

# SNC2D BIOLOGY

TISSUES, ORGANS & SYSTEMS OF ...  
• Animal & Plant Tissues  
(P.42-45)

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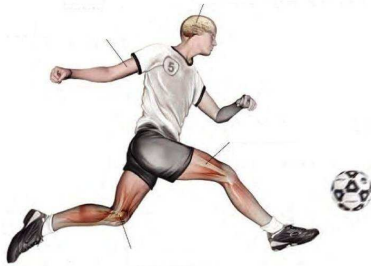
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## Animal Tissues

As you already know, groups of cells that work together to perform a task are called **tissues**. For example, muscle tissue is made up of cells that contract to help the body move. Nerve tissue is made up of cells that carry signals to and from the brain. Animal tissues can be classified into four major types.



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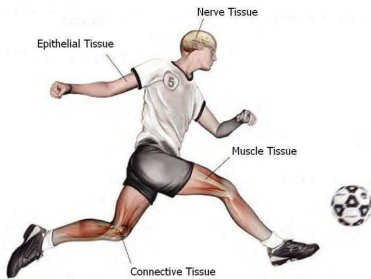
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## Animal Tissues

### ANIMAL TISSUES

- four types:
- epithelial
- connective
- muscle
- nerve



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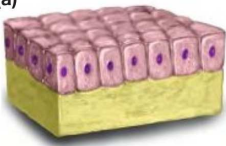
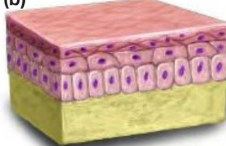
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**Animal Tissue – Epithelial**

*Epithelial tissue (epithelium) is made up of tightly packed cells that cover body surfaces and line the body's internal organs and cavities. Epithelium can be (a) a single layer of cells, or it can be (b) many layers of cells.*

(a)  (b) 

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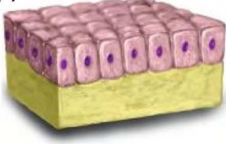
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**Animal Tissue – Epithelial**

*Epithelial tissue is made up of a single layer of cells that allows materials to pass through the layer. For example, it forms the air sacs of the lungs.*

(a) 

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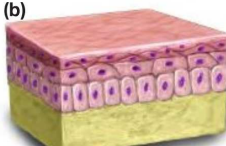
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**Animal Tissue – Epithelial**

*Epithelium, with many layers, covers parts of the body that need greater protection from injury. Human skin contains layers of epithelial tissue. These cells help protect areas beneath the skin.*

(b) 

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### Animal Tissue – Epithelial

**EPITHELIAL TISSUE**

- ❖ thin sheets of tightly packed cells that cover/line parts of the body
- ❖ single layer ☞ allows materials to pass through (lungs)
- ❖ many layers ☞ protects body from injury/dehydration (skin)

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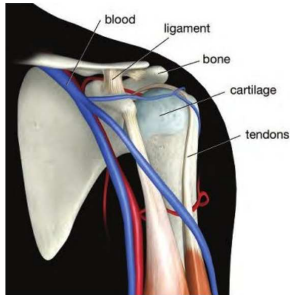
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### Animal Tissue – Connective

Connective tissue supports, protects, and connects the body's organs. **Connective tissue** is made up of both specialized cells and non-living substances.

**NOTE!**  
Blood is a type of connective tissue – it connects body systems by bringing oxygen and nutrients and removing wastes.



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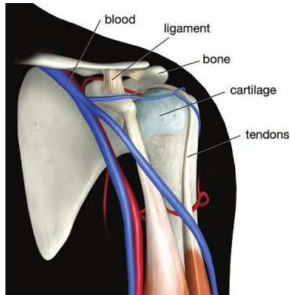
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### Animal Tissue – Connective

Bones, ligaments, cartilage, and tendons are some other types of connective tissues. Tendons connect muscles to bones, and ligaments connect bones to bones. Between the ends of the bones at a joint, cartilage forms a cushioning pad. Cartilage is also found in other parts of your body – your ears, nose, ...



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### Animal Tissue – Connective

**CONNECTIVE TISSUE**

- ❖ supports, protects, and connects the body's organs
- ❖ includes:
  - blood (brings nutrients/removes wastes)
  - bone
  - cartilage
  - tendons
  - ...

**RECALL!**  
*Blood is a connective tissue because it connects body systems by bringing oxygen and nutrients and removing wastes.*

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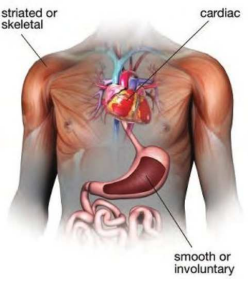
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### Animal Tissue – Muscle

**Muscle tissue** is made up of cells that contract, or get shorter. There are three kinds of muscle tissue: skeletal, smooth, and cardiac. When you move your arm or leg, you are using skeletal muscle. Smooth muscle occurs in blood vessels, the stomach, and other organs. Cardiac muscle is only found in the heart.



Labels: striated or skeletal, cardiac, smooth or involuntary

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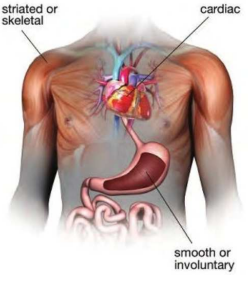
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### Animal Tissue – Muscle

**NOTE!**  
*Skeletal muscle is voluntary, which means that it is controlled by will. Smooth muscle and cardiac muscle are involuntary, which means they move without conscious control. This is important because if they were not involuntary, we would spend all our time thinking about things like breathing, digesting food, and pumping blood.*



Labels: striated or skeletal, cardiac, smooth or involuntary

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### Animal Tissue – Muscle

**MUSCLE TISSUE**

- ❖ cells that can shorten or contract
- ❖ 3 types:
  - skeletal (movement)
  - smooth (arteries, veins, and organs)
  - cardiac (heart)

**NOTE!**  
*Skeletal muscle is voluntary (i.e. you control) while the other two are involuntary (i.e. they move without conscious thought).*

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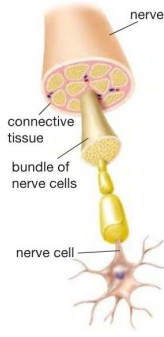
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### Animal Tissue – Nerve

*If your hand gets close to something too hot, you pull your hand away. Your body can feel because your skin contains millions of nerve cells that make up nerve tissue. Nerve cells receive information from inside and outside the body. **Nerve tissue** is the most complex tissue in the body.*



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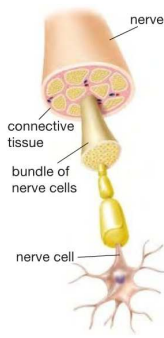
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### Animal Tissue – Nerve

**NOTE!**  
*Nerve cells are capable of creating messages, called impulses, and transmitting them throughout your body. These electrical signals between your body and brain can travel very fast – some at more than 100 m/s!*



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### Animal Tissue – Nerve

**NERVE TISSUE**

- ❖ sends signals between the body and brain
- ❖ responds to stimuli and coordinates body functions
- ❖ consists of the:
  - brain
  - spinal cord
  - nerves

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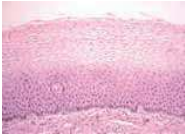


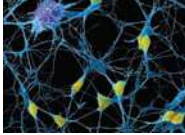
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### Animal Tissue Micrographs

<p>Epithelial Tissue</p> 	<p>Muscle Tissue</p> 
<p>Connective Tissue</p> 	<p>Nerve Tissue</p> 

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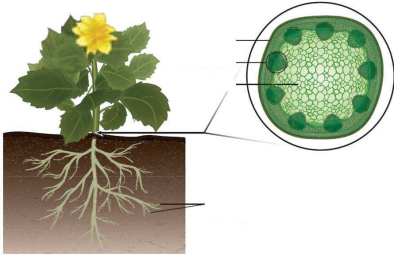
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### Plant Tissues

*Just like animal cells, groups of plant cells form tissues that work together to perform similar tasks. And just like animal tissues, plant tissues can be classified into four major types.*



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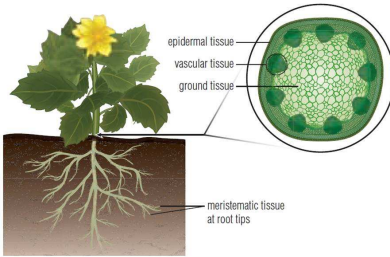
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### Plant Tissues

**PLANT TISSUES**

- ❖ four types:
  - epidermal
  - vascular
  - ground
  - meristematic



epidermal tissue  
vascular tissue  
ground tissue  
meristematic tissue at root tips

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### Plant Tissue – Meristematic

**RECALL!**

All plant tissues are formed from groups of meristematic cells known as **meristematic tissue**. Meristematic cells can differentiate into specialized tissue types.

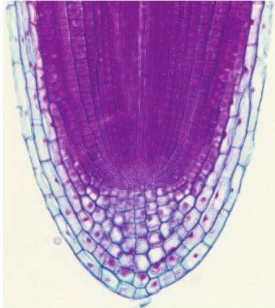


Figure 2 There are regions in all plant roots and stems, near the tips where rapid growth occurs, that contain meristematic cells.

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### Plant Tissue – Meristematic

**MERISTEMATIC TISSUE**

- ❖ tips of roots and stems
- ❖ responsible for plant growth

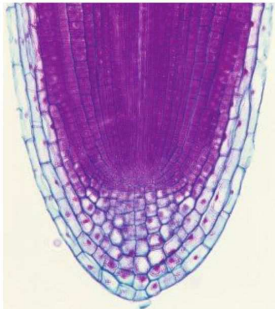


Figure 2 There are regions in all plant roots and stems, near the tips where rapid growth occurs, that contain meristematic cells.

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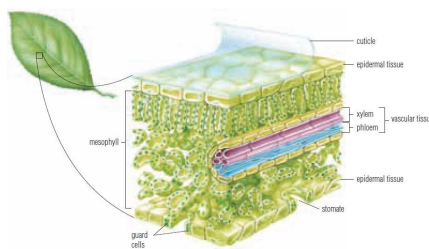
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### Plant Tissue – Epidermal

The **epidermal tissue** on both the top and underside of the leaf is clear and very thin. It forms a protective outer covering that allows the exchange of materials and gases into and out of the plant.



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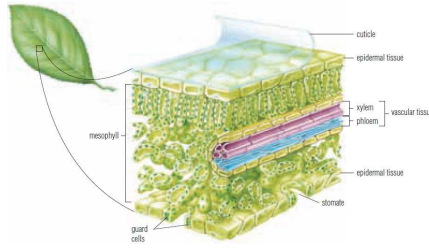
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### Plant Tissue – Epidermal

**NOTE!**  
Guard cells form a tiny opening, called a stomate, that allows carbon dioxide, water vapour, and oxygen to move into or out of the leaf easily.



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### Plant Tissue – Epidermal

**EPIDERMAL TISSUE**

- ❖ the protective outer covering
- ❖ allows materials and gases in and out of the plant

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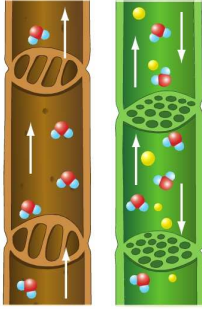
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**Plant Tissue – Vascular**

**Vascular tissue** plays an important role in transporting water and nutrients throughout the plant. There are two types of vascular tissue in the plant:

- *xylem is responsible for the movement of water and minerals from the roots up the stem to the leaves, where these substances are used in photosynthesis*



The diagram shows two vertical tubes representing vascular tissues. The left tube is brown and labeled 'Xylem', with arrows pointing upwards and small blue and red spheres representing water and minerals. The right tube is green and labeled 'Phloem', with arrows pointing downwards and small yellow, red, and blue spheres representing sugar and other nutrients.

Xylem      Phloem

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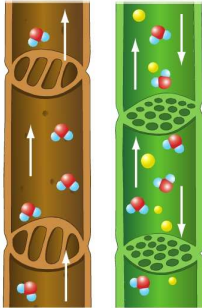
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**Plant Tissue – Vascular**

**Vascular tissue** plays an important role in transporting water and nutrients throughout the plant. There are two types of vascular tissue in the plant:

- *phloem transports the sugar produced during photosynthesis from the leaves to other parts of the plant, where it is used to provide energy for all cellular processes.*



The diagram shows two vertical tubes representing vascular tissues. The left tube is brown and labeled 'Xylem', with arrows pointing upwards and small blue and red spheres representing water and minerals. The right tube is green and labeled 'Phloem', with arrows pointing downwards and small yellow, red, and blue spheres representing sugar and other nutrients.

Xylem      Phloem

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**Plant Tissue – Vascular**

**VASCULAR TISSUE**

- ❖ transports water and nutrients throughout the plant
- ❖ 2 types:
  - xylem (roots to leaves)
  - phloem (leaves to plant)

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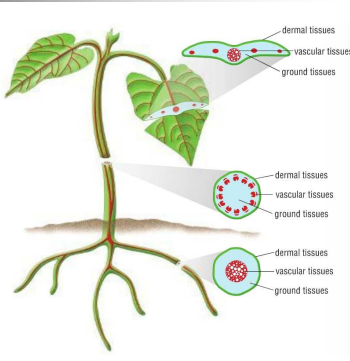
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### Plant Tissue – Ground

Most of the plant is made of **ground tissue**. The function of the ground tissue depends on where it is found in the plant. For example, in the roots, ground tissue is involved in food and water storage. In the leaves, photosynthesis and gas exchange occurs in specialized ground tissues called **mesophyll**.



The diagram shows a young plant with three cross-sections. The top cross-section is of a leaf, showing a central vein with vascular bundles (xylem and phloem) surrounded by ground tissue (mesophyll) and an outer layer of dermal tissue. The middle cross-section is of the stem, showing vascular bundles arranged in a ring, surrounded by ground tissue and an outer dermal layer. The bottom cross-section is of the root, showing vascular bundles arranged in a central cylinder, surrounded by ground tissue and an outer dermal layer.

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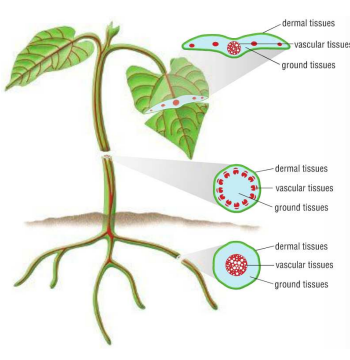
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### Plant Tissue – Ground

**NOTE!**  
During photosynthesis, carbon dioxide and water are converted into sugar and oxygen.



The diagram is identical to the one on slide 27, showing a young plant with three cross-sections of the leaf, stem, and root, with labels for dermal, vascular, and ground tissues.

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### Plant Tissue – Ground

**GROUND TISSUE**

- ❖ majority of the plant
- ❖ function depends on location:
  - strength and support (stem)
  - store food and water (roots)
  - photosynthesis and gas exchange (leaf)

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### Plant Tissue Micrographs

Meristematic Tissue

Ground Tissue

Epidermal Tissue

Vascular Tissue

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### ✓ Check Your Learning

1. List the four types of animal and plant tissue and their function.

**ANIMAL**

- epithelial – covers/lines parts of the body (skin)
- connective – supports, protects, and connects (blood)
- muscle – enables movement (skeletal)
- nerve – sends signals between body and brain (spinal cord)

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### ✓ Check Your Learning

1. List the four types of animal and plant tissue and their function.

**PLANT**

- epidermal – forms a protective outer covering
- vascular – transports water & nutrients throughout the plant
- ground – strength, storage, photosynthesis, ... (depends)
- meristematic – responsible for plant growth

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 **Check Your Learning**

2. Compare the following animal and plant tissues. How are they similar?  
(a) connective and vascular tissue  
(b) epithelial and epidermal tissue

(a) both are concerned with transferring water, nutrients, ... throughout the organism  
(b) both are concerned with protecting the organism

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 **Check Your Learning**

3. Why is it important that some types of muscles can contract and relax without our having to think about it?

if they didn't, we would spend all our time thinking about things like breathing, digesting food, pumping blood, ...

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 **Check Your Learning**

4. Plants are often called "nature's air purifiers." Explain the meaning of this term (think carbon dioxide).

plants use carbon dioxide during photosynthesis and produce oxygen as a by-product

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 Check Your Learning

**TEXTBOOK**  
P.45 Q.1-5

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