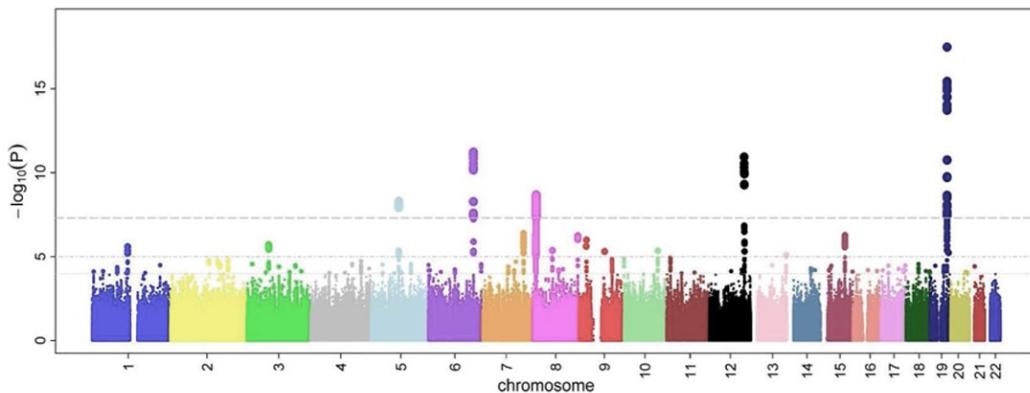


NGS – variant analysis

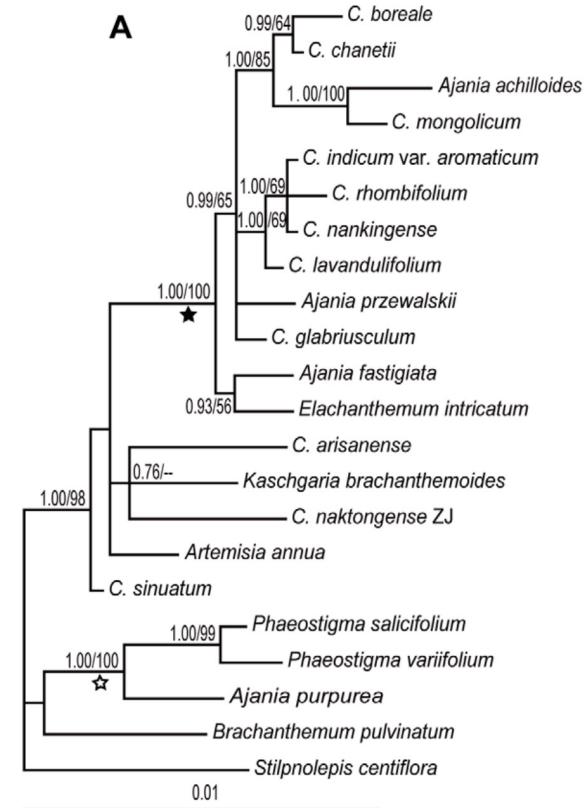
Introduction to variant analysis

Why study variants?

- Find causes for phenotypic variation
- Understand relatedness

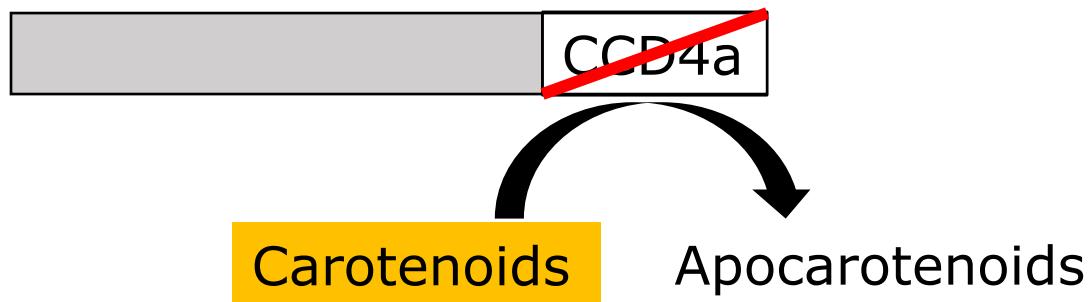


https://en.wikipedia.org/wiki/Genome-wide_association_study



Mutation

Causes variation
Change in DNA sequence



Mutations - causes

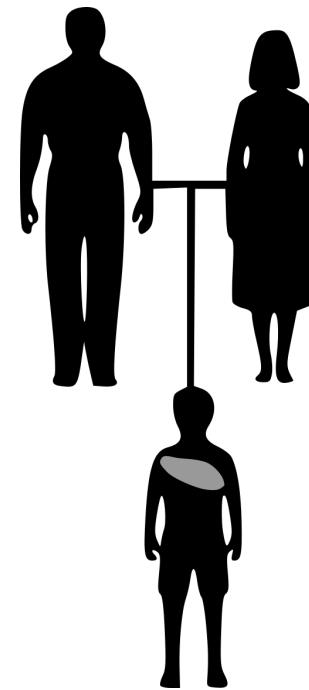
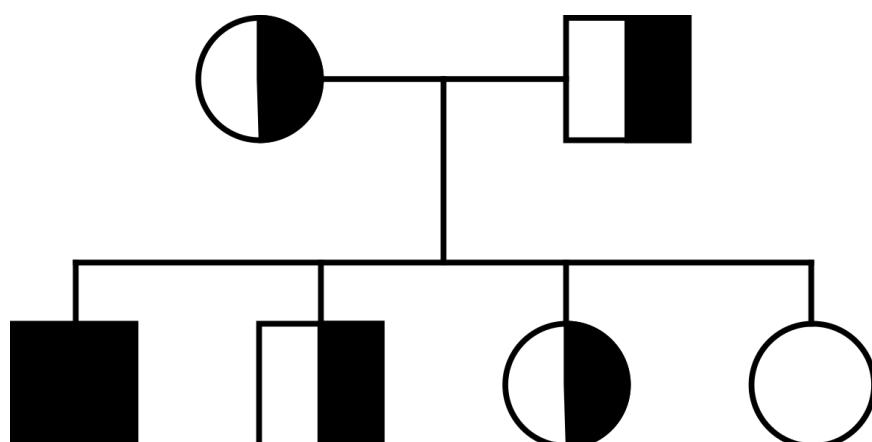
- Repair mistakes
- Unbalanced cell division
- Transposable elements

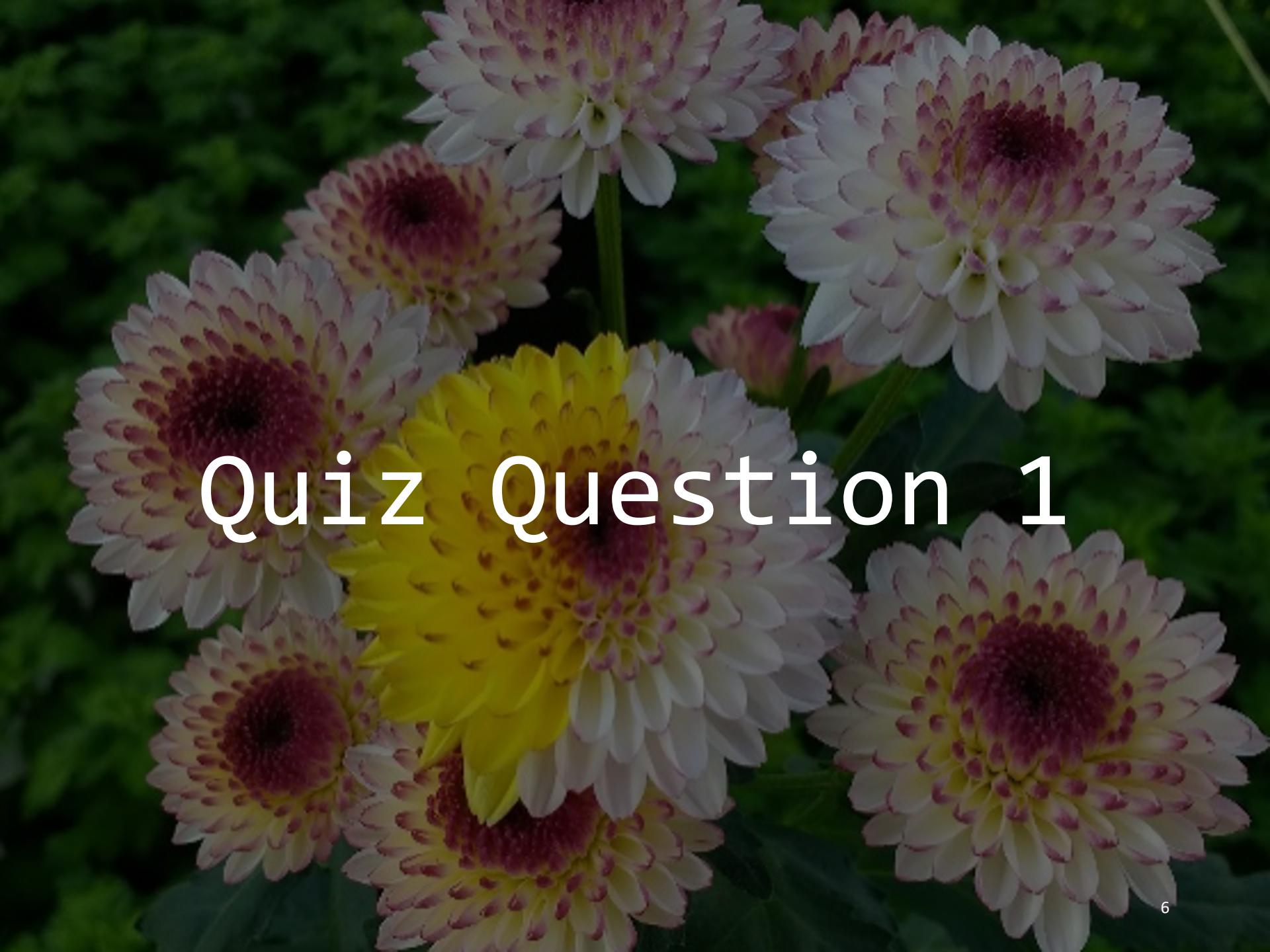


https://nl.wikipedia.org/wiki/Springend_gen

Mutations - types

- inherited – germline mutation
- cells – somatic mutation

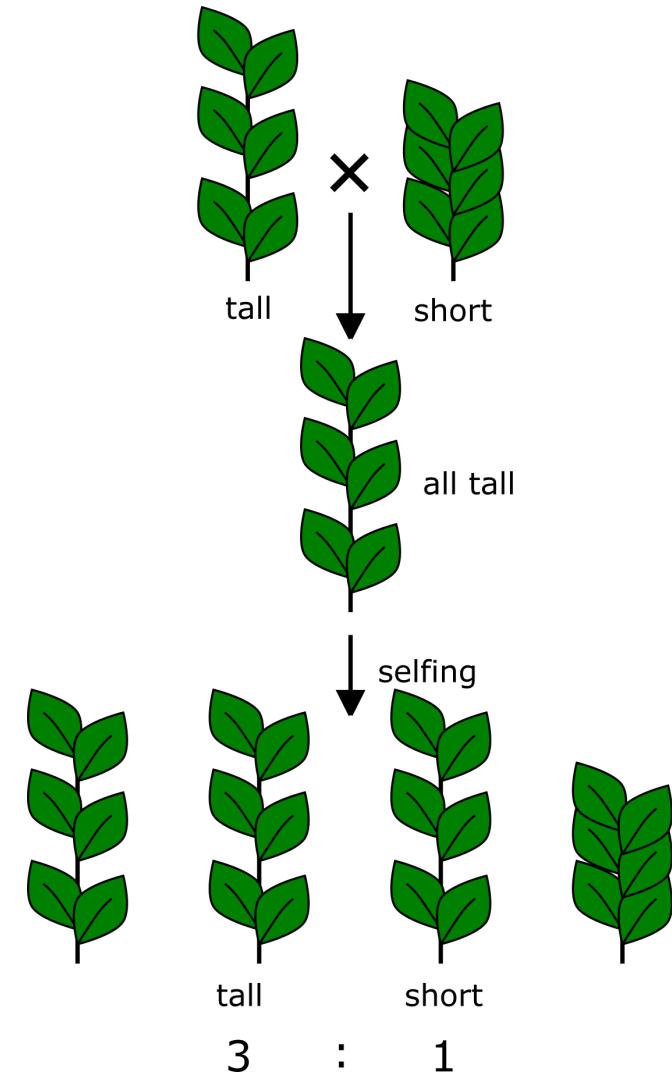
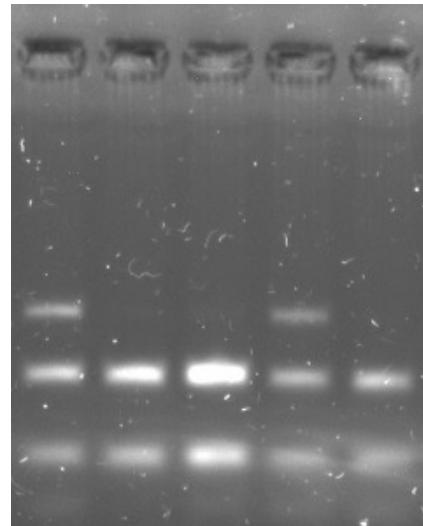
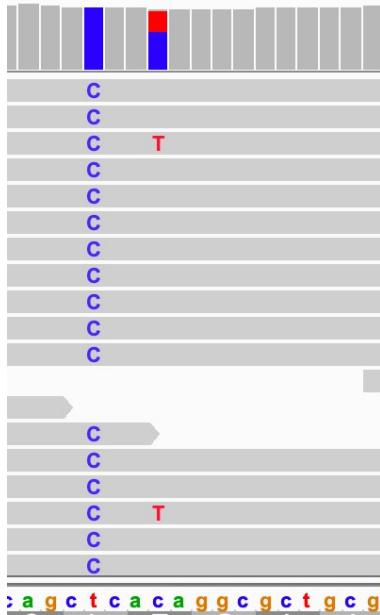


A close-up photograph of several chrysanthemum flowers. The flowers are in various stages of bloom, with some showing bright yellow petals and others showing more pinkish-purple or white petals with dark centers. They are set against a dark, out-of-focus background of green leaves.

Quiz Question 1

Detecting variants

- Phenotypic analysis
- Molecular analysis
 - Sequencing



Small variants

- Single nucleotide variant (SNV)

ATCATG**A**CCGTCA

ATCATG**T**CCGTCA

- Insertion/deletion (INDEL)

ATCATG**A**CCGTCA

ATCATG---GTCA

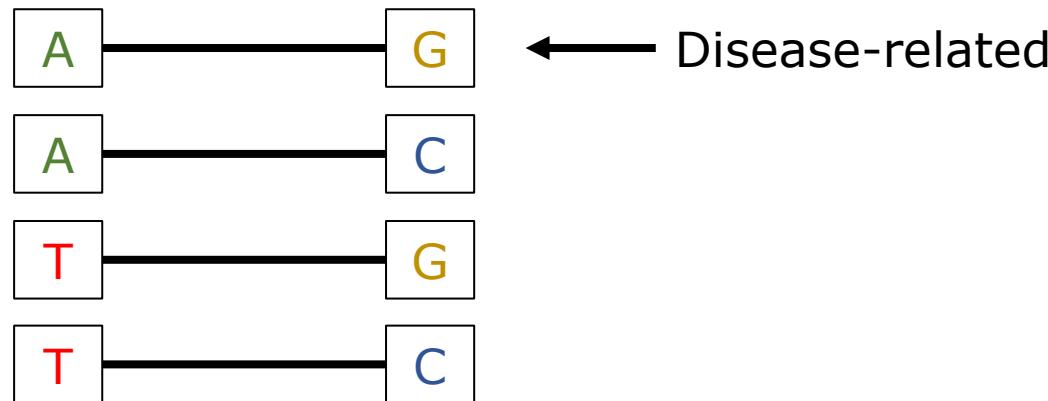
Some definitions..

- **Variant:** any difference that exists between any DNA
- **Mutation:** a change in DNA
- **Polymorphism:** variation that is common in a population (often AF > 1%)

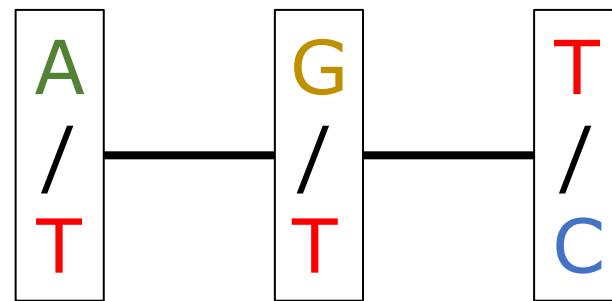
Variant vs polymorphism can be problematic: depends on the population

Haplotypes

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

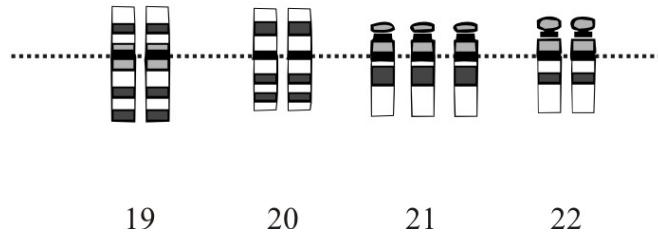


Quiz Question 2



Large variants

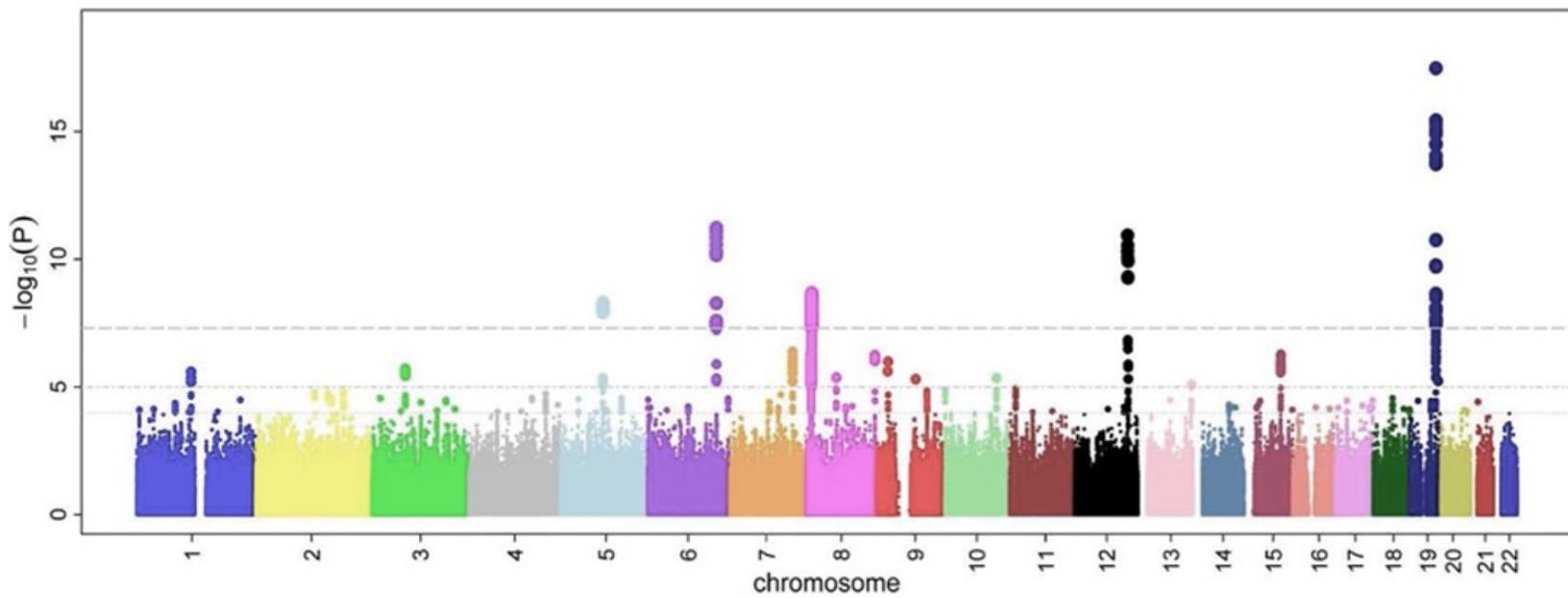
- Structural variance (> 1,000 base pairs)
 - Copy number variation
 - Translocations
 - Inversions
 - Deletions/insertions
- Chromosomal aberration



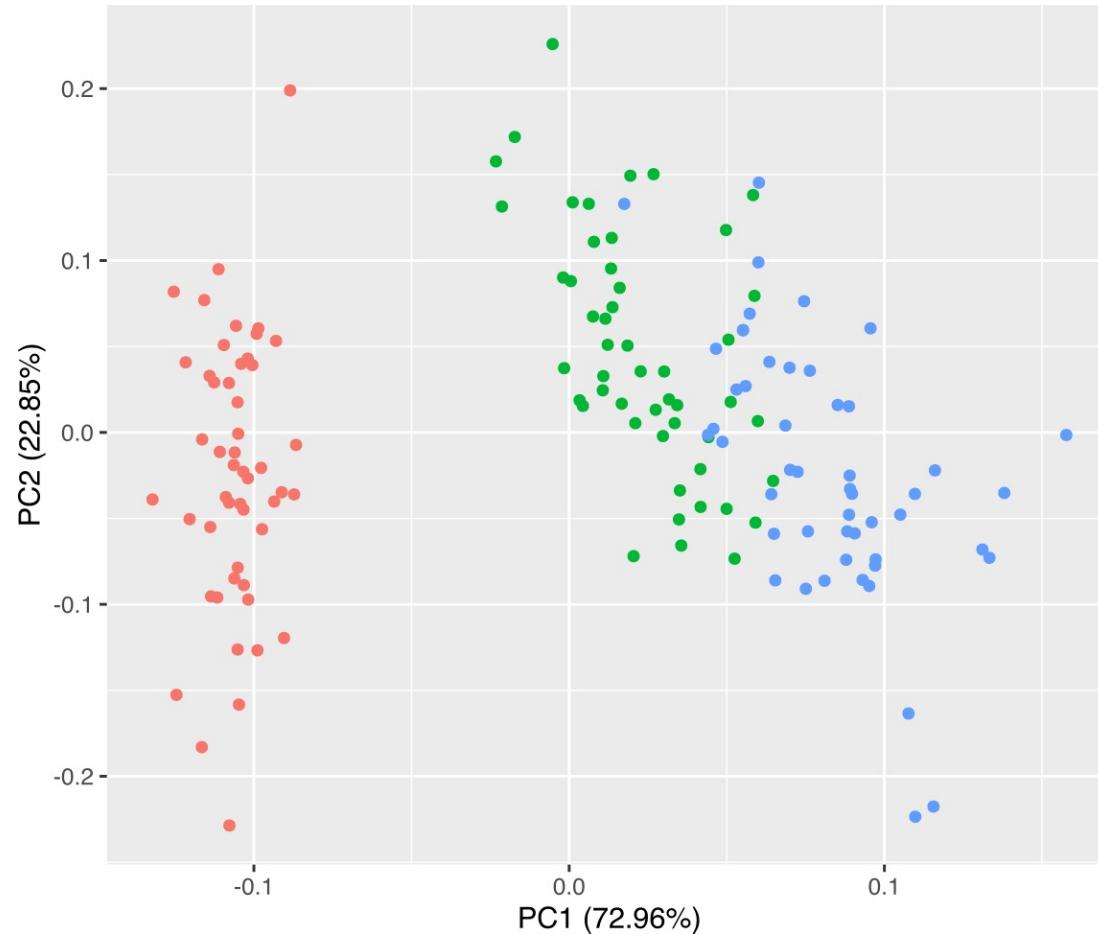
<https://en.wikipedia.org/wiki/Aneuploidy>



Genetic association



Relatedness



This course

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

