

Getting to know Amu (The Bee)

Learning Objectives

1. Understand the role bees have in pollination and how it relates to the larger ecosystem
2. Understand the connection between bees and other living things
3. Learn the various bee species and how they are different (including bee anatomy, flight, sight, and where they live)
4. Learn how to build and maintain solitary bee house

Introduction

In this lesson, we will learn about bees. First, we will hear the story of How the Bee Received its' Stinger and why the Mi'kmaq word for bee is "amu".

Then we will discuss types of bees, bee anatomy (parts of a bee), bee sight, bee habitats, and their roles in keeping balance in the ecosystem. We will also be learning about bee keeping and will build a home for a type of bee that we will discuss.

Bees influence the environment, and therefore people. In this lesson we will learn more about these connections. We will also hear an Indigenous story about how the bee got its stinger.

How the Bee Received its' Stinger



"Back in ancient times when the people were purer and could converse with the animals and the Creator would visit with them, the people asked the Creator for something that was 'sweet' to the taste.

So, the Creator sent the Bee, but the Bee had no stinger. Down came the Bees and they found a suitable tree in which they could build their hive, live in, produce honey, multiply and feed its young.

Soon the people came to the Bee and asked for some of the sweet syrup and the bee gave each person a container full. The people loved the syrup and greedily ate it,

then went back to the Bee for more. But the Bee replied, 'I have not more to give you for a while. You will have to wait.'

The people were not happy, as they craved the sweet syrup. So, they called upon the Creator, saying, 'the Bee does not give us enough of the golden syrup. We want more!!!'

The Creator listened and sent down the Flower People. The Flower People began to spread all types of flowers across the land giving the bees greater access and variety of flowers to pollinate and make more honey.

The Flower People spread all kinds of beautiful wild flowers around to attract the bees; bright blue, red, orange, and yellow. More Bees were created to help pollinate the flowers. The hive grew to be very large.

The people seeing how big the hive was, went to get more of the sweet syrup. So, the Bees gave all the syrup to the people but left enough to feed their young. The people devoured the syrup and wanted more. The bee responded, 'We don't have anymore, you will have to wait.'

The people were angry and asked the Flower People to make more flowers, so they could have more of the golden syrup to eat. The Flower People responded, 'We made all the flowers we could, and they are all pollinated. You will have to wait until Spring.'

'No', said the people, 'We want more now!!'. So, they went back to the Bee's hive and tore it apart killing almost all of the Bees and taking the syrup. The remaining bees were angry. They asked the Creator what to do.

The Creator was also annoyed at the behavior of the people, so he told the Flower People to Create some 'briar bushes' and for the Bees to eat the briars.

The Bees did as the Creator said, they ate the briars, and these were transformed into stingers. The Flower People created an entire briar patch around the Bee's tree.

The next day, the people came back and started toward the Bee's hive for more syrup; but the briars around the tree scratched and tore at their bodies. Some of the people made it through the briars to the hive.

Covered in welts, they yelled at the Bees, ‘Give us some more syrup now, or we will do the same as we did yesterday, kill your young and destroy your home!’

The Bees became angry and loud hum came from the hive in the tree and out they swarmed. The Bees stung the people all over until they were covered in welts and sent them running.

After that day, the people treated the Bees, flowers, and plants with great respect and always promised the replace whatever they asked for and never be greedy or take more then they needed” (6).

This story was borrowed from the Cherokee/Anishinaabe for the purposes of teaching.

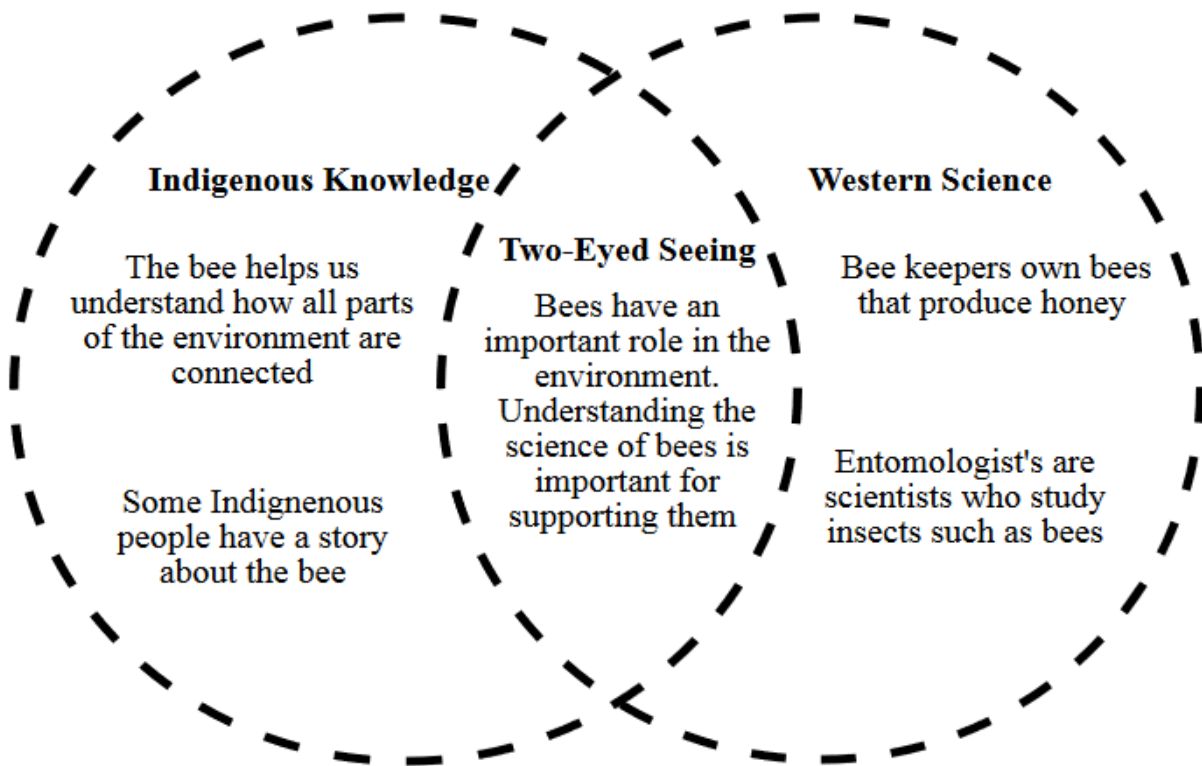


Figure 1. Two-Eyed Seeing diagram

Table 1. Vocabulary Used in this Activity

Ecosystem	A community of living things (plants, animals and microorganisms) and their interactions with each other and the environment (1).
Flowers	The flowers of a plant allow them to reproduce. Usually the flower contains both the male and female parts (pollen and the stigma). the flower cannot reproduce alone, they need help from bees and other flying insects (2).
Pollination	The act of transferring pollen grains to the stigma of a plant. Bees and other flying insects are called pollinators (2).
Cross-pollination	The act of transferring pollen grains to other plant stigmas (2).
Ultraviolet Rays	Ultraviolet rays are short light waves produced by the sun. People cannot see these rays, but some insects can (3).
Habitat	The natural home or environment of an animal, plant or microorganism.
Anatomy	The study of the structure (parts) of living things like animals, plants, and microorganisms (4).
Biodiversity	Biodiversity is the amount of different animals, plants, microorganisms in an ecosystem (5).
Crop	A plant that is grown as food to eat.
Entomologist	A scientist that studies insects.

Questions and Answers about Amu

Why the Bee is Called Amu?

The bee got its name from the swatting motion that is made with the hand when you are trying to scare (or shoo) a bee away. This motion became associated with the bee and this is how the bee got its name.

What is the role of the bee in the ecosystem?

Bees pollinate the flowers on plants by moving pollen from one flower to another. The part of the flower that pollen is moved to is called the stigma. This happens when bees are stopping to snack on nectar and collect pollen (2). This is a very important job. It allows plants to reproduce (create flowers) and spread their genes (seeds) so they can keep growing. This happens because bees travel to many different plants and flowers within an ecosystem.

By moving pollen from one flower to another, the bees are responsible for spreading pollen between flowers and helping with biodiversity. All the natural plant communities in Mi'kma'ki depend on pollinators like bees to help them spread, grow, and thrive.

Some bees are used by people to pollinate food crops on farms (3). Look at the table below for examples of the types of crops that bees help pollinate. Although bees are small creatures, they play a big role in people's lives because they help grow our food.

Table 2: Crops That Bees Commonly Pollinate (2)

Fruits	Vegetables	Oilseeds	Spices
Apples	Cucumbers	Sunflower	Cacao
Blueberries	Onions	Sesame	Fennel
Tomatoes	Pumpkins	Flax	Coriander

Bees are also important for plants that grow wild in an ecosystem. Plants that are found naturally in an ecosystem provide value to the environment, as they can be important for:

- Adding nutrients to the soil or earth
- Filtering water
- Absorbing lots of water (preventing floods and erosion)
- Absorbing carbon dioxide
- Acting as a food source for other animals
- Acting as a food or medicine for people (2).

Without bees as pollinators, natural plant communities could not thrive. Other insects are also important pollinators. These include butterflies, moths, flies, dragonflies, beetles, wasps, birds and even bats (2).

Activity 1: Types of Bees

In this activity we will learn about the differences between two different groups of bees: solitary bees and social bees

What we will need for our activity:

- A pencil

What we will do, step-by-step:

Step 1: Review Social and Solitary Bees

Review table 3 on the next page. Notice the differences between the types of bees.

Table 3: Social and Solitary Bees (7)

Social Bees	Solitary Bees
Live in groups with hundreds and up to thousands of other bees	Live alone
Make honey to feed the colony	Do not make honey
Often the colours yellow and black	Range in colours such as brown, golden yellow and even blue and green
Types of social bees include honeybees and bumblebees	Also known as wild bees. Types of solitary bees include leafcutter bees, mason bees, sweat bees and carpenter bees

Step 2: Applying your Knowledge

Look at the images of the social and solitary bees shown by the camp counsellor. Answer this question on the lines provided:

1. What are some differences in the visual appearance of the four bees (Colour, size, etc.)?

Activity 3: Bee Anatomy

Although all bees have similar anatomy, some differences exist between solitary and social bees. These differences affect the way that they carry pollen.

In this activity we will learn basic bee anatomy.

What you will need

- A pencil

What you will do

Step 1: Finding Anatomy Terms

Review the bee anatomy diagram handout provided by the camp counselor. Using the alphabet key, fill in the blank spaces to solve for the anatomy terms. For example the letter “A” would go in all spaces labeled with 1.

Step 2: Learning about Solitary bees

Social bees collect pollen using a special pocket on their hind legs called corbicula or pollen basket (2). While the bees are looking for food, they combine the nectar and pollen together. The moisture from the nectar is absorbed by the pollen, allowing them to tightly compact together (2). The camp counselor will show you a photo of what this looks like.

Solitary bees do not have corbicula (pollen baskets). Solitary bee species have dense rows of hair called scopae (2). The scopae acts just like Velcro. The pollen grains get caught in the hairs. The hind legs are covered in the scopae, however some solitary bees have them on the underside of their abdomens as well (2). Solitary bees are more effective pollinators because they carry pollen all over their bodies in their scopae. Social bees tightly compact their pollen into one place in the pollen baskets.

The camp counselor will show you the difference between the pollen baskets on the social bees and the scopae on the solitary bees.

Activity 4: Ultraviolet Sight

Ultraviolet rays are short waves of light that are produced by the sun (3). People cannot see these rays, but bees and some other insects like butterflies can.

The ability to see ultraviolet light allows bees to see the center of flowers very clearly. The colour at the center of the flower acts as a target point or a bullseye for the bee to land. This is how the flowers attract the bees so that pollination can occur.

The camp counsellor will show you photos of how bees can see.

The camp counsellor will also show you a video to see more about ultraviolet bee sight. Watch the video below.

Video: <https://www.youtube.com/watch?v=N1TUDFCOwjY>

Watch: 1:17 minutes to 2:43 minutes (8).

Activity 5: Bee Habitats

Habitats differ from bee to bee as it depends on whether they are social or solitary bees.

For example, honeybees are social bees that live in hives made from a substance they create called honeycomb (2). While other social bees like bumblebees live in nests that they either made or stole from other animals (2). Bumblebees make their nests underground (2).

Most solitary bees like leafcutter or mason bees build their nests in gaps between rocks, plant stems or reeds, or abandoned insect borings or tunnels (2).

Today we will build a solitary bee house and will learn about the components of a honeybee hive from the Mount's Bee Keeper, Jillian.

What we need for our activity:

- Nesting trays
- Hollow bamboo reeds
- Bee home frame

What we will do, step-by-step:

Step 1: Review the purpose of the materials

There are several different materials you need to make a solitary bee house.

a) House frame

The house frame will determine how big the solitary bee house is. It needs an angled roof to make sure that any rain will run off onto the ground.

b) Nesting trays

Nesting tunnels can be made from blocks of wood or hollow bamboo reeds. Depending on the bee species, tunnels can range in sizes. These tunnels are where the bees will go. Bigger bees need larger tunnels while smaller bees need more narrow ones.

Step 2: Building the Solitary Bee House

To build the solitary bee house we will be filling in the house frames with nesting trays and bamboo reeds.

Once we finish making the bee houses, we will learn about honeybee hives from the Mount's Bee Keeper, Jillian.

Step 3: Taking Care of the Solitary Bee Home

There are certain things you need to do each year so that bees will return to your solitary bee home.

Listen to Jillian explain the different components on the bee hive. Fill in the diagram below with the proper terms for each hive component.

Activity 6: Social Bee Habitats and Amuesusi'l (Bee Hives)

Amuesusi'l (bee hives) are made of several different pieces. Each piece plays an important part and allows the bees to build honeycomb, make and store honey, royal jelly and pollen, lay their brood, and keep the queen safe. We will learn about all the pieces for the hive, what materials each piece is made of, and how to put them together.

Step 1: Learning the parts of a bee hive

The bee keeper, Jillian, will explain the different components on the bee hive. The camp counsellor will give you a diagram of a bee hive. Fill in the diagram with the parts of the hive you learn with Jillian.

Step 2: Learning the role of the beekeeper

As a group we will discuss the role of the beekeeper, how to check on hive health, why the Mount bees died, and bee keeping as a job. Review the roles of the bee keeper below.

a) Caring for your bees

As a bee keeper it is important to take care of your bees to the best of your ability. Beekeeping is a long-term learning job and is a combination of knowledge, experience and learning from others.







The bees are constantly interacting with the environment, so it is easy for diseases, infections or illnesses to spread quickly throughout an ecosystem to other species.

So, it is important to maintain equipment and check on the bees often to ensure they are healthy, and the colony is working as it should.

b) Hive Health

Inspecting a honeybee hive regularly is important to make sure the colony and the equipment is healthy and clean. These are the things beekeepers look for.

Table 5: Hive Health Signs

Signs to look for when checking hive health:	
	Visual infestations of any sorts. This could be mold spots, mites, etc.
	Odd smells. This could indicate mold, sickness or contamination.
	Equipment that should be changed for newer equipment (i.e. hive frames)
	Signs of quality reproduction, seeing many eggs and new brood (or spotting the queen and eggs)
	Honey and pollen production and amount.
	Honeycomb colour and size. Different sized and different colour honeycomb is made depending on the type of bee that is occupying it.

If you would like to read more about honeybees, see Appendix 2 and 3 for more information.

c) Why did the bees die this year?

Unfortunately, the Mount bee colony did not make it through the winter. After doing a thorough inspection we could see that there were no visual infestations and no odd smells. We also could see lots of honey and healthy honeycomb, so they had lots of food to eat. But all the bees were dead.

This led us to the conclusion that the bees must have died because of the changes in temperature over the winter. There were a few warmer winter days this year, which may have caused the bees to think it was almost spring. When we opened the hive, we could see that the bees had clustered together in small groups instead of one big group.

This indicates that they may have ventured out of the hive due to the change in weather, but then realized it was not spring yet. Because they were no longer clustered all together, they could not stay warm enough to survive.

We are sad the bees died but Jillian will be bringing a new colony to occupy the hive once more.

d) Bee Keeping as a Job

Jillian, the bee keeper will discuss Bee Keeping as a job.

Knowledge Check

See if you can answer the following questions about Amu. If we have time we will answer the questions as a group.

1. What is a social bee?

2. What is an example of a social bee species?

3. What kinds of plants do social bees pollinate?

4. What is a solitary bee?

5. What is an example of a solitary bee species?

6. What kinds of plants do solitary bees pollinate?

7. What is a sign a bad hive health?

8. What is one reason that bees are important?

True or False

The bees at the MSVU hive died because of starvation

- True
 False

Solitary bees have pollen baskets

- True
 False

All bees are black and yellow

- True
 False

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