VARIATIONS IN THE CHEMICAL COMPOSITION OF THREE FRESHWATER FISHES OF BHAVANISAGAR RESERVOIR*

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FAT variation in marine species of fish has been studied extensively in India (Venkataraman and Chari, 1953; Vasavan *et al.*, 1960). But it is not known whether any such variations occur in freshwater fishes. Three dominant species of Bhavanisagar Reservoir were therefore chosen for this study, the fishes taken up being two cat fishes *Wallago attu* and *Macrones* (*Mystus*) *aor*, and a cyprinid, *Barbus dubius*.

EXPERIMENTAL

Fish caught in the gill nets in the experimental fishing units were taken up for analysis. To the extent available at least one fish per month was analysed. Methods of handling, sampling and analysis have been enumerated in an earlier paper (Natarajan and Sreenivasan, 1961). The flesh of the whole fish was taken up, minced well and a portion taken for analysis. Differences, if any, between different parts of the fish are obviated thus.

RESULTS

Variations in fat, moisture and protein represented in Fig. 1. The data on variations for the entire period of over the two years is summarized in Table I.

	Per cent.		
	Water	Fat	Protein
Barbus dubius ..	72·56–80·45 (1·11)	0·30–7·20 (24·27)	16·76–19·26 (1·15)
Macrones aor ..	76·17–84·83 (1·11)	0·21–4·55 (21·67)	14·88–19·04 (1·28)
Wallago attu ..	77·71–81·87 (1·05)	0·50–1·97 (3·94)	15·03–17·97 (1·20)

(Figures in paranthesis are "Variation Factor" of Thurston *et al.*, 1959).

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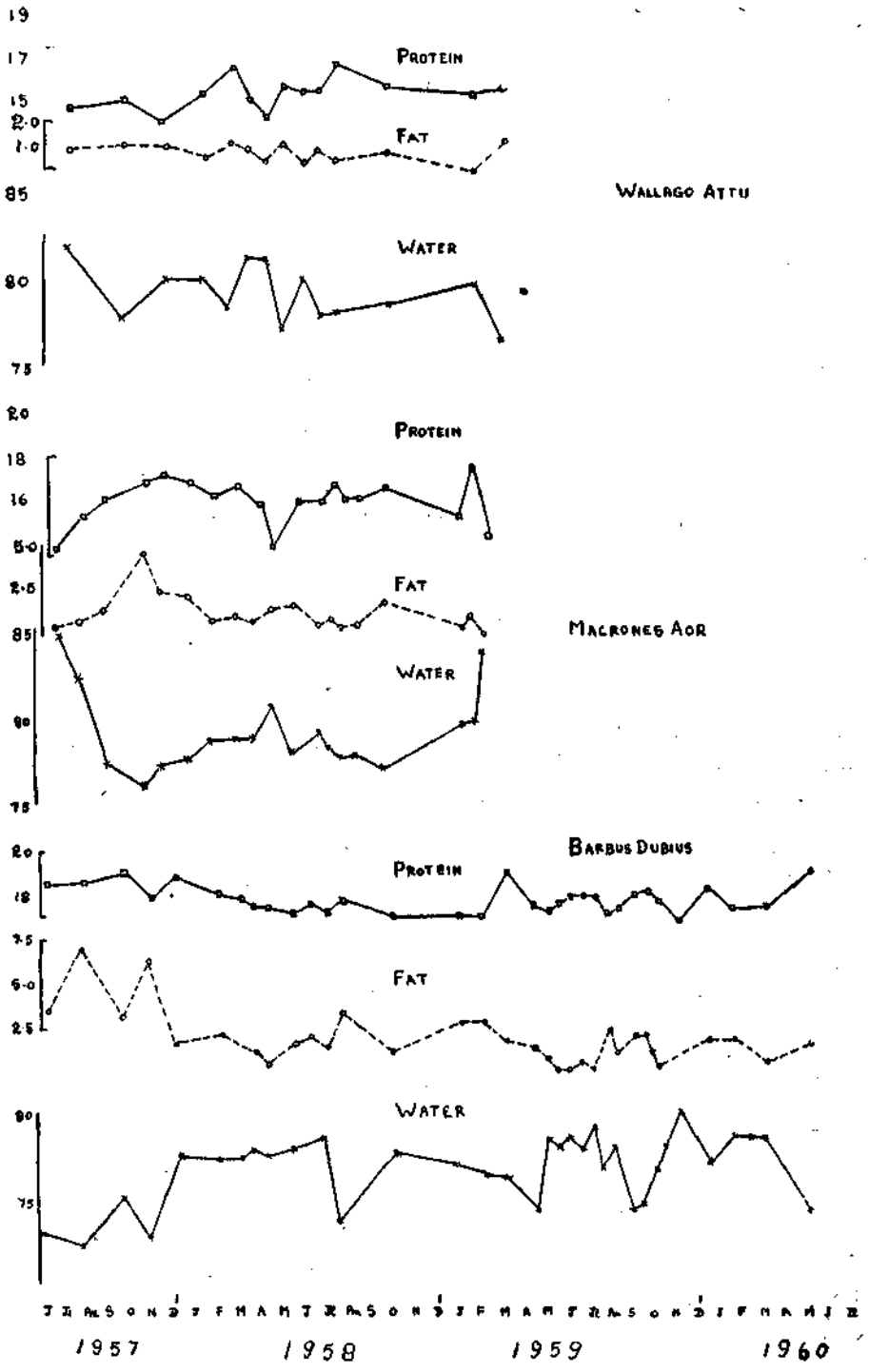
PROTEIN
FAT
WALLAGO ATTU
WATER
PROTEIN
FAT
MACRONES AOR
WATER
BARBUS DUBIUS
PROTEIN
FAT
WATER
1957
1958
1959
1960

FIG. 1

Discussion

From the summarized table (Table I) it is evident that very limited variation in the proximate composition occurs in *Barbus dubius*. The maximum fat content of this fish over a period of three years is only 7·20%. It is much less in *Macrones aor* and the least in *Wallago attu*. Variations in water and protein are also very narrow. From Fig. 1, it is seen that fat and moisture are inversely correlated, particularly in *Barbus dubius*. In the case of the two cat-fishes, however it is the protein that correlates inversely with moisture. Though a striking seasonal variation is not noticed with regard to even fat content, higher fat content within a year generally occurs between July and October in *Barbus dubius*. Since this fish breeds during North-East monsoon and makes a short local migration, it appears that this limited build up of fat is to provide the energy for the upstream migration. But this cannot be compared with the long-range migration of Salmon, which stores a high fat content (Idler and Bitners, 1958). The fat content is not correlated with size of fish or with the " coefficient of condition". The highest fat content in *Barbus dubius* was 7·2%, the average fat content based on three years' data is 2·04%. Similarly the average fat content of *Macrones aor* and *Wallago attu* are 1·24 and 0·94% respectively.

A comparison with the data of Thurston *et al.* (1959) on American freshwater fishes shows that the carp shows a wider range of fat in its muscle than does the cat fish (*Ameiurus melas*). Generally it appears that predatory and carnivorous fishes have a lower fat content than plankton feeding fishes. Sohn *et al.* (1961) have shown that the fat content and its variation is very great in Mackerel but low in cod, haddock and ocean perch. The data furnished by Thompson (1959) for some sea fish and Thurston *et al.* (1959) for freshwater fish supports the conclusions. Morawa (1956) showed that for the perch (*Perca fluviatilis* L.) the fat of muscle throughout the year was about 1–2%. Our results presented here show that fat content and its variation was insignificant in the carnivorous fish *Macrones aor* and the predator *Wallago attu*. But in *Barbus dubius* which feeds on insects, oligochaets and plankton (Ranganathan and Radha, personal communication) the fat content is higher. In *Labeo fimbriatus* which is more of a plankton feeder, a still higher fat content of 10·81% was reached (Sreenivasan and Sounderaraj, unpublished). High fat content in fishes is correlated with pelagic migratory plankton feeding fishes (Sohn *et al.*, 1961; Venkataraman and Chari, 1953; Thompson, 1959). In Bhavanisagar Reservoir, the fishes are local migratory which explains the dispensability of fat storage in them.

Fat content of freshwater fishes seems also to be influenced by the ecological conditions (Morawa, 1960).

Unlike in the case of *Labeo fimbriatus* in which during particular months the protein content is low (Sreenivasan and Sounderaraj, unpublished), the fishes studied herein have a higher average protein content, *e.g.*, *Barbus dubius*, 17·93%, *Macrones aor*, 17·3% and *Wallago attu* 16·65%, and the variation is very little. Hence the nutrtive value (from the point of view of protein availability) is fairly high throughout the year.

Summary

The variations in fat, moisture, protein and ash of three freshwater fluviatile species of fish have been studied. Except in the case of *Barbus dubius* the fat was very low and variation in its content also limited. The protein content of all the three species was fairly high throughout the year. Very slight variation was noticed in ash.

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