

GENERAL BIOLOGY Lecture 12 - Molecular Biology

- I. Introduction to molecular biology**
- A. Where does life begin (another definition)? - the cell...the nucleus...the brain...the DNA
 - B. The prime molecule of life - DNA
 - 1. James Watson - "There is no substance more important than DNA"
 - 2. DNA contains the hereditary information used to determine protein structure
 - 3. DNA contains instructions for cell division
 - 4. DNA provides the basis of evolutionary processes (alterations - mutations)
 - C. Other molecules of importance
 - 1. RNA - ribonucleic acid
 - 2. Protein
 - D. How are these biological molecules interrelated?
 - 1. Transcription
 - 2. Translation
- II. Discovery of DNA - exchange of scientific information - the "battle"**
- A. Fred Griffith and the mouse experiment: GBM (Great Big Mouse)
 - 1. Mouse + rough bacteria - ALIVE
 - 2. Mouse + smooth bacteria - DEAD
 - 3. Mouse + killed smooth + live rough - DEAD!!!!
 - 4. Conclusion - instruction transferred from killed smooth to live rough to kill mouse
 - B. Oswald Avery and discovery of DNA: Almost AAAAAverybody Disagreed with Avery
 - 1. When DNA was destroyed, information was not transferred
 - 2. Francis Crick (a physicist in navy) and James Watson (undergraduate ornithologist) read the paper.
 - C. James Watson - The Double Helix
 - 1. Had an interest in birds - went to University of Chicago - zoology
 - 2. Applied to graduate school - turned down by Harvard, went to Indiana University
 - 3. Approach of "what is life" was well-received. Salvador Luria (geneticist) took Watson as a doctoral student.
 - 4. Watson traveled as a graduate student - got to see Linus Pauling
 - 5. After the Ph.D., Watson went to Europe - Cambridge
 - 6. Watson had a crew cut - Francis Crick's wife noticed him
 - D. Francis Crick - The Double Helix
 - 1. Francis Crick had left the navy after the war because biology interested him
 - 2. Francis Crick was excited about the chemical physics of biology
 - E. Some other contributors
 - 1. Maurice Wilkins ("WilkXns") - X-ray studies of DNA shared Nobel Prize w/ Watson & Crick
 - 2. Rosalind Franklin - ("FranClin") Hired in part by Maurice Wilkins. She was the crystallographer that provided essential evidence for structure of DNA. A personal quarrel between Franklin & Wilkins ranks as one of the greatest in the history of science. She died in 1958
 - 3. Linus Pauling - (hypothesis was "APauling") most brilliant and productive physical chemist of the century (Two Nobel prizes - nature of the chemical bond (1954) & Nobel Peace Prize relating to atomic explosives (1962) - competed with Watson & Crick - claimed a triple helix
 - F. The team - Watson & Crick - The Double Helix - 1953 (We Can Do 'Her)
- III. Structure of DNA**
- A. Sugar (deoxyribose)
 - B. Phosphate group
 - C. Base
 - 1. Purines - adenine & guanine
 - 2. Pyrimidines - thymine & cytosine
 - D. The double helix