Dihybrid crosses

- Mendel also studied *dihybrid crossings*
  - Looking at two different traits at the same time in the same crossing
  - Example: round (R) or wrinkled (r) seed, yellow (Y) or green (y) seed
- All alleles could be shuffled in any random order
  - 16 random combinations
- As long as two traits are not linked, they should *segregate independently*
  - Able to pass onto the next generation either with or without the other

Autosomes and sex chromosomes

- T. H. Morgan found something different
  - Looked at eye colour of fruit flies (Drosophila)
    - Red is dominant
    - White is recessive
- The results were 100% red-eyed females and 100% white-eyed males
  - Ratio 1:1
- The first found sex-linked gene
  - The gene for eye colour in fruit flies has its locus on the X chromosome

Linkage groups

- Any two genes that are found on the same chromosome are said to be linked to each other
  - *Linked genes* are usually passed onto the next generation together
- A group of genes inherited together because they are found on the same chromosome are considered to be members of a *linkage group*
  - Applies to genes found on both autosomes and sex chromosomes

Linked genes

- In the fruit fly the gene for body colour (gray (G) or black (g)) is in the same linkage group as the gene for wing length (long (L) or short (l))
  - *Linked genes* are the genes that are on the same chromosomes
  - True breeding (homozygous) parents' genotypes: GGLL x ggll
  - In order to show linkage, the following notation is used

$$\frac{G\ L}{G\ L} \times \frac{g\ l}{g\ l} \Rightarrow GgLl \quad \frac{G\ L}{g\ l}$$