

## ***Natural Selection Game – A Simulation***

**DO NOT THROW THE BEADS – A ZERO WILL RESULT!**

**Concept:** Natural selection is an “unconscious” but non-random process acting on random variations in a population to produce a high degree of fitness.

### **Materials:**

- Habitat – 1 section of multi-colored fabric
- Colored beads; (a plant seed population named *Plastico beadii*)
- Forceps
- Petri dish (for all predators)

### **Procedure:**

1. Work in groups of three to four individuals
2. Prepare data tables

### **Group members’ responsibilities:**

- A. Mother Nature** – selects a fabric habitat and **30 beads of different colors**. Prepare the habitat by spreading **10 different colors, 3 beads of each color** on the habitat. Takes care of the reproduction cycle for each generation.
- B. Predators “Birds”** – (1 to 2 people may rotate); 2 people prey on organisms for *10 seconds* using forceps.
- C. Naturalists** – monitors the *10 second generations*. Counts surviving organisms after each generation and records data.

**Note: these roles can change every two generations. You must have 2 predators!**

### **PART A: Natural Selection**

3. The **Naturalists** begins the first generation. Each session only lasts 10 seconds with the **Predator** opening his/her eyes and preying upon the organisms (seeds) in the habitat. **Predators** must use forceps to remove one organism at a time and place it in the Petri dish.
4. After each predation session the naturalists counts the survivors by color. The **Naturalist** then enters the number of each organism in the population (survivor) data table. All remaining organisms grow and **reproduce one offspring**. Before the next predation session **Mother Nature** spreads out the organisms randomly.
5. Repeat steps 3 and 4 for four more predation sessions then rotate the Naturalist, Predator, and Mother Nature every other session.

## **PART B: *Variation and Changes in the Environment***

6. Repeat the simulation a 6<sup>th</sup> session, but this time your group must modify the rules of the game. **Environments are dynamic, not static! Your modification of the environment must be clearly stated on your data table and graph. How can your group change the environment? Consider the fabric color (a fire, or change of season perhaps), or topography?**

### **Analysis:**

- Make six bar graphs, **generations 1 through 5 from Part A, and generation 7 from Part B** illustrate the seed color and population size.

### **Conclusion Questions: (for original predation sessions/generations 1 through 5)**

1. Study your survivor populations for each generation especially between the 1<sup>st</sup> and 5<sup>th</sup> generations. What changes occurred in the frequencies (#) of seed colors between these two generations? Why?
2. Examine the colors of bead survivors in the 5<sup>th</sup> generation and the fabric habitat. How do the seed colors of the survivors relate to their habitat colors?
3. What do you predict would happen to the frequencies (#) of seed colors if you continued the simulation activity for several more generations? **How is this related to natural selection; “survival of the fittest”?**
4. How might the seed population change if **pinto bean plants** (a different species) migrated into or out of the habitat? Discuss both situations.
5. What do you think would happen to the population if it produced only offspring that were all alike (the same the color- no variation)?
6. Assuming no new individuals migrate into the habitat, how will the seed population change over thousands of generations? **How are your results related to evolutionary change?** (hint: Discuss what the more predominant colors might be and why).

### **Conclusion:**

Compare the colors of survivors in the 5<sup>th</sup> generation to those who survived the 7<sup>th</sup> generation. Discuss **how your modified environment affected seed frequency (# of seeds)**, if at all. Discuss how the results are similar or different from the original simulation, i.e. PART A.