

Chapter

8

Prokaryotic chromosome

Plasma membrane

Cell wall

1

Duplication of chromosome and separation of copies

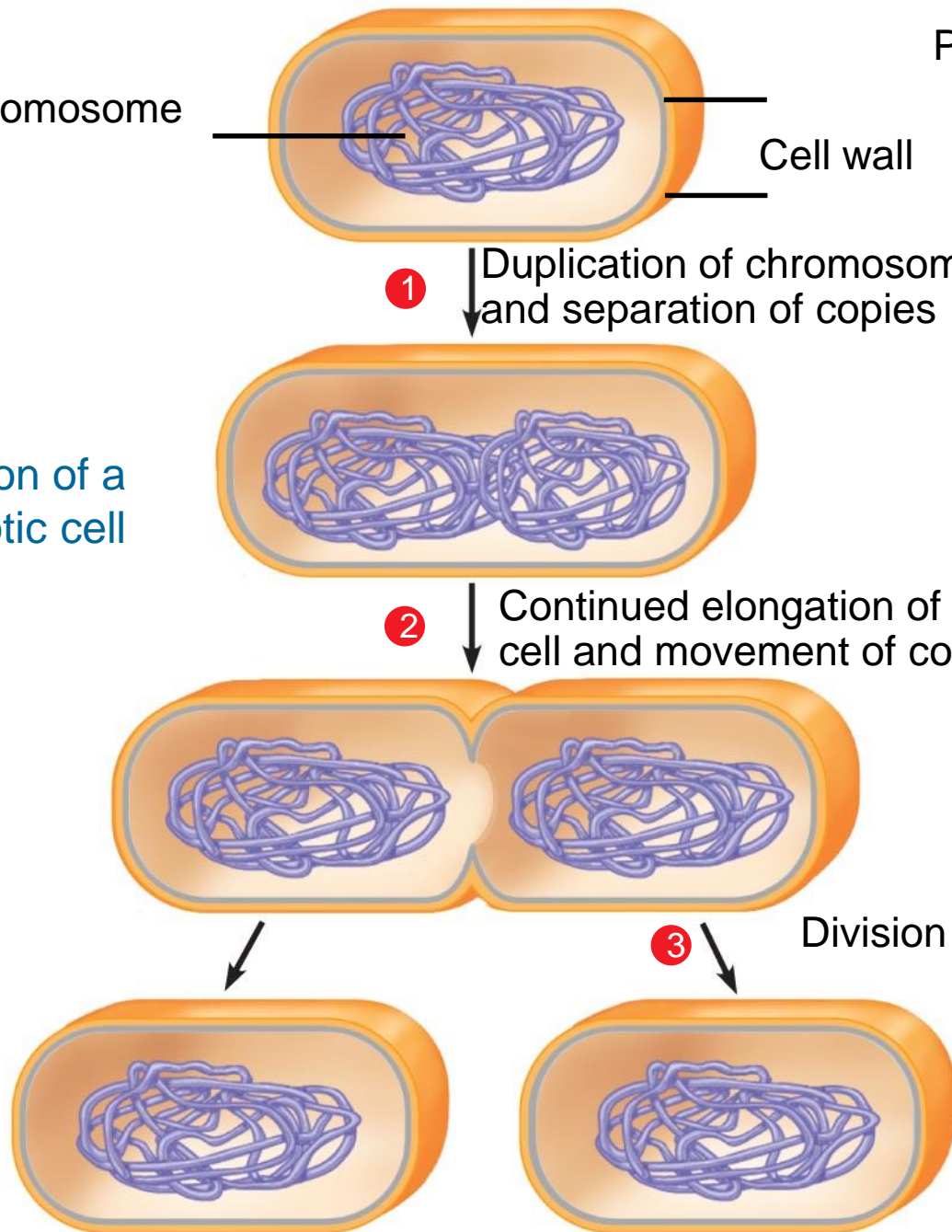
Binary fission of a prokaryotic cell

2

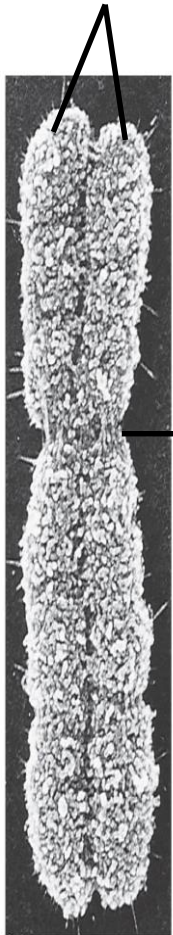
Continued elongation of the cell and movement of copies

3

Division into two daughter cells



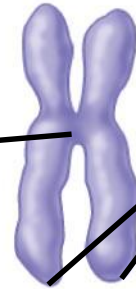
Sister chromatids



Centromere

Electron micrograph
of a duplicated chromosome

Chromosome duplication



Sister chromatids



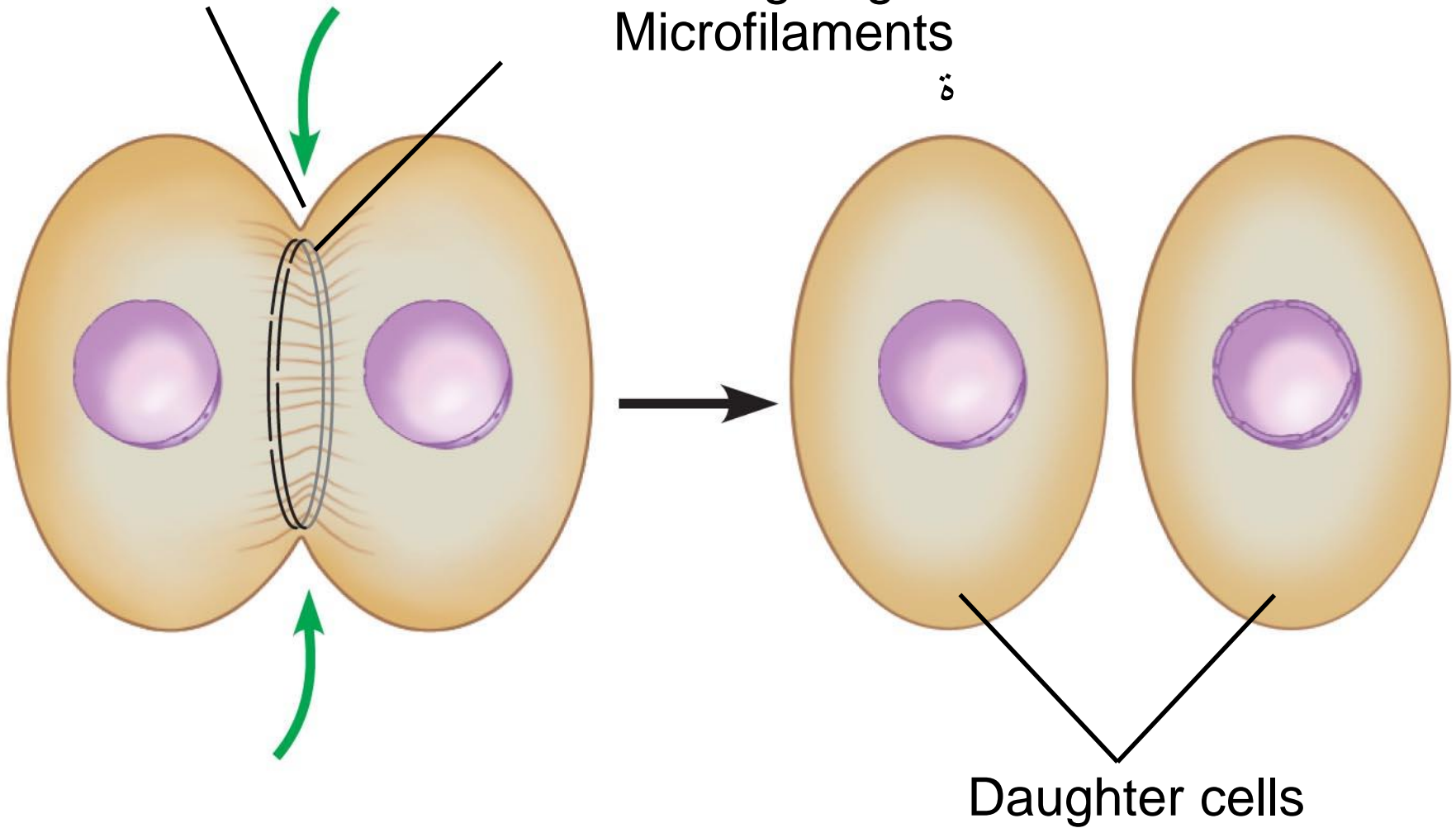
Chromosome
distribution
to
daughter
cells

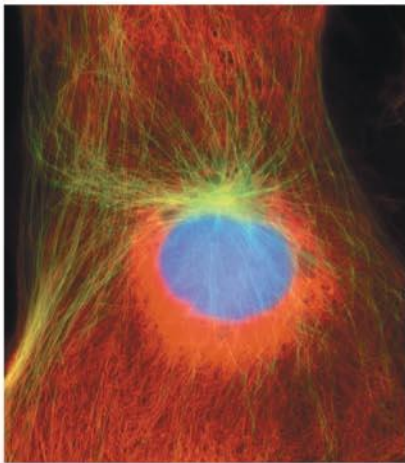


Chromosome duplication
and distribution

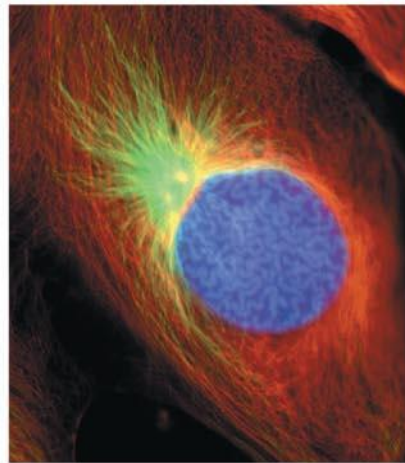
Cleavage furrow

Contracting ring of
Microfilaments
 δ

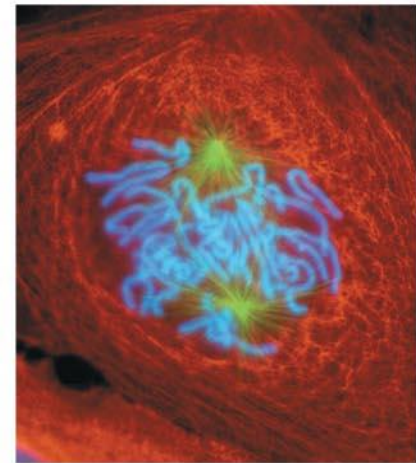




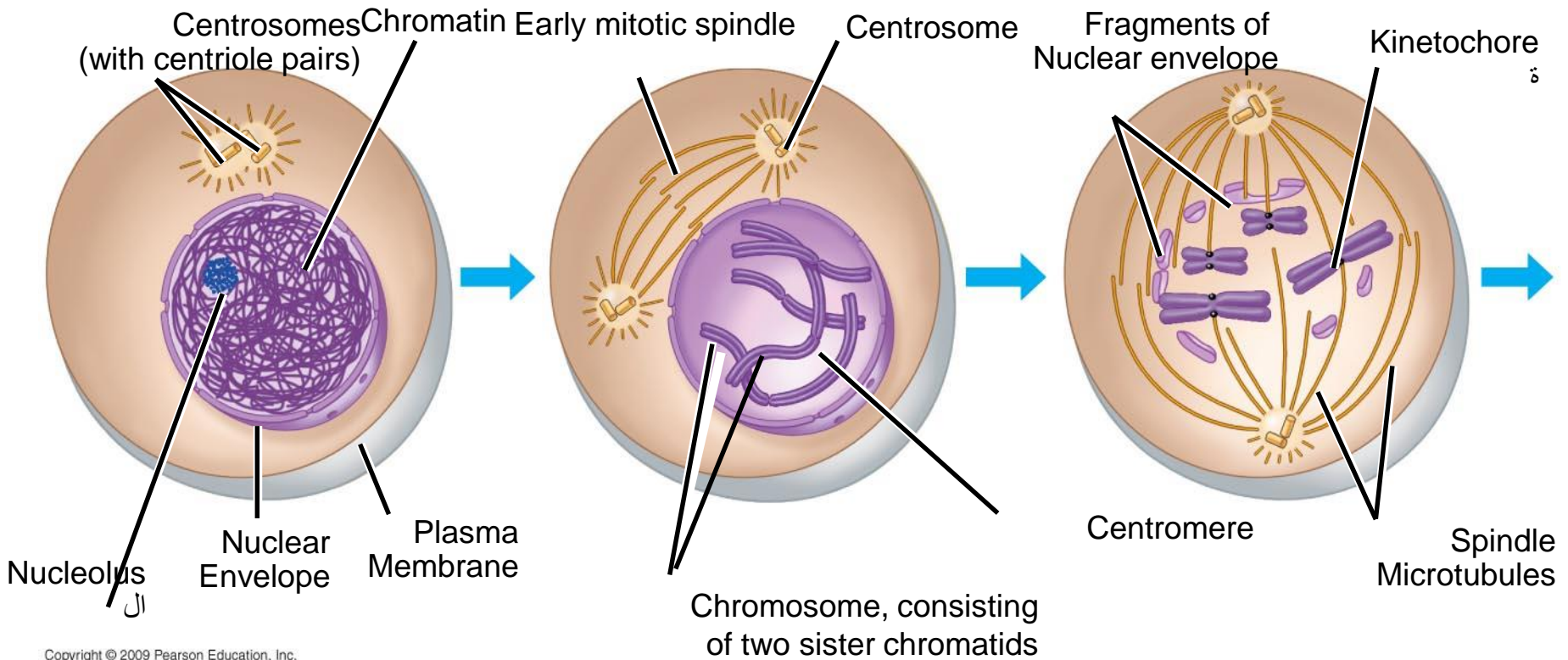
INTERPHASE

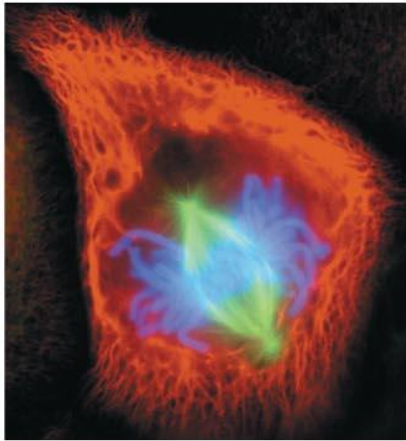


PROPHASE

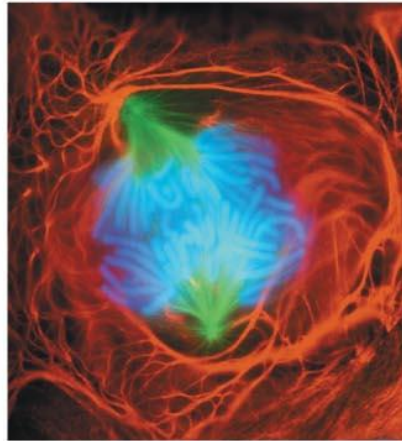


PROMETAPHASE

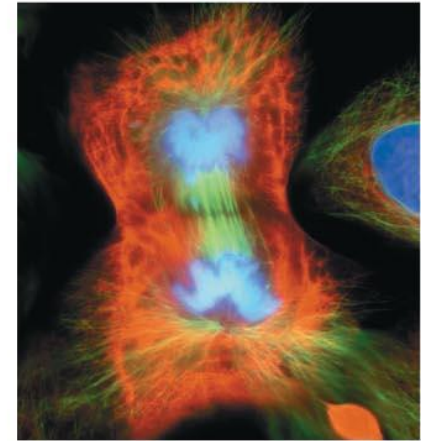




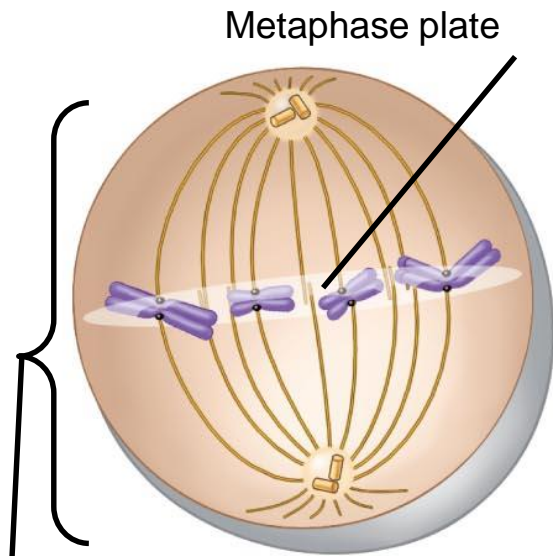
METAPHASE



ANAPHASE

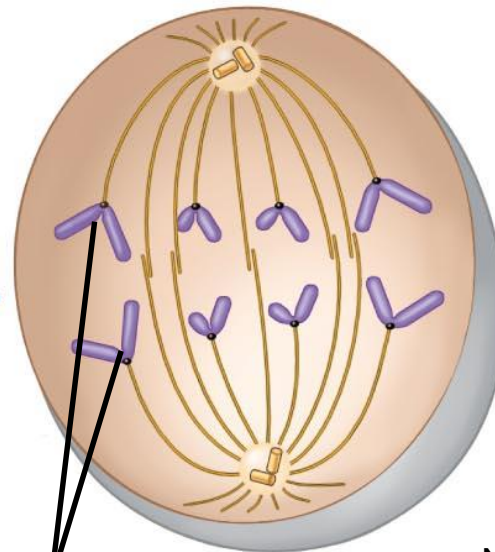


TELOPHASE AND CYTOKINESIS

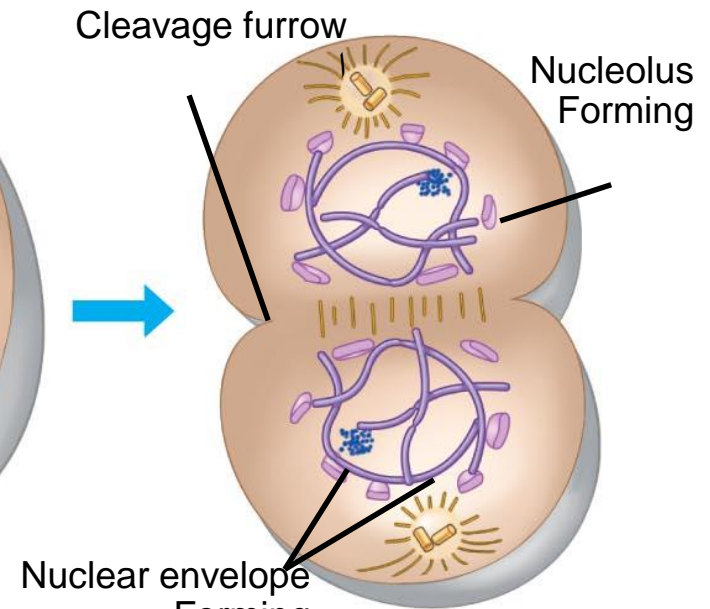


Spindle

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Daughter chromosomes



Nuclear envelope Forming

MEIOSIS I: Homologous chromosomes separate

الانقسام الاختزالي الأول: انفصال الأزواج الكروموزومية المتماثلة

INTERPHASE

الطور البيني

PROPHASE I

الطور التمهيدي الأول

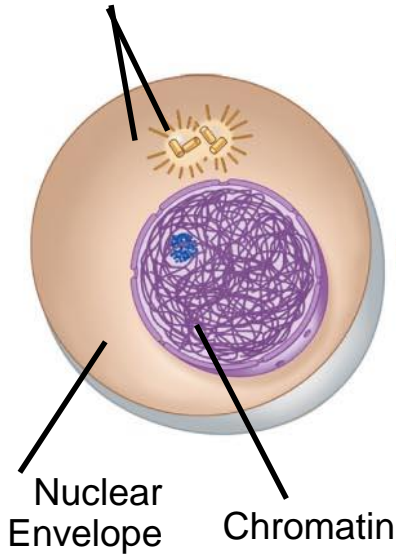
METAPHASE I

الطور الاستوائي الأول

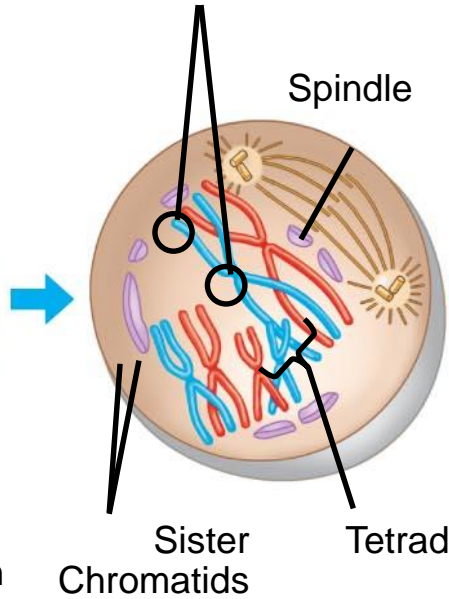
ANAPHASE I

الطور الانفصالي الأول

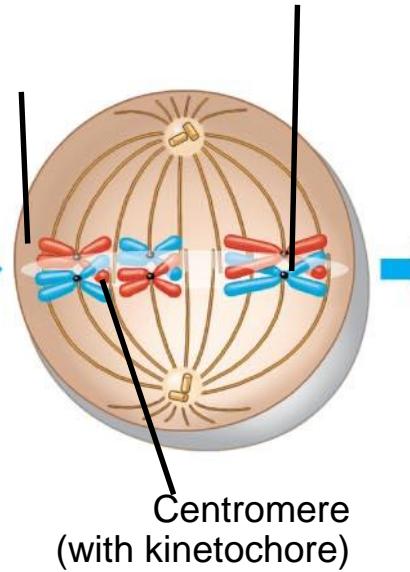
Centrosomes (with Centriole pairs)



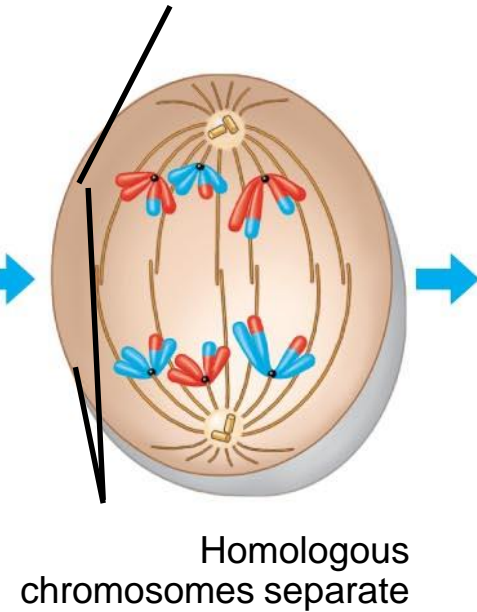
Sites of crossing over



Microtubules attached to Kinetochore



Sister chromatids remain attached



The stages of meiosis I



MEIOSIS II: Sister chromatids separate
الانقسام الاختزالي الثاني: انفصال الكروماتيدات الشقيقة

TELOPHASE I
AND CYTOKINESIS

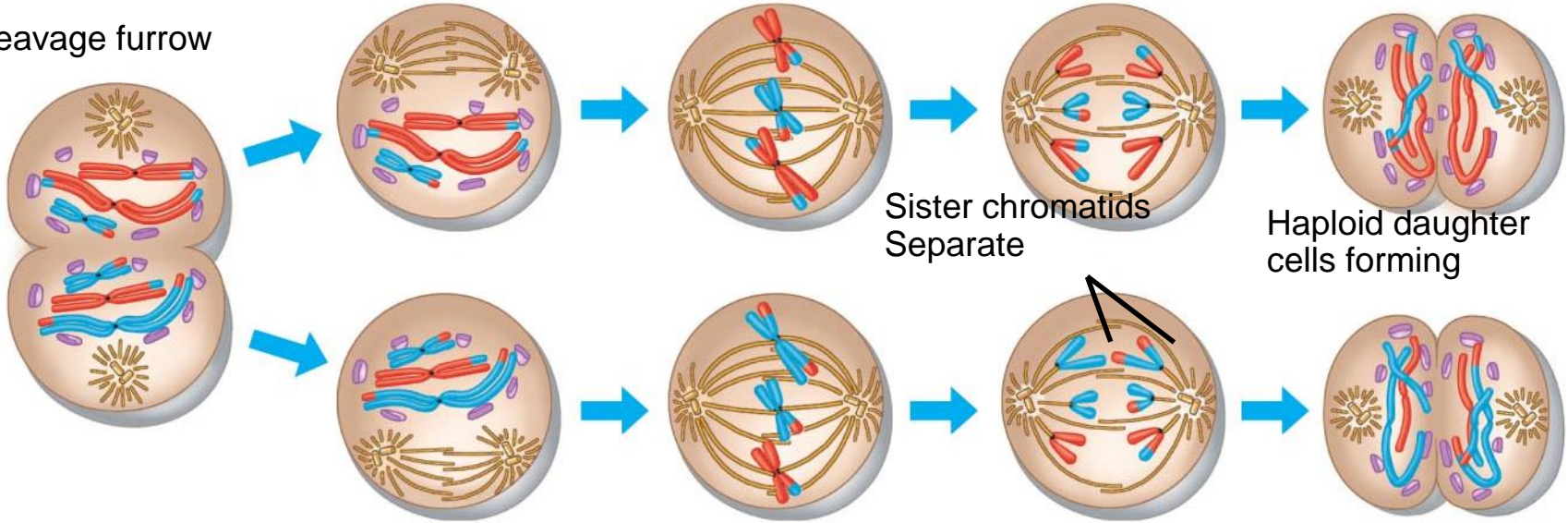
PROPHASE II

METAPHASE II

ANAPHASE II

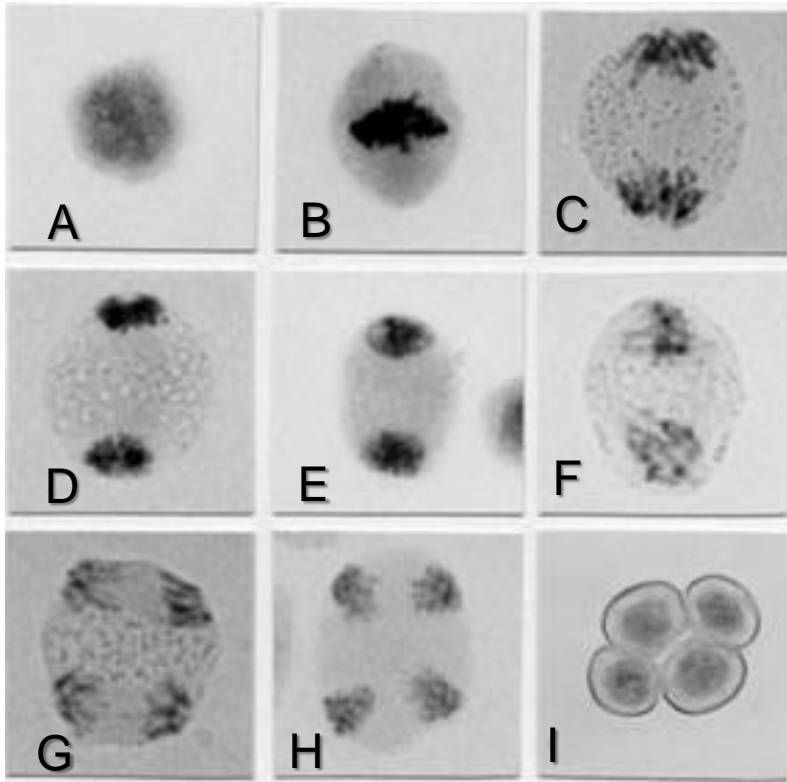
TELOPHASE II
AND CYTOKINESIS

Cleavage furrow

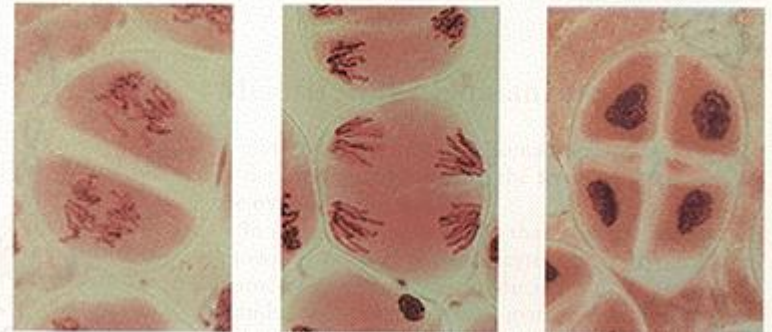
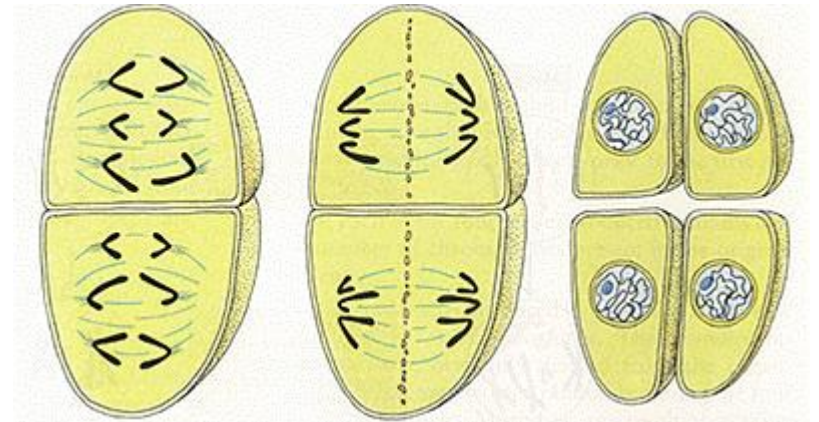


The stages of miosis II

MEIOSIS



- A. PROPHASE I
- B. METAPHASE I
- C. ANAPHASE I
- D. TELOPHASE I
- E. PROPHASE II
- F. METAPHASE II
- G. ANAPHASE II
- H. TELOPHASE II
- I. TETRAD

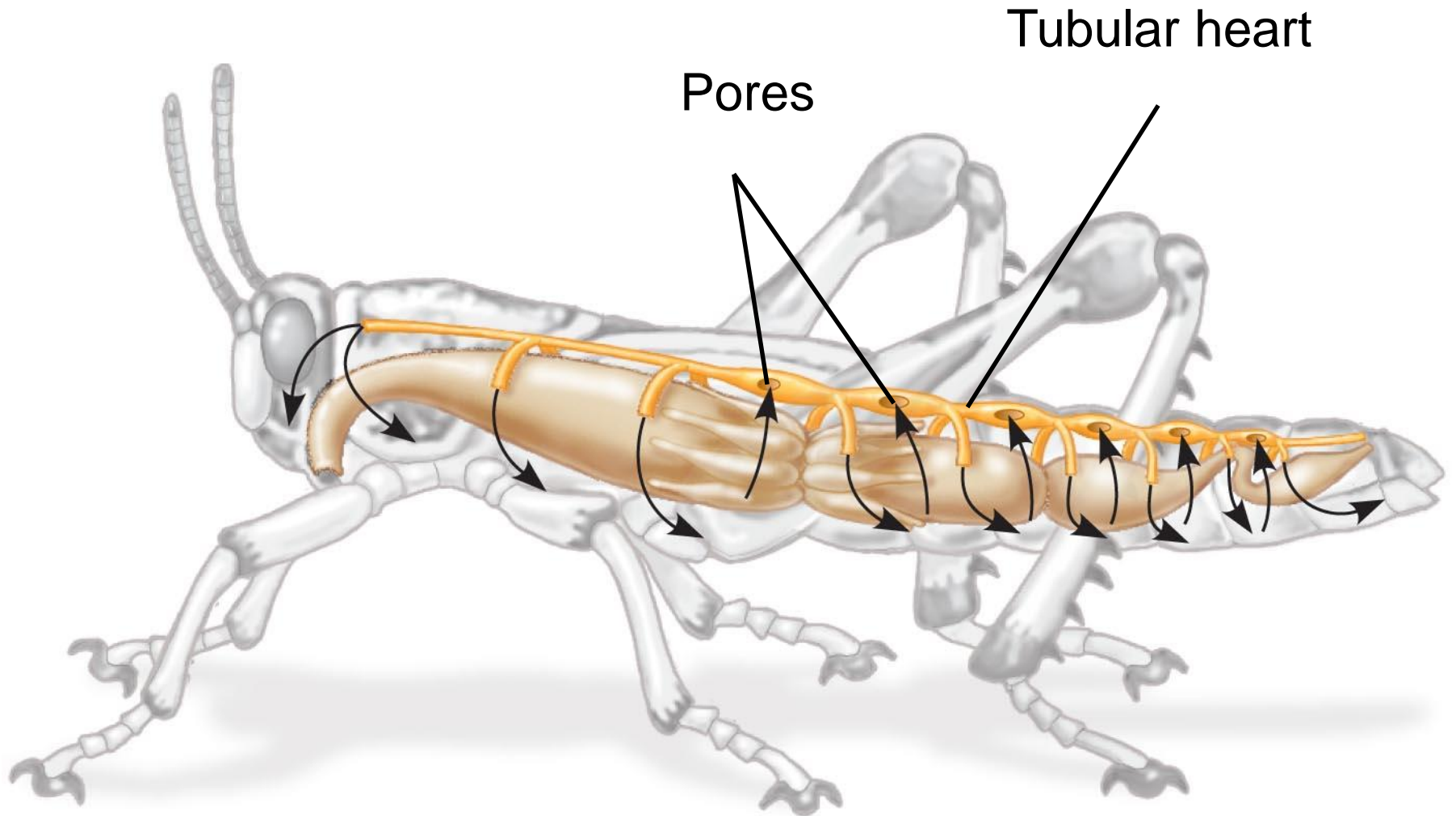


ANAPHASE II

TELOPHASE II

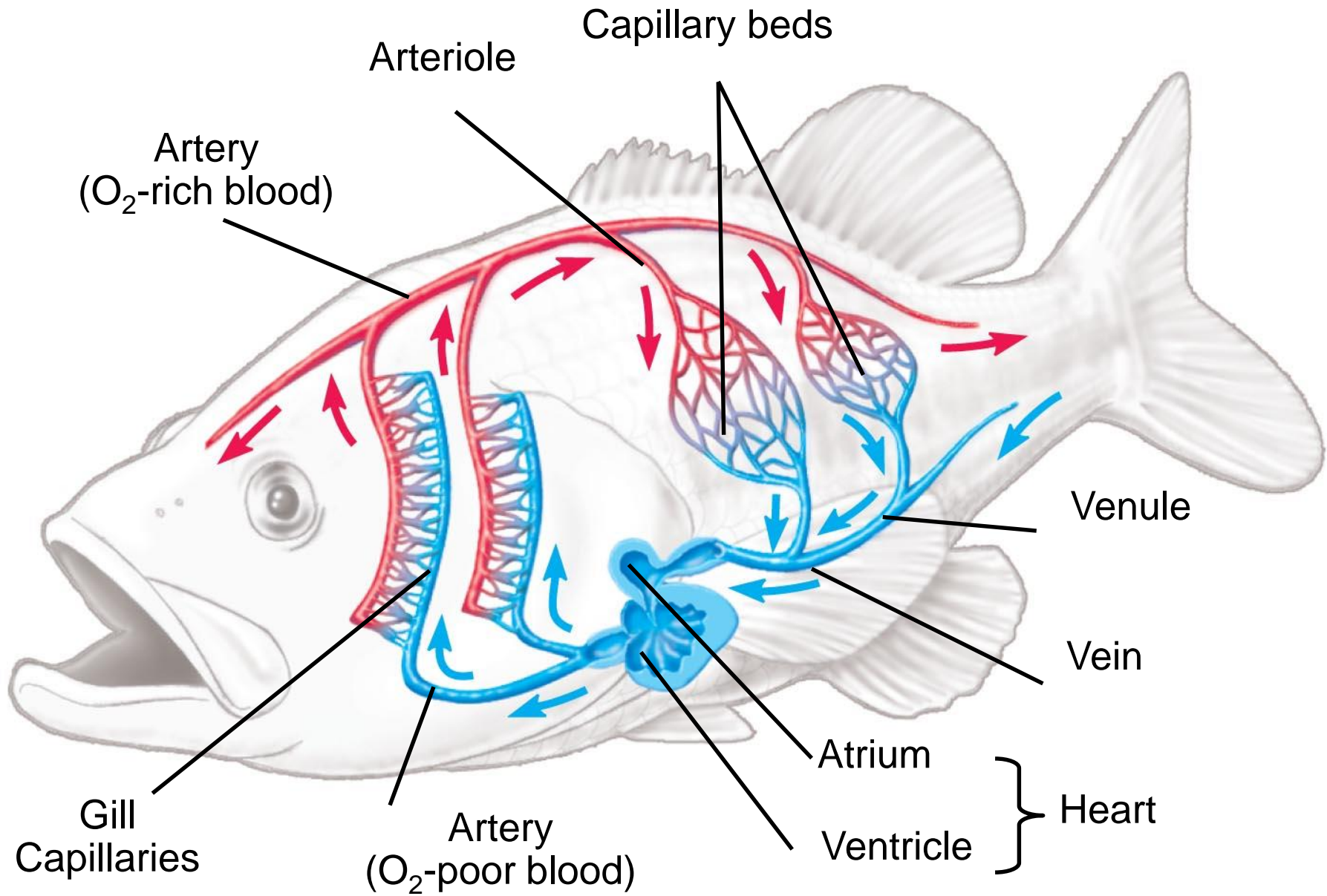
TETRAD

Chapter
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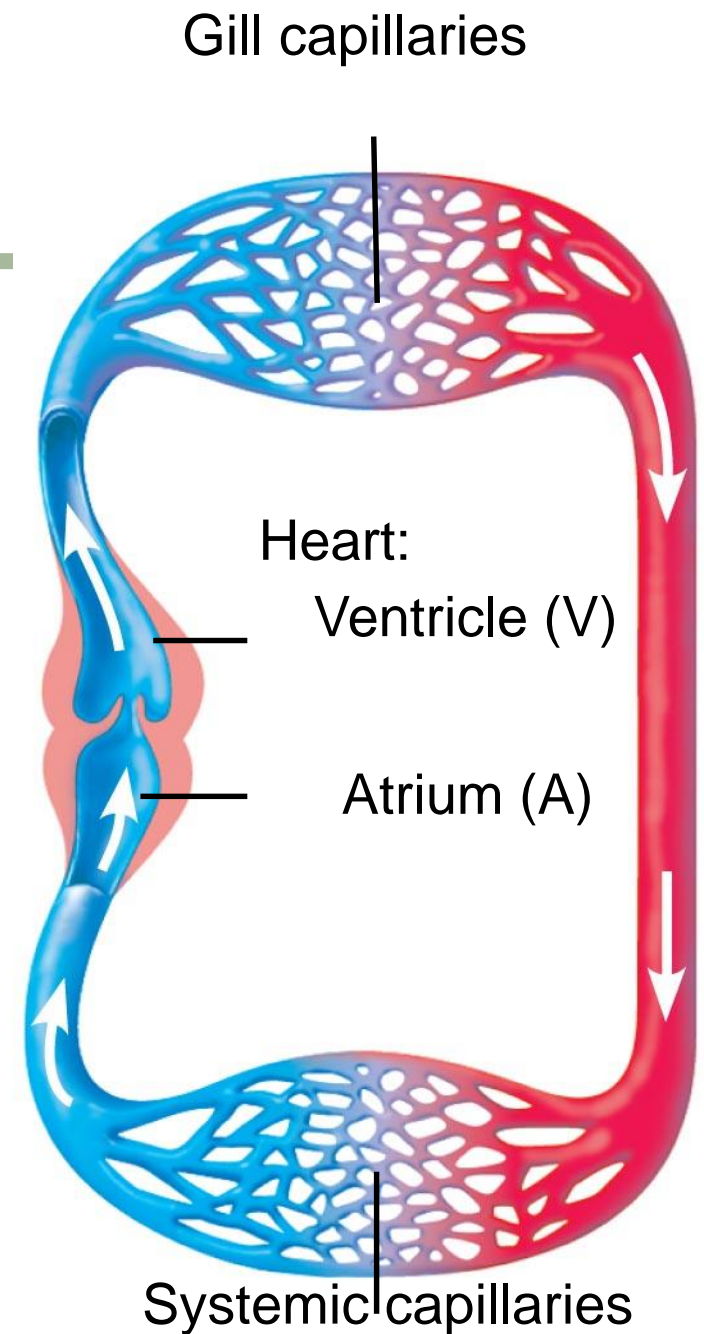
The open circulatory system (vessels in gold) in a grasshopper



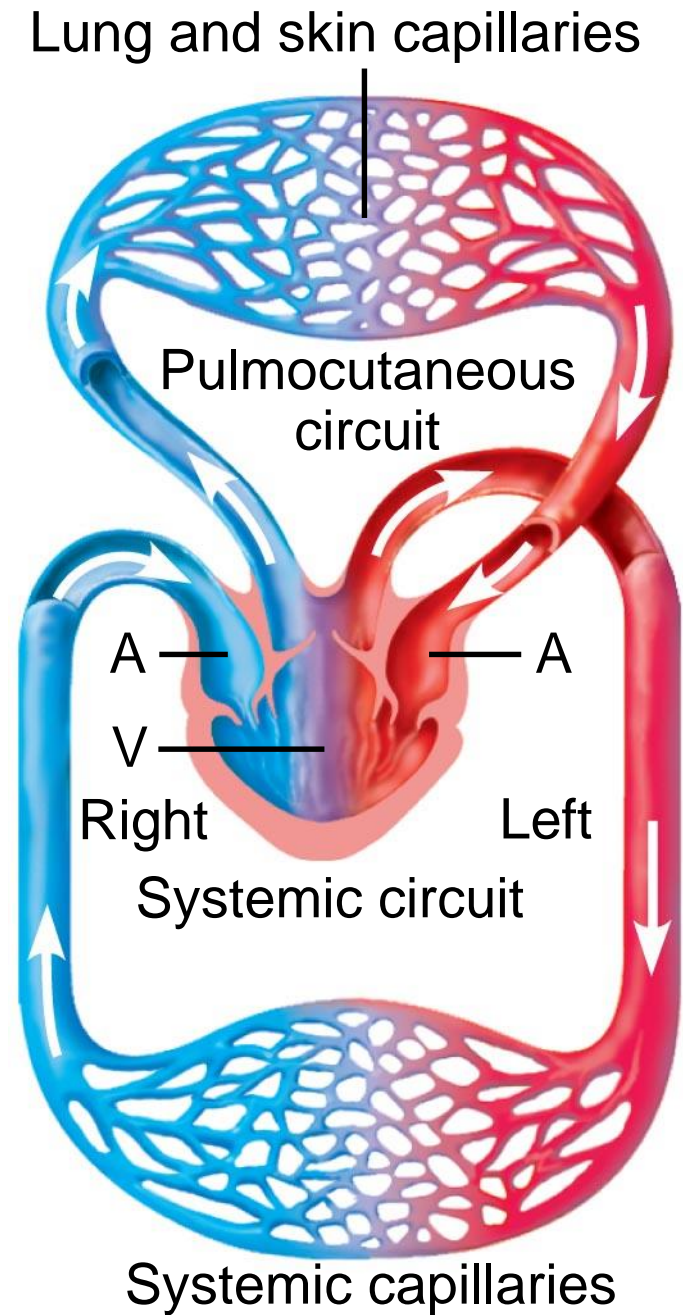
The closed circulatory system in a fish

23.2 EVOLUTION CONNECTION: Vertebrate Cardiovascular systems reflect evolution

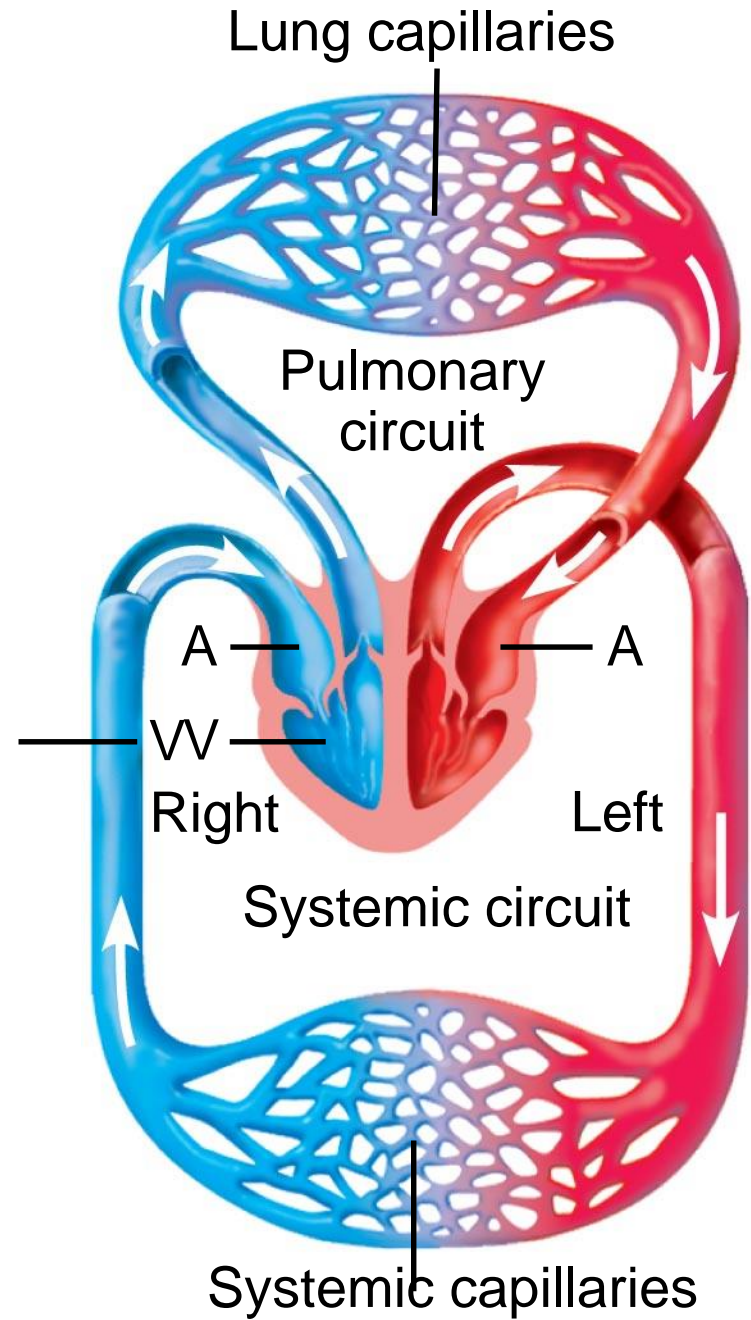
- **Two-chambered heart** in fish pumps blood in a single circuit From gill capillaries To systemic capillaries Back to heart



The double circulation and three-chambered heart of an amphibian

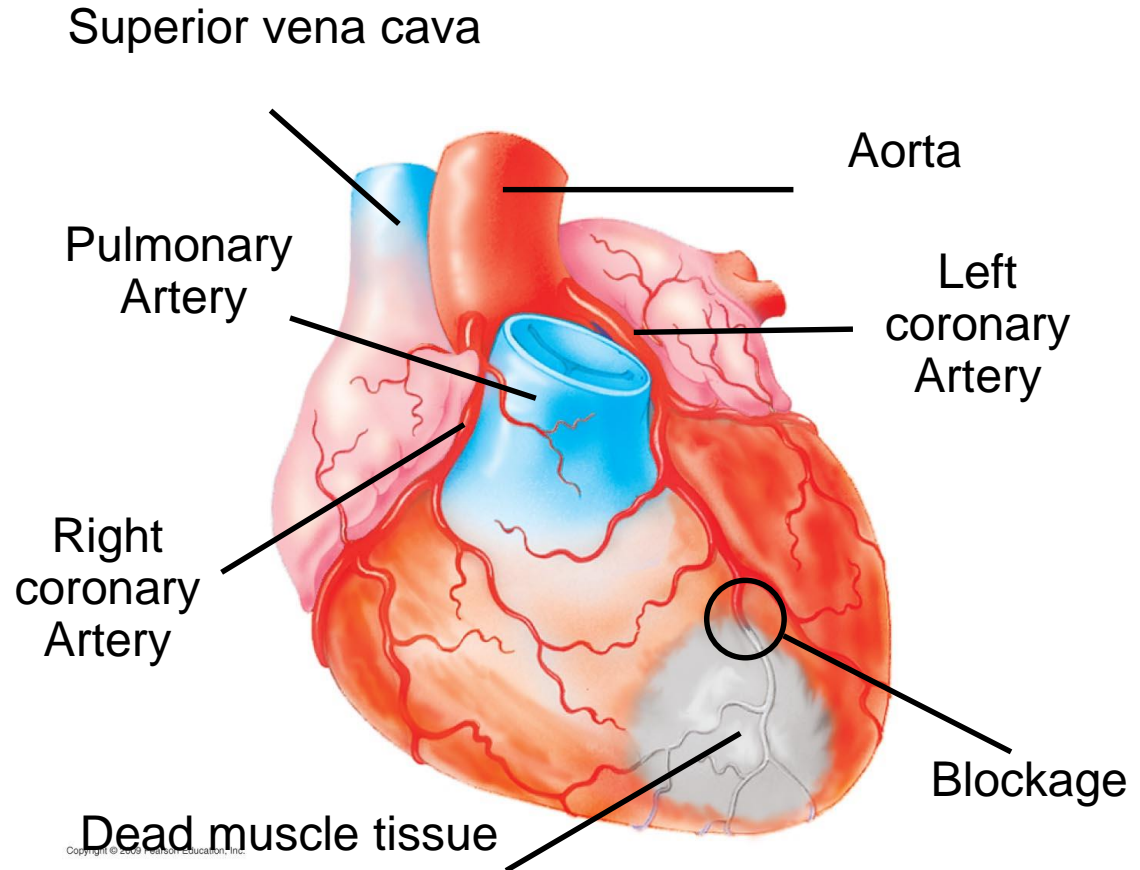


**The double circulation
and four-chambered
heart of a bird or
mammal**



23.6 CONNECTION: What is a heart attack?

- **A heart attack is damage to cardiac muscle typically from a blocked coronary artery**
- **Stroke** Death of brain tissue from blocked arteries in the head

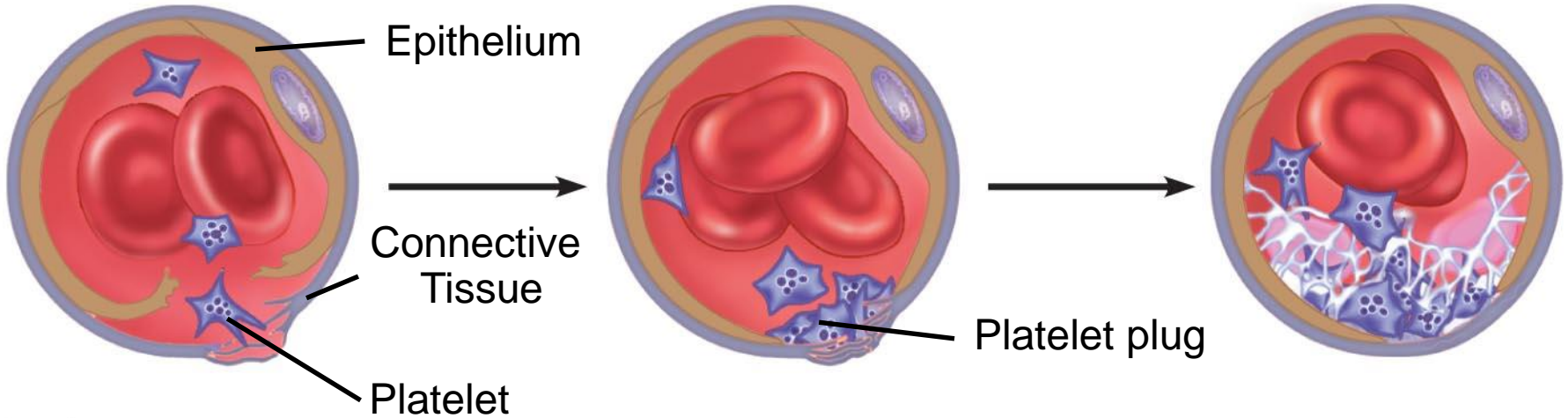


Blockage of a coronary artery, resulting in a heart attack

1 Platelets adhere to exposed connective tissue

2 Platelet plug Forms

3 Fibrin clot traps blood cells



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A fibrin clot

The blood-clotting process



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Chapter

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25.2 Heat is gained or lost in four ways

- **Heat exchange with the environment may occur by**

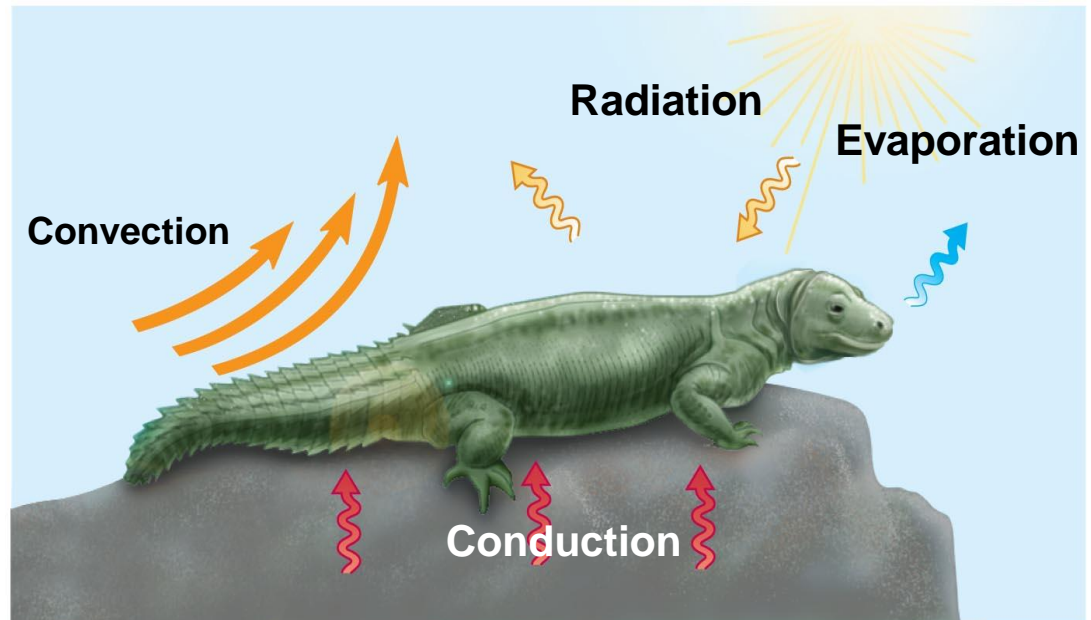
- **Conduction**

- **Convection**

- **Radiation**

- **Evaporation**

Mechanisms of
heat exchange



25.3 Thermoregulation involves adaptations that balance heat gain and loss

2- Insulation

- Hair
- Feathers
- Fat layers

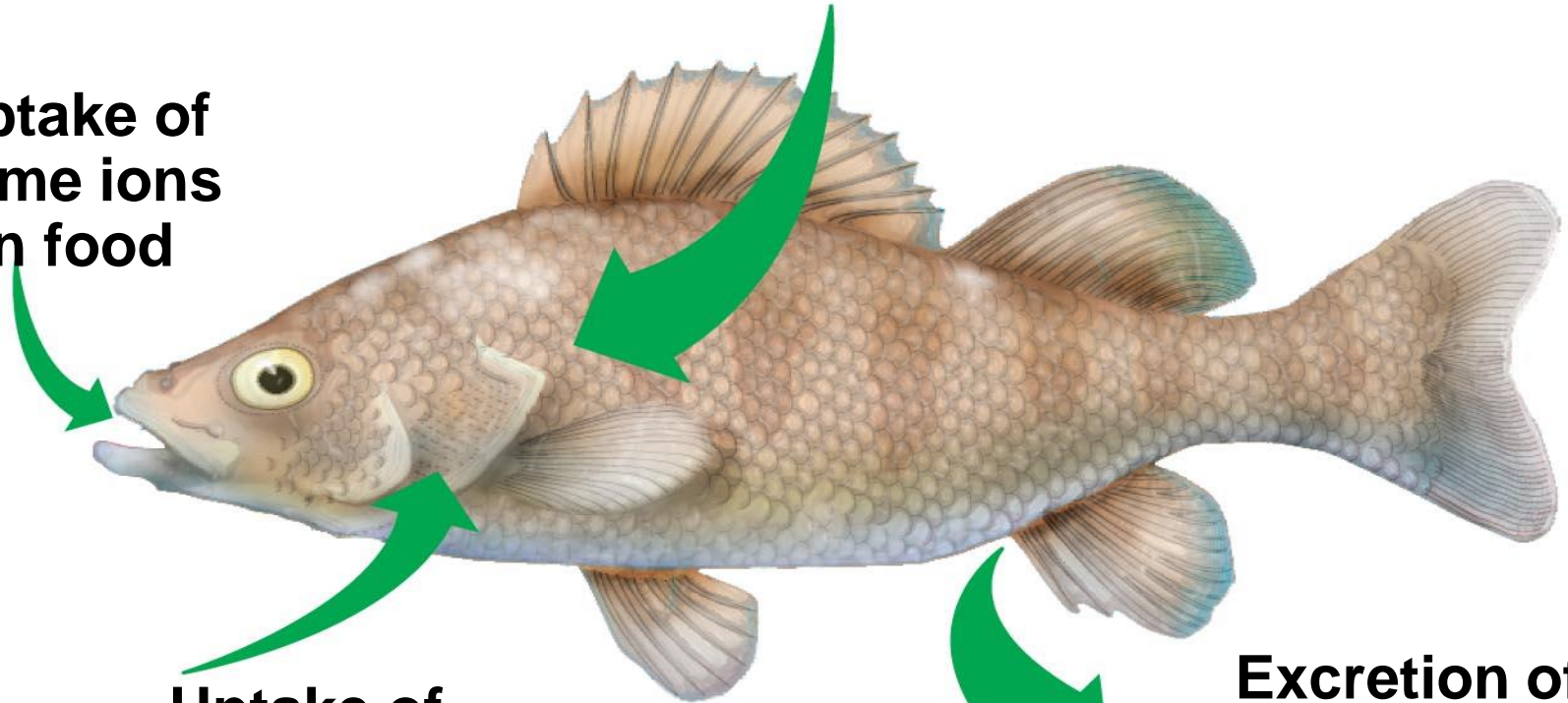


3- Circulatory adaptations

- Increased or decreased blood flow to skin
- Large ears in elephants
- Countercurrent heat exchange

Osmotic water gain through gills and other parts of body surface

Uptake of some ions in food



Uptake of salt by gills

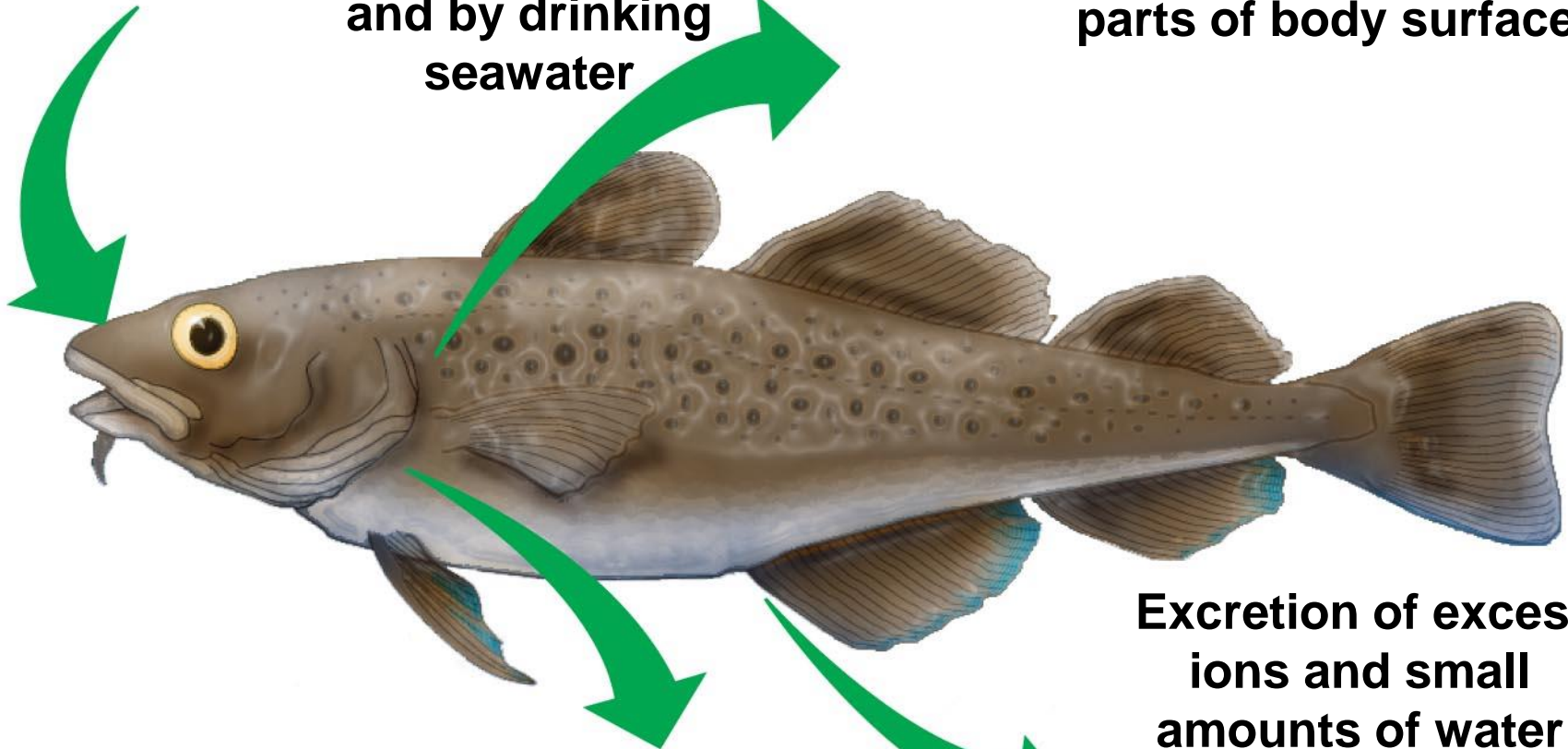
Excretion of large amounts of water in dilute urine from kidneys

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Osmoregulation in a perch, a freshwater fish

Gain of water and salt from food and by drinking seawater

Osmotic water loss through gills and other parts of body surface



Excretion of Salt from gills

Excretion of excess ions and small amounts of water in scanty urine from kidneys

Osmoregulation in a cod, a saltwater fish

Proteins

Amino acids

Nitrogenous bases

Nucleic acids

-NH₂
Amino groups



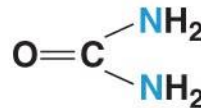
Most aquatic animals,
including most fishes



Ammonia



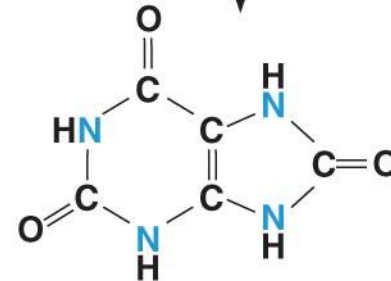
Mammals, amphibians,
sharks, some bony
fishes



Urea



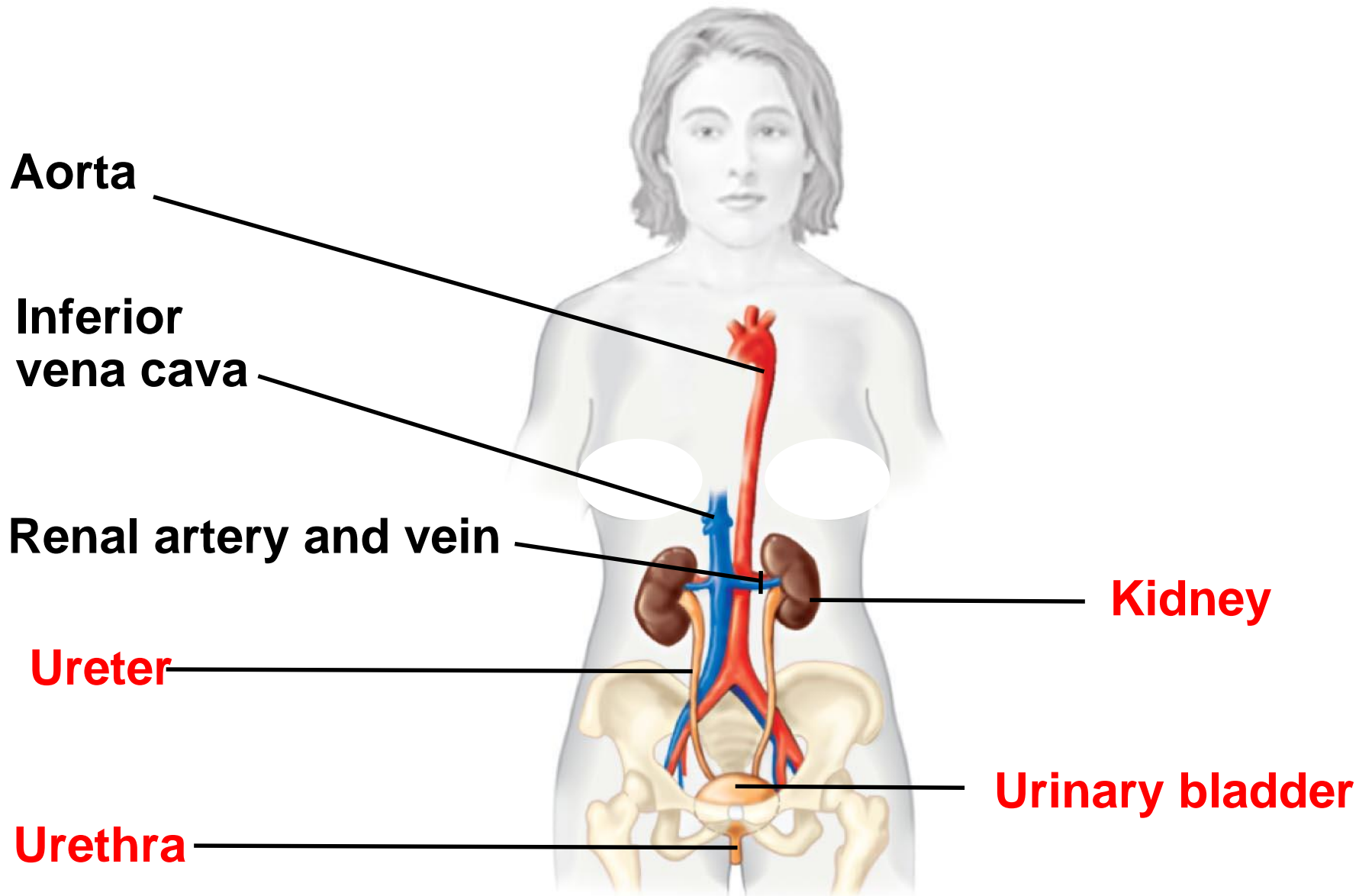
Birds and many other
reptiles, insects, land
snails

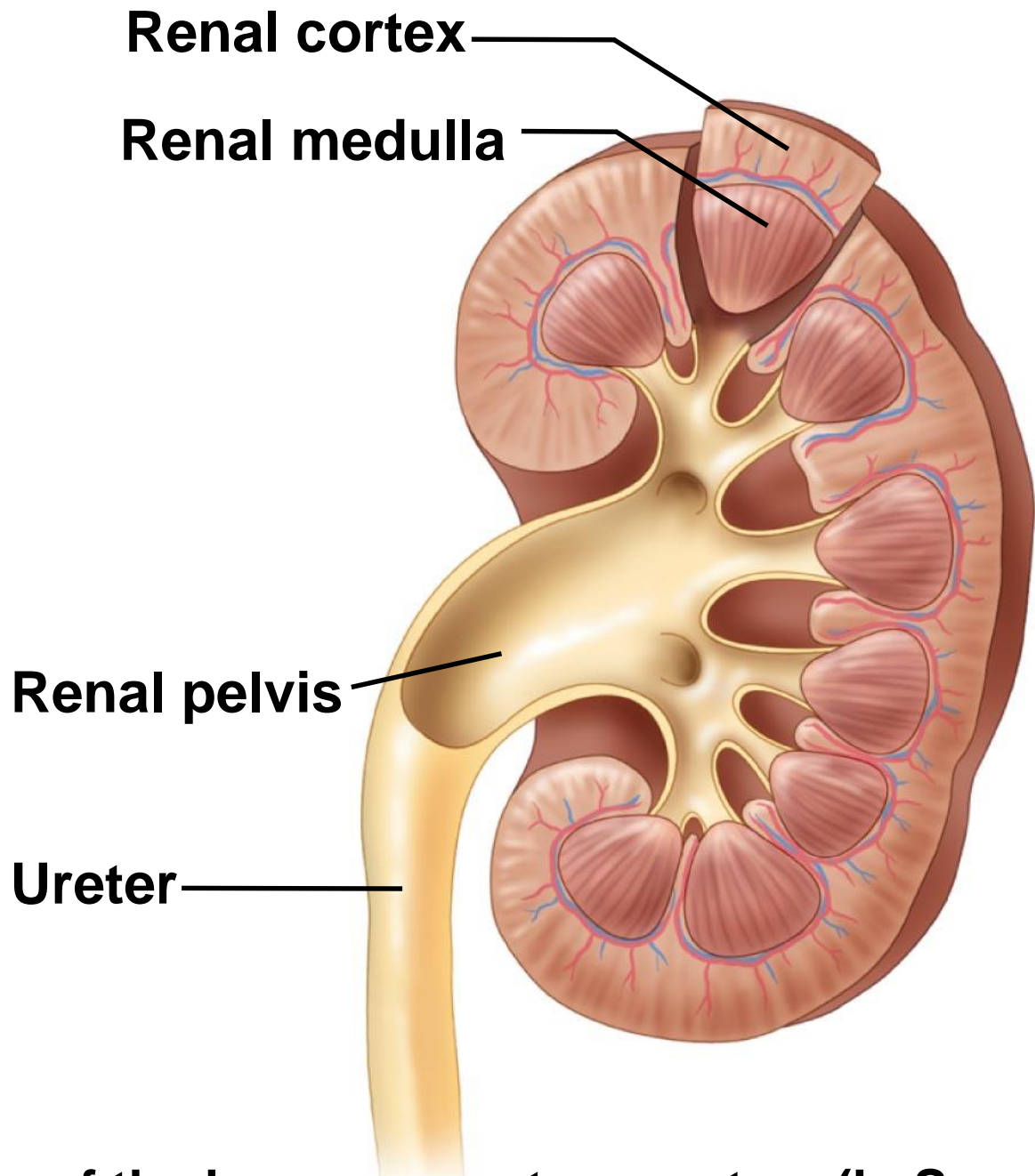


Uric acid

**Nitrogen-
containing
metabolic
waste
products**

Anatomy of the human urinary (excretory) system





Anatomy of the human excretory system (L. Sec. Kidney)

Bowman's Capsule

Tubule

Renal cortex

Renal artery

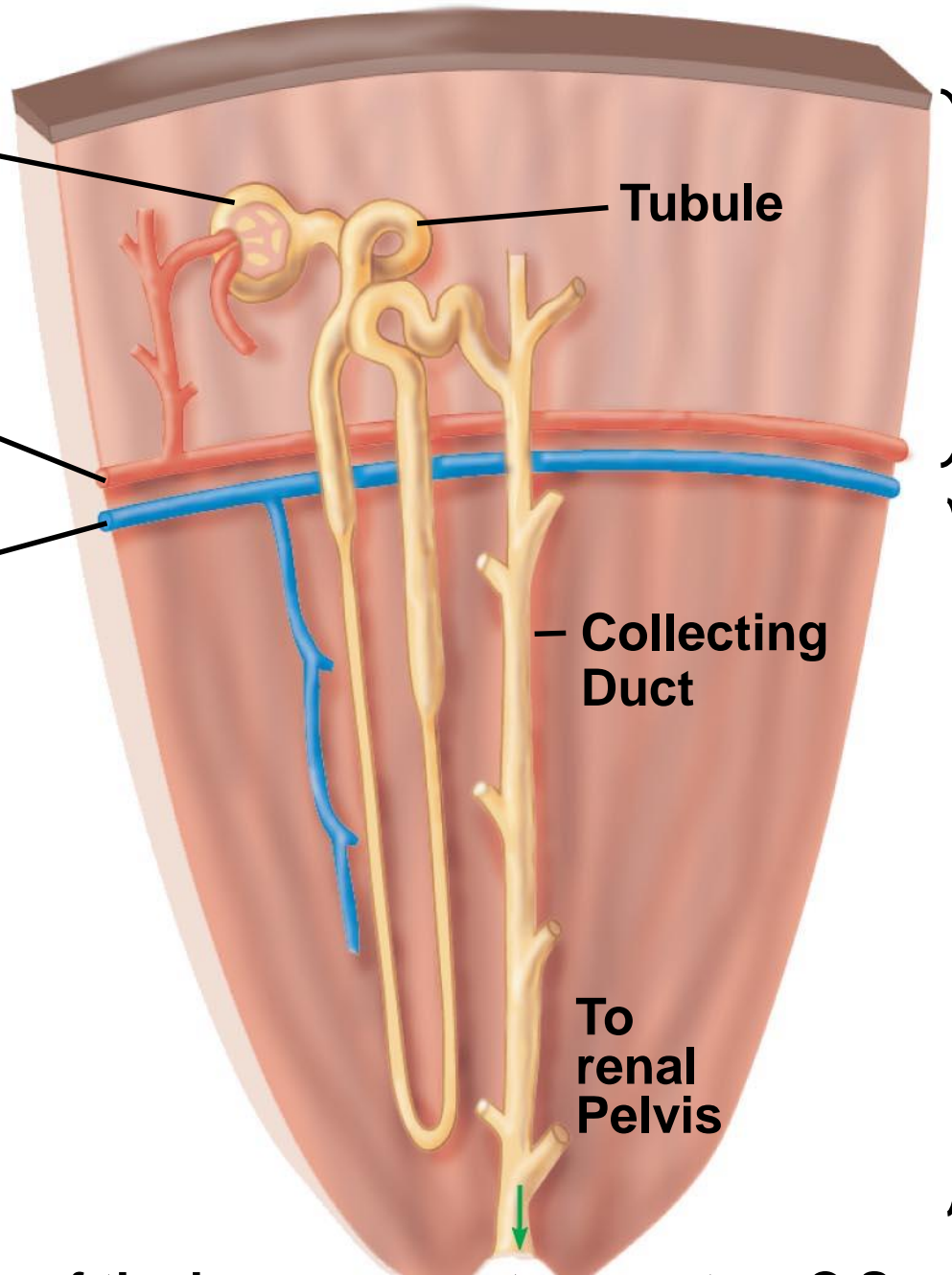
Renal vein

Collecting Duct

Renal medulla

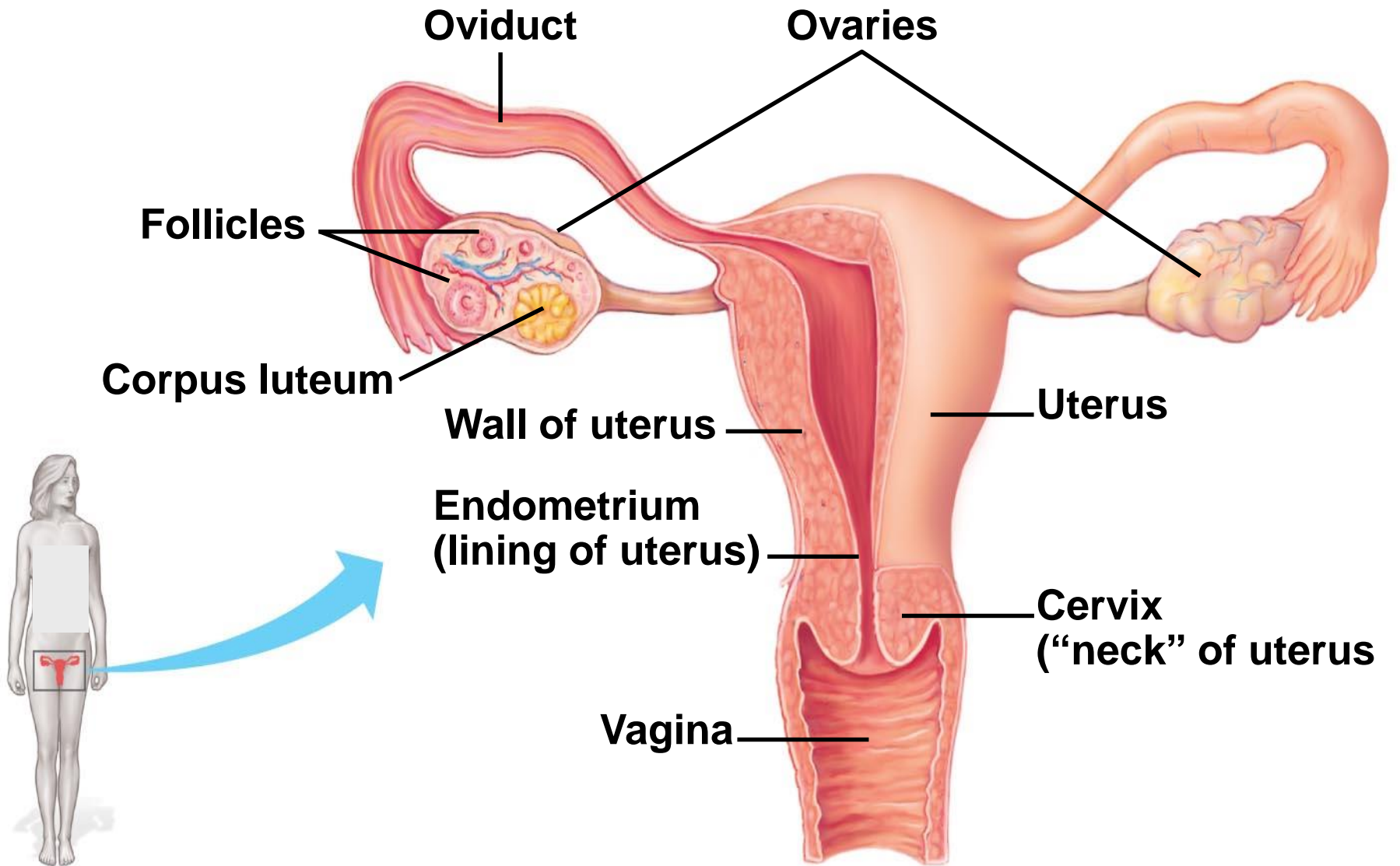
To renal Pelvis

Anatomy of the human excretory system C.Sec. Kidney



Chapter

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Front view of female reproductive anatomy (upper portion)

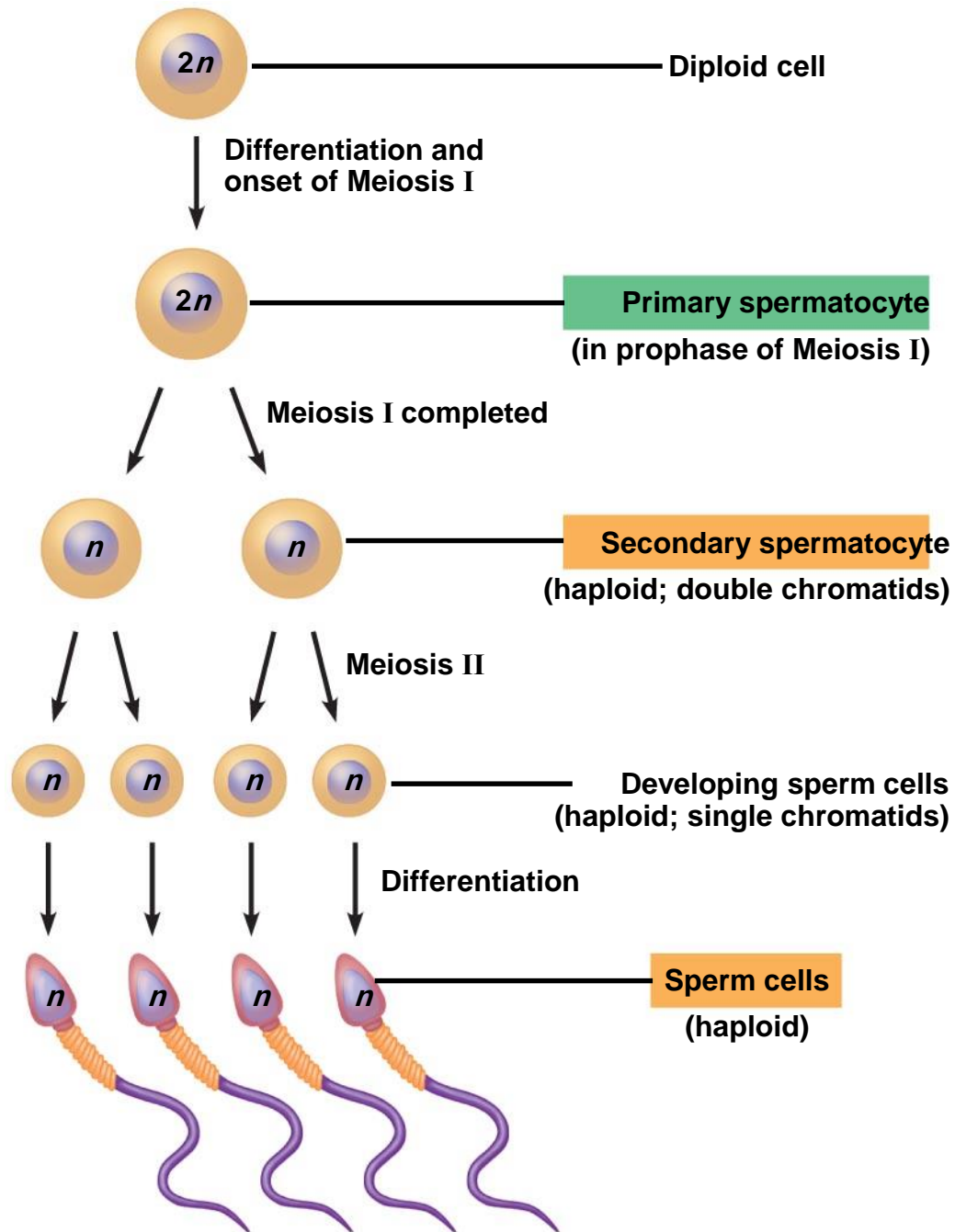
27.1 Asexual reproduction results in the generation of genetically identical offspring

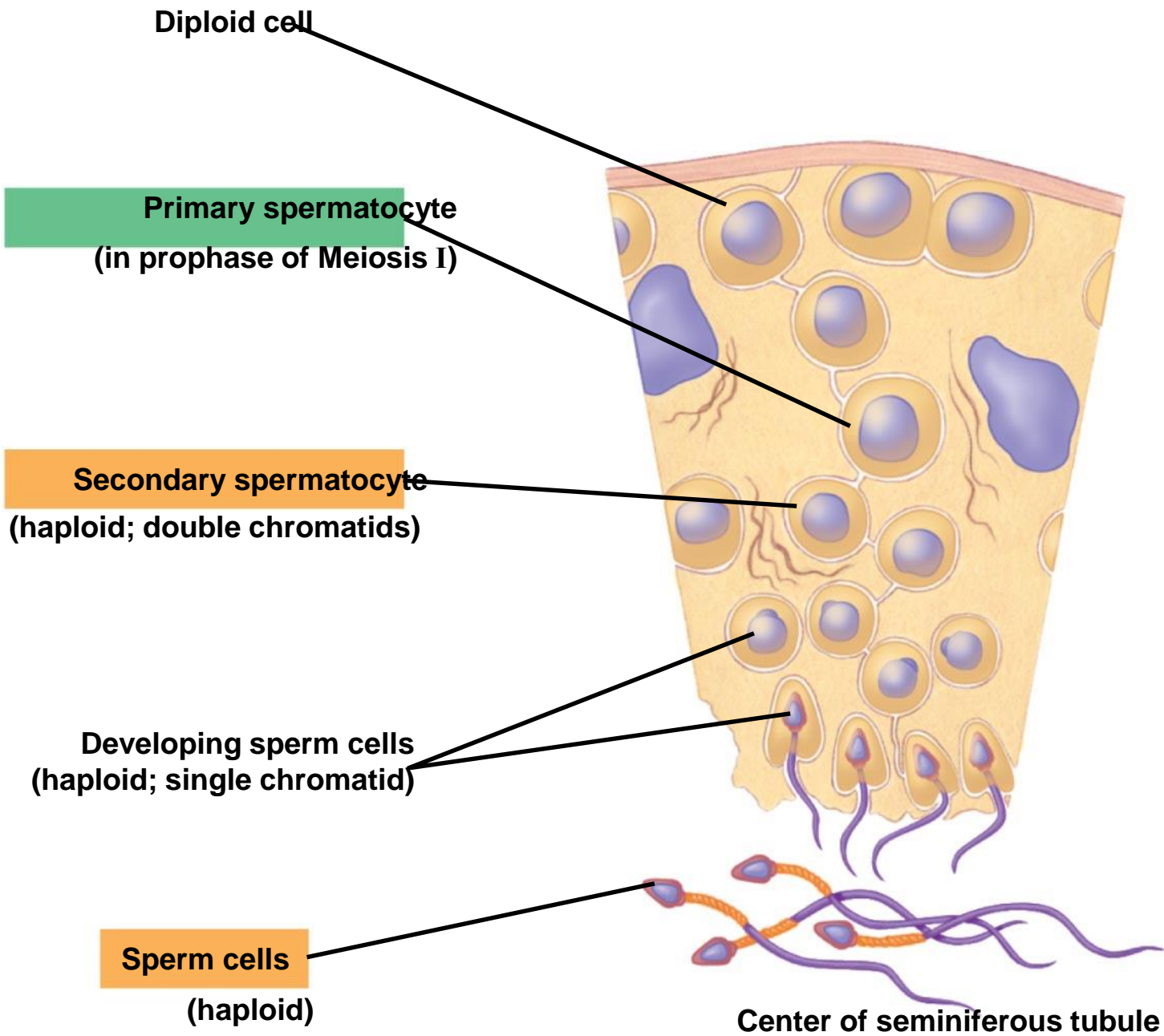
■ Asexual reproduction

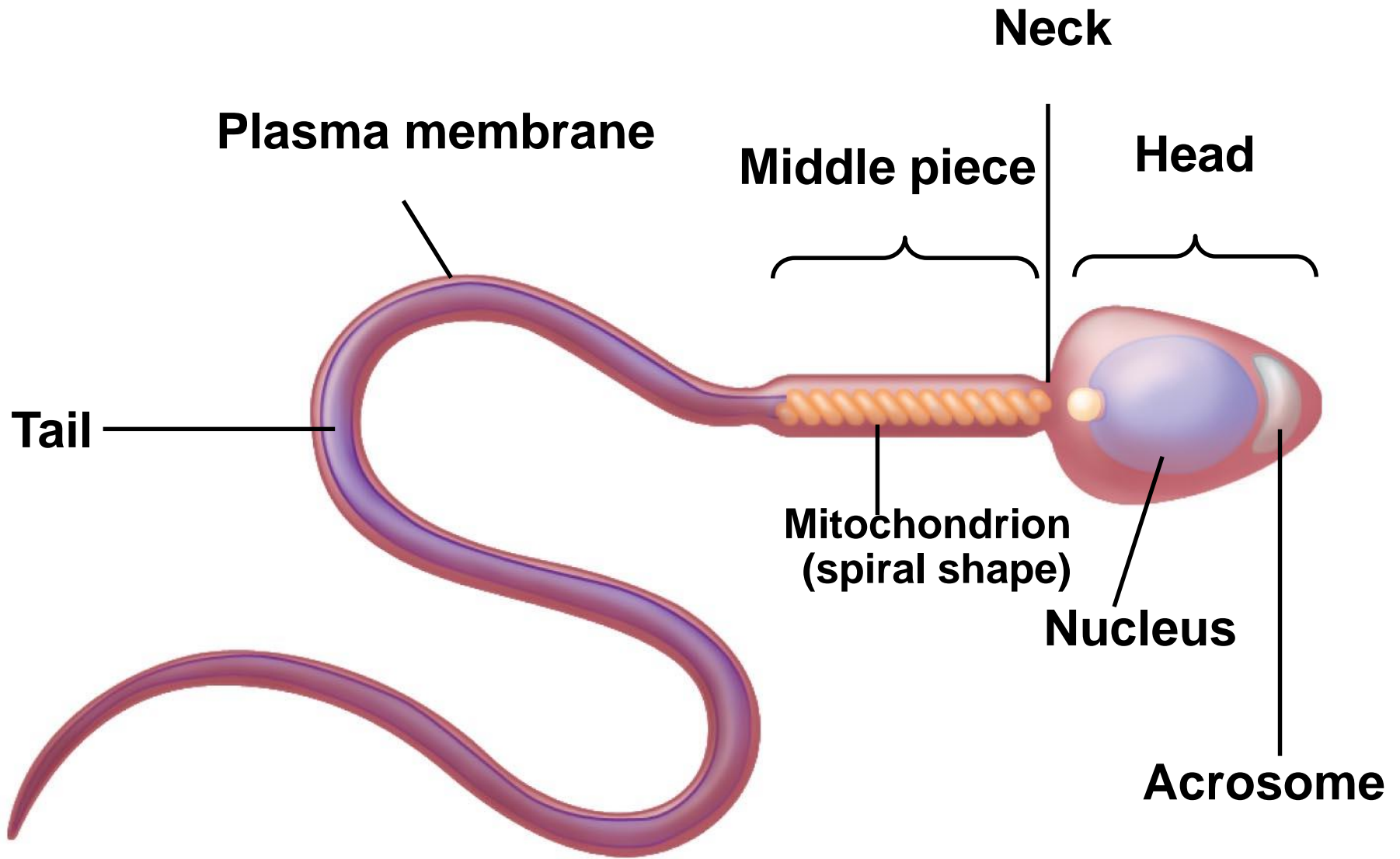
- One parent produces genetically identical offspring
- Very rapid reproduction
- Can proceed via
 - **Budding** /
 - **Fission** /
 - **Fragmentation/regeneration**



Asexual reproduction of an aggregating sea anemone (*Anthopleura elegantissima*) by fission







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The structure of a human sperm cell

WISHING YOU ALL THE
GOOD LUCK
IN THE WORLD!

