Name: _____ Date: _____ Group: _____

Gene Flow

Lexile 1020L

Mainland Lizards

Island Lizards

1 There are many possible explanations for how organisms evolved to the state that they are today. The truth is that we may never know exactly how this occurred. Science, however, uses logical reasoning to attempt to develop an explanation. Many scientists use a process known as inductive reasoning, or "educated guesses," to make general conclusions based on a series of specific observations. However, the term "educated guess" can be misleading. Some of these "educated guesses," or hypotheses, have withstood the test of time. They have given science reliable explanations for how organisms have evolved over the course of history. Hypotheses are never wrong or right. They are either supported or refuted by data, and as a result, they can change. In order to fully understand this process, we must first define some terms.

2 To begin with, what exactly is a hypothesis? A hypothesis is a tentative or temporary statement that offers a possible explanation for observable phenomena or events. Science uses experimental testing in order to understand the relationship between two or more variables. With this type of testing, a factor, or variable, is purposefully changed. Then, the results of how this change affects other variables is observed and recorded. A hypothesis can be considered a testable statement if it includes a prediction of how the variables may be related. The relationship between those variables must be found as a result of a test. The change in conditions of the experiment can produce results that are measurably different.

3 A hypothesis, however, is NOT a prediction. A prediction would state something, such as, "I predict that a population of island lizards that moved to the mainland will have more diversity within their population." This cannot be considered a hypothesis as there are no stated variables. With no stated variables, there is nothing to test.

4 Consider the following question: Is there evidence to support the idea that organisms have evolved over time, and how could we observe that process today? One strong explanation is that of gene flow, or the movement of genetic information into or out of a population of organisms. Scientists can study modern organisms and create hypotheses to test whether or not gene flow genetically alters a population of organisms. If the hypothesis is supported, then that evidence could be used to verify the evolution of that particular species over time. How? Gene flow can eventually alter the genetic makeup of the entire population. In other words, the variety of genes for the population will increase. As genes flow into a population, the genetic diversity or differences **between** populations will decrease. The genetic diversity **within** that population, however, will increase.

5 Imagine that a tiny remote island holds a colony of small lizards. There is no diversity (no difference) among these lizards, as they have lived alone on the island for a very long time. Now imagine a strong storm sweeps some of the island lizards over to the mainland. Once the island lizards reach the mainland, several things occur. First, there are new ecosystems for the island lizards to explore. There are wetlands, rocky areas, and highlands. Second, they meet other lizards in these new ecosystems that they can now breed with. The mainland lizards have different traits than their small island counterparts. The mainland lizards are much larger and more colorful than the island lizards. The island lizards may be adapted to eat a wide variety of food since their choice of food supply may be more limited. T he offspring that result from interbreeding between mainland and island lizards will have different combinations of adaptations or inherited traits from their parents.

6 Your task will be to study how the diversity of the offspring of the island lizards changes once they are introduced to the mainland. It is best in an experimental study to choose one factor to focus on. This makes it much easier to write your hypothesis. For this experiment, you will study how and if the diversity of the offspring of the relocated island lizard population changes over time. You can start the process with the prediction from the original question. Think of how you would use this prediction to create a hypothesis for a field experiment. That experiment must test whether the flow of genes between these two lizard populations could alter the genetic makeup of both populations. Remember that this hypothesis must be testable, and therefore measurable. This hypothesis will actually be your best "educated guess" about what you think might occur with the relocated island lizard population. It is not a hypothesis if the variables are not stated. As a reminder, you will be studying how the diversity of the offspring of the relocated island lizard population changes over generations. This time is not just a period of days, but rather over several generations of lizards. The answer to this study will reveal if there was, in fact, gene flow.

1 Review Paragraph 5. What factor would not affect the island lizard gene pool once they reached the mainland?

A New and diverse ecosystems

B Major island storms

C New populations of lizards to breed with

D Separation from the island lizard population

---

2 In your field experiment to study the gene flow between the lizard populations, what type of evidence would support that gene flow had occurred?

A The diversity of the lizard population originally from the island would increase.

B The diversity of the entire lizard population now living on the mainland would decrease.

C The genetic makeup of both the island and original mainland lizard populations would change.

D All of the above

---

3 You are going to study the diversity of the island lizard population that was relocated to the mainland. What would be the best approach to the study?

A Study the diversity of one generation of **island** lizards.

B Study the diversity of one generation of **mainland** lizards.

C Study the diversity of many generations of **island** lizards.

D Study the diversity of many generations of **mainland** lizards.

4 Review Paragraph 4. What do you predict will happen to the gene pool diversity of the **island** lizards once they reach the mainland?

A It will become more diverse.

B It will become less diverse.

C It will not change.

D Not enough information is given.

---

5 After moving to the mainland, what characteristic is unlikely to change in the island lizards' descendants?

A A change in size

B A change in color

C A change in numbers

D A change in diet

---

6 Imagine that you are the lead scientist studying whether or not a change in island lizard population would be evidence for gene flow. What is the most appropriate hypothesis for this experiment in terms of the results you would expect? After a gene flow event,

A if the diversity of the lizards changes, then many generations will have passed.

B if many generations of lizards are able to interbreed, then the size of the lizards will change.

C if the diversity of the lizards changes, then the color of the lizards will change.

D if the size of the lizards changes, then there would have been a gene flow event over time.