

Survey of Bio.

Wk 7

Thrissur
Survey

Mon, 2009-10-12, 8-9:20 AM MARKER: 8:05 AM Pg. 1

Endomembrane sys:

RER makes protein

SER detox.

makes lipids

Golgi

post office

Lysosome

Cell membrane
or export

in each
cell

Ribosomes make proteins.

Ribosomes exist on RER & in cytoplasm of cells
(free ribosomes).

→ Therefore, proteins are made only in RER & cytoplasm

The nucleolus in the nucleus **assembles** ribosomes.

SERs are found in many cells in the liver.

A cellular organelle, the smooth endo. retic. makes lipids,
and detoxifies drugs. NO PROTEIN SYNTHESIS

RER makes protein.

Protein is transported to the Golgi apparatus.

The Golgi sorts proteins to go to lysosomes, cell membrane,
or exported. Calcium is made in RER, goes to Golgi,
& gets exported out.

Lysosomes contain digestive enzymes to digest

1) food in food vacuoles

2) bacteria in white blood cells

next pg.

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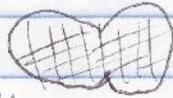
~~Lysosomes~~ 3) Damaged organelles (recycling)

SERs make lipids — essential for cell membrane,
with proteins (cell mem. is made of proteins & lipids).

Golgi sorts proteins for lysosomes & cell membrane
if lipid-soluble; export from cell if water-soluble
↑ exocytosis

Proteins are synthesized by ribosomes or RER

Cytoskeleton = quilt of fibers in the cell consisting of
proteins — "plays a role" in cell shape & movement



the odd shape of a red blood
cell is created by the cell's

In the amoeba, the
cytoskeleton is used to
change shape (!)

cytoskeleton role = shape & streaming
cytoplasmic
→ what is this?

ex:
small hairs (filopodia tubes)

Cilia & Flagella have a 9+2 arrangement



The

whip-like tail (ex: sperm)

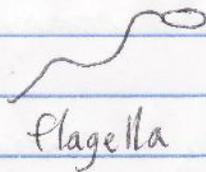
Paramecium is a protista that moves
by cilia.

Pairs of microtubules

→ 9 in circle
→ 2 in middle



cilia

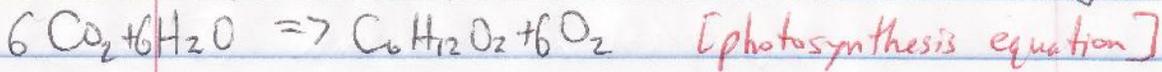


flagella

the fallopian tube & respiratory
tract have cilia

↑
protista — cilia beat in rhythm for movement

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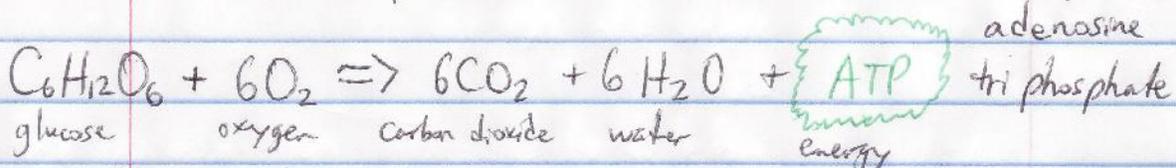
Animals eat plants to get glucose (stored as starch) to feed their mitochondria.

Plants use photosynthesis to get glucose to feed their mitochondria.

We breathe in O_2 , out CO_2 . \star photosynthesis is the reciprocal of cellular respiration.
Plants breathe CO_2 , out O_2 .

Plants & animals have a symbiotic relationship.

Animal waste products CO_2 & H_2O are used by plants.



We take food in to make ATP which are the dollar bills of energy.

exercise

⊖ carbon monoxide (CO) & cyanide kill by disrupting cellular respiration

Aerobic = oxygen reqs met

Anaerobic exercise = oxygen requirements NOT met — cells burned

Energy currency of the cell or the
ATP is a nucleotide, form used by the cell for work.

↳ Adenosine = (adenine + ribose) + 3 phosphate groups

Gets broken into ADP + P_i (spent) to release energy

phosphate was coval. bonded to ATP — then

given to cell (coval bond) for energy

cell respin makes ATP but we use it later

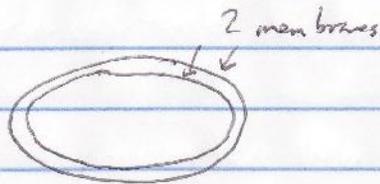
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ATP in
* Photosyn. is only to make

Chemical energy = food glucose to feed mitochondria

ATP made from
ADP + P_i

Chloroplasts (plants only)



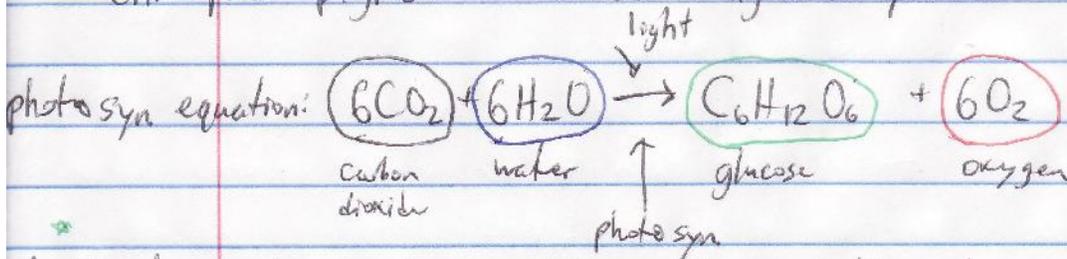
3 organelles have a double membrane:
nucleus, mitochondria, chloroplasts

Visible (red-violet)

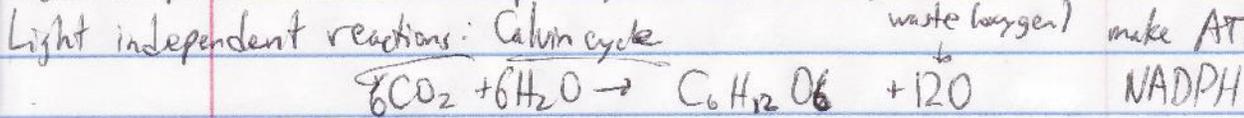
Gamma X-rays UV ^ Infrared Microwaves Radio waves

Plants are green because that is the only color they do not absorb. — thus, a plant can't grow under green light

- 1) chlorophyll a
 - 2) chlorophyll b
 - 3) carotenoid (color like a carrot — orange-yellow)
- ← chloroplast pigments that absorb light in plants



Light dependent reactions: photosyn: $\text{H}_2\text{O} \rightarrow \text{O}_2 \text{ \& \; } \text{H}^+$, release electrons that waste (oxygen) make ATP & NADPH



Calvin cycle makes glucose from STORED CO_2 & H_2O

calvin cycle makes glucose → starch, cellulose, respiration etc

next pg.

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BOTH mitochondria & chloroplasts have double membranes surrounding them. They are, thus, both organelles.

BOTH have DNA — DNA is more like DNA in bacteria than us.

Endosymbiotic theory for origin of mito + chloroplasts



Plants have DNA in 3 places: 2 major categories of cells

1) nucleus

2) chloroplast

3) mitochondria

prokaryotic

eukaryotic

* smaller

* larger

* simpler

* more complex

* no membrane for organelles

* membrane-enclosed organelles

* DNA in nucleoid — no nucleus

* DNA in NUCLEUS

TUE, 2009-10-13, 9:30-10:50 AM

Hydrophobic proteins are in the cell or organelle membrane.

Lysosomes break up food.

→ to break

Golgi → out of cell if hydrophilic
→ to membrane if hydrophobic

Cilia & flagella bend to move the cell or its surroundings.

Cilia often have a 9-2 arrangement: 9 doublets in a circle

w/ 2 doublets in center

We make ATP through cellular respiration to do cellular work.

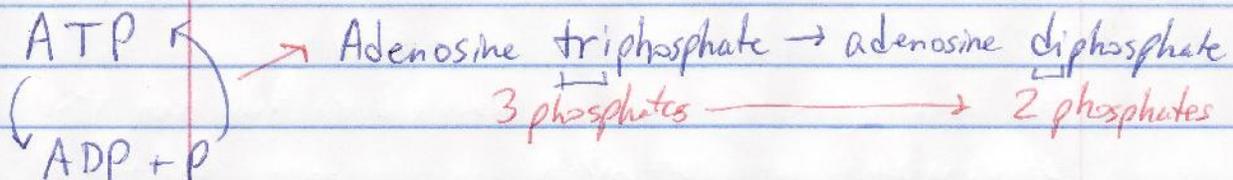
We collect oxygen to make ATP for work.

TUE, 2009-10-13, 9:30-10:50 AM

Lactic acid results from anaerobic exercise — your cells aren't getting enough oxygen, so they burn.

In
Aerobic exercise, your cells get enough oxygen.

ATP may be partially given — when ATP gives one of its phosphates to a cell or enzyme, it becomes ADP.



Chloroplasts are the site of photosynthesis (plants only) — conversion of light to chemical energy.

☺ Everything we eat can be traced to sunlight.

ROY G BIV

chloroplasts don't absorb green — all other colors are absorbed

this is why plants are green

Carotenoids make yellow-orange pigment in fall leaves.

Light reactions make H_2O into O_2 & H^+ releasing electrons.

ATP is made from ADP + P_i

NADPH = ~~ADP~~ ADP + hydrogen

nicotinamide (sp?) \rightarrow nucleotide

plants make starch,

cellulose & other organic

compounds for energy during

nighttime & winter

NASA experiments confirm that

we can live off oxygen from plants

by giving them carbon dioxide.

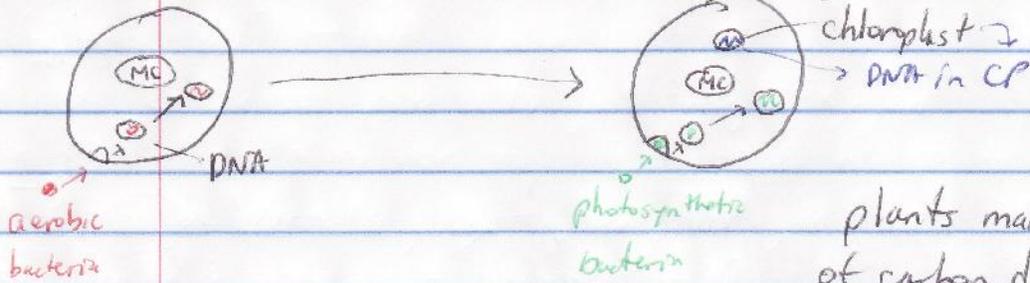
A symbiotic relationship.

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ENDOSYMBIOTIC Theory Origin of Mito. + Chloroplasts

Anaerobic eukaryote

Aerobic eukaryote



plants make a lot of carbon dioxide for us

we set up an evolutionary relationship so we make a lot more ATP so we need less oxygen

evolution explains how plants & animals work together

Plants have mitochondria because MC was first

Chloroplasts feel the mitochondria

nucleoid = nucleus-like

→ in cytoplasm in cell membrane of prokaryotic cells

nucleus = DNA storage

mito = mitochondria

CP = chloroplast

NO NUCLEUS

Organelle = membrane-bound structure

★ Nucleus, mito, CP have 2 membranes & DNA

★ Pg. 4 of

★ All other organelles have 1 membrane & NO DNA

★ On Backer's review

TUE, 2009-10-13, 12:30-1:50 PM TEST 1 REVIEW

Population = all species in an area.

an example of proteins = enzymes

isotopes = different # of neutrons

→ Golgi → lysosomes

Ribosomes make proteins in RER & in cytoplasm.

→ cell membrane

A Transport Vesicle moves protein from RER to the Golgi apparatus

Lysosomes digest food, bacteria, & damaged organelles.

→ I don't know what type of food.

TUE, 2009-10-13, 12:30-1:50 PM

SER sends lipids to organelles for their membranes. Also: cell membrane
Organelles include RER, SER, nucleus, etc.

Proteins are made by ribosomes in the ~~the~~ cytoplasm & on the RER.

Proteins in saliva are made in RER, go to Golgi, & get exported out of the cell, going to the mouth later.
Same for bone proteins.



Red blood

cell's cytoskeleton

determines shape

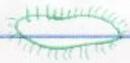
Central vacuole = big clear part in plant cell filled w/ water.

Amoeboid movement = cytoskeleton changes shape to make whole cell into vacuole.

A paramecium moves w/ a bunch of tiny cilia.



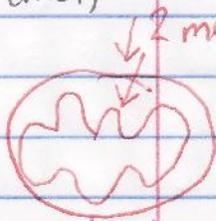
flagellum



cilia

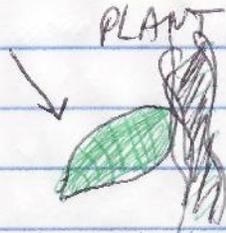
in respiratory tract, fallopian tube (women)

in sperm (men)



Mitochondria

cellular respiration in plants \rightarrow glucose + oxygen \rightarrow carbon dioxide + water + ATP



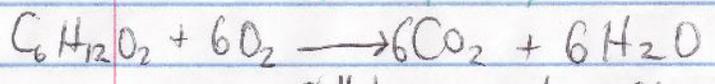
PLANT

Leaf is green because it fails to absorb light.

chloroplast is the organelle
chlorophyll is the photosynthetic pigment that collects light

TUE, 2009-10-13, 12:30-1:50 PM

← photosynthesis



Cellular respiration (to make ATP)

ADP = ~~adenosine~~ adenosine **di**phosphate = one less phosphate
ATP = adenosine **tri**phosphate
Becomes ADP when it gives a phosphate to a cell. (one phosphate given to a cell for energy)

Plants make **oxygen** as waste. They don't care.
Chloroplasts collect energy (photosyn) for plants' mitochondria.

Light dependent & Light independent usually happen @ same time of day
(photosyn) (calvin cycle)
↳ makes ATP + NADPH ↳ uses STORED ATP + NADPH

Originally anaerobic & eukaryotic was attacked by an aerobic bacteria creating the mitochondria in future cells (evolution).

Chloroplasts have 2 membranes & DNA similar to the original photosynthetic bacteria. ← plants' way of getting food

Chloroplasts collect light energy, converting it to chemical energy.

Mitochondria (plants + animals) process chem. energy into ATP.

Both are needed & exist in plants.

A rose bush has DNA in its nuclei, mitochondria, & chloroplasts.

Organelles = membrane-bound structures = RER, SER, Golgi, Lysosomes, Cilia

Part of cells = no membrane = **NOT ORGANELLES**

Nucleus	2 membranes	DNA
Mito	"	DNA
Chloroplasts	"	DNA

End 😊
Richard