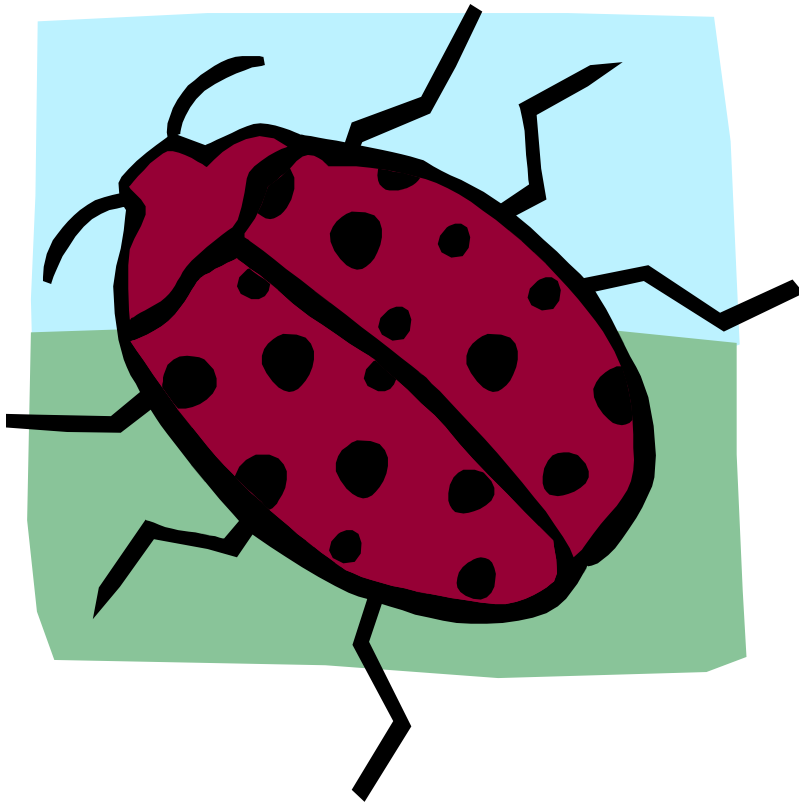


# Cellular Respiration

Everybody's doing it!

# Cellular Respiration

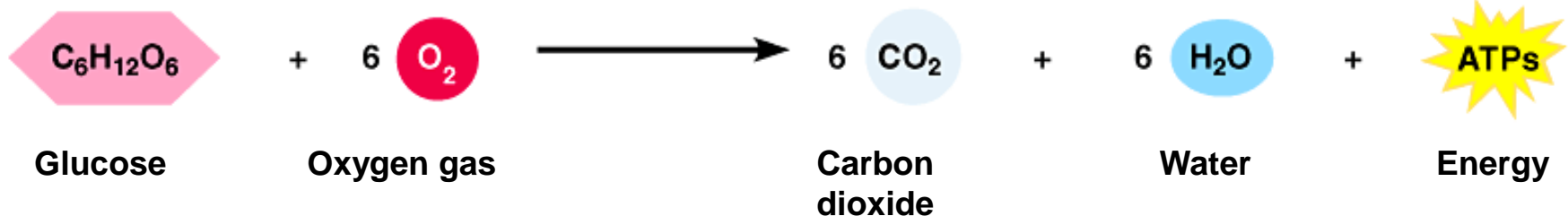


- All living things need energy
- Energy in the form of...
- **Food**=chemical energy
- Cell energy=**ATP**

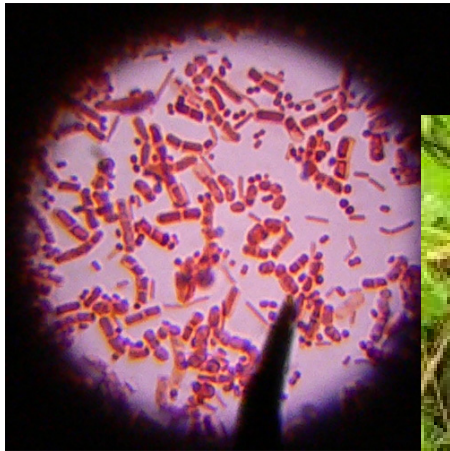
# Cellular Respiration

This process  
breaks down glucose with oxygen  
to produce carbon dioxide, water, and energy.

Most of the energy produced is released as heat  
but 40% of the energy makes ATP - the molecule  
needed for cell work!



# What organisms do Cellular Respiration?



bacteria



fungi



protists



plants



animals

All organisms do cellular respiration or some portion or modification of cellular respiration!

# Cellular Respiration

What questions you will answer in this lab?

1. Is energy released as heat during cellular respiration?
2. What is the metabolic rate (oxygen usage rate) of an endotherm (mouse) at different temperatures?
3. How does the metabolic rate of an endotherm (mouse) compare to an ectotherm (frog)?
4. How much sugar is needed to keep you alive for an hour? (*stamping place*)
5. Do plants carry out cellular respiration based on carbon dioxide output?



# 1. Is heat released during cellular respiration?

- Compare the temperatures of germinating seeds to dormant seeds.
- Germination requires a lot of energy.
- Do not open thermoses.



germinating



dormant

## 4. How much sugar is needed to keep you alive for an hour?

- Do calculation on Page 146.
- As a group, weigh out this amount of sugar, leave it set up on balance and call me over for a stamp.
- You will use a weighing tray.
- REMEMBER, the weighing tray has weight also!
- So how will you proceed?

# 5. Do plants carry out cellular respiration in the dark?

- Remember, carbon dioxide turns phenol red to a yellow color.
- What process produces carbon dioxide?



So will a tube of Elodea (a plant) in phenol red appear red or yellow if left in the dark?



## 2 &3 Endotherm vs. Ectotherm

- **Endotherm** – (warm blooded) uses metabolic energy to maintain body temperature.

Examples – mammals and birds



- **Ectotherm** – (cold blooded) uses the environment and behavior to try to maintain body temperature.

Examples – reptiles, amphibians, worms, insects.



We will compare the metabolic rate of ectotherms vs. endotherms

So what is metabolic rate?

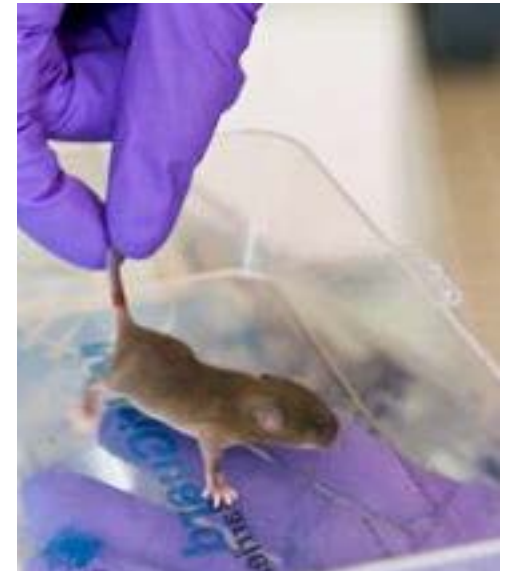
It is how much oxygen an organism uses per gram of its weight in an hour.

(mls O<sub>2</sub>/hr/g)

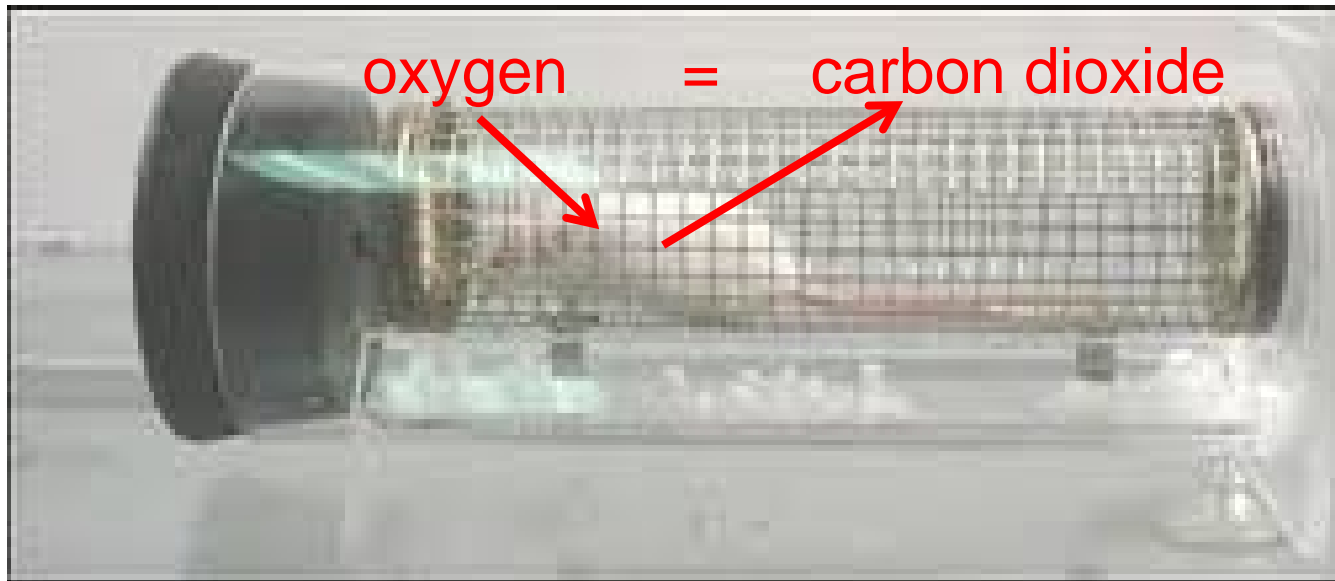
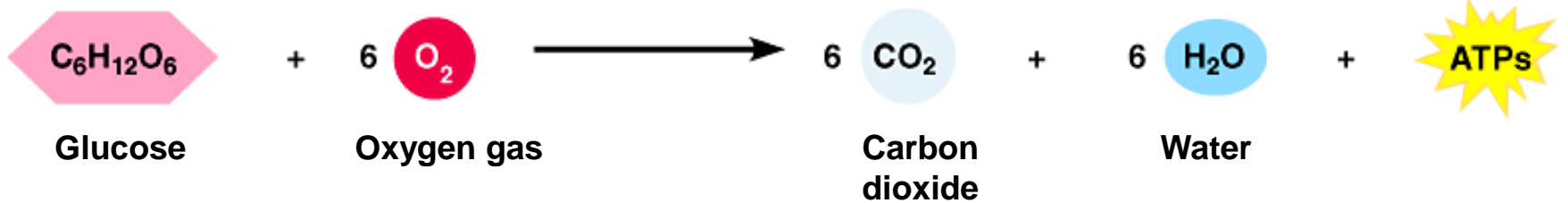
You will be given the data for our ectotherm (ex. 3 - frog) but you will need to collect information for our endotherm (ex. 2 - mouse.)

## 2. Weighing Mouse

- Weigh cage.
- Weigh mouse and cage.
- Subtract weight of cage to get the weight of the mouse.
- Pick up mouse by the tail.
- Always keep tail in hand.
- Leave wood block in cage.

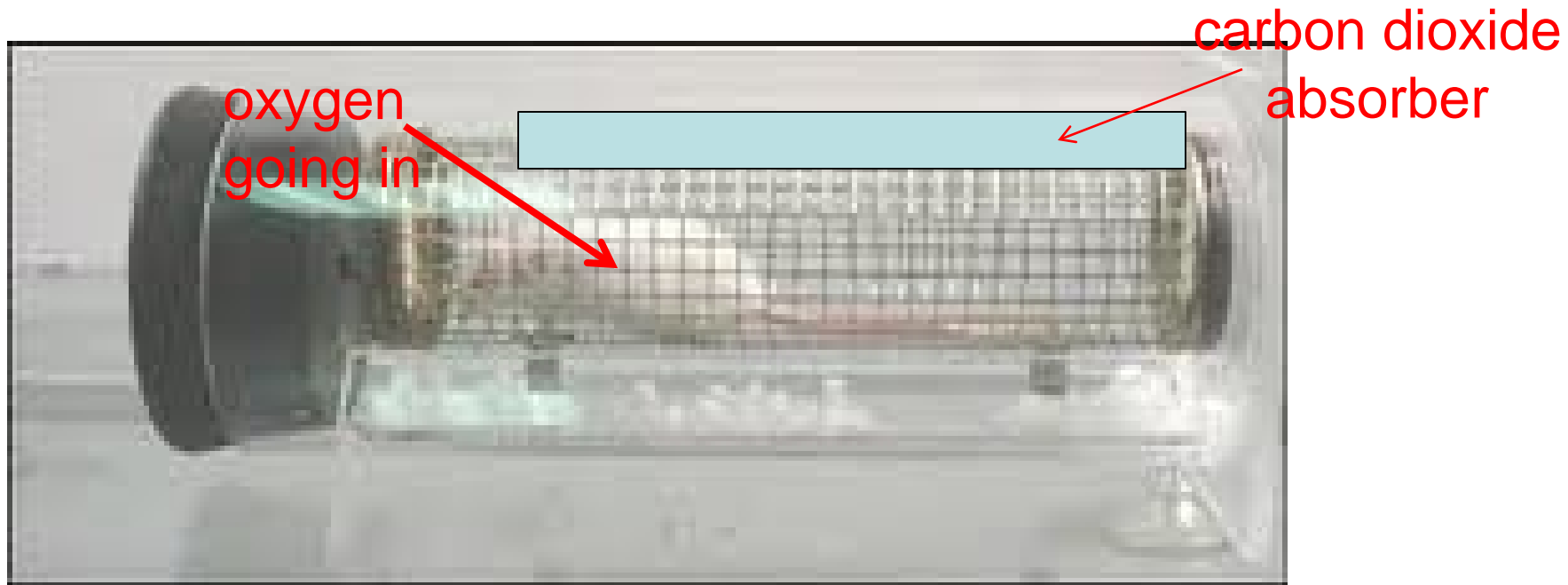


2. During cellular respiration, the amount of oxygen taken in equals the amount of carbon dioxide given off.



So the gas volume will not change in a closed container.

2. If we add a carbon dioxide absorber to the mouse chamber, it will be like no carbon dioxide was produced!



So in a closed chamber what would happen to the gas volume? The volume would decrease, forming a vacuum.

## 2. How will we measure oxygen uptake?

Introduce a bubble at the end of the pipette. The bubble will move towards the mouse due to the oxygen uptake.



Measure in seconds how long it takes to takes for the mouse to use 5 mls of oxygen.

# For Exercise 2

- Weigh mouse and put into chamber.
- Put in carbon dioxide absorber.
- Place paper towel under mouse cage.
- Dip pipette in soapy water.
- Securely put pipette stopper in chamber.
- Let sit for 10 min. to equilibrate temperature.
- Run three trials at first temperature. Do not open chamber.
- Put mouse & carbon dioxide in the other temp. chamber.
- Re-dip pipette in soapy water.
- Equilibrate for 10 minutes at new temperature.
- Run 3 trials at new temperature. Do not open chamber.

# In this lab:

- Start with exercise 2.
- Do other parts of lab while temperature is equilibrating.
- You can do the graph in ex. 3 anytime.
- You can do calculations for first temperature as soon as you are finished.
- Put data on board.



# Clean up, please:

- Be sure to remove all mouse poop out of chambers. Be careful with frozen chambers. Do not rinse chambers.
- Put frozen chambers back in freezer.
- Put mice back in same cage it came from. (Very important!)
- Put all equipment back where it belongs.
- Wipe down tables (with Pinesol!) and push in chairs. Thank you!