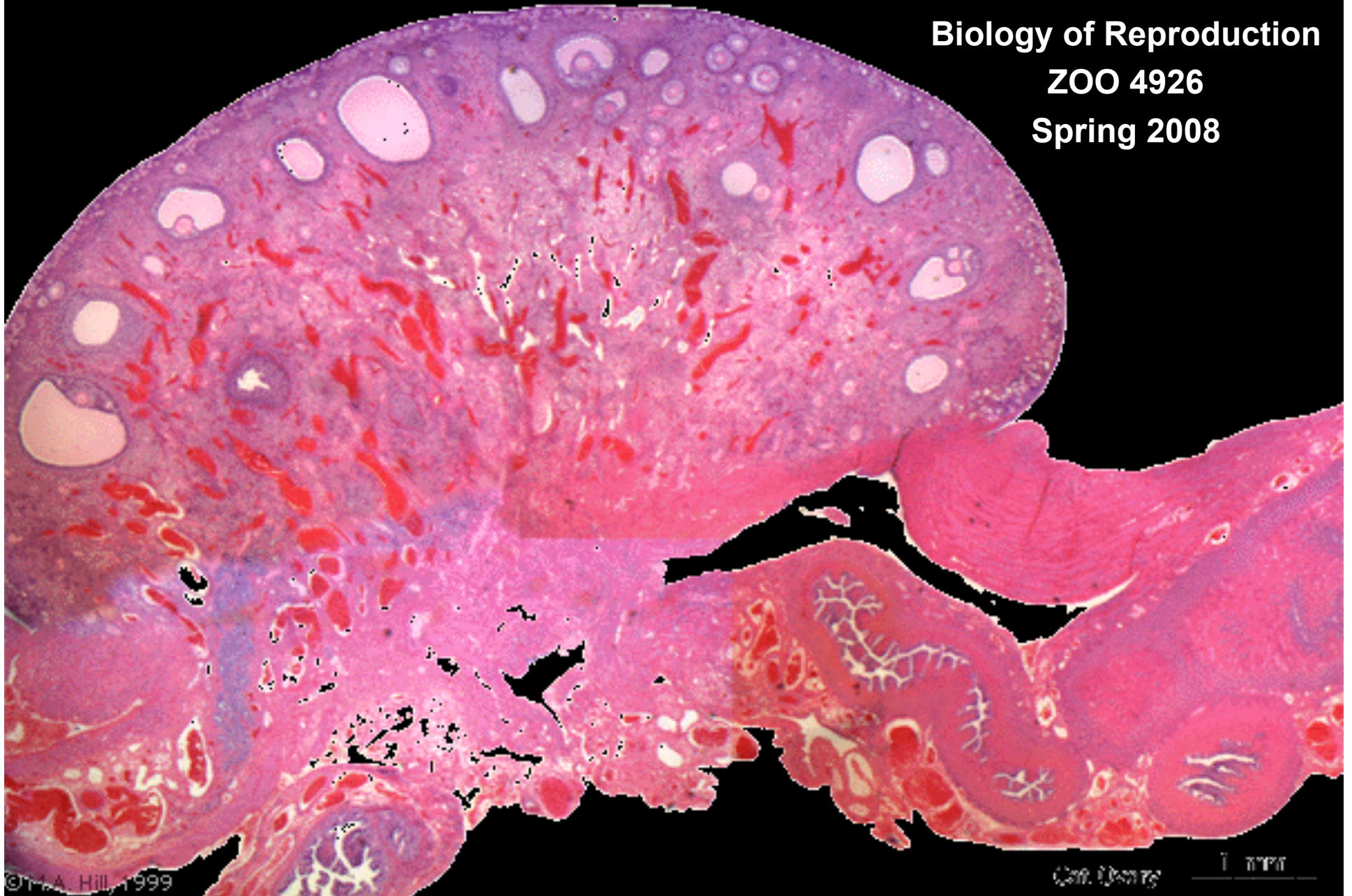


Embryology of the Ovary


Biology of Reproduction
ZOO 4926
Spring 2008



Outline

1. Origin and migration of primordial germ cells
2. Formation of basic gonad architecture
3. Proliferation of oogonia and formation of syncytium
4. Oogenesis and Folliculogenesis

Developmental Biology 231, 291-320 (2001)

doi:10.1006/dbio.2000.0120, available online at <http://www.idealibrary.com> on 

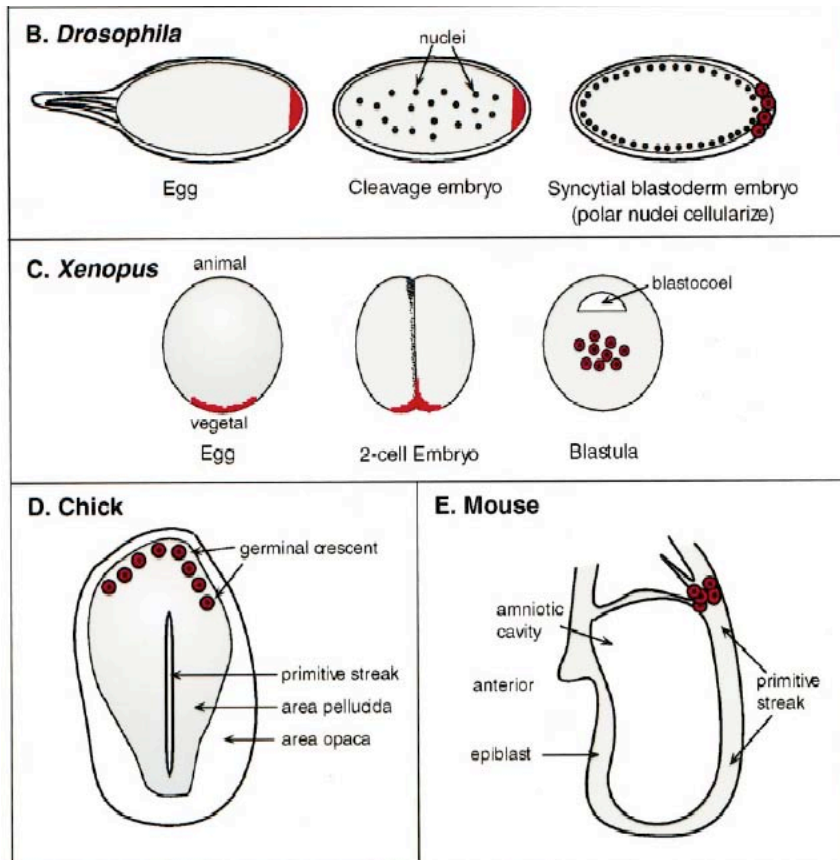
REVIEW

Comparative Aspects of Animal Oogenesis

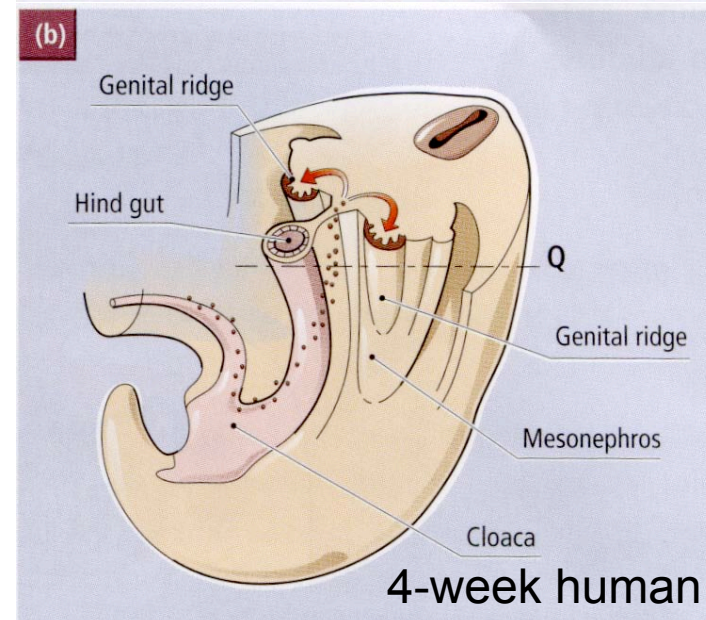
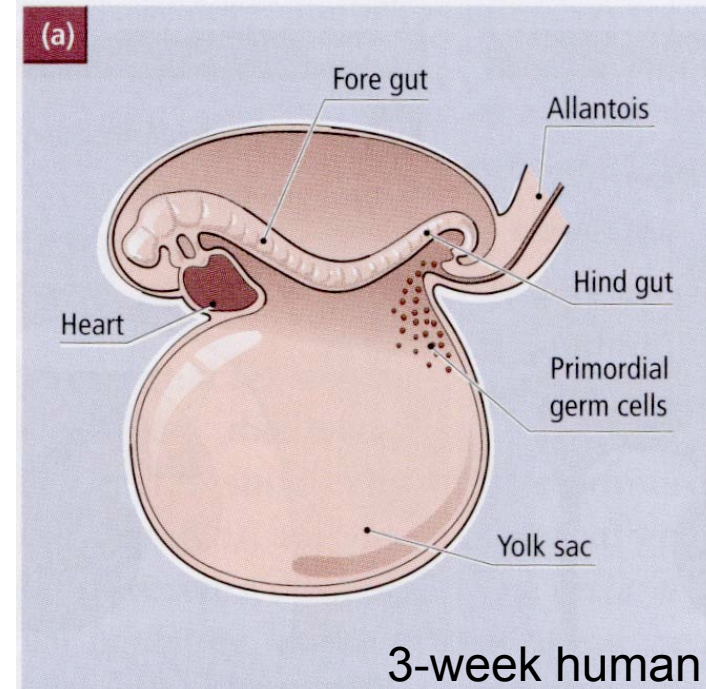
Nina Matova^{*.1} and **Lynn Cooley**^{†.2}

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Origin and migration of primordial germ cells (similar in almost all animals)

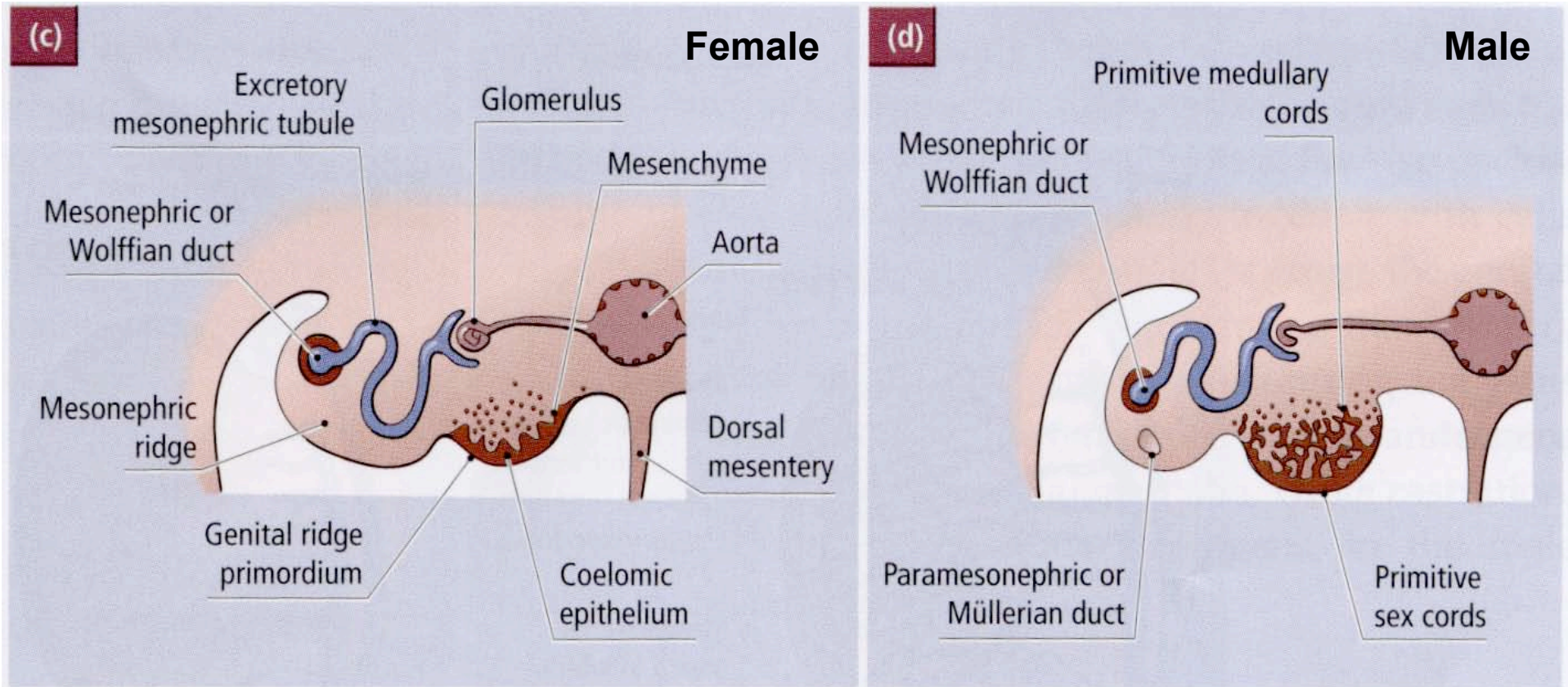


Red = origin of primordial germ cells in multiple species



Formation of basic gonad architecture

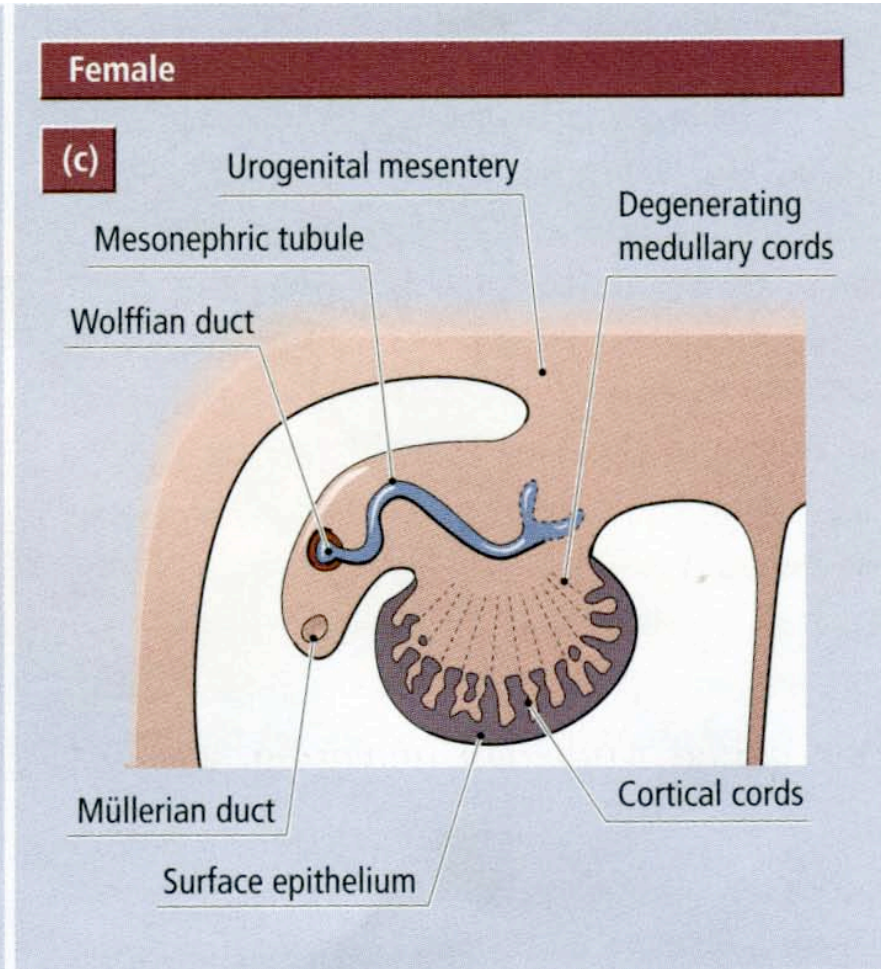
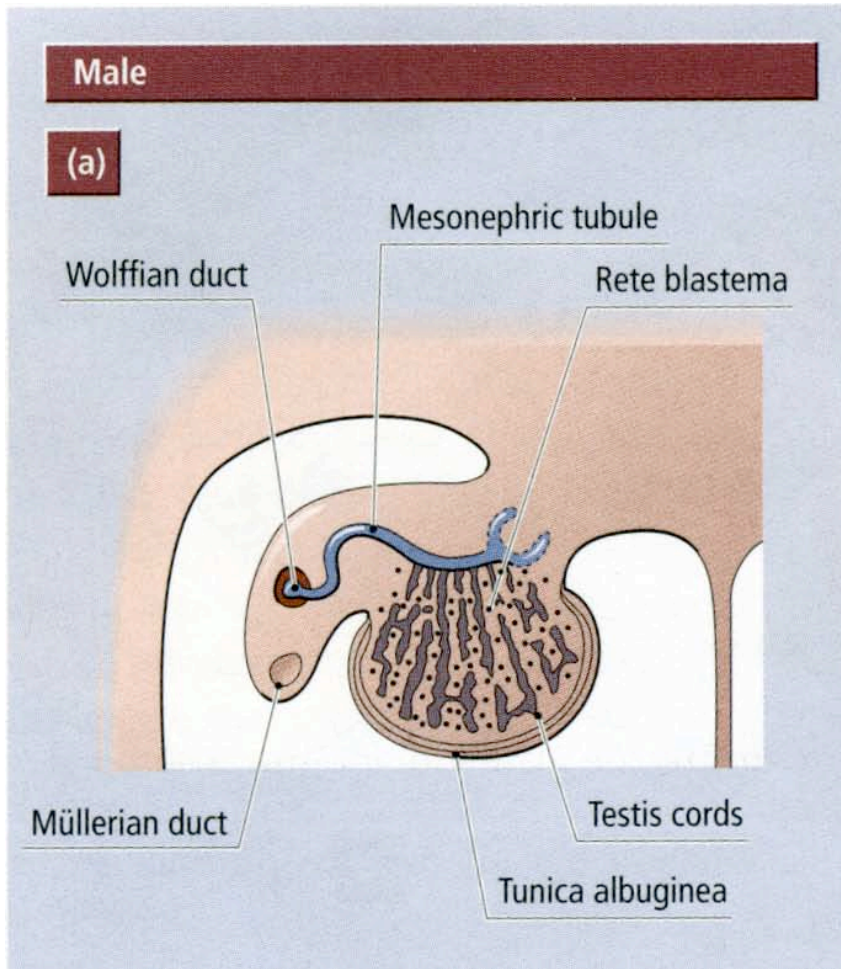
1. Germ cells
2. Somatic gonad derived cells
3. Mesonephros derived cells

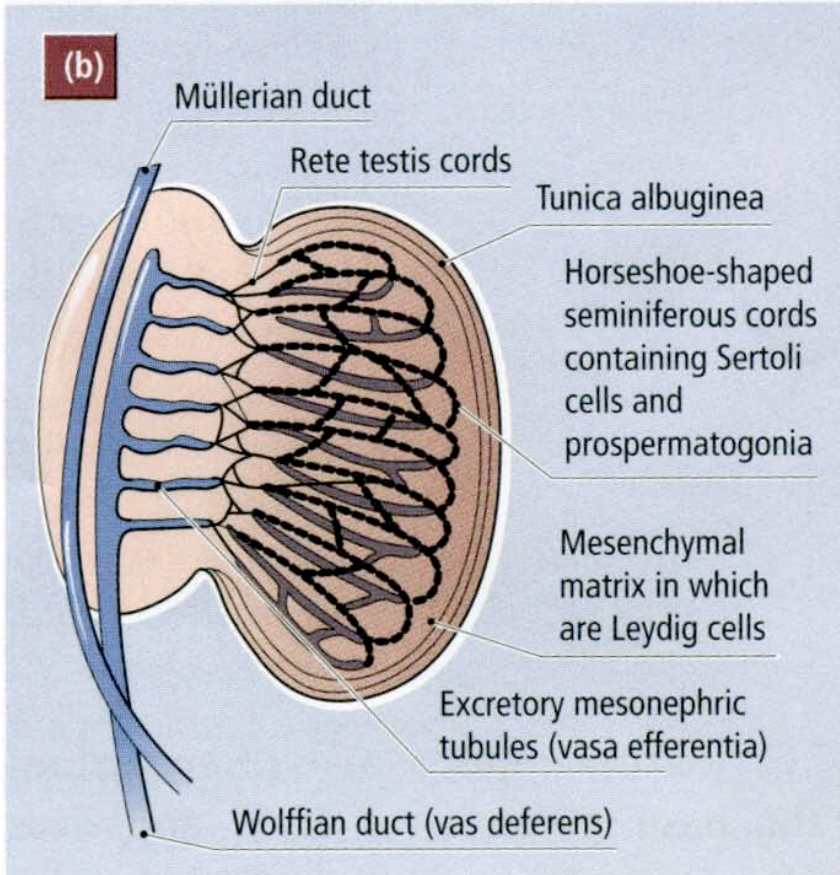


8 week human

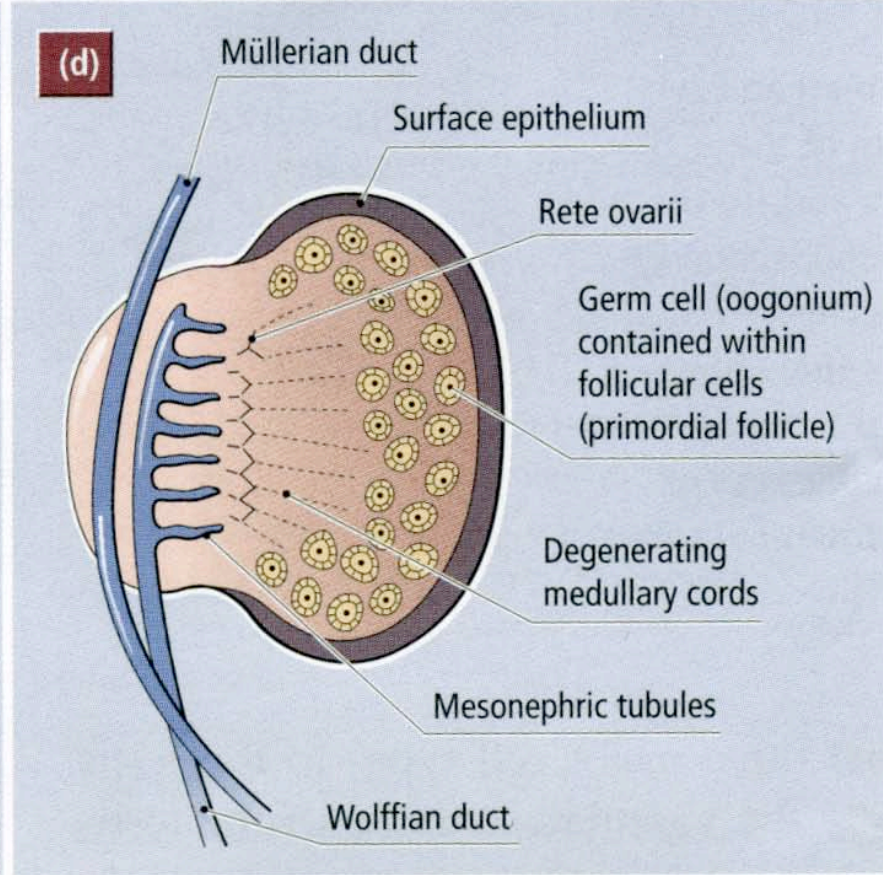
Medulla: inner part
Cortex: outermost layer

7 week human





16-20 week human

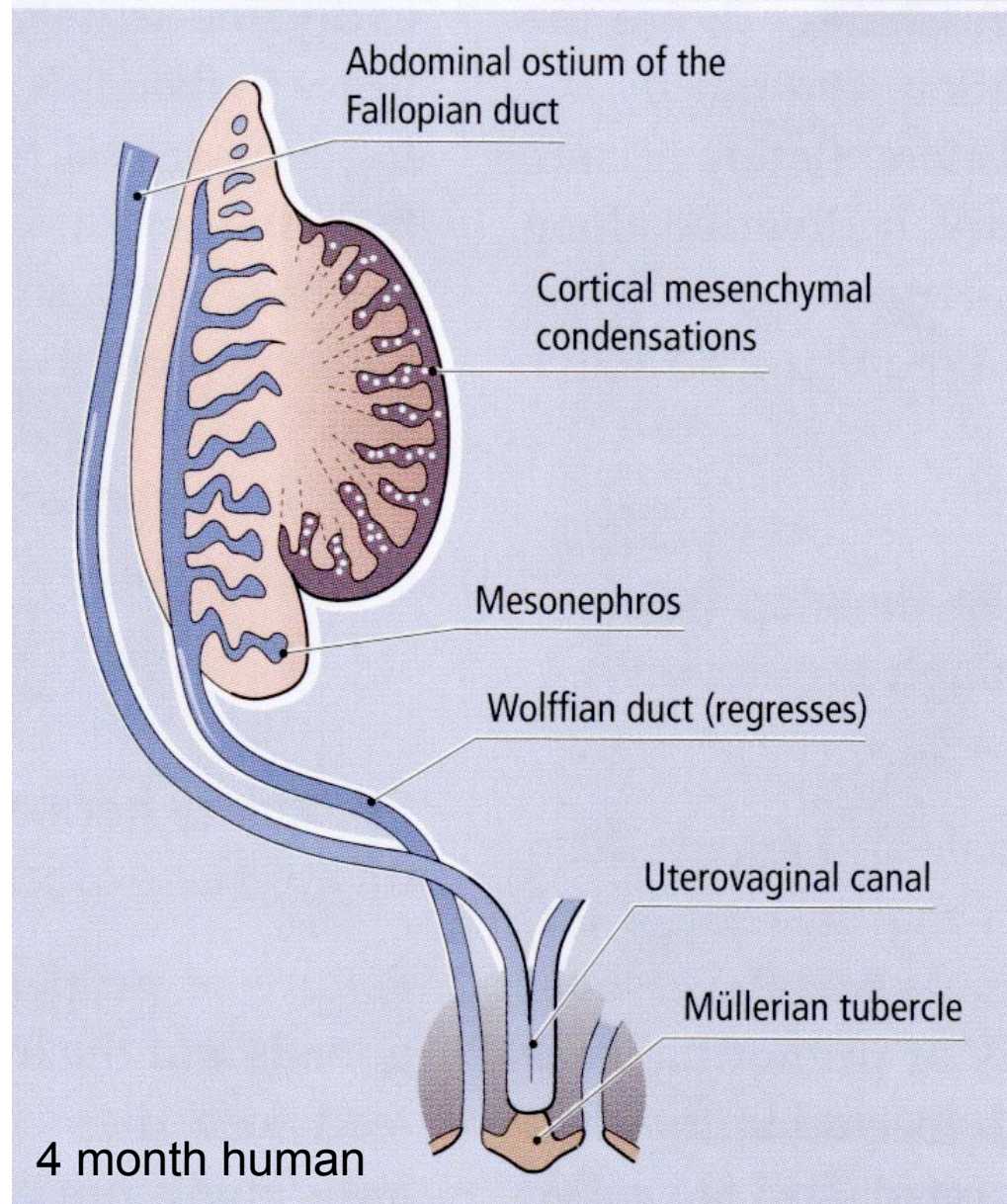


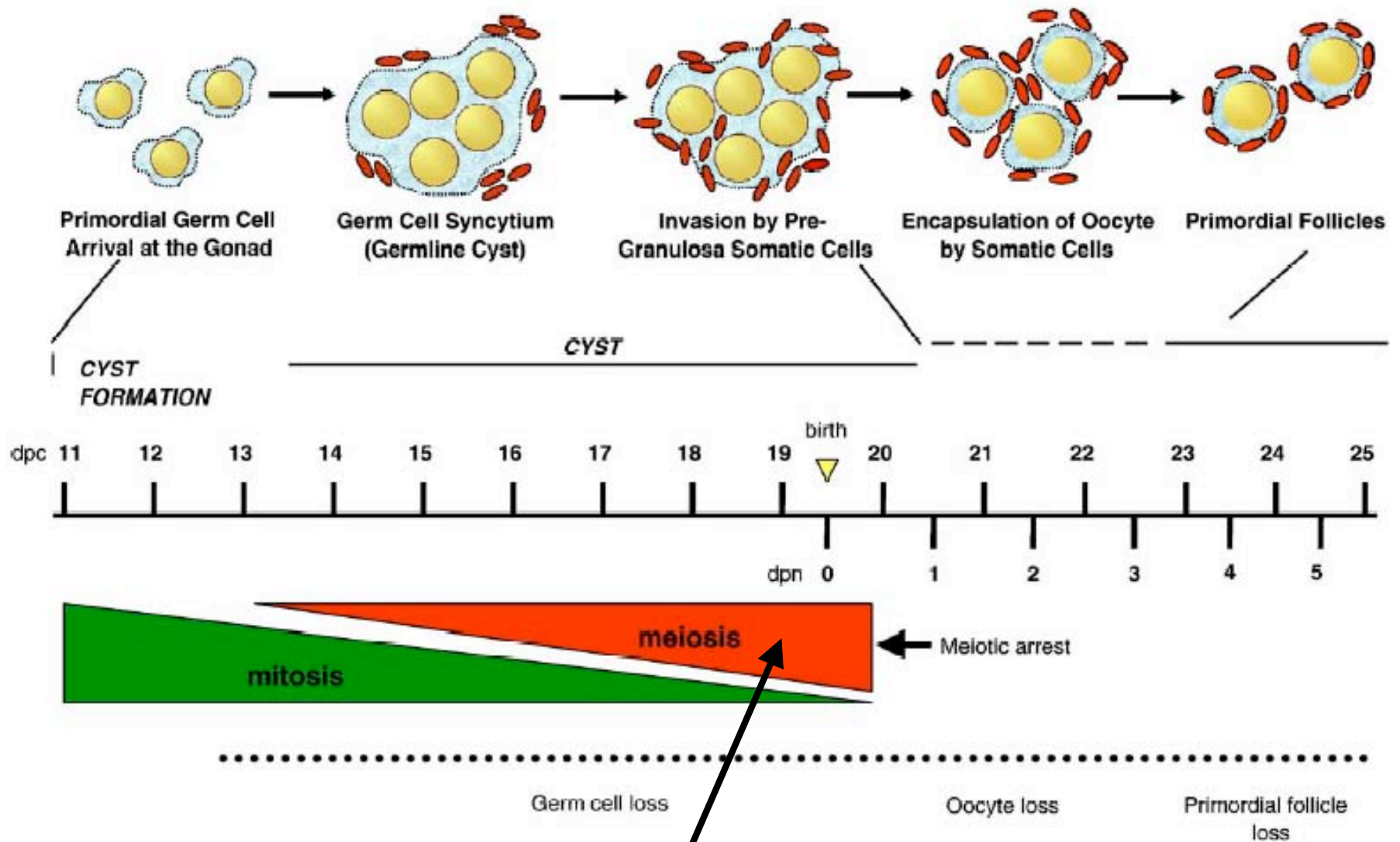
20-24 week human

Proliferation of oogonia and formation of syncytium

Syncytium: a large cell-like structure filled with cytoplasm containing many nuclei.

Cytokinesis: the process whereby the cytoplasm of a single cell is divided to spawn two daughter cells





Meiotic prophase I

Available online at www.sciencedirect.com

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Developmental Biology 298 (2006) 132–148

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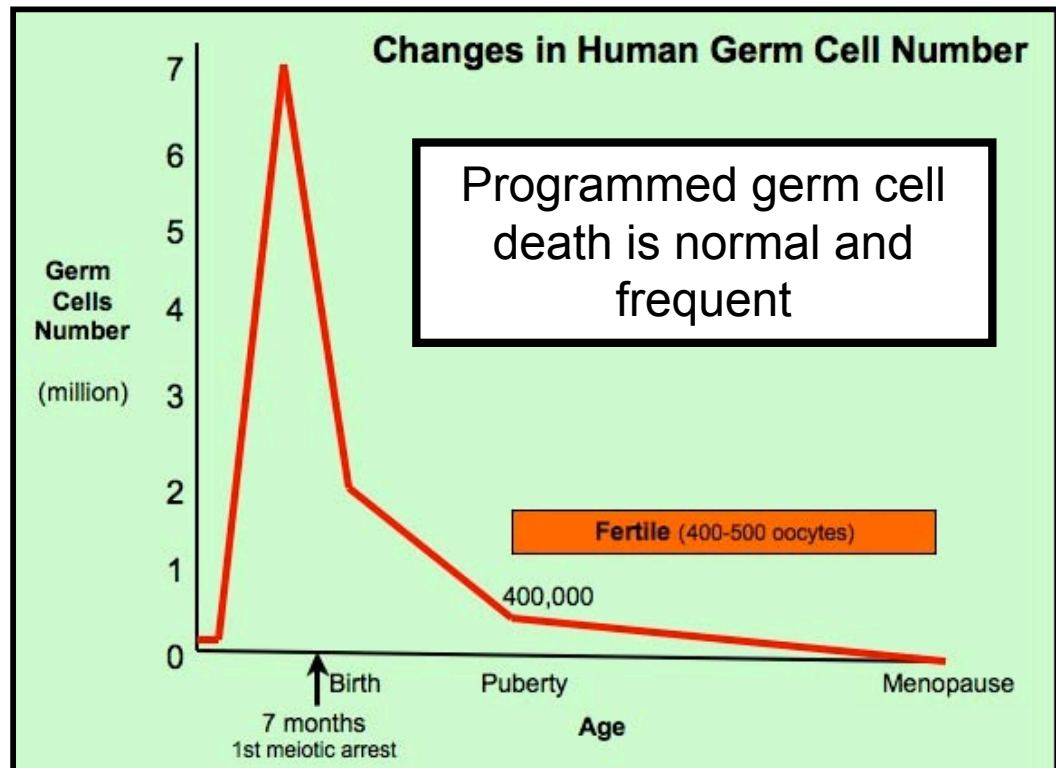
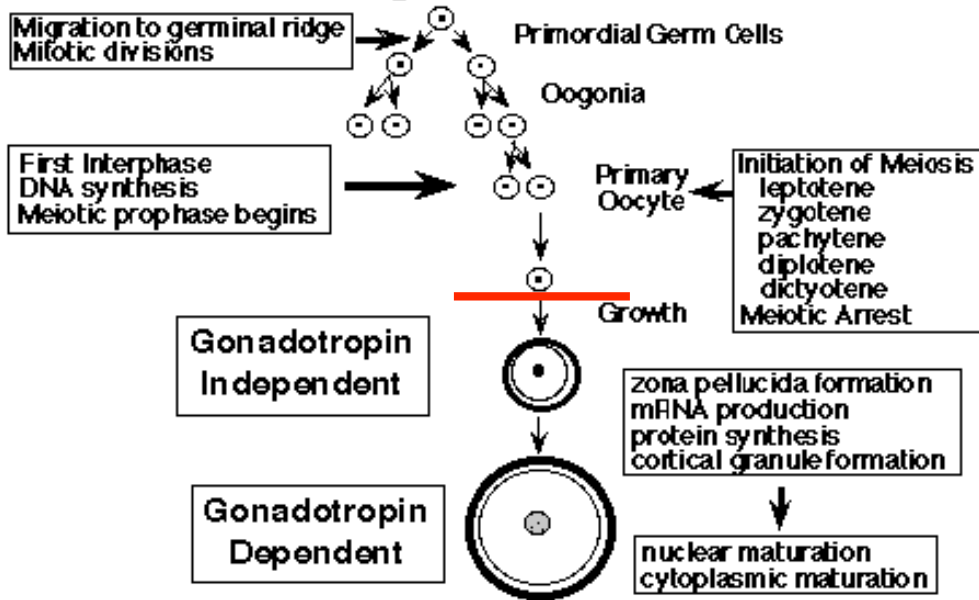
DEVELOPMENTAL BIOLOGY

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Postnatal regulation of germ cells by activin: The establishment of the initial follicle pool

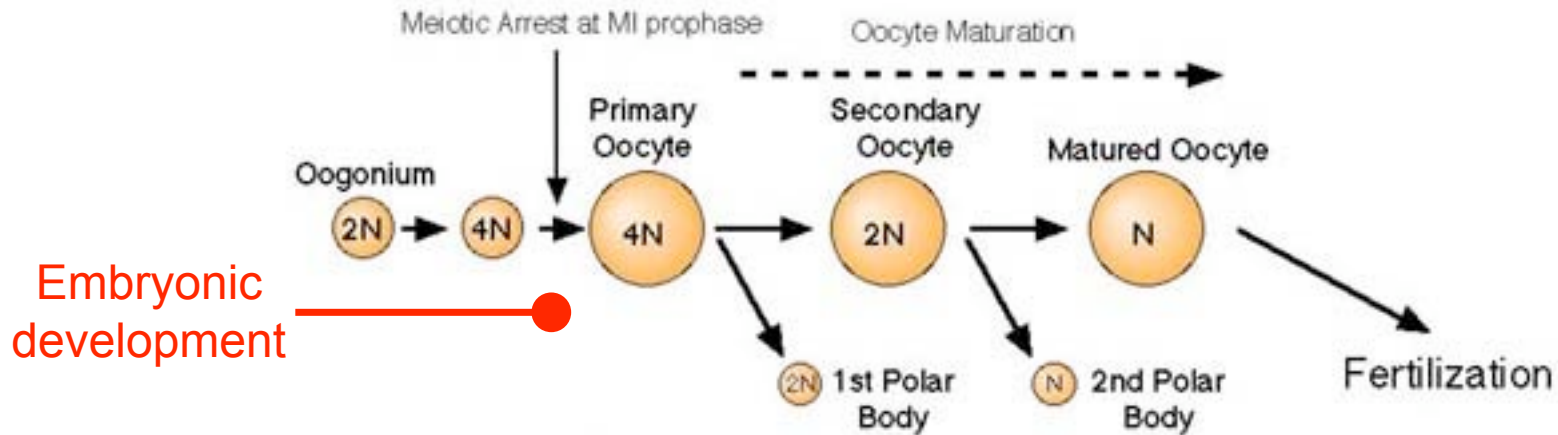
Sarah K. Bristol-Gould^{a,1}, Pamela K. Kreeger^{b,1}, Christina G. Selkirk^c, Signe M. Kilen^c, Robert W. Cook^a, Jingjing L. Kipp^d, Lonnie D. Shea^{b,e,f}, Kelly E. Mayo^{c,d,e,f}, Teresa K. Woodruff^{a,c,d,e,f,g,*}

Oogenesis

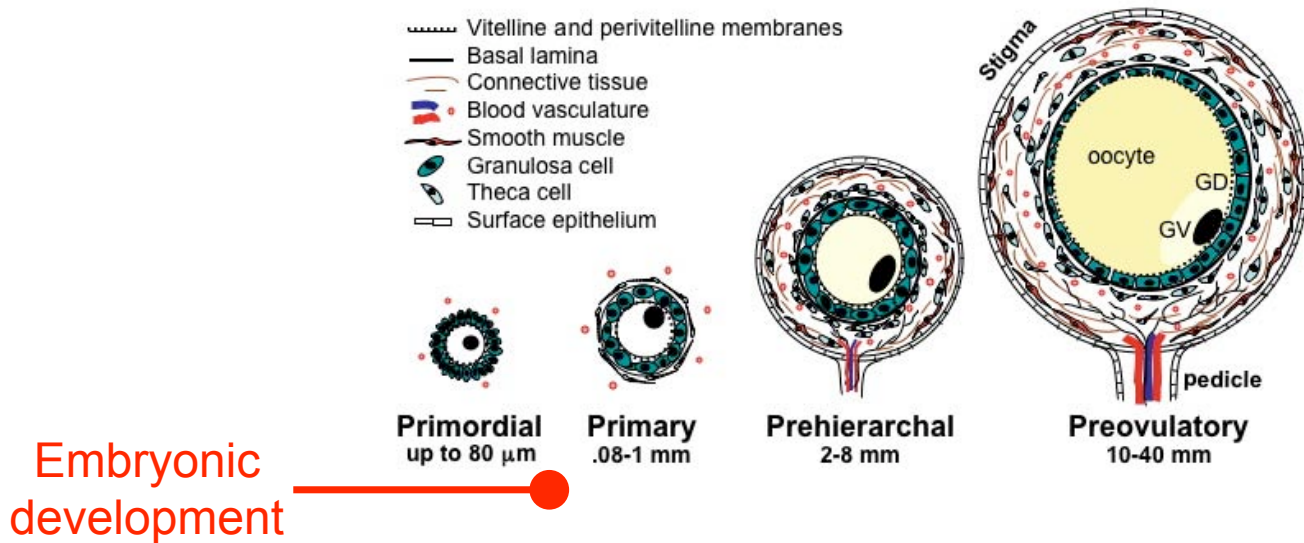


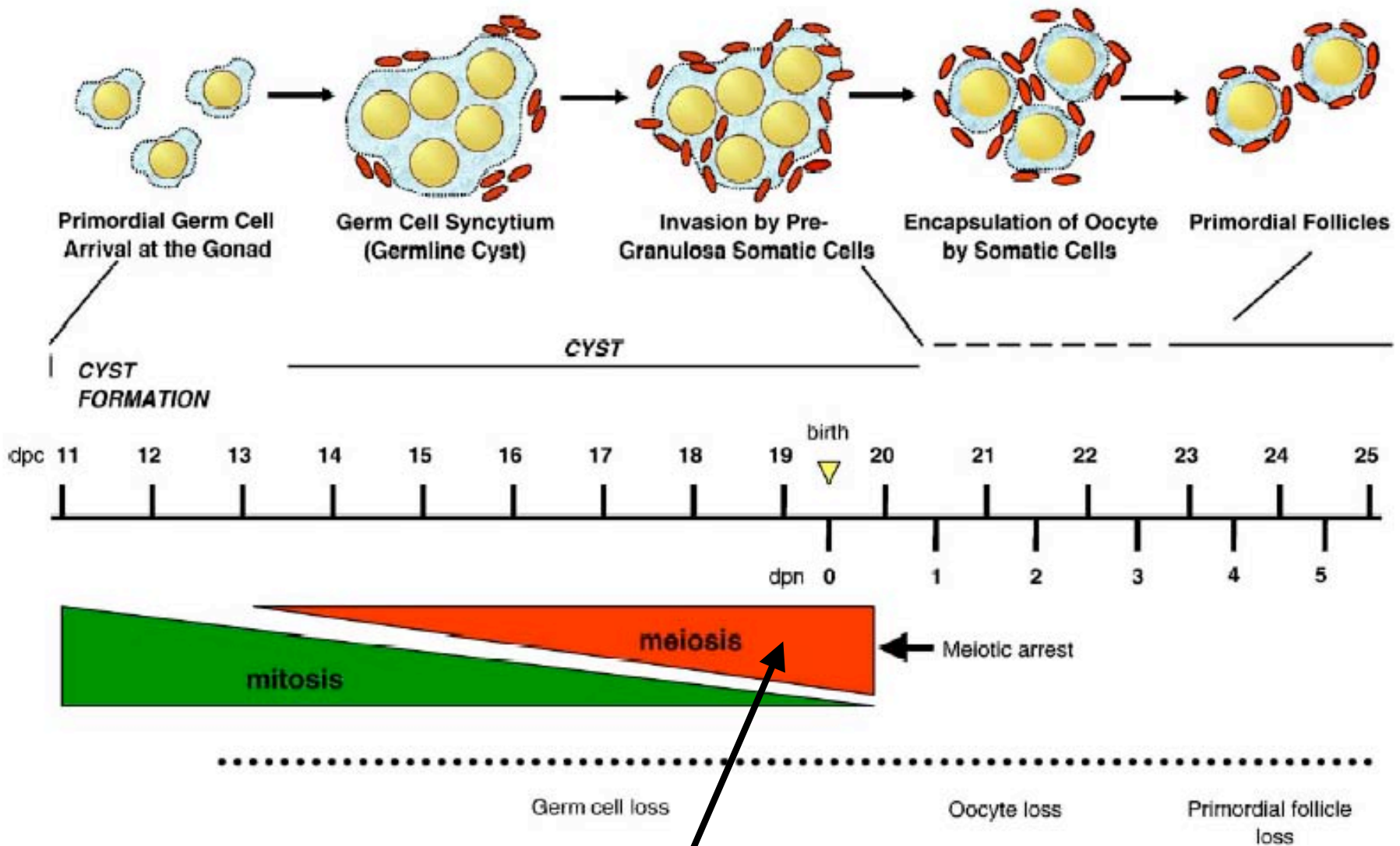
<http://embryology.med.unsw.edu.au/Notes/images/week1/ovary/oocytenundernumber.jpg>

Oogenesis: creation and differentiation of an ovum



Folliculogenesis: maturation of a ovarian follicle





Meiotic prophase I

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DEVELOPMENTAL BIOLOGY

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Postnatal regulation of germ cells by activin: The establishment of the initial follicle pool

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Meiotic Prophase I



Interphase: DNA replication $2N \rightarrow 4N$
Formation of sister chromatids

Leptotene: Chromosomes condense and homologs begin to align,

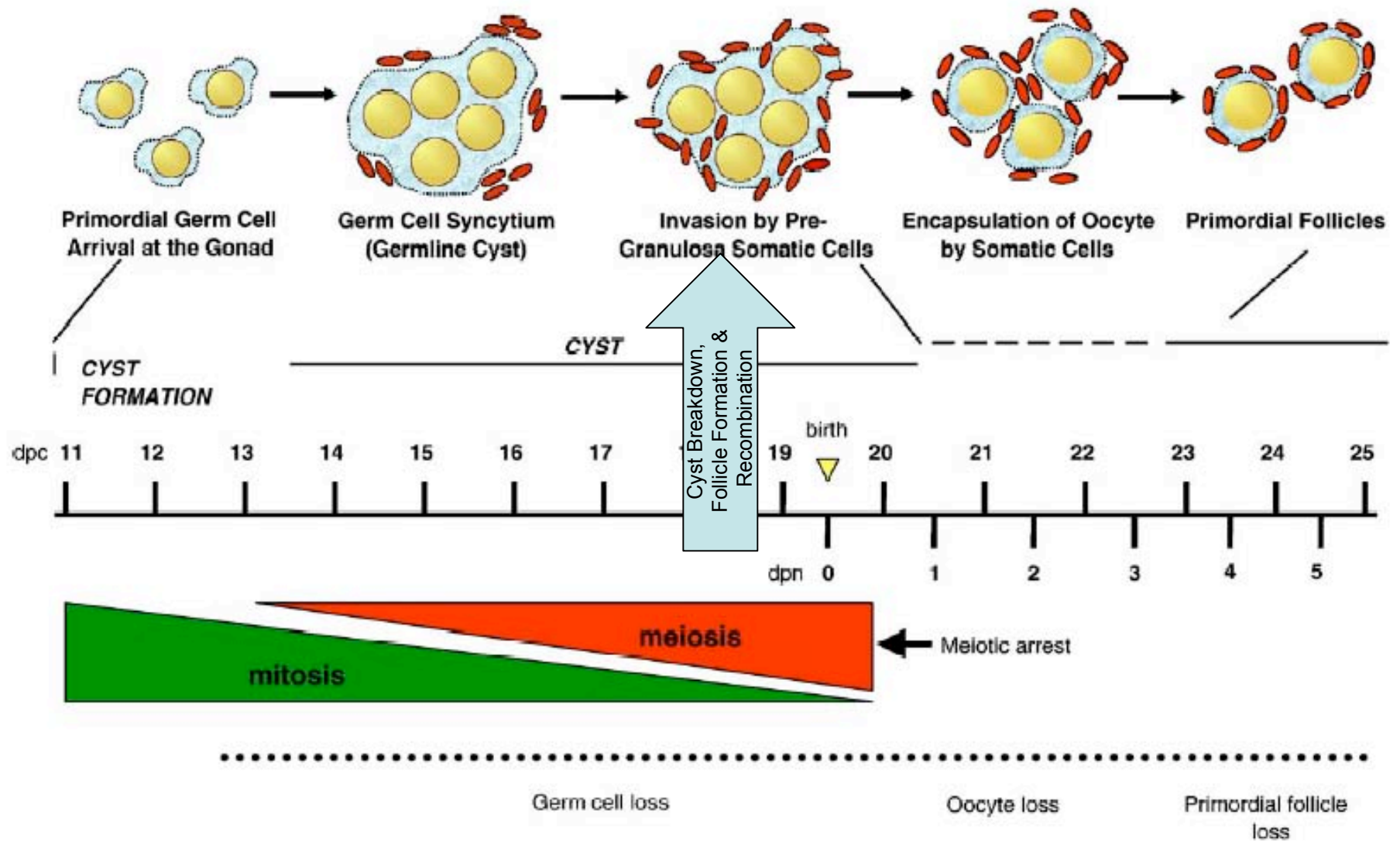
Zygotene: Full homologous chromosomes alignment, “synapsis” forming “tetrads” (4N)

Pachytene: Crossing over occurs, though not visible

Diplotene: Homologous chromosomes pull apart, but stay connected at chiasmata

- Diapause arrest of meiosis until puberty
- However, mRNA is synthesized and stored

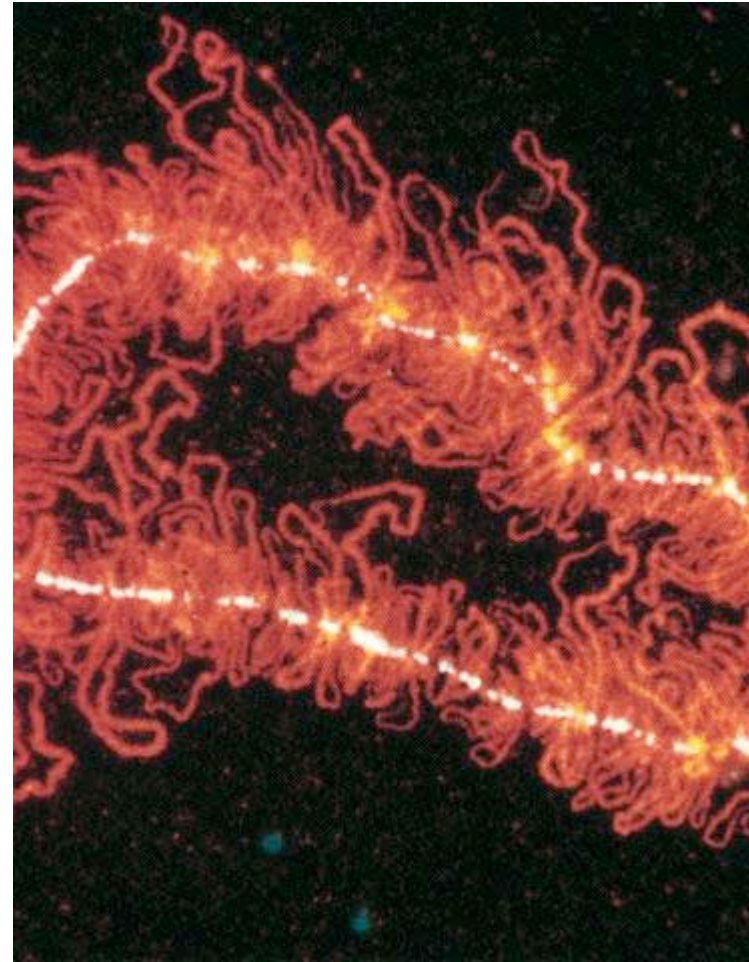
Cyst Breakdown,
Follicle Formation &
Recombination





A

Lampbrush Chromosome:
“Open” DNA structure overtly
transcribing mRNA in a
diapause oocyte



Chiasmata:
Visual evidence of crossing-over,
genetic recombination