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Morphometric and Meristic Characters of Two cyprinids, *Carasobarbus luteus* and *Chandrostoma regium* from Greater Zab River, Erbil, Iraq

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Abstract

The present study was carried out in Greater Zab River from Aski-kalak to analyse Morphometric measurement and meristic count of *Carasobarbus luteus* (Heckel,1843) and *Chondrosotama regium* Heckel,1843 fish species in February 2024. 15 specimens of each fish species were collected from Aski-kalak of river Greater Zab River and ten Morphometric measurements and ten meristic count parameters were studied for each fish species. The total length of *Carasobarbus luteus* ranged from 19.3-23.7 cm; *Chondrosotama regium* fish species ranged from 23.5-26.8 cm respectively were recorded during the study period. The present study concluded that morphometric parameters and the total length of *C. luteus* and *C. regium* were significantly correlated. The positive correlation coefficient indicates the proportional positive increase in morphometric parameters compared to total length.

Introduction

Cyprinidae is the largest family of freshwater fishes and shows an extensive geographic distribution from North America (northern Canada to southern Mexico) to Africa and Eurasia (Nelson, 2006). Approximately 72% of freshwater fishes in Iraq belong to the Cyprinidae (37 species) (Coad, 2010). The subject of this study, *Carasobarbus luteus* and *Chondrosotama regium* are species belonging to the Cyprinidae and are distributed in the Tigris and Euphrates water systems (Beckman, 1962; Coad, 1996).

Chondrosotama regium and *Carasobarbus luteus* (Heckel, 1843) belonging to the family Cyprinidae have a wide distribution and are the most common species in both Euphrates and Tigris basins, as well as in natural and artificial lakes in Mesopotamia (Kuru, 1979; Ünlü, 1991; Coad, 2010). These two species were chosen because they are among the most economically important and abundant species in the region.

Some studies have been study *C. regium* and *C. luteus* from Kurdistan Region (Abdullah, 2002; Abdullah, 2006 and Agha,2017). Historically, fish morphology has been the principal source of data for taxonomy and evolutionary investigations. Morphological research can be conducted on a wide range of traits.

These characters are typically classified into two types Morphometric: characters refer to measurable structures such as fin length, head length, eye diameter, or ratios

between such measurements. Meristic characters encompass nearly every countable structure, including fin rays, scales, gill rakers, etc. However, no work has been done on the Morphometry of *C. regium* and *C. luteus* from Kurdistan Region. Because this information is critical for proper fisheries management and resource exploitation, the current study was undertaken.

Material and methods

Study Area

The Greater Zab River is located to the east Tigris River in the northern part of Iraq (Kurdistan Region) (Figure 1). It is situated between 36°-37° north latitudes and 43°-44° east longitude. The length of the Greater Zab River from the sink to the point of pouring into the Tigris River in the Guer sub-district is 392 km. The mean depth and width of the river in this site is about 3m and 60m respectively (Wright, 2007). Aski-Kalak is one of the towns located near the Greater Zab River and far about 40 km to the west of Erbil city (Bilal, 2006).



Figure 1: Its a location of greater Zab in the Iraq map

Collection of specimens and sampling

A total of 30 species of Fish were collected by fishermen by using gillnet. Fish were transported alive in a cool box with local river water to the laboratory, College of Agriculture Engineering Sciences, Fish Resource Departments, Salahaddin of University as soon as possible and were examined within 24 hours after their capture.

Morphometric Measure

The specimens were brought out of the cool box and the body length was measured using a one-meter measuring board graduated in millimetres (mm) and a digital calliper. The morphometric parameters were measured from the left side of each specimen according to Coad (2010) the morphometric characters (Fig. 2) were studied following:

1. **Total length (TL):** distance between a line perpendicular to the tip of the snout and a line perpendicular to the farthest tip of the caudal fin.
2. **Standard length (SL):** distance between a line perpendicular to the tip of the snout and a line perpendicular to the end of the hypural plate.
3. **Head length (HL):** distance between the tip of the snout to the posterior margin of the opercular bone.
4. **Body depth (BD):** greatest depth of the body.

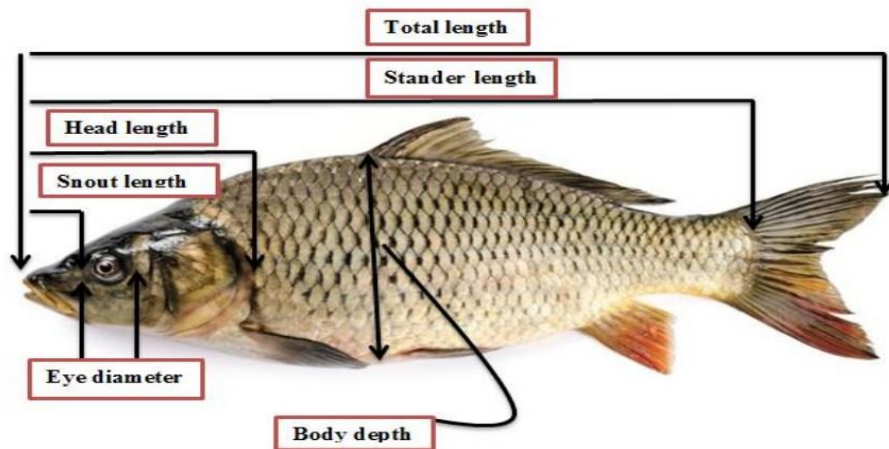


Figure 2 : Morphometric of fish

5. **Length of the longest dorsal-fin ray (LD):** distance between the structural base of the longest dorsal-fin ray and its tip.
6. **Length of the longest anal-fin ray (LA):** distance between the structural base of the longest anal-fin ray and its tip
7. **Eye diameter (ED):** distance between the margins of the cartilaginous eyeball.
8. **Snout length (SnL):** distance between the tip of the snout or upper lip to the front part of the orbit.

Meristic Study (Fig 3.)

1. **Number of dorsal-fin rays (D):** comprises both the number of unbranched and branched dorsal-fin rays, which were counted separately. Roman numerals refer to unbranched rays and Arabic numerals to branched ones. Since the last two branched dorsal-fin rays are often articulated on the the same pterygiophore, they were counted as one.
2. **Number of pectoral-fin rays (Pc):** number of branched pectoral-fin rays.
3. **Number of pelvic-fin rays (P):** number of branched pelvic-fin rays.
4. **Number of anal-fin rays (A):** comprises both the number of unbranched and branched anal-fin rays.
5. **Scales above the lateral line (ALL):** number of scales or scale rows between the lateral line and the anterior margin of the dorsal-fin origin. Scales on the dorsal midline were counted as half.

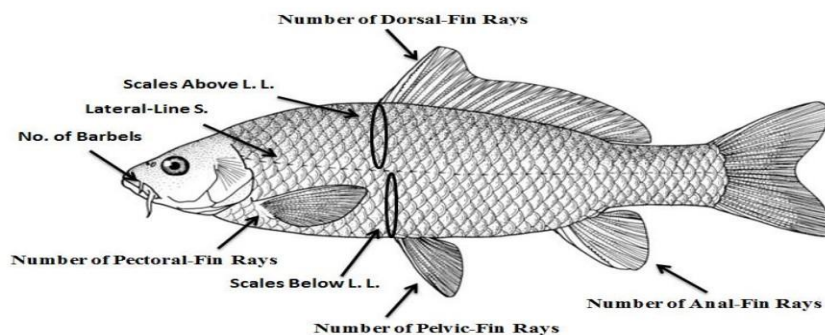


Figure 3: Meristic of fish

6. **Scales below the lateral line (BLL):** number of scales or scale rows between the lateral line and the anterior margin of the anal-fin origin. Scales on the ventral midline were counted as half.

7. **Lateral-line scale count (LL):** Numbers of scales in the lateral-line series from the first pore-bearing scale to the last scale on the caudal fin.

8. **Gill-raker count (GR):** number of gill rakers on the first gill arch.

9. **Total number of barbels:** number of posterior and anterior barbels.

10. **Pharyngeal teeth (PT):** number of teeth on the pharyngeal bone. The pharyngeal bones were removed from fish by first cutting and lifting the operculum back away from the underling gills to clean a pharyngeal arch after removal, this by soaking in warm water.

Result and Discussion

Present research work was focused on Morphometric and meristic parameters during Practical. 15 preserved specimens of each fish species *C. luteus* and *C. regium* figure 4 and figure 5 were measured for morphometric and meristic parameters analysis. During the study, ten Morphometric parameters and ten meristic counts of each fish species from the Greater Zab River Aski-kalak were measured. All the Morphometric parameters of *C. luteus* and *C. regium* revealed a proportional increase in the total length of fish under Studys shown (range and mean \pm S.D. value) in Table 1.



Figure 4: Samples of *Carasobarbus luteus* (Heckel,1843)

The range and mean±S.D., total length, fork length, standard length, predorsal length, body depth, snout length, eye diameter, head length, and depth of caudal peduncle were observed in all two selected fish species of Greater River in Askikalak. The total length (Independent variable) was kept on the x-axis while another



Figure 5: Samples of *Chondrosotama regium* (Heckel,1843)

morphometric parameter (dependent variable) was on the y-axis. The meristic counts of *C. luteus* and *C. regium* including dorsal fin ray, anal fin ray, caudal fin ray, pectoral fin ray, pelvic fin ray, lateral line scale, above lateral line scale, below lateral line scale, barbules, gill rakers were observed. The value of meristic counts of all the fish species are shown in Table 2.

Table 1. Morphometric measurements of selected fish species from Greater Zab River (Mean±S.D)

Morphometric	<i>Carasobarbus luteus</i>		<i>Chondrosotama regium</i>	
	Range	Mean±S.D.	Rang	Mean±S.D.
Total Length	19.3-23.7	20.86±1.15	23.5-26.8	24.65±0.81
Standard Length	20.5-22.8	17.06 ±1.17	15.5-19.3	21.02±0.64
Fork Length	22-25	18.58±1.18	17.3-19	22.73±0.61
Eye diameter	0.7-1.1	1.08±0.09	1-1.2	0.97±0.09
Head Length	3.7-4.7	4.3±0.25	4-4.6	3.92±0.14
Dorsal fin high	3-4	3.36±0.20	3-3.6	3.23±0.22
Anal fin high	2-2.6	3.27±0.28	3.2-3.5	2.35±0.36
Mine body	1.8-2.3	2.12±0.22	1.8-2.5	2.01±0.19
Max body	4-6	6.23±0.45	5.5-7	5.1±0.73
Pr DL	3.7-4.7	8.8±0.55	8.4-10	9.82±0.30

The pharyngeal teeth of *C. regium* was 6-6 and 7-6 (Figure 6) and the Pharyngeal teeth of *C. luteus* usually are 2,3,5-5,3,2, but in one sample the left arch has four row (Figure 7).



Figure 6: Sample of pharyngeal teeth
C. regium

Figure 7: Sample of pharyngeal teeth
C. luteus

The Morphometric parameters showed a proportional positive increase with the increase in the length of fish. Ujjania *et al.* 2012 also observed the positive recorded in Morphometric parameters with an increase in fish length. The meristic counts

Table 2. Meristic counting of selected fish species from Greater Zab River

Counts	Abbreviation	<i>Carasobarbus luteus</i> (Range)	<i>Chondrosotama regium</i> (Range)
lateral line-scale	LL	62-70	25-28
Above Lateral line Scale	ALL	9-11	4-5
Below lateral line scale	BLL	6-7	3
Dorsal fin	DF	9-10	9-10
Anal fin	AF	10-12	6
Pectoral fin	PcF	14-16	14-17
Pelvic fin	PF	8	7-8
Gill racker	GL	23-26	16-18
Barbles	BB	0	1pair

were almost constant in all the length groups of fish with different body lengths, so it concludes that the meristic counts were independent of body length (Talwar and Jhingram 1992; Zafar *et al.* 2002). The fact is observed universally that the growth

of the fish or any other organism was found to be increased with an increase in body length. Hence growth of various body parts is interconnected with body length (Ranjini and Bijoy, 2011).

Conclusion

The present study concluded that morphometric parameters and the total length of *C. luteus* and *C. regium* were significantly correlated and the positive correlation coefficient indicates the proportional positive increase in morphometric parameters compared to total length.

References

- ABDULLAH, S. M. A. (2002) Ecology, Taxonomy and Biology of some Parasites of Fishes from Lesser Zab and Greater Zab Rivers in North of Iraq. Doctor of Philosophy of Science Thesis, Collage of Education (Ibn AlHaitham), University of Baghdad: 153pp. (In Arabic).
- ABDULLAH, S. M. A. (2006) The Inhabitant Fishes in Dukan Lake in North of Iraq and Methods for Developing Their Culturing. 2nd International Science Congress for Environments, South Valley University, Qena, Egypt/28-30 march 2006. P. 68-78.
- Cadrin S. X., 2000. Advances in morphometric analysis of fish stock structure. Reviews in Fish Biology and Fisheries 10(2):91–112.
- COAD, B.W. (2010) Freshwater fishes of Iraq. Pensoft Series Faunistica, 93. 275 pp. 16 plates.
- HECKEL, J. J. 1843 Abbildungen und Beschreibungen der Fische Syriens nebst einer neuen Classification und Charakteristik sämmtlicher Gattungen der Cyprinen. Stuttgart. 109 pp.
- MOHAMED, A. R. M. and ABOOD, A. N. 2016. Occurrence of the King Nase, *Chondrostoma regium* (Heckel, 1843) in the Shatt Al-Arab River, Iraq. Journal of Agriculture and Veterinary Science. 9 (8). P. 85-89.
- Mousavi-Sabet H., AnvariFar H., 2013 Landmark-based morphometric variation between *Cobitis keyvani* and *Cobitis faridpaki* (Pisces: Cobitidae), with new habitat for *C. faridpaki* in the southern Caspian Sea basin. Folia Zoologica 62(3):167–175.

- Ranjini PK, Bijoy NS. Length-weight relationship, condition factor and morphometry of gold spot mullet *Liza parsia* from Cochin estuary, Indian Journal of GeoMarine Sciences. 2011; 40(4):567-571.
- Talwar P K and Jhingran A G. 1991. Inland Fishes of India and Adjacent Countries. Vol. 1 and 2. Oxford & IBH publishing house, New Delhi.
- Turan C., Oral M., Ozturk B., Duzgunes E., 2006 Morphometric and meristic variation between stocks of Bluefish (*Pomatomus saltatrix*) in the Black, Marmara, Aegean and north eastern Mediterranean Seas. Fisheries Research 79:139–147.
- Ujjania N C, Kumar G, Langar R K and Krishna G. 2012. Biometric studies of Mahseer (*Tor tor* Ham. 1822) from Bari Talab (Udaipur), India. International Research Journal of Biological Sciences 2(3): 138–41.
- WHEELER, A. 1984. Key to the Identification of Freshwater Fishes in Britain. Institute of Fisheries Management, Specialist Section Resource. www.ifm.org.uk. (6/2016).
- Zafar M, Nazir A, Akhtar N, Mehdi Naqvi S M H and Zia-urRehman M. 2002. Studies on meristic counts and Morphometric measurements of Mahseer (*Tor putitora*) from a spawning ground of Himalayan foot-hill River Korang Islamabad, Pakistan. Pakistan Journal of Biological Science 5(6): 733–35.