**Middle School STEM Science Lab/Activity Planner**

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| Name of Lab/Activity: Crazy Adaptations | Grade: 7 |
| California Science Standard(s): (please copy and paste standards taught during this lesson)* Students know both genetic variation and environmental factors are causes of evolution and diversity of organisms.
* Students know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.
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| Learning Objective/Goal: * Students will identify possible genotypes and phenotypes of imaginary creatures.
* Students will identify if a trait is an adaptation.
* Students will understand that learned behavior is not inherited.
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| Language Objective/Goal: (based on California Common Core Standards)Writing standard 2/3: Students will write an explanatory paragraph describing what happened to their creature during the Adaptation Survivor game |
| Materials & Resources:* Crazy Adaptations activity (from CPO Science)
* Dice
* <http://www.youtube.com/watch?v=9oqOub_IYj8&feature=youtube_gdata_player>
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| Procedure:See attached | Teaching Notes: (include timing) |
| Math Connection: Create Punnett squares, collect data from Adaptation Survivor (add/subtract points), record class data of creature extinction (analyze what the creatures all had in common) | Teaching Notes: |
| Technology Extension of Learning:YouTube videos of chimps eating termites using tools | Teaching Notes:Talk about how the adult chimps were not born knowing how to use the tools. Baby chimps observe their parents and copy their behavior |
| Formative Assessment: (please attach a copy) * Write a story about your creature and its life (based on the game)
* Post activity questions
 | Teaching Notes: |
| Strategies for EL and Special Needs Students:Have pictures of various phenotypes, environments, predators and prey | Vocabulary: adaptation, evolution, inherited |
| Alignment in science unit: (Brief description of lessons taught **prior to & after** this lab/activity)After Blood Typing web activityEvolution |
| Brief description of lessons taught **after** this lab/activity:Natural Selection |
| Lab/Activity adapted from: (website, textbook, etc.)CPO Focus on Life Science | Formative Assessment adapted from: |
|  |
| This lesson was developed by: |
| Teacher’s Name | Currently Teaching at: (School & District) |
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PROCEDURE

Anticipatory Set:

What do we all have in common?

Students will have a variety of responses. We are all animals, we are all humans, etc. Guide them to answering that we are all members of the same species.

Are all members of the same species exactly alike?

No - there are differences among members of the same species.

Where do those differences come from?

Many of the differences come from differences in genotypes. There is genetic variation among members of the same species.

An adaptation is an inherited trait that helps an organism survive in its environment. Can you

name some of your adaptations for survival?

Students will have a variety of responses such as “big brains,” “warm blooded,” etc. Write a list of human adaptations on the board.

What is behavior? Name some behaviors.

Evolution is the process of how organisms acquire adaptations over time. In this investigation,

you will find out the relationship between adaptations and the environment. You will use the

Crazy Traits set to build a creature that is adapted to its environment. Then, you will play a

game called Adaptation Survivor where you will see how a changing environment can affect a

population of organisms.

Part A: **Determining your environment**

You will work in groups for the investigation. Each group should have a Crazy Traits set. First, you will roll a dice to determine the type of environment in which you live. Table 1 lists the variables you will roll for. Suppose I roll a 4. What type of soil will I have in my environment?

You will have purple soil.

That’s right. Now, in your groups, roll the dice for each variable and record your results in

Table 1.

Give students a few minutes to roll and record their environmental variables.

Part B **Stop and think**

Now, think about the environment you have. What type of soil do you have? What is your food

source? What is your predator? What is the topography? Then, think about what types of adaptations an organism would need to survive in such an environment.

Give students some time to answer questions a and b.

Part C **Choosing your traits**

Now you will design a creature that can survive in the environment your group rolled for. Look at the list of traits, genotypes, and phenotypes in Table 2. Some of the phenotypes are adaptations that will help you survive. Other phenotypes are not adaptations because they will not help you survive, but will not hurt your chances for survival either. Can someone give me an example of a phenotype that is an adaptation?

Webbed feet would help you survive in a swamp. Elephant ears would help you hear better.

Can you name a trait that you think is not an adaptation?

Answers will vary and students could discuss these. There is no completely right or wrong answer here as long as students can justify their answer. For example, students may argue that eye color is not an adaptation. Another student may argue that red or green eyes may help an organism see better.

Now, with your group, complete Table 3. Be sure to discuss all traits in your group. Make sure you all agree before proceeding to the next trait.

Give students some time to complete this task.

Part D **Analyzing the data**

Now answer questions a through c individually. Be creative in your answers.

Allow students to work silently to describe how their creature is adapted to its environment.

Part E **Playing the Game of Adaptation Survivor [if I cannot find the cards, delete this activity]**

Organisms are adapted to their environment. But suppose the environment suddenly changes.

What could happen?

If the organism does not have successful adaptations, it may not survive the changes. Organisms that survive will be able to reproduce and pass their adaptations on to their offspring.

Now we’ll play a fun game of chance to simulate how changing environments can affect organisms of a species. Imagine that all of the creatures in this room are of the same species. As you can see, there is great variation among individuals of the group. The object of this game is to be the last surviving member of the group. You will earn or lose points based upon whether your

creature’s set of traits are adaptations for survival. When your creature earns a minus-three

total, it becomes extinct!

* You will need the Environment Cards that come with the Crazy Traits set for this part of the investigation. Use a deck from one of the sets. Shuffle the deck and have a student pick are card. The student should read the environmental condition on the side of the card that is facing them as they draw it. The scoring is based on a creature’s phenotype for a given trait that is affected by the Environment Card. For each environmental condition, a creature can:

Thrive = (+1)

Be pushed closer to extinction = (-1)

Have no effect = (+0)

* If a Catastrophe Card is drawn, all creatures are pushed closer to extinction and earn (-1).
* Play the game until there is one survivor who wins the game. If the final card wipes out the last two or more creatures, the species becomes completely extinct!
* The object of the game is to help students think about the concept of adaptations and genetic variation. The game itself is not realistic and is not based on real examples.
* Add cards in which learned behavior help the creature.

Part F Show 1st video of chimps using tools to eat termites. Ask students how did the chimp know to use the stick. Was it an adaptation or learned? Would its baby know how to use tools like its parents?

Show 2nd video of chimps where babies are watching the adults and learning how to use tools.

What things were adaptations? What were traits?