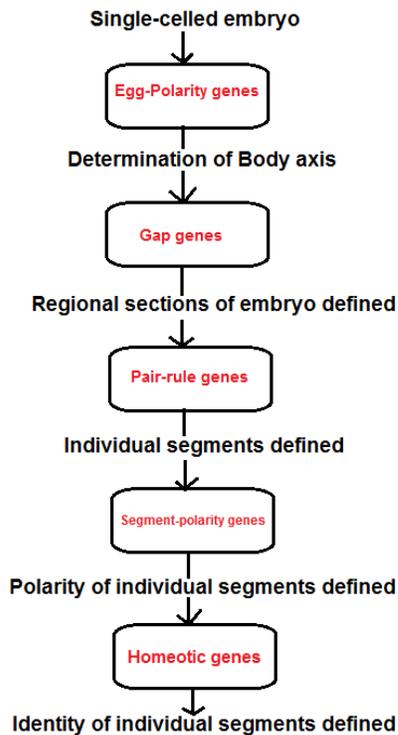


- Fill in the genes responsible for each stage of development.



- Single-celled embryos are totipotent, meaning they have the potential to develop into any cell type.
- What type of proteins do egg-polarity genes encode for?

Morphogen proteins- different concentrations, asymmetrically distributed in the cytoplasm, elicit different developmental responses.

- Which proteins create the anterior and posterior axis?

- Anterior (head)- high conc. of bicoid mRNA in future anterior axis → stimulates hunchback.
- Posterior (butt)- high conc. of nanos mRNA in future posterior axis → inhibits hunchback.
- Hunchback gene is required for the development of the head and thoracic structures.

- Which proteins create the dorsal and ventral axis?

Dorsal gene released → cactus gene captures the dorsal gene → toll gene helps phosphorylate cactus to degrade it → release the dorsal gene into the nucleus

- This occurs in the ventricle cells to allow the formation of the ventral axis.
- This does NOT occur in the dorsal cells to allow the formation of the dorsal axis.
- Genes/Proteins are often named after their effect when mutated aka dorsalization.

3. There are 3 segmentation genes. Fill in the empty spaces in the chart below, the effect of the gene when mutated.

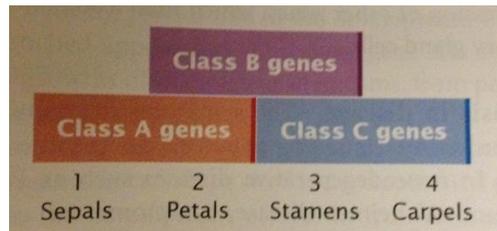
Segmentation Gene	Effect of Mutation
Gap Genes	Delete adjacent segments (maybe deletion of anterior segments)
Pair-rule genes	Delete same part of pattern in every other segment/ alternating segments.
Segment-Polarity genes	Affect polarity of segment; part of segment replaced by mirror image of part of another segment (replace posterior half with anterior half).

4. What type of proteins do Hox genes encode for?

Transcription factor proteins which help determine the identity of body regions.

Movement of these genes to a new location will cause expression of that designated gene in the wrong location.

5. How do genes control the development of flower structures? How does mutation of one or multiple genes effect that expression?



- Class A expressed → Sepals in whorl 1
- Class A+B expressed → Petals in whorl 2
- Class B+C expressed → Stamens in whorl 3
- Class C expressed → Carpels in whorl 4
- Mutation of A → ONLY stamen and carpel expression
- Mutation of B → ONLY sepals and carpel expression
- Mutation of C → ONLY sepals and petals expression

6. What is the difference between the two methods of programmed cell death; apoptosis and necrosis? Why is programmed cell death important?

Apoptosis- programmed cell death. DNA first degraded/chopped up by Caspases then engulfed by macrophages.

Necrosis-cell lysis. Cell swells until it bursts.

Important for development and diseases.