INDuced BREEDING, EMBRYONIC AND LarVAL DEVELOPMENT IN HETEROPNEUSTES FOSSILIS (BLOCH) IN THE AGRO-CLIMATIC CONDITIONS OF MAHARASHTRA

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ABSTRACT

H. fossilis was induced bred for the first time in the agro-climatic conditions of Maharashtra. The embryonic development was completed within 16-18 h after fertilisation. Head and tail ends were distinguishable after 3 h and 11-12 somites were visible after 6-7 h. The eggs started hatching after 14 h of incubation. Average hatching time was 16-18 h at 26°C. In 1st day old pro-larva, notochord was deflected upwards, eyes were darkly pigmented and alimentary canal appeared. In 4th day old post-larva intestinal coiling could be seen and yolk was absorbed. Aerial respiration started by 8th day. The 10 day old post-larva was free swimming and fed voraciously attaining a length of 20 mm in 30 days.

INTRODUCTION

Air-breathing fishes namely Clarias, Heteropneustes, Anabas and murrels, are known for their therapeutic and recuperative values having good cultural traits requiring comparatively little management attention and less water requirement than carps, hold good culture potential in water scarcity zones of Maharashtra.

For adopting culture of any fish it is a prerequisite to procure quality fish seed, which can be obtained from two sources: (a) natural collection and (b) induced breeding. In the present study, first attempt was made to breed Heteropneustes fossilis in the agro-climatic conditions of Maharashtra.

MATERIAL AND METHODS

Brood of H. fossilis were purchased from local fish markets at Dadar and Chembur in Bombay. They were maintained in a plastic pool and fed with a diet of rice bran and fish meal at the rate of 5% body weight in equal ratio. The induced breeding was attempted in July and August, 1986. The male and female breeders were taken out of the pool and weighed. They were injected with extract of carp's pituitary gland by following usual breeding techniques (Chaudhuri and Singh, 1984). Intramuscular injection was given to both males and females simultaneously at the rate of 15 mg/100 g body weight of the recipient and thereafter released into a plastic pool having 10 cm water column. One set consisted of one female and two males. The air and water temperature ranged between 26 - 28.5°C and 28 - 30°C respectively.

RESULTS AND DISCUSSION

Spawning activity started after 6-8 h of injection. The spawning behaviour of this fish has been described in detail by Kohli and Goswami (1982). When fully excited, the male turned its body in U-shape and female touched the genital papilla of the male (Fig.1).

Fig. 1. Mating in H. fossilis

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They remained like that for few seconds and then separated with a jerk, the female releasing eggs and males the milt. The eggs settled down at the bottom of the container and on the way they got fertilized. During each mating act 80-100 eggs were released initially and subsequently the number is reduced. Of the resultant eggs 20 eggs were studied for embryonic and larval development.

*Fertilised eggs*: These were adhesive, demersal and spherical in form. The yolk sac contained no oil globules. The eggs became translucent as development progressed. The diameter of an egg varied between 0.6 to 1.0 mm with an average size of 0.75 mm.

*Embryonic development*: The eggs were released at irregular intervals and as a result the eggs from one spawner did not develop at the same pace. In the present observation embryonic development was completed within 16-18 h after fertilisation. The fertilized egg had an orange blastodisc. The first cleavage commenced in 25-40 minutes after fertilisation. The blastodisc gets divided into two blastomeres. 4 celled stage appeared in 15 minutes time which further developed into 8 celled stage in another 15-20 minutes time. 32 celled stage was attained after 20

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*Fig. 2. Embryonic development of H. fossilis.*
INDUCED BREEDING AND DEVELOPMENT OF H. FOSSILIS

minutes from 8 celled stage. The morula stage was attained within 1 1/2 - 2 h after fertilisation. Following the morula stage, the crown of blastoderm started invading the yolk by spreading over the later as a thin layer. The head and tail ends were distinguishable after the 3rd h. Subsequently in the 4th and 5th h, somites were differentiated (Fig. 2A). At the end of 6-7 h 11-12 somites were longitudinally along the body of embryo. The eggs started hatching after 14 h of incubation (Fig. 2D). Hatching was completed by 20 h of incubation. The average time taken for hatching was 16-18 h at 26°C. Table I gives comparative hatching time in different agro-climatic conditions as given by different authors.

Table I : Incubation period of H. fossilis as observed in present investigation as well as those of earlier workers.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Time (h)</th>
<th>Temperature (°C)</th>
</tr>
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<tbody>
<tr>
<td>Present investigation</td>
<td>16-18</td>
<td>26</td>
</tr>
<tr>
<td>Kohli (1984)</td>
<td>18-20</td>
<td>26-29</td>
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<tr>
<td></td>
<td>24</td>
<td>23-26</td>
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<tr>
<td></td>
<td>40</td>
<td>21-23</td>
</tr>
<tr>
<td>Thakur et al. (1974)</td>
<td>24</td>
<td>24-26</td>
</tr>
<tr>
<td></td>
<td>18-20</td>
<td>26-29</td>
</tr>
<tr>
<td>Khan (1972)</td>
<td>18-20</td>
<td>26-30</td>
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<tr>
<td>Sundararaj (1969)</td>
<td>within 24</td>
<td>25</td>
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visible (Fig. 2B). Optic vesicles appeared at the 15 somite stage. At 17 somite stage the embryo got further elongated encircling more than 2/3rd of the yolk mass making the embryo appear like a comma and the digestive system also appeared. Twitching movement was observed after 10-11 h of development. At 28 somite stage a pulsating mechanism (future heart) was visible. At this stage the caudal portion of embryo got free from the yolk mass (Fig. 2C). Notochord became visible in the form of a tubular structure running

Larval development : In a 2-3 h old larva there was formation of a relatively broad space between the head and the anterior margin of yolk mass to accommodate the developing heart (Fig. 3). The fin folds were distinctly differentiated. Opercles were absent in 6-8 h old larva and alimentary canal appeared as a straight tube. Anal opening was closed and was situated between 10th and 11th somites. The number of distinct somites increased to 32-33. Pulsating of the heart can be seen. The freshly hatched larva had more or less round yolk sac but as the larva grew in age, the yolk sac became oval and gradually got elongated with the growing body of the larva.

Fig. 3. Newly hatched larva of H. fossilis.

Fig. 4. One day old larva of H. fossilis.
One day old larva: Notochord deflected upwards and the barbels started appearing in the form of thin protruberences. Upper and lower jaws were formed. Alimentary canal was a straight tube. The total average length of larva was 3.5 mm (Fig. 4).

Two day old larva: Upper and lower jaws were fully formed. Eyes were darkly pigmented. Alimentary canal appeared functional. Anal and urinogenital openings were also differentiated. Yolk sac was diffused. The larva moved with vigorous tail movements and measured 4 mm.

Three day old larva: Barbels got elongated. Yolk sac shrank further and its space was filled gradually by the developing alimentary canal. The larva measured 5 mm.

Four day old larva: Fin fold was still continuous but the differentiation of dorsal and caudal fins became apparent. The intestinal coiling of the alimentary canal could be seen. Yolk got exhausted by the end of 4th day. Larvae commenced feeding. The larva was 6.5 — 7 mm in length.

Five day old larva: Yolk was completely absorbed and they moved in search of food and if enough food was not available the larvae became cannibalistic in habit. Pectoral fin was differentiated. The post larvae now made unsuccessful attempts to come up to the surface by wriggling through the water column and to sink down passively (Fig. 5).

Eight day old larva: The post larvae came to the surface for aerial respiration. Qasim et al. (1960) opined that the vertical disposition of the post larvae while sinking is due to the air filled respiratory organs which impart bouyancy.

Ten day old larva: The dorsal fin became free with six branched rays. Spines and rays were developed in pectoral fin. The anal fin was still continuous with the larval fin fold. Melanophore patches covered the whole body making the larvae blackish. The larva at this stage was an active swimmer and fed voraciously (Fig. 6).

Fig. 5. Five days old larva of H. fossilis.

Fig. 6. Ten day old larva of H. fossilis.

H. fossilis post larvae reached an average length of 11 mm after 15 days and 20 mm after 30 days.

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REFERENCES


