Getting Curious with Jonathan Van Ness & Gabriela Farfan

JVN [00:00:04] Welcome to Getting Curious, this is Jonathan Van Ness. I'm so excited about this episode because I wanted to learn about this for so long. I feel like ever since Queer Eye came out, like, once a year since 2018, I realized that, like, I can afford something that I never thought that I could. Like, the first year was, like, "Oh my gosh, I can have a house." And then, like, 2021 was, like, "Oh my gosh, I can get jewels." I never knew I could wear jewelry. Like, I thought I wasn't a jewelry person. Next thing I know, I'm a fucking jewelry person. Like, I love jewels, I love a mineral. And it's interesting because my first thing I ever collected was rocks. My favorites were geodes. So it really feels like this, like, return to this, like, childhood joy. Which leads us to our guest, Gabriela Farfan, who is the Coralyn W. Whitney Curator of Gems and Minerals at the Smithsonian National Museum of Natural History, honey. Gabriela is a Chilean American and first woman and first Latina to ever be curator in charge of the National Gem Collection, a.k.a. no better person in the world to teach us about gems and minerals. Like, there's no better person. Gabriela, how are you?

GABRIELA FARFAN [00:01:13] Well, I'm doing great because I am currently sitting in the Natural History Museum, in my office, in our Department of Mineral Sciences, so life is great.

JVN [00:01:24] How cool. So what's it like to research gems and minerals? Like, what do you even study and, like, were you just minding your own business and you're, like, "I'm going to become a—"

GABRIELA FARFAN [00:01:34] Mineralogist.

JVN [00:01:34] Jewelologist? A mineralogist!

GABRIELA FARFAN [00:01:37] Yes. Yes.

JVN [00:01:38] Not a jewelologist. Not a jewel. No.

GABRIELA FARFAN [00:01:41] No, no. You can be a gemologist. That's another one. But mineralogist is a study of minerals.

JVN [00:01:48] So you're literally mining your own business. You're in the Smithsonian as the first Latina to ever be curator in charge of the national gem collection. So you are just, like, literally surrounded by, like, the national collection of gems RN.

GABRIELA FARFAN [00:02:00] Yes. Yes.

JVN [00:02:02] Okay. So how do you handle and store everything at the Smithsonian? Like, does it need to be, like, no humidity ass place? Like, how do y'all deal with that?

GABRIELA FARFAN [00:02:11] So we are in this beautiful building that is the National Museum of Natural History, right on the Mall in Washington, D.C. And our best stuff is always on exhibit. We want to make sure that the public gets to see the Hope Diamond, the Dom Pedro Aquamarine, all of our classic specimens. And those ones are very well taken care of in their cases. But behind the scenes, we have about 385,000 mineral specimens and over 10,000 gemstones that are in storage that we keep for research, for our second best specimens, or specimens that we haven't had a chance to put on display yet. So those are the ones that I get to work with behind the scenes.

JVN [00:02:55] Interest. Okay. So what are some of your favorite pieces in the collection that maybe we haven't seen or people don't know about?

GABRIELA FARFAN [00:03:02] Oh my goodness. So I'm not allowed to have a favorite because I take care of all of them and I love them all so much. But of course, everyone recognizes the Hope Diamond, right?

JVN [00:03:12] I think I've seen that before once.

GABRIELA FARFAN [00:03:14] You have?

JVN [00:03:15] I saw it in the Smithsonian when I was, like, in third grade, and we went to that, like, restaurant, the Smithsonian that, like, Oprah popularized for its root beer floats. I don't know if it's there still, but it was, like, the most delicious root beer float you've ever had. And I cared less about the Hope Diamond then and more about the root beer floats. And I was pissing everybody in my family off—

GABRIELA FARFAN [00:03:32] Well, I can show you it.

JVN [00:03:33] Oh, my God, you guys. The Hope Diamond. She's a blue diamond.

GABRIELA FARFAN [00:03:37] Exactly. Yes. So a lot of people think, "Oh, it's the biggest diamond. Oh, it's the diamond that was in Titanic." No, it's actually the most famous blue diamond in the world. And it has a very, very long, complicated history that you can read all the details about on our website. The big takeaway is that it is a blue diamond about the size of a robin's egg. And it's incredibly valuable and just very special from a humanity standpoint.

JVN [00:04:08] Why?

GABRIELA FARFAN [00:04:09] Back in the day, we didn't have photographs or videos or social media to talk about gems, but because it's a blue diamond, it really stood out. And so it's actually been written about many times in accounts from royalty. So it eventually came from India. It was brought over to France by John Batiste Tavernier, and he brought a bunch of diamonds to sell to the king of France. And it was documented as a much larger blue diamond. And we always suspected it was the same one. But every time you try and sell a diamond, cut a diamond, steal a diamond, usually the diamond gets cut into smaller and smaller pieces. And so something that started out as over 100 carats got cut by Louis the Sun King and then eventually got stolen after the French Revolution and got cut into what we now know of as the Hope Diamond, which is 45.52 carats, so a lot smaller.

JVN [00:05:09] Where's the other half?

GABRIELA FARFAN [00:05:11] Well, it's probably into dust because the whole cutting process of making a gemstone from the original mineral crystal involves cutting off little pieces or grinding away each facet until you get the shape that you want. And so a lot of the stone will get lost through the cutting process. And so usually at least a third of the stone is lost every time you cut something.

JVN [00:05:35] Damn.

GABRIELA FARFAN [00:05:37] I know.

JVN [00:05:39] Okay, so the Hope Diamond's, like, super major and, like, we're probably going to get into this later, but I will. Let's just get it out of the way, like, right at the beginning. How do you reconcile, like, the lack of hum—like, because I think I vaguely remember hearing about, like, a blood diamond, but then I'm, like, because what if that… Is that a thing that, like, gemologists or mineralogists, like, think about it? Or are you more of just, like, "I want to focus on how cool they are and then like, and we have better practices now," or do we now?

GABRIELA FARFAN [00:06:06] No, that's something that's super important in the gemstone industry right now is trying to do ethical sourcing. And so there's a lot of effort being placed on trying to track where those original minerals came from and the conditions that they were mined in. And so I think that's something that the whole industry is moving in that general direction, which is wonderful. With diamonds, there's the Kimberley Process where they actually have certificates that come with crystals that are mined from all around the world. And if you don't have a Kimberley certificate, it can get confiscated at customs. And so we actually get all of those confiscated diamonds into our collection. So when TSA says, "Nope, you didn't follow the Kimberley Process," those diamonds actually come into the National Gem and Mineral Collection because we don't want them being traded or, or used and so we can actually use them for research and provide them for scientists to use instead.

JVN [00:07:04] Interest. And so you work with gems and minerals. You're a mineralogist. You mentioned earlier gemologists. What's the difference between them?

GABRIELA FARFAN [00:07:13] That's an excellent question. And actually a lot of people don't realize this, but gemstones are actually minerals. So I like to think of gemstones as the perfect blend of art and science because they're made up of these minerals that are formed by the Earth. So they're the crystals. And then what happens is that you have an artist that comes along and says, “You know what? I want to actually cut this mineral crystal into a gemstone.” So it's almost like art where instead of using a paintbrush and a canvas, you're actually using a crystal and then an artist—using optics and science and the refractive index properties of the mineral itself—can design the perfect cut to actually create a gemstone that reflects light in all these beautiful ways. And then they actually have to cut the gems. So it's a very long, drawn out process where you start with the crystal and you ultimately end up with the gemstone.

JVN [00:08:13] Interesting. So what's, like, a mineral that is never a gemstone? Is that, like, lime or something? Like, what are minerals?

GABRIELA FARFAN [00:08:22] Oh, my goodness. I think there are so many minerals that you probably would not want to see as a gemstone for several reasons. Either it’s, you know, ugly, chalky, lustered mineral that the average person would not appreciate. Of course, we still appreciate them for their scientific properties and interest. Another reason why you wouldn't use a mineral for a gemstone is it's too soft. For instance, the mineral fluorite is very, very soft and you can actually scratch it with a knife, which would not be ideal if you want to wear it in a ring or something. And so those gemstones that are cut from minerals that are still very beautiful but too soft are considered to be collectors’ gemstones, and you just keep them in a drawer and admire them.

JVN [00:09:06] Like, what are those? What would those be?

GABRIELA FARFAN [00:09:09] So fluorite or calcite, some of these minerals that have hardness, Mohs hardness that's M-O-H-S, Mohs hardness of around three or four. Whereas Diamond is number ten on the most hardness scale. So it's very difficult to scratch unless you scratch it with another diamond. So that's why it's so good for use in jewelry and in gemstones that are commercially traded, whereas other gemstones are much, much softer. So you would scratch them up in a day if you were to wear them on a piece of jewelry. So gemstones would be an art form. And so you have that creativity, that person put into it. Minerals are really valuable when they're beautiful examples of how the earth created these crystals, but you can't really wear them as jewelry, per say.

JVN [00:09:57] Right. So we're looking at a picture right now that has, like, a big chunk of topaz as the mineral which is giving, like, rectangular. I don't know how big that is. It's maybe like a few inches, but it's giving more of like a chunk and then the gemstone of topaz. So it's, like, you know, made from the same material, but it's like this beautiful, like, square, like, diamond shape that's like reflecting and giving me gemstones. So that, that makes sense to me. I'm obsessed. Is it true that there's, like, way more types of minerals than there are gemstones, right? There's just lots of different rocks and things that you wouldn't ever really make into a gemstone.

GABRIELA FARFAN [00:10:34] Exactly. Yes. There are over 5000 kinds of minerals, so individual species have been identified and there's still more that are being identified every year. But oftentimes they're tiny grains. The scientists might find one small grain of this new mineral that gets approved by the International Mineralogical Association, but they would be too small to faceted into a gemstone or too rare.

JVN [00:11:00] Mm. That makes sense. So what are some, like, outliers? Like what's a pearl? Because, like, don't pearls just, like, come in the clamshell or whatever? Like, are they grinding pearls to be more pearly?

GABRIELA FARFAN [00:11:12] No. So pearls are one example of something that I study, which are biominerals. So these are minerals that are formed through biological processes. And in this case, pearls are formed by oysters, mollusks, different bivalves. So they're formed by these organisms and they are what we call nacre. So they're essentially little crystals of the mineral calcite, which is calcium carbonate. And they form in these pancake-like shapes that are stacked on top of one another, and they're woven together with chitin and proteins. And so it's actually a composite material of mineral and organics. And so when you put them together, they form this pearlescent luster. And these pearls are formed in that way by the organism. So that pearly luster is actually natural. And it's amazing that they form that way because in nature that's not biology, so in geological processes, you would never see that same type of pearl form without the biology present.

JVN [00:12:16] So that pearls are considered a gemstone, right?

GABRIELA FARFAN [00:12:19] Yes. Gemstones are a little bit more broad than minerals because minerals have a very strict definition. So minerals are considered to be solids that are crystalline. So they have a repeating symmetry and order to them and they have to have defined chemicals. So in this case it would be calcium, carbon and oxygen that makes the calcite crystal. And then they also have to be naturally occurring and inorganic. So no biology can be involved. But when it comes to gemstones, most of them are made from minerals that follow this definition. But sometimes you'll get biominerals like pearls or amber, which is not at all the mineral because it's fossilized tree sap. Or even something like opal, which is not technically crystal. So you don't have a defined crystal structure.

JVN [00:13:08] I'm obsessed with opal, so opal is not a mineral, but it's a gemstone.

GABRIELA FARFAN [00:13:12] Yes, it's what we call a mineraloid. It's close, though.

JVN [00:13:15] What the hell is a mineraloid What's it mean?

GABRIELA FARFAN [00:13:18] A mineraloid is something that's very similar to a mineral, but it doesn't really follow the strict definition as well. So opals are fascinating.

JVN [00:13:26] Why are they organic or something? Like they're not growing, right? Like, why are they? What's up with them?

GABRIELA FARFAN [00:13:32] So opals are funny. I love opals, too, I will say they're one of my favorite mineraloids, favorite mineral-like things. Opals are technically not minerals because they don't have a crystal structure that you can actually see using x-rays. So we call it “x-ray amorphous.” And so if you were to shine x-rays on any other crystal using an x-ray diffractometer, which is what we use in my lab, you would get these very defined patterns that show the actual crystal structure on an atomic level. So how those atoms are arranged has to be very, very ordered. But in opal, it's almost like glass, where it's just a hot mess of atoms and they're solid, they're put together, but they don't form these really nice crystallographic planes. And so I like to think of opals as an analogy for this would be, if you were to take a swimming pool and empty it, and just put a bunch of golf balls in there. Those would be these little silica spheres that opals are made of. So they're made of x-ray amorphous silica. And then if you were to just pour jello and let it all congeal, that's kind of what an opal is. So it would have some kind of glue that glues together all those little spheres.

JVN [00:14:44] Is that why they're more breakable? Because, like, aren't opals more breakable? Like, they're more fragile? Like, if you drop the shit out of it, like, you're kind of fucked. My friend has this opal ring and she dropped it, and it's, like, you know, I just think opals don't survive drops as well as, like, diamonds, so they must not have the same Mohs hardness.

GABRIELA FARFAN [00:15:03] Yeah. So they're definitely softer than diamonds in terms of scratch ability. So Mohs hardness, this is a fun fact. Mohs hardness only deals with scratch ability. So, Diamond, you can still break it because it's not as tough as other things. So toughness and scratch ability are different forms of durability.

JVN [00:15:21] Oh fuck. Because I dropped the shit out of my diamond, but I'm always like, “Oh, you're good because you're a diamond, so you aren't going to, like,” I've just dropped the fuck out of my diamond before. So you're saying that's not good and it's vintage and old and stuff?

GABRIELA FARFAN [00:15:32] Yeah. You can actually break diamonds because they have cleavage planes where they're essentially planes of weakness in the crystal structure. And so if you were to hit it with a hammer, that would be a very bad idea. You could actually smash your diamond.

JVN [00:15:44] Got it.

GABRIELA FARFAN [00:15:45] But if you were to scratch your diamond against, you know, a piece of steel or something, it should be dandy.

JVN [00:15:51] You know that Kimberley thing. Speaking of Kimberley things, does that G, G-something-something? Is that the same as Kimberly? Like, how do you know if you have a Kimberly certificate or not?

GABRIELA FARFAN [00:16:05] Oh, so the Kimberley Process is more for uncut crystals of diamonds, and then when they're cut, then, usually, people will get them appraised or classified.

JVN [00:16:17] It's, like, if you have, like, a huge chunk of diamond from the ground in your bag.

GABRIELA FARFAN [00:16:21] Yes, exactly. So once it's cut, someone has already gone through that process.

JVN [00:16:25] Oh, fuck. Okay, cool. Thank God. Because when you said that, I was, like, "That's why I didn't want to talk about it longer." And that's why I got awkward. Cause I was, like, Oh my God, are they gonna steal my shit?" But no. So that's like, if you just pull it out of the ground or the mine or whatever.

GABRIELA FARFAN [00:16:36] Exactly. So if you have a gas and the Gemological Institute of America, they'll look at the color clarity, cut all of those properties, and they'll rate them according to how pristine it is. Yes.

JVN [00:16:49] Yes. Okay. Thank God. It was really worried, I was, like, "Oh, my God, I'm going to get in trouble. I don't think I have the Kimberly certificate, I just have the G one!" Okay, that makes sense. Cool.

GABRIELA FARFAN [00:17:00] Unless you mine some diamonds out of the country.

JVN [00:17:03] Yeah, no, I didn't mine—I don't, yeah, I don't even do that. I don't act like that, talk like that.

GABRIELA FARFAN [00:17:06] I love mining. It's fun.

JVN [00:17:08] You do. I've only ever done it at the Mark Twain cave. Like, when you, like, sift the little things from the creek.

GABRIELA FARFAN [00:17:15] Oh, yeah, That's fun. Did you know that you can actually mine minerals that you can make gemstones out of all around the US. Their minds of sapphires, emeralds, rubies, diamonds, opals.

JVN [00:17:26] Are they productive?

GABRIELA FARFAN [00:17:27] They're usually smaller, artisanal mining projects. But yeah, you can. You can go and find your own diamonds. Actually, there's Crater of Diamonds State Park in Arkansas, is free. You can go there and you can dig in the mud and try and find your own diamonds. And whatever you find is yours.

JVN [00:17:46] What's the biggest, nicest diamond that's ever come out of there?

GABRIELA FARFAN [00:17:49] Actually, fun story. We have it in our collection and it was donated to us, gifted to us about two years ago. It's called the Uncle Sam Diamond. It was a very large crystal, and it has since been cut into a beautiful baguette, rectangular-shaped gemstone that's a flawless diamond. And it's named after a man named Sam who dug a lot of diamonds. So not *the* Uncle Sam, but different Sam. And it's actually on display right now in our gem gallery, along with the other largest diamond from Colorado, from Kelsey Lake. And so that one is called the Freedom Diamond. It's in a big ring, and I got to wear it.

JVN [00:18:27] Why are some gems more rare than others?

GABRIELA FARFAN [00:18:30] That is an excellent question. So some of them are rare because the minerals themselves are rare. And the reason for that is because these are natural history objects, right? So the Earth had to create all of these different minerals that we find. And so the Earth, if we like to think of it as a very messy laboratory. So you have all these chemicals, you have heat, pressure, time, all of these variables that are creating mineral crystals. And so some of them have these very long chemical formulas and you needed very specific conditions to form them. And other ones, like, calcite have shorter formulas, less ingredients that are necessary and maybe a little easier to form. So that alone makes certain minerals more rare than others. And then on top of that, you also have to find them. Someone has to find these crystals and bring them into the market and then someone has to cut them. So it's a very long process and it takes a lot of people and a lot of knowledge to actually get a piece of jewelry on your finger.

JVN [00:19:32] Okay. So if this were the Gem Olympics, what are the gold, silver, and bronze medal-winning in terms of rarity?

GABRIELA FARFAN [00:19:40] So some of the gems that we have are rare, and that's the only thing they have going for them, right? So there's a gem called painite. But if you go on BuzzFeed and they tell you, "Here are the rarest gems out there," they'll probably list this mineral called painite.

JVN [00:19:58] But it's fug.

GABRIELA FARFAN [00:20:00] It's so ugly. You don't want one.

JVN [00:20:02] What's it look like?

GABRIELA FARFAN [00:20:03] It's just brown and kind of opaque.

JVN [00:20:06] Is it shiny or no?

GABRIELA FARFAN [00:20:08] Not really. We have one on exhibit, but I wouldn't probably spend a ton of money on painite just because it's rare.

JVN [00:20:16] Okay, yeah. Okay, so, yeah, so rare and expensive. Yeah, what's the Olympics for rare and expensive.

GABRIELA FARFAN [00:20:21] Oof! Okay, so we just unveiled a new gemstone.

JVN [00:20:25] What!

GABRIELA FARFAN [00:20:27] Yeah. Yeah.

JVN [00:20:29] Like, a new species or just, like, a new cut white?

GABRIELA FARFAN [00:20:31] A new cut stone of a gem that we like to call it tsavorite.

JVN [00:20:36] Bitch, that is pretty as fuck. What the fuck is that? That is so fucking hot and sexual. I am so turned on right now. What the fuck is that?

GABRIELA FARFAN [00:20:49] Okay, So have you heard of the mineral garnet?

JVN [00:20:53] Yes.

GABRIELA FARFAN [00:20:54] And what color do we normally think of garnets? Like, a blood red, right? Blood red. Wine red. That's usually the color you think of when you think of garnet. But this garnet, this one's called the Lion of Merelani. And tsavorites are these bright bottle, we call it kryptonite green. And it has this green color because of trace amounts of vanadium and chromium that give it this brilliant, brilliant green color. And they're only found in this gem form in between Kenya and Tanzania, in this very small little area. So the geochemistry was just right. The geology happened to make these beautiful stones and we just got one of the largest ones ever found donated to us last year. And so now it's on exhibit.

JVN [00:21:41] Is this it? The one that we're looking at here?

GABRIELA FARFAN [00:21:44] This is it. This is the Lion of Merelani. You have to come see it. It's 116.76 carats. So that's huge. It's bigger than a quarter. Way bigger than a quarter. Most of them are the size of a tiny pinky nail. So a ten carat tsavorite is a big deal to begin with. So this is just massive and it's cut in a very, very special way. So it was faceted by a master faster.

So this is someone that has dedicated their lives to cutting things as precisely and as perfectly as possible. So this artist's name is Victor Tuzlukov, and he specializes in this precision fastening. And he designs how exactly he's going to cut the stone based on the optical properties of the stone itself. And then he spent three months cutting this. So it's a very, very special piece.

JVN [00:22:35] Okay. That's amazing. Okay, so tsavorite is bronze medal for rarity and price.

GABRIELA FARFAN [00:22:41] Yeah, let's give it bronze. Sure. Okay.

JVN [00:22:44] Who's got silver?

GABRIELA FARFAN [00:22:46] Oh, my goodness. And I don't know if I can rank them. This is hard done, but.

JVN [00:22:52] Honey, you have to! I need you to! Everything is an Olympic comparison.

GABRIELA FARFAN [00:22:57] Okay. We're going to go with—

JVN [00:23:00] And it also is, like, your opinion. It doesn't have to be fact. It's, like, it's your—as a gorgeous fucking gemologist curator ass expert.

GABRIELA FARFAN [00:23:08] Let's do this one. This is the Dom Pedro Aquamarine. And it is a over 10,000 carat gemstone of aquamarine, which is the mineral beryl. And aquamarines are the gem form of beryl, but you can also have emeralds, morganites, heliodors, all different colors of the same mineral. So what gives aquamarine its kind of bluish color are trace amounts of iron. And this particular crystal came from Brazil a very long time ago, and it went to a small little village called Idar-Oberstein in Germany. And they have many, many families that they specialize in cutting gemstones. And they've been doing this for hundreds and hundreds of years. And so this particular family, the Munsteiner family, had this crystal, and Bernd Munsteiner just stared at it for a very, very long time until he finally decided how he was going to cut this crystal into this obelisk-shaped gem art, essentially, or gem object. So this is clearly too big to put on a piece of jewelry unless maybe you're going to the Met Gala or something.

JVN [00:24:20] Know, how many feet tall is that?

GABRIELA FARFAN [00:24:22] It's about a foot tall, maybe a little higher than a foot tall. And it's at the entrance of our gem gallery. And what's really special about it is it's a very avant garde form of cutting. So rather than just having a round brilliant or an emerald cut, this is an example of combining carving with faceting. So the front is faceted, nice and flat, but the back has all of these grooves that are cut into it and carved into the back. And the way that it reflects the light makes it kind of look like a warped wave that's going through. And so if you were to look at the back of the stone, you would see a bunch of grooves. And so definitely, look this up, this is the Dom Pedro Aquamarine, D-O-M. Dom Pedro Aquamarine at the Smithsonian. And it is absolutely breathtaking. So even though aquamarines are relatively common in the gem world, I think that it's amazing the type of cutting that you can do with them. And they're quite clear and they're this beautiful crystal blue. And so they have a lot of potential to make beautiful gemstones.

JVN [00:25:29] Now, you said that aquamarine is aquamarine, but beryl is a mineral. But then, like, can beryl also become an emerald? And it can also become, like, other. Is that what you were saying?

GABRIELA FARFAN [00:25:40] Yes. Yes. So the colors come from trace impurities of different elements.

JVN [00:25:46] Because I got an aquamarine and I got, and I got an emerald. So those are both beryl. They just got put through different conditions, so they look different?

GABRIELA FARFAN [00:25:55] Exactly. It's almost like if you were to take a little bit of food coloring and just, like, put a little drop of food coloring and it would change the color of your dough or whatever. In this case, beryl is going to be clear, but if you put a little bit of iron, too, plus you'll get aquamarine. If you put a little chromium in there, you'll get emerald green color.

JVN [00:26:17] Oh, my God. What else can beryl be? Because I feel you said other things.

GABRIELA FARFAN [00:26:21] Yeah. Have you heard of morganite? A light pink, that's a light pink beryl. Heliodors is a yellow beryl. And then goshenite is what we call just clear, transparent, colorless beryl.

JVN [00:26:33] Now, have I seen something that just is, like, beryl? Like, I feel, like, I've seen, like, on jewelry, like, just, like, a beryl ring or, like, a beryl, like, something.

GABRIELA FARFAN [00:26:42] Yeah. Actually, I'm wearing a, a small ring of what I would call green beryl. Or you might just call this beryl. It's just a very light, kind of minty green color. And I would usually just call this beryl.

JVN [00:26:54] Interesting. What else can beryl turn into? What about rubies? Or is that a different thing?

GABRIELA FARFAN [00:27:00] That's a different mineral. Actually, you can get red beryl, which is only found in the Wah-Wah mountains of Utah. So you can actually go to Utah and find your own crystals of red beryl. And they're kind of, like, a hot pink color. They're very tiny and they're usually quite cloudy, so it's hard to get a beautiful gemstone made out of them. But that being said, the Smithsonian recently got a bracelet made up of red beryl. And I love this piece, because it really showcases American gemstones that we found here. And because they're so tiny, it's hard to really highlight them. But when you have a bunch of them together in a nice row like this tennis bracelet, it really showcases how beautiful they are.

JVN [00:27:44] I am obsessed with that. Okay, so we talked about this a little bit, but, like, basically gems and minerals, they can come from, like, all the continents and from the ocean, right?

GABRIELA FARFAN [00:27:55] Yeah. Yeah, they can come from all over.

JVN [00:27:58] So how deep below the earth's surface do they typically form?

GABRIELA FARFAN [00:28:02] It really depends on the mineral. So there are some minerals, like, some of the diamonds, for instance, the Hope Diamond. We know that it was an ultra deep diamond, so it formed deep in the mantle. And in order to make it blue—again, it's like adding the food coloring—they had to add a little bit of boron, and the boron actually came due to the subduction of tectonic plates where you had essentially ocean sediments that included some boron. They got subducted deep into the Earth. And it's almost a miracle that that little bit of boron got into the crystal structure of the diamond. And then you had to actually get the diamonds from those deep conditions up to the surface. So in order to do that, you need either volcanoes. Or in this case, probably super volcanoes had to bring that deep material up to the surface. Or when you're making mountains, for instance, there's going to be uplift and you might uplift materials. And then if you erode the mountain down, then oop, there it is, right at the surface. So it's usually a combination of different geological processes that allows things that form deep in the Earth or at very high temperatures, etc., to actually make it to the surface so someone can find it. And then the total opposite of that would be, halite crystal. So halite is salt. The salt is a mineral, NAACL. And so if you take some seawater and you let it evaporate, you'll get salt crystals. And those are also minerals. So it doesn't have to be high pressure, high temperature, etc. But most of the gems that we see are formed from these very large crystals that form higher temperature, higher pressure conditions.

JVN [00:29:42] So, like, rubies, sapphires, like, opals, diamonds, like, your morganites, your tanzanite, like, all your beryl stones, like, those are all more like deep in the mantle. High pressure that either brought to the surface or mined out from caves or. But usually, like, the ones that we wear that are popularized and like in the jewelry industry, are, like, these higher pressure, deeper, like, higher temperature situations.

GABRIELA FARFAN [00:30:07] Some of them definitely deep mantle, other ones actually. So you mentioned tanzanite, the Lion of Merelani, that tsavorite. Right. And some rubies are actually formed through metamorphic processes. So essentially they were other rocks, other minerals. And because mountains and rocks get folded almost like pizza dough or just a slab of clay, and you were to squish it and fold it on itself. Geology works that way sometimes. And so that pressure actually helped these new minerals pop out of the old minerals, essentially. It's almost like magic.

JVN [00:30:42] So would that happen, like, more shallow or does that still happen pretty deep? It's just from, like, instead of it being high pressure, high temperature, it's more of, like, a clay metamorphosis thing.

GABRIELA FARFAN [00:30:52] I don't actually know at what depth that happens, but you would need to have pretty substantial pressures for it to actually form those minerals. Yeah, the classic example are actually rubies that you find in Mogok, Burma. So the Carmen Lúcia Ruby is an example of that, that we have an exhibit at the Smithsonian. It's this deep—we call pigeon blood—ruby mined from Mogok, Burma. And this is literally a mountain made up of white marble. And you have thousands of people mining, artisanal and trying to find these little red grains in this mountain of marble. And that's one of the reasons why these gemstones are so expensive, is that they're so rare. And being able to find them is just incredible because they're so tiny relative to this mountain that just imagine all the work that it takes.

JVN [00:31:49] So how long can the process take of these gems getting made? Like, when I was in Australia, like, there's, like, all these opals in Australia, which was, like, part of when I got into opals and they were saying that, like, it can take millions of years of pressure to, like, form in these mines—just to make the mineral, like, does that really just take, like, millions of years?

GABRIELA FARFAN [00:32:07] Sometimes, yes. But we also don't really know the rates at times. So just because something formed a very long time ago, it's kind of hard to know whether it was slowly forming over time or whether the process was actually pretty quick but then it has just been sitting there for a long period of time. So these are all very basic science questions that we're still trying to answer. And when it comes to opals, for instance, they're pretty tricky because we know that opals can opals things like wood or even skeletons of animals that die in those conditions. And if there's opal being formed, it can actually take over even the cell structure of those animals. And so opals actually probably form a lot faster than we think. And definitely they've been forming while life is on Earth. So it can't be that, that long either, compared to maybe something like a diamond.

JVN [00:33:05] So do you think it's possible that there could have been, like, a big ass Hope Diamond and then it got, like, a diamond necklace again and then just, like, turn into fuckin' mud because, like, it just didn't get out in time or something?

GABRIELA FARFAN [00:33:17] Actually, yes. So it turns out diamonds are stable at very high pressures and temperatures. But when they're at the surface, the stable form of carbon is not diamond, it would be graphite. And so millions of years from now, your diamonds may actually transform into graphite. I mean, it will be a very long time.

JVN [00:33:38] No!

GABRIELA FARFAN [00:33:40] It'll be, it'll be so long we won't even know it's happening. But they're technically not stable at ambient pressure temperature conditions. And so in order to get it here in the first place, you had to bring it up quickly. So it had to come in up through a volcano of sorts in order for it to get quenched in a way. Otherwise, it would have just degraded back into graphite or some other form of carbon.

JVN [00:34:02] Wait, so diamonds all come out from volcanoes? Or no?

GABRIELA FARFAN [00:34:06] Actually, yeah. So all of those big mines in South Africa, they come through kimberlite pipes. So it's actually essentially if you were to fossilize or solidify the pipe of that volcano. Yes. And then in Arkansas, the mine that I mentioned, in Arkansas, it's actually lamproite, is the name of the rock.

JVN [00:34:25] And that just turns into diamond.

GABRIELA FARFAN [00:34:27] Well, not the whole rock. They're just the conduit that the diamonds are in.

JVN [00:34:32] Okay, well, that's so interesting. I can't stand it. Okay, so let's talk about colors, shapes and, like, shimmer. So, like, diamonds, for instance. And I also think sapphires. Like, why are some gems the same gemstone but they're different colors?

GABRIELA FARFAN [00:34:47] Usually it's due to impurities. So, for instance, did you know that rubies and sapphires are actually the same mineral? So the mineral is called corundum, and sapphires can come in every single color under the rainbow thanks to iron, nickel, different impurities. And the color red is reserved for ruby. And that's just a gem term. So the mineral term would be corundum. But in the gem world we put a lot of extra value on rubies for their luscious red color. And that's due to chromium.

JVN [00:35:22] What about, like, diamonds? How come there's, like, some, like, green diamonds? There's yellow diamonds, There's, like, brown diamonds. There is, like, all these different diamond colors. Same reason?

GABRIELA FARFAN [00:35:32] Yeah, similar reason. Yes. So you need something that's changing the way that light interacts with the stone. And so usually you would have colorless diamonds, but if you put in boron, you would get a blue diamond like the Hope Diamond. So the Hope Diamond has a few parts per billion boron. And I like to think of this as you know, we have 8 billion people on the planet. If you were to take eight people and turn them bright blue, all, the entire human population would be blue. Right. So it's amazing to think of it that way. So just a few boron atoms can make the whole diamond blue. And with yellow diamonds, the coloring agent is actually nitrogen. So originally, when they were trying to make synthetic diamonds, they were having a really hard time making colorless diamonds because they kept turning yellow because there's so much nitrogen in our atmosphere. So they were getting contaminated with the nitrogen.

JVN [00:36:25] Yeah. I read about, like, J-Lo's green diamond engagement ring. But then when I was researching green diamonds, like, isn't the reason some of them are green from, like, it's, like, uranium or, like, nuclear active or, like, radiation damage?

GABRIELA FARFAN [00:36:37] Yeah. Yeah. So essentially, if you have a perfect diamond structure, so it's a cubic structure where the carbon atoms are arranged perfectly. You would get colorless diamonds. Now, if you replace one of those carbon atoms with a boron, you get blue diamond or nitrogen, you get yellow. But sometimes if let's say you're sitting next to a zircon or some other mineral that has radioactive uranium or something in there, it can actually radiate and damage the crystal structure of the diamond. And so green diamonds are known for having their green color due to this radiation damage, essentially. So it's amazing that something that's damaged, per se, creates this very valuable green color. And then with pink diamonds, it's actually a structural wave, essentially, where it can get distorted and you get, like, a little pink wave.

JVN [00:37:29] And then with the green diamonds, are they really, like, radioactive, like, really dangerous or, like, some of them are and some of them or what?

GABRIELA FARFAN [00:37:36] No. So they're not radioactive themselves. They were just damaged by the radioactivity. So they're not going to harm anyone. Don't worry.

JVN [00:37:43] Ah! Because in this article it was, like, “but you have to be careful because sometimes they're, like,” so they wer just fucking lying because they didn't know they're fucking talking about. Okay, so then, okay, so I think that makes sense. I think why they get different colors. So I have this, like, necklace that's, like, all sapphires and they're all, like, unheated. And the designer was like, “Oh, like, these are, like, unheated ones. Like, they just literally get dug out of the Earth this color.” So do some people just like, heat, the stones. And then that makes, like, a more bright color. If you heat it afterwards?

GABRIELA FARFAN [00:38:12] Yes. So there's a huge industry for heating sapphires in particular. So you can find your own sapphires in Montana. A lot of sapphire mines are there. And some of the sapphire mines will produce these kind of, like, a light teal color or maybe slightly brown. And so what you can do is you can send them off to be heat treated. And usually they'll come out more of a brilliant blue, which is what people typically think of when they think of sapphires. But if you're a little bit more adventurous and you want to have something different, it's actually fun to see what natural colors they come in as well. They might be a little bit more pastel than the heated ones, but they're still very beautiful. And I think that the more people learn about these really interesting stones, the more eager they are to experiment with new colors in jewelry.

JVN [00:39:00] Yeah, mine are stunning. My, like, sapphire necklace is, like, next level. It's like the prettiest thing ever. I'm, like, so obsessed with it.

GABRIELA FARFAN [00:39:07] I want to see it.

JVN [00:39:09] I will send you a pic. Okay? And then, like with watermelon tourmaline, which, like, I love that, like, watermelon tourmaline is so cool. Why [are], like, some gemstones, like, multicolored? Like, because the watermelon one's, like, green on one side and red on the other.

GABRIELA FARFAN [00:39:23] That's such a great question. So tourmalines are really fun minerals because they form in what we call pegmatite deposits. And so pegmatites are very similar to your typical granite, where granite is made up of quartz and feldspars, some mica. But if you look at a rock of granite, the grains of these minerals are relatively small, you know, smaller than a dime. And so with pegmatites, what happens is you have a similar chemistry. But the way that the magma cooled was very slow, and so the crystals had more time to grow. And so if the chemistry is just right, the temperature is going down relatively slowly. The crystals have more time to grow and they can make bigger crystals. And sometimes if you're really lucky, you'll have what we call a pocket. And so it's basically an empty space. And as the crystals grow, they will essentially reject what we call incompatible elements. So really tiny elements like lithium or really big things like uranium. And those incompatible elements are also sometimes known as rare Earth elements. So they're things that don't typically fit into a crystal structure.

And so they get concentrated and concentrated. Until at the very end, you start forming really funky minerals because you have to use up those elements somewhere. And so tourmalines are almost like the trash bins of the mineral world and that their crystal structures are really big. They have, like, really, really long chemical formulas of aluminum, silicon, etc., but they form these big rings on an atomic level that can accommodate all these really interesting elements. And so when you start thinking about, you know, mining rare Earth elements, you're looking for these pegmatite deposits. And in some cases they also happen to make very beautiful minerals that are used in gems. And so tourmalines as they're growing, that chemistry is changing pretty quickly and the fluid in that remaining fluid. And so you'll get different chemistry, different coloring agents, essentially, as that crystal is growing. And so you end up with watermelon, tourmaline, or sometimes there's a type of tourmaline called liddicoatite, which you have, like, many, many bands of pinks, clippers, blooms, etc. they can be beautiful.

JVN [00:41:47] So the bi-colored tourmalines, like, the watermelon ones that's just, like, why—like, what makes the green side green and the red side red and, like, on those sides, like—

GABRIELA FARFAN [00:42:00] So usually it would be if it's growing directly upwards, the chemistry was, you know, iron, let's say, in the green section, and then it may have changed or you have a little manganese or something that causes the pink. I don't actually know what causes each color in tourmaline, so that's something we'd have to look up. But typically it'll be if you look at the periodic table, it'll be kind of like the saddle on the periodic table called the 3D transition metals. So chromium, manganese, iron, etc.

JVN [00:42:33] And then what differentiates a similar-looking gem like a ruby and a pink sapphire? Is it just, like, a deeper red in the ruby than what would be in the pink sapphire?

GABRIELA FARFAN [00:42:43] Because sapphires and rubies are the same mineral, it turns out that the name ruby and sapphire is purely a marketing thing for the gem industry. And so it's actually based on the economics of it all. And so if you have a brilliant, like, pink sapphire that's more expensive than a, quote, "bad quality"ruby.

JVN [00:43:06] So my sapphire necklace is really a ruby necklace?!

GABRIELA FARFAN [00:43:10] Well, it depends how you want to brand it!

JVN [00:43:13] Interest, because really it doesn't even almost matter, because they're just the same. It's the same mineral. Just, one is more known for blues and one is more known for reds. But really, they can be all the colors?

GABRIELA FARFAN [00:43:27] Be all the colors. Exactly.

JVN [00:43:28] Fuck me, okay. Alright. I'm processing. Alright, okay.

GABRIELA FARFAN [00:43:31] But the fun, if you want to get really crazy with sapphires, there is a sapphire called a padparadscha sapphire. And it's a perfect blend of orange and pink. And they're absolutely stunning. It's like a lotus flower. And they're probably the most expensive sapphires you can buy, but we don't really have a good definition of what is the perfect blend of pink and orange.

JVN [00:43:53] I really need to show you my sapphire necklace, I think you'd, like, shit your pants. It's, like, I mean, it's, like, really pretty. Okay, so what gives the gems their shine? Is it, like, how translucent they are? And why do some gems? Cause, like, I have this emerald that has, like, a little cloudy spot. And at first I was, like, "Oh, are you not perfect?" But then it's, like, "Wait, no, that's just how it formed in the Earth. So it's, like, still fierce." Like, what, what's that about?

GABRIELA FARFAN [00:44:17] So typically when you're—if you were a gem cutter or if you were an artist—you want to work with something that's going to be relatively transparent so that you can you can cut your facets at the right angles based on the material properties of that mineral. And so you want light to go into the gemstone, bounce around the facets, and come straight back up at you. And in a well-cut gemstone—so, someone has put a lot of effort and thought and time into it—the angles should be just right. The execution of the fastening should be just right, that you would see a very sparkling gemstone and part of that sparkle will be based on the material properties. So something that has a very adamantine luster like diamond can also deflect the light and cause those rainbows that you see in diamonds. But if it's poorly cut, you might not get those properties. So I think that the quality of the cutting is very, very important. And then of course the material properties themselves, if there's something that has a waxy luster, you're never really going to get that same adamantine luster that you would from a diamond.

JVN [00:45:20] Ooh, what are those terms? A what luster and an adamantine? What are those terms?

GABRIELA FARFAN [00:45:25] Yeah, so adamantine is a term that we use to talk about the, kind of almost, like, diamond-like properties of: you know when you see a diamond and you get flashes of green blues and reds? That would be a lot of dispersion. And we'd call that an adamantine look. Whereas something that has a waxy luster would be almost like wax paper, like, you see that waxiness on the surface. And so it's just, just pay attention next time you look at some gemstones, think, "Okay, is this something that's really glassy or more waxy?" You can actually see those are based on the mineral itself. But then there's the added layer of the cutting itself and the amount of effort that was put into cutting the stone.

JVN [00:46:09] Shit. Okay. What other cool vocabulary words are there that we haven't talked about yet? Like—

GABRIELA FARFAN [00:46:14] You mentioned inclusion.

JVN [00:46:16] Yeah, inclusion? Yeah. Yeah.

GABRIELA FARFAN [00:46:18] So that cloudiness in the emeralds, that's actually a really good thing because the Earth is a very messy, messy laboratory. And so in order to get these minerals to form, you needed to have very interesting chemistry happening. And so with emeralds, they're always going to be cloudy because they're chock full of inclusions. And if you were ever sold an emerald that has no inclusions, be wary, right? Because it's most likely that that was formed in a laboratory. Which is great, if someone tells you, "Hey, I formed this emerald in the lab," they're open with that, wonderful. But sometimes they will try and sell them as the natural object, and that would be lying. And so, usually if you have a nice inclusion, that's a really good thing for emeralds. Of course, they've gotten quite sophisticated now and they can actually fake the inclusions in lab grown things as well, so…

JVN [00:47:13] What about, like, those famous, like Liz Taylor emeralds, though? Like, there are, like, some, like, rare, flawless emeralds, right?

GABRIELA FARFAN [00:47:19] Yeah. Well, I don't know if they'd be completely flawless, but my favorite emerald in our collection is called the Chalk Emerald, and it is absolutely stunning. If you ever want, you know, a gold standard for an emerald, this is a Colombian emerald. So, usually the best emeralds come from Muzo, Colombia. And so this is a very large 37.8 carat emerald from Colombia. And it has this just vibrant, rich color green. And you can see that it also has some inclusions in there, some cloudiness. But overall, it's pretty clean for an emerald.

JVN [00:47:56] Yeah, really pretty. So that actually leads us into our next section perfectly, which is, like: what is the difference between a mined diamond and a lab-grown diamond? Like, how do they grow lab-grown gems? And how would you spot the difference? Because they're just, like, lab grown gems are just, like, *perfect*?

GABRIELA FARFAN [00:48:12] Yeah, typically they're perfect, although because they're also formed through chemistry and through their own process, they sometimes leave behind inclusion signatures or other signatures that trained gemologists can use to identify that they're lab-grown versus natural. And so with a natural diamond, for instance, you might see inclusions of other minerals that were also formed at high pressures. So you might also see a garnet, for instance, in a diamond crystal, and in the cut diamond. And in lab-grown ones, you probably won't be seeing a garnet, for instance, but you might see bubbles or other things that are indicative of the process in which they grew in the lab. So there are two ways right now that we know of that they're growing diamonds. So of course you can simulate what's happening with high temperature and high pressure, where they use these essentially pressure pistons and you can just subject a bunch of carbon to very high pressure temperature conditions and voila, you have the diamond. Or the more recent method is using chemical vapor deposition or CVD diamonds. And they essentially are growing the diamonds layer by layer using a vapor. I really don't know how they do it, but it's fascinating that you can find different ways of making them.

JVN [00:49:33] Is that part of the way that, like, that gemstone industry in the jewelry industry is trying to move towards a more ethical space is, like, lessen the burden on the environment of, like, mining and also at the same time trying to make mining conditions, like, better conditions—like, more shade, more rest, more money, more just, like, more resources for people that are actually, like, doing the work of bringing these out of the ground.

GABRIELA FARFAN [00:49:55] Yeah, I think that there's a lot of work that we still have to do to understand how all of this comes together. I know that at first, when the lab grown diamonds started becoming popularized. The natural diamond industry was not pleased with that because they saw it as competition and people are still buying diamonds. But over time, I think they realized that if people are buying diamonds, it's still an industry and they're still gaining from it. And they realized that naturally formed diamonds still fetch much higher prices than lab-grown diamonds. And so I think that it's really going to take some time for us to really see how it all plays out in the end. But I think that, yes, especially younger generations of consumers are much more aware about mining conditions and ethical sourcing and environmentalism. And so they're demanding that things be improved over time as well. So I think that the industry is going to have to respond to those demands over time. We'll see how long it takes, but I think we're already seeing steps towards that with blockchain technology and tracing crystals, all the way to their cut forms. You know, the Kimberley Process was put into place and you have—of course Hollywood plays a role, like, the movie Blood Diamond that came out with Leonardo DiCaprio, that was really big to kind of shed some light on the ethical concerns at the time. And so I think a lot of strides are being made, and I think that the more that people learn about minerals and how wonderful they are, the more questions they start to ask, the more likely the industry will respond.

JVN [00:51:39] Yes. Thank you. So I think our listeners and myself, I'm most familiar with gemstones as jewelry. What are some of the other uses and applications that they have?

GABRIELA FARFAN [00:51:48] So gemstones, by definition, they are this form of artwork that are typically enjoyed in jewelry. I showed you the Dom Pedro, which is an art object. That's probably something you would put on your shelf and just admire. Of course, there are many minerals that are used for other purposes and sometimes even in their gem forms. So it turns out that mineralogy has many, many subfields. So I like to consider myself a biomineralogist because I study minerals form through biological processes. So I'm actually using pearls, cutting them in half, and learning about how they can record how the ocean's been changing in terms of its chemistry, temperature, etc. So essentially we are using these gem pearls, but to understand environmental conditions and studying climate change and just changes in general and how they're recorded in pearls. High pressure mineralogists will use cut diamonds and they put the ends of the diamonds back to back. And so: pressure is force over area and so you can take this tiny little area, you let simply the very bottom of the diamond and make these incredibly high pressures that can simulate the interior of the Earth in terms of pressure. So you can actually do experiments with these cut diamonds on how different minerals behave inside the Earth and what implications those have for how carbon is stored in the deep Earth. So I like to think of mineralogy as a way to learn about all kinds of science. And they're almost, like, the connectors between very disparate forms of science and trying to solve really big Earth science problems like climate change.

JVN [00:53:30] What have you found about global warming and pearls? Like, are they forming differently, are they forming less often? More often? Like, are pearls going to be okay with the acidification of the ocean? Like, what are you finding?

GABRIELA FARFAN [00:53:39] So that's the next step. I think right now I'm working on what we call basic science, which are just understanding the fundamentals behind how pearls, corals, all the different kinds of organisms actually form their crystals. And so there's surprisingly little known about how they form their minerals. And so once we can understand that, then what I'm doing is trying to piece apart all of the variables that are involved. For instance, how does temperature impact how they form their skeletons and shells? How does salinity impact how they form their skeletons of shells? So all of these variables are going to have to slowly and systematically pick them apart and then apply them to more natural experiments or maybe tank experiments. So there is probably decades of work that we can do on this. But for now I'm actually working on—predominantly on—pearls and on corals. So I mostly work on corals. And I have a student that's done a really brilliant project looking at the effects of temperature stress on coral skeletons and seeing that they actually can change their crystal structures on an atomic level. We can measure those atomic changes as the coral experience different thermal stressors.

JVN [00:54:58] Wow. How interesting is that? What about, like, our phones or, like, the electric battery things? Like doesn't that have mined stuff in it?

GABRIELA FARFAN [00:55:06] Absolutely. So I heard this quote, we had the Mineralogical Society of America Centennial meeting and someone said something that I thought was really profound. She said that apart from air and sunlight, everything that you interact with on a daily basis is related to minerals in some way. And the reason is because minerals are the building blocks that make up our solid earth. So your cell phone has many different elements that had to be mined from minerals. So we talked about those pegmatites that have those rare Earth elements, and those elements had to be mined from those minerals that formed in pegmatites. We are biomineralizing organisms, our bones are made up of the mineral bioapatite. So they really are all around us. And you know, plants, plants need soil and soil is made up of clay minerals, all kinds of minerals, all those nutrients that plants need to grow, so practically everything you interact with it has minerals in some way.

JVN [00:56:10] So, okay, obsessed with that. So for someone like me, if you're, like, just getting into your jewelry journey and you have maybe you got, like, a—like, jewelry passed down to you, maybe you're, like, buying jewelry, how do we care the best for our jewels? Like, which ones, like, stand the best wear and tear? How should we store our jewelry? I have this, like, Mexican fire opal necklace. And then I was researching its Mohs hardness, and then it was, like, saying, like, you got to be really careful with that. And then same with pearls. So, like, are they really that gentle, like, or can I wear the fuck out of it? Or, like, what's up?

GABRIELA FARFAN [00:56:44] Definitely. I think that there are some things that are more delicate than others. I like to say that, you know, some opals, they have, they have personalities. You've got to be very gentle with them. And so opals in particular, because they are these spheres that are put together with almost like a gel, they're quite porous. And so if you have an opal ring, that is not ideal because if you're doing the dishes and there's detergent that can get into it or dyes or all kinds of chemicals can essentially seep into it a lot easier than would be the case for a diamond or something that does not have—oh, you have an opal ring! So just be careful with it. You know, if you, if you're going to a cocktail party and you just want to show off your jewels, that's wonderful. But it's not something I would wear every day if possible.

JVN [00:57:35] Oh fuck. This is my daily wear opal because I don't want to wear my "friend's opal." Yeah, just gotta be careful.

GABRIELA FARFAN [00:57:43] At the end of the day, the jewelry is meant to be worn. It's meant to be enjoyed. So if you're going to enjoy it, have fun with it. Right? And diamonds are meant to be worn in rings. They're very hardy overall. Same with sapphires, rubies. Corindum has a Mohs hardness of nine. And remember, Mohs hardness is on a logarithmic scale, which means that diamond is ten times harder—or harder to scratch—than corindum, which is ruby and sapphire. And the one below that is ten times softer than rubies, so—

JVN [00:58:19] Aren't pearls like 2 to 3?

GABRIELA FARFAN [00:58:20] Yeah, they're very, very soft. So pearls, probably best worn in necklaces. So things that are not going to rub.

JVN [00:58:26] I have this, like, pendant necklace, which, like there's like, aquamarine in a pearl. This is, like, pink tourmaline. And this is, like, green tourmaline. Is the pearl going to get fucked up from, like, jingle jingling these all together? Or is it okay?

GABRIELA FARFAN [00:58:39] If it's actually hitting the tourmaline? Yes, it will probably get scratched over time. But does it have a backing on it?

JVN [00:58:48] Yeah.

GABRIELA FARFAN [00:58:49] Okay. If it has a backing on it. So the metal is essentially between the pearl and the tourmaline. You should be fine.

JVN [00:58:56] Yeah. I just need to make sure that the pearl stays, like, in front.

GABRIELA FARFAN [00:58:59] Yes. Yes.

JVN [00:59:00] Oh, my God. I'm freaking out. Okay. All right. Okay, so that's that. Okay, so and then, like, does prolonged sunlight or water, like, what do we need to do to, like, store them, take care of them? I read this thing, like, where you take, like, colorless detergent. You put it in, like, hot water and then you take a baby toothbrush and just, like, gentle, gentle, don't scrub back and forth, like, gentle, gentle, only one way. And then you, like, dip it in just normal water. And then. Pat, pat, pat, pat, pat. Very much dry. Do we not like that story? Do we like that story?

GABRIELA FARFAN [00:59:34] I think it depends on the mineral. So if you did that to a pearl—

JVN [00:59:38] No, no, not pearl. That's only for my diamonds and sapphires. Yeah, no pearl.

GABRIELA FARFAN [00:59:40] That should be fine. They'll be fine. They're really hard. Right? So you're not going to scratch them with a baby brush.

JVN [00:59:46] But a pearl? You got to be careful when you clean your pearl.

GABRIELA FARFAN [00:59:50] Yeah, I probably wouldn't clean them very often. One thing that is fabulous for cleaning our ultrasonic machines. Yeah.

JVN [00:59:57] What the fuck are those about? What? How do. What do I do?

GABRIELA FARFAN [01:00:00] You basically just buy a little ultrasonic bath, or you can go to a jewelry shop. That's usually how they clean things at professional jewelry shops.

JVN [01:00:07] I don't like leaving there, though. They're like, I'll get it back in like a week. And I'm, like, "What do I fucking look like? Some more patience. Like, get the fuck out of here!" Like, so I just need to buy one for my house. And you put water in and you just layer jewelry in there.

GABRIELA FARFAN [01:00:19] And you turn it on and it'll use ultrasonic to essentially clean it, vibrate any dirt off of it. And it's amazing how clean your jewelry can get.

JVN [01:00:29] What about these steamer things? Do you like these, like, jewelry steamer things? Someone was telling me I could get, like, a steamer.

GABRIELA FARFAN [01:00:35] I've never heard of those. Using heat is usually not a good idea, but. Mm. Yeah, I would. I would probably stick to the ultrasonic cleaner or—

JVN [01:00:45] Okay, I'm doing the ultrasonic.

GABRIELA FARFAN [01:00:45] Maybe hand clean.

JVN [01:00:56] And what about storing just like, a cute little jewelry box with, like, felts or whatever, like, little velvety jewelry box?

GABRIELA FARFAN [01:00:52] Yeah, that sounds fabulous. I think that the only issue is when you have silver, because silver will tarnish. I wear a lot of silver because I can't afford to buy gold things, and so I usually keep things as airtight as possible so that the silver doesn't tarnish.

JVN [01:01:06] Okay, got it. Okay. So listeners may be familiar with De Beers' late 1940s ad campaign A Diamond is Forever. It's credited with inventing the modern engagement ring. Who knew? Obsessed. So what are your thoughts on the diamond hype?

GABRIELA FARFAN [01:01:22] I think it's fascinating. So what you just said, they basically invented modern advertisement as it is. So the idea of equating an object with an emotion—in this case love—is just genius, if you think about it, right? So they actually wrote scenes in Hollywood movies—essentially, it's the original product placement—where they had scenes where someone would do a proposal with a diamond engagement ring and, you know, they would be so excited that they got proposed to with the ring. And that's supposed to signify forever. So it's, it's genius, if you ask me.

JVN [01:01:59] Does it make sense to you that they'd be valued so highly?

GABRIELA FARFAN [01:02:03] It's definitely an artificial value because there are many, many diamonds. You know, diamonds are not rare, per say. Otherwise, not everyone would have one, right? If they were truly rare, they were rare like these emeralds or some of these rubies that are highly, highly prized, not everyone would have one.

JVN [01:02:21] Okay. Well, fuck me. So back to our third, second, first place, which you very artfully, Gabriela, like, fucking dodged. You shimmy shangled your way right out of that question. So for you and your personal opinion. Third place was that one—

GABRIELA FARFAN [01:02:36] Tsavarite.

JVN [01:02:37] What was that?

GABRIELA FARFAN [01:02:37] Tsavarite.

JVN [01:02:38] And then second place was kind of like a sneaker. It was aquamarine because it was like, okay, it's, like, kind of common, but, like, you're, like, "Honey, it's so versatile. It's, like, so beautiful. It's like it's just so interesting and, like, so that gave you a second place." But actually, with what we know about diamonds now, it's, like, that makes sense. So what's your first place for, like, most rare?

GABRIELA FARFAN [01:02:58] I'm going to show you.

JVN [01:03:00] Is it? It's… Topaz?

GABRIELA FARFAN [01:03:02] So normally I would say for first place, it's kind of a tie. I would say that diamonds that have interesting colors are going to be the most valuable and the most rare for volume, because, for instance, the Hope Diamond, that boron, that is so rare. Just think about it. How many blue diamonds have you seen in your life?

JVN [01:03:25] How many are there, do we know of?

GABRIELA FARFAN [01:03:28] Very few. Very few. They come on auction occasionally, but they're, they're fetching, you know, millions and millions of dollars per carat. So just think about that. So if I had to, you know, objectively give a first place, I would say diamonds that are green, blue, violet, orange, pink. They probably would be the winners, just in terms of the monetary value that us humans have assigned to them. That being said, I think that I would have to pick this particular stone, which is a red topaz. Now, the reason I pick this is, first of all, it's one of our most recent gifts, and it's the only neighbor to the Hope Diamond, in the same room as the Hope Diamond, in our Winston Gallery. And it is called the Whitney Flame Topaz. And it is a brilliant red slash pink slash a little bit of orange at the bottom topaz. That's what we would consider an imperial topaz from Minas Gerais, Brazil. So Topaz is typically colorless. And sometimes in jewelry shops, you'll see blue, topaz and blue topaz is irradiated to make it that blue color. Sometimes you have natural radiation from other minerals that are around it, and it can also cause natural blue topaz. But in this case, this is what we call imperial topaz, and they're normally, like, a cognac or champagne colors, kind of brownish, golden colors. And very rarely you'll see pink topaz, which is very lovely. And you can have it in jewelry. And they're already quite rare. But in this case, we have red topaz, and I have only ever seen three red topazes in my entire career. And I've been doing this for quite a long time. So I think it just showcases how rare and special this is, and the red is completely naturally colored by trace amounts of chromium. So no heat treatments, no irradiation treatments. This is just the way it is. And this particular stone is just under 50 carats. So it's a really beautiful teardrop. It's like a long teardrop shape. Yeah.

JVN [01:05:36] Wow, it's huge. So, not to bust out another question right before about to be done, but what's the difference between precious and semi-precious?

GABRIELA FARFAN [01:05:45] Ah, see, personally, I am not a fan of the term semi-precious because I think—

JVN [01:05:50] Yeah, what the fuck does that mean! Cause they're all precious!

GABRIELA FARFAN [01:05:51] I think it's a ridiculous term, personally.

JVN [01:05:54] It's, like, some classist bullshit or something?

GABRIELA FARFAN [01:05:55] Exactly. Exactly.

JVN [01:05:56] Because they're all rare and interesting. Like, they're all like, yeah.

GABRIELA FARFAN [01:06:01] Jonathan, let's get rid of semi-precious. I think that should be our new campaign. They're all precious!

JVN [01:06:06] That’s probably why it wasn’t in the questions. Yeah, they're all precious. I love that. Okay. Yeah. So what about, like, turquoise? What's turquoise?

GABRIELA FARFAN [01:06:11] Turquoise is a mineral, but it's usually, it's opaque. It's usually microcrystalline. So you don't see the individual crystals. They're almost, like, a chalky material. And so if you cut it into a cabochon, which is just a rounded, polished blob, essentially, and you can shape it as, like, a teardrop or an oval. They're used in, in jewelry as well.

JVN [01:06:32] So and then just before we leave, so some of the shapes—like, cat, cat, what was that C-word? That just means smooth.

GABRIELA FARFAN [01:06:37] Cabochon. Yeah. So instead of cutting facets or those flat faces or flat cuts that a lapidary or lasseter would make, in this case, they would just polish a round smooth surface and that would be called a cabochon.

JVN [01:06:52] And then faceting is any type of cutting of a gemstone, like—

GABRIELA FARFAN [01:06:58] Where you have these specific facets. So if you look at a typical diamond that's cut with all those facets, those are each called facets. And so it'd be faceted.

JVN [01:07:07] Got it, and then there's, like, different types of cuts, which is, like, an emerald cut is more of that rectangle one and diamond is more of, like, you know how you would imagine a diamond—

GABRIELA FARFAN [01:07:16] Round brilliant.

JVN [01:07:16] And then princess and then, like, pear—

GABRIELA FARFAN [01:07:20] Cushion.

JVN [01:07:14] Yeah, like, baguette. Is there any other shapes? We haven't—teardrop. What else shapes is there?

GABRIELA FARFAN [01:07:26] The fantasy cuts would be the ones that are those more avant garde cutting where it's a bit unique.

JVN [01:07:32] Any other big ones that we missed that we need to make sure people know?

GABRIELA FARFAN [01:07:36] Princess, cushion, trilliant.

JVN [01:07:41] Trilliant. That's nice.

GABRIELA FARFAN [01:07:44] I like that one. Ovals.

JVN [01:07:48] Yeah. Ovals. Okay, that feels good. So. Okay, so you're just, like, minding your own business, Gabriela. Like you said that you've been studying rocks since you were a kid. Like, what piqued your early interests. Like, how has that evolved. When did you realize you wanted to become a literal—because you're a, we said, mineralogist.

GABRIELA FARFAN [01:08:04] Yes. Yes. Right.

JVN [01:08:04] Yeah.

GABRIELA FARFAN [01:08:05] Yeah. So I was around six years old and my dad worked at the University of Wisconsin in Madison. And down the road there was the UW Madison Geology Museum. And so I happened to go there and I was a very shy kid, and I happened to come across the mineral section of this museum, and I just thought they were amazing. I couldn't believe that things that were so sparkly were naturally grown by the Earth. And to me that was just a really profound idea. And it just so happened that that day, the curator of—or the director of the museum—stopped by and saw me looking very interested at the minerals, and he gave me my first quartz crystal. And so I started collecting minerals and there was a local rock shop that ended up working out when I was 15 and I started volunteering at the museum. So I've had a long, long history of just loving museums and loving minerals and gemstones. And so I knew pretty early on that I wanted to be a mineralogist, I wanted to study gems and minerals. And then I ended up visiting the Smithsonian when I was 16 years old. And that kind of sealed the deal because I met the curator at the time and he kind of joked at me. He said, “Oh, you never know. Maybe you'll come work here someday.” And so I was, like, “Okay, I'm on it.” And I did everything in my power to end up here. So this is a real dream come true for me to be working with these world-class mineral specimens and all of the geologists that I get to work with every day.

JVN [01:09:35] That is so cool! I love a full circle moment. We also read that you were a guest of Michelle Obama's at the 2010 State of the Union address and that you got to tour the Smithsonian on that trip, like I bet—was that, like, what was that like?

GABRIELA FARFAN [01:09:49] Oh, that was an incredible, incredible experience. Again, thanks to minerals. I was quite a nerd in high school. Still am, in case you couldn't tell. But I had done a project on gemstones called sunstones, and there are these feldspars that normally, they're kind of ugly and they form rocks like granites. But in this case, there are gem-quality feldspars from Oregon, so they're called Oregon sunstones. And I was interested in what caused their ruby red colors and inclusions called schiller, where essentially they're micro platelets of copper, of native copper that literally causes them to shimmer, like a little copper veil. And so I was studying them from both a gem perspective and a mineral perspective. And so this project ended up winning one of these science fair competitions. And so I was very lucky that the First Lady invited me to kind of be a little representative for young, young people in science.

JVN [01:10:48] How fucking cool is that?

GABRIELA FARFAN [01:10:50] It was really sweet.

JVN [01:10:51] So we've come to the end with our final question, and you can answer this any way you want and add anything that you want us to know what's happening? Well, actually, it's actually, I'm going to do two in one. So one is what's next for you in your work? And then the last question is, what advice do you have to people who want to learn more about gems, minerals, professionally or casually?

GABRIELA FARFAN [01:11:12] Oh, I love that. Okay, so what's next? So I am now starting off as the curator-in-charge of the National Gem Collection. And this is a huge step for me. So I'm going to be very, very busy for the next few years. We have a lot of projects behind the scenes and in front of the scenes working with a team of collection managers, curators, volunteers, etc. So I'm going to be managing this team of people. And every year we go to the Tucson Gem and Mineral Show and we get to select new things that will go into the collection. We also work with a lot of donors. Every single gem and mineral that's in our collection is through donations. So not a single taxpayer dollar goes towards buying gemstones. And so it's my job to make sure that we get some of the best of the best minerals and gems into our collection so that we can preserve them for hundreds of years to come and so that they can be accessible to researchers. And so I'm really excited to see what kind of research comes out of these stones so we can always learn new things from, from these gemstones and minerals.

And so I'm just excited to see, to see what happens. And of course, I also do my own research. That's half of my job is doing scientific research. And so I'm looking forward to publishing a lot of papers in the future about opals and pearls and all kinds of bio minerals, as well as some other minerals that are used as gems. So that's, that's what's next. But for advice, I'd say I like to say it's never too early or too late to get started in finding something that you're passionate about. And so if you're interested in minerals and gems, read, go to museums. Ask an expert, don't be shy. And so there are many really, really wonderful gem and mineral clubs around the country that you can actually join, and you'll find that there are a lot of, just, kind people that are willing to cheer you on. And I have had many, many, many mentors and many people that have helped me get to where I am today. And so I hope that all of us can continue to encourage each other to learn about minerals and gems. And if you have a chance to visit museums, I highly recommend that our museum is free to anyone in the world. You can just walk in and see the Hope Diamond, see all of these gems that I've talked about today, and we're open 364 days a year.

JVN [01:13:37] Oh, and then you mentioned the Tucson Gem show is that, like, the biggest, coolest one?

GABRIELA FARFAN [01:13:41] Yes. It's like the Coachella of the gem world. You go in—

JVN [01:13:44] When is it? Where is it? So it's in Tucson and then you just go and then you can get your own jewels and then you can figure out how to, like, string it on a necklace or something?

GABRIELA FARFAN [01:13:52] That's, like—yes, that, and much, much, much, much more. So please go sometime. It's the entire month of February.

JVN [01:13:59] Marking up my calendar, next February.

GABRIELA FARFAN [01:14:00] Honey, I'm there for two weeks every year, first for the week of the gems, and then there's a week of minerals, approximately speaking. And there are probably 40 different shows happening at once, all the way from the high end, multimillion dollar gemstones, all the way to key chains that you can buy on the side of the road. The entire city is just bustling with minerals, gems, fossils, everything. So if you've never been, I highly recommend going to Tucson that time of year.

JVN [01:14:29] I love Tucson. I'm a former Wildcat. That's my alum. I'm going, I'm obsessed. You know, this is, like, the most fun I've ever had in my life. Gabriela Farfan thank you so much for coming on Getting Curious and teaching us about gems and minerals and your expertise and sharing your scholarship with us. We are so grateful and thank you so much for coming on Getting Curious.

GABRIELA FARFAN [01:14:48] Thank you so much for having me, this has been fun! I'd love to talk about gems and minerals any time.

JVN [01:14:55] You've been listening to Getting Curious with me, Jonathan Van Ness. Our theme music is "Freak" by Quiñ - thanks to her for letting us use it. If you enjoyed our show, please introduce a friend and show them how to subscribe. Follow us on Instagram @CuriousWithJVN. Our editor is Andrew Carson. Getting Curious is produced by me, Erica Getto, and Chris McClure—with production support from Emily Bossak and Julie Carrillo.