

CLB.STEAM-01, Space and  
Earth Farms for Elementary  
Students: Collaborative Session

**Virtual Session**

**November 8, 2021 from 11:45 AM to 12:45 PM Pacific Time**

# Participants

- Moderator: Bryce L. Meyer
- Participants:
  - Gregg Cannady, Collaboration and Concept Development, STEM School Highlands Ranch
  - EVERYONE!

# Topic:

- Why do we need to farm in space, and how will future space farms work? This session explains how space farms work, including chemistry and machinery, in simple down to Earth (literally) terms so that 4-8th grade students can understand!
- Late elementary school is when kids become interested about space!
- Learning Goals:
  1. Show how plant crops like plants convert carbon dioxide and water to foods
  2. Show how people and animals use food and oxygen and release wastes and carbon dioxide
  3. Explain why a farm in space, a space farm, is different than an Earth farm
  4. Show that people and crops in a space farm can recycle

# Explaining Gases in simple words

- Air is a mix of invisible parts, called gases
- Two very important parts in air are called carbon dioxide and oxygen
- There is also water in air, like clouds.
- Animals and people need oxygen to use food.
- Parts of the food we eat get added to oxygen to make carbon dioxide we breathe out
- Plants work backwards from animals: they take in carbon dioxide and water.
- Plants use sunlight with carbon dioxide and water to make more plant, including food.
- When plants make food, they breathe out oxygen.

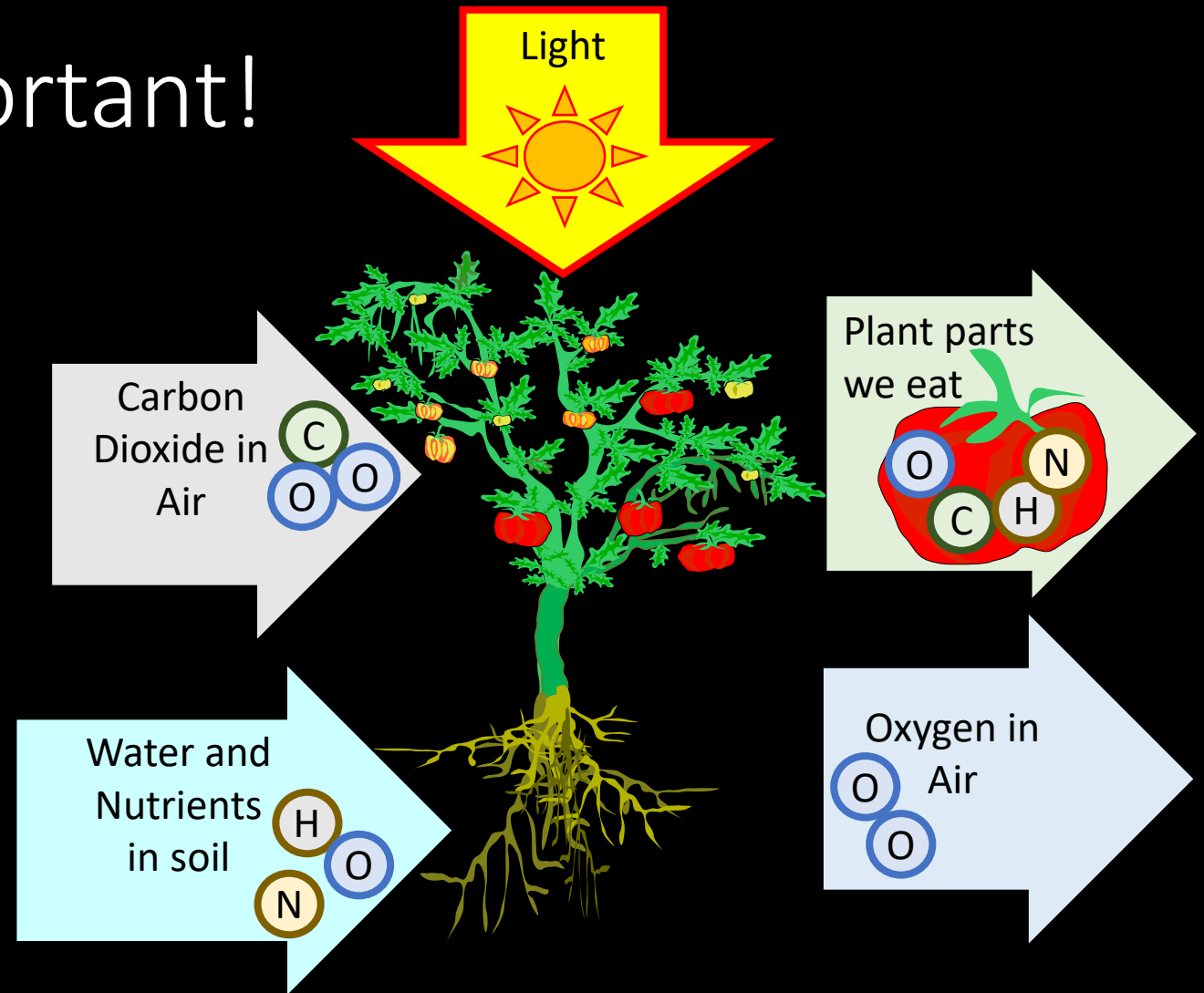
# Space vs. Earth

- Space has no air or water
- Space is too hot and too cold
- Space has too much radiation and light
- All living things must be inside spaceships or space stations to stay alive
  - Space suits are little spaceships
- Everything we eat, drink, breathe has to come with us or be recycled
- We can use plants in a space farm to recycle our 'outs' into our 'ins'

# Diagrams are important!

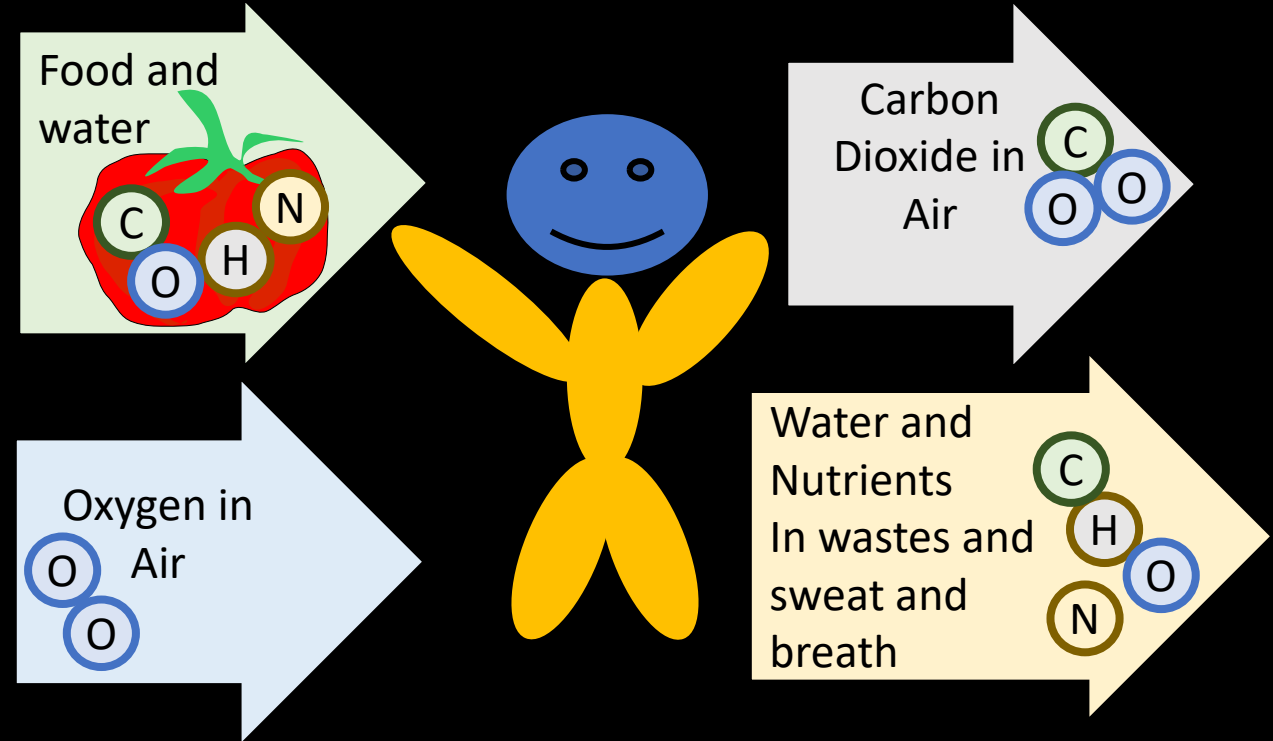
Simple Concepts in familiar pictures:

- Carbon dioxide has carbon ('C') and oxygen('O') parts
- Water and Nutrients have Hydrogen and oxygen parts, and nitrogen parts.
- These parts move through the plant into food and oxygen we breathe.

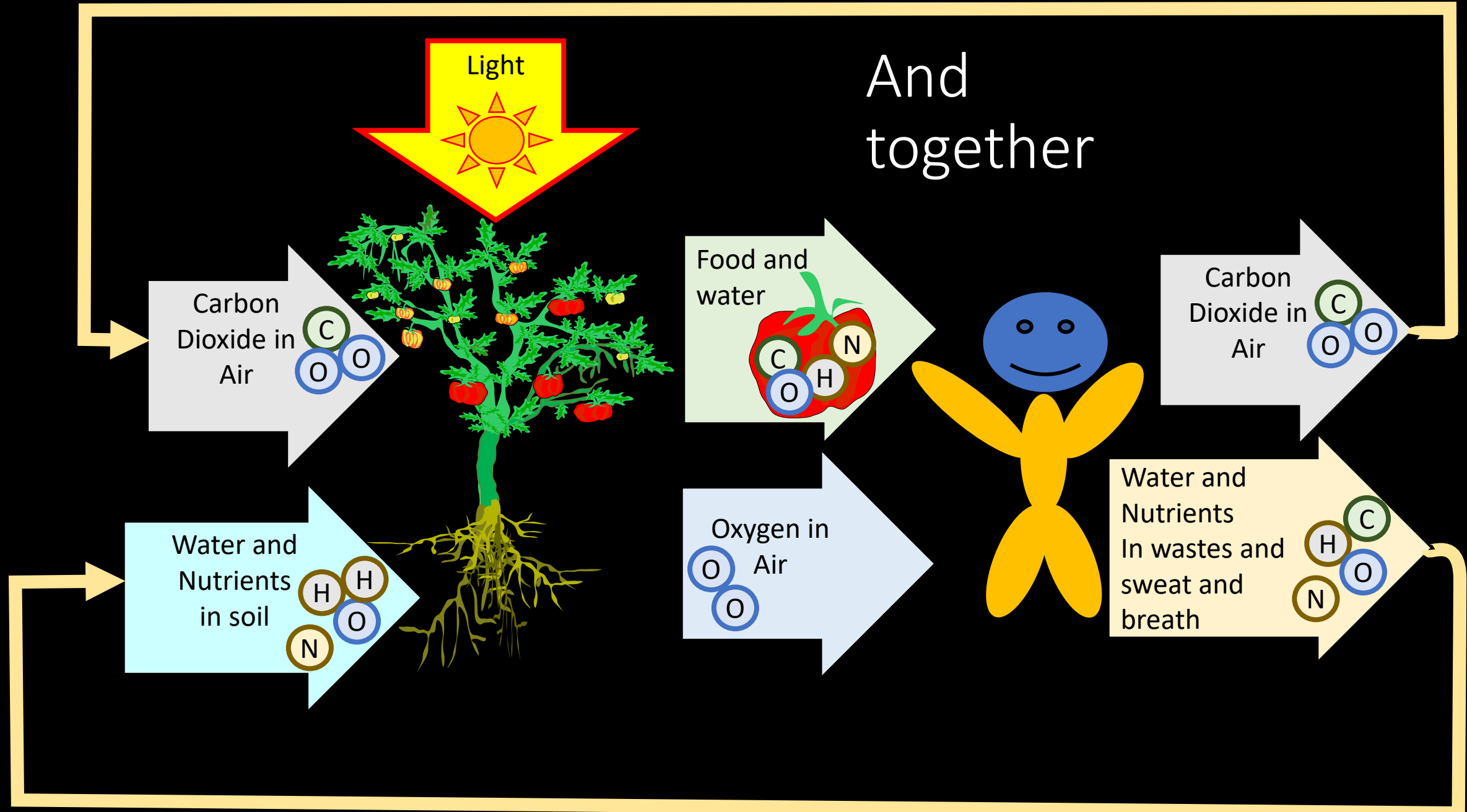


# More simple diagrams

- Same concept for people:
- Food and Water has Carbon, Oxygen, Hydrogen, and Nitrogen
- Air we breath has Oxygen
- We breathe out Carbon Dioxide with carbon and oxygen
- We release water and wastes with hydrogen, oxygen, nitrogen, and



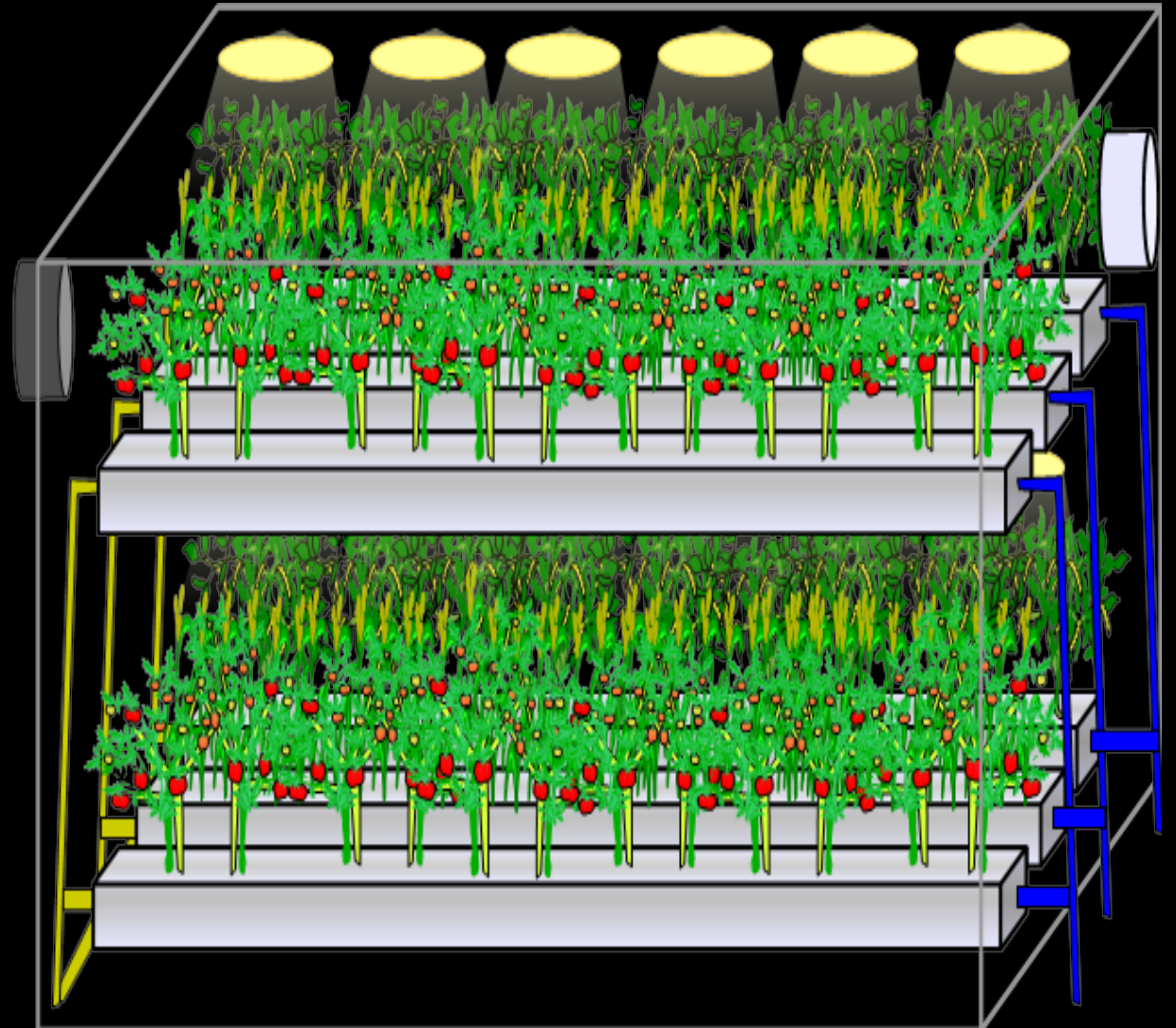
And together



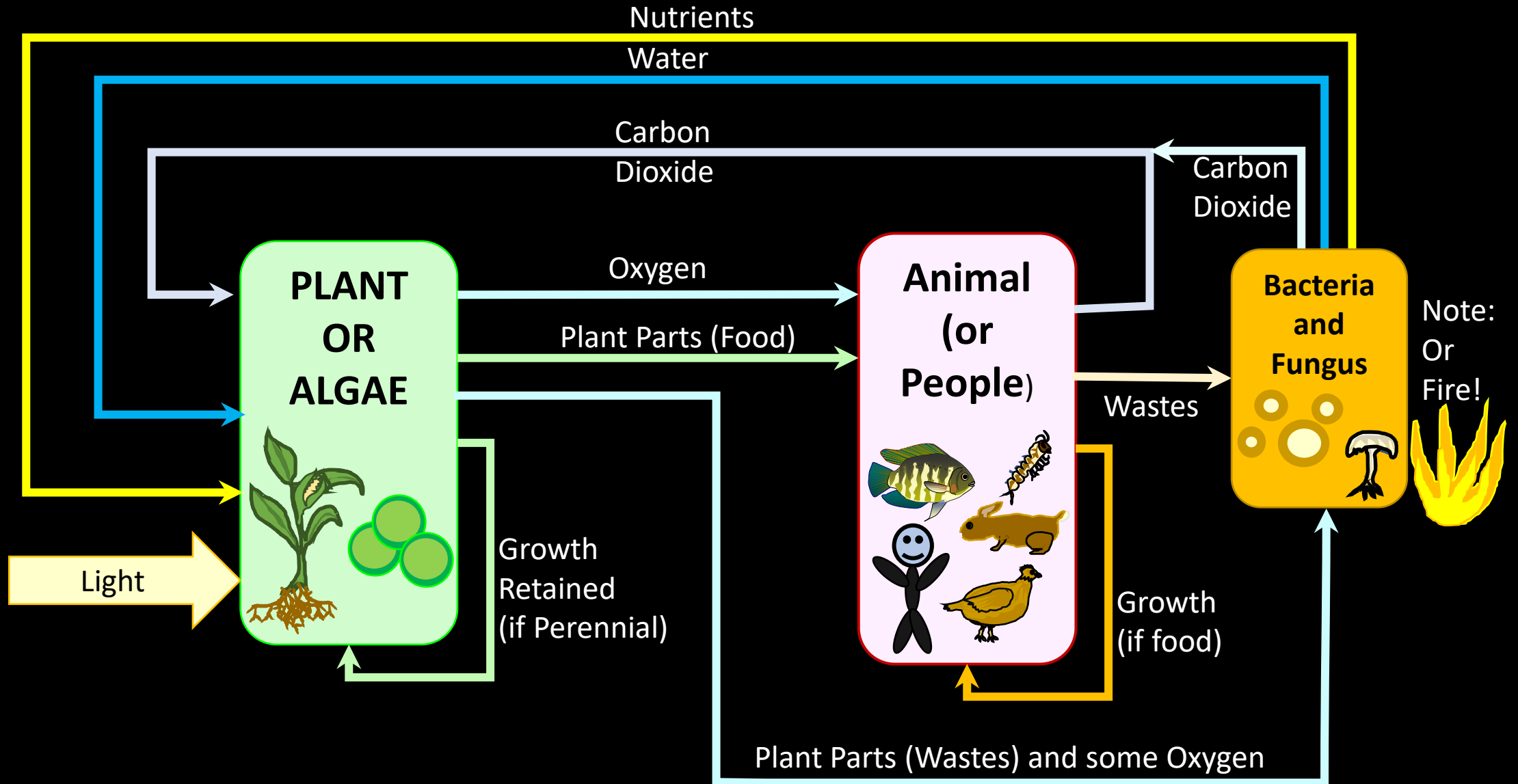


# A few other simple concepts

- We can grow plants in containers instead of soil
- We must convert plant leftovers and wastes from people to make them inputs for plants
- We want to use as little room as we can to grow lots of food
- Animal and mushrooms can be in the farms too
- We can use algae like plants.

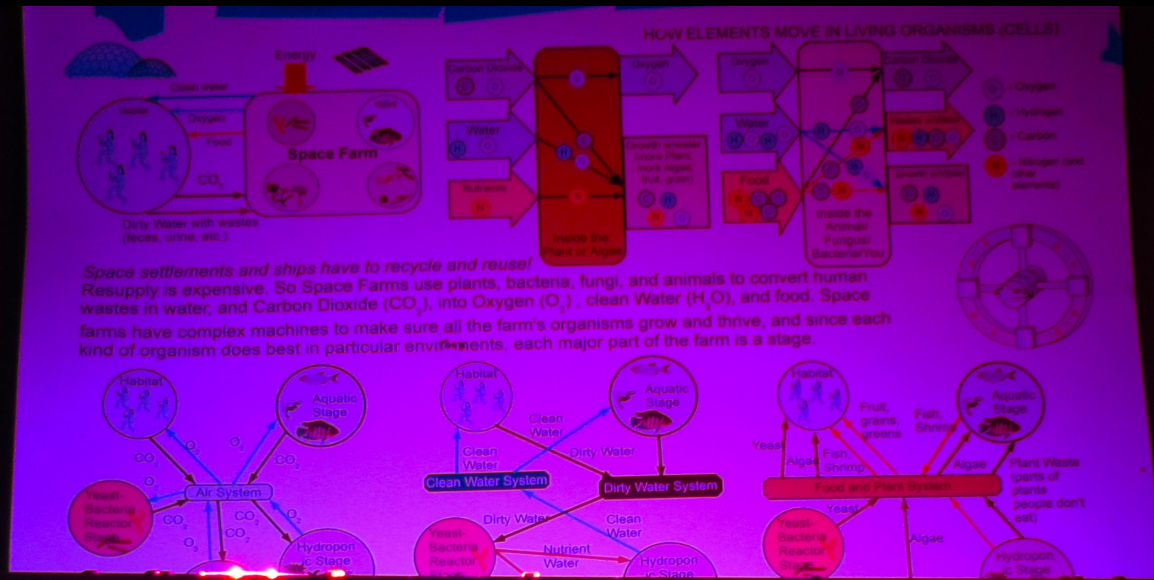


# The Simplified Cycle



Now for everyone else's ideas!!!

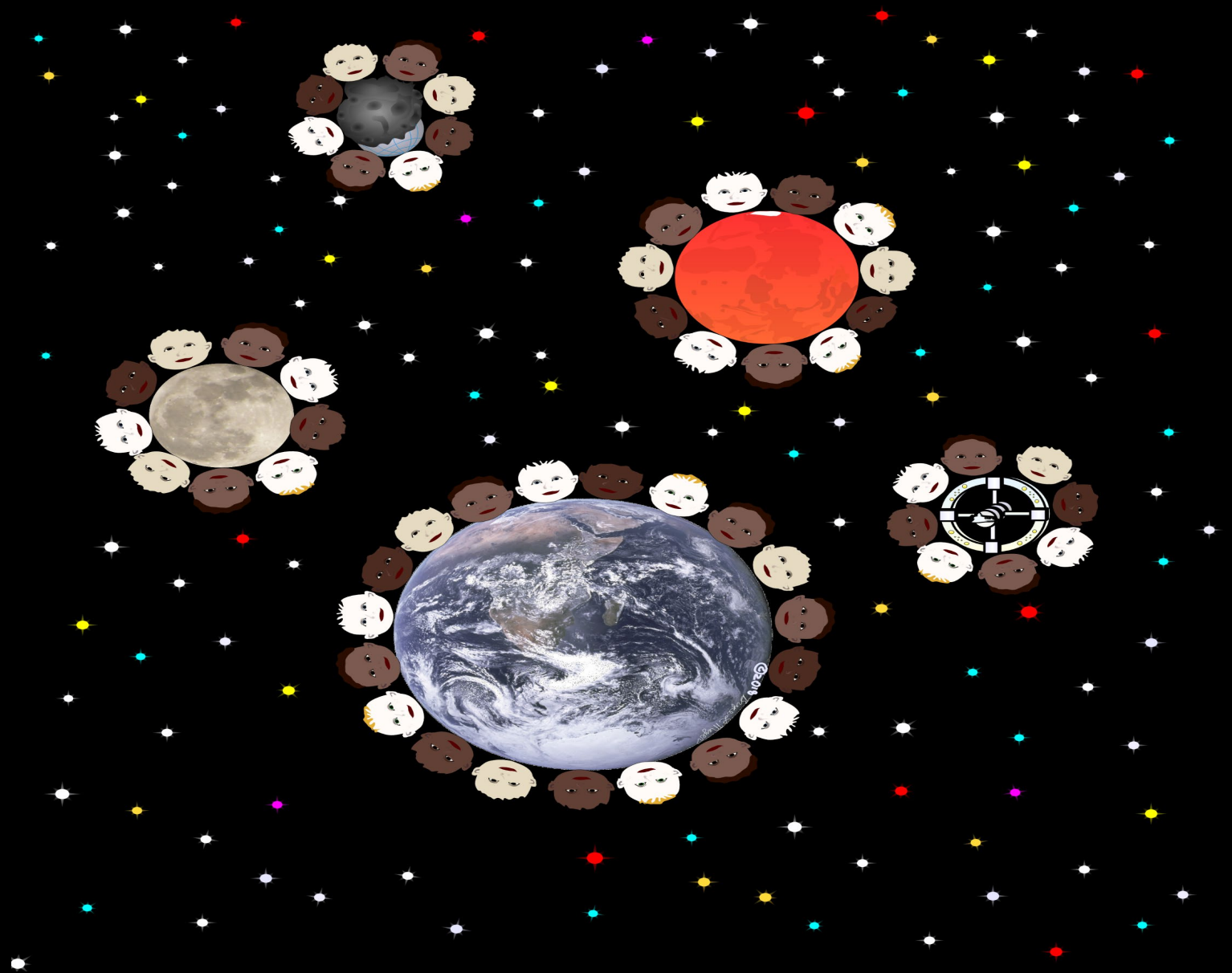
# Visual aids help



# CONCLUSION

- THANK YOU FOR HELPING, AND REMEMBER...WHY DO I DO SPACE?

***TRILLIONS OF  
HAPPY SMILING  
BABIES!!!***



- Why do we need to farm in space, and how will future space farms work? This session explains how space farms work, including chemistry and machinery, in simple down to Earth (literally) terms so that 4-8th grade students can understand!
- Bryce Meyer, Chair, AIAA Space Colonization Technical Committee

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# Condenser/Filter Loop

