

Review 18

Fertilization

- requires enough sperm in vicinity of ovum
- acrosomes release enzymes, which aid in penetration of sperm head into egg
- first sperm head to penetrate causes lifting off of fertilization membrane to prevent polyspermy

Events following fertilization:

- multiple mitotic cell divisions

zygote → 2-cell → 4-cell → 8-cell → morula → blastula → etc.

- differentiation

xprogressive specialization of cells into tissues/organs, etc
xcell movements and rearrangements
xprogrammed cell death

blastula → gastrula → fetus

embryonic induction and determination (set programming), starting with blastopore, followed by the specialization of cells (e.g. lens of eye, skeletal muscle, neurons, etc.) to ultimately form tissues, organs, etc.

✓ectoderm becomes: skin, hair, nails, endothelial tissues, nervous system, lens of eyes, etc.

✓mesoderm becomes: muscle, connective tissues, epithelial linings of blood and lymph vessels, joint cavities, etc.

✓endoderm becomes: inner linings of gut, vagina, urethra and glands; viscera (abdominal organs associated with digestion), etc.

- growth

TERATOGEN = substance which crosses the placental barrier and causes developmental problems in the embryo

examples: alcohol, thalidomide, German measles toxin

How does development happen?

embryonic induction: starts at blastopore and goes in wave around embryo

How?.....contact? chemical messengers?

prior to induction, cells can become anything (pluripotent)

once induced, cells become determined and move down path of development into a specific structure

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epigenesis: very old idea, incorporating gradual emergence of form from unstructured matter

preformation: developed with advent of compound microscope—individual fully formed in sperm and just needing nourishment of egg to develop into baby

modern view: combination of both—instructions preformed in DNA, which direct emergence of form from relatively unstructured matter of zygote

Challenges for the future

- **Cloning**
- **Regeneration of lost parts**