The Bio/Diversity Project

# Lesson 3
# Desert Adaptations

Teacher: Kiara and Maria
Grade Level: 8th
Lesson Length: 50 minutes

This lesson has been adapted from: [Bio/Diversity Project Lesson Title: Adaptations of Desert Animals and Desert Humans]

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| **AZ Science Standard:** | 6.L2U3.12<br>Engage in argument from evidence to support a claim about the factors that cause species to change and how humans can impact those factors<br><br>7.L1U1.10<br>Develop and use a model to explain how cells, tissues, and organ systems maintain life (animals).<br><br>8.L4U1.11<br>Develop and use a model to explain how natural selection may lead to increases and decreases of specific traits in populations over time |
| **Learning Objective:** | ● Students will be able to identify the adaptations of animals that allow them to live in the Sonoran Desert environment.<br>● Students will be able to investigate the effects of heat and wind on evaporation. |
| **Scientist of the Week:** |  |

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| | • Meagan Bethel<br>• Wildlife Specialist who manages camera data for wildlife programs<br>• Teaches the public about wildlife and their identification through communications and graphic design<br>• Interests lie with monitoring population changes using non-invasive techniques<br>• Programs: Border Wildlife Study, Sky Island FotoFauna<br>• Freelance artist specializes in plants and animals |

| **Vocabulary** | **Materials** |
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| • Adaptation<br>• Evaporation<br>• Evapotranspiration | • English Powerpoint<br>• Spanish Powerpoint<br>• Buckets (Home Depot or Foldable)<br>• 1 pack of paper towels<br>• Access to water (sink, drinking fountain, etc.)<br>• stopwatches<br>• Data Collection Handout |
| **Guiding Questions**<br>• Why do animals need to adapt to the desert climate and conditions?<br>• What role does evolution play in adaptations? | |

**Teacher Preparation**:

- Have one person prepare the Exploratory Activity outside while the other person begins the Engagement/Introductory Activity. After the Engagement/Introductory Activity is complete, bring the students outside.
- Bring buckets of water and paper towels outside. Find a spot where pavement is both in the sunshine and in shade.

**Engagement Activity (8 min):**

- Ask students the following questions by displaying it on the board. Prompt students to think about adaptations and what adaptations look like:
  - "List 3 activities that you do to keep cool when it's hot outside in Tucson."
  - Have students share with the class by raising their hands.
- Provide examples of species that have adapted to be active at night/during cooler hours of the day
- Tell students that they will be going outside to do a series of activities to demonstrate adaptations that desert animals have to help them live in the desert.
- Go over rules for being outside: listening carefully, following instructions, being mindful of the

experiments and the results, etc.
- Lead the class outside for the Exploratory Activity

## Exploratory Activity (20 min):

1. Initial Setup (2 min):
    - Explain to students that they will be experimenting with how evaporation works in the desert by observing how fast water evaporates in different conditions (sun vs. shade).
    - Divide the class into pairs and give each pair a stopwatch, a damp paper towel, and a worksheet.
2. Initials in Sun and Shade (5 min):
    - Have each pair dampen a paper towel, then use the moist paper towel to write their initials on both a sunny spot and a shady spot on the pavement.
    - Students will use the stopwatch to time how long it takes for their initials to completely dry in both locations.
3. Observation and Data Recording (5 min):
    - While waiting for the initials to dry, prompt students to observe how fast the initials are disappearing in the sun compared to the shade.
    - Ask, “What does this tell you about the sunny side?” (that water dries up more quickly in the sun)
    - Ask, “If you were an animal living out in the desert, what might you do to keep cool and try not to lose much water?” (rest in the shade during the hottest times of day, come out when it is cooler)
    - Explain that many desert animals are active either at night or in the cooler hours of the day. They pass the heat of the day resting in deep shade or down in burrows out of the sun. For example:
        - Kangaroo rat is a nocturnal mammal, active at night. It reabsorbs nearly all the water in its kidneys before it urinates.
        - Desert tortoises store water in their bladders and move underground in burrows up to thirty feet long to escape the heat. With extreme dryness and heat, they become active at dusk and dawn.
        - Saguaros have spines that provide shade and reduce wind, providing for less water loss due to evaporation. It also has: 1) a huge network of shallow roots to gather water, and 2) ridges which store water, swelling when water is abundant and shrinking as it gets dry. More than four-fifths of a saguaro’s weight may be stored in its stem to be used in times of drought.
    - Once the initials have dried, students should write down the time it took for each to dry.

**Explain Activity (12 min):**
- Return to the classroom.
- Gather the students and create a simple chart on the board comparing drying times for initials in the sun versus the shade. Discuss any patterns or differences observed.
- Guide the students to calculate the average drying time for initials in the sun and the shade (you can do this as a class, summing up the times and dividing by the number of pairs).

**Connecting to Adaptations (5 min):**

- Ask the students: “What does this tell us about conditions in the desert?” (Water evaporates more quickly in sunny areas).
- Relate the drying times to the adaptations desert animals use to survive in hot, dry conditions. For example, animals rest in the shade during the hottest part of the day to reduce water loss.

**Reflection Activity (5 min):**

- Ask reflection questions
- Hand students the journals
- Ask them to write their names and what class period they are in on the first page
- Ask them to them to turn the page and write the date at the top of the page
- What did you learn during our evaporation activity?
- What was fun about the activity?
- What did you find challenging?
- Remind students that they have their data collection sheet to use as a reminder of what they did outside
- Collect journals at the end of class