

A Cellular Adventure

Teacher: Today we are going to look at eukaryote cells. Let me pass out the direction so we can get started.

Joe: Eureka cells? What are those?

Jenny: Eukaryote not eureka. Eukaryote cells are cells that have a nucleus and organelles surrounded by a membrane.

Joe: Oh, I get it.

Teacher: Look through your microscope at the slides of animal cells.

Jenny: Do we need to draw the cell?

Teacher: Good question, Jenny. Yes, you must draw the cell, label the parts, and describe the function of each part. Are there any questions? Well, then you may begin.

Ryan: Man, this is going to be a lot of work. Draw this... label that...write this. Next thing you know we'll be dissecting things.

Teacher: By the way, class, next week we'll be dissecting a frog.

Ryan: Frogs??... I don't think I understand much of this cell stuff.

Jenny: Give me a break. This stuff isn't that hard. Cells are pretty cool.

Steven: Yeah, if it weren't for cells you wouldn't be here.

Ryan: How do you figure?

Steven: Because every living thing on earth is composed of cells.

Teacher: Ryan, Jenny, Steven, are we making progress? How are we doing on the assignment?

Ryan, Jenny, and Steven: Yes.

Teacher: You three had better hurry or you'll run out of time to finish this project.

Jenny: Come on guys, let's get to work.

Ryan: Just a minute, let me go get my book.

Jenny looks into her microscope.

Jenny: Wow, these cells are really cool.

Ryan slips and falls down while hurrying to get his text book. Ryan mumbles....

Jenny and Steven hear Ryan yelling from inside the microscope.

Ryan: Help! Get me out of here.

Steven and Jenny look in the microscope and see Ryan on the microscope slide.

Steven: Hey, Ryan, how did you get in there?

Ryan: I don't know! Just get me out of here.

Steven: Let's get the teacher.

Jenny: No, don't do that. We might get in trouble.

Ryan: Help! I don't want those meteors to hit me.

Jenny: Those aren't meteors. Wow, those are blood cells moving along in the artery. Watch out. Get out of the way. It's coming right at you.

Ryan: Oh, no.....

Red blood cell hits Ryan and he is swallowed up by the cell.

Jenny: Oh where did he go? The cell just hit Ryan.

Ryan: Hey, I'm in here. The cell just sort of sucked me in.

Steven: I think you just passed through the cell membrane.

Ryan: Is that the sticky stuff I'm stepping in?

Jenny: No, the book says that is the cytoplasm.

Cytoplasm holds up a sign and reads:

Cytoplasm

- Jelly like substance
- Breaks down molecules to produce energy
- Builds other molecules up

Ryan: I'm obviously not an organelle. How did I pass through the cell membrane?

Jenny: Well. According to my book, it says that cell membranes are semi-permeable.

Ryan: Semi - permanent? Oh, great. I'm going to be in here forever.

Jenny: No, semi-permeable.

Ryan: Perm? No thanks, I don't need one. My hair's just fine.

Jenny – Not perm. Semi-permeable. That means that the membrane will only allow certain things to pass through it.

Ryan: That's good. I got in here with no problem, so I should be able to get out.

Ryan tries pushing out.

Cell Membrane: Hey watch out.

Ryan: Who said that?

Cell Membrane: I did. I'm the cell membrane. They call me the Gate Keeper.

Ryan: Gate Keeper? Well, if you are the gate keeper then tell me why I am in here.

Cell Membrane: I thought you were a LIPID.

Ryan: I didn't give you any lip.

Cell Membrane: Not Lip..... LIPID.

Lipid holds up a sign and reads the definition of lipid.

Lipid

- Organic compounds like fats, oils, and waxes.
- They are used for structure and to store energy.

Cell Membrane: Lipids can easily pass through the cell membrane.

Cell Membrane holds up a sign and reads the definition.

Cell Membrane

- Thin, outer layer of the cell.
- Holds organelles in place.
- Imports and exports nutrients.
- Passes waste and unwanted particles to the outside of the cell.
- The "Gate Keeper" of the cell.

Ryan: Well, that's great. So, don't call me Ryan, call me Mr. Waste so I can get out of here.

Cell Membrane: Not so fast. The Big Man says you're not going anywhere yet.

Ryan: Big Man? Who's that?

Cell Membrane: The NUCLEUS. He's the boss of our world.

Ryan: Well, I don't care. I just want to get out of here.

Cell Membrane: Well, you should care because you are not going anywhere until he says it's ok.

Ryan: I've got to get out of here because outside of this cell I have a life. I have friends and family. I play sports. You know, basically live.

Cell Membrane: Well, I guess you're going to hang out with us for a while, at least

until the NUCLEUS gives you permission to leave.

Ryan: So, tell me where I can find this NUCLEUS guy so I can talk him into letting me leave.

Cell Membrane: That's easy...pass by the cytoskeleton, hang a left at the endoplasmic reticulum and ribosomes, go straight pass the Golgi body and vesicles, turn right at the lysosome, when you see the mitochondria and centrioles, it will be straight ahead. You can't miss it.

Ryan: Sure.....that was a lot of help.

Jenny: Don't worry Ryan, we'll help.

Steven: That's right, Ryan, we'll get you out of there.

Ryan: Well I hope so. I better get going. *Ryan starts jogging.* It's tough to see in here. I don't know where I'm going.

Jenny: Ryan, watch out.

Ryan: Oh no! What are those big blob things ahead?

Jenny: They are not really blob things. I think they are the Rough Endoplasmic Reticulum.

Ryan: Endoplastic ridiculous?

Rough Endoplasmic Reticulum: Wait a minute. I'm the Rough Endoplasmic Reticulum. And there is nothing plastic or ridiculous about me.

Steven: This is tooooooo cool.

Ryan: I'm sorry I didn't mean to offend anyone. I just want to get out of here.

Rough Endoplasmic Reticulum: Sorry I can't help you get out of here.

Ryan: Oh, well, I guess you are good for nothing.

Rough Endoplasmic Reticulum: Hold on there. Is that what you think? You think I'm good for nothing? I'll have you know I'm good for a lot of things. Actually I am pretty important.

Ryan: So what is it that you do for the cell?

Rough Endoplasmic Reticulum holds up sign and reads:

Rough Endoplasmic Reticulum

- Makes large macromolecules like proteins, lipids, and carbohydrates.
- Separates molecules.
- Transports proteins inside the cell and to other parts of the body.

Rough Endoplasmic Reticulum: You know all this work can wear out an organelle like me. Whew!

Ryan: There, there...I'm sorry. I appreciate everything you do. *Ryan reaches out to pat the Rough Endoplasmic Reticulum.* Ouch! What are those sharp bumps on you?

Rough Endoplasmic Reticulum: Oh, those things. Guess!

Ryan: I don't have a clue.

Jenny: Hey, Ryan, the book says those bumpy things on the rough endoplasmic reticulum are ribosomes.

Ryan: Jenny says they are ribosomes. What do they do?

Rough Endoplasmic Reticulum: Let me introduce the Ribosomes.

Ribosomes come up and hold up card and read:

Ribosomes

- Synthesize, or make, proteins.
- Pass the proteins into the cytoplasm.
- Found on the outside of the rough endoplasmic reticulum and in the cytoplasm.

Ryan: So what do you do with the protein after the ribosomes synthesize, or make it?

Rough Endoplasmic Reticulum: Then I, the Endoplasmic Reticulum, transport the protein to various locations in the cell and to other parts of your body.

Rough Endoplasmic Reticulum holds up sign again and points to:

- Transports protein inside the cell and to other parts of the body

Ryan: So do all endoplasmic reticulum have ribosomes on them?

Rough Endoplasmic Reticulum: No. See my cousin over there?

Smooth Endoplasmic Reticulum comes out.

Ryan: Yes, but I don't see any ribosomes on her.

Rough Endoplasmic Reticulum: We call her Smoothie because her skin is so smooth. You see, there are two types of endoplasmic reticulum.

Ryan: What?

Rough Endoplasmic Reticulum: Yes, there is rough endoplasmic reticulum, like me, and smooth endoplasmic reticulum, like her.

Smooth Endoplasmic Reticulum: I do not have ribosomes on me. My job is to make or synthesize lipids, like fats and waxes. Since ribosomes break down proteins, not lipids, I do not need any ribosomes.

Smooth Endoplasmic Reticulum holds up sign:

Smooth Endoplasmic Reticulum

- Not covered with ribosomes.
- Synthesizes, or makes, lipids (fats, oils, and waxes).

Rough Endoplasmic Reticulum: I'm surprised Smoothie that you aren't trying to synthesize Ryan. He looks like a lipid.

Ryan: That's what the Cell Membrane said. Why do you all think I am a lipid?

Smooth Endoplasmic Reticulum: Don't get upset. Being a lipid is a compliment in our world. Lipids are required for the growth of cell membranes.

Ryan: In that case, I guess it's ok. So ribosomes are only found on the surface of rough endoplasmic reticulum, right?

Smooth Endoplasmic Reticulum: While ribosomes are found on my cousin the Rough Endoplasmic Reticulum, they are also found in the cytoplasm.

Ribosomes hold up sign again and read:

- Found on the outside of the rough endoplasmic reticulum and in the cytoplasm.

Ryan: Oh, cool! *Looking around.* There are ribosomes in the cytoplasm! So let me see if I have this right. *Ribosomes hold up sign again and Ryan reads:*

Ribosomes

- Synthesize, or make, proteins.
- Pass the proteins into the cytoplasm.
- Found on the outside of the rough endoplasmic reticulum and in the cytoplasm.

Rough Endoplasmic Reticulum: Very Good!

Smooth Endoplasmic Reticulum holds up sign and Ryan reads:

Smooth Endoplasmic Reticulum

- Not covered with ribosomes.
- Synthesize, or make, lipids (fats, oils, and waxes).

Smooth Endoplasmic Reticulum: Excellent, Ryan, but we must really get back to work. Good luck on your journey to Mr. NUCLEUS. We've got to run. So many molecules to process and so little time.

Ryan: Wait! Where do I go and what do I do? *Pauses.* Great! Now which way do I go?

Jenny: Ryan, hang on. It looks like you are heading towards another endoplasmic reticulum.

Steven: Hey, let me take a look. No, it's not an endoplasmic reticulum. The book says it's a...here, let me spell it, G – O – L – G – I Body.

Ryan: A GOLD GUY body! Awesome, I'm going to get rich in this cell! Ch-ching!

Jenny: No! Not a GOLD GUY, a Goal-Gee body.

Ryan: Well, what's that?

Jenny: The textbook says that they are sets of flattened, slightly curved sacks that look like endoplasmic reticulum.

Golgi Body: Who are you calling a flattened slightly curved sack? Who are you and what are you doing here? We don't get much company in this part of the cell.

Ryan: I'm looking for the Nucleus.

Golgi Body: Are you a lipid? Because, if you are a lipid you don't belong here.

Ryan: I am NOT a LIPID! Does everybody in the cell hear me? I am NOT A LIPID!!!

Golgi Body: Easy there. I was just kidding.

Ryan: You sure have a lot of layers. What do you do exactly?

Golgi Body: As a Golgi Body in the cell, it is my responsibility to...

Holds up card and reads:

Golgi Body

- Collect,
- Modify, &
- Package substances manufactured by the cell.

Ryan: What kind of substances? Don't say lipids.

Golgi Body: No, I mostly deal with proteins and other newly synthesized substances in the cell and then move them around the cell.

Ryan: Well, maybe I could catch a ride with you to the cell membrane and you can get me out of here.

Golgi Body: Sorry, I'd like to help you, but as you can see I don't have any room. I'm full of synthesized proteins.

Ryan: Ah, come on, you can fit me in there somewhere. And then you can sneak me out of the cell.

Golgi Body: Not past the Gate Keeper. He may be semi-permeable, but he's strict. Oh, you don't mess with the Gate Keeper. He does whatever the Big Boss wants.

Ryan: Oh, I've heard about him, Mr. Nucleus. But let me get this straight. You collect, modify, and package substances that are manufactured by the cell.

Golgi Body: You are correct.

Ryan: And then you transport synthesized proteins to various locations within the cell.

Golgi Body: That's right. But I must be going or I'm not going to make it to the cell membrane to drop off these proteins. The gatekeeper doesn't like me to be late. Speaking of work, there are substances waiting to be packaged. Good luck to you Ryan. I hope for your sake that the nucleus is in a good mood today. See ya Ryan!

Ryan: Gosh, these organelles are really busy today.

Jenny: Yeah, could you imagine if they just stopped doing their work? It would affect our whole body. I can't even think about it.

Ryan: That's cool, but I have other things on my mind, like getting out of here. And besides I think I'm getting close to the nucleus. What do you guys see coming up next?

Jenny: Oh, yuck.

Ryan: What?

Steven: Let me take a look. Oh, it looks like that organelle is eating another organelle.

Ryan: What! An organelle eating another organelle! That's just what I need.

Lysosome: Who are you? Do you need to be digested? If so, you'll have to wait until I finish with this mitochondria.

Ryan: No, no no. I'm not waiting to be digested. I'm just trying to get to the nucleus.

Lysosome: Good, because for a minute there, I thought you were a lipid that didn't get synthesized by the smooth endoplasmic reticulum.

Ryan: Not quite. Besides, what are you?

Lysosome: I am a lysosome.

Ryan: A lysosome?

Lysosome: I digest things.

Ryan: Digest things, like what and how?

Lysosome: Well, inside my membrane I have digestive enzymes. I use these digestive enzymes to break down worn-out organelles, debris and ingested particles.

Lysosome holds up card the card and reads:

Lysosome

- Breaks down worn-out organelles, debris, and ingested particles.
- The "Trash Can" of the cell.

Ryan: You digest old organelles? Gross!

Lysosome: On the contrary! Organelles are a delectable treat, sort of like caviar.

Ryan: Yuck

Lysosome: Hey, if it wasn't for me, old organelles and debris would just float around in the cell and take up space. The cell would be a mess.

Ryan: Well, I can understand that, but it's still kind of weird.

Lysosome: Yes, it can be. When a worn-out organelle sees me coming, they know

it's the end of the line for them and that can be unpleasant. Some of them can put up a fight.

Ryan: Well, I can't say I blame them.

Lysosome: Well, it may not be the best job, but some organelle has got to do it. Just imagine if no one picked up your garbage? Just think of me as a trash collector, except I eat this stuff. Yum, yum.

Ryan: So all you do is travel around the cell and digest worn-out organelles, debris, and ingest particles. You must get full eventually.

Lysosome: Yeah, I do get very full. Sometimes I feel like I'm going to burst.

All of the organelles mumble "Oh, no... don't burst!"

Ryan: Well, what's wrong with that?

Lysosome: Remember when I said that I was full of digestive enzymes?

Ryan: Yeah, but what does that have to do with anything?

Lysosome: It has everything to do with it. You see, if my membrane were to break, all my digestive enzymes would leak out into the cell.

Ryan: Huh, and that's bad?

Lysosome: Yeah, the digestive enzymes could destroy the whole cell.

Ryan: Destroy the whole cell! Whoa!

Lysosome: That's right! Destroy it all, and kaboom! The cell is over as we know it.

Ryan: So, if your membrane were to break, your digestive enzymes would leak out into the cell and digest the whole cell.

Lysosome: Yup, exactly. Hey, what is that over there? Looks like a worn-out organelle trying to hide. Sorry, Ryan, I have to go.

Ryan: Wait, wait wait.... Where am I supposed to go, what am I supposed to do?

Steven: Relax Ryan. You're on the right track. You're almost there.

Jenny: That's right, just hang a right and keep going.

Ryan: I'm going. I wonder who I am going to meet next. What is that big bubble floating towards me?

Joe: It looks like a vacuole.

Ryan: A vacuum? I already met the organelle that cleans up the cell.

Joe: No, vacuole!

Vacuole: Hey there! I'm one of the vacuoles in this cell – do you need anything stored for you?

Vacuole holds up a sign and reads:

Vacuole

- Storage area for the cell.
- Keeps materials such as food until the cell needs them.
- The "Suitcase" of the cell.

Ryan: Well I guess a cell would need somewhere to store all the nutrients from the food we eat until it can be used.

Vacuole: Well, if you'll excuse me, I have to be on my way to see if anyone else in this cell needs something stored.

Steven: Is that a red flashing light I see?

Ryan: Oh, you see it, too. I thought I was imagining things?

Jenny: Hey, let me see. What does it say, Ryan?

Ryan: Powerhouse. Oh, no! Not another organelle?

Jenny: Wait a minute. I think I saw something about this in my book. Look, here it is. It says that the mitochondria are the powerhouse of the cell.

Ryan: Hypochondria? Does it think it's always sick or something?

Jenny: Not hypochondria...Mito Mito...chondria.

Ryan: It looks like a big sausage. It doesn't feel like a sausage, though. It actually feels pretty strong.

Mitochondria: Hello, Ryan. I am strong because I am the Powerhouse of the cell.

Ryan: What do you mean?

Mitochondria: I use sugars to create energy.

Ryan: I love sugars. I like Snickers Bars, and Skittles, and M&M's and...

Mitochondria: Hold it. Hold it. I do not sit around all day eating candy bars.

Ryan: Well, what do you do?

Mitochondria holds up a sign and reads:

Mitochondria

- Uses sugars & fatty acids to generate energy for the cell.
- The "Powerhouse" of the cell.

Mitochondria: Just think of me as the **Mighty Condria**.... Ha ha Get it?

Ryan: Got it...

Mitochondria: Well we are quite busy you know. We have serious work to do, energy to make, organelles to see, and places to go.

Ryan: You organelles can be so touchy sometimes. Let me see if I have this right. You use sugars and fatty acids to make energy for the cell.

Mitochondria: You're right. Very Good. Excellent.

Ryan: It seems I really have been learning some things while I've been visiting your cell. Who is that over there?

Mitochondria: That's the nucleus.

Ryan: Great. I've been looking for him all day. Hey, Steven and Jenny, the nucleus is right up ahead.

Jenny: Hurry, Ryan, it looks like the cell is beginning to divide.

Ryan: Hello, are you the nucleus?

Nucleus: Who goes there?

Ryan: My name is Ryan. I just want to get out of here.

Nucleus: You don't leave here until I say so. Come here. Come a bit closer. I want to take a good look at you. Are you a lost lipid?

Ryan: I am NOT a lipid!

Nucleus: I know who you are. You're the one who has been wandering around in the cell getting all of the organelles in an uproar. Pretty soon you'll have all the organelles rebelling. Who are you to be getting all the organelles upset?

Ryan: I'm no one important, sir. Like I said, I just want to get out of here. Hey, how did you know I was talking to all of the organelles?

Nucleus: You have a lot to learn about me. I know everything that goes on in this cell. I'm the boss. They call me the Control Center of the cell.

Nucleus holds up a sign and reads:

Nucleus

- Directs all activities inside the cell.
- Manages cell division.
- The “Control Center” of the cell.

Ryan: Control Center? I heard you were the control freak.

Nucleus: Control freak? Which organelle said that? If I find out I’ll send a lysosome over to digest him.

Ryan: I was just kidding.

Nucleus: Kidding.... Kidding.... Do you know who I am and what I do?

Ryan: You’re the nucleus and you are the control center for the cell. What else is there to know?

Nucleus: Well, it’s much more complicated than that. Not only do I have to direct the organelles in the cell I am also responsible for the activities that take place inside my nucleolus.

Ryan: Nucleolus? What’s that?

Nucleus: Do see that large body inside of me?

Ryan: Yes. What is it?

Nucleus: That’s the nucleolus.

Nucleolus holds up a sign and reads:

Nucleolus

- Synthesizes, or makes, ribosomes.

Ryan: And that produces ribosomes. Is that all you do?

Nucleus: I wish. I also have to take care of the DNA inside my nuclear membrane.

Nuclear Membrane holds up a sign and reads:

Nuclear Membrane

- Separates the nucleus from the cytoplasm.
- Contains the DNA, chromosomes, and genes of the cell.

Nucleus: That DNA can be such rascals. They’ve gotten swelled heads recently because they are always in the news. What with cloning and shows like CSI, the DNA think they are something special.

Ryan: But DNA and cloning are pretty important.

Nucleus: Yes they are. DNA and your chromosomes carry the genes that make you.

Ryan: Wow! That’s right. I think I know almost all there is to know about cells now. Right?

Nucleus: Oh, Ryan. You are just beginning to learn about cells. There is so much more for you to learn and so little time. For instance, all of the organelles you’ve met so far live in animal cells. Plant cells have other specialized organelles.

Ryan: Really? Like what?

Nucleus: Plants such as trees and corn stalks need strong cell membranes so they can stand tall and straight even in a strong wind. Meet Mr. Cell Wall.

Ryan: How are you different from the cell membrane I met earlier?

Cell Wall: I am so much stronger. See, I have rigid sides, not like those soft, flexible cell membranes in the animal cells.

Cell Wall holds up a sign and reads:

Cell Wall

- The rigid outer wall of a plant cell.
- Provides structure so the plant can stand up straight.

Nucleus: And plant cells have chloroplasts.

Chloroplast: Hi, Ryan. I am the round, green, sausage shaped organelle in plant cells. The chlorophyll that makes plants green is stored inside of me. I help plants turn sunlight into food. Without chloroplasts plants could not carry out photosynthesis.

Chloroplast holds up a sign and reads:

Chloroplast

- Has chlorophyll inside that allows the plant to do photosynthesis.
- Photosynthesis combines carbon dioxide and water to make food for the cell.

Ryan: Wow. You are important. There is so much more for me to know about cells isn’t there? So if I understand correctly, cell walls and chloroplasts are special organelles that are only found in plant cells.

Cell Wall and Chloroplast: Yep, you’ve got that right!

Nucleus: Wait a minute Ryan, I need to make an announcement: **Attention all organelles – Mitosis will begin in one minute. Let me repeat...Mitosis will begin in one minute.**

Ryan: Mitosis, what is that?

Nucleus: Mitosis is cell division. A cell grows and grows and then divides into two new cells. There are many steps or phases of mitosis. You’ll learn more about them later. **Attention all organelles – Mitosis will begin in 30 seconds.**

Ryan: What exactly happens in mitosis?

Nucleus: The cell splits in two and everything inside splits, too.

Ryan: You mean **everything** splits in two? What about me?

Nucleus: **Attention all organelles – Mitosis will begin in 20 seconds.**

Ryan: Wait, I don’t want to split in two.

Nucleus: Ryan, you’ve learned a lot during your cellular adventure so if you want to split as in leave the cell, not split in two, I guess you can leave the cell now. **Attention all organelles – Mitosis will begin in 10 seconds.**

Ryan: Leave? You mean it? I can really leave.

Nucleus: Sure you can go. You didn’t think I would really keep you trapped in here, did you?

Ryan: How do I get out of here?

Nucleus: Just go back the same the way you came in. Wait, take this pass or they will never let you out.

Ryan: Thanks, Mr. Nucleus. You’re not such a bad guy after all.

Nucleus: You’d better hurry. Things are going to get really busy here in just a moment. 10 – 9 – 8 – 7 – 6...

Ryan: Bye

Steven: Run, Ryan, run.

Jenny: Hurry. You are almost to the cell membrane. Get ready to JUMP!

Teacher: Wake up Ryan

Ryan: Wow... Where am I? What happened?

Teacher: Ryan, you slipped and hit your head.

Ryan: You mean I wasn't really in the cell?

Teacher: In the cell? What are you talking about? I think you need to go to the school nurse to be sure you are ok. Now class, let's get back to your microscope work.

The End