Fisher — In Fisher's original presentation, he was thinking of Q preference for male traits that were favored by natural selection.

This leads to the "run away" process, but it also yields a wee problem.

Kirkpatrick's model:

Kirkpatrick showed that Q preference could increase even if the Q's preferred male traits that were selected against under natural selection. This is more along the lines that Darwin was thinking.

Lande's model — A GQ model

Felix Breden's study of genetic correlation between orange spots and Q choice.
Fisher / Lande Model (from a cokburn)

\[ \frac{U^2}{\omega^2} + 1 \]

Effect of q-choice

\[ \frac{B}{G} \] = slope of regression on daughters

Mate preference on son's trait

Equilibrium line

Evolution away from line of equilibria

If the red lines (the covariance between male character & female choice) are steeper than the blue lines, then both preference and the of trait runaway.
Sexual Selection (cont.)

→ Intersexual Selection

So far we have shown that ♀ preference for a ♂ trait can result in the spread of the ♂ trait (even if it reduces the viability of the ♀.)

The question now is:

Why do ♀s have preferences?
(or, equally, why do ♂s sometimes show preferences?)

Possible answers (not mutually exclusive)

1. "whims" or sensory exploitation.
   Assumed in Kirkpatrick's model

2. ♂s provide resources (e.g. nuptial gifts) and or paternal care

3. Males are selected for their good genes
   A. Incest avoidance
   B. Genetically based advantages to offspring
   C. Favorable combinations of genes with maternal genes
But, there is a problem with the good genes model. The problem is that:

SS & NS for good genes reduces VA for the fruit. At some point there is no point in # choice.

One possible solution to this problem is the favored combination of genes changes over time.

The presently favored combination results in better condition.

Males are chosen based on this condition - resulting in choice for presently better combinations of genes.
Another possible solution is similar favored combinations of genes change over time.

But mates are chosen directly for the combination of genes (not on condition) that will interact in the offspring.

Opposites attract?

Evidence for choice:

1. MICE & MHC
2. Humans & MHC
   The T Shirt study
3. Fish & the MHC
METHODS

1. 6♂ & 6♀ students typed for MHC

2. 6♂ wore standard T-shirt
   for two nights (no showers)
   no wine, etc.

3. Women were given T-shirts to
   "sample" in a "Wederkind" box

4. Women asked to rate odors
   of six shirts: 3 similar for MHC
   3 dissimilar

5. Score was given for pleasantness
   dissimilarity & intensity

RESULTS

odors of dissimilar 6♀ more preferred
by women and therefore more likely

unless

They (the women) were taking oral
contraceptives
AFTER 13 GENERATIONS OF ARTIFICIAL SELECTION

1. Control lines
   10♂ & 25♀ picked at random

2. Long-eyestalks Selected in Males
   10♂ of longest eyestalks selected from 50 males taken at random, plus 25♀ at random

3. Short-eyestalks Selected in Males
   10♂ of shortest eyestalks selected (from 50 random)

There was a correlated response in ♀ preference in the selection on Short eyestalks in males.

But the converse was not observed, why not?

Other correlated responses to selection...

- Observation: stalk-eyed flies have ♀ biased sex ratios
  1. High lines: ♀ freq increased over controls became 1:1
  2. Low lines: ♀ bias increased WHY?
LEVELS OF SELECTION - THE GENE LEVEL.

Suppose we have two kinds of males:

\[ x^d y \quad \text{and} \quad x y \]

The \( d \) means drive. \( x^d \) is a driving \( X \).

What do we expect regarding the fate of \( x^d \)?

Remind me again of the def. of NATURAL SELECTION.

What do you expect to happen?

How does this affect the stalk-eyed flies increased.

Can it explain the QTL biases in the low lines?