

Xiphophorus milleri



Female (++)



Male (TyS)

Strain Code: mil82

Phenotypes scored: Pigment pattern, spotting: striped side (Sr) / faint striped side (Srf) / wild type (+); black gonopodium (Gn); maturation time: early (small, S) / late (large, L); autosomal tail pattern: point (pt) / wild type (+); sex-linked tail color: tail yellow (Ty) / wild-type (+).

Introduction:

X. milleri was described by Rosen (1960), in collections from Catemaco, Veracruz, Mexico. The fish in early collections displayed two macromelanophore patterns, one which showed strictly paternal inheritance, leading Kallman and Atz (1966) to conclude that this species has an XX / XY mechanism of sex determination. In addition, three micromelanophore tail-spot patterns were evident in this species.

The *X. milleri* stock maintained in the Stock Center was collected in 1982. These fish showed two types of striped side patterns: striped side (Sr), which looks similar to the Sr in *X. maculatus* and is more defined, and faint striped side (Srf), which is more difficult to see. Sr expression masks the presence of Srf. The stock also has a Y-linked allele for black-gonopodium (Gn) and will only be seen in males. There are also two P-factors segregating in this stock, one for early maturation and small size (S), and one for late maturation and large size (L).

Sex determination / sexing:

Sex determination is XX / XY. Fish are sexed at 1 to 2 months of age, ensuring that early maturing males and females are separated from each other. The late maturing fish reach maturity at about three or four months of age; while the early maturing fish are ready to be mated by two months of age. The results of sexing should always be checked after two weeks.

Maintenance:

Seven different sex-chromosomes are maintained in the stock. Four X-chromosomes and five Y-chromosomes segregate in this stock; they differ in the specific linkage of pigment-pattern and P-alleles. The X-linked alleles include faint-striped side ($X^{Srf S}$) and wild type ($X^{+ S}$). Specific alleles and linkage groups defining the Y-chromosomes include faint striped side and early maturation ($Y^{Srf S}$), striped-side linked to an allele for late maturation ($Y^{Sr L}$), tail yellow linked with an early maturation allele ($Y^{Ty S}$), late maturation linked to the wild-type allele for color pattern ($Y^{+ L}$), and late maturation linked to black gonopodium ($Y^{Gn L}$). Gn could be an allele of Sr and Srf. Two alleles segregate for an autosomal tail spot pattern: point (pt) and wild-type (+). This gene is maintained in the heterozygous state (pt/+) by ensuring one parent in a mating displays point (pt) and the other is wild-type (++).

In setting up matings for each generation, all chromosomes must be represented, including ones carrying wild-type alleles. In order to ensure this, progeny must be scored accurately, and matings designed with great care. For example Sr can mask Srf, or it may be impossible to distinguish an $X^{Srf}Y^{+L}$ male from an $X^{+}Y^{Srf}$ male. Therefore, chromosomes must be carefully tracked through matings and offspring. These chromosomes, i.e., the stock, can be maintained with five matings each generation, and each mating should have one fish heterozygous for the tail-spot pattern, pt and one wild-type tail spot:

X-SrfS	X-+S, pt/+	(x)	X-+S / Y-+ L, +/+
X-SrfS / X-+S, +/+		(x)	X-+S / Y-TyS, pt/+
X-+S / X-+S, +/+		(x)	X-+S / Y-SrL, pt/+
X-+ S/ X-+S, pt/+		(x)	X-+S / Y-SrfS, +/+
X-+S / X-+S, +/+		(x)	X-+S / Y-+GnL, pt/+

All matings should be set up in duplicate to ensure that at least one will produce offspring.

Stock source:

Prof. Klaus Kallman, the New York Aquarium, 6/93 and 8/93.