**True Colors: Plant Pigments**

[Adapted from Dayna Wilhelm Photosynthesis Unit - Blacksburg High School -Mr. Wilkins’ Biology Courses]

We can see the pigments that capture the light using a method called paper chromatography. In paper chromatography, the solvent (acetone) moves up the paper carrying with it the dissolved substances (plant pigments). The pigments are carried along at different rates because they are not equally soluble in the solvent and are attracted in different degrees to the paper.

Materials (per pair):

* Strips of filter paper Coin
* Acetone Pencil
* 150-mL beaker Metric ruler
* Cover for the beaker Fresh spinach leaf
* Coleus leaf (or other red leaf)

Procedure:

1. Using a pencil, draw a base line 1.5 cm from the bottom of the strip of paper.

2. Place the spinach leaf over the line and use the coin to rub the leaf onto the paper. (The teacher will demonstrate.)

3. Repeat for the Coleus leaf.

4. Add enough acetone to cover the bottom of the beaker (no more than 1cm).

5. Lower the filter paper into the beaker. Be careful to keep the paper in an upright position. Cover the beaker. Do not disturb the beaker for approximately 15 minutes or until the solvent is about 1cm from the top of the strip of paper.

6. When the solvent is about 1 cm from the top of the paper, remove the paper and mark the farthest point of the solvent’s progress (front line) with your pencil before this line evaporates.

**Hypothesis and Rationale**: What do you think is going to happen and why?

**Experimental Observations**: Use the space below to draw a sketch of your chromatogram. Use appropriate colors.

Possible colors: faint yellow-carotenes, yellow-xanthophyll, bright green-chlorophyll a, yellow green-chlorophyll b, red-anthocyanin.

Using your data and the other partner group’s data to fill in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Line | Color observed | Probably Pigment |
|  | 1 |  |  |
|  | 2 |  |  |
| **Spinach** | 3 |  |  |
|  | 4 |  |  |
|  | 5 |  |  |
|  | 1 |  |  |
|  | 2 |  |  |
| **Coleus** | 3 |  |  |
|  | 4 |  |  |
|  | 5 |  |  |

**Questions:**

1. Photosynthesis begins with the absorption of light, specifically the white light. What is white light composed of? We can use a device called a prism to answer this question.
2. What colors did you observe through the prism? *List all of them (there should be 7)*
3. What pigments did you observe in the spinach leaf?
4. What pigments did you observe in the coleus leaf?
5. How are the two leaves different?
6. Which of these leaves can carry out photosynthesis? Please explain your answer.
7. When you look outside in the Fall, you see many vibrant colors like red, yellow, orange, and yellow
   1. Where do you think these colors were during the summer?
   2. How can they suddenly appear in autumn?
8. Why are leaves green?