

 **Exploring Evolution & Natural Selection:**

 **Do only the *Fittest* Survive?**

**50 Points**

**Standard**

SC.912.L.15.1 Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.

**Introduction**

 One of every organism’s most basic needs is food. The ability of an animal to get enough food to *survive and reproduce* basically depends on three things: the type of “tool/s” the animal has to eat with, the type of food available, and the amount of food available. The factors are dependent on each other because, without the right tools the animal can’t get the food, and without the right types of food, the animals’ tools are useless. To make an analogy, it’s like trying to change a flat tire with garden tools.

 In this lab you will discover how these factors interact by using “bird beaks” to pick up the various “foods” they eat. An ***adaptation*** is a characteristic that helps a plant or animal survive in its environment. Bird beaks have adapted for many things such as eating, defense, feeding young, gathering and building nests, preening, scratching, courting and attacking. The size and shape of a beak is specific for the type of food the bird gathers. For example, cardinals have heavy thick bills used to crack seeds, and humming-birds have thin bills to sip nectar. Other uses include: sifting, sucking, cracking, crushing, spearing, tearing, picking, and probing.

**Pre-Lab Questions**

1. The process of change over time is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (pg. 450)

2. What is the theory of biological Evolution? (pg. 450)

3. Who is Charles Darwin and what are some of the major findings that contributed to his development of the theory of biological evolution? Provide specific examples. (pg. 450; 460-464)

4. Define the term ***Fitness*** (pg. 460-461):

5. Define the term ***Natural Selection*** (pg. 463):

6. When does Natural Selection occur (pg. 463)?

**Lab:**

Students will work in groups of 3-4. Each member will choose only one tool and use it to hunt for 10 seconds at each station for three trials. Prior to hunting, each group member must hypothesize which bird they believe will be the ***fittest*** at each station. Each bird must eat at least 9 total specimen in order to be able to survive and go on to reproduce.

**Feeding Station #1: Worms (Trollies in Brown Sugar)**

**Materials:** Tweezers, Spoon, Skewer, Tong

1. Hypothesize which bird will be the ***fittest*** at this station: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Data Collection:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bird & Tool** | **Trial #1** | **Trial #2** | **Trial #3** | **Total** |
| Finch- Tweezer |  |  |  |  |
| Spoon- Spoonbill |  |  |  |  |
| Avocet- Skewer |  |  |  |  |
| Pelican- Tong |  |  |  |  |

Which bird & tool ate the most? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which bird did not survive? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Feeding Station #2: Fish (Swedish Fish in distilled water)**

**Materials:** Tweezers, Spoon, Skewer, Tong

1. Hypothesize which bird will be the ***fittest*** at this station: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Data Collection:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bird & Tool** | **Trial #1** | **Trial #2** | **Trial #3** | **Total** |
| Finch- Tweezer |  |  |  |  |
| Spoon- Spoonbill |  |  |  |  |
| Avocet- Skewer |  |  |  |  |
| Pelican- Tong |  |  |  |  |

Which bird & tool ate the most? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which bird did not survive? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Feeding Station #3: Small animals (i.e. mice) (Jumbo Marshmallows in brown sugar)**

**Materials:** Tweezers, Spoon, Skewer, Tong

1. Hypothesize which bird will be the ***fittest*** at this station: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Data Collection:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bird & Tool** | **Trial #1** | **Trial #2** | **Trial #3** | **Total** |
| Finch- Tweezer |  |  |  |  |
| Spoon- Spoonbill |  |  |  |  |
| Avocet- Skewer |  |  |  |  |
| Pelican- Tong |  |  |  |  |

Which bird & tool ate the most? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which bird(s) did not survive? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Feeding Station #4: Insects (M&Ms and imitation grass)**

**Materials:** Tweezers, Spoon, chopsticks, Clamp/ clothespin

1. Hypothesize which bird will be the ***fittest*** at this station: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Data Collection:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bird & Tool** | **Trial #1** | **Trial #2** | **Trial #3** | **Total** |
| Finch- Tweezer |  |  |  |  |
| Spoon- Spoonbill |  |  |  |  |
| Avocet- chopsticks |  |  |  |  |
| Pelican- Clamp |  |  |  |  |

Which bird & tool ate the most? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which bird(s) did not survive? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Post-Lab Questions** You may use your textbook or lab notes to answer the following questions *individually*.

1. List 4 major causes of natural selection.
2. What are 3 effect that natural selection can have on an organism, population, or species?
3. List some effects that might occur if there is an overproduction of offspring within a population.
4. What is inherited variation? Name some ways that those variations can be “introduced” into a population.
5. Discuss possible outcomes of struggles to survive. Be sure to address the *differences in the ability to reproduce*.

**Conclusion** Each group member is to *individually* write a 3-paragraph (4-5 sentences each) lab report that summarizes the results of each lab station, discusses the meaning of those results, and includes a summary of the pre-lab AND post-lab questions. Staple the lab report to this packet and turn in by the next class day.