Meiosis - making **haploid** gametes from **diploid** cells

**The problem:** ensuring that homologs are partitioned to separate gametes

**The solution**
- hold homologous chromosomes together by **synapsis** and **crossing over**
- target homologs to opposite poles
- then separate the homologs
Meiosis proceeds in two steps:
• Meiosis I — “reductional division”
• Meiosis II — “equational division”
The chromosome theory of inheritance

Based on the congruence of **determinant behavior** (Mendel) and **chromosome behavior** (cytology)

**The essence of the theory:**

**Proof**- Based on tests of **predictions**:

- transmission of traits should parallel the segregation of specific chromosomes

- if chromosome segregation is altered the transmission of determinants should be altered also
Thomas Hunt Morgan, 1909: Test of the first prediction - in *Drosophila*

Chromosomes of *Drosophila melanogaster*:
Morgan’s interpretation:
Conclusion: Calvin Bridges’ experiments with exceptional progeny: Test of the 2nd prediction

![genetic diagram]

white eyes

Red

Expect:

Occasionally got:
[“primary exceptional progeny”]

Explanation?
Rare errors in meiosis  \( \Rightarrow \)  mis-segregation of chromosomes
Conclusions

1. Determinants are on chromosomes

2. In Drosophila, two X = female (one X = male)