Name_____

Squirrel Islands

Purpose: To explain how adaptations help organisms survive in different environments

Background Information: **Mutations** are random changes in the genetic information of an organism. They cause new traits in an organism. Most are harmful, but a few are neutral or even beneficial.

There are two main types of genetic mutations: a **point mutation** and a **frameshift** mutation. In a point mutation, one of the bases (chemicals) in the chain of DNA is replaced by a different base. In a frameshift mutation, one base pair is "deleted," so it throws off the DNA sequence, leading to different proteins that are usually useless or harmful.

A beneficial or neutral mutation can quickly become harmful when ***the environments change***. The environment greatly affects an organism's ability to survive, and even a small change can be harmful to some organisms.

Some examples:

- The panda's "thumb" is actually an enlarged bone of the wrist. In the panda's environment, bamboo is the main food source. It is difficult to handle and break the hard stalks, so an enlarged wrist bone helps to grasp the bamboo. In another environment where the food source is not plants, an extra 'finger' would have little benefit, perhaps even be cumbersome. The mutated hands of pandas have been beneficial only because of their need for a better grip on bamboo.

- The kokapo is a strange flightless parrot that lives in the brush on the mountains of New Zealand. Before man reached its shores, the island was almost mammal-free, with no ground predators of birds. As a result, the many ground dwelling birds lost the ability to fly, because there was no need. Their wings are small and useless. When man did come they brought mammals, such as cats and weasels. The kokapo was easy prey for them, and is now nearly extinct. This happened to several other birds, including the kiwi. These birds inability to fly quickly caught up to them when the environment changed, showing how their mutation of bad wings was harmful in a different environment.

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- The penguin has a similar situation, living in the waters of Antarctica and surrounding places. They have evolved into flightless birds that are cumbersome and ineffective on land, but are masters of the water. In Antarctica, the sea is the best place to get food, so that is where the penguin has hunted. It has gradually lost its ability to fly, attained huge amounts of insulating blubber, and gained mutated legs that are great for swimming and terrible for walking. If the penguin was not in the environment it is so well suited for, it would be very vulnerable and helpless. The mutations that have helped it survive in Antarctica would quickly become useless in a place like the grasslands or mountains. In an environment without water nearby, mutated wings and legs suited for swimming are useless. (Information from *Nature Niche*; http://natureniche.tripod.com/mutation.html)

Materials:

Drawing paper Map pencils

Procedure:

1. Work with your partner.
2. Put your names on the back of the drawing paper.
3. Use a PENCIL
4. You will be assigned an island habitat.
5. Design a squirrel that has adapted to the environment of the island (*beneficial mutations*).
6. Draw the island environment and the squirrel.
7. On the back of your drawing, describe the adaptations, and why they are beneficial to the squirrel.
8. Neatness and attention to detail matters!

Island Environments:

ISLAND 1	***ISLAND 2***
▪ Fairly flat ▪ Few hills ▪ Ground is soft dirt ▪ Several species of small bushes and shrubs grow in the center of the island ▪ No animal life on land; but the water is full of fish. ▪ Surrounded by a coral reef which keeps the predators out. ▪ Sandy beach with no algal growth ▪ Fresh water is available.	▪ Rocky shoreline ▪ Many tide pools dot the island along the beach ▪ Wave action is somewhat sheltered by rock outcrops. ▪ Tide pools contain barnacles, oysters, sea urchins and crabs ▪ Algae grows all around the island, however, it is quite thin in the tide pools where the animals feed ▪ The current is quite strong along the rocky outcrops where the algae grows best ▪ Fresh water is available.
ISLAND 3	***ISLAND 4***
▪ Desert-like ▪ A few species of cactus live on the bare rocks ▪ A large cactus-eating tortoise lives on the island ▪ A species of very large bird nest on the island annually ▪ They build their nests on the rocks, and protect their eggs from the sun by standing over the nests with outspread wings ▪ The nests are always found on the windy side of the island which is somewhat cooled by offshore breezes.	▪ The island is an extinct volcano ▪ Plant life on the island changes with the altitude moving up the volcano ▪ Grasses grow at the base. ▪ Further up the slope the grasses give way to low shrubs ▪ Half way up, the island becomes quite lush; tropical plants and trees dominate the landscape ▪ At this altitude, the island experiences frequent rain showers ▪ There are two species of birds that live on the island: One is a raptor (meat-eating) which preys upon the smaller birds. The other bird fishes the waters approximately one mile offshore ▪ Both nest in trees.

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Questions & Conclusions:

Use Chapter 20, page 586 in your textbook as a reference.

1. Give an example of each of the following in your Squirrel Island ecosystem:

   - Producer
   - Consumer
   - Predator
   - Prey
   - Scavenger
   - Decomposer
   - Habitat
   - Community
   - Population
   - Niche
   - Abiotic factor
   - Biotic factor
   - Limiting factor
   - Carrying capacity