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Studies on Meristic Counts and Morphometric Measurements of Mahseer (*Tor putitora*) from a Spawning Ground of Himalayan Foot-hill River Korang Islamabad, Pakistan

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Abstract: Ninety specimens of *Tor putitora* were collected from Korang river. Different meristic counts and morphometric measurements of different parameters were studied. All the meristic characters remained constant with increasing body length. The morphometric character showed a gradual increase with increase in body length. On the basis of meristic and morphometric characteristics, the fish was identified as *Tor putitora*. Morphometric studies of *Tor putitora* in relation to body length showed that there was isometric growth pattern.

Key words: *Tor putitora*, meristic counts, morphometric measurements

Introduction

Mahseer (*Tor putitora*) is the most important Cyprinid fish of the South Asian Subcontinent. It is also known as golden Mahseer and is usually considered as a sportive fish by the anglers, because of its big size, fighting properties and as an excellent game fish (Shrestha, 1990).

Identification of a species plays a key role for the behavioral study. Different methods are used for identification but meristic counts and morphometry are considered as earliest and authentic methods for the identification of species (Nayman, 1965). Meristic counts mean any thing that can be counted while morphometry is the external measurement of an organism (Talwar and Jhingran, 1992).

According to Mirza (1982), 4 species of Mahseer were reported in Pakistan. Ahmed (1963) listed two species of Mahseer from west Pakistan i.e. *Tor tor* (Hamilton) and *Tor putitora* (Hamilton). Later, Mirza (1967) described a new species, *Tor zhobensis* from the river Zhob in the North east Balochistan while Mirza and Omer (1974) recorded *Tor mossal* (Hamilton) from the river Hero in northern Punjab.

In Pakistan limited information is available on the Meristic and morphometric characteristics of this important game fish, since four species of Tor are reported from the country, it is necessary that in all types of biological studies, recognition or identification of the species must be done.

Taxonomic problem due to difficulty in determining species with reliability exist due to the reason that patchy studies have been done to describe biological characteristics including basic characters of taxonomy, such as meristic counts and morphometric measurements. Present study is designed with objectives to determine what kind of species of Mahseer exists in Korang River and also to determine the meristic counts and morphometric measurements of *Tor putitora*.

Materials and Methods

The present study was conducted in Aquaculture and Fisheries Research Institute (AFRI), at National Agriculture Research Center (NARC) Islamabad from September 1999 to January 2000. Ninety specimens of *Tor putitora* (9-27 cm total body length) were collected from Korang river located in Islamabad and regulated by construction of Rawal Dam with the help of cast net of circumference 2-2.5m and of mesh size 2.5 inch. The Korang river is considered to be the spawning ground of Mahseer. Fish were killed at the spot and preserved in 5% formalin solution. The fish were tagged by using the tagging material in the dorsal fin.

Distribution of fish into three groups in accordance with the total length of the body was done as below.

Group A. 9-15 cm (30 specimen)
Group B. 15-21 cm (30 specimen)
Group C. 21-27 cm (30 specimen)

The meristic and morphometric measurements were done with the help of magnifying glass model 50m/m Dia.(China), stage microscope Model Wild M7A (Switzerland) and electric balance Model EP-12 Ka (Yagami International Japan) and Scales, divider and vernier calliper. The methods used for measurements are given in Fig. 1 and 2.

Results and Discussion

From Table 1, it is clear that dorsal fin rays, pectoral fin rays, pelvic fin rays, anal fin rays, caudal fin rays, lateral line scales, scales above the lateral line and scales below lateral line remained constant in all groups of fish having different body length. It means that meristic counts are independent of body size and there is no change in meristic counts with increase in body length (Talwar and Jhingran, 1992; Vladykov, 1934).

Table 1: Meristic counts (Numbers)

	Meristic characters							
Fish distribution	Dorsal fin rays	Pectoral fin rays	Pelvic fin rays	Anal fin rays	Caudal fin rays	Lateral line scales	Scales above lateral line	Scales below lateral line
Group A	4*-8**	1-14	1-8	3-5	17	26	4-1/2	2-1/2
Group B	4-8	1-14	1-8	3-5	17	26	4-1/2	2-1/2
Group C	4-8	1-14	1-8	3-5	17	26	4-1/2	2-1/2

* Un-branched fins ** Branched fins

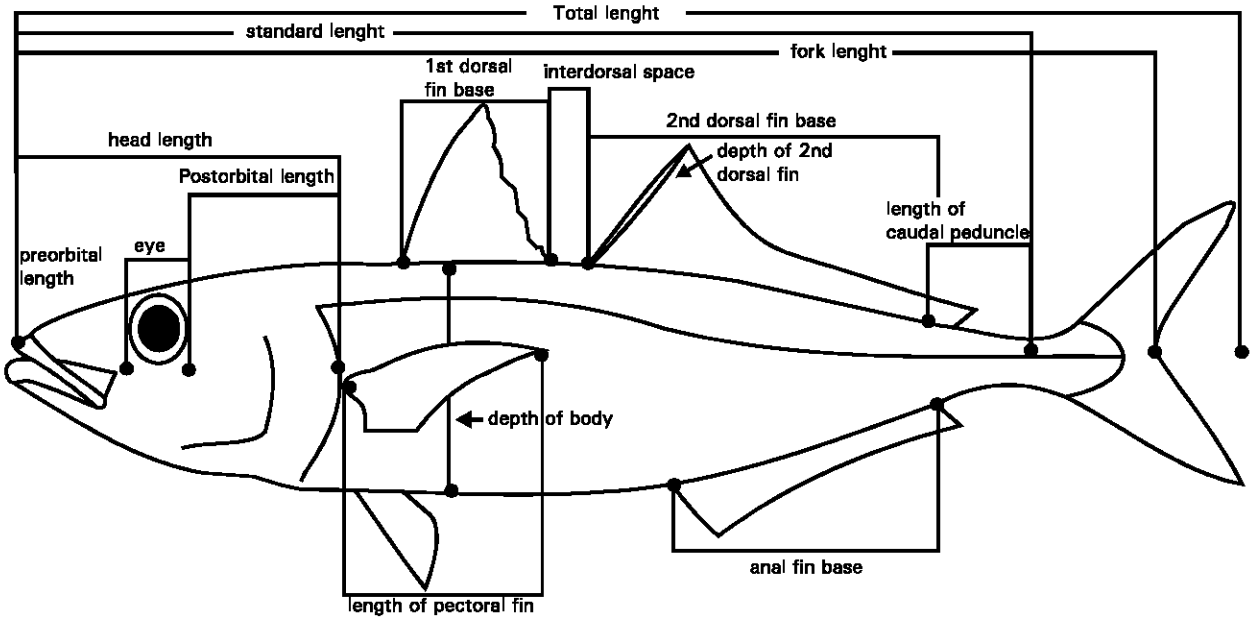

Fig. 1: Technical terms and principal measurements

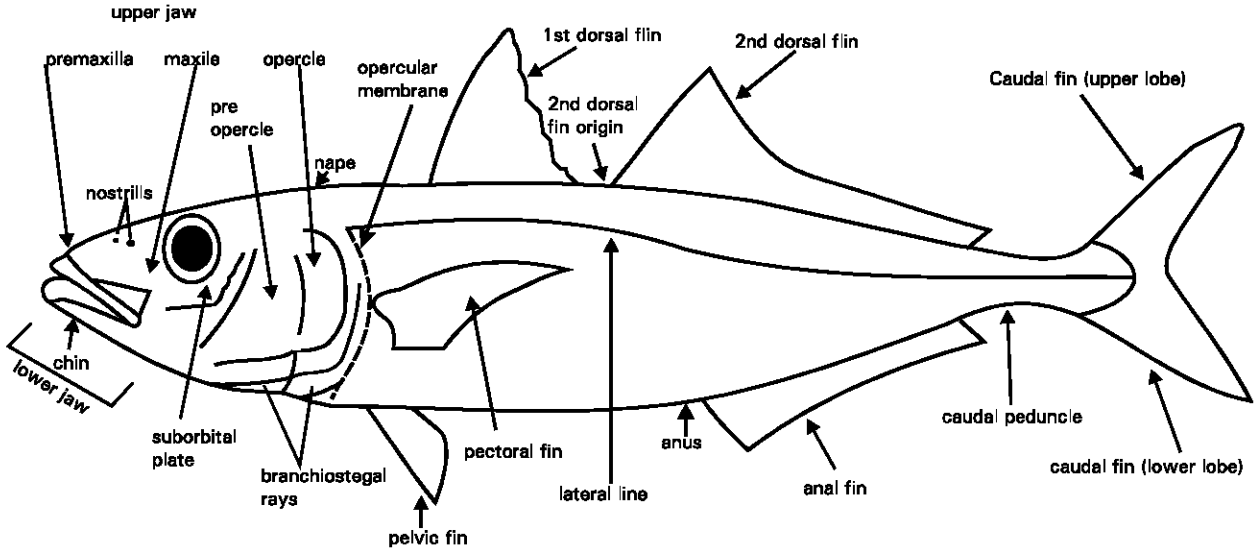

Fig. 2: General nomenclature of the external morphology

Table 2: Morphometric measurements (cm)

Distribution groups	Morphometric Characters							
	W.F. (gm)	T.L.	St.L.	F.L.	B.D.	P.O.L.H.	Po.O.L.H.	D.E.
Group A (Range)	28.32(8.4-45.7)	13.46(9-15)	10.46(6.6-12)	12.05(7.8-13.6)	3.26(2.1-4.7)	1.04(0.7-1.4)	1.56(0.9-1.9)	0.85(0.6-1.1)
Group B (Range)	58.02(50.9-70.7)	17.57(16.9-18.2)	13.4(12.5-14.6)	15.32(14.3-15.6)	4.08(3.8-4.6)	1.1(1.1-1.4)	1.94(1.8-2.2)	1.02(0.9-1.2)
Group C (Range)	114.92(21.1-22.3)	21.67(19-21)	16.84(14.8-18)	18.94(16.7-19.8)	4.86(3.8-6)	1.6(1.4-1.8)	2.83(2.15-2.5)	1.14(0.8-1.2)

W.F. = Weight of Fish T.L. = Total Lengths St.L = Standard Length F.L. = Fork Length
B.D. = Body Depth Po.O.L.H. = Post Orbital Length of Head D.E. = Diameter of Eye

Table 3: Morphometric measurements (cm)

Distribution groups	Morphometric Characters							
	I.O.D.	I.N.D.	H.L.	H.D.	L.C.P.	D.C.P.	L.U.J.	L.L.J.
Group A (Range)	0.91(0.5-1.1)	0.66(0.4-0.9)	3.41(2.2-4.1)	2.1(1.3-3.7)	1.66(0.9-2.1)	1.48(0.8-2.9)	0.73(0.4-0.9)	0.62(0.3-0.8)
Group B (Range)	0.92(0.9-1.1)	0.7(0.7-0.9)	4.01(3.8-4.3)	2.81(1.5-2.7)	1.9(1.5-2.4)	13.9(0.6-2)	0.67(0.5-0.9)	0.62(0.4-0.8)
Group C (Range)	1.24(1.2-1.3)	3.72(0.8-1.1)	4.94(4.3-5.3)	3.30(2.8-3.5)	2.44(2.2-2.6)	1.88(1.6-2)	0.67(1-1.1)	0.85(0.8-0.9)

I.O.D. = Inter Orbital Distance of Caudal Peduncle I.N.D = Inter Nostril Distance D.C.P. = Depth of Caudal Peduncle H.L. = Head Length. L.U.J. = Length of Upper Jaw H.D = Head Depth L.L.J. = Length of Lower Jaw L.C.P. = Length

Table 4: Morphometric measurements (cm)

Distribution groups	Morphometric Characters								
	L.D.F.	L.P.F.	L.Pl.F.	L.AF.	L.Cu.F.	Lo.D.F.	Lo.P.F.	Lo.Pl.F.	Lo.A.F
Group A (Range)	2.92(1.7-2.7)	2.34(1.2-2.4)	1.91(1.2-2.4)	2.14(1.3-2.9)	3.36(2.3-4.4)	2.92(2-2.4)	2.34(1.7-2.9)	1.91(1.2-2.6)	2.14(1.5-2.9)
Group B (Range)	3.48(2.6-4.1)	2.86(2.7-3.3)	2.34(2-2.7)	2.6(2.2-2.8)	4.37(4-4.8)	3.67(3.4-4.1)	2.61(2.7-2.9)	2.48(2-2.9)	2.48(2.3-2.8)
Group C (Range)	4.26(4.1-4.5)	3.5(3.2-3.7)	2.78(2.7-2.9)	3.22(2.9-3.5)	5.16(4.7-5.8)	4.18(3.7-4.5)	3.42(2.8-3.7)	2.82(2.7-2.9)	3.32(2.9-3.4)

L.DF. = Length of Dorsal Fin L.P.F = Length of Pectoral Fin L.Pl.F. = Length of Pevicl Fin L.A.F. = Length of Anal Fin
L.Cu.F. = Length of Caudal Fin Lo.D.F. = Longest Dorsal Fin Lo.P.F. = Longest Pectoral Fin Lo.Pl.F. = Longest Pelvic Fin
Lo.A.F. = Longest Anal Fin

Table 5: Morphometric measurements (cm)

Distribution groups	Morphometric Characters					
	L.D.F.B.	L.A.F.B.	P.D.L.	P.P.L.	P.Pl.L.	P.A.L.
Group A (Range)	1.77(1.2-1.9)	0.92(0.6-1.1)	5.87(3.8-6.9)	3.25(2-3.9)	6.11(3.9-7.2)	8.90(5.6-10.3)
Group B (Range)	2.03(1.9-2.1)	1.04(0.9-1.2)	7.11(6.8-7.8)	3.84(3.6-4)	7.04(6.6-7.4)	10.44(9.7-10.8)
Group C (Range)	2.36(2-2.6)	1.24(1.1-1.3)	8.44(7.85-8.9)	4.66(4.1-5.3)	8.84(7.9-9.7)	13.2(12-14.2)

L.D.F.B = Length of Dorsal Fin Base L.A.F.B= Length of Anal Fin Base P.D.L. = Pre Dorsal Length
P.P.L. = Pre Pectoral Length P.Pl.L. = Pre Pelvic Length P.A.L. = Pre Anal Length.

Morphometric characters of fish (Table 2) i.e., weight of fish, total length, standard length, fork length, body depth, pre orbital length of head, post orbital length of head and diameter of eye with increased when comparison was observed among three groups of different body length. These are close to the measurements reported for *Tor putitora* earlier (Mirza, 1982; Dasgupta, 1982).

It is clear from the results (Tables 3, 4 and 5) that all the body parameters grow symmetrically when observed in different length groups. The same body parameters grow symmetrically when observed in different length groups of Mahseer spp. (Mann, 1976; Talwar and Jhingran, 1992).

The meristic counts and morphometric measurements of *Tor putitora* commensurate and are in confirmation with different studies (Talwar and Jhingran, 1992; Dasgupta, 1991; Vladykov, 1934 and Mirza, 1982).

With the help of Meristic counts and morphometric measurements it is concluded that Mahseer (*Tor putitora)* exists in Korang river.

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