THE CHIPS ARE DOWN: A NATURAL SELECTION SIMULATION

INTRODUCTION

The process of natural selection occurs because organisms vary in their heritable characteristics, and because some variants survive and reproduce better than others. As a result, the genetic structure of a population changes through time, which is a factor in evolution. Although evolution may be defined in terms of genetic change, natural selection occurs by the interaction of the environment and whole organisms, and not directly on their genome. The genome is affected by mutations.

In this exercise, we want to reinforce the concept with a demonstration of how natural selection works. It is far too time-consuming to observe natural selection at work in natural populations, so we will use artificial populations consisting of paper chips.

PROCEDURE

1. Spread out the fabric or paper habitat given to you by your teacher on the table top.

2. Count out ____ chips of each of the ____ colors for a total of 100 as your initial population.

3. Appoint one person as the prey (chip) distributor. That person should spread the chips out randomly over the entire fabric, making sure the chips do not stick together. The other members of the group should have their backs turned during this procedure.

4. The predators (other members) should turn around and take turns picking off the prey (chips) one by one until only 25% remain. COUNT CAREFULLY. Predators are to take the first chip they see and follow each chip to the discard area with their eyes so as not to see more chips, and keep track of the number of chips they get.

5. Carefully shake off the fabric to remove survivors (remaining 25 chips).

6. Group the survivors according to color. Count and record these numbers.

7. Assume each survivor produces three offspring. Using the reserve chips, place three chips of the same color with the survivors (i.e., take the number of survivors multiplied by 4).

8. Mix these chips together and re-distribute them as in step 3.

9. Repeat the entire process two more times, making a total of three generations of prey being preyed upon.

(OPTIONAL) The teacher may require students to do a population growth lab of each of the colored chips to show quantitative results and search for a pattern in survival.

Source: http://www.indiana.edu/~ensiweb/lessons/ns.ch.in.html
CHIPS ARE DOWN....Data Sheet

PURPOSE:

<table>
<thead>
<tr>
<th>COLORS</th>
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| Number at start-->
| # after 1st predation-->
| # after 1st reproduction-->
| # after 2nd predation-->
| # after 2nd reproduction-->
| # after 3rd predation-->

REVIEW QUESTIONS:

1. Study your survivor populations.
   a) Was 1 color of paper chip represented more than others in the first generation of survivors?
   b) Were shades of that color or similar colors also present?
   c) What, if any, change occurred between the 1st and 2nd, and again between the 2nd and 3rd generation of survivors?

2. Compare the original and survivor populations. Is there any color from the original population that is NOT represented in the survivor population? _____ If so, what color (or colors)?

3. Examine your survivor chips and the fabric from which you took them. How do you think the colors of the survivors are related to their habitat?

4. Write a conclusion as to which colors survived in the habitat and which did not, and why. Try to extrapolate this to a natural situation.