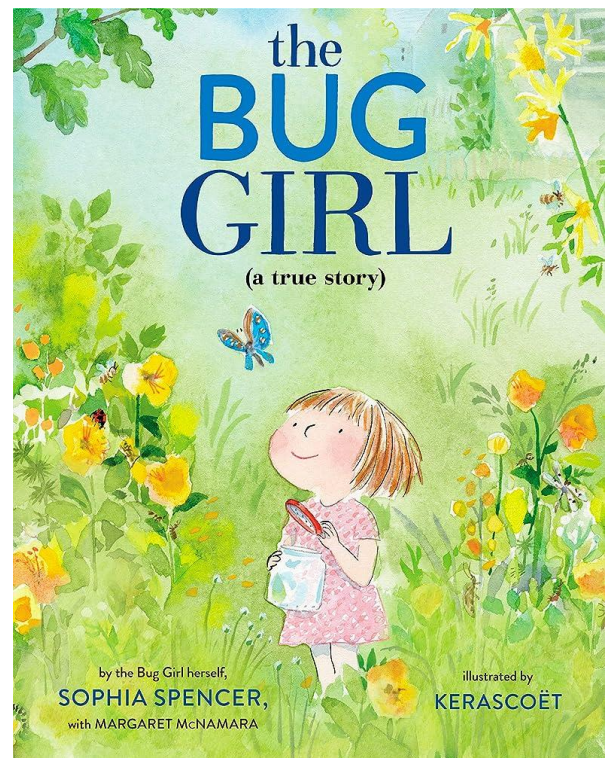
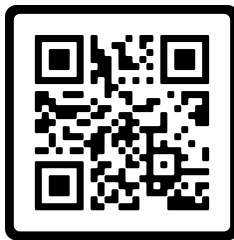




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September Monthly Book  
The Bug Girl: A True Story  
Written by Sophia Spencer  
And Margaret McManara  
Illustrated by Kerascoët  
Grade Levels: K-8  
Google Slides: [Click Here](#)



### Book Summary:

Real-life 7-year-old Sophia Spencer was bullied for loving bugs until hundreds of women scientists rallied around her. Now Sophie tells her inspiring story in this picture book that celebrates women in science, bugs of all kinds, and the importance of staying true to yourself.

## **Background Agricultural Connections:**

### Butterfly Gardens

A butterfly garden is simply a garden with plant material that attracts butterflies. The general needs of butterflies are host plants and nectar plants. Host plants are the plants eaten by the caterpillar or larva of the butterfly. Each species of butterfly has a specific plant that the adult butterfly lays her eggs on and which the caterpillar will eat. Nectar plants are the food of the adult butterfly. They use a proboscis to sip nectar from the flowers of the plant. A butterfly garden also needs protection from the wind. Many butterflies like a damp spot or mud hole for puddling. Finally, butterflies like sunny areas and some rocks to rest on and soak up the sun.

There are many places in SC where you can discover and experience the magic of butterflies and other pollinators in habitats catered to them. One example is the Roper Mountain Science Center butterfly garden in Greenville. It contains many varieties of plants that attract butterflies and bees, and is lovely during each season of the year. The Greater Greenville Master Gardeners help to maintain the butterfly garden. In 2002, it was certified a National Wildlife Federation Schoolyard Habitat. This certification means that wildlife is provided food, shelter, water and a place to raise the young on these grounds.

### Entomology Exhibits - Coastal Discovery Museum

Did you know the Coastal Discovery Museum created one of the first Insect Houses of its kind in the Lowcountry?

Created in 2016, this unique structure made of tightly packed, dried bamboo shoots (or "pipes"), provides habitats for a wide variety of regional insects like wasps, ants, bees, and spiders. The initiative behind it was to foster the breeding and lifecycle of species that play an important role in the health of our local ecology. While common across Europe, the idea of keeping insect houses is still an obscure one in the US, but so beneficial to both the insect world, and to us for how they impact the environment at large. Perhaps in years to come insect houses will grow to be as commonplace in the countryside, backyards, and farms as bee colonies have become in recent decades.

On the museum's home campus of Honey Horn, Museum Natural History Curator and Manager Carlos Chacon covers the basic nature of Lowcountry insect houses in a variety of talks, workshops, and streaming online resources. Starting with what kind of insects are likely to use the structure and Chacon shows the different behaviors of different inhabitants like what they eat, how they breed, their habitation cycle, and other unique behaviors like the Mason wasp which gets its name from sealing their "pipe" at the end with mortar-like mud. Then take what you learned and put it into practice in your area of influence as Chacon walks you through benefit of adding one to your home and area gardens and what you'll need to build one.

**Book Discussion:**

1. Look at the book cover; what is the difference between a true story and fiction?
2. Do you have a favorite insect? Can we name lots of bugs that live where we live (e.g. flies, mosquito, honey bee, wasp, ants, lady bug, aphids, dragon flies, grasshopper, beetles, moth, butterfly)?
3. What is an entomologist?
4. How would you safely and respectfully study a bug? Do you think Sophia investigated bugs safely and respectfully
5. How are insects important to agriculture and plants?

**Agricultural Vocabulary:**

- abdomen: the last of an insect's three main body parts.
- adaptation: any structure or behavior of an organism that improves its chances for survival
- antenna (pl. antennae): the thin feelers on the head of an animal like a crayfish, isopod, or insect. Antennae are used to sense the environment.
- arthropods: a group of animals with exoskeletons, jointed legs and segmented bodies, including insects, spiders, ticks, scorpions, centipedes, crabs and shrimp.
- entomologist: a scientist who studies insects
- exoskeleton: a hard, protective covering found in all arthropods, which provides structure like a skeleton, but is on the outside.
- habitat: the place or type of place where a plant or animal naturally or normally lives and grows
- head: the first of an insect's three main body parts
- insects: a group of arthropods that is characterized by having a three-part segmented body, six legs, and two antennae, including beetles, ants, and bees.
- larva (pl.: larvae): the wormlike early stage in the life cycle of an insect.
- metamorphosis: the change of an insect (or other animal) from one form into another as it develops into an adult. Butterflies are a well-known example.
- thorax: the middle of an insect's three body parts. An insect's legs and wings are always attached to the thorax.

**Did you know...**

- Fruit flies were the first living creatures to be sent into space.
- A single honeybee colony can produce around 100kg of honey each year – that's 220 jars!
- More than 100 U.S. grown crops rely on pollinators. The added revenue to crop production from pollinators is valued at \$18 billion.
- Honey bees are America's primary commercial pollinator, although there are over 4,000 types of bees in the United States.

- Major U.S. pollinated crops include almonds, non-citrus fruit trees, berries, melons, and squash.

### **Activities:**

### **Social Studies / History**

#### Great Monarch migration

##### Procedure:

- Start the discussion by asking students to define migration. Migration is an example of an animal adaptation, a behavior passed down through generations that helps the species survive. Animals that migrate exhibit this behavior for different reasons—most often to avoid a changing climate, to look for food, or to reproduce. Encourage students to name examples of species that migrate.
- Describe to the students this migration route taken by many monarchs so they fully understand the concept. It may help to display your own map and refer to it while explaining.
  - First leg: Fall is approaching, temperatures are dropping, and monarch butterflies throughout the northern United States and southern Canada are heading out on a long journey. This generation of butterflies is responsible for traveling all the way to the forests of the Monarch Butterfly Biosphere Reserve in Michoacán, Mexico, to hibernate in Mexico's warm climate and avoid the harsh cold of winter. Once their winter hibernation is over and temperatures indicate spring has arrived, typically by March, these butterflies will awake and begin the journey north.
  - Second leg: As this generation of butterflies heads north, they will stop to eat and reproduce along the way, laying eggs along milkweed plants. This generation lives the longest, about seven or eight months, hence why they're referred to as the "super generation". After a few weeks of traveling north, these butterflies reach Texas and die, leaving a new generation to emerge from their eggs and continue the journey north.
  - Third leg: This next generation of butterflies will continue to travel north for about four to five weeks, stopping in various states along the way to eat and lay eggs, before eventually dying. Their offspring will emerge and continue the journey from where their parent butterflies left off for approximately four to five weeks before dying.
  - Fourth leg: This pattern happens one or two more times, resulting in a fourth or fifth butterfly generation completing the last leg of the journey to areas of the northern United States and Canada where they rest and reproduce during the warm months. One of the most popular areas for monarchs during the summer is the grasslands of the Northern Great Plains, spanning Nebraska, North Dakota, South Dakota, Wyoming, and Montana in the United States, as well as

Saskatchewan and Alberta in Canada. These grasslands provide ideal habitat for monarchs to feed and lay eggs.

- Emphasize to students the relevance of this monarch migration to people. Monarchs are pollinators, responsible for transporting pollen between flowering plants, fertilizing them. The plants then produce seeds and fruit, all of which humans use to make various food products. Without monarchs and other pollinators, a lot of the food we routinely depend on would not exist. It's important for monarchs to complete their migration cycle with the necessary habitat to reproduce and continue their role of pollinating.

Teacher resource:

[WWF Monarch Migration Lesson Plan](#)  
[Teaching Tools About Monarchs](#)

### History of the Boll weevil

1. On the chalkboard, write the old saying, "Don't put all your eggs in one basket." Ask students what this means. Ask how this saying applies to the lesson farmers in the South learned about planting only one crop on their land.
2. On a map of the United States, students will trace the route of the boll weevil from Mexico through the southern states.
3. How does the climate affect cotton and boll weevils? Compare the climates of the different states and countries where cotton is grown.
4. Research the impact of cotton on our economy. Make a list of products made from cotton. If boll weevils wiped out all of the cotton, which of these products would you most miss? Write an opinion piece explaining why.

Teacher resource: <https://cdn.agclassroom.org/ok/lessons/intermed/weevil.pdf>

## **Science**

### Origami Flower Model

Purpose - to explore the parts of a flower by creating origami flower models.

Materials - origami paper or square cut paper, pipe cleaners, beads, glue or tape, tissue paper.

Follow the instructions in the video below to build your origami flower!

<https://www.youtube.com/watch?v=Pmcbrt3Vtsw>

As you build your flower, talk through the parts - petals, filament, stigma, anther, sepal

\*Focus on how each part affects pollination

- Petals have different colors shapes and sizes to attract insects
- The anthers hold the pollen grains
- The stigma is what receives the pollen from other flowers when a pollinator lands on it

### Flower Dissection

Purpose - to explore and identify the parts of a flower by dissecting and labeling parts on a real flower.

Materials - Lilies, labeling worksheet. Optional - magnifying glasses, tape, scalpel.

Teacher resource - <https://www.instructables.com/Flower-Dissection/>

Procedure: lead students through dissecting the parts of the flower listed on the worksheet. Carefully cut or pull apart each part. Discuss the names of each part and their function, focusing on how each part affects pollination.

- The outer ring of your flower consists of sepals, and the inner ring is of petals. In many flowers, these look different, but in these lilies they look nearly identical. Peel them off and count how many are in each ring.
- Your petals and sepals will be the most fragrant part of the flower, so give one a small tear and smell it up! If you use your cutting tool, to cut across its stalk, you can also see evidence of its xylem and phloem running nutrients, water, and sugars around the plant.
- Next look at the stamen, which contains all the male parts of the flower. These mostly consist of anthers (the elliptical heads) and filaments (the supporting stalks). Anthers contain pollen, which will either be exposed or still enclosed in your anther.
- The long stalk remaining is the pistil (the female parts), the end of which is the stigma. If the flowers are fresh, the stigma will be sticky for catching pollen. If you open it up, you can see the chamber inside, and the path down the style (the stalky part), and down to ovule. Cut the style to see the semi-hollow tube inside for the pollen travel down.
- Right at the base of the style is the ovary, and is often a strong structure that contains all the wee little ovules that can become viable seeds if fertilized with pollen. If you cut the ovary in half, you can see the little ovules all in a row.

## Art

### Invent an insect

Procedure:

1. What is an insect? Discuss as a class what makes an insect. Be sure to specify what makes an insect different from other arthropods: they have three body segments, two antennae, and six legs.
2. Divide class into small work groups of four to six students each and provide each group with an invent an insect worksheet and a set of art supplies. Each student will need an Invent an Insect worksheet.
3. Present the rules of the activity:
  - a. Invented insects should be grounded in reality (insects can't make jet packs to fly around) and have the same body parts as real insects.
  - b. Have fun and be creative!
  - c. Don't forget to give your insect a name.

Teacher resource: <https://www.calacademy.org/educators/lesson-plans/invent-an-insect>

## English

### Sequencing - life cycle of a butterfly

#### Materials

- Very small amounts of rice, fusilli, shell pasta and bow tie pasta
- Paper
- Glue
- Marker, pen or pencil

#### Procedure:

1. Give each student a life cycle of a butterfly worksheet
2. Use glue to attach pieces of pasta to the paper, to represent the different stages of the butterfly life cycle.
3. Label each stage of the life cycle:  
Butterflies lay their tiny eggs on leaves. Use rice to represent eggs.  
When the egg hatches, out comes a caterpillar. The caterpillar eats and eats until it forms itself into a chrysalis. Use fusilli pasta to represent a caterpillar (larva).  
Inside the chrysalis, the caterpillar is changing into a butterfly.  
Use shell pasta to represent the chrysalis (pupa).  
A butterfly emerges from the chrysalis. Use bow tie pasta to represent a butterfly.

Teacher resource: [Bee and Pollinator Activities](#) (pages 16-17)

### Types of insects - beneficial and detrimental (in agriculture)

#### Procedure

- Have students read the following article about good and bad bugs :  
<https://www.gardentech.com/blog/pest-id-and-prevention/identifying-good-and-bad-bugs-in-your-garden-infographic>
- Have students fill out a venn diagram comparing 1 good bug to 1 bad bug from the article

\*pay special attention to how these bugs affect agriculture and plant growth.

## Engineering/Math

### Landscape architecture (pollinator garden)

#### Purpose:

- Using square foot gardening proportions (12" x 12"), students will explore number concepts, perimeter and area. Students will create a dream garden with their favorite produce using a planting chart. This activity can be applied to an outdoor raised bed by sectioning off with string.

#### Procedure:

- Explain to students the importance of pollinator gardens - to attract and provide adequate habitat for pollinators to do their job. Pollination is important because plants must be pollinated to survive and reproduce.
- Hand each student a garden plot worksheet and a pollinator plant list.
- Have students design a pollinator garden with the following aspects:
  - At least 4 different pollinator plant species
  - Adequate room for each plant based on size
  - Key with size dimensions (to scale for older students)
- Have students present their garden designs to the class

#### Plant list:

<https://drive.google.com/drive/u/0/search?q=designing%20a%20square%20foot%20garden>

#### References

<https://agclassroom.org/matrix/lesson/223/>

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<https://pollinator.org/PDFs/Guides/SoutheastMixedForestrx5FINAL.pdf>

<https://www.ropermountain.org/pages.asp?titleid=butterflygarden>

<https://www.coastaldiscovery.org/explore/exhibits/insects/>

<https://www.natgeokids.com/uk/discover/animals/insects/15-facts-about-bugs/>

<https://www.usda.gov/sites/default/files/documents/pollinator-week-factsheet-06.25.2020.pdf>



<https://www.gardentech.com/blog/pest-id-and-prevention/identifying-good-and-bad-bugs-in-your-garden-infographic>

## Mapping Monarch Migration

Use what you've learned about monarch migration to show the steps of their round-trip journey on the map below. Remember to include a legend that defines every symbol you use.



## Flower Dissection Lab

Directions: Carefully dissect a flower. Find each of the flower anatomy parts listed in the table below. Tape each part to the table as you find it.

Stem	Petals
Pistil (stigma and style)	Stamen (anther and filament)
Sepals	Ovary

