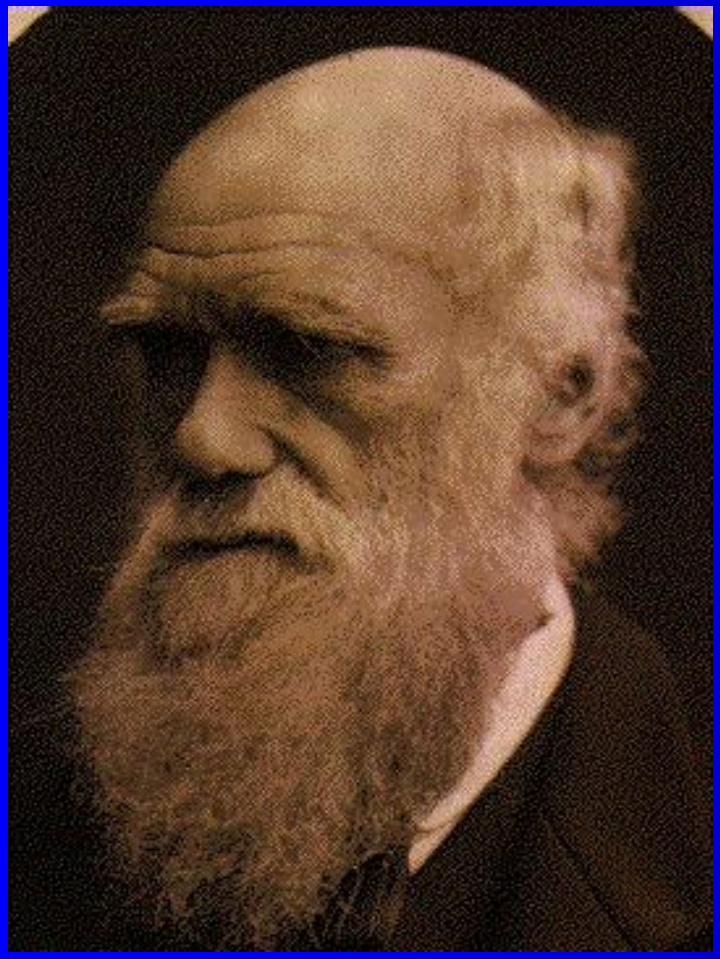
# A brief history

of

Molecular biology

# Big names



- Charles Darwin (1809-1882)
- On the origin of species by means of the natural selection (1859)

# Cell theory

- Antony van Leeuwenhoek (1632-1723)
- Robert Hooke (1635-1703)
- Theodor Schwann (1810-1882)
- Matthias Schleiden (1804-1881)

# Classical genetics

Gregor Mendel
1822-1884

Thomas Hunt Morgan
1866-1945
Nobel prize (1933)

# Molecular genetics

The discovery of DNA

1869, Friedrich Miescher

The composition of genes

1944, Avery

The relationship between genes and proteins

1941, George Beadle & EL Tatum

# Activities of genes

- *How genes are replicated*

  *1953, J Waston, F Crick. 1958, M Meselson, F Stahl*

- *How genes direct the production of polypeptides*

  *1966, M Nirenberg, HG Khorana*

- *How genes accumulate mutations*
- *Gene cloning*

James Waston
(1928-)

Francis Crick
(1916-2004)

Noble prize winner
in 1962

# Molecular biology time line

| | | |
|---|---|---|
| 1859 | Charles Darwin | Published *On the Origin of Species* |
| 1865 | Gregor Mendel | Advanced the principles of segregation and independent assortment |
| 1869 | Friedrich Miescher | Discovered DNA |
| 1900 | HD Vries, C Correns EV Tschemak | Rediscovered Mendel's principles |
| 1902 | Archibald Garrod | Noted the first genetic disease |
| 1902 | W Sutton, T Boveri | Proposed the chromosome theory |

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|---|---|---|
| 1910 | Thomas Hunt Morgan | Demonstrated that genes are on |
| 1916 | Calvin Bridges | chromosome |
| 1913 | AH Sturtevant | Constructed a genetic map |
| 1927 | HJ Muller | Induced mutation by X-rays |
| 1931 | Harriet Creighton, Barbara McClintock | Obtained physical evidence for recombination |
| 1941 | G Beadle, EL Tatum | Proposed the one gene-one enzyme hypothesis |
| 1944 | O Avery, C Mcleod M McCarty | Identified DNA as the material genes are made of |
| 1953 | J Waston, F Crick R Franklin, M Wilkins | Determined the structure of DNA |
| 1958 | Matthew Meselson, Franklin Stahl | Demonstrated the semiconservative replication of DNA |

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|---|---|---|
| 1961 | S Brenner, F Jacob<br>M Meselson | Discovered messenger RNA |
| 1966 | Marshall Nirenberg<br>Har Gobind Khorana | Finished unraveling the genetic code |
| 1972 | Paul Berg | Made the first recombination DNA *in vitro* |
| 1973 | H Boyer, S Cohen | First used a plasmid to clone DNA |
| 1977 | W Gilbert, F Sanger | Worked out methods to determine the sequence of bases in DNA |
| 1977 | Frederick Sanger | Determined the base sequence of an entire viral genome (ΦX174) |
| 1977 | P Sharp, R Roberts | Discovered introns in genes |
| 1990 | LC Tsui, F Collins,<br>J Riordan | Found the gene that is responsible for cystic fibrosis |

| | | |
|---|---|---|
| 1990 | J Waston and others | Launched the Human Genome Project to map the entire human genome and, ultimately to determine its base sequence |
| 1991 | WF Anderson and others | First successful gene therapy performed on two girls with severe combined immunodeficiency,bubble-boy syndrome |
| 1993 | The Huntington's Disease Group | Identified the Huntington's disease gene |
| 1995 | Craig Venter Hamilton Smith | Determined the base sequences of the genomes of two bacteria |
| 1996 | Many investigators | Determined the base sequence of the genome of one yeast |
| 1997 | F Blattner, T Horiuchi, and others | Determined the base sequence of the genome of *Escherichia coli* |

1997 Ian Wilmut and others Cloned a sheep (Dolly) from an adult udder cell

1998 The genome of *Caenerhabditis elegans*, a small soil nematode, was completely sequenced (97Mb)

1999 *Drosophila melanogaster* (fruitfly) genome completely sequenced (175 Mb)

2000 Completion of the *Arabidopsis thaliana* sequence (157 Mb)
Human genome draft version finished (3200 Mb)

2002 Presentation of human genome by Celera Genomics and the collaborating group of laboratories supported by public foundation

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# Main topics of molecular biology

- DNA recombination
- Gene expression and regulation
- Structure and function of biological macromolecules
- Genomics, proteomics, bioinfomatics