

L567. 31 October 2006. For next time read Zeh&Zeh on website.

### **Levels of selection: selfish genetic elements...**

From last time, in the experiments with Stalk-Eyed flies (Wilkinson and Reillo 1994). The experiment went for 13 generations, and then female choice was determined. Specifically, at generation 13, females were given a choice between two males, matched for body size, where one had a long eye stalk and one had a short eye stalk).

Results.

1. females preferred to mate with males with short eye stalks when taken from the lines where males with short-eye stalks were selected. **Why?**
2. females preferred to mate with males with long eyestalks when taken from unselected control lines (both males and females selected at random). **What does that mean?**
3. females preferred to mate with males with long eyestalks when taken from lines where males were selected for long eyestalks. But they did not prefer males with long eye stalks more than females from the control lines. **Why?**

Curious result...

Stalk-eyed flies are female biased in nature. But, the female bias became less extreme in the lines where males were selected for long stalks (i.e., sex ratio became closer to 1:1).

And it (the sex ratio) became more female biased in the lines where males were selected for short eyestalks. **Why?**

A surprising twist....

Suppose we had two kinds of males:  $X^dY$  males and  $XY$  males, where the  $d$  refers to “driving.”

At meiosis, the driving X chromosome,  $X^d$ , kills Y-bearing sperm.

Normal X chromosomes do not kill the Y-bearing sperm.

**What happens to  $X^d$ ?**

And what does this have to do with the stalk-eyed flies? Remember that the offspring of the lines selected for short-eye stalks had female biased sex ratios. Perhaps short eyes are genetically associated (in linkage disequilibrium) with the driving X chromosome.

**Why do females prefer long-stalk males in Nature?** It would now appear that either:

1. Males with long eye stalks are more likely to have a normal X (non driving) chromosome.

Or, 2. That males with long eyestalks are more likely to have Y chromosomes that prevent the action of the driving X (Wilkinson et al. 1998).

Lecture 17 L567

- Wilkinson, G. S., D. C. Presgraves, and L. Crymens. 1998. Male eye span in stalk-eyed flies indicates genetic quality by meiotic drive suppression. *Nature* 391:276-279.
- Wilkinson, G. S., and P. R. Reillo. 1994. Female choice response to artificial selection on an exaggerated male trait in a stalk-eyed fly. *Proceedings of the Royal Society of London B, Biological Sciences* 255:1-6.