

*Xiphophorus variatus*, Encino



Female



Male

Strain Code: Encino

Phenotypes scored: Black gonopodium (Gn); dorsal yellow & tail yellow (DyTy) or tail red (DyTr).

Introduction:

This strain of *X. variatus* was collected by Dr. Kallman from the Arroyo Encino at Encino, Tamaulipas, Mexico. The arroyo flows into the Rio Sabinas of the Rio Tamesi system. The strain shows the black gonopodium (Gn) macromelanophore pattern as well as the xanthophore/ erythrophore patterns dorsal yellow and tail yellow (DyTy) or tail red (DyTr). The black gonopodium trait is linked to the X-chromosome and is sex-limited, thus is only exhibited in mature males. Three sex chromosomes are present:

$X^+$  (no macromelanophore pattern)

$X^{Gn}$  (black gonopodium)

$Y^+$  (no macromelanophore pattern)

Although males of this strain develop dorsal yellow (Dy) and tail yellow (Ty) (sometimes called Tail Orange (To)), the inheritance is not well understood since these traits are sex limited to mature males. At least in the Rio Panuco basin (and perhaps elsewhere) all *X. variatus* males may develop yellow dorsals and either red or yellow caudal fins. Caudal fin pigmentation in the Zarco and Encino populations is autosomally determined. The evidence for this was provided by the observation that when strains with yellow or red caudal fin coloration and differently marked Y chromosomes were crossed with each other, in the F2 generation the marker gene on the Y's segregated independently from caudal fin coloration (Kallman unpubl.). On the other hand, another *X. variatus* strain was reported to have these patterns on the sex chromosomes but his evidence is not compelling (Anders et al., 1973).

Sex determination / sexing:

The male of this species is heterogametic (XY); the female is monogametic (XX). Fish are sexed at about 2 months, and become sexually mature at about 5 months of age. Sexual maturation in males can be inhibited by the presence of other males through a social & behavioral mechanism (see Borowsky 1973, 1978, 1987).

Stock maintenance:

This stock is maintained with 2 sets of crosses.

1<sup>st</sup> generation:

$X^+ X^+$  (x)  $X^{Gn} Y$  (2 of these matings)

All female offspring will be  $X-Gn X-+$  and all male offspring will be  $X-+ Y$ .

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All of the fish produced by the above matings are distinguishable and can be used to set up crosses for the next generation.

2<sup>nd</sup> generation:

$X^{Gn} X^+$  (x)  $X^+ Y$  (2 of these matings)

Female offspring will either be  $X-Gn X-+$  or  $X-+ X-+$ , but these genotypes cannot be told apart. So do not use these females for next generation matings. The male offspring will either be  $X-Gn Y$  or  $X-+ Y$ . These male phenotypes are easily distinguishable and all of the males can be used for matings to produce the next generation.

$X^+ X^+$  (x)  $X^+ Y$  (2 of these matings)

All female offspring will be  $X-+ X-+$  and all male offspring will be  $X-+ Y$ . Any of these fish can be used to set up the next generation of crosses. The females in particular will be the only ones needed to set up the next generation.

After this generation has produced the mating scheme will rotate back to the crosses designed for the 1<sup>st</sup> generation.

Stock source:

Prof. Klaus Kallman, the New York Aquarium, 8/20/93.