CONCEPT: STUDYING THE GENETICS OF DEVELOPMENT

● Scientists use many different techniques to study development

□ Developmental research focuses on four main questions

- What genes control development, and at what point in development are they expressed?

- Where are these genes expressed?

- How are these genes regulated?

- What happens if these genes are defective?

□ Scientists use many different **model organisms** to study development

- These include: yeast, plants, fruit flies (*drosophilia)* worms (*C. elegans)* and mice

- These organisms are chosen because they grow easily, rapidly reproduce, and are genetically similar

EXAMPLE:

● Development begins with a **zygote**, which is a fertilized egg

□ This cell is **totipotent**, which means it can develop into any cell type

□ **Determination** is the process through which a cell becomes committed to its fate (cell type, death, etc…)

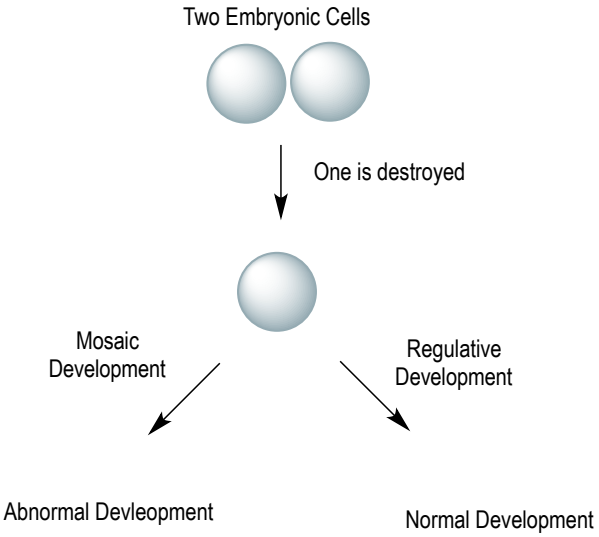
- **Mosaic determination** is when each cell in an organism has a pre-determined fate (*C. elegans)*

- **Regulative determination** is when cells can regulate their fates according to their environment (humans)

□ **Variable gene activity hypothesis** states that determination is controlled through activating/inactivating genes

- Gene activation/inactivation occurs at different times and in different cell types

EXAMPLE:


Two Embryonic Cells
One is destroyed
Mosaic Development
Regulative Development
Abnormal Devleopment
Normal Development