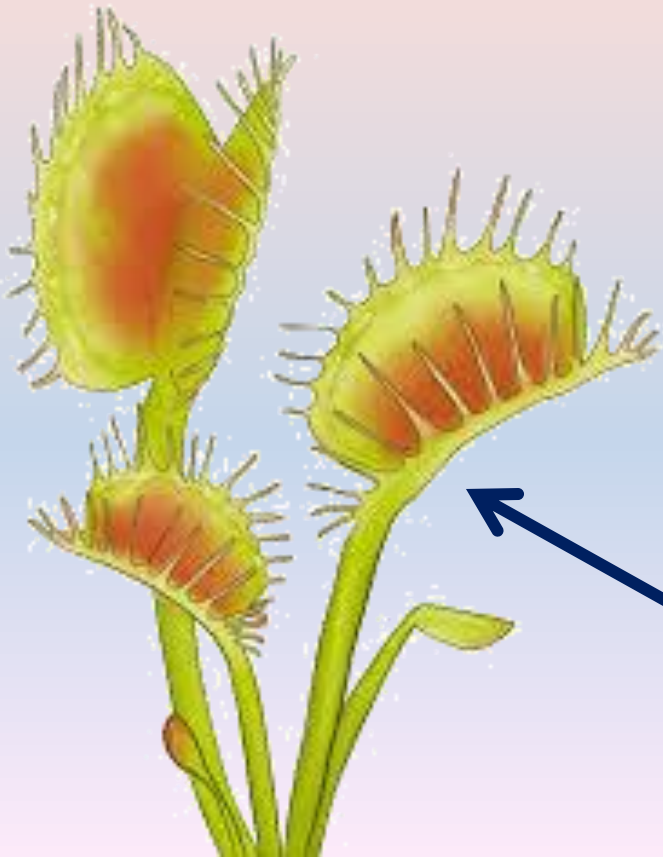


Genetic Variation and Natural Selection



You and your partner have just gone into the business of growing Venus Flytraps for the local botanical gardens. You have purchased starter plants from a grower that assures you the plants have a heterozygous genotype for color inside the “traps”.



Trap Color Genetics

C_g = Green Allele

C_r = Red Allele

$C_g C_g$ = Green Trap

$C_r C_r$ = Red Trap

$C_g C_r$ = Two-toned Trap

You want to make some predictions of what your future plants are going to look like, so you use your middle school genetics knowledge to assist you.

You are going to flip a coin to determine which allele each parent plant will pass on to the offspring
 C_g = heads and C_r = tails.

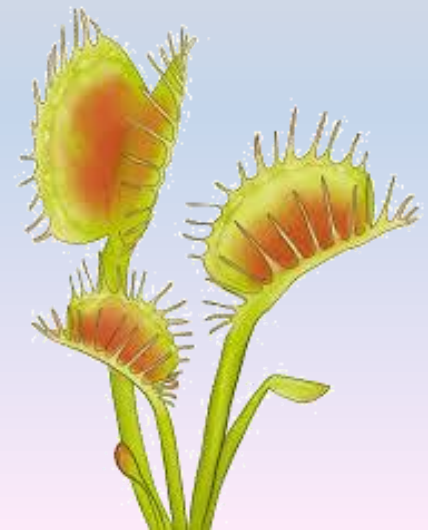


Then, you construct this table to record data.

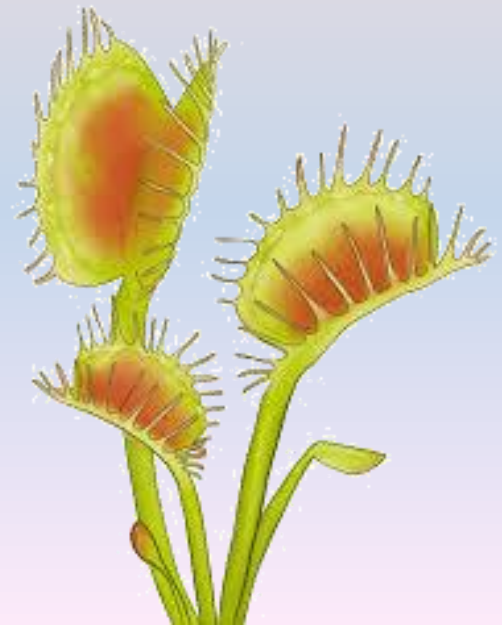
Multiple Generations Data

Generation	Parent 1 Passes	Parent 2 Passes	Child 1 Genotype	Parent 1 Passes	Parent 2 Passes	Child 2 Genotype
1						
2						
3						
4						
5						

- You are going to flip a coin to determine which allele each parent plant will pass on to the offspring Cg = heads and Cr = tails.
- Combine the allele that Parent 1 passes to the offspring with the allele that Parent 2 passes to the offspring
- For Generation 1 under Child 1 indicate the genotype that results. Repeat the flipping to determine the genotype of Child 2.



- For Generation 2, each person selects the genotype of ONE of the children in Generation 1 to become the parent in the next generation
- Each person then goes and “mates” (by flipping coins) with another person in the class to determine the genotypes the children in Generation 2
- Continue the same steps for Generations 3 - 5



It turns out that Venus Flytraps can catch the most insects when their trap is two-toned, which occurs when the plant is heterozygous for trap color and possesses one of each allele (C_gC_r).

Plants that are homozygous for green trap color, possessing two copies of the C_g allele (C_gC_g), suffer from not being able to catch any insects, thus not gathering enough nutrients to survive.

Plants that are homozygous for red trap color, possessing two copies of the C_r allele (C_rC_r) do catch some insects and have a change of survival.

CgCr – Heterozygous, carrying both alleles, showing two-toned traps and catching ample insects

CgCg – Homozygous, showing green traps and not catching enough insects to survive

CrCr – Homozygous, showing red traps and catching a few insects with the possibility of survival



Learning this new information, you decide to make your predictions again, and construct this table to record the data

Natural Selection Data

Generation	Parent 1 Passes	Parent 2 Passes	Child 1 Genotype	Parent 1 Passes	Parent 2 Passes	Child 2 Genotype
1						
2						
3						
4						
5						

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- Combine the allele that Parent 1 passes to the offspring with the allele that Parent 2 passes to the offspring
- For Generation 1 under Child 1 indicate the genotype that results. Repeat the flipping to determine the genotype of Child 2.

BUT...

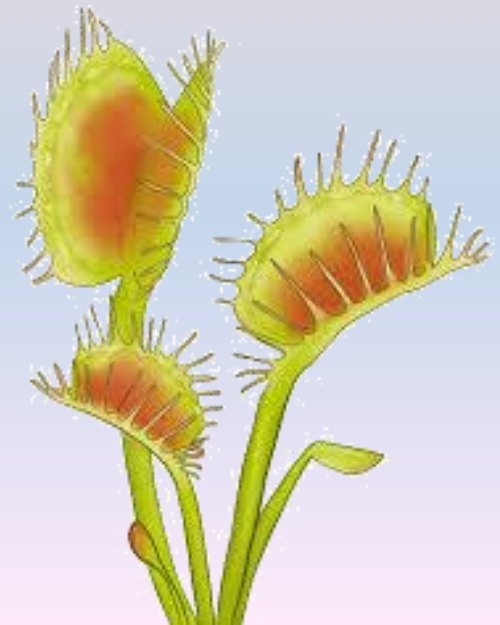


Only record offspring that live

- Plants that are heterozygous ($CgCr$) will always survive
- Plants that have green colored traps ($CgCg$) will not survive to adulthood. **You must mate (flip) again to get a viable child.**
- Plants that are $CrCr$ only **survive 50%** of the time. **Flip a coin to determine if the plant survives. If you get “heads” the plant survives. If you get “tails”, the plant does not survive to adulthood and you must mate until to get a viable plant.**

- For Generation 2, each person selects the genotype of ONE of the children in Generation 1 to become the parent in the next generation
- Each person then goes and “mates” (by flipping coins) with another person in the class to determine the genotypes the children in Generation 2
- Continue the same steps for Generations 3 - 5

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1. How were the genotypes of offspring (children) different between Multiple Generations (1st run) and Natural Selection (2nd run)?
2. After natural selection, does the Cg allele still exist after several generations? Explain your answer.
3. Explain how genetic variation and natural selection cause organisms to adapt to their environment.