**Exercise 4 — Meristems**

**Objectives:**
By completing this laboratory session you will be able to:

1. Identify the different types of apical meristems.
2. Learn the common properties of meristems.
3. Identify patterns of root and shoot apical meristems in a variety of taxa.
4. Distinguish differences between “open” and “closed” meristems in roots.
5. Understand the tunica-corpus concept in stems.

**Materials:**
In addition to the basic equipment for preparing slides, you will need prepared slides of:

- *Botrychium* root meristem
- *Equisetum* shoot
- *Coleus* shoot meristem
- *Pisum* root meristem
- *Elodea* shoot meristem
- *Acer* shoot meristem
- *Raphanus* root meristem

In addition, you will need fresh specimens of: *Coleus* *Elodea*

**Laboratory Exercises:**

**Root apical meristem:**
*Botrychium* is a fern. Look carefully at a prepared slide. Identify the quiescent center, which is near the apex of the root, and find a tetrahedral apical cell. Draw and label what you see.

**Pisum**, the garden pea, has a single set of initials. Does this species have an “open” or “closed” meristem?

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**Raphanus**, radish, has three sets of initials with the most distal set producing both the rootcap and the epidermis. Does this species have an “open” or “closed” meristem?

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**Shoot apical meristem:**
*Equisetum*, the horsetail – Draw the shoot illustrating the tetrahedral apical cell with three cutting faces. Label the apical cell.

Examine a prepared slide of *Elodea* as well as the fresh specimens in whole mounts. To make a whole mount of the fresh *Elodea*, cut off the apical tip about 3-4 mm back from the end, and mount in a drop of water on a slide with cover slip. Remove extra leaves that may obscure the apical tip. No staining is required, but dilute toluidine blue-O may be used.

Examine the prepared slide of *Coleus*.

Note the decussate leaf arrangement on the stem. Prepare cross and/or longitudinal sectional cuts of the apical meristem of *Coleus* and mount in toluidine blue-O stain with a cover slip.

What type of cellular arrangement does the meristem have?

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In the space below draw the preparations you have made of the *Elodea* and *Coleus* meristems and indicate by labels the differences as seen in longitudinal view. Prepared slides may be used if fresh preparations are not clear.
Compare the prepared slides of *Acer* (maple) and *Salix* (willow). *Acer* has opposite leaves and *Salix* possesses alternate leaves. How does the arrangement of cells in the apical meristems differ?

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Make sketches below showing the comparison described above. Label as appropriate.