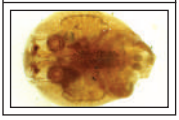
Chapter 17



CRUSTACEA : BRANCHIURA : ARGULIDAE (FISHLICE)

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ABSTRACT

Argulids are a group of primarily freshwater parasitic crustaceans commonly known as 'carp-lice' or 'fish lice' and are ectoparasites of fishes primarily but occasionally live on amphibians or invertebrates. The Family Argulidaea comprises four genera namely *Argulus, Dipteropeltis, Chonopeltis, Dolops*. Out of these four genera only the genus *Argulus* is represented by 17 species and one sub species in India of which 14 species and one sub species are freshwater inhabitants. Among the17 species and one sub species of Indian Argulids and 10 species and one subspecies are exclusively available only in India.

Keywords: Argulidae, Argulus, Branchiura, Freshwater, India

INTRODUCTION

The (sub) class Branchiura is a group of primarily freshwater parasitic crustaceans commonly known as 'carp-lice' or 'fish lice' and are primarily ectoparasites of fishes but occasionally live on amphibians or invertebrates, and they can move about freely on their hosts (Poly, 2008, Moller, 2015, Dev Roy, 2015). They are obligate parasites and utilize many different fish hosts from a wide range of families, e.g. carps, sticklebacks, perch, roach, and even predators such as pike (Moller, 2015). They occasionally increase in number and cause fish mortality in aquaculture operations, aquaria of ornamental fishes and rarely in wild populations (Nandi and Das, 1991, Dev Roy, 2015, Saha, 2016). The subclass Branchiura contains a single family, the Argulidae, and four valid genera namely *Argulus* Müller, *Chonopeltis* Thiele, *Dipteropeltis* Calman, and *Dolops*. According to Worms the genus *Argulus* is represented by 127 species, the genus *Chonopeltis* is having 15 species, *Dipteropeltis* is represented by only 2 species and the *Dolops* with 13 species at global level. Among the four genera of Branchiura only the genus *Argulus* was reported from India with 18 species of which 15 species were from freshwater fishes.

Review of literature

The first report of Indian Branchiura of was made by Southwell (1915) who reported *Argulus foliaceous* from the skin of *Labio rohita* in Bengal Fisheries. Later Hora (1943) also reported this species from the then Bengal. Ramakrishna (1951) described *A. bengalensis* from West Bengal, *A. giganteus* from Andhra Pradesh

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and a variety of *A. siamensis* namely *A. siamensis peninsularis*. From Madhya Pradesh, Malaviya (1955, 1958) reported *A. siamensis peninsularis*. *A.indicus.* Again Ramakrishna (1959) added *A. puthanvaliensis* from Kerala. From Bangalore Sundari Bai (1973) reported *A. siamensis,* where as Sreenivasan (1976) reported *A. japonicas* from Tamilnadu. *A. boli* and *A.parsi* were described by Tripathi (1975) from river Son at Dehri-on-son and river Hoogly near Kolkata. Simultaneously Thomas and Devaraj (1975) described *A. cauveriensis* from River Cauvery. From Tamilnadu, Devaraj and Hamsa (1977) described *A. quadristriatus* as new species. Natarajan (1982) added a new species *A. mangalorensis* from Karnataka. Omprakasam and Manohar (1992) described *A. krishnangiriensis* from Indian major carps the exact locality is not known but the species name is not available in the World Register of Marine species. For the first time from Punjab, Brar and Battish (1993) reported the occurrence of *A. bengalensis, A. indicus, A. monadi, A. schoutedeni and A. siamensis*. Mallick *et al.* (2010) noticed the occurrence of *Argulus* sp. on Indian Snow Trouts in a subtropical Himalayan Lake of Bhimtal, Uttarakhand. Dev Roy (2015) provided a synaptic list of Indian Argulids. Saha and Bandyopadhyay (2015) observed the infection of three species of *Argulus* namely *A. coregoni, A. japonicas*, and *A. foliaceus* infecting Oranda gold fish (*Carassius auratus auratus*) in West Bengal and affecting their marketing value.

Diversity, Distribution and Endemism

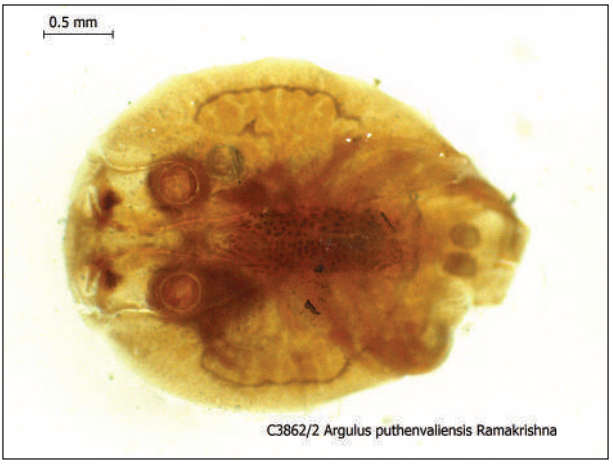
The Branchiurans contain four genera. The genus *Dipteropeltis* contains two valid species and occurs in South America; *Chonopeltis* has 15 valid species and is found only in Africa; and *Dolops,* with 14 valid species, has a Gondwanan distribution (South America, Africa, and Tasmania; Fryer 1969; Poly, 2009; Worms, 2017). The genus *Argulus* contains about 129 valid species and occurs on or around all continents, except Antarctica, in marine, estuarine, and freshwater habitats and nearly 85 species are reported from freshwater (Poly, 2009). Out of the four genera of Branchiurans only the genus *Argulus* is represented by 17 species and one sub species in India of which 14 species and one sub species are freshwater inhabitants. Among the17 species and one sub species of Indian Argulids and 10 species and one subspecies are exclusively available only in India (Dev Roy, 2015).

LIST OF SPECIES AVAILABLE IN INDIA

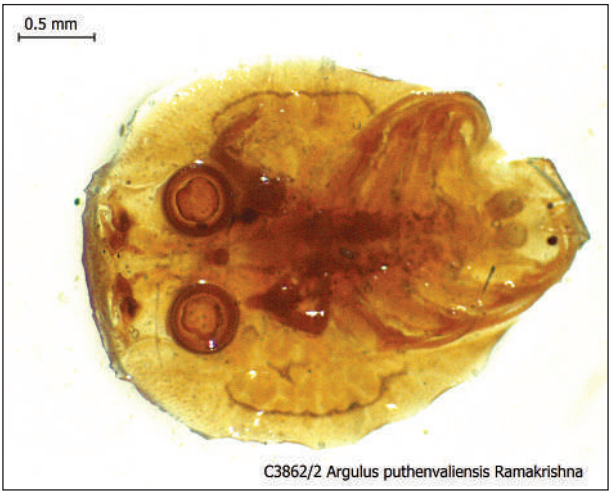
1. *Argulus bengalensis* Ramakrishna, 1951*
2. *Argulus boli* Tripathi, 1975*
3. *Argulus cauveriensis* Thomas and Devaraj, 1975*
4. *Argulus coregoni* Thorell, 1865
5. *Argulus fluviatilis* Thomas & Devaraj, 1975*
6. *Argulus foliaceus* (Linnaeus, 1758)
7. *Argulus indicus* Weber, 1892
8. *Argulus japonicas* Thiele, 1900
9. *Argulus krishnagiriensis* Omprakasam and Manohar, 1992*
10. *Argulus mangalorensis* Natarajan, 1982 (Back Water)*

11. *Argulus monodi* Fryer, 1959
12. *Argulus parsi* Tripathi*
13. *Argulus puthenveliensis* Ramakrishna, 1959*
14. *Argulus quadristriatus* Devaraj & Ameer Hamsa, 1977 (Marine)*
15. *Argulus schoutedeni* Monod, 1928
16. *Argulus siamensis* Wilson C.B., 1926
17. *Argulus siamensis peninsularis* Ramakrishna, 1951*
18. *Argulus vittatus* (Rafinesque-Schmaltz, 1814) (Marine)*

(Source: Modified and updated after Dev Roy, 2015; *species available only in India)



Dorsal



Ventral

Argulus puthenveliensis Ramakrishna, 1959 (Dorsal and Ventral view)

Significance

Argulids are obligate ectoparasites of fishes, unlike other aquatic parasites, they retain the ability to swim freely throughout the whole of their life and quickly increase in number, their uncontrolled proliferation leads to a disease called argulosis. The *Argulus*-infected fish have reduced feeding, reduced growth rate and behavioral changes, a significantly reduced growth rate, and loss of physical condition makes them susceptible to stress and secondary infection (Mikheev *et al.*, 2015; Saha *et al*., 2015, De Zoysa, 2017). As these ectoparasites repeatedly change their hosts and inflict skin damage, they can act as vectors for fish pathogens (Mikheev *et al.*, 2015). They are known to affect both wild and cultured fishes and cause fish mortality which leads to the economic loss in fishery industries. Hora, (1943) noticed the infection of fish louse *Argulus foliaceous* causing the heavy mortality among carp fisheries of Bengal. Prabavathy and Sreenivasan (1976) reported the occurrence of *Argulus japonicus* in brood fish ponds in Tamil Nadu. Nandi and Das (1991) observed the juvenile mortality in some fishes at Kakdwip, West Bengal due to argulosis. Both modern and indigenous techniques are used to control these fish pathogens.

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REFERENCES

Brar, M. and Battish, S.K. 1993. Systematics and bioecology of parasitic branchiura and copepod of fishes of India (Supervisor S.K. Battish) Indiabiodiversity.

Devaraj M and Ameer Hamsa K.M.S. 1977. A new species of *Argulus* (Branchiura) from a marine fish *Psammoperca waigiensis* (Cuvier), *Crustaceana*, **32**(2): 129-134.

Dev Roy MK. 2015. A Synoptic list of Argulids (Crustacea: Branchiura: Argulidae) of India. *J. Environ & Sociobiol.,* **12**(2): 237-241.

De Zoysa M, Ryu1 S Y, Kim H.C and Park B.K. 2017. A Scanning Electron Microscopic Study of *Argulusjaponicus* (Crustacea: Branchiura) Isolated from Goldfish (*Carassius auratus*) in Korea. *Pakistan J. Zool., vol.,* **49**(2): 1-5, 2017. DOI: http://dx.doi.org/10.17582/journal.pjz/2017.49.2.sc3

Fryer, G. 1969. A new freshwater species of the genus *Dolops* (Crustacea: Branchiura) parasitic on a galaxiid fish of Tasmania—with comments on disjunct distribution patterns in the southern hemisphere. Australian Journal of Zoology, **17**: 49-64.

Hora, S.L.1943. The fish louse *Argulus foliaceous* Linn. Causing heavy mortality among carp fisheries of Bengal. *Proc. Indian Sci. Congr*., **39**: 66-67.

Malaviya, R.B.1955. Parasitism of *Ambasis ranga* H.B. by *Argulus simensis* susp. *peninsularis* Ramakrishna. *Curr. Sci.,* **24**(8): 275.

Malaviya, R.B. 1955. Parasitism of *Ophicephalus gachua* Hamilton by the copepod *Argulus indicus* Weber. *J. Bombay. Nat. Hist. Soc*., **55**(2): 370-371.

Mallick, S.K., Shah, N., Pandey, N.N., Haldar, R.S. and Pande, A. 2010. Occurrence of fish louse (*Argulus* sp.) on Indian Snow Trout (*Schizothorax richardsonii*) and Golden Mahseer (Tor putitora) in subtropical Himalayan lake of Bhimtal, Uttarakhand, India. *Indian J. Anim. Sci.,* **80**(11): 1150-1156.

Mikheev N, Pasternak A.F. and Valtonen E.T. 2015. Behavioural adaptations of argulid parasites (Crustacea: Branchiura) to major challenges in their life cycle. *Parasites & Vectors* (2015) **8**: 394. DOI 10.1186/s13071-015-1005-0.

Moller OS. 2015. Class Branchiura, Order Arguloida. *Revista IDE@* - SEA, nº **103B**: 1-8.

Nandi, N.C. and Das, S.R. 1991. Argulosis causing juvenile mortality in some fishes at Kakdwip, West Bengal. *Indian J. Fish*., **38**(2): 132-133.

Natarajan, P. 1982. A new species of *Argulus* Müller (Crustacea: Branchiura) with a note on the distribution of different species of *Argulus* in India. *Proc. Acad. Anim. Sci.,* **91**(4): 375-380.

Omprakasam, M and Manohar, L. 1992. Description of a new species of *Argulus* Müller (Crustacea: Branchiura) parasitic on Indian major carps. *Indian J. Parasitology,* **16**(2): 119-121.

Poly, W.J. 2009. Branchiura (Crustacea) of the Gulf of Mexico, Pp. 837-840 in Felder, D.L. and D.K. Camp (eds.), Gulf of Mexico–Origins, Waters, and Biota. Biodiversity. Texas A & M University Press, College Station, Texas.

Prabavathy, G and Sreenivasan, A. 1976. Occurrence of *Argulus japonicus* in brood fish ponds in Tamil Nadu. *J. Inland Fish Soc. India*, **8**: 131-133.

Ramakrishna, G. 1951. Notes on the Indian species of the genus *Argulus* Müller (Crustacea: Copepoda) parasitic on fishes. *Rec. Indian Mus.,* **49**(2): 207-216.

Ramakrishna, G. 1959. On a new species of *Argulus* Müller (Crustacea: Copepoda) from Kerala. *Proc. First All India Congr. Zool.,* 1959, pt. **2**: 178-179.

Sundari Bai, A. 1973. The occurrence of Branchiura parasite *Argulus* sp. (Arguloidea: Argulidae) on the carnivorus fish *Lebistes reticulatus* (Peters) in Mysore State. *Curr. Sci.,* **2**: 75-79.

Tripathy, Y.R. 1975. Studies on Branchiura from Indian fishes. *Dr. B. S. Chauhan commemoration Volume,* pp.117-127. Zoological Society of India Publication.

Thomas, M.M. 1962. Observations on the habits and post-embryonic development of a parasitic branchiuran *Argulus puthenveliensis* Ramakrishna. Journal of the Marine Biological Association of India (for 1961) **3**: 75-86.

Thomas, M.M. and Devaraj, M. 1975. Two new species of *Argulus* Müller (Crustacea: Branchiura) from River Cauvery with a key to Indian species. Indian J. Fish., **22**(1&2): 215-220.

Saha, M.M. and Bandyopadhyay P.K. 2015.First report of three species of *Argulus* (Crustacea: Branchiura) infesting on redcan Oranda gold fish (*Carassius auratus auratus*) in India. *Biolife*., **3**(4): 813-819.