

Cycle 9: Class 18

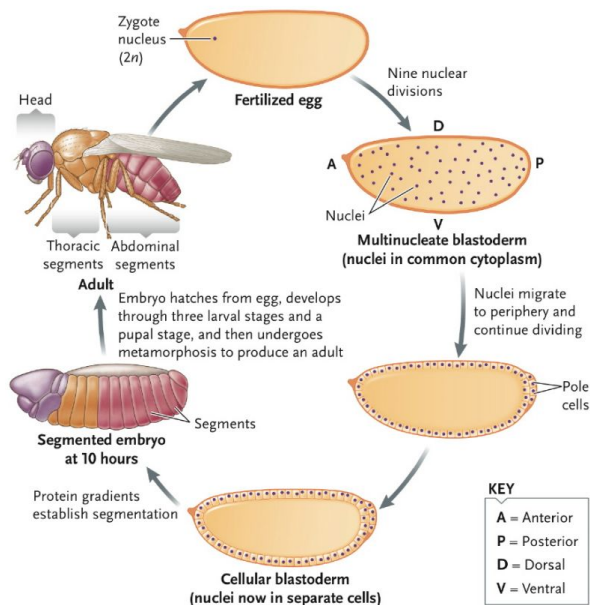
1. given the genetic code, identify mutations as missense, nonsense, or silent

- Missense
 - A mutation that changes a codon that changes the amino acid
- Nonsense Mutation
 - We go from a codon that codes for an amino acid that will now code for a stop codon (more severe)
- Silent Mutation
 - Change in DNA that does not change the protein
- Frameshift
 - Is the most severe
 - It will shift all the mRNA bases which will then shift all the amino acids in the polypeptide

2. characteristics that make *Drosophila* an attractive model system.

- The nucleus divides and divides but the cell does not
 - A multi nucleus egg cell
- Eventually each nucleus goes to the surface and are surrounded of the cell
- They are very cheap, and popular, they develop as larva and eat and eat and then transforms into a fly, how?
 - Giant mutant

3. main stages in *Drosophila* embryonic development.



4. main role of maternal effect, segmentation and homeotic genes in *Drosophila* development.

- The nucleus genes need to know where they are in order to express the correct genes

- Bicoid and gurken mutations occur when mother's pack their eggs full of protein and mRNA (Their own genes) into the zygote that they will need, BUT when these genes are connected to the masking proteins and they
- IT COMES FROM THE MOTHER
 - All her children will have bicoid and this have heads

5. structure/function of the "homeobox" in homeotic genes

- Genes triggered by segmentation genes to create specific structures
- Change on body function to another (ex. Legs growing out of a head)

6. significance of evolutionary conservation of Hox genes

- Genes

7. function of caspases.

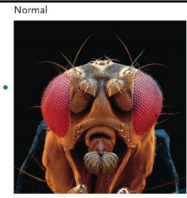
- In the larvae there are sacs of tissue, once it gets a blast of hormone, the disks expand and produce legs and wings for the adult fly
- The larvae tissue gets destroyed by programmed death because the adult does not need it
 - All the cells are ready to die, just need a signal

8. programmed cell death cascade in *C. elegans*.

9. role of programmed cell death in *Drosophila* development

Homeotic Genes determine structures

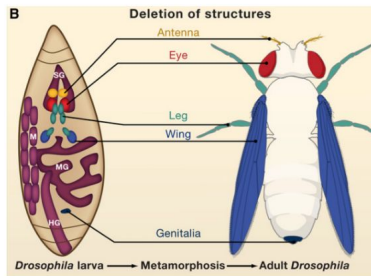
These genes contain a homeobox – 180 bp sequence coding for a type of HTH DNA-binding domain



Antennapedia

R10029

Programmed cell death destroys the larval tissues ...



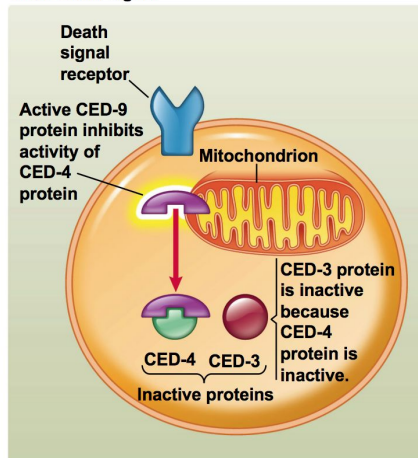
Fuchs and Steller 2011 Cell 147:744

Programmed Cell Death Mechanism

"Executioner" caspases are proteases that cleave specific, essential proteins, leading to a controlled, but irreversible, biochemical cascade causing cell shrinkage, chromatin fragmentation and cell death.

In silico methods have identified caspase orthologues in bacteria.

a. No death signal



b. Death signal

