CHAPTER - XIV

LIFE HISTORY OF NEMACHILUS KASHMIRIENSIS - HORI IN KASHMIR
CHAPTER IV
LIFE HISTORY OF Nemachilus Kashmiriensis Nova in Kashmir

This fish is one of the most beautiful ornamental fishes which is highly prized for food also. It is present in lakes, streams and rivers of Kashmir. This cobbid is conspicuous in the fish fauna of Kashmir on account of its small size and speckled pigmentation. The average size in this species varies between 5 cm. to 7 cm, maximum size reaching up to 9 cm. only. Their weight is also comparatively low of the order of 6 g to 7 g. This fish is with slender, cylindrical body with dark brown spots arranged transversely along the entire body. There are six barbels two rostral pairs and one maxillary pair.

* Nemachilus Kashmiriensis* is the first spring spawner in Kashmir. The spawning period lasts throughout the month of April. This fish neither shows seasonal abundance nor territorial behaviour. The spawn is present above the green algae in comparatively clear waters. The development of the embryos proceeds successfully at water temperatures between 6°C -7°C.

The present investigations are based on the observations made on the material collected in the field during the preceding and post-breeding reasons. The larval and post larval stages were collected by means of handnets, especially designed for the collection of larval stages by the local fishermen.

These larval and post larval stages were then reared in the aquarium in the laboratory and regular observations were noted so as to follow the pattern of life-history development of *Nemachilus Kashmiriensis*.

**Stage I**: The size of the larva is 3.4 mm. It is approximately 7 days old. It shows following prominent features:

1) The larva is very active swimmer.
2) The yolk sac has completely disappeared.
8) The mouth has broken through and the greenish contents in the gut indicate that feeding had begun.

4) The air-bladder has not shifted to its final anterior position but shows tendency towards division into two chambers.

5) The blood is coloured.

6) The otic capsule contains two otic vesicles.

7) The eye is pigmented.

8) The fins are distinct but the dorsal, caudal and the anal are not completely separated from the one continuous adipose fin. The fin-rays are formed in the fins.

9) The caudal fin has not attained its final shape as yet.

10) The gut is not yet distinctly formed.

11) The operculum has four gills with gill rakers.

12) The disceidal melanophores are present mostly on the dorsal side of the body, but in very preliminary fashion, the specks not yet distinct. The pigmentation in head and the tail is only diffused.

13) The 6 barbels of the genus Nemachilus are present (Plate I, top)

**STAGE II**: This stage is 5 days older than the Stage I and, therefore, about 10 days old. It does not show much advance over the previous stage in length but shows comparatively higher degree of organodifferentiation.

It has following features:

1) The size is 5.5 mm.

2) The gut is comparatively better formed than the previous stage.

3) The air-bladder is a double-chambered structure and slightly shifted to the anterior side.

4) The otic vesicles in the otic capsule increased in size.

5) The olfactory capsule is a distinct and prominent structure but very close to the eyes.
6) The dorsal, anal and caudal fins become more separated from the median continuous fin. The fin-rays in the dorsal, anal, pelvic and pectorals are fully formed, while in the caudal these have not attained the final pattern.

7) The caudal fin is on the pattern of the final shape.

8) The pigmentation of the eye is more darkened.

9) There is appearance of stellate melanophores on the ventral side of the vertebral column, and addition in melanophores on the head region.

10) The head has increased in width. (Plate I, bottom).

STAGE III: This stage was recorded three days after the stage II and is, therefore, 15 days old. There is a general increase in the width of anterior half of the trunk. The body has also increased in length.

1) The length of the body is 5.6 mm.

2) The gut is a regular and prominent tube below the air-bladder.

3) The air-bladder is increased in size and shifts to the anterior, close to the opesulum.

4) The otic otic capsule also shifted below toward the vertebral column. The number of otic vesicles is 5.

5) The olfactory capsule shifts to the anterior towards the mouth.

6) All the fins but for caudal fin are fully demarcated from the continuous median fin and have well-developed fin-rays.

7) The caudal fin-rays have not yet attained the final pattern.

8) The eyes have shifted more dorsally and heavily pigmented.

9) The melanophores are arranged in the form of spots in a regular fashion. There is a dorsal row of spots and a lateral row along the vertebral column. A few scattered spots are also present on the post and region below the vertebral column. The pigmentation on the head is yet diffused.
10) The barbels have increased in size only slightly.

11) The end of the tail curved upwards. (Plate II- top).

**STAGE IV:** This is the 15 days old stage of *N. Kashmiriensis.* This is a rather well developed larva showing greater degree of organogny very much after the adult stage.

1) The length of larva is 3.7 mm.

2) There is development of exoskeleton so that the internal structure is less and less visible.

3) The olfactory organs fully formed and at its final position at the extreme anterior of the head.

4) The number of melanophores increased. The spots are rather prominent and reaching also towards the head region.

5) There is great addition of stellate melanophores on the sides of the air-bladder.

6) The tail is considerably lengthened.

7) The mouth is distinct.

8) The stomach is a distended bag-like structure puffed with food.

9) There are 6 as distinct fin rays in the dorsal fin, 9 fin rays in anal fin 5 fin-rays in the pectoral fin and 4 fin rays in the pelvic-fin.

10) The anal fin rays still not completely formed.

11) The anal spine is present. (Plate II, bottom).

**STAGE IV:** This is 20 days old post larval stage. This may be safely named as a FRY-Stage. Here in we find following important features –

1) There is appreciable increase in the size of the larva. The length is 4.2 mm.

2) The head, trunk and the tail region are prominently distinct.

3) The number of black spots has greatly increased and is almost on the
pattern of the adult fish.

4) The fin-rays are completely formed even in the caudal fin. The number of fin rays is between 15-15.

5) The post larva is voracious eater and makes swift movements.

6) The air-bladder is completely double-chambered with partition. (Plate III, top)

STAGE VII: This is a 25 days old fry. This is a very well developed and highly organised stage. This is not very much different from the previous stage (V).

1) The length of the fry is 4.5 mm.

2) The fin-rays in all the fins are formed.

3) Operculum is a distinct structure.

4) There is great development of the esoco skeleton.

5) The caudal fin is in its final shape, i.e. flame-like.

6) The melanophores are very prominent structures.

7) The air-bladder is completely separated into two unequal halves.

8) The 6 barbels are prominent structures.

9) Eyepads are present below the caudal spine. (Plate III, bottom).

50 DAYS OLD FRY STAGE: This is comparatively very highly advanced stage in the life-history of this fish. The auditory vesicles are no longer visible due to the growth of the skull over them. The larva is very active and feeds on the algal and zooplanktons. The air-bladder is shifted anteriorly and is transparent structure. The length is 5 mm.

Since the temperature of the water now rising (9°C - 9°C) the growth is rather rapid. (Plate IV).

55 DAYS OLD FINGERLING STAGE & ITS CHANGE TO JUVENILE: This is the last stage in the larval development of the fish. This fry has changed into fingerling stage and has become slender and cylindrical. It looks like a
juvenile Nemachilus kashmiriensis. It has following features:

1) The length is 5.5 mm.
2) Scales absent.
3) The colour is irregularly blotched and mottled with dark brown.
4) The fins are more or less spotted.
5) Some bars are present on the back of the tail.
6) The 6 barbels are prominently and distinct.
7) Otolith is transparent.
8) The air-bladder rather shifted towards the gills.
9) There are 9 dorsal fin-rays, 5 anal fin-rays, 18 caudal fin-rays, 11 pectoral and 7 pelvic fin-rays.
10) The lateral line system not yet visible.
11) The myotomes are no longer visible.

The larva completes its most embryonic metamorphosis and becomes a replica of its parents but is sexually immature. (Plate V).
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