

## Mollusca-The Bridge of Trematode life cycle

Dr. (Mrs.) Pallabi Devi, Dr.Mousumi Hazorika and Dr.Abhijit Deka

Assistant Professor,

Veterinary Clinical Complex, College of Veterinary Science,

Assam Agricultural University, Khanapara, Ghy-22

The Word “Mollusca” or “Mollusc” is derived from the latin word “Mollis”, meaning soft and refers to the soft body of the animals which is generally enclosed in a protective shell.All the molluscs possesses an unique structure called mantle, which envelops the internal organs.The principal function of the mantle is secretion of the protective shell in these forms which possess one.

Mollusca are one of the largest groups of invertebrates which comprises of more than 1,00,000 known species and an even greater number of fossil forms. Actually, molluscs evolved during the post- Cambrian time i.e. more than 600 million years ago. But the appreance of air breathing (Pulmonata) appeared in Carboniferous period of Upper-Paleozoic era.

Molluscs are capable of survival in both extreme cold and extreme hot condition. For example, *Vitrina* species of snail could continue to live even in ice when they are themselves frozen hard. Similarly the genus *Bullinus* could be found even at highest altitude of 16,000 ft above the sea level.It is also reported that at the desert of Algeria, where there is hardly any vegetation and the mid-day temperature is more than 100<sup>0</sup>F, the mollusc *Helix lacteal* can be seen in large number.

The first systemic study on molluscs begins with Aristotle, who described various kinds of cephalopods and gastropod in his famous, “Historia

Animalium”. Today the phylum “Mollusca” includes----

- (1) Gastropoda (snail,slugs)
- (2) Bivalves(Oyesters)
- (3) Scaphopod (Task Shell)
- (4) Cephalopod (Squid,Octopus)
- (5) Amphineurans
- (6) Chitons

Molluscs have always been a great social interest and also of economic importance because of Its use as food,as tool by the primitive men an as ornaments, money or religious icons. To the oil geologist and paleontologist, fossil molluscs is an index and one of the organisms most often used in carbon dating. They are an aid to the anthropologist in tracing the trade route of primitive people who fed on animals and used the shells as money. Shells are also of interest to collectors and are an important part of tourist trade in some sea shore.

The importance of molluscs and its medical, veterinary and economic role is the least worked out aspect of Indian malacology. The importance of mollusks in the life cycle of helminthes was established with the discovery of life cycle of *Fasciola hepatica* by Thomas and Leukert (1882) . From this work it has become a well-documented fact that, snail is the obligatory intermediate host of digenetic trematodes of man, animals and birds.

It is also obligatory in the life cycle of some nematodes like *Mullerious*, *Angiostrongylus* etc.

Trematode parasites are very selective in choosing their snail intermediate host. Even strain from different geographical locations exhibits differences in susceptibility for infection by trematode. Therefore, presence of susceptible snail host is a primary requirement for the establishment of a focus of snail borne infection in man animal and birds. Expansion of water filled areas, for example through introduction of irrigation, increases the habitat of the intermediate host and thus aggravate a preexisting moderate prevalence of the infection. On the other hand, filling of swampy and over flooded areas reduces the snail habitat and thereby reduces the prevalence of snail borne infection.

It has been observed that the trematodes may not be selective in choosing their definitive host but are very much selective in choosing their intermediate host, which is a snail, either water or terrestrial. If we look towards the life cycle of *Fasciola gigantica*, it has been observed that it can infect a wide range of host like sheep, goat, cattle, elephant, man and so on, but its intermediate host is only *Lymnaea auricularia var. rufescens*. No species other than this snail picks up the infection. Even strain of different geographical locations exhibits differences in susceptibility as repeated by number of workers.

By confirming the presence of the snail intermediate host in a locality one can very fairly judge the endemicity of a particular trematode disease in that area. For example India is endemic for largest number of animal schistosome. But in spite of favourable environmental condition for propagation of human schistosomiasis, India is considered to be free from the disease. The reason may be attributed to absence of its specific snail intermediate host. Hence without going into any methods of diagnosing trematodal parasitism in final host one can be sure about prevalent snail borne disease merely by observing snail

intermediate host, thus a nidus of the infection can also be identified.

It is pertinent to mention herein that as the adult trematode passes the eggs with its faeces, eventually the egg hatch and from each egg a free-swimming Miracidia emerges. These miracidia penetrate the integument of a suitable molluscan host and shed its ciliated epidermis and develop into a sporocyst. They migrate to the digestive gland and lodged in it. In the digestive gland of the snail, it eventually differentiated into another larval generation the redia. This redia becomes the final, tail bearing cercaria. Cercaria escapes from their molluscan host and become free swimming in search of their definitive host. In some cases, the cercaria never leaves their molluscan host and enters the next host only if the infected mollusce is ingested. Some cercaria get encysted in vegetation and form metacercaria, which upon ingestion along with the vegetation enters the host to initiate the infection. Depending upon the morphology the cercaria is catagorised into many classes. Some of them are given below

1. Monostome cercaria-possesses only one sucker- it gives rise to monostomate adult.
2. Amphistome cercaria-possesses acetabulum or posterior sucker at the posterior end of the body, along with oral sucker.
3. Gasterostome cercaria- It is limited to certain species of parasite in fish. It is characterized by the mouth being located not in the center of the anterior sucker but in the middle of the ventral sucker. Thus, in this case ventral sucker is the oral sucker.
4. Echinostome cercaria- This is actually specialized distome as the position of the suckers are comparable to those of distome. But distinctly there is a collar of large spines surrounding the oral sucker.
5. Furcocercus cercaria- it is characterized by a forked tail, some species may possess eye spot. Generally cercaria of schistosome related species bears this type of cercaria.



6. Distome-This is most common type of cercaria,it possesses oral sucker anteriorly and ventral sucker or acetabulum posteriorly.
7. Xiphidiocercaria- This type of cercaria possesses anteriorly an oral stylet in the anterior sucker
8. Longifurcate cercaria- These are the furcocercus cercaria having a longer bifurcated tail.Generally found in mammalian host
9. Bhavifurcate cercaria- These are the furcocercus cercaria having a shorter bifurcated tail.Generally found in avian host.

10. Pleurolophocercaria- This type of cercaria is characterized by dorsoventral finlike fold along the length of the tail.This type of cercariae are generally found in the superfamily Opisthorchidae

A lot of study has been carried out to know the prevalence of fresh water snail in Assam. In one such study a total of 17 different species could be recorded in and around greater Guwahati area. The location of their collection along with the name of the snail is tabulated below.

	Species of snail	Locality of collection ( in greater Guwahati)
1	<i>Bellamya bengalensis f.typica</i> (Lamarck)	Deepor beel,Silsako beel,ponds and tanks at khanapara,Sola beel,Rongagora beel,Hanhchora beel,ponds and paddy fields in Sonapur
2	<i>Bellamya bengalensis</i> (Lamarck)	
3	<i>Bellamya dissimilis</i> (Mueller)	
4	<i>Pila theobaldi</i> (Hanley)	
5	<i>Digoniostoma pulchella</i> (Benson)	Paddy fields in Khanapara and Sonapur,Silsako beel
6	<i>Brotia(Antimalania) costula</i> (Rafinesque)	Streams in Sonapur area
7	<i>Paludomus conica</i> (Gray)	
8	<i>Melanoides tuberculata</i> (Mueller)	Deepoe beel, Silsako beel,Hanhchora beel and paddy field in Sonapur area
9	<i>Lymnaea(Pseudosuccinea) acuminata</i> (Lamarck) f. <i>rufescens</i> (Gray)	Deepor beel, Silsako beel
10	<i>Lymnaea(P) acuminata</i> (Lamarck)f. <i>chlamys</i> (Benson)	Deepor beel
11	<i>Lymnaea (P) luteola f.ovalis</i> (Gray)	Deepor beel,Silsako beel,Sola beel,Hanhchora beel,Rongagorah beel,Ponds, tanks,roadside drains in khanapara and Sonapur area
12	<i>Lymnaea(Galba) andersoniana</i> (Nevill)	Ponds and tanks in Khanapara area
13	<i>Indoplanorbis exustus</i> (Deshyes)	Deepor beel,Silsako beel,Sola beel,Hanhchora beel,Rongagorah beel,Ponds, tanks,roadside drains in khanapara and Sonapur area
14	<i>Gyraulus convexiusculus</i> (Hutton)	Deepor beel,Silsako beel,Sola beel,Hanhchora beel, paddy field in khanapara and Sonapur area
15	<i>Segmentina trochoidea</i> (Benson)	Govt. livestock farm campus,Khanapara and Sola beel
16	<i>Physa acuta</i> (Draparnaud)	Instructional livestock farm campus,C.V.Sc Khanapara
17	<i>Lamellidens corrianus</i> (Lea)	Deepor beel, hanhchora beel

Different species of snail bears different cercarie. For example *Indoplanorbis exustus*

snail were found to bear amphistome ,echinostome,mammalian and avian furcocercus cercaria.(Rajkhowa et.al 1991)

Similarly Lymnaea species were found to be infected with furcocercus, Echinostome, gymnocephalus, amphistome and Xiphidocercaria. (Amrita et.al. 1997)

A study carried out in the water logged areas in and around greater Guwahati revealed the following result about the freshwater snails and the cercarial fauna borne by them.

Type of cercaria→	Monostome Cercaria	Amphistome cercaria	Distome cercaria	Xiphidocercaria	Echinostome Cercaria	Longifurcate cercaria	Cercaria cristata	Bravifurcate cercaria	Pleurophocercus cercaria
<i>Lymnaea luteola f. ovalis</i> (Gray)	+	+	-	+	+	-	-	-	-
<i>L. acuminata f. rufescens</i> (Gray)	+	-	+	-	-	-	-	-	-
<i>Indoplanorbis Exustus</i> (Deshayes)	-	+	-	-	+	-	+	+	-
<i>Gyraulus convexiusculus</i> (Hutton)	-	+	-	-	-	+	-	-	-
<i>Digoniostoma pulchella</i> (Benson)	-	-	-	+	-	-	-	-	+
<i>Melanoides tuberculata</i> (Muller)	+	-	-	-	-	-	-	-	-

Trematode parasites of livestock are one of the root causes of the heavy economic loss to the farmer in terms of health and production. For example, Fascioliosis, paramphistomiasis and Schistosomiasis causes a great halt in the health and production sector of livestock. It is therefore very much essential to control these parasites in order to check this loss. In order to control the trematodal infection to the livestock, bird and also human, It is essential to break the life cycle of the parasites, which can be achieved by controlling their snail intermediate host.

Present article is aimed just to give an idea about the role of the freshwater snails as a bridge in the life cycle of trematode infection which is a major concern to the livestock farmer. And a sure path to the control of the havoc by controlling the

snail fauna. There still lies a great area for study for the researcher to study in this matter.

### Reference

1. Thomas, A.P.W.; Leukert, R. (1882). The life history of the liver fluke (*Fasciola hepatica*). *Quart. J. Micr. Sci.*, 23:99-123.
2. Amrita, K.; Sharma, P.N.; Khatri, A. (1997) Survey of larval digeneans from snails of freshwater lake of Kailashpuri Udaipur. *J. Parasitol. Applied Animal Biol.*, 6(2):81-88
3. Rajkhowa, C.; Gogoi, A.R.; Borkakoty, M.R.; Sarma, P.C.; Das, M.R. (1997). Cercarial fauna and their pattern of seasonal liberation from *I. exustus* in Assam. *J. Vet. Parasitol.*, 5(1):49-52

4. Devi,P .(2001): Ecological and Biological Studies of some aquatic snails and their control-M.V.Sc. thesis submitted to the Assam Agricultural University,Khanapara, Ghy-22
5. Cheng.T.C.-General Parasitology (Second Edition)-Published by Elsevier Publication, 17-A/1, Main Road ,Lajpat Nagar-IV, New Delhi-110024,India