good morning

Survey of Biology

Wk. 4

Section 2 (S2) Thripp Survey

~~Ho~~ Wed, 2009-09-23 MARKER: 8:07AM Pg. 1

DNA is made of nucleotides. Codes for proteins.
Some aa's & some proteins are hydrophillic —
others are hydrophobic.
aa = amino acid

Hydrophillic substances will be found in water.

Which of these are NOT found in water?

a. proteins
b. amino acids
c. lipids ←
d. carbohydrates

DON'T just memorize definitions. Go further
Quiz yourself. DaytonaState.org/biology

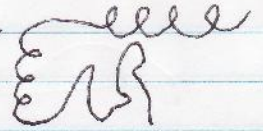
Element unique to aa's and thus unique to proteins: SULFUR

PROTEIN STRUCTURE

Primary: Straight line of aa's, change in function (arrangement of aa's) = change in function.
EX: Sickle-cell anemia. Protein 6 changes from Glu to Val making bad red blood cells.

Secondary: Alpha helix, OR pleated sheet — hydrogen bonds essential to structure. JUST A PIECE

THIS whole thing = ~~Teritary~~ Tertiary structure →



← alpha helix — a secondary structure

↑ pleated sheet — a secondary structure

alpha helix } ∿ pleated sheet

Different proteins are } or ∿, often mixed

Wed, 2009-09-23:
Primary = straight line, Secondary = helix or pleated sheet,
Tertiary = whole sheet, Quaternary = whole rack of sheets
Primary Secondary Teritary ~~Quart~~ Quaternary
OR: thread, 2 pleats, whole pleated skirt, rack of skirts

Primary = think one, Secondary = second,
~~Tertiary~~ Tertiary = Trio = 3, Quaternary = Quartet = 4

Quaternary = complete folding of 2 or more polypeptide chains, forming a functional protein
Tertiary = same, just ONE chain
Secondary = localized folding
Primary = linear sequence of aa's

Some aa's form ionic bonds, others form hydrogen bonds

Protein shape is sensitive to environment: temp. & pH
A 105° fever, prolonged, will denature your body's proteins permanently and kill you
Denaturation = breaking of hydrogen or ionic bonds
Heart burn = denaturing protein cells in esophagus.

DNA codes for the primary structure of proteins
Consists of nucleotides NOT aa's. →
Proteins consist of aa's.

phosphate NOT ~~Base~~ connected ~~to Sugar~~
~~phosphate~~ connected ~~to Base~~ Sugar
~~Phosphate base Monomer Sugar~~ for nucleotide

MARKER: 8:32 AM

See pg. 5 of these notes

DNA	RNA
Sugar: Deoxyribose	Sugar: Ribose
Bases: AGCT	Bases: AGCU
Adenine	Adenine
Guanine	Guanine
Thymine ←	~~Thymine~~ Cytosine
Cytosine	Uracile ←

In alphabet:
D . . . . R
T . . . . U

DNA	RNA
AGCT	AGCU

polynucleotides = DNA strands = sugar-phosphate backbone

A pairs w/ T or U
G pairs w/ C

Wed, 2009-09-23: AGCT paired by hydrogen bonds

What kind of organic molecule is ribose? Carbohydrate! [sugar]

	DNA	RNA
deoxyribose		
~~lacks~~ less oxygen	double strand	single strand
deoxygenated	Sugar: deoxyribose	ribose
	Bases: AGCT	AGCU
nucleotide is a	A pairs with T	A pairs with U
base, sugar, & phosphate	BOTH: G pairs	with C

Biologists use DNA & protein sequences to test evolution.

Monomer of DNA: nucleotides.
" " proteins: amino acids.
" starch: polysaccharide
" carb: monosaccharide

Carbs: store energy, plant structure (cellulose)
monosac, disac, polysac, glucose, fructose, lactose, sucrose, galactose, starch, glycogen, cellulose.
Lipids: long-term energy storage (fat), hormones (steroids)
Proteins: enzymes, structure, storage, contraction, transport etc.
Nucleic acids: information storage

hormones = steroid (lipid) or protein

END

51 SUPPLEMENTAL

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Thu., 2009-09-24: 2/20 aa's have ~~sulphur~~ sulfur.

SO: most proteins have: sulfur

CHON, = CHONS

Change to primary structure of protein can change secondary, tertiary, quaternary

a y x i u
r d y t l
b r g r f
o o e o u
n g n g r
e e
n n

Secondary structure: localized folding of part of a polypeptide

Tertiary structure: complete folding of a polypeptide

Quaternary structure: Complete folding of more than one polypeptide

basic / acidic aa's = ionic bonds in protein
polar (hydrophilic) aa's = hydrogen bonds in proteins
Sulfur (containing) aa's = covalent bonds in proteins

hydrophobic proteins are found in the cell membrane

Archea likely have more sulfur aa's & thus more covalent bonds (much stronger than hydrogen or ionic bonds)

Primary structure = linear sequence of aa's (→ amino acids)
Secondary " = localized folding of aa's in polypeptide chain
Tertiary " = complete folding of aa's forming polypeptide chain
Quaternary " = complete folding of 2 or more polypeptide chains forming a complete, functional protein

shape = function in proteins & enzymes which are proteins

Stomach bile = pH 2 = 100,000 times more acidic than pH 7 (saliva)

DENATURATION = not folding properly

Carb: $C_1H_2O_1$

Lipid: CH(O) → much less oxygen

Protein: CHONS (sulfur)

Nucleic acids: CHONP (phosphorus)

SUPPLEMENTAL

Thu, 2009-09-24: 2 types of nucleic acids:
DNA = deoxyribonucleic acid
RNA = ribonucleic acid
monomer = nucleotide = [phosphate — sugar, base] monomer for nucleotide

DNA = double helix = 2 strands

phosphate connects to sugar
base connects to sugar

RNA has Uracil instead of Thymine.

Deoxyribonucleic acid is a carbohydrate
→ nucleic acid => base is ribose =>
ribose is a sugar => sugar is a carb.
Ribonucleic acid is a carbohydrate

RNA = single helix folded in on itself = 1 strand

Lactose = sugar = carb
Lactase = enzyme = protein

AGCU AGCT

Biologists use DNA and protein to test evolutionary relationships.

Biologists look at things between genes in addition to genes.

Make a polymer by dehydration synthesis.
Break a polymer by hydrolysis. ("catalyzed by a hydrolase enzyme")

Carb: dietary energy, storage, plant structure.
Lipids: long-term energy (fat) & hormones (steroids)
Protein: enzymes, structure, storage, contraction, transport
Nucleic acid: information storage to make proteins

starch is a carb

S1
Thu, 2009-09-24: MARKER: 10:25AM
film | Organic Chemistry = study of carbon compounds

Carbs: CH_2O usually
glucose $C_6H_{12}O_6$ monosac
↓
$6CO_2$ + something
energy w/ oxygen

Dehyd syn forms disac or polysac, each combo gives off H_2O molecule.

hydrolysis = digestion = break polysac's apart

chitin = in crabs exoskeletons : also lobsters, scorpions

single covalent bonds in fatty acids: saturated fats
double " " " : unsaturated fats
↓
break down easier

Camel's hump = large chunk of fat for energy
proteins: do a lot of stuff
~~20~~ 20 aa types form proteins

glycene aa = H

P — SUGAR — T
DNA

P — SUGAR — U
RNA

Thu 12:30-1:50 class

MARKER: 12:45 PM S3
Secondary structure = localized folding of polypeptide chain
denaturation = clear egg white becomes permanently white (opaque) when heated. proteins have been denatured — hydrogen & ionic bonds have been broken, making the egg "cooked"

SUPPLEMENTAL

Thu., 2009-09-24 S3: hydrophobic R groups retreat to inside of the protein tertiary structure — the complete polypeptide chain

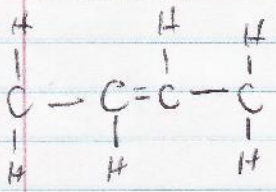
Quaternary structure can be 2, 3, 4, ... 100, or more complete polypeptide chains — whatever form a complete "protein structure."

hormones can be lipids or proteins

lactase = enzyme = protein
lactose = sugar = carbohydrate

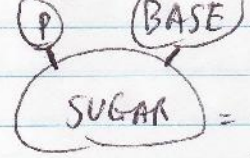
$C_6H_{12}O_6$ = glucose

peptide bond forms polypeptides in living organisms
polypeptide bond = type of covalent bond



unsaturated fatty acid

DNA / RNA



BASE = T in DNA
U in RNA

SUGAR = deoxyribose in DNA
ribose in RNA