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## SERUM PROTEIN DIFFERENCE IN *MUGIL CEPHALUS* (L.) AND *M. PARSIA* (HAM.-BUCH.) FAM MUGILIDAE

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### SUMMARY

Serum proteins of *Mugil cephalus* and *M. parsia* from Mandovi and Zuari estuaries of Goa obtained during the period March-June 1973 have been examined. Differences in the protein components and in the quantity of total solids and total serum proteins are seen.

### INTRODUCTION

The use of serological techniques for the study of races and populations of marine fishes is comparatively recent (Cushing 1952, 1956; Ridgway 1957; Sindermann 1958). The taxonomy of mullets and the differences amongst the species are not well defined and need a very careful attention. Serum proteins of the two grey mullets *Mugil cephalus* and *M. parsia* have been examined to determine the differences. Both the species are widely distributed and occur in fresh water estuaries and coastal regions. *M. cephalus* is found from the Red Sea, through Indian ocean and extends upto China sea and Japan (Day, 1878; Munro, 1955). *M. parsia* occurs from Bombay down the west coast and all along the east coast (Sarojini, 1957; Day, 1878; Munro, 1955). Further, it occurs through the Indian ocean upto the Australian coast and the Philippines.

The two species differ morphologically. The maximum size attained by *M. cephalus* is 18 inches

whereas *M. parsia* reaches a maximum length of 6 inches (Munro, 1955). These species differ in colour pattern, particularly that of the fins. The other differences are summarized in Table 1.

### MATERIALS AND METHODS

Specimens of both the species were obtained by trawling from Mandovi and Zuari estuaries of Goa from March to June 1973. Blood samples were obtained from the caudal end of the fish in non-heparinized capillary tubes and allowed to clot. They were then centrifuged at 1,000 rpm for 5 minutes to obtain the clear sera. Samples showing evidence of hemolysis were not utilized. Electrophoresis was carried out on cellulose acetate strips using a veronal buffer of pH 8.6 and ionic strength of 0.05. The stain used was 2% ponceau S in 3% trichloroacetic acid. Later they were destained in 5% glacial acetic acid.

### OBSERVATIONS AND RESULT

More than 15 samples were screened separately for both the species. The number and pattern of

Table 1. The details of differences in *Mugil cephalus* and *M. parsia*.

Species	Author	Dorsal	Anal	Fin rays		Lateral line scales
				Pectoral	Ventral	
<i>Mugil cephalus</i>	Day	IV, 8	III, 8	15	1/5	42-44
	Munro	IV, 6-8	III, 8	—	—	38-42
<i>Mugil parsia</i>	Day	IV, 8	III, 8-9	14	1/5	34-35
	Munro	IV, 8	III, 8-9	—	—	34-35

bands obtained for each species were constant. Difference in the pattern and number of bands were noted between the two species, which led to establishing differences between them. The pattern of *M. cephalus* consists of 6 major components; two components of slow anodic mobility, a component located at the point of application, a fast anodic component and two medium fast anodic components. The pattern of *M. parsia* consists of 7 major component; two components of slow anodic mobility, a component located at the point of application, a fast anodic component

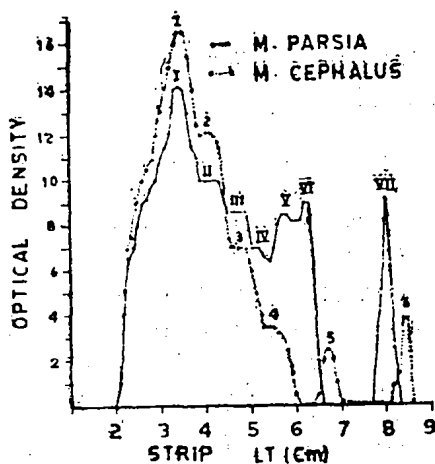


Fig. 1. Electrophoretic patterns of sera proteins in *M. cephalus* and *M. parsia*. LT = length of strip.

and three medium fast anodic components. The differences remain constant and exhibit remarkable specificity. The electrophoretic patterns have been studied by a photoelectric densitometer for the total quantity and positions of different components. The number of crests correspond to the number of distinct proteins, and the area under the crests are proportional to their concentrations (Carpenter, 1965). The Fig. 1 shows clear differences in the position and intensity of different bands. These species were also examined for total protein contents and total solids in the sera by using a Golob refractometer. The differences are given in Table 2.

Table 2. Variations in total proteins and total solids in the sera of *M. cephalus* and *M. parsia*.

Species	N	Total serum proteins (g/100ml)	Total solids (g/100ml)
<i>M. cephalus</i>	10	9.1±0.094	13.2±0.095
<i>M. parsia</i>	10	8.2±0.120	12.6±0.180

The value of *t* calculated was found to be 2.778. From the table (Bishop, 1966) for *P* at 0.02 and at 18 degrees of freedom *t* is 2.55 which is less than the value calculated. Therefore the means of the two species given in Table 2 are significantly different.

It is thus seen that the two species differ in their protein components and also in the quantity of total solids and total serum proteins.

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#### REFERENCES

- Bishop, N., *Statistics for Biology*. Longmans Green and Co. Ltd., London, 1966.
- Carpenter, B.L., *Immunology and Serology*. W.B. Saunders Company Philadelphia and London, 1965.
- Cushing, J.E. Serological differences of fish bloods. *Science* 1952, 115, 404-405
- , Observations on the serology of tuna. *U.S. Fish Wildl. Serv., Spec. Sci. Rept. Fish.* 1956, 183, 1-14.
- Day, F., *The fishes of India*. William Dawson and Sons London, 1878.
- Here, A. W., Fishes from the Andaman Island. *Mem. Indian Mus.*, 1941, 13, 331-403.
- Luther, G., The food habits of *Liza macrolepis* Smith and *Mugil cephalus* Linnaeus (Mugilidae). *Indian J. Fish.* 1962, 9, 604-626.
- Munro, I.S.R., *The marine and fresh water fishes of Ceylon*. Department of external affairs, Canberra, 1955.
- Ridgway, G., The use of immunological techniques in racial studies. *U.S. Fish Wildl. Serv., Spec. Sci. Rept. Fish.*, 1957, 208, 39-43.
- Sarojini, K.K., Biology and fisheries of the grey mullets of Bengal. *Indian J. Fish.*, 1957, 4, 160-207.
- Sindermann, C.J., Antimammalian erythrocyte properties of sea herring serum. *Anat. Rec.*, 1958, 131, 599-600.