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(RESEARCH ARTICLE)

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Comparative study of "herbivores (*Labeo rohita*) and carnivorous (*Channa striata*) FISHES"

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Abstract

The present study on comparative study on morphological features, morphometric, and anatomical features on Herbivores (*Labeo rohita*) and Carnivorous (*Channa striata*) and these fishes were collected from integrated fish market-siddipet. *Labeo rohita* commonly known as rohu as well as *Channa striata* common name is murrel the both species belongs to fish. *Labeo rohita* belongs to the family cyprinide and another fish murrel belongs to channidae family. This comparative study also presence the physiological and ecological differences between the herbivorous fish *Labeo rohita* and the carnivorous *Channa striata*. *Labeo rohita*, a prominent species in freshwater aquaculture, primarily consumes plant material, while *Channa striata*, a top predator in Southeast Asian freshwater ecosystems, feeds on other fish and invertebrates. This study evaluates differences in dietary habits, digestive efficiency, growth rates, and ecological roles of these species.

Keywords: *Labeo rohita; Channa striata;* Rohu; Murrel; Cyprinide; Channidae

1. Introduction

Labeo rohita is an herbivorous. comparing the difference between these two fish externally (body shape, scale, fins, eyes, & scale) and internally (gills, intestine, heart, and tooths). Morphological is a basic fundamental tool to know variation between both fishes to compare. The fish morphological study is very important morphology comparative study and help to determine the variations in *Labeo rohita* and *Channa striata*. Morphology study help to find difference between there body structure and shape of the body. Fishes indicates greater variation between fish to fish (6).

Labeo rohita common name rohu belongs to *cypinide* family, it is a column or middle zone feeder and herbivorous. It has depressed snout head with thick lips and a fresh water fish. Scientific name is *Cyprinus Rohita Hamilton* named by Hamilton in the year of 1822. Life span is up to 10 years, this fish is commonly found in north India, Orissa, Bengal and other part of country such as Pakistan, Bangladesh, Nepal and Myammar. *Labeo* feeds on marine algae which grows on aquatic environment and plants also it is herbivorous nature in feed habit (7)

Channa striata common name is striped snake head belongs to family *channidae* (8.Ayodhya reddy et al 2024), it is a surface feeder. *Channa striata* has snake headed, sub-cylindical body with large head and with fully toothed mouth. It lives in fresh and marine water bodies found in ponds, rivers, lakes, canales and irrigation reservoirs. Native of *Channa striata* from east and southeast Asia majorly in western islands of Malay pelago, including Sumatra, Borneo, java, Thailand and other countries like India, southern China, Bangladesh, Pakistan, Buton and in all south-east Asian nations. This species introduced to other countries like eastern islands of Indonesia and Philippines. *Channa striata* migrators from permanent lakes and streams into flooded area during rainy seasons. Female fish head is larger than the male *Channa striata*. Scientific name of the *Channa striata* is *ophicephalus striatus* named by Bloch in 1793. *Channa striata* life

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span is 7 years or more. Feeding habit is carnivorous feeds on small insects, crustaceans, earthworms, terrestrial worms, reptiles, fish and amphibians. It is a predatory species (9)

By comparing the morphological features of these two species, we aim to explore how their physical. Characteristics have evolved in response to their ecological niches, feeding habits, and reproductive strategies. This study not only enhance our understanding of these specific species but also contributes to broader knowledge of fish morphology and adaptation in freshwater ecosystems. The study of morphological is helps to understand the taxonomy, ecology, and evolutionary relationships among the fish species also help to understand their adaptive strategies in different aquatic environment.

2. Materials and Methods

To compare and contrast the morphological features of *Labeo rohita* and *Channa striata*. There are distinct morphological differences between the two species due to their differing ecological roles and evolutionary adaptations. Documenting various anatomical and morphological traits. Comparison will focus on both qualitative and quantitative aspects of their morphology.

2.1. Species Collection

Collect a sufficient weight of *Labeo rohita* and *Channa striata* specimens. Aim at least 1kg fish each species for sufficient observation of taken species.

Ensure the fish is similar weight, similar age, weight and good health to minimize variation due to development differences.

Weight of the species- *Labeo rohita* – 1.245 kg*Channa striata* – 1.160 kg

2.2. Measurement and Observation

Measure the total body length from the tip of the snout to the end of the caudal fin using a measuring tape. Weigh the specimens using a digital caliper. Measure the length of the dorsal, pectoral, anal and caudal fins using the measuring tape. Note the measurement of each fin.

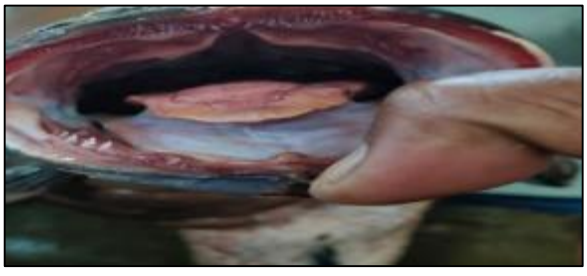
Table 1 Labeo rohita morphometrics

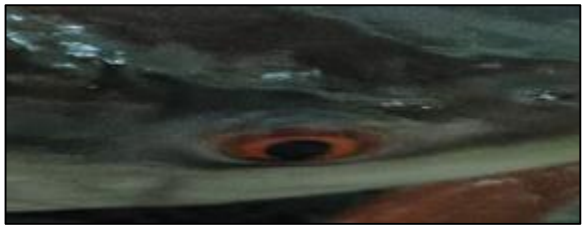
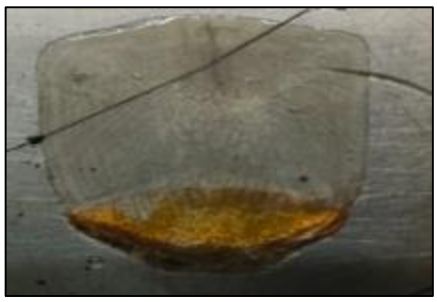
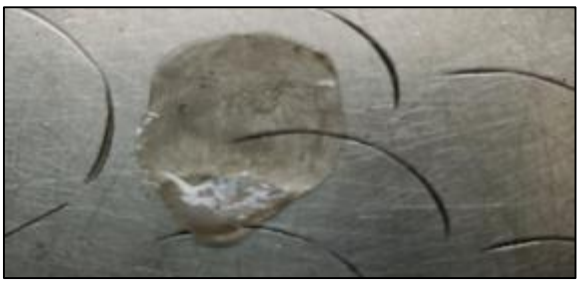
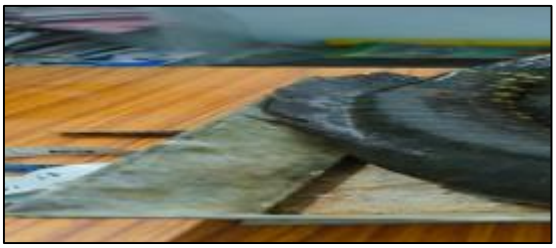
S.No	**Name of the body part**	**Length in cm**
1.	Total body (TL)	24.6 cm
2.	Fork	17.22 cm
3.	Maximum standard length	86.8 cm
4.	Head	4.92 cm
5.	Snout	1.23 cm
6.	Eye diameter	0.49cm
7.	Post orbital	0.74 cm
8.	Jaw length	1.48 cm
9.	Pre pectoral	8.61 cm
10.	Pectoral fin	3.69 cm
11.	Pelvic fin	2.46 cm
12	Anal fin	3.69 cm
13.	Caudal fin	3.69cm
14.	Dorsal length	24.6 cm

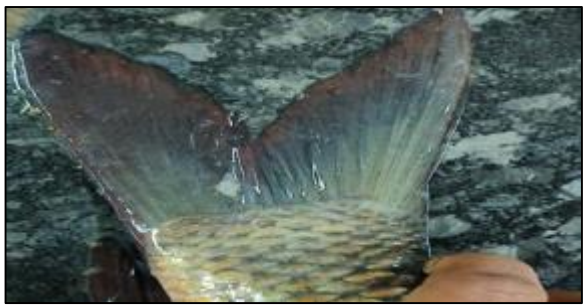
Table 2 Channa striata morphometrics

S.No	Name of the body part	Length in cm
1.	Total body (TL)	51 cm
2.	Fork	45.9 cm
3.	Maximum standard length	38.25 cm
4.	Head	3.06 cm
5.	Snout	2.55 cm
6.	Eye diameter	1.02 cm
7.	Post orbital	1.53 cm
8.	Jaw length	1.91 cm
9.	Pre pectoral	15.3 cm
10.	Pectoral fin	7.4 cm
11.	Pelvic fin	5.1 cm
12	Anal fin	7.7 cm
13.	Caudal fin	7.7 cm
14.	Dorsal length	10.2 cm
15.	Lateral line	40.24 cm

Table 3 Comparative morphology of Labeo rohita and Channa striata

Sl.no	***Labeo rohita* (Herbivorous)**	***Channa striata* (Carnivorous)**
HEAD		
1.		
	The head is depressed dead and with thick lips. Blunt and round with a slightly convex 363 forehead.	elongated, flattened and head snake-like head
MOUTH		
2.		

	Mouth is subterminal below the snout, which is suitable for bottom feeding. The snout is rounded and blunt, which is typical of many	Mouth is terminal with sharp, conical teeth, adapted for carnivorous feeding
Eyes		
3.		
	Eyes are yellowish to reddish-brown hue. The eyes are relatively prominent and contributes to fish's overall silvery appearance.	Eyes is typically a golden yellow with darker often black puilp the eye are larger comparing to *Labeo rohita*
Scales		
4.		
	Cycloid scale are another type of fish scale, distinct from ctenoid scales in both structure and appearance.	Ctenoid scale are type of fish scale that are characterized by their rough texture and comb-like edges. Shape is oval or rounded in shape.
Dorsal fin		
5.		
	Located along the midline of the black. Structure is elongated and features 12-16 branched rays, with a single hard spine at the front followed by softer rays.	Located extends nearly the entire length of the back, from just behind the head to near the tail. Structure of the fin is long, continuous, and made up to 40-45 soft rays
PECTORAL FIN		
6.		

	These fins help the fish maneuver, maintain the position in strong current and fine adjustments during swimming. They help the fish navigate and maintain balance. These help the fish maneuver and maintain position in strong current.	Positioned behind the gill on either side of the body. The pectoral fins are broad and rounded. Used for making fine adjustments and hovering in place, aiding in slow, deliberate.
PELVIC FIN		
7.		
	Positioned ventrally, slightly behind and below the pectoral fin on the ventral side. These fins are smaller and consist of 9 rays. Assist in stabilizing the fish and maintaining balances, particularly in controlling its vertical position in the water.	Positioned ventrally ,slightly behind and below the pectoral fin on the ventral side. These fins are smaller and consists of 6 rays
ANAL FIN		
8.		
	Located on the ventical side of the body just behind the anus. The anal fin is relatively short and composed with 7-9 rays. The anal fin aids in balance and stability while swimming, working in conjuction with the dorsal fin.	Positioned on the ventral side, running parallel to the dorsal fin but shorter in length. The analfin is long, with 26-32 soft rays. Works with the dorsal fin to stabilize the fish and support its maneuverability, particularly during slow stalking and rapid lunges at prey.
CAUDAL FIN		
9.		
	The caudal fin is distinctly forked, with two lobes that are nearly symmetrical. This fin is typically broad and help in providing the fish swift	located at the very end of the body. The caudal fin is rounded rather than forked. Allows for quick, powerful bursts of speed, which is essential for a predator that relies on ambush tactics. The rounded shape facilitaes sudden directional changes

2.2.1. Colouration of body

Labeo rohita has a silvery body with slight golden or reddish tinge. The scales on the dorsal side are usually darker, often with a bluish or greenish sheen, while the ventral side is lighter, with a silvery or whitish appearance.

Channa striata, known as the striped snakehead, has a more cryptic and camouflaged coloration. The body is generally dark brown, with irrgular dark bands or stripes runningalong.

2.2.2. Comparative anatomy of Labeo rohita and Channa striata

Comparative anatomy of *Labeo rohita* and *Channa striata* reveals significant differences that reflect their distinct ecological niches. Feeding behaviors and evolutionary adaptations. Below is a detailed comparison of their anatomical features. The anatomical differences between *Labeo rohita* is adapted to herbivorous lifestyle and *Channa striata* is adpated to carnivorous lifestyle. With the anatomical features that enhance its swimming efficicency and plant-based diet. In contrast, *Channa striata* is a highly specialized predator with anatomical adaptation.

Figure 1 Observation of phytoplanton & zooplankton from digestive extract from both the species

2.2.3. Phytoplankton

Table 4 Phytoplankton

Sl.No	***Labeo rohita*(Herbivorous)**	***Channa striata* (Carnivorous)**
GILL RACKERS		
1.		
	Gill rackers are many in a bunch. Gill rakers are shot and flat situated on both side of the gill arch.	Comparing to rohu *channa* has less gill rackers. Gill racker is smaller comparing to *Labeo rohita.*
HEART		

2.		
	Size of the heart and colour is different comparing to *Channa striata*	Size of the heart and colour is different comparing to *Labeo rohita*
PANCREAS GLAND		
3.		
	Pancreas gland is larger	Gland is smaller
ALIMENTARY CANAL		
4.		
	Alimentary canal is larger because of cellulose and digestion process	Alimentary canal is smaller

In *Labeo rohita* digestive extration I observed phytoplanktons from rohu digestive simple complex. Primarily consumes a variety of phytoplankton, which are essential components of its diet, especially in its juvenile stages. These photoplankton are microscopic, photosynthetic organisms found in fresh water environments. The availability and abundance of these phytoplankton vary seasonally and with water quality. Rohu adapts its feeding habits based on the availability of these phytoploankton in its environment. Phytoplankton is rich in essential nutrients like

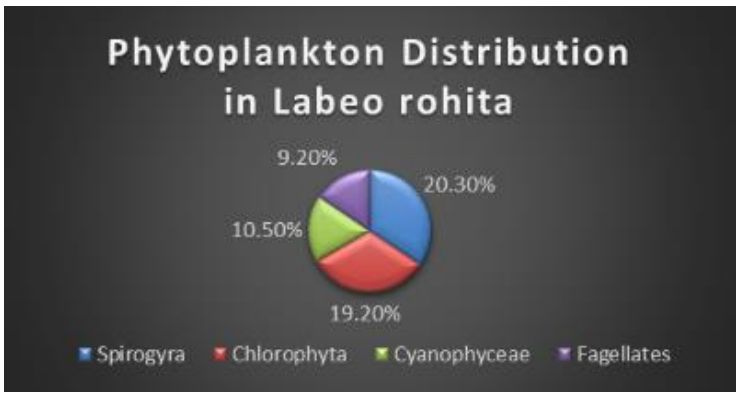
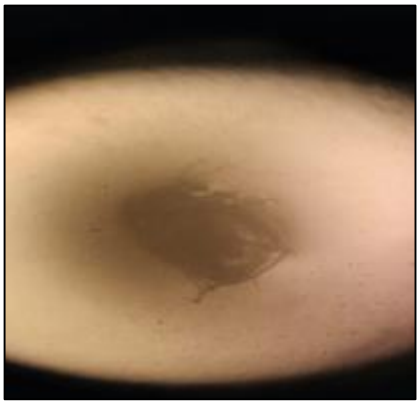
	
SPIROGYRA	

Figure 2 Observation of phytoplankton

Zooplankton:*Channa striata* digestive extration I observed zooplankton from digestive simple complex



DAPHNIA

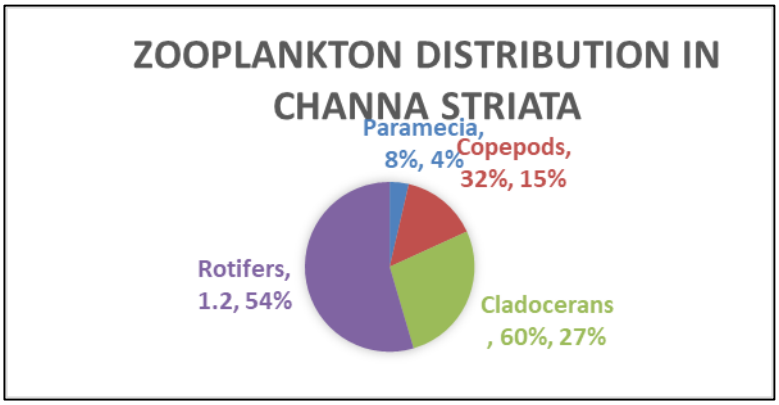


Figure 3 Observation of Zooplankton

3. Result and Discussion

Labeo rohita has a fusiform, streamlined body that will-suited for fast swimming in riverine environments. The body is laterally compressed. The average size of *Labeo rohita* often total body length measures around 24.6 cm length depending on the age and weight of the fish.

Channa striata has an elongated, cylindrical body shape, which allow it to navigate through dense vegetation and muddy waters typical of stagnant or slow-moving waters. It is typically shorter but bulkier compared to *Labeo rohita,* with an average length of 51 cm.

Labeo rohita fins are adapted for sustained swimming. The caudal fin is deeply forked, aiding in propulsion. The dorsal fin is short and located towards the middle of the back, while the pectoral fin are relatively large.

Channa striata has a large, terminal mouth equipped with sharp, canine-like teeth, designed for capturing and holding prey, reflecting its carnivorous diet. The mouth is capable of extending allowing it to consume relatively large prey.

Labeo rohita possesses a sub-terminal mouth, which is adapted for bottom-feeding. It primarily consumes algae, plankton, and plant material. The lip is thick and fleshy, aiding in scraping food from surfaces.

Channa striata has a large, terminal mouth equipped with sharp teeth and capable of extending.

Labeo rohita covered with cycloid scales, which are smooth-edged and provide a sleek surface for fast swimming.

Channa striata has ctenoid scales which have tiny spine or comb-like projections. These scales provide better protection and are typical of predatory fish.

3.1. Internal organs

Internal anatomical features of both species. Both species possess four pairs of gill arches, both species have two-chambered heart, but the cardiovascular system of *Channa striata* is adapted to support both aquatic and aerial respiration, whereas *Labeo rohita's* heart is optimized for a fully aquatic environment.

Labeo rohita has a longer, more convoluted intestine suited for its herbivorous diet and *Channa striata* has a shorter digestive tract, more appropriate for a carnivorous diet, allowing for quick digestion of protein-rich prey.

3.1.1. Observation from Digestive Extract

Labeo rohita has a long, coiled intestine, reflecting its herbivorous diet that requires extended digestion of plant material. *Channa striata* has a shorter, more direct digestive tract, which is efficient for processing animal prey items. I

observed phytoplankton in *Labeo rohita* and in *Channa striata* has zooplankton under microscope from intestinal simple from extraction which I extracted from both species' intestine.

4. Conclusion

Labeo rohita morphology is adapted to an herbivorous diet, with features supporting efficient grazing and digestion of plant material. In contrast, *Channa striata's* adaptations reflect its predatory lifestyle, with robust structures for capturing and digesting animal prey.

The morphological differences between the two species illustrate their adaptations to their specific ecological roles. *Labeo rohita* design supports a grazing, herbivorous lifestyle in freshwater habitats, while *Channa striata* robust build and feeding adaptations are suited to a carnivorous diet in diverse aquatic environments.

This comparative analysis highlights how different environmental and dietary pressures shape the evolutionary adaptations of these two fish species.

the internal organs of a *Labeo rohita* and *Channa striata* have been extensively studied by scientists across various disciplines, including ichthyology, fish physiology, and comparative anatomy. These studies are adapted to their respective environments, with *Labeo rohita* being optimized for an herbivorous lifestyle in riverine habitats, and *Channa striata* being a versatile predator capable of surviving in low-oxygen environments.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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