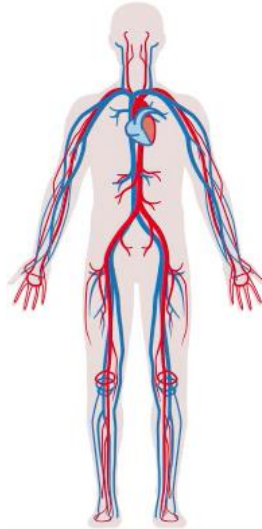
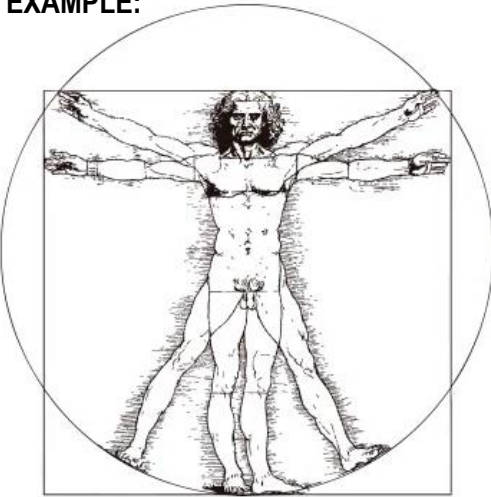


CONCEPT: ANIMAL PHYSIOLOGY

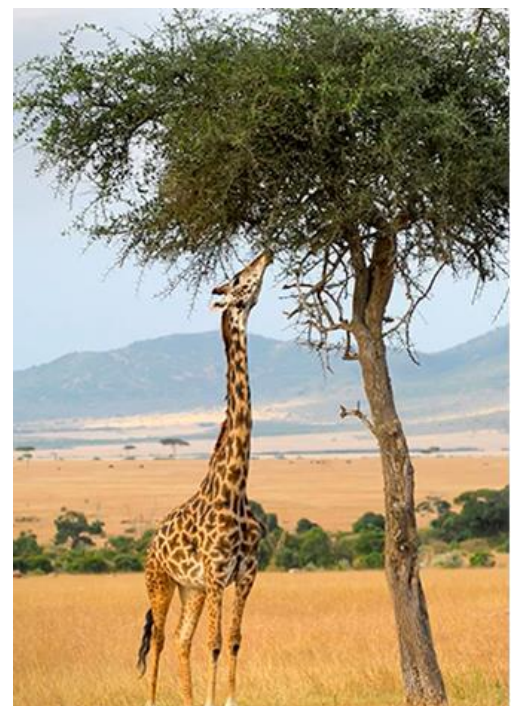
- **Anatomy** – study of organisms' physical structures
- **Physiology** – study of the functions of organisms' structures
- **Adaptations** – heritable traits that improve the chances of an organisms surviving and reproducing in an environment
- **Acclimatization** – short-term ability to adapt to changes in the environment

EXAMPLE:



- **Fitness trade-offs** – limit to an organism's ability to adapt to its environment due to finite energy capacity
 - Energetic demands require cost/benefit compromise for energy investment in adaptations
 - Adaptations are limited by existing alleles, and ancestral genes
 - Trade-off between reproductive success and survival of the organism
- If mutant allele alters feature making the individual survive and reproduce more efficiently, allele will increase in frequency

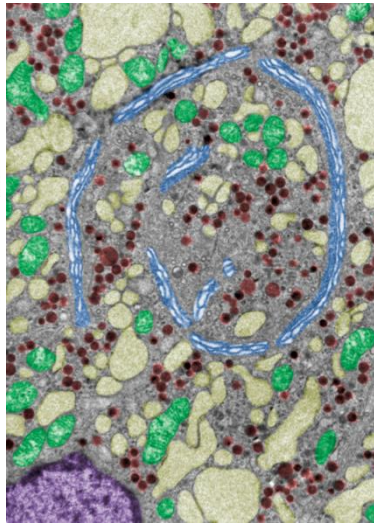
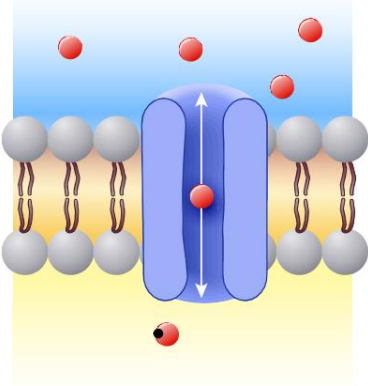
EXAMPLE:



CONCEPT: ANIMAL PHYSIOLOGY

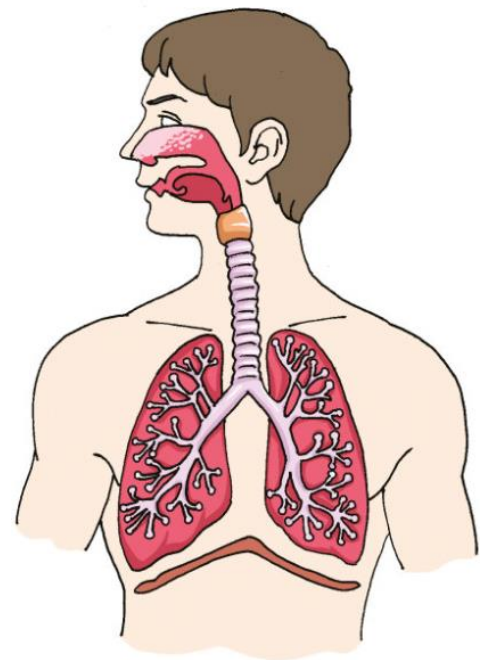
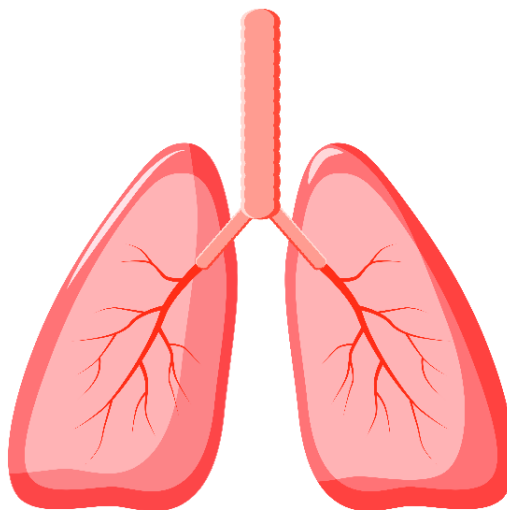
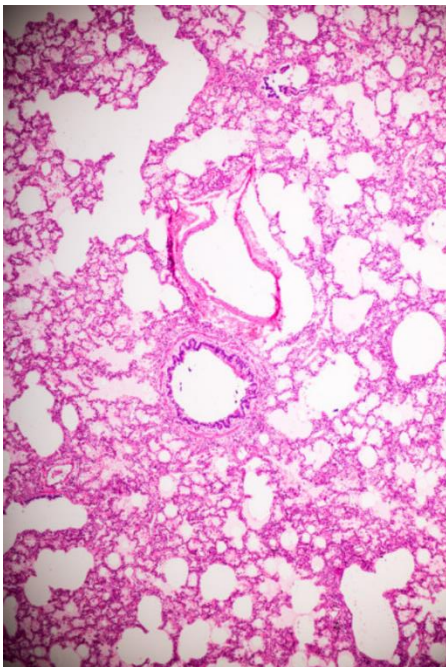
- Structure is related to function in living systems
 - Molecular level: hydrophobic and hydrophilic regions of membrane proteins
 - Cellular level: secretion cells have lots of Golgi apparatus

EXAMPLE:



- **Tissue** – group of cells that carry out a specific function
- **Organ** – structure composed of tissues that carries out a specialized function
- **Organ system** – group of organs working in concert to perform a specific function

EXAMPLE:

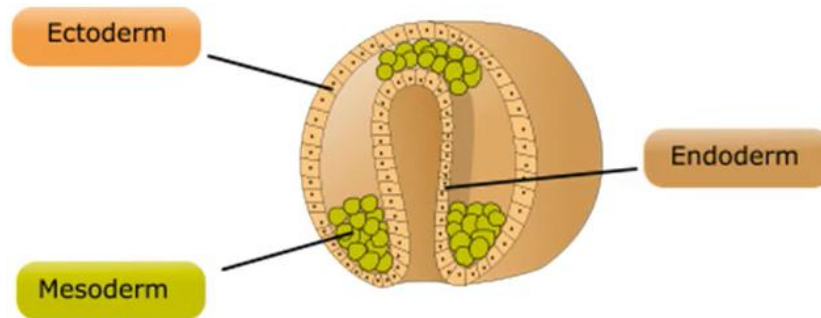


CONCEPT: ANIMAL TISSUES

- **Germ layers** – embryonic tissues that form following gastrulation

- **Ectoderm** – outer layer of cells that form nerves, adrenal medulla, skin, brain, eyes, and inner ear
- **Mesoderm** – internal cells that give rise to organs, adrenal cortex, blood, bone, gonads, and the soft tissues
- **Endoderm** – innermost cells that form the epithelial linings of the digestive tract, liver, pancreas, and lungs

EXAMPLE:

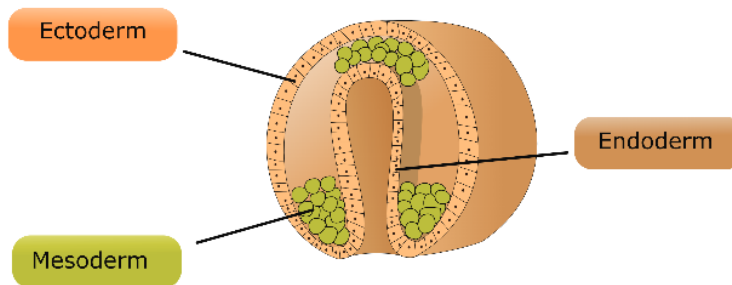


- Adult tissues are derived from embryonic tissues

- Nervous tissue is derived from the ectoderm
- Muscle tissue is derived from the mesoderm
- Connective tissue is derived from the mesoderm
- Epithelial tissue is derived from endoderm and ectoderm

EXAMPLE:

GERM LAYERS



Ectoderm

Nervous tissue
Epidermis cells
Pigment cells



Mesoderm

Muscle cells
Skeleton
Heart, Kidney, blood



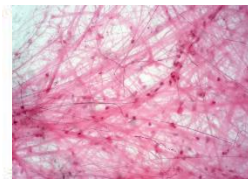
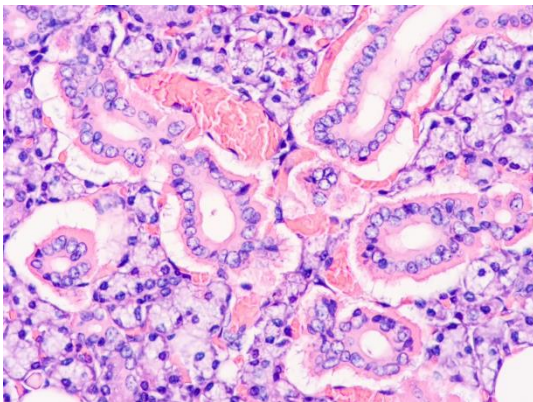
Endoderm

Endocrine glands
Lungs
Gastrointestinal tract

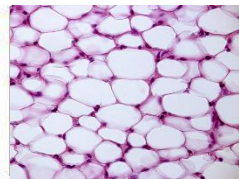
CONCEPT: ANIMAL TISSUES

- **Connective tissue** – connects, separates, and cushions other tissues in the body; scattered within extracellular matrix
 - **Extracellular matrix** – array of proteins and ground substance, a gel-like substance
 - **Loose connective tissue** – helps hold organs in place and attaches epithelial tissue
 - **Adipose tissue** – made mostly of adipocytes, or fat cells
 - **Dense (fibrous) connective tissue** – tissue dense with collagen fibers
 - **Tendons** – connects muscle to bone
 - **Ligaments** – connects bone to bone
 - **Supportive connective tissue** – forms hard extracellular matrix, bone and cartilage provide structural integrity
 - **Fluid connective tissue** – blood, cells have a liquid extracellular matrix called plasma

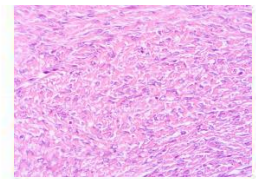
EXAMPLE:



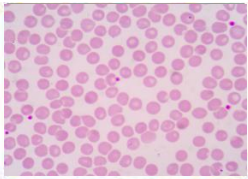
Areolar connective tissue



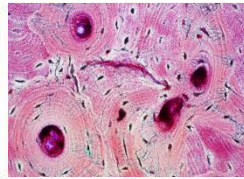
Adipose tissue



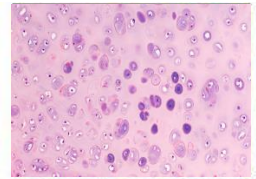
Fibrous connective tissue



Blood



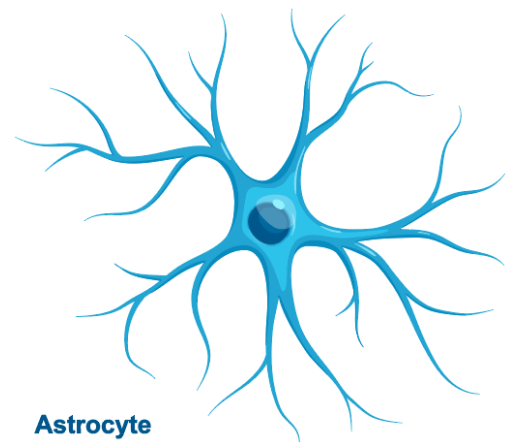
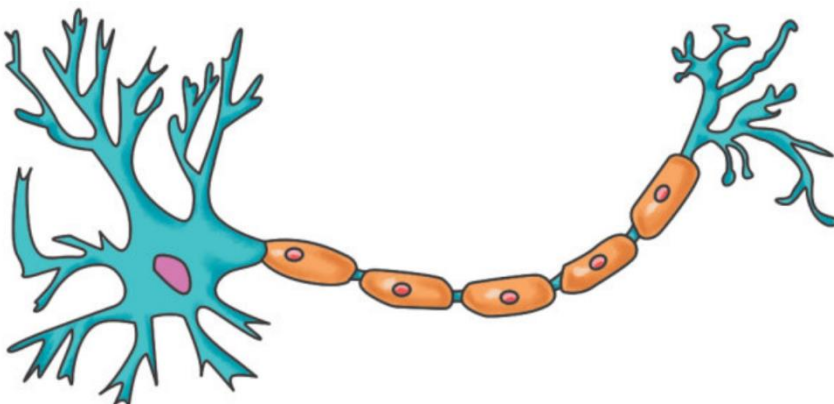
Osseous tissue



Hyaline cartilage

- **Nervous tissue** – conducts electrical and chemical signals, divided between central and peripheral nervous systems
 - **Neurons** – receive and transmit electrical signals by transporting ions across the membrane
 - **Axons** – long thin structure that transmits the electric signal, similar to a wire
 - **Dendrites** – branched structure that receives signals and responds to them
 - **Glia** – support cells for neurons, essential to their survival and proper functioning

EXAMPLE:

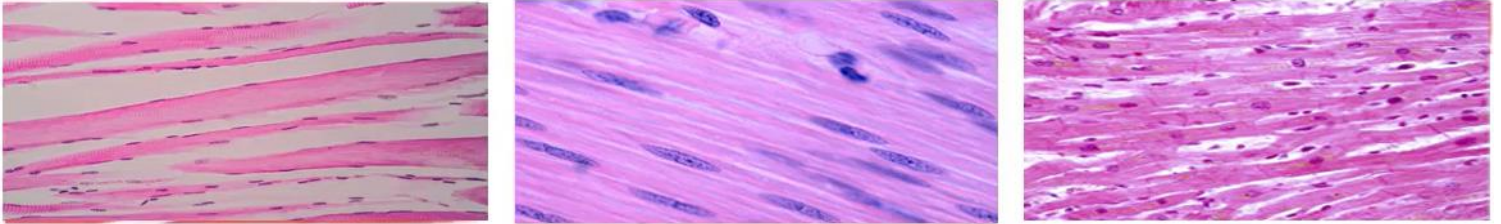


Astrocyte

CONCEPT: ANIMAL TISSUES

- **Muscle tissue** – contractile tissue that is unique to animals
 - **Skeletal muscle** – attached to bone, used for locomotion and posture
 - **Cardiac muscle** – only found in the heart, used to contract heart and pump blood
 - **Smooth muscle** – found in the walls of organs and vasculature

EXAMPLE:



- **Epithelial tissue** – lines organs and body surface, separates interior and exterior environments
 - Creates unique environments allowing for drastically different physical/chemical conditions
 - **Apical side** – faces toward the exterior environment
 - **Basal side** – faces the interior of the animal
 - Basal lamina – extracellular matrix on basal side that the epithelium sits on

EXAMPLE:

