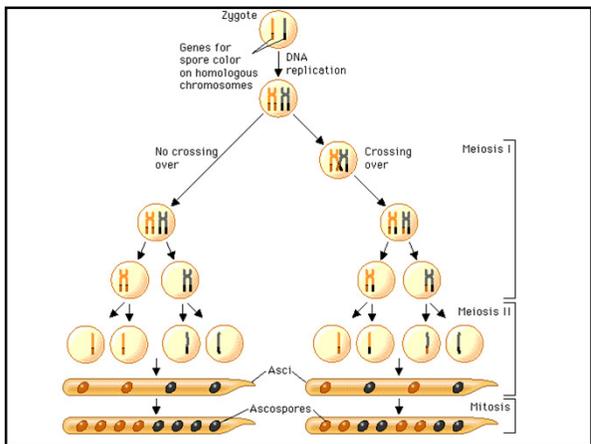
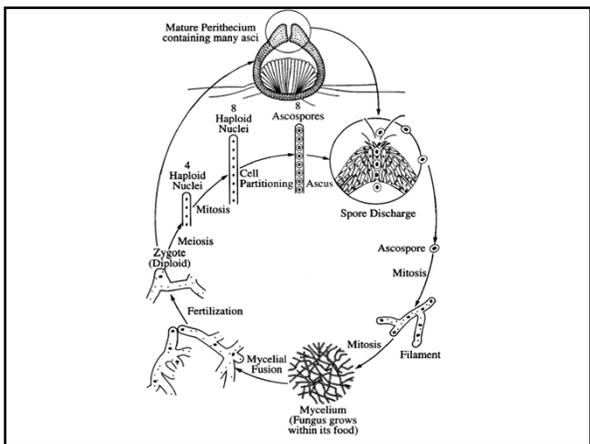
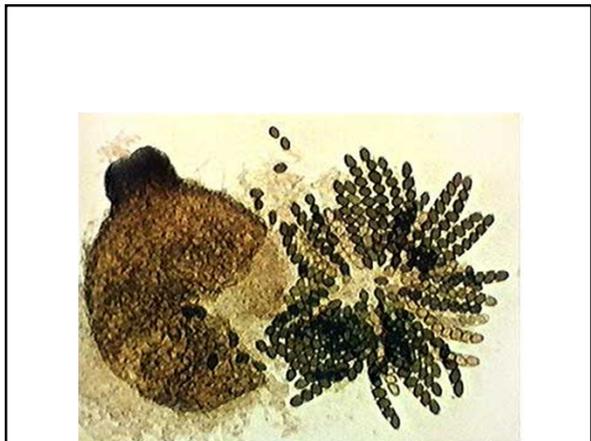
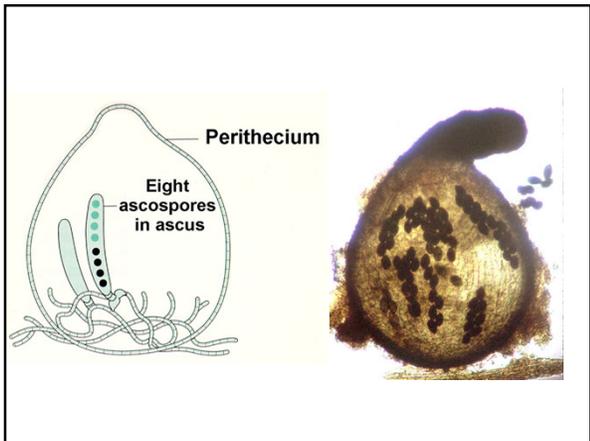


Sordaria Crossing Over

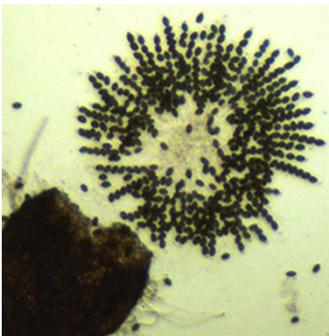
This activity involves observing the results of crossing over in a fungus, *Sordaria*. A cross between two haploid strains of *Sordaria* produces spores of different colors.

- *Sordaria fimicola* is an ascomycete fungus
- *Sordaria* is a **haploid (n)** organism for most of its life cycle.
- When the mycelium from two individuals meet, a diploid zygote (2n) is formed.
- The diploid zygote then undergoes **meiosis** to yield 8 haploid **ascospores**. These **ascospores** exist in a narrow pod called an **ascus** (plural, asci). Many asci will grow together forming a reproductive structure called a **perithecium**.
- When ascospores are mature the ascus ruptures, releasing the ascospores. Each ascospore can develop into a new haploid fungus.



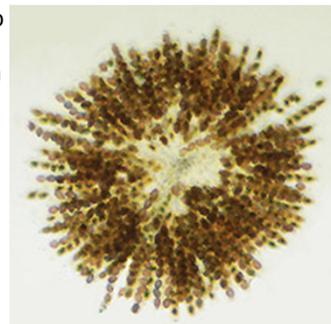
Sample of all black spores

- To the right is a photo of asci that resulted from a cross between two black strains that is both parental strains had black colored spores
- All of the 8 asci spores are black



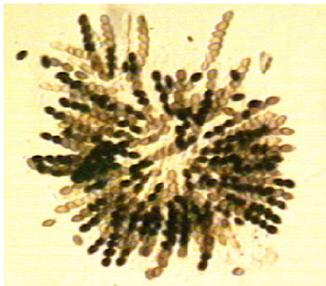
Sample of tan spores

- To the right is a photo of asci that resulted from a cross between two tan parental strains.
- All of the 8 asci spores are tan.



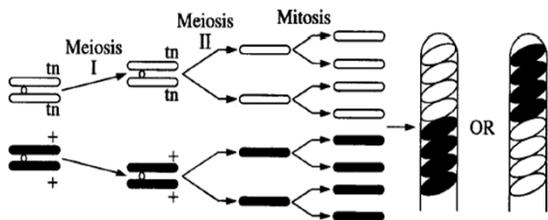
Black and tan cross

- To the right is a photo of asci that resulted from a cross between black and tan strains.
- Some asci have 4 black spores and then 4 tan (4:4)
- Some asci display a 2:4:2 or 2:2:2:2 sequence

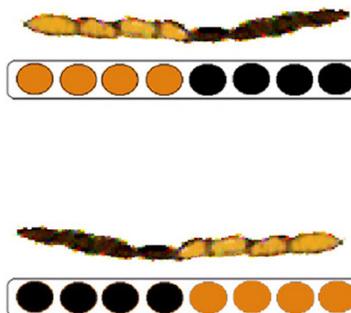


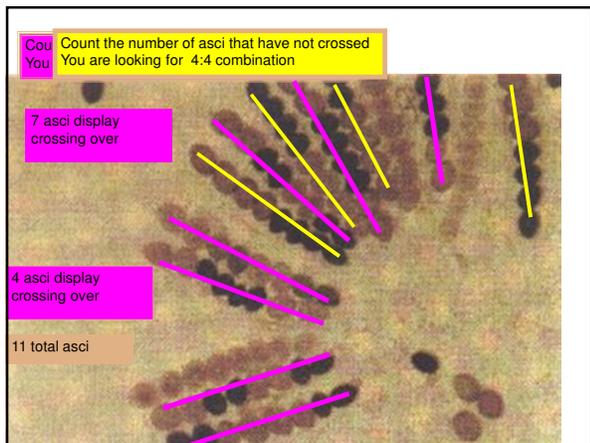
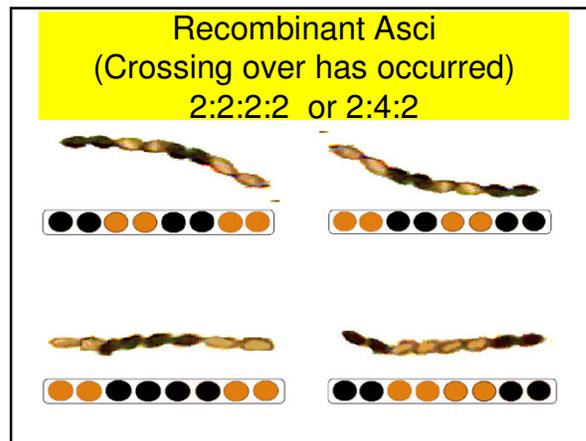
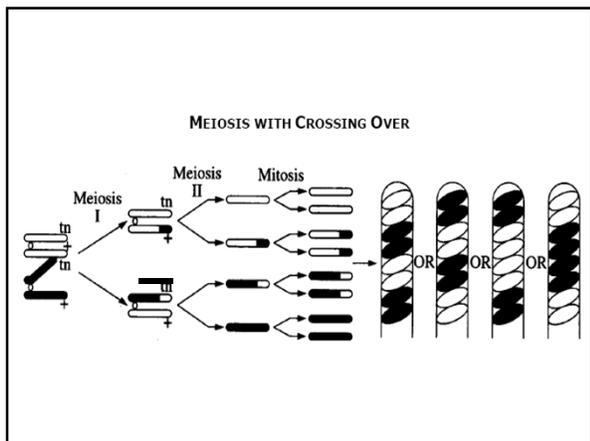
Four black ascospores in a row next to four tan ascospores in a row indicates that crossing over has NOT occurred. Any other arrangement of ascospores indicates that crossing over has taken place.

FORMATION OF NONCROSSOVER ASCI



No Recombination Asci 4:4





Crossing Over in *Sordaria*

Now it's your turn!

Directions for lab

- Observe 10 photos of *Sordaria* asci.
- Count 100 asci. Keep track of the number of crossover, and no crossover asci that you see.
- Do not count the asci that are entirely one color (all tan spores or all black spores).
- Fill in the data table and answer lab questions.

Data Table

Slide #	# asci 4:4 (no crossover)	# asci 2:2:2:2 or 2:4:2 (crossing over)	Total # asci	% showing crossover divided by 2	Gene to centromere distance (map units)
Mean/Average					

Copy data table in lab notebook make it large enough to fit 10 slides.

Calculating average crossing over and distance between the gene and centromere

Calculations

$$\frac{(\text{number of crossover})}{(\text{total asci})} \times 100 = \% \text{ crossover}$$

$$\frac{\% \text{ crossover}}{2} = \text{distance between gene \& centromere (MAP UNIT)}$$

Crossing over during Meiosis in *Sordaria*

Why do we divide the % by 2?

Crossing over during Meiosis in *Sordaria*



Crossing over happened between these two chromatids...

Crossing over during Meiosis in *Sordaria*



Crossing over happened between these two chromatids...
...but not between these two

Crossing over during Meiosis in *Sordaria*



Crossing over happened between these two chromatids...
...but not between these two
so it only happened 1/2 the time.

Crossing over during Meiosis in *Sordaria*

Map units show us *relative* distances between genes.
They do not translate directly into numbers of nucleotide pairs.
Genes that are more than 50 map units apart assort independently... and might as well be on separate chromosomes.

