**THE CHIPS ARE DOWN: NATURAL SELECTION BY PREDATORS ON PREY**

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. Natural selection occurs by the interaction of the environment and whole organisms.

In this model you will be the predator species. We will use pieces of paper to represent a single prey species (the “Chips”). The Chips come in different colors to represent natural variation in the prey species. We will be looking at the effect of the variant’s ability to avoid predation on their survival and reproduction rates.

Materials: One sheet of newspaper, 50 white chips, 50 green chips, and 50 newsprint chips

1. Write a hypothesis about the relationship between how well camouflaged the Chips are and how well they will survive to reproduce.
2. Consider your hypothesis, if it is correct; predict what you expect to happen by the end of the fourth generation…

to the number of newsprint Chips?

to the number of white Chips?

and to the number of green Chips?

How to play:

Work in groups of four.

One member of the group will be the “Keeper” who will set up the playing board each time.

The other three members of the group will be Predators. They remove 5 chips before the Chips have a chance to reproduce.

1. Lay out the newspaper across the desk.
2. Sort Chips into piles by color. Each Chip represents an individual.
3. The Keeper begins by taking 10 of each type of Chip, for a total of 30.
4. The Predators cover their eyes until it is there individual turn.
5. The Keeper spreads the Chips out on the environment, mixing the colors well and spreading out the Chips.
6. The first Predator may look at the board and as quickly as possible, remove 5 Chips.
7. The next Predator looks at the board and removes 5 Chips.
8. The last Predator looks at the board and removes 5 Chips.
9. These 15 Chips are dead. ☹
10. Shake the remaining Chips off the environment and count the survivors according to type.
11. Record the number of surviving Chips in Table 1.
12. Each survivor reproduces one more Chip in their same color to make a population total of 30.
13. Record the total number of each color of Chip as the next round begins.
14. Repeat steps 4-13 for a total of four rounds, recording your data each time.

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| **Table 1. The Chips Are Down Data Table** | | | | |
|  |  | **Paper Chip Variants** | | |
| **Generation** | **Newsprint** | **White** | **Green** |
| **1** | Starting Number | 10 | 10 | 10 |
| Number left after 1st predation |  |  |  |
| **2** | Number after 1st reproduction |  |  |  |
| Number left after 2nd predation |  |  |  |
| **3** | Number after 2nd reproduction |  |  |  |
| Number left after 3rd predation |  |  |  |
| **4** | Number after 3rd reproduction |  |  |  |
| Number left after 4th predation |  |  |  |
| **Final** | Number after 4th reproduction |  |  |  |
| **Calculate Percent Change** |  |  |  |  |

% change = 100\*[(Number after 4th reproduction – Starting number)/Starting number)]

1. Examine the data. Does any Chip variant have more survivors than the others? Why?
2. Was your hypothesis in Question 1 and predictions in Question 2 supported?
3. If they were not supported, revise them here:
4. Based on the data, which of the Chip variants was the best competitor (least affected by natural selection) in this habitat? Why?
5. What do you suppose will happen to the Predator species over time if the Chips become well camouflaged?