

*Xiphophorus variatus*, Zarco



Female (+, C)



Female (P-1, +)



Female (P-2, C)



Male (P-2Gn, +)

Strain code: Zarco

Phenotypes scored: Pigment patterns punctatus 1 (P-1) & punctatus 2 (P-2); black gonopodium (Gn); tail spot pattern crescent (C)

Introduction:

This strain of *X. variatus* was collected from the Arroyo Zarco locality west of Encino, Tamaulipas, Mexico. The arroyo Zarco joins the arroyo Encino. The locale is described by Richard Borowsky (1984). The strain was kept at New York University, until it was moved to UTMD Anderson Cancer Center by Dr. Steven Kazianis. This strain is one of the few where individuals can develop melanoma in the absence of hybridization. The P-2 pigment pattern can eventually result in progressively larger black blotches as an animal ages. After about 1.5 years of age, these fish can develop external melanotic nodules

(Borowsky, 1973; Scharl et al., 1995). Usually, this occurs in animals that are homozygous for P-2.

#### Sex Determination / sexing:

The male of this species is heterogametic (XY); the female is homogametic (XX). Fish are sexed at 2 months, and become sexually mature at approximately 4 months of age. In this species early maturing males can inhibit maturation of other males by a "social mechanism" (see Borowsky 1973, 1978, 1987).

#### Scoring:

All phenotypes exhibited in this stock should be scored when the fish have reached full maturity. The strain shows 3 macromelanophore pigment patterns and a tail spot micromelanophore pattern, as well as a xanthophore/ erythrophore pattern. The chromosomal linkage of these is as follows:

X-P-2 (Punctatus-2)

X-+ (wild type)

Y-P-1Gn (Punctatus-1 linked to Black Gonopodium)

This strain also possesses a micromelanophore tail spot pattern called Crescent (C). This is autosomally inherited (LG XVII; Kazianis, Morizot, Nairn, Borowsky unpublished). The strain has a chromosome with C and the corresponding chromosome is wild type (+).

Although some males of this strain may develop Dorsal Yellow (Dy) and Tail Yellow (Ty) (sometimes Tail Orange (To)), the inheritance is not worked out since the trait is sex limited to mature males. Klaus Kallman has observed at least one *X. variatus* strain, where such xanthophore/ erythrophore patterns are autosomally inherited. Some males may also develop a blue hue. These colorations may also be related to male dominance (Borowsky, ?.)

Crossing over between the X and Y chromosomes is believed to have occurred several times and was manifested by females with P-1. In one case, such a crossover resulted in an X chromosome with P-1 and the Gn linked. A test cross was performed to verify this. Stock Center data also indicates a large frequency of X Y females occurring in this stock. This evidence is supported by the occurrence of P-1 females and biased sex ratios. Proper care must be taken to ensure production of males and fish with the proper genetic make up. This is complicated by the fact that P-2 will mask P-1 and will be further discussed in the maintenance section.

#### Maintenance:

Two crosses should be set up for one generation. These are as follows;

X-+ X-+, C/+                    (x)                    X-+ Y-P-1Gn, +/+

&

X-+ X-+, +/+                    (x)                    X-P-2 Y-P-1Gn, C/+

Each type of cross needs 3 replicates. This makes a total of 6 matings set up for each generation. This mating scheme will compensate for biased sex ratios and masking of P-1 in P-2 females. The P-2/+ females are needed in the next generation. For each mating one

fish is C and the other is + with respect to the tail pattern. This will ensure that C is maintained in a heterozygous state and that neither C or + is lost.

For the successive generation the following crosses must be established;

X-+ X-+, C/+            (x)            X-+ Y-P-1Gn, +/+

&

X-P-2 X-+, C/+            (x)            X-+ Y-P-1Gn, +/+

Also set up 3 replicates each for this generation. Greater numbers of fish are required to compensate for any skewed sex ratios and/or unexpected phenotypes. These two crosses will generate the proper fish needed for the original set of matings. Be careful in all generations to score fish accurately and rescore matings after they have been set up for a while and the fish have had a chance to age.

Stock source:

Dr. Steve Kazianis, New York, 9/6/96.