III. Ground Tissue
- usually parenchyma cells
- located b/w dermal & vascular tissues
- performs photosynthesis, storage & support

Plant Growth

What is the difference between determinate and indeterminate growth?
determinate → grows a specific/determined amount of time (annual, biennials)
indeterminate → grow as long as they are alive (perennials)

Growth in roots originates in the apical meristem. The root cap protects the apical meristem and secretes a lubricant as the root moves through the soil. This structure (is/is not) part of the zone of cell division.

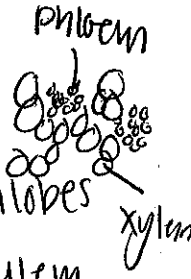
Describe what happens in each region of the meristem:

Zone of Cell Division	grows by mitosis
Zone of Elongation	- these cells take in H_2O & elongate - where root hairs are located
Zone of Cell Differentiation	- contain root hairs & lateral roots

How does the organization of xylem and phloem differ in the roots of dicots and monocots?

monocots: xylem - arranged in ring
phloem - ring, external to xylem

dicots: xylem - arranged in lobes (looks like an X)
phloem surrounds xylem



How does the organization of xylem and phloem differ in the stems of dicots and monocots?

monocots: xylem & phloem are arranged in scattered bundles

dicots: xylem & phloem arranged in bundles (xylem is internal)

Lateral roots arise from which tissue? Where is this tissue found?
pericycle → found inside the vascular cylinder (so it can get nutrients for roots to grow)

All plants have primary growth, but only woody plants undergo secondary growth.

Layers of wood in tree trunk:
Heartwood: oldest xylem (most interior)
Sapwood: newest xylem
Springwood: larger xylem cells
Summerwood: small dark xylem cells

1. How does meristematic tissue differentiate?

meristem → protoderm → dermal
meristem → procambium → vascular
meristem → ground meristem → ground tissue (periderm)

Plant Cells

Describe the following types of plant cells

Parenchyma:
- least specialized
- no cell wall (secondary)
- thin, primary cell wall
- does most of the metabolism
- large central vacuole to store H_2O & nutrients
- usually do not divide
- important in repair

Collenchyma
- have a more rigid primary cell wall
- no secondary cell wall
- important in support of young plants & stems of non-woody plants
- capable of elongation

Sclerenchyma
- secondary cell wall w/ lignin (rigid)
- dead, found where growth has stopped
- can be fiber or sclereid cells

Plant Tissues:

I. Dermal tissue is comprised of the epidermis and periderm

Epidermis-
- protection
- single layer of tightly packed cells
- can contain the waxy cuticle

Periderm-
- replaces epidermis in secondary growth
- forms cork & cork cambium
- dead

II. Vascular Tissue is comprised of xylem and phloem

Xylem-
- dead @ maturity
- transports H_2O
- 2 types: tracheids or vessel elements
  - have pits that form plasmodesmata
  - supports plant & carries H_2O

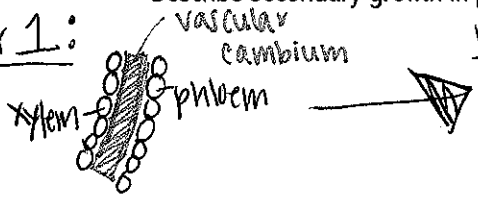
Phloem-
- transports sugar & some mineral ions
- two types:

sieve-tube cells
- lose nuclei & organs
- transports sugar

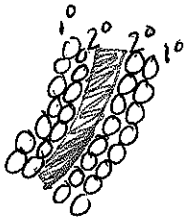
companion cells
- retain nuclei
- coordinates function of sieve-tube cells

Describe secondary growth in plants:

Year 1:



year 2:



- VC lays down xylem internally & phloem externally
- VC lays down new layer of xylem & phloem
  - old xylem pushed inward
  - old phloem pushed outward
- cork cambium forms in the cortex & makes cork cells that replace the epidermis
- phloem doesn't accumulate
- every year a new cork cambium forms & lays down cork

periderm = cork cambium + cork

*Bark = all layers exterior to vascular cambium (periderm + living phloem)

Which cells are no longer capable of carrying out the process of DNA transcription?

A. Xylem
B. Sieve tube elements – no nuclei
C. Companion cells
D. A and B
E. A, B, and C

Which of the following are sugar-transporting cells in angiosperms?

A. Parenchyma cells
B. Collenchyma cells
C. Clerenchyma cells
D. Tracheids and vessel elements
E. Sieve-tube elements

Which of the following are relatively unspecialized cells that retain the ability to divide and perform most of the plant's metabolic functions of synthesis and storage?

A. Parenchyma cells
B. Collenchyma cells
C. Clerenchyma cells
D. Tracheids and vessel elements
E. Sieve-tube elements

A student examining leaf cross sections under a microscope finds many loosely packed cells with relatively thin cell walls. The cells have numerous chloroplasts. What type of cells are these?

A. Parenchyma
B. Xylem
C. Endodermis
D. Collenchyma
E. Sclerenchyma

A plant has the following characteristics: a taproot system, several growth rings evident in a cross section of the stem, and a layer of bark around the outside. Which of the following best describes the plant?

A. Herbaceous eudicot
B. Woody eudicot
C. Woody monocot
D. Herbaceous monocot
E. Woody annual

Use for following question:

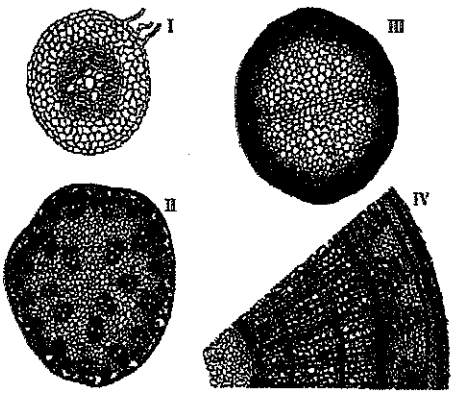
I. Root Cap (1)
II. Zone of elongation (4)
III. Zone of cell division (3)
IV. Zone of cell maturation (5)
V. Apical meristem (2)

Which of the following is the correct sequence from the growing tips of the root upward?

A. I, II, V, III, IV
B. III, V, I, II, IV
C. II, IV, I, V, III
D. IV, II, III, I, V
E. I, V, III, II, IV

Which of the following root tissues gives rise to lateral roots?

A. Endodermis
B. Phloem
C. Cortex
D. Epidermis
E. Pericycle



A monocot stem is represented by:

A. I only
B. II only
C. III only
D. IV only
E. Both I and III

A plant that is at least 3 years old is represented by:

rings of xylem

A. I only
B. II only
C. III only
D. IV only
E. Both I and III

A woody eudicot is represented by:

A. I only
B. II only
C. III only
D. IV only
E. Both I and III

You drive a nail in the trunk of a young tree that is 3 meters tall. The nail is about 1.5 meters from the ground. Fifteen ears later, you return and discover the tree has grown to a height of 30 meters. The nail is now _____ meters above the ground

A. 0.5
B. 1.5
C. 3.0
D. 15.0
E. 28.5

The vascular system of a three-year-old eudicot stem consists of:

A. 3 rings of xylem and 3 of phloem
B. 2 rings of xylem and 2 of phloem
C. 2 rings of xylem and 1 of phloem
D. 2 rings of xylem and 3 of phloem
E. 3 rings of xylem and 1 of phloem