

## Warm-up

- Objective:
  - Describe the major tissue structure of animals

- Warm-up:

Body temperature can be increased by all of the following EXCEPT:

- Muscle contractions
- Drinking alcohol, which results in vasodilation
- Increasing metabolic activity
- Puffing up feathers or hair
- Reducing blood flow to ears



## Chapter 40

### Animal Structure

## Animal form & function reflect Biology's major themes

- Animals provide examples of biology themes:
  - Diversity & unity of life
  - Form & function are interwoven
  - Evolution is the thread that ties it all together
    - Adaptations observed in a comparative study of animals evolved by natural selection

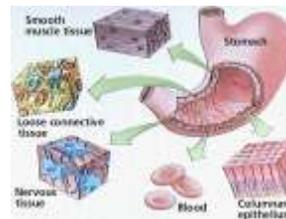
The long, tongue-like proboscis is a structural adaptation for feeding. The moth can forage for nectar when temperatures are as low as 5°C

The moth uses a shivering-like mechanism for pre-flight warm-up of its muscles



## Hierarchy of Structure

- Cells → tissues → organs



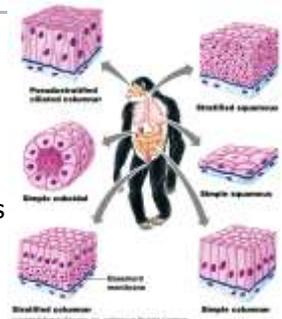
- Tissues = groups of cells with common structures & functions
- Organs = composed of different tissue types

## Tissue Types

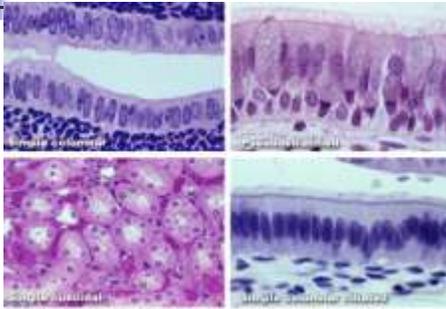
- Epithelial
  - Covers body surface & lines internal body cavities
  - Skin, mucus membranes, lining of digestive tract
- Muscle
  - Body movement
  - Skeletal, cardiac, smooth muscle
- Connective
  - Framework of body
  - Bone, cartilage, fibers, blood
- Nervous
  - Integration & control of response to stimuli
  - nervous

## Epithelial Tissue

- Lining, protecting & forming glands
- Protection of internal environment against external environment
- Secretion of a products

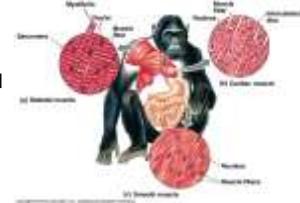


## Epithelial tissue cell types

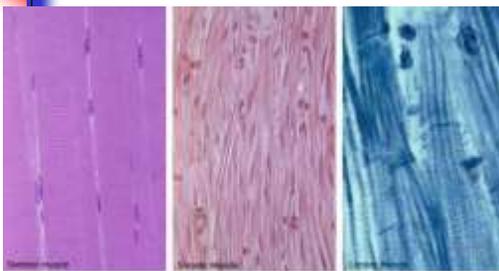


## Muscle tissue

- Function
  - Facilitates movement by contraction of muscle cells (fibers)
- Types
  - Skeletal
    - Striated
  - Cardiac
  - Smooth



## Muscle tissue



"Power" muscles (striated)      Involuntary muscles of digestive systems      Heart muscle

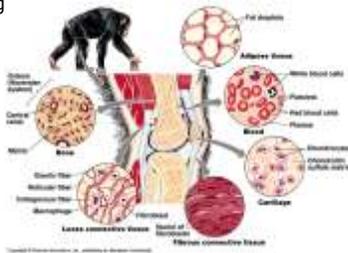
## Nervous Tissue

- Functions
  - Integrating stimuli
  - Response to stimuli
- Types
  - Neurons, brain, spinal cord

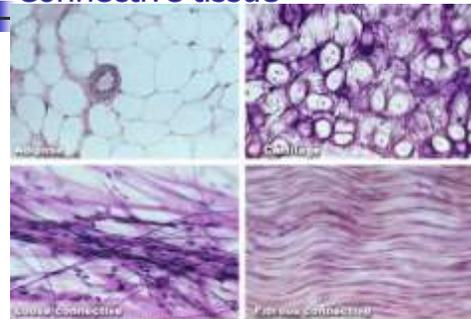


## Connective tissue

- Functions
  - Support & binding
  - Blood
  - Storing fats
  - Filling space
- Types
  - Bone
  - Blood
  - Fibers
  - Cartilage
  - Adipose (fat)

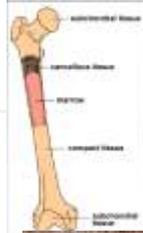


## Connective tissue



## Cartilage & Bone

- Rigid connective tissue
  - Structural proteins deposited in matrix between cells
- Bone is stronger
  - Strength from calcium salts deposited in matrix
    - Calcium reservoir
- Cartilage is softer
  - Forms embryonic skeleton of vertebrates & adult skeleton of sharks and rays
  - In human body = ears, tip of nose & joints



## Organ Systems

Cells → tissues → organs → organ systems → organisms

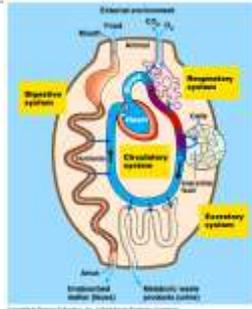
**Table 40.1 Organ Systems: Their Main Components and Functions in Mammals**

Organ System	Main Components	Main Functions
Digestive	Mouth, pharynx, esophagus, stomach, intestines, liver, pancreas, anus	Food processing (ingestion, digestion, absorption, elimination)
Circulatory	Heart, blood vessels, blood	General distribution of materials
Respiratory	Lungs, trachea, other breathing tubes	Gas exchange (intake of oxygen, disposal of carbon dioxide)
Immune and Lymphatic	Immune system, lymph nodes, thymus, spleen, lymph vessels, white blood cells	Body defense (fighting infections and cancer)
Excretory	Kidneys, ureters, urinary bladder, urethra	Disposal of metabolic wastes; regulation of osmotic balance of blood
Endocrine	Pituitary, thyroid, parathyroid, other hormone-secreting glands	Coordination of body activities (e.g., digestion, metabolism)
Reproductive	Ovaries, testes, and associated organs	Reproduction
Nervous	Brain, spinal cord, nerves, sensory organs	Coordination of body activities; detection of stimuli and transmission of impulses to effectors
Integumentary	Skin and its derivatives (e.g., hair, nails, skin glands)	Protects against mechanical injury, infection, drying out
Muscular	Skeletal muscles, tendons, ligaments, cartilage	Body support, protection of internal organs, movement, locomotion

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## Homeostasis

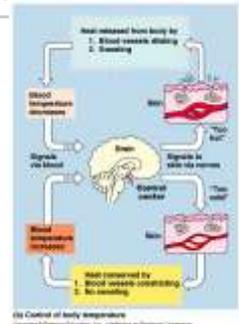
- Systems work to maintain a balance
  - Integrated open & closed systems
  - Required monitoring, feedback & response



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## Feedback Circuits

- Negative Feedback
  - Stimulus triggers control mechanisms
  - Counteracting further change
    - Reverse effect
- Positive Feedback
  - Stimulus triggers control mechanism amplifying effect
    - Much less common



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## Control of body temperature

