

*Wei has been diligently working on a biology lab when Noé saunters into the room. Wei join our brainy biologists as they begin their discussion...*

Wei: *[looking up from the microscope]* Hey, Noé! Good to see you in the ol' biology room. How did you know I'd be here?

Noé: Hi Wei! Where else would a dedicated biology student be??? But I have to admit that I wasn't really looking for you...*[holds out hand]* I was just looking for a place to throw away this empty, non-recyclable bag. What are you working on?

Wei: As you know, I'm interested in medicine and pathology—especially lab work! So I'm looking at these slides of different human tissues and cells that the teacher kindly provided for me. I'm making drawings of the cells.

Noé: Wow! That's really ambitious. I didn't know we could do EXTRA biology labs. Mind if I join you?

Wei: I don't mind at all! Pull up a microscope and help yourself to the slides.

*[Wei and Noé spend some time looking at slides of different cells and tissues]*

Noé: *[surprised]* Wow! I never realized that our cells were all so different! There are even different types of cells within one organ!

Wei: That's right, Noé. Each cell has evolved the best structures for doing its particular jobs—obviously, muscle cells end up looking very different from skin cells.

Noé: I have a question about that. The cells look and act very differently...so does that mean that they all have different versions of DNA?

Wei: I'm not sure that I understand your question, Noé.

Noé: I have free earlobes (the dangly ones) while you have attached earlobes. Based on what we've learned in class, our earlobes are different because we have different versions of the gene for that trait.

Wei: Oh...I think I see what you're getting at. Since your muscle cells produce different proteins and enzymes than your skin cells, you are wondering if different cell types contain different genes—different DNA!

Noé: Yes, that's exactly what I'm asking!

Wei: Back in the late 1800's and early 1900's, scientists thought the same thing—that cell differences must be due to differences in the genes. It was called the hypothesis of differential gene content.

- Noé: So...is that the answer?
- Wei: We have actually learned enough in biology class for you to answer that question.
- Noé: Really? Uh...I mean, yes...of course I could. Can you give me a hint? Just a small one?
- Wei: *[exasperated]* Oh, alright! How many cells do you come from?
- Noé: *[excited]* Uh...one! *[uncertain]* No, two...no, one...I don't know.
- Wei: Let's reason it out. How were you produced?
- Noé: *[joking]* Hey, let's not get personal, here. *[serious]* Well, I started out when an egg and a sperm combined to form a fertilized egg cell—so one “real” cell, I guess.
- Wei: OK...good! And then what happened? What did that cell do?
- Noé: That cell grew then went through mitosis and cytokinesis and became two cells. *[excited]* I get it!!! Then they became four cells, then eight cells, and so on until there was me.
- Wei: That's right. And since all your cells came from that original fertilized egg, they are all the result of long lines of nuclear and cell divisions.
- Noé: Which means that all my cells have the same genetic makeup as the original... and the same genetic makeup as each other!
- Wei: Which means that the differences between the cells is not due to different genes—all your cells have the same copies of DNA!
- Noé: That makes sense! On the crime shows, it doesn't matter if they get a cheek swab or a blood sample or some other tissue. Any sample with DNA in it would carry the same copy and could be used to identify the person.
- Wei: Exactly! Which is also good evidence that the DNA in our cells is the same. Now can you figure out why the cells are different?
- Noé: Sure! *[explains to Wei]*
- Wei: *[getting up from the chair]* Nice work! Well, it's time to get to our next class. Why don't you call me after school and we can get a cone at the ice cream shop...I think they're featuring DNA Crunch...my favorite!

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