Mitotic recombination

Genetics 371B Lecture 19 2 Nov. 1999

Rare relative to meiotic recombination

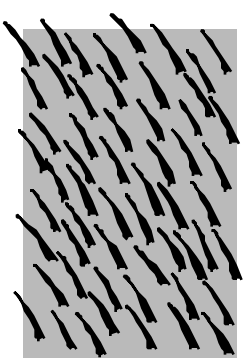
Discovery: Curt Stern, 1936

Linked genes **singed bristles** and **yellow body**

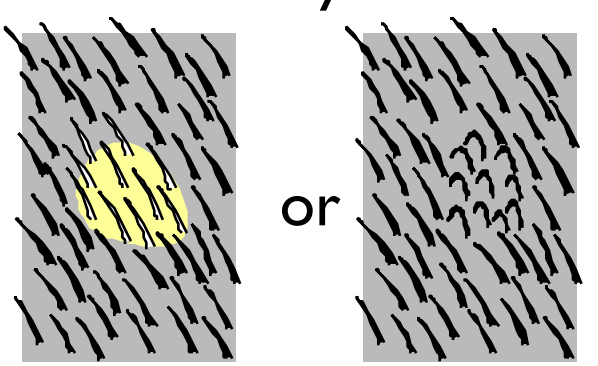
$$\frac{+ \quad y}{sn \quad +}$$ double heterozygote in trans configuration

Exercise: Design an experiment to confirm the trans configuration

Normal

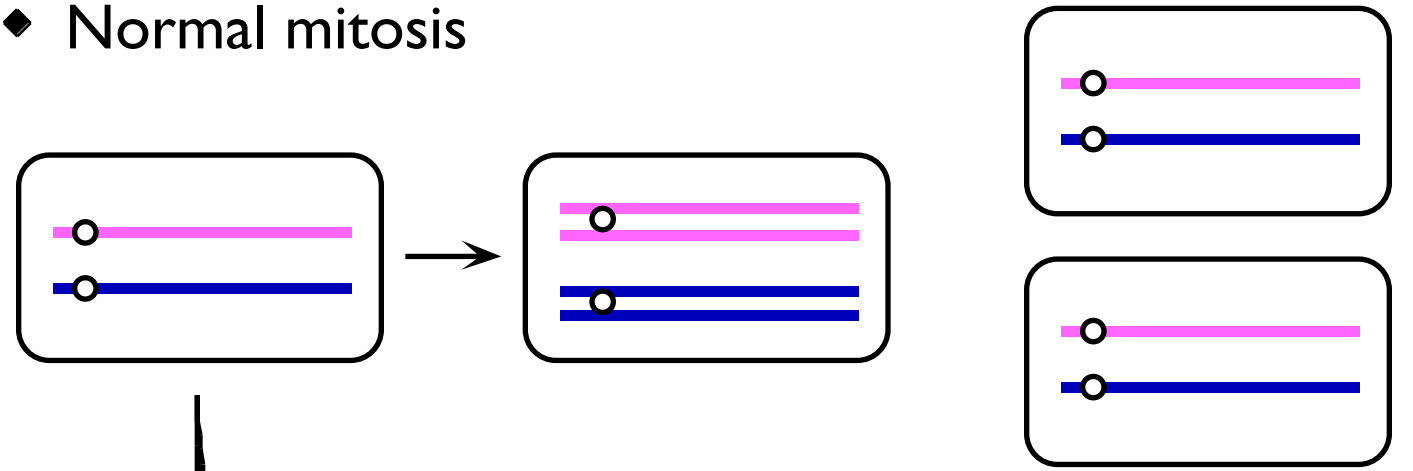


Occasionally:

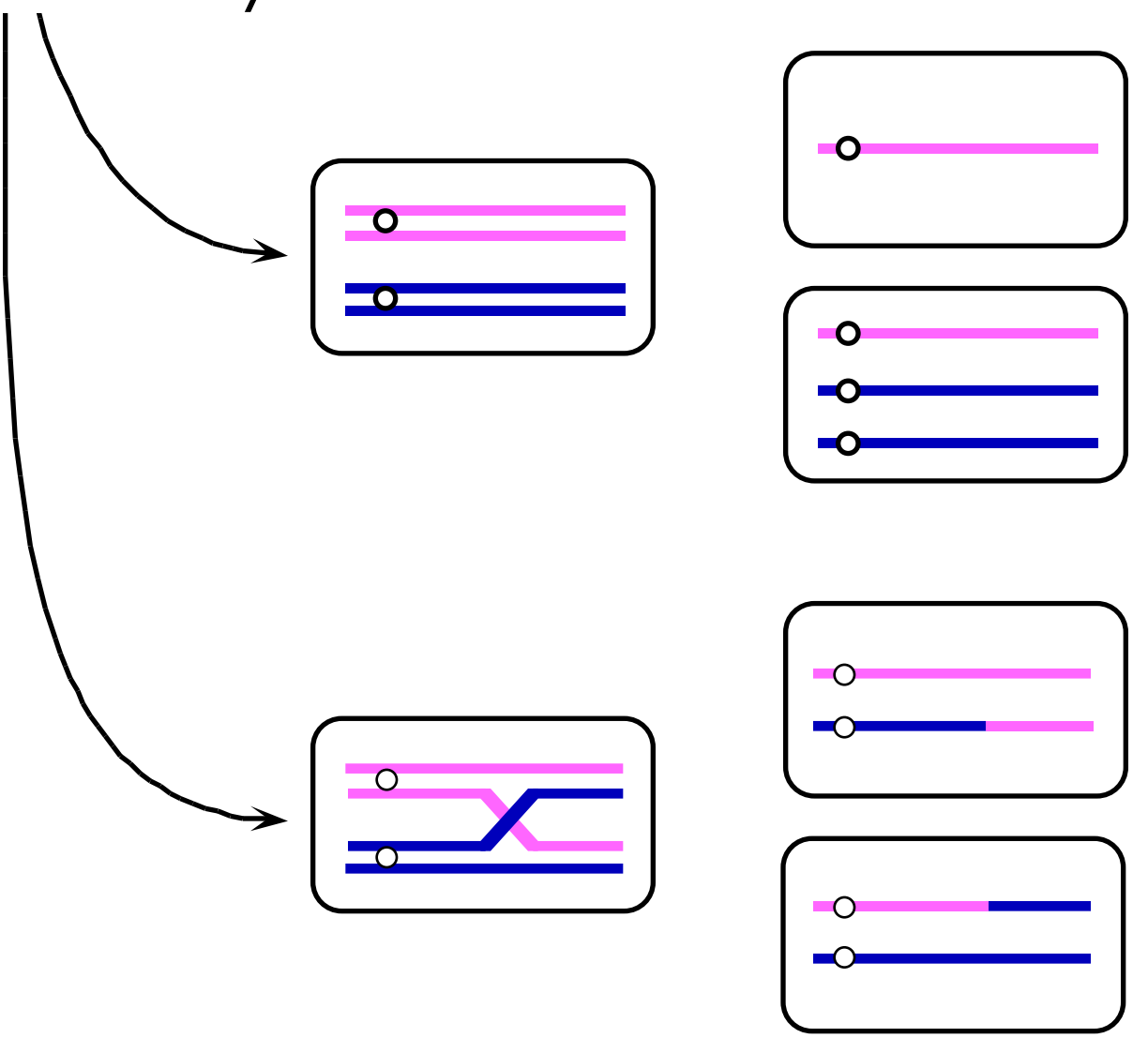


Stern's explanation

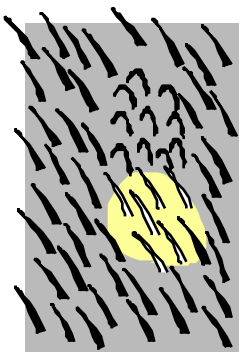
- Normal mitosis

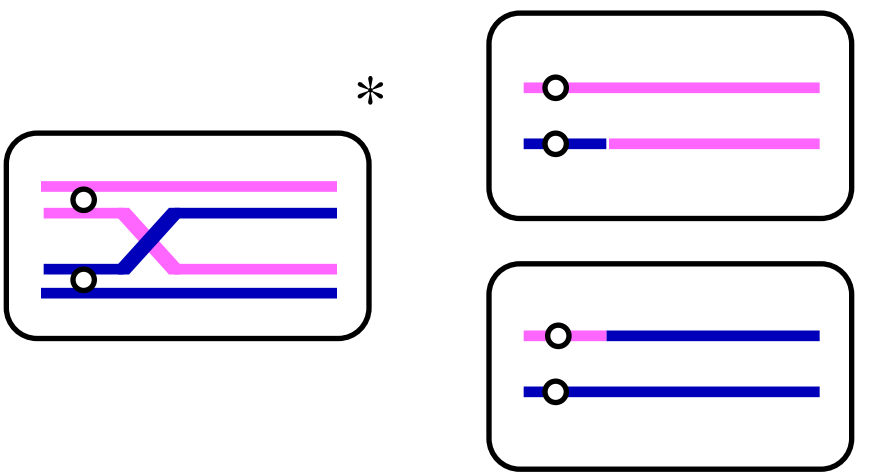


- but occasionally…



Rare twin spots:





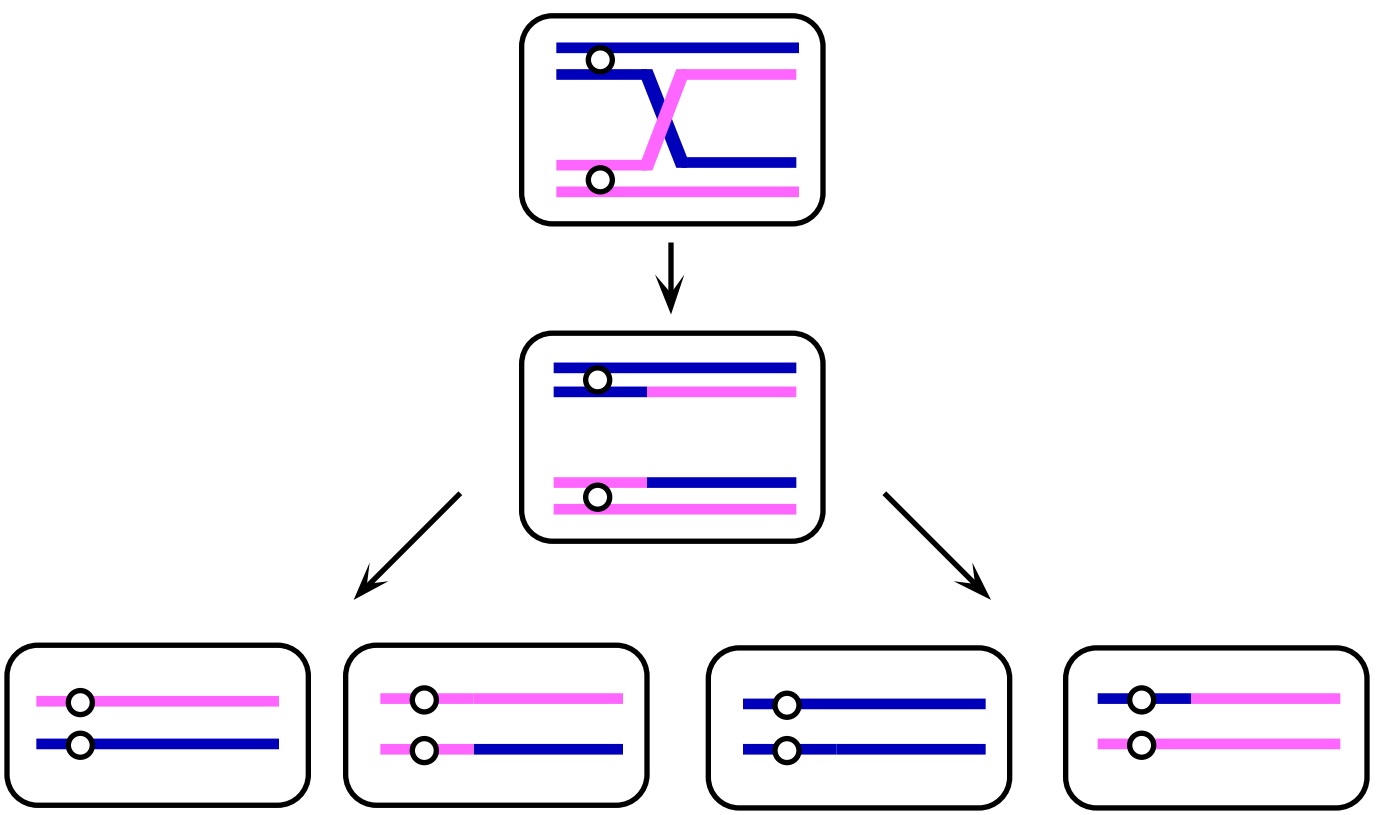
Exercise: This cell is shown to be undergoing mitotic recombination after completion of S phase (how can we tell from the diagram)? How can you tell from the products of the division that the recombination did indeed occur post-S phase?

Significance for human health?

Suppose we're talking about a recessive disease allele…

"Loss of heterozygosity"

e.g., Retinoblastoma, Wilms tumor



Sporadic cases—

Inherited form—

Explanation?

"2-hit kinetics"

$Rb^+/Rb^+ \longrightarrow Rb^+/rb \longrightarrow rb/rb$

"1-hit kinetics"

$Rb^+/rb \longrightarrow rb/rb$

Applications

- Mapping – requency of "spots" proportional to map distance

  - Mapping *centromeres* – can you get twin spots?

Caution: These are *mitotic recombination* frequencies!

- Studying development, recessive lethal alleles

- Assay for genotoxic agents – “SMART”