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**Indu Sharma**

Zoological Survey of India, High  
Altitude Regional Center, Solan,  
Himachal Pradesh, India

## Comparative morphological study of pituitary gland in cyprinid species

**Indu Sharma**

### Abstract

Pituitary gland is an endocrine gland situated on the ventral side of the brain. It is a small, soft, whitish body. The comparative morphological study of pituitary gland in cyprinid species *i.e.* *Cyprinus carpio communis* Linnaeus, *Ctenopharyngodon idella* (Valenciennes) and *Tor putitora* (Hamilton) revealed that the morphologically the shape, size of the gland varies in different species and also changes with the ages. The caudobasic type of infundibular stalk in *Tor putitora* and dorsobasic type in *Cyprinus carpio* and *Ctenopharyngodon idella* is found. Further, the shape of pituitary gland varies interspecifically with body weight. Thus, it is concluded that these fishes attained maturity at different body weight and length and among these *Cyprinus carpio* get early maturity than *Tor putitora* and *Ctenopharyngodon idella*.

**Keywords:** Pituitary, concavity, intraspecifically

### Introduction

The pituitary (master gland) is one of the important endocrine gland and regulates all the hormonal activities. The hormones of the pituitary control the function of the other glands of the endocrine system *i.e.* the thyroid, adrenal, ovaries, and testes. Morphology of this gland depicts that it is divided into *Neurohypophysis*- a neural component derived from the diencephalon and *Adenohypophysis*- an epithelial component derived from the buccal epithelium. Intraspecific variation have been noticed in respect of morphology of the gland in most of the teleost species in as much as it exhibits wide range of variations in the arrangement and organization of various components as has been reviewed by Pickford & Atz (1957) [7], Olivereau (1962, 1963) [5], Dodd & Kerr (1963) [3], Hoar (1965) [4] & Rao (1969) [8]. Sathyanesan (1966) [9] has made comparative study of some fresh water teleosts. Although, the work on morphology of the gland has been done by many workers elsewhere, but very little is available to cold water species. Thus, an attempt has been made to work out the pituitary gland in the prevailing environmental conditions of the North Western Himalaya.

### Material and Methods

The pituitary gland *Cyprinus carpio* Linnaeus, *Ctenopharyngodon idella* (Valenciennes) and *Tor putitora* (Hamilton), was collected throughout the year for the study. The pituitary gland of *Tor putitora* was collected from the Pong reservoir at Dada Siba (the feeding ground of the species) while the gland of *Cyprinus carpio* and *Ctenopharyngodon idella* was collected from the CSKHPKV, University fish farm, Palampur, district Kangra (H.P.). The gland was removed by chopping off the scalp of fish skull by butcher's knife. After that the grey matter and fatty substances lying over the brain were cleaned with cotton. The brain was lifted out and gland collected from just beneath the optic chiasma situated in a concavity. The gland was immediately fixed in fixatives *viz.* Boulin's fluid or Zenker's fluid.

### Result and Discussion

The pituitary gland is situated ventral to the brain just behind the optic-chiasma in a concavity called the 'Sella turcica'. The pituitary is attached to the infundibulum which may be closely attached, long or short and it varies interspecifically. The pituitary gland is divided into two parts *i.e.* *pars glandularis* or *adenohypophysis* and *pars nervosa* or *neurohypophysis*. The *adenohypophysis* is further divided into three components *viz.* pro, meso and meta *adenohypophysis*. The *neurohypophysis* is the extension of the infundibular stalk. There is extensive innervations of *neurohypophysis* in the meta-*adenohypophysis*.

**Correspondence**

**Indu Sharma**

Zoological Survey of India, High  
Altitude Regional Center, Solan,  
Himachal Pradesh, India

### i) Shape

The studies on the morphology of pituitary gland reveal that the shape of the gland in *Tor putitora*, *Cyprinus carpio* and *Ctenopharyngodon idella* varies with the age and growth. The pituitary gland of *Tor putitora* is elongated in smaller specimen's upto weight of 860g and ovoid in large one above 900g. It is cylindrical in smaller fish's up to 300g weight of fish and is pear shaped in adult individuals of above 300g weight of fish in *Cyprinus carpio*. The shape of the gland is round up to 850g weight of fish in smaller specimens and oval in large fishes of above 900g weight of fish in *Ctenopharyngodon idella*. Rao (1969)<sup>[8]</sup> while studying the comparative study of pituitary gland of certain fresh water teleosts made the similar observation in *Tor tor* as observed in *Tor putitora* during the present studies. However, Lal (1964) reported that the shape of the pituitary gland is spherical in *Cirrhina mrigala* in large individuals becoming approximately pear-shaped in adults. Rao (*Op cit.*) observed that the shape of the gland is pear shaped in *Amphipnous cuchia* conical in *Nandus nandus*, *Channa punctatus*, *Ambassis ranga* and almost hemispherical in *Ompok pabda*, *Eutropiichthys vacha* and *Mystus cavasius* and oblong in *Puntius sarana*, *Noemachilius botia*, *Mastacembelus armatus*, *Mastacembalus pancalus* and *Macragnathus aculeatum*. Thus, it is inferred that change in the shape of the pituitary gland differ in different species and also changes with the age group.

### ii) Structural Modifications

A deep suture divides the gland into two lobes in *Tor putitora* and *Ctenopharyngodon idella* but it is trilobulated in *Cyprinus carpio*. Rao (*op cit.*) reported two lobed gland in *Oxygaster bacaila*, *Rasbora daniconius*, *Garra lamta*, *Labeo bata*, *Labeo calbasu*, *Labeo rohita*, *Cirrhina mrigala*, *Punctius sarana*, *Tor tor* and *Mastacembalus armatus* and three three lobed in *Glossogobius gluris*.

### iii) Infundibular Stalk

According to the classification of Brestchneider and Duwenede Wit (1947)<sup>[1]</sup> the infundibular stalk is differentiated into platybasid type *i.e.* the stalk is absent or it is closely attached to the floor of the infundibulum while in leptobasic type the stalk is present. Laptobasic type is further differentiated into cranio, caudo and dorso basic type. The present study depicts the dorso basic type in *Cyprinus carpio* and *Ctenophayngodon idella* and caudo-basic type in *Tor putitora*. Charriper (1937)<sup>[2]</sup> reported that during development and growth of brain, pressure is exerted in the cranial cavity which leads to a shift of the stalk entrance.

### iv) Disposition of the pituitary

The gland lies over the parasphenoid bone in a concavity *i.e.* sell turcica in all the three species studied. The concavity is shallow in large individuals in *Cyprinus carpio* and *Ctenopharyngodon idella*. Similar condition was observed by Rao (1969)<sup>[8]</sup> in *Notopterus notopterus*, *Silonia silondia*, *Channa gachua*, *Channa marulius*, *Channa punctatus* and *Channa striatus*. Different type of lodgement is observed by Rao (1969)<sup>[8]</sup> in different species. However, in *Tor putitora* the gland is completely embedded in the myodome. In *Cyprinus carpio* and *Ctenopharyngodon idella* two type of lodgement *i.e.* shallow and deep concavity are observed in same species in different age groups.

Thus, it is pertinent with the present studies that Shape, Structural modifications, Infundibular Stalk and disposition of the gland varies with the age and also with in different species of the *Tor putitora*, *Cyprinus carpio* and *Ctenopharyngodon idella*. But, sexual dimorphism is not found in none of the species during the present study.

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