LIVING LAB CURRICULUM

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OVERVIEW

Living Lab is a live animal exhibit show casing everything from the stinging and scaly to the fuzzy and flash eating, including an impressive red diamond rattlesnake, an observation beehive, and a Gila monster. The exhibition brings you eye to eye with animals that are common to our region, but sometimes rarely seen because of their seasonality, reclusive nature, or nocturnal lifestyle habits. Students will learn about unique adaptations that help animals survive. Everything from their body form to their behavior helps them evade predators, survive environmental extremes, and acquire food. Students will not only experience our special regional species but also the threats to biodiversity.

THEME

All living things are adapted for their environment through evolution and natural selection. Ecosystems are made up of many interdependent relationships between groups of living things and their environment. Humans are an integral part of every ecosystem and can affect them through our actions, both positively and negatively.

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NGSS STANDARDS

MS-LS1-4: Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively.

MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and non-living parts of an ecosystem.

MS-LS4-4: Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

ESSENTIAL QUESTIONS

What is a food web? What if one species is missing from the food web?

What is a keystone animal? Apex predator?

How does the structure and function of an animal help it survive/reproduce?

How do environmental and genetic factors affect the growth of an animal?

Where do animals get their energy?

What role do humans play in Earth's ecosystems?

PRE-VISIT LESSONS

To maximize the use of time during your Museum visit, it would be helpful to introduce some key concepts and vocabulary to your students prior to visiting by incorporating one or both of the following activities into your lesson plan.

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LESSON #1:

YOU ARE WHAT YOU EAT

(MS-LS2-1, MS-LS2-2, MS-LS2-3)

OBJECTIVE

Students will learn that the sun is the source of energy for all living things; that energy is transferred among organisms through a food web

MATERIALS

Food Web Organism Cards

Yarn or string

VOCABULARY

Food Chain - a series of organisms interrelated in their feeding habits, the smallest being fed upon by a larger one, which in turn feeds a still larger one, etc.

Food Web - a series of organisms related by predator-prey and consumer-resource interactions; the entirety of interrelated food chains in an ecological community.

Trophic Level - any class of organisms that occupy the same position in a food chain, as primary consumers, secondary consumers, and tertiary consumers.

Producer - an organism, as a plant, that is able to produce its own food from inorganic substances.

Consumer - an organism, usually an animal, which feeds on plants or other animals.

Predator - any organism that primarily obtains food by the killing and consuming of other organisms.

Prey - an animal hunted or seized for food, especially by a carnivorous animal.

Carnivore - an animal that eats primarily or exclusively animal matter.

Herbivore - an animal that eats primarily or exclusively plant matter.

Omnivore - an animal that eats both animal and plant matter.

Apex consumer - consumers with few or no predators of their own.

Decomposer - an organism, especially a soil bacterium, fungus, or invertebrate, which breaks down organic material.

Energy pyramid - (also trophic pyramid or ecological pyramid) a graphical representation showing the flow of energy at each trophic level in an ecosystem.

Habitat - the natural home or environment of an animal, plant, or other organism.

Ecosystem - a biological community of interacting organisms and their physical environment.

Biome - a large naturally occurring community of flora and fauna occupying a major habitat, e.g. forest or tundra.

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ACTIVITY

Have the words “You are what you eat” written on the board prior to students arriving in class.

You can add some interest by handing out an approved treat to the students (cookie, candy, carrot, etc.). Ask students to discuss this phrase.

- What is actually happening to the things we eat?
- Why do we need to eat?
- Is the phrase literal? Are we what we eat?

Engage students in a discussion of **food chains.** Depending on the prior knowledge of your students, you may need to teach/review food chains.

In this activity, students will physically model a **food web.** Place students in groups of 7-8.

Give each group a set of organism cards. (See example) Be sure to have at least 2 producers in each group. Each group also receives 12 pieces of yarn or string, 2-3 feet long each. As you do this activity, have students talk about the **trophic level** of each organism.

- Starting with the sun, connect the sun to each of the living things that would get its energy from the sun. These are the **producers** (plants).

- Now connect to each living thing that gets its energy from the producers. These are the **primary consumers** (**herbivores** and **omnivores,** sometimes **prey**).

    - Can the primary consumers get their energy from more than one source?

- Now connect those living things that get their energy from the consumers. These animals can go by many names: **secondary consumer, predator, carnivore, apex consumer.** Where do humans fit in a food web?

- Finally, connect all the animals back to the **decomposer.** Why is the decomposer important in a food web?

- Have students process food web and pyramids as individuals or small groups. They can create a poster or complete the information in a science notebook.

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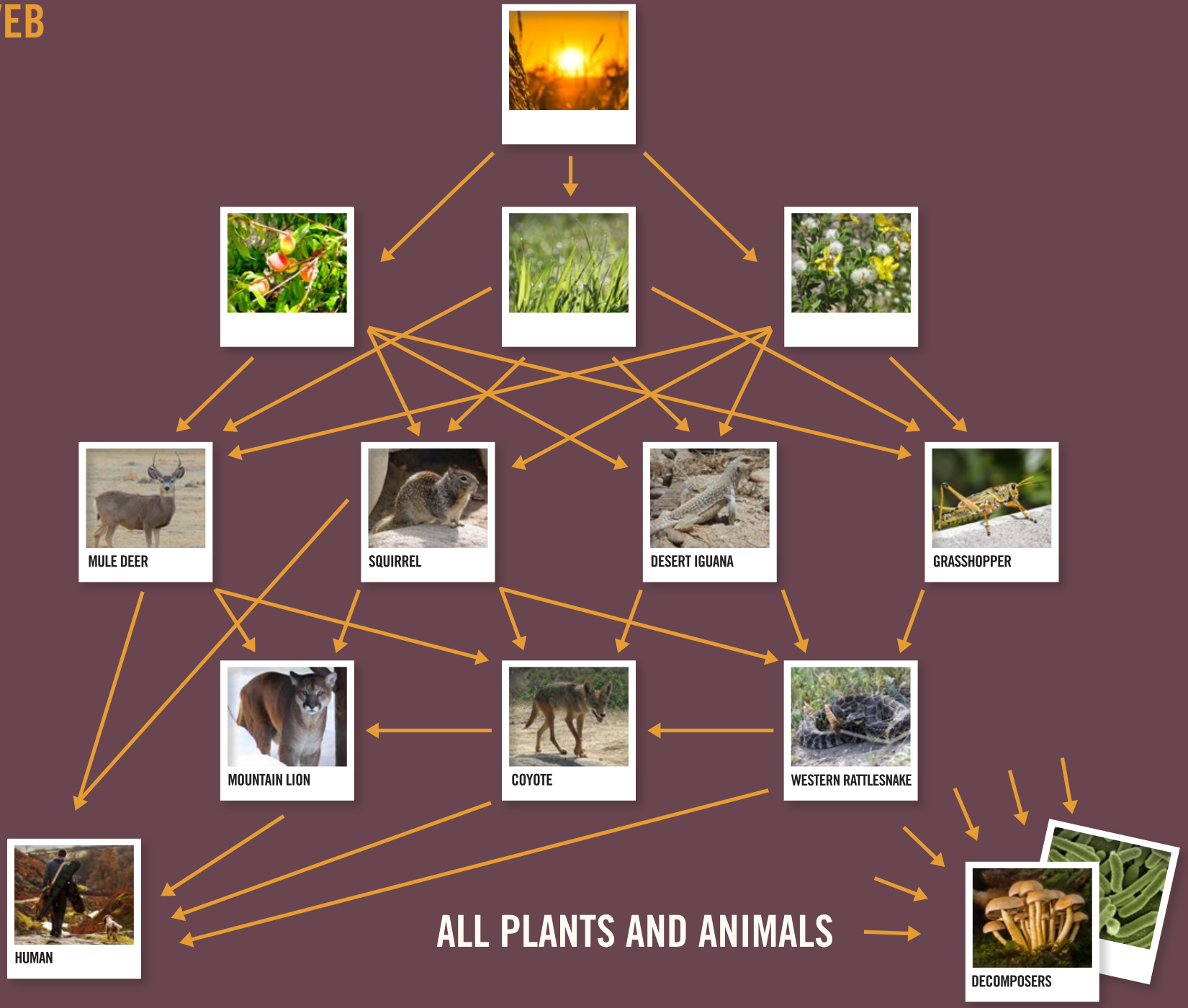
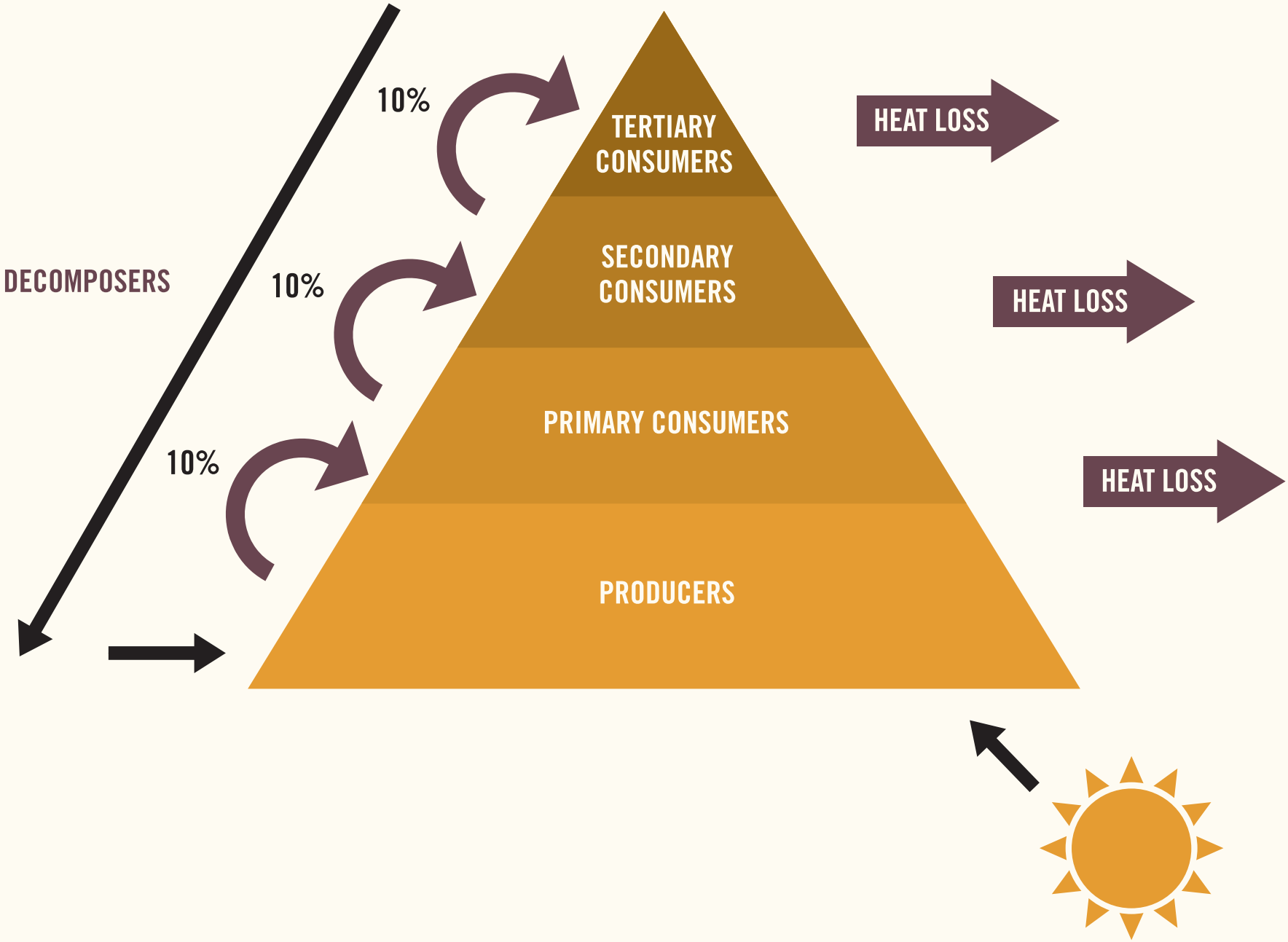
FOOD WEB

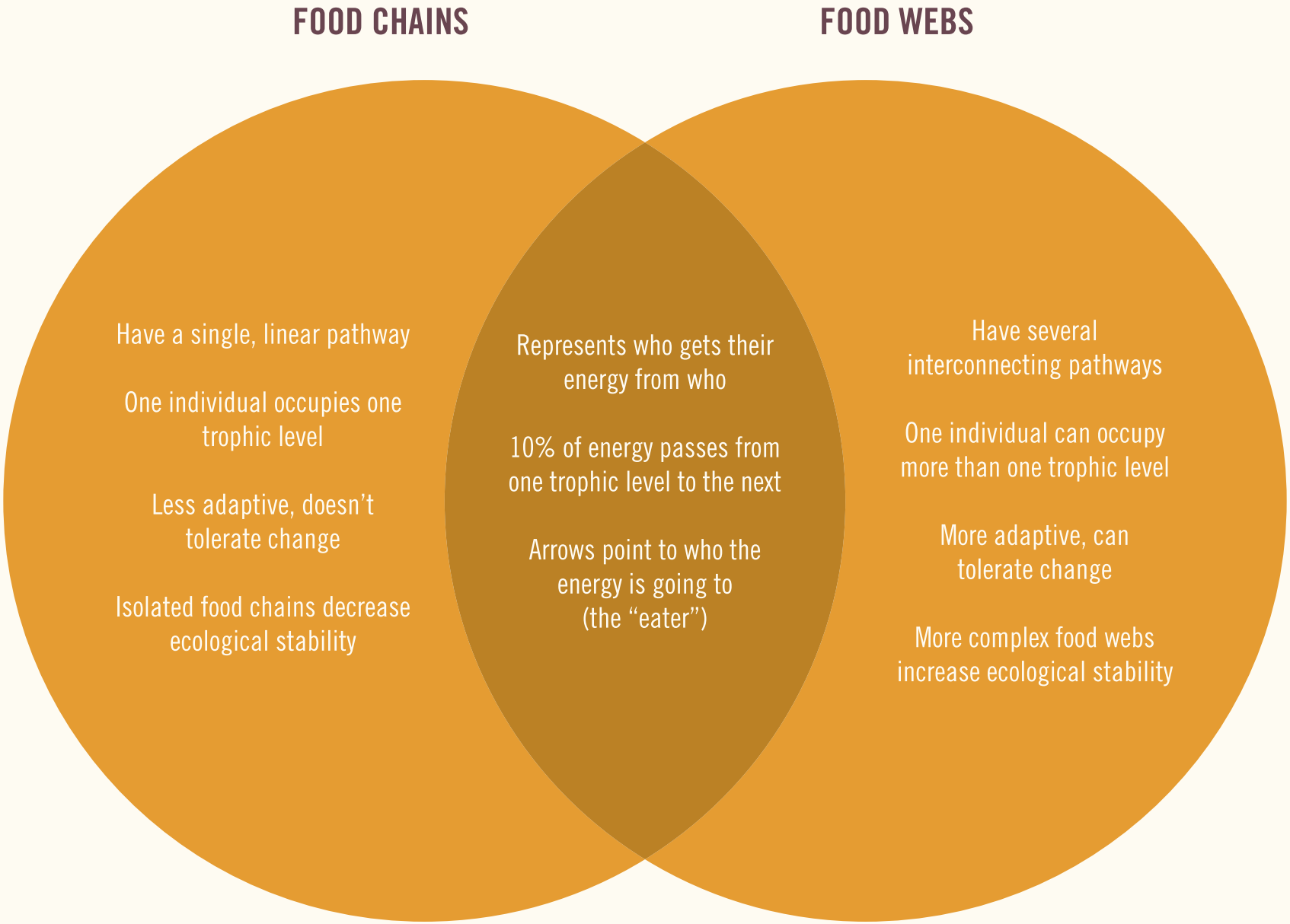

MULE DEER
SQUIRREL
DESERT IGUANA
GRASSHOPPER
MOUNTAIN LION
COYOTE
WESTERN RATTLESNAKE
HUMAN
ALL PLANTS AND ANIMALS
DECOMPOSERS

AN **ENERGY PYRAMID** EXPLAINS THE AMOUNT OF ENERGY THAT MOVES FROM ONE TROPHIC LEVEL TO THE NEXT.

AS LITTLE AS 10% OF ENERGY IS TRANSFERRED AT EACH LEVEL.


10%
10%
10%
DECOMPOSERS
TERTIARY CONSUMERS
SECONDARY CONSUMERS
PRIMARY CONSUMERS
PRODUCERS
HEAT LOSS
HEAT LOSS
HEAT LOSS

HAVE STUDENTS CREATE A VENN DIAGRAM COMPARING FOOD CHAINS AND FOOD WEBS.



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A **VENN DIAGRAM** IS AN ILLUSTRATION OF THE RELATIONSHIP BETWEEN TWO OR MORE GROUPS OF IDEAS OR OBJECTS THAT HAVE SOMETHING IN COMMON.

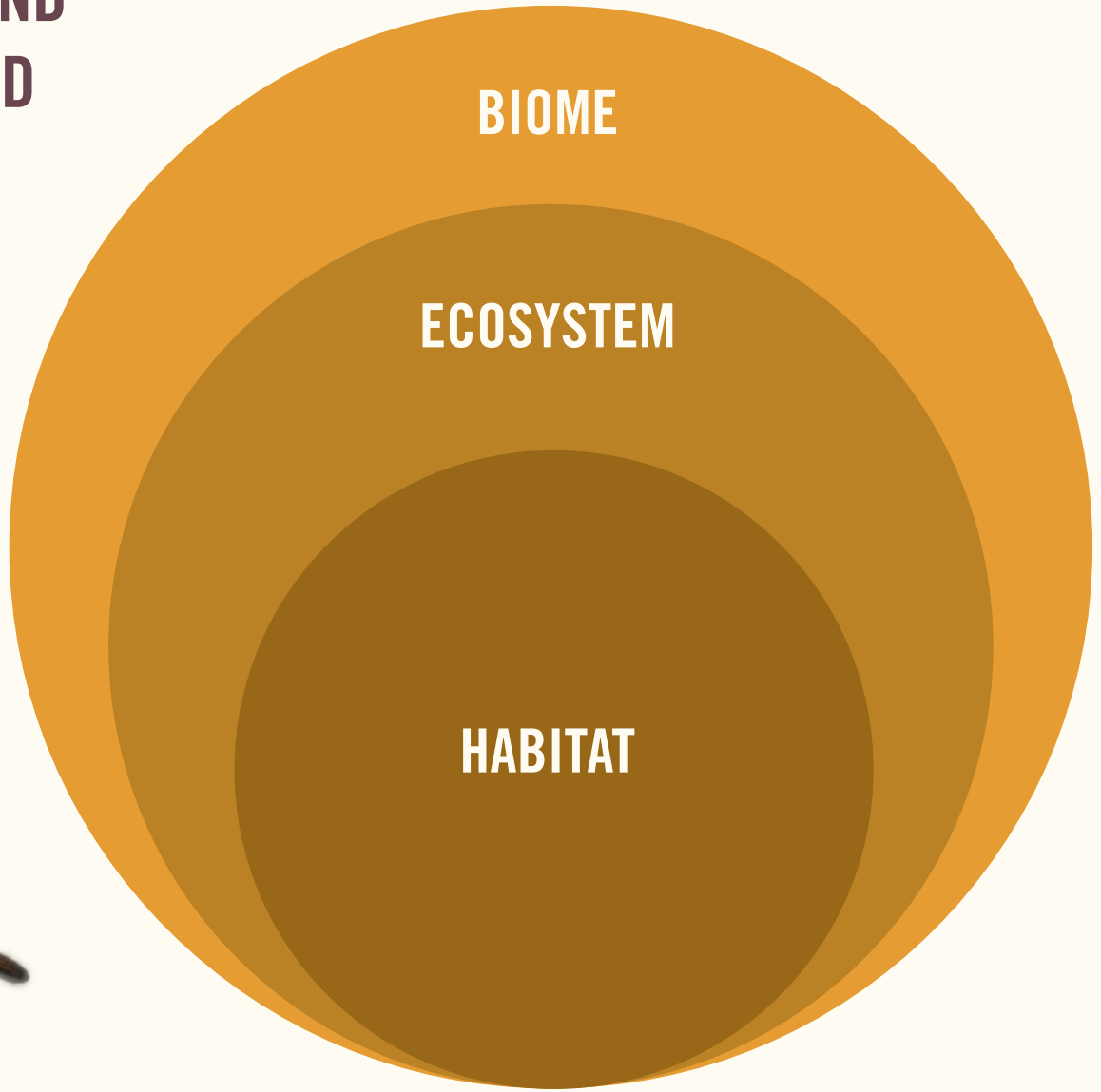
WHERE THE CIRCLES INTERSECT REPRESENTS THOSE COMMONALITIES.

Every living thing on the Earth lives in a **habitat,** the area where a plant or animals lives and grows. Habitat is specific to a population or species. There are three basic parts to a habitat: food, water and shelter. Some animals can live in more than one habitat, others cannot.

An **ecosystem** is a community of living and non-living things that work together and interact. The feeding relationship within an ecosystem is a food web. A biome is the geographic place that can be classified by the kind of animals living in it.

A **biome** can contain many ecosystems. Currently, scientists do not agree about how to classify biomes; some are more broad and count as few as two, terrestrial and aquatic, others are more precise and name more than a dozen.

FINALLY, HAVE STUDENTS DRAW A DIAGRAM TO EXPLAIN HABITAT, ECOSYSTEM, AND BIOME AND WHERE FOOD WEBS FIT.



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LESSON #2:

AMAZING ADAPTATIONS

(MS-LS1-4, MS-LS1-5, MS-LS4-4)

OBJECTIVE

Students will learn that adaptation is a trait or behavior in which a living thing becomes well suited to living in a particular habitat. Students will learn that natural selection is an evolutionary process where organisms better adapted to their environment survive and produce offspring.

MATERIALS

Toothpicks of different colors

Tweezers (one for each student)

Paper and Pencil

VOCABULARY

Adaptation - a characteristic of a plant or animal that makes it able to adjust to the conditions of a particular environment.

Trait - a genetically determined characteristic.

Variation - the occurrence of an organism in more than one distinct color or form.

Natural selection - the process whereby organisms better adapted to their environment tend to survive and produce more offspring. The theory of its action was first fully expounded by Charles Darwin and is now believed to be the main process that brings about evolution.

Evolution - change in the heritable characteristics of biological populations over successive generations.

Camouflage - an animal's natural coloring or form that enables it to blend in with its surroundings.

Mimicry - the close external resemblance of an animal or plant (or part of one) to another animal, plant, or inanimate object.

Migration - seasonal movement of animals from one region to another.

Hibernation - the condition or period of an animal or plant spending the winter in a dormant state.

Nocturnal – active at night

Diurnal – active during the day

Instinct - an innate, typically fixed pattern of behavior in animals in response to certain stimuli.

ACTIVITY

Present students a few images of animals that have unique characteristics: zebra, sea otter, owl monkey, anteater, or walking stick. Elicit ideas for what unique physical characteristics each animal has. How do they think those help them to survive? You can expand the discussion: What other animals can you think of that have unique physical characteristics that help them survive in their environment? These characteristics are called adaptations.

An **adaptation** is a **trait** or behavior that helps an organism survive and reproduce. Traits are genetic differences that can occur in a species. Organisms of a species differ from one another in many of their traits.

Variations can occur randomly or as a result of being fit for a particular environment.

Natural selection is the process that explains this survival and shows how species can change over time. This process of change can take millions of years.

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ADAPTATIONS CAN BE GROUPED AS PHYSICAL ADAPTATIONS/TRAITS OR BEHAVIORAL ADAPTATIONS. HAVE STUDENTS DISCUSS AND COME UP WITH SOME EXAMPLES OF BOTH.

PHYSICAL ADAPTATIONS

Color

Camouflage

Beaks (food gathering)

Claws (food gathering, protection)

Sensory abilities (sight, smell, taste, touch, hearing)

Mimicry (close external resemblance of an animal or plant)

BEHAVIORAL ADAPTATIONS

Migration

Hibernation

Traveling in herds

Hunting in packs

Nocturnal or Diurnal

Instincts (running, hiding, building nests)

Learned behaviors

Communication

In this activity, students will be exploring one particular adaptation: camouflage.

SETUP

Scatter the toothpicks outside in a lawn.

Divide students into four groups.

Assign each group a color of toothpick to “hunt.”

1. Explain to students that they will be hunting “stick bugs” of a certain color. They are only to pick up that color and they must do it with their tweezer “beaks.”

2. Have students hunt for stick bugs for 1 minute. They should keep their bugs to count and tally them.

3. After they have recorded their capture, students should scatter the stick bugs for the next round.

4. Repeat hunting until students have had an opportunity to hunt every color of stick bug.

5. Discuss the results with students back in the classroom. Was there any one color of stick bug that was easier/harder to hunt than the others? Why or why not?

6. You may want your students to process the data into a chart or graph. So how does natural selection work? Stick bugs of a particular color will be harder for predators to catch so they will survive and reproduce, passing down that color trait to their offspring.

HAVE STUDENTS CREATE A DIAGRAM OR COMIC STRIP EXPLAINING NATURAL SELECTION.

WHAT ADAPTATIONS HAVE HUMANS DEVELOPED TO SURVIVE?

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SOME MICE ARE EATEN BY BIRDS

A population of mice has moved into a new area where the rocks are very dark. Due to natural genetic variation, some mice are black while others are white.

MICE REPRODUCE

White mice are more visible to predatory birds than black mice. Thus, white mice are eaten at a higher frequency than black mice. Only the surviving mice reach reproductive age and leave offspring.

GIVING NEXT GENERATION

Because black mice had a higher chance of leaving offspring than white mice, the next generation contains a higher fraction of black mice than the previous generation.

MUSEUM VISIT ACTIVITY WORKSHEETS

Before visiting the Museum, print out a copy of one or both of the accompanying worksheets for each of your students. Explain to students they will be observing animals while visiting the exhibit, using the worksheet to record their observations. Review the worksheet with students prior to your visit, clarifying what information they should collect when at the Museum.

Activity #1 helps to gather information to be able to place the animal in a food web post-visit.

Activity #2 focuses student attention on some of the unique adaptations on display in the exhibit.

ACTIVITY #1: CREEPY, CRAWLY, COOL

Complete this worksheet while visiting the exhibit *Living Lab* at The Nat. Examine closely three of the animals on display. Draw each one in the box provided. Then answer the following questions about each animal.

- What does it eat? What would eat it?
- Describe its habitat.
- Does it live with other animals? If so, what kind? Why or why not?
- Why do you think this animal is important?

Activity worksheets are found on pages 37-38

ACTIVITY #2: ADAPTATION BINGO

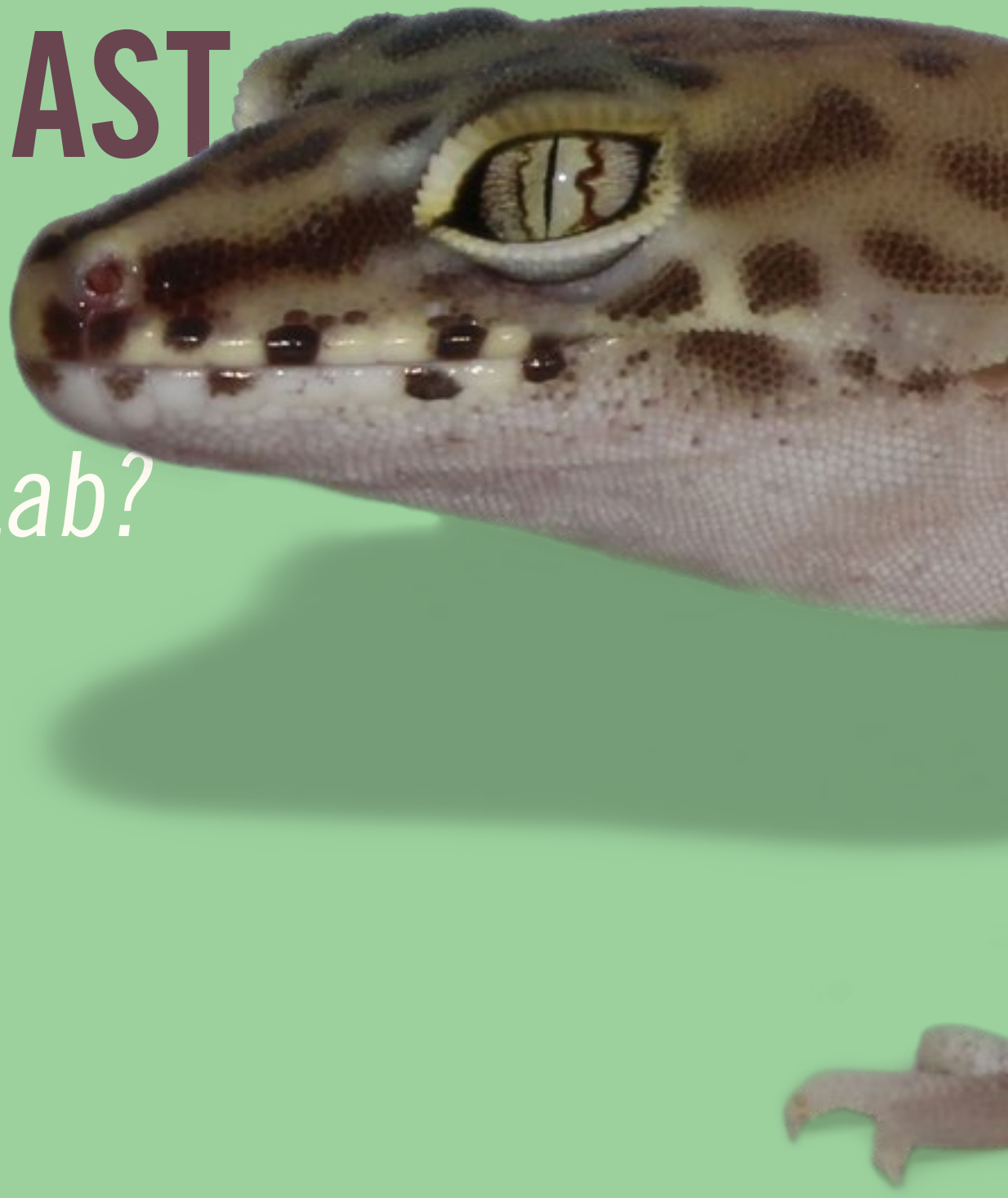
Complete this worksheet while visiting the exhibit *Living Lab* at The Nat. Find the animal that has the adaptation listed in each box. Fill in your answers to get four in a row or complete the whole board.

While students are completing the worksheets, engage with students by asking inquiry based questions. Try open-ended questions that ask students to think or give an opinion.

- What do you think of the exhibit/this animal?
- Why do you think The Nat made this exhibit?
- Why did they choose the animals that are here?
- How do you know?
- Can you tell me more?
- What is important about this exhibit?
- Do you have any questions or things you are wondering?

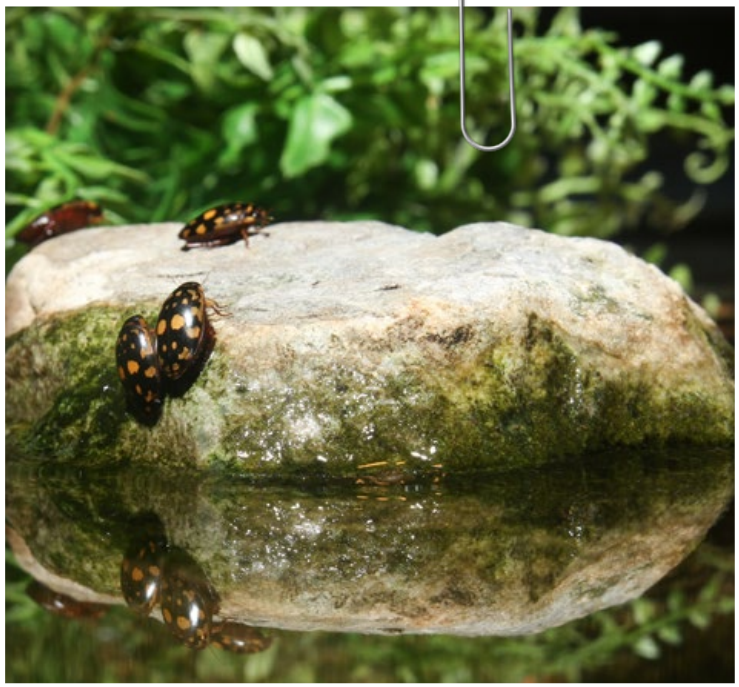
CRITTER CAST

Who are the animals that inhabit *Living Lab?*



SOUTHERN ALLIGATOR LIZARD

The southern alligator lizard frequently can be found near human habitation, and is often seen foraging in the mornings and evenings. It is often found in or around suburban yards and garages. This lizard is notable for its vicious self-defense, and will bite and defecate if handled. Notice the long lateral fold where the dorsum meets the belly scales. The fold acts like the pleats in an accordion to allow for expansion of the lizard's body. It moves with a snake-like undulating motion, often tucking the rear legs up against the side of the body and pulling itself along on its belly with the front feet. The slightly prehensile tail can be used to wrap around vegetation when climbing.



SUNBURST DIVING BEETLE

The behavior of this diving beetle has been compared to a scuba diver, since it carries with it a bubble of air as it dives down into the water. The beetle has recently become notable when it was discovered that its aquatic larval stage is the first ever recorded use of bifocal technology in the animal world. The beetle uses in its eyes in the manner of bifocals to switch their vision from up-close to distance, for easy and efficient capture of their prey. The sunburst diving beetle's distinctive yellow spots also serve as a warning sign to predators that the insect can release a foul tasting chemical.

ARIZONA BARK SCORPION

Bark scorpions hide during the heat of the day, typically under rocks, wood piles, or tree bark. Bark scorpions do not burrow, and are commonly found in homes, requiring only 1/16 of an inch for entry. They can climb walls, trees, and other object with a rough surface. They prefer an upside-down orientation, which often results in people being stung due to the scorpion being on the underside of an object. The bark scorpion is considered to be the most venomous of all the scorpions in North America. Scorpions are preyed upon by large centipedes, tarantulas, lizards, birds (especially owls), and mammals such as bats, shrews, and grasshopper mice.

GIANT DESERT HAIRY SCORPION

The giant desert hairy scorpion, giant hairy scorpion, or Arizona Desert hairy scorpion is the largest scorpion in North America, attaining a length of 14 cm (5.5 in). It emerges from its burrow at night to forage for prey such as insects, spiders, and small vertebrates. The large pincers are used more often to sting than crush prey. Although this scorpion is big, its venom is not very potent. Its sting can be painful but not dangerous to humans, unless there is an allergic reaction.

DESERT CENTIPEDE

This is the most common centipede seen in San Diego County from backyards to the desert. Coloring ranges from reddish to bluish background with darker banding on body segments. Centipedes actively search leaf litter, crevices and the ground, using sensitive antennae to locate their food. The pairs of legs at the fore part of the body and sometimes the long, last pair of legs are used to grab and hold prey. Prey is immobilized with a powerful venom delivered by the first pair of legs that have been modified as sharp venom conducting jaws. When disturbed, a centipede will raise its rear and wave it about in the same manner as its head as it runs, confusing would be predators. Don't touch a centipede's rear! It will grab your finger with that long pair of hind legs, and wheel around and give you a nasty bite.

CALIFORNIA KINGSNAKE

The California Kingsnake is widespread along the West Coast of North America. This snake is primarily diurnal but may become nocturnal during periods of hot weather. It is a generalist predator, feeding on rodents, lizards, snakes, bird eggs. The "king" in their name refers to their propensity to hunt and eat other snakes, including venomous rattlesnakes, which are commonly indigenous to their natural habitat. California Kingsnakes are naturally resistant to the venom of rattlesnakes, but are not totally immune.

GILA MONSTER

Gila monsters prowl at night or overcast days, often after a summer rain, in search of food. Their venom targets pain receptors and does not cause the kind of tissue damage that rattlesnake venom does. Gila monster bites are not considered deadly to humans. Their powerful, crushing jaws are enough to subdue the nestling birds, small mammals and reptiles that it feeds on. Reptile and bird eggs are included in its menu. One or two meals are enough to sustain the Gila monster for a whole season. Fat stored in its tail helps it survive lean times.

GLOSSY SNAKE

The glossy snake and its many subspecies are all similar in appearance to gopher snakes. However, they are smaller than gopher snakes, with narrow, pointed heads, and a variety of skin patterns and colors. They appear “washed-out” or pale, hence the common name, “faded snakes.” These desert snakes are usually nocturnal and active desert hunters. They are constrictors that feed on lizards and small mammals.

GRANITE NIGHT LIZARD

On warm nights, granite night lizards emerge from crevices of large boulders where they shelter to search for small invertebrates. They also take advantage of any prey items that they may find hiding in crevices where they reside. Their flattened form allows them to fit in narrow spaces and large eyes with elliptical pupils allow for great night vision.

ROSY BOA

The rosy boa is native to the American Southwest and Baja California and Sonora in Mexico. It's name is derived from the rosy or salmon coloration that is common on the belly of specimens of the rosy boa originating from coastal southern California and Baja Mexico.
This snake searches rock crevices rodent burrows and other hiding places for small rodents and birds. It will grab anything that gets too close with incredible rapidity. The rosy boa is extremely docile when encountered by humans. When disturbed, it usually rolls into a compact ball with the head in the center. The species is not prone to bite in defense, but rather will release a foul-smelling musk from the base of the tail when threatened. When human bites have occurred, they have usually been the result of a feeding response with a captive animal.

GOPHER SNAKE

The gopher snake is usually diurnal but may be nocturnal on warm nights especially in the desert. It actively roams about searching for rodents and birds. Juveniles may take smaller prey like lizards. When threatened, it assumes a threatening posture, inflate itself and expels air suddenly across a raised flap of cartilage on its epiglottis making a loud hiss. It also vibrates its tail. In dry grass or leaf litter, this can resemble the sound of a rattlesnake's rattle.

DESERT STINK BEETLE

Stink beetles wander about at night or during cool weather searching for seeds and other vegetable matter and dead insect carrion. A head stand warns predators that glands in the beetle's rear end harbor vile chemicals that have a bad odor and taste.

WESTERN BANDED GECKO

The western banded gecko is a terrestrial lizard. Its tiny scales give its skin a silky texture. The western banded gecko is secretive and nocturnal, foraging at night for small insects and spiders, and is one of the few reptiles that control scorpion populations by eating baby scorpions. If captured it may squeak and discard its tail. As a defense mechanism, it can also curl its tail over its body to mimic a scorpion.

CALIFORNIA LYRE SNAKE

The Lyre snake hunts prey at night among the boulders and crevices where it lives. Prey is subdued with constriction and envenomation. The venom may be most useful subduing prey captured in tight quarters such as a rock crevice where constriction can't be employed. It has small fangs in the rear of its mouth so it chews to release the mild venom. The Lyre snake feeds on primarily lizards, but is also known to eat small mammals, nesting birds, and other snakes. It is not considered to be dangerous to humans.

BAJA CALIFORNIA TREE FROG

The name “tree frog” is not entirely accurate. This frog is chiefly a ground-dweller, living among shrubs and grass typically near water, but occasionally it can also be found climbing high in vegetation. Its large toe pads allow it to climb easily, and cling to branches, twigs, and grass. Because this species of chorus frog is found near Hollywood, its vocalizations have frequently been used as stock sounds for film and television. As a result, its distinctive advertising call of “ribbit, ribbit” has become a standard representation of frog vocalizations, both in the United States and in the English-speaking world more widely, despite the fact that only it and a few closely related species actually make the sound.

CALIFORNIA TOAD

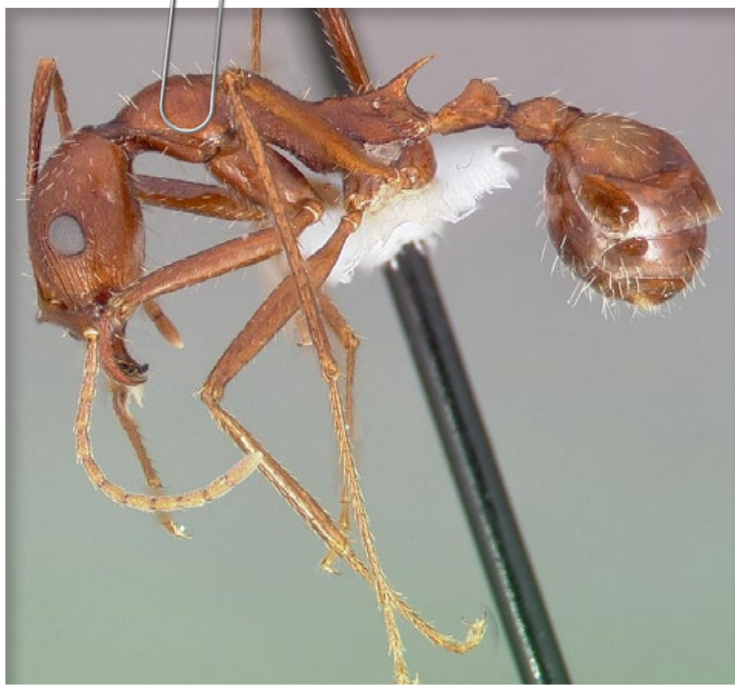
The California Toad reproduces in standing water. It is generally nocturnal except in the spring when it is also active during the day. The males of the species tend to become territorial during the breeding season between January and July. Its level of activity is highly dictated by temperature. This toad uses poison secretions from parotid glands and warts to deter predators. Some predators are immune to the poison, and will consume toads. Still other predators such as ravens have learned to avoid the poisons by eating only their viscera through the stomach.

DESERT IGUANA

This heat tolerant diurnal lizard often remains active through mid-day when high temperatures force other lizards to seek shelter. It hibernates during the cold months of winter and late fall. This speedy lizard flees with an explosive burst of speed and often seeks shelter in a burrow when frightened. Primarily a ground dweller but often climbs into the branches of the creosote bush to reach the small yellow flowers (a favorite food item). They are mainly herbivorous but occasionally feeds on insects or carrion.

GRANITE SPINY LIZARD

The Granite Spiny Lizard occurs in a wide variety of arid and semiarid habitats that are dominated by the presence of massive to scattered rock formations. This lizard makes extensive use of rocks for shelter, foraging sites and perches. They are rarely found away from rocks and love to bask on granite boulders. The Granite Spiny Lizard is omniverous, eating small insects, lizards and occaisionally fruits and flowers. They can often be seen doing push-ups as a territorial display.



LONG-LEGGED DESERT ANTS

Photo: Wikimedia Commons

This native ant of the Sonoran Desert has very long (spider-like) hind legs. Although this is a large ant, it does not sting and is not aggressive as in harvester ants. This species has been referred to as the “cowardly lions of the ant world” because it would rather run than fight. Desert ants are omnivorous, searching for dead and dying insects, parts of seeds and plants.

POST-VISIT ACTIVITIES

The following activities can be incorporated into your lesson plans after your visit to The Nat. They are designed to further enhance the student's understanding of the animals they have seen and the concepts they have been studying.

BUILD A FOOD WEB

(MS-LS2-2, MS-LS2-3)

Students will create a food web with at least two of the animals from *Living Lab*.

- Each food web must have at least ten (10) organisms including the sun and a decomposer.
- Establish as many energy transfer relationships as possible.
- The arrow points toward the organism consuming the other organism.
- Label each organism according to their trophic level.
- Producer, Consumer, Secondary Consumer, Apex Consumer, Decomposer.

WHAT IS A KEYSTONE SPECIES?

(MS-LS2-1, MS-LS2-3)

Repeat the pre-visit food web activity, but this time remove or add a species.

- What effect does this change make to the food web?
- Can the food web and the other organisms stay healthy without that organism (or with the new one added)?

Students will research and write about a **keystone species.** Every ecosystem has at least one species that is critical to the survival of other species in the system. If it were to disappear, the ecosystem would radically change or even collapse. Some examples include Bees, California Condors, Grizzly Bears, Mountain Lions, and Sea Stars. What role do humans play in the preservation/elimination of keystone species?

ECOSYSTEM PROJECT

(MS-LS2-2, MS-LS2-3)

Living Lab highlights animals from a couple different ecosystems. Have students create an imaginary ecosystem that includes one of those animals. Provide students with some parameters for this project.

- Draw and describe your ecosystem.
- Include several species and describe their niche and habitat.
- Include a food web and identify the trophic level for each (producer, primary consumer, secondary consumer, etc.).
- Extra credit: Describe what happens to your ecosystem if humans and their habitat are included.

HOW DOES IT DO THAT?

(MS-LS1-4, MS-LS1-5)

Students will focus on different body structures that help animals survive.

- Give students a habitat (desert, chaparral, coast, forest, etc).
- Provide students with these questions to answer as they design their creature.
  - Where will the animal live?
  - What will it eat?
  - Where will it get water?
  - How will it breathe?
  - How does it move?
  - What type of body covering will it have?
  - What is the name of the animal?
- Students can draw a picture or make a model of their well-adapted creature.

MAKE AN ADAPTATION FORTUNE TELLER

(MS-LS1-4, MS-LS4-4)

Make a fortune teller so students can quiz each other about some amazing adaptations. A paper fortune teller is an easy origami craft. Many students already know how to make one. Instead of colors on the outer flaps, have students title their fortune teller "What is my adaptation?"Instead of numbers in the inside, have students draw and/or name an organism. You can have students use the adaptations from *Living Lab* or research their own. On the inside flap, have students write an adaptation that helps that animal survive. Students can focus on structure or behavior or have a mix of both. Have students show their fortune teller to others in the class and have them try to guess the adaptation.

EXTENSION

iNaturalist is a citizen science project and online social network of scientists and community scientists who share observations of nature. The goal is to build a database of biodiversity across the globe. The app is free, easy to use, and available for Android and Apple platforms.

https://www.inaturalist.org/

Scientists at the San Diego Natural History Museum use iNaturalist to inform some of their research. Your students can contribute to that research and be citizen scientists.

Visit The Nat webpage for citizen science for more info:

https://www.sdnhm.org/calendar/citizen-science/

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WORKSHEET #1: LIVING LAB: CREEPY, CRAWLY, COOL

Complete this worksheet while visiting the exhibit *Living Lab* at The Nat. Examine closely three of the animals on display. Draw each one in the box provided. Then answer the following questions about each animal.

What does this animal eat? What would eat it?

Describe its habitat.

Does it live with other animals? If so, what kind? Why or why not?

Why do you think this animal is important?

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Why do you think this animal is important?

WORKSHEET #2: LIVING LAB: ADAPTATION BINGO

Complete this worksheet while visiting the exhibit *Living Lab* at The Nat. Examine closely three of the animals on display. Draw each one in the box provided. Then answer the following questions about each animal.

I am immune to rattlesnake venom.	I can walk on water.	I am a carnivorous decomposer.	I am a venomous lizard.
I kill my prey by squeezing it.	I am sometimes called a sand swimmer.	I am nocturnal.	I am an excellent climber.
I am a fierce and clever warrior.	I use my rattle to scare away predators.	I can stand high temperatures.	Living in a colony helps me survive.
My barbed hairs can be very irritating.	I secrete poison out of my skin.	I can breathe underwater.	I squirt an unpleasant liquid from my back end.

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WORKSHEET #2: LIVING LAB: ADAPTATION BINGO ANSWER KEY

Complete this worksheet while visiting the exhibit *Living Lab* at The Nat. Examine closely three of the animals on display. Draw each one in the box provided. Then answer the following questions about each animal.

I am immune to rattlesnake venom. **California Kingsnake**	I can walk on water. **Water Strider**	I am a carnivorous decomposer. **Hide Beetle**	I am a venomous lizard. **Gila Monster**
I kill my prey by squeezing it. **Baja California Rat Snake**	I am sometimes called a sand swimmer. **Western Shovel-nosed Snake**	I am nocturnal. **Western Banded Gecko**	I am an excellent climber. **Granite Spiny Lizard or Arizona Bark Scorpion**
I am a fierce and clever warrior. **Southern Alligator Lizard**	I use my rattle to scare away predators. **Red Diamond Rattlesnake or Western Rattlesnake**	I can stand high temperatures. **Desert Iguana**	Living in a colony helps me survive. **Western Honey Bee Or Long-legged Desert Ant**
My barbed hairs can be very irritating. **California Ebony Tarantula**	I secrete poison out of my skin. **Western Toad**	I can breathe underwater. **Sunburst Diving Beetle**	I squirt an unpleasant liquid from my back end. **Desert Stink Beetle**

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