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SHORT COMMUNICATION

Extensive polymorphism at adenosine deaminase in the marine fish *Sciaenops ocellatus* (L.)

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Summary. Eleven different allelic variants at the adenosine deaminase (ADA) locus have been detected using vertical starch-gel electrophoresis among 474 individuals of the marine fish *Sciaenops ocellatus* (L.). Thirty-five of the 66 possible genotypes were observed, and the heterozygosity level at ADA was estimated to be 70·3%. The extensive polymorphism at ADA may prove useful in terms of providing genetic markers for stocking programs using hatchery-raised fish.

Keywords: allelic polymorphism, adenosine deaminase, marine fish

The enzyme adenosine deaminase (E.C. number 3.5.4.4) has been shown to be polymorphic in a variety of vertebrates. Allelic variation at adenosine deaminase (ADA) has been reported in several species, including humans (Spencer *et al.* 1968), pigs (Widar & Ansay 1975), cattle (Carleer *et al.* 1978), birds (Grunder & Hollands 1978; Cole & Parkin 1986), and several marine and freshwater fishes (Johnson 1975; Morizot *et al.* 1977; Grant *et al.* 1984; Kobayashi *et al.* 1984; Grant 1986). From two to six alleles typically occur at ADA, and the allelic variants detected by protein electrophoresis are often useful as genetic markers or in populational studies (above references). In this note, we report the occurrence of an exceptionally high number of ADA alleles in the marine fish, *Sciaenops ocellatus* (L.), commonly called the red drum.

The *S. ocellatus* specimens were obtained from several sampling localities in the Gulf of Mexico and along the Atlantic coast of the south-eastern United States. Specific details as to individual sample localities and numbers of individuals collected from each locality may be found in Bohlmeyer (1989). Tissue samples of white muscle from 474 (total) individuals were prepared and run on vertical starch gels according to the methods of Sicilano & Shaw (1976). Tissue samples were homogenized in 200 µl of buffer (0·01 M Tris-HCl, 0·001 M EDTA, and 0·005 M β-mercaptoethanol) per 100 mg of muscle. The homogenized samples were centri-

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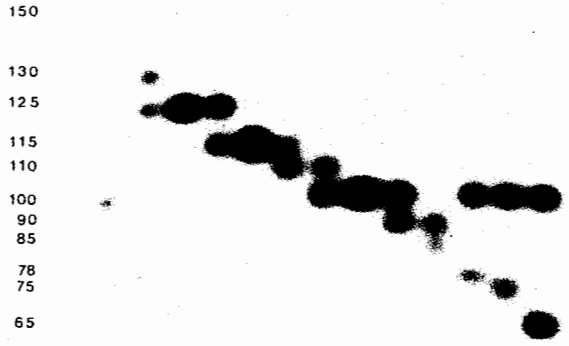

Figure 1. Adenosine deaminase phenotypes displaying the 11 ADA allelic variants thus far observed among 474 individuals of *Sciaenops ocellatus*. The allelic variants are indicated by their different mobilities (left), with allele 100 being the most common.

fuged for 5 min at 10000 rpm, and the supernatant used for electrophoresis. Samples were loaded onto 12% starch gels and run at 200 V for 15–17 h at 4°C. All allelic variants were scored twice using side-by-side comparisons and two buffer systems (Tris-citrate pH 7·0 and tris-borate-EDTA pH 8·0) in order to confirm allele identity and to detect possible cryptic variation.

Eleven different allelic variants at ADA (Fig. 1), distributed among 35 of the 66 possible genotypes, have thus far been found. Differences in staining intensity among some of the bands (cf. Fig. 1) suggest there may be differences in tissue expression or activity of some ADA alleles such as found in the pig (Widar & Ansay 1975). The heterozygosity level among the 474 *S. ocellatus* individuals examined was 70·3%, which means that 7 out of every 10 individuals are heterozygous for some allelic combination at this locus. This level of polymorphism at ADA is exceptionally high and offers the unique opportunity of having multiple genetic markers at a single locus for crosses among hatchery populations of *S. ocellatus*. This is of more than passing interest since approximately six to eight million *S. ocellatus* eggs, fry or fingerlings from a single hatchery population have been stocked annually into Texas bays and estuaries over the last 10–12 years (Dailey & Matlock 1987). However, because of the small physical size at which the fish are released, there are presently no effective means (e.g. mechanical tags) with which to monitor stocking success (Dailey & McEachron 1986). The use of genetic tags could alleviate this problem.

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