

FLORA AND FAUNA

2015 Vol. 21 No. 1 PP 80-84

ISSN 0971 - 6920

THE COMPARATIVE STUDY OF BUCCOPHARYNX OF *LABEO DERO* AND *GLOSSOGOBIUS GIURIS* IN RELATION TO THEIR FOOD AND FEEDING HABITS

NAND KISHOR PRASAD AND N.P. SINGH¹

Department of Zoology
M.S. College, MOTIHARI,
BIHAR

nankishorprasad50@gmail.com

Received : 5.2.15; **Accepted** : 30.3.15

ABSTRACT

In this investigation *Labeo dero* and *Glossogobius giuris* were the material for study. *Labeo dero* is herbivorous and *Glossogobius giuris* is carnivorous. In *Labeo dero*, the food mainly comprised of algae, diatoms, plant material & zooplanktons. On the other hand in *Glossogobius giuris*, the food mainly consisted of animal nature such as crustacean, insects, larvae, small fishes & tadpoles. The mouth and buccopharyngeal region of the fishes under observation were modified according to the various kind of food. Hence in the present study special attention was laid down upon the modification of buccopharynx based upon the food and feeding habits

Figures : 02

References : 13

Table : 00

KEY WORDS : Buccopharynx, Carnivorous, Herbivorous.

Introduction

Normally the fishes are herbivores, carnivores or omnivores, feeding predominantly on plant food, animal food or a combination of both plant and animal food respectively. However, a few fishes depend entirely on phyto and zooplankton and therefore, called plankton feeders. In either case a meagre amount of sand/mud is also observed in the gut contents. This feeding habit is supported by the highly adapted bucco- pharyngeal region to suit the ingestion and utilization of readily available food items in and around the surroundings.

The mouth, buccal cavity and the pharynx are concerned with the selection and seizure of the food. The position and form of the mouth, dentition on the jaws and in the buccopharynx and gill rakers, show a close relation with the mode of feeding and the kind of food.

In herbivorous fishes true teeth are absent due to soft nature of food. The folded mucosa with papillae and comb shaped plate in the region of buccopharynx are found in herbivorous fishes to prevent the escape of food hence compensate the absence of teeth. The inferior pharyngeal teeth are present in herbivorous forms to crush the prey.

In carnivorous fishes buccopharynx is armed

with well developed superior and inferior pharyngeal teeth. There are teeth also on the jaws. The pharyngeal teeth prevent the regurgitation of food and act as rasping organ also. The teeth found on the jaws prevent the escape of the prey. Several workers studied on the feeding behaviours of the fishes^{1,2,4,12}.

Materials and Method

Labeo dero and *Glossogobius giuris* were collected from local market. The collected specimens were washed and preserved in 10% formalin solution. After this preserved fishes were dissected and opened the mouth through each angle. The roof and floor of the mouth were washed properly and detail study was carried out. For stretching purpose the buccopharyngeal region was preserved in 70% alcohol and glycerine.

The guts of fishes were examined for their food and feeding habits. The food contents were examined mainly from intestinal bulb and intestine. The jaws, teeth, gills and gill rakers were examined very minutely.

Result

Labeo dero

Food and feeding habits – *Labeo dero* (Local name - Pathaarchatta) is a herbivorous and bottom

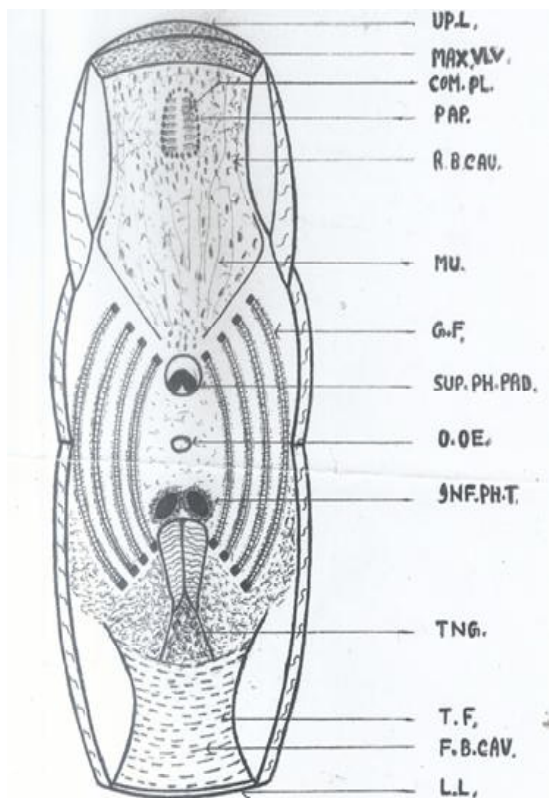


Fig. 1 : Bucco-pharynx of *Labeo dero*

feeder fish. Its food mainly comprises of algae, diatoms, plant materials and zooplanktons. A considerable amount of sand and mud along with the gut contents was observed in this fish.

The buccopharynx of *Labeo dero* consisted of following:

Mouth:-The mouth was placed antero-ventrally just behind the end of the head. The opening of the mouth was wide and elliptical. The lower lip was slightly protrusible helping in extracting food from the mud.

Buccal cavity:-Anteriorly the buccal cavity was guarded by well developed upper and lower lips. The upper lip was beset with a large number of blunt papillae and taste buds. The upper lip was followed by a wide membranous and papillated maxillary valve. The mucous membrane of the roof of the buccal cavity was prominently folded so that grooves and ridges were formed. The grooves were provided with numerous backwardly directed

papillae. There was a depressed area in the mid dorsal line of the roof of the buccal cavity giving rise to a number of thin combed plates. The upper jaw and palate were edentulous.

The lower lip was beset with blunt papillae and taste buds. The mandibular valve was absent. The mucosa of the floor of the buccal cavity, behind the lower lip, was transversely folded and provided with minute papillae. The taste buds and mucous cells were found in buccal epithelium. Along the mid ventral line behind the transversely folded mucosa, a feebly developed tongue. The lower jaw and tongue are edentulous. The buccal cavity opens into pharynx.

Pharynx:-The pharynx could be easily distinguished from the buccal cavity by a V-shaped fold of mucous membrane. The pharynx could be distinguished into an anterior respiratory and gustatory part and the posterior masticatory part. On both sides the dorsolateral wall of the pharynx were perforated by gill slits. There were four pairs of gills and two rows of gill lamellae borne by the ceratobranchial and epibranchial segments of each gill arch. The gills were covered externally by the operculum. The operculum enclosed a cavity outside the pharynx called extra branchial chamber. All gill slits open into this chamber and finally branchial chamber opened out by single branchial aperture.

The floor of the pharynx was supported by a median cartilagenous rod which represented the fifth arch. The posterior end of rod possesses a pair of inferior pharyngeal bones, beset with a number of blunt and upwardly directed teeth called as inferior pharyngeal teeth. The superior pharyngeal pair of bones were not beset with teeth. The inferior pharyngeal teeth were situated just opposite to the dorsal pair of pharyngeal pads and formed an efficient grinding surface to crush the food material into finer parts.

Tongue: - It was situated along the mid ventral line of the floor of the buccal cavity. The tongue was not well developed consisting of only a thick layer of connective tissue and mucosa. It was provided with numerous taste buds.

Teeth:-The teeth were blunt and upwardly directed beset on the dorsal surface of paired inferior pharyngeal bones. A pair of superior pharyngeal pads was found just above the inferior pharyngeal teeth. Both structures formed an efficient grinding surface.

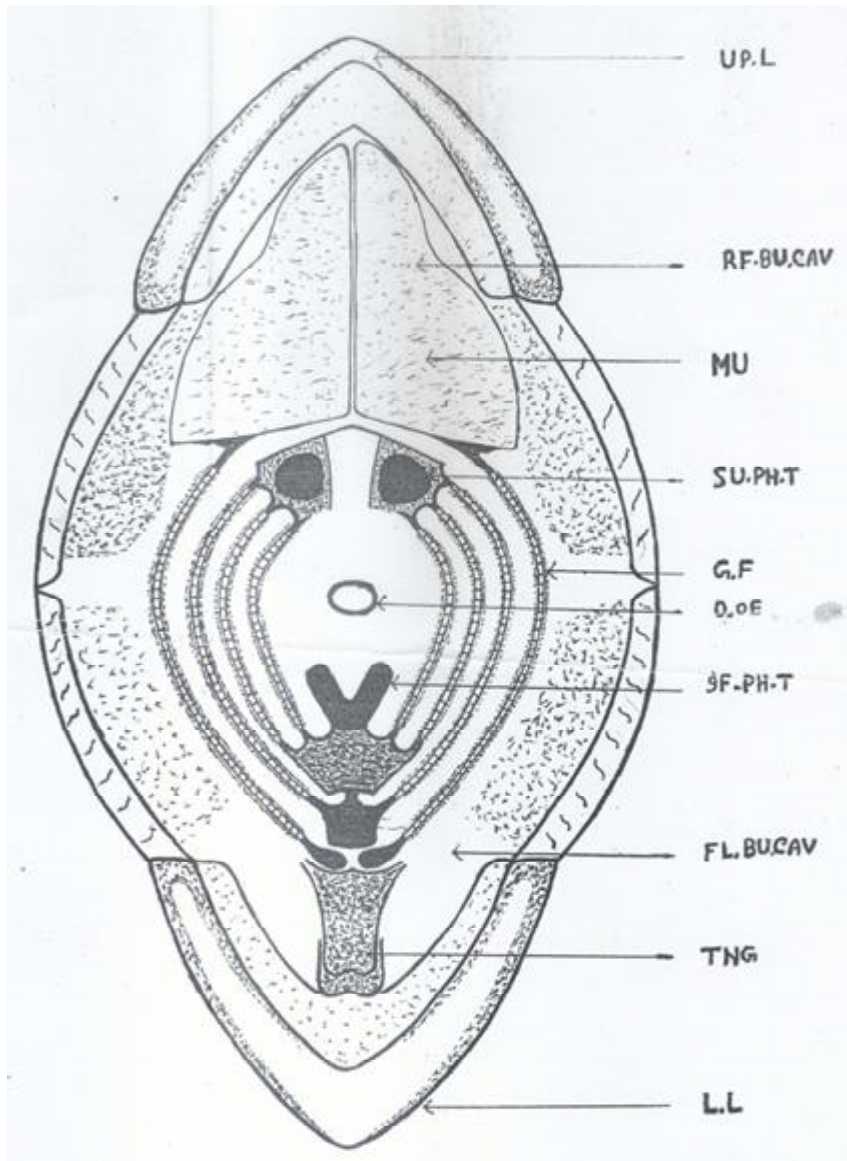


Fig. 2 : Bucco-pharynx of *Glossogobius giuris*

Gill rakers: - Those were numerous, thick, plate like and attached to the branchial arches by its bases. On each arch gill rakers were supplemented by small pointed finger like edentulous gill rakers. When two branchial arches came closer, an efficient sieve like structure was formed.

Glossogobius giuris

Food and feeding habit:-*Glossogobius giuris* was a carnivorous as well as predatory fish. It is a surface feeder with predominantly animal food such as crustaceans (copepods & daphnia), Insect (water bugs, beetles, dragon flies & damsel flies), larva and small fishes and tadpoles etc ,in the gut content.

The bucco- pharynx of *Glossogobius giuris* consist of following:-

Mouth:-The gap of mouth was wide and directed upward to enjoy surface feeding habit conveniently. The upper and lower jaws form the anterior boundary of mouth. The lower jaw is larger than the upper jaw. The skin is turned over the jaws, forming well developed movable lips which are highly important for food catching. Both the jaws are provided with well developed sharp, conical teeth. The mouth posteriorly leads in the buccal cavity.

Buccal cavity: - It was well developed and spacious. It is dorso-ventrally compressed and wide laterally. The roof of buccal cavity was provided with whitish muscular cushion pad covered by transparent mucus membrane. The whole area of buccal cavity was lined by smooth and soft mucus membrane, having providing large number of mucus secreting cells. These secreted mucus to lubricate the food for easy swallowing. The buccal cavity was devoid of papillae and taste buds. The buccal cavity led posteriorly into pharynx.

Pharynx:- It was compressed dorsoventrally and wide laterally. The floor of the pharynx was flat while roof was arched. The lateral wall of the pharynx was perforated by five pairs of gill slits separated by means of four pairs of gills. Each gill had two rows of gill lamellae, borne by the ceratobranchial and epibranchial segments of each gill arch. The gills were covered externally by the operculum. The operculum formed a cavity like structure outside the pharynx called extra branchial chamber, in which all the gill slits opened and finally branchial chamber opened out by single branchial aperture.

Tongue: - The tongue was well developed movable and a lie affixed along the mid ventral line of the floor of the buccal cavity. It was edentulous.

Teeth - The buccal cavity possessed three sets of teeth. Two sets of teeth were found behind the upper lip and one set behind the lower lip. As per their position, the teeth were called as maxillary teeth – borne on the premaxilla of upper jaw, vomerine teeth – borne on the vomer of upper jaw and mandibular teeth borne on the dentary of lower jaw. Interestingly all the teeth were similar and directed backward. The functions of these teeth were not mastication. They simply helped in catching the prey and preventing the escape of prey from mouth.

The posterior region of pharynx was graced

with well marked pharyngeal teeth both on the roof and the floor. On the roof, a little anterior to the gullet and between the upper ends of the posterior gill arches, the teeth were located on two wide separated rounded patches called as superior pharyngeal teeth. On the floor, the teeth were located on the two V – shaped elevated close set structure borne by the fifth gill arch called as inferior pharyngeal teeth. The pharyngeal teeth are similar with buccal teeth in structure. The function of pharyngeal teeth was to prevent the regurgitation of food or prey when once it has crossed into the gullet.

Gill rakers: - These were blunt, wide and teeth like, arranged in interlocking fashion and attached to the branchial arches through their base. The gill rakers form efficient sieve like structure when two gill arch came closer and act as rasping organ.

Discussion

The observation of food contents, feeding habit and food capturing apparatus (the bucco pharynx) as found in the fishes, *Labeo dero* and *Glossogobius giuris* in the present study were compared with other fishes. It was reported that structure of buccopharynx and alimentary canal of a fish were adapted according to the nature of food¹¹. A worker⁹ laid down emphasis that the fish adapt itself according to the availability of food. The present study also supports the finding.

L. dero was herbivore and its lower lip was protrusible due to bottom feeding habits. Both jaws lack teeth. The protrusible mouth has also been reported^{3,8,10} in *Mugil tade* and *Chagunius chagunio*.

G. giuris was carnivore and its mouth was not protrusible. The mouth was armed with well developed teeth because it had to capture the living flowing animals as food from water. Similar findings were found earlier⁶, in *Wallago attu*, *Channa marulius*, *Notopterus chitalo* etc.

In *Labeo dero*, the mucosa of the buccopharynx was folded to provide suitable space for food and form guiding ridges for minute vegetation and diatoms. This condition justifies its herbivorous feeding habit. Folded mucosa in *Catla catla*, *Barbus sarana* and *Mugil corsula* etc. was reported⁶.

Glossogobius giuris had no folded mucous membrane because of carnivorous nature. They need to push the food into oesophagus not to settle

down. Their buccopharyngeal epithelium was provided with mucus secreting cells to lubricate the food for easy passing on to the oesophagus. A worker⁶ reported the same feature in fishes having no folded mucous membrane in carnivorous forms.

The gill rakers of *Labeo dero* were used only for sieving purpose; it was an indication of being herbivorous. Similar findings were reported⁵ in *Mystus gulio*. But in the carnivorous species *Glossogobius giuris*, gill rakers only help in protection of gill filaments. In addition they could act as rasping organ too. A worker reported same condition in *N. chitala* and *C. marulius*⁶.

The tongue in *Labeo dero* was feebly developed and was represented by only raised area of thick layer of connective tissue and mucosa. This condition justified the herbivorous nature of feeding because herbivorous fishes take mostly the sluggish vegetation hence there was no need of

tongue. Feebly developed tongue in *Catla catla* and *Labeo dero* had a well developed mobile tongue as it has to feed on small animals which try to flee⁷.

The teeth were absent in *Labeo dero* due to certainly soft nature of food justifying its herbivorous feeding habit. The folded mucosa with papillae and comb shaped plates prevent the escape of food hence compensate the absence of teeth. The pharyngeal teeth might work for grinding if needed.

Glossogobius giuris had well developed teeth on both jaws and pharyngeal bones as it was carnivorous fish. Armed mouth was reported in *wallago attu*⁶.

On the basis of above discussion it could be concluded that the various parts of the buccopharynx of both the fishes in the present works are entirely adapted fully according to their food and feeding habits.

References

1. DAS, S.M. AND MOITRA, S.K. (1956) Part III Comparative anatomy of the alimentary tract and its modification in relation to feeding habits. *Proc.Nat.Acad.Sci.India,B* .XXVII,224 – 233
2. DUTTA,S.P.S.(1989 and 1990) Food and feeding ecology of *Mastacembelus armatus* (Lacep)from Gadigarh Stream,*Jammu,Matsya*.15 and 16 : 66 – 69
3. GIRGIS, S. AND S.(1952) The buccopharyngeal feeding mechanism in a herbivorous bottom feeding Cyprinoid fish *Labeo horie* (Cuvier): *J.Morph*. 90 : 281 – 315
4. HAQUE ,S.A. (2000) The biometry (age and growth and length weight relationship), food and feeding behavior and breeding and development of the fish *Mystus vittatus* (Bloch)in East champaran, Ph.D.Thesis (B.U.)
5. KAMAL PASHA, S.M.(1964) The anatomy and histology of the alimentary canal of an omnivorous fish *Mystus gulio*.*Proc .Indian Acad. Sci*.59. 211 – 221
6. KHANNA, S.S. (1962) A study of the buccopharyngeal region in some fishes, *Indian Jour.Zootomy* 3; 21 – 40
7. KHANNA, S.S.AND PANT, M.C. (1964) On the digestive tract and feeding habits of some teleostean fishes. *Agra,univ. J.Res. Sci*.13;15 - 30
8. LAL, M.B.BHATNAGAR, A.N.AND KAILE, R.K.(1964) Studies on the morphology and histology of the digestive tract and associated structure of *Chagunius Chagunio* (Ham.),*Proc.Natn.Acad. Sci.India* 34, 160 – 172
9. MOHSIN, S.M. (1944 -46) The morphology and histology of the alimentary tract of *Anabs testudineus* (B I), *J. Osmania uni. (Sci Fac)* 12, 66 -75.
10. PILLAY, T.V.R. (1953) Studies on the food and feeding habits and alimentary tract of the grey mullets, *Mugil tade* (Forsk); *Proc. Natn.Inst. Sci.India* 19,777-827
11. SINGH,R. (1967) Studies on the morphology and histology of alimentary canal of *Ophiocephalus marulius*, *Agra univ. Jour.Res (Sci.)* XVI.II.27-38
12. SINGH, K.M.(2002) Studies on the age and growth of *Channa marulius*(Ham.) found in the lakes of East Champaran Distt. With special references to its food and feeding habits, Ph.D.Thesis,B.R.A.B.U. Muzapharpur, .
13. SRIVASTAVA,S.,RAO,K.S.AND SEBASTION, S.(2000) Studies on the food and feeding interrelationship of *Mystus seenghala* with reference to growth from Kshipra river, *Indian J. Environ. and Ecoplan* 3(3): 307-311