Asian Fisheries Science 3(1990): 269-273.
Asian Fisheries Society, Manila, Philippines

https://doi-org/10-33997/j-afs-1990-3-2-010

Genetic and Morphological Variation in *Acanthopagrus latus* (Sparidae) in Iraq

L.A.J. AL-HASSAN

Department of Fisheries and Marine Resources
College of Agriculture, University of Basrah
Basrah, Iraq

Abstract - The structure of populations of the sparid fish *Acanthopagrus latus* in the Shatt al-Arab River and Khor al-Zubair area of Iraq was assessed from electrophoretic and morphological characters. Electrophoretic analysis of two enzyme coding loci showed that loci at both localities were in a Hardy-Weinberg equilibrium.

The genetic homogeneity obtained contrasts with the pattern of heterogeneity observed in meristic counts. The data provide a preliminary idea about the absence of subpopulation differentiation and suggest that there is only one stock of *A. latus* in the area studied.

Extensive knowledge of fisheries resources is needed for their efficient management. Fisheries biologists must be sure about the sources of recruitment and the status of various stocks and be able to predict the effect of depletion of particular stocks on the fishery as a whole.

The sparid fish *Acanthopagrus latus* is a commercially important species in both the Shatt al-Arab River and Khor al-Zubair area. These fishes spend the greater part of their life in water of high salinities such as the Arabian Gulf and Khor al-Zubair area and enter the Shatt al-Arab River during autumn. Little is known about the population structure of this species in Iraqi waters or the Arabian Gulf. This paper reports the results of an electrophoretic and meristic study of *A. latus* obtained from the Shatt al-Arab River and Khor al-Zubair area.

Samples were collected from the two areas (Fig. 1). Muscle samples taken were individually labeled and maintained at -20°C. Muscles were homogenized in Tris-EDTA-Borate buffer, pH 8.6. Homogenized samples were centrifuged at 3,000 rpm for 30 minutes and the clear supernatant subjected to horizontal electrophoresis in 13% starch gels made up in Tris-EDTA-Borate buffer (Dando 1974).

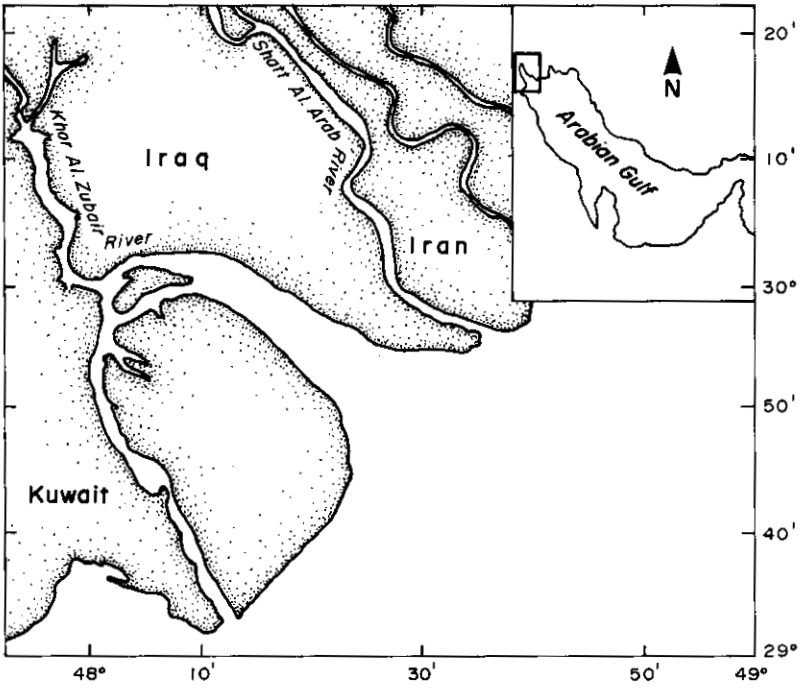

Fig. 1. The northwestern Arabian Gulf showing the sampling areas for *A. latus*.

Gels were run for four hours at 4°C after which they were stained. Following electrophoresis, isozyme patterns were visualized using the filter paper method of Scopes (1968).

Goodness of fit to Hardy-Weinberg proportions and gene-frequency heterogeneity between populations were tested for significance using the chi-square test.

The study of meristic characters was based on samples of adult fish. Meristic characters used were numbers of finrays. Ray counts included all rays, however small, which could be distinguished without dissection. The variables were compared using the method of least significance (LSD) (Snedecor and Cochran 1967).

Two enzyme systems, phosphoglucomutase (PGM) and tetrazolium oxidase (TO), were surveyed for this study and both of them were polymorphic. An electropherogram of these enzymes is shown in Fig. 2. The number of alleles observed at the polymorphic loci studied was two. Allele frequencies for each locus at each locality are presented in Table 1. Observed genotypic proportions closely

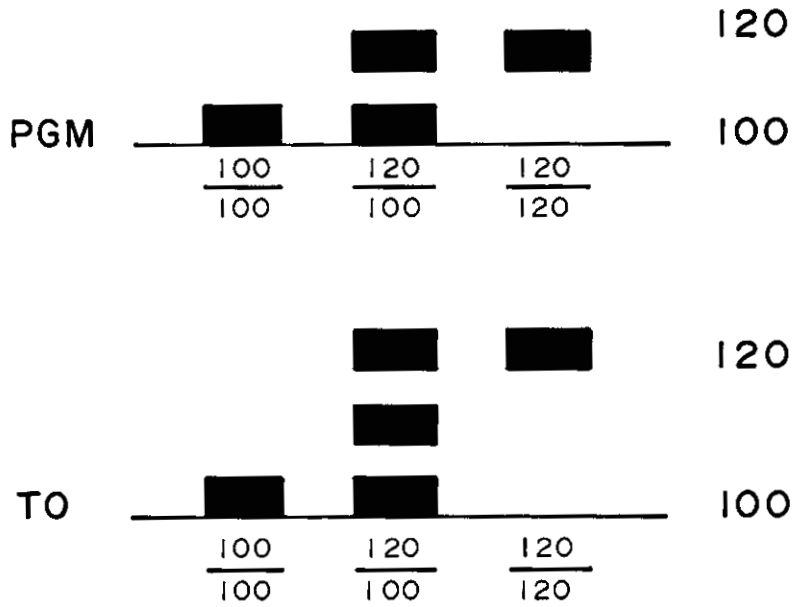

Fig. 2. Isozyme patterns for two variable enzyme systems in the sparid fish, *Acanthopagrus latus*. The enzymes are: PGM = Phosphoglucomutase (monomer) and TO = Tetrazolium Oxidase (dimer). The anode is toward the top of the diagram. The origin (point of sample application) is at the bottom of the diagram. The allelic classes for each enzyme are indicated by their relative mobilities at the right of the diagram. Presumed genotypes are indicated at the bottom of each diagram.

Table 1. Allele frequencies, heterozygosities (h) at two polymorphic loci in *Acanthopagrus latus*, N = number of individuals sampled.

		Genotype:Observed (Expected)							
		Shatt al-Arab River				Khor al-Zubair area			
Locus		100/100	120/100	120/120	Allele freq.	100/100	120/100	120/120	Allele freq.
PGM		24	46	24		20	46	30	
		(23.3)	(46.5)	(23.3)	0.5000	(19.3)	(47.5)	(29.3)	0.5521
	(h)	0.5000				0.4940			
	(N)	94				96			
To		14	49	34		18	43	35	
		(15.3)	(46.4)	(35.3)	0.3969	(16.3)	(46.5)	(33.3)	0.4115
	(h)	0.4780				0.4880			
	(N)	97				96			

agreed with Hardy-Weinberg expectations for the two polymorphic loci.

The contingency X^2 tests were directed at identifying stock or population subdivisions in the two localities. No significant differences in allele frequencies were found.

Numbers of pectoral and dorsal finrays are given in Table 2. The two samples under consideration were significantly different from each other in pectoral and dorsal finray counts (Table 2). Anal and pelvic finrays showed no variation.

Table 2. Meristic character variation of *A. latus* from the Shatt al-Arab River and Khor al-Zubair area.

	Locality	No. fish	Mean	Range	
Dorsal finrays	Shatt al-Arab	209	10.16	9-13	LSD = 2.120 P < 0.005 F = 0.0565
	Khor al-Zubair	38	11.16	10-12	
Pectoral finrays	Shatt al-Arab	419	13.85	11-16	LSD = 3.167 P < 0.005 F = 0.0079
	Khor al-Zubair	104	12.99	12-14	

The subunit structure for homologous enzymes in other vertebrates (Darnall and Klotz 1975; Harris and Hopkinson 1976; Shaklee 1984) was consistent with the patterns of variation for the polymorphic enzymes studied in *A. latus* (Fig. 2).

The congruence between the homozygote and heterozygote banding patterns and the subunit structures observed in the present study for the two polymorphic enzymes of *A. latus* and Mendelian patterns of inheritance reported in the literature for the same enyzmes in other species support the presumption that the variation observed in *A. latus* has a simple genetic basis. This conclusion was supported by the close agreement between the observed distribution of presumed genotypes and those expected on the basis of Hardy-Weinberg equilibrium.

The observed genetic uniformity of *A. latus* in the two areas studied can be interpreted as evidence for the existence of a single population.

The genetic homogeneity observed between the Shatt al-Arab River and Khor al-Zubair area stocks is not reflected in the morphological characteristics. The variation in these meristic traits may thus reflect the varying environmental conditions to which the developing fish are subjected (Felley and Avise 1980).

References

Dando, P.R. 1974. Distribution of multiple glucose phosphate isomerase in teleostean fishes. Comp. Biochem. Physiol. 47: 663-679.

Darnall, D.W. and I.M. Klotz. 1975. Subunit constitution of proteins. A table. Arch. Biochem. Biophys. 166: 651-682.

Felley, J.D. and J.C. Avise. 1980. Genetic and morphological variation of Blue-gill populations in Florida lakes. Trans. Amer. Fish. Soc. 109: 108-115.

Harris, H. and D.A. Hopkinson. 1976. Handbook of enzyme electrophoresis in human genetics. Elsevier Publ., Co., New York.

Scopes, R.K. 1968. Methods of starch gel electrophoresis of sarcoplasmic proteins. Biochem. J. 107: 139-150.

Shaklee, J.B. 1984. Genetic variation and population structure in the damselfish *Stegastes fasciolatus* throughout the Hawaiian Archipelago. Copeia 3: 629-640.

Snedecor, G.W. and W.G. Cochran. 1967. Statistical methods. 6th ed. Iowa State University Press.

Manuscript received 7 September 1987; accepted 22 June 1990