

CHAPTER I

SYSTEMATIC STUDY OF FISHES

INTRODUCTION

Identification of a species is primary step towards any research work and plays a key role for the behavioral study. In addition to the information to help with fish identification, other information on biology has been including such as species range, habitat, diet, migration and reproduction. For proper management of natural resources, we need information on the number of species and their identification (Kottelat, 2013).

A variety of morphological, physiological, behavioral and biochemical characteristics are used to identify and classify fishes. According to Vikash Kumar and Hassan (2015) taxonomy is the science of description and classification of organisms, essential in theoretical and applied biology. Biological classification is based on systematic studies (Nelson, 2006).

Bookstein et al., (1985) reported fish identification is a process of matching the diagnostic features with the specimen of a species. Fish is identified by morphological characteristics taking into consideration the variation exhibited by each character. In some instances considerable biological information may be available (on behavior, genetics, physiology and ecology) and could further confirm the identification of fish in one way or the other. Correct identification of species is of paramount importance for improvement of the quality of statistical data and ultimately for any attempt to manage fishery resources (FAQ 1996).

Morphometric measurements and meristic counts are considered as easiest and authentic methods for the identification of specimen which is termed as morphological systematics (Nayman, 1965). According to Kovac, et al., (1999) morphometric characters represent one of the major keys for determining fish systematics, growth variability and other parameters. It is more common to use morpho-meristic measurements, morphological measurements i.e, body length, body depth, head length, eye diameter, jaw length and meristics measurements i.e, fin rays, scales, teeth, gill rakers and lateral line (Gaygusuz, et al., 2006).

With these characters including the nature of adipose eyelids, type of mouth, its development, position of nostrils, extension of maxillae, nature of operculum, presence of pores around the mouth region and its numbers, the arching of lateral line, pigments, bands on the lateral side etc. are to be studied carefully in large number of specimens covering different length groups.

Fishes exhibit a number of specialized features which distinguish them from the other animals very easily. Fish can be defined as a group of cold-blooded aquatic vertebrates, which breathe by means of brachial gills and locomotion is carried out by means of fins (Hiware, et al., 2015).

Nelson (2006) reported that the fishes comprise nearly half of global vertebrate species. The group is represented by 27,977 valid species including 11,952 primary freshwater, 12,457 secondary freshwater and 3,568 exclusively marine species and the proportion of fish diversity in the Indian subcontinent is about 8.9% of the world ichthyofauna, consisting of approximately 2,500 species-930 primary and secondary freshwater species and 1,570 marine species. Jayaram (1999) noted, the primary freshwater fish diversity in India consists of 667 species, represented by 62% cyprinoids, 26% siluroids and 12% other groups.

Studies on morphology of fishes is found in many standard references, Hubbs and Lagler (1958), Miller and Lea (1972), Lagler et al., (1977), Bond (1979), Moyle and Cech (1981) and Trautman (1981).

MATERIALS AND METHODS

Fish specimens of *Channa orientalis* and *Cirrhinus mrigala* were collected from Kaigaon Toka, Aurangabad region and brought to fishery research laboratory, Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. For identification of fishes various characters were studied and observed like natural color, pattern of scales, fins, pattern of mouth, identification marks like black spot, Bloch on operculum, paired unpaired fins and other body parts. Fin formula was also used for fish identification.

The fishes were identified up to species level using some authentic keys given by Munshi, Shrivastava (1988); Talwar and Jhingran (1991); Day Vol I and II (1989); Jayaram (1981 and 1999); Sharma (2006); Datta and Munshi (1996); Rajbanshi (1996); Hiware, et al., (2015).

RESULTS

***Channa orientalis* (Bloch and Schneider, 1973)**

Channa orientalis is commonly known as gaira, raga, cheng, telo taki, chengal, cheng, dheridok, chainga, dorrah, chenga, malamatta-gudisa, erramatta, tatimatta-gidisa, parakoravai, maniamkoravai, korava, vattudi, mohkorava and mottu.

Body and Colour

Body is elongated and rounded in cross section. Body is slightly compressed behind the head and tapers posteriorly. It is covered with scales and distinguished into three regions, anterior head, middle trunk and posterior tail. Head of *Channa orientalis* resembles to that of snake in its external appearance. A pair of tubular nostril is observed in front of eyes. Body color is bluish, reddish on ventral side and greenish on dorsal side, outer margin is orange in color, caudal fin is pale yellow in appearance while pectoral is orange.

Mouth and teeth

Mouth is large and moderately cleft. Moderate eyes are present. Scales are absent on the head, having lateral line from the snout. Few cross lines are also observed on the head with black spots. Lower jaw is longer protruding while upper jaw covers the lower one. Canine, maxillary, mandibular teeth are observed on the upper and lower jaws of *Channa orientalis*. Gill rakers are also observed.

Scales

In *Channa orientalis* scales are small, brownish and sometimes blackish in colour covered with mucus. Cycloid scales are observed only on the head, they are slightly larger than those from any other part of the body. Ctenoid scales are observed on the remaining body. Scales are also observed on lateral line.

Fins

Caudal fin is rounded in appearance and has twelve fin rays. A pair of pectoral fin is present behind the opercular slits with fifteen fin rays. Pectoral fins extend to the anal fin while pelvic fin is absent. Lateral line is complete and bears 40 scales. A single pair of dorsal fin is observed on the mid dorsal line of the body that continues upto the caudal penduncle of the tail region. A spot is present at the posterior end of dorsal fin, dorsal fin rays are 34. Anal fin is unpaired and single present on the mid ventral line of the body and consists of 22 fin rays.

Fin formula of *Channa orientalis* is as follows

BV. D 35-36 (1/34-35); P.14-15 (1/13-14); V.6 (1/5); A.21 (1/20); C.12; LI 42-44;
L.tr. 3.5-4.5/5.5-7/5, (Gupta and Gupta, 2006).

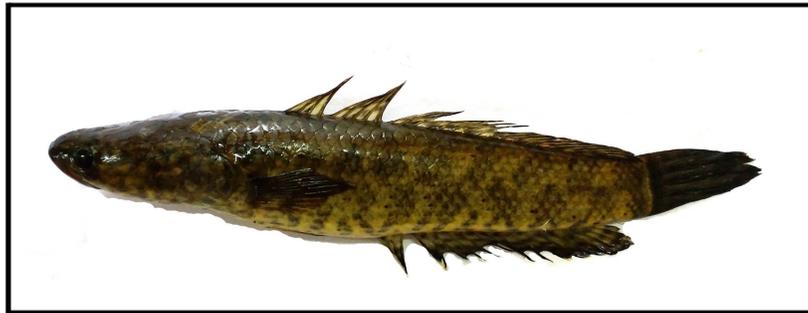
Economic importance

Channa orientalis is used as food fish, popular in Maharashtra and has high demand in China, Pakistan, Nepal, Bangladesh, Shri Lanka and Southeast Asia. It is one of the important useful nutritional resources. It is protein rich and contains high amount of vitamin A, vitamin D and minerals.

Kingdom	Animalia (Linnaeus, 1758)	Order	Channiformes			
Phylum	Chordata (Bateson, 1885)	Family	Channidae (snake heads)			
Sub-Phylum	Vertebrata (Cuvier, 1812)	Genus	<i>Channa</i> (Scopoli, 1777)			
Class	Pisces	Species	<i>orientalis</i> (Blochand Schneider, 1801)			
Sub- Class	Actinopterygii (Ray finned fishes)	Scientific name	<i>Channa orientalis</i> (Bloch and Schneider, 1973)			
Name	Common / English:- Doke/ Snake headed murrel.	New name :-	<i>Channa orientalis</i> (Bloch and Schneider, 1973)			
Status	Common, (2006).					
First-Record	1801. <i>Channa orientalis</i> , Bloch and Schneider, <i>Syst. Ichth.</i> P.496, pl. 90, fig.2.					
Habit	Herbivorous	Carnivorous	Omnivorous	Scavengers	Larvivorous	other
		√				
Diagnostic characters	Anal fin with 20 to 23 rays. No black spots on scales. Dorsal fin with 32 to 37 rays, (Jayaram, 1999).					
Fin formula	BV. D 35-36(1/34-35); P.14-15(1/13-14); V.6 (1/5); A.21 (1/20); C.12; LI 42-44; L.tr. 3.5-4.5/5.5-7/5, Gupta and Gupta, (2006).					
Specimen L/wt	L- 143 mm.			Wt – 29 gm.		
Distribution	India: - Through out India, (Kapoor, Dayal and Ponniah, 2002).					
	Abroad- Afghanistan, Iran, Pakistan, Nepal, Sri Lanka, Myanmar, Bangladesh and East India, (Kapoor, Dayal and Ponniah, 2002).					
Categories	Commercial fish	Nutritive fish	Medicinal fish	Food fish	Ornamental fish	Other
				√		

Reference: Ubarhande, (2010).

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***Channa orientalis* (Bloch and Schneider, 1973)**

***Cirrhinus mrigala* (Hamilton, 1822)**

Cirrhinus mrigala is commonly called as mirgal, mirka, mirgel, nga kyinn, mrigal carp, suur tsirrin, nain, nainee, mori, arju, yerramosa, mirya, mrigalam, mirrgah, ballalamosa, mirkali, morahkee and nagari.

Body and Colour

Cirrhinus mrigala is silvery with yellow shade on the dorsal side below the pectoral fin and having dark grey caudal fin. Orange pelvic and anal fin, silvery-white belly and golden colored eye. Body is streamlined with small head. It is covered with scales and distinguished into three regions, anterior head, middle trunk and posterior tail. A pair of nostril is observed in front of eyes.

Mouth

Mouth is terminal, broad and transverse. Snout is blunt, depressed and round, spots are observed on the snout. A single pair of small barbel is present on the snout. Lips are thin. Upper lip is entire, fringed while lower lip is sharp and indistinct. Small gill rakers are observed.

Scales

Cycloid scales are observed on *Cirrhinus mrigala*. These scales are golden in colour.

Fins

Dorsal fin is observed on the mid dorsal line of the body slightly concave and equal to the length of head while pectoral fin is shorter. A pair of pectoral fin is present behind the opercular slits and has 18 rays. Anal fin is unpaired and short, orange in color, present on the mid ventral line of the body. A pair of pelvic fin is present very close to its throat. Deeply forked caudal fin is present, lower lobe of caudal fin is reddish in color. Lateral line is complete, continuous toward the caudal fin bearing 40-43 scales.

Fin formula of *Cirrhinus mrigala* is

D.15 (3/12); P.18; V.9; A.8 (2/6); C.19; L.I. 41-43; L.tr. 6(1/2)-7/6. 1/2; Barbels 01 pair, (Datta Munshi and Srivastava, 1988).

Economic importance

Cirrhinus mrigala is protein rich, tasty and popular as table fish, found all over Asia in monoculture and polyculture. It is fastest growing major carp, hence used for culture. It is also used as a game fish and has good market price. It is used in extensive culture the production being 1-2 tons/hectar.

Kingdom	Animalia (Linnaeus, 1758)	Order	Cypriniformes			
Phylum	Chordata (Bateson, 1885)	Family	Cyprinidae (Minnows & carp)			
Sub-Phylum	Vertebrata (Cuvier, 1812)	Genus	<i>Cirrhinus</i> (Hamilton, 1822)			
Class	Pisces	Species	<i>mrigala</i> (Hamilton, 1822)			
Sub- Class	Actinopterygii (Ray finned fishes)	Scientific name	<i>Cirrhinus mrigala</i> (Hamilton, 1822)			
Name	Common / English:- mrigal/Mrigal carp	New name				
Status	LR-lc (Lower risk least concern) (IUCN).					
First-Record	1822. <i>Cyprinus mrigala</i> (Hamilton), <i>Fish Ganges</i> , pp.279, 389. pl.6. fig.79.					
Habit	Herbivorous	Carnivorous	Omnivorous	Scavengers	Larvivorous	other
	√					
Diagnostic characters	Dorsal fin with 15-16 rays and lateral line scales are 40-45, (Jayaram, 1981).					
Fin formula	D.15(3/12); P.18 ; V.9 ; A.8(2/6) ; C.19 ; L.I. 41-43; L.tr.6(1/2)-7/6.1/2; Barbels 01 pair, (Datta Munshi and Srivastava, 1988).					
Specimen L/wt	L- 215 mm.			Wt – 69 gm.		
Distribution	India- Freshwater of West Bengal, Eastern Himalayas, U.P, Bihar, H.P Mumbai, Northern India and Punjab, (Kapoor, Dayal and Ponniah 2002).					
	Abroad –Bangladesh, (Kapoor, Dayal and Ponniah 2002).					
Categories	Commercial fish	Nutritive fish	Medicinal fish	Food fish	Ornamental fish	Other
				√		

Reference: Ubarhande, (2010).

PLATE - 2



***Cirrhinus mrigala* (Hamilton, 1822)**