
wellcome
connecting
science
Welcome to the
Wellcome Genome Campus

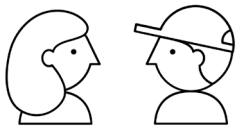
# Before we start – the important bits

If the alarm sounds for more than one minute, please evacuate. Your host will guide you to the nearest assembly point

If you feel unwell or suffer an accident, let your host know and they will summon appropriate first aid

Please stay together and with your host(s) at all times during your visit

All buildings on the Campus are non-smoking



Be respectful of your hosts, speakers, tour guides and each other

# Genome Academy

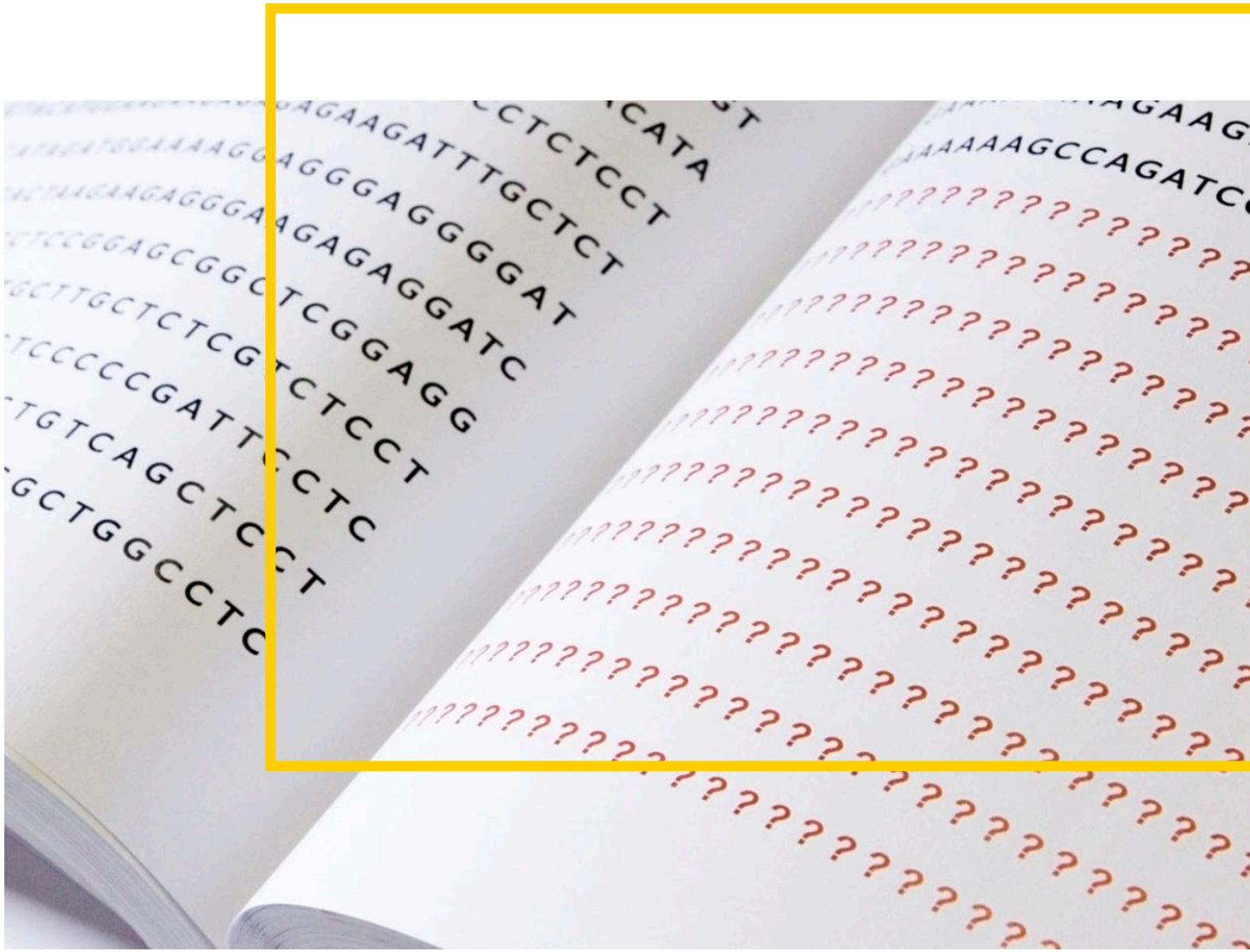
Timetable

- Carry out DNA barcoding
  - Practical work
  - Bioinformatics
- Hear about current research
- Experience the sequencing facilities
- Tour labs and data centre
- Consider the ethics of genomics
- Meet staff

# Plan for today

- Introduction
- DNA barcoding
- Lab safety
- Micropipetting and electrophoresis
- Lunch
- DNA extraction
- PCR
- Talk ‘Tropical diseases and drug creation’
- Reflections

# Introduction to the Wellcome Genome Campus



WELLCOME GENOME CAMPUS

wellcome sanger institute

wellcome connecting science

EMBL-EBI

# Wellcome Genome Campus

Sir Henry Wellcome (1853 – 1936)

American pharmaceutical entrepreneur

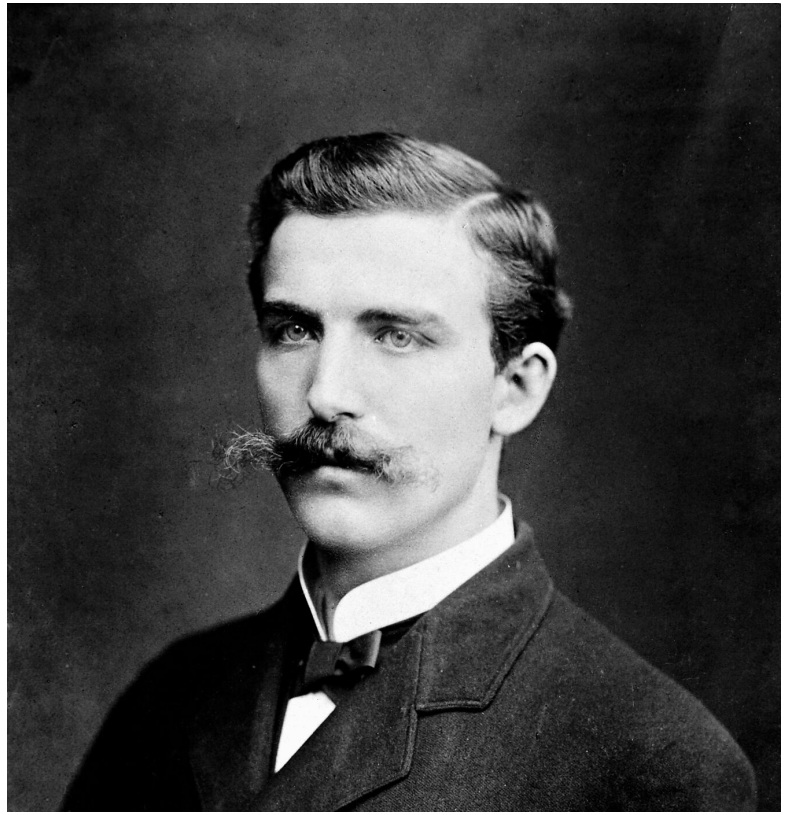
**1880**
Founded Borroughs Wellcome & Company

**1910**
Became a British subject

**1924**
Established the Wellcome Foundation

**After 1936**
Wellcome Foundation sold to GSK

Profits used to establish **The Wellcome Trust**, a biomedical charity



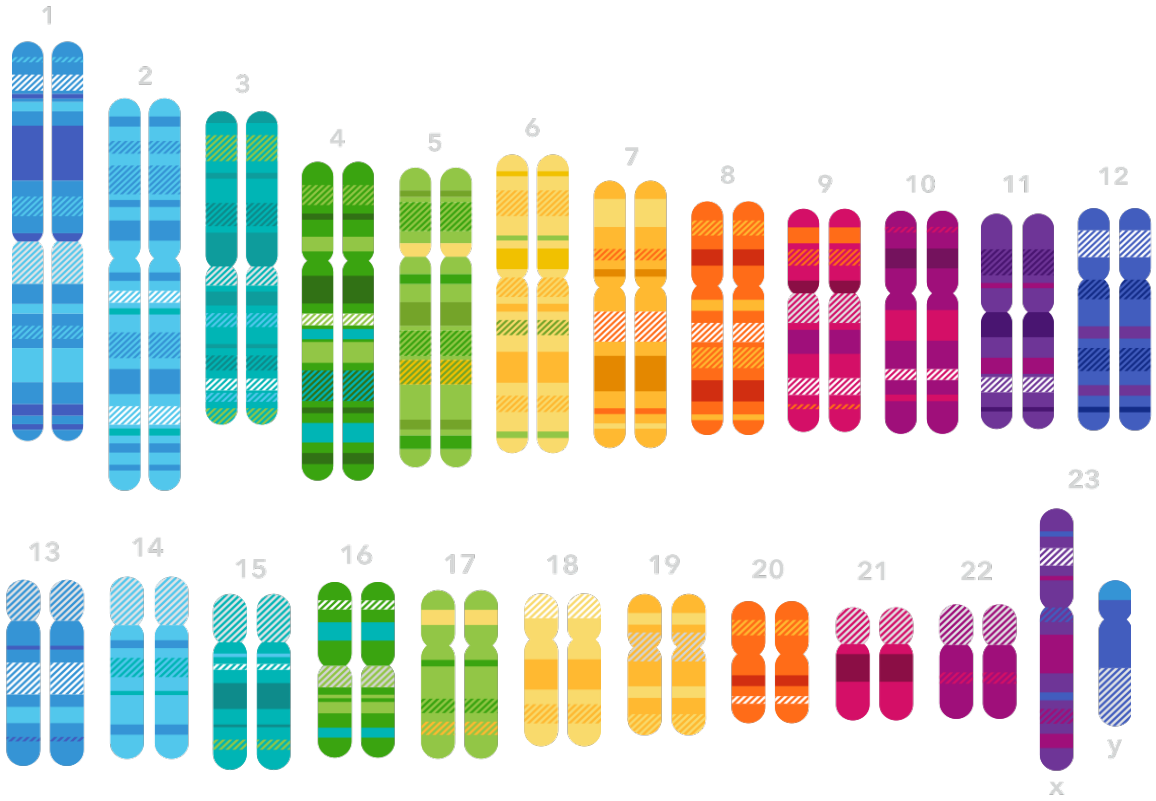
Portrait of Sir Henry Wellcome, Wellcome Collection

# Wellcome Genome Campus

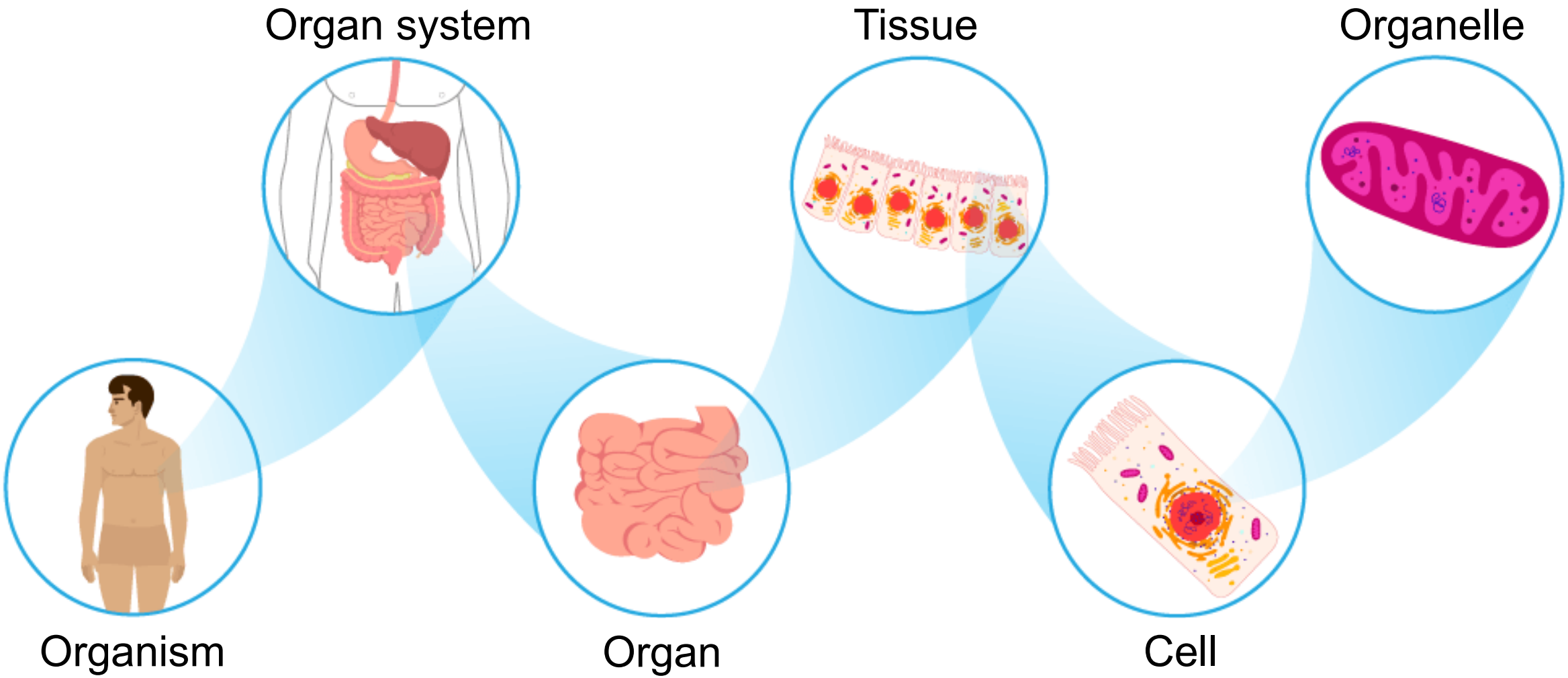
A genome is **the entire genetic material of an organism**

All organisms have genomes

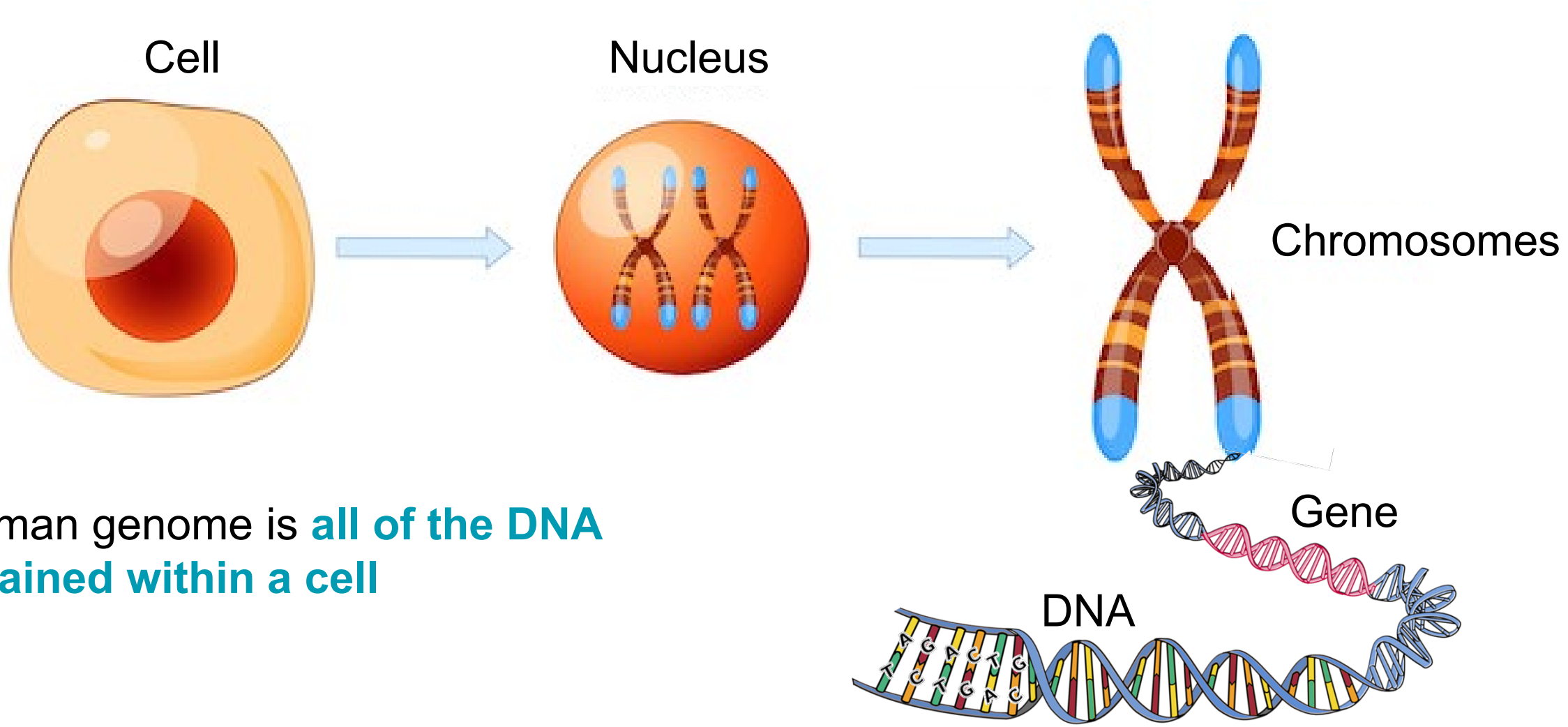
Humans have 2 copies of our genome packaged in 23 pairs of chromosomes in somatic cells



# What is a genome?



# What is a genome?



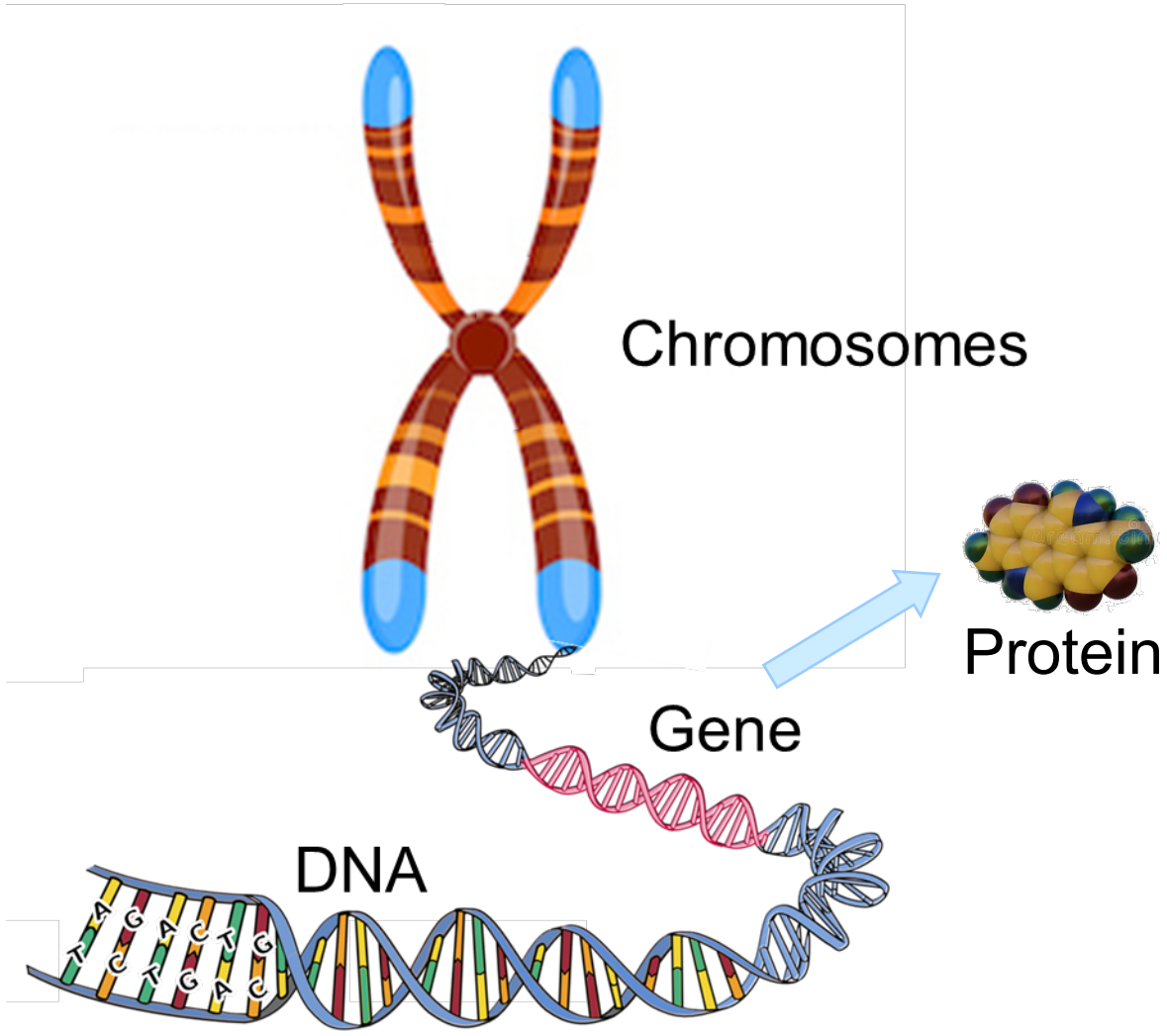

A human genome is **all of the DNA contained within a cell**

# Why study genomes?

Genes are sections of DNA that carry the information required to make proteins

Proteins give cells their structure and function

So studying genomes helps us to find out **how the instructions carried in our genes allow our bodies to work**



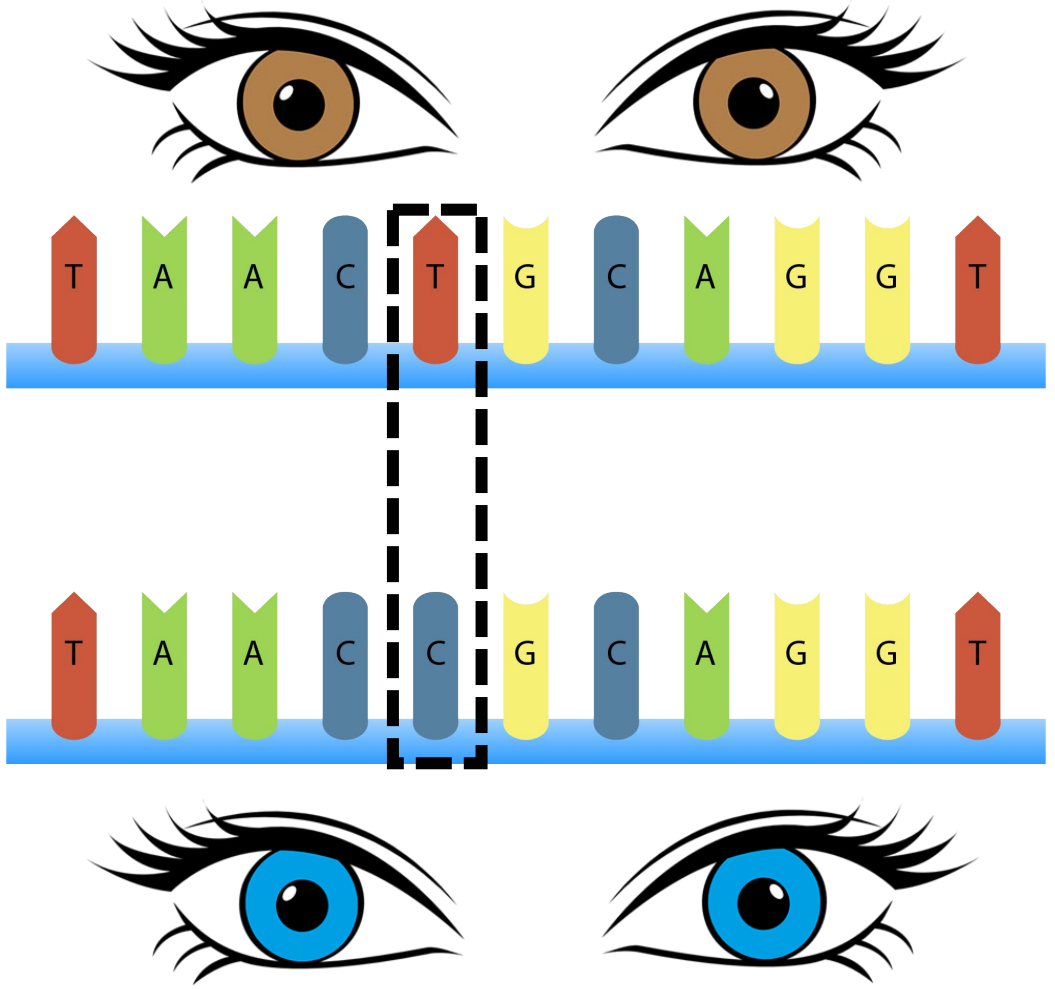
# Why study genomes?

DNA contains 4 different bases (A, T, C, G)

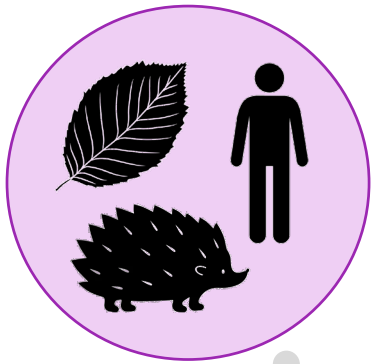
The order or sequence of these bases varies

This variation causes differences in characteristics

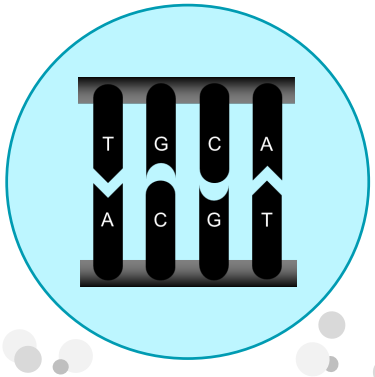
So studying genomes helps us to find out **how the variation in DNA sequence affects characteristics**



# How do you study genomes and variation in genomes?



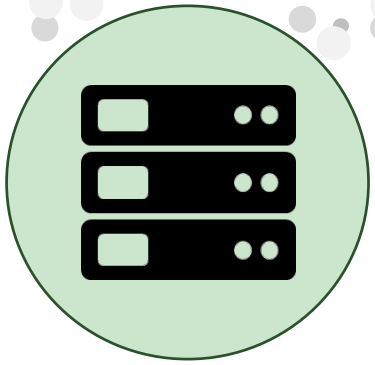
Sample selection




Sequence DNA


Data analysis

Obtain DNA from sample



Data storage

# Careers at the Wellcome Sanger Institute

Technical specialists

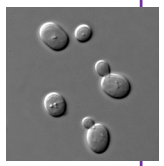
Bioinformatics and software

Project leaders

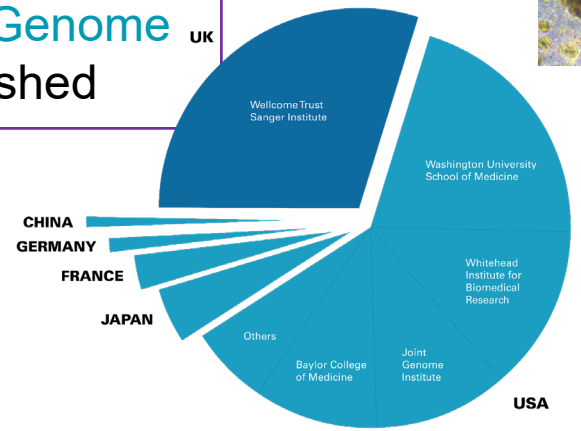
Specialist support

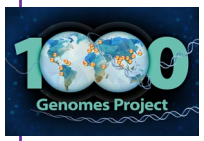
# Research findings from the Wellcome Sanger Institute

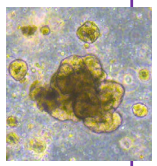
**1993**
Sanger Centre opens and starts sequencing

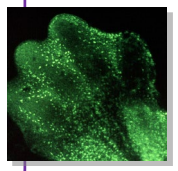
**1996**

*S. cerevisiae* genome sequence published
1st eukaryote

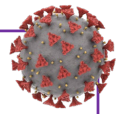
**1998**
*C. elegans* genome sequence published
1st animal


**2003**
Finished version of Human Genome published



**2008**
Establishes 1000 Genome Project
Variation detected



**2015**

Human Cancer Model Initiative
Organoids grown

**2016**
Leading Human Cell Atlas
Map of human cells


**2021**

Sanger sequences **20% of COVID-19** samples worldwide

# Projects at the Wellcome Sanger Institute

## Cellular Genetics

Define the cell types in the human body by studying expression of genes in single cells

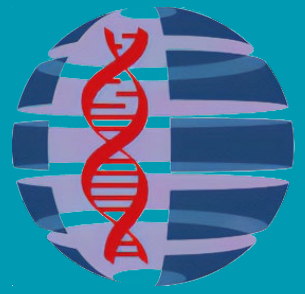
HUMAN CELL ATLAS

## Human Genetics

Discover the mutated genes that cause rare and common diseases

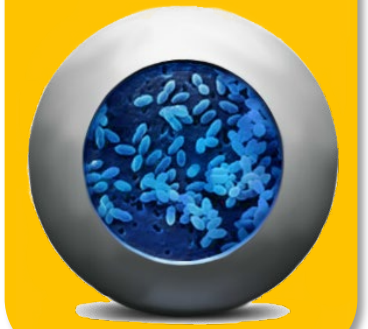

## Cancer, Ageing and Somatic Mutation

Understand the causes and consequences of DNA mutations throughout the body over the course of life



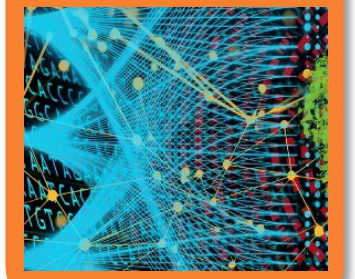
## Parasites and microbes

Understand the evolution of endemic and epidemic infectious diseases



## Generative Genomics

Predict and programme molecular biology by synthesising and engineering genomes



## Tree Of Life

Sequence the genomes of all species of life on Earth (starting with the UK and Ireland)

Darwin TREE of LIFE

# Getting to know you

Ice-breaker bingo

- Try to find someone for each of the statements
- You may only use a person's name once

| | | | |
|---|---|---|---|
| Name: | Name: | Name: | Name: |
| … has an interesting pet | … plays an instrument | … lives in another county | … has more than 2 siblings |
| Name: | Name: | Name: | Name: |
| … was born outside the UK | … holidayed in Cornwall last year | …is over six foot tall | … has won a competition |
| Name: | Name: | Name: | Name: |
| … plays on a sports team | …can bake a mean sponge cake | … takes Art as a subject at GCSE | … fluently speaks a foreign language |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