

Chem 431A-Lecture 1 9/21/07

admin:

- (1) sign attendance sheet.
- (2) distribute syllabus
- (3) ask for prerequisites

Orientation: go over the syllabus (hours, emailing, bluebook, grading, schedule)

lecture:

(1) Intro to biochemistry:

-beside basic biol. Science:

-permeates daily life:

diseases – like cancer or metabolic disorders;

nutrition-the role of cholesterol, vitamins

and supplementary diets;

investigations – DNA or even alcohol level;

agriculture and sustainability of our farming

methods – fertilizers, etc.

(2) goals of biochemistry: to understand at the molecular level the structure, the organization and function of living organisms

general areas: structural biochem, metabolism, information biochemistry

In C431A we first take overview of the basic structure of organisms and the molecules

within: : nucleic acids., proteins,

carbohydrates, and lipids.

(3) History: Beginning of biochem countered *vitalism*

-Wohler (1828) discovery urea synthesis

-Pasteur discovered that tiny living organisms assoc with decay and disease, and fermentation (complex reactions can occur only with interjection of living things)

-Buchner bro's 1897 demo that fermentation from cell extracts dead cells was possible (living processes are possible in nonliving systems *in vitro* not *in vivo*)

-Embden and Meyerhof describe *glycolysis* - pathway steps

Sumner crystallized urease - enzyme. biocatalysts not so complex that it doesn't behave like other molescs.

Svedberg ultracentrifuge - powerful prep/analytical tool

Krebs elucidation of citric acid cycle

(4) living organisms remarkable attributes:

- *high chem complexity & organzn
- *system utilizing E from envirnmt
- * self-replic'n and self assembly
- * sense and respond to environ
- *parts are defined functionally
- * History of evolutionary change.

A. Composition of elements:

C,H,O,N(+PS), + trace elements like P, Na, K, Cl.

Why C? these form strong covalent bonds.

C = versatile, for skeletons of complex molecules. 4 bonds per C.

H = 1 bond per atom.

O= available, strong oxidant; H-bonds with positive H.

N = eneg atom.

S

P

B. Cell foundation: all cells are very similar:

plasma membrane, cytoplasm, cytosol, metabolites, coenzymes, ribosomes, nucleus or nucleoid, genome; eukaryotes and prokaryotes. Universal biomolecules.

3 domains (Kingdoms) of life: eubacteria, archeobacteria, eukaryotes

subgroups: aerobic and anaerobic

phototrophs – based on light as energy source

autotrophs (all C from CO₂) and heterotrophs

chemotrophs – based on chemical substances (fuels)

(no autotrophs); lithotrophs (inorganic fuel) vs

organotrophs (organic fuels)

