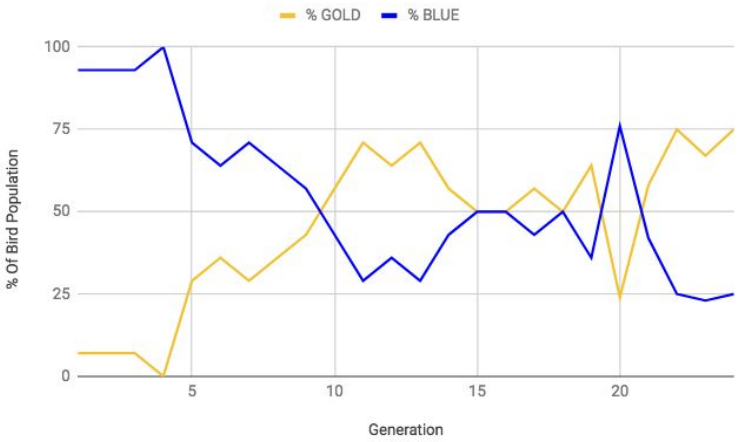
Dylan Ng
Due: 11/20/18
Bird Lab Report

Question: Did the bird population evolve?

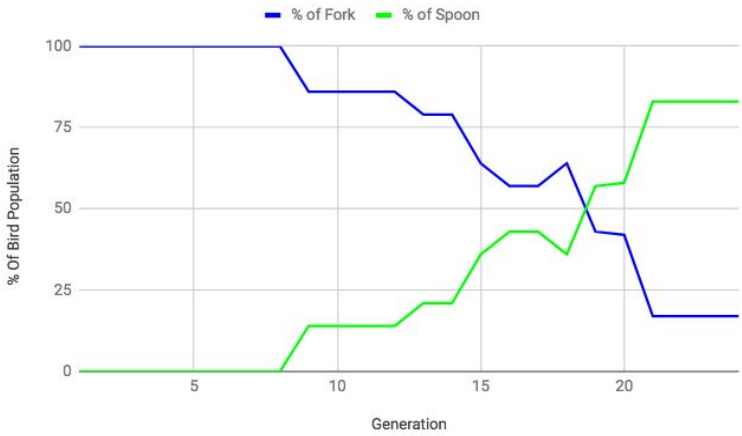
Claim: The bird population evolved.

Evidence:

Percentage of Gold and Blue Over Time



Percentage of Fork and and Spoon Over Time



(In percentages because there was a different amount of the total population between days of conducting experiment)

Trends:

Percentage of Gold and Blue Over Time: Over the 24 generations, the population of blue birds decreased, while the Gold Bird population increased. There isn't a constant trend, throughout whole graph because both lines fluctuate up and down.

Percentage of Forks and Spoons Over Time: Compared to the "Percentage of Gold and Blue Over Time," there is a much more obvious trend in both populations. Although in the beginning, the population of forks was 100%, but because of a mutation in the bird population, over time the gene due to an environmental shift and natural selection became more prominent.

Reasoning:

As a class, we have defined evolution as descent with modification. This can be seen in both characteristics of the bird population: color and beak, as over time and generations the

percentages of both characteristics drastically changed ("An Introduction to Evolution") Firstly, we can eliminate the idea of speciation, or the two different types of beaks being different species due to the both types of birds being able to sexually reproduce with each other ("Causes of Speciation").

Secondly, the order and timeline of the bird lab and evolution is key. A mutation first needs to occur, and it doesn't need to be beneficial or harmful, there just needs to be a random genetic change, which is represented in the bird lab as Kerry gave two people spoons, to replace their forks. Having a spoon or fork did not matter to the bird's survival because there was no environmental shift that would make one more advantageous. This can be seen in the graph as the spoons were introduced in generation 10 as there is no linear trend shown. This mutation allows for more genetic diversity and broadens the gene pool during reproduction. Then there needs to be an environmental shift, which is depicted in the bird lab as the drought after generation 16. Due to the drought, there was an unbalance and the advantageous trait now was the spoon because that type of beak could feed more. The imbalance between traits is shown in the bird lab as the two birds that fed the least were majorly birds with fork beaks that died off, while the birds who fed the most, were always spoons. They reproduced together to create a new generation, along with everyone else ("Evolution Simulation Lab Instructions"). The important point here is that this process happened over a long stretch of time. The evolution of the bird population did not happen overnight, it took over 20 generations for the population to evolve due to a mutation and natural selection.

Natural selection is the process of less advantageous traits dying off, and individuals with the more advantageous trait surviving and reproduce which inevitable increases the percentage of individuals with the advantageous trait in the population ("Natural Selection"). This is exactly what happened to the bird population due to the environmental shift. Before the environmental shift, neither fork or spoon was advantageous, and neither one was necessary for survival because the amount of water drank did not affect your survival, until the flood, when water became rarer and the two individuals who drank the least died. Logistically speaking, it is much harder to carry water with a fork, than a spoon, which caused the imbalance between traits and the development of a more advantageous one.

There are many types of natural selection, but the one represented here in the bird lab is directional selection. Directional selection is when there is one extreme phenotype that is more fit to survive than all the other phenotypes.("Evolution: Worksheet 2 on Natural Selection") This describes the bird lab exactly. The phenotype, birds with spoons, are more fit to survive after the environmental shift(flood), than forks because of its morphology which is more advantageous to drink water. This allows the percentage of birds with spoons in the population to increase because of two reasons: firstly, forks die out, secondly, spoons reproduce and spread their recessive gene. This is depicted in the graph after generation 16, when there is a clear trend(besides one outlier) that goes up.

Unlike the type of beak, the color of the bird did not matter to the bird's survival. Although there is a trend that the blue bird population decreased while the gold bird population increased, this isn't due to evolution, this is just due to reproduction and time. This is represented in the fluctuation of the lines because the survival of the bird was not dependent on color unlike the type of beak. This isn't an example of evolution, but an example of genetic diversity amongst a population.

The bird lab is representative of evolution. Although simplified, it contains all aspects needed for evolution: mutation, gene diversity, environmental shift, reproduction and time. Looking at a real-life example of evolution, the present day Peppered Moth population is a product of evolution due to directional selection ("Evolution: Worksheet 2 on Natural Selection"). In the beginning, most Peppered Moths were black so they could better camouflage themselves against birds that would eat them. There was a mutation in color and some were born with white wings, but due to the Clean Air Act of 1959, tree trunks started lightning, meaning the moths lost their ability to camouflage against the trees. Now the moths with lighter wings(mutation) were more advantageous because they could camouflage so due to directional selection, where one phenotype(white-winged moths) are more fit to survive, the mutation spread and the percentage of white moths in the population increased because dark moths died off, and white moths kept reproducing.

Citations:

An Introduction to Evolution. (n.d.). Retrieved November 19, 2018, from https://evolution.berkeley.edu/evolibrary/article/0_0_0/evo_02

Kline, Kerry. (2018, November 1st) *Evolution: Worksheet 1 on Natural Selection.*

Kline, Kerry. (2018, October 31st). *Evolution: Worksheet 2 on Natural Selection*.

Kline, Kerry. (2018, October 15th) *Evolution Simulation Lab Instructions.*

Natural Selection. (n.d.). Retrieved November 19, 2018, from https://evolution.berkeley.edu/evolibrary/article/0_0_0/evo_25

Causes of Speciation. (2018. Retrieved November 19t, 2018, from https://evolution.berkeley.edu/evolibrary/article/evo_43.

Acknowledgement:

- Kerry Kline's A Band Biology Class for defining terms used.
- Lila Dominus for helping with my graphs