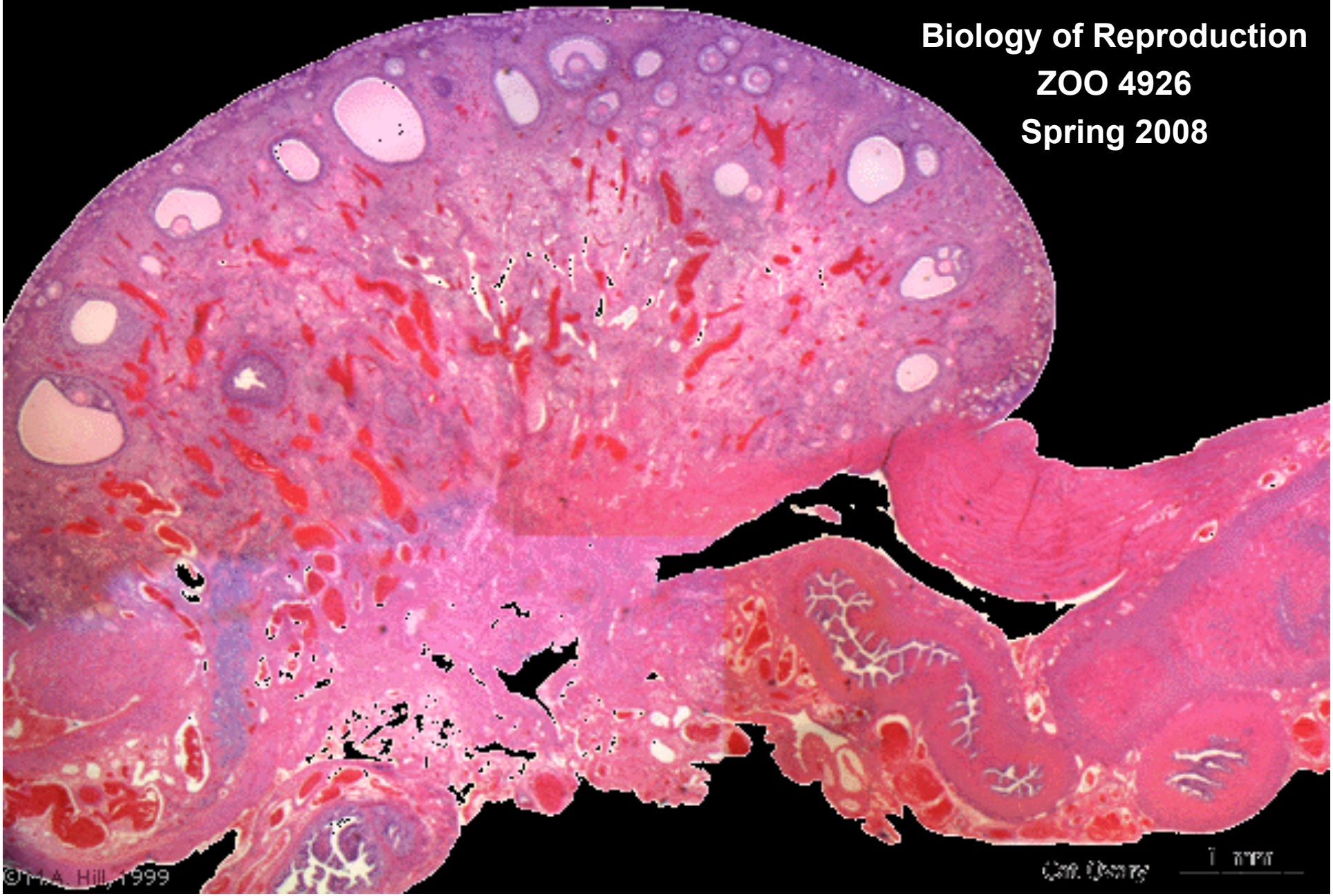
Embryology of the Ovary

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)
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REVIEW

Comparative Aspects of Animal Oogenesis

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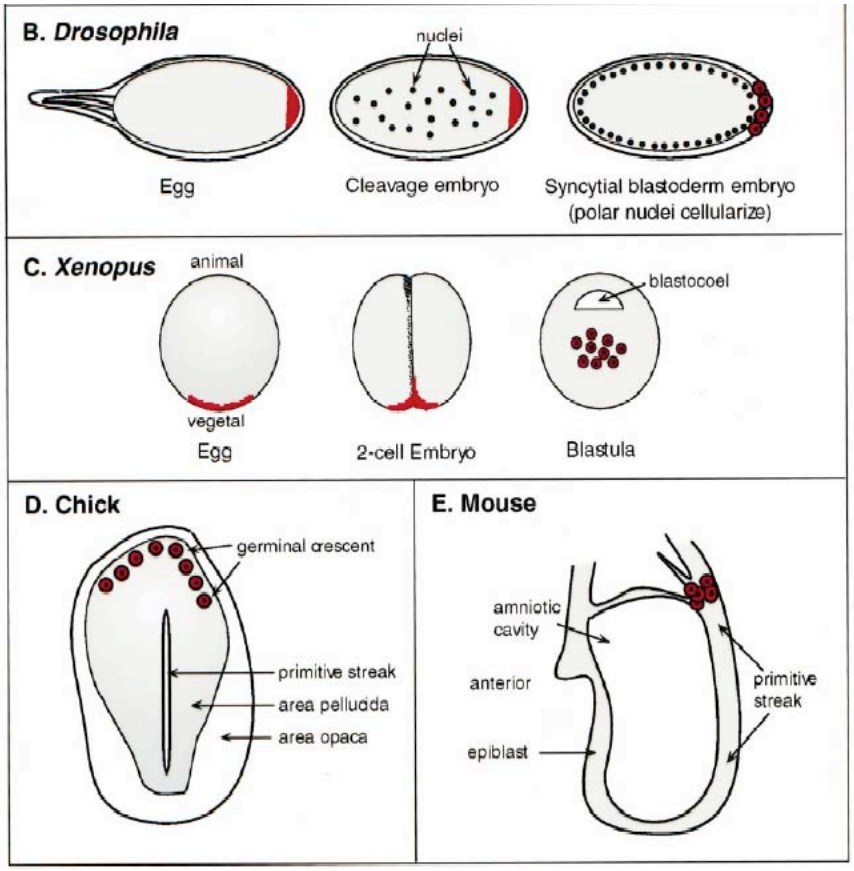
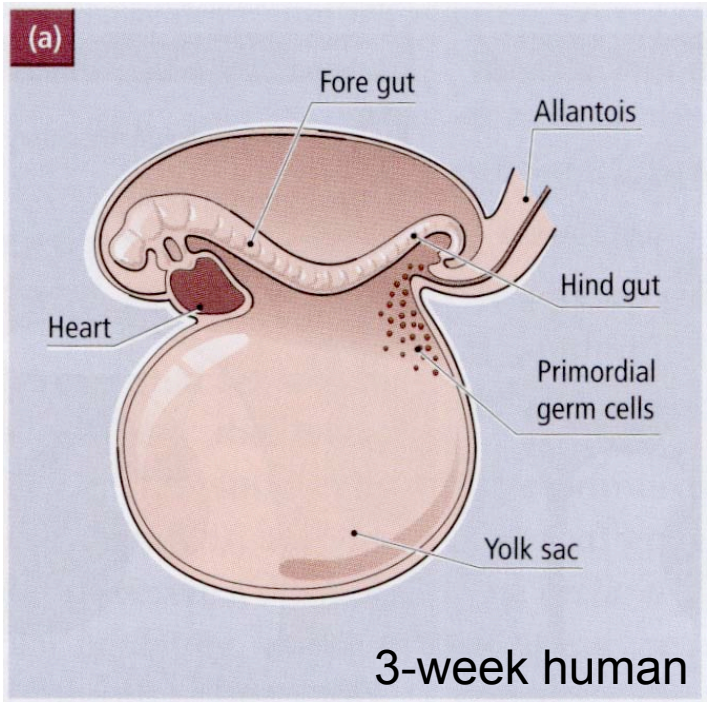
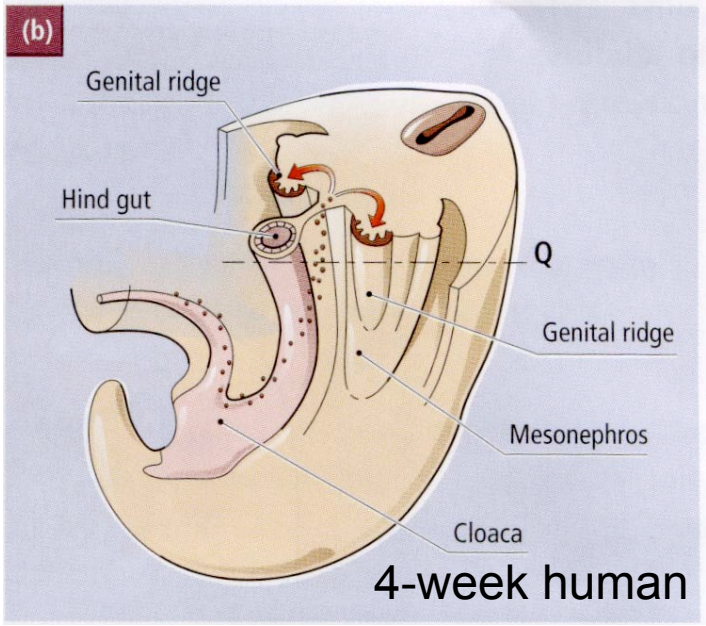
Origin and migration of primordial germ cells

(similar in almost all animals)



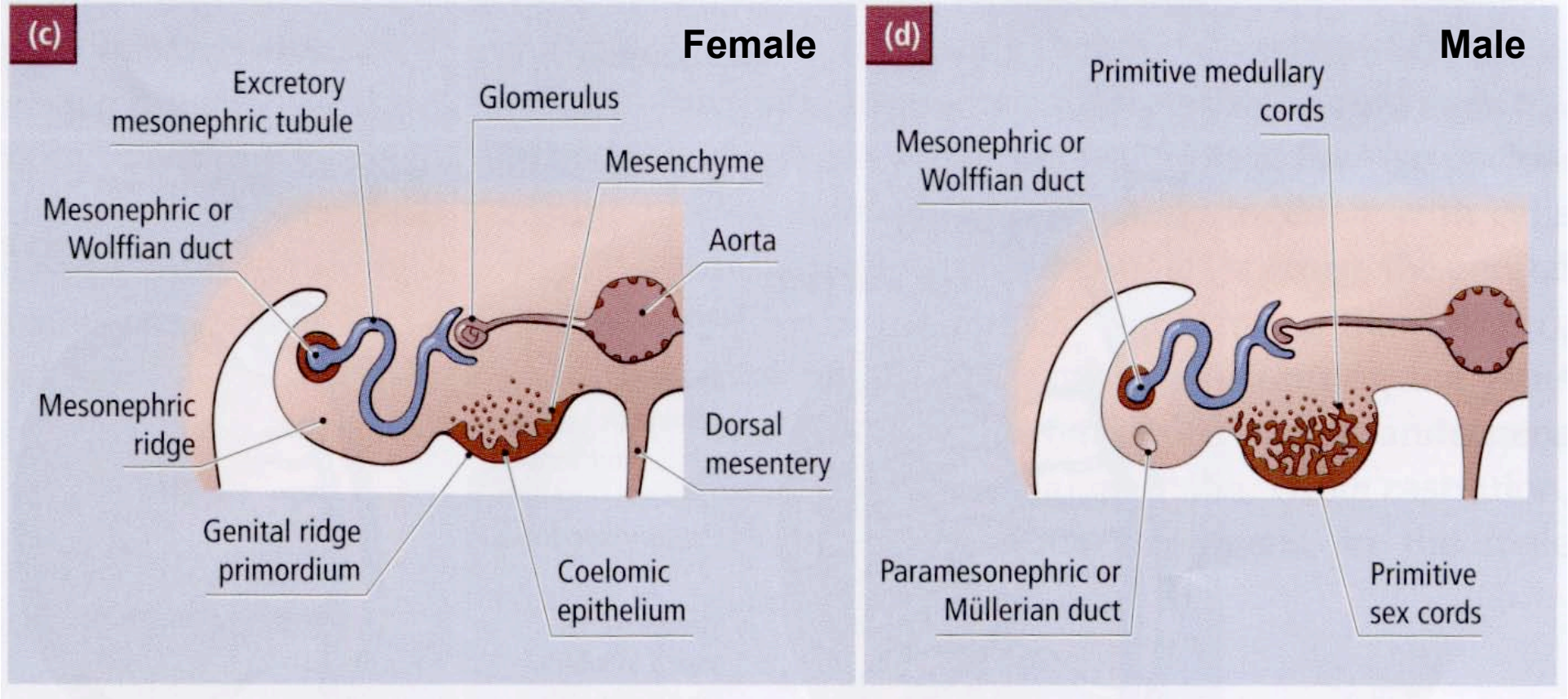
Red= origin of primordial germ cells in multiple species





Formation of basic gonad architecture

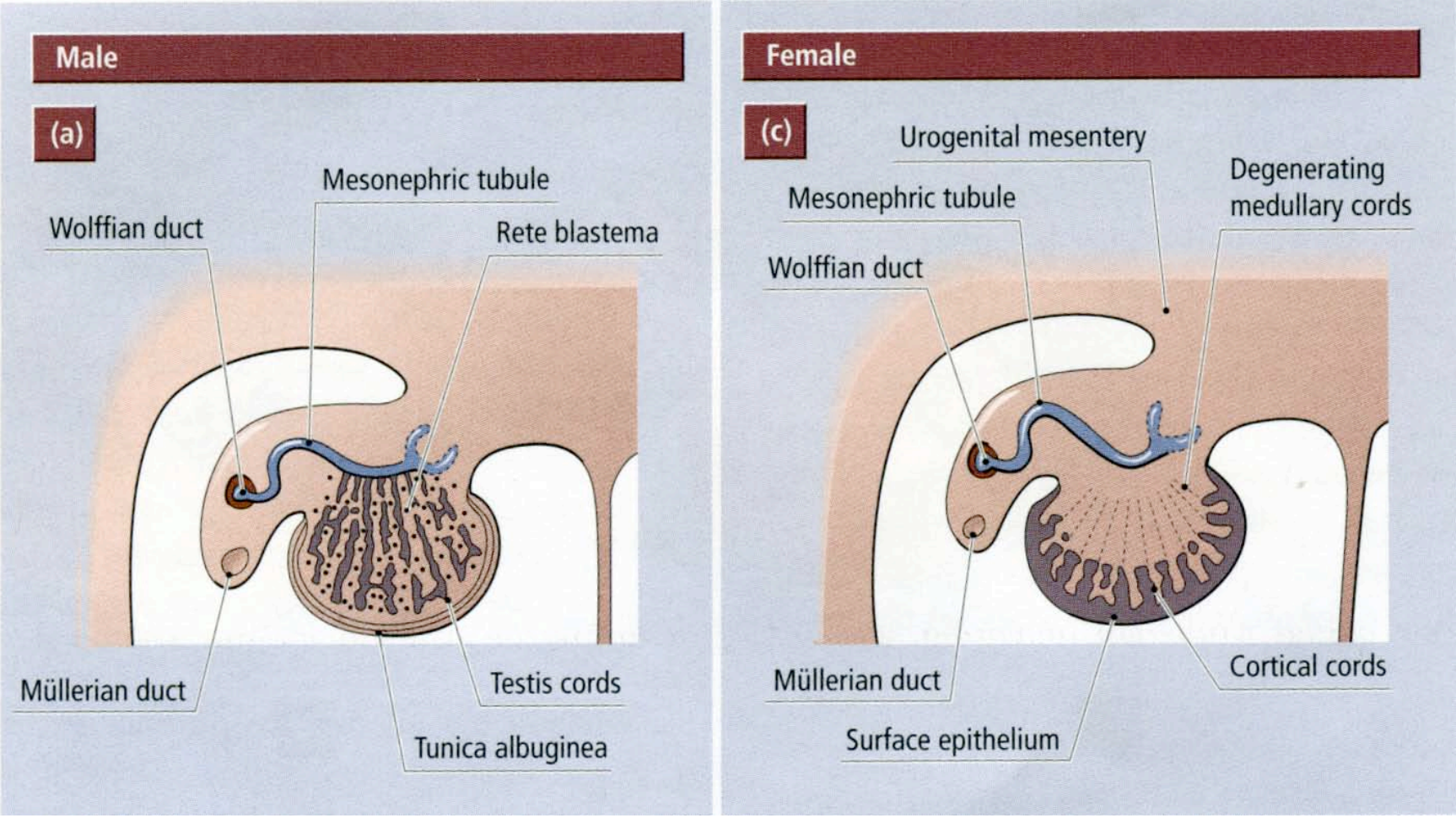
1. Germ cells
2. Somatic gonad derived cells
3. Mesonephros derived cells

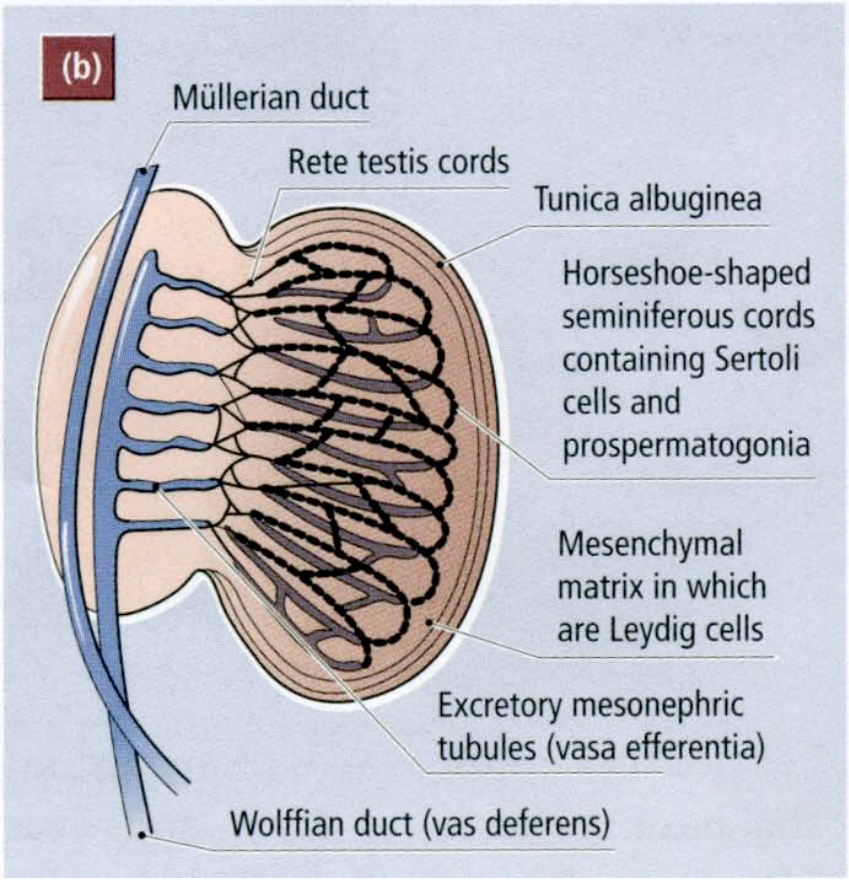


8 week human

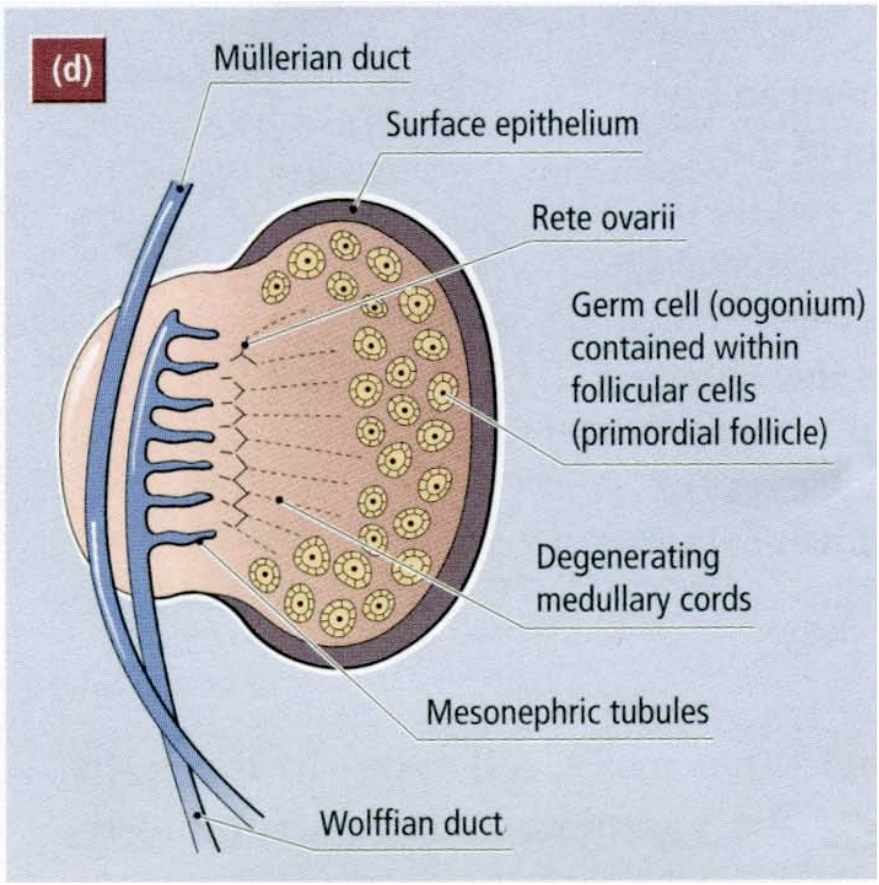
Medulla: inner part
Cortex: outermost layer

7 week human





16-20 week human

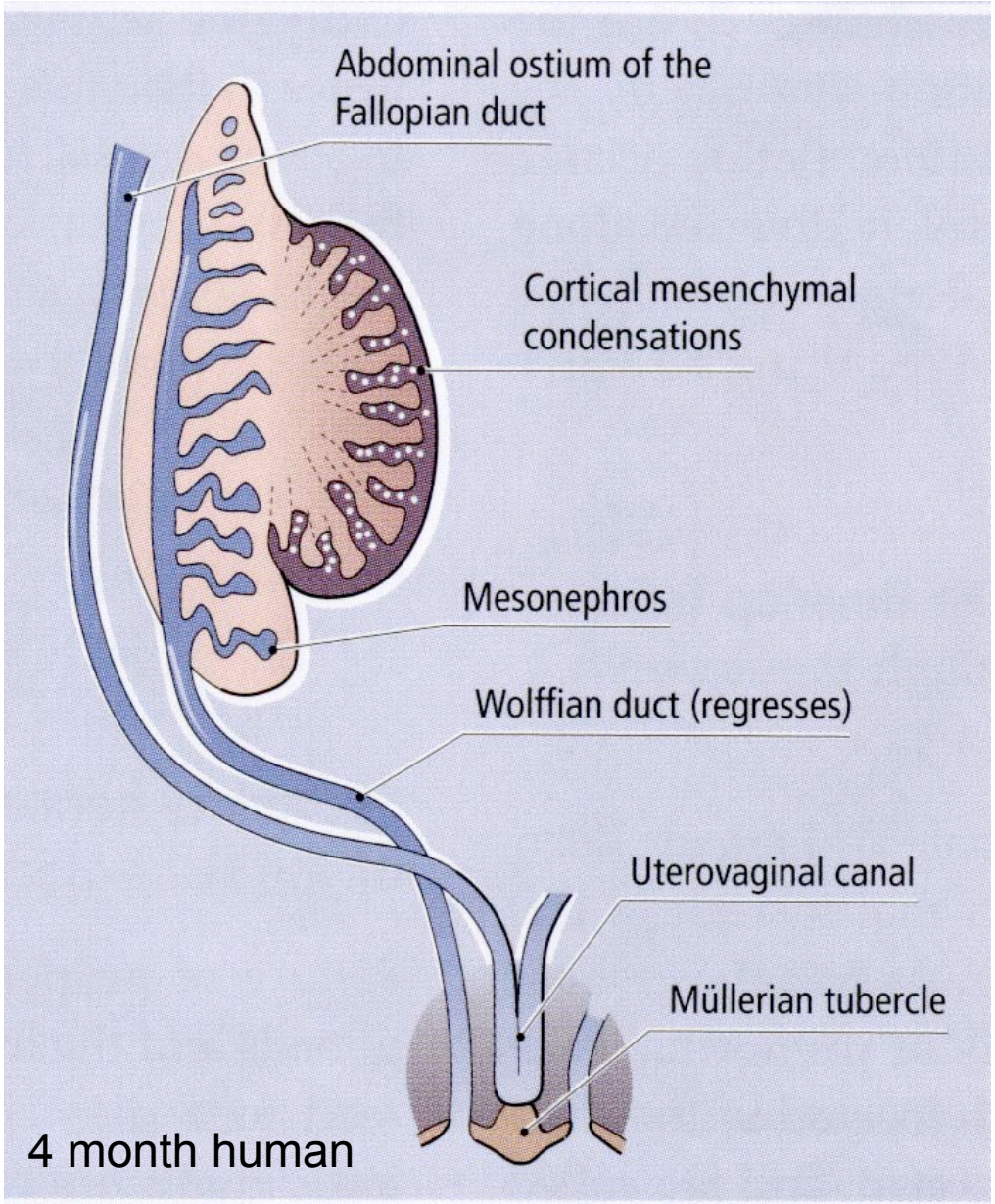


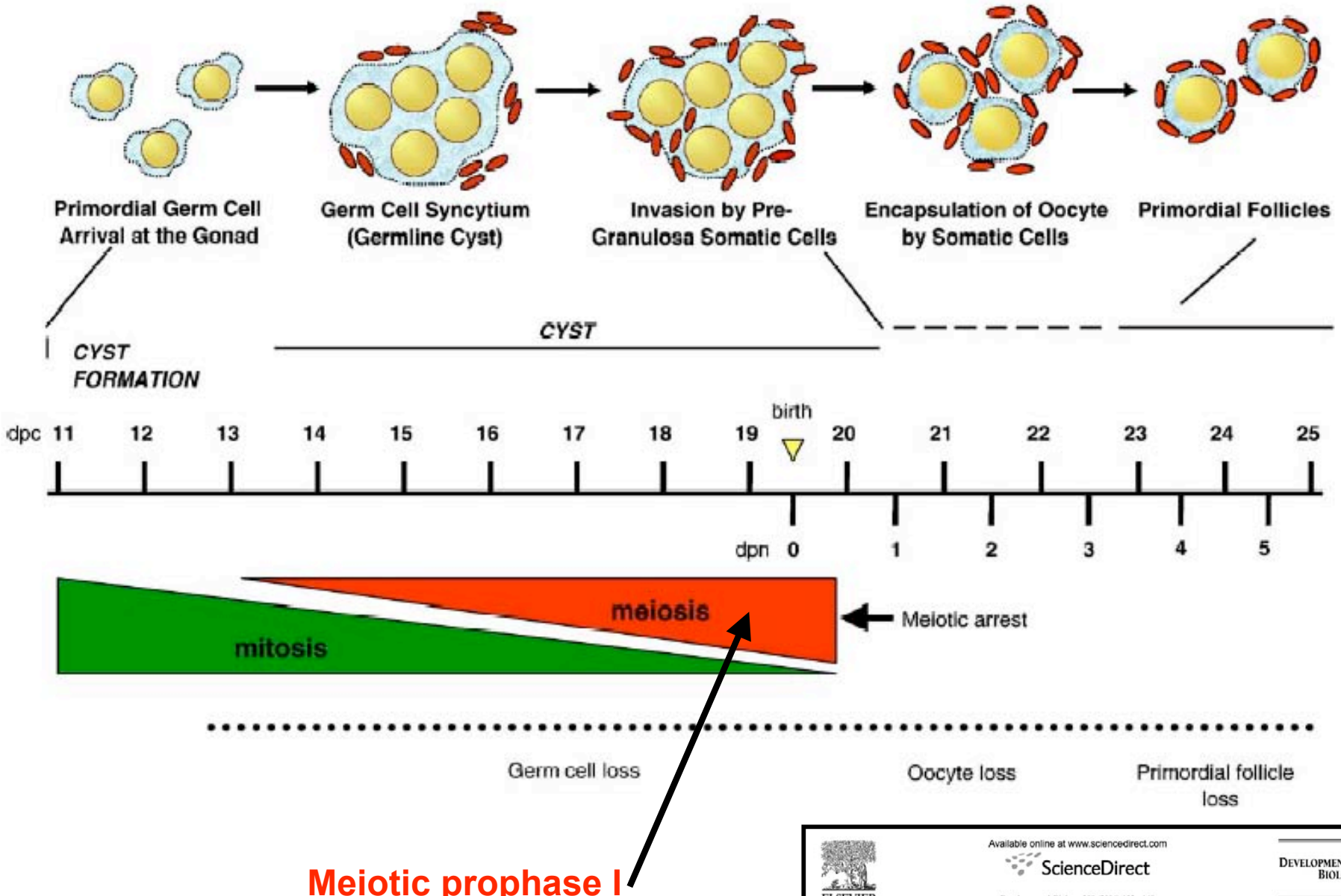
20-24 week human

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

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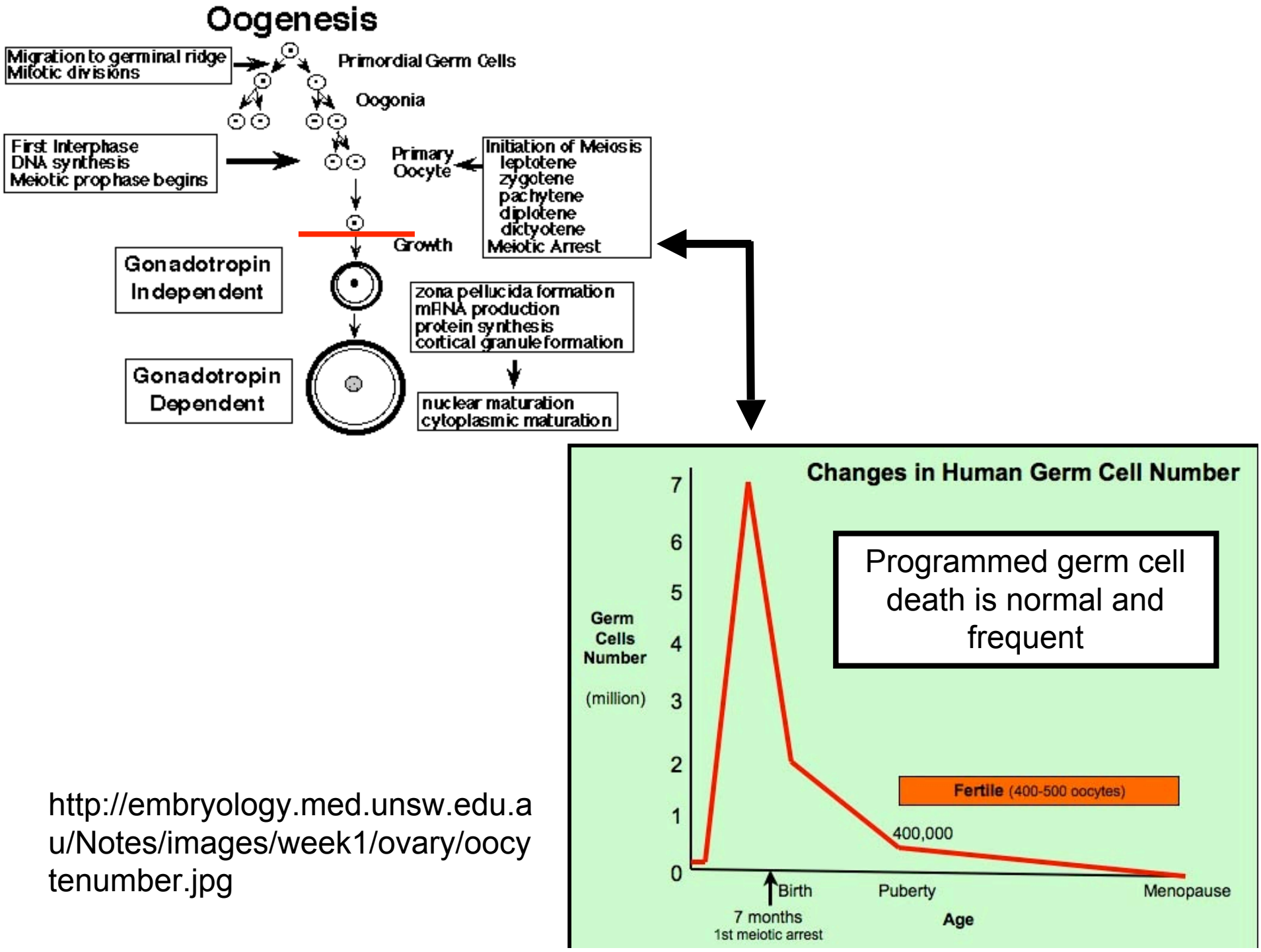
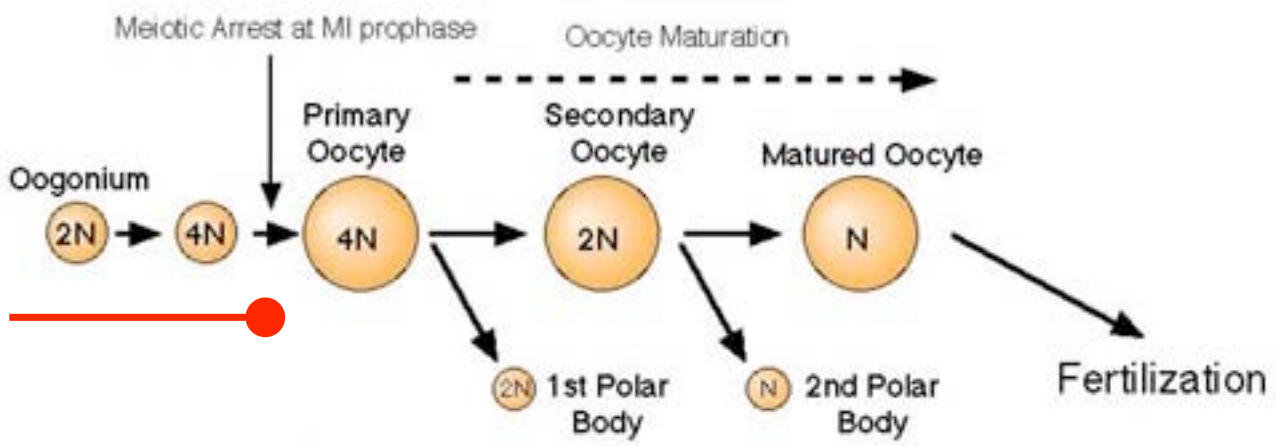
Postnatal regulation of germ cells by activin: The establishment of the initial follicle pool

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,*]



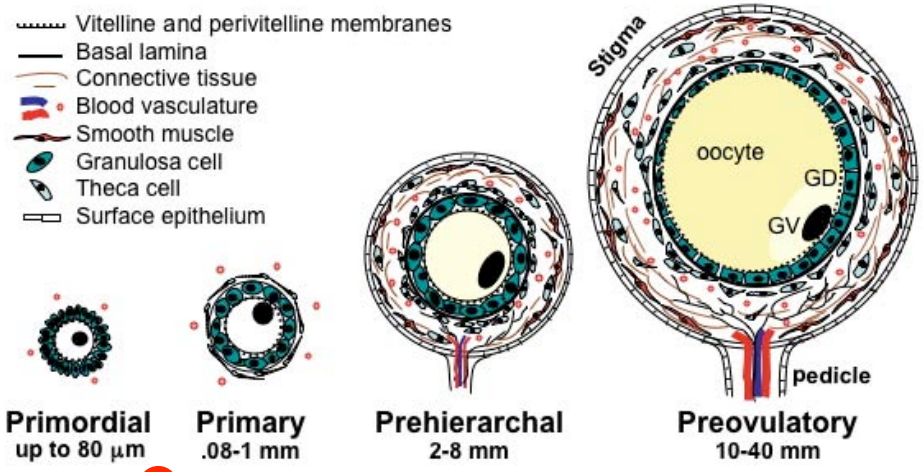
http://embryology.med.unsw.edu.au/Notes/images/week1/ovary/oocytenumber.jpg

Oogenesis: creation and differentiation of an ovum



Embryonic development

Folliculogenesis: maturation of a ovarian follicle



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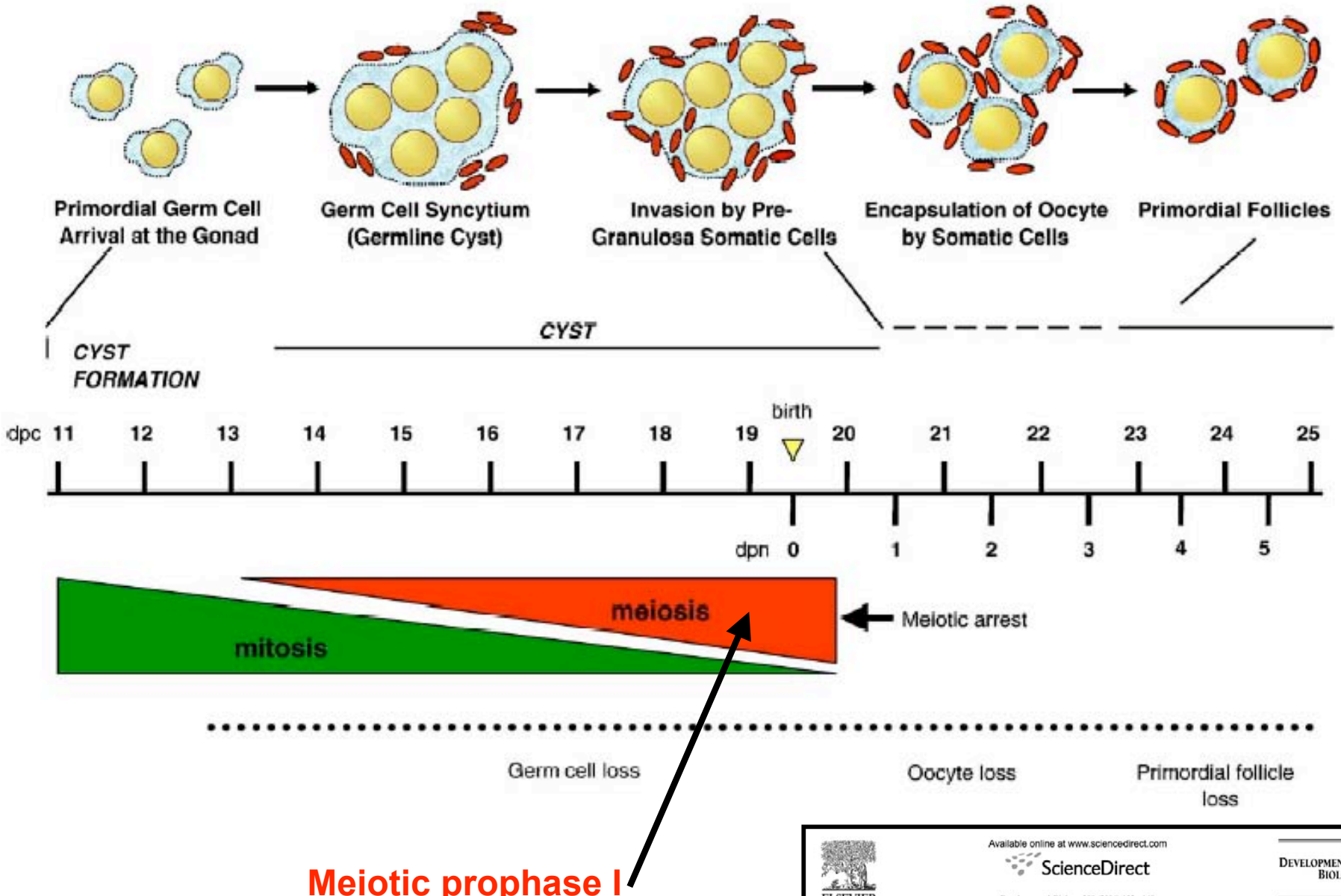

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Meiotic Prophase I

Interphase: DNA replication 2N->4N
Formation of sister chromatids

Leptotene: Chromosomes condense and homologs begin to align,

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

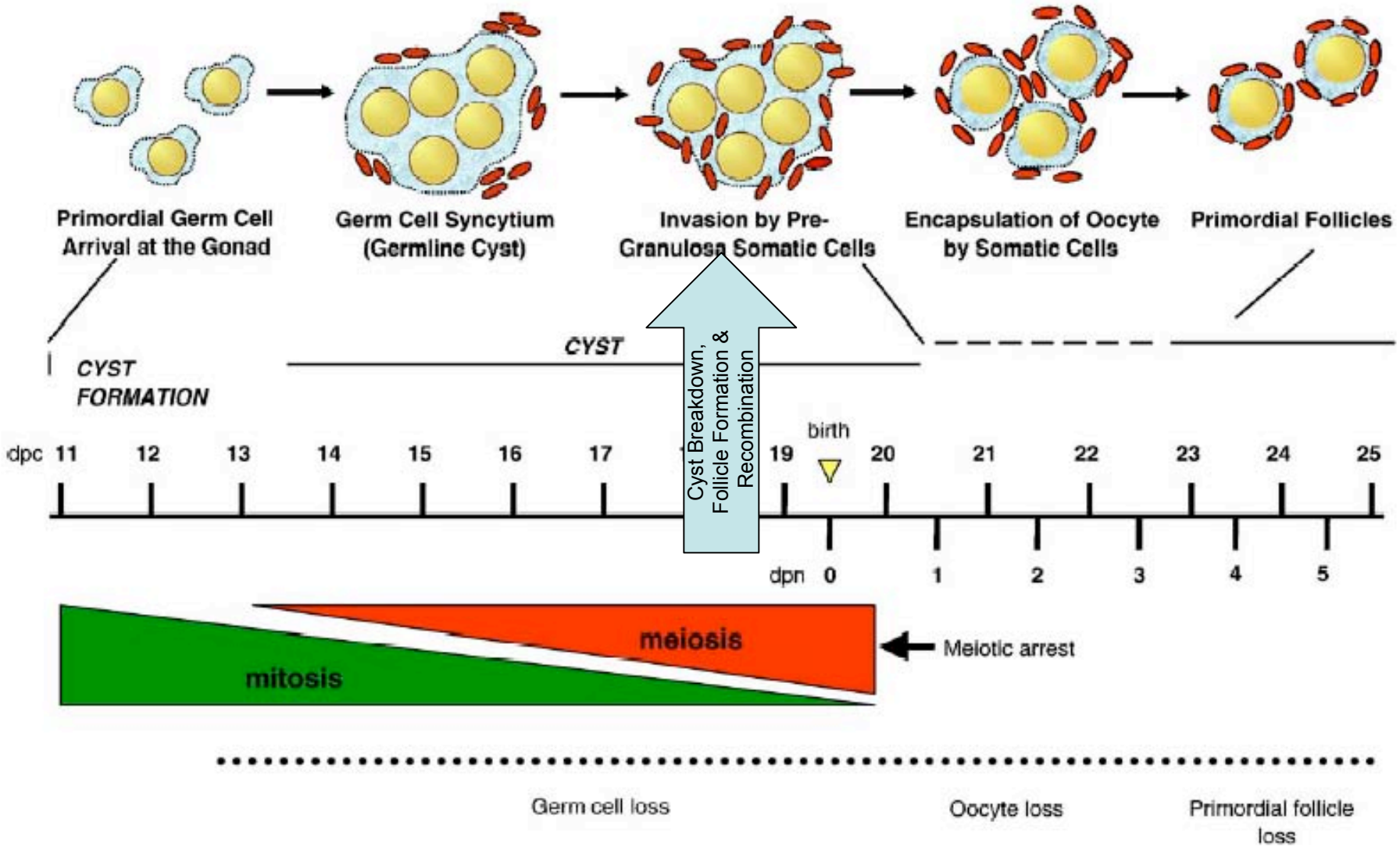
Cyst Breakdown, Follicle Formation & Recombination

Pachytene: Crossing over occurs, though not visible

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

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

www.answers.com/topic/meiosis



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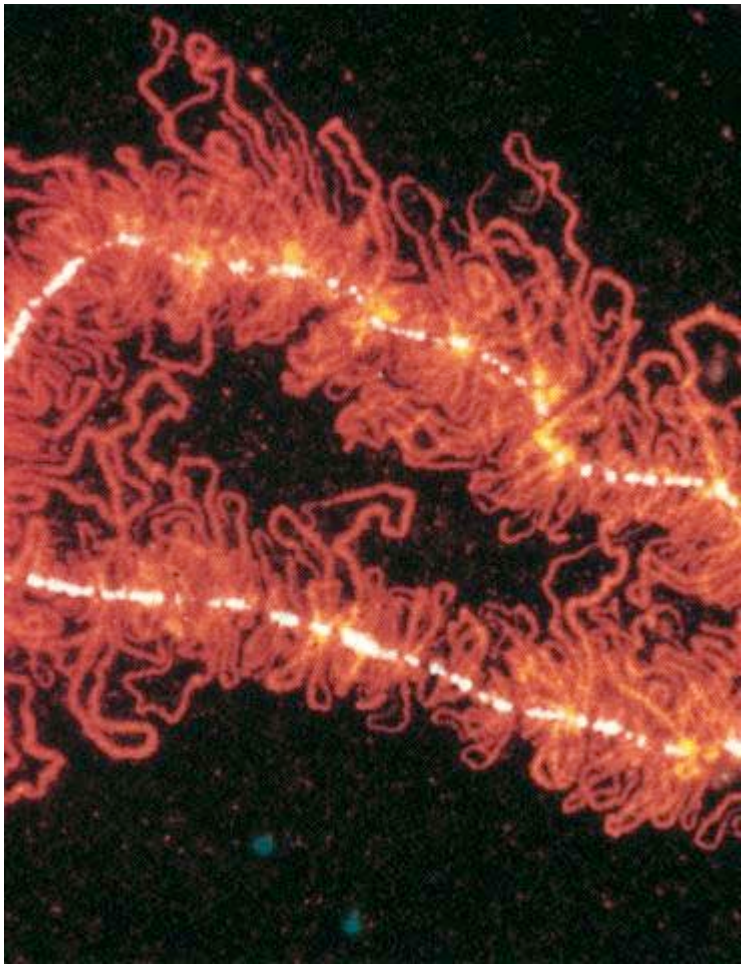
Chiasmata:
Visual evidence of crossing-over, genetic recombination

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