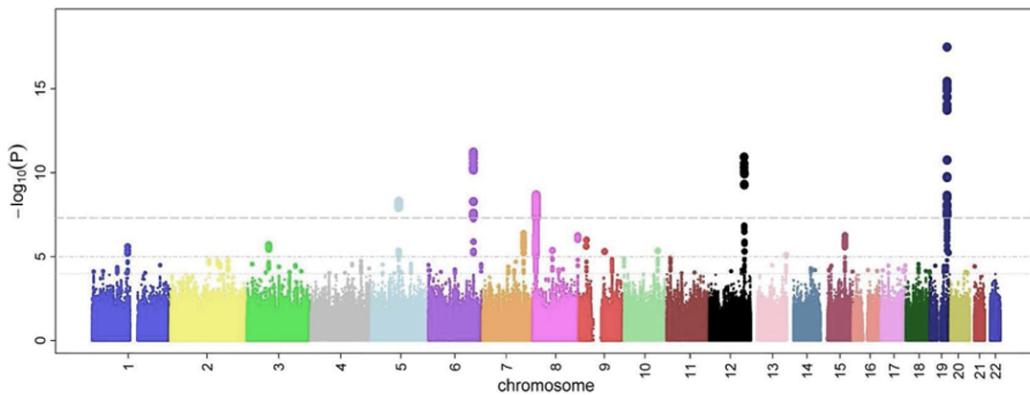


NGS – variant analysis

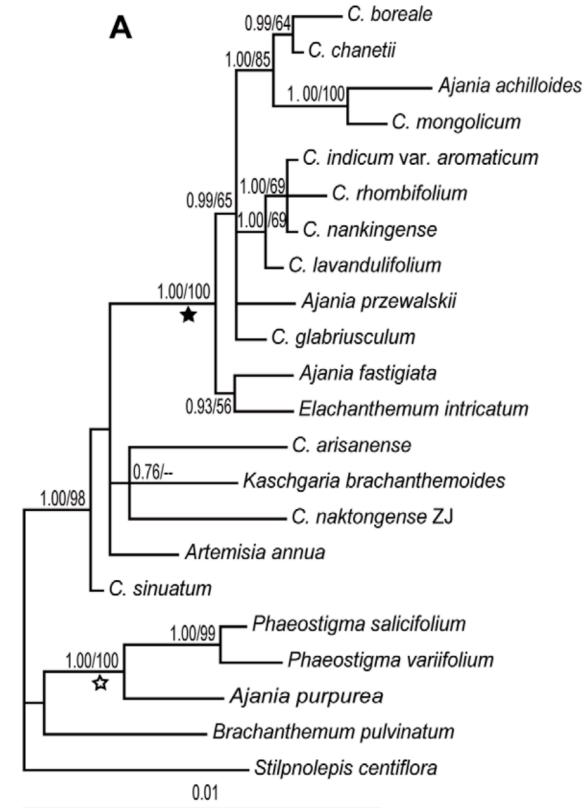
Introduction to variant analysis

Why study variants?

- Find causes for phenotypic variation
- Understand relatedness

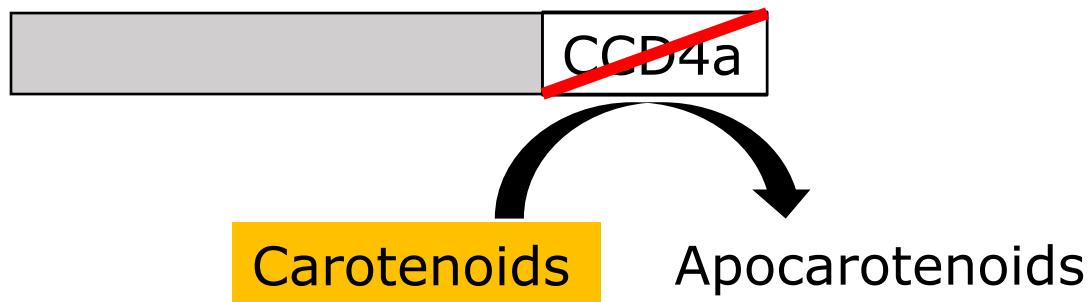


https://en.wikipedia.org/wiki/Genome-wide_association_study



Mutation

Change in DNA sequence



Mutations - causes

- Repair mistakes
- Unbalanced cell division
- Transposable elements



https://nl.wikipedia.org/wiki/Springend_gen

Mutations - types

- cells – somatic mutation
- inherited – germline mutation

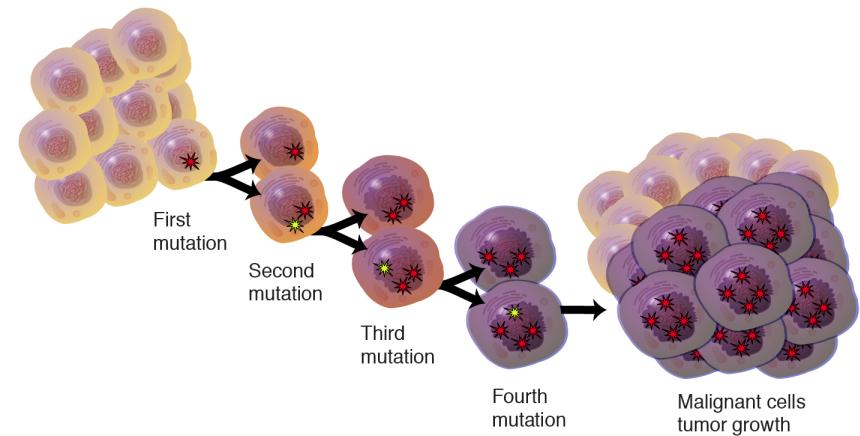
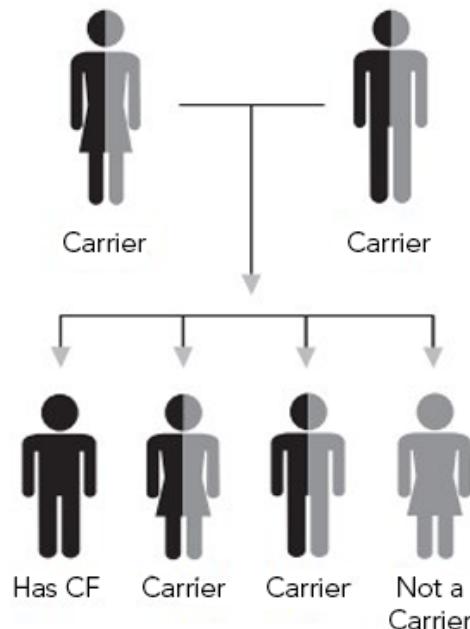
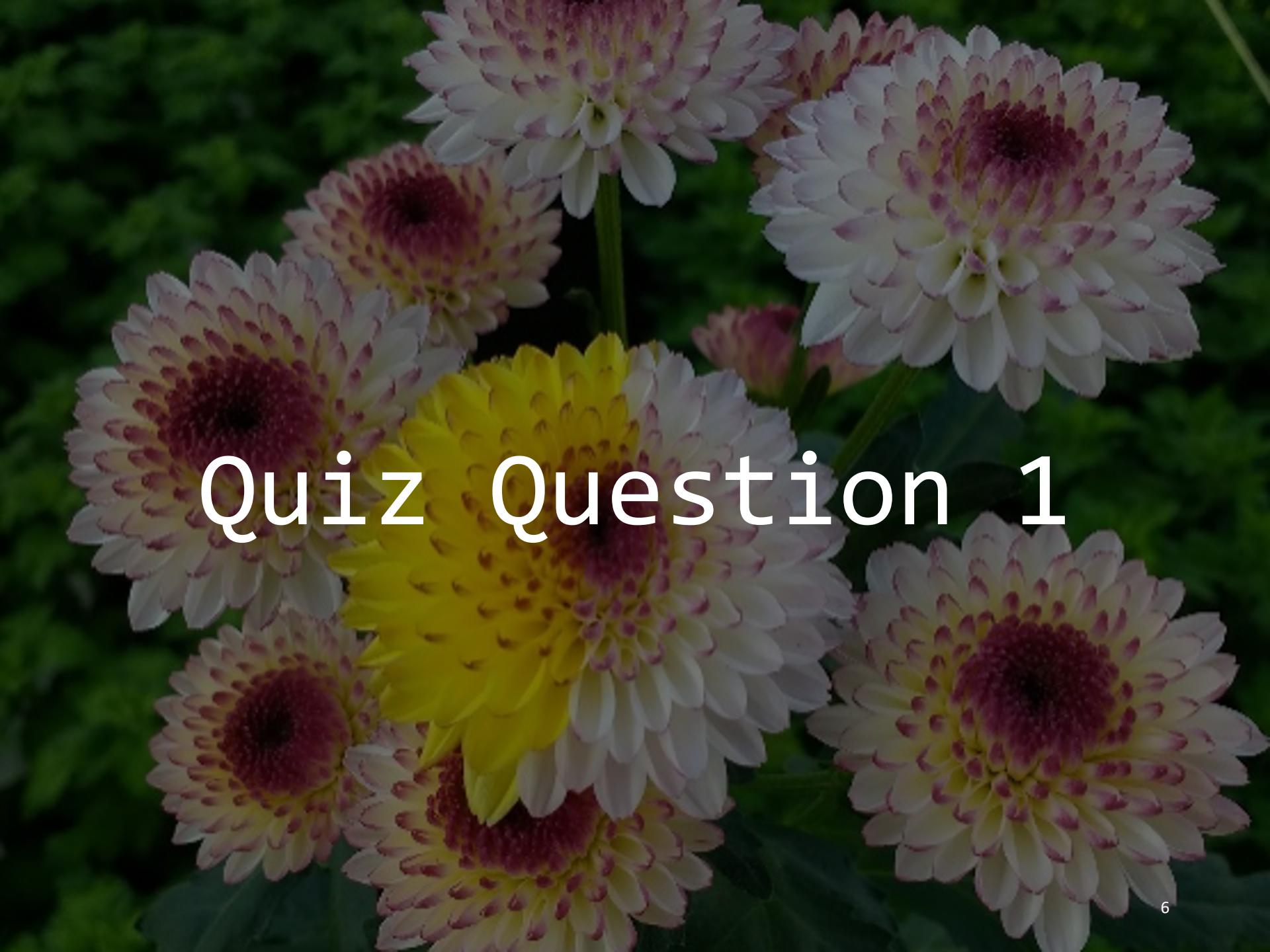


image sources

<https://www.cff.org/>

<https://www.genome.gov/genetics-glossary/Cancer>

A close-up photograph of several chrysanthemum flowers. The flowers are in various stages of bloom, with some showing a dense center of dark purple or maroon stamens surrounded by yellow petals, and others showing more fully developed, ruffled petals in shades of pink and light purple. The background is a dark, out-of-focus green, suggesting a garden setting.

Quiz Question 1

Detecting variants

- Phenotypic analysis
 - Molecular analysis
 - Sequencing

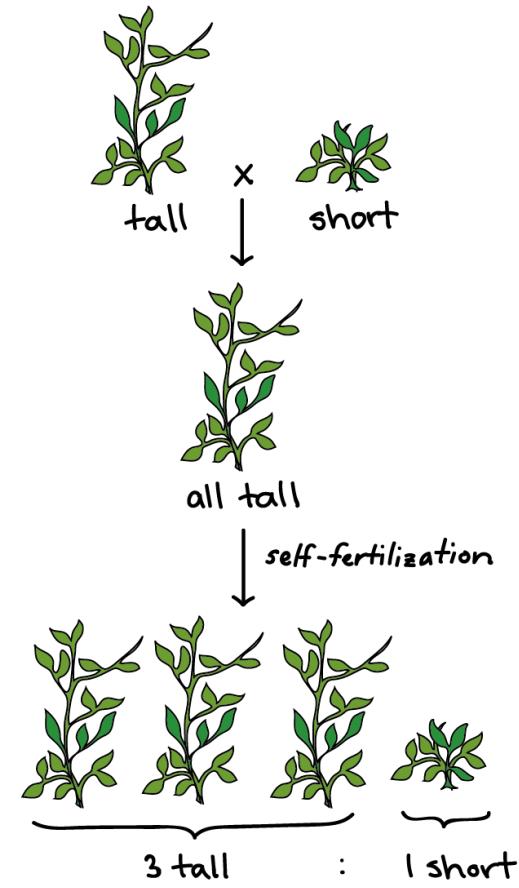
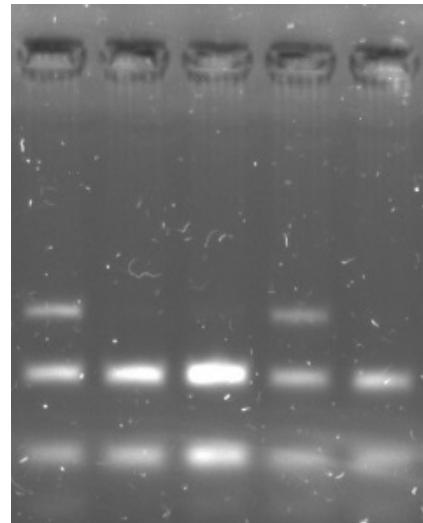
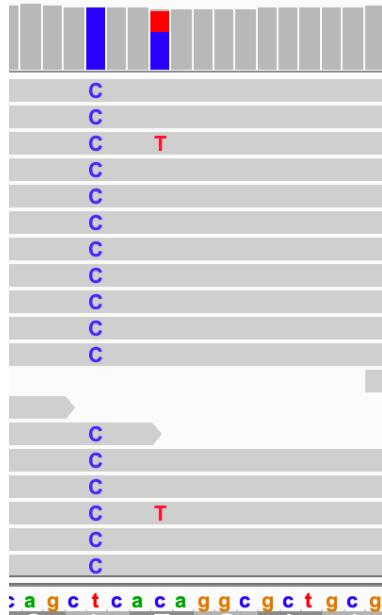


image: <https://www.khanacademy.org>

Small variants

- Single nucleotide polymorphism (SNP)

ATCATG**A**CCGTCA

ATCATG**T**CCGTCA

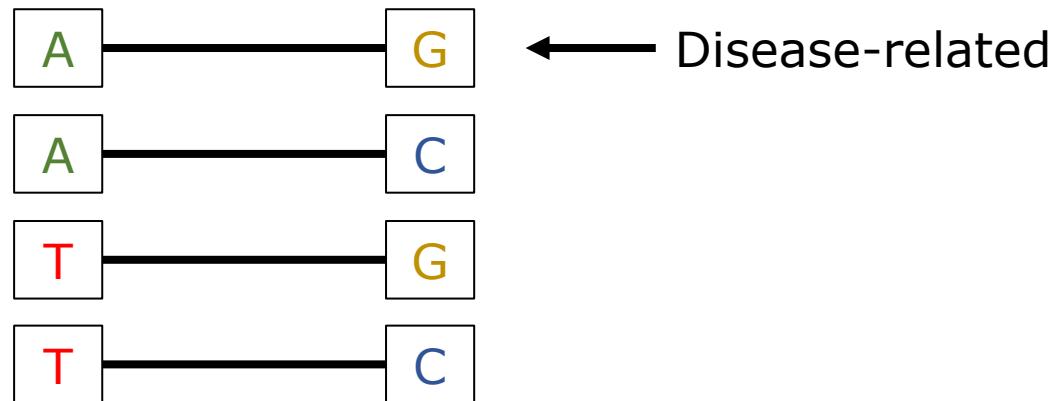
- Insertion/deletion (INDEL)

ATCATG**A**CCGTCA

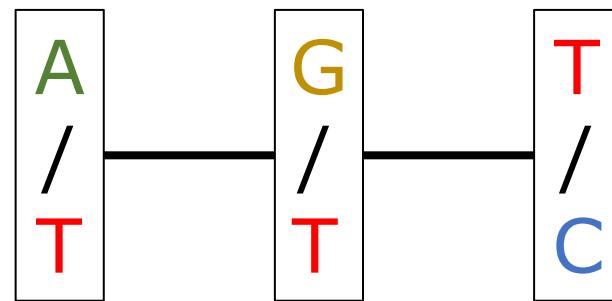
ATCATG---GTCA

Haplotypes

- NGS variants: mostly SNP
- Most SNPs are bi-allelic e.g. [A/T], [G/C]
- Genetic variation is often multi-allelic

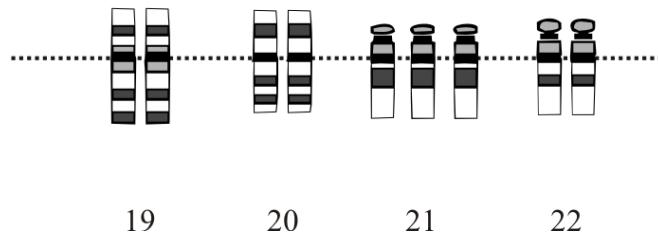


Quiz Question 2



Large variants

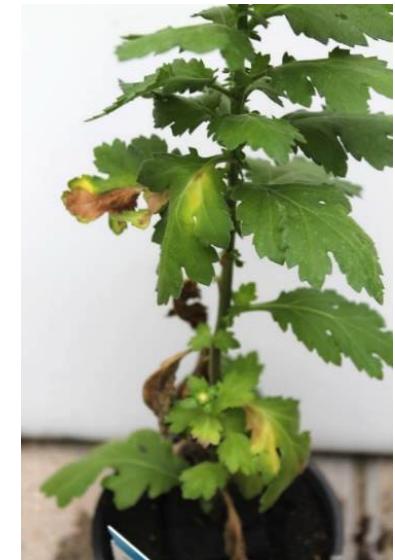
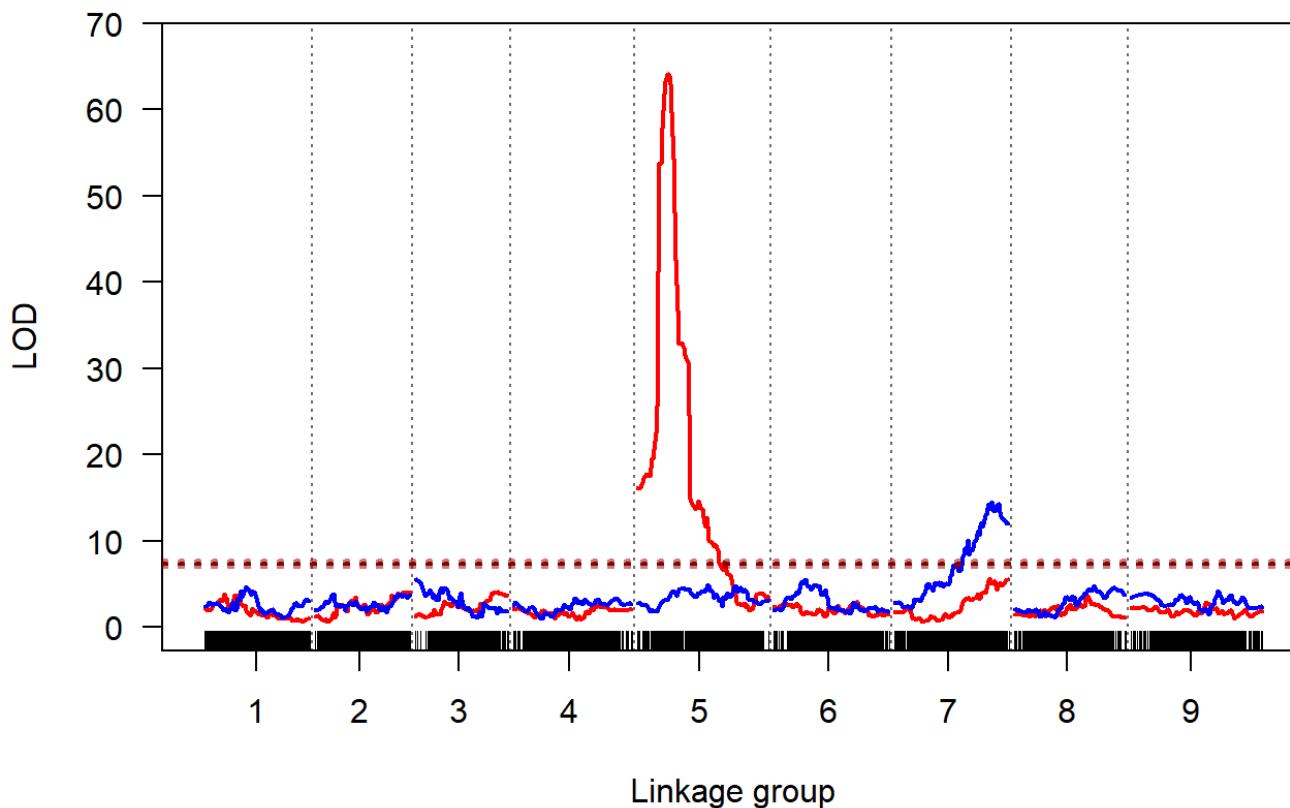
- Structural variance (> 1,000 base pairs)
 - Copy number variation
 - Translocations
 - Inversions
 - Deletions/insertions
- Chromosomal aberration



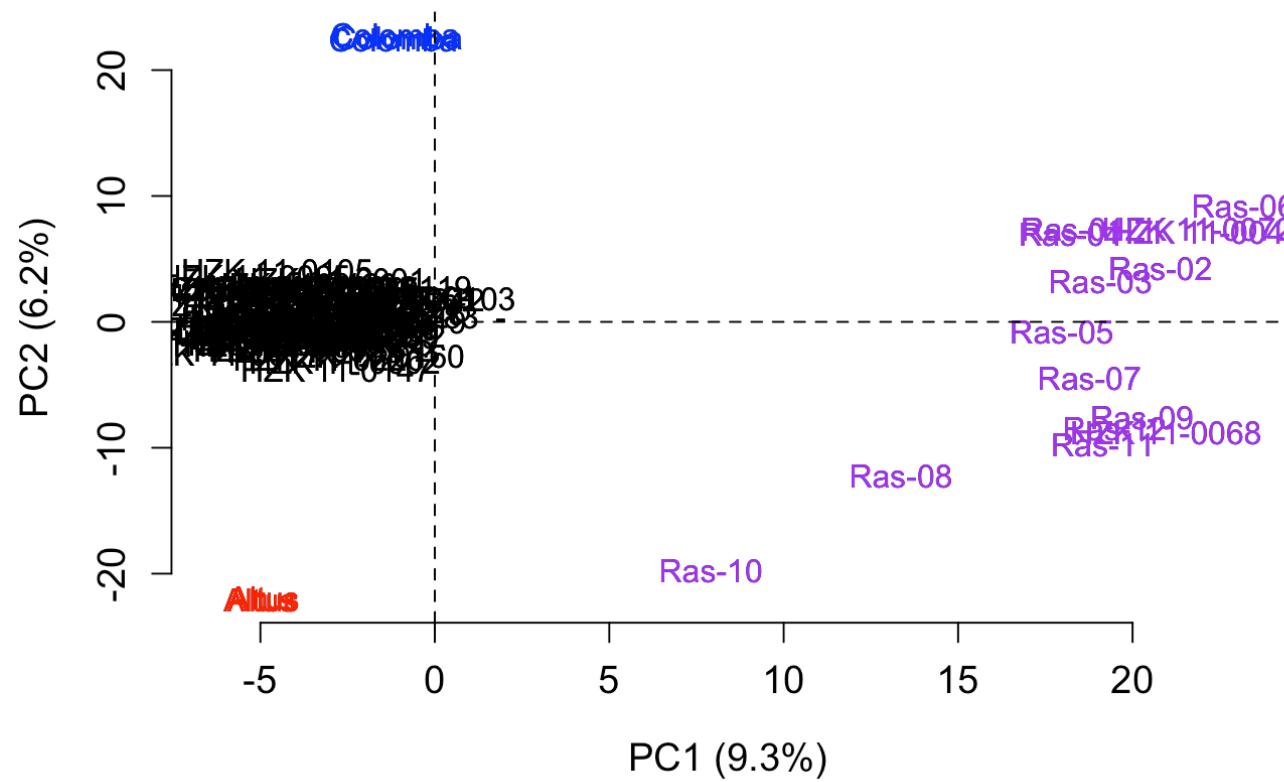
<https://en.wikipedia.org/wiki/Aneuploidy>



Genetic association



Relatedness



This course

- Inherited (germline) small variants
- Detection by next generation sequencing (NGS)

