

24 January 2022

Hello, and thanks for joining us to use our film The Love Bugs and lesson plan with your group!

A bit of background about our work:

This educational program, created by Far Star Action Fund, a 501 c4 non-profit, is an example of how we partner with films and organizations to solve the world's most considerable challenges, emphasizing climate, good governance, civil society, and education. Far Star believes movies and media have a powerful ability to help individuals enact change when partnered with the right programs or tools. One of the most powerful tools we've found is using quality educational programs to highlight film messages and lessons. We've created this lesson plan to complement The Love Bugs, a film with ideas about conservation, relationships, and legacies.

We hope you enjoy the activities and can't wait to hear feedback from you and your students on the lesson plan!

Please complete the instructor and student(s) evaluation forms and return them to: info@farstaractionfund.org.

The best,

Far Star Action Fund

Stream a free screening of the film here:

https://vimeo.com/530506131 Password: q1tlbScreener





Celebrating the Love of Nature and the Nature of Love!

Film and Lesson Plan for Grades 3-5



About Over the course of 60 years, Lois and Charlie O'Brien, two of the foremost entomologists and pioneers in their field, traveled to 70 countries, all 7 continents, and quietly amassed the world's largest private collection of insects. Their collection is a scientific gamechanger with 1.25 million specimens and more than 1,000 undiscovered species. In the past couple of years, however, the O'Briens have grappled with increasingly debilitating health conditions.

Charlie, 85, and Lois, 91, realize that their lifetime of exploration and discovery is coming to an end. They want to leave their legacy with those who appreciate their huge body of work, and who will care for it long into the future. This humorous and poignant film explores the love of Nature—and the nature of Love—and what it means to devote oneself completely to both.

The Emmy-winning documentary film, The Love Bugs, and the accompanying lesson plan provide an exceptional opportunity for you and your students to become amateur entomologists and discover the wonder of small creatures, just like Lois and Charlie did. It also provides a process for understanding the nature of love through your students' eyes and through those of a couple who have worked and lived together for 60 years.

Table of Contents

Pathway 1 - The Love of Nature

Lesson 1: What Do Entomologists Do?

Time frame: Two class periods (90-120 minutes) **Objectives**

- To assess what students know about scientists and what they do
- For students to reflect on what a scientist does and contrast their ideas with those of other students
- To engage in an activity of gathering model 'insects' to gain a deeper understanding of what entomologists do

Lesson 2: Meet Real Entomologists in the Film, The Love Bugs

Time frame: One class period (60 minutes) **Objectives**

- To see real scientists in action, specifically entomologists, as shown in the documentary film, The Love Bugs
- To compare and contrast the real scientists they see in the film with the scientist they drew and described in Lesson 1
- To reflect on the concept of legacy in terms of what Charlie and Lois are leaving for future generations, and what types of legacies students see in their families.

Lesson 3: How Do Scientists Classify Animals?

Time frame: One class period (45-60 minutes) **Objectives**

- To understand the need to classify organisms by observable characteristics and through DNA testing
- To create a classification system to identify a collection of animals and revise the system as new observations and ideas are uncovered
- To reflect on new ways that scientists behave to add to the scientist they drew and described in Lesson 1

Lesson 4: Discovering Animals in the Schoolyard

Time frame: One class period (60 minutes) **Objectives**

- To use the schoolyard or nearby location to observe insects in their natural habitat
- To experience how an entomologist collects insects and other small invertebrates for observation, being careful not to injure them
- To make drawings of the insects and other small invertebrates rather than collecting them to keep as specimens

Lesson 5: Sorting and Classifying Animals Time frame: Two class periods (90-120 minutes) **Objectives**

- To reflect on their experience as a field scientist in the study area
- To be introduced to the concept of animal communities and notice some of the communities living in the study area
- To create two classification systems for the animals they found in the study area. The first one is open-ended and the second one is a dichotomous key where they try to identify each

Pathway 2 - The Nature of Love

Lesson 1: What Qualities Do You Want in a Best Friend?

Time frame: 50 minutes; first activity 20 minutes, second activity 30 minutes

Objectives

- To set the stage for viewing The Love Bugs and observing the characteristics of the couple featured in the film who lived and worked together for over 55 years.
- To ask students to reflect on and then list the qualities they want in a best friend

Lesson 2: Observing a Lifelong Friendship

Time frame: One - two class periods (60-90 minutes) **Objectives**

- To meet Lois and Charlie O'Brien, a team of scientists who have lived and worked together for over 55 years, in the Emmy-winning documentary film, The Love Bugs
- To closely examine how Lois and Charlie interact with each other, and what makes them best friends and successful project partners.
- To compare and contrast the qualities students want in a best friend to the qualities they observe in Lois and Charlie

Alignment to the Next Generation Science Standards (NGSS)

Performance Expectations

- 3-LS2-1 Construct an argument that some animals form groups that help members survive.
- 3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- 4-LS1-1 Construct an argument that plants and animals have internal and external structures and function to support survival, growth, behavior, and reproduction.

Connections to the Nature of Science

- People from all cultures and backgrounds choose careers as scientists and engineers.
- Most scientists and engineers work in teams.
- Science affects everyday life.
- Creativity and imagination are important to science.

Science & Engineering Practice (SEP)

- Asking Questions and Defining Problems
- Developing and Using Models
- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Disciplinary Core Idea (DCI)

LS1.A: Structure and Function

LS2.D: Social Interactions and Group Behavior

LS4.C: Adaptation

Cross Cutting Concept (CCC)

- Patterns
- Cause and Effect
- Systems and System Models
- Structure and Function



Getting Started

Preview the film

- 1 It is recommended that you preview the Emmy-winning film The Love Bugs prior to using it in your classroom. It is 34 minutes in length. To access the film, <u>click on this link</u> and register to view the film at no charge.
- 2 Decide if you want to start with Pathway #1: The Love of Nature or Pathway #2: The Nature of Love. Pathway #1 focuses on what scientists and entomologists do and Pathway #2 focuses on the 60-year relationship of two entomologists who work together in their research on insects. You can combine the two pathways, one after another, or use them separately depending on your goals and curriculum needs.

Have a real entomologist visit your classroom

You may want to invite a real entomologist to your classroom either in person or via a live video chat. There are many resources you could use to find a volunteer.

1 The Entomological Society of America:

The Entomological Society of America (ESA) is the largest organization in the world serving the professional and scientific needs of entomologists and individuals in related disciplines. Founded in 1889, ESA has more than 7,000 members affiliated with educational institutions, health agencies, private industry, and government. Members are researchers, teachers, extension service personnel, administrators, marketing representatives, research technicians, consultants, students, pest management professionals, and hobbyists.

https://www.entsoc.org/

Contact them through their web page https://www.entsoc.org/meet-esa-staff

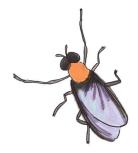
2 Find a scientist from your local university

Search for the Entomology Department of a university near you. They may be able to provide a scientist to visit your classroom.

3 Find a scientist who conducts research in a topic of interest who could visit your classroom through an online video chat

Search for an area that interests you and/or your students. If they want to find someone who studies bees, you could search for "research on bees". Here is an example of what could come up in your search

https://www.beelab.umn.edu/honey-bees/research



What are Love Bugs?

The love bug (Plecia nearctica) is a species of march fly found in parts of Central America and the southeastern United States. They can remain coupled with their mates for most of their adult lives.

A love bug is also a nickname for two people who are inseparable due to their love for each other.

Is there a difference between insects and bugs or are they the same thing?

In common language, the words insect and bug are often used interchangeably, but they are different in the eyes of scientists who study them. In the film, The Love Bugs, students meet two entomologists who study insects, although one of them studies true bugs.

Insects have segmented legs and hard outer layers called exoskeletons. Insects typically have six legs, two antennae, and a body segmented into three sections (head, thorax, and abdomen). Insects comprise a lot of the creatures you tend to think of as bugs like ants, grasshoppers, bees, and flies.

All bugs are insects, but not all insects are bugs. True bugs belong to an order of insects called Hemiptera. There are a few characteristics that distinguish bugs from other insects: Most bugs have a straw-shaped mouth that they use to suck juice from plants or blood from animals. True bugs include stink bugs, bed bugs, water striders, and cicadas. Lois O'Brien, one of the entomologists in the film, studies leaf hoppers which are true bugs. Some insects with bug in their name aren't true bugs, like ladybugs, which are actually beetles.

Overview

In this first Lesson, before being introduced to the entomologists featured in The Love Bugs, students are asked to consider what a scientist does - what they look like, where they work, what equipment they need, etc. This lays the ground work for comparing their idea of a scientist to the two scientists in the film. Students learn the terms for some different types of scientists - biologists, zoologists, and entomologists. Students then become field entomologists and search for pretend escaped 'insects' from Africa. The teacher puts out biodegradable model insects in the form of beans and pasta. Students are challenged to observe where these model insects live and conclude something about their behaviors and environmental needs. This sets the stage for safely collecting actual insects in the schoolyard or nearby and getting a taste for what entomologists do.

Time frame: Two class periods (90-120 minutes)

Objectives

- To assess what students know about scientists and what they do
- For students to reflect on what a scientist does and contrast their ideas with those of other students
- To engage in an activity of gathering model 'insects' to gain a deeper understanding of what entomologists do

Materials

For the class:

- The following items to be used as examples of 'insects':
 - ◆ 1/4 lb. of pinto beans
 - ◆ 1/4 lb. of black beans
 - 1/4 lb. total of 3 types of pasta (e.g. spaghetti, elbow macaroni, spiral macaroni)
- The large study area (at least 30 ft. X 30 ft.) in your schoolyard or nearby where the pretend 'insects' can be hidden

For each student:

- ☐ Science notebook
 ☐ A sheet of paper and drawing materials to draw their version of a scientist
- A non-breakable collection container such as a plastic tub from cottage cheese, salsa, etc.

Pathway #1: The Love of Nature What Do Entomologists Do?

Lesson 1

The week before class:

- 1 Collect non-breakable collection containers such as a plastic tub from cottage cheese, salsa, etc., at least one per student.
- 2 Purchase or gather the following items that will serve as models for actual 'insects':
 - ◆ 1/4 lb. of pinto beans
 - ◆ 1/4 lb. of black beans
 - ◆ 1/2 lb. total of 2-4 types of pasta (e.g. spaghetti, elbow macaroni, spiral

The day before class

- 1 Conduct a trial run for streaming The Love Bugs to your students. Make sure the film can be seen and heard by all students in your class. The film is 34 minutes long. To access the film, click on this link and register to view the film at no charge.
- 2 Decide how you will collect student ideas of what a scientist does for use throughout the unit. Students will add to this data as the unit progresses. Students will be asked the following questions:
 - What does the scientist look like? Do they look like you or someone else?
 - What equipment are they using?
 - What other equipment would they need that isn't in your drawing?
 - Where do they work? (in a lab? outdoors? both? somewhere else?)
 - Who do they work with? (alone or with others?)
- 3 Find a study area in the schoolyard or nearby where you can hide the 'insects' in various places. Think of specific adaptations each 'insect' will have. Example: pinto beans can be placed in the open with exactly five beans in each group; spaghetti can be camouflaged with the grass; elbow macaroni can be found only under something else; black beans could be found next to litter; spiral macaroni could be found alone.
- 4 Decide how you will group students when they go into the study area to find their 'insects'. Students can work in groups of 4-6. You will need enough different types of 'insects' for each student to collect one type (example: 6 students in a group will mean you need 2 types of beans and 4 types of pasta).

Begin!

What is a scientist?

- 1 Post the word "scientist" where students can see it. Ask your students to write down what comes to mind when they see that word. Give them a few minutes to write in their science notebooks.
- 2 Once most students are finished writing, ask them to draw what they think their scientist looks like. With their drawing, they should include information like where they work, what they do, what types of equipment they need, what kind of education and training they might require, etc. Allow 10-20 minutes for them to complete this activity.
- 3 Circulate around the room and ask probing questions to help them make more complete descriptions of what their scientist looks like and what they do in their work.

Views held by students of what scientists look like and how they engage in science are often narrow and exclusive, reflecting stereotypes of science and scientists that have existed for decades (Finson, 2010). Characteristics of the stereotypical scientist include being white, male, working independently in a lab, and usually with test tubes and a lab coat.

Debrief

- 1 Ask students to take turns sharing their scientist with the students at their tables. They may jot down how other student's versions of scientists differ from theirs in their notebooks.
- 2 Have students display their drawing on their desk. Explain that they will now circulate around the room and see what other students drew and described. You may want to have them move as a table group and stay at another table until you call "time" to move, or you may let them circulate freely, depending on your class structure.

While they are circulating around the room, they should take their notebooks and jot down some observations: (you may choose to post these questions to guide students as they circulate)

- What do all (or many) of our pictures have in common?
- What is missing from our drawings?
- Did anything surprise you?
- How were other student's drawings the same or different from yours?

- 3 Once students have returned to their tables, ask for volunteers to share their scientist with the class. Create a way to tabulate the student descriptions into some categories to use throughout the unit:
 - What does the scientist look like?
 - Do they look like you or someone else?
 - What equipment are they using?
 - What other equipment would they need that isn't in your drawing?
 - Where do they work? (in a lab? outdoors? both? somewhere else?)
 - Who do they work with? (alone or with others)
- 4 As a final question, ask students if they have a more complete idea of what a scientist looks like or does, or do they want to know more? Have them write their thoughts in their notebooks. When they are done, they need to save their drawings and descriptions in their notebooks to use in the next lesson.



What is an entomologist?

1 Ask you students if they have heard of the term "biology"? (most have). Ask them to share what they think that means with an elbow partner. Draw them back together and share that it means 'the study of living things or the study of life'. Write on the board:

bio – life (from the Greek word bios)ology – the study ofbiology – the study of life or living things

- 2 Ask if they have heard of other similar words. Take a few answers. Give "zoology" as an example that comes from the new Latin zoologia meaning the "study of animals." Contrast zoology from biology as the study of animals versus the study of living things, which also includes plants and microscopic organisms.
- 3 Ask your students if they have heard the term "entomology"? Some may have heard the word or they might have wild guesses. Refrain from clarifying the term just yet. Have them turn to their elbow partner and say the word out loud a few times.
- 4 Write the word on the board and have them put it in their science notebooks. You may want to have them look up the definition or you may provide it for them here:

Entomology is the study of insects, including their relationships with other animals, their environment, and human beings.

Entomologists study insects, such as flying insects, ants, bees, and beetles. They also study arthropods, a related group of species that includes spiders and scorpions. Most entomologists specialize in a particular type of insect.

- 5 Have students describe what they think an entomologist might do if they lived in your area. They can write their description in their notebooks.
- 6 Once most of your students have finished, have them share what they wrote in their notebooks with the others at their table. They should take turns so each student can speak if they choose. They can add any information that another student shared to complete their description of what an entomologist does.
- 7 Ask students to think of questions they might like to ask an entomologist if they met one. They can write these questions in their notebooks.



Acting like entomologists

- 1 Explain that entomologists were bringing 5 new species of insects from Africa back to your city/town to study. They have gotten loose in the schoolyard! (or where ever your study area is located). The entomologists are asking your student scientists to help them recover these escaped insects. It is up to your student scientists to find the insects and safely bring them in the classroom where they can be returned to the entomologists. The entomologists say that the 'insects' are safe to handle - they won't bite or sting, nor are they poisonous. Mention that it is acceptable to collect these insects because they don't belong here and could pose a problem to the native animals and plants. This provides the rationale for collecting insects instead of leaving them out in nature.
- 2 Show an example of each 'insect' to be collected, one at a time. Enhance the students' role-playing abilities by showing each insect carefully, as if it could escape from your hands! Ask the students to give short descriptions of the 'insect.' They can even think of a name for the new creature, which helps prevent them from associating the new 'insect' with a common food item.
- 3 Explain that as scientists, they need to be very careful observers of these insects. Before picking up any insect, they need to note where it is living and under what conditions. If they are careful observers, they will get clues as to where the insects are hiding. Reassure them that these 'insects' are safe to handle they won't bite or sting, nor are they poisonous.
- 4 Pass out the collection containers they will use. Recommendt that they don't combine different types of insects in the containers, just in case

- they might fight or eat one another, since you don't know anything about these insects just yet. Suggest that once they find a type of insect, they choose a person in their group to collect that one type of insect, but all students in the group may find any kind of insect in the study area.
- 5 Explain to your students that they are to collect only these escaped 'insects' and leave naturally occurring insects (the real ones) alone.
- 6 Take the students outside and explain the boundaries where the insects can be found. After reinforcing the need to observe all they can about the insects first, let them search for the 'insects' for a few minutes or until about half of them have been found.
- 7 Bring the group back together near the study area and have them share where they found the insects and under what conditions. You may need to ask specific questions to get the students to focus on certain conditions rather than just a treasure hunt.
 - "What do you think that insect might eat?"
 - "Do they live with other insects or alone?"
 - "How do you think they defend themselves?"
 - * "Did a particular type of insect live in a specific place or just anywhere?"
- 8 After a good discussion, let them find the rest of the insects. Many clues from the discussion will help them locate the harder-to-find insects. Bring the class back in the room for discussion. They may keep their insects in their containers at their tables for now.

Debrief their findings

- 1 Ask your student scientists to jot down their ideas about the insects they found in their notebooks. Post these questions to guide them in their recordings:
 - "What do you think that insect might eat?"
 - "Do they live with other insects or alone?"
 - "How do you think they defend themselves?"
 - "Did a particular type of insect live in a specific place or just anywhere?"
- 2 Once most students have finished, ask for some examples of what students learned about these insects. Once students have shared enough information for a lively discussion, have them continue the discussion at their tables. They can write any additional information they have learned from their fellow student scientists in their notebooks.
- 3 Thank them for being such excellent scientists and collectors and have them bring the 'insects' to you so they can be returned to their natural habitat in Africa.
- 4 After collecting all the 'insects.' explain that even though these were make-believe insects, this kind of research really happens. Ask how they would have to behave differently if these were real insects. Did any of the pasta get broken? Would that kind of treatment hurt or kill real insects? Explain that they will get a chance to find real insects later on in the unit and they will have to be very careful in handling them so no one (insect or human) gets hurt.
- 5 Have students take out the drawing and description they made of a scientist. Have them add any other ideas about what a scientist does after doing the insect collection activity.
- 6 End by telling the students that scientists use models to help them understand the real world. In class today, students experienced a chance to model what entomologists do when collecting insects. Tell them they will get to meet two real entomologists next by watching a film about them.
- 7 If you tabulated data about scientists from the student drawings with the whole class, revisit that data and ask for suggestions of other categories of what scientists do. Ask the class if their scientist fits any of the new categories and add to the class data.





Meet Real Entomologists in the Film, The Love Bugs

Overview

Students get to meet the two scientists featured in the documentary film, The Love Bugs and learn about their lifetime of work together. They review the questions they would ask of an entomologist if they met one, and decide if their questions were answered in the film. Students review their drawing and description of a scientist and compare it to the scientists in the film. A list of probing questions is provided for student reflection on what scientists do. They also reflect on the unique qualities of Lois and Charlie who worked together as husband and wife for over 60 years.

The day before class

If you haven't done so already, it is recommended that you preview the film The Love Bugs prior to using it in your classroom. It is 34 minutes in length. To access the film, <u>click on this link</u> and register to view the film at no charge.

Conduct a trial run for streaming The Love Bugs to your students. Make sure the film can be seen and heard by all students in your class.

Begin!

View the film, The Love Bugs

- 1 Tell students they will get to see a film called The Love Bugs and meet real entomologists who have been working together for over 60 years! Ask students to look in their notebooks and find the questions they wrote if they could ask a real entomologist.
- 2 After most of the class has finished reviewing their questions, have them take turns sharing some of their questions with their group. Give students a few minutes to add any notes to their questions after hearing the perspectives of others. As time permits, allow students to share some of their questions with the class.
- 3 Have students take out their drawing and description of a scientist. Suggest that, as students watch the film, they jot down notes on ways that the two scientists in the film are: similar or the same to the scientist they drew different from the scientist they drew
- 4 Show the film The Love Bugs. It is 34 minutes in length. To access the film, <u>click on this link</u> and register to view the film at no charge.
- 5 You may want to pause the film to let students add ideas about what scientists do and compare/contrast to what they originally wrote on their drawings of a scientist.

Time frame: One class period (60 minutes)

Objectives

- To see real scientists in action, specifically entomologists, as shown in the documentary film, The Love Bugs
- To compare and contrast the real scientists they see in the film with the scientist they drew and described in Lesson 1
- To reflect on the concept of legacy in terms of what Charlie and Lois are leaving for future generations, and what types of legacies students see in their families.

Materials

For the class:

☐ 1 link to the documentary The Love Bugs. To access the film, click on this link and register to view the film at no charge.

For each student:

- ☐ Science notebook
- ☐ The drawing and description they made of a scientist from Lesson 1

Lesson 2 – Meet Real Entomologists in the Film, The Love Bugs

Debrief the film

- 1 At the conclusion of the film, have students take time to write their impressions of the two entomologists and anything they learned or observed in the film.
- 2 Ask students if they know what the term **legacy** means. Ask for a few ideas. Provide them with a more comprehensive definition they can write in their notebooks:

A legacy is the story of some ones life, the things they did, goals they accomplished, and more. Legacy is something that a person leaves behind to be remembered by.

Ask them to consider what Lois and Charlie's legacy might be. What are they leaving behind? Who is it for? How will they be remembered? Have them write their thoughts in their notebooks.

After students are finished writing, hold a short discussion on the meaning of a legacy, and specifically on the legacy that Lois and Charlie are leaving for future generations.

For homework, you could have students reflect on any legacies that family members or friends are leaving or have left behind. They can put this in their notebooks to share in class when time permits.

In their notebooks, have students answer the following questions:

- ☼ Did the film answer any of the questions you would ask of an entomologist? If yes, which ones were answered? If no, which ones would you still like to know? Do you have any additional questions you would ask of an entomologist if you could meet one?
- List the ways your scientist was the same or similar to what Charlie and Lois did in their work.
- List the ways your scientist was different from what Charlie and Lois did in their work.
- ♠ Do you think it was easy or difficult for Lois to be a woman scientist at the beginning of her career? Did her role change over time? How many women scientists as compared to men scientists were drawn by the students in your class? Explain why you think the numbers of men and women are different, or are they the same?
- Did Charlie ever retire from his work? Why did he keep on working even when he had

- physical problems that kept him from doing all he wanted to do?
- Why do you think the filmmakers called the film The Love Bugs – The Love of Nature and The Nature of Love?
- ★ In your drawing, is your scientist working alone or in a group? How do you think it would be to work with your spouse for over 55 years? Do you think Charlie and Lois are typical or unusual in their relationship with each other?
- How old are Lois and Charlie in the film? (91 and 85 respectively) How old is the scientist you drew? If they are younger, do you think they will still be working as a scientist when they are Lois' or Charlie's age?
- ♦ What would it be like to move at their age? Why did they have to move? Do you know anyone who had to move their home when they were in their 80's or older? What was that like for them?









Lesson 3
Pathway #1

How Do Scientists Classify Animals?

Overview

Students create a classification system for a class set of plastic animals or photos of animals. As they build the classification system, they see the need to revise and refine their definitions to fit this specific collection of animals. They learn that scientists constantly revise and refine the categories they use to classify animals. A real-life example is used of red pandas and giant pandas that are now classified into two different families and not related to each other. This sets the stage for students to create a classification system in Lesson 5 for actual animals they will collect in the schoolyard.

The week before class

- 1 Gather about 40 different small plastic animals. They should be found in different habitats including aquatic and terrestrial locations. Some should have no legs, like snakes and fish. These animals can be found in many toy stores or brought in by the students. Another option is to gather pictures of animals that are about 3x3" in size so they can be easily seen by the class, but not so small that they are hard to see from about 10 feet away.
- 2 Decide where you will have the students gather for the classification activity. You need a space large enough for the entire class to stand in a circle with open space in the middle.

Time frame: One class period (45-60 minutes)

Objectives

- To understand the need to classify organisms by observable characteristics and through DNA testing
- To create a classification system
 to identify a collection of animals
 and revise the system as new
 observations and ideas are
 uncovered
- To reflect on new ways that scientists behave to add to the scientist they drew and described in Lesson 1

Materials

For the teacher:

□ 40 assorted small plastic animals
□ 20 8.5x11" pieces of paper
□ 1 pad of Post-it notes (3x3 or 4x6)
□ 1 marking pen to write labels on the Post-it notes
□ Image examples of a red panda and a giant panda to show the class

Optional

☐ A field guide to insects or other types of animals to use as an example of a way to classify animals

For each student:

- ☐ Science notebook
- ☐ The drawing and description they made of a scientist from Lesson 1

Begin!

The need to classify animals

- 1 Ask students what types of insects were studied by Charlie and Lois in the film. If they don't remember, tell them that Charlie studied weevils and Lois studied leafhoppers. Ask if they had ever heard of weevils or leafhoppers before.
- 2 Have students use their notebooks to describe the difference between a weevil and a leafhopper. They may not remember many specifics and that is fine.
- 3 Ask students if they should find an insect in the wild, how would they know what to call it? Take a few answers. Many might say, "Look it up in a book." Ask where they would start to find the insect in a book.
- 4 Have students write in their notebooks how they would organize a book on insects so that they would be easy to look up and identify. Allow them to think about this for a bit and talk with their table mates. They can work as individuals or with others at their table.
- 5 After a few minutes, ask for any suggestions as to how they would organize a book on how to identify insects. Many will not have any solid

- ideas but that is to be expected. This is an activity to get them thinking. If you brought in a field guide, you may show it to them as an example.
- 6 Explain that scientists need a way to identify animals so they are easier to study. Since there are millions of organisms on the Earth, it's much easier to group them together by certain characteristics for better research methods. In the film, Charlie mentioned that only 5% of insects are really known to us.
- 7 Tell students that they will try to classify a group of animals in ways that make sense to them. Ask them to help you brainstorm a list of characteristics or observable qualities that could help identify animals. Record them so all can see. Some of these characteristics could include:
 - Where they live (habitat)
 - What they eat
 - How they reproduce
 - How many legs they have (insects by definition have 6 legs; spiders have 8)
 - Other physical characteristics (e.g., bones, fur, scales, fins, protective coverings, # of

Creating a classification system

- 1 For the demonstration, bring your sample animal, the pieces of paper, the Post-it notes, and the marking pen to an open area where all students can stand in a circle.
- 2 Ask students to stand and form a circle in the open area you have designated. Hand out one animal to each student. After they have had a chance to look over their animal and think of characteristics that could be used to classify it, let them share any observations they have.
- 3 Place one piece of paper on the floor in the center of the circle. Demonstrate the process by showing your animal to the class. Suggest a characteristic that could be used to classify your animal such as where it lives. For example, if you had a fish, you could write "lives in the ocean" on a Post-it note and stick that on the paper along with your fish. Ask if anyone else has an animal that lives in the ocean

Lesson 3 – How Do Scientists Classify Animals?

and have them place their animal on the "lives in the ocean" paper. It's not necessary to have all the animals that live in the ocean end up on that piece of paper. Some students like to wait for a characteristic they have chosen before putting their animal on a different piece of paper.

- 4 Put down another piece of paper. Ask for a volunteer to place their animal on the page and give a name for how to classify that animal. Write their classification idea on a Post-it and stick it on the page. Invite students with animals that fit that classification to be placed on the page.
- 5 Have students count the number of animals on each of the two pages. Have them predict how many pages will be needed to classify all the animals in the class. Accept all answers.
- 6 Have another student suggest a different category and place their animal on that page. Write the name of the category on a Post-it. Ask other students to place their animals that fit that category on the page. Count how many animals are on each of the three pages. Have them revise their predictions of how many pages it will take to classify all of the animals in the class.
- 7 Continue in this manner until all the animals have been classified. Allow for reorganization of the classification categories as students come up with different ideas of how to classify the class set of animals. Complement them on acting like good scientists who create new categories as they learn more about the animals they are studying.
- 8 Ask if this classification system the class has created helps identify animals. Ask for suggestions as to how they could make it more effective.
- 9 Ask if their predictions of how many pages it would take to classify all the class animals came close to the actual number of pages.
- 10 Ask students to collect their toy animal or picture and give them to a designated student or students, then return to their seats. Have the designated student(s) bring the animals to your collection spot.
- 11 Collect the pages with the Post-it note categories for use in the debrief.



As you move through this activity, students may notice that some animals belong in more than one category. For example, a whale and a fish could both be on the "lives in the ocean" page. They might say that a whale is a mammal while a fish is not. Point out that this is exactly what scientists do when they see that some animals can exist in more than one category.

They can create a new category to help organize those animals. You can ask students for suggestions for new categories. If students need ideas, you could suggest that there be a page that says "mammals" and one that says "fish," or separate the "lives in the ocean" page into two pages that say "mammals - lives in the ocean" and "fish - lives in the ocean." Use this technique to have students define and refine the pages as they search for a more effective classification system. They may move their animals from one page to the next as they decide a better criteria to classify their animal. There is no right or wrong classification system in this activity. The main point is for students to be able to make accurate observations and create a system that makes sense to them. They may not all be able to agree, but do your best to accommodate all suggestions for classifications.

Debrief

- 1 Post the categories that the students created to sort their animals. Have students write the categories in their notebooks.
- 2 After they have recorded the categories, ask them to evaluate the classification system they created as a group. Have them record their ideas in their notebooks. Ask them to make suggestions to revise the classification system the class created to be more effective in identifying animals. They may discuss this with elbow partners or others at their table.
- 3 When most have finished, have students suggest ways to revise the classification system you posted. Remind them that this is a process that scientists go through all the time in order to be more accurate in their classification of animals. Save this classification system for use in Lesson 5.
- 4 Provide an example of how this happened in real life. Show the photos you found of a red panda and a giant panda. Ask for any observations of these two animals. Are they alike or different? How?
- 5 Have students take out the scientists they drew and described in Lesson 1. Have them add any more ideas they have about what scientists do. After a few minutes, ask for any volunteers to share what they have added.





From the start, red pandas and giant pandas were often classified together -- and additionally, there was a lot of debate over which family they belonged in. Bears? Raccoons? Neither? They had characteristics of both bears AND raccoons, and they were argued over -- and reclassified over and over again -- for decades.

Eventually DNA sequencing settled the question: giant pandas are true bears (Ursidae), red pandas are in their own family (Ailuridae) but most closely related to raccoons, and much to everyone's surprise, they aren't particularly closely related to each other even though they look very similar. This is even more interesting when you learn they share the same habitat and both eat bamboo. It took looking at their DNA to find the important difference.

Time frame: One class period (60 minutes)

Objectives

- To use the schoolyard or nearby location to observe insects in their natural habitat
- To experience how an entomologist collects insects and other small invertebrates for observation, being careful not to injure them
- To make drawings of the insects and other small invertebrates rather than collecting them to keep as specimens

Materials

For the teacher: Extra Animal ID Card sheets Ziplock bags Paper
For each pair of students:
1 gallon-sized zip lock bag, clear
☐ 1 piece of white paper
2 copies of the Animal ID Card
sheet found at the end of this
lesson
2 pencils
☐ 1 magnifying lens, if possible
2 clipboards or other solid surface
for writing/drawing on the Animal
☐ ID Cards
For each student:
☐ Science notebook
☐ Drawing and description they

made of a scientist from Lesson 1

Lesson 4 Discovering Animals Pathway #1 in the Schoolyard

Overview

This exciting activity involves pairs of students using a zip lock bag to sample and study more closely a variety of small schoolyard animals such as insects and small invertebrates that live on trees, bushes, and grasses. One student holds the bag under a branch or tuft of grass while the other shakes the vegetation. As animals fall into the bag, students place white paper beneath it to reveal what fell from the plants. The animals are temporarily trapped so they can be easily observed.

Students will be amazed by how many different creatures slide into the bag. A typical catch includes varieties of leafhoppers, moths, midge flies, caterpillars, spiders, and beetles. The student observe and describe the small animals on Animal ID cards. They record as much about their habitat as possible, then release their animals back to their home plant.

The week before class

1 Choose an area or areas in or near your schoolyard with some diversity of vegetation, particularly bushes and grasses. This may be the same or a different area than the one you used for the insect search in Lesson 1. That might mean including areas off the playground where students can be easily supervised. Often times, the school landscaping can be excellent sources of insects and small invertebrates.

Take a tour of the area so you are aware of any potential hazards, such as wasp's nests, black widow spiders, poison oak or ivy, nettles, or ticks.

Try to build flexibility into your schedule in case of inclement weather. Take recess, lunch, and P.E. schedules into account. If other students will be in the study area along with your student scientists, you might ask the other teachers to advise their students about what your class is doing.

The day before class

- 1 Make copies of the Animal ID Cards, at least one page per student, with some extras for students who find more than 8 animals in their search.
- 2 Collect one clipboard per student or make an inexpensive clipboard from an 8.5"x11" piece of cardboard with two binder clips at the top to attach the Animal ID Cards sheet.
- 3 Obtain enough zip lock bags for each pair of students to have one, plus a few spares.
- 4 Gather the rest of the materials: blank white paper (the backside of used paper is fine as long as it is blank on one side), pencils if necessary, and hand lenses if you have them.

Begin!

Acting like entomologists - this time for real!

- 1 Tell students that they are now ready to act like real entomologists and learn about the insects and invertebrates (we'll call them all "animals") that are found in their schoolyard, or in the nearby study area you have chosen. Explain that they will again be acting as scientists, looking for any small animals in the schoolyard. This time, they will be searching for real animals, not model animals, like they did in Lesson 1.
- 2 Ask students what kinds of animals they have seen in the schoolyard. List these on the board or project them where all can see. Save this list for Lesson 5.
- 3 Explain where the study area is (you can show them the specific boundaries when you take them outside). As in Lesson 1, they are going to be looking for animals in their schoolyard or in the study area. The difference this time is that they won't be collecting the animals since these animals belong here. They will be carefully observing the animals and drawing what they look like. Stress that the life and safety of each animal are to be respected and is in the care of each "scientist."
- 4 Let students know that if they want to, they can carefully turn over rocks and leaves to find animals. To find animals in trees, bushes, or grass, they will use a Shake Bag, which you will show them how to use outside.
- 5 Divide the students into pairs. Distribute the Animal ID Cards and clipboards. Make sure each child has a pencil for recording and drawing.
- 6 If you have hand lenses, provide a short demonstration of how to use them. Show the students that they don't put the lens against their eye like pictures they have seen of 'private eyes.' They will get their faces close, but not too close, to the object they want to investigate and move the magnifying lens up and down until the object comes into focus. Warn students that they are not to use the lens to magnify the sun as they could kill the animal they are looking at or burn themselves. Tell them that anyone not using their magnifying lens in a scientific way will have it taken away. You can use other consequences for this behavior as you see fit.
- 7 Take the class outdoors to the study area.

Lesson 4 – Discovering Animals in the Schoolyard



8 Ask the class if they remember in the film when Lois was shaking some branches and collecting the insects that fell into her net. Tell them they are going to collect insects and other small animals in a similar way. Gather the class around a bush or clump of vegetation in the study area. Show how to shake vegetation over the sheet of paper, being sure to shake carefully so as not to damage the plant.

Hold the paper under the branch with one hand and give a few vigorous shakes with the other hand. Now show them how to insert a few inches of paper into the open bag so the animals can slide into the bag for observation. Explain that with pairs of students, one will hold the paper and the bag while the other shakes the plant.

As small animals fall onto the paper, tip it so they slide into the bag. Once they have captured a few animals, they can close the bag to keep them from escaping. Students can hold the bag up to the light to see the animals or gently lay the bag on the paper on the ground and view them that way.

Once they have drawn and recorded information about the animals, they should put them back in the exact place they found them. Warn students not to view the animals in direct sunlight as the heat may kill them. They may use their bodies as shade if there is none available.

- 9 Stress the importance of recording observations. When they find an animal, they should fill out an Animal ID Card with a good drawing of the animal plus any other observations they make. They should note where each animal was found. If they notice any behaviors, they should write that down too.
- 10 Explain the boundaries of the study area. Let the children know they are not to go outside the study area. Make sure all are clear on the boundaries.
- 11 Distribute the Shake Bags and paper and have the pairs of students begin. Circulate among the pairs, noting their discoveries and encouraging them to share the tasks of collecting and recording. Encourage pairs to show each other what they found. This can often be quite exciting and students are likely to observe differences in the kind of animals found on different kinds of plants. It can also be quite noisy, so you may want to warn your colleagues!

12 Give students a 5-minute warning before returning to the classroom. Remind them to release their animals to the exact place where they were collected.

Debrief in the classroom:

- 1 Give students a few minutes to put the finishing touches on their Animal ID Cards.
- 2 In their science notebooks, ask for students to write what they thought about collecting and observing animals in the study area. Have them include how they acted like the entomologists they saw in The Love Bugs and how they behaved differently. After a few minutes, ask for volunteers to share their thoughts.
- 3 Have each pair of students cut up their Animal ID Cards into individual cards. Have them paper clip their Animal ID Cards together. Have them put their cards in a safe place to save for the next lesson.
- 4 Have students take out the scientists they drew and described in Lesson 1. Have them add any more ideas they have about what scientists do. After a few minutes, ask for any volunteers to share what they have added.



Lesson 5 Pathway #1

Sorting and Classifying Animals

Time frame: One class period (60 minutes) Objectives

- To reflect on their experience as a field scientist in the study area
- To be introduced to the concept of animal communities and notice some of the communities living in the study area
- To create two classification systems for the animals they found in the study area. The first one is open-ended and the second one is a dichotomous key where they try to identify each animal

Materials

For the teacher:

- the classification system created by the class in Lesson 3
- the list of animals that were predicted to be found in the study area from Lesson 4

For groups of four:

 scrap paper or Post-it notes for creating labels for their dichotomous keys

For student pairs:

the Animal ID Cards they completed from Lesson 4

For each student:

science notebook

Overview

Back in the classroom, students share their findings from the study area. Students then develop their own systems for sorting and classifying the Animal ID Cards. Students reflect on how this investigation is similar to what they observed Charlie and Lois doing in the film. Finally, they reflect on how they acted like scientists during this unit and revise their ideas about what scientists look like and what they do.

Begin!

What was it like to act like entomologists?

- 1 Ask students to take out their Animal ID Cards from Lesson 4. Have each pair of students work with another pair of students to make a team of 4. Give the students a few minutes to review the animals they observed.
- 2 Hold a class discussion of their findings, using the following kinds of questions:

"What surprised you?"

"Which animal did you find the most of?"

"What were the largest animals collected?

Smallest?" (When a student describes a particular animal, ask everyone who found that kind of animal to raise their hand.)

"Which kind of plant seemed to have the most different kinds of animals? Which kind of plant seemed to have the least kinds of animals?

Why do you think there was a difference?"

- 3 Ask for additions to the class list of animals that you made in Lesson 4 and record them for all to see. Ask if there are any conclusions they can make about the animals in the study area.
- 4 Introduce the concept of **animal communities**. Tell students that an animal community is similar to a human community. An animal community is made up of a variety of different animals that live in the same area and depend on each other for food and other things. Ask students to name several different animals that they found on one plant.

Point out that the plant and its animals make up a small community. Some of the animals depend on the plant for food and/or shelter. The plant also provides shelter for animals that feed on the "plant-eaters".

5 Invite students to suggest another example of a small community in the schoolyard. Encourage them to be on the lookout for other schoolyard communities of plants and animals.

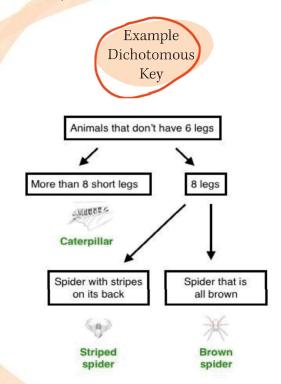
Creating our own animal classification system

1 Announce that students will work in teams to sort their cards in different ways. Each time they do a sort, they must agree as a group on the characteristic used to separate the cards into groups.

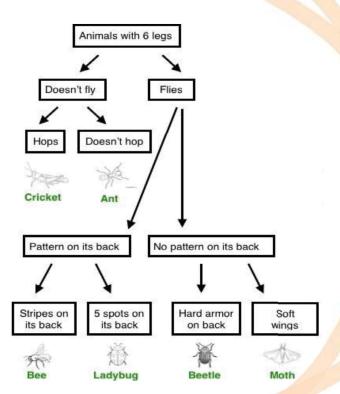
Give students an example such as: "If I wanted to sort all of you into two different groups, I might have everyone wearing green move to that corner, and those not wearing green to this corner."

- 2 Ask for examples of ways to group animals. (Spiders/not spiders; brown animals/black animals; live in grasses/live in trees, etc.).
- 3 Ask students to begin sorting their cards. Circulate among the groups. Encourage students to agree as a group on one way the animals on the cards can be separated into piles. There is no correct number of piles, as long as their system makes sense to everyone in the group. Say that they need to agree on a reason for their groupings. Encourage groups who have sorted their cards one way to mix up their cards and sort them into groups in a different way.

- 4 When all of the student groups have finished at least one sort, gain the attention of the class and ask for volunteers to describe a way they sorted their animal cards. Tell the class that scientists work the same way they just did, to put animals into groups, to sort and classify by different characteristics in order to learn more about animals and their relationship to the environment (for example, green insects hiding on a green plant).
- 5 Have students record their classification system in their science notebooks.
- 6 Tell students they will now try to create a dichotomous key with their Animal ID Cards. Dichotomous comes from the Greek word meaning "two parts." Explain that scientists use this type of key to identify specific animals by going through a series of steps that continuously put the organisms in one or the other category until all animals are identified.



7



21

- 7 Working in their groups of 4, challenge students to sort all of their animals into a dichotomous key until each animal is identified. They can use scrap paper or Post-it notes to write the categories in their key like they saw in your example. It's fine if they don't know the actual name of the animal, but they can try to identify their animals by looking them up online or in any resources they have available.
- 8 As groups finish, have them put their keys in their science notebooks.
- 9 Once all groups are finished, have them display their Animal ID Cards in their dichotomous key along with the corresponding category labels. Allow students to take a tour and see how other groups created a key for the animals they found.
- 10 When most students are finished, ask students to return to their tables. Have them share any insights they had when they saw other keys.

Reflecting on ways we acted like scientists and entomologists

- 1 Have students take out the scientists they drew and described in Lesson 1. Have them add any more ideas they have about what scientists do.
- 2 Have students reflect on how they acted like Lois and Charlie, the entomologists they saw in the film, and put their answers in their science notebooks.
- 3 Have students go back to their notebooks and find the questions they would ask an entomologist if they met one. Ask them to identify any of those questions they have been able to answer now. They can write their answers in their notebooks. Have them add any more questions they would now want to ask an entomologist. For homework, have students see if they can answer these additional questions and share them with the class.

- 4 After students are finished writing, ask for any volunteers to share what they have added. Allow for a lively discussion as time permits. Congratulate them on being excellent scientists and entomologists!
- 5 Ask students if any of them are now considering a career in science. For those who raise their hands, ask how many of them might want to study science in the out of doors. Remind students that scientists work in a variety of places some indoors, some outdoors, and some in both places. Charlie and Lois worked both indoors and outdoors to conduct and record their research.
- 6 Have students think for a minute about their ideas of what scientists and entomologists do, and how the film affected them. They can have a discussion with their elbow partner first, then talk with their tablemates. Once the discussion has started to wane, ask for volunteers to share anything that came up at their tables.

Extend the unit

could be divided into "flying insects" & "crawling

- Use the Animal ID Cards to make a bulletin insects' board or large book and create a "Field Guide to Our Schoolyard." Group animals according to major categories like "insects" and "arachnids" 6 legs and 3 main body parts
 - 8 legs and 2 main body parts
- 2 Take a field trip to a local museum that houses insect collections or displays insect exhibits. They may have collections that are not currently on display but would be willing to share them with your students. Some museums have traveling exhibits designed for classroom use that can be borrowed or rented.
- 3 If you have connected with a real entomologist, invite them to visit your classroom or have them speak to your students via video chat. Have students use the questions they wrote in Lessons 1 and 2.



Pathway #2: The Nature of Love

What Qualities Do You Want in a Best Friend? ... in a Project Partner?

Overview

In this first lesson, before being introduced to the scientists featured in the Emmy-winning documentary film The Love Bugs, students are asked to consider one of the two strands in the film – The Nature of Love.

Over the course of 60 years, Lois and Charlie O'Brien, two of the foremost entomologists and pioneers in their field, traveled to 70 countries, all 7 continents, and quietly amassed the world's largest private collection of insects. Students watch the film, focusing on the Lois & Charlie's relationship, their interactions, and the unique aspects of their collaboration both in their personal lives and work.

The week before class:

If you haven't done so already, it is recommended that you preview the film The Love Bugs prior to using it in your classroom. It is 34 minutes in length. To access the film, click on this link and register to view the film at no charge.

Conduct a trial run for streaming The Love Bugs to your students. Make sure the film can be seen and heard by all students in your class.

Decide how you will collect the student responses to the following questions:

- "What are the qualities you want in a best
- friend?" "What are the qualities you want in a project partner?"

In order to compile a class set of responses, you will need to have them answer these questions a few days before you begin the unit.

Here is an example of the responses from one 5th grade class.

Qu	alities in a best frie	nd:	Qualities in a project partner:	
	Nice/Kind/Caring	16	Nice/Kind/Caring	16
	Funny	14	Hardworking	11
	Trustworth/Loyal	14	Positive Attitude	11
	Fun	7	Honest	6
	Honest	4	Collaborative	4
	Understanding	3	Helpful	3
G	ets along with/likes	9	Team Player	3
	my other friends	2	Reliable	2
	Outgoing	2	Fair	2
	Supporting	2	Creative	
	Helpful			
	Respectful			



Time frame: 50 minutes

Part 1 - 20 minutes Part 2 - 30 minutes

Objectives

- To set the stage for viewing The Love Bugs and observing the characteristics of the couple featured in the film who lived and worked together for over 55 years.
- To ask students to reflect on and then list the qualities they want in a best friend followed by those they would want in a project partner
- To compare individual student responses to those of the entire class

Materials

For the class - Part 2:

- Copies of the class list of answers to two questions in paper or electronic form:
 - "What are the qualities you want in a best friend?" "
 - "What are the qualities you want in a project partner?"

For each student - Part 1 & 2:

Paper or electronic device for recording and viewing their answers to the two questions posed above

Lesson 1 – What Qualities Do You Want in a Best Friend? ... in a Project Partner?

The day before class:

Decide how you will share the student responses to the questions – printed pages or projected on a screen. If they are on printed pages, put the answers to each question on one side of the paper so students can focus on one question at a time. If using an electronic device, set it up to display one set of answers at a time.

Begin!

Part 1

What qualities do I want in a best friend? ... in a project partner?

- 1 Ask students to think about a person who they might call their best friend. Have them consider the qualities in that person that they like and appreciate. Let them think a minute and then explain what you mean by 'qualities' that you are looking for words that describe how that person behaves, what they do that you like, and how they treat you or others. Ask for a few examples of qualities that someone might want in a best friend and write them where all can see.
- 2 Have students answer the question, "What qualities do you want in a best friend?" Have them write these qualities on a sheet of paper or on an electronic device. Let them know that they don't have to be complete sentences or be in any order of preference.
- 3 Ask them the second question, "What qualities to you want in a project partner?" Tell them that a project partner is friend who helps you with a project, task, or any job you're working on. They help you complete various assignments by working together. Have the students think what qualities they want in someone that they would work together with. Let them think independently for a minute, and then explain
- 4 that these 'qualities' would be words that describe how they act when working together.

Once students have finished their responses, tell students that you will make an anonymous class list of all their responses. Collect their papers or have students upload their responses to your online location.

Part 2 Comparing our answers to the questions:

- 1 Have students take out their answers to the questions you posed on qualities of best friends and project partners. Have them review their answers and add any they may have thought of since they first wrote their answers.
- 2 Share the class answers to the first question, "What qualities do you want in a best friend?" Allow students to talk at their tables and compare their answers to the class list. Suggest that students can add more qualities to their own lists if they want.
- 3 When the discussion begins to wane, ask if anyone wants to share any thoughts or ask any questions. Take as many comments and questions as time permits.
- 4 Share the class answers to the second question, "What qualities do you want in a project partner?" Allow students to talk at their tables and compare their answers to the class list. Suggest that students can add more qualities to their own lists.
- 5 Allow for additional discussion at their tables, then take comments and questions as time permits.
- 6 Ask students if they notice any similarities between the top answers to each question. Give them a few moments to read over both sets of class responses before taking any observations. In the example above, and most likely in their answers, the top listed qualities in both are often the same or very similar.
- 7 Allow as much time for discussion as you can. When the discussion slows down, have students write any more qualities they want to their answers to both questions.
- 8 Have students save their answers to use after they watch The Love Bugs.

Lesson 2 Pathway #2

Observing a Lifelong Friendship and Partnership

Overview

Students get to meet the two scientists featured in the documentary film, The Love Bugs and learn about their lifetime of work together. As they watch the film, they make notes on the qualities they see in Lois and Charlie's relationship that are similar to the qualities they have listed in a best friend and a project partner, and what qualities are different. In a debrief of the film, students look deeply at what makes a long lasting friendship.

The day before class:

- 1 If you haven't done so already, it is recommended that you preview the film The Love Bugs prior to using it in your classroom. It is 34 minutes in length. To access the film, click on this link and register to view the film at no charge.
- 2 Conduct a trial run for streaming The Love Bugs to your students. Make sure the video can be seen and heard by all students in your class.

View the film, The Love Bugs

- 1 Tell students they will get to see a film called The Love Bugs and meet real scientists who have been working together for over 60 years! Ask students to write down what qualities they think they will find in this couple who have lived and worked together for so long. Tell them that while they are viewing the film, they can check off the qualities they see in their own lists, and add qualities they didn't think of before.
- 2 Show the film The Love Bugs. It is 34 minutes in length. To access the film, click on this link and register to view the film at no charge.
- 3 You may want to pause the film to let students add ideas about qualities they see in Lois and Charlie that show they are best friends and good project partners.

Time frame: One - two class periods (60-90 minutes)

Objectives

- To meet Lois and Charlie
 O'Brien, a team of scientists who
 have lived and worked together
 for over 55 years, in the Emmywinning documentary film, The
 Love Bugs
- To look deeply at the ways that Lois and Charlie interact with each other, and what makes them good friends and project partners
- To compare and contrast the qualities students want in a best friend and project partner to the qualities they observe in Lois and Charlie

Materials

For the class:

- ☐ 1 link to the documentary The Love Bugs. To access the film, click on this link and register to view the film at no charge.
- ☐ Notebook or electronic device with their answers to the two questions from Lesson 1

For each student:

☐ Notebook or electronic device with their answers to the two questions from Lesson 1



Debrief the film

- 1 At the conclusion of the film, have students take time to write their impressions of the relationship between Lois and Charlie, and anything they learned or observed in the film.
- 2 In their notebooks, have students answer the following questions:
 - What did qualities did you observe in Lois that shows she is Charlie's best friend? What qualities did you observe in Charlie that shows he is Lois' best friend?
 - Note the qualities that you want in a best friend that are the same as what you saw Lois and Charlie show in the film. Did the film help you add some qualities to your list? Note the qualities you want in a best friend that are different from what you saw Lois and Charlie show in the film.
 - What did qualities did you observe in Lois that shows she was a good choice for Charlie's project partner? What qualities did you observe in Charlie that shows he was a good choice for Lois' project partner?
 - Note the qualities that you want in a project partner that are the same as what you saw Lois and Charlie show in the film. Did the film help you add some qualities to your list? Note the qualities you want in a project partner that are different from what you saw Lois and Charlie show in the film.
 - How did Lois and Charlie meet? Do you know anyone who met in the same way? If yes, how did that work out?
 - Did Lois and Charlie's relationship change over time? Explain your reasoning for your answer.
 - What did you like about the ways that Lois and Charlie treated each other? Was there anything about they way they treated each other that you didn't like?
 - What challenges did Lois and Charlie face as they grew older together? Do you have any advice for what they could do differently or add to what they have already done
- 3 Feel free to add questions of your own, or encourage students to create and answer questions of their own. If students are taking a long time to answer the questions, you may want to have them complete these questions for homework.

Lesson 2 – Observing a Lifelong Friendship and Project Partnership Pathway #2

Sharing and comparing our ideas on friendship and project partners

Tell students they will have a chance to share their answers to the questions posed above with others at their tables. They don't have to share anything they don't want to. It is important to let them know that any personal information should not be shared in order to protect people's privacy. Instead of saying, "My mother had this happen ...," students should say, "Someone I know had this happen"

- 2 Once you have set the ground rules for privacy, have students take turns sharing their answers to the questions posed above with their tables or with an elbow partner. Tell them they can add more qualities to their best friend or project partner list as they hear what others have to say.
- 3 After most students have finished their discussions, ask the class for volunteers to share any insights they gained from their lists ... from the film ... from their discussion with their tablemates. Remind students to say, "Someone I know ..." where appropriate.
- 4 End the discussion by asking students to answer these final questions:
 - List the three most important things you learned from this unit.
 - Did anything surprise you?
 - What will I remember in 10 years about this unit and the film?
- 5 Have volunteers share any of their insights before you end the unit and collect their notebooks. Thank your students for being very insightful and thoughtful about their ideas on friendship and partnerships.







Thank you!

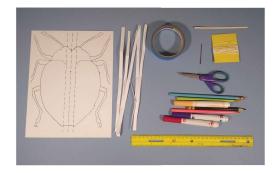


Animal ID Card Animal ID Card Name: Name: **Kind of Animal: Kind of Animal:** Describe it: **Describe it: Draw it:** Draw it: Number of animals of this type: Number of animals of this type: Animal ID Card Animal ID Card Name: Name: **Kind of Animal: Kind of Animal:** Describe it: **Describe it:** Draw it: Draw it:

Number of animals of this type:

Number of animals of this type:

Bug Kite Instructions





Materials Bug sail 8.5 x 11 print out

String: wind 15'-20' light weight cotton upholstery thread on a cardboard about $2" \times 4"$ (experiment with different types of string, light weight is best!)

Tape

Kite tail: 6 strips 1/4" x 11" joined together to make 2 tails appox. 32" long (add more if it is a gusty day)

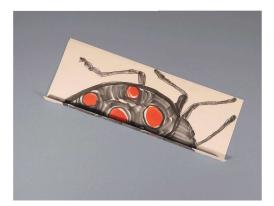
Coffee stir stick

Markers or color pencils for decorating kite

Ruler (optional)



Print out and decorate kite.



Fold kite on dotted lines, then unfold it.



Cut the outline of the kite.



Use the sewing needle to poke a hole at \boldsymbol{x} and thread string through hole.



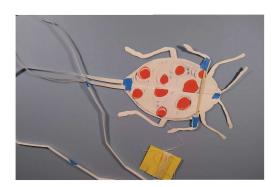
Step 5Flip kite over and securely tape string to back side of kite.



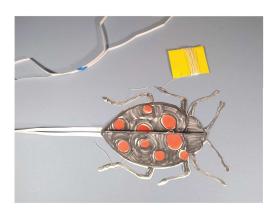
Step 6Flip kite over to front and refold to form a keel down the center of kite as shown.



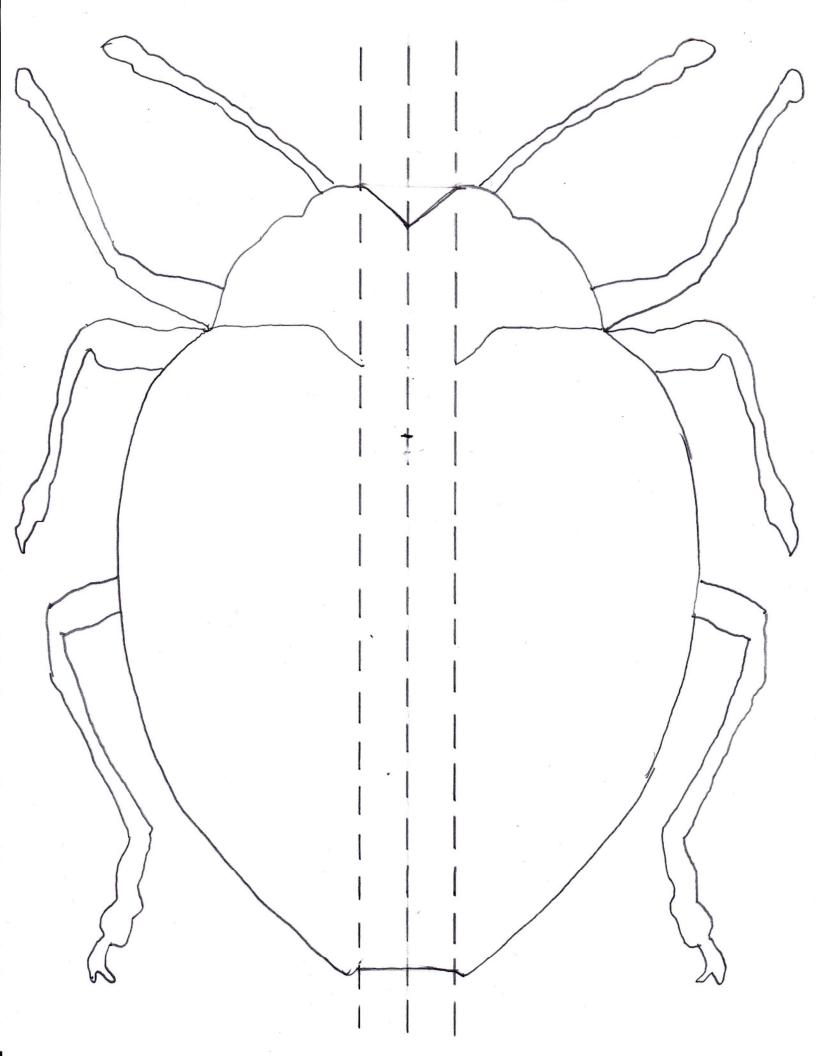
Step 7Flip kite over, place a mark 1 3/4" from top of kite and tape stir stick at mark perpendicular to foldline.
Tape top and bottom of kite.



Step 8 Tape tails to the bottom of kite.



Congratulations your kite is now complete and ready to fly!





Join Instagram Love Bugs Museum A LoveBug Activity

SHOW US YOUR LOVEBUGS Join the start of a virtual insect museum.

Calling all aspiring entomologists, it's time to #showusyourlovebugs!

Dream up a bug and scribble it anywhere. Give it a name and a word or two about what makes your insect unique and tag our account so we can repost it!

Find us on Instagram at: https://www.instagram.com/thelovebugsfilm



Student Feedback Form

We would love to know what you think! Help us make these activities even better and get a **free sticker**! Just fill out this feedback form. Thank you very much!!

Celebrating the Love of Nature ... and the Nature of Love!

Strand 1: The Love of Nature

1. What did you think of the film, <i>The Love Bugs</i> ?				
2. Write three sentences to describe what you think of Charlie and Lois, the scientists in the film?				

3. What did you learn about what a scientist looks like and what scientists do from the film and from your classmates?
4. What did you think about the following activities? Please explain your thinking.
Gathering model insects in the study area –
Classifying animals on the paper sheets –
Gathering real animals in the study area –

Sorting and classifying real animals from your study area –			
5. What could we do to make those activities more interesting and fun? Please tell us why you think so.			
Strand 2: The Nature of Love			
1. What did you think of the film, The Love Bugs? (don't answer this if already did)			
2. Write three sentences to describe what you think of Charlie and Lois, the scientists in the film? (don't answer this if already did)			

3. What did you learn about what makes a best friend from the film and from your classmates?			
4. What did you learn about what makes a good project partner from the film and from your classmates?			
Your ideas on Strand 1 and Strand 2			
1. Please list the three most important things you learned from the whole lesson:			
2. What surprised you? Why?			

3. What will you remember in 10 years? Why?				
Please list your address so we can send you a Lov	e Bug sticker to tha	ank you for your	comments	s!
First Name	Last Name			
Street Address	Cit	y Sta	te	Zip



Teacher Feedback Form

We would deeply appreciate your feedback on this this curriculum. Your comments and insights will be extremely helpful as we strive to make the curriculum as effective as possible. As a thank you, we would like to offer you a class set of stickers sent either to you in a package, or sent to your students at their homes. We will also send you a final copy of the revised curriculum.

Thank you very much!!

Celebrating the Love of Nature ... and the Nature of Love!

Teacher Feedback Form

General information Name ______ Email _____ Phone Number _____ 1. What is the grade level of your students? _____ How many students in the class? 2. What is the type of class you teach? 3. Number of years you have been teaching _____ 4. What is your comfort level with teaching this type of unit? Strand 1: The Love of Nature

- 1. What were your students' reactions to the film, *The Love Bugs*?
- 2. Did you feel your students connected well with Charlie and Lois in the film? Why or why not?
- 3. What could be included in the preparation information for the teacher or students that would make it more effective?
- 4. What were your impressions of the field activities?

5. Did you make any changes or adaptations to the curriculum that you found effective? If so, could you describe what you did?
Strand 2: The Nature of Love

- 1. What were your students' reactions to the film, *The Love Bugs*? (no need to respond if you answered this already)
- 2. Did you feel your students connected well with Charlie and Lois in the film? Why or why not? (no need to respond if you answered this already)
- 3. Describe your students' involvement and overall takeaways from the activities involving the qualities in a friend and a project partner. Are there questions we could add to make it more effective? Delete? Adapt?
- 4. Did you make any changes or adaptations to the curriculum that you found effective? If so, could you describe what you did?

Overall thoughts on the entire Curriculum

- 1. What is your overall impression of *The Love Bugs* curriculum? Do you have any additional suggestions for ways to improve it or make it more relevant to your class and your curriculum?
- 2. Would you like any additional background information or resources added for teachers?
- 3. Please list any additional comments, suggestions, and ideas you may want to share.

Check one:						
☐ I would like a class set of stickers. I have students in my class. Send the stickers to:						
Name						
Street Address	City	State	Zip			
☐ Please send the stickers to individual student feedback forms)	s. (students will p	ut their addresse	s on thei			

Thank you again for your wonderful feedback! We deeply appreciate it!