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# On the Spawning Behavior of *Clarias batrachus*

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*Clarias batrachus* (Linnaeus), being one of the important cultivable species of freshwater air-breathing teleosts, drew considerable attention of researchers particularly in regard to its breeding season, preferred breeding ground, nest-building habit, egg deposition etc. (Mookerjee and Mazumdar, 1950; Sidthimunka et al. 1966) Very little is known about courtship and spawning behavior in *C. batrachus*. In the present communication, certain observations on these aspects are discussed.

## Material and method

Live specimens of adult *C. batrachus* were procured for this study from various fish landing and assembling centers falling within the jurisdiction of the district of Darbhanga, Bihar (26.12°N, 85.53°E). They were maintained in floating bamboo-mat or nylon-net cages at the stocking rate of 40 fish/m$^2$. Specimens were regularly given a diet of aquatic insects (mostly *Anisops* and *Corixa*), small prawns (decapods) and trash fishes (*Ambassis renga, A. nama, Amblypharyngodon mola, Esomus denricus* and *Puntius* sp.) at the rate of 5% of the total weight of the stocked material. To observe breeding behavior, the fish were bred in the laboratory by hypophysation using pituitary glands of the Indian major carp, *Labeo rohita,* at a dose of 8 to 13 mg/100 g body weight of the recipient. Collapsible plastic pools (0.8 m diameter) or glass aquaria(60×30×30 cm) were used as breeding containers. During the course of experiment, the temperature of ambient water fluctuated within the range of 26 to 29°C. The details of spawning behavior presented here are based upon observations made in 14 successful trials of induced breeding of the species conducted during the breeding seasons of the years 1974 and 1975. In each set, a male and a female (total length, 198～276 mm) were used.

## Observations

Spawning activity of the fish was observed to start around 16 to 20 hours after the injection of pituitary extract and it lasted in various experiments for various durations of 6 to 12 hours. During this period there were repeated mating acts at small intervals.

Until apparently the impulse to mate did not occur, male and female just rested at the bottom of the container in a standstill position carefully avoiding the lighted zones. From time to time, they hurriedly negotiated the water column and came to the surface to gulp air. While resting at the bottom, they kept their body horizontally disposed or remained floating at angle ranging from 20° to 90° with their caudal fin touching to the bottom (Devaraj, 1972).

The impulse to mate manifested by apparent restlessness and they started moving around displaying actions like chasing or nudging each

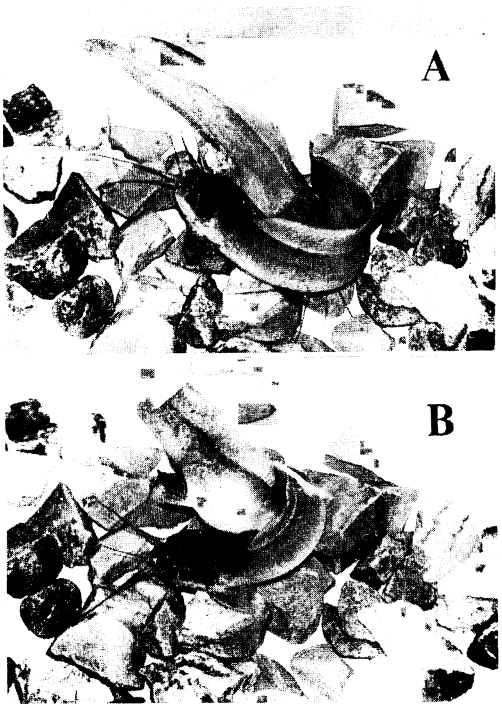


Fig. 1. Spawning behavior of *Clarias batrachus*. A: Initial stage of the mating act; male twists its body to embrace the snout portion of female which remain affixed at male's genital region. B: Culminating stage of the mating act; eggs are discharged. Male is 206 mm in total length and female 198 mm. On the bottom of the container are the stone chips provided to facilitate egg deposition.

other with their snouts. Often their snout to snout collision made a feeble thud audible. The sound was probably produced by the snapping of the jaws of the fish. Generally, female took the lead in mating behavior and induced the male to participate by nudging with its snout at its genital region. Male, on the other hand, maintained an indifferent attitude and responded to the female only as if under compulsion. With its repeated nudging the female finally succeeded in inducing the response from the male. Both the partners then took a hurried trip to the surface to gulp air and settled down at the bottom for the mating act. In this process, male twisted its body in the form of 'U' embracing the snout portion of the female which remained affixed at his genital region (Fig. 1A). In this posture, the pair remained motionless for about 5 to 10sec. The shivering dorsal fin of male was clearly noticeable. The act ultimately culminated into a vigorous shivering motion of female which by turning to its side tried to bring her genital region in the proximity of male's genitilia (Fig. 1B). Simultaneously, the female released small number of eggs and then swam away to settle and relax. The extrusion of eggs was generally accompanied with the expulsion of some air bubbles from the genital opening. Owing to the rapidity with which it takes place and also because of the watery-texture of the milt, it was difficult to observe the actual transference of milt from male to the released eggs of the female.

Although female generally took the lead in the mating act, in two instances the excited male had to attack its reluctant female partner by severe pushes to respond. In both the cases, the female ultimately yielded and started participating.

After each mating act, the female appeared considerably exhausted and rested for a minute or two or even longer. The male, on the other hand, did not reveal any such exhausted appearance and kept on moving here and there and waited for the female for the next round. In the initial stage, the mating act was generally less frequent with extrusion of very few eggs each time. In a few cases, it was observed that the initial mating acts yielded no eggs at all. Reaching the height of excitement, the mating acts became more frequent and a small number of eggs (5 to 15 in all) was extruded almost everytime. In certain cases, spawners were noted to graze upon the released eggs but such tendency was rare. During the period of spawning activity, the female appeared least concerned towards the disturbances caused by the glass fillers, tubes, and other such things. The male, on the other hand, reacted instantaneously to such intrusions and showed a restless behavior.

## Remarks

One of the important points observed in all the experimental trials was the extremely low survival of the resultant eggs and very low yield of hatchlings. The main cause of this was the protracted spawning activity of the fish which damaged the developing eggs in the limited breeding space. It was noted to be harmful in two ways: 1) the exudates released during the mating acts polluted the ambient water to an extent that it started stinking and 2) the released eggs got fatally injured by the movement of spawners. It may be mentioned here that the eggs of *C. batrachus* are highly adhesive by nature (Thakur, 1976) and if they are dislodged from their fixed spots, their perivitelline membrane gets ruptured and they ultimately perish. On the basis of results obtained in a series of experimental trials

Table 1. Comparison of spawning behaviors of *C. batrachus* and *H. fossilis* based on original observation.

| | *C. batrachus* | *H. fossilis* |
|---|---|---|
| Duration of spawning activity | longer, from 6 to 12 hrs | shorter, from 2 to 6 hrs |
| Major lead in spawning activity | female takes and provokes male to co-operate | male takes and provokes female to co-operate |
| Site of mating act | male and female invariably settle down at the bottom | generally in the column or near surface layer of the ambient water |
| Duration of mating | for 5 ~ 10 sec | for 1 ~ 2 sec |
| Expulsion of air-bubbles from the genital opening | some | none |
| Number of egg released at each mating | from 5 to 15 | from 50 to 150 |
| Egg eating tendency | incidental | marked, more particularly in male |

it was finally concluded that breeding of *C. batrachus* in captivity particularly when amied to produce its seed on mass scale, unless appropriately improvised, would not be an economical venture.

When compared with the spawning behavior of *Heteropneustes fossilis* (Thakur et al. MS), that of *C. batrachus* differs in many respects (Table 1). It has been observed that the pen-spawning is generally successful in the case of *H. fossilis* (Dehadrai et al. MS). This is primarily because the eggs of *H. fossilis* are less sticky and the spawning activity in this fish is relatively of much shorter duration.

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***Clarias batrachus* の産卵行動**

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東南アジア産ナマズ，*C. batrachus* の容器内での産卵行動を観察した．インドゴイ，*Labeo rohita* の脳下垂体を注射した後，16～20 時間で産卵行動を開始し，行動は 6～12 時間にわたってみられた．行動のクライマックスは雄魚が雌の魚体にU字型で巻きつくことであり，雌が放卵する．放卵数，卵のふ化率はともに低く，この方法では種苗として多量の生産を期することは困難である．また，他のナマズ，*Heteropneustes fossilis* の産卵行動との差異を論じた．