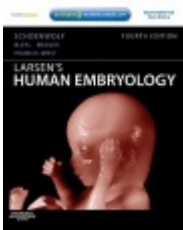
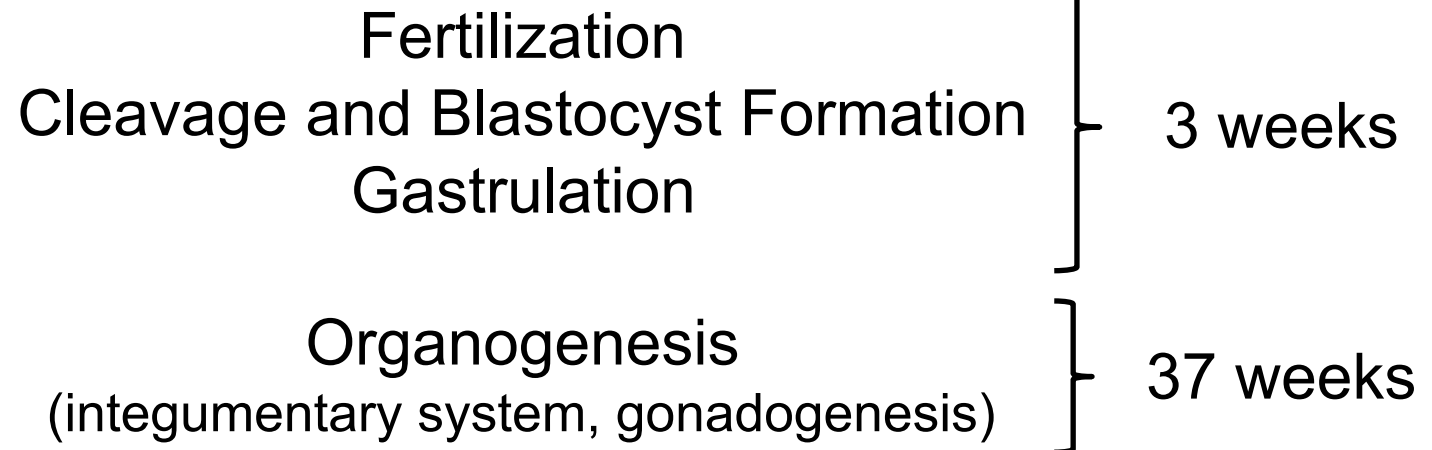
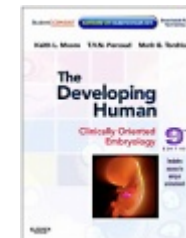


# ANAT2341: lectures overview

## EMBRYOGENESIS



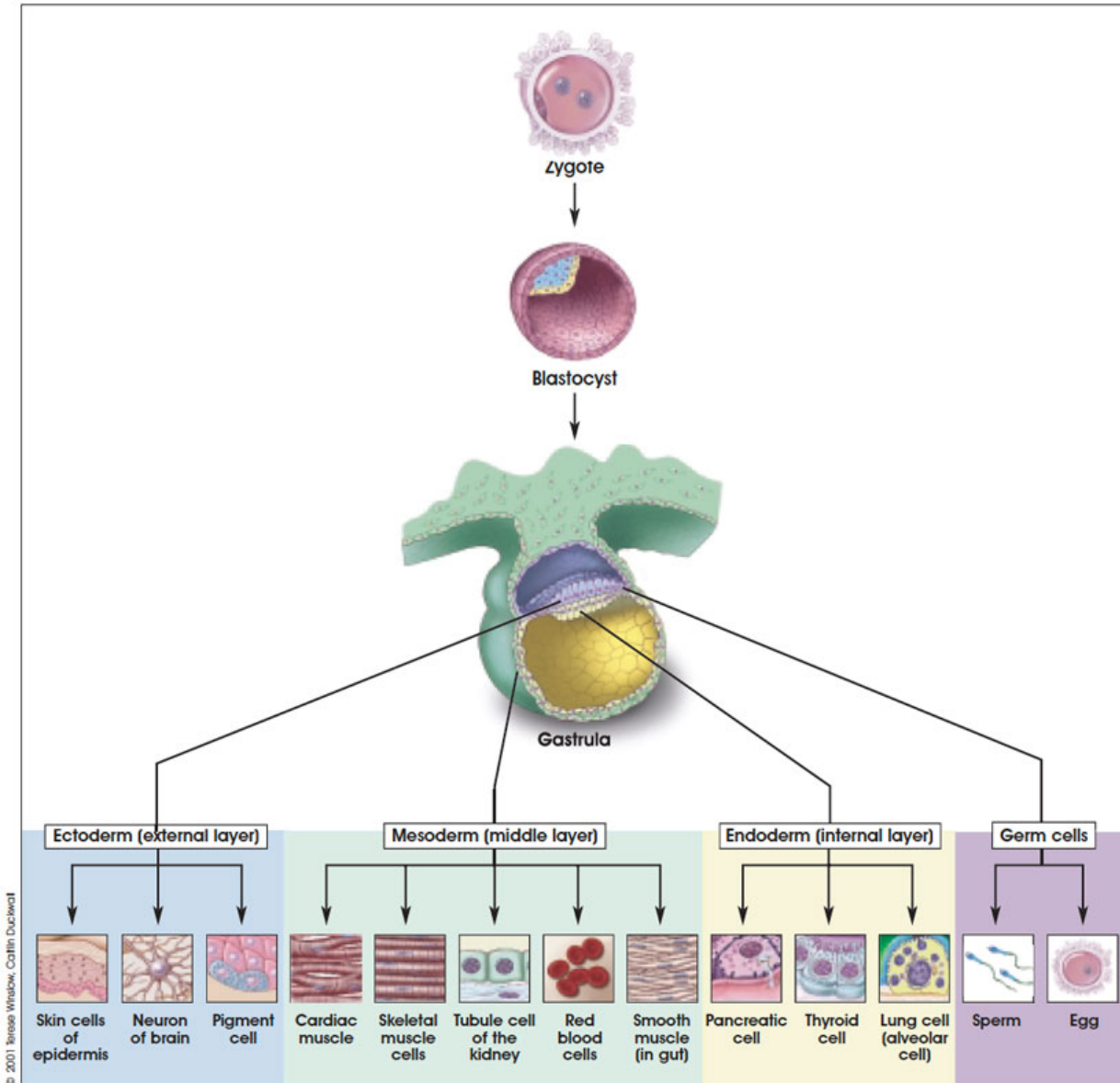
Resources ANAT2341:  
<http://php.med.unsw.edu.au/embryology/>  
Larsen's Human Embryology  
The Developing Human: Clinically Oriented Embryology



Dr Annemiek Beverdam – School of Medical Sciences, UNSW  
Wallace Wurth Building Room 234 – A.Beverdam@unsw.edu.au

# Lectures overview

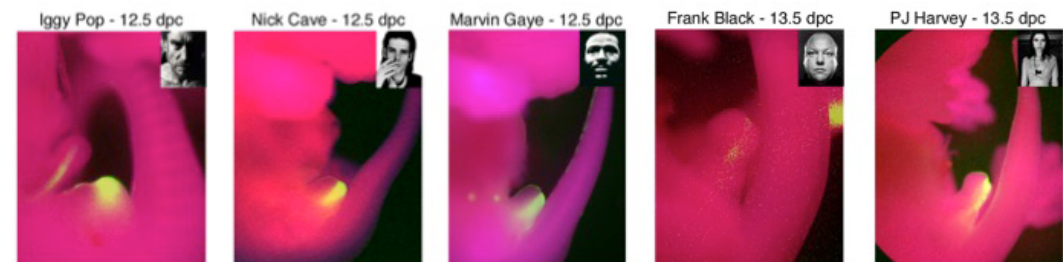
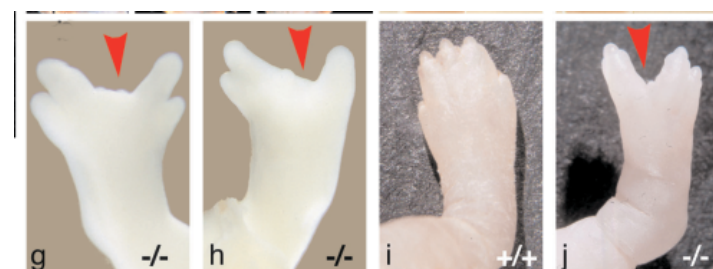
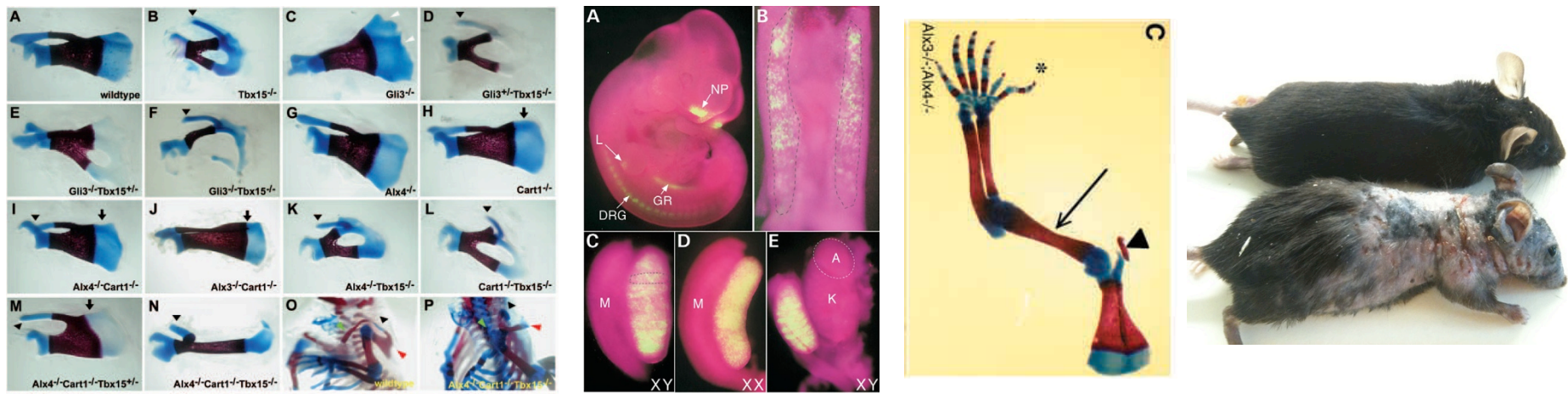
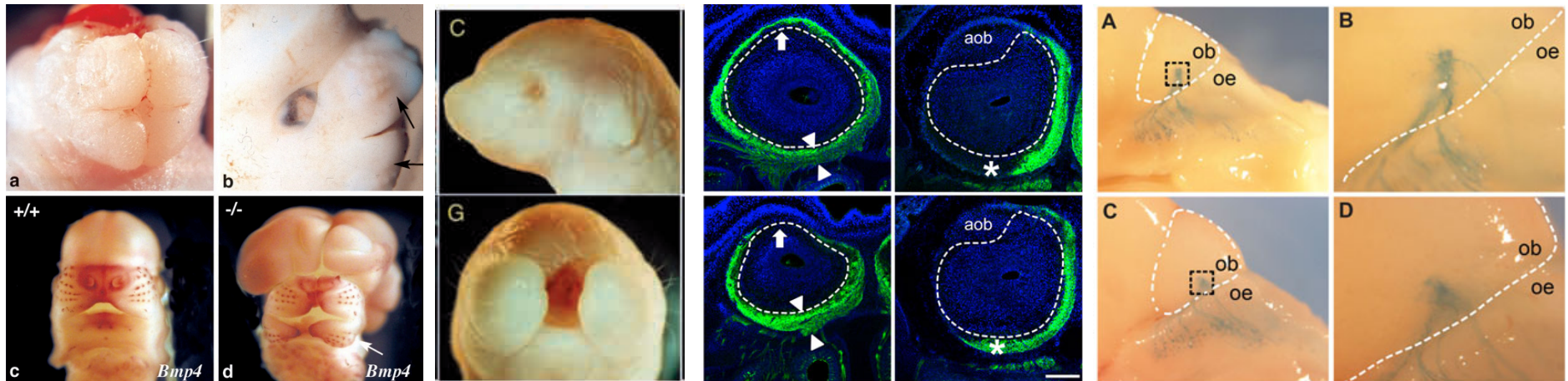
## Early embryogenesis



3 weeks

37 weeks

# Images of my past



# My Travels



# Fertilization



Dr Annemiek Beverdam – School of Medical Sciences, UNSW  
Wallace Wurth Building Room 234 – [A.Beverdam@uq.edu.au](mailto:A.Beverdam@uq.edu.au)

# Fertilization lecture overview

Cell division, mitosis and meiosis

Gametogenesis: oogenesis and spermatogenesis

Fertilization

Dr Annemiek Beverdam – School of Medical Sciences, UNSW  
Wallace Wurth Building Room 234 – [A.Beverdam@uq.edu.au](mailto:A.Beverdam@uq.edu.au)

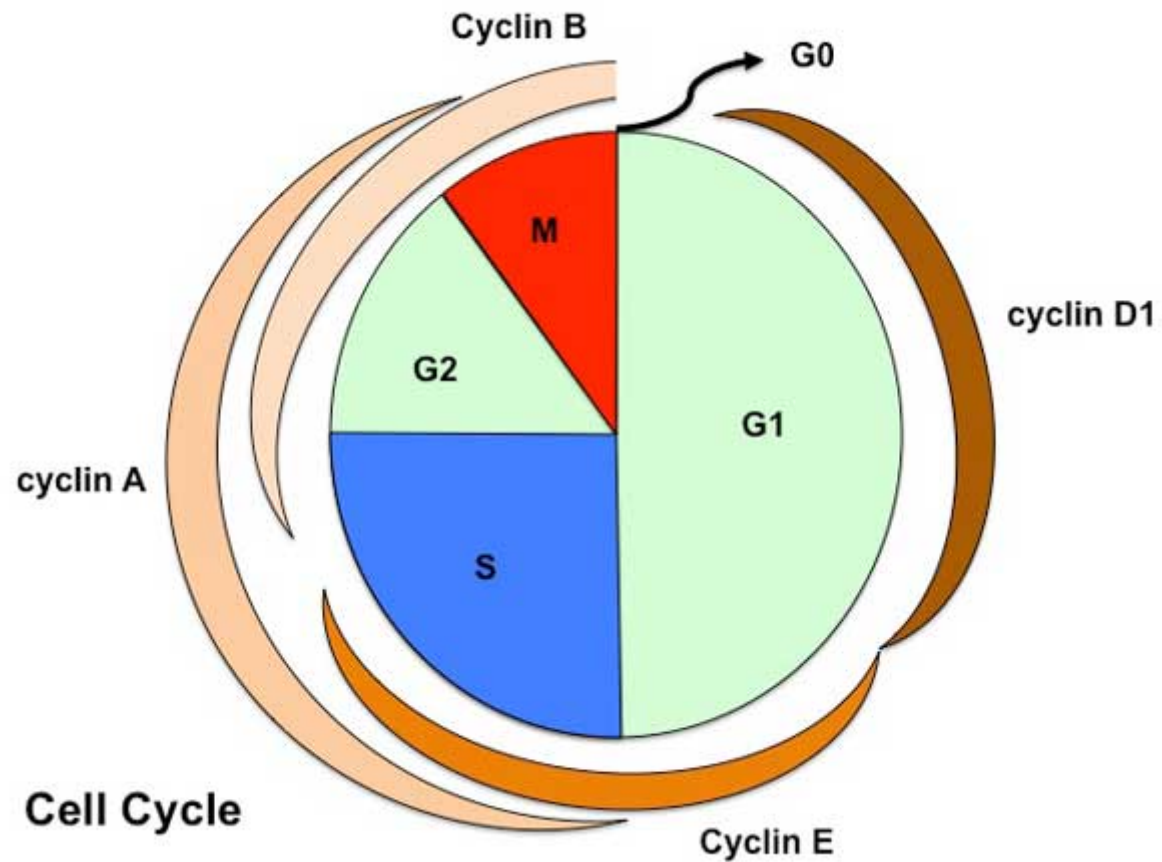
# Cell Cycle

1 fertilized cell produces  $10^{14}$  cells

Regeneration vs Quiescence

Interphase vs mitosis

Mitosis vs meiosis



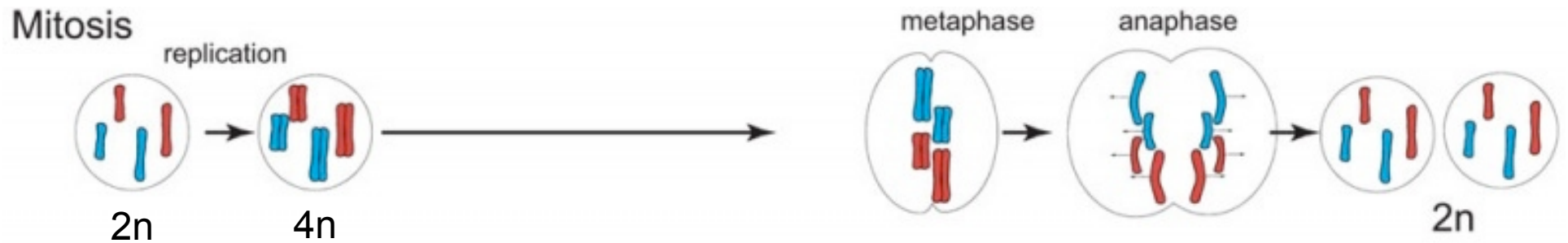
# Mitosis

Generation of two genetically identical daughter cells

Occurs in all cells

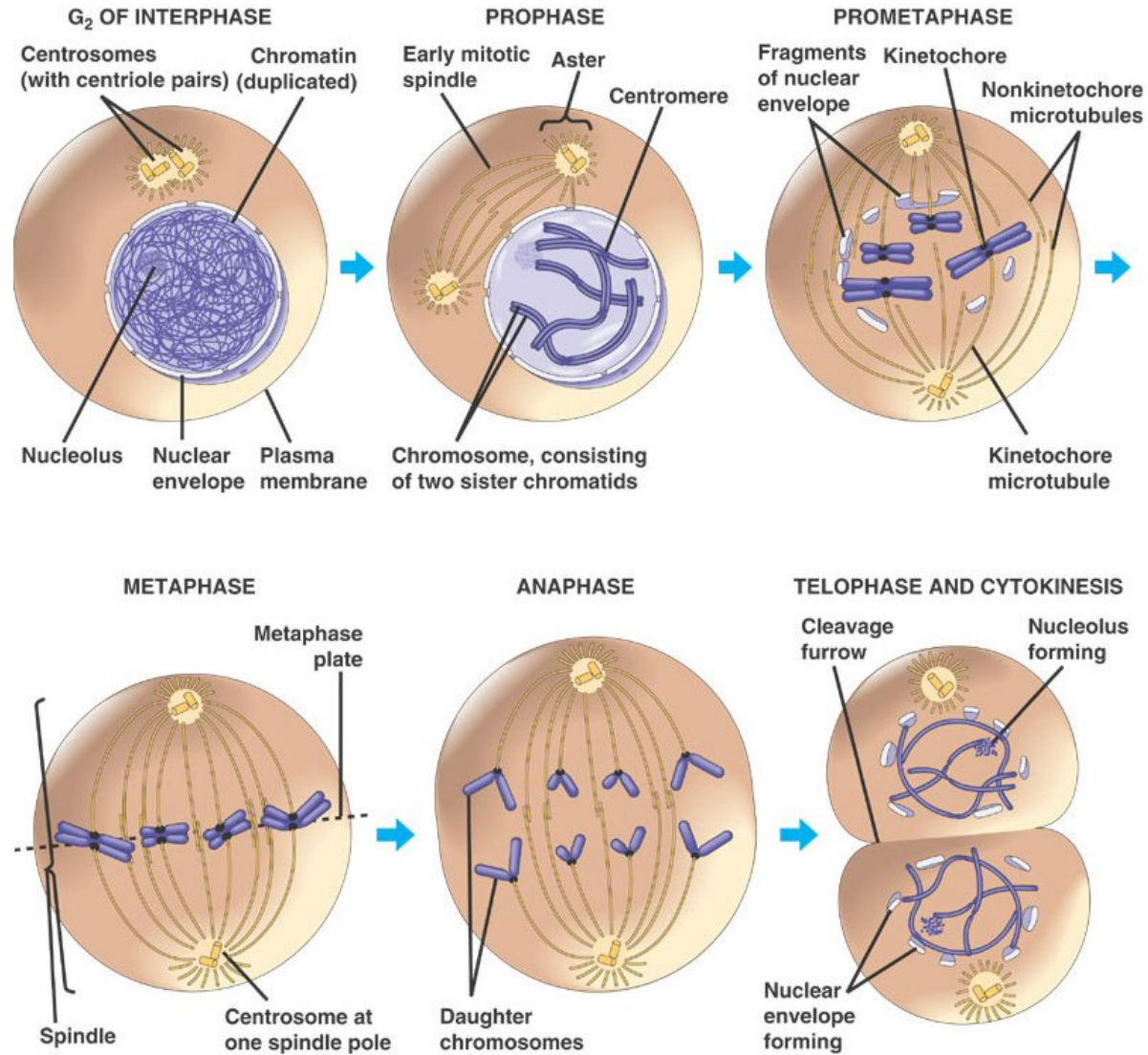
Shuts down cellular function

$2n \rightarrow 4n \rightarrow 2n$





# Mitosis

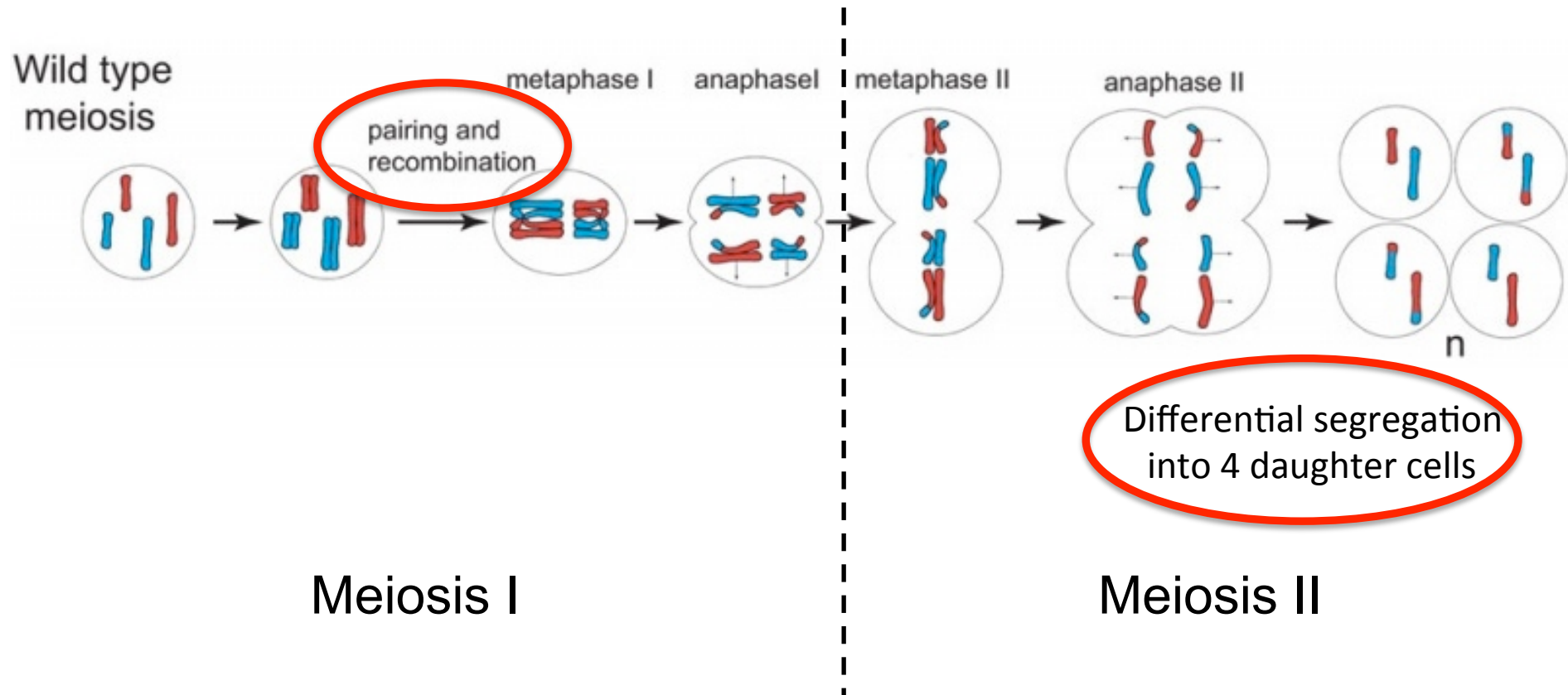


# Meiosis

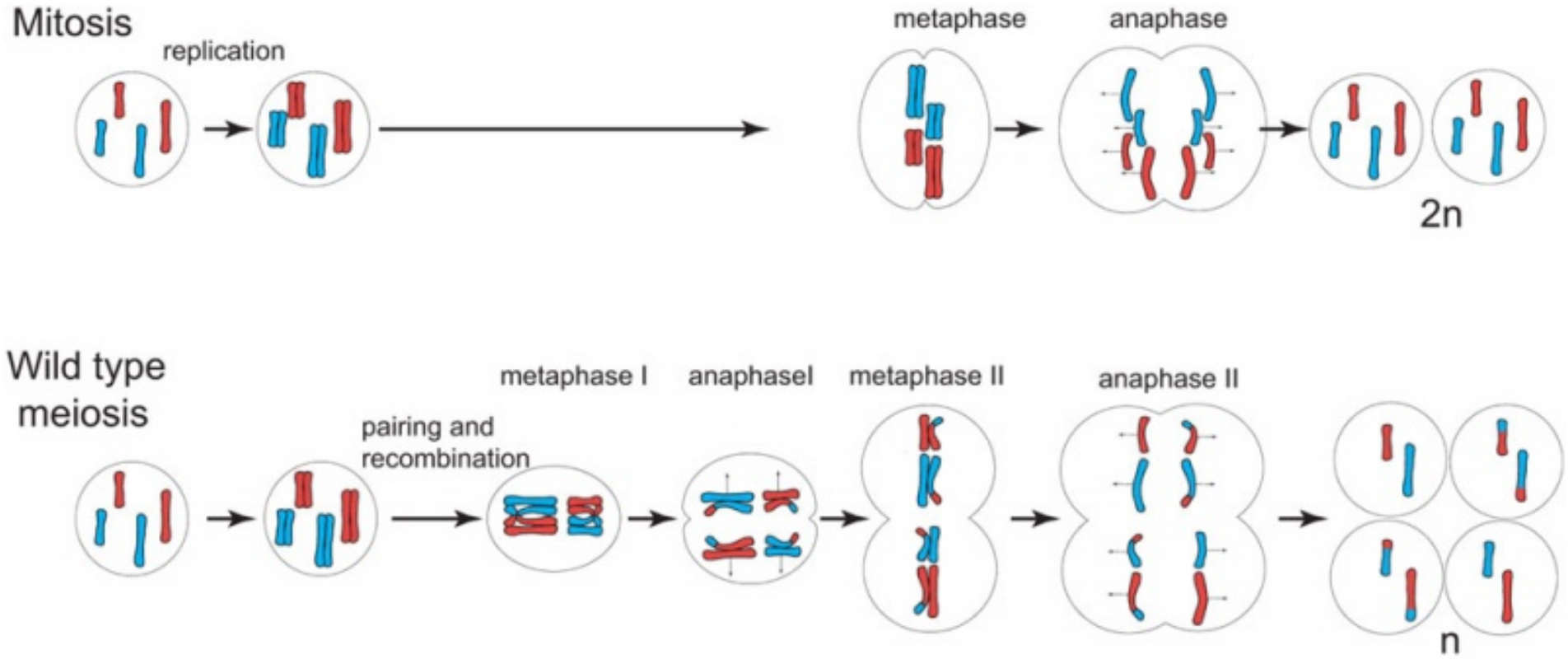
Generation of 4 genetically different daughter cells

Occurs only in gametes

$2n \rightarrow 4n \rightarrow 2n \rightarrow n$



# Mitosis vs meiosis



# Gametogenesis

## Reproductive system

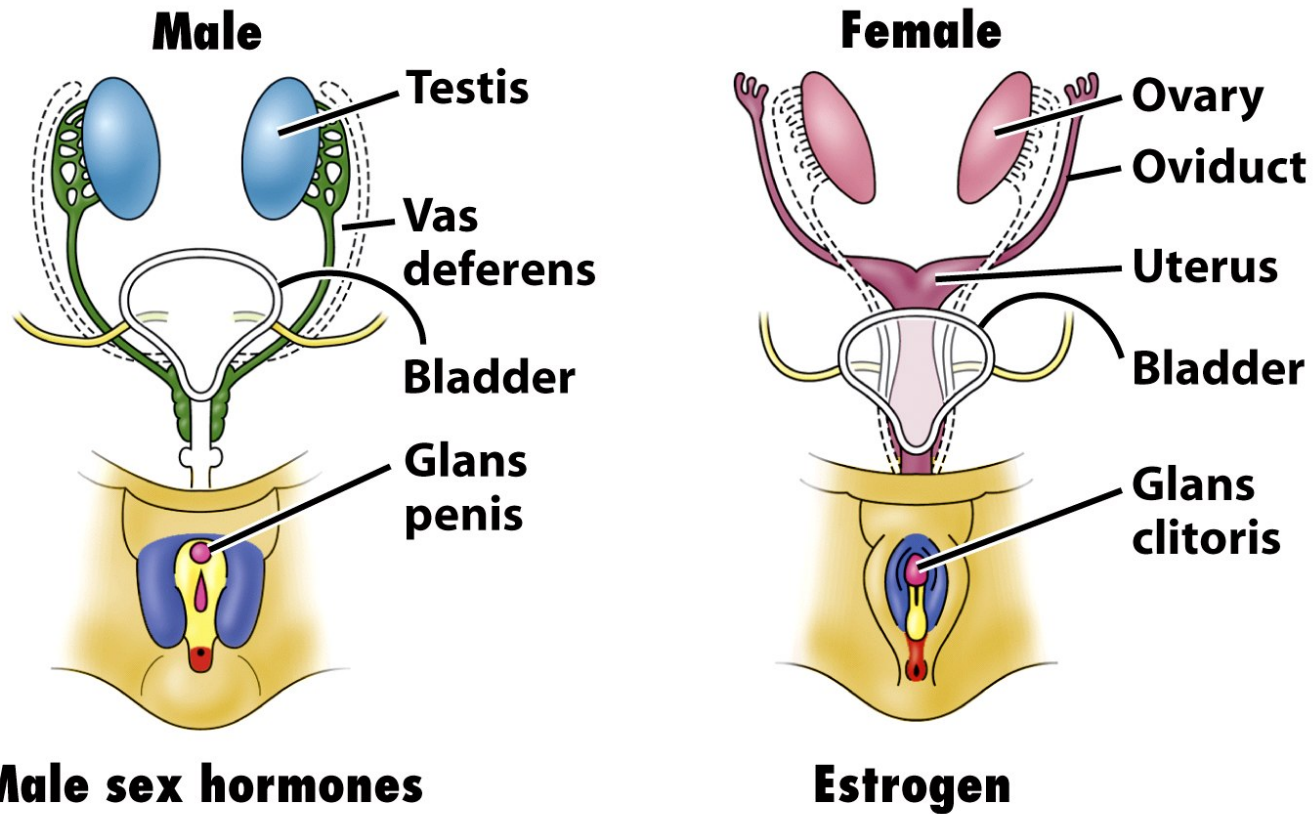
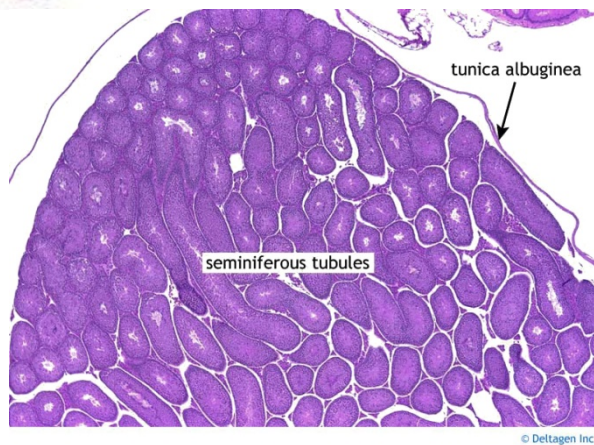
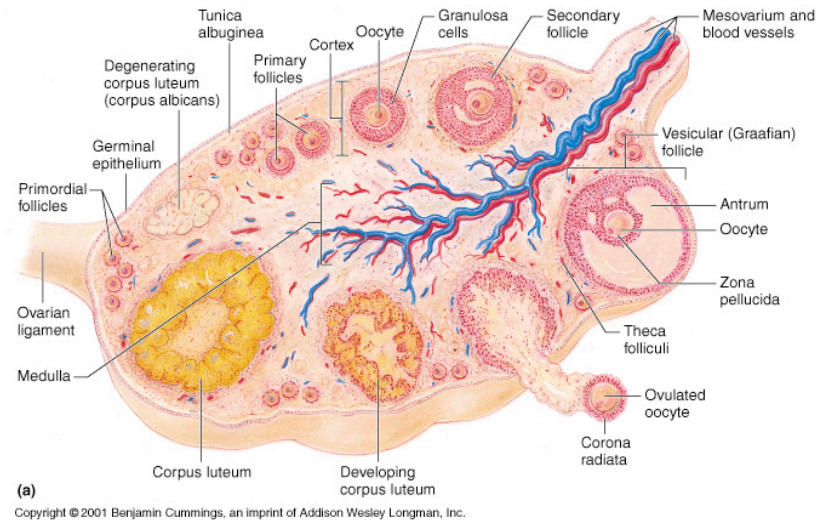
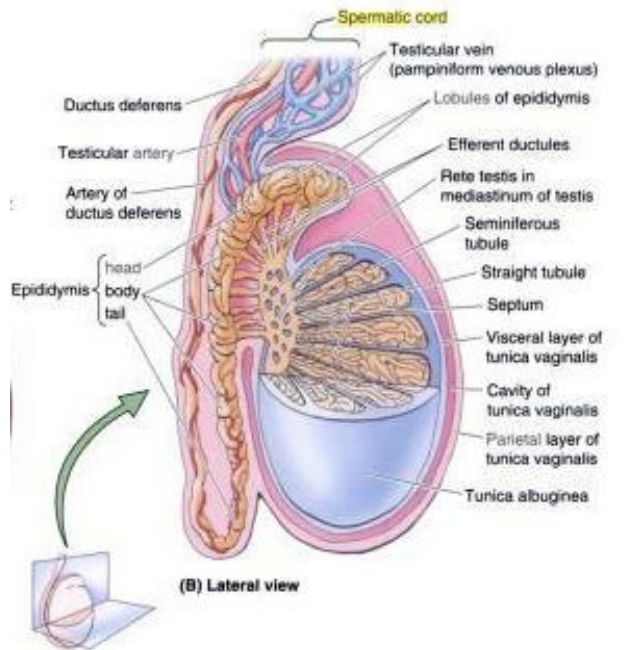
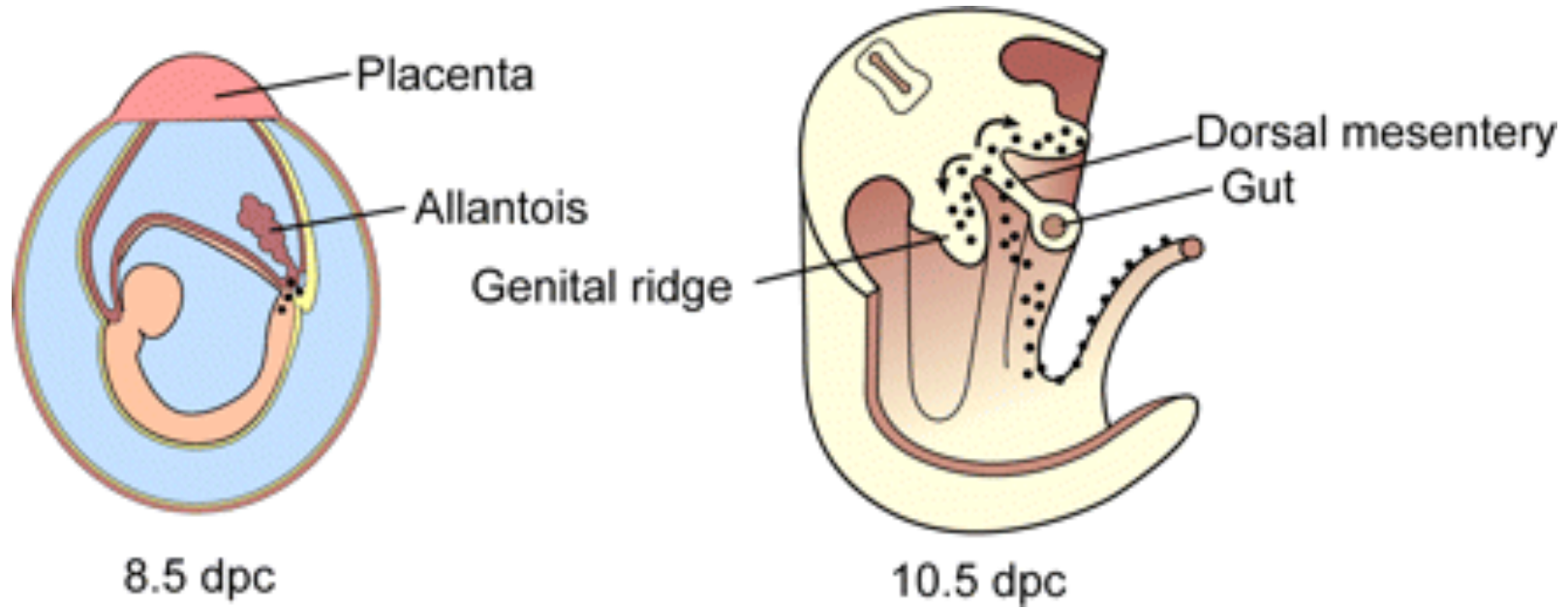


Figure 24-8 part 2 Discover Biology 3/e  
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# Gametogenesis Reproductive system



# Gametogenesis



# Gametogenesis

Female:

Oogenesis

Ovaries/oviduct

Meiotic arrest at prophase I until puberty

Meiotic arrest at metaphase II until fertilization

1 oocyte per month

Male:

Spermatogenesis

Testes

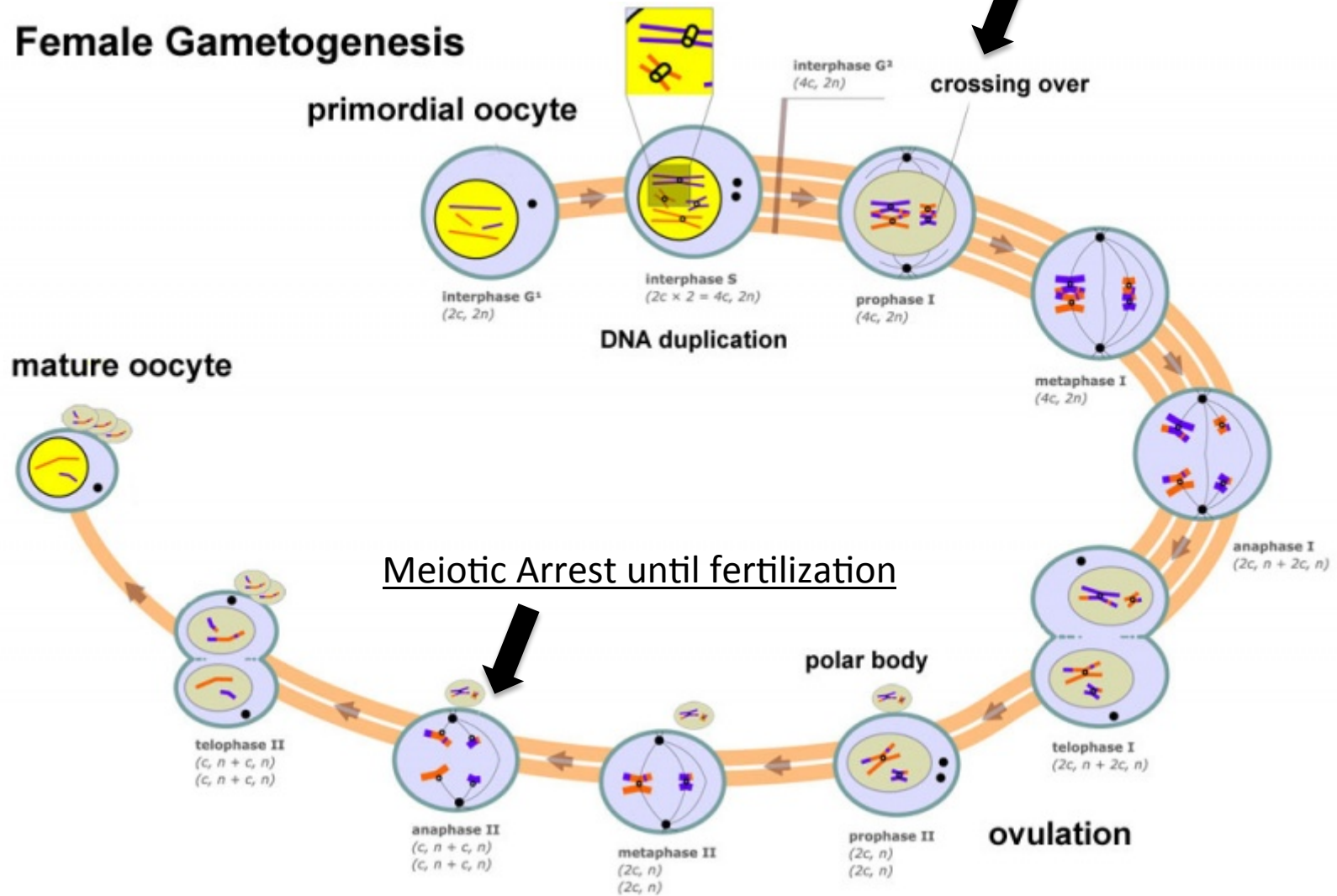
Puberty

Maturation of many spermatocytes throughout life

# Oogenesis

Meiotic Arrest @ week 12

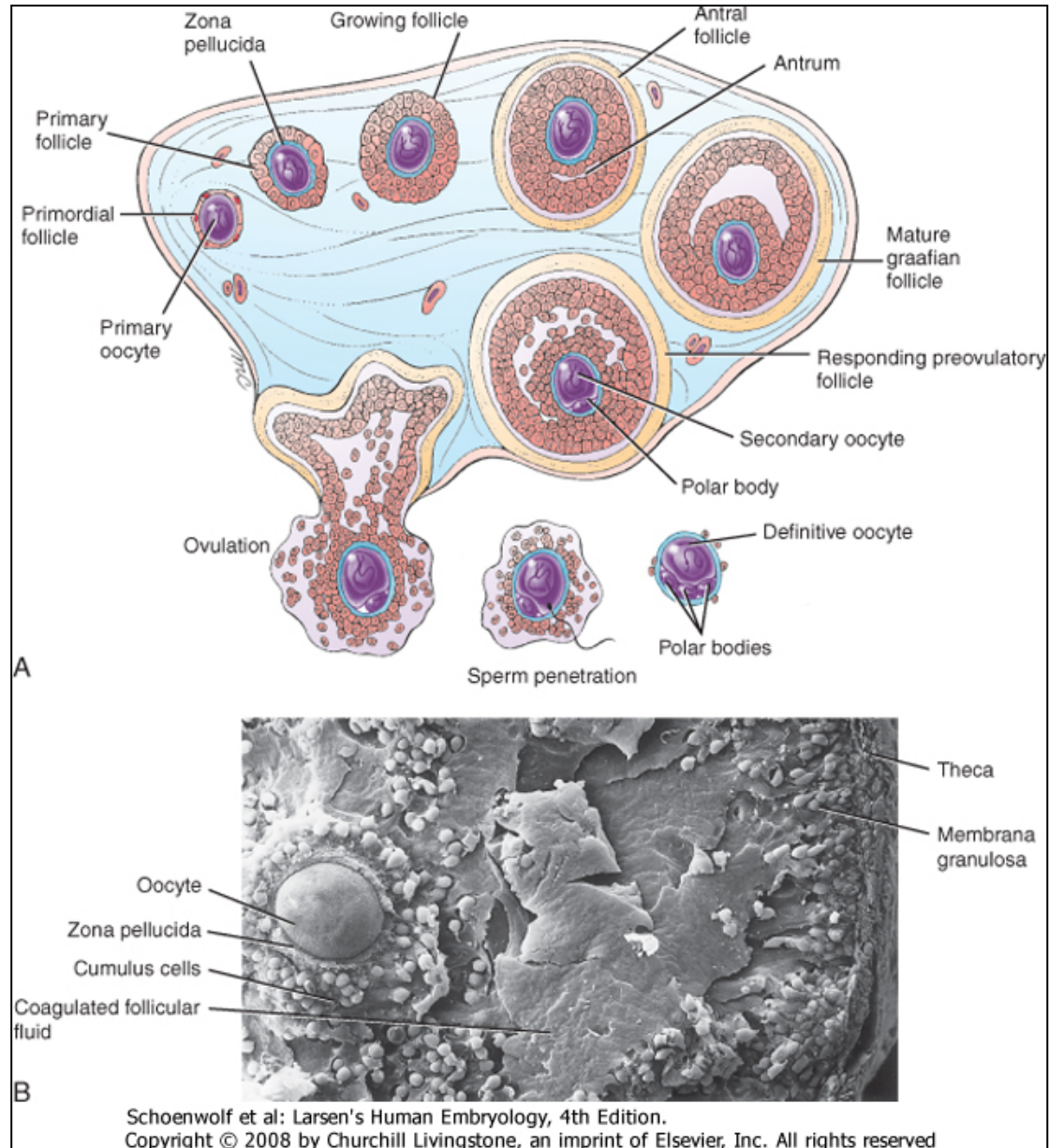
## Female Gametogenesis



Primary oocyte generates 1 mature oocyte and 2 (or 3) polar bodies

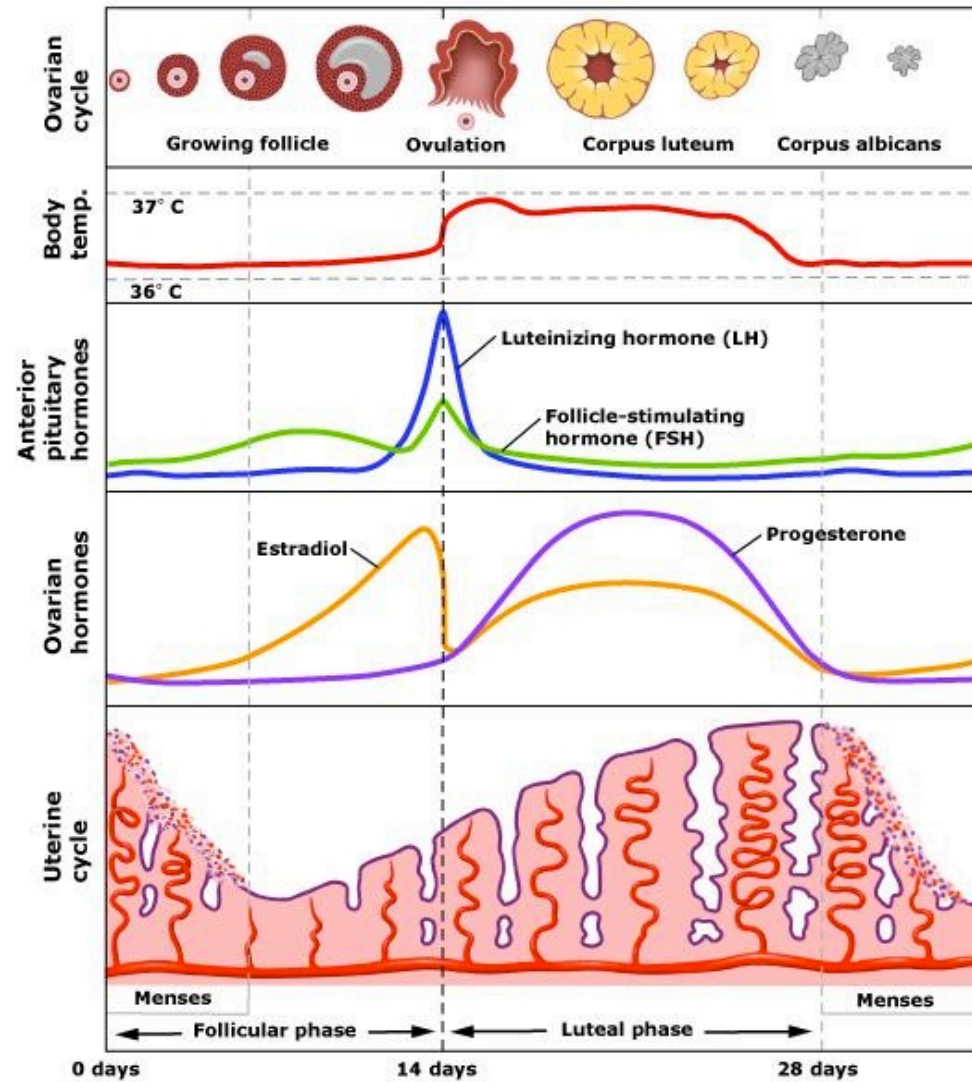
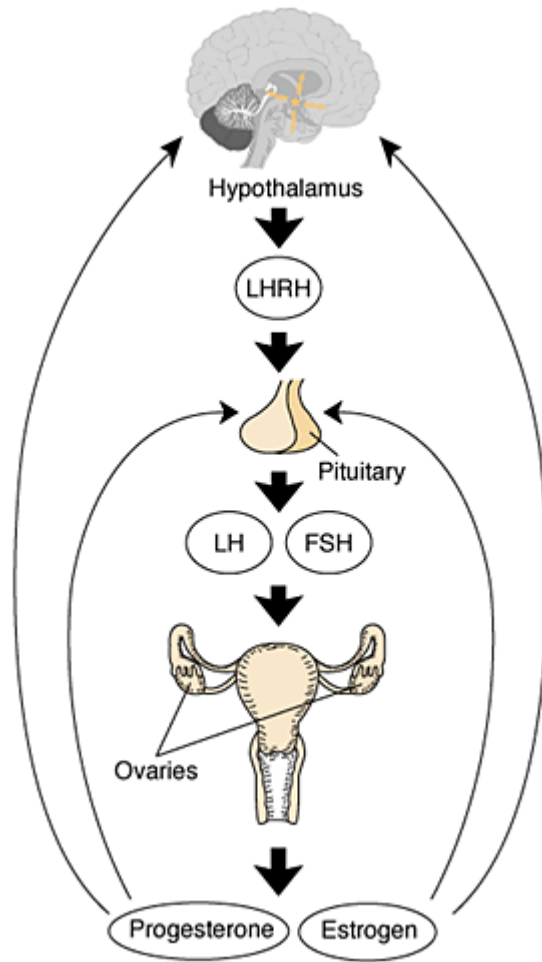


# Oogenesis



# Oogenesis

## Menstrual cycle



# Oogenesis

## Zona Pellucida

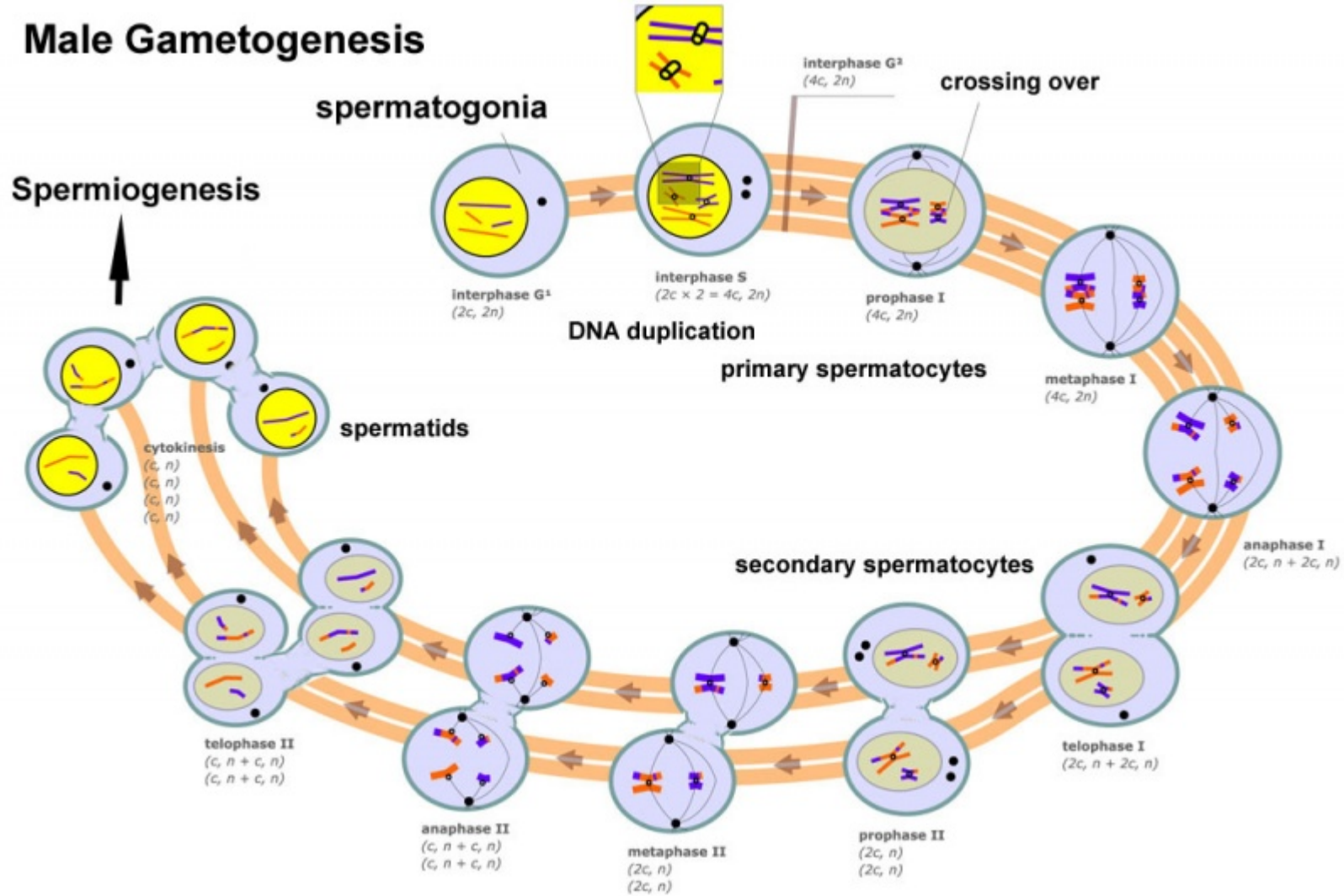


Produced by granulosa cells and oocyte

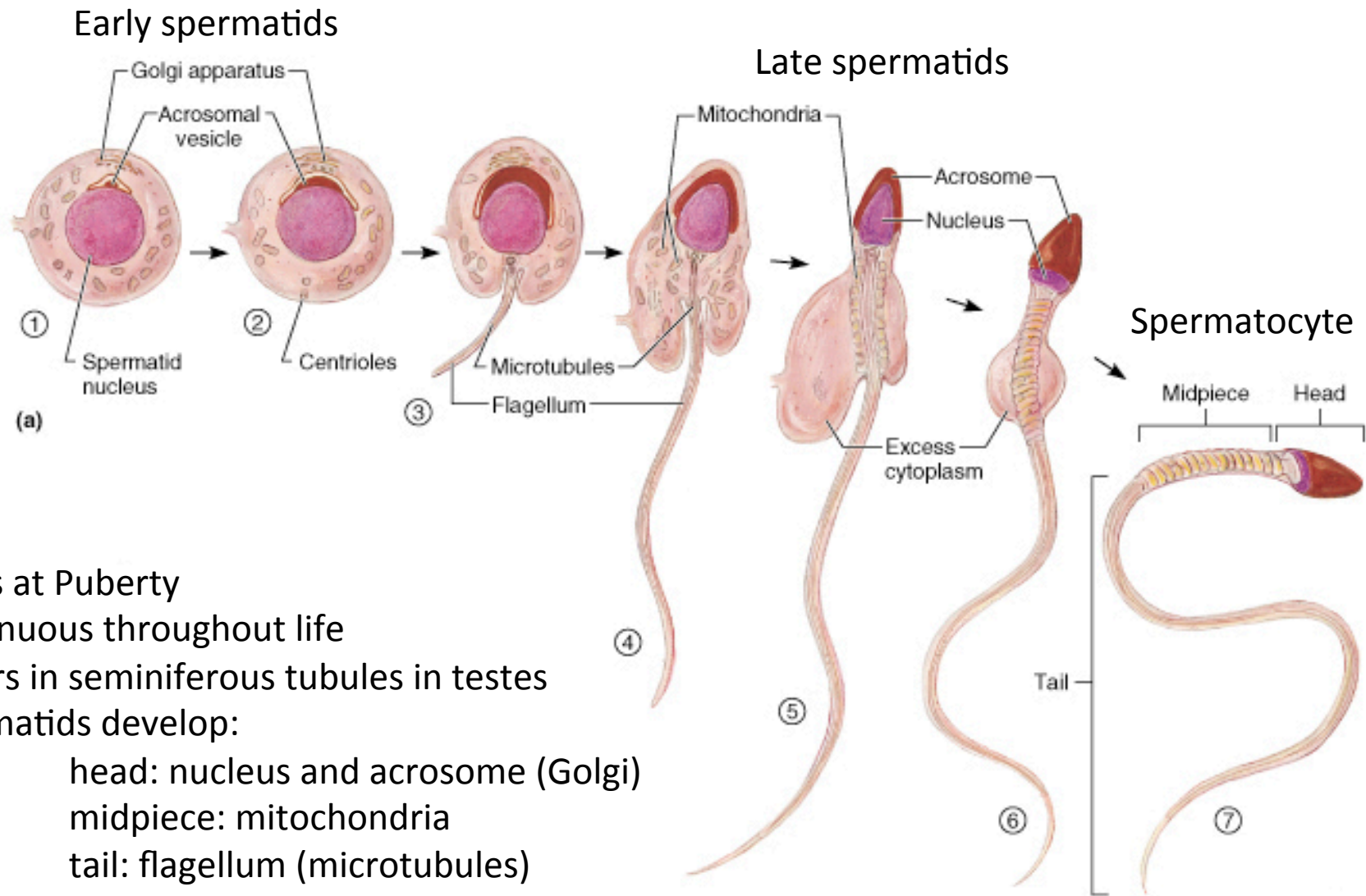
ZP1, ZP2, ZP3 glycoproteins:

Fertilization process/sperm binding/acrosome reaction

# Spermatogenesis



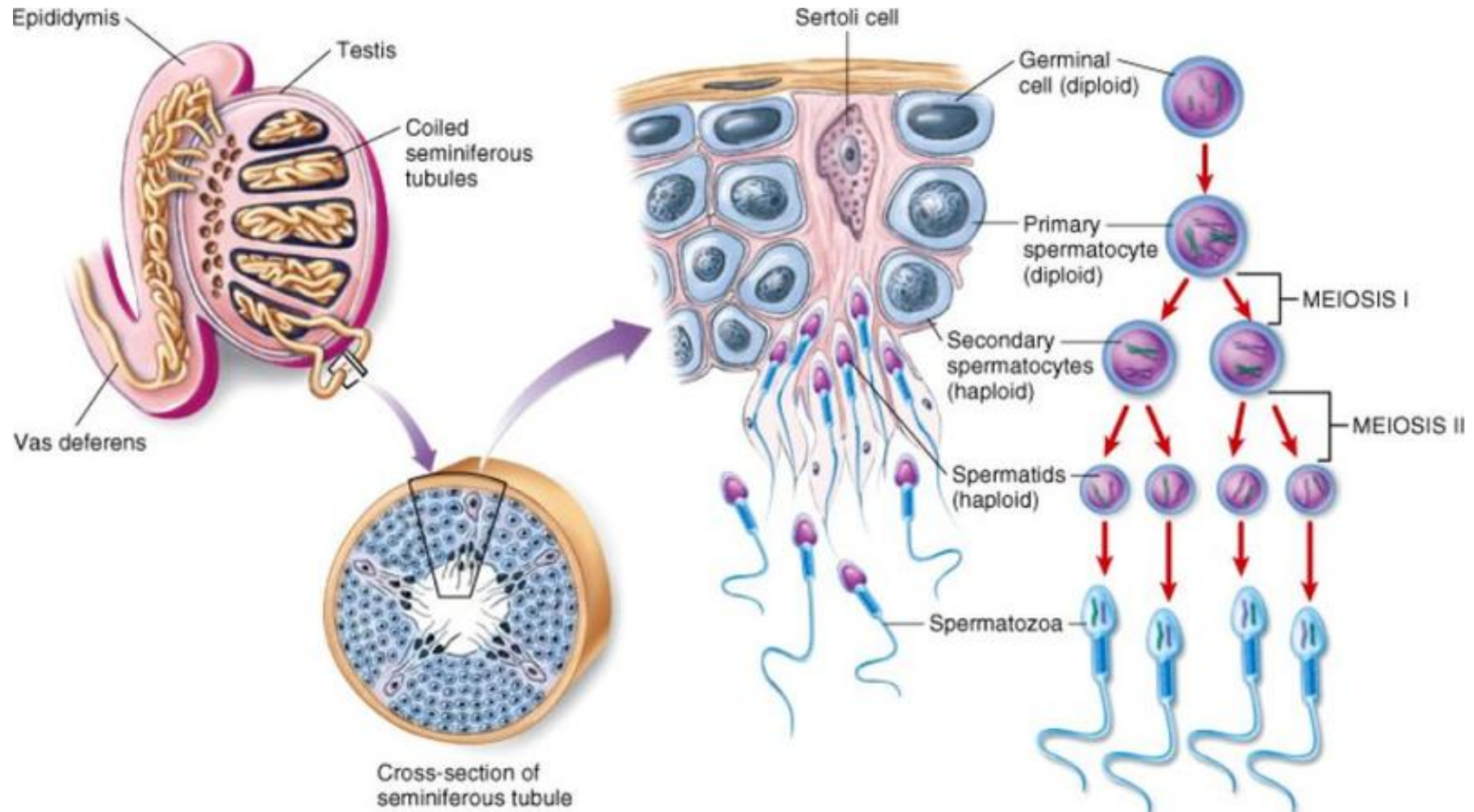
# Spermiogenesis



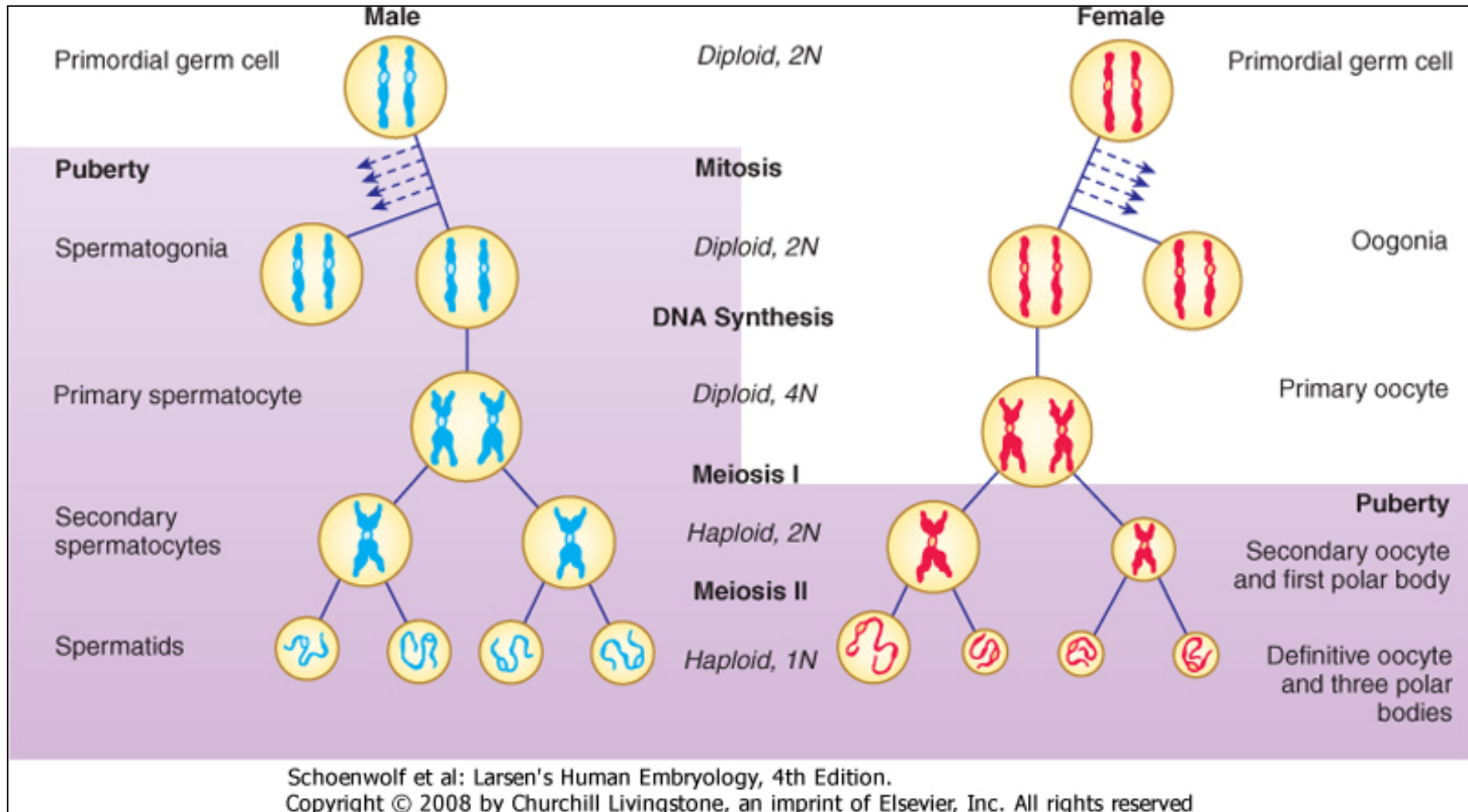
Starts at Puberty  
 Continuous throughout life  
 Occurs in seminiferous tubules in testes  
 Spermatids develop:

- head: nucleus and acrosome (Golgi)
- midpiece: mitochondria
- tail: flagellum (microtubules)

# Spermatogenesis/spermiogenesis



# Gametogenesis



Mitotic arrest until puberty  
 Continuous mitosis followed by meiosis from puberty  
 1 spermatogonium: 4 spermatocytes (cytoplasmic bridges)  
 Spermiogenesis in testes

Prophase I arrest prenatally  
 Metaphase II arrest until fertilization  
 1 primary oocyte: 1 oocyte, 3 polar bodies  
 Oogenesis in ovary and oviduct

# Fertilization

Ejaculation

Oocyte secretes chemotactic factors

Capacitation of sperm in female genital tract

Fertilization takes place in first 1/3 of oviduct

Zona Pellucida induces acrosome reaction

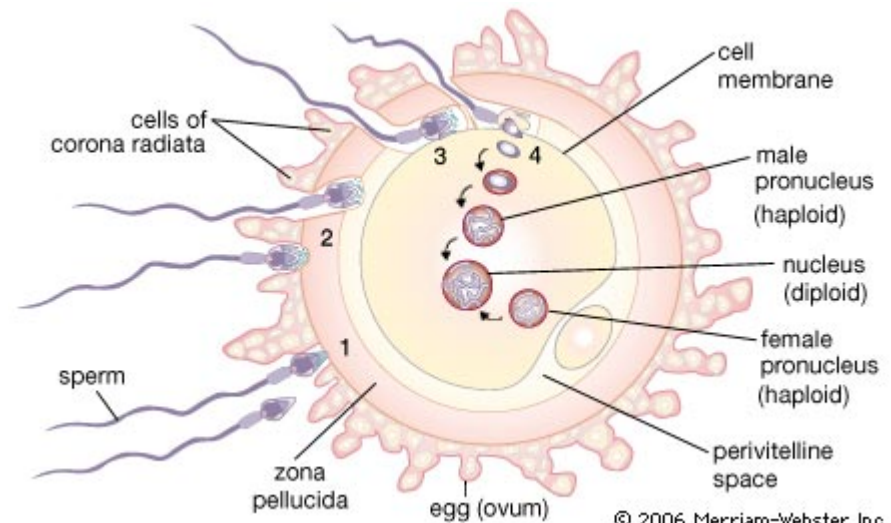
Membrane Fusion:

Cortical granule release: prevention of polyspermy

Oocyte resumes meiosis

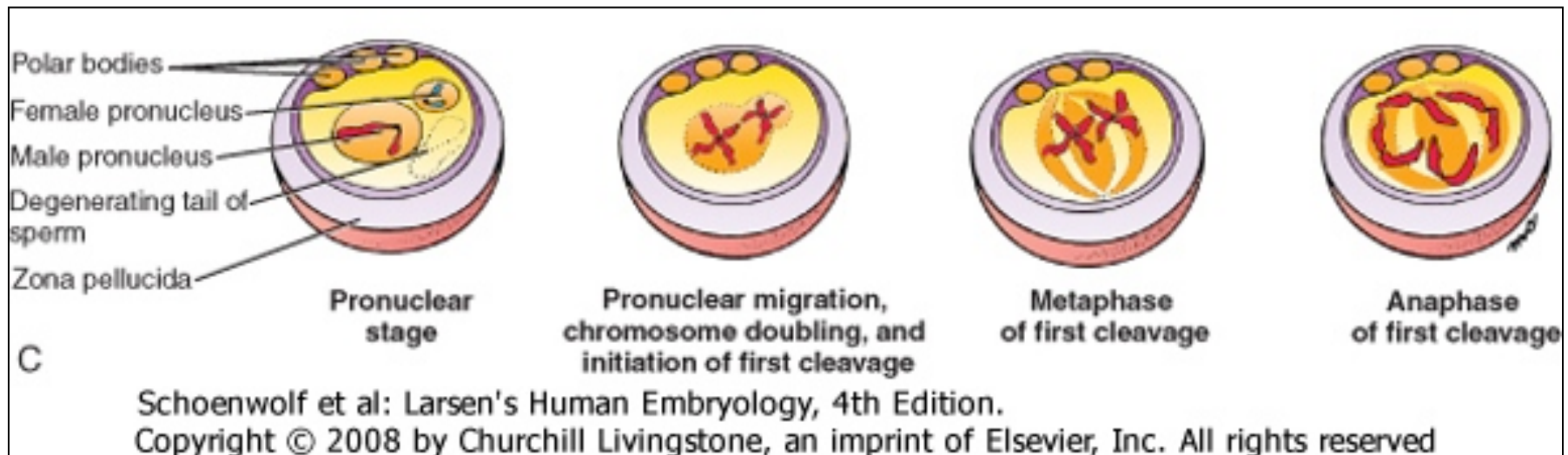
Fusion of male and female pronuclei

Mitosis





# Fertilization



[http://php.med.unsw.edu.au/embryology/images/5/5f/Fertilization\\_003.mp4](http://php.med.unsw.edu.au/embryology/images/5/5f/Fertilization_003.mp4)

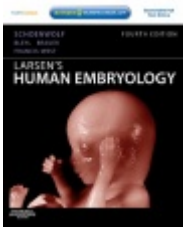
[http://php.med.unsw.edu.au/embryology/images/9/95/Pronuclear\\_fusion\\_001.mp4](http://php.med.unsw.edu.au/embryology/images/9/95/Pronuclear_fusion_001.mp4)

# Fertilization lecture overview

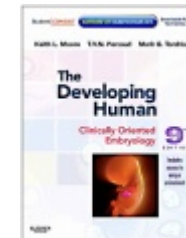
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Gametogenesis: oogenesis and spermatogenesis

Fertilization



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