

ELECTROPHORETIC STUDIES OF SERUM AND EYE LENS PROTEINS OF TWO SPECIES OF FLAT FISHES

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ABSTRACT

Blood sera and eye lenses of two species of flat fishes, namely *Brachirus orientalis* and *Pseudorhombus arsius* collected from June to August 1975 were analysed electrophoretically for their protein components. Total solids and total proteins were also determined. The sera and eye lens proteins of the two species showed clear differences in the number, amount and the position of the different protein components.

INTRODUCTION

Electrophoretic studies of fish serum and eye lens proteins have revealed much information concerning interspecific as well as intraspecific similarities and differences in fishes (Moore, 1945; Fugiga, 1961; Sanders, 1964; Badawi, 1971). The present investigation was undertaken to compare under uniform conditions, the electrophoretic components of sera and eye lens proteins of two species of flat fishes as regards their mobility, amount and number, so as to enable the determination of electrophoretic patterns characteristic of each species. The fishes investigated were *Brachirus orientalis* and *Pseudorhombus arsius*. Both these are widely distributed species. *B. orientalis* occurs along the coasts of India, Sind, Andamans, China, Australia and the Persian Gulf. *P. arsius* is found along the coast of Africa, seas and estuaries of India and Australia

(Day, 1878; Pradhan, 1964; Norman, 1928; Misra 1943; and Munro, 1955).

MATERIAL AND METHODS

Samples of both the species (*B. orientalis* and *P. arsius*) were collected from the fish landing centres of Panjim from June to August 1975. In *B. orientalis*, the range in length was from 12.8 to 18.6 cm and in *P. arsius* from 13.6 to 22.0 cm. Blood samples were obtained from the caudal end of the fish in non-heparinized capillary tubes and were allowed to clot. The clotted blood was then centrifuged at 1,000 rpm for 5 minutes to obtain a clear sera. Samples showing evidence of hemolysis were discarded.

Eye lenses were removed from the fishes, washed in 1% saline and then ground in a test tube with 0.5 ml veronal buffer pH 8.6 and ionic strength 0.05.

They were then centrifuged at 3,500 rpm for 15 minutes to obtain a clear solution.

total solids and total proteins, a refractometer was used.

Electrophoresis was carried out on cellogel strips using a veronal buffer pH 8.6 and ionic strength 0.05. All samples were run for 1 hour at a constant voltage of 150 volts, after which the strips were scanned using a photoelectric densitometer. For the determination of

RESULTS

Several sera and eye lens samples of *B. orientalis* and *P. arsius* were screened separately. The results obtained on the electrophoretic mobilities and the total proteins and total solids of the two species are given in Tables I and II. The

TABLE I: Electrophoretic analyses, total proteins and total solids of serum proteins.

Analyses of serum proteins	Species	Fractions (in order from slowest to fastest)					
		1	2	3	4	5	6
Distance in mm from the point of application	<i>B. orientalis</i>	12	18	24	30	39	-
	<i>P. arsius</i>	5	12	20	26	33	41
Relative mobility (as percentages)	<i>B. orientalis</i>	31	46	61	77	100	-
	<i>P. arsius</i>	12	29	49	63	80	100
		Total proteins			Total solids		
		g/100 ml			%		
<i>B. orientalis</i>		6.7			10.0		
<i>P. arsius</i>		5.4			8.4		

TABLE II: Electrophoretic analyses, total proteins and total solids of eye lens proteins

Analyses of eye lense proteins	Species	Fractions (in order from slowest to fastest)							
		1	2	3	4	5	6	7	8
Distance in mm from the point of application.	<i>B. orientalis</i>	0	8	13	18	26	44	-	-
	<i>P. arsius</i>	0	4	7	12	16	21	28	44
Relative mobility (as percentages)	<i>B. orientalis</i>	0	18	29	41	59	100	-	-
	<i>P. arsius</i>	0	9	16	27	36	47	64	100
		Total proteins				Total solids.			
		g/100 ml				%			
<i>B. orientalis</i>		0.5				2.2			
<i>P. arsius</i>		2.5				4.7			

typical electrophoretic patterns for the serum and eye lens proteins of the two species studied are given in Figs. 1 and 2. The serum pattern of *B. orientalis* consists of 5 fractions, of which 1, 2 and 4 are the major protein fractions. Six fractions are present in the serum of *P. arsius*,

fractions 1, 2, 3 and 5 are the major protein fractions. The eye lens pattern of *B. orientalis* consists of 6 fractions, of which 1 and 2 are the major proteins. Eight fractions are present in the eye lens of *P. arsius* fractions 1, 2, 3 and 6 are the major protein fractions. The differences remain constant and exhibit remarkable species specificity.



Fig. 1. Serum protein electrophoresis patterns in *B. orientalis* and *P. arsius*.



Fig. 2. Eye lens protein electrophoresis patterns in *B. orientalis* and *P. arsius*.

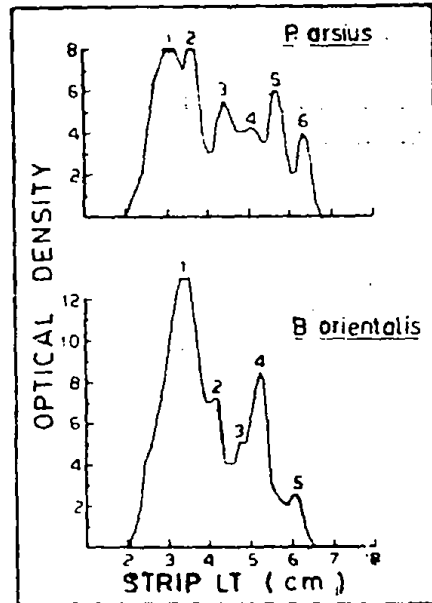


Fig. 3. *B. orientalis* and *P. arsius*, serum protein electrophoresis patterns as obtained by densitometer.

(Note: Lt = length of strip)

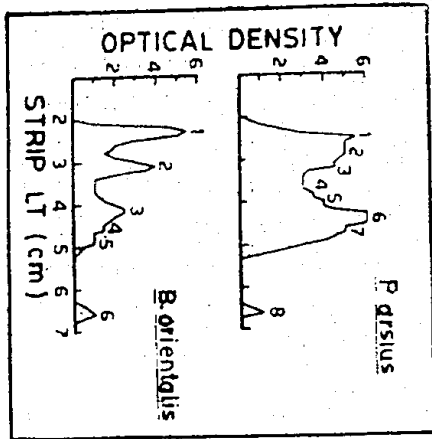


Fig. 4. *B. orientalis* and *P. arsius*, eye lens protein electrophoresis patterns as obtained by densitometer.
(Note: Lt = length of strip).

crests was found to correspond to the number of distinct proteins and the areas under the crests were proportional to their concentrations as noted earlier by Carpenter (1965).

CONCLUSION

The study of serum and eye lens proteins of the two species of flat fishes clearly indicate the patterns which are characteristic of the species. A comparison between them revealed a major difference in their protein fractions.

Serum proteins of *B. orientalis* showed 5 fractions, and of *P. arsius* 6 fractions. Fractions 1, 2 and 4 contain the most protein found in *B. orientalis* sera, and fractions 1, 2, 3 and 5 in the sera of *P. arsius*. The sera of the two species also differed in their final mobility. The sera of *B. orientalis* migrated 39 mm and *P. arsius* sera 41 mm. The eye lens proteins of *B. orientalis* showed 6 fractions, and of *P. arsius* 8 fractions. Fractions 1 and 2 contained most of the protein in the eye lens of *B. orientalis* and fractions 1, 2, 3 and 6 in the eye lens of *P. arsius*. The eye lens proteins of *B. orientalis* and of *P. arsius* had similar final mobilities as they migrated up to 44 mm. The number of fractions present in the serum and the eye lens was constant in each of the two species.

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