Timeline of DNA

Genetics BIO208

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Timeline of DNA -1800's

- 1865: **Gregor Mendel** discovers through breeding experiments with peas that traits are inherited based on specific laws (later to be termed Mendel's laws).

- 1866: **Ernst Haeckel** proposes that the nucleus contains the factors responsible for the transmission of hereditary traits.

- 1869: **Friedrich Miescher** isolates DNA for the first time.

- 1871: The first publications describing DNA (nuclein) by Friedrich Miescher, Felix Hoppe-Seyler, and P. Plo´sz are printed.

Timeline of DNA -1800's

- 1882: **Walther Flemming** describes chromosomes and examines their behavior during cell division.

- 1884–1885: **Oscar Hertwig**, **Albrecht von Kflliker**, **Eduard Strasburger**, and **August Weismann** independently provide evidence that the cell's nucleus contains the basis for inheritance.

- 1889: **Richard Altmann** renames nuclein to nucleic acid.

Timeline of DNA 1900-1949

- 1900: **Carl Correns**, **Hugo de Vries**, and **Erich von Tschermak** rediscover Mendel's Laws.
- 1902: **Theodor Boveri** and **Walter Sutton** postulate that the heredity units (called genes as of 1909) are located on chromosomes.
- 1902–1909: **Archibald Garrod** proposes that genetic defects result in the loss of enzymes and hereditary metabolic diseases.
- 1909: **Wilhelm Johannsen** uses the word **gene** to describe units of heredity.

Timeline of DNA 1900-1949

- 1910: **Thomas Hunt Morgan** uses fruit flies (Drosophila) as a model to study heredity and finds the first mutant (white) with white eyes.
- 1913: **Alfred Sturtevant** and **Thomas Hunt Morgan** produce the first genetic linkage map (for the fruit fly Drosophila).
- 1928: **Frederick Griffith** postulates that a transforming principle permits properties from one type of bacteria (heat-inactivated virulent Streptococcus pneumoniae) to be transferred to another (live nonvirulent Streptococcus pneumoniae).

Timeline of DNA 1900-1949

- 1929: **Phoebus Levene** identifies the building blocks of DNA, including the four bases adenine (A), cytosine (C), guanine (G), and thymine (T).

- 1941: **George Beadle** and **Edward Tatum** demonstrate that every gene is responsible for the production of an enzyme.

- 1944: **Oswald T. Avery**, **Colin MacLeod**, and **Maclyn McCarty** demonstrate that **Griffith's transforming principle** is not a protein, but rather DNA, suggesting that DNA may function as the genetic material.

Timeline of DNA 1900-1949

- 1949: **Colette** and **Roger Vendrely** and **Andre´ Boivin** discover that the nuclei of germ cells contain half the amount of DNA that is found in somatic cells. This parallels the reduction in the number of chromosomes during gametogenesis and provides further evidence for the fact that DNA is the genetic material.

- 1949–1950: **Erwin Chargaff** finds that the DNA base composition varies between species but determines that within a species the bases in DNA are always present in fixed ratios: the same number of A's as T's and the same number of C's as G's.

Timeline of DNA 1950-1999

- 1952: **Alfred Hershey** and **Martha Chase** use viruses (bacteriophage T2) to confirm DNA as the genetic material by demonstrating that during infection viral DNA enters the bacteria while the viral proteins do not and that this DNA can be found in progeny virus particles.

- 1953: **Rosalind Franklin** and **Maurice Wilkins** use X-ray analyses to demonstrate that DNA has a regularly repeating helical structure.

- 1953: **James Watson** and **Francis Crick** discover the molecular structure of DNA: a double helix in which A always pairs with T, and C always with G.

- 1956: **Arthur Kornberg** discovers DNA polymerase, an enzyme that replicates DNA.

Timeline of DNA 1950-1999

- 1957: **Francis Crick** proposes the central dogma (information in the DNA is translated into proteins through RNA) and speculates that three bases in the DNA always specify one amino acid in a protein.
- 1958: **Matthew Meselson** and **Franklin Stahl** describe how DNA replicates (semiconservative replication).
- 1961–1966: **Robert W. Holley**, **Har Gobind Khorana**, **Heinrich Matthaei**, **Marshall W. Nirenberg**, and colleagues crack the genetic code.
- 1968–1970: **Werner Arber**, **Hamilton Smith**, and **Daniel Nathans** use restriction enzymes to cut DNA in specific places for the first time.

Timeline of DNA 1950-1999

- 1972: **Paul Berg** uses restriction enzymes to create the first piece of recombinant DNA.
- 1977: **Frederick Sanger**, **Allan Maxam**, and **Walter Gilbert** develop methods to sequence DNA.
- 1982: The first drug (human insulin), based on recombinant DNA, appears on the market.
- 1983: **Kary Mullis** INVENTS PCR as a method for amplifying DNA in vitro.
- 1990: Sequencing of the human genome begins.

Timeline of DNA 1950-1999

- 1995: First complete sequence of the genome of a free-living organism (the bacterium *Haemophilus influenzae*) is published.
- 1996: The complete genome sequence of the first eukaryotic organism—the yeast *S. cerevisiae*—is published.
- 1998: Complete genome sequence of the first multicellular organism—the nematode worm *Caenorhabditis elegans*—is published.
- 1999: Sequence of the first human chromosome (22) is published.

Timeline of DNA 2000-

- 2000: The complete sequences of the genomes of the fruit fly Drosophila and the first plant—*Arabidopsis*—are published.
- 2001: The complete sequence of the human genome is published.
- 2002: The complete genome sequence of the first mammalian model organism—the mouse—is published.