Newsletter 296 BIG Little Science Centre February 2017

BIGScience

EDITOR's E-Mail: gordongore0@gmail.com

ISSN 1920-9932 BIG Science (Print) ISSN 1920-9940 BIG Science (Online)

Mimosa---the 'Sensitive Plant'

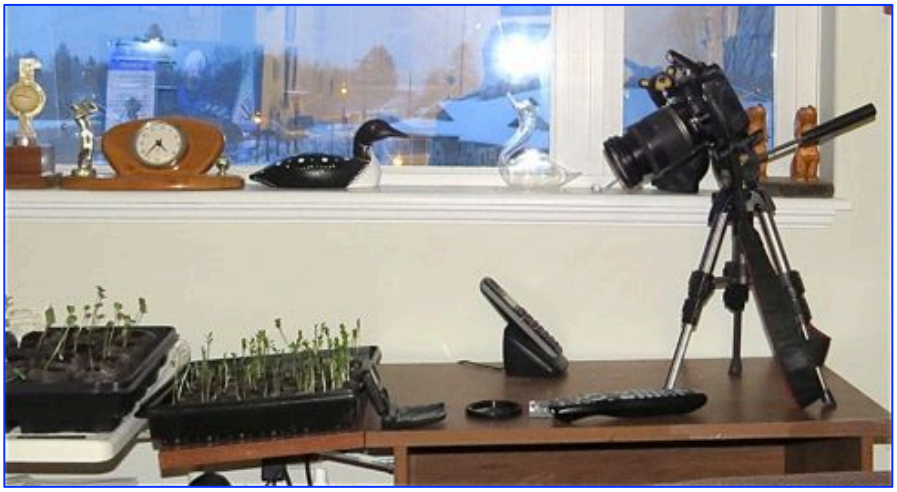
Planting season is approaching. In this issue we suggest a few ideas for experiments young people might do with growing plants. Mimosa seeds can be obtained from nurseries or seed catalogues, and they take a long time to germinate. Some seeds germinate very quickly. Radishes are in this category.

Light Entertainment

Gordon Gore

As a way to fight 'cabin fever' in my apartment at a seniors' residence, I purchased some peat pellets and some flower seeds and got them started near my window, which faces East. When the seedlings started growing, it was interesting to watch them lean in the direction of the light coming through the window. It reminded me of my teaching days, when we taught grade 8's about phototropism. I think we used radish seeds because they grew so rapidly. The seedlings in the photos are 'Bachelor's Button'. I chose them (and zinnias) because I hope their vivid colours attract butterflies and perhaps hummingbirds to the garden outside our meal area.

I did two trial runs with my camera (on a tripod). The clock in the photos gives some idea of how long it takes for the 'lean' to become obvious. When I started taking photos in Trial 1, the sky was overcast. Toward noon the sun came out from behind the clouds, and there was a 'spike' in the response to light.



Camera Setup for Trial 1

Trial 1 6:32 AM

Trial 1 9:51 AM

Trial 1 12:38 PM

Camera Setup for Trial 2

In Trial 2, I put a single peat pellet with two zinnia seedlings in a large box with a light source consisting of an LED flashlight. (This flashlight has 9 LED's, and the two AAA batteries lasted longer than the experiment did.)

Trial 2 8:14 AM

Trial 2 12:16 PM

This bit of camera play was in no way a controlled experiment. It was 'just for fun'. However, it might give a young student ideas for a more serious experiment with phototropism. Digital cameras are far more convenient than film cameras for projects like this, of course, and phototropism would be fun to study with a video camera that can be set to take a few frames every minute instead of every second.

- ***Is there a time when the growth is at a peak?***
- ***What happens if the brightness of the light source is varied?***
- ***Do some seedlings illustrate phototropism better than others?***
- ***If the plants in a window (or outdoors) 'follow the sun' during the daytime, what happens to them between sundown and the next sunrise?***

Some students might wish to pursue the topic of phototropism further. **Dr. Gary Hunt*** provided a few suggestions for senior science students:

- ***What is the cellular and molecular explanation for phototropism?***
- ***Where are the light receptors in plants?***
- ***What factors inhibit or stimulate germination?***
- ***You can look at gravitropism by turning plants sideways and watching the roots and shoots re-orient.***

Dr. Hunt recommended these websites for ideas. (There are many such websites dealing with tropisms.)
http://www.all-science-fair-projects.com/category50p2.html
http://www.juliantrubin.com/fairprojects/botany/seedsgermination.html

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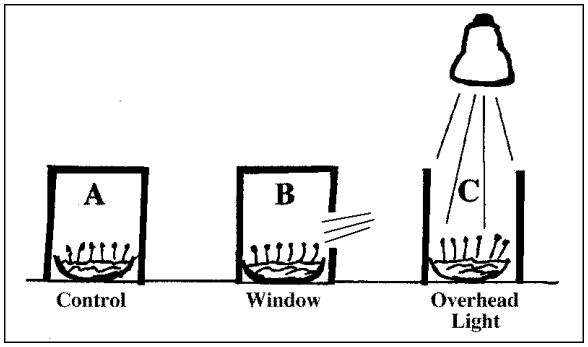
***Dr. Gary Hunt** is **Professor Emeritus** at **Thompson Rivers University**. He is a mycologist and taught in the Department of Natural Resource Sciences for 18 years.

Phototropism

Idea Source: **LABTEXT IN SCIENCE, BOOK ONE** (G. H. Cannon, V. L. Chapman, D. C. Gillespie, G. R. Gore and F. A. Gornall, **Copp Clark Publishing, 1968)** The authors of this Science 8 book were 50 years ahead of their time, promoting hands-on science in 1968. Team leader **Fred Gornall** was truly a pioneer in science education.

Living plants and animals respond to **stimuli** (external conditions). The following is a controlled experiment involving the **response** of seedlings to **light**. The response of plants to the **stimulus** of light is called **phototropism**.



You Need: Three identical dishes, labelled A, B and C; Paper towels; Radish Seeds; water; three boxes to cover the dishes as in the diagram; Desk Lamp; Window

What to Do

- Line the three dishes with crumpled paper towel and thoroughly moisten the towel with water.
- Sprinkle a dozen radish seeds evenly over the damp towel in each of the dishes.
- Label the containers **A**, **B** and **C**.
- **Dish A**: Cover this dish with a box so that *no light can enter the box*. Air must be allowed to circulate into the box. Dish **A** is your **control** for this experiment.
- **Dish B**: Cover this dish with a similar box, but cut a hole about 3 cm long by 3 cm wide in one side of the box so that light can enter through this hole. Set this box near a window so that light from the window can enter the box and shine on dish **B**.
- **Dish C**: Use a similar box, but cut the top open so that light can enter the box from directly above dish **C**. See the Figure.
- Each day for several days, examine and compare the shoots in dishes **A**, **B** and **C**. Make sketches or take photographs of your observations. Measure the heights of the seedlings and make a note of their directions of growth and their colour. Also, add water to each dish each day if necessary to keep the seedlings moist.

Think About It!

1. What effect does light have on the *direction* of growth?
2. Does an increase in the *amount of light* encourage or slow down the rate of growth?
3. What condition is necessary for the production of *green colour* in plants?
4. Find an example of *phototropism* in or around your home, and describe it.
5. What was the purpose of the *control* (**Dish A**)?

Project Idea

Place a leafy houseplant in a window facing south. Observe the leaves of the plant closely throughout the day for evidence of **phototropism**. Does the plant seem to 'follow the sun'? What happens to the plant when the sun goes down? What happens to the plant during the night? What happens in the morning when the sun comes up?

Mimosa (The Sensitive Plant)

Mimosa Pudica

You Need

1 **mimosa pudica** (sensitive plant)
1 stopwatch or a clock with a 'seconds' hand
1 toothpick
1 lightproof box that will cover the entire plant

The plant you will experiment with is called the **Sensitive Plant**, for reasons you shall soon see. The mimosa is native to Central America. In this experiment, you will investigate how the Sensitive Plant responds to a number of **stimuli**. A **stimulus** is something in the environment that has an effect on a living thing, or on a part of a living thing.

Seeds of the mimosa take a long time to germinate. Start them at least 2 months before you plan to do this experiment. Seeds are available from nurseries. Buy several packages. One trick for speeding their germination is to put the seeds in the freezer overnight, then pour them into a cup of boiling hot water the next morning. This cracks the thick seed coat, but does not harm the plant-to-be.

Punch pencil-size holes in the bottoms of several Styrofoam™ coffee cups. Fill them with potting soil and plant a couple of seeds in each one. Water regularly. Within about 10 days, you should see the seedlings.

What to Do

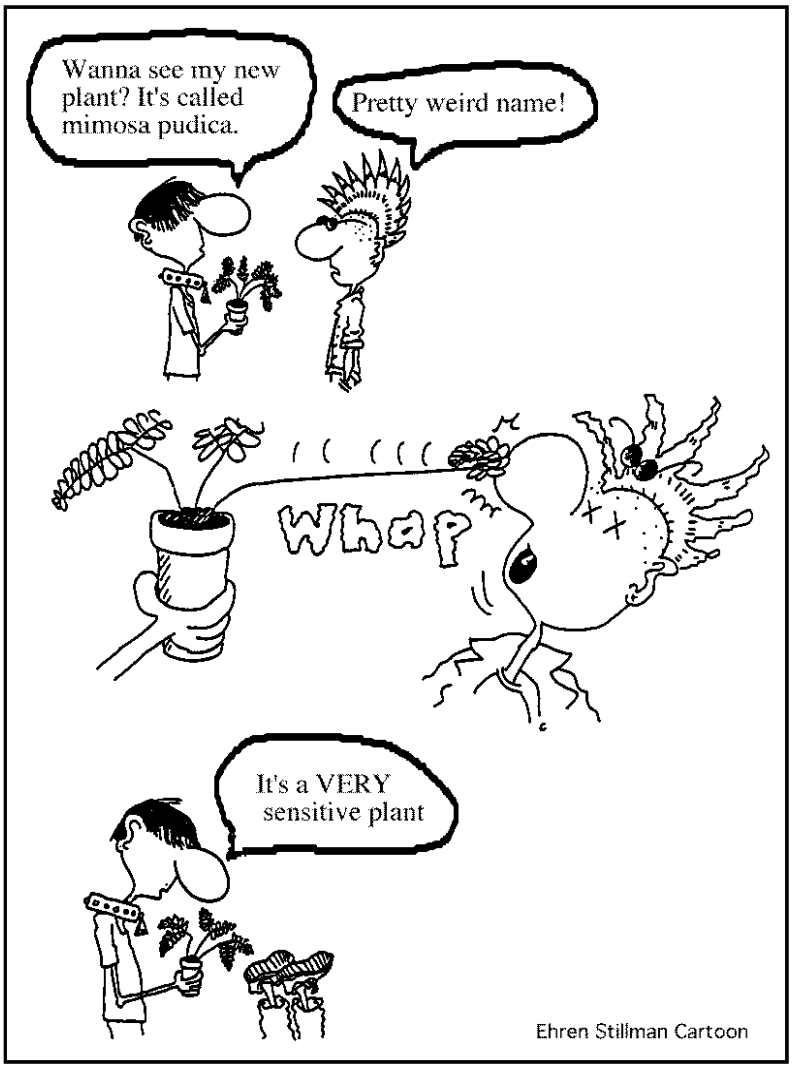
1. *Very, very carefully* carry a potted mimosa plant to your work area. (It really *is* very sensitive.) If necessary, wait a few minutes while it recovers from the shock of being transported.
2. Blow very gently on the leaves of the plant. Note how it **responds** to the stimulus of a gentle wind.
3. (a) Use a toothpick to *gently* touch various parts of the plant. Notice how the plant responds. How are the leaves affected? How are the stems affected?
   (b) Draw a sketch showing a typical branch before and after it is touched.
4. Use a stopwatch or a watch with a 'seconds' hand to measure how long the mimosa takes to respond to the stimulus of touch.
5. Measure how long it takes, in minutes, for the mimosa to *recover* after it is disturbed by a gentle touch or by a gentle wind.
6. (a) *Predict* how the mimosa will react when it is removed from the light and placed in a dark place.
   (b) Cover the whole plant with a lightproof cardboard box, or *move it very carefully into a dark cupboard*.
7. Examine the plant after it has been in darkness for at least 15 minutes. (If necessary, leave it in darkness for a longer time.)

Challenges!

- Will the mimosa react to other stimuli?
- Design experiments that will test the response of the mimosa to **heat** and **cold**. Consult with an adult to see if the experiments can be done safely with available materials. Then, do the experiment.
- List as many stimuli as you can which you think might cause the mimosa to respond. For example, would the odours of perfume or other safe household chemicals affect the mimosa? Would changes in temperature, or static electricity, or bright light from a camera flash, or a strong magnet affect the plant? If convenient, test the effects of as many of these stimuli as possible.
- Over time, watch your mimosa grow and, later, flower. Keep it in a place that is brightly lit, but not too hot and sunny, and water it regularly. Find out all you can about this interesting plant.

Think About It!

1. Write a sentence or two describing the way the mimosa responds to the stimulus of touch.
2. How might the mimosa's response to touch (including wind) help the plant survive in nature?
3. To which stimuli did your mimosa respond?
4. In your opinion, what is the most interesting fact about the mimosa?
5. What question or questions would you like to have answered about this plant, that your experiments did not answer?



More Memories

Gordon Gore

Open House at the BIG Little Science Centre. Bert Edwards Science School Site

Howard Grieve greets visitors as they arrive for the big show we always presented at Open House. In the background **is Sharon Cooley**, who was principal of that school at the time. Howard and Sharon were Directors of the **BIG Little Science Centre Society**.

PLEASE POST

Attention: Science Department Head/Secondary Science Teachers
From: BC Association of Physics Teachers
Re: Professional Development Opportunity for Science Teachers

Simon Fraser University
Department of Physics
&
the BC Association of Physics Teachers

Are pleased to announce:

"Teaching the New BC Science Curriculum"

A Conference and Workshops for Secondary Science Teachers

(Suitable for Junior Science, Senior Physics & Chemistry)

Friday February 24th 2017

- **Keynote:** Students on the Beamlines: Inquiry Learning at Canada's National Synchrotron
- **Hands-On Activities:** Workshops, talks and activities for Junior and Senior Science Teachers
- **SFU Physics Faculty and BC High School Teachers will share their knowledge and expertise about teaching topics in the new BC Grade 10-12 Science curriculum including Quantum Mechanics, the Big Bang Theory and Energy.**

Registration Advanced registration required, pay online as follows:
$40 BCAPT members
$50 Non-members
$25 Student teachers or teacher candidates
Or: $60 Cash at the door for Everyone

Registration includes classroom resources, lunch, and raffle!

Register online by indicating your preference of workshops and activities at: http://www.bcapt.ca

Space is limited so please sign-up early.

Location: SFU Department of Physics, Burnaby Campus

Attention: Science DepartmentHeads/Secondary ScienceTeachers

From: **BC Association of Physics Teachers**

Re: Professional Development Opportunity for Science Teachers

Schedule

8:30 - 9:00 AM – Registration with coffee and snacks
9:00 - 10:00 AM – Keynote: Students on the Beamlines: Inquiry Learning at Canada's National Synchrotron (Joe Muise & Students - St. Thomas More Collegiate)

SESSIONS

Session 1: 10:10 - 11:30 AM

A. Energy – Understanding Your Hydro Bill (Barbara Frisken – SFU)
B. From Schroedinger's Cat to Quantum Computing – Insights into Quantum Theory for Grade 11 (Daria Ahrensmeier - SFU)

11:30 – 12:30 PM – Lunch provided by SFU catering

Session 2: 12:30 – 1:50 PM

A. Our Universe: the Big Bang and the Rest of it (Levon Pogosian – SFU)
B. Teaching Quantum Physics in High School (Svetlana Catia – Crofton House School)

Session 3: 2:00 – 3:00 PM Closing remarks (2:00-2:15) & Sharing Session & Book Raffle

Bring your favourite lesson/s to share with everyone!

Optional Activity:
2:30-3:30 SFU Physics Dept Colloquium: Talk on Physics Education Research (Eugenia Etkina – Rutgers University)
(This talk is not organized by BCAPT, but may interest some of you. Dr. Etkina is a leading researcher in the field of Physics Education. She specializes in the preparation of physics teachers.)
For registration information and more details on the conference including descriptions of hands-on activities, workshops and speakers please refer to:

www.bcapt.ca

Parking information & Directions: This conference will held in the Physics Building in the Shrum Science Centre at SFU Burnaby which is located at 8888 University Drive, Burnaby, BC. For maps and directions about how to get to the SFU Burnaby campus, go to:

https://www.sfu.ca/campuses/maps-and-directions/burnaby-map.html

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This Newsletter is a publication of **BIG Little Science Centre Society**
Mailing Address **Box 882 Station Main Kamloops BC V2C 5M8**
Location: **655 Holt Street Kamloops BC V2B 5G2** ***Website*** **http://blscs.org**
Executive Director: **Gord Stewart Phone (250) 554 2572** or **(250) 554 BLSC** ***E-Mail:*** **gord@blscs.org**
Assistant Operator: **Susan Hammond Phone (250) 554 2572** or **(250) 554 BLSC** ***E-Mail:*** **susan@blscs.org**
Newsletter Editor: **Dr. Gordon R. Gore F-411, 3255 Overlander Drive, Kamloops BC V2B 0A5**
Home phone 778 472 2014 ***EDITOR's E-Mail: gordongore0@gmail.com***

Back issues of **BIGScience** can be viewed at <http://blscs.org/newsletters/>

The **BIG Little Science Centre** is open to the public at these times:
Tuesday to Saturday **10:00 AM to 4:00 PM**
CLOSED SUNDAYS and HOLIDAYS
Phone: 250 554 2572 ***E-mail*** Gord@blscs.org or Susan@blscs.org

A family membership is $60.00/year. An individual membership is $45.00/year. A family membership consists of five directly related people. (This includes any combination of grandparents, parents and children). Individual day rates are:

Adults (16 to 59) $6 Seniors (60 plus) $4 Youth (6 to 15 years old) $3 Family $15.
Children 5 years old or younger) Free

Visit our website blscs.org for more details on the benefits of membership.

Drop-in Visit Information

What is a Drop-in Visit?

During drop-in times our hands-on rooms are open for visitors to tour at their leisure. The rooms have approximately 140 stations of hands-on activities to try. We also have an activity or show running Saturdays!

Drop-in Visiting hours

- Tuesday - Saturday 10:00 - 4:00
- Check Facebook or twitter for the latest information.

For safety purposes we require children under age 16 be accompanied by a minimum number of supervising adults:

- For children 4 years old and under, 1 adult per every 3 children is required.
- For children 5 years old to 9 years old, 1 adult per every 5 children is required.
- For children 10 years old to 16 years old, 1 adult per 10 children is required.

The BIG Little Science Centre is Closed Sundays and Holidays.