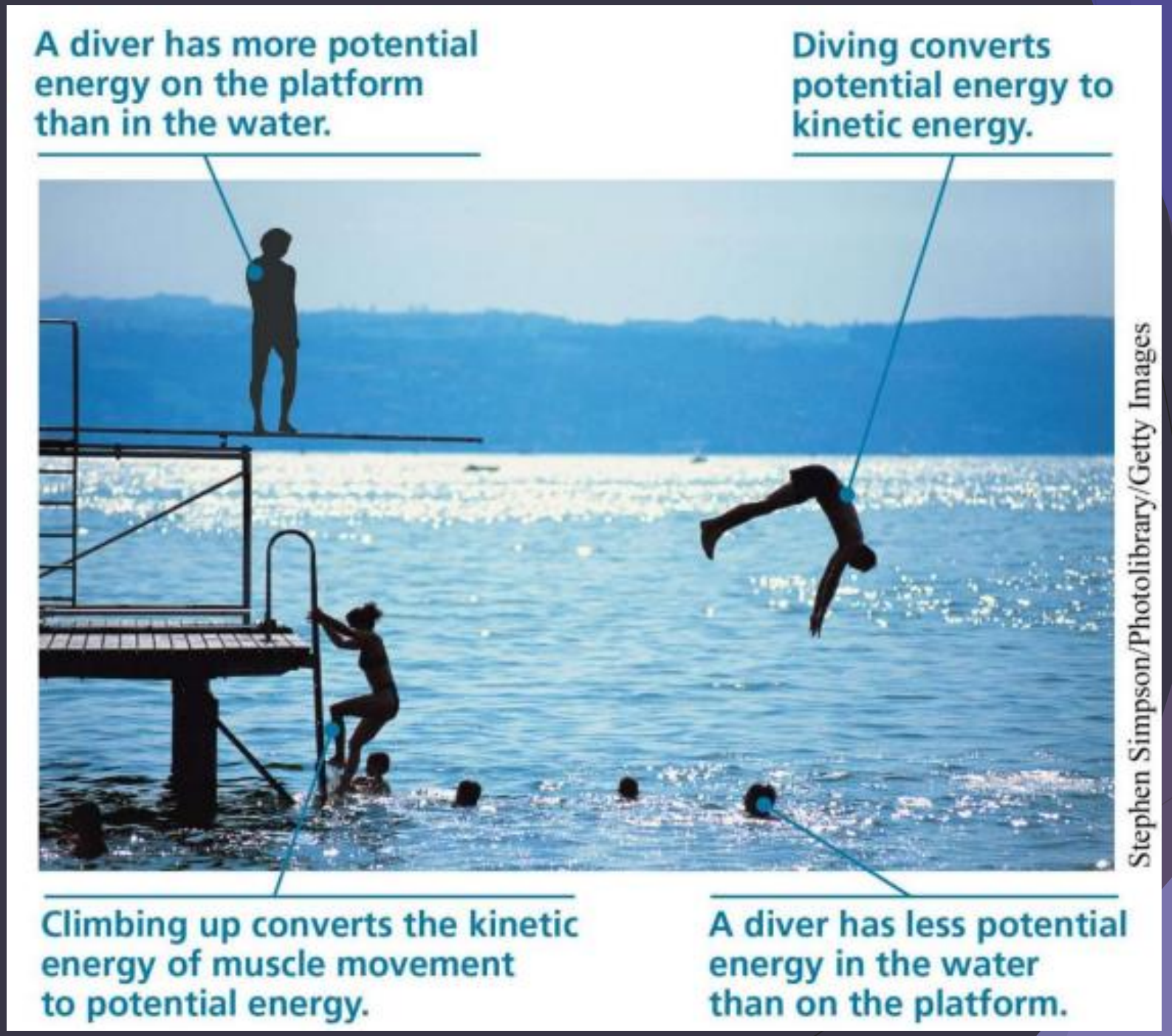
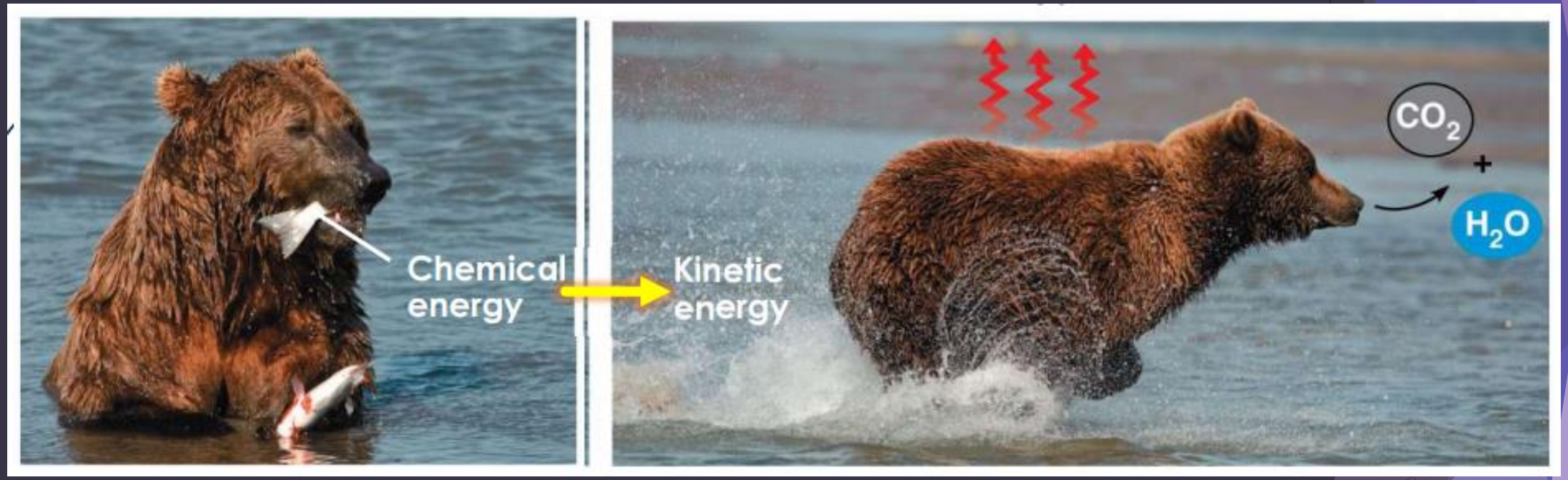
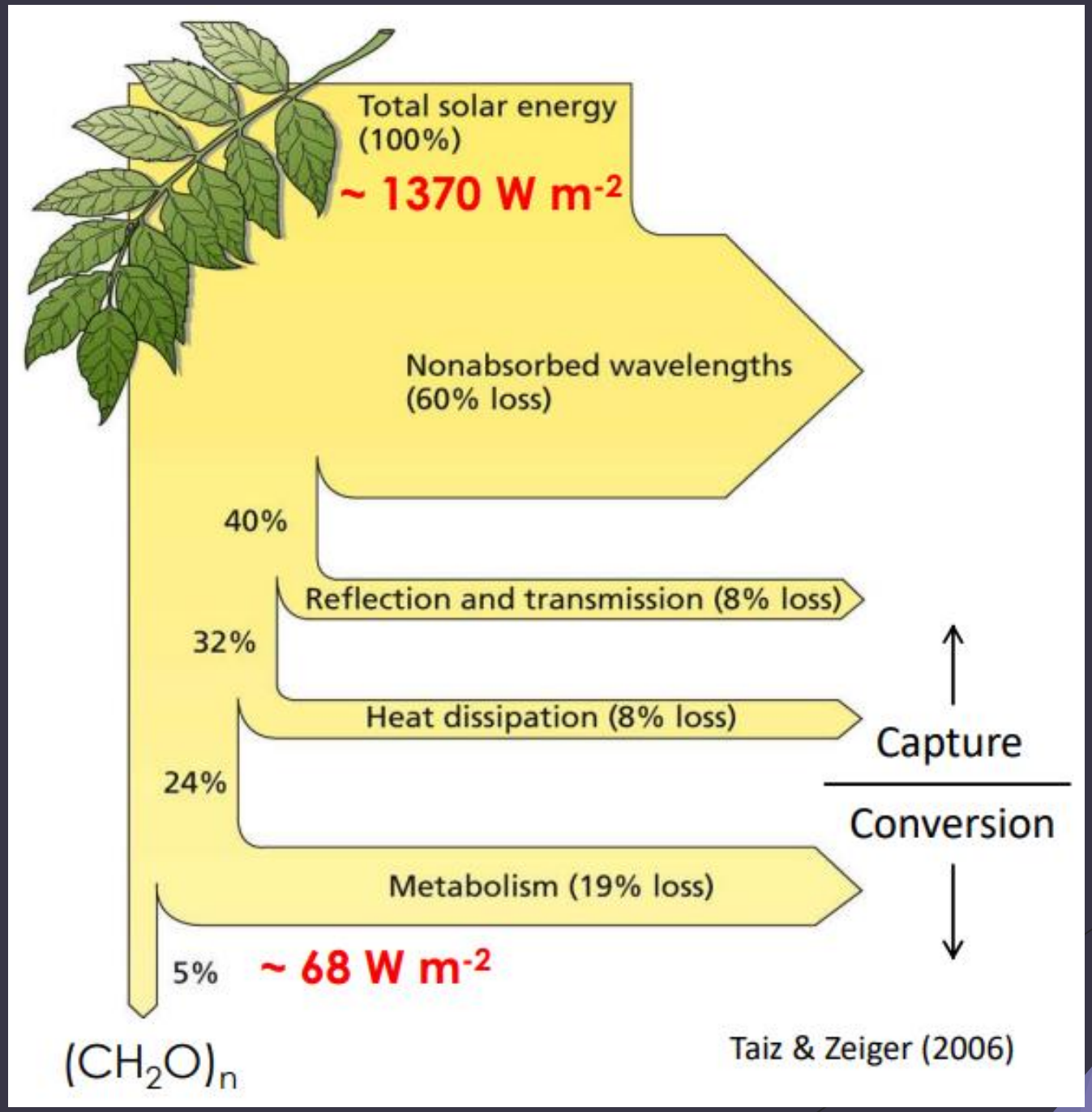
# BIOL 1012 Midterm 3 Review

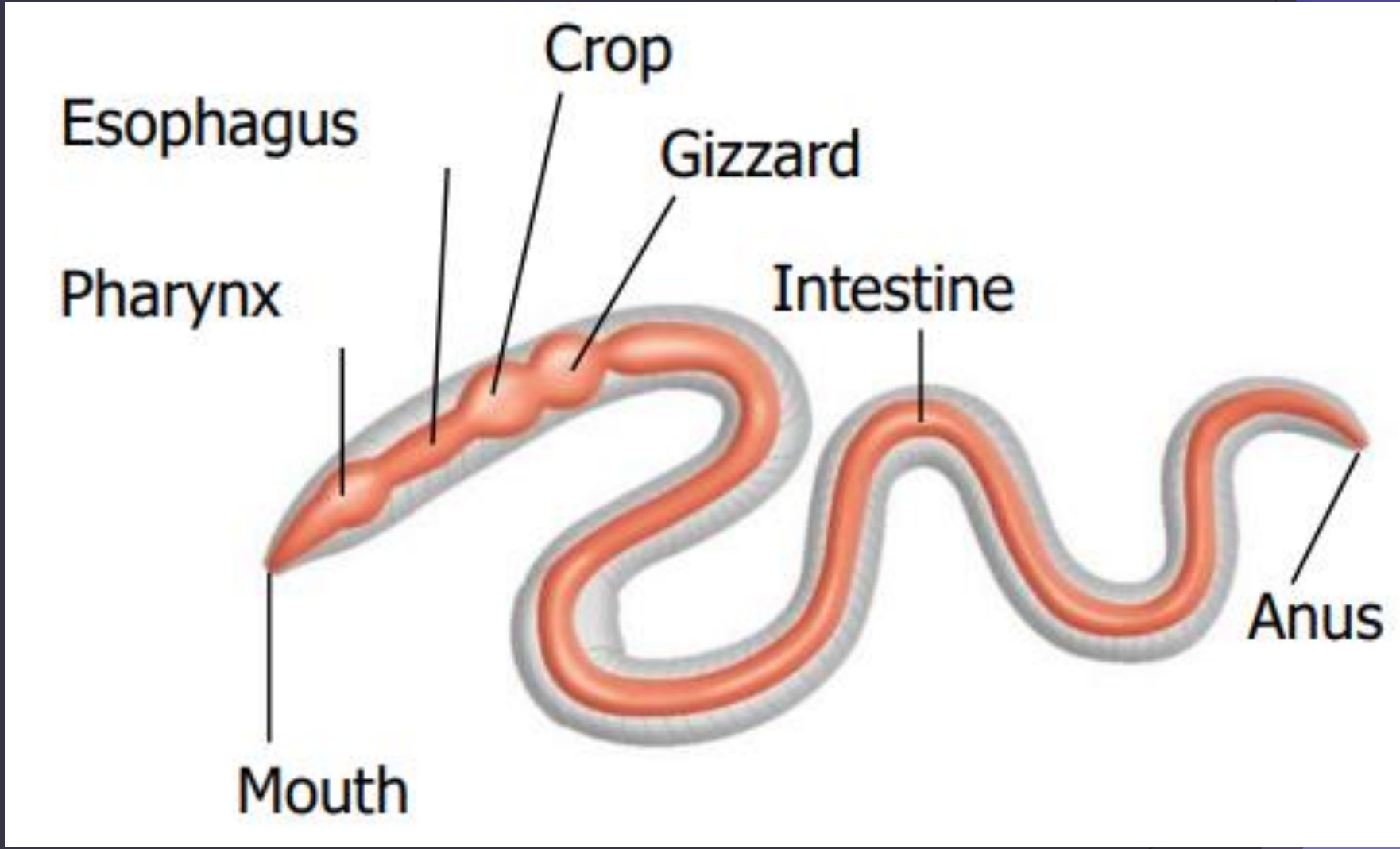
By: Andrew Kroon (:

# Important/Helpful Diagrams


A diver has more potential energy on the platform than in the water.
Diving converts potential energy to kinetic energy.
Climbing up converts the kinetic energy of muscle movement to potential energy.
A diver has less potential energy in the water than on the platform.
Stephen Simpson/Photolibrary/Getty Images


Chemical energy
Kinetic energy
$CO_2$
+
$H_2O$


Total solar energy
(100%)
~ 1370 W m-2
Nonabsorbed wavelengths
(60% loss)
40%
Reflection and transmission (8% loss)
32%
Heat dissipation (8% loss)
24%
Metabolism (19% loss)
5%
~ 68 W m-2
(CH2O)n
Capture
Conversion
Taiz & Zeiger (2006)


Crop
Esophagus
Gizzard
Pharynx
Intestine
Anus
Mouth

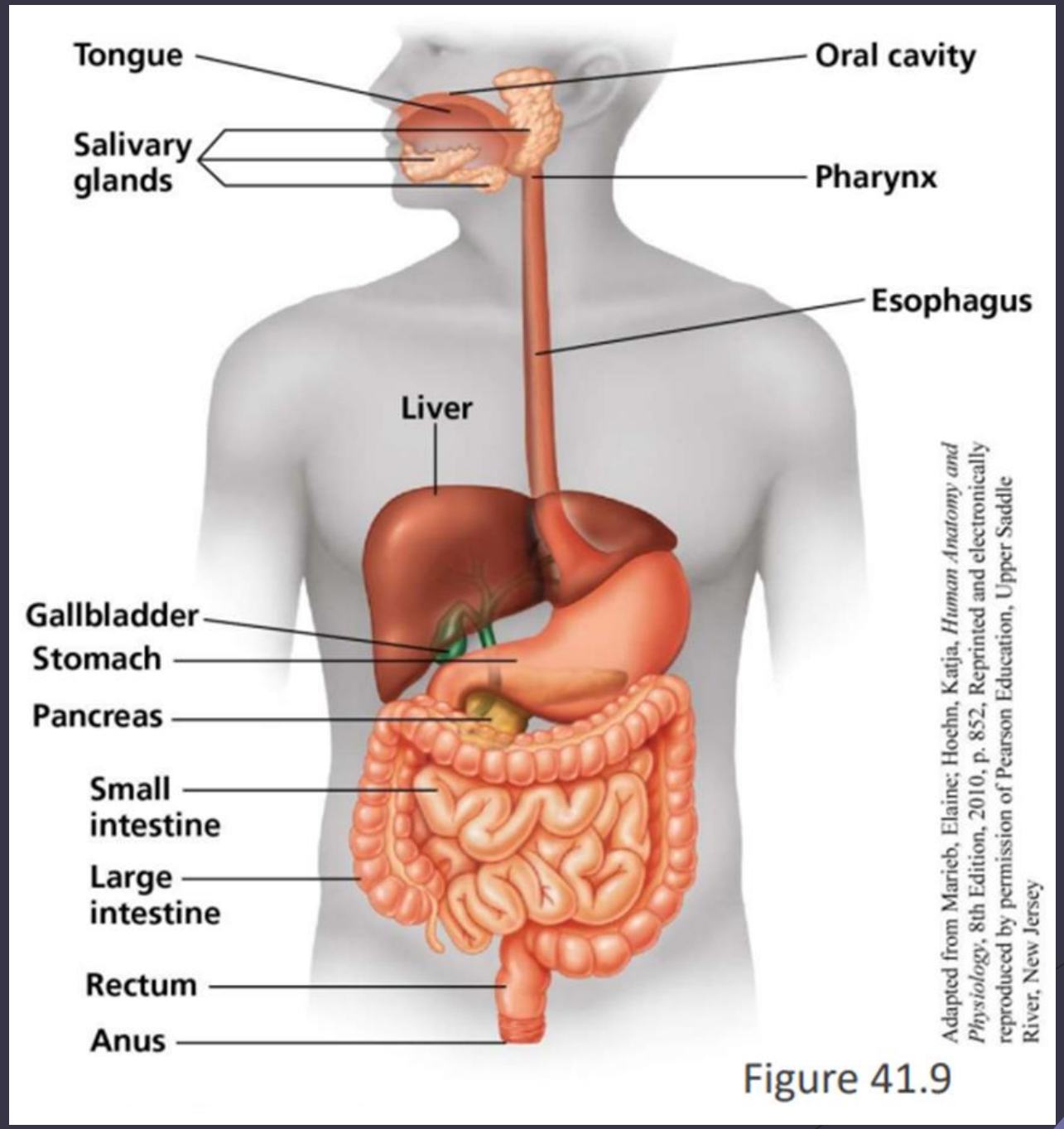

Tongue
Oral cavity
Salivary glands
Pharynx
Esophagus
Liver
Gallbladder
Stomach
Pancreas
Small intestine
Large intestine
Rectum
Anus
Adapted from Marieb, Elaine; Hoehn, Katja, *Human Anatomy and Physiology*, 8th Edition, 2010, p. 852, Reprinted and electronically reproduced by permission of Pearson Education, Upper Saddle River, New Jersey

Figure 41.9

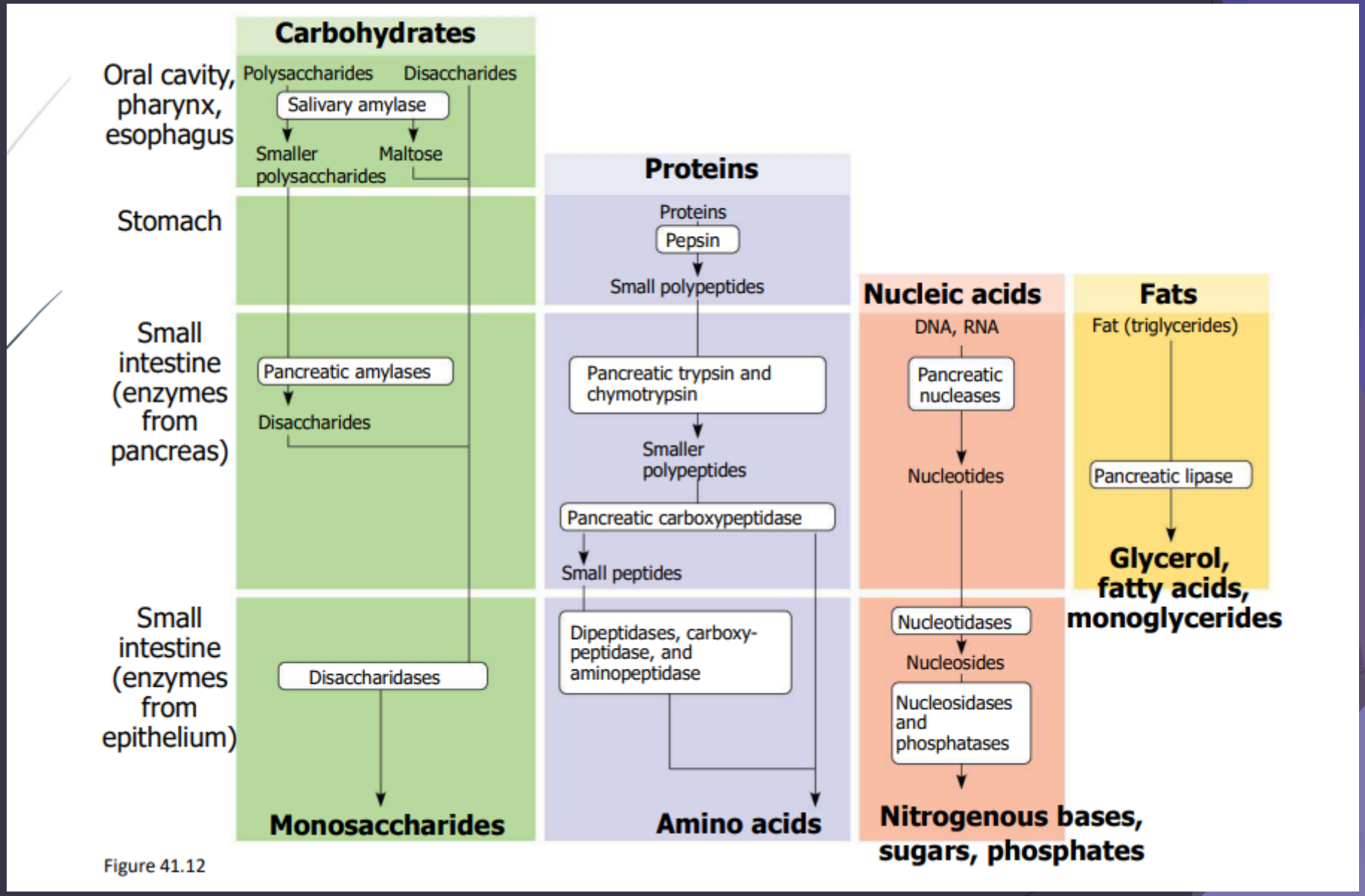
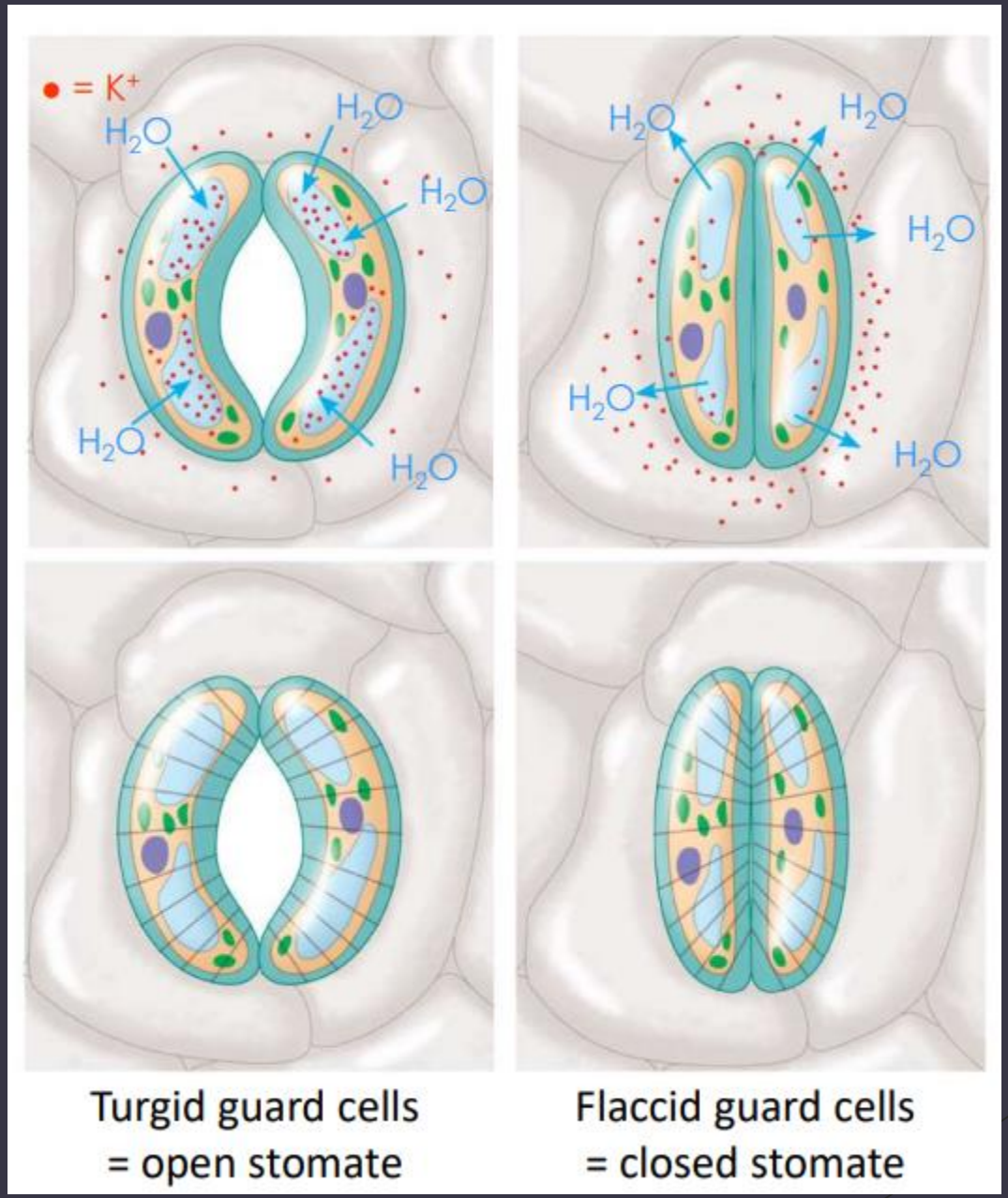

Carbohydrates
Proteins
Nucleic acids
Fats
Oral cavity, pharynx, esophagus
Stomach
Small intestine (enzymes from pancreas)
Small intestine (enzymes from epithelium)
Polysaccharides
Disaccharides
Salivary amylase
Smaller polysaccharides
Maltose
Proteins
Pepsin
Small polypeptides
DNA, RNA
Fat (triglycerides)
Pancreatic amylases
Disaccharides
Pancreatic trypsin and chymotrypsin
Smaller polypeptides
Pancreatic carboxypeptidase
Small peptides
Pancreatic nucleases
Nucleotides
Pancreatic lipase
Glycerol, fatty acids, monoglycerides
Disaccharidases
Dipeptidases, carboxy-peptidase, and aminopeptidase
Nucleotidases
Nucleosides
Nucleosidases and phosphatases
Monosaccharides
Amino acids
Nitrogenous bases, sugars, phosphates

Figure 41.12


● = K+
H2O
H2O
H2O
H2O
H2O
H2O
H2O
H2O
H2O
H2O
Turgid guard cells
= open stomate
Flaccid guard cells
= closed stomate

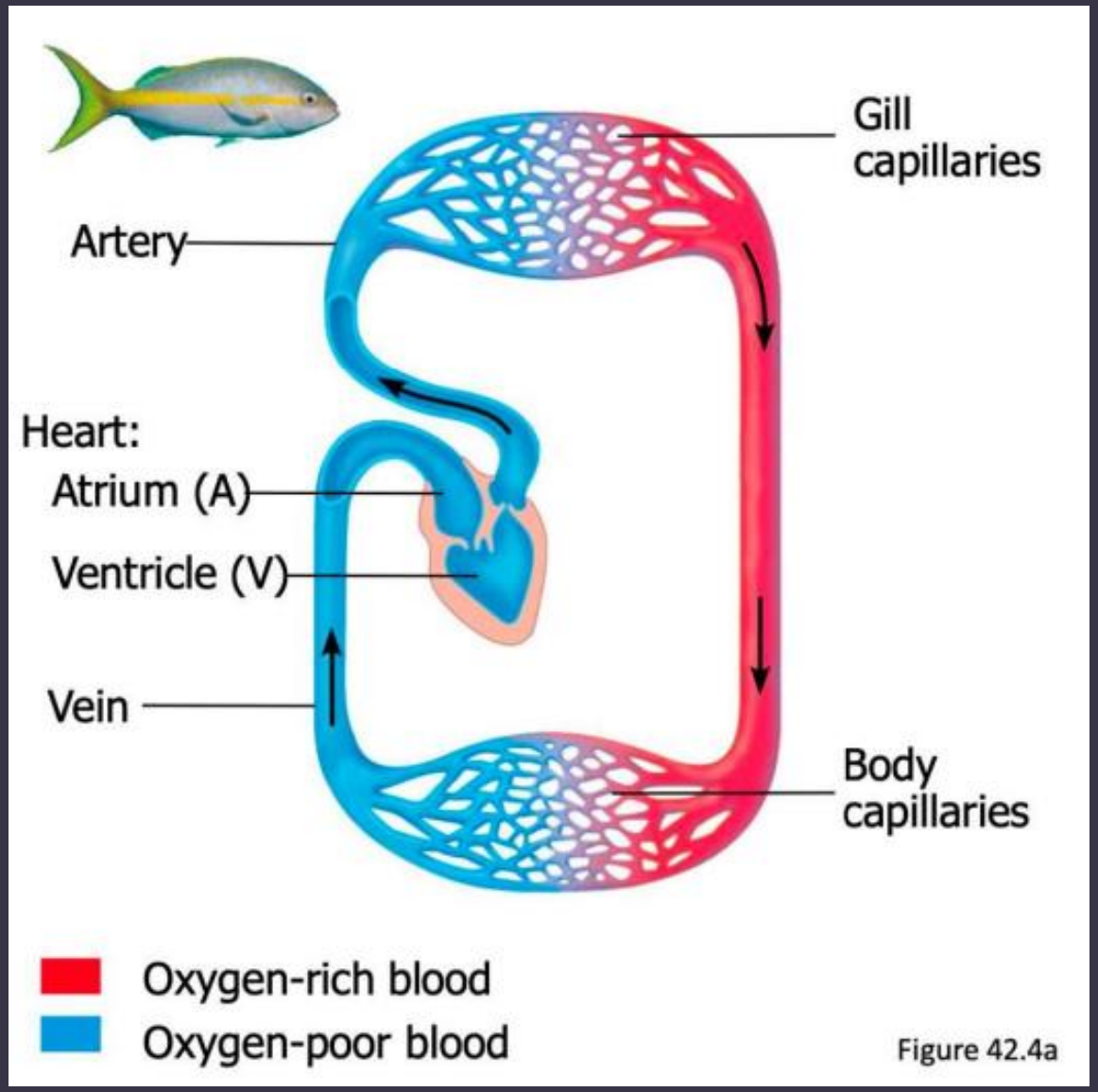



Figure 42.4a

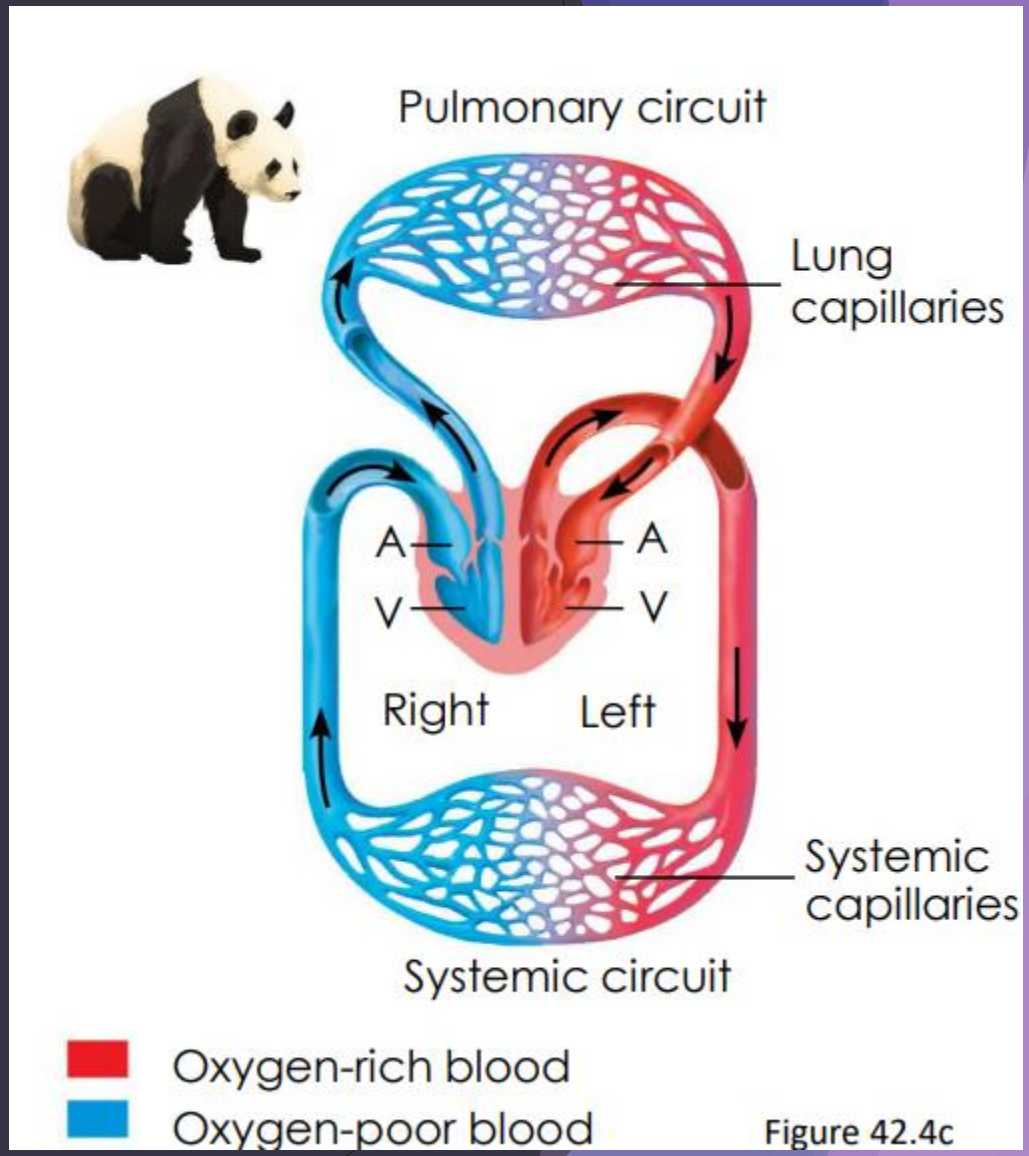



Figure 42.4c

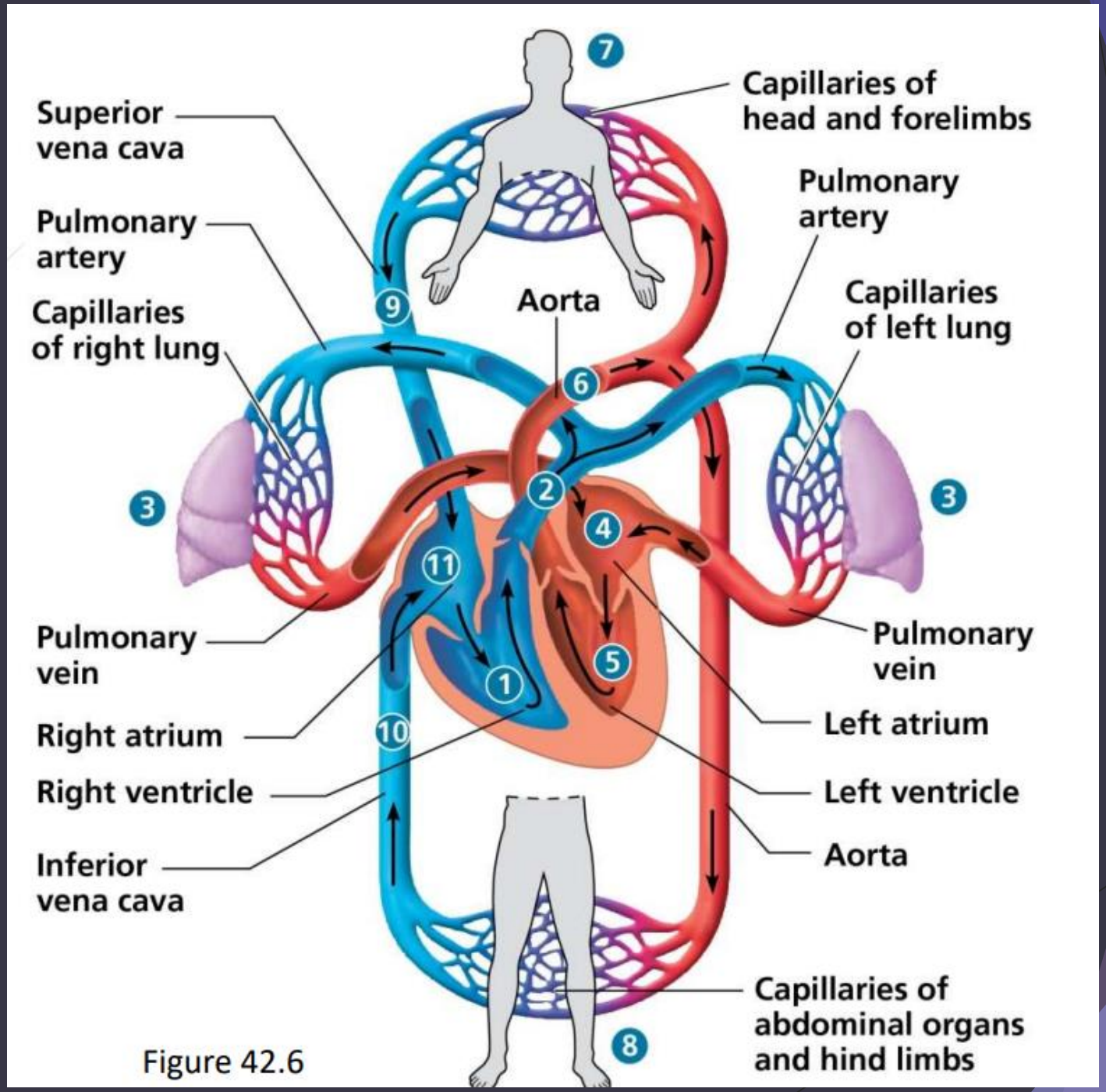
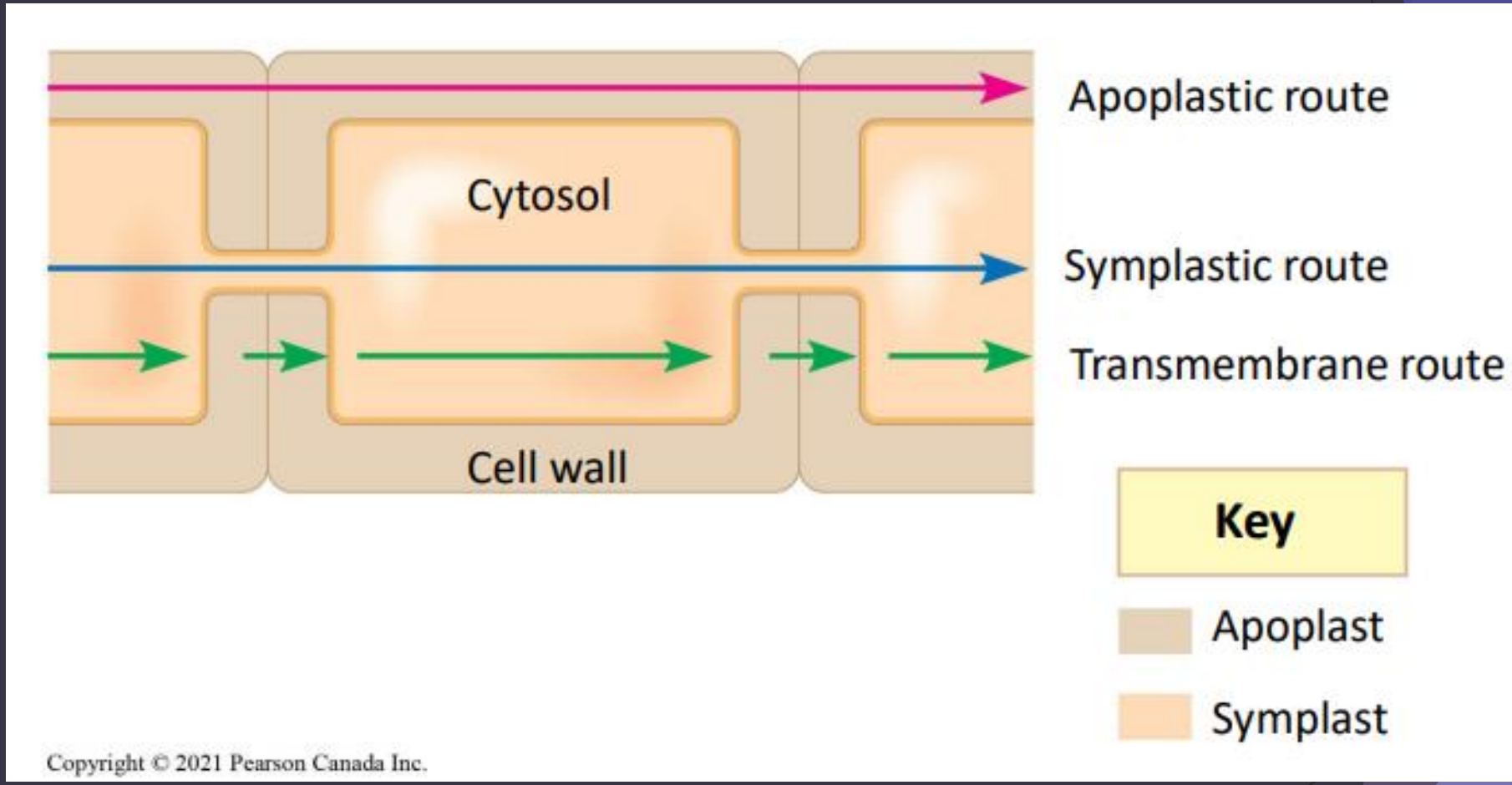

7
Capillaries of head and forelimbs
Superior vena cava
Pulmonary artery
Pulmonary artery
Capillaries of right lung
9
Aorta
Capillaries of left lung
6
3
2
3
4
11
Pulmonary vein
Pulmonary vein
5
1
Left atrium
10
Right atrium
Right ventricle
Left ventricle
Aorta
Inferior vena cava
Capillaries of abdominal organs and hind limbs
8

Figure 42.6



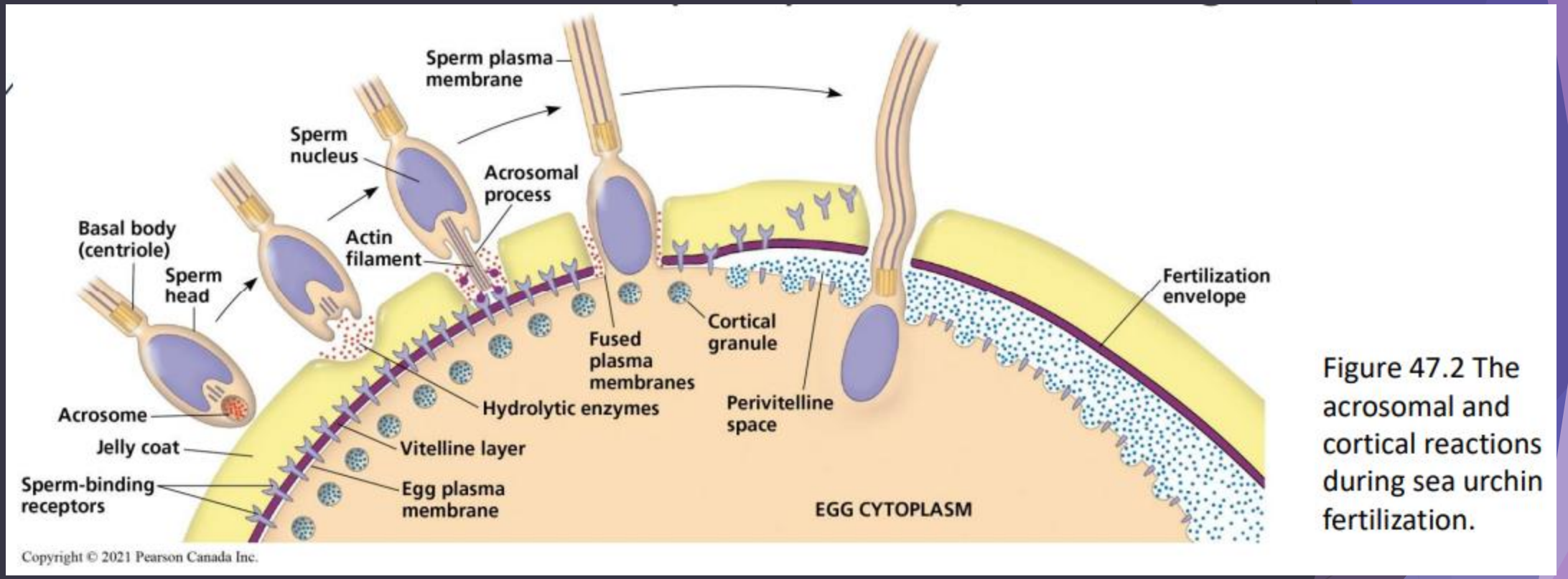
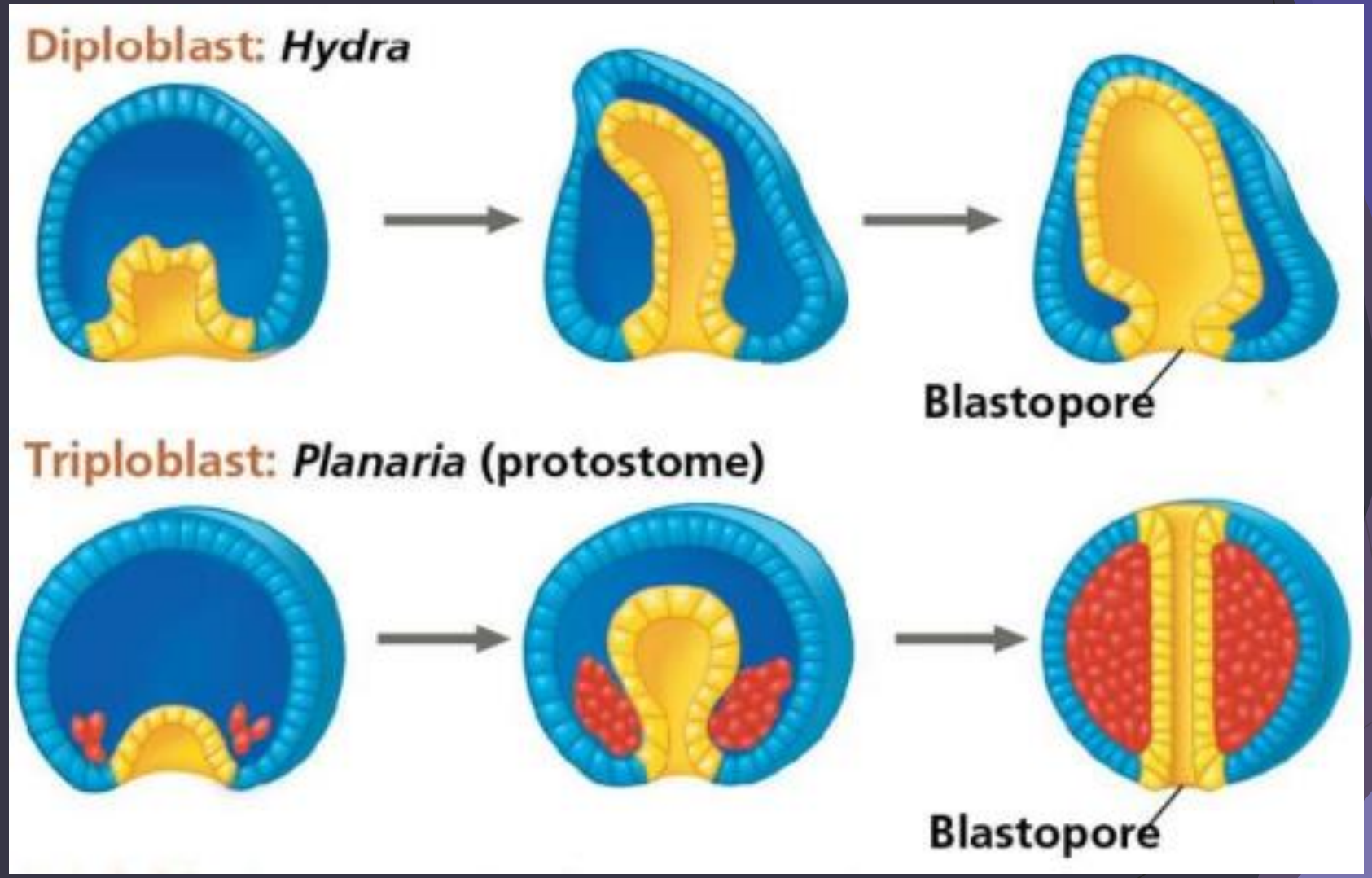
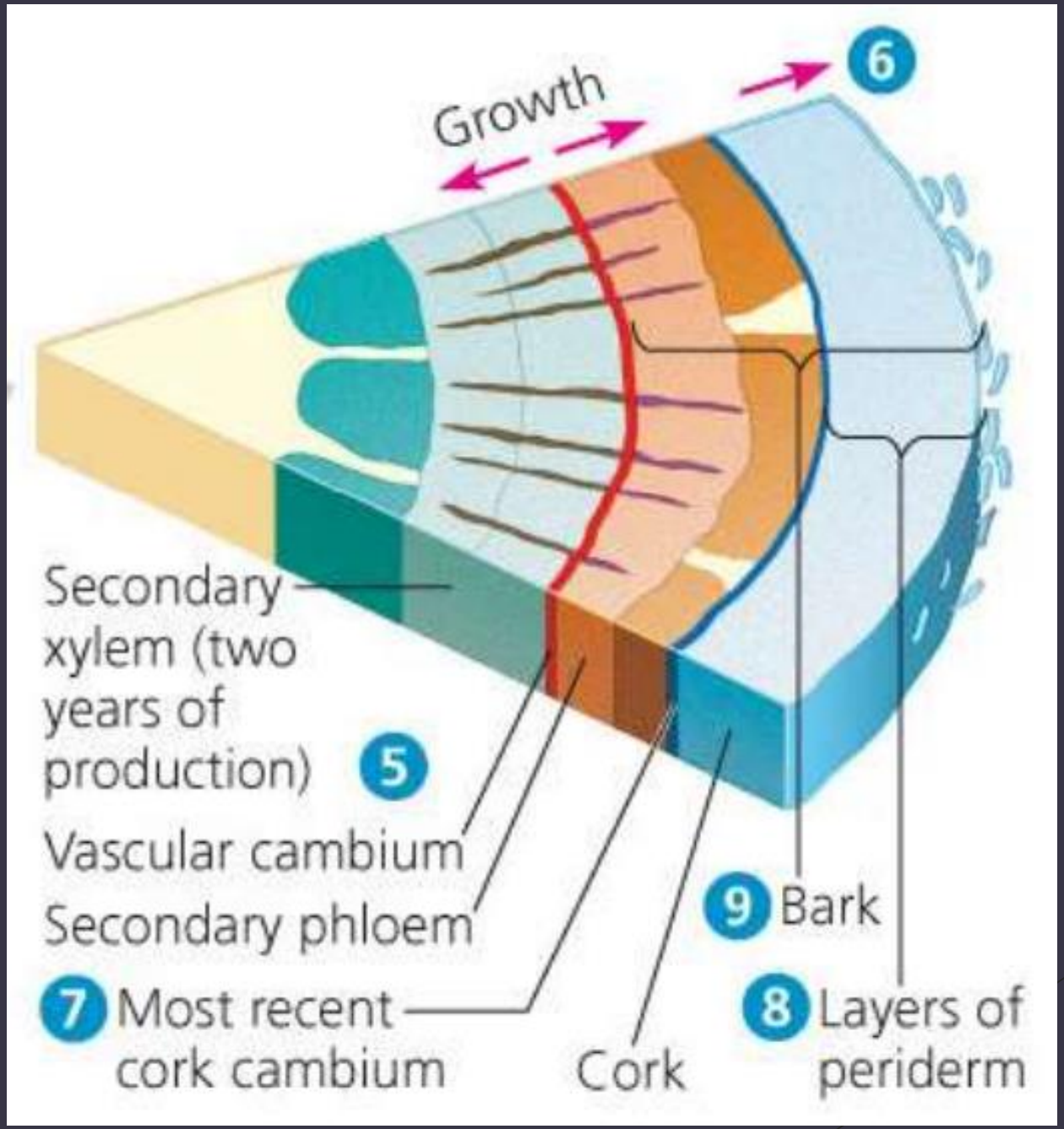




Figure 47.2 The acrosomal and cortical reactions during sea urchin fertilization.


Diploblast: *Hydra*
Blastopore
Triploblast: *Planaria* (protostome)
Blastopore


Growth
6
Secondary xylem (two years of production)
5
Vascular cambium
Secondary phloem
9 Bark
7 Most recent cork cambium
Cork
8 Layers of periderm

# Lecture 17

# The capacity to do work is called what?

# Match

- Kinetic Energy
- Heat (Thermal Energy)
- Potential Energy
- Chemical Energy

- Potential energy for release in a chemical reaction
- Energy associated with motion
- Energy due to location and/or structure
- Kinetic energy associated with random movement of atoms and molecules (usually accompanied by some change or transfer of temperature)

# True or False: Energy can be created?

True or False: Energy transformation/transfer can either increase or decrease entropy?

In the equation $\Delta G = \Delta H - T\Delta S$, What does it mean when $\Delta G$ is positive? What about when its negative?

# Compare and Contrast

## Autotrophs

- Use energy to build their own food
- Use inorganic carbon sources to build food
- Most use light as their energy source (although some use chemical energy – unicellular organisms)

## Heterotrophs

- Use energy to collect food (cannot create their own food within)
- Use organic carbon sources as food
- Most use chemical energy (from the food they have eaten), however some use light energy (unicellular organisms)

# What is the difference?

- Endothermy
- Ectothermy

# Match

- Metabolic rate
- Basal Metabolic Rate (BMR)
- Standard Metabolic Rate (SMR)

- Metabolic rate of a non-growing, fasting, non-stressed ectotherm, at rest, at a specific temperature
- Amount of energy an animal uses in a unit of time
- Metabolic rate of a non-growing, fasting, no-stressed endotherm, at rest, in a comfortable temperature range

# Which one has the higher BMR?

- Elephant
- Mouse

# Which one has the higher BMR/kg?

If you have trouble remembering this, either memorize Bigger BMR = Bigger animal, and just remember that BMR/kg is the opposite. If you think about things more mathematically, think of BMR/kg as a fraction. Kg is on the bottom, meaning that weight is the denominator, the larger the denominator, the smaller the value of the fraction, therefore the larger the animal, the smaller the BMR/kg

# Lecture 18

# What is heliotropism?

What organelle is responsible for converting light energy into chemical energy?

# What is carbon fixation?

What percentage of light is captured by plants? What percentage of the captured light is converted into chemical energy?

Why is a high surface area to volume ratio favourable? How is the ratio affected when cells increase in size?

# What are hyphae? What is a group of hyphae called? Do fungi ingest things?

# What is Mycorrhizae? What do the different kinds of it (Ectomycorrhizae, and Arbuscular Mycorrhizae) do?

Order the following processes: Absorption, Digestion, Ingestion, and Elimination.

# Match

- Filter Feeders
- Substrate Feeders
- Fluid Feeders
- Bulk Feeders

- Suck fluids from a host
- Trap organisms from fluids
- Live in/on food
- Eat large amounts of food at once, then doesn’t need any more food for a while

# Compare the teeth

## Herbivore

- Large Molars and premolars used for grinding plants

## Carnivore

- Weapon-like incisors and canines

# Lecture 19

# What’s the difference between mechanical and chemical digestion?

# What is the difference between catabolism and anabolism?

(Hint: Catabolism sounds like catastrophy)

# Compare and Contrast

## Intracellular Digestion

- Phagocytosis
- Chemical sources stores in food vacuoles until needed

## Extracellular Digestion

- Gastrovascular cavity
- Alimentary Canals

# What is an essential nutrient and what are the 4 classes of them?

# Lecture 20

# What is partial pressure?

# Which is more effective?

- Gas exchange in the water
- Gas exchange on land/in the air

# What do aquatic animals use for ventilation? What is countercurrent exchange?

What is the name of the part of the lung where gas exchange happens?

What is the difference between negative pressure breathing and positive pressure breathing? Which do birds exhibit?

Explain what happens when the stromata opens, how it opens, what triggers it,etc

# What is a xerophyte? When do they take up CO2 and why?

# Lecture 21

# Compare and Contrast

## Passive Transport

- No input of energy required
- Follows concentration gradient

## Active Transport

- Requires input of energy
- Goes against concentration gradient

# What is cotransport and how does it work?

# Compare and Contrast

## Open Circulatory System

- Organs bathed in circulatory fluid directly
- No vessels of any kind
- Hemolymph instead of blood

## Closed Circulatory System

- Circulatory fluid transports nutrients through vessels
- Veins, capillaries, arteries, etc.
- Exchange happens at capillaries
- Blood is the circulatory fluid here

# Why does flow rate decrease across a capillary beds

# Compare and Contrast

## Apoplastic

- Travels through cell walls
- Xylem

## Symplastic

- Travels through plasmodesmata in cells in a sort of channel.
- Phloem

What does it mean if the water potential is positive? What about negative?

# Lecture 22

# What is the difference between a regulator and a conformer?

What is the difference between homeotherms and poikilotherms? What is torpor? In what organisms is ener

# What are the benefits of flower temperature regulation in plants?

# What are the 4 methods for heat exchange and can you describe them?

# What are feathers, skin, the bladder, and fur in animals?

# Compare and contrast

## Vasodilution

- Blood flow increase in the skin
- Heat loss is maximizes

## Vasoconstriction

- Blood decreases in the skin
- Heat loss is minimized

# Lecture 23

What is an irreversible increase in biomass known as?

# Compare and contrast

## Apical Meristems

- Shoots and Roots
- Primary Growth
- Elongates

## Lateral Merictems

- Vascular and Cork Cambia
- Secondary Growth
- Widens

# What is phenotypic plasticity?

# Lecture 24

# What are the 3 steps in signalling cascade?

# Match the plant hormone to the affetcs

- Gibberellins
- Auxins
- Abscisic Acid
- Ethylene

- Stem elongation, formation of lateral roots and vascular tissue
- Response to stress, senescence, leaf abscission and fruit ripening.
- Stem elongation, fruit growth, and seed germination
- Seed dormancy, drought tolerance, rapid close of the stromata

# How do bacteria communicate with one another?

# Compare and contrast

## Plant Hormones

- Few varieties
- Not specific (each can do many things)
- Cooperate well.

## Animal Hormones

- Many Varieties
- Specific functions
- Not cooperative

# Define photomorphogenesis

# What are the 2 main types of light receptors in plants?