

Determining functions of gene duplications from *Drosophila* X chromosomes to autosomes

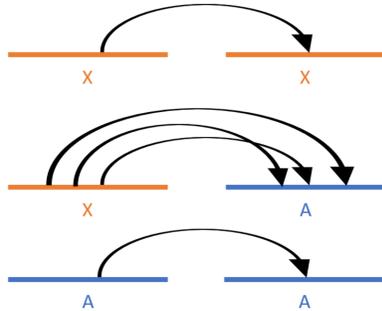
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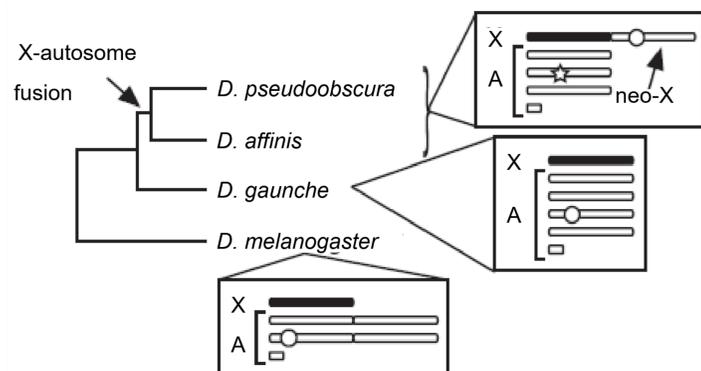
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BACKGROUND

- Unusually high number of gene duplications observed from the X chromosome to autosomes in *Drosophila* (fruit flies)¹
- Ancestral copies have ubiquitous expression, derived copies have testis-biased expression²
- X-linked genes are downregulated in sperm production³
- We predict that mass gene duplication from the X chromosome to autosomes allows X-linked genes to escape downregulation in sperm production

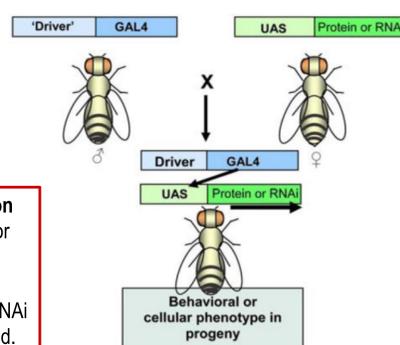


METHODS



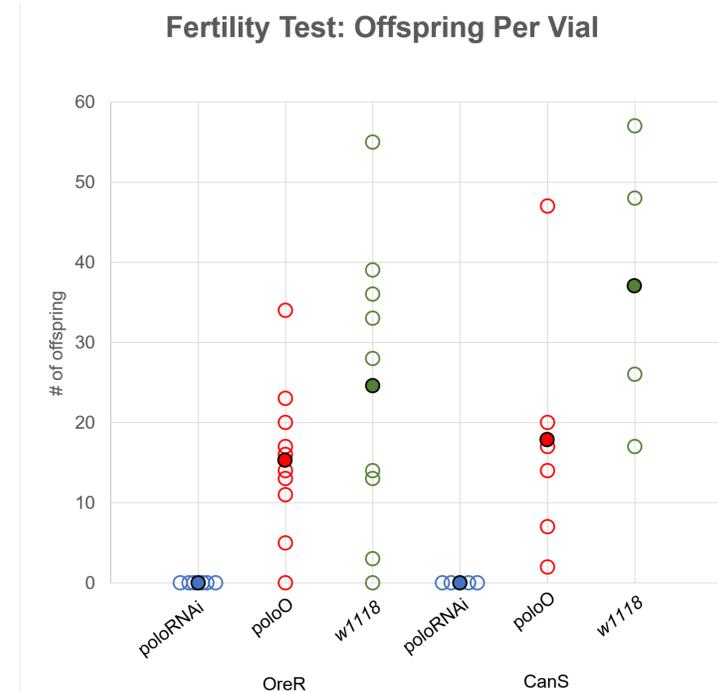
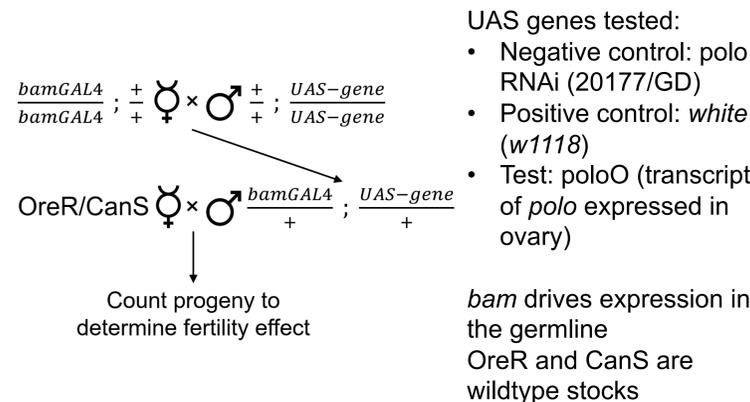
The evolution of karyotypes in *Drosophila*. The *Drosophila pseudoobscura* neo-X chromosome was formed by fusion of the ancestral X chromosome and an autosome. The circle represents the chromosomal location of the **ancestral** copy of a gene of interest, and the star represents the location of the **derived** copy in *D. pseudoobscura*.

- The *D. pseudoobscura* neo-X chromosome is a disproportionate source of duplicated genes²
- We studied genes that have 2 copies in *D. pseudoobscura* and 1 copy in *Drosophila melanogaster*
- Used GAL4-UAS to knock down *D. melanogaster* copy
- Will attempt to rescue knockdown with the *D. pseudoobscura* copies
- We have performed controls to test the effect of the rescue genes, before we test rescue of knockdown

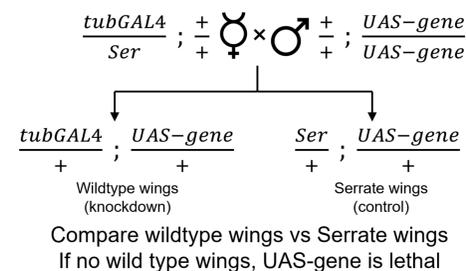


GAL4-UAS targeted gene expression system⁴. GAL4 is a transcription factor that binds to UAS. The Driver is a promoter or enhancer that drives expression of GAL4. The Protein or RNAi is expressed where GAL4 is expressed.

RESULTS

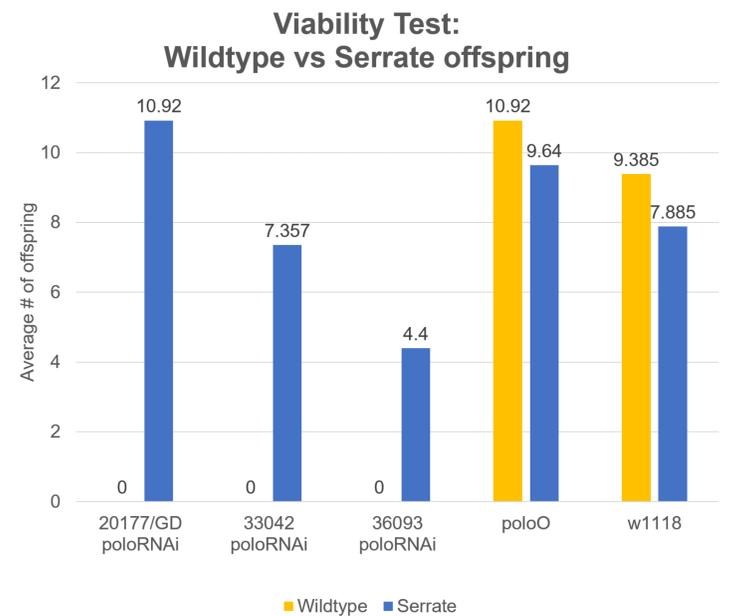


poloO expressing flies are fertile. Unfilled circles depict number of offspring produced by single mating between 1 male and 1 female for each cross. Filled circles represent average value for each cross type.



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RESULTS (CONT.)



Expression of poloO does not reduce viability.

CONCLUSIONS

- Expression of polo RNAi causes infertility and lethality
- Expression of the poloO transcript does NOT cause infertility or lethality
- Therefore, we can use poloO to rescue the effect of *polo* knockdown
- Similar experiments expressing *D. pseudoobscura* genes will allow us to determine the functional capabilities of duplicated genes

Future directions:

- Need to prepare flies with both poloO gene and polo RNAi to test rescue of knockdown
- Need to make lines carrying *D. pseudoobscura* genes

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