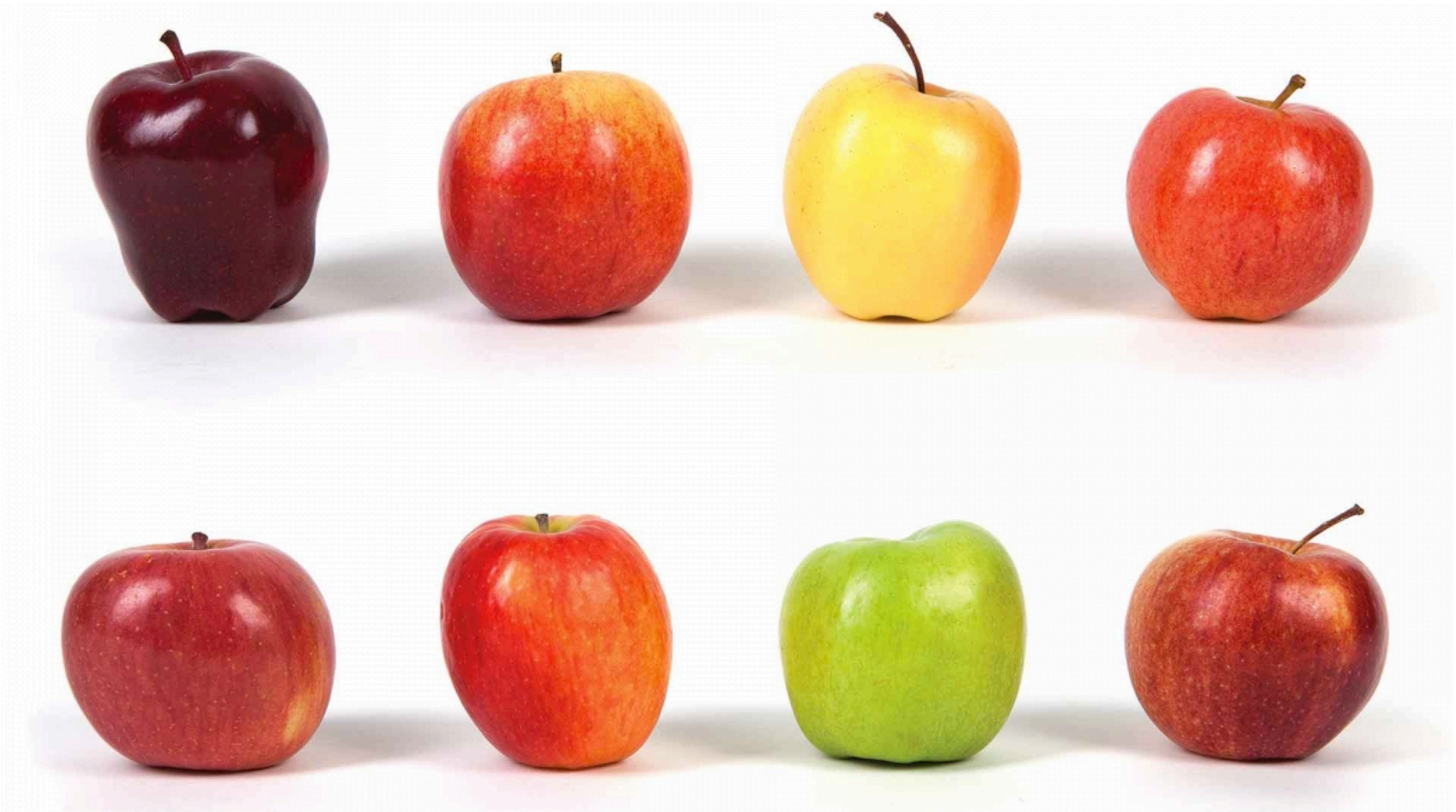


Apple Genetics



What similarities and differences did you find between the two apples?

Gala



Braeburn



Genetics Vocabulary Review

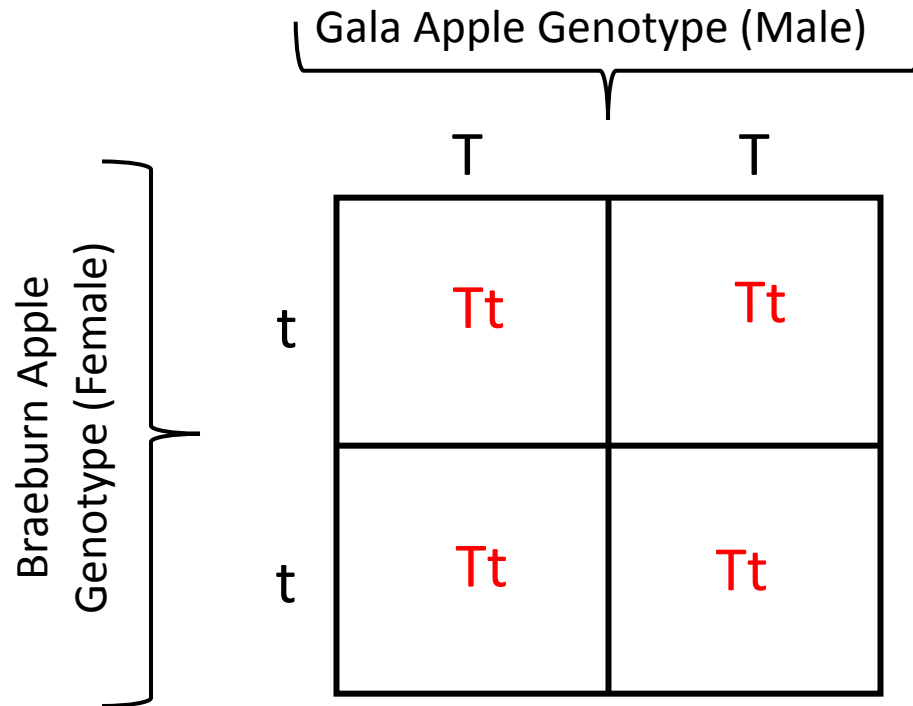
- **Gene:** a section of DNA that codes for a certain trait
- **Allele:** a variant of a gene
- **Dominant Allele:** an allele whose trait always shows up in the organism when the allele is present (written as uppercase letter)
- **Recessive Allele:** an allele that is masked when a dominant allele is present (written as lower case letter)
- **Genotype:** an organism's genetic makeup or allele combinations
- **Phenotype:** an organism's physical appearance or visible trait
- **Punnett Square:** a diagram that is used to predict an outcome of a particular cross or breeding experiment
- **Homozygous :** having 2 identical alleles for a trait
- **Heterozygous:** having 2 different alleles for a trait

Apple Genotypes

- Here are examples of genotypes that the Gala and Braeburn apples may possess
 - Tartness is recessive (Gala's genotype is TT, Braeburn's genotype is tt)
 - Sweetness is recessive (Gala's genotype is ss, Braeburn's genotype is SS)
 - Juiciness is dominant (Gala's genotype is JJ, Braeburn's genotype is JJ)
 - Crunchiness is dominant (Gala's genotype is Cc, Braeburn's genotype is CC)
 - Red skin coloring is dominant (Gala's genotype is RR, Braeburn's genotype is Rr)
 - Smooth skin texture is dominant (Gala's genotype is Bb, Braeburn's genotype is Bb)

Punnett Square Activity

- Complete Punnett Squares for each trait to illustrate genetic cross



Probabilities

0 % TT (very tart)

100 % Tt (very tart)

0 % tt (not tart)

Comparing all 3 apples

What similarities and differences did you notice?

Gala



Braeburn



Jazz



Jazz Apple



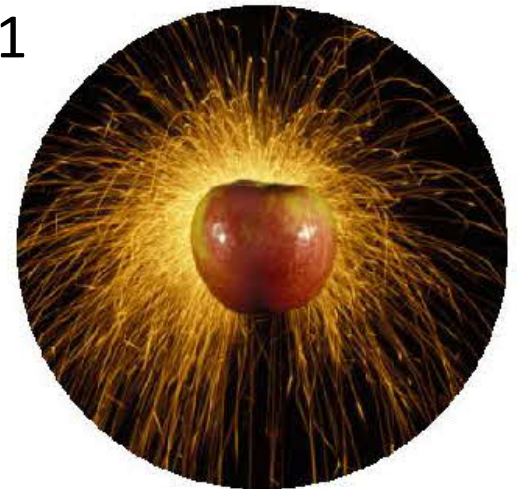
- Fusion between Gala and Braeburn apple
 - Developed in New Zealand
 - Multiple cross pollinations of the Gala and Braeburn occurred, producing 8,500 seedlings to choose as Jazz apple
- “Tangy-sweet taste and loud crunch”
- Sold internationally in 2001
- Grown in New Zealand, Chile, France, and Washington

Crossbreeding Apples

- Jazz apple is the result of crossbreeding
- Goal is to make better quality apples
- Breeders must look at both genotypes and phenotypes of apples
- Must decide on what traits they hope to see in new apple
- Often use a backcrossing approach – successive generations of apples with the trait of interest are crossed with different high quality parent apples at each generation
- Process typically takes 15 years
- Some consider crossbreeding a genetic modification

Honeycrisp Apples

- Competitor of Jazz apples
- Known to be “explosively crisp”
- Derived in 1960 from a cross from Macoun and Honeygold apples at the University of Minnesota
- Released for commercial propagation in 1991



Grafting

- Most apples are not grown from seed
- Most apple trees originate from method called grafting
 - A section of a stem with leaf buds is inserted into another tree
 - Allows the tree to skip the juvenile phase which may last 5-9 years.



Graphic Sources

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