

History of DNA

Big picture: seems trait pass has some pattern

1866 Gregor Mendel

✓ Gregor Mendel (1822-1884) publishes "Experiments in Plant Hybridisation," establishing basic laws of inheritance

- The law of independent assortment.
 - one character is independent from other characters (height is independent from hair color)
- The law of independent segregation
 - Alleles. Gene pair, one in each chromosome yet control the same character
 - These pairs segregate and recombine during reproduction
- The law of dominance.

1869 Johann Friedrich Miescher

✓ Friedrich Miescher extracts what comes to be known as DNA from the nuclei of white blood cells.

Friedrich Miescher identified the "nuclein"(DNA = Protein) by isolating a molecule from a cell nucleus that would later become known as DNA.

1881 Albrecht Kosse

✓ Naming DNA

identified nuclein as a nucleic acid. He also isolated those five nitrogen bases that are now considered to be the basic building blocks of DNA and RNA: adenine (A), cytosine (C), guanine (G), and thymine (T) (which is replaced by uracil (U) in RNA).

How cell divided and trait pass chromosomes

1882 Walther Flemming

✓ Discovery of chromosomes.

Walther Flemming, a German anatomist investigating the structure of cells, discovers a substance he calls chromatin. He notices that, during cell **division**, this substance separates into threadlike strings, which become known as **chromosomes**.

1902 Theodor Boveri (1862-1915) and Walter Sutton

✓ Theodor Boveri (1862-1915) recovered mendelian concept and found process of cell division

- Chromosomes remain organized and individual structures through the process of cell division.
 - observation: chromosomes are the same before and after cell division
- Sperm and egg contribute the same number of chromosomes.

1909 Wilhelm Johannsen

genotype as the genetic constitution of an organism; phenotype as an organism's totality of inherited characteristics.

Morgan: it is the pair of factor in the chromosomes works

Q: 1. How do they work? 2. what are they?

1910 Thomas Hunt Morgan

✓) establishes the chromosomal theory of heredity

- Discrete pairs of factors located on chromosomes
- Certain characteristics occur together with certain gender cuz the gene is located at X or Y
- mechanistic consequence of reproduction, this linkage between genes is broken, allowing for new combinations of traits.

1927 Muller

✓ X rays can induce mutations

Artificially induce more than 100 mutations in the resulting progeny—about half the number of all mutations discovered in *Drosophila* over the previous fifteen years.

1933 Ochoas recovered polynucleotide phosphorylase PNPase

✓ [Click here to expand...](#)

PNPase is one of the [exoribonuclease](#)., which role is catalyzes the processive 3–5 phosphorolytic degradation of RNA, releasing [nucleoside](#) diphosphates --> be able to bind to an RNA substrate

One evidence for Q1: gene direct protein generation

1941 Beadle Gene direct protein generation

✓ [genes direct the synthesis of enzymes that control metabolic processes](#)

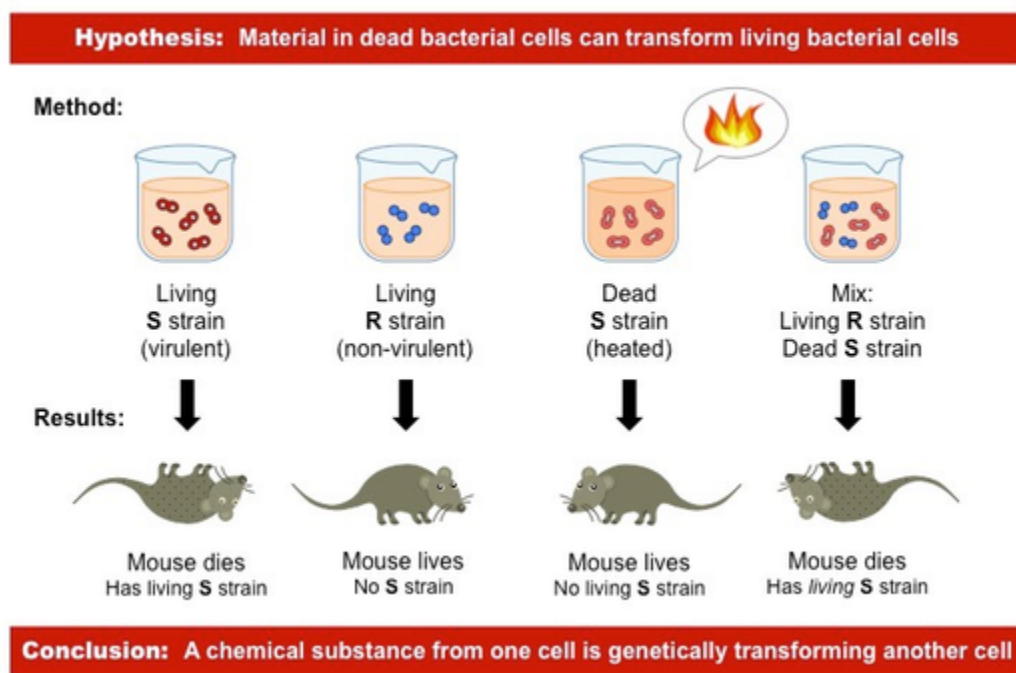
1. Beadle and Tatum first irradiated a large number of *Neurospora*, and thereby produced some organisms with mutant genes
2. crossed these potential mutants with non-irradiated *Neurospora*
3. found some of the mutant spores would not replicate without addition of a specific amino acid—arginine lost use of a specific gene that ordinarily facilitates one particular enzyme necessary to the production of arginine.

One evidence and answer for Q2:

1944 Avery The famous R S experiment

✓ [identify deoxyribonucleic acid \(DNA\) as the "transforming principle"](#)

- two forms of pneumococcus: R with rough is harmless and "S" with smooth cover is lethal



- The hypothesis might be what leads to dead S effect
- The answer is its "transforming factor"

1953 Crick (1916-2004) and James D. Watson

✓ [chemical structure of DNA](#)

- hint from previous research no of A = T and C = G
- double helix with base pair
- X-ray crystallography had provided crucial evidence.

Now q2 solved back to Q1: how gene → protein?

1957 Crick two Hypothesis

▼ [Click here to expand...](#)

- *The Sequence Hypothesis*: The order of bases in a portion of DNA represents a code for the amino acid sequence of a specific protein
- *The Central Dogma*: Information is transmitted from DNA and RNA to proteins, but information cannot be transmitted from a protein to DNA.