BISC208-081
Lab 3 – Functional Plant Anatomy
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I. Introduction
- a. Monocot
  - i. Vascular Bundle
    1. Arrangement
       - a. Scattered
    2. Components
       - a. Air space
       - b. Xylem
       - c. Phloem
- b. Dicot
  - i. Vascular Bundle
    1. Arrangement
       - a. Cylindrical shaped
    2. Components
       - a. Vascular cambium
       - b. Xylem
       - c. Phloem
  - ii. Pith
    1. Storage tissue
    2. Supportive tissues
  - iii. Cortex
    1. Storage tissue
    2. Supportive tissues
- c. Experimental questions
  - i. Is transport only vertical?
  - ii. Is there dedicated tissue for transport to a leaf?
- d. Hypotheses
  - i. No
    1. Transport to the leaves is not verticle
- e. Observations
  - i. Transport to the leaves occurred

II. Methods
- a. Species
  - i. Helianthus annuus (Sunflower)
  - ii. Sorghum (Unknown species)
  - iii. Dianthus caryophyllus (Carnation)
- b. Age
  - i. 6 weeks old
- c. Setup
  - i. Carnation Experiment
    1. Carnation stem was cut six inches below the petals

2. The stem was split 4 ways
3. The stem was place in four food colorings

ii. Dicot Uptake
1. Stem was cut close to soil surface
2. Stem was immediately submerged in water
3. 5-10 cm was cut off from the bottom
4. Stem was split at the internode
5. Split ends were placed in Toluidine Blue O and Amaranth Red
6. Stem was cross sectioned
7. Cross sections were viewed under the microscope

iii. Dicot/Monocot Composition
1. Thin cross sections were prepared using a hand microtome
2. Cross sections were placed on a dyed slide
3. Slide were viewed under a microscope
4. All major tissues in the stem were identified

III. Results
a. See full text

IV. Conclusions
a. Transport is not interrupted by cutting the plant stem
b. There is transport to leaves
c. In dicots, water is transported orderly by the xylem

Results

Plant transport was examined through three different species of plant: Helianthus annuus, Unknown sorghum, and Dianthus caryophyllus. Helanthus annuus was used to view dye uptake and structure in a dicot plant. The stem was cross-sectioned and stained. It was observed that contained a cylindrical pattern of vascular bundles (Fig. 2). All of the tissues were examined and labeled (Fig. 2). The procedure was then repeated with monocot, Sorghum (Fig. 3).

The plant stem was split and dye uptake was allowed to occur. Dye allowed for the xylem to become stained and the pattern of xylem to be easily identified. A cross section at three internodes was taken and examined (Fig. 4-6). Xylem are found to run the length of the stem parallel to the other xylem. Cross sections of petioles were then taken to determine if dye intake to the leaves was occurring (Fig. 7-9). Intake to the leaves was found to have been supplied by one side of the stem or simply one xylem as only one dye was found in the petioles.

Dianthus caryophyllus was also examined to determine if there was transport to petals. The stem was quatered and placed in food coloring. It was found that the petals are in fact supplied by transport as food coloring began to color the petals (Fig. 10).

Figure 1: Helianthus annuus with split stem at internode one in Toluidine Blue O and Amaranth Red dye

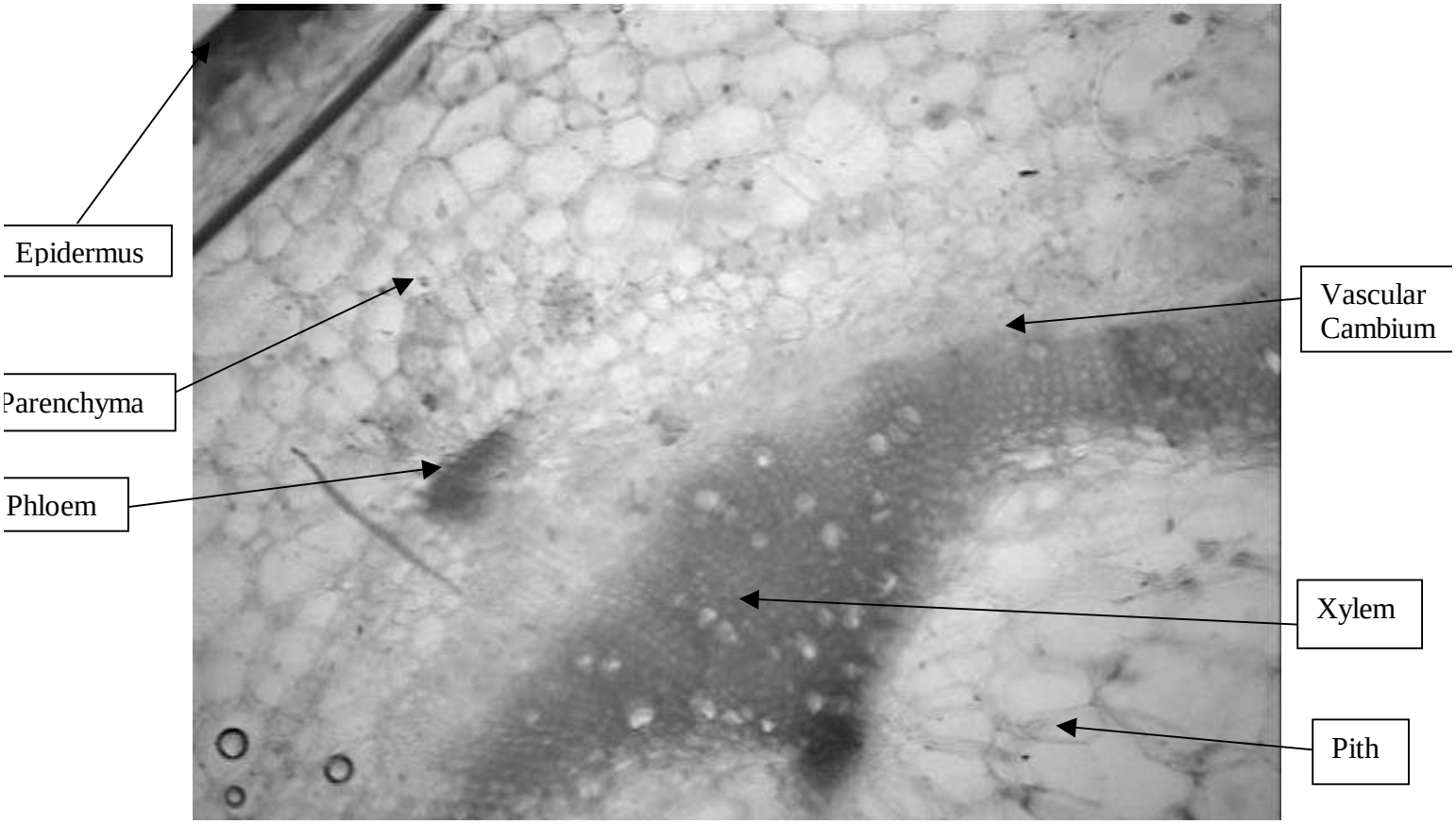

Figure 2: Helianthus annuus (dicot) stem cross section stained with Toluidine Blue O

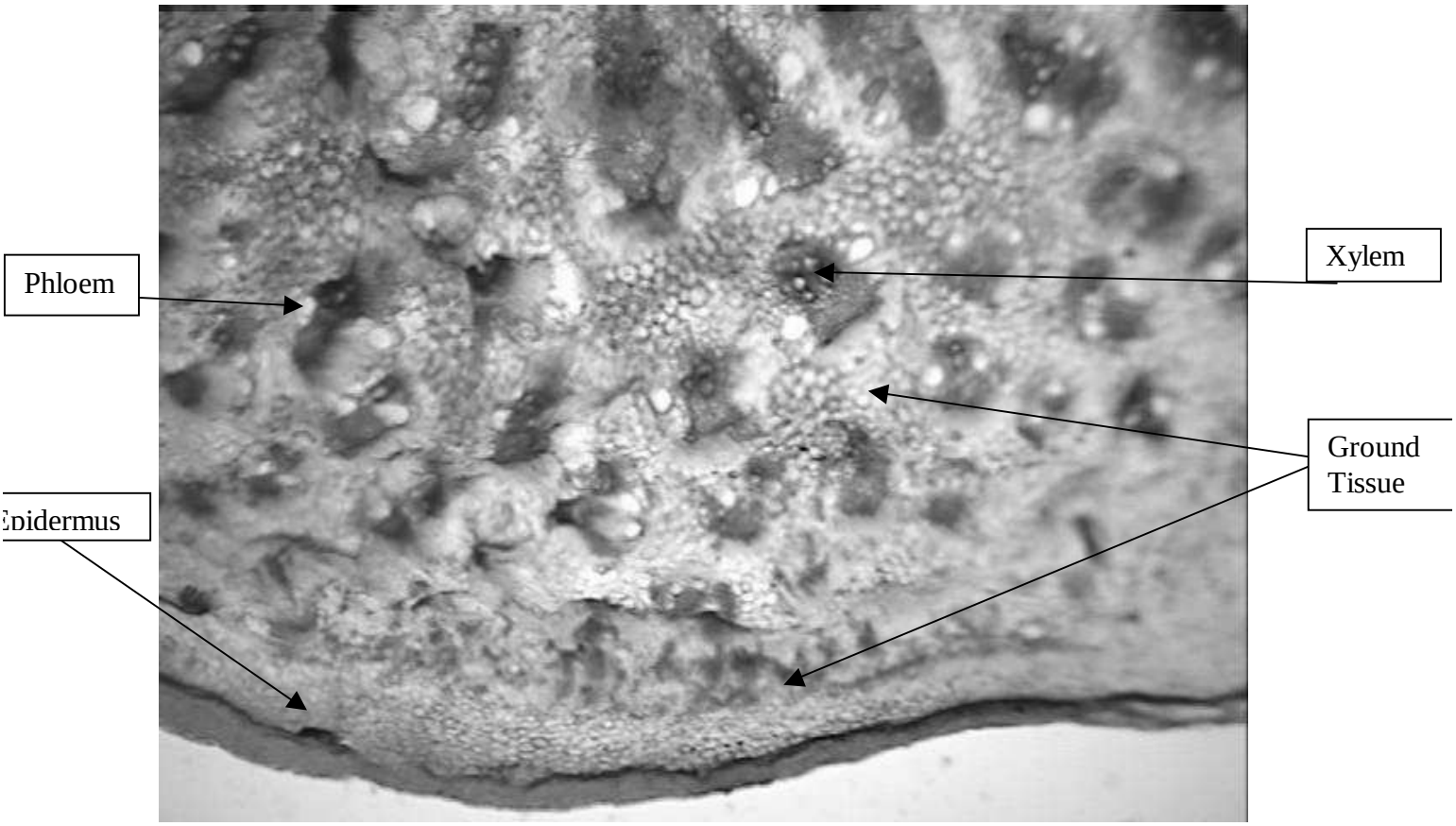

Figure 3: Sorghum (monocot) stem cross section stained with Toluidine Blue O

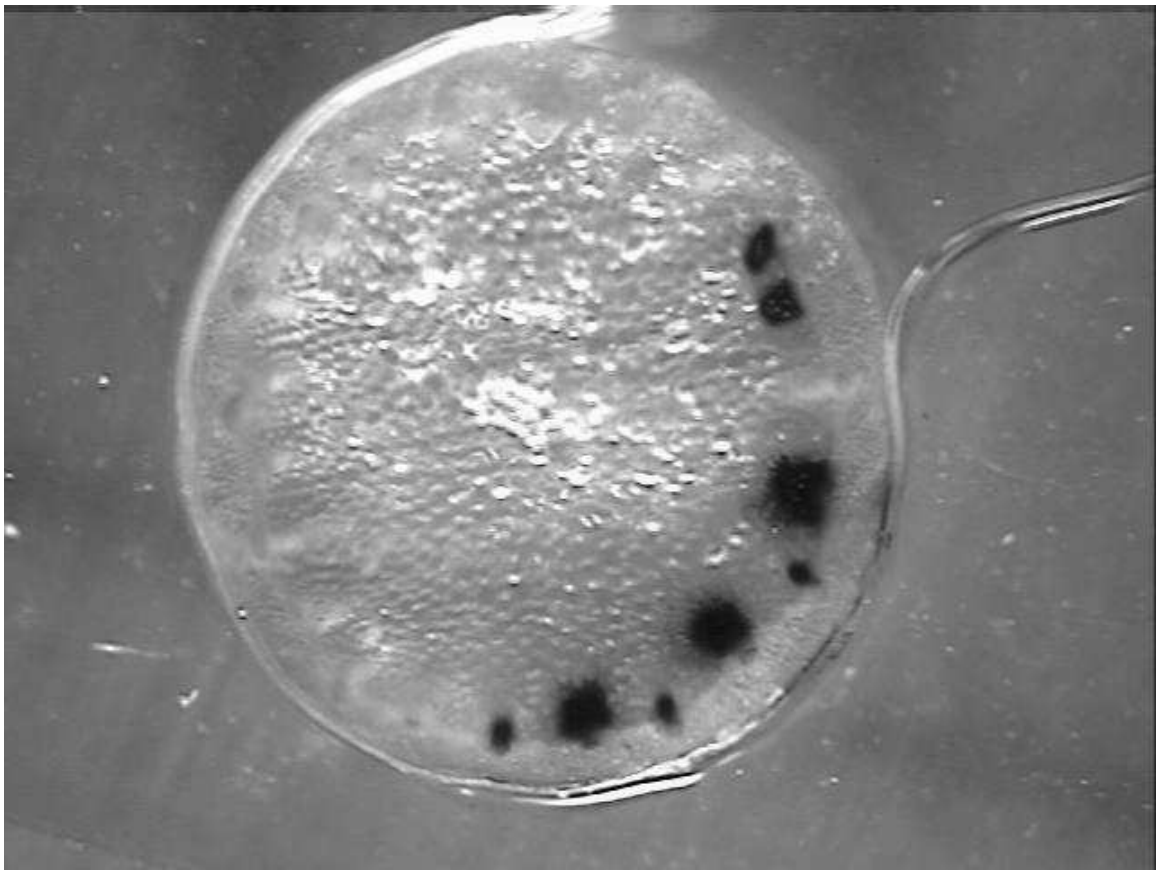

Figure 4: Helianthus annuus internode one cross section with Toluidine Blue O and Amaranth Red dye uptake

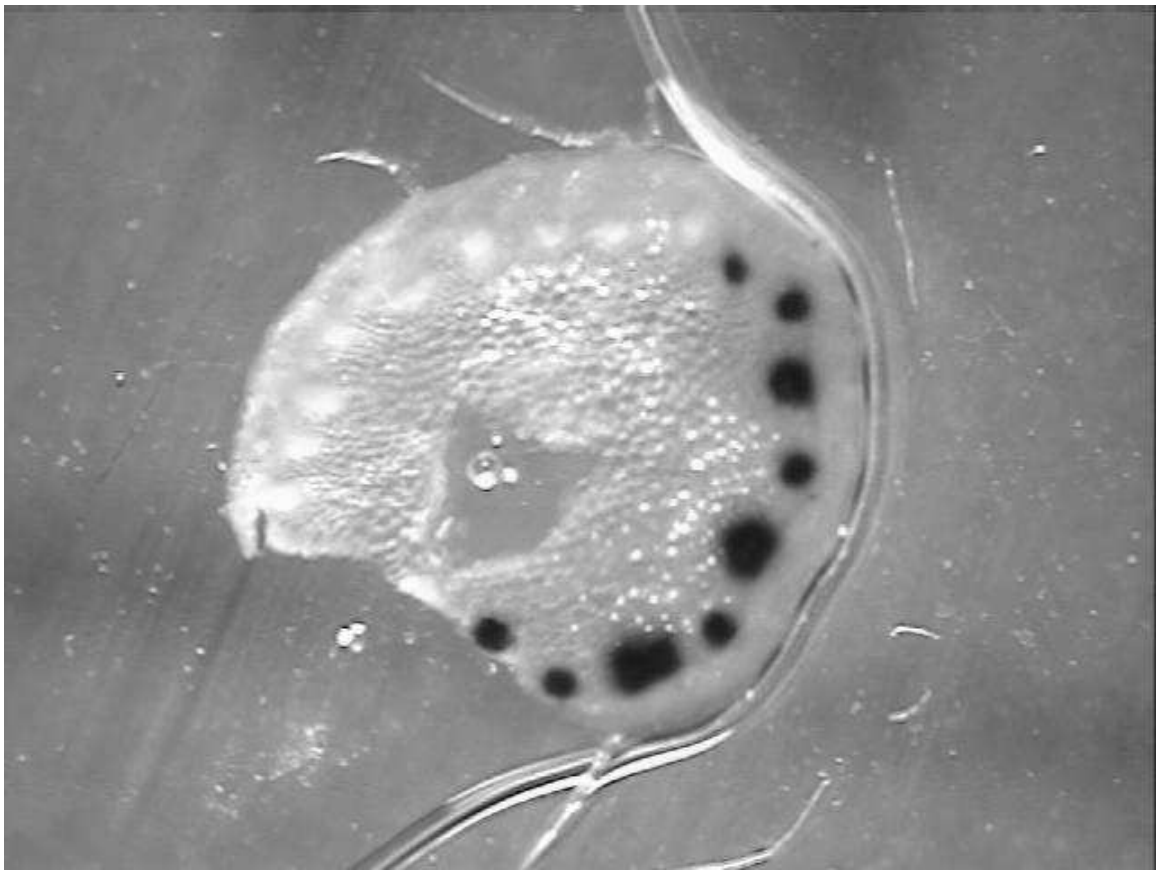

Figure 5: Helianthus annuus internode two cross section with Toluidine Blue O and Amaranth Red dye uptake

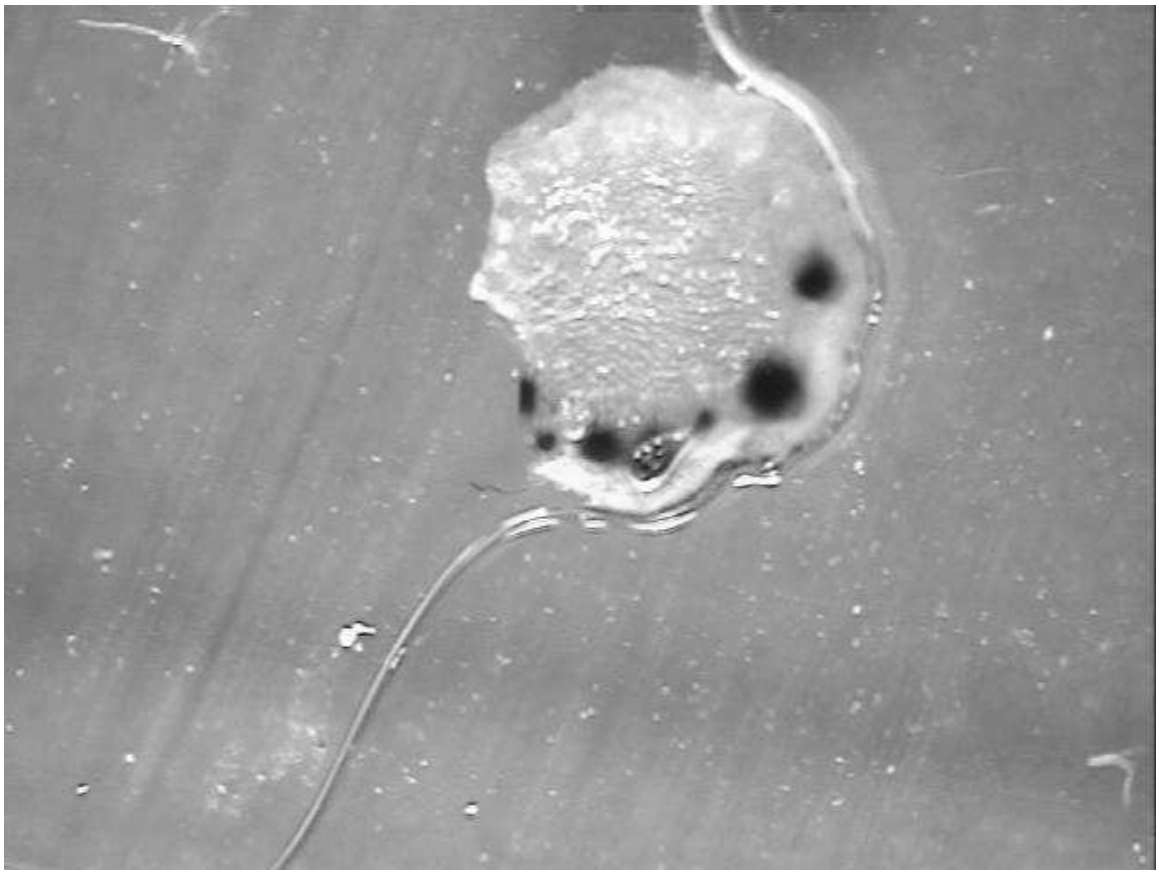

Figure 6: Helianthus annuus internode three cross section with Toluidine Blue O and Amaranth Red dye uptake

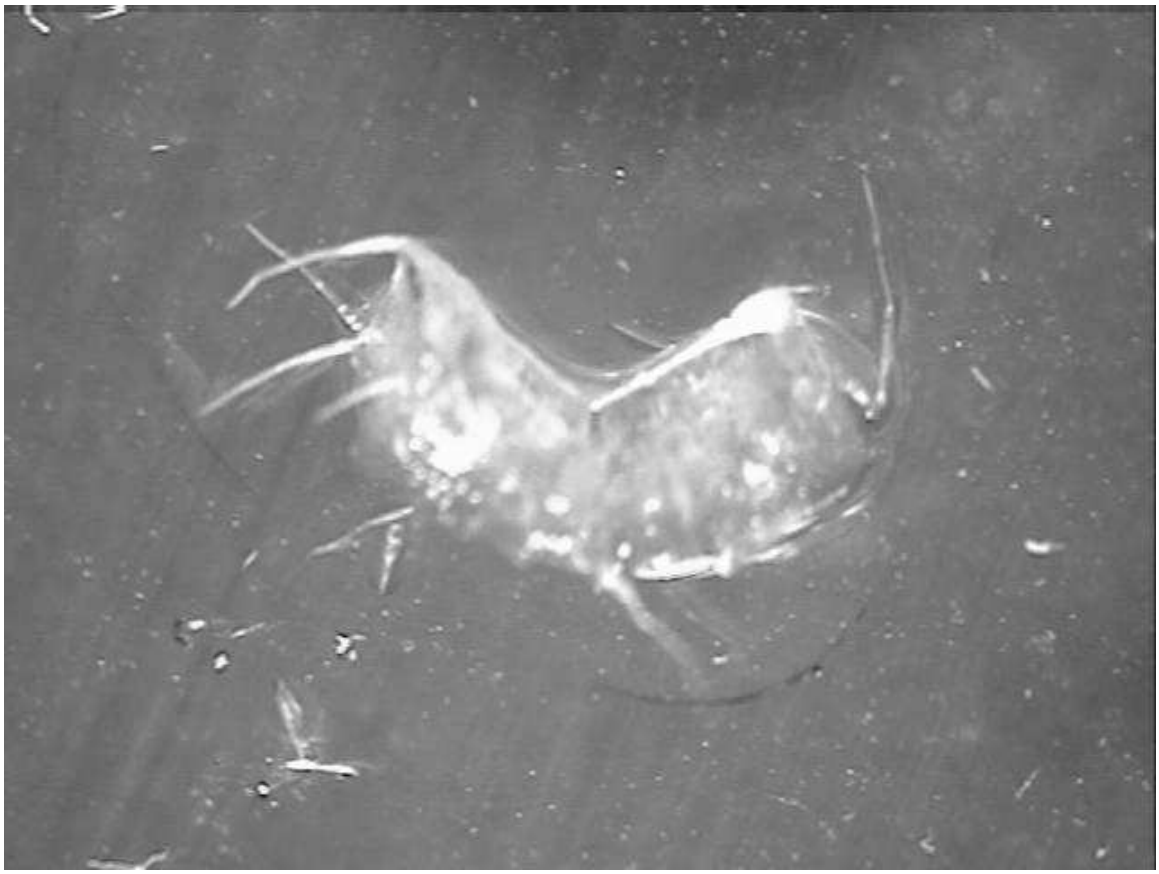

Figure 7: Helianthus annuus petiole one cross section with Amaranth Red dye uptake

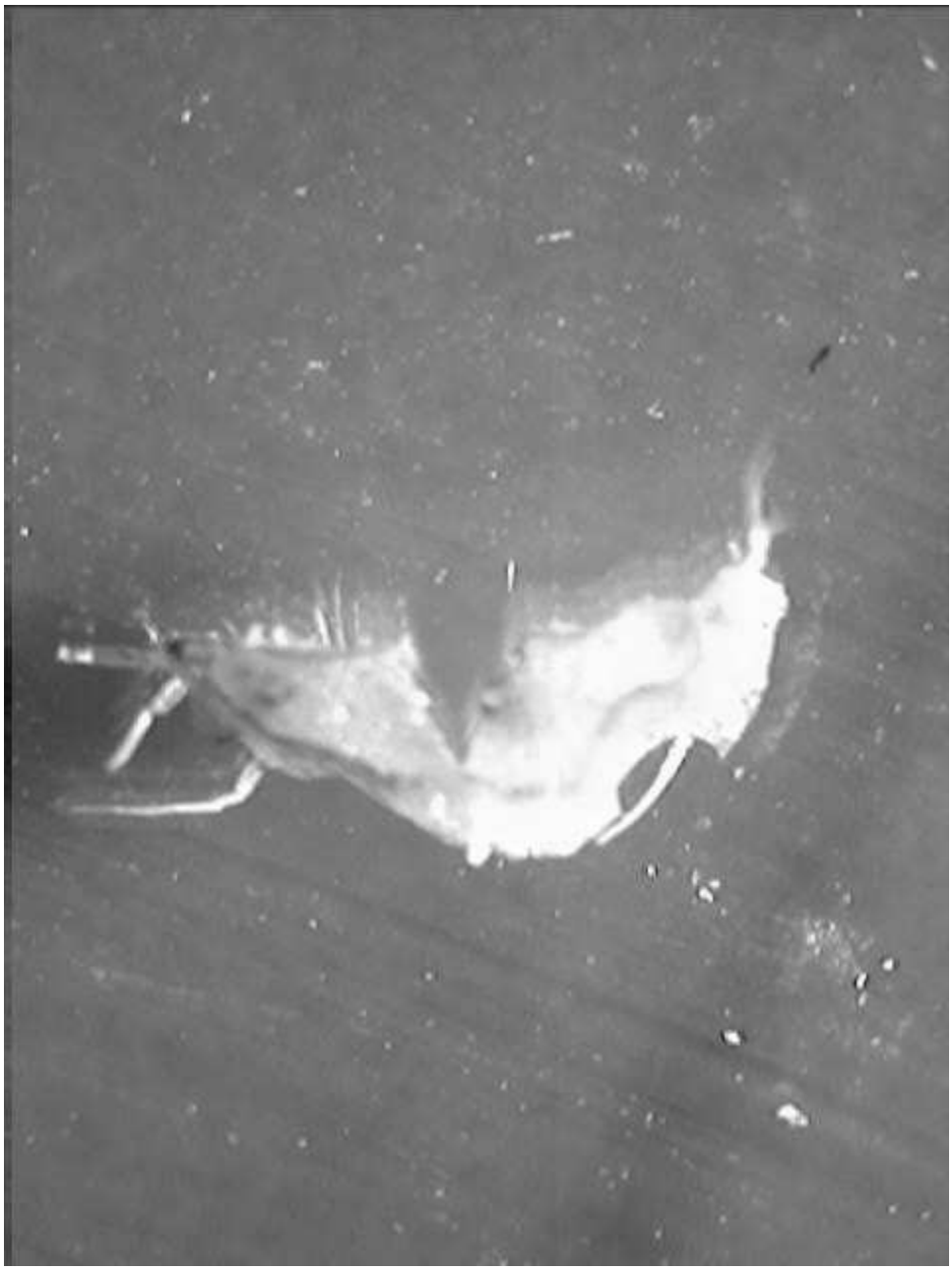

Figure 8: Helianthus annuus petiole two cross section with Amaranth Red dye uptake

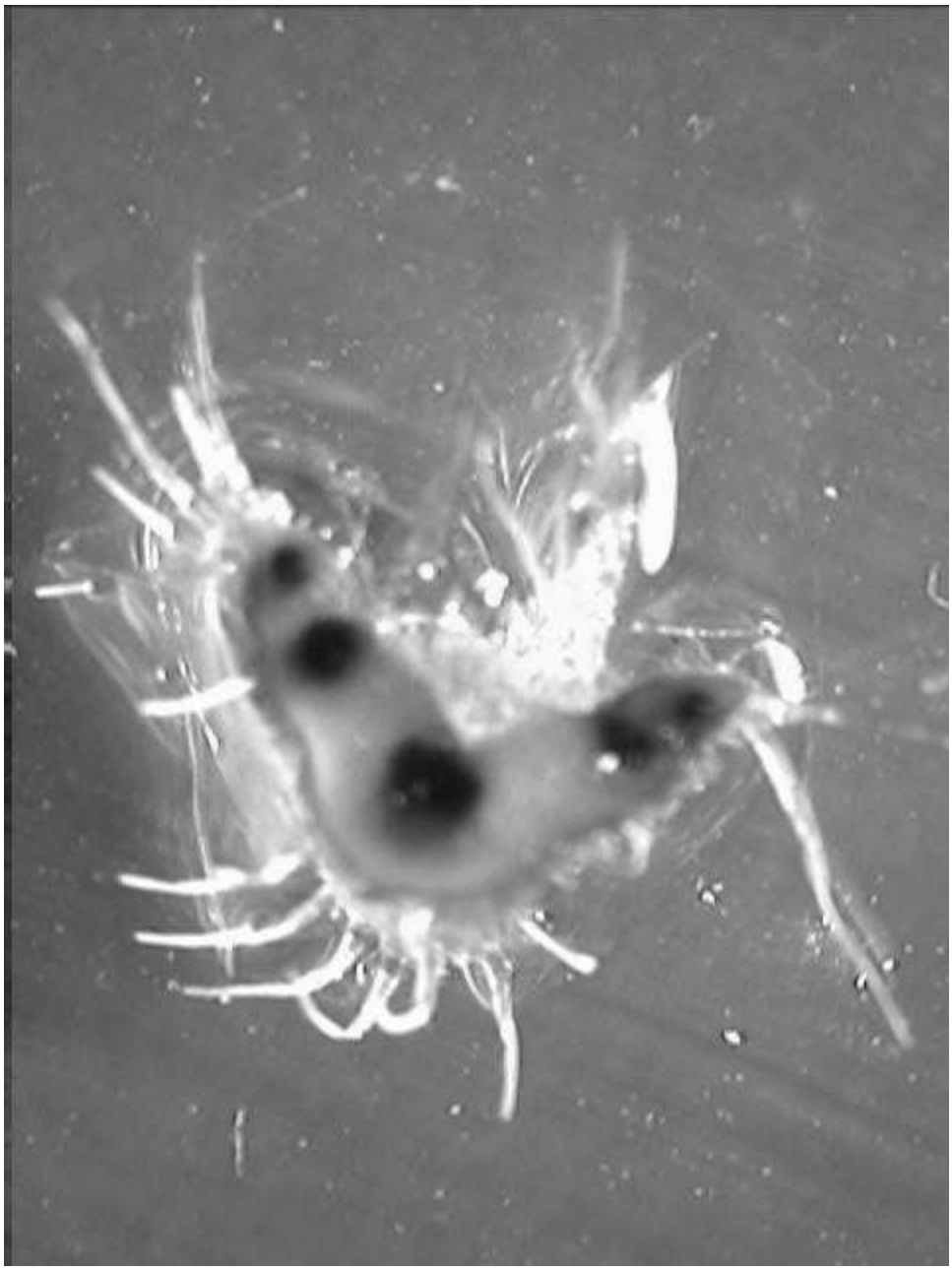

Figure 9: Helianthus annuus petiole three cross section with Toluidine Blue O dye uptake

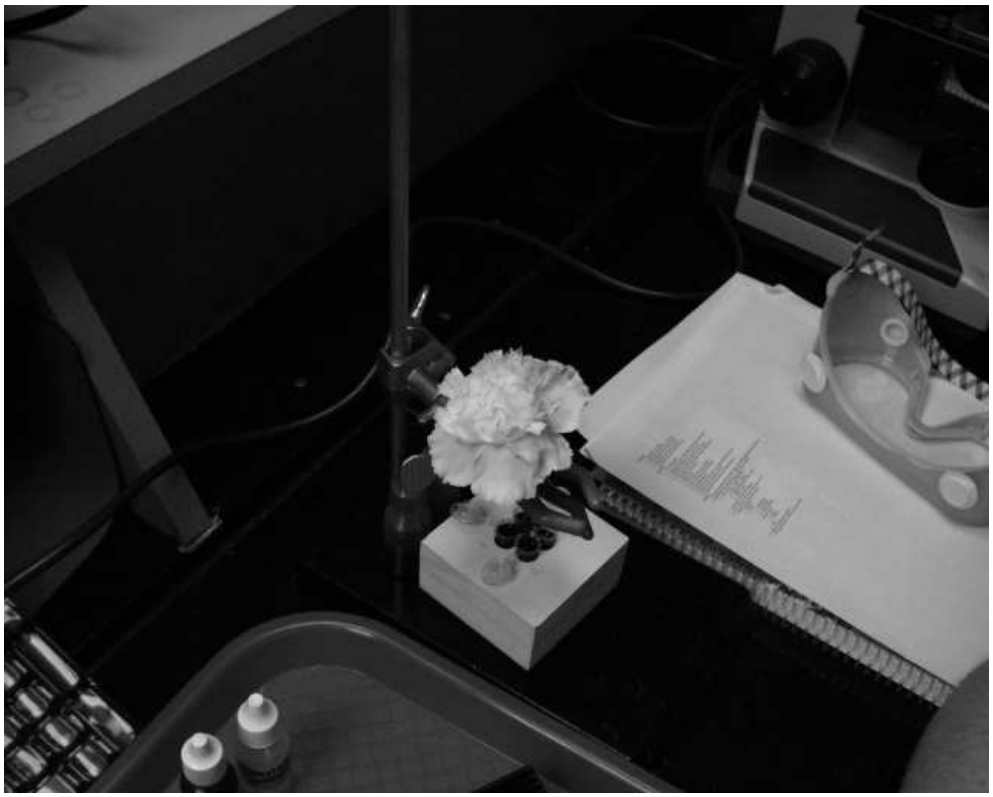

Figure 10: Dianthus caryophyllus with quartered and cut stem in food coloring