

THE WIZARD OF OZ: BOTANY STYLE

~**Narrator:** Dorothy is found frolicking in her garden, admiring the lovely, sunny day, admiring the splendid progress of her apple orchard with her aunt. She bends down to inspect on that is doing unusually well for the conditions.

Dorothy: Oh my! Look at these wonderful apple trees. There must be 8 different cultivars here! And look, the tree is flowering. I love flowers.

Aunt M: Do you even know what an apple is?

Dorothy: Why yes. It is a red thing that you eat.

Aunt M: Well, that is correct. But there's much more to it than that.

Dorothy: Oh, do tell. Do tell.

Aunt M: Well, though it may sound gross, an apple is a swollen ovary

Random guy: Wow that is gross!

Aunt M: Yes, well as a matter of fact, all fruits are just swollen ovaries.

Dorothy: Well, why do they taste so good?

Aunt M: Well, sweetie, the tree wants people to eat this fruit because inside are seeds. When people eat apples, they don't eat seeds. That's the same with animals. However, the seeds get spread out...whether they just fall out or they get pooped out a couple miles away. Seeds are ovules that have been fertilized. They were fertilized on the flower.

Dorothy: Ah yes, I know all about flowers.

Aunt M: Well why don't you explain to me what a flower is then Dorothy while I munch on this delicious McIntosh.

Dorothy: Flowers are my favorite thing in the whole world! They are so pretty! Their function is reproduction. They give the plant a family. I want a family someday! Someday!!! (**sung [in the same manner as freebird [really kind of stretched out]]**). The flower is attached to rest of the plant with its receptacle, just like I would be attached to my family! The flower has petals that attract "pollinators"...the same reason I wear makeup. I don't have sepals though. Sepals give the flower protection. Flowers have more parts than that though...I bet you're getting bored and I want to try that Golden Delicious over there.

Toto the dog: Ahhh, hell no. Keep on going.

Dorothy: Fine. The pollinators spread the pollen around the flowers. The pollen is made in the anther which is part of the male part called the stamen. When the pollinator comes, which could be an insect or even the wind, this pollen gets stuck on them and put in other nearby flowers. When the female part, the pistil, gets the pollen, the ovules become fertilized and are now seeds. Ok?

Aunt M: Yea I get it. You want a baby. You know how much work that is?

~**Narrator** (not narrating): What are you guys doing eating all of my apples?

Pulls out blow gun and shoots Dorothy in the neck. Aunt M makes a frantic escape.

~**Narrator Narrates-** Dorothy, has just been injected with a horse tranquilizer/peyote combination and will think that she is stuck in one of my Apple trees. She will learn all about plants as she hallucinates.

END SCENE 1

Dorothy: Where am I?

Earth Worm: Why don't you know child? You're in the ground. See that nodule over there?

Dorothy: What is a nodule?

Earth Worm: A nodule is a tumor like swelling on roots of certain higher plants that houses nitrogen-fixing bacteria. They're on the outside of the roots.

Dorothy: Well, then how do I get home?

Earth Worm: Well, seeing as they aren't the friendliest organisms in the soil, I suggest you go into the flower through the root hair.

Dorothy: the what? Root hair? I didn't know roots had hair...

Earth Worm: well they don't... not exactly, at least not the kind humans have. The root hairs are the small hair-like extensions of the outer layer of root cells. Their function is to absorb nutrients and water. Roots can have an amazingly large number of root hairs.

Dorothy: Oh, thank you!

Earth Worm: Hope you get home safely!

~**Narrator:** Dorothy continues to wander on until...

Dorothy: Where am I now? All I want is to go home.

Glenda: Why child. You're in the epidermis, the protection of the root that keeps all the nasty things out.

Dorothy: ohh... but I still don't know how to get home!

Glenda: Well, I would start by following the xylem brick road.

Dorothy: The xylem brick road?

Glenda: Yes. It will take you up, and up, and up all the way to a leaf where you will be able to transpire out!

Dorothy: Transpire?

Glenda: Yes, transpire. The evaporation of water from leaves and stems that occurs mostly through the stomata.

Dorothy: What's the stomata?

Glenda: Oh dear, you really do not know the plant. The stomata is the epidermal structure consisting of two guard cells and the pore between them that enable water loss and gas exchange.

Dorothy: Oh, alrighty, so how do I get to this xylem brick road?

Glenda: Well, first you must get past the cortex, then the casparian strip and you will bump into the road which will take you home.

Dorothy: Thanks!

Glenda: Oh, You're welcome and if you ever need any help feel free to snap your fingers and lean wit it, rock wit it. (*Glenda "Lean wit it rock wit it" off stage while snapping fingers*)

Dorothy: Alrighty then! I'll make sure to "lean wit it rock wit it" when I need choo.

Glenda: I'm down wit that homey. Peace dawg. *ghetto hand signs*

~**Narrator**: Dorothy continues walking on looking for the mysterious cortex...

Dorothy: Oh where is this cortex I've heard so much about. How am I supposed to ever get home if I can't find it!?

Cortex: Why you're in luck! I am the cortex!

Dorothy: Oh Excellent! **(Starts to go)**

Cortex: Not so fast, you must diffuse!

Dorothy: But I don't know how to diffuse.

Water Molecule: Hey, you're new around here, aren't you? Let me help.

Dorothy: Oh wonderful!

Water Molecule: It's hard at first; the cortex can be so stubborn sometimes making us fit in between the air sacs.

Dorothy: Well thank you!

Water molecule: You're welcome! Just remember to walk along the cell walls and intercellular spaces around the protoplasts up to the endodermis.

Dorothy: Xylem brick road! Here I come!

~**Narrator**: And on she traveled until she hit a very difficult layer...

Endodermis: Not so fast, first you must pass through me.

Dorothy: Who are you?

Endodermis: Why, I'm the endodermis. And this is my friend, Casparian Strip.

Dorothy: Goody! You're the ones I've been looking for! May I pass?

Endodermis: What do you think Cas, should we let her pass?

Casparian Strip: Oh, I don't know. Lets see if she knows our function. So?...

Dorothy: Well, I'm not certain as to what you do, but I think you may allow access to the xylem brick road?

Endodermis: Actually, that's part of it. I mainly offer protection like my older brother epidermis; we like to call him Epi. But, Cas and I work together.

Casparian Strip: I'm the suberized layer covering the radial and transverse walls of endodermal walls. Well, I guess you knew enough for never having been in a plant before, you may continue.

END SCENE 2

~**Narrator**: Dorothy continues walking through the rest of the plant. She starts to pass through the stem. The sturdy aboveground structure that supports the flower and the leaves. The stem is also the place where growth occurs. Dorothy continues on the xylem brick road. The xylem and phloem run throughout the stem to conduct water and other materials. Suddenly Dorothy stops and realizes just how long it has been since she's seen something to help her...

Dorothy: (**talking to herself**) Wow, I've been walking for a while, I wish I could just go home. Oh no! A fork in the road, what am I going to do?

Node 1: Take me!

Dorothy: Who are you?

Node 2: Don't be stupid I'm the node!

Dorothy: How would I know that?

Node 1: Because I'm an important part of the stem.

Dorothy: But that doesn't explain why I should take you over the other beautiful road.

Node 2: You should take me because I'm in your path home. I am the road that will take you to the leaf you see. That's what we nodes do; we are the path to the leaf.

Dorothy: Oh I see, but what would happen if I follow the road I'm on now?

Node 1: Well, this xylem road will lead you to another internode, and you don't want that.

Dorothy: Well what about stolon?

Node 2: Why would you take the stolon, the stolon is a shoot that bends to the ground or that grows horizontally above the ground and produces roots and shoots at the node.

Dorothy: What does that mean?

Node 1: It means if you want to get the leaf, you take me, the stolon won't get you there.

Dorothy: Alrighty here we go!

END SCENE 3

Dorothy (talking amongst herself): So this is Chloroplast City. It is amazing how many chloroplasts there are in just these few perpendicular cells. I can't even begin to imagine how many there are all together.

Almighty Chloroplast Oz: Why hello there little lady, you seem lost. Can I be of any assistance?

Dorothy: Why yes, actually. See, I've had an unfortunate, yet truly eventful experience, I must say, here in this plant, I was instructed to follow the xylem brick road to this city so that I might find the almighty chloroplast oz so he could instruct me on how I might get home, but I haven't a clue where to find him.

Chloroplast: Well, I see your dilemma. However, I must let you know that oz, just as all of us here chloroplasts, have a very important job in this here cell so we really don't have that much free time. As you may know, a plant must undergo the process of photosynthesis in order for it to

produce the sugar that is essential to a plants survival. In this vital process, we are the ones responsible for capturing the energy from the sun, which is used to produce the essential sugar that will eventually be converted into ATP through the process of cellular respiration. This ATP formation is the driving force behind all of the plant's actions.

Dorothy: Wow, I never knew that you guys had to deal with this much pressure. I hope this won't affect the Oz's availability to see me. How am I going to get home NOW?

Chloroplast: I suppose I could be of some assistance. **(powerful voice) I am the almighty chloroplast oz.**

Dorothy: You don't look so mighty to me. What makes you different from all the other chloroplasts?

Chloroplast: Well, nothing I guess. I just seem to possess knowledge that none of these other numbskulls do. So do you want my help or not?

Dorothy: Why, of course. Sorry if I offended you in any way.

Chloroplast: Whatever. Pay close attention. I don't like repeating myself. I work my butt off during the day, every day, and I only get a break during the nights. So I'm not about to spend my night explaining this to you.

Dorothy: I completely understand.

Chloroplast: Well, to start you're going to have to pass by the palisade layer. Look over there (**points**) see, he can help you out. Let's go talk to him.

~**Narrator:** Our friends walk toward the Palisade layer in search of more answers...

Chloroplast: Hello there Palisade. How are you today?

Palisade: Ah, you know. Same old, same old. Relaxing, you know taking in the CO₂ and sunlight making some oxygen, sugars and ATP. Keeping the whole plant going, nothing major.

Dorothy: Well good for you. Can you tell me how to get to the stomata? I really need to transpire and get out of here!

Palisade: Can't help you with that one! Have a nice day though. (Walks away)

Dorothy: That's great...now what am I supposed to do?

Chloroplast: Ok. Let's see. I am familiar with the spongy layer that sits below me, but after that it is all somewhat of a blur. I will try my best to remember. So as I said, the next layer you will encounter if you continue on the xylem brick road is the spongy layer...

Mesophyll: Yeah! The spongy layer that's me! I work just as hard as the 'Almighty Chloroplast' but I don't do photosynthesis like him, I regulate the flow of gases within the plant. I mean isn't it obvious. I'm pretty large, but most of it is just space for gases to float around in! So as I was saying, just keep going past me.

Dorothy: Uh huh. Then where do I go?

Chloroplast: Well, to be honest, there is not that much more too it. However, you must pay close attention, because there is a specific way you must leave the cell.

Dorothy: I'm listening.

Chloroplast: After the spongy layer, you will encounter the abaxial epidermis. This epidermis is similar to the one that you entered through earlier, however this one contains numerous openings called stomata. These stomata are your ticket out of this cell; however, they do not just let anything pass through them. During the day, carbon dioxide is let in and oxygen is let out. I'm afraid the only way you will be able to transpire out of the leaf is to in fact hitch a ride on a water molecule. You must hurry because the stomata are only open during the day. Once night hits, you will no longer be able to leave the cell. And watch out for the guard cells!!

Dorothy: How will I know that I have reached a stomata?

Chloroplast: That's what I was saying. I believe they are sausage shaped and they regulate the opening and closing of the stomata, they are what will either help you transpire out of the leaf, or what will keep you here.

Dorothy: Thank you so much for all your help, but I must be on my way because as you said, I haven't much time. Bye!

Chloroplast: No problem. I have to stop procrastinating and get back to my work anyways.

~**Narrator:** Dorothy hastily begins her journey towards the stomata because as the chloroplast so wisely told her, she hasn't much time.

Dorothy (to herself): I wish I had listened more carefully to Oz. I swear I knew where I was going.

~**Narrator:** Dorothy proceeds on her quest to find the guard cells, and lets out a satisfied screech when she suddenly spots the sausage-shaped guard cells that the chloroplast had so clearly described.

Dorothy (to herself): Ok, I found the stoma, but where the heck and I supposed to find a water molecule!?!?

Guard Cell 1: HALT!

Guard Cell 2: What do you think you're doing?

Dorothy: I just want to go home, and this is the direction she pointed me to. 'Stay on the xylem brick road...' blah blah blah. EASIER SAID THEN DONE!

Guard Cell 1: Who is *she*?

Guard Cell 2: Yeah, *she* isn't in charge of this stoma, we, the best guard cells in the world are!

Dorothy: Ohhhh, ahhh. Guard cells...what does that mean?!

Guard Cell 1: What does that mean?! What does that mean?!

Guard Cell 2: Are you serious? Haven't you ever been to chloroplast city before, haven't you even gone to a leaf?

Dorothy: No. I normally don't travel through strange plants in my spare time.

Guard Cell 1: Oh. Well, why are you here then?

Dorothy: I don't know. I just want to go home. They told me to follow the xylem brick road all the way to chloroplast city where I will be able to transpire out to the real world.

Guard Cell 2: Transpire? I think we can help you with that.

Dorothy: Really?! Can you? I miss my aunt and uncle, its lonely here.

Guard Cell 1: Well, before we can help you, tell us what you've been up to all this time.

Dorothy: Well, I started down in a root, went through all these crazy places and met Ghetto Glenda, Who told me if I stayed on the xylem brick road and followed all the water I would be able to get out of here.

Guard Cell 2: Oh really? That is really far away from us. How did you get all the way up here?

Dorothy: Well, I kept following the xylem brick road and then came upon this node who gave me more directions.

Guard Cell 1: Ohhhh, a node. You have to be careful with those; they lie sometimes and send you to internodes farther up the plant...

Guard Cell 2: Or to stolons that keep going and going and going...

Dorothy: Yes, I'm aware of that. But this node sent me in the right direction. Then I went through a really waxy epidermis, a photosynthesis layer, a really cool spongy mesophyll layer and now I'm here, standing in front of you two 'guard cells' wanting to get past, but chit chatting in the mean time. Why are you two here any way?

Guard Cell 1: Well, we're in charge of regulating gas flow in and out of the leaf.

Dorothy: What? I don't understand.

Guard Cell 2: Well we open and close the stomata to let things like oxygen and other gases in and out.

Dorothy: Stomata... what's stomata?

Stomata: what's a stomata?! I'm a stomata!

Dorothy: Alright, what do you do then? Can I please just go home yet?

Guard Cell 1: That depends if we want to let you through

Stomata: He's right. I don't really do much. I'm just a hole in the epidermis of the leaf that has gases flowing in and out. But those gases are very important, because with them I can do things like... TRANSPIRATION.

Dorothy: Transpiration?! That's how I'm supposed to get home! Well, let's go. I'm ready!

Stomata: It's not up to me... talk to the guard cells. If they let you pass you will evaporate from the leaves with the rest of the water that has been with you all day in the xylem, then you can go home.

Dorothy: Well, what do you two think?

Guard Cells: TURGID!! We're open go on through with this water molecule!

Water Molecule: Long time no see! Quick, let's go!

END SCENE 4

~**Narrator:** Dorothy suddenly regains consciousness as the sprinklers in her garden go off.

Dorothy: Where am I? Did I make it home?!?

~*Auntiem standing over her!*

Auntiem: Make it home? Honey, what are you talking about?

Dorothy: Auntiem, you're never going to believe what happened to me! I was in the garden, and then all of a sudden this dart came out of no where and THEN... (Gets interrupted)

Auntiem: I saw what happened to you. Some random guy thought it would be funny to shoot tranquilizer darts at people. You were knocked out cold for at least fifteen minutes. You had me worried to death!

Dorothy: You mean I never met the almighty chloroplast oz, or those grumpy guard cells??

Auntiem: Almighty chloroplast...grumpy guard cell???

Dorothy: Oh my god. It was all a dream...