



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

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**Project Title**  
**How Does Acid Rain with a pH Level of 3.0 and 6.0 Affect the Cell Structure of Spirogyra?**

**Abstract**

**Objectives/Goals**  
Hypothesis: The cell structure of the spirogyra will start to deteriorate when the acid rain is at a pH level of 3.0.

**Methods/Materials**  
Materials: 15cc of acid containing 90% water and 10% sulfuric acid, 3 1-qt bottles of soil/water mixture, 3 Spirogyra algae cultures, 1 cc-calibrated dropper, 1 pen, 15 concave microscope slides, 3 1-gallon fishbowls, 3 lamps, 10 sheets of paper, 1 200x microscope, 6 qts of distilled water, 3 40-watt bulbs, 1 pH indicator, 1 pair of gloves

**Procedure:**

1. Set out fish bowls labeled 1 to 3 with 2 quarts of distilled water, equal amounts of the Spirogyra and soil water.
2. Place each bowl under a 40-watt lamp, heat to 20 degrees Celsius and observe algae growth.
3. When algae look healthy take a small sample from each bowl and observe under the microscope. Label the slides and place in a safe area.
4. Observe algae for ten days then repeat step three.
5. Test the pH level of the water by using the pH indicator. Check to see it's neutral.
6. 1st day - Acid treatment.
  - a. Repeat step 3 and 5. Add 12 cc of the mixture water and 10% sulfuric acid to bowl 1. This simulates a low pH level of 3.0. Add 3 cc of the mixture water and 10% sulfuric acid to bowl 2. This simulates a high pH level of 6.0.
  - b. Leave the third bowl to grow naturally without acid as the control. Record what was put into each of the bowls. Immediately take a sample from bowls number 1 and 2 and follow step 3. Draw what was seen under the microscope.
7. 24 hours later.
  - a. Repeat step 3 with all of the bowls. Draw what was seen under the microscope for each of the bowls.
8. 48 hours later.
  - a. Repeat step 3 with all of the bowls. Draw what was seen under the microscope for each of the bowls.
  - b. Note any changes in the cellular structure of bowls 1 and 2.
9. Compare the notes and drawings from experiment. Note changes or differences in cell structure from the acid in bowls 1 and 2. Refer to the control, bowl 3, to see change.

**Summary Statement**  
My project tested the effects of acid rain on the cell structure of spirogyra.

**Help Received**  
My mother poured my acid into a temporary holding beaker.