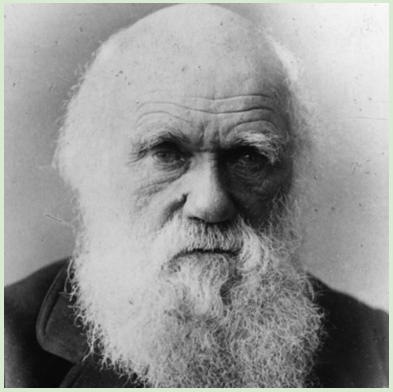
Scientists who worked on the knowledge of DNA and heritable traits

Charles Darwin (1859)

- He discovered that the galapago islands were related and had the same species, however, the species looked a little different
- When he returned to England, he came up with the theory of evolution caused by natural selection.
- He said that the living things best suited to their environment are more likely to survive and reproduce.
- However, the public's thoughts on this were very controversial.

Charles Darwin ->



Gregor Mendel (1866)

- He is considered the father of genetics.
- It took three decades for his ideas to be taken seriously.
- While doing his experiment on pea plants, he discovered that it has seven characteristics. Plant height, pod shape and color, seed shape and color, and flower position and color.
- He discovered that when a yellow pea plant and a green pea plant bred, their offspring was almost always yellow.
- He coined the terms recessive and dominant for traits.

Gregor Mendel ->

Friedrich Miescher (1869)

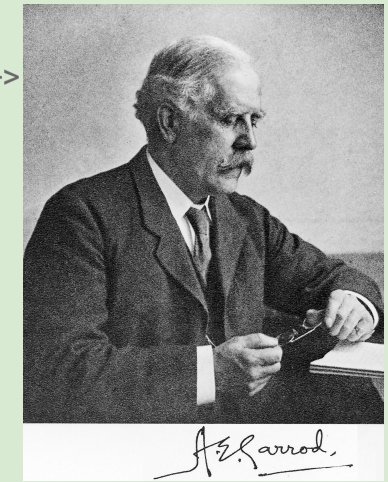
- Swiss physiological chemist
- He first identified nucleic in the nuclei of human white blood cells
- His original plan was to isolate the protein components of the white blood cells.
- During his experiment/process, he found an unusual chemical substance which were nothing like the proteins he was looking for.
- Shortly after, he discovered that he found a new substance.
- It took 50 years for the science community to appreciate his discovery

Friedrich Miescher ->

Sir Archibald Edward Garrod (1902)

- The first person to associate Gregor Mendel's theories with human diseases.
- He discovered that alkaptonuria is an inheritance disorder.
- He published 'The incidence of Alkaptonuria'

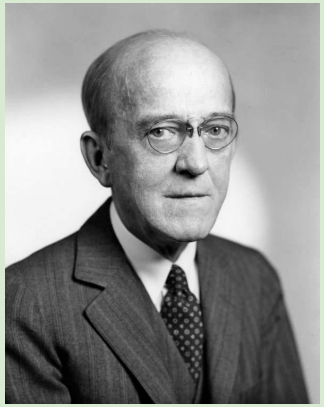
Sir Archibald Edward Garrod ->



Oswald Avery (1944)

- Identified DNA as a ‘transforming principle’
- Oswald and his colleagues published a paper for the Journal of Experimental Medicine.
- Oswald Avery worked with bacteria that is responsible for pneumonia and pneumococcus for many years, and discovered that if you mix pneumococcus with a lethal form, the harmless bacteria would become deadly.
- He discovered that the substance responsible for this is Nucleic Acid.

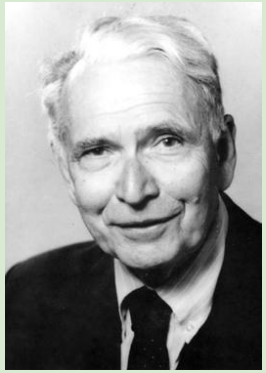
Oswald Avery ->



Erwin Chargaff (1950)

- Discovered that DNA is species specific
- He read Oswald Avery's scientific paper.
- Erwin Chargaff decided to work on chemistry of the nucleic acids
- He submitted two papers to JBC with details on the complete analysis of DNA preparations.
- He improved his research and analyzed DNA from all types of species.

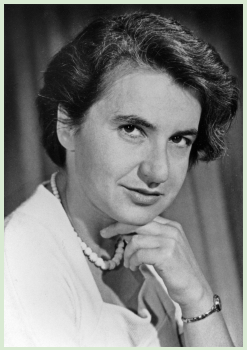
Erwin Chargaff ->



Rosalind Franklin (1952)

- Photographed crystalized dna
- Conducted a huge part of research towards DNA
- She spent 3 years learning about X-ray diffraction.
- After, she returned to work as a research associate
- Produced two sets of high quality photographs of DNA fibres.
- Her photographs were described as “the most beautiful photograph of a substance ever taken”
- Died due to cancer

Rosalind Franklin ->



James Watson and Francis Crick (1953)

- They discovered the double helix structure of DNA
- James met Francis at Cambridge University.
- James and Francis were 12 years apart.
- They used x-ray data and model building to solve the structure of DNA.
- They were awarded the Nobel prize for Physiology with Maurice Wilkins

James Watson and Francis Crick ->

George Gamow (1953)

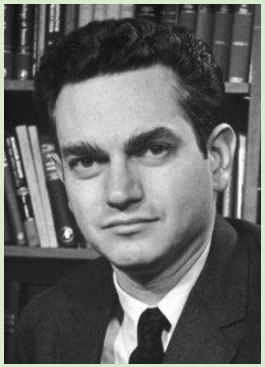
- He created the RNA tie club
- Each member would talk about their ideas about how nucleotide bases transform into proteins by the body's cells.
- There was 20 members (one for each amino acid)
- However, the man who discovered the genetic code was not a member

George Gamow ->

Marshall Nirenberg (1965)

- First person to sequence the bases in codon.
- Focused on researching nucleic acids.
- He did many experiments on RNA, he wanted to show that RNA could trigger photosynthesis.
- Some of the experiments were with strands of RNA
- After many tries, He finally became the first person to sequence the code.

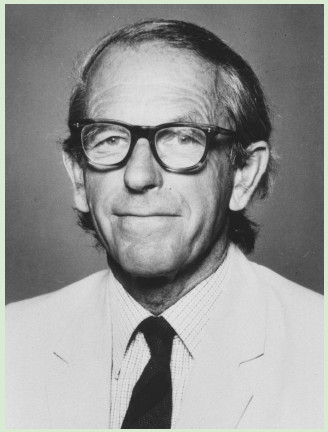
Marshall Nirenberg ->



Frederick Sanger (1977)

- Developed a rapid DNA sequencing technique
- Ordered the amino acids and obtained a protein sequence (he was the first person to do this)
- He thought that if proteins were ordered, then DNA must have an order too.
- He was working on sequencing RNA but the techniques for RNA also worked for DNA as well.

Frederick Sanger ->



Human diseases/disabilities that are caused by defects in DNA

Familial Breast and Ovarian Cancer

- The gene associated with this disease is found on chromosome 17
- They found a second gene associated with this disease, this one was found on chromosome 13
- If a person has one slightly different copy of either gene, it can lead to mutations.

Symptoms:

Symptoms will vary from person to person. If a person in your family has had this disease, there is a chance of you getting it as well.

Huntington’s Disease

- Huntington’s Disease is rare.
- People usually get it between 30-45.
- In 1983, a genetic marker that is linked to Huntington's Disease was found in chromosome 4.
- It was the first genetic disease.

Symptoms:

- Difficulty focusing
- Depression
- Mood swings
- Clumsiness

Down Syndrome

- It was discovered that an additional copy of chromosome 21 was linked to Down Syndrome
- They used Cytogenetics to discover this.

Symptoms:

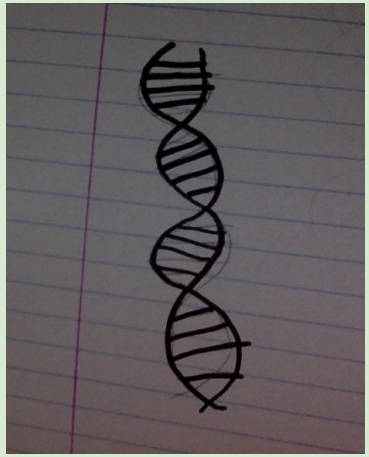
- A flat face
- Short neck
- Small ears
- Below average intelligence

Genes and DNA

The shape of helix DNA, when it was discovered, and who discovered it.

- The shape of helix DNA ->
- It was discovered in 1953
- It was discovered by James

Watson and Francis Crick



What are Genes?

- Genes are a nucleotide sequence in DNA
- They carry information for traits
- Your genes can spread to your kids by offspring.

Genes ->

Future applications

Three modern technologies that use DNA sequencing

- DNA sequencing can help solve cases involving identical twins.
- DNA sequencing can help find out who you are related to
- DNA sequencing can help scientific studies on animals.

A future way we can use DNA techniques

- We can use DNA techniques to make personalized medicine.