

REPRODUCTIVE BIOLOGY OF THAI FRESHWATER PEARL MUSSEL  
*HYRIOPSIS (LIMNOSCAPHA) MYERSIANA* (LEA, 1856)

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ABSTRACT

The gonadal development of *Hyriopsis (Limnoscapha) myersiana* (Lea, 1856) an economically important freshwater pearl mussel in Thailand was investigated by monthly histological examination of mussels collected from the natural habitat for 1 year. The gonad development was divided into 6 stages: Prefollicular, initial, developing, mature, partially spawned, and spent. The dioecious mussels had a sex ratio of 1 male to 0.91 female. Reproduction was observed from May to October. Formation of marsupia in rearing condition showed the same period of reproduction as in the wild population. On average, marsupia were formed 18.9 times in 1 year. The incubation period of fertilized eggs inside marsupia was 5-9 days. About 11 % of a total of 599 fishes carried encysted glochidia. Cysts were found in 18 species, mainly in the family Cyprinidae. The prevalence of infested fishes was highest in *Hampala macrolepidota*, *Mystus nemurus*, and *Puntius schwanenfeldi* respectively. Infestation occurred in gills, especially gill filaments, more than on other parts of the fish body.

INTRODUCTION

The bivalve *Hyriopsis (Limnoscapha) myersiana* (Lea, 1856) is classified in the order Unionoida, family Amblemidae (Brandt 1974). Having a large body size, sufficient thickness, and lustrous inner shell, this species has been considered of economic importance being used for a wide range of decorative products of inlay work and shell-based accessories, such as earrings, necklaces, and brooches. At present, the population is decreasing due to overharvesting and environmental degradation.

MATERIALS & METHODS

To estimate stages of gonad development, 20 individuals of *H. myersiana* were collected every month during 1 year. The mussels came from natural habitats around Kanchanaburi Inland Fisheries Research Centre, Thailand. Gonadal tissues were fixed in formalin and standard histological examination made to estimate stages of gonad development.

Twenty individuals of *H. myersiana* in natural habitat were collected monthly for

1 year. Stages of gonad development and reproduction period were recorded according to histological examination of gonad tissues.

The gonad development of *H. myersiana* was divided into 6 stages:

1. Prefollicular. No reproductive cells; connective tissue (stained in haematoxylin) spread all over the gonad as a net webbing.

2. Initial stage. Many eosinophilic granular cells. Spermatogonia and spermatocytes in male; oogonia and some young oocytes in female.

3. Developing. Number of eosinophilic granular cells decreased. Follicular membranes thick. Spermatogonia, spermatocytes and spermatids, occasionally spermatozoa in male; many oogonia and young oocytes in female.

4. Mature. Thickness of follicular membranes decreased. Many spermatids and spermatozoa in male; numbers of mature oocytes higher than young oocytes in female; mature oocytes round, diameter 0.1175 mm. Oocytes moved from the follicular membrane into the middle of the follicle.

5. Partially Spawned. Follicular membrane very thin; spermatozoa and mature oocytes partially released which could cause spaces in the follicle.

6. Spent. Spermatozoa and mature oocytes mostly released from follicle. Follicles slack and small.

To investigate the reproduction period, 15 labelled mussels were kept in rearing cages at the Research Centre. The mussels were examined monthly during 1 year. The shells were carefully forced open and gills examined for the presence of marsupia (modified gills which contain incubated fertilized eggs). After examination the mussels were placed in the cages again. The reproduction period, times of marsupia formation, and incubation period of fertilized eggs were recorded.

Fishes from the mussel culture area were collected by gill nets every month during 1 year to examine glochidial encystment on the fishes. The seasonal occurrence of glochidium cysts, species of natural fishes infested by glochidia, and site selection of glochidia on the fish body were recorded.

## RESULTS

The sex ratio of *H. myersiana* was 1 male to 0.91 female. Based on the gonad development and percentage of present marsupia, the reproductive period of *H. myersiana* was from October to May. Marsupia formed in the outer demibranchs of females 13-25 times a year (average 18.9 times) indicating the number of times a female could release glochidia larvae. The incubation period from fertilized eggs to glochidia larvae was 5-9 days, depending on water temperature.

### *Occurrence of glochidia larvae*

A total of 599 fishes belonging to 28 species were dissected and examined for encysted glochidia. Glochidia were found on gills and fins of 18 species, mainly in the family Cyprinidae. A total of 66 individual fishes (11.02 %) were infested. Glochidia occurred on gills, especially gill filaments, more than

on other parts of the fish body. The counts of glochidia were highest in *Hampala macrolepidota*, *Mystus nemurus*, and *Puntius schwanefeldii* respectively. Glochidia were recorded from November to April, but numbers were highest in December and February.

## DISCUSSION

Histological examination of gonad development indicated that the reproduction period of *H. myersiana* was from October to May. The mature, and partially spawned stages of female gonads coincided with the presence of marsupia (Nagachinta *et al.* 1989). The presence of marsupia and the occurrence of glochidia on fish hosts showed nearly the same reproductive period of time, viz from September to May and November to April respectively (Nagachinta *et al.* 1993, 1994).

Binhe (1984) stated that the incubation period of freshwater pearl mussels is inversely related to water temperature: 4 and 10 days at temperatures of 30 °C and 20-25 °C respectively. In the present study, the incubation period of *H. myersiana* was 5-9 days (7-9 days in December at 24-25 °C, and 5-7 days in March-April at a temperature of 29-31 °C).

The study of glochidia larvae on natural fishes showed that mainly species in the family Cyprinidae were infested by glochidia. Among these, 10 species were previously recorded: *Puntius schwanefeldii*, *P. gonionotus*, *Punctioplites proctozysron*, *Probarbus jullieni*, *Mystus nemurus*, *Oxyeleotris marmoratus*, *Notopterus notopterus*, *Pristolepis fasciatus* (Mewan 1979; Panha 1990).

Kat (1984) reported that glochidia larvae could be divided into 3 types: hooked, hookless, and axed head. The hookless type was usually found on gill filaments of infested fish. Accordingly, the glochidia of *H. myersiana* were hookless and mainly found on gill filaments.

So far, there is not sufficient information on the mussel-host relationship. Research related to this issue should be conducted to

clearly determine the specific host(s) for glochidia of each species of freshwater pearl mussel.

#### REFERENCES

- Binhe, G. 1984. Freshwater pearl culture. Fourth training course for senior aquaculturists in Asia and Pacific Region, Tigbauan, Iloilo, Philippines, 20 pp.
- Brandt, R.A.M. 1974. The non marine aquatic Mollusca of Thailand. Frankfurt am Main, 463 pp.
- Kat, P.W. 1984. Parasitism and the Unionacea (Bivalvia). - *Biological Review* **59**: 189-207.
- Mewan, M. 1979. Investigation on parasites in Sand Goby: *Oxyeleotris marmorata* (Bleeker, 1852) in Ubolratana Reservoir. - *Thai Fisheries Gazette* **34**(4): 441-447 (in Thai).
- Nagachinta, A., S. Banyen & K. Sahassanonta. 1989. Gonadal development and spawning period of freshwater mussel *Hyriopsis (Limnoscapha) myersiana* (Lea, 1856) in Maklong River near Vachiralongkorn Dam, Kanchanaburi Province. - *Proceeding of the Seminar on Fisheries 1989*, Department of Fisheries, pp. 360-372 (in Thai).
- Nagachinta, A., B. Chaopaknam & K. Toopbucha. 1993. Seasonal occurrence of freshwater mussel glochidia on natural fishes. Technical paper no. 41/1993, Inland Fisheries Division, Department of Fisheries, 16 pp. (in Thai).
- Nagachinta, A., B. Jamnongsittatum & K. Sridej. 1994. Study on spawning cycles of freshwater pearl mussels; *Chamberlainia hainesiana* (Lea, 1856) and *Hyriopsis (Limnoscapha) myersiana* (Lea, 1856). Technical paper no. 38/1994, Inland Fisheries Division, Department of Fisheries, 14 pp. (in Thai).
- Panha, S. 1990. The site survey and the study on reproductive cycles of freshwater pearl mussels in the central part of Thailand. - *Venus, Japanese Journal of Malacology* **49**: 240-257.

