0.13-0.16 wide.

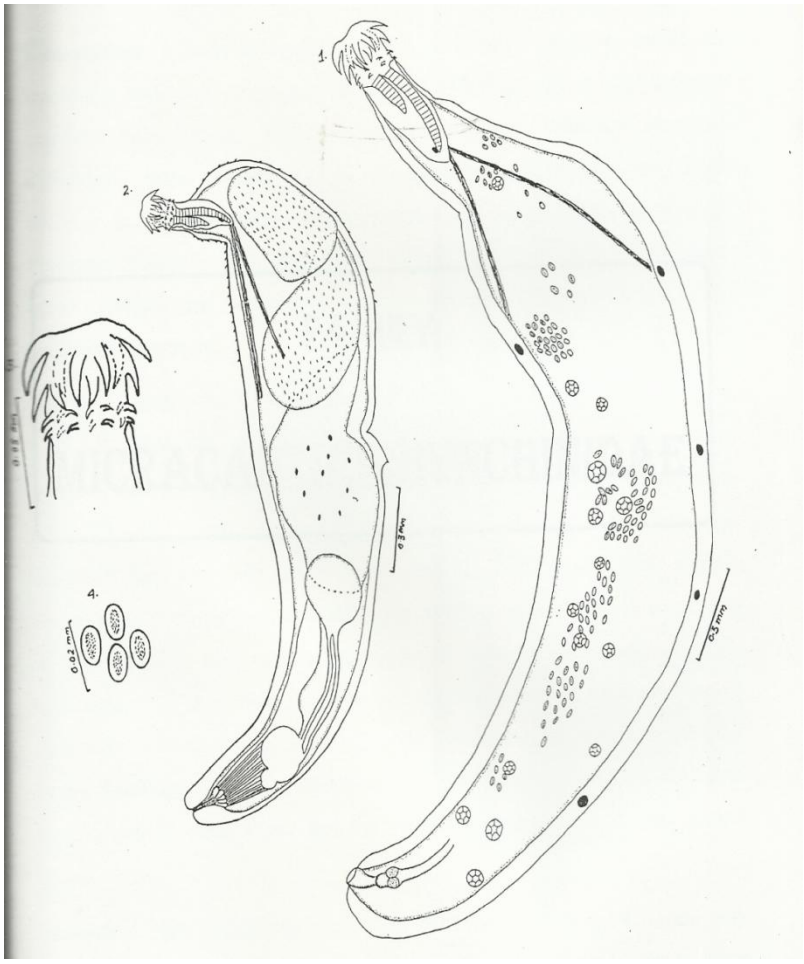

Fig. 1. Raosentis cavasii sp. nov A) Entire body of male B) Entire body of Female C) Proboscis enlarged D) Eggs

Female: Body 2.58-3.66 long, 0.39-0.43 wide. Proboscis hooks of first circle 0.065-0.07 long, of second circle 0.05-0.06 long and of the third and fourth circles 0.02-0.025. Proboscis receptacle 0.22-0.27 long, 0.09-0.10 wide. Smaller lemniscus 0.12-0.14 long, larger lemniscus 0.245-0.27 long. Uterine bell cylindrical, 1.6 long, 0.025 wide. Uterus with sphincters 0.06 long opening outside through terminal genital pore. The entire body cavity filled up with embroynated eggs and ovarian balls. Ovarian balls spherical 0.03-0.05 in diameter, eggs oval 0.025-0.03 long and 0.01-0.015 wide.

Host - *Mystus cavasius* (Hamilton)
Location - Intestine
Locality – Lucknow
Prevalence - 2 male and 2 female specimens from 2 hosts out of 123 examined.

4. DISCUSSION AND RESULTS

The present forms belong to the genus *Raosentis* erected by Datta, [6] with type species *Raosentis poddari* from a fresh water fish *Mystus cavasius* (Hamilton) from Calcutta. Two more species namely *Raosentis thapari* Rai, [7] *Raosentis dattai* Gupta and Fatma, [8], *Raosentis godaverensis* Vankara and Vijaylakshmi, [9]and *Raosentis lucknowensis* Saxena,Gupta,Johri & Ramakant, [10] have been added afterwards. Present form resembles to *Raosentis thapari* and *Raosentis dattai* in having 6,6,8,8 proboscis hooks in first, second, third and fourth circles respectively. It differs from *Raosentis poddari* in having 6,6,7,7 hooks in proboscis. It further differs from *Raosentis dattai* in having pre-equatorial testis instead of post-equatorial and in presence of hypodermal nuclei 2-3 pairs dorsal and 1 ventral instead of 4-5 pairs dorsal and 1-2 pairs ventral. The present form further differs from *Raosentis thapari* in presence of 20 rows of trunk spines instead of 9 rows in having unequal lemnisci instead of being equal and in their extension upto proboscis receptacle instead of much beyond it and in their number of hypodermic nuclei 2-3 pairs dorsal and 1 ventral instead of 3 pairs on both the sides.

Accordingly it is justified to create a new species with specific name *Raosentis cavasii sp.nov.* after the name of its host.

5. CONCLUSION

In the present study, new species has been identified on the basis of presence of 20 rows trunk spines, unequal lemnisci extending upto proboscis receptacle and number of hypodermic nuclei of which 2-3 pairs dorsal and one ventral differing from all the known species. This new species *Raosentis cavasii* added to animal kingdom strengthens the biodiversity and is useful in ground level study of acanthocephalan parasites found in fishes. This study also provides the information about host population ecology.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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