

SOLUBLE LENS PROTEIN POLYMORPHISM IN THE OIL SARDINE, *SARDINELLA LONGICEPS* VAL

M. R. MENEZES

National Institute of Oceanography, Dona Paula-403 004, Goa

ABSTRACT

Soluble eye lens protein of the oil sardine, *Sardinella longiceps* was studied by cellogel electrophoresis. Two distinct patterns characterized by the number of fractions, mobility and staining intensity were observed. These two patterns did not show any variation either due to sex or size. The study, therefore, suggests the occurrence of two populations.

The oil sardine, *S. longiceps*, is a very common species in the Indian Ocean and constitutes an appreciable part of the fish landings from this area. Even though the systematics of the species has been well covered, there are persistent problems regarding the identification and discreteness of sub-populations within the species. Electrophoretic separation of nuclear eye lens protein is commonly used for distinguishing populations of fish of the same species. Although genetic information about lens proteins is scarce, the evidence indicates that the electrophoretic pattern variations have a genetic basis (Eckroat and Wright, 1969; Smith, 1966; 1971). In this communication, the results obtained from the electrophoretic analysis of eye lens protein of *S. longiceps* is presented.

S. longiceps varying in length from 13.5-18.8 cm of both sexes were collected from the fish landing centres of Panaji, Goa between October 1976 to March 1977. Eye lenses were removed from the fish and freed of aqueous and vitreous humour, pieces of retina and capsule. The lenses from each fish were then weighed and placed in a dry tube and used for analysis immediately. Protein extracts were prepared by mechanically mincing the lenses of each fish in a 0.9 percent saline solution using 0.5ml of saline for about 60 mg weight of the lens. They were then centrifuged at 3,000rpm for 5 minutes to obtain a clear solution.

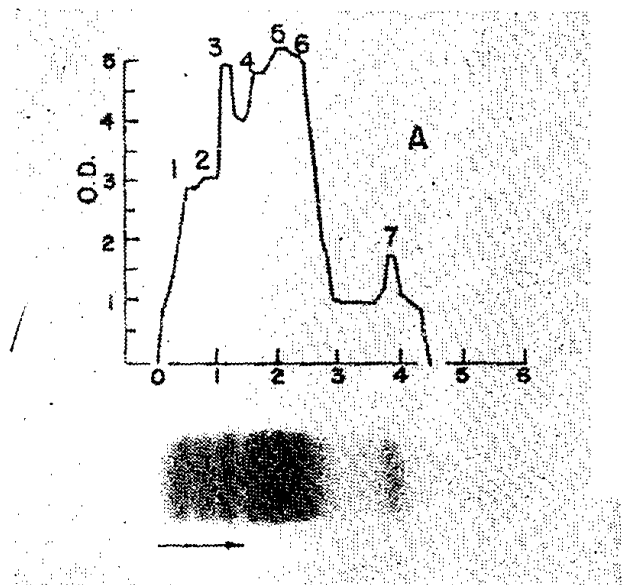


Fig. 1. Photograph and densitometric tracing of electrophoretic pattern of *S. longiceps* lens extract (type A).

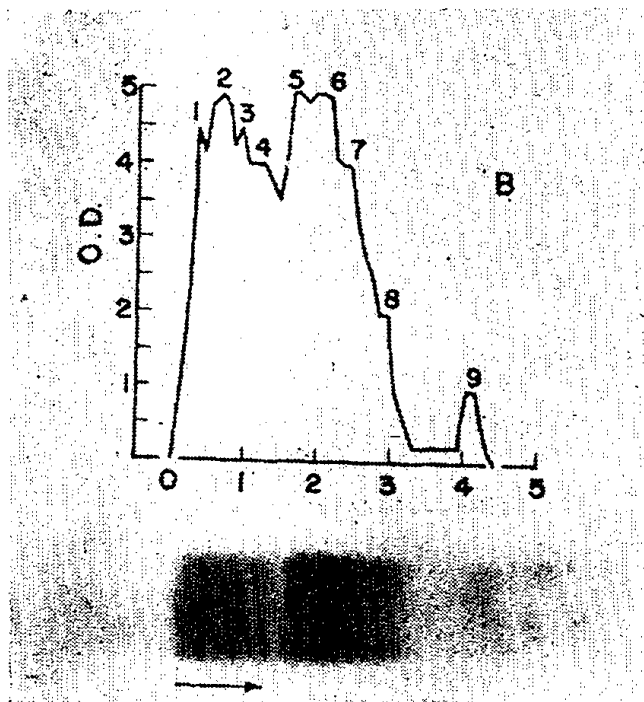


Fig. 2. Photograph and densitometric tracing of electrophoretic pattern of *S. longiceps* lens extract (type B).

Electrophoresis was carried out under uniform conditions on cellogel strips of 2.5x14 cm size using a veronal buffer of pH 8.6 and ionic strength 0.05. Human serum was used as a reference standard. 6ml of the sample was applied to each strip. All runs were made for 1 hr at a constant voltage of 150. The stain used was 0.2% ponceau S in 3% trichloroacetic acid. Finally they were washed in several changes of 5% glacial acetic acid.

Two band patterns, types A and B were observed in the electropherograms of the soluble lens protein extracts. These patterns along with the densitometric tracings showing the intensity of proteins in each fraction are given in Figs. 1 & 2. The fractions have been assigned numbers in the order of increasing mobility.

In an earlier study (Menezes, 1976) conducted during the period December 1974 to February 1975 no variation in the lens protein was observed. However, the protein patterns produced in the present study revealed a conspicuous polymorphism. The electropherogram of type A shows 7 bands, of which 1, 6 and 7 are the major protein bands. Type B shows 9 bands, of which 1, 5, 7 and 8 are the major proteins. These two patterns further differed in their final mobility. Type A migrated 38 mm and type B 41mm. The mobilities of the various bands are given in Table I. The repeated experiments produced the same consistent patterns and these did not show any variation either due to sex or size. Two patterns of electropherograms were obtained consistently. The two extra bands in pattern B were located one at the point of application and the other at a distance of 27mm from the point of application.

The possibility that denaturation, rather than genotype, accounts for this variability seems unlikely because the lenses were examined immediately. Furthermore,

Table I. Electrophoretic analyses of soluble eye lens proteins.

Analyses of lens proteins	Species	Fractions (in order from slowest to fastest)								
		1	2	3	4	5	6	7	8	9
Distance in mm from the point of application	<i>S. longiceps</i> (A)	3	6	10	15	19	22	38		
	<i>S. longiceps</i> (B)	0	3	7	10	15	19	23	27	41
Relative mobility (as percentage)	<i>S. longiceps</i> (A)	8	16	26	39	50	58	100		
	<i>S. longiceps</i> (B)	0	7	17	24	37	46	56	66	100

denatured lens proteins produced electrophoretic patterns in which the lesser migrating fractions are more mobile, even to the extent of fusing with the farthest migrating fraction so that only one is observed (Sibley and Brush, 1967.)

The high uniformity in the patterns A and B gives confidence in the reliability of the procedures used in this investigation and the pattern heterogeneity having a genetic basis. This suggests that the specimens of *S. longiceps* used in this study would have probably come from two different breeding populations.

ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to Dr. S. Z. Qasim, Director, National Institute of Oceanography, Goa, for constant encouragement and guidance while the work was in progress and for critically going through the manuscript.

REFERENCES

- Eckroat, L. R. and J. E. Wright, 1969. Genetic analysis of soluble lens protein polymorphism in brook trout, *Salvelinus fontinalis*. *Copeia*, **1969** : 466-473.
- Menezes, M. R., 1976. Electrophoretic studies of eye lens and serum proteins of *Sardinella fimbriata* Val. and *S. longiceps* Val. *Mahasagar-Bulletin of the National Institute of Oceanography*, **8** : 117-121.
- Sibley, C. G. and A. H. Brush, 1967. An electrophoretic study of avian eye lens proteins. *Auk*, **84** : 203-219.
- Smith, A. C., 1966. Electrophoretic studies of eye lens protein from marine fishes. Doctoral dissertation, University of California, Irvine. *Dissertation Abstracts*, **28** (1968).
- Smith, A. C., 1971. The soluble proteins in eye lens nuclei of albacore, bluefin tuna and bonito. *Comparative Biochemistry and Physiology*, **39** : 719-724.