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# Study of Alimentary Tract of Channa Punctatus from Kaigaon Toka, Aurangabad.

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**Abstract:**

The alimentary tract of teleosts has attracted considerable interest because of its diversity of form, related to diet. Therefore, the gross morphology and histology of the tract has long been a topic of investigation and the present study reveals information on alimentary tract of Channa punctatus. While observing the morphological characters of alimentary canal of *Channa punctatus* it is found that the alimentary canal is demarked into oesophagus, stomach, pyloric caecae, intestine and rectum. The mean alimentary canal length (ACL) observed was 17.4 ± 1.57cm. (Table 3.1).

**Keywords:** *Channa punctatus*, oesophagus, stomach.

## Introduction:

Studies on trophic morphology expanded following the classic work of Suyehiro (1942), Al- Hussaini (1949), and Angelescu and Gneri (1949), among others, who demonstrated that a correlation exists between the structures of the digestive apparatus and the feeding habit of fishes. Particular morphological traces give insights on the feeding ecology of a species, since these peculiarities suggest how a fish is able to feed. Wootton (1990) emphasized that there may be evolutionary convergence in the morphology of phylogenetically unrelated species that use similar food resources. Although the relationship between the morphology of the digestive apparatus and diet of fishes have been well documented (Suyehiro, 1942; Al- Hussaini, 1949; Angelescu and Gneri, 1949; Junger et al., 1989; Veregina, 1990), the morphological variations within trophic categories in tropical fishes appear to be poorly known, specially among detritivores and other benthic feeding fishes.

For a correct understanding of the feeding habits of a fish, a study of the anatomy of the organs of feeding and digestion is necessary. 'An examination of the special relations of food and feeding structures gives clues, not only to the present significance of fishes but also their past effect on life at large, showing how they must have modified the course of evolution' (Forbes, 1888). The feeding apparatus exhibits one of the most significant example of correlation, and the investigation of the food of a fish will be incomplete without a study of its alimentation. Al-Hussaini and Kholy (1954) have given an excellent review of the previous work relating to the correlation of the structure of alimentary tracts with the feeding habits of fish. His contributions (Al-Hussaini, 1945, 1946, and 1949) and that of Angelescu and Gneri (1949) have served to elucidate some of the most interesting morphological adaptation among fishes. Practically no work on these lines has been done in any detail in India. Dharmarajan (1936), Vanajakshi (1938), Sarbahi (1940) and Mohsin (1944-46) have all dealt with the structure of the alimentary tracts of fishes or of their appendages: but have not made simultaneously a detailed study of the food of these fishes or correlated the nature of the food and the feeding habit with the morphology of the alimentary tract.

## MATERIAL AND METHODS:

Live fish specimen of Channa punctatus, Oreochromis mossambicus and Cyprinus capio were collected from Kaigaon Toka, Dist. Aurangabad, (M.S.) India. Immediately the specimens were fixed in 4% formaldehyde. The intestine was separated from the viscera and the length was measured from the insertion of the stomach to the urinogenital aperture and morphological studies of the various parts of the alimentary canal of *Channa punctatus,Oreochromis mossambicus* and *Cyprinus capio* were carried out.

To study the relationship between total length and alimentary canl length and relative length of gut, statistically by regression analysis and correlation method by Pearson correlation method, a total number of 30 specimens each of *Channa punctatus, Oreochromis mossambicus* and *Cyprinus capio* were studied.

## RESULTS AND DISCUSSION:

### *Channa punctatus*:

While observing the morphological characters of alimentary canal of *Channa punctatus* it is found that the alimentary canal is demarked into oesophagus, stomach, pyloric caecae, intestine and rectum.

The mean alimentary canal length (ACL) observed was 17.4 ± 1.57cm. (Table 3.1)

### Oesophagus:

In the present investigation it is observed that the oesophagus of Channa punctatus is short, straight, highly muscular tube. Oesophageal variations are almost negligible (Plate 10 c).

Similar results were observed by Nijaguna (1989) in Channa gachua. Kaul (1999) reported that oesophagus in predatory fishes is short, straight, and muscular. It was also reported that, in predaceous fishes (e.g. Channa gachua) oesophagus is capable of great contraction and extension which helps in swallowing larger prey. The only function of oesophagus, however, seems to transport food from bucco-pharyngeal cavity to gut of the fishes. Moitra and Das (2002) reported that the oesophagus is short in carnivorous fishes Ambassis ranga and Channa striatus.

**Stomach:**

It is observed that the stomach of Channa punctatus is large demarcated into anterior cardiac and posterior pyloric region. (Plate 10b and 10c). The stomach of Channa punctatus acts as a food storage organ and helps in physical treatment of the stored food, and finally digest the food (Table No. 6.4).

Similar results were observed by Nijaguna (1989) in *Channa gachua*. Kaul (1999) reported that highly developed stomach is present only in *Channa gachua* because of its carnivore and predatory nature. Barrington (1957); Lagler et al., (1962); Romer (1969) earlier reported the gastric nature of alimentary canal in carnivorous fishes. Lagler et al., (1962) reported that the primary criterion for being able to do with or without stomach does not seem to be true whether fish is an herbivore or carnivore, but whether accessory adaptation for trituration and very fine grinding of food exists in the form of teeth or other accessory grinding apparatus or organ viz. gizzard. According to Mookerjee et al. (1946), Quayyum and Qasim (1964), Tandon (1963), stomach in *Channa gachua* is highly developed and resembles with the stomach of *Channa punctatus* and *Channa striatus*. Subla (1967) reported that well developed musculature of the stomach helps in accommodating prey larger than stomach and prevent escape of the prey by cardiac spinchter. Moitra and Das (2002) reported that the stomach iswell developed in carnivorous fishes Ambassis ranga and *Channa striatus*.

**Pyloric caecae:**

It is observed that *Channa punctatus* bears a pair of pyloric caeca one on either side of the stomach. The left pyloric caeca is longer than the right (Plate 10b and 10c).

Pyloric caeca helps in accommodating the prey besides helping in digestion and absorption, as observed by Kapoor et al. (1975). Similar results were observed by Nijaguna (1989). Pyloric caeca and their extreme numerical variations have been reported by Suyehiro (1942) and Rahimulla (1945). Moitra and Das (2002) reported that the stomach is provided with a pair of pyloric caeca in carnivorous fishes Ambassis ranga and Channa striatus.

**Intestine:**

The intestine of the *Channa punctatus* is a short, coiled tube, having descending limb and ascending limb (Plate 10).

Similar results were observed by Nijaguna (1989). Modification in the intestine (short, moderate, lengthy or coiled) is an indication of its feeding habit (carnivore, omnivore or herbivore) as observed by Fukusho, (1969). Moitra and Das (2002) reported that the intestine is short and muscular in carnivorous fishes Ambassis ranga and Channa striatus.

Rectum:

The rectum of *Channa punctatus* is well defined (Plate 10).

Similar results were observed by Moitra and Das (2002) in carnivorous fishes Ambassis ranga and *Channa striatus*.

Relationship between Total length (TL) and Alimentary canal length (ACL) of Channa punctatus

The mean total length (TL) of Channa punctatus was calculated 19.8 ± 1.79 cm and the mean alimentary canal length (ACL) was 17.4 ± 1.57 cm. (Table 4.1)

The ratio of alimentary canal length to total length of Channa punctatus was 0.88:1.

The mean relative length of gut (RLG) of Channa punctatus obtained was 0.88 ± 0.004. (Table 4.1)

For Regression Analysis:-

Dependent variable is alimentary canal length (ACL) and

Independent variable is total length (TL) of Channa punctatus.

Then the regression equation (Graph 4.1) for relationship between total length (TL) and alimentary canal length (ACL) of Channa punctatus is ACL = 0.0541 + 0.877 TL.

Thus as the total length (TL) increases, then the alimentary canal length (ACL) increases by 0.877 per unit of total length (TL) of Channa punctatus.

The Pearson correlation coefficient of alimentary canal length (ACL) and total length (TL) of Channa punctatus (r) = 0.999

The above analysis of relationship between the total length (TL) and alimentary canal length (ACL) of Channa punctatus reveals that there is positive correlation between the total length (TL) and alimentary canal length (ACL) of Channa punctatus.

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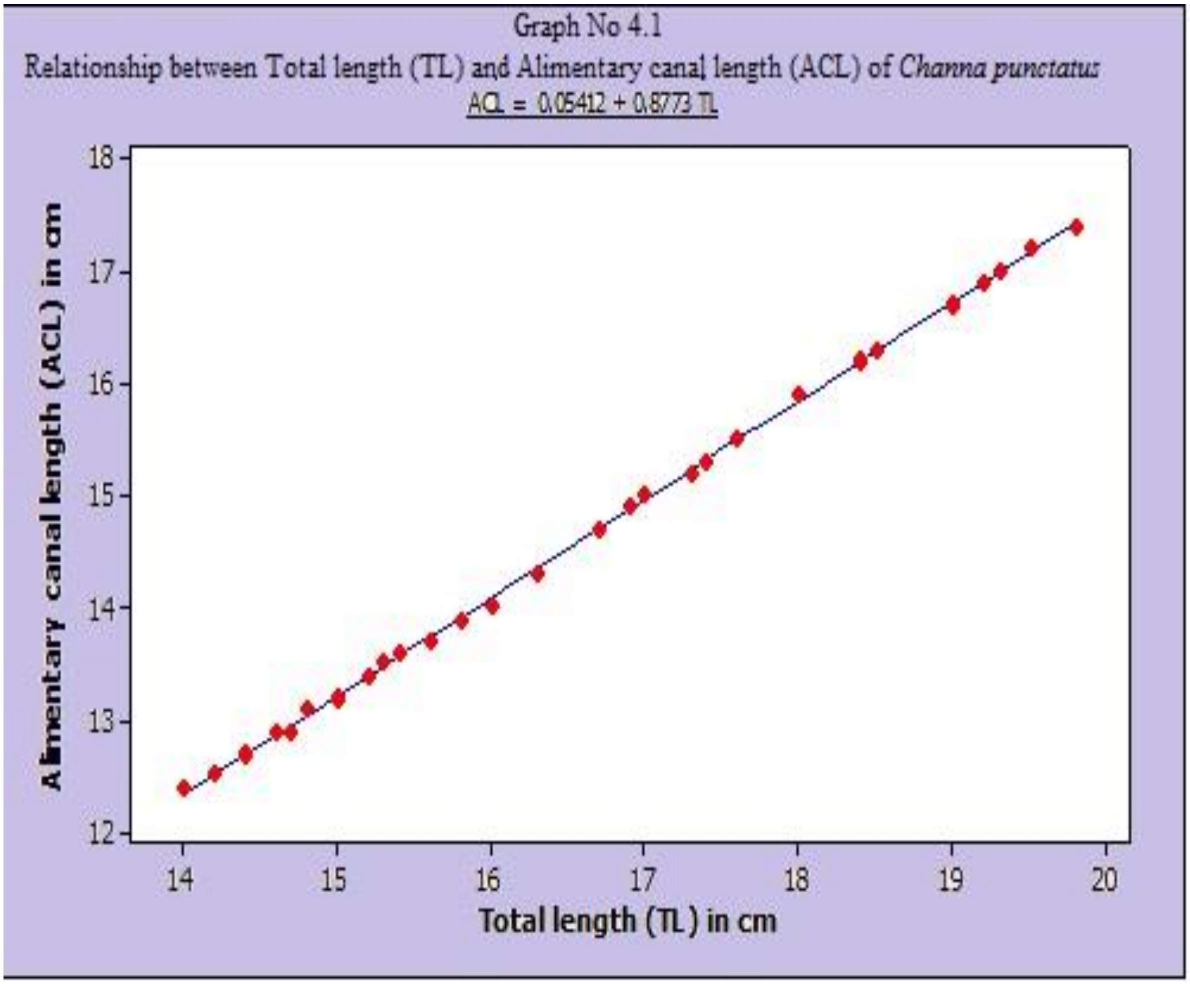
**Table 3.1 *Channa punctatus* Relative Length of Gut**

| Observation | Total Length of Fish (TL) in cm | Length of Alimentary Canal (ACL) in cm | Relative length of gut (RLG)= (ACL) / (TL) |
|---|---|---|---|
| 1 | 14 | 12.4 | 0.88 |
| 2 | 14.2 | 12.5 | 0.88 |
| 3 | 14.4 | 12.7 | 0.88 |
| 4 | 14.6 | 12.9 | 0.88 |
| 5 | 14.7 | 12.9 | 0.87 |
| 6 | 14.7 | 12.9 | 0.87 |
| 7 | 14.8 | 13.1 | 0.88 |
| 8 | 15 | 13.2 | 0.88 |
| 9 | 15.2 | 13.4 | 0.88 |
| 10 | 15.2 | 13.4 | 0.88 |
| 11 | 15.3 | 13.5 | 0.88 |
| 12 | 15.4 | 13.6 | 0.88 |
| 13 | 15.6 | 13.7 | 0.87 |
| 14 | 15.8 | 13.9 | 0.87 |
| 15 | 16 | 14 | 0.87 |
| 16 | 16.3 | 14.3 | 0.87 |
| 17 | 16.7 | 14.7 | 0.88 |
| 18 | 16.9 | 14.9 | 0.88 |
| 19 | 17 | 15 | 0.88 |

| | | | |
|---|---|---|---|
| 20 | 17.3 | 15.2 | 0.87 |
| 21 | 17.4 | 15.3 | 0.87 |
| 22 | 17.6 | 15.5 | 0.88 |
| 23 | 18 | 15.9 | 0.88 |
| 24 | 18.4 | 16.2 | 0.88 |
| 25 | 18.5 | 16.3 | 0.88 |
| 26 | 19 | 16.7 | 0.87 |
| 27 | 19.2 | 16.9 | 0.88 |
| 28 | 19.3 | 17 | 0.88 |
| 29 | 19.5 | 17.2 | 0.88 |
| 30 | 19.8 | 17.4 | 0.87 |
| **Mean** | **16.52** | **14.55** | **0.87** |




**Correlations: ACL, TL**
Pearson correlation of ACL and TL = 1.000
The regression equation is
ACL = 0.0541 + 0.877 TL

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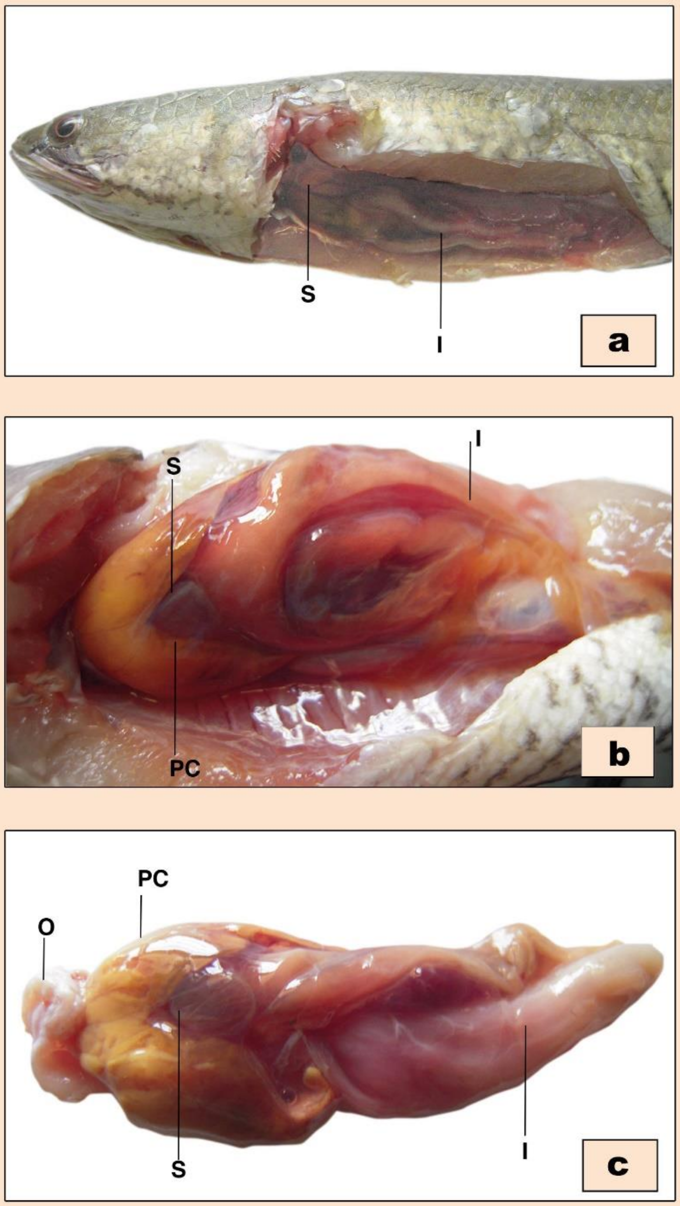
# PLATE - 10



**References:**

**Al- Hussaini, A.H. (1945):** The anatomy and histology of the alimentary tract of *Scarus sardidus* Klunz. *Bull. Inst. Egypte*, 27, 349.

**Al- Hussaini, A.H. (1946):** The anatomy and histology of the alimentary tract of the bottom feeder, *Mulloides auriflamma* (Forsk.). *J. Morph.*, 78, 121-153.

**Al- Hussaini, A.H. (1949):** On the functional morphology of the alimentary tract of some fish in relation to their feeding habits. *Quart. J. Mirc. Sci.*, 90, 109-139.

**Al-Hussaini, A. H. (1947a):** The anatomy and histology of the alimentary tract of the plankton-feeder, *Atherina forskali* Rupp. *Journal of Morphology*80, 251-286.

**Al-Hussaini, A. H. and Kholy, A. A. (1954):** On the functional morphology of the alimentary tract of some omnivorous teleost fish. *Proceedings of the EgyptianAcademy of Sciences, Cairo*, 9 (1953), 17-39.

**Al-Hussaini, A. H. (1949):** On the functional morphology of the alimentary tract of some fish in relation to differences in their feeding habits: anatomy and histology. *Quart. Journ. Micr. Sci.*, 90(2): 109-139.

**Bishop, C. and Odense, P. H. (1966):** Morphology of the digestive tract of the cod, *Gadus morhua*. *J. Fish Res. Bd. Can.*, 23: 1607-1615.

**Cataldi, E., Cataudella, S., Monaco, G., Rossi, A. and Tancioni, L. (1987):**A study of the histology and morphology of the digestive tract of the sea-bream, *Sparus aurata*. *J. FishBiol.*, 30: 135-145.

**Chaudhary, H.S. and Khandelwal, O.P. (1961): The anatomy and histology of the alimentary tract of *Orineus plagiostomus* (Hackel.) *Ann. Zool. Jap*. 354: 139- 152.**

**Dawes, B. (1929) :**The histology of the alimentary tract of the plaice (Pleuronectes pla- tessa). *Quart. J. Microscop. Sci.* 73(2): 243-274.

**Dharmarajan, M. (1936):** The anatomy and histology of the alimentary system of *Otolithus ruber* (B. Schn.). *Proc. 23rd Indian Sci.Congr.*, Pt, III, 354.

**Domeneghini, C., Radaelli, G., Bosi, G., Arrighi, S., Di Giancamillo, A., Pazzaglia, M. and Mascare, F. (2002):** Morphological and histochemical differences in the structure of the alimentary canal in feeding and runt (feed deprived) white sturgeons (*Asipenser transmontanus*). *J. Appl. Ichthyol.*, 18: 341-346.

**Domeneghini, C., Arrighi, S., Radaelli, G., Bosiand, G. and Mascarello, F. (1999):** Morpoholgical and histochemical peculiarities of the gut in the white sturgeon, *Acipenser transmontanus*. *Eur. J.Histochem*, 43: 135-145.

**Ellis, B. A., Mills, J. N., Kennedy, E. J. T., Maiztegui, J. I. and Childs, J. E., (1994):** The relationship among diet, alimentary tract morphology, and life history for five species of rodents from central Argentine *pampa*. *Acta Theriologica* 39:345–355.

**Fish, G. E. (1960):** The comparative activity of some digestive enzymes in the alimentary canal of tilapia and perch. *Hydrobiologia*, 15: 151- 178.

**Gargiulo, A. M., Dall**, **C., Agrilo, Tsoku, Z., Caccarelli, P. and Pedini, V. (1996):** Morphology and histology of the oesophagus of a warm water tilapine fish (Teleostei). *J. Appl. Ichthyol.* 12, 121-124.