

# Anne Villeneuve: Chromosome Segregation in C. elegans Meiosis

## History of mitosis/meiosis/chromosomes

I) Staining "spread"

II) Mitosis - following darkly staining bodies thru division  
- noted that # of chromos. was constant w/in organism

- except

III) Meiosis - gametogenesis

A) Pairing of homologues

- synaptonemal complex -

- proteins that hold together homologues as seen by fixing cells

- chiasmata - attachments w/o syn. complex

B) Recombination

C) Disjunction = movmt. of chromos. to opposite poles

what is evidence that X-over requires disjunction?

- how are these linked? suggests that B is necessary for C. but what about Drosophila males?

## C. elegans = meiosis machine

### Genetic screen

①  $XX = \text{♀} = \text{hermaphrodite}$

$XO = \text{♂} = \text{male}$

Hermaprodite self fertilization

- ~~XX~~  $\xrightarrow{\text{non-disjunction (v. rare)}}$

gametes =  $X \leftrightarrow O$

② so males only produced rarely

③ isolate him mutants (high incidence of males)

trans-acting

cis-acting

expected... prob. many prot. involved in pairing

{ - 13 affect all  
- 4 affect X chromos

2 } may involve chromos. pairing sites

but - maybe the screen does this & there are special mechanisms to deal w/ each

suggests that this implies C. elegans may have special mechanism to deal w/ X.

## Celegans

- 6 pairs of chromosomes
- screen for recombination mutants
- these mutants could be deficient in recombination  
or pairing

trans

## Him8

- can measure intrachromosomal recomb. w/  
tandem duplication on X
- in WT presence of homolog (& normal recombination)  
inhibits intrachromosomal recombination

me14

spermatocyte specific mutation

## cis-act<sub>1</sub> - me8

- important locus in promoting chiasma formation betw. X's
- shows cis activity
  - ① doesn't f(x) when on other chromos
  - ② X-chromosome specific
  - ③ semidominant
- altered recombination  $\rightarrow$   $\neq$  distribution
- mapping me8 sight using RFLP's & cosmids/yacs
- mapped to 140 kb region spanned by three  
cloned fragments
- further mapping... difficult w/ cis-locus - can't do  
complementation
  - ① high copy # competition
  - ② reinsertion
  - ③ southern