

## Photosynthesis: The Play

Characters & “costumes” (to be held up in front of them, all cut from colored foam, or just use printed signs)

- Narrator (a plant)                                 -Leaves (w. small “chloroplasts” drawn on one side), ferns, grasses, or other plants
- Visitor (a person)                                 -Chloroplasts (green ovals)
- Sunbeams (who hold pieces of energy, which are jazzy shapes)                                 -Glucose (appears as a clump of molecules; its parts have been defined before it appears)
- Water drops                                         -Six CO<sub>2</sub>: Each holds 1 Carbon atom & a paired Oxygen (1 circle for carbon, 2 overlapping for oxygen)
- Six H<sub>2</sub>O: Each holds 1 Oxygen atom & a paired Hydrogen

*Woodsy scene, with trees, ferns, and grass, all swaying happily. Water drops and sunbeams are dancing around. Narrator and visitor stand at the side.*

Narrator (who is a plant): Welcome to our woods! You can see how happy we are here. We have sunlight, water, and plenty to eat!

Visitor: Thanks; it’s great to be here. Everything does look wonderful and healthy, but what do you mean—plenty to eat? Plants don’t eat!

Narrator: Well, not like you do, but we need fuel for energy. All living things need fuel for energy. Food is fuel; fuel is food. We all need it.

Visitor: OK, but where do plants get food? They can’t go anywhere. Oh, I know! You get it through your roots!

Narrator: Well, you are partly right. Water and important minerals come from the soil through the roots, but we plants still need food.

Visitor: So where does it come from?

Narrator: We make it ourselves!

Visitor: You're kidding! That doesn't make sense. No one makes their own food. Besides, you are just stuck in one place, growing. How can you make things?

Narrator: Oh, we do a lot of things that you can't see, and making our own food is one of them! We can call our food "sugar"—or glucose, if we're being fancy—but it's not like the sugar you put on cereal. It's a different kind of sugar. There's even a name for how we make the sugar: Photosynthesis.

Visitor: Photosynthesis. Pretty big word. How does it work?

*Sunbeams, holding energy pieces, and H2Os, and CO2s dance to the front of the stage, along with individual leaves, "chloroplast" side away from the audience. Larger chloroplasts wait behind. Water drops quietly drift offstage.*

Narrator: Many things are involved, and they all work together. First of all, did you notice how beautiful and green all the leaves are?

Leaves: *We are green, both dark and light,  
And we make a lovely sight.  
We produce this color thrill  
For we're filled with chlorophyll!*

Visitor: Chlorophyll?

Narrator: That's right. Chlorophyll is what makes leaves green. And it is what starts the food-making.

Visitor: You mean the photosynthesis?

Narrator: Right. The chlorophyll is inside lots of tiny chloroplasts in every leaf. You can't see them, but they're there. *(leaves turn around to show their chloroplasts).*

*Students holding larger chloroplasts come forward:*

Chloroplasts:

*1<sup>st</sup> chloroplast: Chlorophyll's green power blast  
Starts inside us chloroplasts.*

*2<sup>nd</sup> chloroplast: We hold all the chlorophyll,  
So who will start this off? We will!*

*3<sup>rd</sup> chloroplast: We take in the sunlight's power  
To make food for leaf and flower!*

*Leaves and chloroplasts now dance around with the sunbeams, meeting and parting, meeting and parting.*

*Sunbeams, who never stop moving:*

*Energy sent from the sun  
We deliver, on the run.  
We bring warmth and light, and thus,  
Life on Earth begins with us.*

*Sunbeams (spoken by any of them):* We have so much energy to spread around. It's easy to reach right down, touch all the beautiful plants, and give our energy right to the chloroplasts. They're such cute little chloroplasts!

*Sunbeams hand "energy" to the chloroplasts and say,*

*We send power through the air  
For there's energy to spare.  
Starting with the sun so strong,  
Energy gets passed along.*

*Chloroplasts (passing the large energy piece around):* Yay! Thank you! Thank you! And then we know what to do because we have a special recipe. We use a gas from the air, called carbon dioxide, or CO<sub>2</sub>, and breathe it in through the tiny little holes in the leaves. And then we take some of the water that came up through our roots.

*Visitor (to narrator):* Where did they get the carbon dioxide? I thought the air was oxygen.

*CO<sub>2</sub> molecules come dancing in and mingle about. H<sub>2</sub>O's and O's are in the background.*

Narrator: Oxygen is there, but there are other gasses in the air, too, including carbon dioxide. And guess where the carbon dioxide (also called CO<sub>2</sub>) came from?

Visitor: I don't know. Where?

Narrator: From animals! Animals breathe in oxygen and breathe out carbon dioxide. It also comes from plants and animals that are dead and decaying. And some comes from things that burn.

Chloroplasts: And then we mix up the water and carbon dioxide, using the sun's power, and guess what we get?

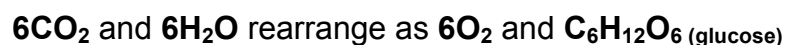
Visitor: What, glucose?

Chloroplasts: You guessed it ! We make sugar, our food!

*We take water, we take air;  
We make food with plant-like care.  
CO<sub>2</sub> and water mix  
To build structures without bricks.*

*As they sing/chant, the various Cs, Os, and Hs run around, bumping into energy, and rearrange. At the same time, the chloroplasts hand the Energy to the incoming Glucose.*

*The H<sub>2</sub>O's hand their H atom pairs to the CO<sub>2</sub>'s and "float" offstage with their six single oxygen atoms. Everyone remaining clumps together. "Glucose" comes in, takes the Energy, and stands in front of the molecules, now representing them. i.e.,*



Glucose:

*Now that all the mixing's done  
I'm the sugar that they've spun.  
After all that chemistry,  
Energy belongs to me!*

*Hungry leaf and hungry stem?  
I'll be feeding all of them!  
Energy to make a flower?  
I deliver, every hour!*

Visitor: Wow! That's pretty impressive! Then you must have to rest after all that work.

Narrator: Well, we rest at night, when there's no sun.

Visitor: By the way, where did the oxygen go?

Narrator: It's in the air now. Remember how animals breathe out carbon dioxide? After you have used oxygen, carbon dioxide is the waste product.

Visitor: Yes....

Narrator: Well, photosynthesis has a waste product too, something that is left over at the end. And it's oxygen! The plants put oxygen back into the air. And you want to know something cool?

Visitor: Sure

Narrator: All the oxygen in earth's atmosphere has come from plants—every single bit of it.

Visitor: Wow!

All the plants:

*Do you like to breathe air in?  
Thanks to us, there's oxygen.  
Plants release it to the air  
So that you will find it there.*

*(O's come back onstage)*

Visitor: Plants are really important! And now I see how it all works together—animals breathe in oxygen and breathe out carbon dioxide, and plants take in

the carbon dioxide and release oxygen! That's so cool! It just keeps going around and around.

Oxygen: It sure does. And it's really fun, going around in that circle. We especially love the part where we float in the air. [*all or one oxygen atom says:*]

*When the leaf has made its food  
We get in a giddy mood,  
For we are released to ride  
On the air and float outside.*

Narrator: But the molecules aren't done yet. They're still working.

Visitor: They are?

Narrator: Yes; they dance around some more, and get new partners. The cells take apart the glucose so that they can use its energy. And there's some water left over, which is also released to the air.

Water drops reenter: That's us! Back again! We were there at the beginning, and we're here at the end. The leaf used us water molecules to make the glucose, and then released the extra water along with the oxygen.

Visitor, in stage whisper to narrator: You mean, leaves sweat?

Narrator: Well, sort of, but in plants it's called transpiration.

Visitor: Water in, water out. It looks like every living thing needs water.

Narrator: We sure do, animals and plants. Besides having water to drink, animals need photosynthesis to happen. Without it, there would be no plants for all the little plant-eaters to eat.

Visitor: And sometimes big plant-eaters.

Narrator (confirming): And sometimes the big plant-eaters. And, of course, the animal-eaters eat the plant eaters, so without plants, the animal-eaters would be in trouble, too.

Visitor: Well, in that case, let's hear it for plants! And let's hear it for photosynthesis!

Everyone: Yay, photosynthesis!

Everyone (as each character is mentioned, she/he raises his "costume.")

*Water in, water out  
While the gasses change about.  
CO2 comes in to stay;  
Oxygen then floats away.  
Chlorophyll is that green tool  
Used in making glucose fuel.  
Photosynthesis is fun,  
Powered by our friend, the sun.*

*[The following is not part of the play, but teachers might find it useful.]*

From sun to leaf,  
From leaf to plant,  
Who makes what we creatures can't,  
Energy gets passed around  
From sky to leaf, from leaf to ground.  
It's in growth we see each day,  
Then set free by death's decay.  
Animals receive from plants,  
Plants from sunshine in a dance  
From life to death, and back to birth.  
That circles 'round all life on Earth.