

A Genomic Timeline

Tim Shank 2003

1800s

1865

Gregor Mendel reports the results of his pea plant expts, from which he discerned several fundamental laws of heredity. His results appeared in an obscure journal in 1866, ignored for 34 years.

1882

Walther Flemming publishes his observations of tiny threads—later known as chromosomes—inside salamander larvae cells that appear to be dividing.

1900s

1900

Hugo de Vries in the Netherlands, Erich Tschermak von Seysenegg in Austria, and Karl Correns in Germany simultaneously rediscover and verify Mendel's principles of heredity.

1902

Walter Sutton points out connection between chromosomes and Mendel's "factors", thereby expanding the science of genetics from the organismal level to the subcellular level.

1910

Thomas Hunt Morgan and co-workers in the "fly lab" show that some genetically determined traits are sex-linked. They also confirm that some trait-determining genes are located on specific chromosomes.

1927

Working with fruit flies, Hermann Muller determines that x-rays can cause genetic mutation.

1928

Fred Griffith discovers the phenomenon of transformation, in which some unknown "principle" transforms a harmless strain of bacteria into a virulent one.

1944

Oswald Avery, Colin Macleod, and Maclyn McCarty prove that DNA, not protein, embodies the heredity material in most living organisms.

Late 1940s

Erwin Chargaff discovers one-to-one correspondence between adenine and thymine and between cytosine and guanine- a key piece of information for determining the structure of DNA.

1952

Rosalind Franklin obtains x-ray diffraction data of DNA, which become central to the elucidation of DNA's molecular structure. Martha Chase and Alfred Hershey report experiments with bacteriophages that help prove DNA is the molecule of heredity.

1953

James Watson and Francis Crick announce their discovery of the double-helix structure of DNA. They write in a 958-word *Nature* article: "It has not escaped our notice that the specific pairings we have postulated immediately suggest a possible copying mechanism for the genetic material."

Mid-1960s

Marshall Nirenberg, H. Gobind Khorana, and others crack the triplet code that maps messenger RNA codons to specific amino acids.

1969

A team at Harvard Medical School led by Jonathan Beckwith isolates the first gene, specifically, a bacterial gene whose protein product is involved in sugar metabolism.

1970

A team at the University of Wisconsin, led by H. Gobind Khorana, synthesizes a gene from scratch, beginning what might be called chemical genetics.

1972

Using restriction enzymes from Herbert Boyer's research group, Paul Berg and colleagues produce the first recombinant DNA molecules.

1973

The era of genetic engineering begins when Stanley Cohen, Herbert Boyer, and co-workers insert a gene from African clawed toad into bacterial DNA.

1976

Genentech, the first genetic engineering company, is founded in San Francisco.

1983

James Gusella and co-workers locate a genetic marker for Huntington's disease on chromosome 4. This leads to scientists having the ability to screen people for a disease without being able to cure it. Kary Mullis conceives of the polymerase chain reaction, a chemical DNA replication process that greatly quickens the pace of genetic science and technology development.

1984

Alec Jeffreys develops "genetic fingerprinting" a molecular biological analog of traditional fingerprinting for identifying individuals by analyzing polymorphic sequences in the DNA.

1986

The Human Genome Initiative, later called the Human Genome Project, is announced. The goal is to sequence the entire human genome and provide a complete catalog of every human gene.

1987

A large, collaborative effort yields the first comprehensive human genetic map with 400 signposts.

1987

First volume of the journal "Genomics".

1988

The National Center for Human Genome Research is created, with the goal of mapping and sequencing all human DNA by 2005.

1990

The Human Genome Project is formally launched, with a completion date set for 2005. W. French Anderson performs the first gene therapy procedure on a 4-year-old girl with an immune disorder known as ADA deficiency. (It didn't work)

Genomic Research journal initiated by Cold Spring Harbor Laboratory Press

Mary-Claire King finds evidence that a gene on chromosome 17 causes an inherited form of breast cancer and increases the risk of ovarian cancer.

1992

An international collaboration produces a rough map of genetic polymorphism: the variable genetic regions along all 23 pairs of chromosomes that govern person-to-person biological variation.

1995

The Institute for Genomic Research reports first complete DNA sequence of the genome of a free-living organism- the bacterium *Haemophilus influenzae*.

1996

The first complete sequence of a eukaryote (the yeast *Saccharomyces cerevisiae*) is reported by an international effort involving some 600 scientists in Europe, North America, and Japan.

1996

The development of the first microarrays by Affymetrix

1998

The first genome of a multicellular organism- the 97megabase DNA sequence of the roundworm *Caenorhabditis elegans*- is published by the *C. elegans* Sequencing Consortium.

2000s

2000

Completion of the first draft of the sequence of the entire human genome.

2005

The ability to sequence a prokaryotic genome for \$1,000.

Start Journal Name

Date

1987 Genomics

1991 Genome Research

1993 Gene and Function

1995 Journal of Agricultural Genomics

1996 Mammalian Genome

1996 Nature Genetics

1996 Proteins: Structure, Function, and Genetics

1996 Molecular Genetics and Genomics

1999 Genome Biology

1999 Physiological Genomics

2000 Functional and Integrative Genomics

2001 Proteomics

2001 Comparative and Functional Genomics journal initiated

2001 American Journal of Pharmacogenomics

2003 Applied Genomics and Proteomics