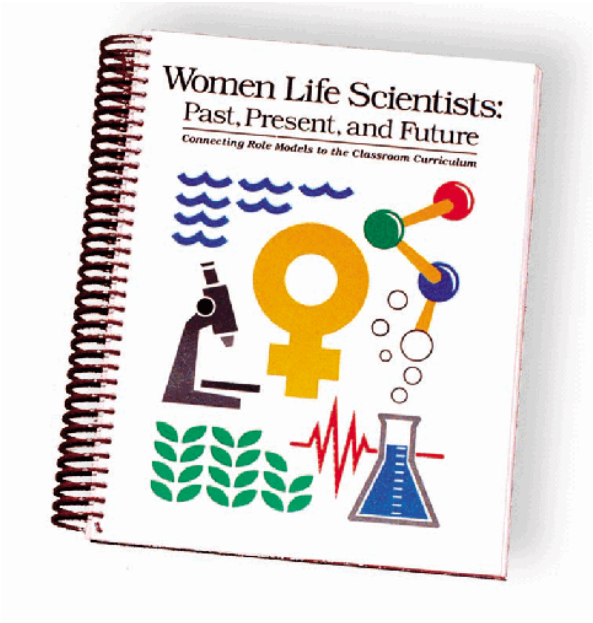

Helen Beatrix Potter

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Copies of the activities from *Women Life Scientists: Past, Present, and Future* can be found at http://www.the-aps.org/education/k12curric/index.asp. To purchase bound copies, visit the APS store at http://www.the-aps.org/cgi-bin/ecom/productcatalog/Product_catalog.htm.

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http://www.the-aps.org/education/

Helen Beatrix Potter
Naturalist
1866–1943

Unit developed by
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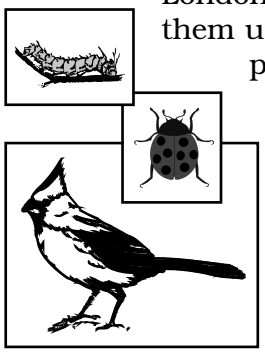
The history of the times

Helen Beatrix Potter was born on July 30, 1866, at Bolton Gardens, London. During this period, known as the Victorian Age, middle-class Londoners were prosperous and their lifestyles reflected this: maids whitened house steps each morning, carriages and coachmen waited to take residents about the town, ladies left calling cards, doors were opened by parlor maids, and neighbors drank tea seated amid ferns and cushions (Lane, 1985).

The Potters were a characteristic Victorian family of this moneyed middle class. Beatrix grew up with few friends and rarely left the nursery. She received most of her education from her governess. In general, children during that time period were "seen and not heard." Beatrix had one younger brother named Bertram, who was sent away to school. Beatrix Potter never went to a formal school, although she received some art lessons at home and eventually earned an art certificate in 1881.

Scotland summers

The highlight of Beatrix's childhood was the summers that her family spent in Scotland. There she became aware of the beauty of the countryside, including its animals. Beatrix and Bertram collected toadstools, beetles, dead birds, hedgehogs, frogs, caterpillars, and minnows (Lane, 1985). By age nine, Beatrix was a busy artist, drawing many of the animals and plants that she observed. She caught rabbits, tamed them, drew them, and brought them back to London. When she and Bertram found dead animals, they skinned them and boiled them until only the bones were left. Then they studied the skeletons, and drew and preserved them.



As Beatrix matured, her shyness increased. Her main companions were her pet animals and her diary, which she kept in a elaborate secret code she had developed. Like her brother, she pursued painting but, while Bertram's canvasses focused on landscapes, Beatrix painted animals and plants in great detail. She drew like a naturalist and spent hours with Bertram's microscope, drawing mold spores. She often visited nearby museums to sketch fossils in the display cases.

An interest in fungi

Between the ages of 15 and 30, Beatrix filled her journal with observations, especially about fungi and their *sporulation*, that is, how they reproduced. At one point, she planned to compile a book on *mycology*, the study of fungi. She searched for specimens, drew and dissected them, compared varieties, certified details at the museum, and tried to study the subject as thoroughly as she could. This work went on for several years and her drawings and watercolors of fungi multiplied. She hoped a mycologist would recognize her talent and ability.

When she was 30, she took her summer collections of fossils and fungi home to identify at the Natural History Museum. She had studied the spores of her fungi under a microscope, tried cultivating new spores, and carefully studied Louis Pasteur's experiments with penicillium. Her uncle, Sir Henry Roscoe (a chemist), introduced her to the Director of the Royal Botanical Gardens at Kew and requested that she be permitted to study there. She went to the Kew labs

to study and observe between 1896 and 1897.

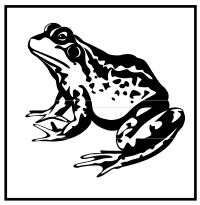
Beatrix's strength of will was clearly tested when she came up against the specialists at the Royal Botanic Gardens. In the course of her work, she became convinced she had discovered a way to grow spores and was anxious to know whether she was correct. Unfortunately, the reception she received at Kew was cool, particularly from one of the principal assistants, George Massell. Her work was virtually ignored. Beatrix feared that her work would appear in someone else's book without acknowledging her contribution, so she persisted in pursuing the work herself. As a result, she authored a paper, "On the Germination of Spores of Agaricineae." George Massell read the paper for Beatrix to the Linnean Society of London in 1897 because women were not allowed to attend the Society's meetings.

Unfortunately, during this time the Keeper of Botany at the Museum of Natural History told Beatrix that her paintings lacked a "diagrammatic extension of detail" necessary for them to be scientifically useful (Lane, 1985, p. 43). She reluctantly laid aside the beautiful drawings of fungi. Beatrix began copying nursery rhyme pictures and pictures of rabbit families for her friends' children. She sometimes regretted abandoning her studies on fungi but, instead, focused her efforts on writing picture letters to children, which were the foundation of her first books.

From fungi to children's books

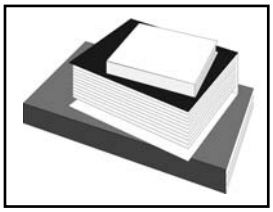
In her mid-30s, Beatrix Potter's work as a published illustrator and author began. The letters she wrote to children were filled with animal drawings and tales. No one would publish the story of Peter Rabbit for her, so she paid for its first publication herself.

She continued to take animals into her home and to write about them and draw them. She never lost her desire for accuracy in her drawings. The embroidered waistcoats in *The Tailor of Gloucester* were drawn from museum specimens. She was a careful observer, paying attention to the details of nature. For example, Mrs. Tiggy Winkle's laundry business was based on the fact that, in nature, hedgehogs groom themselves carefully (Lane, 1985).



Beatrix tried to convey the beauty of the countryside in her stories. She "was deeply aware of the realities of nature; the earth and its seasons; the rhythms of sowing and harvest, of life and death...and the laws of nature (especially those of pursuit and prey, with which the life of most wild animals is endlessly concerned) are nowhere softened nor sentimentalized in any of her stories" (Lane, 1985, p. 124). Rather she presented them as a normal part of life.

At age 47, Beatrix Potter married William Heelis and became an expert sheep farmer. She also acquired large tracts of land, which she later donated to the National Trust of the United Kingdom. In her 50s, she gave the Director of the New York Public Libraries a portfolio of her fungi drawings. Beatrix told the Director that she knew they were good and hoped they would be used to illustrate a book. The drawings filled seven portfolios. Beatrix Potter had never exhibited her work and very few people ever knew of her interest and research in fungi. She died December 22, 1943, at the age of 77.



SUGGESTIONS FOR TEACHERS

ACTIVITY #1: Tell Me What You See

Purpose
To improve and expand observational skills needed for experimental work.

Objectives
1) To strengthen observation skills so that students can distinguish his/her observation subject from other similar subjects (*Part 1*).
2) To strengthen skills in observation, measurement, and description so that students can identify changes that occur during an observation period (*Part 2*).
3) To strengthen skills in observing and recording data for a complex biological scenario to accurately describe changes over time (*Part 3*).

Materials
Part 1
- paper
- pencil
- "Observation Rules" (found on student activity pages)
- one peanut in the shell

Part 2
- paper
- pencil
- "Observation Rules" (found on student activity pages)
- a timer or clock
- animals and plants that can be observed in the classroom over a number of days

Part 3
- paper
- pencil
- "Observation Rules" (found on student activity pages)
- a book or folder to use as a writing surface
- a ruler or measuring tape
- permanent markers
- ice cream sticks or other position markers
- compasses
- magnifying glasses or "bug boxes"

Before You Begin
Part 1
1) Gather materials.
2) Review the "Observation Rules" on the student activity pages with students.
3) Clarify the final goal of each student being able to identify his or her peanut.

Part 2
1) Obtain classroom animals for observation. Good possibilities include an aquarium of saltwater or freshwater fish and/or snails; a cage of gerbils, guinea pigs, budgies, or white mice; and/or a terrarium with plants, hermit crabs, *anolis* (chameleons), geckos, skinks, crickets, mealworms; or any combination of the above.
2) All groups do not need to observe the same tank or cage of animals but a particular group needs to observe the same tank/cage of animals for every observation. See the "References and Resources" section for NSTA guide to maintaining animals in the classroom.
3) If you are very close to a zoo or animal park, you could do observations there, but make sure that students choose animals that they can observe closely enough to make detailed and accurate observations.
4) Each student should observe animals and plants over a 1- to 2-week period so that changes in appearance, growth, and behavior can be noted. You may find it easiest to set up an observation schedule for students. Observation periods should be about 10 minutes.

Part 3
1) Students will work in an outdoor area where plants and insects and/or animals are likely to be found. These "mini-environments" could include the grass and weeds growing along a building or in cracks in the sidewalk.
2) Check weather forecasts when scheduling this activity. You may want to have

garbage bags or pieces of plastic available for students to sit on if the ground is damp.

3) Use this activity in the fall and again in the spring so students can compare seasonal changes.
4) Have students do the activity in silence so they can observe sounds as well.

Safety Considerations

Parts 1 and 2

None.

Part 3

- Remind students to follow the rules of observation, particularly that no plants should be eaten and that poisonous spiders and insects (e.g., bees and wasps) should not be captured for observation.
- Students should avoid locations with poison ivy, sumac, or oak. You should check the area first and point out these plants.
- Warn students to watch for sharp objects (e.g., broken glass or nails) in their observation area and in the spot where they plan to sit to do their observation.

Questions to Ask

Part 1

- What were some differences in the way that Victorian boys and girls were treated?
- How did Beatrix's childhood activities influence her later life? Can Beatrix be considered a "true" scientist? Why or why not?

Parts 2 and 3

- What is the most challenging aspect of observing organisms? What became easier the longer you observed?
- Look at your area. Do the plants give you any indication from which direction the sunlight comes?

Part 3 (Math Connection)

- How do you know that your area is square? (Hint: The hypotenuse of an equilateral right triangle with sides = 3 feet should be 4.24 feet, that is, $a^2 + b^2 = c^2$.)

Where to Go From Here

- From your library, check out several books or videos with original illustrations by Beatrix Potter and by other children's authors who write about animals. Ask students to compare and contrast the illustrations. Then ask students to compare and contrast how animals and their interactions with humans are portrayed by Potter versus more contemporary authors. Who is more realistic? If possible, bring a rabbit into the classroom and have students compare the characteristics of the rabbits drawn by Potter with the live specimen. The same can be done with Beatrix's drawings of fungi.
- Have students build their own terrariums. See "References and Resources" for a unit from GEMS on this subject.

Ideas for Assessment

- For *Part 1*, use the identification process as an assessment. If conflicts arise (both students claiming the same peanut), have students use their observation notes to justify why they believe the peanut is theirs.
- For each of the three activities, students can write an observational report. Ask students to describe how the activities were different. For example, was one type of observation harder than the other? Why? Students should also note any changes in how they approached observing an object as they work through the activities. Students may want to return to the peanut activity and add to their observations after building their skills on *Parts 2* and *3*.

References and Resources

✓*About Beatrix Potter:*

Crouch, M. (1961). *Beatrix Potter*. New York: Henry Z. Walck Inc.

Hofer, P. (1966). *Beatrix Potter. Letters to Children*. New York: Walker & Co.

Jay, E., Noble, M., & Hobbs, A. S. (1992). *A Victorian Naturalist*. New York: Frederick Warne & Co.

Lane, M. (1978). *The Magic Years of Beatrix Potter*. New York: Frederick Warne & Co.

Lane, M. (1985). *The Tale of Beatrix Potter*. New York: Frederick Warne & Co.

Linder, L. (1971). *A History of the Writings of Beatrix Potter*. New York: Frederick Warne & Co.

Moore, A. C. (1955). *The Art of Beatrix Potter*. New York: Frederick Warne & Co.

Taylor, J. (1986). *Beatrix Potter: Artist, Storyteller and Countrywoman*. New York: Frederick Warne & Co.

✓*On observational studies of animals:*

Allery, A. J. (1975). *Science — An Indian Perspective: Ten Modules for Learning*. Pierre, SD: South Dakota Department of Education. (South Dakota Curriculum Center, 435 South Chapelle, Pierre, SD 57501-3210)

Hampton, C. H., Hampton, C. D., Kramer, D. C., et al. (1994). *Classroom Creature Culture: Algae to Anoles*. Washington, DC: National Science Teachers Association.

The Massachusetts Audubon Society, Educational Resources, South Great Road, Lincoln, MA 01773, (617) 259-9506, ext. 7255, has an excellent series of public service information sheets (2-4 pages; $.50 each) on cottontail rabbits, squirrels, skunks, young wild birds (and what not to do with them when you find them), and raccoons.

Russell, H. R. (1990). *Ten-Minute Field Trips*. Washington, DC: National Science Teachers Association.

✓*About the activities:*

Part 1 of "Activity #1: Tell Me What You See," is adapted with permission of the Biological Sciences Curriculum Study, Colorado Springs, CO.

The *Terrarium Habitat Unit* is available from GEMS, Lawrence Hall of Science, University of California, Berkeley, CA 94720, (510) 642-7771.

✓*Related novels and stories:*

Adams, R. (1974). *Watership Down*. New York: Macmillan.

Fossey, D. (1983). *Gorillas in the Mist*. Boston: Houghton Mifflin.

Herriot, J. (1972). *All Creatures Great and Small*. London: Crown Publishing.

Herriot, J. (1974). *All Things Bright and Beautiful*. New York: St. Martin's Press.

Herriot, J. (1974). *All Things Wise and Wonderful*. New York: St. Martin's Press.

Herriot, J. (1981). *The Lord God Made Them All*. New York: St. Martin's Press.

✓*For science supplies:*

Carolina Biological Supply Company, 2700 York Road, Burlington, NC 27215, (800) 334-5551.

Fisher Scientific, Educational Division, 485 South Frontage Road, Burr Ridge, IL 60521, (800) 955-1177.

Flinn Scientific, P.O. Box 219, Batavia, IL 60510, (630) 761-8518.

WARD'S, 5100 West Henrietta Road, P.O. Box 92912, Rochester, NY 14692-9012, (800) 962-2660.

✓*Photo credit:*

Photo on page 217 courtesy of Frederick Warne & Co., London, England.

ACTIVITY #1: Tell Me What You See

Part 1: Inanimate Objects

Purpose

The goal of this activity (*Parts 1-3*) is to sharpen your skills in making detailed observations. These skills will be useful not only throughout your science studies but in all areas of your life!

Your Mission

Use the "Observation Rules" to learn as much as you can about your peanut. Write down your observations, take sketches, take measurements, etc. When you are finished, you must be able to do two things:

1. Place your peanut in the shell into a bowl with the peanuts of four other people. Use your notes to describe your peanut to another member of the group so that he/she can pick it out from the bowl. You are not allowed to point to your peanut or describe it in relation to the others (for example, "it's the one on the bottom"). You must use only the information in your observation notes to describe your peanut.

2. Place your peanut on a table with those of everyone in the class. After the peanuts are shuffled around, you must be able to pick out your peanut in the shell from all of the others in the class. If a conflict arises (that is, two people claim the same peanut), you must use your observation notes to justify why you believe the peanut is yours.

Materials

- paper and pencil
- measuring tape or ruler
- metric balance
- one peanut in the shell

Observation Rules

Please Do...

- turn the object over
- measure it
- weigh it
- make drawings
- write descriptions (you can even write a poem about it, if you are so inclined)

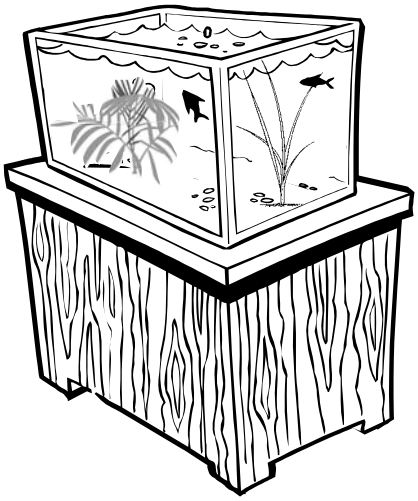
Please Do Not...

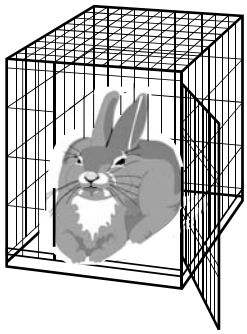
- make any permanent changes to the object unless directed to do so by your teacher (cutting, marking, dissecting)
- eat or open the peanut

Part 2: Animals and Plants in the Classroom

Materials

- paper and pencil
- timer or clock
- animals and plants in the classroom to observe





Observation Rules

Please Do...

- sit quietly and keep your face and hands away from the tank or cage
- keep track of different animal behaviors by time
- make drawings of animals, plants, the setup of the cage, tank, terrarium, etc.
- watch for changes in the animals and plants from day to day.
- try to be quiet and unobtrusive

Please Do Not...

- touch the animals or plants unless directed to do so by your teacher
- tap on the cage or glass to get the animals to respond
- talk loudly (yes, fish can "hear" you)

Your Mission

Follow the "Observation Rules" to learn as much as you can
about the animals and/or plants that you are assigned to observe.
Write down your observations, make sketches, take measurements, etc.
When you are finished, you must be able to do two things:

1. Give an accurate description of the animal and/or plants and their surroundings so that another person can visualize the cage or tank and what's inside. If your observation includes animals, be sure to include descriptions of their behaviors.

2. Describe at least four changes that you observe about your animal and/or plants and their surroundings over the 1- to 2-week observation period. Use sketches and provide detailed descriptions about these changes.

Part 3: Animals and Plants in Natural Settings

Materials

- paper and pencil
- a book or folder for a writing surface
- a ruler or measuring tape
- permanent markers
- ice cream sticks/other position markers
- compasses
- magnifying glasses or "bug boxes"

Observation Rules

Please Do...

- observe insects with your magnifying glass or in your "bug box" but release them when you are through
- be sure to observe what the insects do when you release them
- try to leave your observation area and the surrounding area as you found them

Please Do Not...

- eat anything or put anything in your mouth
- try to capture poisonous or stinging insects
- try to capture birds or mammals
- uproot plants or kill animals
- touch or sit on poisonous plants such as poison ivy, oak, or sumac (if you don't know what these plants look like, ASK YOUR TEACHER)

Your Mission

Use the "Observation Rules" to learn as much as you can about the animals and/or plants that you are assigned to observe in a natural setting.

- With direction from your teacher, select a three foot by 3-foot square observation area. Your observation area should not overlap with anyone else's.
- Use your measuring tape and position markers to mark the corners of your area. If your area is partly on a sidewalk or parking lot, make a small "x" with the permanent marker to mark the corners of your area. While measuring, try not to walk on your observation area (or anyone else's).
- Use your compass to determine which direction your observation area faces. (Why might you want this information)?
- Over a 2-week period, learn as much as you can about your observation area. As always, write down your observations, make sketches, take measurements, etc.

When you are finished,
you must be able to do two things:

1. Verbally describe to another student how they can get to your observation area and identify it (without the position markers).
2. Provide a written report on your observations, including any changes that you observed over the 2-week period.