"Skittlefish" Adaptation and Evolution

- **Evolution:** change over time
- **Adaptation:** living things change traits to improve their chances of survival
- **Camouflage**: animals make themselves hard to see by blending in with their environment
- **Mimicry**: looking like other (harmful) animals to avoid being eaten.
- **Population**: a big group of animals living nearby
- **Natural selection:** any trait that makes it more likely for an animal to survive will eventually become more common in a popuplation

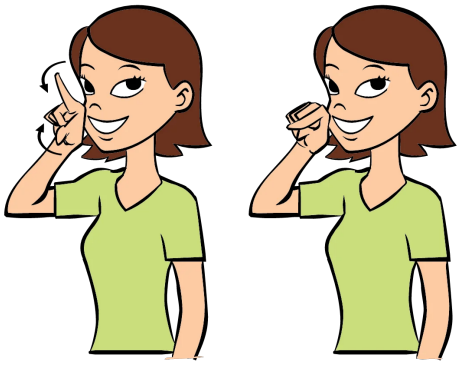
Part 1: "Skittlefish" Camouflage

1. Place a piece of red paper (or several red plastic bowls) in a poorly lit area, on the floor.

2. Count out 5 Skittles of each color (red, yellow, orange, green, purple). Scatter the skittles over the red paper or bowls, so that they are well separated and not touching each other. Flip them so the "S" faces down.

The candies represent a novel species of animal: the rare "skittlefish". Skittlefish come in many colors. The paper or bowls represents the **habitat** where the skittlefish live.

3. You will be a predatory bird that swoops out of the sky to eat the skittlefish. Make a bird beak out of your thumb and pointer finger:



Your bird eye-sight is limited – put on your sunglasses and turn the lights down so you can just barely see the skittlefish.

Aim for the skittle you can most easily see, dive down and pick it up. As quickly as you can, pick up 12 skittlefish, one at a time.

4. When you are done, record how many of each color skittlefish are left.

red	orange	yellow	green

Which color skittlefish did the best at surviving the predatory bird attack?
_____

Why do you think this is?_____
_____

Animals sometimes use **camouflage** – making themselves look like their surroundings. Here are some examples of real animal camouflage:

Why is camouflage a useful adaptation? _____

Which skittlefish are the best camouflaged in their current habitat? _____

Part 2: Natural Selection

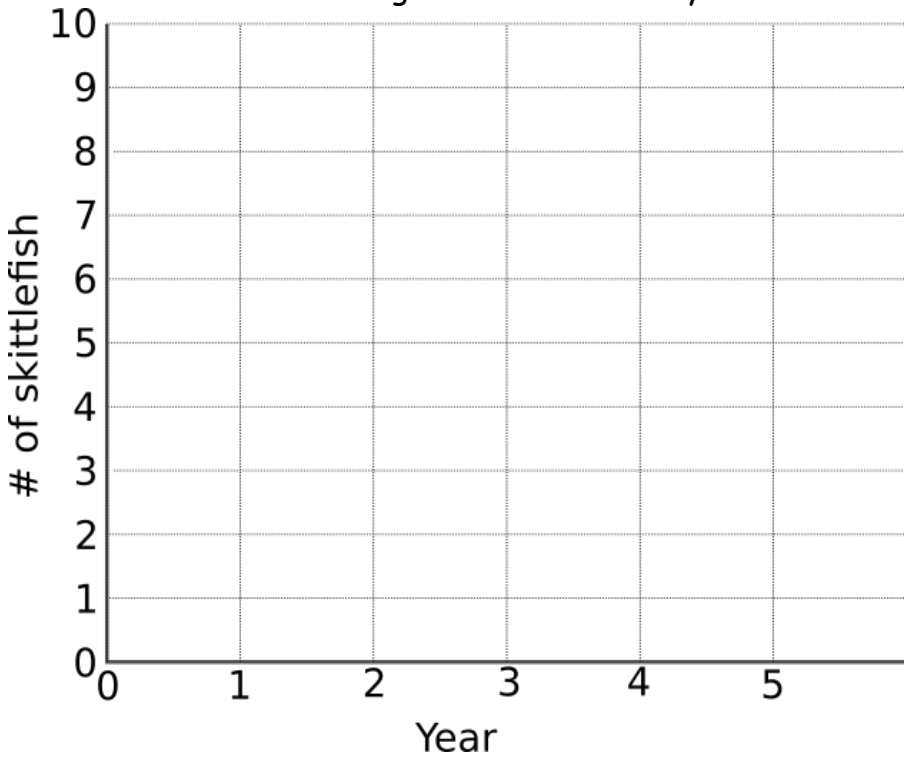
You just simulated a single year of hunting by the predatory birds. Now let's look at what happens over many years.

1. Every year the skittlefish reproduce – the baby skittlefish are always the same color as their parent. For each color of skittlefish left in your habitat, add in the same number of additional skittlefish in that color. In the table below, write down how many skittlefish you now have of each color.

2. Repeat another round of hunting by predatory birds, then another round of reproduction. Write down how many skittlefish of each color you have after the second year. Continue to simulate several more years

(after)	**red**	**orange**	**yellow**	**green**
Year 1				
Year 2				
Year 3				
Year 4				
Year 5				

3. Make a graph that shows the evolution of skittlefish color over time. For each year, plot the number of skittlefish surviving at the end of the year.



What happened to the skittlefish?: _____

_____

What is the main color of the skittlefish population after 5 years?

_____

Did any colors go extinct (disappear entirely)?:

_____

What do you think would happen if you repeated the experiment in a green habitat? What would be the main skittlefish color after a few years?

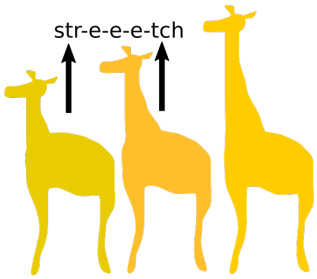
_____

The process you just simulated is called **natural selection**. Any population (group) of creatures will have a variety of traits (for example, color). If one of those traits helps the creatures survive it will be "selected" over time until most of the population has this trait.

In your experiment, did any <u>individual</u> skittlefish change color? _____

Did the overall color of the <u>entire population</u> change its typical color? _____

The long necks of giraffes are an adaptation that helps them reach the highest leaves on trees. Years ago, scientists argued over how giraffes evolved this adaptation over time.



(a) One scientist (Lamarck) claimed: "Each giraffe stretches its neck as high as it can to get the best leaves. A mother giraffe stretches her neck longer and then passes this longer neck to her baby. Eventually, all the giraffes have longer necks.

(b) Another scientist (Darwin) said: "Each mother giraffe has babies with the same length neck as she does. But those mothers which happen to have longer necks are more likely to survive and have babies. So over time the entire population of giraffes will have long necks.

From what you saw with skittlefish, which scientist do you think was right?

_____

Part 3: Mimicry

Instead of using camouflage to blend with their environment, some animals use **mimicry:** making themselves appear like other, more dangerous creatures. Here are some examples of real animal mimicry:

honeybee hoverfly

coral snake (venomous) milksnake (not venomous)

1. Put 5 of each color skittlefish in your habitat. Add 10 yellow M&Ms. Each candy should have the letter facing downward.

2. In this simulation M&Ms are poisonous to the predatory bird. Your goal as the bird is to gather as many skittlefish as you can, without picking up any M&Ms.

3. Put on your sunglasses and try one round of predation. How many skittles of each color are left in the habitat?

red	orange	yellow	green	purple

Which skittlefish is most common among the survivors?_____

What useful adaptation did this color skittlefish have? _____

_____