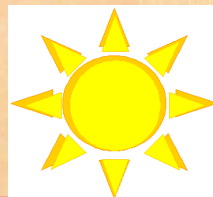


# History of Photosynthesis & Plant Pigments

1

## Photosynthesis

- Involves the Use Of light Energy to convert Water ( $6\text{H}_2\text{O}$ ) and Carbon Dioxide ( $6\text{CO}_2$ ) into Oxygen ( $6\text{O}_2$ ) and High Energy Carbohydrates (sugars, e.g. Glucose) & Starches



2

## Investigating Photosynthesis

- Many Scientists Have Contributed To Understanding Photosynthesis
- Early Research Focused On The Overall Process
- Later Researchers Investigated The Detailed Chemical Pathways

3

## Early Questions on Plants

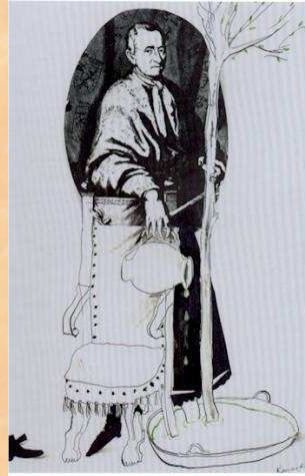
Several Centuries Ago, The Question Was:

Does the increase in mass of a plant come from the air? The soil? The Water?

4

## Van Helmont's Experiment 1643

- Planted a **seed** into A pre-measured amount of soil and **watered** for 5 years
- **Weighed Plant & Soil.** Plant Was 75 kg (164 Lbs).
- Van Helmont dried and weighed the soil. Had it lost 164 pounds to the weight of the tree?
- **No! It had only lost 2 ounces!**
- **Concluded Mass Came From Water**



5

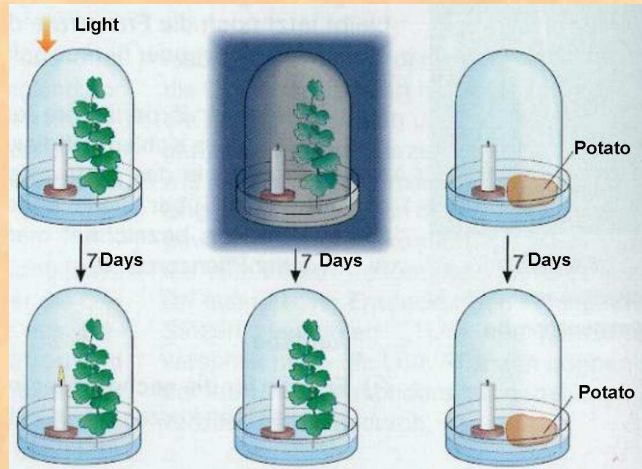
## Priestley's Experiment 1771

- **Burned Candle In Bell Jar Until It Went Out.**
- **Placed Sprig Of Mint In Bell Jar For A Few Days.**
- **Candle Could Be Relit And Burn.**
- **Concluded Plants Released Substance ( $O_2$ ) Necessary For burning.**



6

# Ingenhousz's Experiment 1779



Repeated Priestly experiment with & without sunlight<sub>7</sub>

## Results of Ingenhousz's Experiment

- Showed That Priestley's Results Only Occurred In The Presence Of **Sunlight**.
- Light Was Necessary For Plants To Produce The "Burning Gas" or **oxygen**



## Julius Robert Mayer 1845

Proposed That  
Plants can  
Convert Light  
Energy Into  
Chemical  
Energy



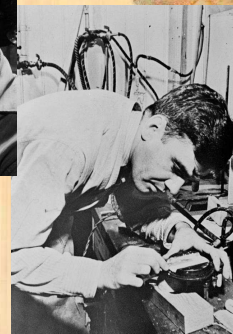
9

## Samuel Ruben & Martin Kamen 1941

Used Isotopes  
To Determine  
That The  
Oxygen  
Liberated In  
Photosynthesis  
Comes From  
Water



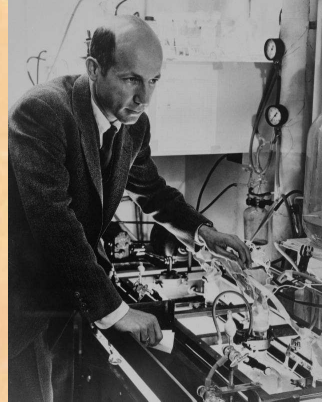
RUBIN



<sup>10</sup>  
KAMEN

## Melvin Calvin 1948

- First to trace the path that carbon ( $\text{CO}_2$ ) takes in forming Glucose
- Does NOT require sunlight
- Called the Calvin Cycle or Light Independent Reaction
- Also known as the Dark Reaction



11

## Rudolph Marcus 1992

- Studied the Light Independent Reactions
- First to describe the Electron transport Chain



12