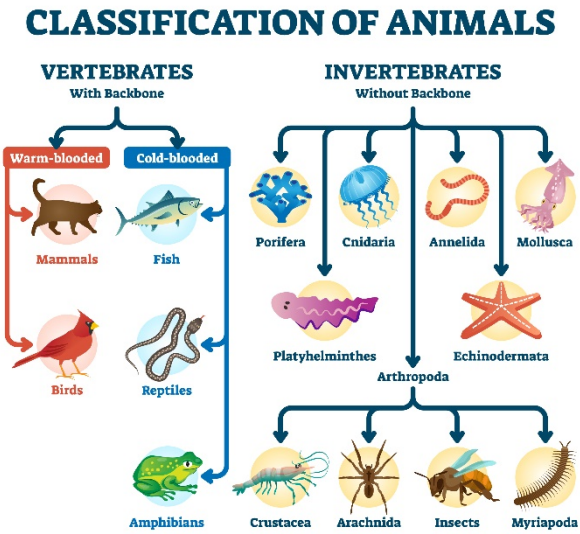
jump | STEAM AT HOME

DO TRY THESE AT HOME!

MICROSCOPY 201
ANIMAL ANATOMY: TISSUES

MICROSCOPY 201

ANIMAL TISSUES



All animals:

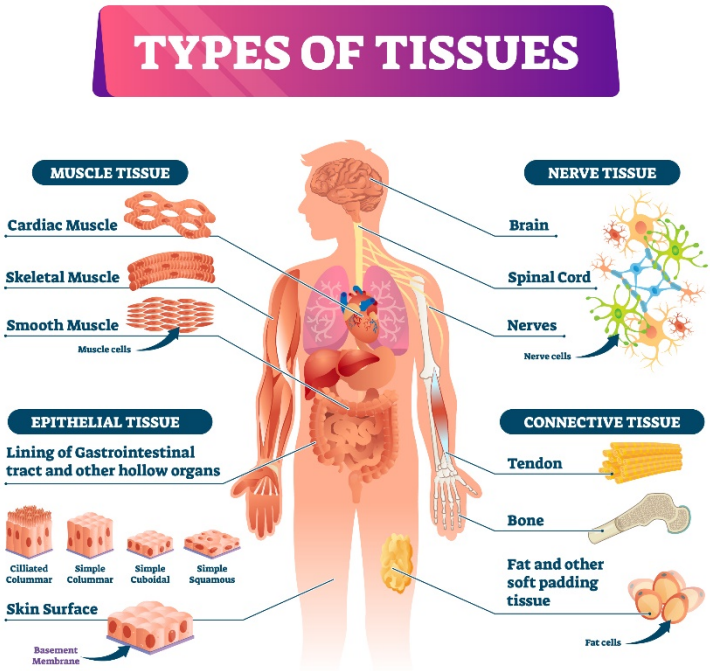
- Eat other organisms
- Move freely
- Multicellular

Animals are grouped by:

- defined tissues and specialized cells?
- How they develop
  Protostome or deuterostome
- Symmetry?
  None, Radial or bilateral?
- How do they grow?
  Molting or continuous

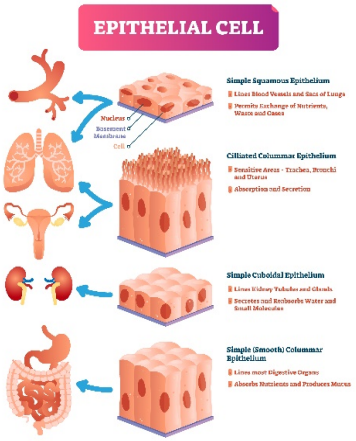
ANIMAL HISTOLOGY

Histology is the study of tissues. Most animals and plants are multicellular organisms meaning that cells have to work as a team to keep each other alive.



EPITHELIAL TISSUE

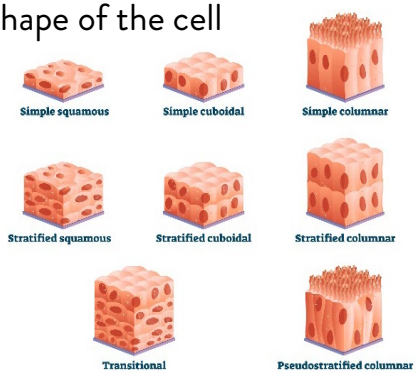
Epithelial tissue lines surfaces of the body as uninterrupted, continuous sheets of cells locked together and composes **glands**. The lining of the mouth, ears, nose, eyes, and other entrances into the body are made of a continuous sheet of epithelium. Internally, the lining of the stomach, blood vessels, and heart composed of epithelial tissue. Epithelial tissue even covers the cornea of the eye.



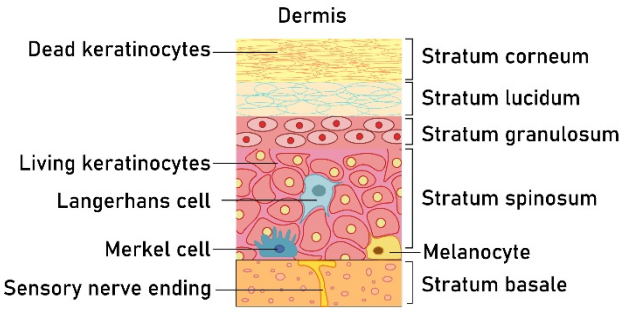
Naming epithelial cells

1 # of layers(simple or stratified)

2 shape of the cell



Layers of Epidermis

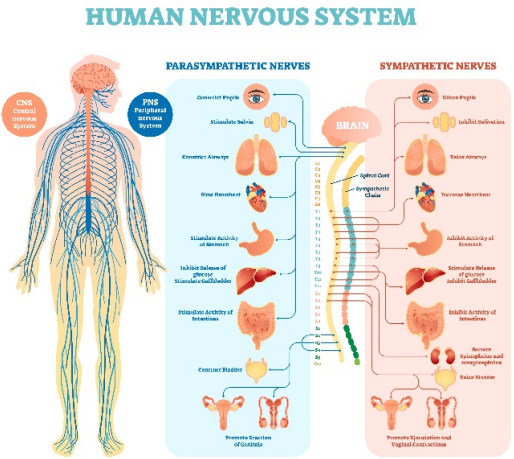


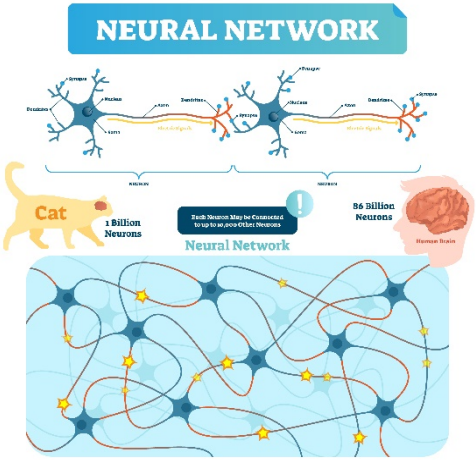
Skin cells of animals mostly consist of **keratinocytes** and **melanocytes** – '-cyte' means cell.

- Keratinocytes make up around 90% of all skin cells and make a protein called "keratin". The **keratin** in skin cells makes skin a strong layer of protection for the body. Keratin also comes in a "hard" form and makes hair and nails
- Melanocytes make a chemical called '**melanin**' that gives skin color. Melanocytes sit underneath keratinocytes and push melanin up to the surface cells of the skin. The more melanocytes you have in your skin, the darker your skin is.

NERVOUS TISSUE

Nervous tissue conducts electrical impulses within and between the brain, spinal cord, and nerves. Nervous tissue is composed of **neurons** and **glial cells**. Neurons can send, receive, and process, signals to all parts of the body.

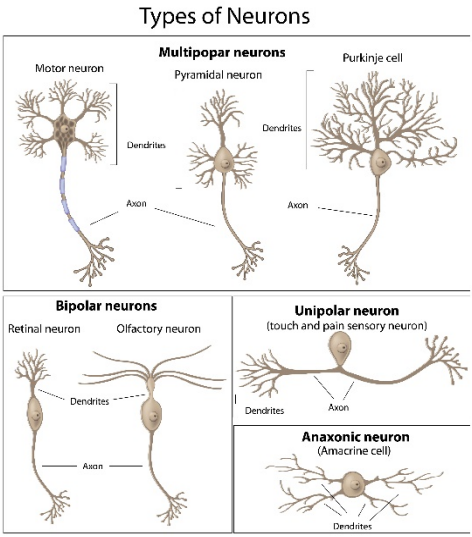


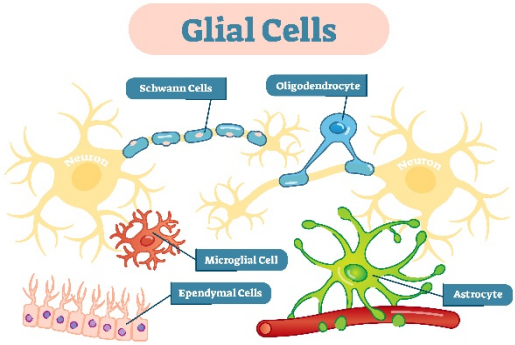


Neurons come in a variety of shapes but all have the same parts and work under the same rules of signal sending. There are billions of neurons in the brain alone that form a neural network that works like a supercomputer.

Nervous tissue cells

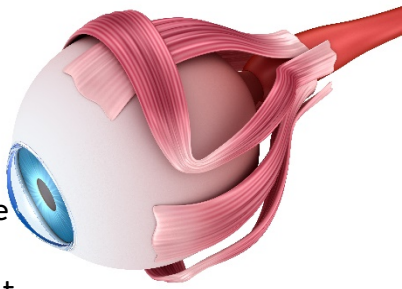
- Neurons
- Gilal cells



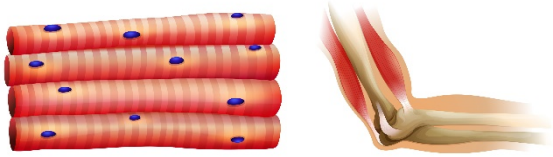


MUSCLE TISSUE

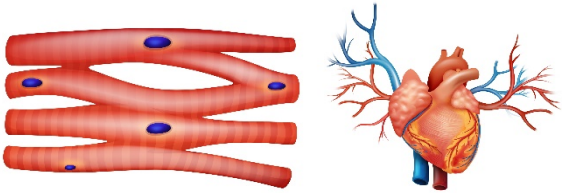
Muscle tissue's responsible for every macroscopic movement in your body. And its all based on microscopic activity. Muscle tissue can contract, pulling other structures like bones for running, skin for facial expression, and other organs like blood vessels to change your blood pressure. Some muscles have to be very precise and work in perfect unison like extrinsic eye muscles that move the eye for clear vision even when tracking something.



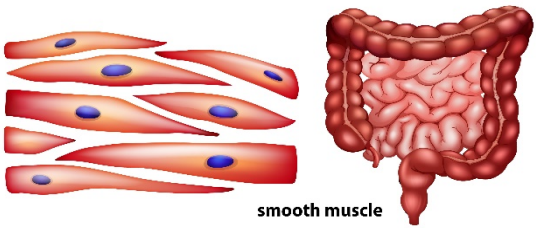
Types of Muscle Cells



skeletal muscle



cardiac muscle



smooth muscle

Voluntary muscles are consciously controlled

- **Skeletal muscle** cells are the only voluntary muscle and most common type of muscle cells, responsible for making general, conscious movements of the body.

Involuntary muscles work without you thinking about them

- **Cardiac muscle** cells control contractions of heart by generating electrical impulses
- **smooth muscle** cells control subconscious movements of tissues such as blood vessels, the uterus, and thes tomach

Each of the muscle types have unique and identifying characteristics.

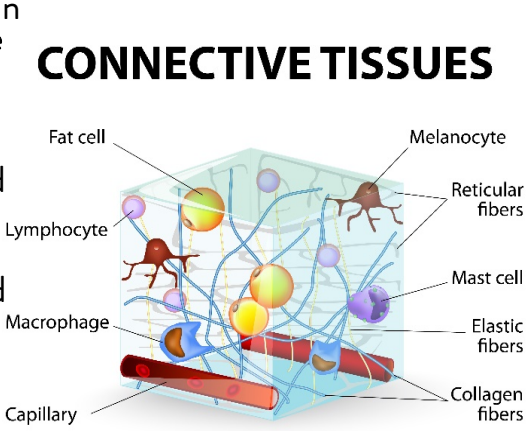
CONNECTIVE TISSUE

Connective tissue is the most diverse and abundant tissue in the body probably because it includes every tissue that wont fall into the descriptions of the others and it surrounds and it connects, separates, and supports all other types of tissues in the body.

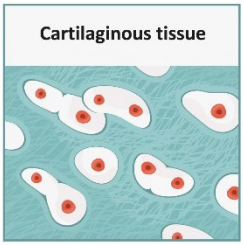
Two types of connective tissue:

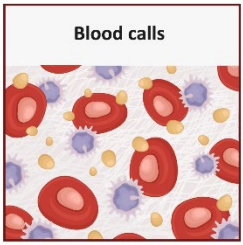
1) Connective tissue proper; it can be divided into **loose connective** and **dense connective tissues** that describe how closely packed the cells are.

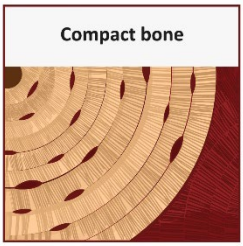
- Immune cells to wander around looking for body invaders
- **Fibroblasts** that make new supporting fibers that help hold things in place
- Gelatinous **matrix** (ground substance) that holds it all together

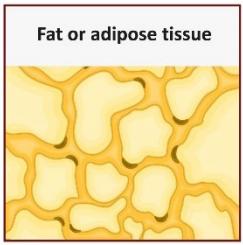


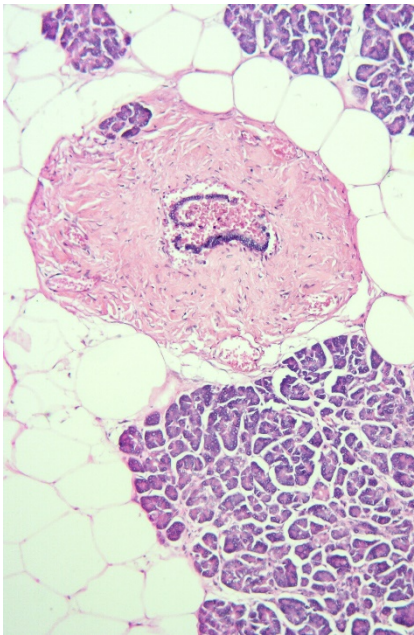
2) Specialized connective tissue: blood, bone, cartilage and adipose tissues







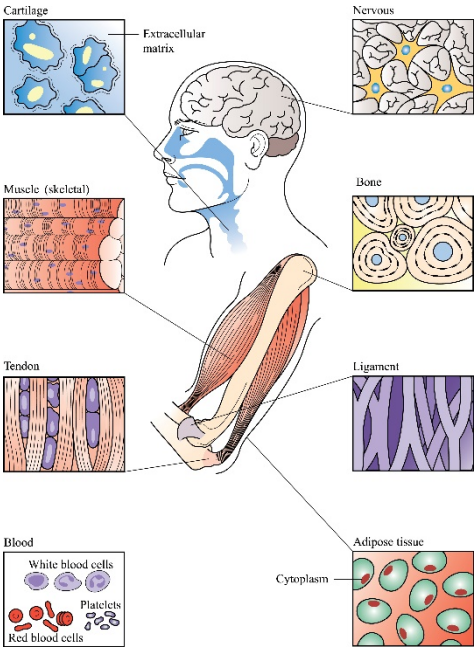


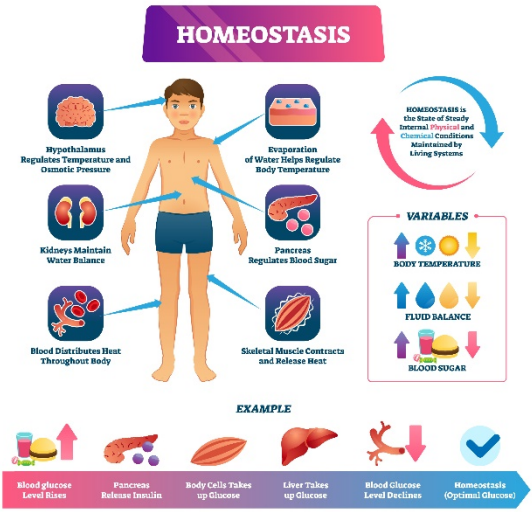


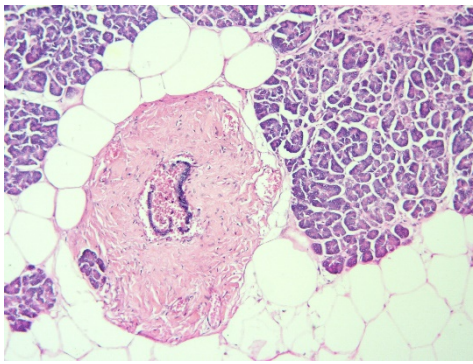
ORGANS

Organs include multiple tissue types that work together to achieve one function.

Animals have specific systems in place to help the body maintain a perfect balance of all the chemicals, temperature, water, nutrients, and more. This system is called **homeostasis** and it is a main driver of all life.

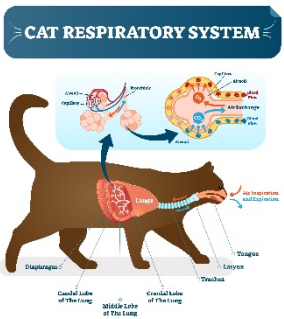


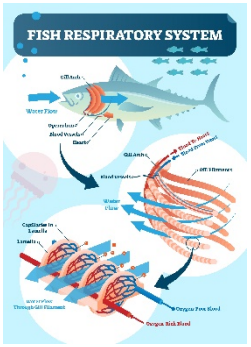




Organ Systems are groups of organs that work together to carry out a particular function

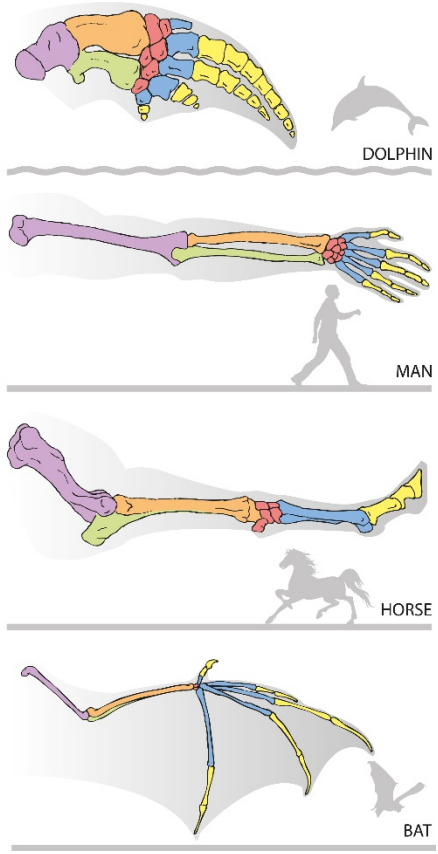
Organisms are the collection of all organ systems that work together.





COMPARATIVE ANATOMY

We can compare the anatomies of different living things, looking at cellular similarities and differences, studying embryological development, and studying vestigial structures, organs, and organs systems within individual organisms. Its called **Comparative anatomy,** the study of similarities and differences in the anatomy of different species. Its really the foundation for the classification systems we've discussed before.



Comparative anatomy can be as simple as looking for the similarities and differences in bone structures in forelimbs of cats, whales, bats, and humans. All of these appendages consist of the same basic parts; yet, they serve completely different functions

Homologous structures have similar characteristics due to relatedness of species.

This can be tricky because two things work similarly does not mean the species are related.

Analogous structures are similar function and superficial resemblance of structures that have different origins.

For example, the wings of a fly, a moth, and a bird are analogous because they developed independently as adaptations to a common function—flying.

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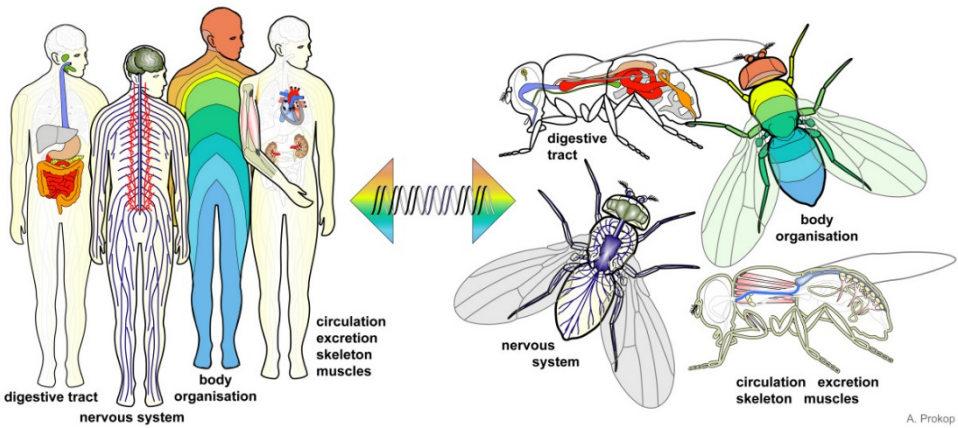

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The "About Me" Activity Book and app are interactive tools that give kids the opportunity to learn about the body by coloring 3D models that pop off the page, defend against invading germs in a short video game and watch fun videos! The Rube-E Educational app allows young people to better understand their bodies as they build a 3D Rube Goldberg machine using augmented reality elements.

ABOUT JUMP STEAM

Jump Simulation created its STEAM program to spark the curiosity of our youth in health care careers. Designed to give middle and high school students hands-on opportunities, Jump STEAM offers experiences in everything from learning what it takes to be a doctor to understanding how engineers are working with clinicians to transform health care. Learn more and sign your kids up at **jumpsimulation.org/STEAM**

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