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## From Fertilization to Gastrulation

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- Sperm differentiation:
1. Meiosis begins post-puberty in the testes.
  2. Following meiosis, spermatocytes are remodeled to spermatids and finally to spermatozoa.
  3. Note the presence of tight junctions (arrow) between Sertoli cells forming a blood-testes-barrier



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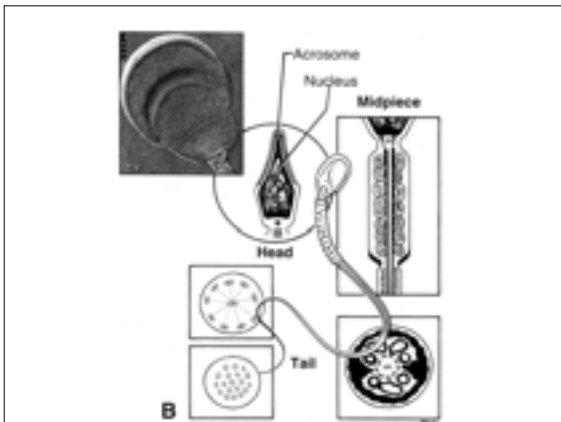
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Final phases of sperm maturation.

1. "Education" of sperm in epididymis (3 wks).

2. In female reproductive tract:

**Capacitation:** able to fertilize an egg.

**Acrosome reaction:** fusion of apical vesicle membrane (acrosome, modified lysosome) with sperm's plasma membrane. This releases hydrolytic enzymes to penetrate zona pellucida (extracellular material) surrounding the egg.

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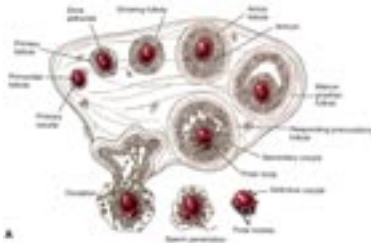
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1. Ovum begins meiosis in fetal life and is held in prophase of first meiotic division.
2. Meiosis re-initiated at ovulation.
3. Meiosis is only completed if ovum is fertilized.

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1. Many sperm try but only 1 "makes it".
2. Polyspermy prevented by exocytosis of cortical granules.



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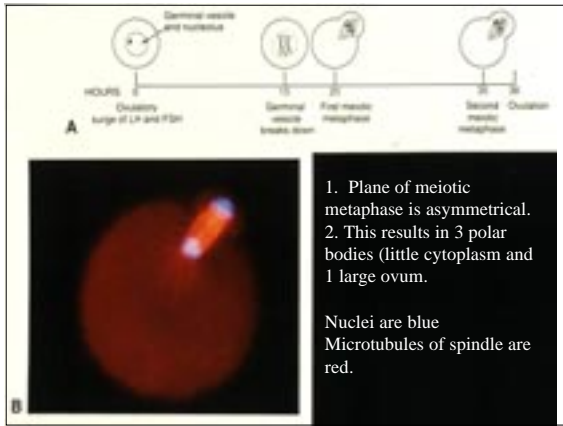
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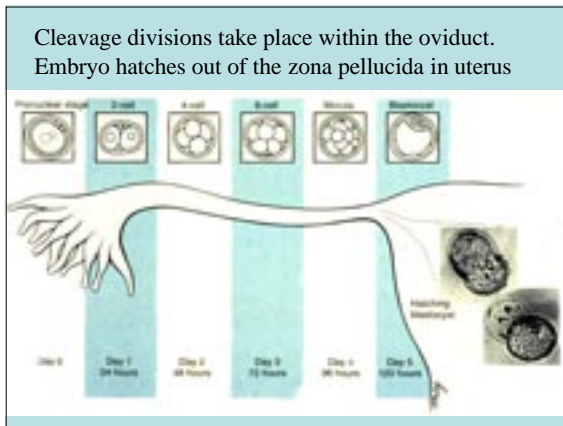
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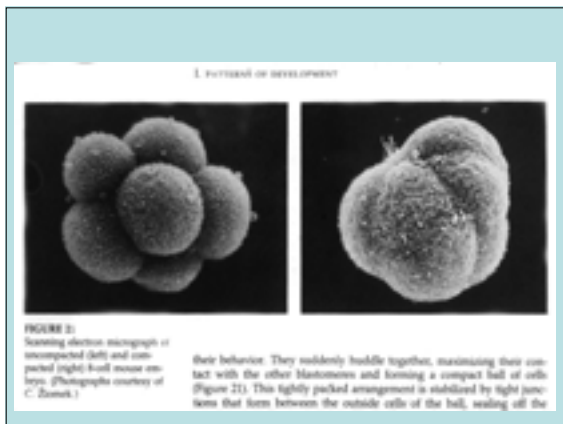
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Fate:  
Potency:  
Commitment:  
Differentiation:

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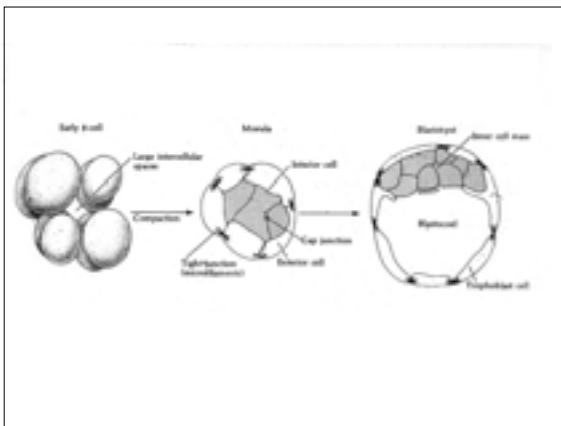
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Implantation

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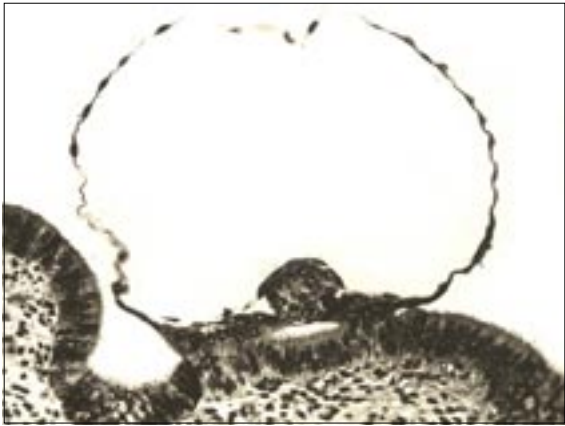
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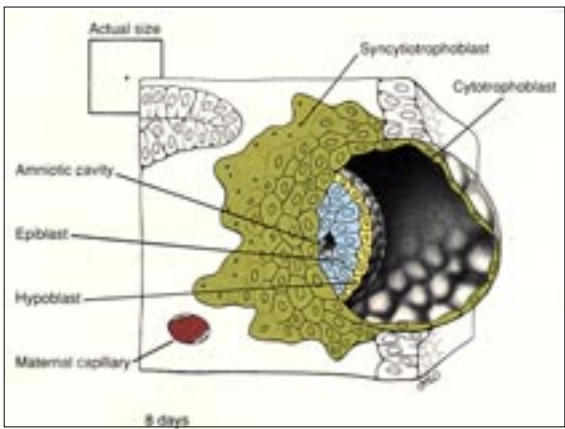
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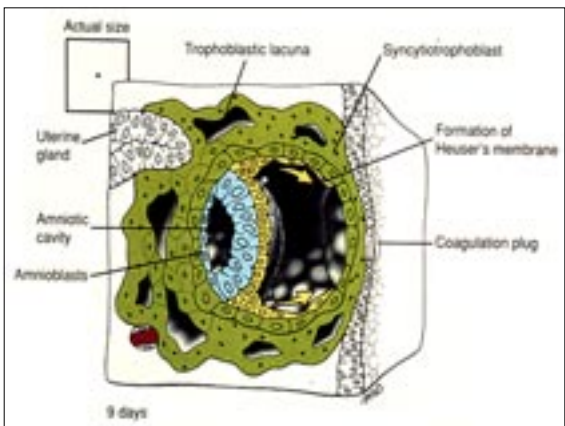
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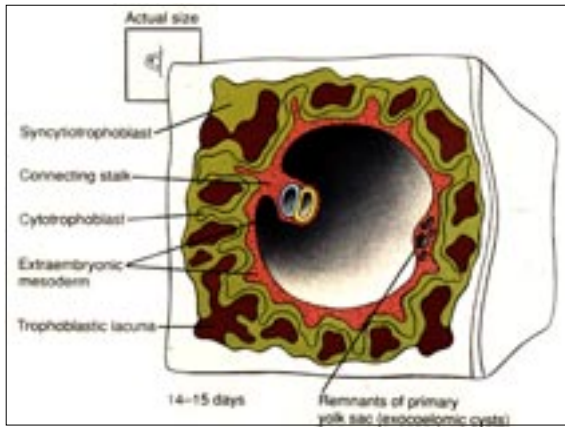
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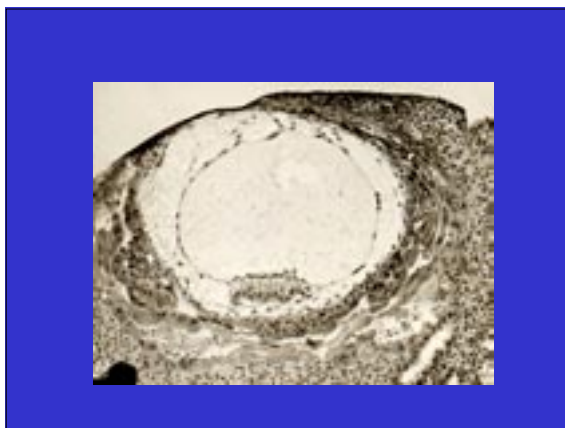
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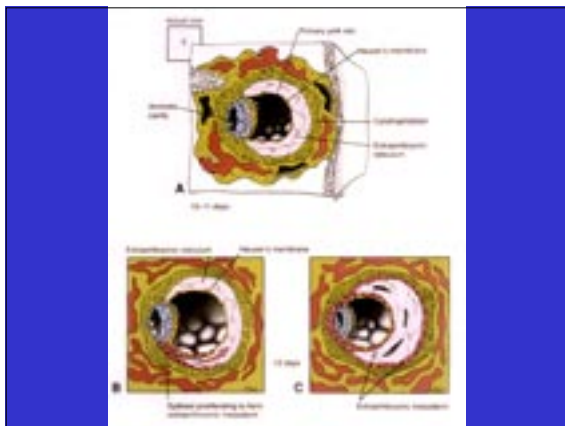
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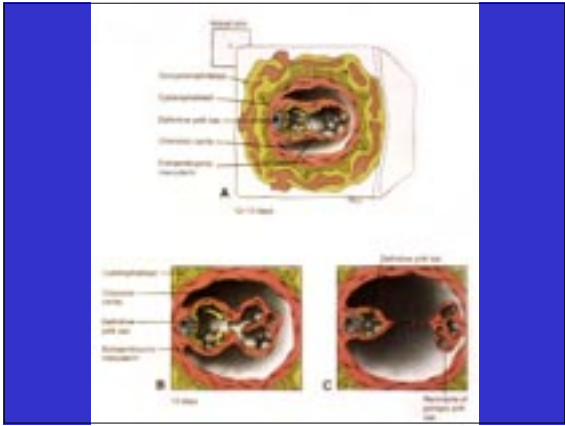
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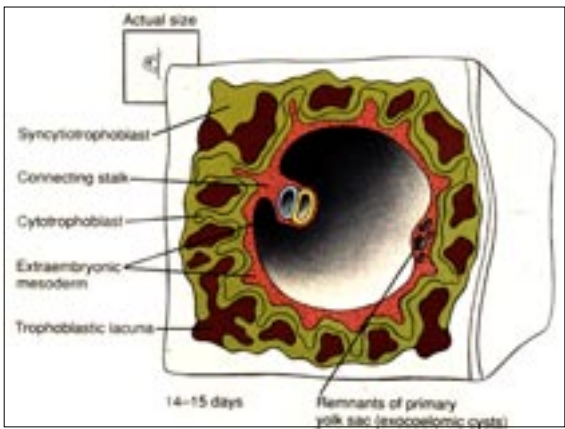
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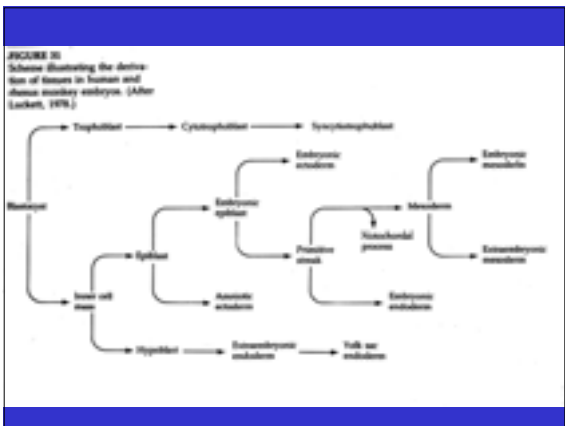
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## Gastrulation

Formation of the 3 germ layers

**Ectoderm:** Epidermis and neural tissue

**Mesoderm:** axial, paraxial, intermediate and lateral plate

**Endoderm:** lining of gut and respiratory tract

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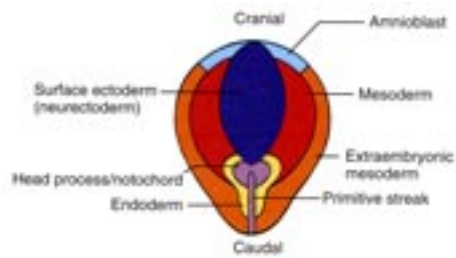
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### Fate map of epiblast prior to gastrulation.



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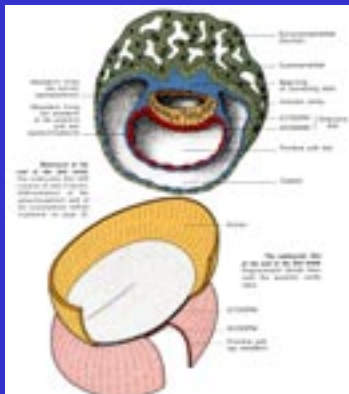
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First sign of gastrulation is the formation at midline of primitive streak.

Formation of streak defines cranial and caudal axes.



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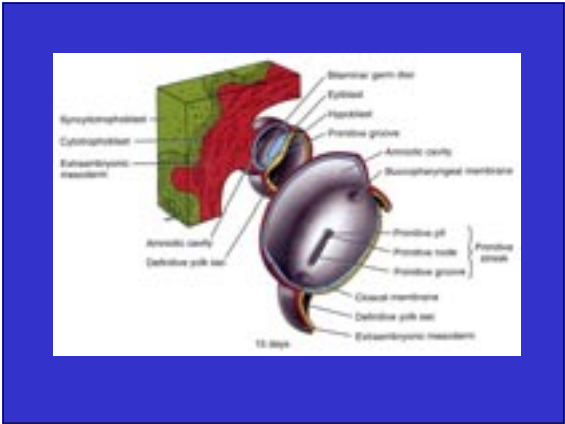
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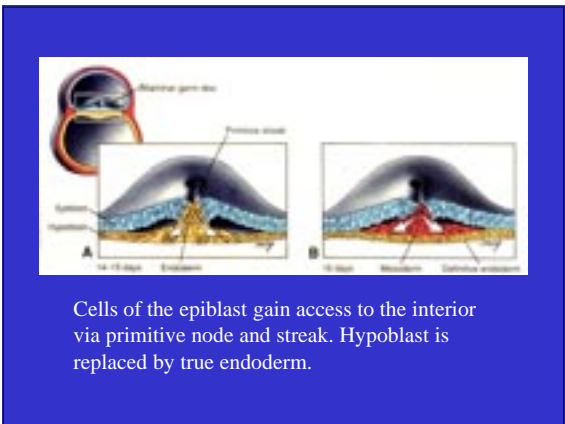
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Cells of the epiblast gain access to the interior via primitive node and streak. Hypoblast is replaced by true endoderm.

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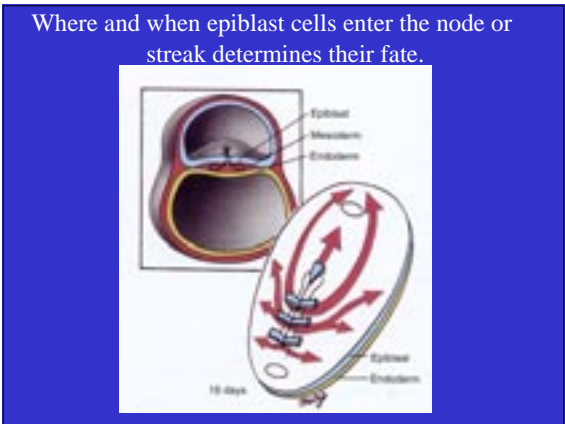
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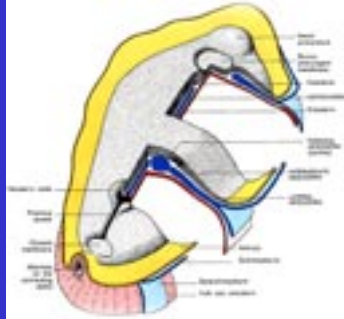
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At the end of gastrulation the primary germ layers are present.  
The three axes of the embryo are established.  
The embryo still touches extra-embryonic tissue on all edges.



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#### Gamete production and fertilization

Cleavage divisions: setting aside embryonic vs. extraembryonic cells initial stages of implantation and formation of extraembryonic spaces.

Gastrulation: from whence you migrate determines your fate. Formation of 3 germ layers.

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