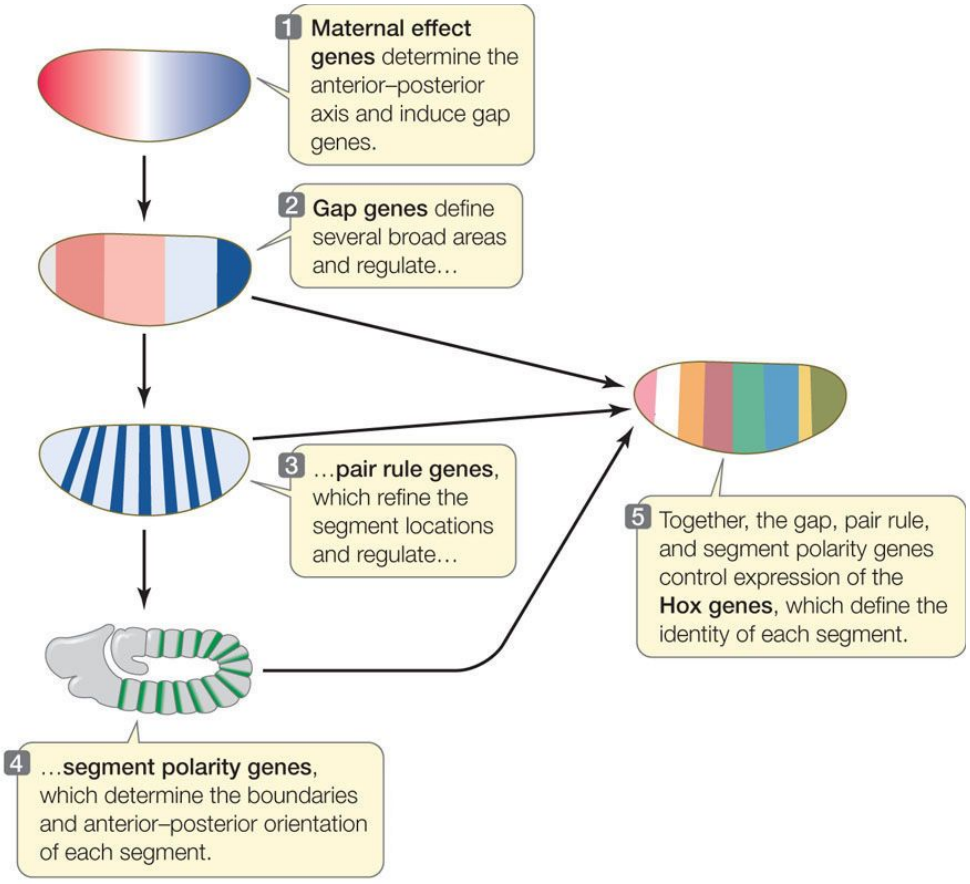
Reference page: The Segmentation Network in *Drosophila melanogaster*



The fruit fly (*Drosophila melanogaster*) body plan is determined in the first few hours of embryogenesis. Spatial positioning of gene expression along the embryo ultimately allows for the body of the fruit fly to have unique head, thoracic, and abdominal segments. One reason why embryogenesis is commonly studied in fruit flies is because of these clear spatial expression patterns and the ability to visualize and model how the expression patterns determine downstream expression and processes.

Segmentation begins with the maternal effect genes (ex. bicoid) which are deposited by the mother and form concentration gradients along the embryo to define the anterior (head) to posterior (tail) axis. The expression domains and concentration of these genes position the expression of the gap genes (ex. hunchback - hb). The gap genes then dictate the position of the pair-rule genes (ex. even-skipped - eve). Multiple gap genes work together from separate regions of the embryo to make the seven stripe pattern of the pair-rule genes. The seven stripe pattern leads to the creation of the 14 stripes of the segment-polarity genes which in turn defines the segments where Hox genes are expressed to create the body plan.