Educator Exhibition Worksheets

Dr. Entomo's Palace of Exotic Wonders

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California State Content Standards

Life Science
Kindergarten 2a–c
First 2a–c
Second 2b, c
Third 3a–d
Fourth 2c, 3b

Investigation and Experimentation
Kindergarten 4a–e
First 4a, b
Second 4a
Third 5e
Fourth 6a, c

English–Language Arts
Kindergarten–Fifth Reading Comprehension and Writing Strategies

Mother Nature's Chemical Factory!

Definitions:
Adaptation – any alteration in the structure or function of an organism or any of its parts that results from natural selection and by which the organism becomes better fitted to survive and multiply in its environment
Chemical – any substance used in or resulting from a reaction involving changes to atoms or molecules, especially one derived artificially for practical use
Defense – resistance against danger, attack, or harm; protection

1. What are the two examples of arthropods in this exhibit that use chemicals as a defense adaptation?

2. What are those two chemicals?

3. How do these arthropods use these chemicals and what part of their body do they emit them from?

4. What is/are an example(s) of an arthropod found in San Diego County which uses chemical adaptations as a defense?

Mother Nature's Chemical Factory!

5. Based on what you have seen, draw and describe your own species of arthropod which uses chemicals as a defense adaptation.

6. What kinds of chemicals do humans use in defense of 'predators'?

7. Why do we study arthropods that use chemicals for defense? Does learning about this help or hinder our survival? Hypothesize what more we can learn from these arthropods.

Fun Fact: *Bombardier Beetles eject a noxious chemical spray with a popping sound in a rapid burst of pulses from special glands in its abdomen. When threatened, the beetle contracts muscles that force the two reactants through tubes into a mixing chamber containing water and a mixture of catalytic enzymes. When combined, the reactants undergo a violent exothermic chemical reaction, raising the temperature to near the boiling point of water!*

The Devil with Two Heads!

Definitions:
Deception – the act of misleading by a false appearance or statement;
Predator – any organism that exists by carnivorous means of survival
Defense – resistance against danger, attack, or harm; protection

1. Which arthropod uses deception as a defense?

2. What is the advantage of having a tail that looks like a head?

3. Can you think of another animal that uses deception for its defense? How do they use deception?

4. Draw the centipede in the space below. (a) How do YOU tell the head from the tail? (b) How might this confuse a predator?

(a)

(b)

Fun Fact: *Centipedes come in a variety of colors. The majority of centipedes are brown, reddish-brown or yellow. However, in some places in the world, you can find centipedes that are blue, bright orange and red!!*

Glowing Terror!

Definitions:

Adaptation – any alteration in the structure or function of an organism or any of its parts that results from natural selection and by which the organism becomes better fitted to survive and multiply in its environment

Fluorescence – the emission of radiation, especially of visible light, by a substance during exposure to external radiation

Ultra-violet Light – Light beyond the color violet in the visible light spectrum. (Light having wavelengths shorter than 4000 angstrom units)

1. What arthropod in this exhibit glows or fluoresces under ultraviolet light?

2. Is this fluorescence an adaptation? Hypothesize as to why. If "Yes," why? If "No," why not?

3. Give two examples of things that glow in the dark or fluoresce that help humans in our everyday world.

4. How do scorpions defend themselves against predators?

5. What makes this arthropod fluoresce?

Fun Fact: *Some scorpions have up to 10 eyes, though they can't see very well at all!*

Rogue's Gallery!

Definitions:
Myth – a traditional or legendary story with or without a determinable basis of fact or a natural explanation
Misconception – an erroneous or incorrect notion

1. How are myths presented in this exhibit?

2. Draw a line to the correct arthropod. What arthropod is...

...accused of murdering their mate?

...wrongfully accused and 'framed'?

...accused of unlawful assembly?

...accused of home invasion?

...accused of loitering or obnoxious behavior?

...accused of illegal immigration?

Desert Hairy Scorpion

Black Widow Spider

German Cockroach

Chilean Rose Hair Tarantula

Giant Vietnamese Centipede

American Cockroach

Rogue's Gallery!

3. Are any of these charges from question #2 false?
   Which ones?

4. Give an example of a destructive "home invader."

5. Why do we want to prove these myths as true or false?

Fun Fact: *A Praying Mantis can turn their triangular heads up to 180 degrees in search for an insect and see up to 60ft (18 meters) away!*

Living Mummies!

Definitions:
Metamorphosis – a profound change in form from one stage to the next in the life history of an organism

1. How many stages of metamorphosis do advanced insects like beetles, butterflies, and fleas go through and what are those stages called?

2. How many stages of metamorphosis do primitive insects like dragonflies, grasshoppers, and silver fish go through and what are those stages called?

3. How does studying insect metamorphosis help humans to understand our own species development?

4. Do humans go through any kind of 'metamorphosis'? If so, how?

5. What advantages are there in studying insects in relation to agriculture and environmental protection?

6. What stage of 'change' are the giant mealworms in right now? Are there any 'adults' visible with the mealworms? Why?

7. In many cultures, the term metamorphosis is used as a metaphor for changes we make or take in our lifetime. Hypothesize the following: If I were to see myself as an insect, what kind of metamorphosis would I go through? What species of insect am I most like and why?

Fun Fact: Glow Worms are not worms, but are actually beetle larvae! They catch their dinner by lowering a long line of sticky mucus to catch midges, mosquitoes and flies.

Bird-Eating Terror!

Definitions:
'Bird eating' – these tarantulas were so named because some have been observed feeding on hatchling birds in their nests. These spiders usually feed on other small animals and DO NOT fly through the air feeding on birds in flight

1. What is the world's largest species of spider? Where can you find it?

2. How did this spider get its name?

3. If you were the discoverer of this species, what would your reaction be and what would you have named it?

4. Draw a life-sized Goliath Bird-eating Tarantula on the back of this page. What do you use to make your scale measurements accurate since you cannot hold this specimen? Do you think this may have played a role in the 'reputation' and name of this arthropod? How?

Fun Fact: The Goliath bird-eating tarantula can make noise by rubbing bristles on its legs together. This hissing noise called stridulation is loud enough to be heard up to 15 feet away!!

Wall Of Wonder – Right here in San Diego!!

Zombie Crickets! (Jerusalem crickets and horsehair worms)

Definitions:
Parasite – an organism that lives on or in an organism of another species, known as the host, and from whom it obtains nutriment
Host – a living animal or plant from which a parasite obtains nutrition
Cyst - a capsule or resistant covering
Symbiotic – the living together of two dissimilar organisms, as in hosts and parasites
Hypothesize – a proposition, or guess, set forth as an explanation for the occurrence of some specified group of phenomena, asserted merely as a provisional conjecture to guide investigation

1. The two organisms in the "Zombie Cricket" display have a _____ relationship.

   This means they _____

   Are either of these organisms dangerous to humans? Why or why not?

2. Common names are sometimes very misleading which is why scientists use Latin or scientific names. What are the common names of these two organisms and how did they get them?

3. How many eggs can a horsehair worm lay? Why so many?

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Zombie Crickets! (Jerusalem crickets and horsehair worms)

4. The horsehair worm must use two different hosts in its lifetime. The first one is called a _____ host and really is nothing more than a mode of transportation to find its next host.

5. Be a detective and think outside the box!! The horsehair worm is like a patient stalker and shrewd hitchhiker waiting for just the right victims to come along not once but twice, just to complete its simple life cycle. If the worm has to go back to the water to complete this cycle, hypothesize why it bothers to go to the land in the first place. What are the possible advantages? Is there room for 'reasonable doubt' as to the success or guilt of this stalker hitchhiker?

Fun Fact: Jerusalem crickets play the 'drum' by beating their abdomen on the ground. Each species actually has a unique 'song' all their own!

Alien Empire Invasion! (Argentine Ants)

1. If the Argentine ant is inadvertently introduced to other parts of the world, what can we consciously do to help make sure they do not invade new territories?

2. The Argentine ant 'alien invaders' like to use human dwellings and readily take over abandoned nests of other ant species. Why do they have this strategy? Why not take over a thriving nest of a competitive species?

3. Why can't or doesn't the Coastal Horned Lizard just eat the Argentine ants?

Alien Empire Invasion! (Argentine Ants)

4. Is there a way to help bring the Coastal Horned Lizard back from decline? What can you do to help?

5. It seems the Argentine ant is a non-aggressive and benign species that is making the best of a situation it was displaced to, regardless of where it goes. These ants move into abandoned or already existing structures, tend or 'farm' aphid colonies for food production, and even comingle with the bordering neighbor nests. Therefore, who is the REAL culprit responsible for the destruction from this 'alien invader'?

6. What can we learn from the Argentine ant colonization practices that would help us live better on our planet? Is it too late?

Fun Fact: Argentine ant colonies almost invariably have many reproductive queens, as many as eight for every 1,000 workers, so eliminating a single queen does not stop the colony's ability to breed. When they invade a kitchen, it is not uncommon to see two or three queens foraging along with the workers!

Invasion of the Body Snatcher! (Tarantula hawk)

1. What adaptation does this wasp have that helps warn predators and competitors that it is dangerous?

2. Does San Diego County have a species of tarantula hawk living within its borders? If so, where could you find it?

3. What does a female tarantula hawk do with her prey once she has stung and paralyzed it? Why?

Invasion of the Body Snatcher! (Tarantula hawk)

4. The tarantula hawk stinger can be up to 7 mm (1/3 in) long, is considered to be one of the most powerful and painful stings in the world but is generally considered docile toward humans. Hypothesize as to why such a potent sting is needed, but NOT used on humans (unless provoked.)

5. One of the biggest advantages animals have is their ability to mimic or copy other animals to defend themselves. Find two examples here in the display of mimicry. How does it help them survive?

Fun Fact: The tarantula hawk sting is among the most painful of any insect, though the intense pain only lasts about three minutes. The pain has been described as "…immediate, excruciating pain that simply shuts down one's ability to do anything, except perhaps scream. Mental discipline simply does not work in these situations."