The Bio/Diversity Project

Lesson Title: Insects of the Sonoran Desert

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Grade Level: *7th*

Time: *30 minutes*

*Adapted from:* [*https://www.desertmuseum.org/books/nhsd\_inverts.php*](https://www.desertmuseum.org/books/nhsd_inverts.php)

[*http://tolweb.org/treehouses/?treehouse\_id=4421*](http://tolweb.org/treehouses/?treehouse_id=4421)

[*http://www.arizonensis.org/sonoran/fieldguide/arthropoda/arthropoda.html*](http://www.arizonensis.org/sonoran/fieldguide/arthropoda/arthropoda.html)

[*https://www.calacademy.org/educators/lesson-plans/invent-an-insect*](https://www.calacademy.org/educators/lesson-plans/invent-an-insect)

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| **AZ State Science Standard:** | 8.L4U1.12: Gather and communicate evidence on how the process of natural selection provides an explanation of how new species can evolve. |
| **Learning Objective:** | * Students will be able to communicate adaptations of the insects of the Sonoran Desert
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| **Language Objective:** (Optional) | N/A |
| **Scientist of the Week:** | * Margaret S. Collins, Phd.
* Born in 1922
* Given access to West Virginia State College at age 6 because her father was a professor of agriculture.
* Obtained a bachelors and masters in biology
* Admitted to University of Chicago’s PhD program for Zoology.
* Graduated and became an entomologist.
* Became known as the ‘Termite Lady’
* Active scholar and Civil Rights Activist
* Accomplishments as a scientist include co-identifying a new species of termite, Neotermes luykxi, in 1989 and working for the Smithsonian National Museum of History as a research associate.
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| **Vocabulary** | **Materials** |
| * **Insect:** a small arthropod animal that has six legs and generally one or two pairs of wings
* **Arthropod**: an animal that has no back-bone, but a skeleton on the outside of its body (exoskeleton); part of the large phylum Arthropoda, that includes: insects, spiders, or crustaceans.
 | Slides: <https://biodiversityproject.arizona.edu/sites/default/files/_Insects%20of%20the%20Sonoran%20Desert%20Lesson%204%20%28Mansfeld%29.pptx>Brave Wilderness Coyote Peterson Video: <https://youtu.be/MnExgQ81fhU?t=341> Kahoot Link: <https://create.kahoot.it/v2/details/fdec5db0-a422-4066-9637-aa3bcf7eeeed>  |
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| **Seasonality:** (If more specificity is required, please note date/time range under the season)Highlight which season(s) your lesson would be most suited to. When working with the natural world, it is important to keep this in mind for your planning! Some activities are possible for a brief window of time while others may be appropriate during any time of year. |
| *Monsoons*July-Sept. | *Autumn*Oct.-Nov. | *Winter*Dec.- Feb. | *Spring*Mar.-Apr. | *Dry Summer*May-June |
| **Guiding Questions:** * What are some adaptations of Sonoran Desert Insects?
* How have sonoran desert insects evolved these adaptations?
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| **5E Steps** | **Teacher Strategies**  | **Student Behavior**  |
| **Engagement/Introductory Activity:**This is what you will do to get the students engaged in and excited about the topic of the lesson! It should also provide an opportunity for you to get an idea of what they do (and do not) already know, and the assumptions that they have going into the lesson. | **Slides 4-8*** (**Slide 4**) Introduce students to the scientist of the week, Margaret S. Collins, Phd.
	+ Went to West Virginia State College at age 6.
	+ First African-American Woman to earn a phd as an entomologist! She also studied biology.
	+ Became known as the ‘Termite Lady’
	+ Active scholar and Civil Rights Activist
	+ Explain her relation to the lesson:
		- She was an entomologist (the study of insects) and how we shall learn about adaptations of the insects of the Sonoran Desert
* (**Slide 5**)Define the term arthropod as an animal that has no backbone, but a skeleton on the outside of its body (exoskeleton).
	+ Discuss how insects,spiders, and crustaceans are also part of this group (phylum) of organisms.
* (**Slide 6**) Introduce the term insect as a small arthropod animal that has six legs and generally one or two pairs of wings.
	+ Explain how the ladybug and butterfly on the slide also have six legs and two wigs to get students to understand the definition better.
* Further elaborate on the next slide (**Slide 7**) titled: ‘How to Identify an Insect”
	+ Explain how the anatomy of a wasp (image on slide) features antennae, two wings, six legs, an abdomen, thorax, and its head.
		- Compare the definition of an insect with that of the image of the wasp and the body features we went over before.
* (**Slide 8**) Clarify the definition of an insect by repeating the features and compare them with that of the tarantula hawk and tarantula.
	+ Discuss why a tarantula is not considered an insect by pointing out that they have 8 legs not 6 and do not have antennae. State that they are part of another section of arthropods which are arachnids.
* Play “Stung by a Tarantula Hawk” video linked in the notes section to play the time frame (5:41-7:29).
	+ The video will describe the tarantula hawk in more detail and explain some of its bodily features along with its hunting process.
 | * Students will learn about the scientist of the week Margaret S. Collins, Phd.
	+ They will connect her job, being an entomologist, with today’s lesson.
* Students will learn two vocabulary terms and the implications this has on how they view insects and other arthropods.
* Students will learn the definitions of an arthropod and an insect.
	+ They will be able to distinguish insects from other groups of arthropods by being presented with an image to get a visual of their bodily features/anatomy.
	+ They will learn to further distinguish an insect and an arachnid by watching a video titled, “Stung by a Tarantula Hawk”.
	+ They will be able to discuss how a tarantula hawk (insect) and a tarantula (arachnid) differ in bodily features/anatomy.
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| **Exploratory Activity:**Provide step-by-step instructions on what the teacher and students will do in this activity to gain new skills and/or knowledge. Attach worksheets, PowerPoints, video links, or other material used to this section. | **Slide 9*** “Invent an Insect” Activity
* Will have students provide instructor with step-by-step directions on how to make an insect. The students will ideally have a grasp on what parts are important to create an insect at this point. The instructor will draw on a whiteboard or piece of paper exactly what the students say. They should offer details such as what part, size, shape, and color. Mention that the insect should be specific in it’s adaptations to our environment: the Sonoran Desert.
* At the end, we will discuss our “insect”, give it a name, and move on to local insects. We will come back to our insect later on to see if it still meets the qualifications and has the proper adaptations for our environment.
	+ We will also have them guess what other insect their insect might be related to.
 | * Students will provide the instructor with step-by-step directions on how to create an insect.
* Students will be as descriptive as possible. They will include details such as size, parts, color, and shape. They will take into consideration that their insect should be adapted to our environment.
* Students will discuss whether they think they our insect is fully an insect and they will give it a name.
	+ They can also make a guess as to what their insect might be related to.
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| **Explain:** What questions or prompts will you use to get students to explain their observations or to explain what the outcomes of the activity that they participated in were? This should provide an opportunity for students to communicate their new understandings, as well as to articulate what they still do not understand.  | **Slide 10-15*** Introduce Sonoran Desert Insects and their Adaptations.
	+ (**Slide 10**) Praying Mantis :
		- The praying mantis folds his front legs and His reflexes are lightning quick, enabling him to strike his prey with his front legs
		- They also exhibit camouflage which they use to resemble leaves and avoid being eaten.
		- Their name comes from how they hold their large front legs together in a manner that reminds people of a praying position.
	+ (**Slide 11**) Figeater Beetle:
		- Beetles makeup the largest group of insects on Earth !
		- Primary agents of decomposition.Due to this skill they lay their eggs 6 to 8 inches beneath the surface of the soil in late summer. The eggs hatch in about two weeks and survive by eating organic matter in the soil until winter
		- Loves munching on fruit and cacti in the Sonoran desert.
	+ (**Slide12)** Jessica’s Underwing Moth:
		- They use the brown to blend in with tree bark during the day.
		- If this fails, they flash red to appear like blood and ward off predators such as lizards and birds.
		- They, along with other night flying moths, have pairs of ‘ears’ on their abdomens that are tuned to exactly the sound frequencies emitted by hunting bats.
	+ (**Slide 13**) Honey Pot Ant:
		- Food source: liquid nectar of plants and the juice of other insects
		- Honey pot ants have solved the seasonal problem with specialized members of the colony that store liquid food in their abdomen.
			* When other members of the colony need food, they share their stored reserves.
 | * Students will learn definitions of Sonoran Desert Insects through the following slides.
	+ Praying Mantis
	+ Figeater Beetle
	+ Jessica’s Underwing Moth
	+ Honey Pot Ant
* Students will listen to each described adaptation specific to that Sonoran Desert insect.
* Students will learn and connect each of the Sonoran Desert insects to a specific adaptation.
* Praying Mantis:
	+ Strong back legs with quick reflexes and camouflage to avoid predators.
* Figeater Beetle
	+ When eggs hatch beetles can survive on organic waste in the soil from summer to winter due to decomposing abilities.
* Jessica Underwing Moth
	+ They use camouflage, their red coloring to appear like blood to ward off predators, and have ears that allow them to hear sound frequencies from predators.
* Honey Pot Ant
	+ Evolved to store liquid food in their abdomens to have stored food reserves when there is no food available.
* **Slide 15**: Students will be able to form connections with these insects and adaptations to the insect they drew on slide 9.
	+ They will be able to connect insect adaptations, behavior, and bodily features, to the insect they drew and about the ones they learned.
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| **Extension Activity/Questions:**This section provides an opportunity for students to connect the knowledge that they have gained to other contexts – can they take what they learned and logically expand upon it, or apply it to alternate situations? Provide one or two additional ideas for activities that students can use to expand upon the new knowledge that they have gained.  | **Slide 14-16*** (14) Discuss specific adaptations of the 4 insects we went over. We will also discuss why we think they have evolved these adaptations over time to be best suited for their environment.
	+ Ask students the following questions.
		- What are some adaptations of Sonoran Desert Insects?
		- Why have Sonoran Desert insects evolved these adaptations?
* (15) After going through our slides about local Sonoran Desert Insects, students will connect their new knowledge to determine whether the insect we created is an insect or not. We will see if they have any of the same adaptations as the 4 we went over.
* (16) Introduce the “Name the Insect Activity”, where students will see a set of our Sonoran Desert insects we discussed in slides 10-13.
	+ Figeater Beetle, Honey Pot Ant, Praying Mantis, and Jessican Underwing Moth.
	+ Ask students what the insect depicted in the image is named?
		- As you pose that question, reveal the insects name as the students answer with animated transitions.
 | * Students will discuss some adaptations of the insects we covered. They will also provide reasons they think the insects have evolved those adaptations over time.
* Students will compare and contrast the insect we made with the insects we went over. They will determine whether the insect they made is an insect or not. They will note whether their insect has any of the same adaptations as the 4 we discussed.
* Students will participate in the “Name the Insect” activity where they will see 4 of the insects we discussed in the previous slides. They will provide the names of those insects one by one.
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| **Evaluation Activity:**How will you evaluate whether or not the students have achieved the learning objective(s) of the lesson?  | **Slide 17*** Kahoot! Activity to evaluate learning objectives for this lesson.

Kahoot! Questions and Answers:* + Is this a Jessica’s Underwing Moth ?
		- Yes
	+ Honey Pot Ants store liquid food in their abdomen!
		- True
	+ This is a Beetle
		- False
	+ Our Scientist of the Week Studied Insects
		- True
	+ This is a Figeater Beetle
		- True
	+ An Insect has six legs and usually one or two pairs of wings.
		- True
	+ The Honey Pot Ant has an adaptation for storing food in its abdomen.
		- True
	+ The Praying Mantis has strong back legs and uses camouflage as part of its adaptations in the Sonoran Desert.
		- True
 | * Students will review Sonoran Desert adaptations and anatomy by playing a Kahoot game. This will help them identify an insect and how to distinguish them from other arthropods along with learning about the adaptation specific to each Sonoran Desert insect.
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