December 2016 Book of the Month
Snowflake Bentley
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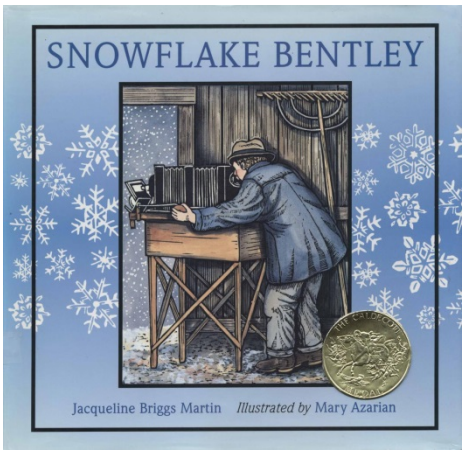

Wilson "Snowflake" Bentley grew up in Vermont, where the snowfalls were plenty. Many people, including his father and brother, did not understand why he spent so much time studying snowflakes when he could be doing other things on the farm, especially when snow was not considered "unique" in the Vermont climate. However, Snowflake Bentley's work pioneered what we know about snow and snowflakes. He was one of the first farmer-scientists; incorporating photography and microscopy to his work, a practice that is very common to modern farmers today.

Fun Facts:

- By 1926, Snowflake Bentley had spent $15,000 on his work with snowflake photography and received $4,000 from the sale of photographs and slides. [1]
- Snowflake Bentley liked to photograph insects and plants early in the morning while they were fresh with droplets of dew. [1]
- Farmers who raise livestock must spend extra time caring for animals when it is very cold outside. Poultry farmers must have generators handy in case power outages occur, to keep heat steady for brooder (heated house for chicks). They must also collect eggs 2-3 times a day to prevent the eggs from freezing. [2]
- Snow can provide much needed moisture for the root development of dormant wheat crops, and surprisingly, snow has an insulating effect on the soil. [3]
- In North Carolina, snow creates trouble with greenhouses and high tunnels (hoop greenhouses), as accumulated snow can cause structure collapse. Some farmers spend 2-3 hours manually removing snow from their tunnels. [2]
- Apples, beets, carrots, Christmas trees, greens (collards, turnips, kale, mustard, spinach, bokchoy), pecans, and sweet potatoes are all crops that can be in season in North Carolina in the month of December. [4]

Activities

Are Farmers Scientists?
Wilson "Snowflake" Bentley was considered a farmer-scientist. The historical and modern farmer is considered to be a great many things: an engineer, a steward of the land, a planner, as well as a scientist. What kinds of tasks make the modern farmer a scientist? Create a chart, and list the tasks of a farmer

and categorize those tasks. What are other jobs of a farmer that are not listed? Students may add those to their charts. See the following example.

Job Title:	**Engineer**	**Land Steward**	**Planner**	**Scientist**
Task:	Repairing a tractor	Crop rotation	Deciding on crops to grow	Identifying plant diseases and pests
Task:				
Task:				
Task:				

STEM Snowflakes [5]

Design some paper snowflakes and see which paper snowflake would make the best windmill design. Start with a square piece of card stock. Fold the paper in half diagonally to make a triangle. Fold the other corner down so the pointy corners meet. Fold the triangle into thirds. Trim off the tail (opposite end of the point). Cut the folded paper with variations of straight and curvy lines. Gently unfold to see the snowflake. [6] Poke a hole through the center of the snowflake and slide a bamboo skewer through. Make the hole loose enough so the snowflake can spin. Blow on the snowflake (or use a fan). Does the snowflake spin or buckle? What improvements can be made to the snowflake's "wings" to make it spin better?

Water Cycle Demonstration [7]

Did you know that the water we have on Earth (our oceans, lakes, ponds, and even puddles) is the same water that falls from the sky when it rains or snows? The process that makes this possible is called the Water Cycle. The activity below illustrates the process.

Materials:

Large glass bowl (that can hold a small Tupperware container inside)
Small Tupperware container
Hot water
Salt
Plastic cling wrap
Ice

1. Pour the hot water into the large glass bowl, and add plenty of salt (you are immolating the ocean). Stir well.
2. Place the small Tupperware container in the middle of the glass bowl on top of the salt water (this is where you will "collect" the rain that falls.
3. Cover the top of the glass bowl with cling wrap. This will provide a place for your water to condense into "clouds."
4. Place several cubes of ice on top of the center of the cling wrap. The cool ice in the "sky" will cause the evaporated water to condense when it rises up.

5. After several minutes, you should see the water condensing into "clouds" on the underside of the cling wrap.
6. Once enough water has condensed into "clouds," precipitation will begin. Water will drop from the cling wrap back into the "ocean" and some of that water will fall into the small Tupperware container.
7. Once you have collected sufficient rain water into your small container, take a drink. Notice how it isn't salty compared to the "ocean water" you began with. This illustrates how only water evaporates, not the salt that's in the water. Thus, rain water is okay to drink even though it has evaporated from all sources of water on Earth.

Then and Now

Snowflake Bentley's camera was said to cost as much as a herd of ten cows. How much did a herd of ten cows cost in the late 1800s? How much does a herd of ten cows cost today? How much did simple produce items cost in the 1800s? Did everyone have access to produce like we do today? Research the answers to these questions, and then discuss whether the modern farmer's job is easier than the historical farmer's. Compare and contrast the reasons.

Links:

- "The Snowflake Man" (a short film about Snowflake Bentley) https://www.youtube.com/watch?v=ptLmA263hlk
- The Water Cycle video https://www.youtube.com/watch?v=al-do-HGuIk

Sources:

1. Martin, Jacqueline Briggs. *Snowflake Bentley*. Boston: Houghton Mifflin Company, 1998. Print.
2. https://growingsmallfarms.ces.ncsu.edu/2014/02/farmers-dont-get-snow-days-this-winter-a-challenging-one-for-area-farmers/
3. http://www.agriculture.com/crops/wheat/production/snow-c-provide-benefits-to-wheat-crop_145-ar28437
4. http://www.ncagr.gov/markets/chart.htm
5. http://stemactivitiesforkids.com/2015/12/21/winter-stem-with-snowflakes/
6. http://www.marthastewart.com/276331/how-to-make-paper-snowflakes#185246
7. http://www.giftofcuriosity.com/water-cycle-demonstration/