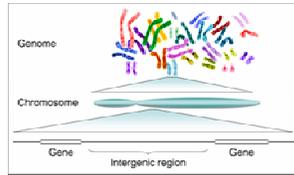


# Human Genomics

## The Secret of How Life Works



### Genome Time Line

- 1800's - Gregor Mendel  
Parents pass specific traits to offspring
- 1909 - Wilhelm Johannsen, a Danish botanist  
Coined the term "gene"
- 1902 - Walter Sutton suggested that chromosomes contained genes
- 1911 - Thomas Hunt Morgan worked with fruit flies and proposed that genes are found in fixed locations on the genes.
- 1920 - Protein was thought to be an important component of genes
- 1943 - Oswald Avery discovered that harmful bacteria were passing on DNA, he proposed that genes were made of DNA.
- 1952 - Alfred Hershey and Martha Chase discovered that viruses inject bacteria with DNA and not protein proving that Avery was correct.
- 1953 - James Watson and Francis Crick discovered discovered that DNA was a double stranded helix in which each strand served as a template for reproduction.
- 1961 - Sydney Brenner found that RNA acts as a messenger carrying the DNA message to protein factories called ribosomes.
- 1968 - Hamilton Smith discovered the first "molecular scissors" called restriction enzymes that were used to snip pieces of DNA for genome experiments.
- 1973 - Stanley Cohen and Herbert Boyer showed that bacteria could be made into protein producing factories starting recombinant DNA technology.
- 1977 - Phillip Sharp and Richard Roberts found that most DNA doesn't seem to be a recipe for anything coining the term "junk DNA".
- 1983 - Kary Mullis discovered a technique called PCR to begin DNA fingerprinting and genetic testing.
- 1990 - Human Genome Project began.
- June 26, 2000 - Human Genome Project completed the first draft of mapping of a human genome.
- 2003 - Human Genome is published concurrent with the 50<sup>th</sup> Anniversary of the discovery of the double helix.

### What is the Human Genome Project?

The Human Genome Project was an international research project with the primary goal to determine the sequence of the approximately 20,000 to 25,000 human genes and to identify them from both a physical and functional standpoint. The project hoped to determine the sequences of the 3 billion chemical base pairs, store this information, improve the tools for data analysis, and allow universal access to this data. The project began in 1990 and was headed by James D. Watson. A working draft was released in 2000 and was completed in 2003. Work continues to be carried out internationally.

GENES INFLUENCE THE TRAITS YOU INHERIT IN PREDICTABLE AND UNPREDICTABLE WAYS

- Biological parents' sperm and egg create a complete set of chromosomes
- Your surroundings influence your genes : they may turn off some genes and turn on others.
- Diet, lifestyle, choices, and experiences : may turn off some genes and turn on others.

### Human Genome Recipe

- 1 recipe book = 1 genome
- 23 chapters = 23 pairs of chromosomes
- 1 recipe = 1 gene
- 1 word = 1 codon
- 1 letter = 1 base

### How similar are you? Compare genomes



•human to yeast about 30%

•human to worm about 40%



•human to banana about 50%

•human to fruit fly about 60%



•human to mouse about 90%

•human to chimp about 98.4%



•human to human about 99.9%

(except for twins, whose genes are 100% identical)



### Potential Benefits of Human Genome Project

- Molecular medicine  
Stem Cell Research  
Bypassing mutations such as: muscular dystrophy and cystic fibrosis.  
Reversal of Fragile X  
Safeguarding human health by: new drug therapies to prevent or cure diseases
- Energy sources and environmental applications  
Use microbial genomics research to create new energy sources (biofuels)  
Use microbial genomics research to develop environmental monitoring techniques to detect pollutants  
Use microbial genomics research for safe, efficient environmental remediation
- DNA forensics (identification)
- Agriculture, livestock breeding, and bio-processing

