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# Caryophyllaeid cestode infestations in *Clarias batrachus* (Linn., 1758) in Mymensingh region

**M. S. Chhanda, K. J. Chandra and N. N. Laboni**
Department of Aquaculture, Bangladesh Agricultural University, Mymensingh -2202, Bangladesh
Email: kirtuniajchandra@yahoo.com

## Abstract

Investigation was conducted on seasonal infestations of caryophyllaeid cestodes in *Clarias batrachus* of Mymensingh from August 2010 to July 2011. Host fish were collected for examination from different sources of water bodies and fish markets of Mymensingh. Five different parasite species- *Djombangia peretrans*, *Lytocestus indicus*, *L. birmanicus*, *L. parvulus* and *Bovienia serialis* were recorded. Percent of infestations was 85.75 with 7.37 parasites per infested host. The prevalence was (100%) in December, April, June, August and September and the lowest (33%) in July. The maximum mean intensity (25.94) was found in December and the minimum (1.5) in May. The highest prevalence was observed in winter season and the lowest was in rainy season. Index of infection and abundance were the highest in winter and the lowest in rainy season.

**Keywords:** Infestations, Cestode parasite, *Clarias batrachus*

## Introduction

The fish disease obviously is having the highest practical significance for every fish culture programmed. Parasites can make the fish susceptible and finally cause disease and mortalities. As a result parasitological research is getting importance along with aquaculture practices. The walking catfish *Clarias batrachus* popularly known as Magur is a very highly demanded fish in Bangladesh. It is very expensive and liked by everybody for its delicacy and nutritive value. Clariid culture is rapidly increasing worldwide including Bangladesh. Unfortunately this fish is reported to be infested heavily by caryophyllaeid cestodes.

Caryophyllaeid cestodes in particular, are well known to produce certain adverse effects on their piscine hosts (Almacher, 1961). These include mechanical blockage of the gut lumen, production of lesions (Mackiewicz and Murhar 1972) and in the physiological state of the host thereby predisposing it to other infections (Agarwal, 1985). In heavy infestations the caryophyllaeid cestode, can cause obstruction in the intestine by mechanical means (Chandra, 1993).

Caryophyllaeids fulfill their life cycle using oligochaetes, polychaetes annelids of benthic nature. Through the feeding of these organisms *Clarias batrachus* and *Heteropneustes fossilis* accumulate their larval forms in the alimentary canal, which in course of time infests to host fishes. However, their infestations was reported variable in different sexes and seasons of the year (Chandra *et. al*., 1997). In view of culture programme of this important fish the seasonal variation of caryophyllaeid infestations is essential. Present work is therefore undertaken for detailed information about different species of parasites infesting the magur with their seasonal infestations.

## Material and Methods

The Magur, *C. batrachus* were collected for the study from different water bodies of Mymensingh. Investigation was conducted during August, 2010 to July, 2011. A total of 227 *C. batrachus* were examined for seasonal infestations of caryophyllaeid cestodes during the study period.

In the laboratory the fish were examined after opening the stomach and the intestine. Parasite were collected and fixed in F.A.A. Permanent slides were prepared staining in Borax carmine, dehydrated in alcohol grades, cleared in lactophenol and mounted in Canada balsam. The entire year was divided into four remarkable seasons, as winter (December-February), summer (March-May), rainy season (June-August) and autumn (September- November). Identification of parasites were done following Yamaguti (1959) and Hafeezullah (1993).

Infestations were analyzed after Margolis *et al.* (1982) as i) Prevalence (%) = Percent of infestation of a host species, ii) Mean intensity = Number of parasites per infested host, iii) Abundance = Number of parasites per examined host and

iv) Index of infection = $\frac{\text{No. of the parasites collected x No. of the infested hosts}}{\text{No. of the hosts examined}}$

## Results and Discussion

Among 227 examined fish 188 *C. batrachus* were infested with 1432 parasites of five different caryophyllaeid cestode species. The parasites were identified as *Djombangia penetrans* Bovien, 1926, *Lytocestus indicus* (Moghe, 1925), *Lytocestus birmanicus* Lynsdale, 1956, *Lytocestus parvulus* Furtado, 1963 and *Bovienia serialis* (Bovien) Fuhrmann, 1931. (Plate I, II).

**Description of collected parasites**

**(I) *Djombangia penetrans* Bovien, 1926 (Plate I, Figs. 1-2)**
The parasite was mainly found in the posterior part of stomach region of the host. Body milky white when freshly recovered from host, divisible into scolex, neck and flat trunk, posterior end broadly rounded. Neck narrow, distinctly separating scolex from trunk. Testes numerous rounded or ovoid larger than vitelline follicles. Vas deferens tubular, narrow coiled. Post ovarian set of vitelline follicles absent.

**(II) *Lytocestus indicus* (Moghe, 1925) (Plate I, Figs. 3-4)**
Body robust, elongated, flat. Scolex stumpy, bluntly rounded anteniorly, much narrower rest of body. Neck present, a constriction or very short and indistinct. Main body slightly tapering posterior with rounded end. Ovary
bilobed, wing-like in posteriorly part of the body.

**(III) *Lytocestus birmanicus* Lynsdale, 1956 (Plate I, Figs. 5-6)**
Body elongated flattened. Scolex globular, distinctly marked off from neck behind. Neck present, narrow long. Testes medullary, oval or spherical, extending from a short distinct behind anterior vitellaria to cirrus sac. Ovary wing-like, near posterior end of body. Uterus in a number of loose coils, glandular, extending up to cirrus sac. Post ovarian set of vitelline follicles absent.

**(IV) *Lytocestus parvulus* Furtado, 1963(Plate II, Figs. 1-2)**
Scolex undifferentiated, muscular, inflammed or not. Neck not clearly delimited from scolex or body; latter unsegmented, slightly fusiform, broadest at level of utero-vigianal orifice, internally differentiated into long vitellario-testicular region. Testes occupying almost entire medullary space in large part of worm. Cirrus sac large, vas deferens relatively long, fairly regularly coiled. Ovary follicular and H-shaped. Uterus greatly coiled, extending from near extremity to cirrus sac.

**(V) *Bovienia serialis* (Bovien) Fuhrmann, 1931(Plate II, Figs. 3-4)**
Body elongated, narrow, tapering anteriorly, posterior and pointed, scolex not distinctly demarcated from neck, unspecialised, not broader than body. Neck present, long, narrow. Testes ovoid or spherical extending from slightly behind anterior most vitellaria to coils of vas deferens, surrounded by a ring of inner longitudinal muscles. Ovary H-shaped, situated near posterior end of body. Post-ovarian vitelline follicles absent.

**PLATE I**

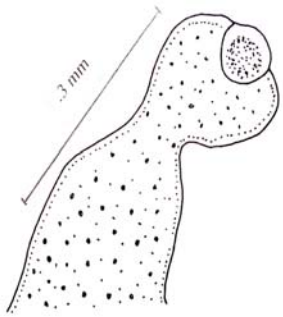



Fig. 1. Scolex of *Djombangia penetrans*

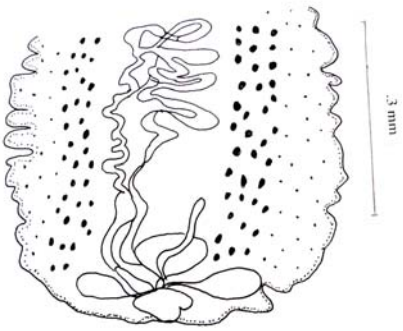



Fig. 2. Posterior part of *Djombangia penetrans*

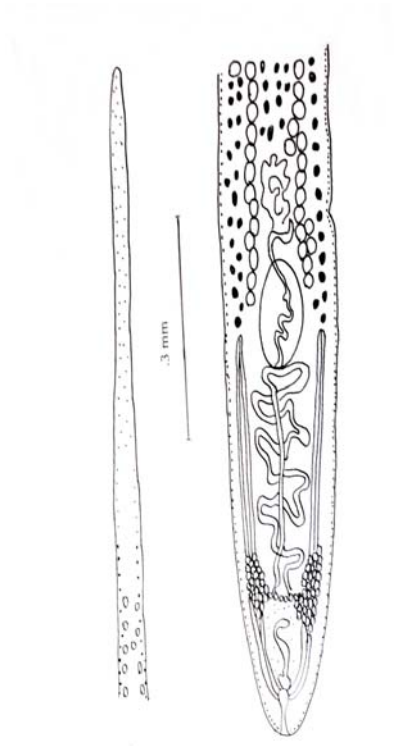
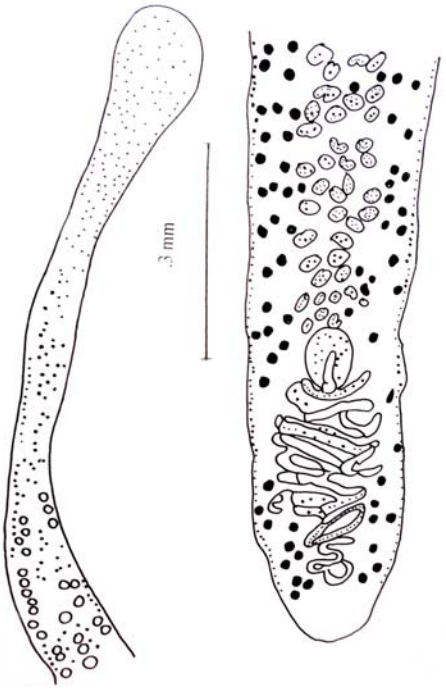



Fig. 3. Scolex of *Lytocestus indicus*

Fig. 4. Posterior part of *Lytocestus indicus*

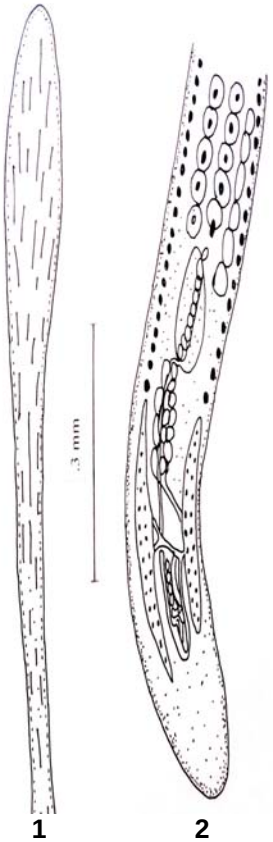



**5** **6**

Fig. 5. The elongated Scolex region of *Lytocestus birmanicus*

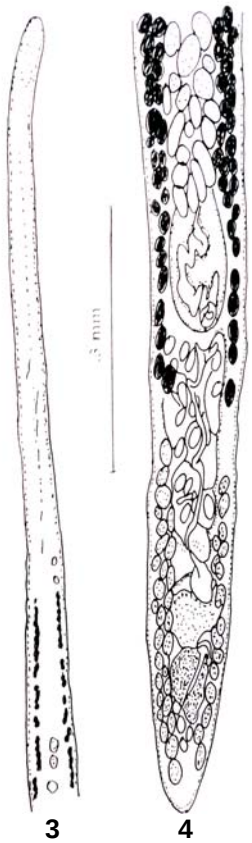
Fig. 6. Posterior part with female genitilia of *Lytocestus birmanicus*

**PLATE II**




**1** **2**

Fig. 1. Scolex region of *Lytocestus parvulus*
Fig. 2. Posterior end of *Lytocestus parvulus*




**3** **4**

Fig. 3. Scolex with neck region of *Bovienia serialis*
Fig. 4. Posterior extremity of *Bovienia serialis*

**Monthly infestations**

The nature of monthly infestations due to infection of caryophyllaeid parasites on to host is presented in Table 1. From where the average prevalence was found 85.75% and mean intensity was recorded 7.39. It was observed that maximum number of parasite could be collected from the host in December and minimum in May. Maximum number of parasites in a single infected fish was 151 in December and the lowest in October ( Fig. 1). The maximum prevalence (100%) was in the months of June, August and September. The prevalence was also (100%) in April and December. Though the minimum prevalence was in July 33%, appeared different from the rest month of the year. On the other hand the highest mean intensity was recorded in December (25.94) followed by November (10.83) and September (9.73). Prevalence though minimum in July intensity was higher (8.8). However lower level of intensity was recorded in October (1.56) and 1.50 in May. In case of monthly distribution the prevalence and intensity of infestation of *C. batrachus* also indicated that there were significant differences among different months after applying t-test at 5% level of significance.

**Seasonal infestations**

Seasonal variation of infestation is presented in Table 2. The overall infestations were higher in winter with the prevalence recorded 92% and mean intensity 13.2. Similarly, index of infestation and abundance were also higher in winter (Table 3). Though infestation was high in all seasons it was comparatively lower in rainy season. That means prevalence, index of infection and abundance were lower in rainy season

**Table 1. The infestations of caryphyllaeid cestodes in *C. batrachus* in different months during the period from August 2010 to July 2011**

| Months/Year | No. of host examined | No. of host infested | No. of parasites collected | Prevalence (%) | Mean intensity | SD |
|---|---|---|---|---|---|---|
| Aug. /10 | 10 | 10 | 21 | 100 | 2.1* | 0.316 |
| Sep. /10 | 12 | 12 | 117 | 100 | 9.75* | 0.866 |
| Oct. /10 | 15 | 9 | 14 | 60 | 1.56* | 1.130 |
| Nov. /10 | 20 | 18 | 195 | 90 | 10.83* | 2.572 |
| Dec. /10 | 16 | 16 | 415 | 100 | 25.94* | 34.740 |
| Jan. /11 | 24 | 22 | 146 | 91 | 6.64* | 4.510 |
| Feb. /11 | 20 | 17 | 90 | 85 | 5.29* | 2.643 |
| Mar. /11 | 20 | 19 | 75 | 95 | 3.95* | 2.460 |
| Apr. /11 | 20 | 20 | 138 | 100 | 6.9* | 2.552 |
| May. /11 | 20 | 15 | 23 | 75 | 1.5* | 0.516 |
| Jun. /11 | 20 | 20 | 110 | 100 | 5.5* | 1.539 |
| July. /11 | 30 | 10 | 88 | 33 | 8.8* | 2.530 |
| **Total** | **227** | **188** | **1432** | **85.75** | **7.39** | |

- significant at 5% level of probability

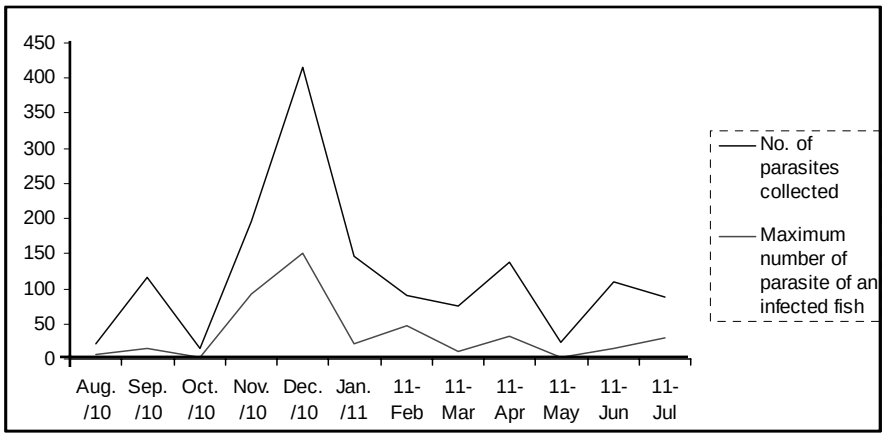



Fig. 1. Relationship of number of parasite collected and maximum number of parasite collected during different months of investigation

**Table 2. Prevalence(%) of caryphyllaeid cestodes in *C. batrachus* in different seasons during the period from August 2010 to July 2011**

| Sl. No. | Season | No. host examined | No. of host infested | No. of parasites collected | Prevalence (%) |
|---|---|---|---|---|---|
| 1. | **Summer** | 60 | 54 | 236 | 90 |
| 2. | **Rainy** | 60 | 40 | 219 | 67 |
| 3. | **Autumn** | 47 | 39 | 326 | 83 |
| 4. | **Winter** | 60 | 55 | 726 | 92 |

**Table 3. Mean intensity, index of infection and abundance of caryphyllaeid cestodes in *C. batrachus* in different seasons during the period from August 2010 to July 2011**

| Sl. No. | Season | Mean intensity | Index of infection | Abundance |
|---|---|---|---|---|
| 1. | **Summer** | 4.37* | 212.4 | 3.93 |
| 2. | **Rainy** | 5.48* | 146 | 3.65 |
| 3. | **Autumn** | 8.36* | 270.51 | 6.94 |
| 4. | **Winter** | 13.2* | 665.5 | 12.1 |

* significant at 5% level of probability

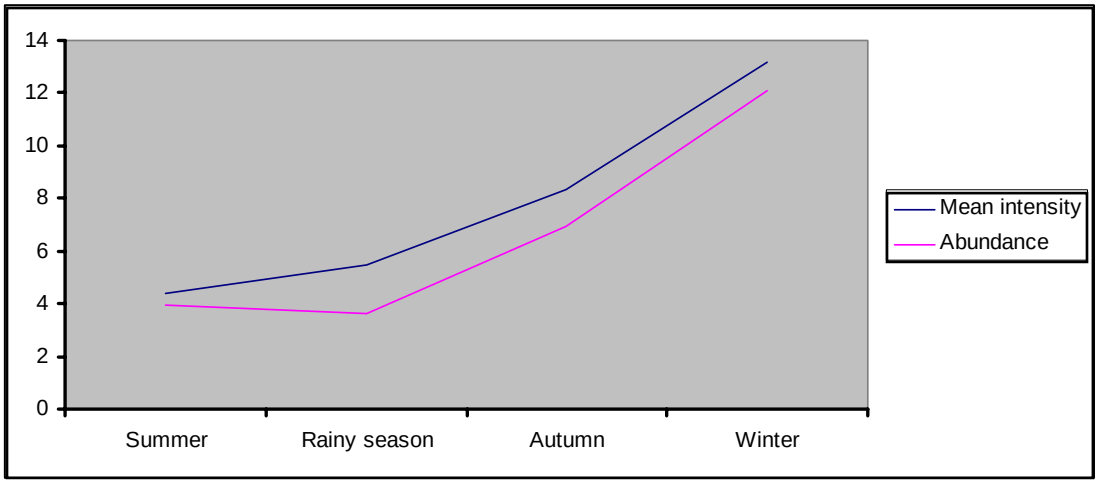



Fig. 2. Seasonal variation of mean intensity and abundance of parasite in *C. batrachus* during the period of investigation

(Tables 2, 3) where as intensity and abundance were lower in summer (Fig. 2)**.** By applying t-test the infestations in *C. batrachus* indicated significant differences among different seasons at 5% level of significance. Infestations of caryophyllaeids in *C. batrachus* was found throughout the year andwas also observed that the fish *C. batrachus* was highly infested with this cestode. During the winter months (December), parasitic infestation was recorded high. The similar findings were recorded by Satpute and Agarwal (1974) who observed maximum infestation in December. Lawrence (1970) also found that the greatest intensity of infestation of caryophyllaeids during January through April. Agarwal (1985) mentioned that infestation was heavy during spawning of fish from March to August which was in agreement of Niyogi *et. al.* (1982). Mamnur Rashid *et al*. (1985) described heavy infestations just after winter months i.e, in March to May. Chandra *et al.* (1997) recorded higher intensity and prevalence of the cestode *Lytocestus indicus* after summer months that was similar to Satpute and Agarwal (1980). Kennedy (1970) opined that infection patterns of helminths in fish were influenced by the ability of infective larvae. Fish was susceptible to a wide range of parasites and diseases when under stress from poor environmental condition and inadequate feeding. It can be explained that the *C. batrachus* feeds on throughout the year and the recruitment of the caryophyllaeid cestodes also occur in all months of the year with certain variations in different months.

Prevalence, mean intensity, index of infection and abundance all were higher in winter season and lower in rainy season but mean intensity was lower in summer. It might be happened that maximum mature worms expell their eggs from their body at the end of the autumn which enter in to intermediate host for continuing their life cycle. They become infective and finally accumulate to host intestine along with infected polychaetes in winter months. Kennedy (1969) observed that factors such as distribution and environment of the host, the diet and mode of feeding, often play important role to limit a parasite to a particular host species as well as higher prevalence occur in a particular season. Agarwal (1985) mentioned that the infection was heavy during spawning of fish.

It can be concluded from the present investigation that the fish *C. batrachus* can be infested by caryophyllaeid cestodes throughout the year and the parasite has a continuous process of recruitment and infection to host fish with cartain variations in different seasons of the year. As the fish seems to be more suscestible during winter season, proper care may be taken including natural feeding to prevent their infestations during this period for susceptible clariid culture.

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