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Name _____ Period _____

AP Biology _____ Date _____

LAB 11 NATURAL SELECTION OF STRAINING

You have already been introduced to the idea that when an organism is "selected" by nature's forces, there is the opportunity to reproduce and pass on the genes for its favorable traits to offspring. In this way, the genes for most favorable traits — traits that give an individual organism greater fitness — show up more frequently in each succeeding generation.

In this activity, we will explore this concept further. Our model organism is the fish, and we'll use a species of fish — the "Strawder" — that has 3 freshwater ponds in its habitat, and we'll investigate how different natural selection factors in the environment can influence the colors of Strawder. We will also look "backward" the other way and measure how these natural selection factors also affect the prevalence of the genes that code for the color of Strawder.

In Strawder, there are three available colors (phenotypes) — blue, yellow, green. These three colors are controlled by a color gene that comes in two versions (two alleles) — the blue allele and the yellow allele. The blue and yellow alleles do not show a dominant/recessive relationship, instead when they are mixed together they show an intermediate dominance relationship. Therefore the heterozygote will be a green colored fish.

Each lab group (working in pairs) will be given a bag of strawder (Straw) — 20 yellow and 20 blue strawder. These represent the coloration of genes in our population of fish — the fish GENOTYPE. As it relates, Strawder are additive organisms — they have NO DOMINANCE of every gene. The color of each fish's skin is always determined by the interaction of the two copies (the two alleles).

On the chart, indicate the possible genotypes (blue control) for each phenotype (fish color)

Phenotype	Genotype
yellow fish	YY
blue fish	BB
green fish	YB, BY

In each part of the lab, you will create fish by randomly pulling out two strawder to determine their skin color. Each group will complete four different scenarios including different selection factors affecting your population of Strawder.

Ready? Let's go fishing!

GENERAL INSTRUCTIONS: READ THE FOLLOWING

1. First, make sure there are 40 strawder in your bag (20 blue & 20 yellow).
2. In each round, you will randomly pull two strawder (chosen from your fishing bag) for each fish in the population and record the color of the resulting "Strawder" in your data table with the bag's identity.
3. The fish round is all built around as a genotype and should be completed without any predators. In the next five generations in each set, predators will prey on the fish but under different selection factors (see below table).

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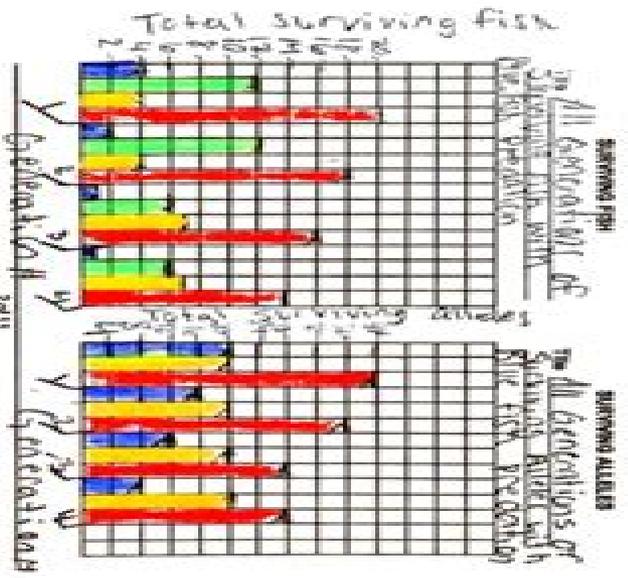
TEST 1: PHENOTYPICAL PREDATION (PREDATORS PREFER BLUE FISH)

In this round, the predators discover that the yellow allele makes a less-tasty protein. Since both yellow and green fish have the yellow allele, both color fish were easy to be predators. As a result, the genotypes prefer blue fish.

The fish round is a genotype and you should randomly pull strawder out of the bag to produce your fish. You fish are eaten in the control round. For the remaining three generations in the round, the predators will eat predators other than blue fish (half of the blue fish) and those other will be removed from the population — not passing on to the next generation. Between generations within the round, fish will add the heterozygote fish to the bag. After each generation, record the results for fish color and the number of surviving strawder.

Generation #	Color of surviving fish			Surviving alleles			
	Blue	Green	Yellow	Total fish	Blue	Yellow	Total alleles
1 (control)	4	12	4	20	20	20	40
2	2	12	4	18	16	20	36
3	1	10	5	16	12	20	32
4	1	10	7	14	8	20	28

Present your data as BAR GRAPHS on the graphs below.



Biology Lab Natural Selection Of Strawfish Answers

Jiyuan Zhang



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