

# ELECTROPHORETIC STUDIES OF EYE LENS AND SERUM PROTEINS OF *SARDINELLA FIMBRIATA* (VALENCIENNES) AND *SARDINELLA LONGICEPS* VALENCIENNES

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## ABSTRACT

Eye lenses and blood sera of two species of sardine, *Sardinella fimbriata* and *S. longiceps* collected from December 1974 to February 1975 have been analysed electrophoretically for protein components. Total solids and total proteins were also determined. No marked differences were observed in the number and position of the different protein fractions in the eye lenses of the two species. But the sera of the two species showed a clear difference in the number and position of the different protein components.

## INTRODUCTION

Identification of marine fishes using eye lens and serum protein techniques has recently received much attention (Cushing, 1952; Moore, 1945; Sindermann, 1964; Deligny, 1969 and others). Eye lens and serum proteins of the two species, *S. fimbriata* and *S. longiceps* have been studied to determine the differences and to construct electrophoretic patterns characteristic of the species. Both are widely distributed species. *S. fimbriata* is found in the Red Sea, Indian Ocean to the Malay Archipelago, Coasts of Philippines and China (Day, 1878; Munro, 1955; Nair, 1973). *S. longiceps* occurs along the coasts of Somalia, Arabia, Mombasa, Seychelles, Iran, Gulf of Oman, Pakistan, Indian Peninsula, Ceylon, Malayan Archipelago, around Indonesian and Philippine waters as well

as off Vietnam (Rosa and Laevastu, 1960; Whitehead, 1965; Devanesan and Chidambaram, 1943; Day, 1878; Munro, 1955 and Nair, 1973).

## MATERIAL AND METHODS

Samples of both the species *S. fimbriata* and *S. longiceps* were collected from fish landing centres in Panjim from December 1974 to February, 1975. In *S. fimbriata*, the length of the specimens collected ranged from 13.0 to 18.0 cm and in *S. longiceps* the length ranged from 12.5 to 18.5 cm. The eye lenses were removed from the fishes, washed in 1% saline to remove the vitreous humour and then ground in a test tube with 0.5 ml Tris - EDTA - Boric acid buffer of pH 9.1 and ionic strength 0.12. They were then centrifuged at 3,500 rpm for 15 minutes to obtain a clear solution.

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 discarded.

Electrophoresis was carried out on cellogel strips using a veronal buffer of pH 8.6 and ionic strength 0.05. All runs were for 1 hr at a constant voltage of 150 volts. The strips were scanned using a photoelectric densitometer. Total solids and total proteins in the eye lenses and sera of the two species were determined using a refractometer.

#### OBSERVATIONS AND RESULTS

Several eye lenses and sera samples of *S. fimbriata* and *S. longiceps* were screened separately. The typical electrophoretic patterns for the eye lens and serum proteins of the two species studied are given in Figs. 1 and 2. The eye lens pattern of *S. fimbriata* consists of 10 components: two components on the cathodic side, a component located at

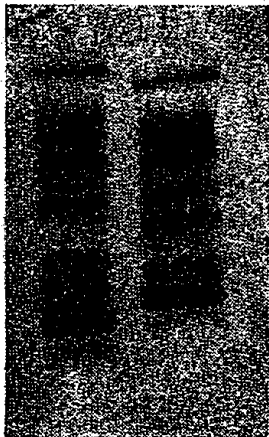


Fig. 1. Electrophoretic patterns of eye lens proteins in *S. fimbriata* and *S. longiceps*

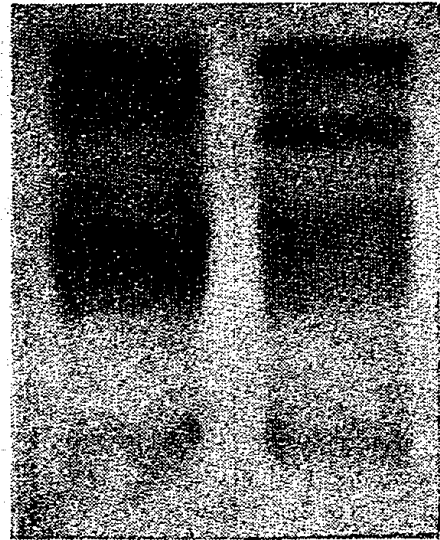


Fig. 2. Electrophoretic patterns of serum proteins in *S. fimbriata* and *S. longiceps*

the point of application, two components of slow anodic mobility, a fast anodic component and four medium fast anodic components. The pattern of *S. longiceps* also consists of 10 components but only one component is on the cathodic side, a component located at the point of application, three components of slow anodic mobility, a fast anodic component and four medium fast anodic components. The serum pattern of *S. fimbriata* consists of 6 components: one component of slow anodic mobility, a component located at the point of application, a fast anodic component and three medium fast anodic components. The pattern of *S. longiceps* consists of 7 components: two components of slow anodic mobility, a component located at the point of application, and four medium fast anodic components. The differences remain constant and exhibit remarkable species specificity.

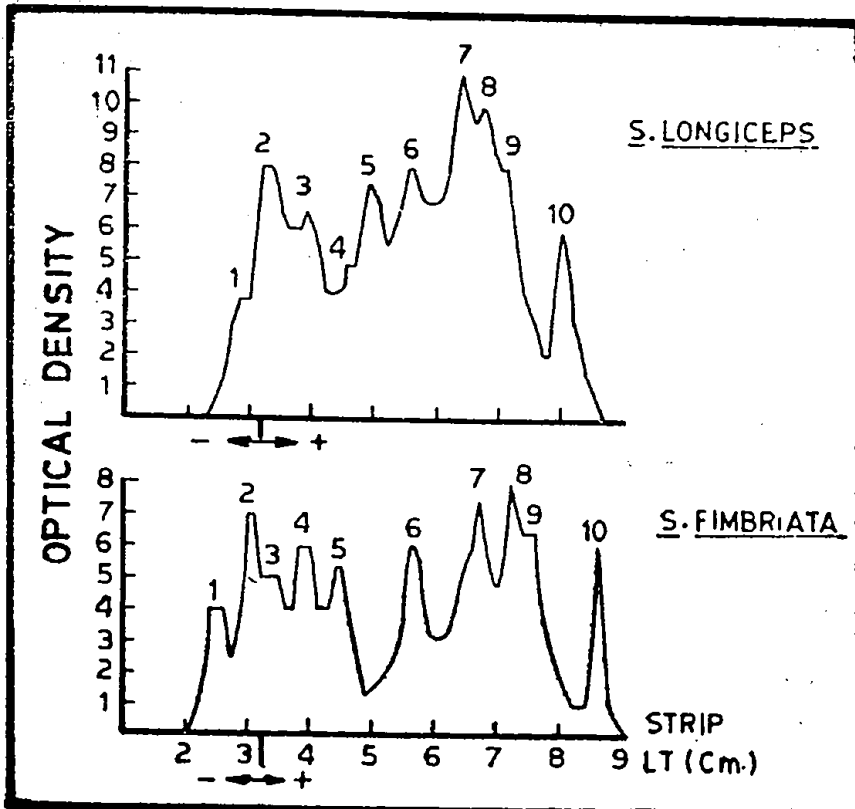


Fig. 3. *Sardinella fimbriata* and *S. longiceps*: Electrophoretic patterns of eye lens proteins as obtained by photoelectric densitometer.

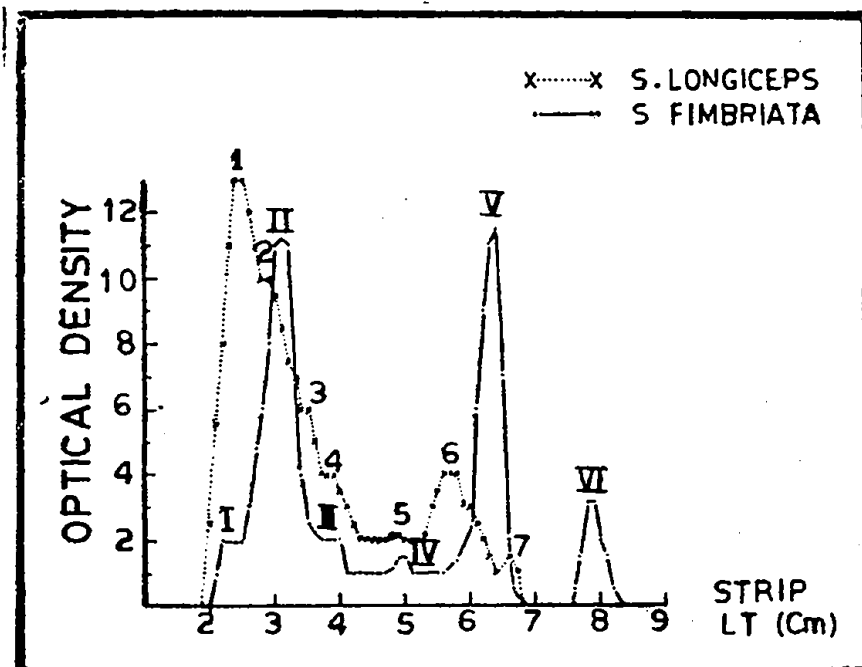


Fig. 4. *Sardinella fimbriata* and *S. longiceps*: Electrophoretic patterns of serum proteins as obtained by photoelectric densitometer.

The intensity and position of the different components have been studied by a photoelectric densitometer. The electrophoretic fractions have been assigned numbers in the order of increasing mobility. The number of crests corresponds to the number of distinct proteins and the area under the crests is proportional to their concentrations (Carpenter, 1965).

TABLE I. Total proteins and total solids in the eye lenses of *S. fimbriata* and *S. longiceps*.

Species	Total proteins g/100 ml	Total solids %
<i>S. fimbriata</i>	3.0	5.3
<i>S. longiceps</i>	2.1	4.2

TABLE II. Total proteins and total solids in the sera of *S. fimbriata* and *S. longiceps*.

Species	Total proteins g/100 ml	Total solids %
<i>S. fimbriata</i>	9.0	13.2
<i>S. longiceps</i>	7.5	11.0

The total solids and total proteins in the eye lenses and sera of the two species are given in Table I & II. Variation was not observed in the total solids and total proteins of the same species. However, there was difference between the two species.

#### CONCLUSIONS

The study of the eye lens proteins of the two species *S. fimbriata* and *S. longiceps* did not show marked differences in the number, position and intensity of the different components. However the study of serum proteins of the two species clearly showed patterns which are characteristic of the particular species studied. Comparative studies between the species studied revealed a major difference in their protein fractions. *S. fimbriata* showed 6 major fractions and *S. longiceps* 7 major fractions. They differed further in the amounts of protein in the various fractions.

#### ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to Dr. S. Z. Qasim, Director of the Institute for constant encouragement and guidance while the work was in progress and also for the valuable criticism in the preparation of this paper. I am thankful to Dr. Radhakrishna and Dr. N. G. Karanth for kindly scrutinizing the manuscript.

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