


transformer and Sex determination in *Drosophila*

last update 5/15/2017

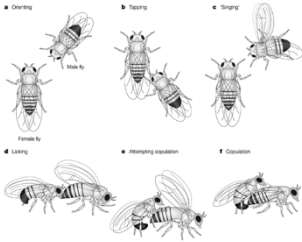
Alternative Splicing

Male fruit fly courtship behavior
HHMI Streaming Media



Male Courtship Behaviors

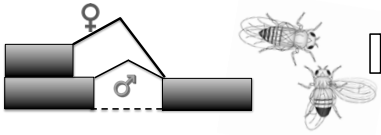
- Following female
- Tapping female
- Playing species-specific courtship song by vibrating its wings
- Licking female
- Curling abdomen to mate



Marla B. Sokolowski
Nature Reviews Genetics 2, 879-890 (November 2001)

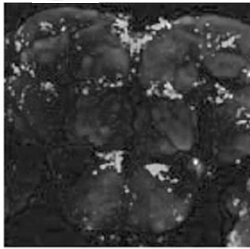
These behaviors are all regulated by the *fruitless* gene.

Male courtship behavior dictated by *fruitless (fru)* gene that is alternatively spliced in a gender-specific manner

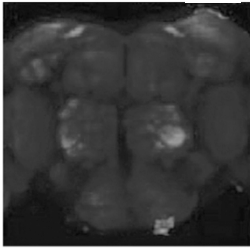


Sexually dimorphic neural circuits in adult male and female *Drosophila* brains:
Fruitless protein shown in green

(A) ♂



(B) ♀



DEVELOPMENTAL BIOLOGY 166, Figure 15.20
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Chromosomal sex determination in mammals

- XX embryos develop into females.
- XY embryos develop into males.
- Y chromosome contains a “master regulator” transcription factor for male development called *SRY*.
- XO embryos develop into females.
- Transgenic X^{SRY} mice develop into males

Chromosomal sex determination in fruit flies

- Like mammals, XX flies are female, and XY flies are males.
- However, XO flies are male.
- The number of X chromosomes determines the sex of the fly.
- The Y chromosome in flies plays no role in sex determination.
- Instead, the X-linked gene *Sex-lethal (Sxl)* determines sex in flies.

Sex-lethal (Sxl)

- *Sxl* encodes an RNA splicing factor that regulates gonad development and levels of gene expression from the X chromosome
- The number of X chromosomes determines the activation of *Sxl*
- XX embryos express the female, functional *Sxl* protein
- XY embryos express the male, non-functional protein

XX embryos

After Gilbert and Barresi Figure 6.14

XY embryos

After Gilbert and Barresi Figure 6.14

Summary of alternative splicing cascade leading to male courtship behavior

DEVELOPMENTAL BIOLOGY, 9e, Figure 14.18