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**BREEDING OF Notopterus borneensis (BLEEKER)
CARRIED OUT IN SOUTH SUMATRA, INDONESIA**



By :

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The Directorate General of Fisheries, Indonesia,
in collaboration with
the United States Agency for International Development,
in the Cage Culture and Seed Production Sub-project
of the Small Scale Fisheries Development Project.
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PREFACE

This manual has been prepared within the framework of the Small Scale Fisheries Development Project implemented by the Directorate General of Fisheries in collaboration with the United States Agency for International Development.

Its primary objective is to disseminate the author's technical and practical knowledge to extension workers and to other personnel engaged in fish breeding practices which ultimately to increase fish production.

The contents of this manual deal with natural breeding of Notopterus borneensis (Bleeker) under controlled conditions, which has successfully, for the first time, been carried out in South Sumatra province. It outlines the general biological aspects of the species, preparation of broodstocks, setting-up the spawning ground, spawning activity, incubation of eggs and the subsequent rearing of larvae and fry. To make the manual more comprehensible, steps of activities are also illustrated.

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1. INTRODUCTION.

Notopterus borneensis (Bleeker), is very popular among freshwater species in Indonesia, particularly, in South Sumatra province with the local name known to be "ikan Belida". The fish is traditionally important commodity, because of its good taste and flavour and it is also excellent for making crackers and fish ball. The products are not only consumed locally, but also distributed to other regions.

It is evident, however, that the production from the nature does not seem to sufficiently meet the high demands. There is also indication that due to some changes in environmental conditions, the species is threatened by extinction in their natural habitat and that the production shows declining trend.

Realizing these facts, the Directorate General of Fisheries in collaboration with the United States Agency for International Development have set up a Programme on breeding of Notopterus borneensis under the establishment of the Small Scale Fisheries Development Project.

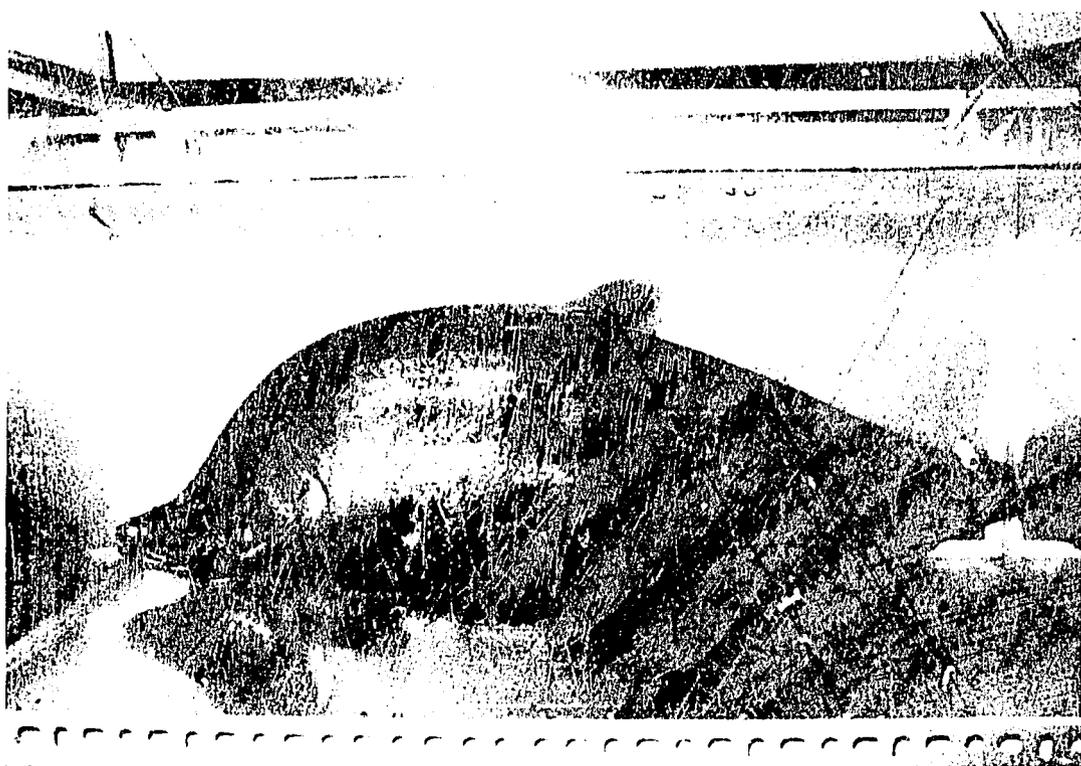


Figure 1 Notopterus borneensis brooder.

2. BIOLOGY.

Notopterus borneensis belongs to one of large-size freshwater fishes, found in rivers, and swampy areas distributed over Java, Kalimantan, Sumatra, India, Burma, Malaysia and Thailand. The body is elongated, broad, compressed and finely scales. The fish is also consisted of large membranous opercular flap; teeth on jaws; tongues; vomer; palatines and pterygoids; double serrated ridge along the median line of the very short abdomen; small tuftlike dorsal fin inserted near the middle of the long back; ribbonlike anal fin with 100 or more rays occupying seven – eights of the length of the head and body; small caudal fin confluent with the anal, and rudimentary ventral fins. Upper part of the body is black-grey colour, and silver or grey at the lower part, normally without spotted in the caudal fin region.

Notopterus borneensis is a carnivore, subsists on insects, and small surface-swimming fishes. They naturally belong to the mating spawning fishes, eggs deposited to stumps and cared for by the males. The fecundity is about 5.000–10.000 eggs, depending on the female size with the incubation period takes about 6–7 days at water temperature of 29–31°C.

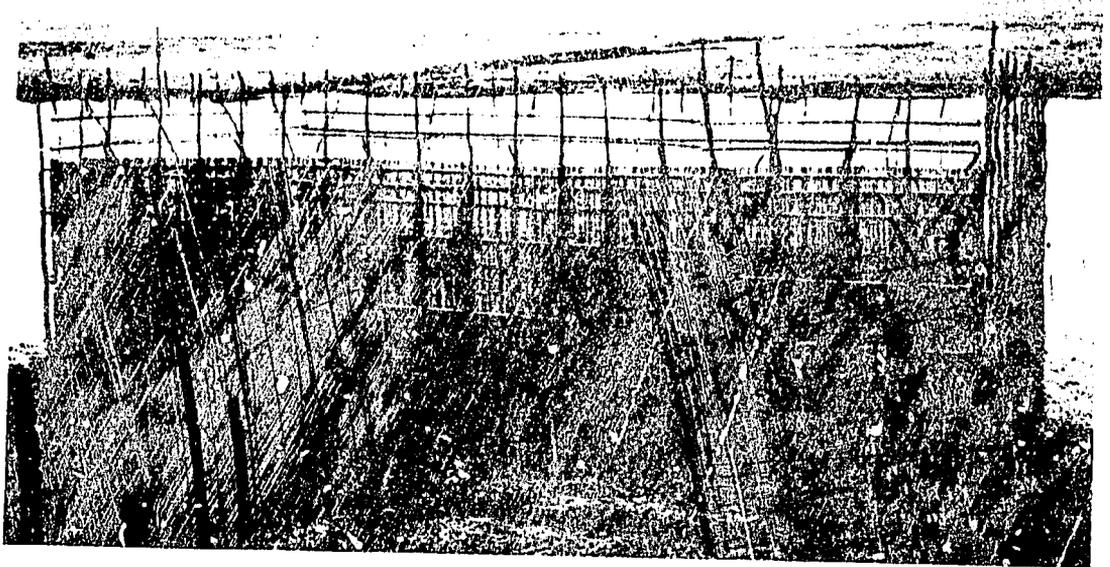


Figure 2 Fence-system for rearing brooders.

3. PREPARATION OF BROODSTOCKS

The breeding programme of Notopterus borneensis was initiated during the fiscal year of 1985–1986 of the Small Scale Fisheries Development Project. The brooders were collected from swampy areas at Tanjung Pering district and were strictly selected according to their age and size. Usually, males and females attain their weight of over 3 and 4 kgs, respectively, to become sexually mature, and be in ready-to-spawn during the season. At the time, more or less 50 pairs brooders, in about their second year were collected for stock. The sex ratio being one female to one male.

The male's sex organ is distinguishable from the female's one. A small and tiny papilla, next to the opening of cloaca is easily recognized, whereas the female's organ forms a small rounded tiny opening.



Figure 3 Selection of male and female fish.

In the swampy areas at Tanjung Pering and Lebung Karang districts, the brooders were reared in fence-system made of bamboo measuring 10 x 20 x 4 m³ in which males and females were stocked together.

The stocking density being one fish in 4 m², and small fishes were used for feeding. The breeding preparation was commenced 3 months before the spawning season in September, 1985, when the water level fluctuated between 1 to 4 metres deep.

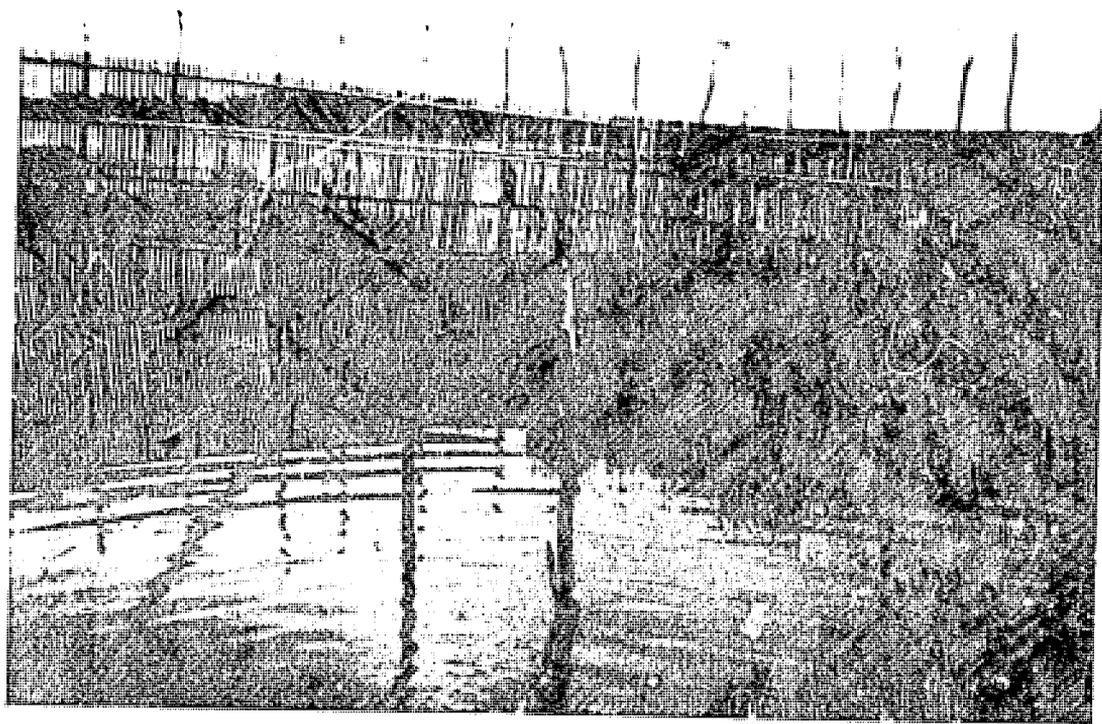


Figure 4 Spawning ground.

4. SETTING-UP THE SPAWNING GROUND.

Two bamboo fences of 10 x 20 x 4 m³ constructed on the flat and muddy bed of the swampy areas, were not only used for rearing the brooders but were also, at the same time, set up for the spawning ground. Inside, the stumps or wooden sticks were posted every 2 metres interval for the eggs being attached to. Floating weeds found on the surface and other water plants were left to grow and used as hiding place for the fish.

5. SPAWNING ACTIVITY.

The brooders were started to be collected and reared in September 1985 and the males and females were stocked together in the bamboo fence. During the rainy season (in October – March) the water in the swamp normally rose and in the spawning ground fluctuated between 1 to 4 metres.

In December 1985, when the water level in the spawning ground remained 2 to 3 metres in depth, there was an indication that the brooders were in the mating behaviour. When they were in pairs swimming around the posts and frequently splashing about the surface, this indicated that during this period the spawning activity was taking place. Fertilized eggs were laid and deposited to the posts, about half to one metre above the bottom of the ground or about 1.5 to 2 metres under the surface.

During the spawning activity the parental care of eggs developed only on male fish.

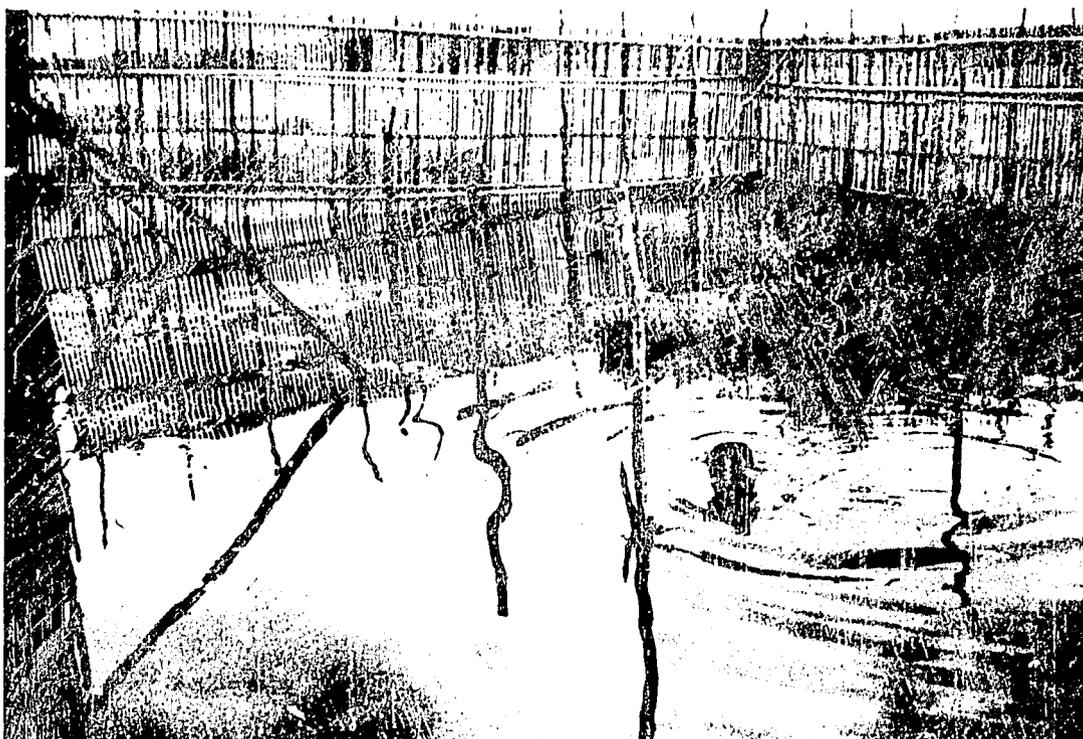


Figure 5 Checking the egg-nests.

Throughout the hatching period the male usually is in assiduous attendance. Natural enemies comprising, for the most part, of small fishes are driven off. An equally important duty of the male is keeping the eggs aerated and free from the sediment by fanning movements of the tail. In the sluggish water of swamp the eggs may become covered with sediment, which prevents normal development and induces the growth of fungus. If the guardian is removed the eggs are preyed on by small fishes and those that escape are coated with sediment and ultimately asphyxiated.

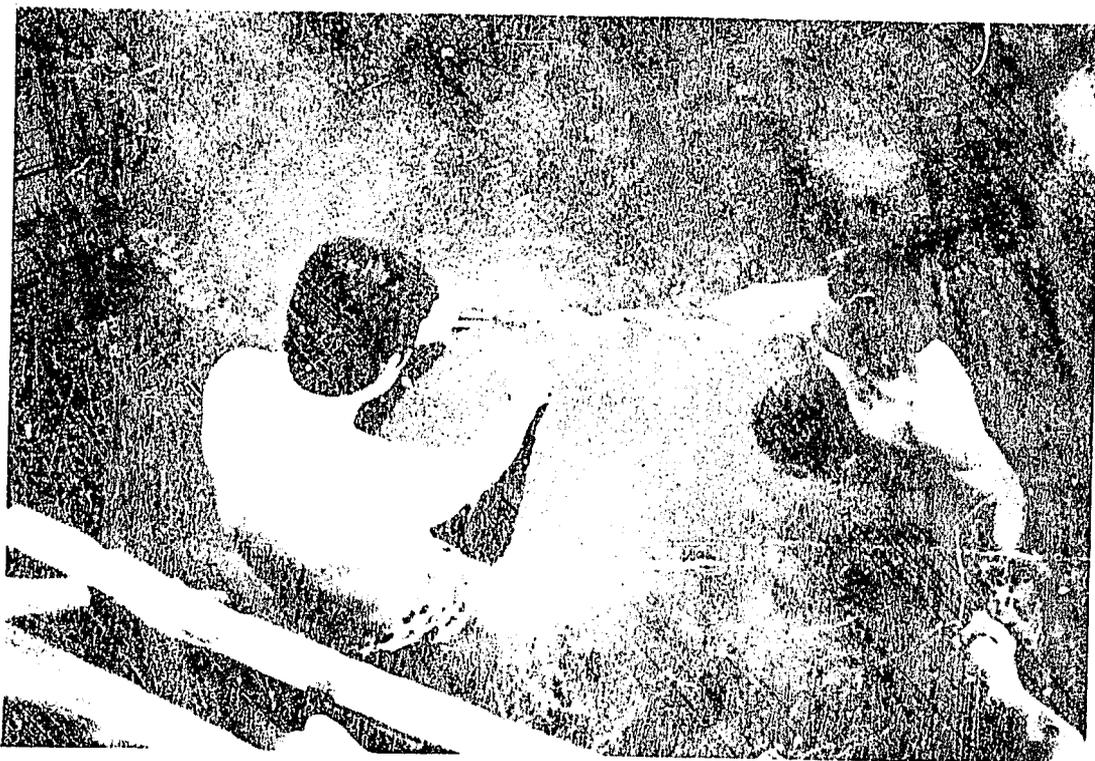


Figure 6. Cutting the eggs-laden stump.

6. INCUBATION OF EGGS.

In the fence-system, the fertilized eggs that attached to the posts were easily destroyed by small fishes and sedimentary particles. This was evident, especially in the swampy areas where the project being implemented the water was almost stagnant in which *Rasbora spp* was predominant. This was one of the reasons that in the natural water the hatching rate of this species become very low.

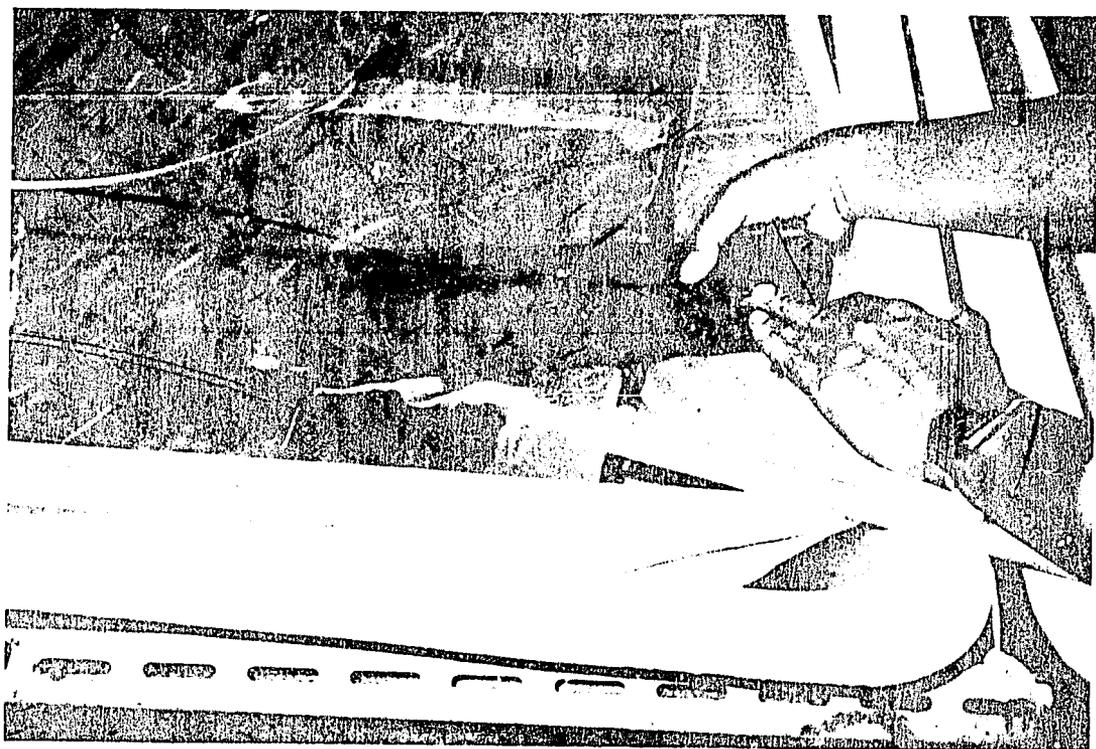


Figure 7. Incubation of eggs.

To control the seed production, an improved technique was applied by way of cutting off the stump-part where the eggs deposited to, which referred to as "nests" and transferring the whole nests equipped with aeration system to the indoor hatchery. The eggs still attached to the nests were then incubated in the fibreglass or concrete tank or aquarium for 6-7 days at the water temperature of 29-31°C for subsequently hatching.

During the spawning season the nests should be inspected regularly, at least once a week, otherwise when the male fish being off its guard the eggs would be preyed on by small fishes.

When the spawning was over, the eggs-laden stumps should then be detached, cut off and immediately transferred for hatching under controlled conditions. The number of eggs deposited on the stump, might be several thousands and the eggs produced from one brooder at a time, might exceed 5,000 or even greater than 10,000.

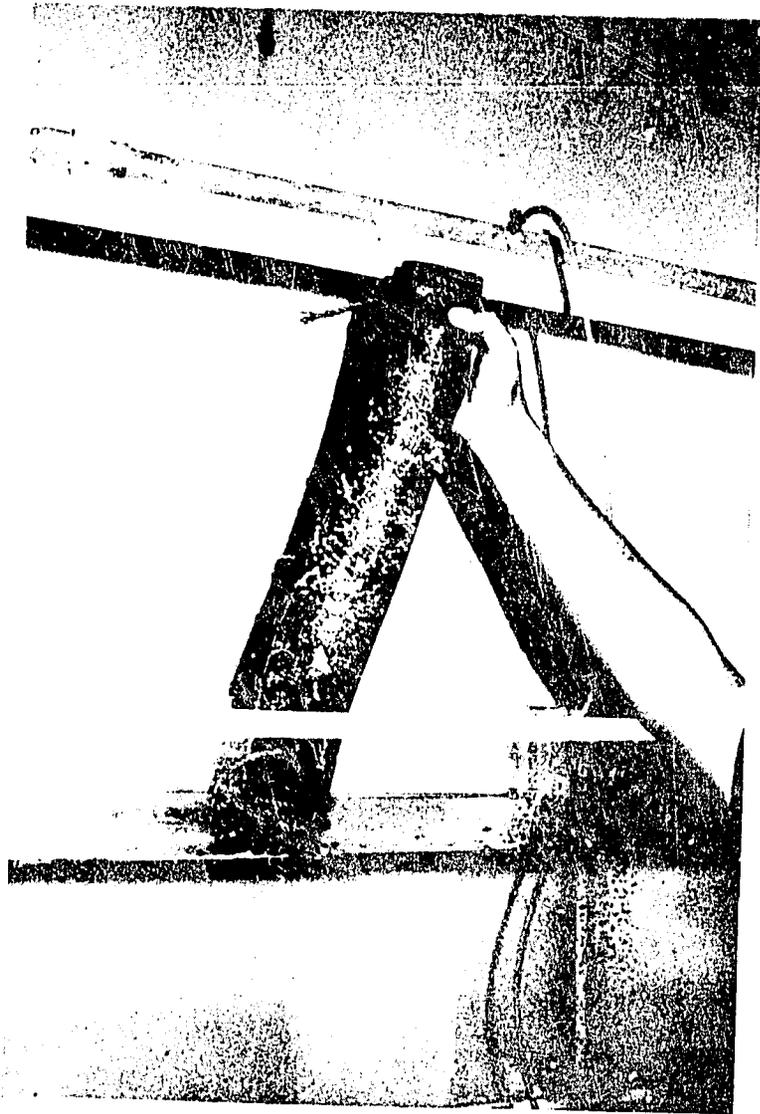


Figure 8. Eggs deposited on the stump.

Transferring the eggs-laden stump from the spawning ground to the hatchery was quite painstaking because a great deal of eggs were broken during transportation. The low hatchability was merely due to a technical problem that the eggs-laden stump, being put in the oxygenized bag, consistently got in contact with and unavoidably caused friction between the stump and the container's wall. The transportation technique should, therefore, be improved to prevent the eggs being crushed by employing a rolling device to hold the stump and that to avoid the stump touching the wall of the bag.

To prevent and protect contamination of fungi, the eggs should be treated with malachite green at a concentration of 1 : 15 ppt (part per thousand) for about 15–30 seconds prior to incubation step.



Figure 9. Larval rearing.

7. LARVAL REARING.

The size of newly hatched-out larvae were considerably large, about 7–8 mm in length, tiny blade bodies and big yolk sacs. They sank and lay down on the bottom, move slowly in some periodically. After 3–4 day of age, when their yolk sacs began to disappear, they were able to eat live food. *Moina* and *Daphnia* were suitable for feeding, because their mouths were large enough to consume the bigger-size live food directly and that they were not necessarily fed with egg yolk or Rotifer during their early life.

Notopterus borneensis fry had a nocturnal eating habit. They preferred to eat at night time and were also very active. During the day time they stayed shoaling pasively at the corner of container or hiding places. In the indoor hatchery, the newly larvae were reared in the aquarium equipped with aeration-system. They could also be reared in a concrete tank filled with tap-water which left for a few days to let the water settle down before use.

After the yolk sacs disappeared, they were fed every day with live moina until their 3-week of life. Fresh fish minced finely was then given to the fry or alternatively they could also be fed with supplementary feeding which was easier to find in the region.

During the larval rearing, the water quality should be carefully inspected. To avoid pollution, the water should be changed and refilled regularly.



Figure 10. Changing the water.

DIAGRAM OF LARVAL REARING FOR
Notopterus Borneensis

Age	Activities and facilities
1. Fertilization	: Natural spawning in fence-system.
2. Hatched out	: In aquarium and fibreglass tank in indoor hatchery during 6-7 days period at water temperature of 29-31°C.
3. Newly larvae	: - Reared in aquarium, - Antibiotic being applied at about 250 mg per aquarium.
4. 4-21 days old	: - Fed with life moina and given in the evening - Changed the water about a half of aquarium every day. - 0.1% Salt (Sodium Chloride) was applied after the water been changed.
5. 3-6 weeks old	: - Size attained about 1 inch or larger. - Fed with minced fresh fish. - Changed the water, cleaned the bottom of aquarium. - Antibiotic and salt still being applied.
6. 1½ month of age	: - Size obtained about 2 inches.

REFERENCE

Smith, H.M. (1945). The fresh water fishes of Siam or Thailand.
Bull. U.S. Nah. Mus. 188.

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