## Lab #3: The Natural Selection of Fruit Loops (PAGE 12)

One of the most noticeable forms of **natural selection** is **predation**. Predators eat other organisms, while **prey** are eaten by them. We will study the evolution of **protective coloration**. Many animals are very well **camouflaged** against being found by their predators. Some prey mimic part of their **habitat**. How do **mimicry** and **protective coloration** evolve?

**Procedure**

1. Partner up. Each team will begin with a different color of "environment" (construction paper). Pick one person to be the "Fruit Loop Predator". They should not look at what the other person does in Step 2.
2. The other person randomly scatters four (4) of each color of fruit loop on the environment (**carrying capacity**). This is **Generation 1**. Record this in the data table.
3. The Fruit Loop Predator should now capture ten (10) wild fruit loops. Look away from the environment, look back quickly, and grab the first one you see. Then look away again until you select the next one. Don't waste precious predator time being picky! Grab the first fruit loop you see and eat it!
4. The fruit loops that you ate died (they don't get to reproduce). The fruit loops left on your environment **survived**! They **do get to reproduce**! For each surviving fruit loop, add one more of the same color.
5. Count your fruit loops and record the number of each color variety for **Generation 2**. (Always = 20)
6. Repeat Steps 3 through Step 5 for **Generations 3 – 6**.
7. Switch roles with your partner and everything. Remember: **R**epetition makes **R**esults more **R**eliable!

*Adapted from "Natural Selection" by Kim B. Foglia. www.explorebiology.com*

## Data Collection (PAGE 13)

Predict species of fruit loop better be able to survive:_____

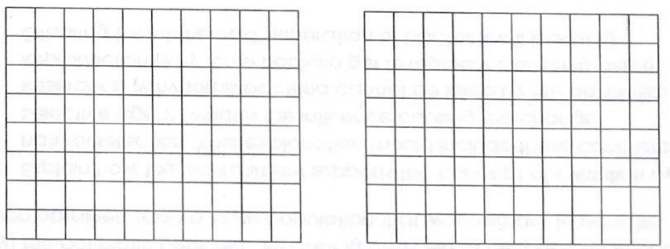
Record your raw data in the table below:

| | ***Number* of Fruit Loops Entering Generation:** | | | | | |
|---|---|---|---|---|---|---|
| **Colors ↓** | **1** | **2** | **3** | **4** | **5** | **6 (final)** |
| Red | | | | | | |
| Green | | | | | | |
| Purple | | | | | | |
| Yellow | | | | | | |
| Orange | | | | | | |
| **Totals →** | **20** | **20** | **20** | **20** | **20** | **20** |

Now, calculate the percentage:

| | ***Percentage* of Fruit Loops Entering Generation:** | | | | | |
|---|---|---|---|---|---|---|
| **Colors ↓** | **1** | **2** | **3** | **4** | **5** | **6 (final)** |
| Red | | | | | | |
| Green | | | | | | |
| Purple | | | | | | |
| Yellow | | | | | | |
| Orange | | | | | | |
| **Totals →** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** |

Now, graph your calculated percentages for Gen 1 & Gen 6 using a bar graph/histogram. Include title and label axes:



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**Lab #3: The Natural Selection of Fruit Loops → Analysis Questions**

1. Separate yourself from this lab and consider the following "thought experiments" in natural selection— **what outcome might you expect under the following conditions described below:**
    a. If the color differences were less distinct (ex. all fruit loops were only shades of reds and oranges), would you expect similar results? Explain what you would expect and why.
    b. What if you had a population with all 5 colors again, but the red fruit loops made the predator very ill; would you expect similar results? Explain what you would expect and why.
    c. What if the red fruit loops made the predator very ill and it learned to stay away from them, and there also was a new group of fruit loops very similar in color (a close red, orange color). What would happen to the red-orange fruit loops? Explain your answer.
    d. Over the long term, what trait (ability) could be strongly selected for in the predator population in the situation of similar color variants proposed above?
    e. You identified a trait (ability) that would strongly benefit the predator population. Does that mean the population will evolve that trait, since it is a "need" they have.
2. Consider the results in this lab.
    a. Did any of the fruit loops survive because they chose to be the more fit color?
    b. Did any supernatural power design the surviving fruit loops to be more fit?
    c. Describe how natural selection caused the fruit loop population to evolve? (Include the four steps as they apply to the fruit loops.)

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**Lab #3: The Natural Selection of Fruit Loops – REGENTS PRACTICE**

A scientist discovered that in a large population of pathogenic (disease-causing) bacteria, a few were resistant to (could not be killed by) the antibiotic penicillin. By adding penicillin to the population, she soon obtained (got) a large population that was resistant to penicillin.

1. Explain how this environment supports the concept of evolution by natural selection. Your explanation should include these concepts:
- Selective agent (what is the influence causing the change)
- Resistance (why some bacteria cannot be killed by the antibiotic)
- Reproduction (why some bacteria get to reproduce & others don't)
- Offspring (what the next generation of bacteria will look like)

2. Identify the chemical substance in the bacteria that provides the resistance to penicillin and makes this resistance inheritable (able to be passed on to offspring)

3. The evolutionary changes described here occurred in a relatively short period of time rather than requiring millions of years. State one reason why it is possible for bacteria to evolve so rapidly.