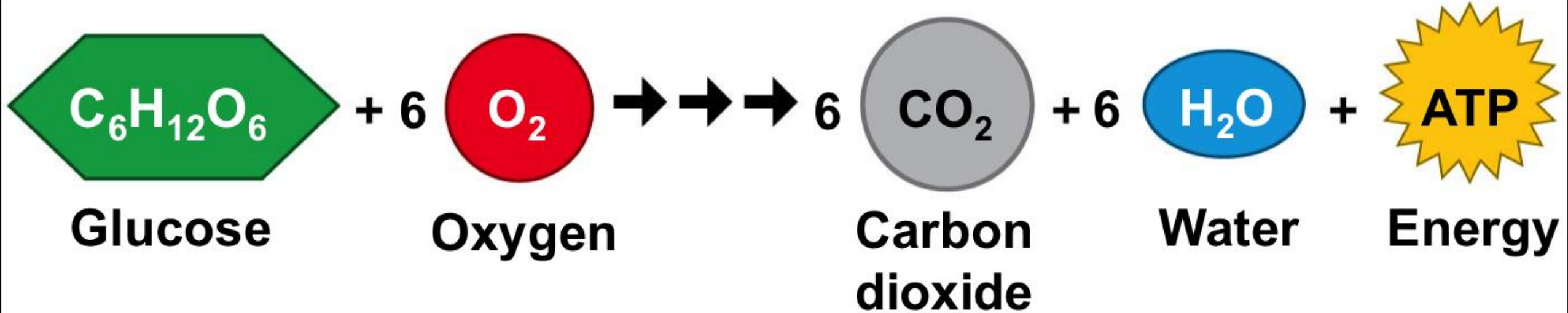


CELL RESPIRATION Made Easy

The cellular respiration is kind of like photosynthesis but backwards.

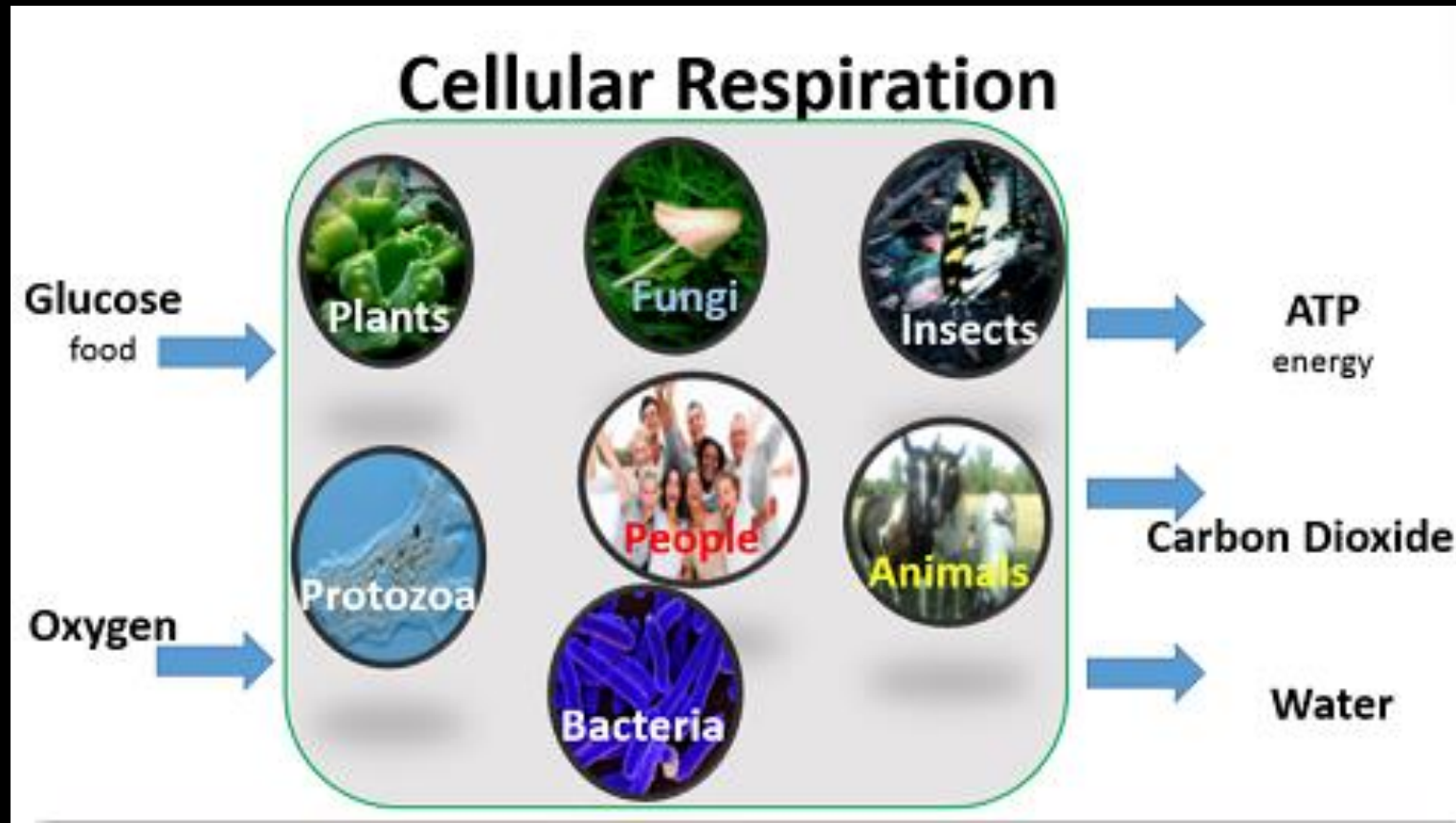
SPOoOooOoKY

Overview Equation



WHO DOES CR?

Every organism with oxygen!



Location-Mitochondrion

Mitochondria Structural Features

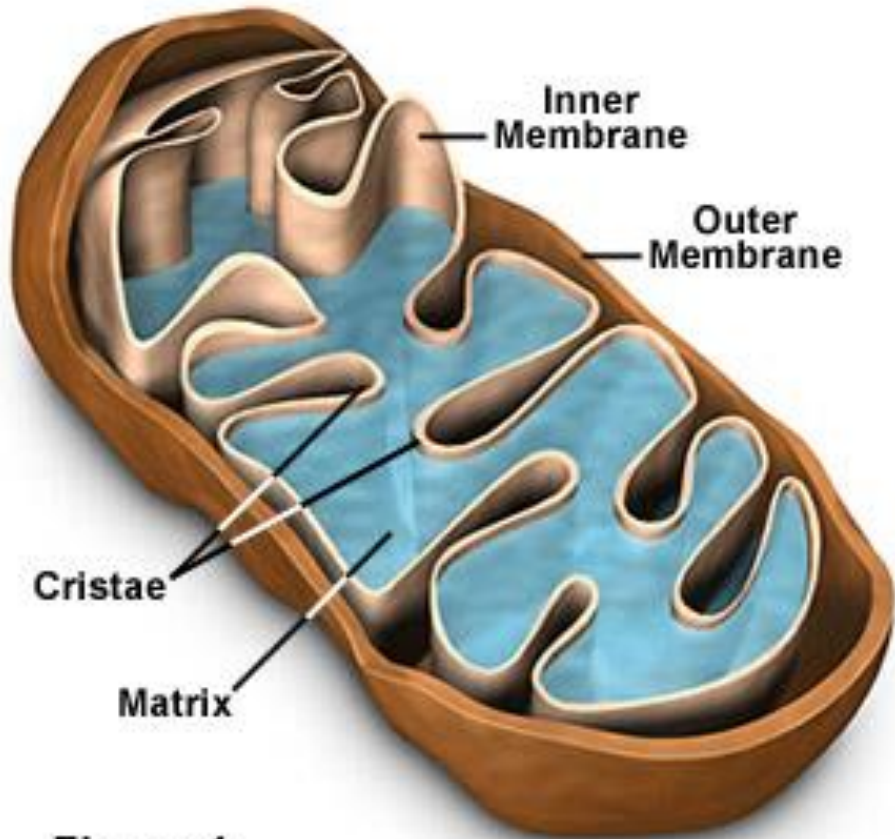
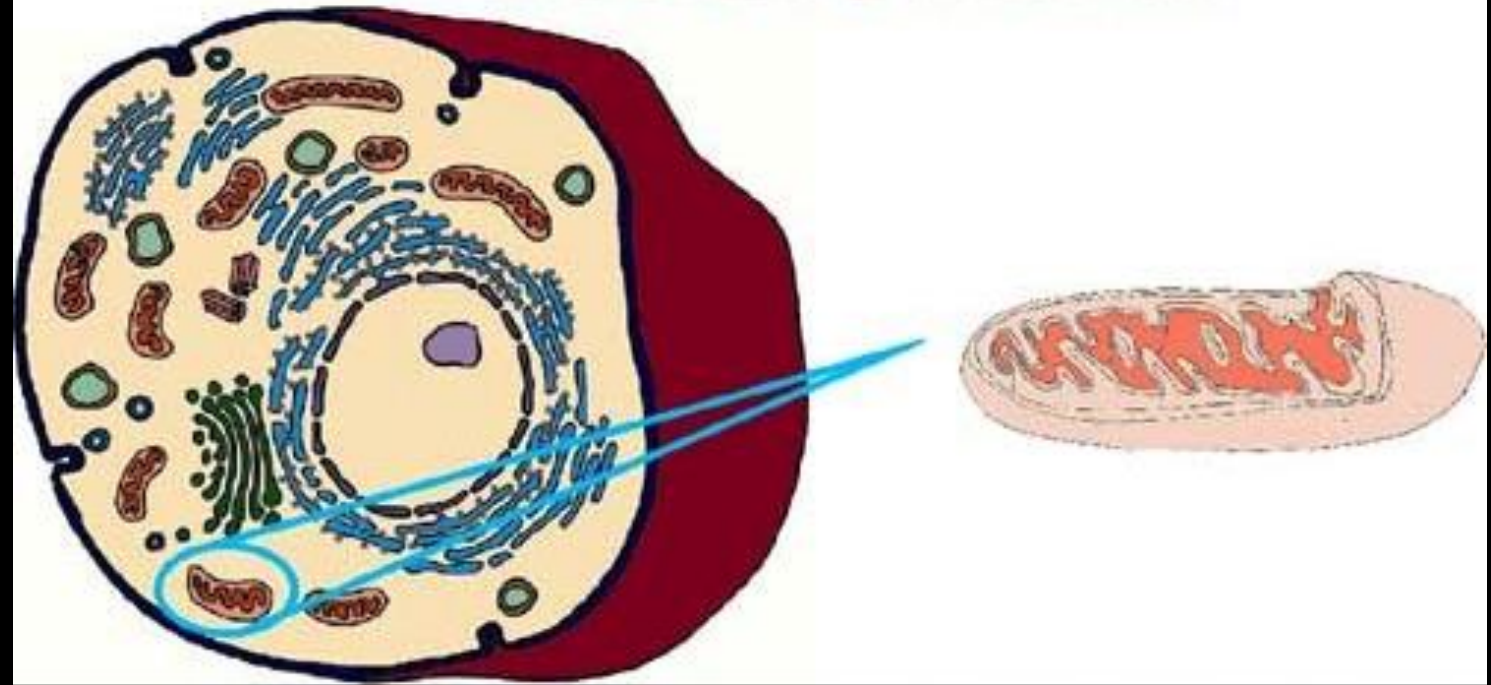
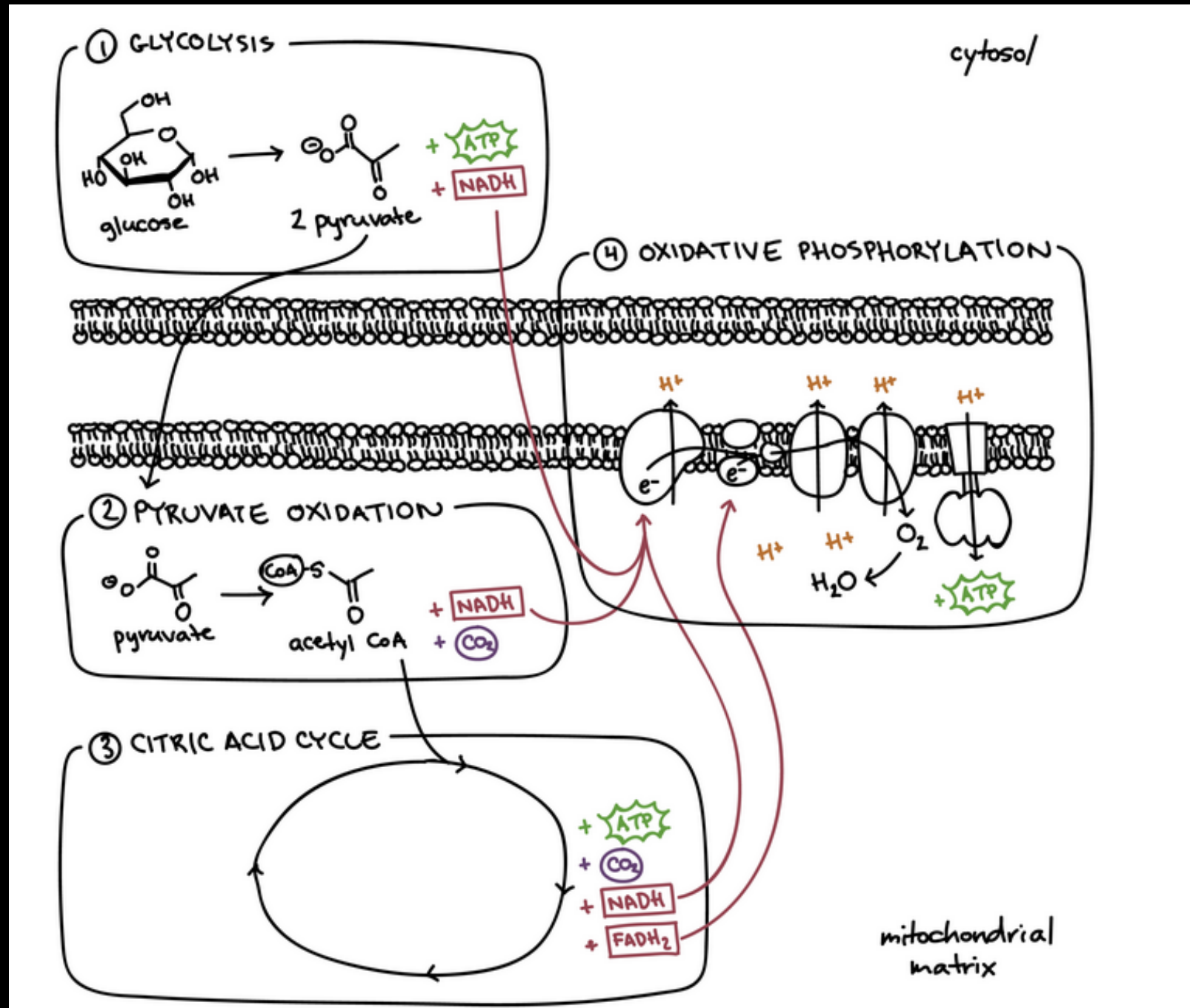


Figure 1

Mitochondria

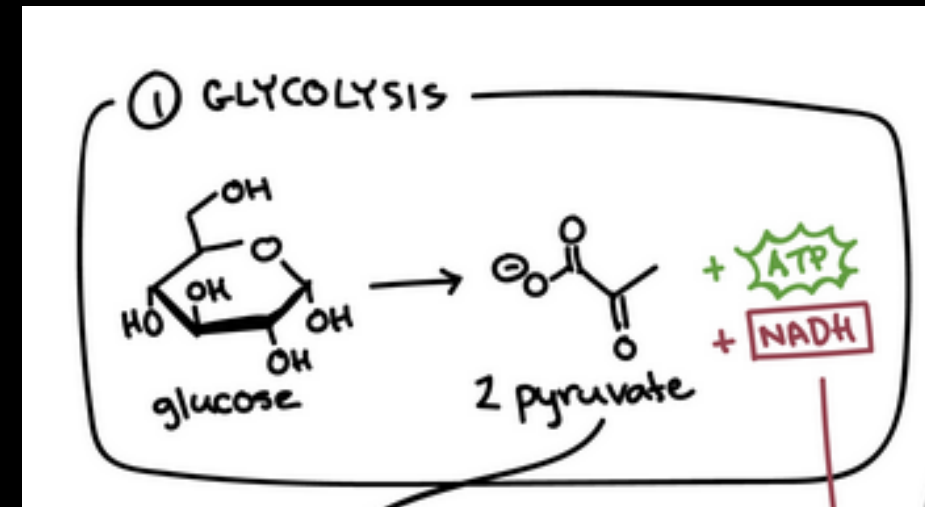


Steps



1- GLYCOLYSIS

- In cytoplasm
- All living things perform this with/without oxygen
- Take one glucose → two **pyruvate** molecules (3C molecules)
- Produces 2 ATP
- NAD converted to NADH+



How Glycolysis Works



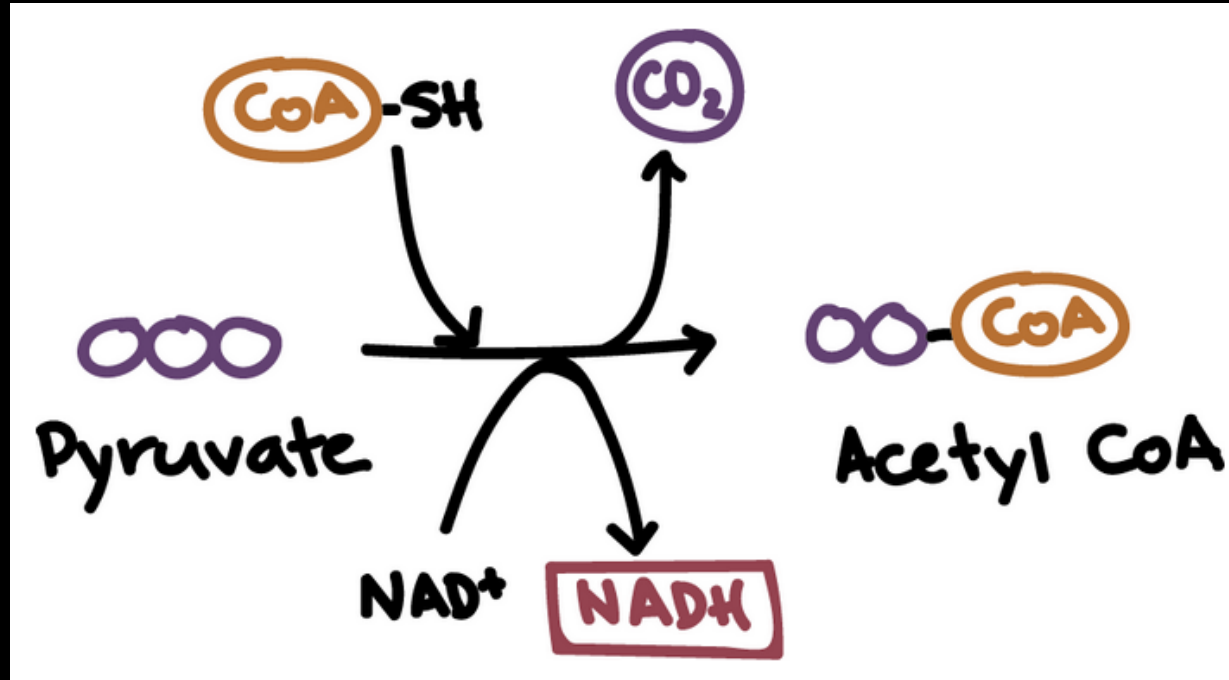
6-carbon glucose

▶ Play
⏸ Pause
⏪ Audio
📄 Text

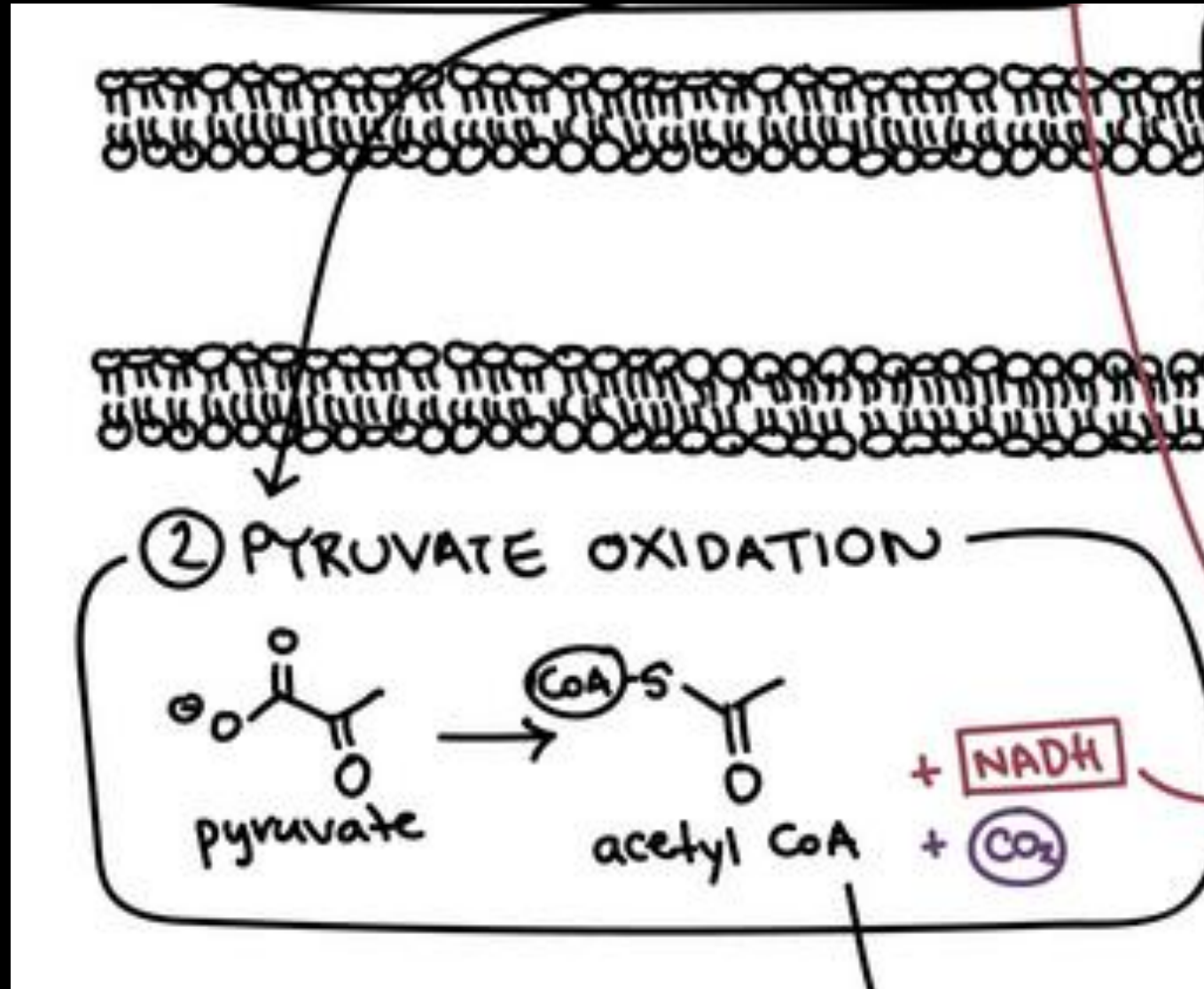
Cells derive energy from the oxidation of nutrients such as glucose. The oxidation of glucose to pyruvate occurs through a series of steps called glycolysis.

2-Pyruvate Oxidation

- Pyruvate goes into matrix.
- Converted in 2 carbon molecule bound to Coenzyme A: called acetyl CoA
- CO₂ released, NADH made



2-Pyruvate Oxidation



3-Citric Acid Cycle AKA KReb'S Cycle

Why the name?

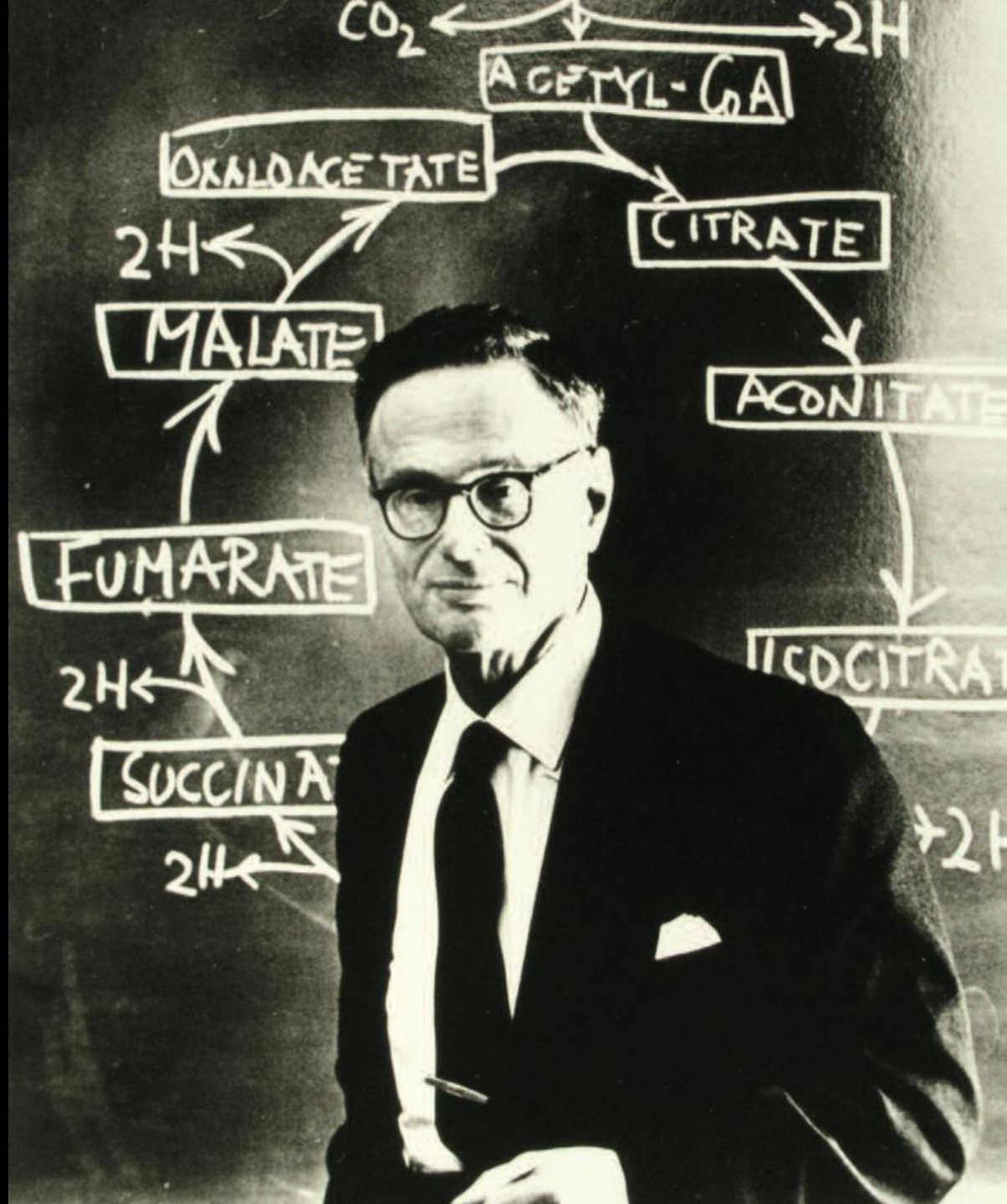
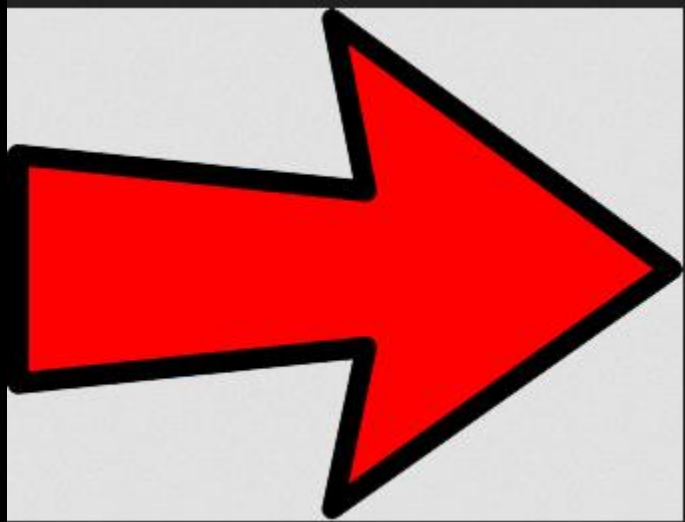
1st compound in series of reactions is called citrate aka citric acid



FUN FACT!

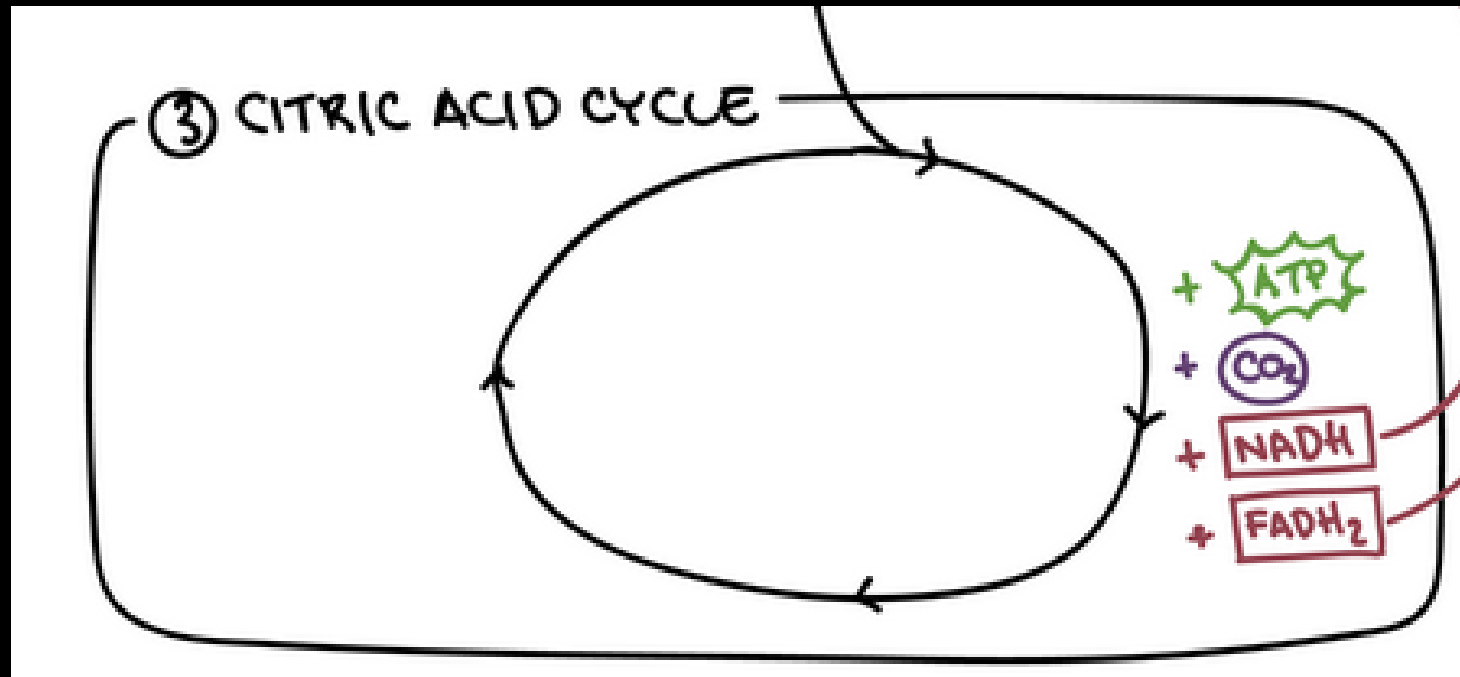
3-Citric Acid Cycle AKA KREB'S CYCLE

Hans KREB:
Discoverer



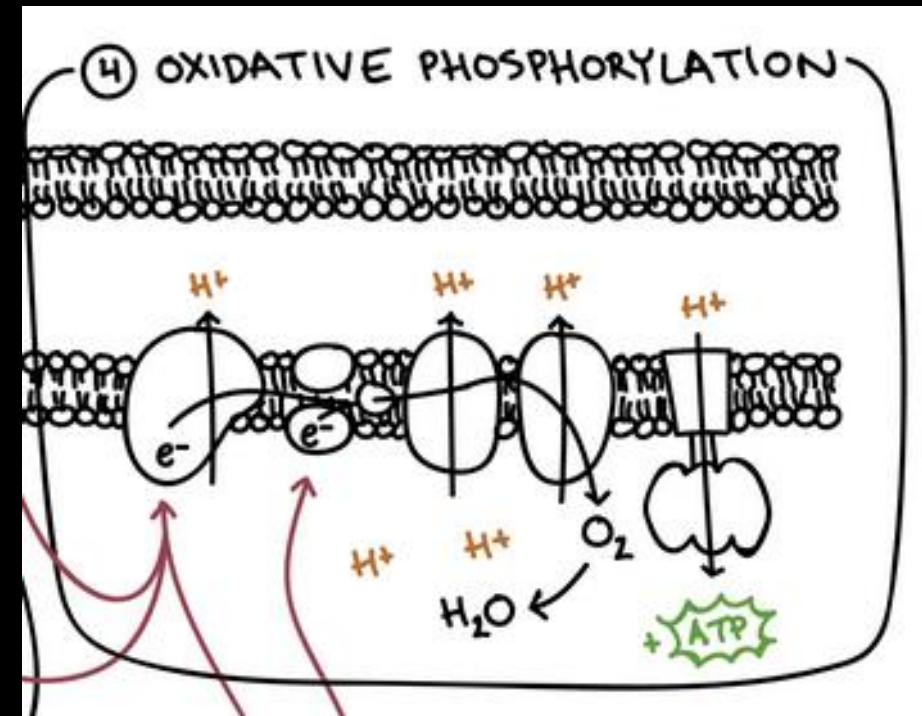
3-Citric Acid Cycle AKA KReb'S Cycle

Acetyl CoA \rightarrow Redox (LEO goes GER) reactions to make CO₂, NADH, FADH₂, and ATP



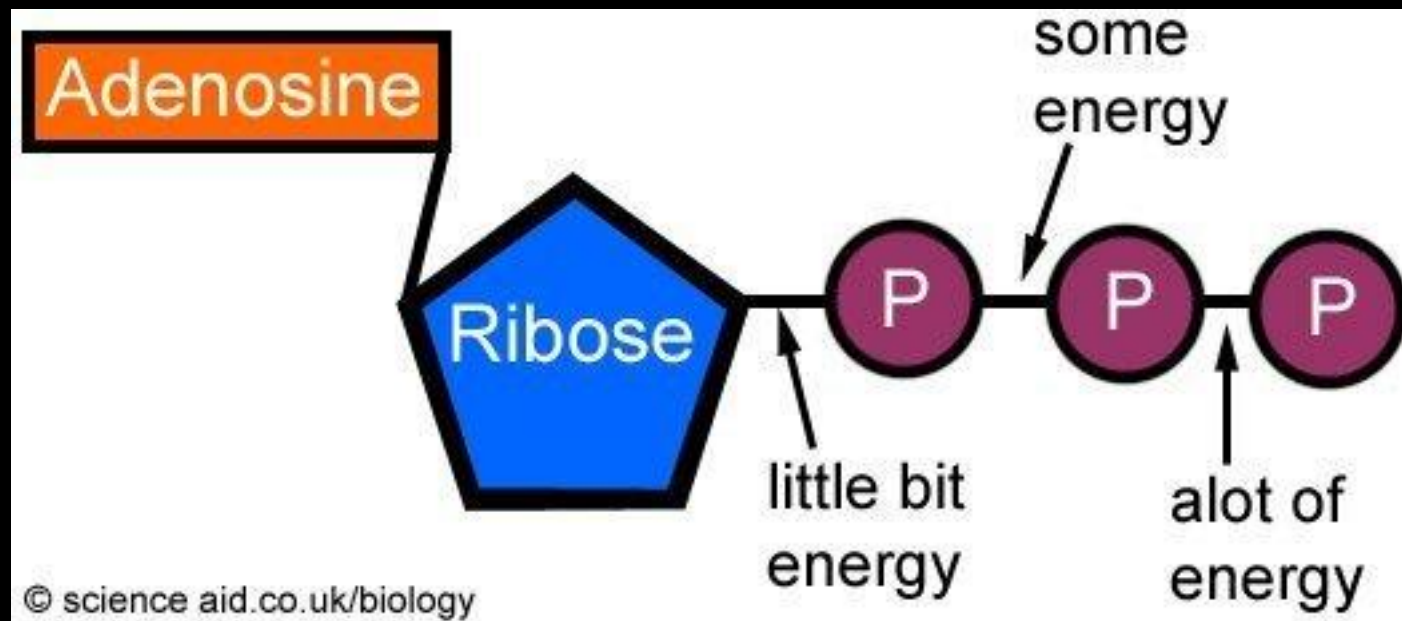
4-Oxidative PHOSPHORYLATION

- NADH and FADH₂ deposit their electrons to electron transport chain here
- Electrons make H protons get pumped out of matrix (gradient formed)
- H protons come back in through ATP synthase, making ATP
- O₂ accepts electrons, joins with H to make water



4-Oxidative PHOSPHORYLATION

- Most ATP produced here
- 32-38 ATP produced. Most books say 36 ATP molecules made from 1 glucose molecule.



IF NO OXYGEN, FERMENTATION

- Anaerobic cellular respiration
- Lactic acid fermentation: Pyruvate makes lactic acid byproduct
- Ex: Bacteria that make yogurt, RBCs with no oxygen in muscles.



IF NO OXYGEN, Fermentation

- **Alcohol fermentation:**
Byproduct from pyruvate is ethanol.
- Ex: Yeast eats grapes to make wine.





Facultative ANAerobes

Bacteria that can switch from PS to Cell Respiration in presence of oxygen

- Survival mode.

C. botulinum Bacteria

Obligate ANAerobes

- Bacteria can live and grow only in absence of O₂.
- O₂ is toxic and injures/ kills them on exposure.

CELLULAR RESPIRATION

HOW CELLS HARVEST ENERGY

