Distribution Pattern of Some Biochemical Constituents in Muscle of the Common Cat Fish, *Heteropneustes fossilis* (Bloch)

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The quantitative distribution pattern of fat, moisture, protein and ash has been studied in the muscle of the various zones corresponding to the dorsal and ventral regions of the body of a common cat fish, *H. fossilis* (Bloch). The ventral part of the body showed more accumulation of fat and ash than the dorsal part, while this dorso-ventral gradation was not marked in the case of protein content. All the four constituents also showed an increase from the anterior to the posterior zones, both in the ventral as well as dorsal regions of the body. The distribution of moisture followed an almost opposite pattern, indicating an inverse relationship with fat and ash contents.

It is well known that the biochemical constituents of fish are influenced by many factors like size, sex, species, maturity, feeding, environment, season etc. In addition, individual variations and variations with different anatomical locations have also been recorded (Love 1970). Variations in the chemical composition and nutritive value of muscle from different parts of the individual fish have been reported by several workers in the past (Brandes & Dietrich, 1953 a, b; Alexander, 1955; Olley & Lovern, 1960; Thurston & MacMaster, 1960; Mannan *et al.*, 1961; Karrick & Thurston, 1964; Jafri, 1973).

The present paper describes the variations in the total fat, moisture, protein and ash contents of the muscle of *H. fossilis* from different regions of the body.

Materials and Methods

Fishes of same size (24 cm total length) and sex (female), were brought to the laboratory in live condition. To avoid any seasonal or environmental differences, the entire study was completed within a fortnight and all fishes were obtained from the same environment. The body of each individual was divided into two horizontal regions along the lateral line, each of these being further divided into three vertical zones, head (8.5 cm in length), trunk (8.5 cm in length) and tail (7 cm in length) as shown in Fig. 1. The skin and bones were then carefully separated from the muscle. All the determinations were made in triplicate.

Methods of estimation of fat, protein, moisture and ash were the same as followed by Jafri *et al.* (1964).

Results

The data obtained for the distribution of fat, moisture, protein and ash contents of the muscle from different body regions of *H. fossilis* are presented in Table 1, which indicate an interesting distributional pattern in the muscle from different body regions. The muscle from the various zones of the ventral portion of the body showed higher values of fat than that from the dorsal body zones. Further, it has been observed that in the ventral region, the percentage of fat increased from the head (zone 4) to the tail (zone 6) region. Similarly, in the dorsal region, the percentage of fat was found to increase from the anterior (zone 1) to the posterior (zone 3) region.

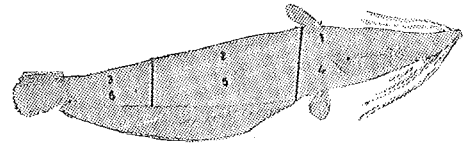

Fig. 1. *Different regions and zones of the body of H. fossilis selected for muscle sampling*

A definite dorso-ventral gradation in the moisture content of the body is indicated. The moisture values were slightly higher in the dorsal region than in the ventral region of the fish. The highest moisture level was recorded in the dorsal part of head region and the lowest in the ventral side of caudal peduncle. The protein contents did not show any marked variations between the dorsal and ventral regions of the body. However, a marked increase could be seen from the head to the tail region of the fish. The variations in ash contents were not well marked but declining values were observed with increase in the degree of hydration of the muscle in various zones of the fish.

Discussion

Higher lipid values observed in the ventral region of the fish have been reported to be characteristic of many fish species like herring, *Clupea harengus* (Brandes & Dietrich, 1953 a), the siscowet trout, *Salvelinus namaycush siscowet* (Thurston, 1962) as also of certain Indian species namely, *Arius dussumieri*, *Ophiocephalus striatus* (Alexander, 1970) and *Wallago attu* (Jafri, 1973). Increasing values of fat from the head to the tail zones of the ventral region have been found to be consistent with the observations of Jafri (1973) on *W. attu*. Higher fat accumulation recorded in the caudal region, both in the dorsal as well as in the ventral part might be associated with a greater demand of energy for muscular activity of the tail during swimming, which involves swift lashing of this region of the fish body. The moisture contents maintained an inverse relationship with those of fat in the muscle. similar relationship was pointed out in fish muscle by several other workers (Brandes & Dietrich, 1953 a, b; Iles & Wood, 1965).

The fat-water relationship in the muscle of *H. fossilis* could be explained through the following regression equation.

$$X = 15.200 - 0.177\ Y$$

where x was the percentage of fat, and y was the percentage of water.

The correlation co-efficient for this relationship was found to be – 0.924, significant at 1% level. The fat-water line for the muscle of *H. fossilis* has been plotted in Fig. 2

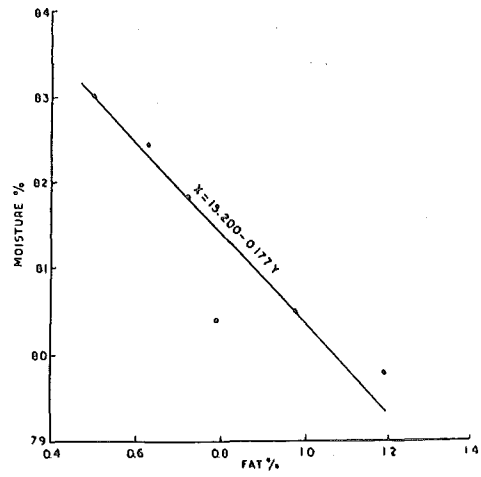

Fig. 2. *Relationship between fat and water distribution pattern in the flesh of H. fossilis*

The relationship between the ash and water has been represented in Fig. 3 and could be expressed by the following equation.

$$A = 2.989 - 0.021\ Y$$

where A was the percentage of ash and Y was the percentage of water.

The value of correlation co-efficient, 'r' for the above relationship was found to be – 0.927, significant at 1% level of probability ($p < 0.01$).

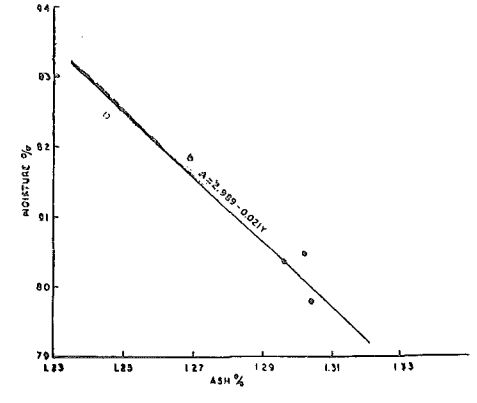

Fig. 3. *Relationship between ash and water distribution pattern in the flesh of H. fossilis*

Table 1. *Fat, moisture, protein and ash contents of the muscle from various body zones of H. fossilis*

	Body zones	Fat %	Moisture %	Protein %	Ash %
	1	0.496±0.030	83.043±0.355	13.774±0.296	1.239±0.032
Dorsal series	2	0.725±0.055	81.856±0.356	14.586±0.194	1.269±0.011
	3	0.975±0.022	80.490±0.135	15.270±0.083	1.303±0.128
	4	0.629±0.054	82.446±0.065	13.754±0.385	1.245±0.036
Ventral series	5	0.795±0.534	80.380±0.062	14.506±0.257	1.296±0.234
	6	1.191±0.518	79.790±0.051	15.353±0.083	1.304±0.094

± Standard error

The present investigation on *H. fossilis* thus indicates that any increase in the proportion of any of the major biochemical constituents of fish muscle is generally accompanied with a simultaneous decrease in those of the others, the sum of these remaining almost relatively constant.

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