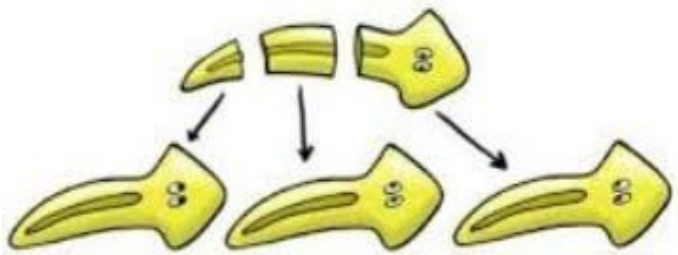

بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ
In the name of Allah, the most gracious, the most merciful

OVERVIEW OF REPRODUCTIVE SYSTEM

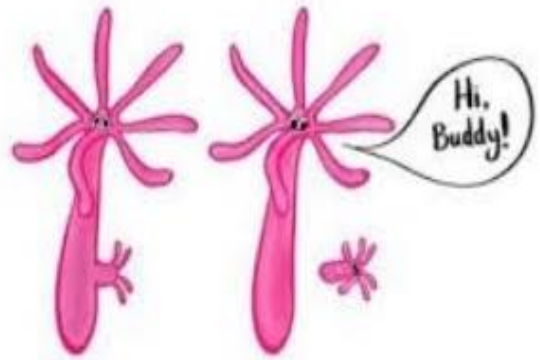
Dr Zubia Shah

Live Birth

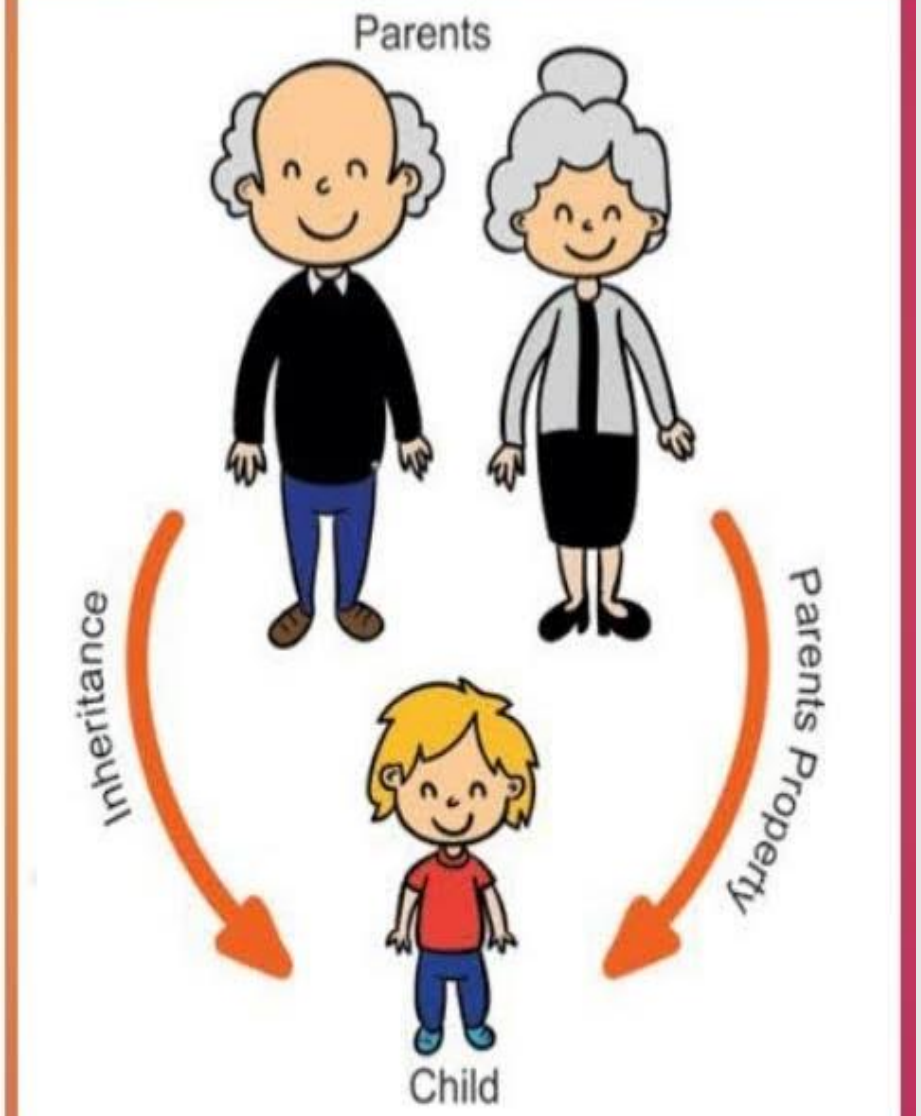
Eggs



Fragmentation



Budding



Why invest in reproductive health?

LONG-TERM BENEFITS

Women who are able to plan their births...

- are better able to complete their education
- participate more fully in the labor force
- have increased productivity and earnings
- enjoy higher household savings and assets

Learning Objectives

01

Describe spermatogenesis.

02

Describe the functions of prostate gland and composition of semen

03

Describe the overview of female reproductive system.

The Reproductive System

- the gonads
- reproductive tract
- accessory sex glands - differ in males and females
- External genitilia

The Primary Reproductive Organs - Gonads

- Testes in the male
- Ovaries in the female
- the dual function of

1. gametes - spermatozoa (sperm) - male and ova (eggs) - female
2. sex hormones - testosterone in males and oestrogen and progesterone in females

The Secondary Sexual Characteristics

Male	Female
Broader shoulders	Curvier hips
Hair distribution - beards	Less body hair, Soft skin
Testosterone	Estrogens and progesterone
Penis, scrotum	Breasts, labia

Sexual Differentiation

Wolffian ducts and **Mullerian ducts** develop in all embryos

- **Male** reproductive tract → **Wolffian ducts** & Mullerian ducts degenerate
- **Female** - **Müllerian ducts** → reproductive tract and the Wolffian ducts regress

the early embryo → either a male or a female reproductive tract

2 Hormones secreted in Males

Testosterone & Mullerian Inhibiting Hormone

Females No such hormones

Male Reproductive System

Functions

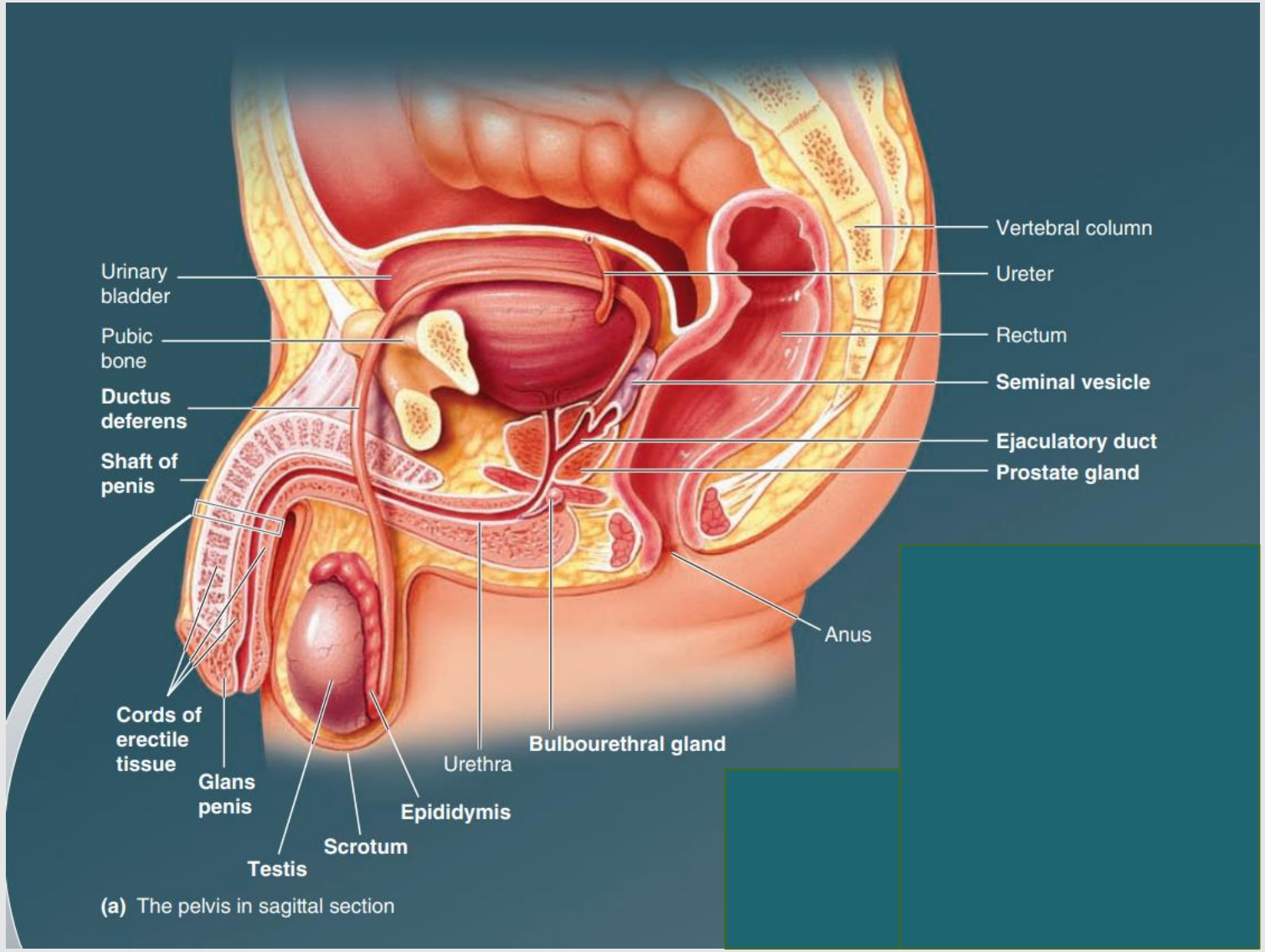
- 1. Production of sperm (spermatogenesis)
- 2. Delivery of sperm to the female

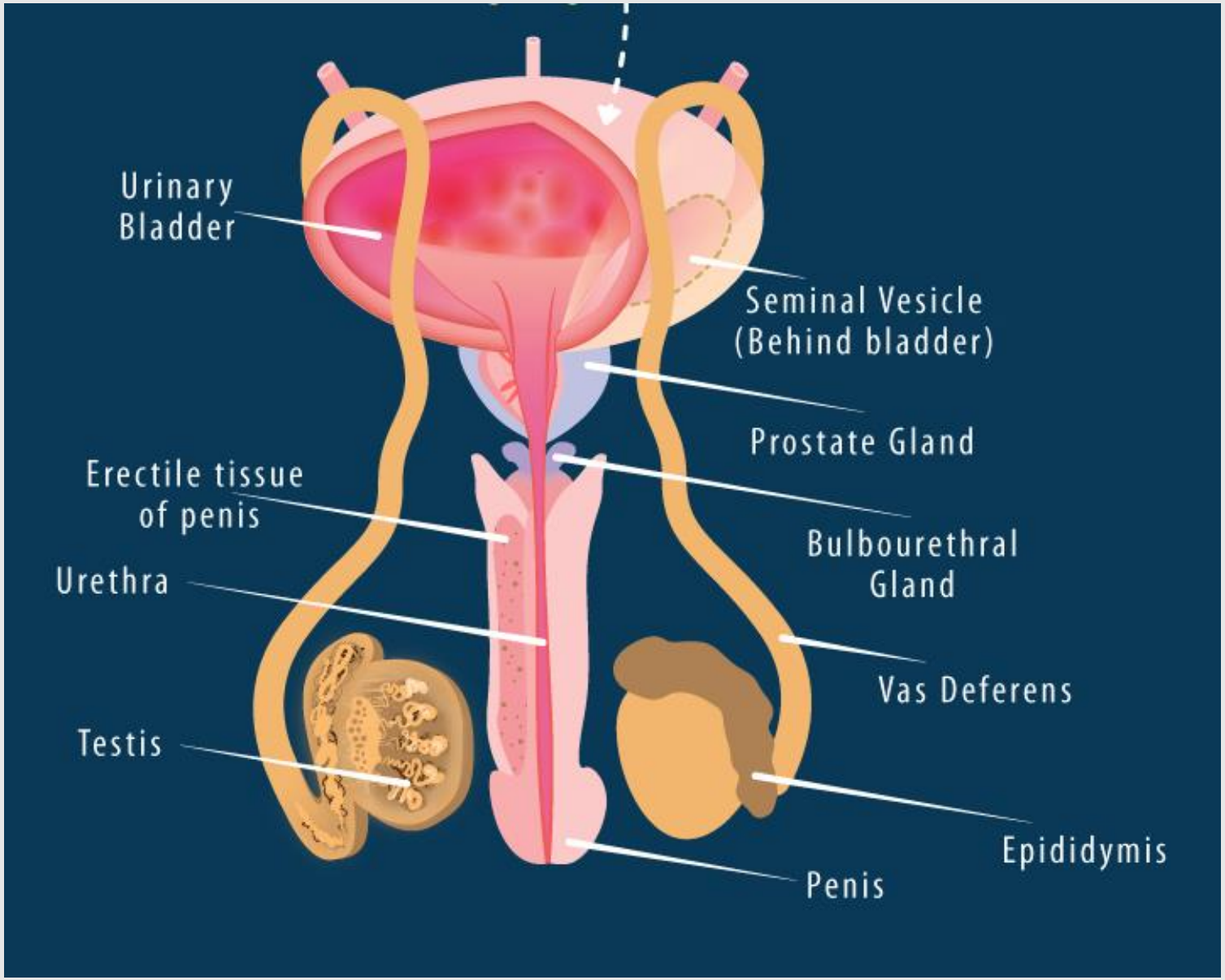
Components

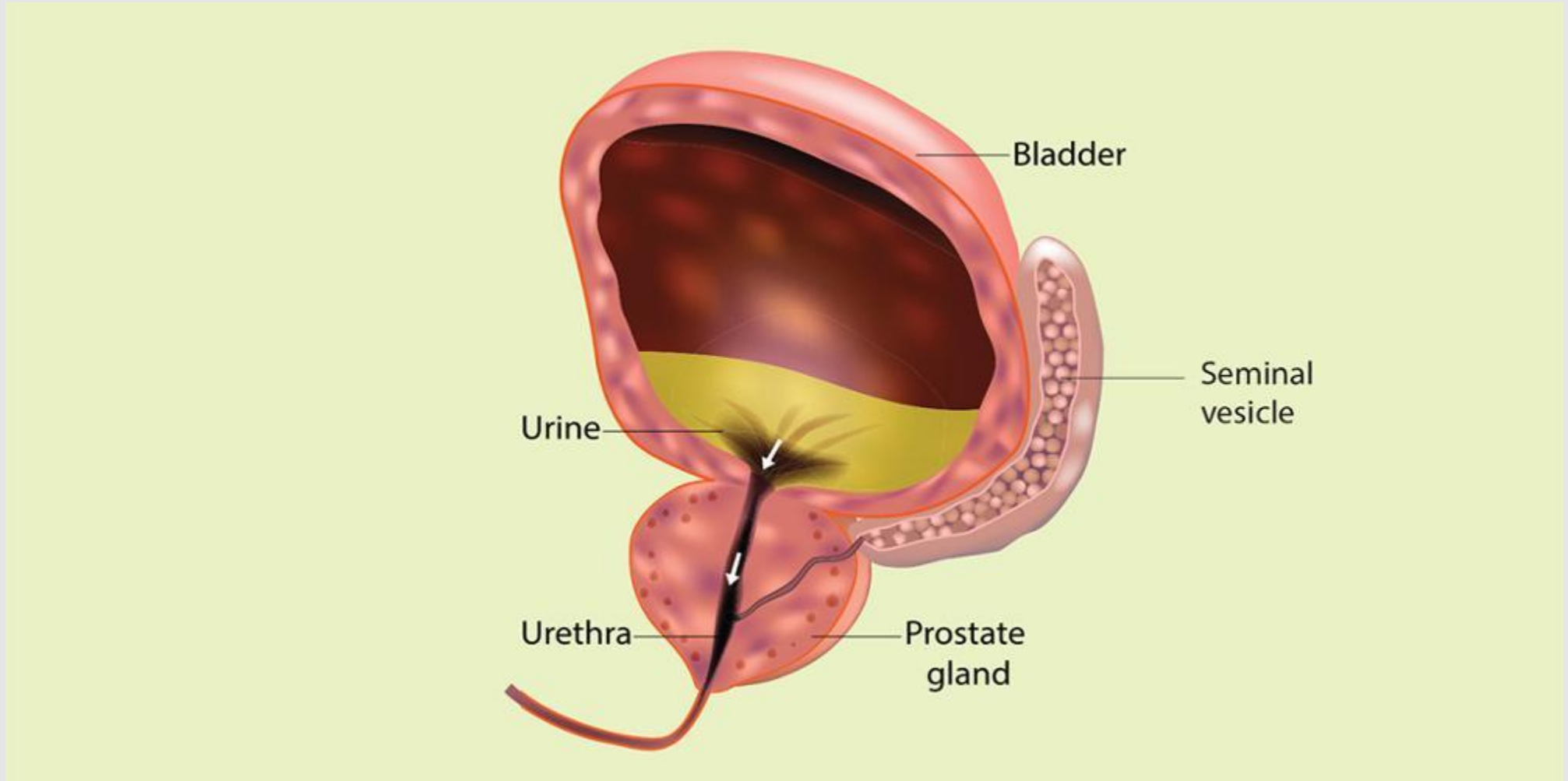
- **Testes** in **scrotum**
- **Semen**
- **Male accessory sex glands** – secretions make the bulk of the semen are

1. seminal vesicles
2. prostate gland
3. bulbourethral gland(Cowper's)

- **Penis and glans penis**


Urinary bladder
Pubic bone
Ductus deferens
Shaft of penis
Vertebral column
Ureter
Rectum
Seminal vesicle
Ejaculatory duct
Prostate gland
Anus
Cords of erectile tissue
Glans penis
Testis
Scrotum
Epididymis
Urethra
Bulbourethral gland
(a) The pelvis in sagittal section


Urinary Bladder
Seminal Vesicle (Behind bladder)
Prostate Gland
Erectile tissue of penis
Bulbourethral Gland
Urethra
Vas Deferens
Testis
Epididymis
Penis


Bladder
Seminal vesicle
Urine
Urethra
Prostate gland

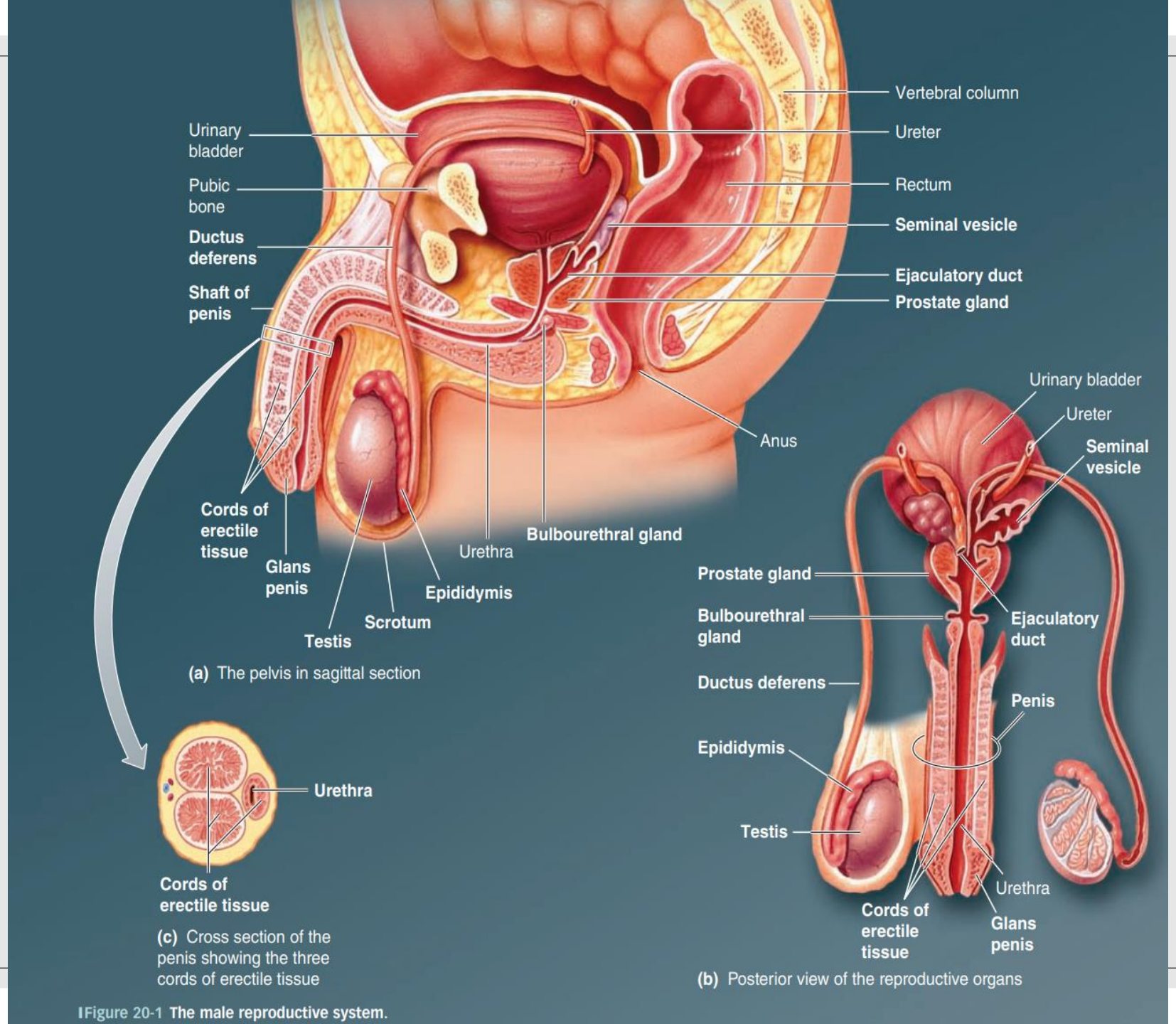
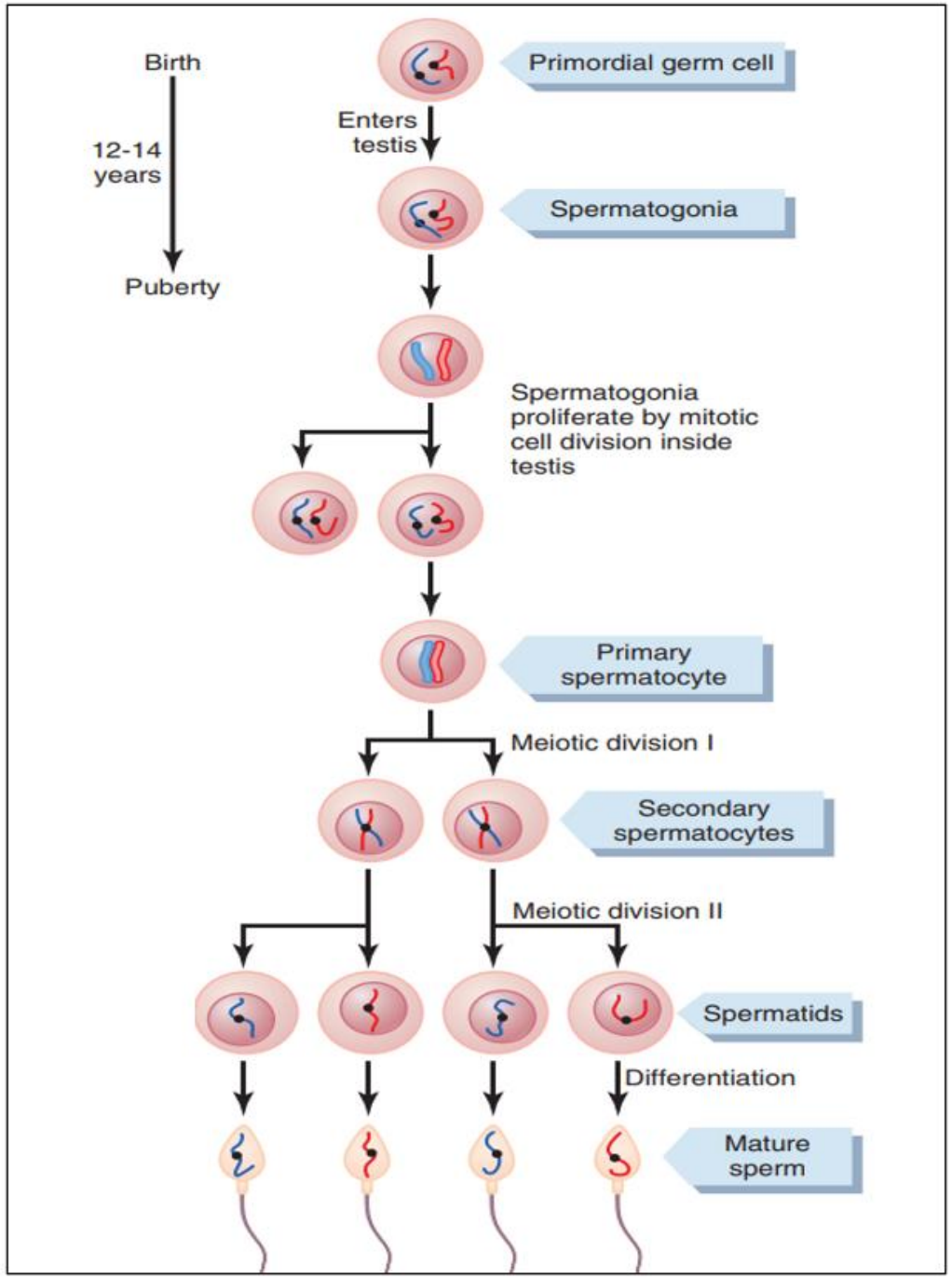


Figure 20-1 The male reproductive system.

Prostatic hypertrophy



Spermatogenesis

Functions of Prostate Gland

Secretes a thin, milky alkaline fluid that contains

Calcium

Citrate Ion

Phosphate Ion

Clotting Enzyme

Profibrinolysin

Composition of Semen

Composition of healthy human semen

Approx 5%	Sperm produced in the seminiferous tubules and stored in the cauda epididymis
Less than 5%	Clear mucus produced by the Cowper (bulbourethral) glands
50–65%	Fluid from the seminal vesicles, including fructose (sugar that "feeds" the sperm), prostaglandins, and ascorbic acid
20–30%	Fluid from the prostate gland, including zinc, amino acids, and lipids (fats and cholesterols)

SOURCE: LAWRENTSCHUK ET AL., 2016.

Composition of Semen

Color: White, opalescent		
Specific gravity: 1.028		
pH: 7.35–7.50		
Sperm count: Average about 100 million/mL, with fewer than 20% abnormal forms		
Other components: Fructose (1.5-6.5 mg/mL) Phosphorylcholine Ergothioneine Ascorbic acid Flavins Prostaglandins	}	From seminal vesicles (contributes 60% of total volume)
Spermine Citric acid Cholesterol, phospholipids Fibrinolysin, fibrinogenase Zinc Acid phosphatase	}	From prostate (contributes 20% of total volume)
Phosphate Bicarbonate	}	Buffers
Hyaluronidase		

FEMALE REPRODUCTIVE SYSTEM

Functions of Female Reproductive System

- **Two Phases**

1. Preparation of female body for conception & pregnancy
2. The period of pregnancy itself

Functions of Female Reproductive System

- **Production of ova**
- **Reception of Sperm**
- **Fertilization and Conception**
- **Maintenance of Developing Fetus (Gestation or Pregnancy)**
- **Formation of Placenta**
- **Giving Birth to the baby**
- **Lactation**

Principal organs of the human female reproductive tract include

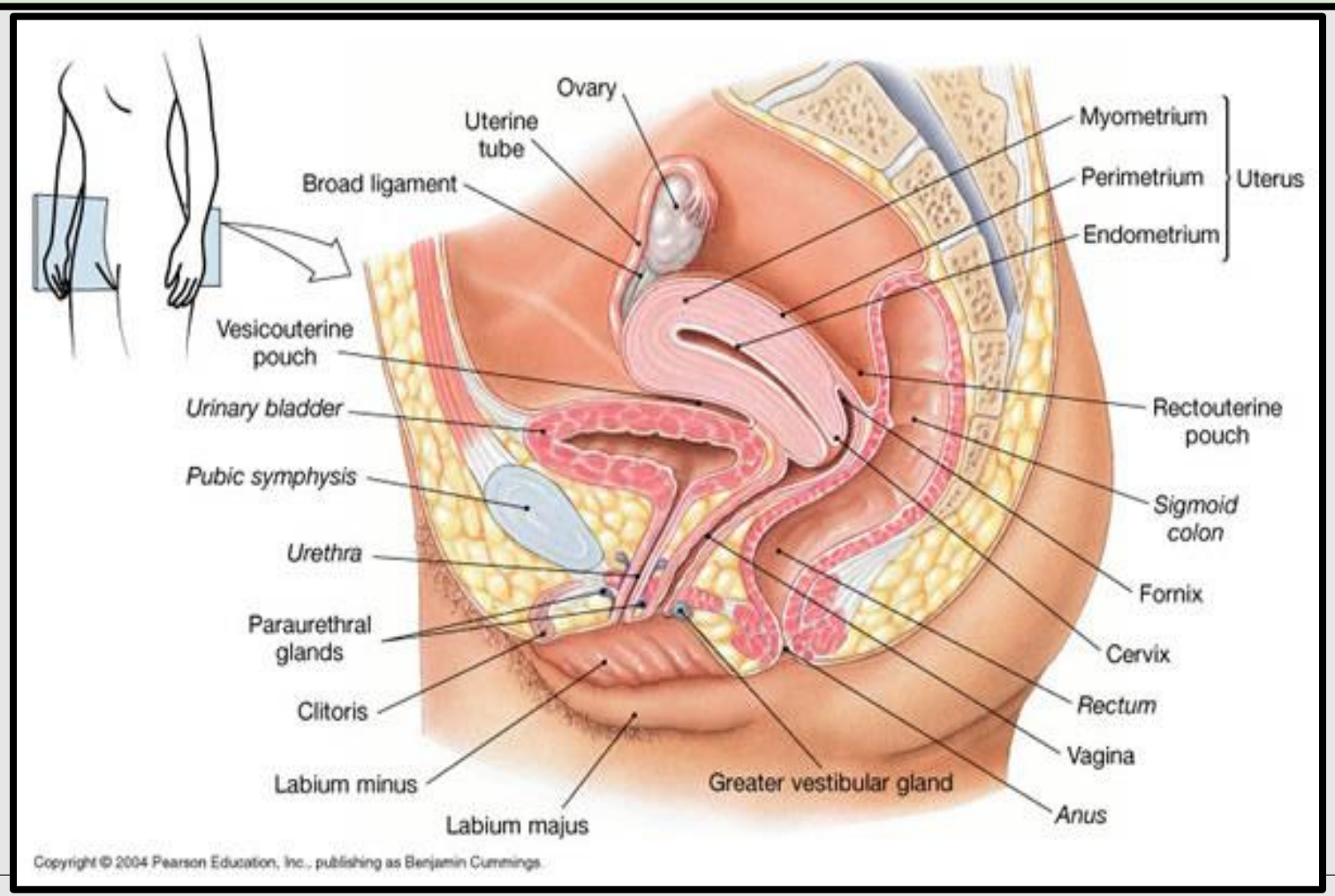
1. Ovaries

2. Fallopian tubes (also called uterine tubes)

3. Uterus

4. Vagina

Physiological Anatomy of Female Sexual Organs



Female Reproductive System

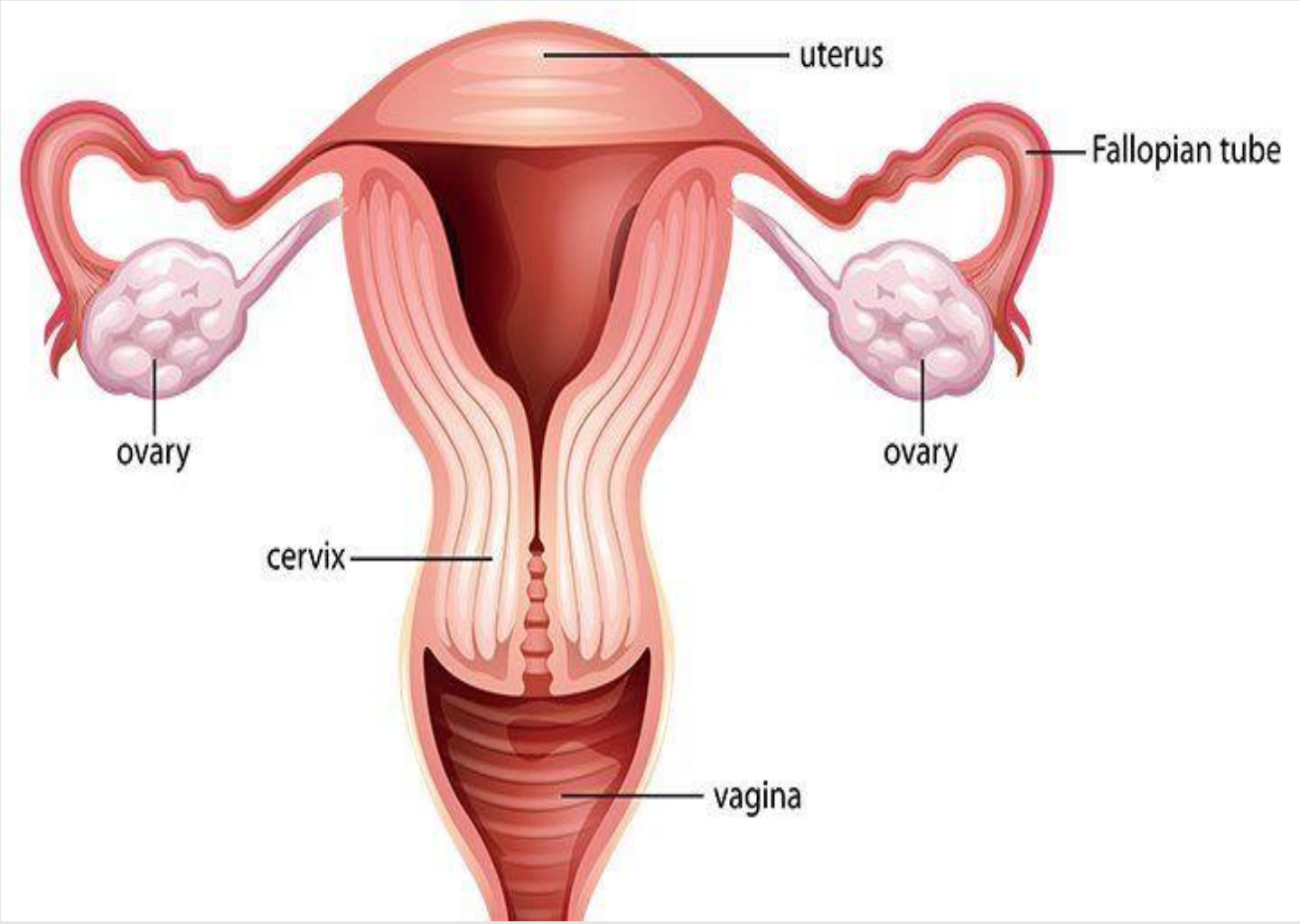
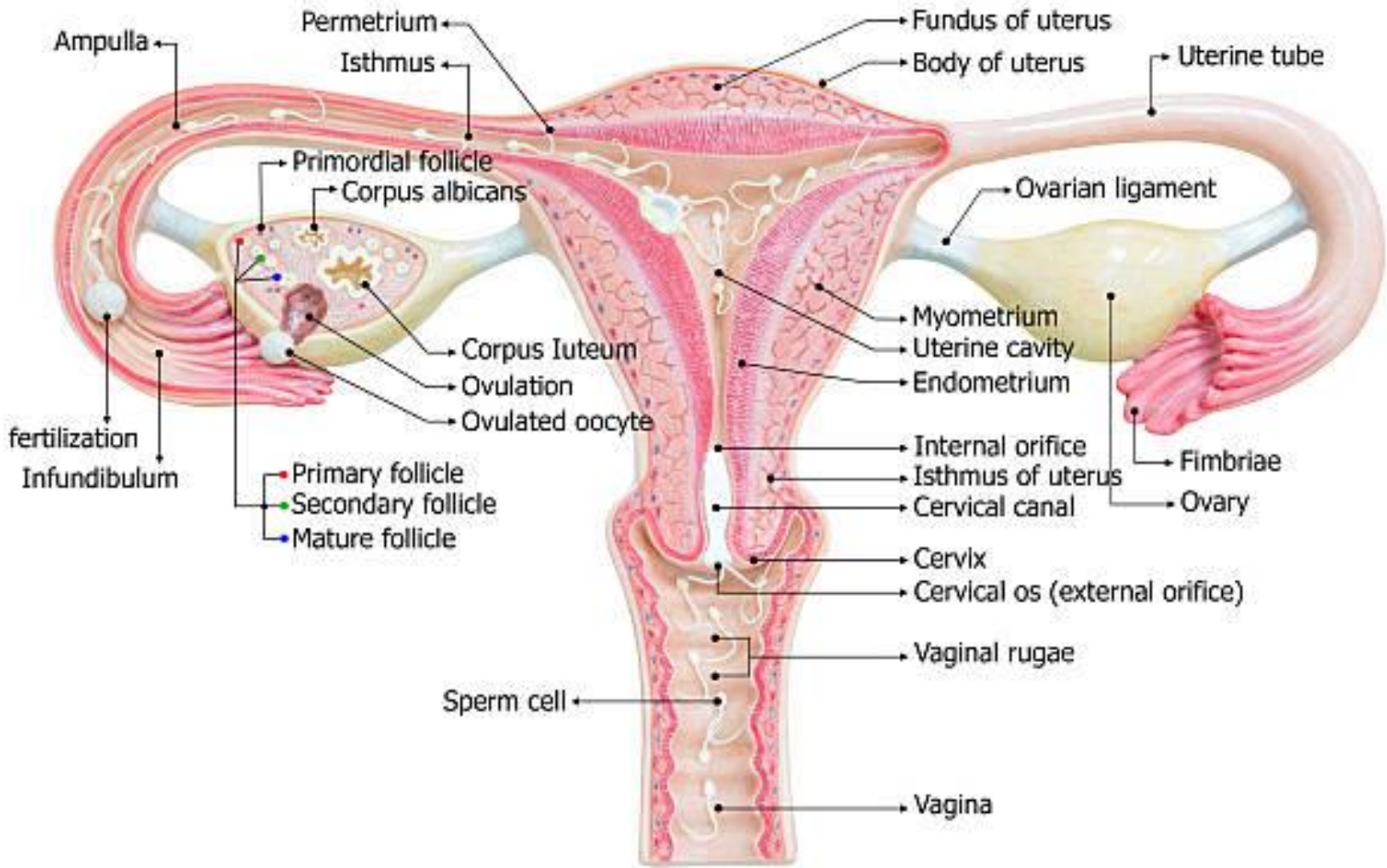
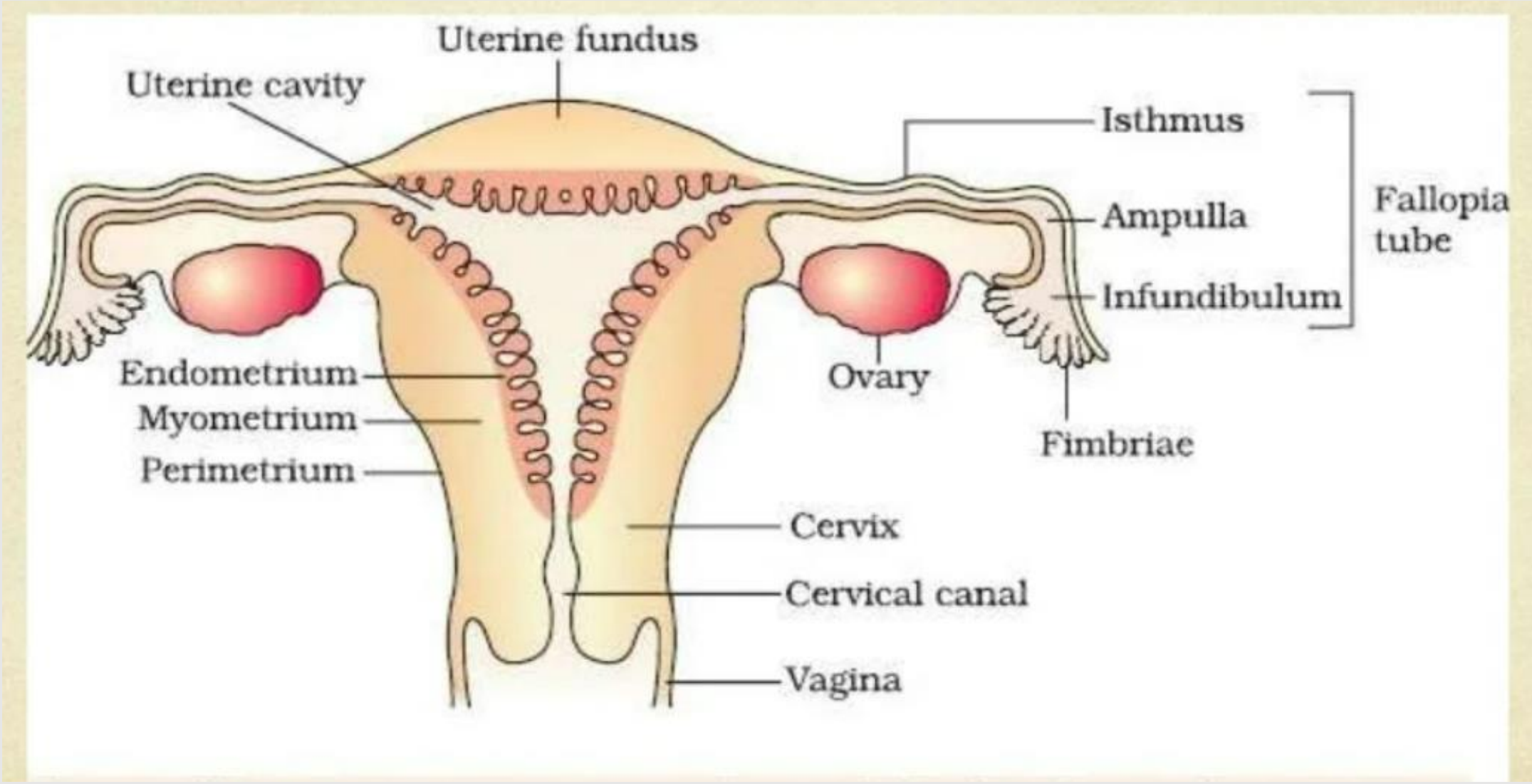


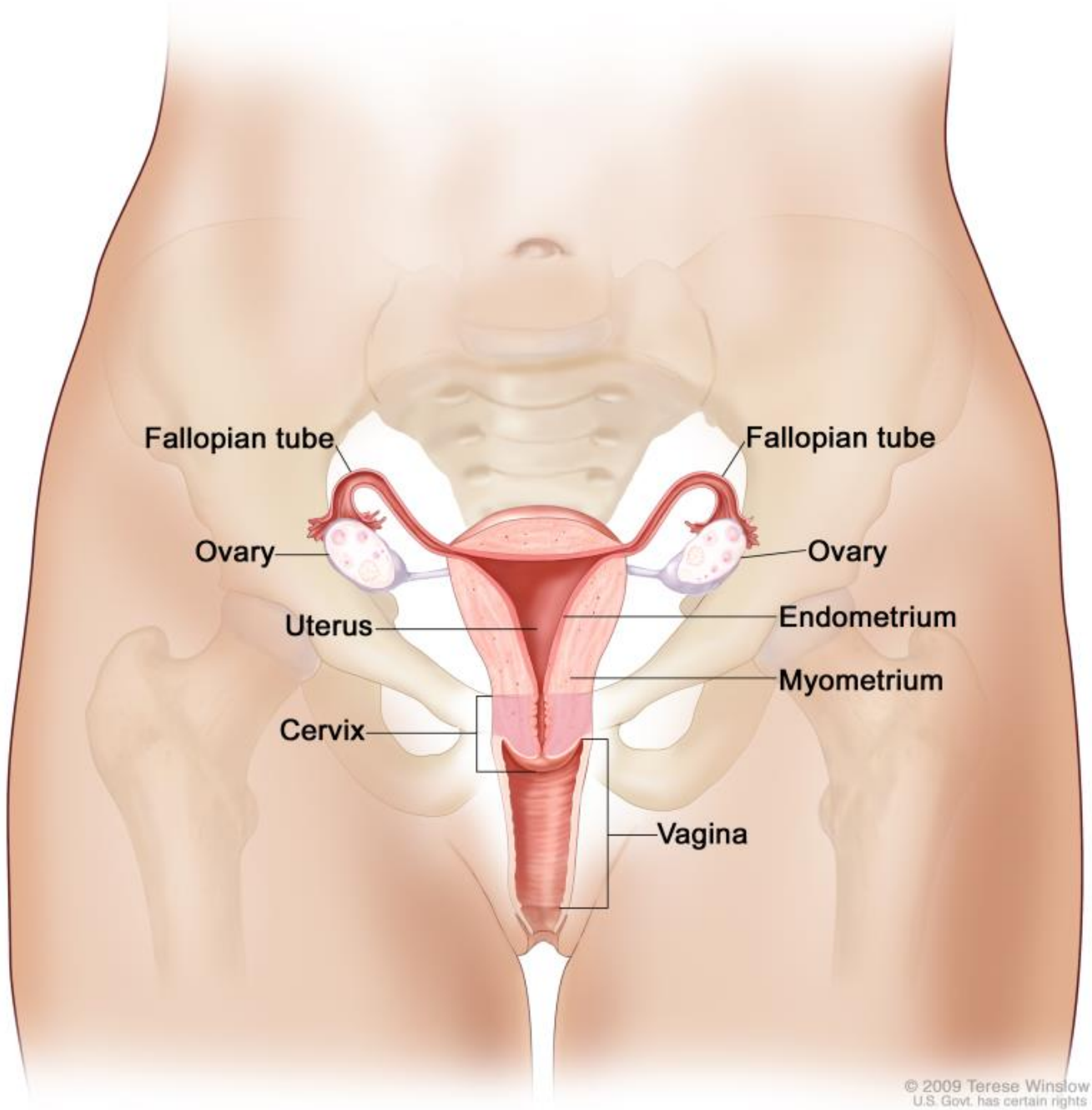
Diagram of Female Reproductive System

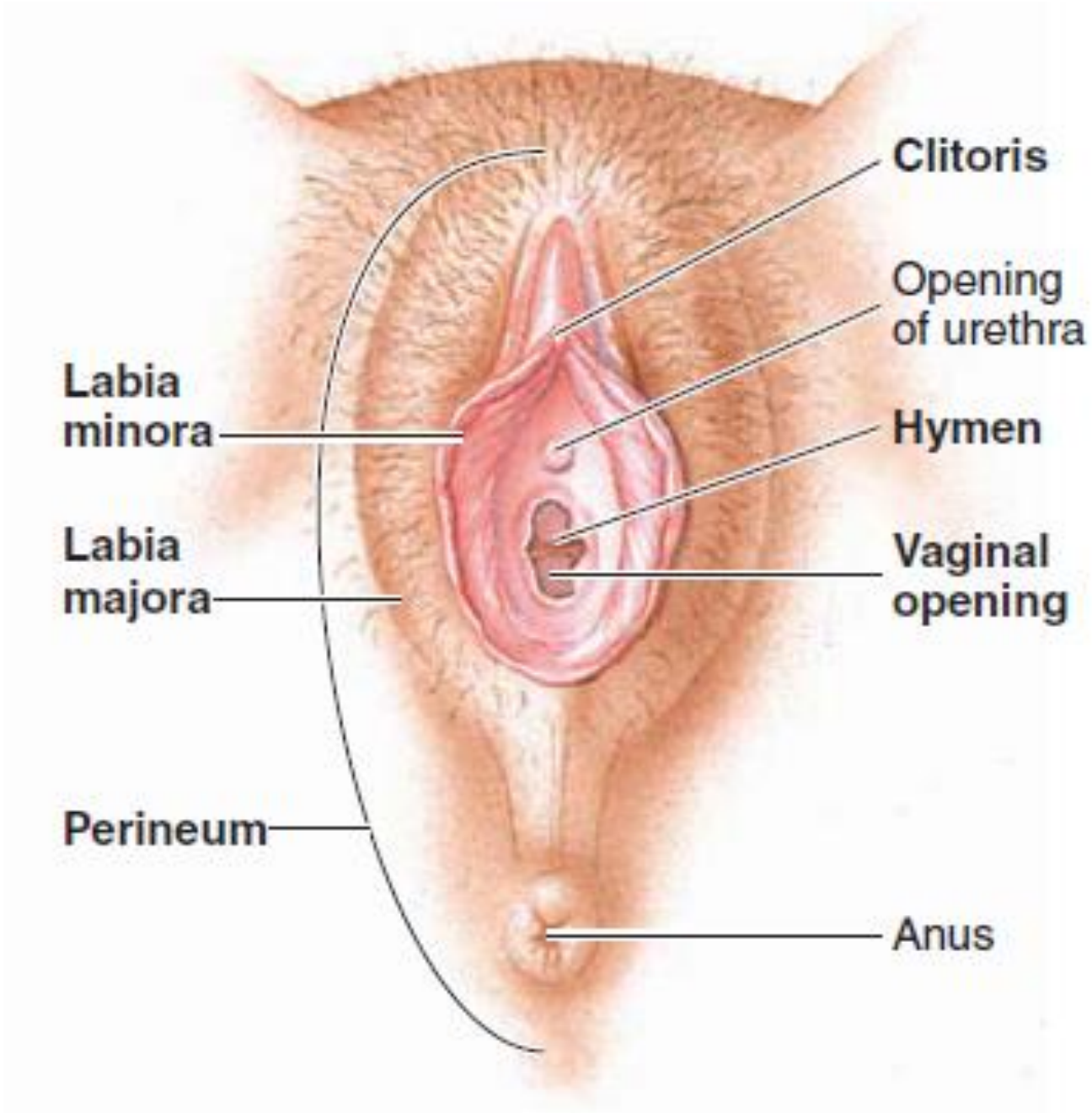


Female Reproductive System



Female Reproductive System





Perineal View of External Genitalia

Reproduction begins with the development of ova in the ovaries

In each monthly sexual cycle, an ovum is expelled from an ovarian follicle into the abdominal cavity

→ passes through one of the fallopian tubes into the uterus

If fertilized, it implants in the uterus and
→ into a fetus, a placenta, fetal membranes and a baby

Oogenesis and Follicular Development in the Ovaries

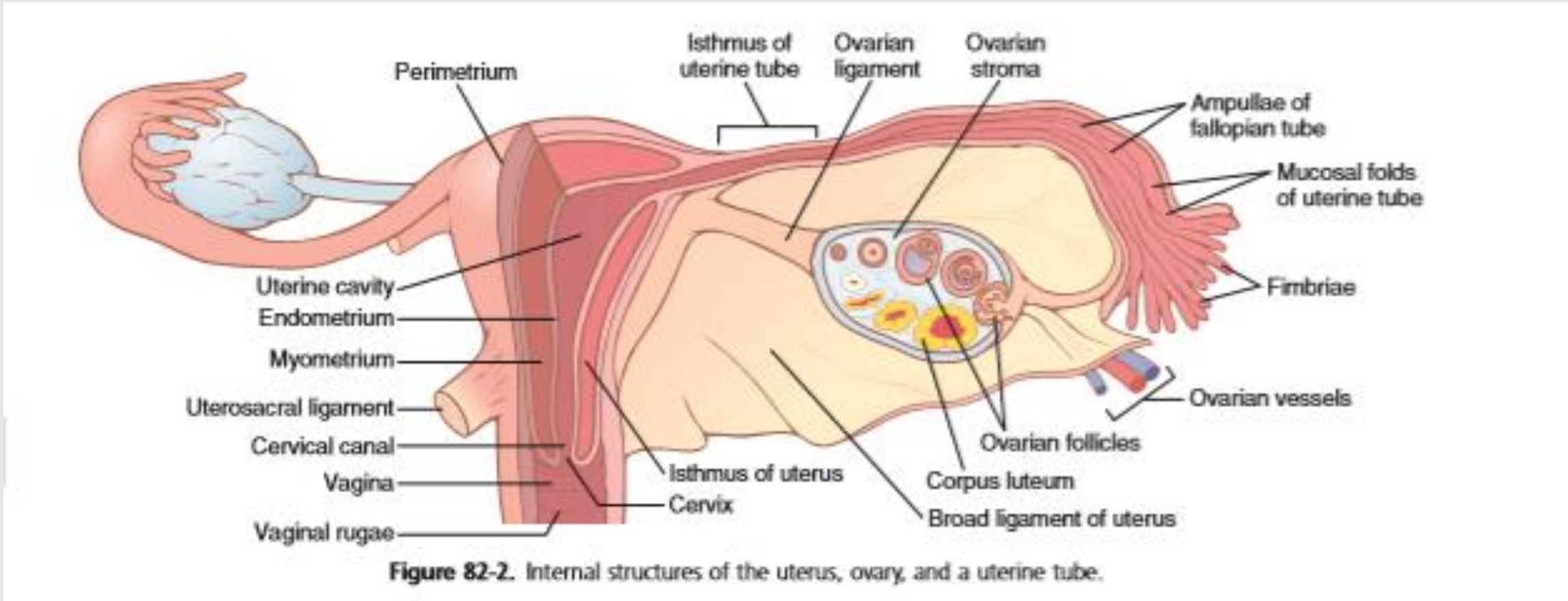


Figure 82-2. Internal structures of the uterus, ovary, and a uterine tube.

Oogenesis & Follicular Development

Developing egg/oocyte → mature egg/ovum

This process is called oogenesis

Primordial germ cell

Oogonia/ Primordial Ova

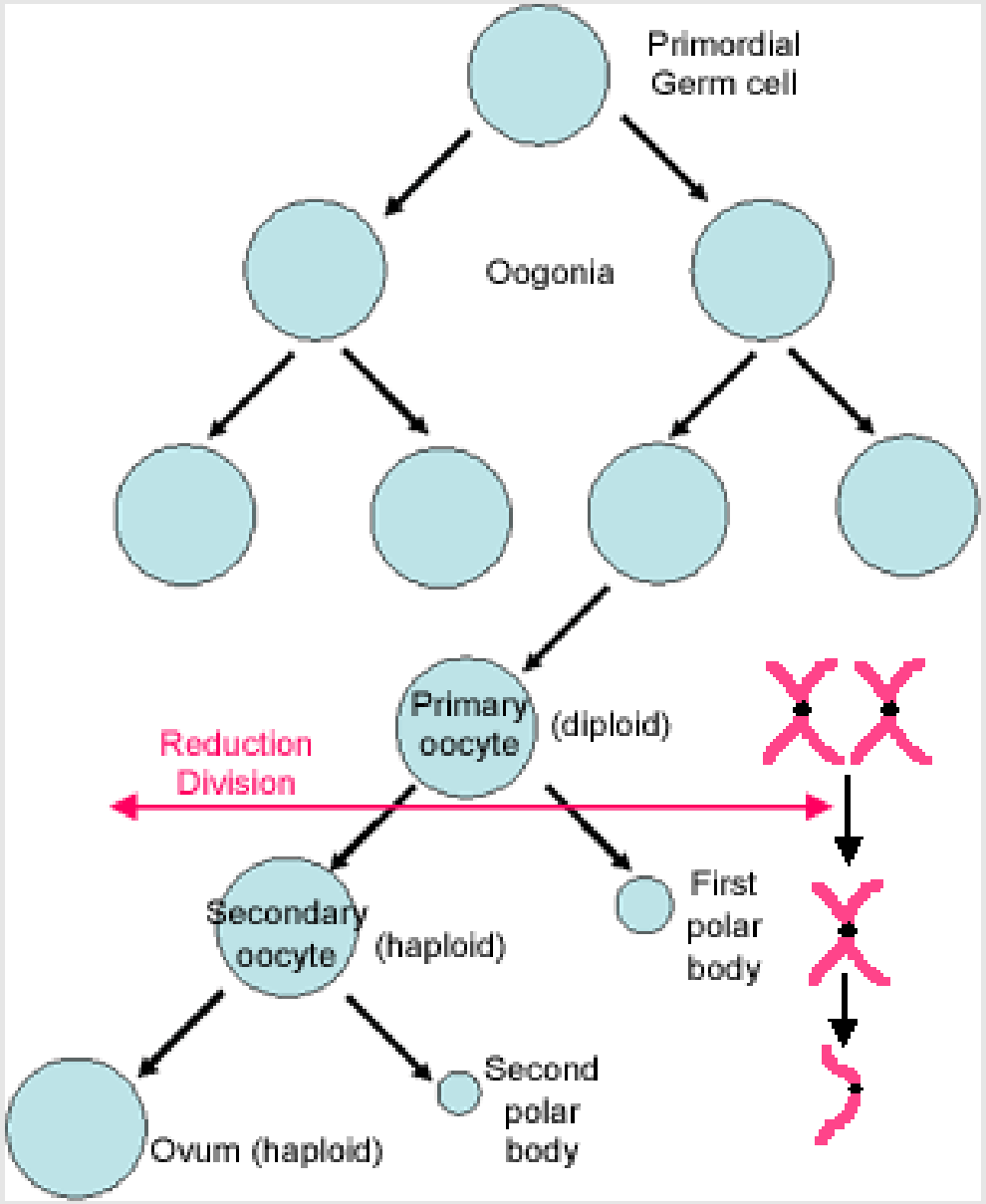
Primordial Follicle/ Primary oocyte

5th month of fetal life

Oocyte → Secondary oocyte (Ovum) + first polar body

Puberty

Ovum undergoes second meiotic division


Primordial
Germ cell
Oogonia
Primary
oocyte
(diploid)
Reduction
Division
Secondary
oocyte
(haploid)
First
polar
body
Ovum (haploid)
Second
polar
body

Oogenesis & Follicular Development

At birth, 1 – 2 million primary oocytes – 2 divisions before fertilization

First meiotic division - after puberty → secondary oocyte (23n) + first polar body (23n)

Ovum → a second meiotic division and after the sister chromatids separate there is a pause in meiosis

When ovary releases ovum during ovulation and sperm enters the ovum final meiosis occurs

At puberty about 300,000 oocytes remain in ovaries and only a small percentage become mature

Oocyte maturation inhibition factor

Puberty

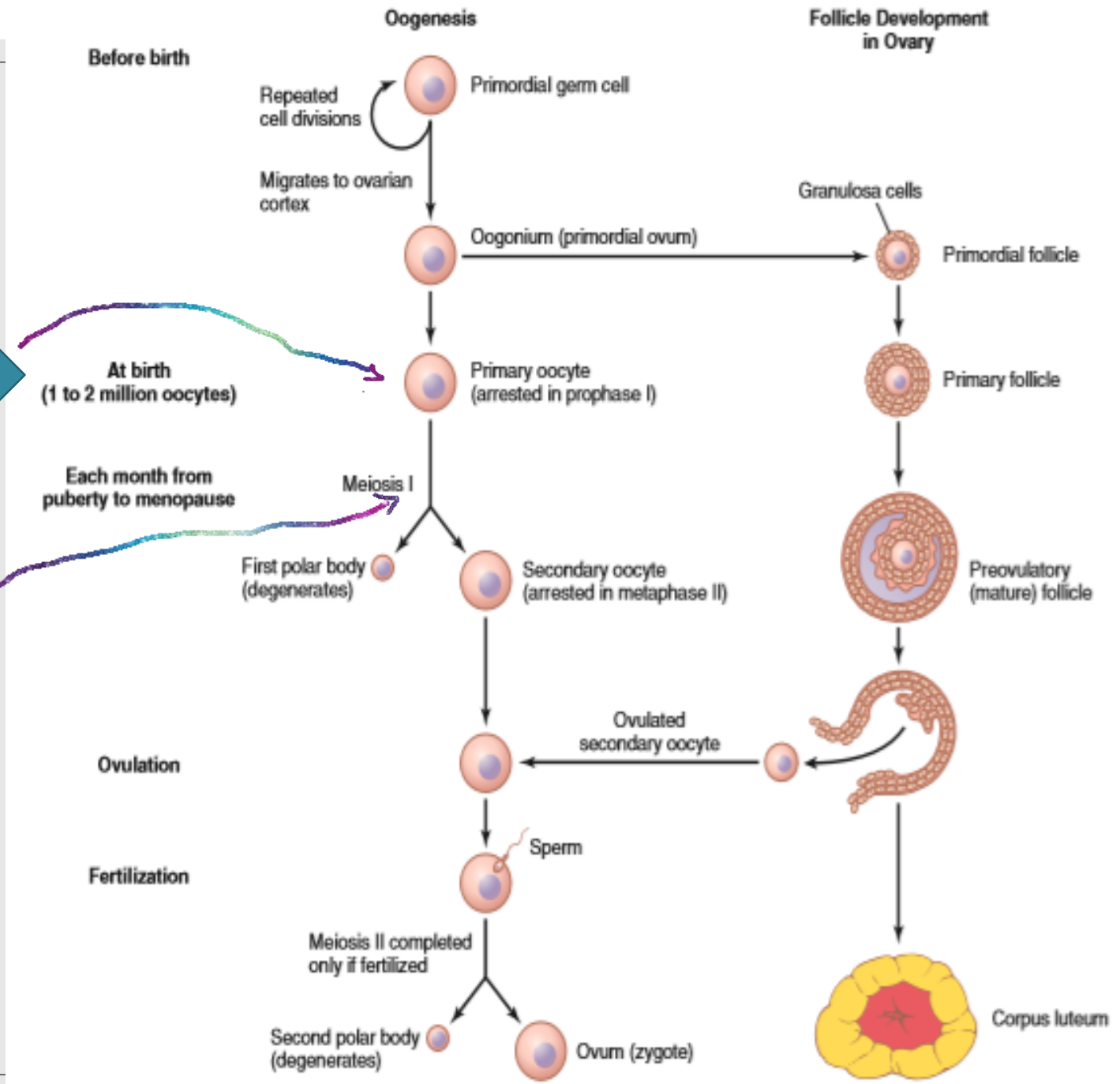
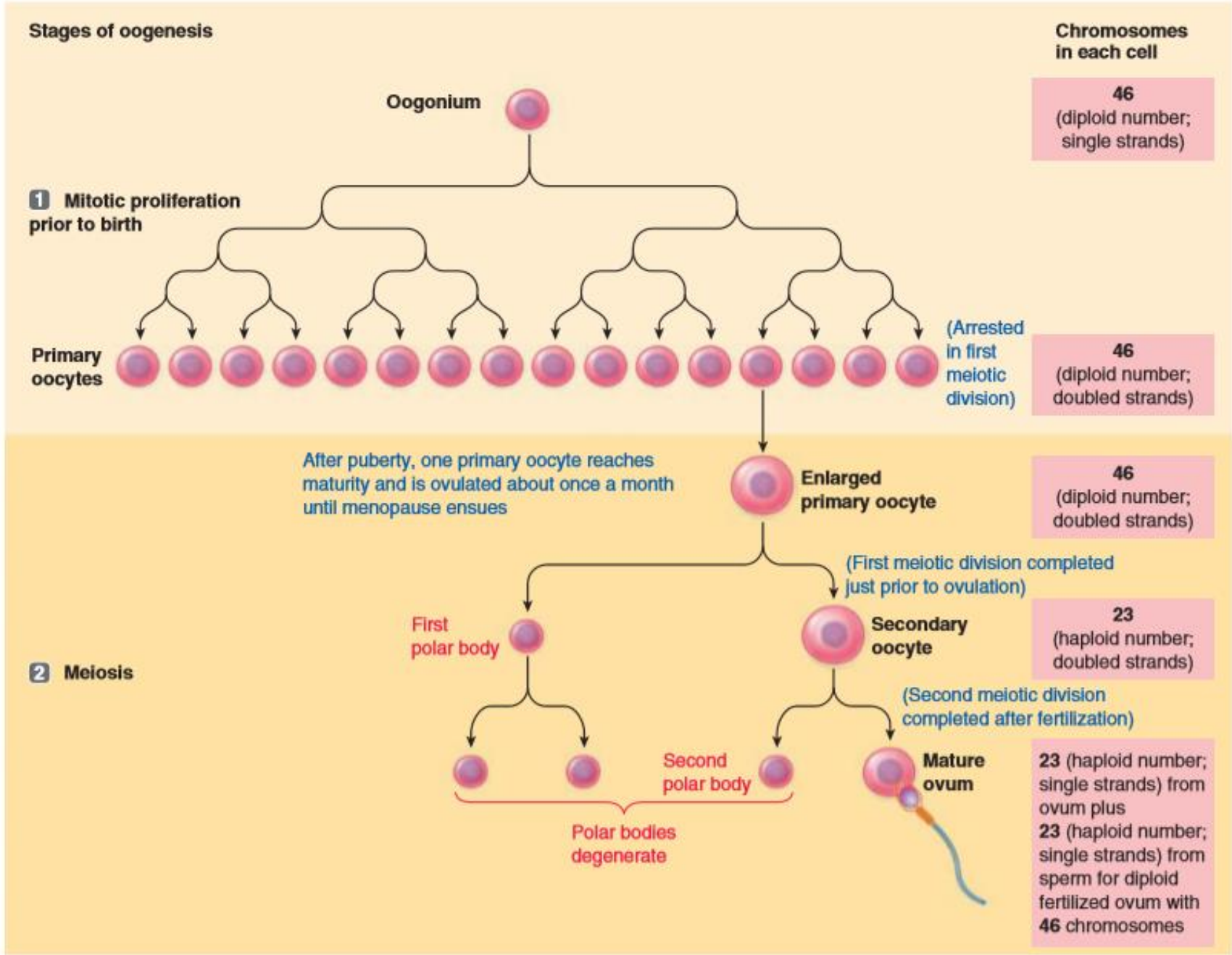
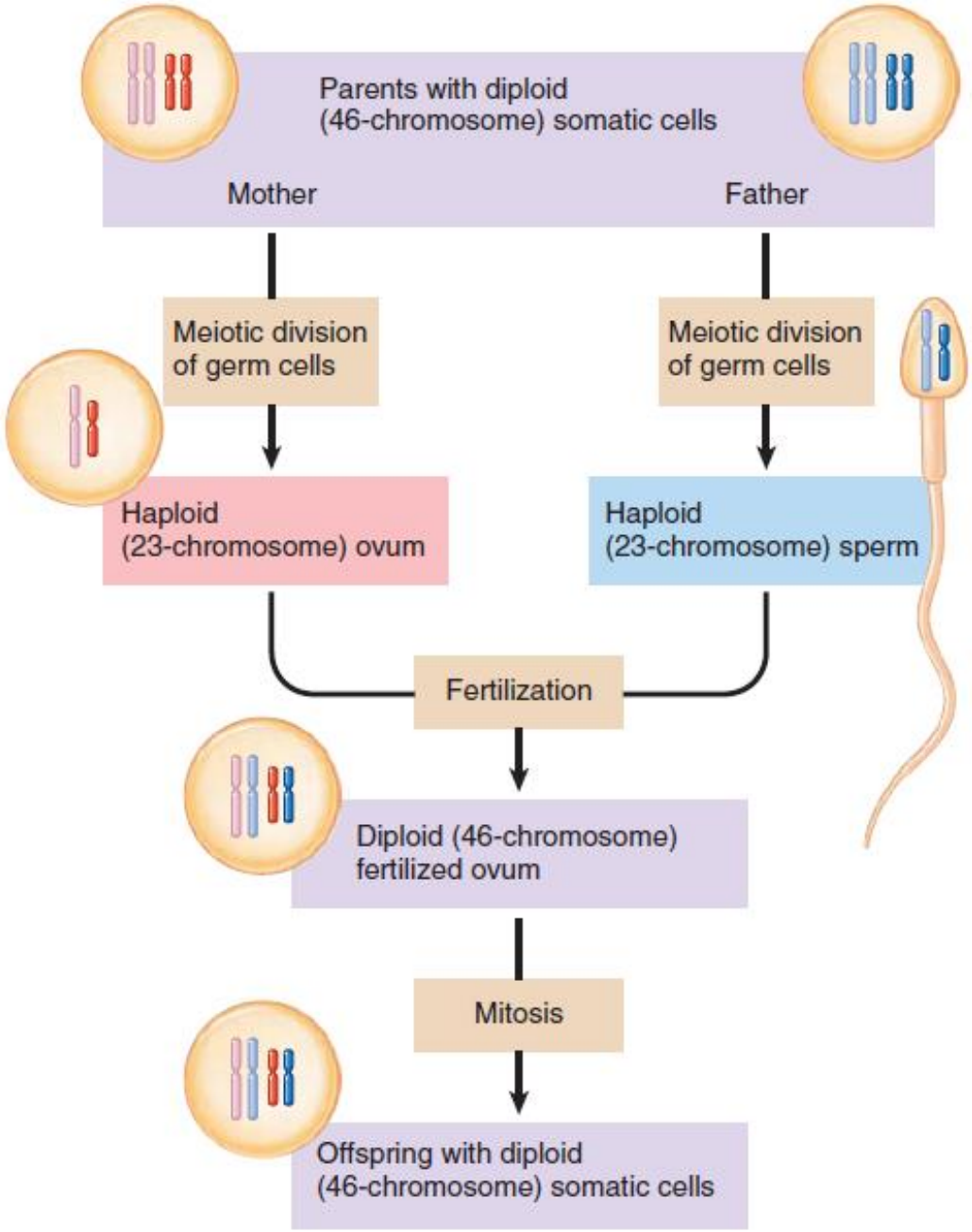


Figure 82-3. Oogenesis and follicle development.



● **FIGURE 20-14 Oogenesis.** Compare with ● Figure 20-8, p. 753, spermatogenesis.



Chromosomal Distribution in Sexual Reproduction

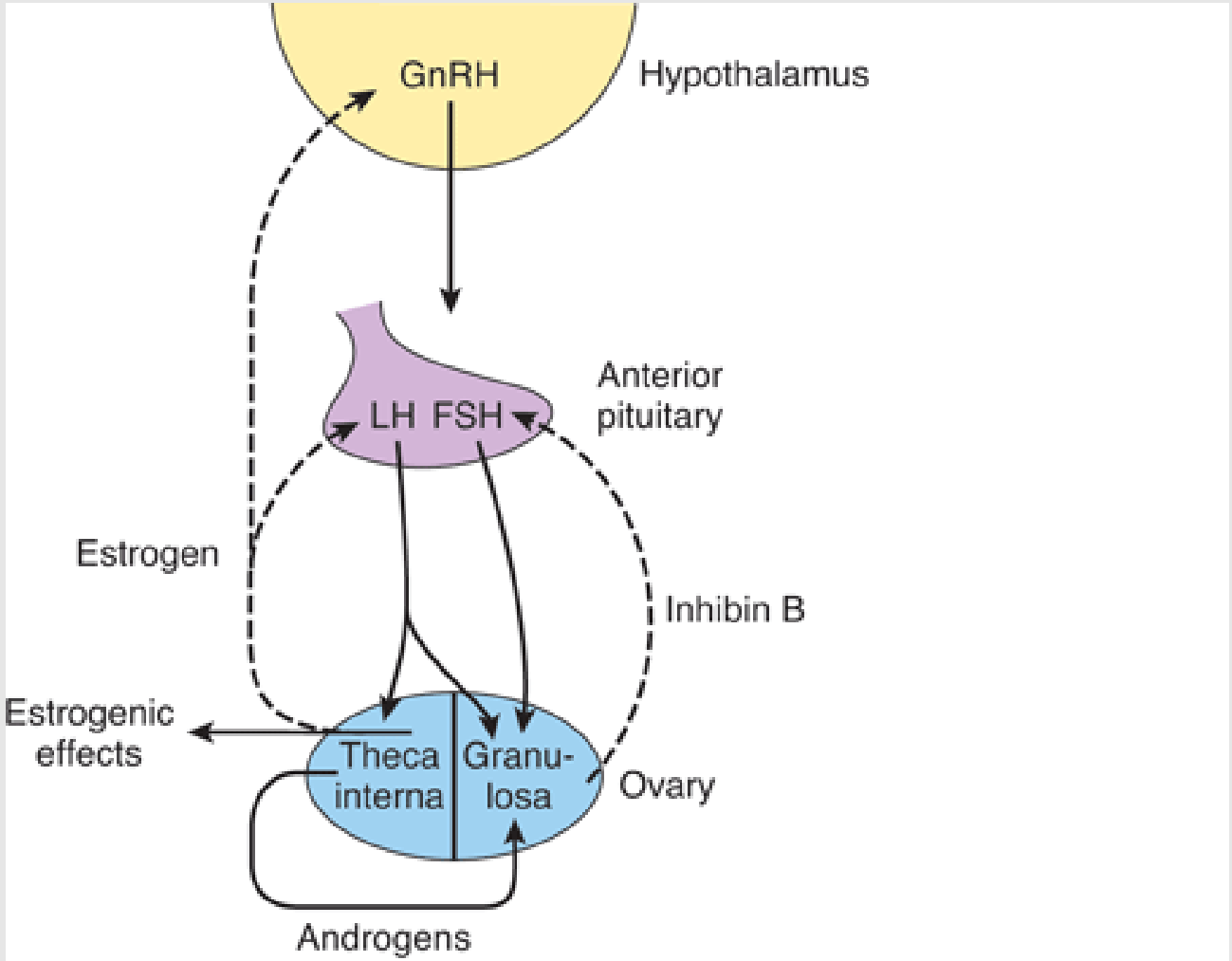
Female Reproductive Hormones

A hypothalamic releasing hormone- **Gonadotropin-releasing hormone (GnRH)**

The anterior pituitary

follicle-stimulating hormone (FSH) and luteinizing hormone (LH)

The ovarian hormones- **Estrogen and Progesterone**



Source: Barrett KE, Barman SM, Boitano S, Brooks H: *Ganong's Review of Medical Physiology, 23rd Edition*: http://www.accessmedicine.com

IN THE OVARIES

PRODUCED HORMONES

IN THE BRAIN

ESTROGENS

IMPORTANT ROLE IN SEXUAL & REPRODUCTIVE DEVELOPMENT

PROGESTERONE

FACILITATES THE IMPLANTATION OF THE FERTILIZED EGG

LH

FACILITATES OVULATION

FSH

STIMULATES FOLLICULAR PRODUCTION

PREMENSTRUAL SYNDROME

PMS

Premenstrual Syndrome

- affects emotions, physical health, and behavior during menstrual cycle usually just before menses
- symptoms start 5 to 11 days before menstruation and typically go away once menstruation begins
- Cause of PMS is unknown

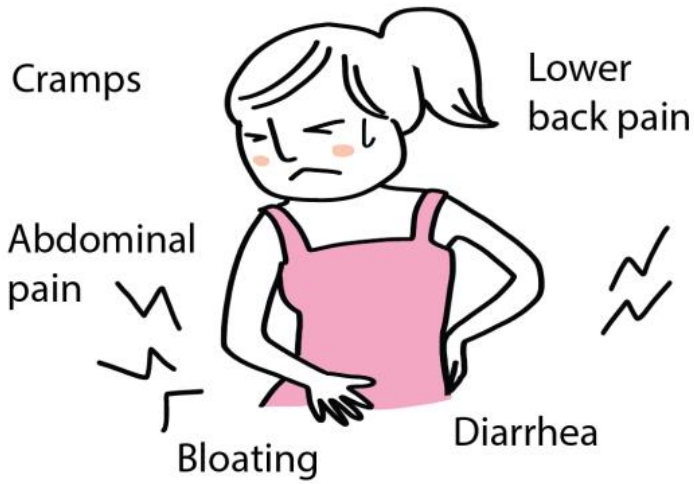
Causes of Premenstrual Syndrome

- a change in both sex hormone and serotonin levels at the beginning of the menstrual cycle
- ↑ estrogen, progesterone & ovarian steroids can cause mood swings, irritability and anxiety
- Serotonin levels (↓) affect mood

https://www.mayoclinic.org/diseases-conditions/premenstrual-syndrome/symptoms-causes/syc-20376780

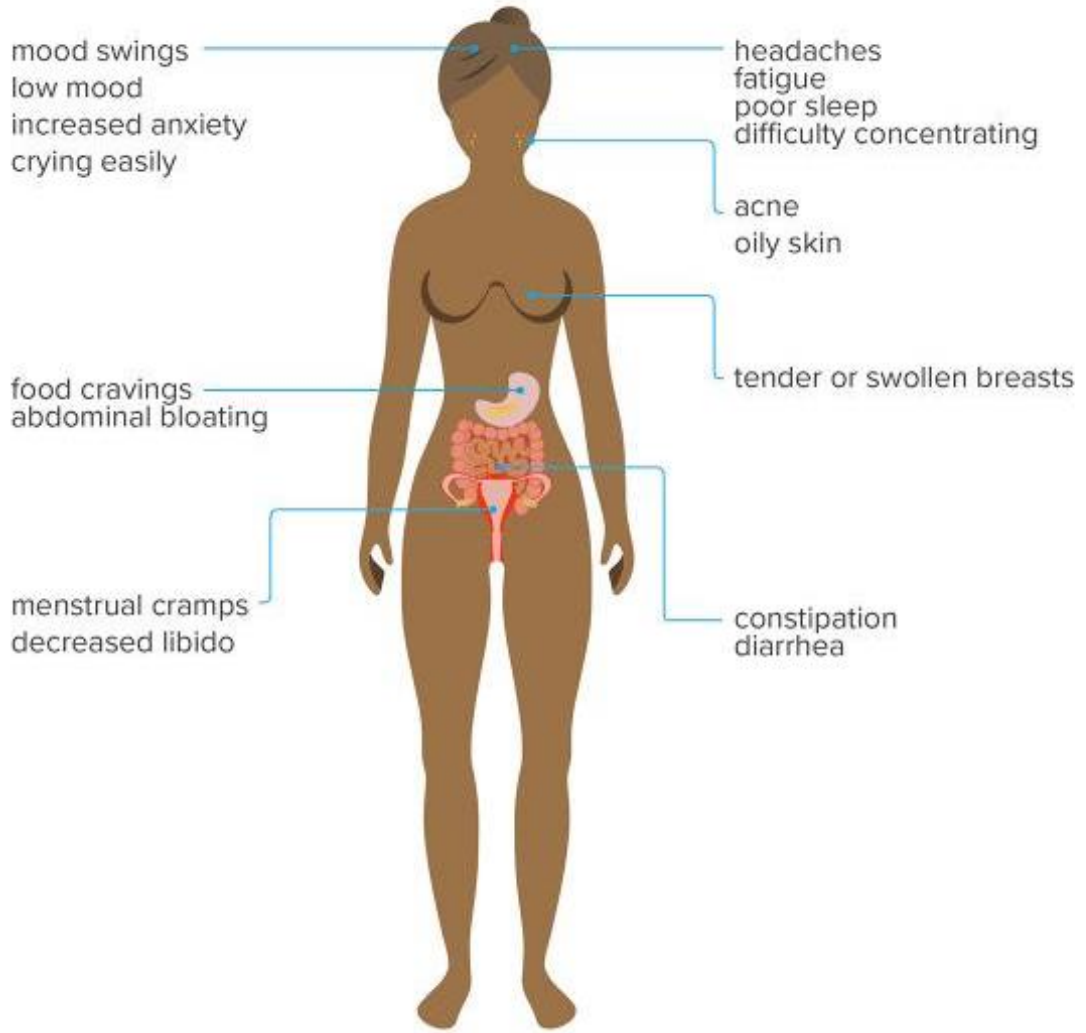
PMS symptoms

Premenstrual Syndrome



Effects on the Body

Premenstrual Syndrome (PMS)




BALANCED
DIET


Any
questions
?

References

- Guyton and Hall
- Sherwood Physiology
- Ganong’s Physiology


Thank you