

GENETICS

LESSON 2: CHROMOSOMES

Learning Outcomes:

- I can explain how DNA, chromatin and chromosomes are linked.
- I can explain the difference between genes, traits and alleles.
- I can explain what a karyotype is.

Chromatin and Chromosomes

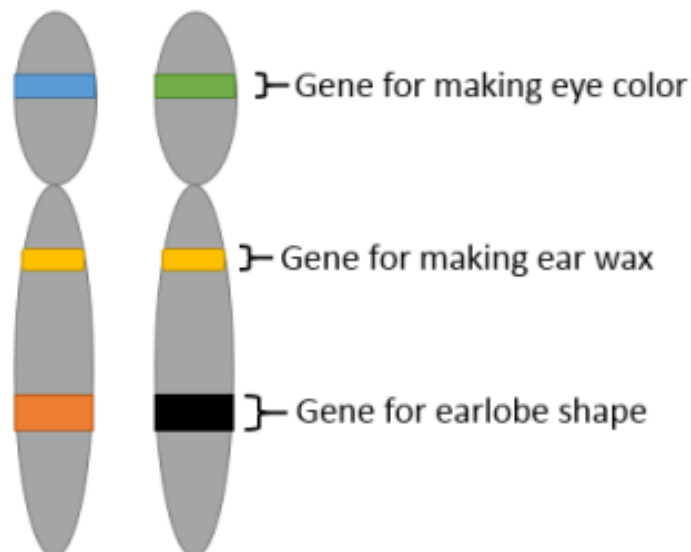
- during normal cell activity (interphase), DNA form long fibres called chromatin in the nucleus.
- at the start of mitosis, the chromatin fibres condense to form chromosomes
- human DNA is collected into 46 chromosomes that form 23 chromosomal pairs
 - each pair consists of one chromosome from each parent
- there are 24 distinct chromosomes in human DNA
 - 22 paired homologous chromosomes
 - X chromosome – paired in females & only one in males
 - Y chromosome – single one in males only paired to an X chromosome
- in humans, each of the 22 paired chromosome codes for between 2058 genes (chromosome 1) and 234 genes (chromosome 21)
 - X chromosome codes for 842 genes
 - Y chromosome only codes for 71 proteins – results in “sex-linked” traits

Homologous Chromosomes

- chromosome pairs are joined at their centromeres
- homologous chromosomes are pairs of chromosomes that are similar in length and centromere position, and contain gene sequences for the same traits

Genes

- a gene is a sequence of DNA that codes for a specific trait
- alleles – variations in a gene that results in differences in individuals



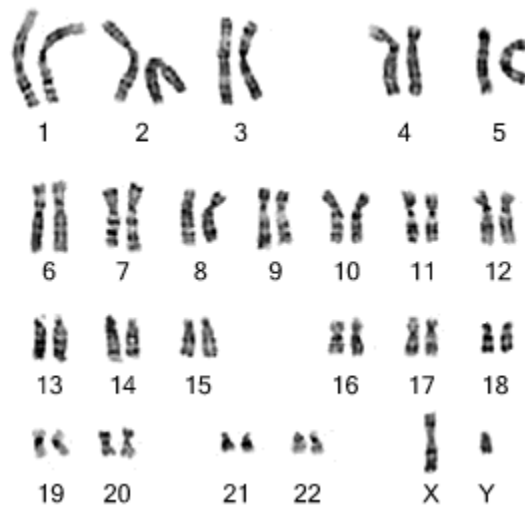
What is a chromosome?

<https://www.youtube.com/watch?v=IePMXxQ-KWY>

1. Autosomal or Mendelian Traits
 - one gene sequence traits with only 2 allele variations
 - ex: hair line, hitch-hiker's thumb, earlobes
2. Multiple Allele Traits
 - one gene sequence traits with more than 2 allele variations
 - ex: blood type
3. Polygenic Traits
 - traits controlled by multiple genes, each with 2 or more allele variations
 - ex: eye colour, hair colour, height
4. Sex-Linked Traits
 - traits affected by the presence or absence of the Y chromosome
 - ex: colour blindness, baldness

Karyotypes

- refers to the number and appearance of paired chromosomes from a eukaryotic cell (i.e., a cell with a nucleus)
- often shown as a photograph



Homework

Genetics worksheet Lesson 2

Chromosomes and Karyotypes Activity