Hello, this is Dr. Mike Harrington, and this is a lecture for Biology 107. So this lecture is Lecture 15, and I'll be talking about some misconceptions about eukaryotic cells. So here we have kind of a list of misconceptions, and we'll begin with organelle size and number. So here's a very good figure from your textbook that depicts an animal cell, but it stylizes. And the reason it stylizes is so that it can be served as a teaching example, but it's not necessarily realistic. So for example, so that you can see the mitochondria, they make them larger than they actually are. But what that means is that there's fewer in this cell than in reality. So for example, this figure here shows mitochondria at four per cell. There's four mitochondria in this figure. So the problem with drawing the organelle is too large is that they are not numerous enough. Here's a cross section through an actual human liver cell, the nucleus ER mitochondria. All these little circles are individual mitochondria. So in fact, we have a lot more than four per cell. We tend to have between 500 and 1,000 per cell. OK, so that's the first misconception. The second misconception is density. Here, again, using the same figure, we can see that the cell is drawn with lots of empty space. So for example, mitochondria, a space, peroxisome, a space, and other mitochondria. And again, this is drawn this way so that it's easier to see where the organelles are. In reality, cells are very crowded places. So for example, here, this artistic depiction shows a Golgi apparatus. So here we have the different cisterna. We can see a transport vesicle here moving between this cisterna and the cisterna here. And another transport vesicle forming at this cisterna here, presumably to travel to either a lysosome or the plasma membrane. So cells in reality are very, very crowded places. The third misconception is specialization. Here, for example, going back to our hypothetical animal cell, we see both the flagella and microvilli. So flagella and microvilli on the same cell. But in reality, we'd see one or the other. So some cells have flagella. For example, sperm cells have flagella for propulsion. Intestinal epithelial cells have microvilli to increase their surface area. So it isn't both these structures. You're either going to see one or the other or neither. And the fourth misconception I want to talk about is movement. Cells are drawn as so emotionless, and this is just because it's a two-dimensional image. But in reality, cells are moving around, and the contents within cells are moving as well. So here we have some cells within a plant. And you think, well, plant cells, they don't move around, but in fact, they do. So a misconception here is that plant cells are emotionless, but in fact, they move around. So for example, this isn't a movie here, but we'll show this movie when we get to the cell movement lectures. All these chloroplasts are moving around in a big circle, and this is called cytoplasmic streaming. And we'll come back to how this process occurs and why this process occurs in the cell movement lectures. And the final misconception is uniformity. All cells are assumed to be animal cells. So here we have an animal cell, and yet plants have plant cells, and there's a lot of similarities, but there are some differences between the two different cell types. So question for you. Here we have a table. So let's fill in this table. So we're going to fill in the animal cell column first, and then the plant cell column. So when it comes to the animal cells, I've listed eight different organelles. Your question is, how many of these are found in animal cells? So if you think all eight of them, vote E, if you think only seven of them, so what is missing, vote D, and so on. So how many of these organelles are found in animal cells? And the answer is six, C, six. So animal cells have, and the answer here is six of these choices here. So they have a nucleus, ER. They have one Golgi apparatus. They have a lot of lysosomes, a lot of peroxisomes. They do not have a central vacuole because they have lysosomes. They do not have plastas because they are an animal cell. And they have many mitochondria. Okay, so animal cells have six of these eight organelles. Next question is plant cells. So we're now doing this column here. Those are your choices. And the answer is D, seven. They have seven of these. So again, one nucleus, one ER. They have many little Golgi apparatuses. They don't have any lysosomes, and the reason they don't have any lysosomes is because they have a central vacuole instead. They also have peroxisomes. They also have plastas, for example chloroplast. And very importantly, they have mitochondria. It's a common

misconception that because plants have chloroplast and animal cells have mitochondria, that plants don't also have mitochondria, and yet they do. So proof of that is this figure here. Here we're looking at cross sections for a plant cell. You can see there's a chloroplast, there's a peroxisome, and there's a mitochondria. So plant cells have chloroplast and peroxisomes and mitochondria. This figure here will be posted online as a separate document. So that's the end of this lecture. If you have any questions, ask me in the Google Doc. Otherwise, have a good day.