

[00:18:11.15]

1. Karla: Okay. So turn to the next page, oh, not that one, not that one, Kingdom Monera. So find the page at the top that says Kingdom Monera. Sorry, some folks are complaining that I copied these upside down, but we're looking at the page that says Kingdom Monera. Now is this, is this kingdom part of the old classification system or the new one?

[00:18:46.10]

2. Students: Old.

[00:18:47.03]

3. Karla: Old, right, good job, because the county for some reason wants you to learn the old version, so their documents say Kingdom Monera, for some reason. Monera's the old term. Scientists have now split this fifth kingdom into two, so now we have how many kingdoms?

[00:19:03.24]

4. Students: Six.

[00:19:04.06]

5. Karla: Six, right. So the two groups that they split Monera into are, and I'll write these up here, Archaeobacteria, and you should copy this down, and Eubacteria. Now I don't want you to get confused just because Eubacteria starts with "Eu," this prefix "Eu" actually means true, so eukaryote is sort of like saying it has a true nucleus. So "Eu," E U, that prefix E U means true. So eukaryote is saying it's like it has a true nucleus, Eubacteria is like saying true bacteria. Eubacteria are what we think of when we think of bacteria, like E. coli, the bacteria that makes you sick, or the bacteria that lives in your gut. So Eubacteria are what you think of when you think of bacteria, and Archaeobacteria, we used to lump in there with bacteria, but now we're like, "You know what, these guys are different enough that they deserve their own group." And we're going to talk about each of these groups underneath. Do you see how, the table below has Eubacteria facts on the top and Archaeobacteria facts on the bottom? Do you see that? In the table you're going to take notes in? We're going to start with which one? The first one.

[00:20:28.12]

6. Student: Eubacteria.

[00:20:28.21]

7. Karla: Eubacteria. So facts about Eubacteria, they are single-celled, that means they only got one cell, that's their whole body, that's it. They're so tiny, prokaryotic cells are smaller than eukaryotic cells generally. So when you look in a week or so in the microscope, I have some bacteria slides, you're gonna look and say like, "Oh my God, those are the tiniest little specks, I just see, like, clumps of them." So they're very tiny. And what do we call it when they have no nucleus?

[00:20:59.17]

8. Students: Prokaryote.

[00:20:59.29]

9. Karla: Call out.

[00:21:00.25]

10. Students: A prokaryote.

[00:21:02.10]

11. Karla: Yep, prokaryote. So you'll want to write down prokaryote here on your paper. Did everybody write down prokaryote there? They have a very simple cell structure, like pro -- like a prokaryote, and you find Eubacteria everywhere, they're in your gut, they're in your mouth, they're on your skin, they're on just about every surface. They're everywhere, you can't get away from them. The only place that they don't live too well is really extreme conditions, like really hot or really cold. That's why you cook your food because hot temperatures will kill these guys. And they reproduce asexually, all that means is that they don't need another bacterium to reproduce.

[00:21:51.25]

12. Student: They split themselves.

[00:21:53.03]

13. Karla: Bingo. So they, when they decide it's time to reproduce, they just split into two. And some can do that as frequently as every twenty minutes.

[00:22:01.01]

14. Students: Whoa.

[00:22:02.08]

15. Karla: Which is why you don't leave your food out at room temperature for too long. So they, they use energy through a process called respiration, just like you and me, they need oxygen to survive, and they put out carbon dioxide as a waste, just like we do. They don't have lungs, but they take in oxygen and put out carbon dioxide to use energy like we do. And you'd find these guys in yogurt, cheese, on your skin, in your intestines. When you take antibiotics, you may find that after you've been on antibiotics for awhile, you feel a little uncomfortable, you're a little irregular because your antibiotics kill the, the good bacteria that help you digest things in your gut. So then you might have some yogurt to try to replace those. Um, now we'll move down to the category, and there should be a line here, I'll add it back, it got deleted. Now we're going to look at Archaeobacteria. Just like Eubacteria, Archaeobacteria only have one cell, they're ver -- very teeny tiny, and they have no nucleus, so what do we call them?

[00:23:07.18]

16. Students: Prokaryotes.

[00:23:08.07]

17. Karla: Prokaryotes again. So so far, these guys are looking pretty similar, right? You can see why they first were classified probably in the same group. They also have a very simple cell structure, but these guys are special because they are only found -- well, they're, actually this isn't true, they're not only found in extreme conditions, but they're the only bacteria that can survive there. So they are in extreme conditions, they reproduce asexually too, they respire just as the other bacteria do too, but here's the other difference here, and you may want to star or highlight or underline these differences so they stand out to you. They get the name Arc -- are people writing this down or circle or highlighting these two differences here? Okay. They get the name Archaeobacteria, like arc, archaic, sounds old, right, like if it's archaic, it's old. Archaeobacteria are, we think of as sort of a more ancient life form of bacteria that are still around, and they have this, they, their cells are structured in, and their, their processes in their cell are so special that they allow them to live in really harsh conditions where most other things could not survive. You'd find these bacteria in the polar ice caps, in hot springs like, like those geysers like at Yosemite, um, even there are some of these guys that live at the very bottom of the ocean where no light ever reaches, and the only reason life exists there is because it's based on these life forms, that these like, you know, miles and miles down in the ocean. So they're found in crazy, crazy places, that's, that's the difference. Lucy?

[00:25:04.19]

18. Lucy: Well, are they, like, you said that when we boil our food, like, it gets really hot, so the, um, the Eubacteria died, like so, um, so we don't eat it, but like for the Archaeobacteria, is it in any like raw food so even if we boil it like it won't --

[00:25:22.11]

19. Karla: Well, these, the Archaeobacteria are less common in the environment. I don't think this is true that they're only found in extreme conditions, but these are not the guys that, that are causing the problem with food safety. But, but they can survive boiling temperatures, some of them, and when we discovered that, it allowed some of the experiments that scientists are able to do with DNA because, well, you'll learn about it in high school, I won't get into it. But, but we actually use enzymes that we get from these guys to do really cool experiments with DNA because we can boil it. Ned?

[00:25:57.00]

20. Ned: Um, well are, are, are there any of these germs like that can actually cause like fatal sicknesses?

[00:26:02.01]

21. Karla: Mm-hmm, mm-hmm.

[00:26:03.15]

22. Ned: Can they carry diseases?

[00:26:04.23]

23. Karla: Well, some, some bacteria actually cause disease. Some do not, but some do. We, when they cause disease and make you sick, we call them pathogens. Yeah, okay. Any other questions about this page? So I don't bore you, I want you to turn to a partner and answer the question at the bottom together. Talk to somebody and then write it down.

[Students begin discussing.]

[00:26:32.20]

24. Karla: And Ms. Richards, I can print you a copy of this, just remind me before you go.

[00:26:42.27]

25. Jack: It's like –

[00:26:43.15]

26. Greg: The major difference I think is really the fact that Archaeobacteria can survive in harsh conditions as well as normal conditions.

[00:26:52.20]

27. Jack: Yeah, but, but, it's, it's, it's like, it's harder, it's harder to have the normal conditions –

[00:26:59.22]

28. Greg: Yeah, but they can still [inaudible]... weren't you listening?

[00:28:13.10]

29. Karla: Megan, did you write this down? Did you already write it down? Okay... I know a couple folks are still finishing writing down their thought, but I, could I get somebody to read the answer they put? Alan, could I get you to read what you put?

[00:28:36.10]

30. Alan: I put the major difference between Eubacteria and Archaeobacteria is that, um, the Archaeobacteria is ancient and Eubacteria isn't, and Archaeobacteria can live in extreme conditions and Eubacteria can't.

[00:28:50.06]

31. Karla: Yeah, that last piece is the, is the big piece, that Archaeobacteria have this, this ability to live in these conditions that Eubacteria could not survive in. So that's the big, that's that big difference there. Yeah?

[00:29:03.15]

32. Ricky: They can survive in extreme conditions and be found in polar ice caps and hot springs.

[00:29:09.00]

33. Karla: Great. So as long as you have something along those lines, we're good to go.
Um, we're gonna turn the page...