CONCEPT: ENDOSYMBIOTIC THEORY

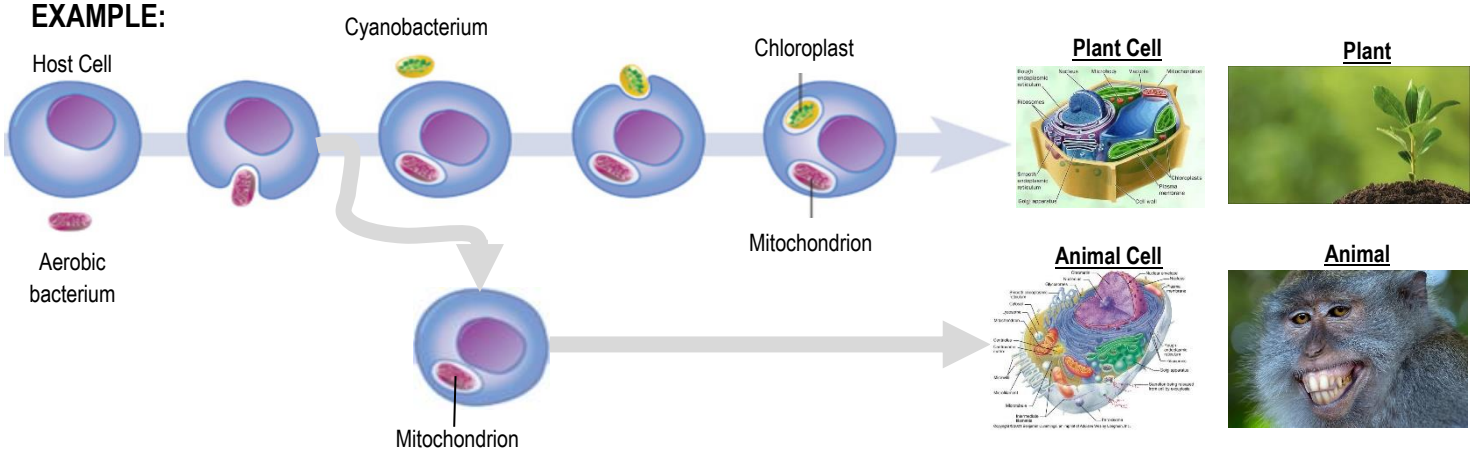
●The *endosymbiotic theory*: mitochondria & chloroplasts were once independently living _____.

●~1.5 _____ years ago, an *aerobic* bacterium was engulfed by an *anerobic* host cell, making a *symbiotic relationship*.

□ Over time, the aerobic bacterium lost many genes/abilities & developed into today's _____.

□ Photosynthetic *Cyanobacterium* were engulfed by a host cell & over time, evolved to the _____.

EXAMPLE:



Supporting Evidence

●Mitochondria & chloroplast have many similarities to prokaryotes:

□ Both have: **1)** small circular *DNA*, **2)** 70S *ribosomes,* **3)** replicate via _____ _____.

●Mitochondria & chloroplast both have a _____ membrane that differ from each other.

Mitochondria

●Function: produce *ATP* (energy for a cell) via _____ *energy metabolism*.

●Vary in shape & have their own DNA that is *independent* of the nuclear DNA.

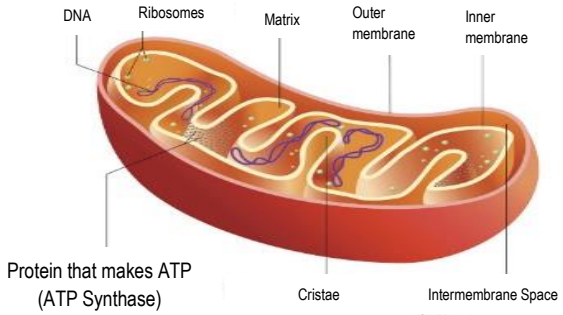
□ Have an outer & an _____ membrane, which is highly folded into *cristae* to increase surface area.

●Location of major processes of _____ respiration, like the *Citric Acid Cycle* & *electron transport chain*.

EXAMPLE:

$C_6H_{12}O_6 + 6\ O_2 \xrightarrow{\text{Cellular Respiration}} 6\ CO_2 + 6\ H_2O + ATP$

_____ + Oxygen gas → Carbon Dioxide + Water + _____

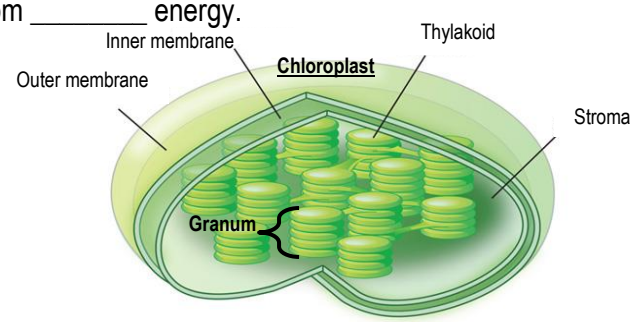


Chloroplasts

●Function: perform _____ to produce chemical energy from _____ energy.

EXAMPLE:

$6\ CO_2 + 6\ H_2O + Sunlight \xrightarrow{\text{Photosynthesis}} C_6H_{12}O_6 + 6\ O_2$



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PRACTICE: According to the endosymbiotic theory, which of the following is likely the ancestor of the mitochondria?

a) Aerobic eukaryotes
b) Aerobic bacteria
c) Anaerobic bacteria
d) Cyanobacteria
e) Chloroplasts

PRACTICE: What is the primary purpose of cristae in the mitochondria?

a) Provide a large surface area for chemical reactions
b) Prevent the mitochondria from folding onto itself
c) Protect the mitochondrial DNA
d) No purpose has been identified yet