

وراثة الأحياء الدقيقة

Microbial Genetics

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مكتب ٢ ب ٤٥

مقدمة

Introduction

- Microscopic biology began in 1665.
- Robert Hooke (1635-1703) discovered organisms are made up of cells.
- Matthias Schleiden (1804-1881) and Theodor Schwann (1810-1882) further expanded the study of cells in 1830s.



- Robert Hooke



- Theodor Schwann



- Matthias Schleiden

Historical Events of Genetics (1800 – 1870)

- **1865** Gregor Mendel discover the basic rules of heredity of garden pea.
 - An individual organism has two alternative heredity units for a given trait (**dominant trait** v.s. **recessive trait**)
- **1869** Johann Friedrich Miescher discovered DNA and named it nuclein.



Mendel: The Father of Genetics

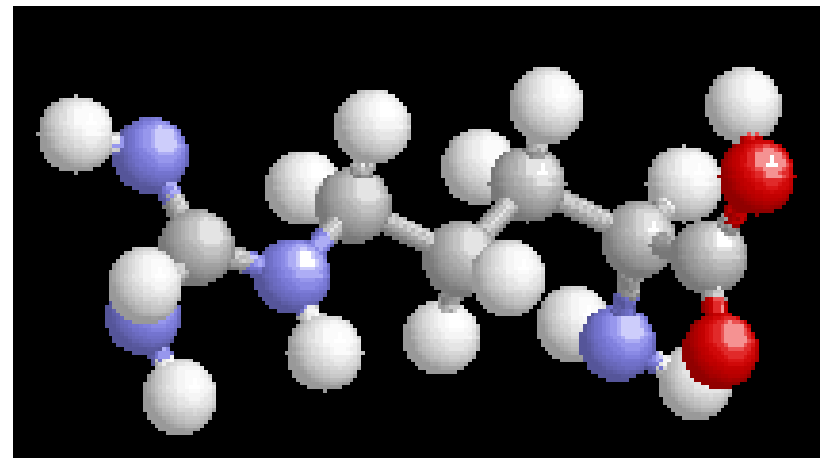


Johann Miescher

Miescher

Historical Events of Genetics (1880 – 1900)

- **1881** Edward Zacharias showed chromosomes are composed of nuclein.
- **1899** Richard Altmann renamed nuclein to nucleic acid.
- **By 1900**, chemical structures of all 20 amino acids had been identified.



Historical Events of Genetics (1900-1911)

- **1902** - Emil Hermann Fischer wins Nobel prize: showed amino acids are linked and form proteins.
 - Postulated: protein properties are defined by amino acid composition and arrangement, which we nowadays know as fact.
- **1911** – Thomas Hunt Morgan discovers genes on chromosomes are the discrete units of heredity.
- **1911** Pheobus Aaron Theodore Lerene discovers RNA.



**Emil
Fischer**



**Thomas
Morgan**

Historical Events of Genetics (1940 – 1950)

- **1941** – George Beadle and Edward Tatum identify that genes make proteins



George
Beadle



Edward
Tatum

- **1950** – Edwin Chargaff find Cytosine complements Guanine and Adenine complements Thymine



Edwin
Chargaff

Historical Events of Genetics (1950 – 1952)

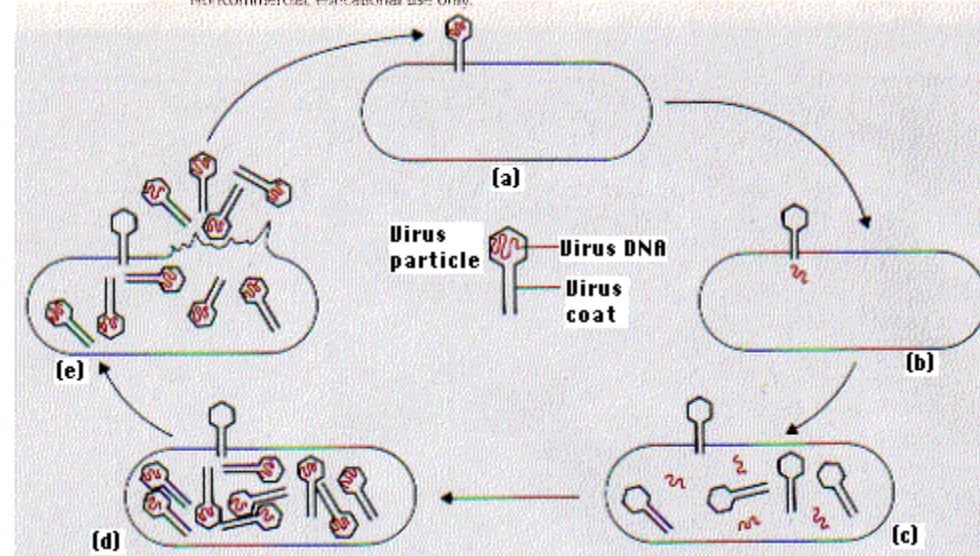
- **1950s** – Mahlon Bush Hoagland first to isolate tRNA.



Mahlon Hoagland

Courtesy of Dr. S. Chan, DNA Learning Center.
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- **1952** – Alfred Hershey and Martha Chase make genes from DNA.



Hershey Chase Experiment

Historical Events of Genetics (1952 – 1960)

- **1952-1953**

James D. Watson and Francis H. C. Crick deduced the double helical structure of DNA.



**James Watson
and Francis Crick**

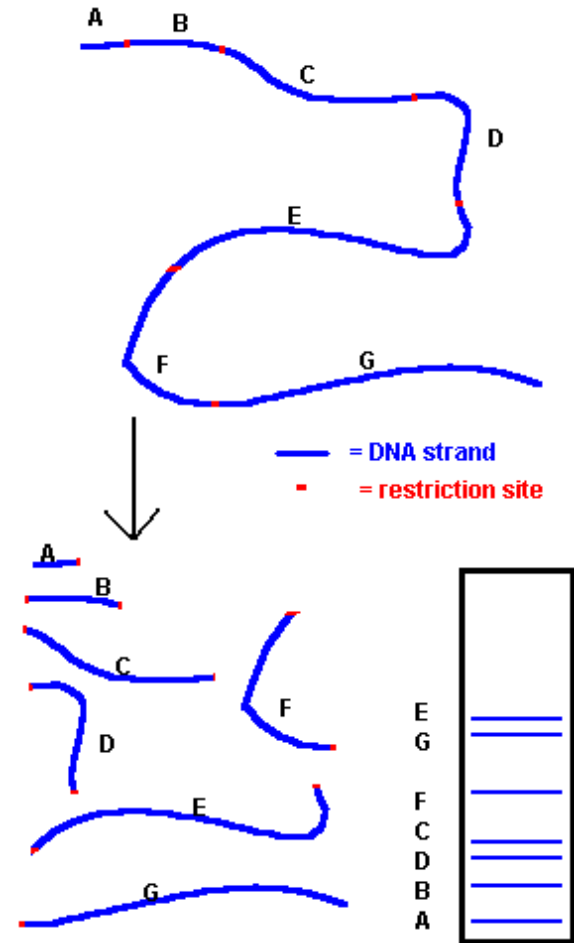
- **1956** - George Emil Palade showed the site of enzymes manufacturing in the cytoplasm is made on RNA organelles called ribosomes.



George Emil Palade

Historical Events of Genetics 1970

- **1970** Howard Temin and David Baltimore independently isolate the first restriction enzyme
- DNA can be cut into reproducible pieces with site-specific endonuclease called restriction enzymes;
 - the pieces can be linked to bacterial vectors and introduced into bacterial hosts. (**gene cloning** or **recombinant DNA technology**)



Historical Events of Genetics (1970- 1977)

- **1977** Phillip Sharp and Richard Roberts demonstrated that pre-mRNA is processed by the excision of introns and exons are spliced together.
- Joan Steitz determined that the 5' end of snRNA is partially complementary to the consensus sequence of 5' splice junctions.



Phillip Sharp



Richard Roberts

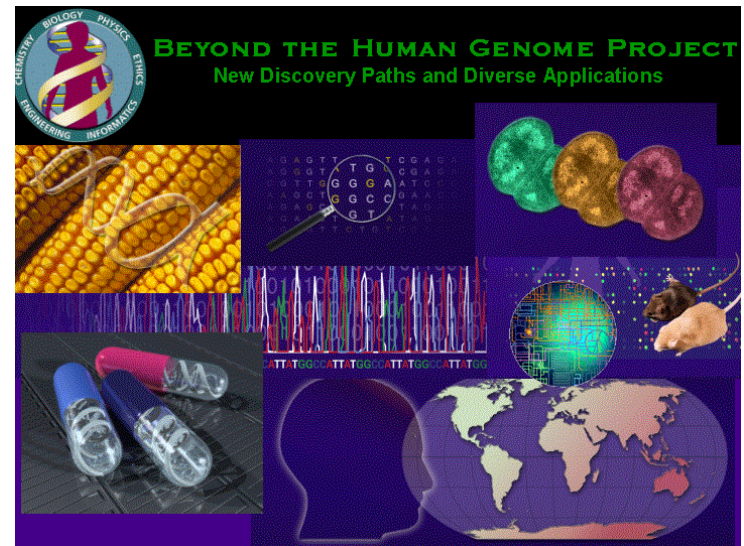


Joan Steitz

Historical Events of Genetics (1986 – 1995)

- **1986** Leroy Hood: Developed automated sequencing mechanism
- **1986** Human Genome Initiative announced
- **1990** The 15 year Human Genome project is launched by congress
- **1995** Moderate-resolution maps of chromosomes 3, 11, 12, and 22 maps published (These maps provide the locations of “markers” on each chromosome to make locating genes easier)

Leroy Hood



Historical Events of Genetics (1995-1996)

- **1995** John Craig Venter: First bacterial genomes sequenced.
- **1995** Automated fluorescent sequencing instruments and robotic operations.
- **1996** First eukaryotic genome-yeast-sequenced.



John Craig Venter

Historical Events of Genetics (1997 – 1999)

- **1997** - E. Coli sequenced
- **1998** - PerkinElmer, Inc.. Developed 96-capillary sequencer
- **1998** - Complete sequence of the *Caenorhabditis elegans* genome.
- **1999** - First human chromosome (number 22) sequenced.

Historical Events of Genetics (2000-2001)

- **2000** - Complete sequence of the euchromatic portion of the *Drosophila melanogaster* genome.
- **2001** - International Human Genome Sequencing: first draft of the sequence of the human genome published.



Historical Events of Genetics (2003- Present)

- **April 2003** - Human Genome Project Completed. Mouse genome is sequenced.
- Lot of Applications nowadays.
- Food and Agriculture.
- Health.
- Industry.
- Environment.

