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A new ectoparasitic crustacean, *Argulus maharashtrians* sp. from Parbhani district (M.S)

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Abstract
The most common members of the Branchiura belong to the genus *Argulus*. It is an ectoparasite of the skin or gill of the fresh water fish species. In the present study, Catfishes (*Clarias batrachus* and *Wallago attu*) were taken from Masooli Reservoir with different symptoms or clinical signs such as abnormal swimming, poor growth and death, were examined for ectoparasites. It causes pathological changes due to direct tissue damage and secondary infections. The male and female *Argulus* parasites collected from the skin and fins of fish and one male specimen is identified as *Argulus maharashtrians* sp.

Keywords: crustacean new parasite, catfishes, Masooli reservoir, Parbhani district (M.S)

Introduction
Member of Branchiura are commonly known fish louse, which have a dorsoventrally compressed body with circular to oval shield like Carapace, anteriorly a pair of compound eye, four pair of swimming legs on the thorax and a short unsegmented abdomen posteriorly. Branchiura are generally ranges from few mm to centimeter, and adult female larger than male. A pair of suction cup which are modified part of first maxillae are present in late juvenile and adult stages, in the member of genera *Argulus, Chonopeltis* and *Dipterous.*
At present in fish more than one hundred fifty known species of Argulus have worldwide distribution (Kabata, 1985), which causes *Argulosis* disease. They are small in size, ranges from 5 to 10 mm; animal body can be divided in three distinct parts: Cephalothorax, Thorax and Abdomen. The head is covered with Horse shoe shaped carapace, a pair of compound eyes, median nauplis eye, maxillipeds, preoral sting and basal gland. The thorax has four segments, each segment bearing a pair of swimming legs. The abdomen is a simple bilobed segment. Fish parasites can cause mortalities of fishes in culture operations. They attack fishes and destroy them or make wounds or disease on their flesh, thus making them unedible (Woo, 1999) [27]. Hence, in order to control fish diseases caused by the parasites, it is essential to study their taxonomy and morphology to identify them, their infestations, as well as their effect on hosts.

Materials and Method
During present investigation period randomly 35-40 catfishes *(Clarias batrachus, Wallago attu)* were collected from Masooli reservoir of Parbhani district with the help of local fisher man. The specimens were preserved in 4 % formalin and brought to the laboratory for the further study. The Crustacean parasites (Male and Female *Argulus)* have found on gill filament and skin surface respectively. Both parasites were carefully removed with the help of needle and soft brush under a low power binocular microscope. Both parasites were preserved in 5% formalin. Identification and Classification of Crustacean parasites were done with the help of "Parasitic Copepod and Branchiura of Fishes" by Yamagutti (1963).

Result
Argulus maharashtrians sp. nov.
Site: Body surface (Skin). Colour:
Pale/ Dirty white (preserved)
Host: Wallago attu
Locality: Parbhani District.
Etymology: The name refers to the state name of the locality, from where this new species has been recorded for the first time.

Material examined:
Holotype: Male
Total length: 5.40 mm, width: 3.41mm
Carapace length: 0.30mm, width: 3.41mm
Suckers diameter: 0.61mm
Proboscis length: 0.58mm, width: 0.47mm
Eyes length: 0.36mm, width: 0.28mm
Respiratory area length: 2.85mm, width: 0.67mm
Testes length: 1.05mm, width: 0.22mm
Length of abdominal lobe: 0.14mm, Width of abdominal lobe: 1.03mm

Diagnostic Features
Shape and size:-The present *Argulus* species is large in size, oval in shape, dorsoventrally flattened and measures 5.40mm in length and 3.41mm in width. Body consists of head, thorax and abdomen. Head and thorax covered by broad, elongated and flattened carapace.

Carapace: Carapace is oval in shape, longer than wide and covers almost the entire part of the body i.e. from head to the last thoracic segment and it measures 0.30mm in length and 3.41mm in width.

Respiratory area: Respiratory area consists of two large area of banana shaped, located on each lateral side of the thorax and near the edge of carapace. Respiratory areas possess a much thinner cuticle located near to the large blood sinus, which fascilates the diffusion of oxygen into the blood of an animal. Both respiratory areas cover almost half area of the thoracic region and it measures 2.85mm in length and 0.67mm in width.

Abdomen: Abdominal lobes are elongated, almost equal in size. Proximal end of abdominal lobes are united while distal end divided into two equal lobes and it measures 0.14mm in length and 1.03mm in width.

Antennae: A pair of antennae is smaller than antennules located beneath the antennules, dorsal to the compound eye and divided into four podomers. First podomer large in size and stout than the other three and consists of a backwardly directed short, thick spine. The last podomer is short and pointed with one spine. Second and third podomers are moderate in size and rectangular in shape.

Eyes: The compound eyes are located at the base of antenna; somewhat kidney shaped and bears uneven sized 16 plates around both the eyes. The compound eye measures 0.36mm in length and 0.28mm in width.

Proboscis ad Suckers: Proboscis situated posterior to style. When animal is not feeding than proboscis rests in the middle groove but during feeding activities it extended away from the body so that penetrate in the host skin. The proboscis measures 0.58mm in length and 0.47mm in width.

Maxilliped: Pair of maxilliped is large in size, stout, located just posterior to both the suckers. It consists of five podomers. First or basal podomer (Coxa) is somewhat smaller in size, very stout, bearing three elongated spines at its distal end and one thick, large spine at anterolateral margin. Second podomer is larger and stouter than the other podomers and it measures 0.79mm in length and 0.54mm in width. The third podomer is smaller and triangular in shape and measures 0.23mm in length and 0.26mm in maximum width. The fourth podomer is rectangular in shape, somewhat larger than third podomer and measures 0.19mm in length and 0.312mm in width. Fifth podomer is almost oval in shape and measures 0.33mm in length and 0.28mm in width.

Testes: Testes are elongated and it covers almost half area of the abdominal lobe and it measures 1.05mm in length and 0.22mm in width.

Thoracic legs: Four pairs of biramous thoracic legs (swimming legs) present on the ventral surface of thorax. They are stout and well developed and divided into 2-3 podomers with fine distal ends. The length and size of thoracic leg gradually decreases from first to last leg. First, second and third thoracic legs divided into three podomers. First and second pair of thoracic legs bears flagellum basipod.

Fig A: Dorsal view

Fig B: Ventral view

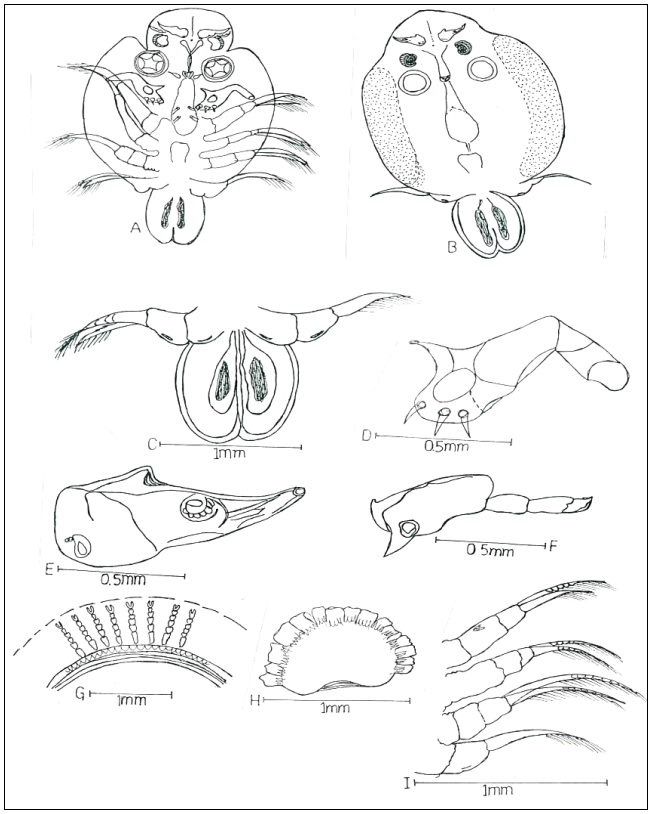

Fig C: *Line Diagram of Argulus maharashtrians. sp.*

A-Dorsal view

B- Ventral view

C- Abdomen

D-Maxilliped

E-Antennule

F-Antenna

G-Part of sucker showing imbricate plates

H-Compound eye

I-Thoracic legs

Scale:- 0.5mm and 1mm

Fig C: Line diagram of *Argulus maharashtrians.sp*

Discussion

Recently in 2009 Everts, L and Avent-Oldwageort (Department of Zoology University of Johansberg, South Africa) published a list of 28 species of *Argulus* in Malaysia (Applied Biology, 2009) with their host name and location; of these 09 species from India.

Over the last century lot of literature has been published on *Argulus*, but very little work have been published on its taxonomy. Whatever the work published regarding the taxonomy it is very scanty, incomplete and there is no recent review of the subject. Therefore it is very difficult to compare the present species with previously described species. Present species first time reported from Maharashtra, However it is described in detail and compared with previously described species.

By comparing the body shape of present *Argulus* with the previously described species, it is found that the body is large in size, oval in shape and dorsoventrally flattened. Regarding the shape and size it shows similarities with *A. foliaces* (Lin, 1758), but differ in other species as it is narrow in *A. sindhensis* (Muller, 1785), anterolateral depressed and elongated in *A. personatus* (Cunnington, 1913) and the author Thorell, 1866 not mentioned it in *A. coregoni.*

When we compare the carapace, it is found that the carapace of the present species is oval in shape, longer than wide and covers almost the entire part of the body and it shows somewhat similarities with *A. sindhensis* (Muller, 1785) and differ in other previously described species that is as broad as long and carapace lobes extend to anterior mid line of 3rd pair of swimming legs in *A. personatus* (Cunnington, 1913); it is like as wide convex scutum in case of *A. foliaces* (Lin, 1758) and in *A. coregoni* (Threoll, 1866), the carapace has a band of sharp triangular scales along the outer edge and it tapers towards the abdomen on either side.

By comparing the respiratory area with other previously described species of *Argulus*, it is found that in the present species, the respiratory areas are large in size, banana shaped and located at each lateral side of the thorax, near the edge of carapace and these cover almost half area of the thoracic region. Regarding the location of respiratory area, it shows somewhat similarities with all previously described species but there is dissimilarities in shape as it is long, narrow, slightly curved and clubbed shaped in *A. sindhensis* (Muller, 1785), unequal in *A. foliaces* (Lin, 1758) and one is roughly ovular and other is larger kidney bean shaped in *A. coregoni* (Thorell, 1866).

By comparing the abdomen, it is found that the abdominal lobes of the present *Argulus* are elongated, almost equal in size. Proximal end are united while distal end divided into two equal lobes. Testes are elongated and it covers almost half area of the abdominal lobes. It shows somewhat similarities with *A. sindhensis* (Muller, 1785) and *A. personatus* (Cunnington, 1913), while it is different in *A. foliaces* (Lin, 1758) as itsurosomes having rounded lobes which covered marginally with small spines and posterior incisures of urosomedonot reach into center. Author Thorell, 1866 has not mentioned about abdominal lobes in *A. coregoni.*

When we compare the antennules of present *Argulus* with previously described species, it is found that pair of antennules is large, situated above the antennae and compound eye and divided into three podomeres. Regarding the location it shows similarities with other described species. But regarding the division of the podomere it shows similarities with only *A. coregoni* (Thorell, 1866) and differ in other species as two segmented in *A. sindhensis* (Muller, 1785), having four podomeres in *A. personatus* (Cunnington, 1913) and author Lin, 1758 has not mention in *A. foliaces.*

By comparing the antenna, it is found that the pair of antenna is smaller than antennules located beneath the antennules,

dorsal to the compound eye and divided into four podomeres. Regarding the division of podomeres it shows similarities with *A. sindhensis* (Muller, 1758) and *A. personatus* (Cunnington, 1913), while antenna is divisible into six podomeres in *A. coregoni* (Thorell, 1866) and it is not clearly mentioned by author in *A. foliaces* (Lin, 1758).

By comparing eyes, it is found that the compound eyes are located at the base of antenna; somewhat kidney shaped and bears uneven sized 16 plates around both the eyes. Regarding location of eyes, it shows similarities with other described species but differ in shape and plates of eyes which are not mentioned in other described species.

When we compare proboscis and style of present *Argulus*, it is found that the proboscis situated anterior to style and style located on the mid line of head just anterior to proboscis in present species, which shows similarities with other described species.

After comparing suckers (first maxilla), it is found that in present *Argulus*, the suckers are rounded in shape, located above maxilliped, consist of 4-5 imbricate vertical plates, of these basal plate is large in size and other diminished. Regarding location it shows similarities with other described species but differ in number of imbricate plates as 5-6 in *A. sindhensis* (Muller, 1785), 8-10 in *A. personatus* (Cunnington, 1913) and the number of imbricate plates is not mentioned in *A. foliaces* (Lin, 1758).

By comparing maxilliped, it is found that the pair of maxilliped is large, stout, located just posterior to suckers and consists of five podomeres, which shows similarities with all other described species.

By comparing the thoracic legs, it is found that four pairs of biramous thoracic legs are present on the ventral surface of the thorax of present *Argulus* species. They are well developed, stout and divided into 2-3 podomeres with fine distal ends. Regarding the number they shows similarities with all other previously described species but either biramous or uniramous not mentioned in *A. sindhensis* (Muller, 1785) and *A. coregoni* (Thorell, 1866).

After going through the comparative study, the present *Argulus maharashtrians* (n.sp.) is similar with other described species in only one or two characters, but maximum morphological characters are differ than other species. Therefore these characters are enough to create a new species as *Argulus maharashtrians* (n.sp).

During present study the morphological characters of females *Argulus* and the comparative chart of both the species was also recorded separately and it is too lengthy to tabulate here.

Conclusion

The present investigation will provide the basic data which could be useful in further studies to know about the new species of *Argulus* parasites of freshwater catfishes and It may be concluded that the most preferable sites of *Argulus* in festation were at the base of pectoral, pelvic and anal fin but this new species of *Argulus* was found all over the body surface of the host fish.

References

1. Abu El-Wafa SAD. Protozoa parasites of some freshwater fishes in Behera Governorate. M.V. Sc. Thesis, Alexandria University, 1988.
2. Ahmed A, Ali SMK, Samad A. Probable cause of fish ulcer in Bangladesh. Nutr. News. 1991; 14(1):3.
3. Akhter M, DSilva J, Khatun A. Helminth Parasites of *Anabas testudineus* (Bloch.) in Bangladesh. Bangl. J Zool. 1997; 25:135-138.
4. Banu ANH, Hossain MA, Khan MH. Investigation into the occurrence of parasites in carps, catfish and tilapia. Progr. Agric. 1993; 4:11-16.
5. Bhuiyan AS, Akther S, Musa GM. Occurrence of parasites in Labeorohita (Hamilton) from Rajshahi. Univ. J. Zool. 2007; 26:31-34.
6. Chandra KJ, Islam KZ, Wootten R. Some aspects of association and development of *Lytocestusindicus moghe* in catfish, Clariasbatrachus in Bangladesh. J Fish. Res. 1997; 1:31-38.
7. Ebrahimzadeh Mousavi HA, Behtash F, Rostami Bashman M, Mirzargar SS, Shayan P, Rahmatiholasoo H. Study of Argulus spp. infestation rate in Goldfish, *Carassius auratus* (Linnaeus, 1758) in Iran. Human and Veterinary Medicine. International Journal of the Bioflux Society. 2011; 3(3):198-204.
8. Farhaduzzaman AM, Alam MM, Hossain M, Hussain MA, Rahman MH. Prevalence of parasites in the Indian major carp, Labeorohita (Hamilton) in Rajshahi, Bangladesh. Univ. J Zool. Rajshahi. Univ. 2010; 28:65-68. http://dx.doi.org/10.3329/ujzru.v28i0.5290Hakalahti T, Lankine
9. Hakalahti T, Valtonen ET. Population structure and recruitment of the ectoparasite *Argulus coregoni* Thorell (Crustacea: Branchiura) on a fish farm. Parasitology. 2003; 127:79-85.
10. Hanson SK, Hill JE, Watson CA, Yanong RP, Endris R. Evaluation of emamectin benzoate for the control of experimentally induced infestations of Argulus sp. in goldfish and koi carp. Journal of Aquatic Animal Health. 2011; 23(1):30-34.
11. Hossain MA, Banu ANH, Khan MH. Prevalence of ectoparasite in carp nursery operation of greater Mymensingh. Progr. Agric. 1994; 5:3944.
12. Khan S, Ali W, Javid M, Ullah I, Hussain G, Shahnaz Z *et al*. Prevalence of Argulusin Common Carp (*Cyprinus carpio*) From D.I. Khan (Khyber Pakhtunkhwa) Pakistan. Journal of Entomology and Zoology Studies. 2017; 5(1):203-205.
13. Lester RJG, Roubal FR. Phylum Arthropoda. In P.T.K. Woo [ed], Fish Diseases and Disorders, Volume 1: Protozoan and Metazoan Infections. CAB International, Wallingford, U.K, 1995, 475-598.
14. Mikheev VN, Valtonen ET, Rintamäki-Kinnunen P. Host searching in *Argulus foliaceus* L. (Crustacea: Branchiura): the role of vision and selectivity. Parasitology. 1998; 116:425-430.
15. Mofasshalin MS, Bashar MA, Alam MM, Alam GM, Moumita D, Mazlan AG *et al*. Parasites of three Indian minor carps of Rajshahi, Bangladesh. Asian. J. Anim. Vet. Adv. 2012; 7(7):613-620. http://dx.doi.org/10.3923/ajava.2012.613.620
16. Mortuza GM, Al Misned FA. Prevalence of ectoparasites in carp fry and fingerlings of Rajshahi district, Bangladesh. J Parasit. Dis. 2013. DOI 10.1007/s12639-013-0296-3. http://dx.doi.org/10.1007/s12639013-0296-3
17. Pasternak A, Mikheev V, Valtonen ET. Growth and development of *Argulus coregoni* (Crustacea: Branchiura) on salmonid and cyprinid hosts. Dis Aquat Org. 2004; 58:203-207.

18. Rahman MR, Akter MA, Hossain MD. Parasitic diseases of exotic carp in Bangladesh. J Agric. Rural. Dev. 2007; 5(1-2):127-134.
19. Ruane NM, Nolan DT, Rotllant J, Tort L, Balm PHM, Wendelaar Bonga SE. Modulation of the response of rainbow trout *Oncorhynchus mykiss* (Walbaum) to confinement, by an ectoparasitic (*Argulus foliaceus* L.) infestation and cortisol feeding. Fish Physiology and Biochemistry. 1999; 20:43-51.
20. Saha M, Bandyopadhyay PK. First report of three species of Argulus (Crustacea: Branchiura) infesting on red-can Oranda gold fish (*Carassius auratus* Auratus) in India. Biolife. 2015; 3(4):813-819. doi:10.17812/blj.2015.3411.
21. Shimura S. Seasonal occurrence, sex ratio and site preference of *Argulus coregoni* Thorell (Crustacea: Branchiura) parasitic on cultured freshwater salmonids in Japan. Parasitology. 1983; 86:537-552.
22. Shimura S. Seasonal occurrence, sex ratio and site preference of *Argulus coregoni* Thorell (Crustacea: Branchiura) parasitic on cultured freshwater salmonids in Japan. Parasitology. 1983; 86:537-552. Singhal
23. Tak IR, Dar SA, Chishti MZ, Kaur H, Hamid Dar G. Parasites of some fishes (Labeorohita and Schizothoraxniger) of Jammu and Kashmir in India. International Journal of Fisheries and Aquaculture. 2014; 6(9):104-107.
24. Tavares-Dias M, Ruas de Moraes F, Onaka EM, Rezende PCB. Changes in blood parameters of hybrid tambacu fish parasitized by Dolopscarvalhoi (Crustacea: Branchiura), a fish louse. Veterinarskiarhiv. 2007; 77(4):355-363.
25. Taylor NGH, Sommerville C, Wootten R. The epidemiology of Argulus spp. (Crustacea: Brachiura) infections in Stillwater trout fisheries. J Fish Dis. 2006; 29:193-200.
26. Tokşen E. *Argulus foliaceus* (Crustacea: Branchiura) Infestation on Oscar, Astronotus ocellatus (Cuvier, 1829) and Its Treatment. E.U. Journal of Fisheries and Aquatic Sciences. 2006; 23(1-2):177-179.
27. Woo PTK. Fish diseases and disorders. Protozoan and metazoan infections. CABI Publishing, 1999; 1:808.
28. Woo PTK, Buchmann K. Fish Parasites: Pathobiology and Protection. CABI, UK, 2012, 400.