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Embryonic and larval development of guchibaim , *Mastacembelus pancalus* (Hamilton)

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Abstract

The embryonic and larval development of local Guchibaim, *Mastacembelus pancalus* (Hamilton) was studied during May to October 2007. This study presents preliminary observations on the embryonic and larval development of *Mastacembelus pancalus* under laboratory conditions. The parents stock was collected from different places of Mymensingh district. The eggs were obtained through induction of spawning by use of hormones. At fertilization; the eggs were 0.50 mm in diameter. Samples were taken every 10 minutes interval till completion of morula and then every 1 hour interval up to hatching. After hatching, daily observations took place until the attainment of the fingerling stage. The eggs presented coloration varying from yellow to brownish-green. They were spherical, demersal and adhesive. The stages of embryonic development observed with cleavage, followed by blastula, morula, early gastrula, middle gastrula, late gastrula and until hatching of non-pigmented larvae which displayed total average length of 1.3 mm ± 0.22, 35 hours after fertilization. First cleavage was recorded within 1.05 hrs after fertilization and the embryonic rudiments of developing eggs appeared at 24.30 hrs at 27.0-31.0°C. The yolk sac was completely absorbed at 67 hrs during embryonic development on attainment of 5.50 mm total length. At the same time the digestive system became fully developed and the larvae searched for feeding.

Keywords: Embryo, Larvae, Guchibaim, *Mastacembelus pancalus,*

Introduction

Guchibaim (*Mastacembelus pancalus*) is a popular and highly priced and considered to be a highly nourishing, palatable and tasty fish. This species was sufficiently available in rivers, canals, beels and inundated fields in the past throughout Bangladesh. Locally it is called guchi, baim, turi or chirka. It lives in the water bodies beneath the mud and during the rains it is seen in the root of the water hyacinth. The villagers during this period catch fish by push net. The highest size of guchibaim is recorded to be 135mm (Rahman, 1989).

During the past few years the natural population of this fish has been rapidly declining due to various man-made and natural causes. According to IUCN (2000), among 266 species, 14 are going to be extinct, condition of 12 has been severely deteriorated and 28 of them are critically endangered. Moreover, natural breeding grounds of this fish are also under threat due to drying up of the low lying areas and indiscriminate use of fertilizers and pesticides. Now guchi baim is considered to be a critically endangered. The species should be protected from being extinct. There is no sufficient information on the early development of this fish. So it is necessary to undertake proper study to characterize its various stages of embryonic and larval development to understand the biological clock and cultural techniques of the species. Life starts with the unification of male and female gametes. As soon as the egg is fertilized by a sperm the zygote is formed and embryonic development starts and ends up at hatching. The hatchlings further undergo organogenesis and appear as like as their parents, thus end the larval stages. Egg development in the ovary is maternally derived and is predetermined in the ovary but its genetics complex is determined at the very instant of fertilization. Considering the enormous importance of guchibaim, the present study was carried out to know the early life story stages (embryonic and larval stages) of *Mastacembelus pancalus* in relation to various time intervals, to determine the developmental clock and to identify the first feeding time of this species for larval rearing.

Materials and Methods

The experiment was conducted in the fisheries field laboratory complex, water quality laboratory of the department of fisheries management and field fertility clinic laboratory of the department of surgery and obstetrics, Bangladesh Agricultural University, Mymensingh. Early developmental stages of guchibaim, *Mastacembelus pancalus* were studied up to 72 hrs starting from egg fertilization.

It may be mentioned that for the study of embryonic and larval development, special procedure was employed for preparation of eggs and developing embryos. The wild brood fish of *Mastacembelus pancalus* was collected from different places of Mymensingh district for breeding purpose. The collected brood fishes were stocked in fisheries field laboratory complex, Bangladesh Agricultural University, during the period from May to October 2007.

Maintenance of brood stock

Proper rearing and maintenance of brood stock of both sexes to prime mature condition is a pre-requisite for successful induction of spawning. The brood fish were reared in the predator free pond. Fertilizer was applied weekly at the rate of 5.0kg cow dung, 100 g urea and 100 g TSP /decimal to stimulate the growth of plankton. The fish were fed with a mixture of mustard oilcake, rice bran, wheat bran, fish meal, and vitamin premix and di-calcium phosphate mixed at the ratio of 20:33:25:20:1:1 respectively by weight at 4-5% of total body weight of fish per day. Later on a series of breeding trials were conducted to find out the appropriate hormonal substances (PG extract 160-190mg/Kg body wt.) and doses for successful propagation of fish. The brood fish were bred; their offspring were reared in the earthen nurseries and later on transferred to field research complex of Bangladesh Agricultural University, Mymensingh.

Collection of egg sample

To study the developmental stages, the eggs were collected randomly from the hatching jar. The developing stages of *M. pancalus* were observed at every 5 to 10 mins interval till completion of morula and then after every one-hour interval up to hatching. The eggs were put into 70% ethanol for preservation for further study. At least 10 eggs undergoing embryonic development process were studied to get precise information.

Collection of larval sample

The larval samples were collected from the hatching jar. Initial samples were collected at hourly intervals. At least five larvae were collected and immediately put into 70% ethanol for further study. The larvae were examined as soon as they were collected.

Developmental stage

Early developmental stages were studied under a stereomicroscope (Olympus bx 51 Japan research stereo). Five individuals at each developing stage were examined for confirmation of various stages and the timing of development. The stages of development were observed at every 5 to 10 mins interval till the completion of morula and then after every one-hour interval till completion of organogenesis. The development stages were documented by using a camera (Olympus, Japan-e5000) fixed on a stereo microscope.

Preparation of embryo or larvae for microscopic study

Staining of the fish larvae: For the study of development stages, the fish larvae were temporarily stained with methylene blue for clear observation.

Drawing of specimens: Specimens of early stages of *M. pancalus* were drawn by hand using a camera (Olympus, Japan e5000) setting on stereo microscope (Olympus, bx51 Japan research stereo).

Results and Discussions

Embryonic development

Unfertilized eggs (stage 1): Unfertilized eggs measured 0.5±0.00 mm in diameter (plate A).

Fertilized eggs (stage 2): The fertilization of eggs took place as soon as the sperm enters into the eggs Immediately after fertilization the diameter of the egg was found to be 0.7±0.02 mm. Fertilized eggs had a spot (blastodisc) on one pole and were readily recognizable through naked eye within 30 mins of fertilization (plate B).

Two celled stage (stage 3): The first cleavage of eggs occurred within 1.05 hrs at 28^0C. The cleavage of eggs was partial or meroblastic, forming a transitory blastula stage. The blastodisc was divided into 2 distinct cells by vertical cleavage within 40 mins post fertilization (plate C).

Four celled stage (stage 4): A second cleavage was observed forming four cells within 1.20 hrs. The second cleavage was at right angle to the first. At this stage eggs measured 1.2±0.01 mm in diameter. (Plate D and E).

Eight celled stage (stage 5): Third cleavage forming eight cells was recorded after 1.10 hrs of second cleavage at 28^0C (plate F). The diameter of the eggs was 1.2±0.02 mn.

Sixteen celled stage (stage 6): The sixteen celled stage was developed within 2.40 to 3.10 hrs (plate G). The mean diameter of the eggs was 1.2±0.02 mm.

Multi celled stage (stage 7): The sixteen celled stage in quick succession transformed into 32, 64, 128 celled stage and so on dividing geometrically. This occurred so quickly that it was very difficult to observe or count all the cells. So, it was generally referred to as multi celled stage. Eggs were measured 1.2±0.01 mm (plate H).

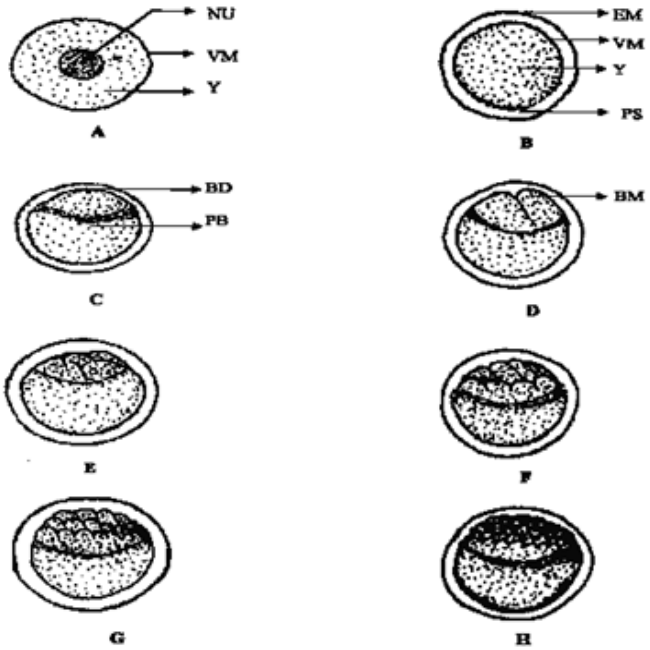

Plate A. Unfertilized egg
Plate B. Fertilized egg
Plate C. Blastodisc just formed
Plate D. Two celled stage
Plate E. Four celled stage
Plate F. Eight celled stage
Plate G. Sixteen celled stage
Plate H. Multi celled stage
NU = Nucleus, VM = Vitelline membrane, Y = Yolk, EM = Egg membrane
PS = Perivitelline space, BD = Blastodisc, PB = Periblast, BM = Blastomere
Plate (A–H) Unfertilized eggs and fertilized eggs with different developmental stages

Fig. 1 Unfertilized and fertilized eggs with different developmental stages

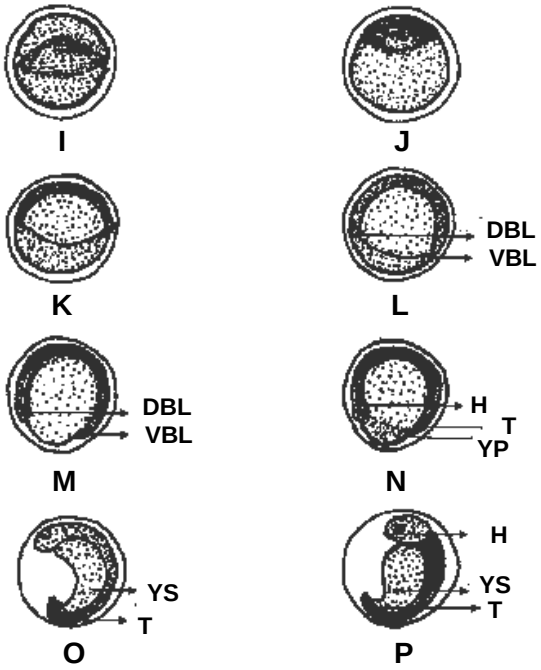

Plate I. Morola stage
Plate J. Early gastrula stage
Plate K. Middle gastrula stage
Plate L. Late gastrula stage
Plate M. Yolk plug stage
Plate N. Organogenesis
Plate O. Hatching stage
Plate P. Just before hatching
DBL = Dorsal Blastophore Lip, VBL = Vental Blastophore Lip, H = Heat, T = Tail
YP = Yolk Plug, YS = Yolk Sac
Plate (I–P) Fertilized eggs with different developmental stages

Fig. 2. Fertilized eggs with different developmental stages

Morula stage (stage 8): The blastomeres after repeated cleavage resulted into morula stage within 10.40 hrs after fertilization. A cap like structure was seen over the animal pole, which was gradually increased in size. Eggs were measured 1.2±0.01mm (plate I).

Early gastrula stage (stage 9): Following the morula stage the blastoderm started invading the yolk by spreading over the yolk in the form of a thin layer. Gastrulation resulted within 21.00 hrs of fertilization. Eggs were measured 1.2±0.01 mm in diameter (plate J).

Middle gastrula stage (stage 10): This stage appeared at 24.30 hrs after fertilization. The formation of germinal ring around yolk was clearly visible and that about half of yolk was occupied by blastoderm. The mean diameter of the eggs was 1.2±0.01 mm (plate K)

Late gastrula stage (stage 11): In this stage, blastoderm covered 3/4 th of the yolk and embryonic shield was clearly visible. Optic rudiment appeared. The diameter of the eggs was 1.2±0.01 mm (plate L).

Yolk plug stage (stage 12): In this stage, the yolk invasion was completed by gradual spreading over the germ layer. Rudimentary head and tail appeared and became differentiated. It was seen 30.00 hrs after fertilization. It measured 1.2±0.01 mm in diameter (plate M).

Organogenesis (stage 13): The head and tail end of the embryo was differentiated (plate N). The embryo was elongated and encircled the yolk materials. Both tail and head ends were clearly differentiated and the beating heart was visible (plate O). Heart rudiment, pectoral fin buds, otocysts and gill rudiment appeared one by one. The pectoral fin appeared first as a bud and then the fin rays were formed. At this stage the eyes lack were of pigments, the notochord in cellular structure became visible within 32.00 to 33.30 hrs. When auditory and optic vessels developed.

Just before hatching (stage 14): The embryo further elongated and was gradually differentiated. The tail gradually became detached from the yolk mass. This stage was obtained in 34.00 to 35.00 hrs (plate P). Embryo started occasional twisting movement. The embryos ruptured the egg shell by the continuous movement. Larvae emerged with its tail portion first in 34.00 to 35.00 hrs after fertilization. Hatching continued for 2.30hrs because the entire embryo did not hatch out at a time. Newly hatched spawn measured 1.30±0.02 mm just after hatching (plate P). The rate of development of the embryo had varied, accordingly to the variation in the temperature of water. The higher the temperature the quicker was the development process and vice versa.

Hatching

The findings of larval development process of *Mastacembelus pancalus* at different stages were given below (Table 1). All the larval development stages have been documented in Fig. 3.

Table 1. Summary of embryonic developmental events of *M. pancalus* in **the laboratory**

Phase	Plate No	Stage	Taf (hrs)	Mean Temperature	Mean Diameter (mm)	Characteristics
1	2	3	4	5	6	7
Unfertilized eggs	a	1	0.00	27.00±0.02	0.50±0.00	eggs spherical ,brownish-yellow, demersal and adhesive
Fertilized Eggs	b	2	0.00	27.50±0.01	0.70±0.02	eggs spherical , brownish-yellow , demersal and adhesive
Blastolation (segmentation)	c	3	0.30	28.00±0.01	1.20±0.01	one hour and five minute after initiation of 1st cleavage, a small disc of cytoplasm was observed at the animal pole, dividing blastodisc into two blastomeres.
	d-e	4	1.10-1.20	28.00±0.01	1.20±0.01	the 2nd division of the two blastomers resulted in four blastoers.
	f	5	2.20	28.00±0.01	1.20±0.01	eight blastomeres formed
	g	6	3.10	28.00±0.01	1.20±0.02	sixteen celled stage reached
	h	7	5.20	28.50±0.02	1.20±0.01	multiple cell visible
Morula	i	8	10.40	29.00±0.02	1.20±0.01	blastomeres visible at the animal pole, which gradually increased in size over time.
Gastrulation	j	9	21.30	29.00±0.01	1.20±0.01	blastomeres gradually increased which started invading the yolk by spreading over the yolk in the form of a thin layer.
	k	1o	24.30	29.00±0.01	1.20±0.01	germinal ring visible, which occupied about half of yolk by blastoderm.
Yolk plug Stage	m	12	31.30	30.00±0.01	1.20±0.01	the yolk invasion completed rudimentary head tail appeared and become differentiated.
Organogenesis	n-o	13	32.00-33.30	31.00±0.02	1.20±0.01	appearance of heart rudiment,pectoral fin buds and gill rudiment.at this stage eye lack of pigment, the notochord in cellular structure within 33.40 hours, when auditory and optic vessels developed.
Just before hatching	p	14	34.00-35.00	31.00±0.02	1.30±0.02	start of hatching, initiation of twisting movement and the embryo detached from the yolk mass. twisting movement become more vigorous and the embryo ruptured the egg capsule.

Taf = time after fertilization

Zero hour post hatching (stage 1): Newly hatched larvae (2.10±0.04 mm) were slender, straight and transparent, gradually tapering towards the tail. Hearts of the larvae were functional in between head and the anterior margins of the yolk (plate A).

One and half hour post hatching (stage 2): The length of the larvae was 2.15±0.04 mm. The colour of larvae was green black. Yolk sac remained attached to the body. Melanophore bands appeared on posterior end of the body (p1ate B).

Four hour post hatching (stage 3): The body was transparent. The yolk sac became partially decreased. Two vertical bands of melanophores appeared at the posterior end. The total length was measured 2.20±0.02 mm (plate C).

Seven hour post hatching (stage 4): Melanophores appeared on the head, around the yolk sac or on the yolk sac. The anterior part began to thicken. The colour of the yolk sac was brown-yellowish. The total length was measured 2.30±0.01 mm (plate D).

Ten hour post hatching (stage 5): The yolk sac was partially reduced. Melanophores appeared more prominent. The length of the larvae was 2.55±0.03 mm (plate E).

Thirteen hour post hatching (stage 6): A tubular pulsating heart appeared. Eye and anus become slightly visible. Intestine was visible. Notochord appeared. The leneth of the larvae was 2.80±0.07 mm (plate F).

Fifteen hour post hatching (stage 7): Pectoral fin bud appeared. Melanophore bands were very much prominent at the posterior end of the body. A large number of melanophores also appeared above the eye and around the yolk sac. The larvae were increased to 2.95±0.05 mm in size (plate G).

Seventeen hour post hatching (stage 8): More melanophores appeared on the head and body. Brain did not differentiate from the body. Yolk sac slightly decreased. Myomere were still partially visible. The length of the larvae was 3.00±0.02 mm (plate H).

Twenty one hour post hatching (stage 9): The total length of the larvae measured 3.25±0.02 mm. The eyes were slightly pigmented. External melanophores appeared dorsally on head. Myomeres were partially visible. The yolk sac became thin (plate I).

Twenty five hour post hatching (stage 10): Chromatophores were visible in the head and above the eyes. Eyes became pigmented and dark in colour. Pectoral and pelvic fin bud appeared. Air bladder was visible. Myomere was partially visible. The larvae were increased to 3.50±0.01 mm in size (plate J).

Thirty three hour post hatching (stage 11): Myomeres were visible. Colour of larvae changed to silver-yellowish. Mouth cleft formed. At this stage; the length of the larva was 4.25.0±0.01 mm in size (plate K).

Thirty six hour post hatching (stage 12): At this stage, the length of the larva was 4.60±0.03 mm. The pectoral and pelvic fin buds were found. The colour of the larvae was whitish-black. Eyes became whitish black (plate I).

Forty one hour post hatching (stage 13): Eyes were increased in size and became densely pigmented. Brain lobe was visible. Pectoral and pelvic fin fold were well developed. Myomeres were partially visible. At this stage, the length of the larva was 4.80±0.02 mm (plate M).

Forty five hour post hatching (stage 14): Opercula fold appeared. Brain lobe clearly visible and mouth cleft easily distinguished. The heart functioned actively. Upper and lower jaws were fully formed. The larvae were increased to 5.15±0.01 mm in size (plate N).

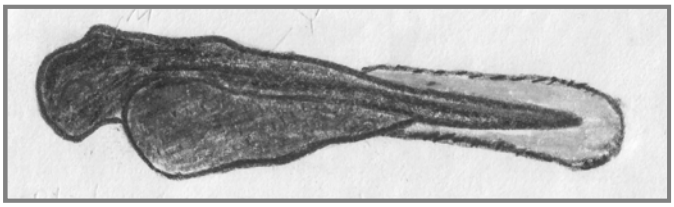

Plate A. zero hour old larvae

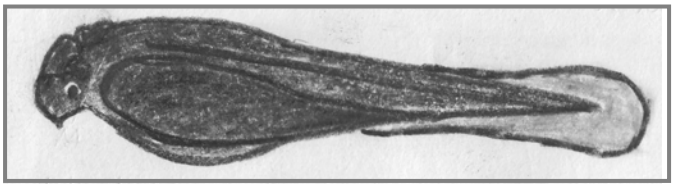

Plate B. three hour's old larvae

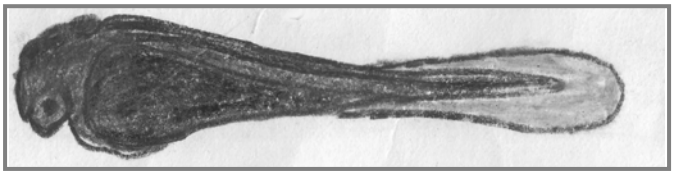

Plate C. five hour's old larvae

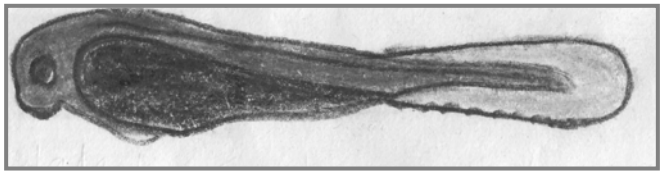

Plate D. eight hour's old larvae

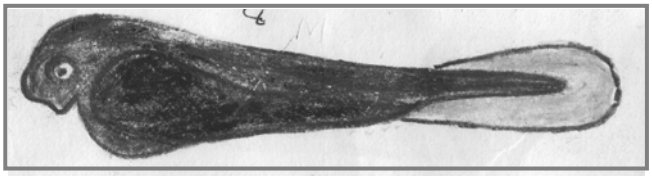

Plate E. ten hour's old larvae

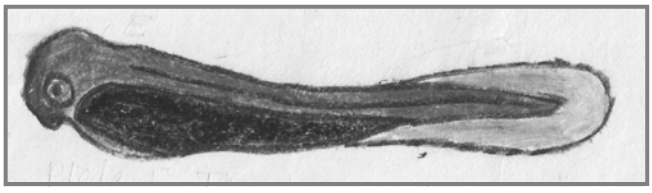

Plate F. thirteen hour's old larvae

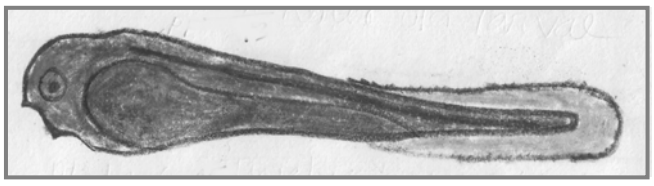

Plate G. fifteen hour's old larvae

Fig. 3 Different developmental stages of newly hatched larvae (continued)

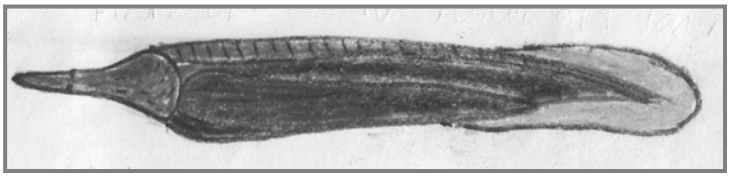

Plate H. Seventeen hour's old larvae

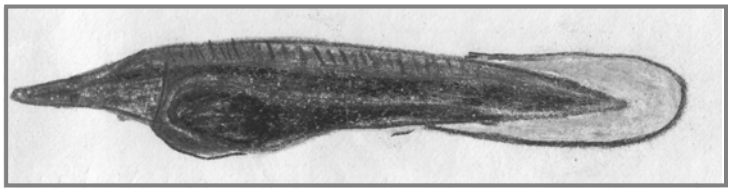

Plate I. Twenty one hour's old larvae

Plate J. Twenty five hour's old larvae

Plate K. Thirty three hour's old larvae

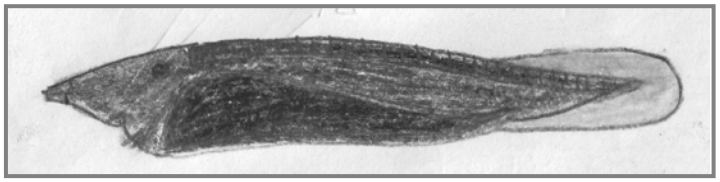

Plate L. Thirty seven hour's old larvae

Plate M. Forty one hour's old larvae

Plate N. Forty five hour's old larvae

Fig. 3 Different developmental stages of newly hatched larvae (continued)

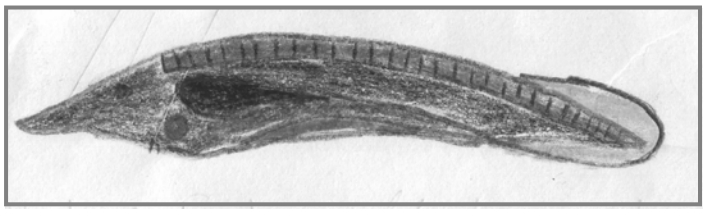

Plate O. Fifty one hour's old larvae

Plate P. Sixty hour's old larvae

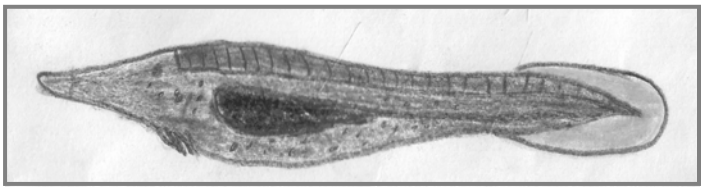

Plate Q. Sixty seven hour's old larvae

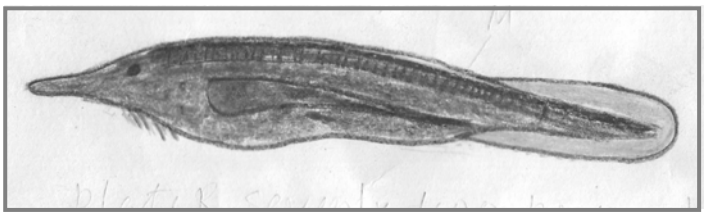

Plate R. Seventy two hour's old larvae

Fig. 3 Different developmental stages of newly hatched larvae

Fifty one hour post hatching (stage 15): Air bladder was distinct. A few black chromatophores were found in a row from the posterior to the auditory concentrations up to the base of the caudal fin. Large black chromatophores were observed on head. The larvae were increased to 5.35±0.02 mm in size (plate e).

Sixty hour post hatching (stage 16): Eyes were fully pigmented. Pectoral fin bud was more pronounced. The length of the larva was 5.40±0.01 mm (plate p).

Sixty five hour post hatching (stage 17): The larvae were 5.45±0.02 mm in length. The brain lobe was fully visible. Yolk sac completely disappeared and larvae had started feeding.

Seventy two hour post hatching (stage 18): Eyes were fully pigmented. Distinct black chromatophores were seen behind the eye. Myomere was clearly visible. The larvae were 5.50±0.02 mm in total average length (plate r).

Table 2. Summary of larval development events of *M. pancalus* in the laboratory

Stage No.	Age (hrs)	Plate No.	Mean total Length(mm)	Characteristics
1	0.00	a	2.10±0.04	larvae become brown-yellowish in color, yolk sac attached to the body. larvae slender, transparent showing internal organs.
2	1.30	b	2.15±0.04	larvae brown-yellowish in color, yolk sac still remained attached to the body, melanophore bands appeared on posterior end of the body and larvae slender, transparent showing internal organs.
3	4.00	c	2.20±0.02	body of the larvae becomes more transparent. head and body laterally compressed. yolk sac partially decreased.
4	7.00	d	2.30±0.01	melanophores appeared on the head, around the yolk sac. the anterior part began to thickness.
5	10.00	e	2.55±0.03	yolk sac partially reduced. the tail thickened a melamophores distribution no change.
6	13.00	f	2.80±0.07	a tubular pulsating heart appeared. yolk sac reduced. eye and anus slightly visible. intestine also appeared.
7	15.00	g	2.95±0.05	vertical melanophore bands become very prominent chromatophores seen in the eye only. anal fin fold more prominent. pectoral fin bud appeared.
8	17.00	h	3.00±0.02	interior part of the yolk globular in shape. pectoral fin rudiment faintly visible.
9	21.00	i	3.25±0.02	newly chromatophores appeared above eyes. yolk sac became thin.
10	25.00	j	3.50±0.01	operculum appeared but did not extend over gills. dark eyes pigmented .myomeres partially visible. prominent pectoral and anal fold. air bladder and distinct. myomere slightly visible.
11	33.00	k	4.25±0.01	myomeres visible. color of the larvae change to brown –yellowish. mouth cleft formed.
12	37.00	l	4.60±0.03	the eyes increased in size and pigmented. pectoral fin and mouth cleft more prominent. dorsal and ventral sides of the larvae pale yellow. brain lobe visible.
13	41.00	m	4.80±0.02	pectoral fin fold well developed. mouth cleft more prominent. the eye increased in size and densely pigmented with reddish color.
14	45.oo	n	5.15±0.01	opercula fold appeared. brain lobe clearly and mouth cleft easily distinguished. the heart functioned actively.
15	51.00	o	5.35±0.02	yolk sac convex interiorly, air bladder becomes distinct. a few black chromatophores in a row from the area posterior to the auditory concentration up to the base of the caudal fin. large black chromatophores observed on head. gills prominent and air bladder elliptical in size.
16	60.00	p	5.40±0.01	eyes fully pigmented. pectoral fin bud becomes more pronounced. the jaws more pigmented.
17	67.00	q	5.45±0.02	brain lobe is fully visible. yolk sac completely disappeared and larvae started feeding.
18	72.00	r	5.50±0.02	myomere clearly visible. the larvae silver-blackish and transparent in color. larvae swim actively.

In the present study, we succeeded in obtaining larvae of *Mastacembelus pancalus* by artificial fertilization. Fertilized eggs were round, transparent, demersal and adhesive. The colour of the fertilized eggs was yellowish- brown. Mookerjee (1945) found more or less greenish-brown colour in case of *Labeo rohita.* The diameter of *Mastacembelus pancalus* eggs after fertilization was increased from 0.50±0.00 to 0.70±0.01 mm, while according to Chakraborty and Murty (1972), the diameter of the fertilized eggs of *L. rohita* ranged between 4.1 to 4.8 mm with an average 4.4 mm. These differences in egg diameter are due to the variation in species and brood size of major carp. The two cell stage, four cell stage, eight cell stage, sixteen cell and multiple cell stage of *Mastacembelus pancalus* were found within 1.05, 1.20, 2.20, 3.10 and 5.20 hrs after fertilization, respectively. In case of *L. rohita* same series of stages occurred at 35, 45, 70, 95 and 130 mins after fertilization

(Mookerjee, 1945). Morula stage was found ten and half hours after fertilization where as Mookerjee (1945)) observed the same stage in the case of *L. rohita* 5 hrs and 45 mins after fertilization. This variation was due to the species difference and temperature. The gastrula stage was observed in *Mastacembelus pancalus* at 21.30 to25.50 hrs after fertilization of egg at a temperature of 31.00±0.02°C. Galman (1980) observed initiation of gastrulation within five hours in case of *Tilapia nilotica* at 26.0 to 27.0°C. The heart rudiment, gill rudiment and pectoral fin buds of *Mastacembelus pancalus* appeared after 32.30 hrs, 33.00 hrs and 32.10 hrs of fertilization respectively, whereas, Mookerjee (1945) observed the same characteristics in 15 hrs and 5 minutes, 14 hrs and 50 minutes and 13 hrs and 30 minutes in case of *L*. *rohita.* Incubation period of *Mastacembelus pancalus* was 34.00- 35.00 hrs at water temperature of 27.0 - 31.0^{0}c, which was almost double in case of *Cirrhinus mrigala* (Chakraborty and Murty, 1972).

The length of the newly hatched larvae of *Mastacembelus pancalus* was found to be 2.10±0.04 mm. But Mookerjee (1945) found the newly hatched larvae of olive barb, *Puntius sarana* to be 4.2 to 4.7 mm. The apparent deviation in the size of hatchlings of *Mastacembelus pancalus* from that of *Puntius sarana* might be related with the size of the olive barb which is much larger than the *Mastacembelus pancalus.* In larval stage at 15.00 hrs after hatching, the development of pectoral fin bud of *Mastacembelus pancalus* appeared which was similar to *Cirrhinus mrigala* (Khan, 1943) and according to Chakraborty and Murty (1972), the development of ventral embryonic fin fold of *C. mrigala* was *more* prominent which was very similar to this study. Twenty four hours after hatching operculum appeared but did not extend over gills; pectoral and pelvic fins were prominent and air bladder was visible, which were similar to *L. rohita and C. mrigala* (Khan, 1943 and Chakraborty and Murty, 1972. In *Mastacembelus pancalus,* the yolk sac was convex anteriorly, air bladder distinct, chromatophores was found on the head behind the eyes and in the auditory region, gills were prominent and air bladder was elliptical. These aspects of organogenesis were similar to *L. rohita and C. mrigala* (Khan, 1943 and Chakraborty and Murty, 1972). The yolk sac of the guchibaim after hatching of 65 hours was completely disappeared and brain lobe was fully visible but Chakraborty and Murty (1972) found these developments in *C. mrigala* within 72 hrs. Larvae of *Mastacembelus pancalus* started feeding movement after 65hrs of fertilization when they reached a length of 5.45 mm. This agrees with the findings of Bruton (1979).

During the present experiment the embryonic and larval development of *Mastacembelus pancalus* were studied at an ambient temperature of 27.00 to 31.00°C. The rate of development of the larvae varied from other species. This variation seems to be temperature dependent. The higher the temperature the quicker was the development (Hoar And Randal, 1969). Considering all the facts and findings of the experiment the present work provides information on early development stages of the *Mastacembelus pancalus.* The present work generated some information on the early life history, developmental stages and commencement of first feeding time for larval rearing. This study will help fishery biologists in understanding the biology and ecology of the fish, which might be of great use to take appropriate measure for sustainable development of culture and management technology of *Mastacembelus pancalus.*

Conclusion

Embryonic development of *Mastacenbelus pancalus* was studied in relation to various time intervals. The embryonic and larval developing stages of guchibaim were observed at every 10 mins interval till the completion of morula and then every one hour interval up to hatching. The eggs were preserved into 70% ethanol for further study. Early development stages were studied under a stereomicroscope. Based on the results of the present study following conclusion may be drawn:

The experiment provides information on early developmental stages of *Mastacembelus pancalus*.

I. This study generated some information on the early life history and commencement of first feeding time for larval rearing.

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