

Gus: You're listening to Brains On, where we're serious about being curious.

Brains On! Is supported in part by a grant from the National Science Foundation

Bob: Ahhh -- there's nothing like taking a walk outside to get the blood pumping. I don't even care that I have to wear this mask. It's just great to be outside!

Menaka: Bob!

Bob: Huh?

Menaka: It's Menaka! Over here! Across the street!

Bob: Oh, hi Menaka! So great to see you! (velcro sounds)

Menaka: Cool mask, Bob! It looks like you're smiling.

Bob: Oh -- yeah, this is my regular mask with a smiley face velcroed right on it. It was my very first mask-moji.

Menaka: Oh, I get it!... mask plus emoji equals Mask-moji! Great idea!

Bob: I realized that it's harder to communicate with people when they can't see my mouth. So I used emojis for my most common reactions... like this.

Menaka: Hmm... looks like your lips are puckered? Is that a kiss?

Bob: (chuckling) Well, not really. This is how I let someone know that I'm thinking about lemon popsicles. How about this?

Menaka: Okay, now it looks like you're smiling with your tongue sticking out. Does that mean you are joking?

Bob: What?! Joking?! No. It's how I let people know I remembered to brush my tongue. Dental hygiene is no laughing matter Menaka. Okay -- let's try this one. (velcro sounds)

Menaka: Hmm. Now the mouth looks like it's making an O. ... Bob, are you scared?

Bob: Wrong again! This is for my neighbors. It's my way of showing that I'm saying hellooooooooooooooooooooo! Maybe my mask-mojis need some work. Oh well. Thanks for the feedback Menaka. (velcro sound)

Menaka: Oh - now your mouth looks stretched and like it's showing all your teeth. Oh I know that this one is! Is that... you saying... byeeeeeeee!

Bob: Ha! You got it! Yay! BYEEEEEEEE!!!!

(Theme music plays)

Molly: You're listening to Brains On from American Public Media. I'm Molly Bloom and I'm here today with Gus from Seattle! Hi Gus!

Gus: Hi Molly.

Molly: Gus, you have become our official Coronavirus co-host. And it's always great to check in with you. So I want to know what emojis would you want for your mask-moji to show people how you've been feeling lately?

Gus: I think it would be... shut eyes and a drooly mouth.

Molly: Why? Why is that your choice?

Gus: Cuz I'm always sleepy. I'm always sleepy now.

Molly: I get it. I get it. I think mine would be the upside down smiley face. It's just kind of really captures my feeling lately of like, well, we're doing our best! A few months ago, if you mentioned wearing a mask, I'd think you were talking about a costume party. But now, some cities are asking people to wear masks when they go outside. Lots of stores are requiring you to wear a mask while shopping. So they are a part of our lives now. And so Gus, I would like to know have you been wearing a mask at all?

Gus: Yeah, I've been wearing a cloth mask.

Molly: How do you feel about wearing a mask?

Gus: I think they really help if you're if you know you're gonna be near people.

Molly: Mm hmm. And have you made any masks yourself?

Gus: No, but my dad made one for me. It's, um, he took an old t shirt. And he he measured my head and cut out a cloth mask.

Molly: Perfect. So it fits you just right?

Gus: Mm hmm.

Molly: So we should point out that the cloth masks most of us are wearing are not the kind that keep the virus from getting in.

Gus: Yeah, viruses are sneaky and small, and they can get through most fabric.

Molly: But the thought behind these masks is that if you're sick and you don't know it yet, the mask will catch the large bits of spit from your sneeze or cough or from just talking. So the virus is less likely to get out and spread to other people.

Gus: Yeah, I wear my mask to protect you. And you wear your mask to protect me.

Molly: Right. It's not clear how much of a difference these masks make. Scientists are still looking into this, but there's enough evidence to suggest it's a good idea for now.

Gus: Plus, it's not hard, so mask up everyone.

(Masks On stinger)

Molly: These are not normal times. But weirdly, I think I'm sort of getting used to it if that makes sense.

Gus: Yeah, I think I know what you mean.

Molly: Part of adjusting is coming up with new things to do, and new routines. Like me and my family have been doing lots and lots of puzzles. What's something new that's become part of your routine, Gus?

Gus: Um, I've been biking a lot more. And I've read a lot more books.

Molly: Oh, nice. We asked our listeners what they've been up to lately and wow, you all have been busy.

Montage:

Hi Brains On I'm Racine. I'm 12 years old and I'm from Dublin, Ireland. What I like to do here in quarantine is bake and play JA with my brother. JA's a national sport in Ireland, and it's really fun.

Hi, I'm Eva, and I'm from Nanaimo, Canada. But I currently live in Spain. I've been doing lots of projects like an underwater scene, and I'm planning to do tie dying.

Hi, my name is Cheyenne and I live in Berlin. My favorite thing to do: growing crystals! and comics. I put my friends as superheroes in there and I put me in there too.

Hi, my name is Brandon. I'm 11 years old. Hi, my name is Jules I'm nine years old. Hi my name is Kevin. I'm a seven year old.

For fun during the coronavirus, we like to do a lot of major things in our backyard. We took wet plaster, and put in animals tracks to copy them. We had deer tracks, racoon tracks, and dog tracks. Oh, and our dog is named Isaac Newton. So he's a famous scientist. He has a body of a dog but a mind of a scientist.

Molly: Oh, I need to meet that dog someday. Thanks to all listeners who have been keeping us up to date on what they've been up to during this time. And if you want to share what you've been up to and how your life has changed in the past few months, get in touch at [brains on.org slash contact](https://brainson.org/contact).

Gus: One thing a lot of us want to do right now is help.

Molly: like Amora from New York City.

Amora: Hi, how can a kid like me help others during the coronavirus pandemic. We have been saying at home and social distancing. Can I do more?

Gus: I think a lot of us would like to do our part. But how?

Ruby: Oh, you are in luck. I've got so many thoughts on this.

Molly: Hey, Ruby Guthrie, you look amazing. Is that a cape?

Ruby: Oh yeah. I've got my cape. My sparkly tights. My superhero utility belt *and* my face mask. Because right now, we're all having to be brave and tough so why not dress the part?

Molly: I love this logic.

Gus: So, Super-Ruby, how can we help during this difficult time?

Ruby: Well, citizen Gus. I'm glad you asked. I want to start by saying -- listener Amora is right. We're -- wait, hold on. Can I get some inspiring superhero music?

(inspiring superhero music)

Ruby: Perfect. Now. Listener Amora is right. We're all helping by staying home. By social distancing. By washing our hands and covering our coughs and generally being a pain in the butt for any virus looking to spread far and wide. So remember, you're already helping! But there's always more to do -- and people willing to do it!

Ruby: One place to start is to think of things you already know how to do -- and see if that could help others. Especially if you have time on your hands.

Phoenix: I went from working, you know, 12 hours a day to, you know, sitting around for 12 hours a day.

Ruby: Meet Phoenix Mellow. She works in Los Angeles making costumes for TV shows and movies. But that all came to a crashing halt when coronavirus appeared. So, she turned her sewing gear into virus fighting machines by making colorful masks and sending them to people in the mail.

Molly: Oh man, a mask in the mail sounds like a great surprise.

Ruby: Right?! Especially a fun one, like this polka-dot mask!

Phoenix: So you know when you go out not only are you protected, but you'll feel good about what you're wearing. I think when you're wearing a mask, it encourages other people to wear a mask. And ultimately we have to work together to stop the spread.

Ruby: But you don't have to be a costume designer to make masks. There are lots of videos online to teach you how. And you can use old curtains or t-shirts to get started. Then you can send them to friends or family.

Ruby: Now, cloth masks are fine for regular citizens like you and me. But health-care workers on the front-lines need extra special masks to stay safe -- since they're interacting with sick people all the time. One of the most needed masks is called the N95 respirator. So high school freshman Sophia Lord decided to use the skills she developed while doing robotics -- to make N95 mask parts using a 3D printer.

Sophia: So we're printing like the outer part and then we're sending them or donating them to our local clinic and ambulance barn. And then they're taking and putting in filters. So the idea is -- the part that we're 3D printing can be reused and sanitized to keep from wasting as much and then you would just throw away the filter after every use.

Ruby: Now that's next level mask making.

Gus: So very cool.

Ruby: Yeah. And I gotta talk about another cool helper hero I met. Her name is Rebecca Taylor and she's an assistant professor of Mechanical Engineering at Carnegie Mellon University. She's been making something called... a face shield!

Rebecca: In the instance that someone coughs or sneezes around you, it's really useful to also have a face shield. So a face shield is basically a headband. But then it's got like a film that comes down all the way over your face, and then some coverage on the side, ideally as well.

Ruby: Picture something like a car windshield but for your whole face. Healthcare workers wear this in addition to other masks-- it's like having an extra force-field blocking any cough attacks or sneeze blasts.

Rebecca: It'll stop the big drops, it'll protect you, and what it'll end up doing is making that mask underneath last a lot longer.

Ruby: Rebecca and her team are making hundreds of these face shields every day using 3D printers and laser cutters. Pew pew! Which -- I mean, how much more superhero sounding can you get? Then they donate them to hospitals and clinics so frontline healthcare workers can stay extra safe.

Molly: Wow -- so amazing to hear how people are helping.

Gus: Yeah - inspiring stuff. But what about those of us who don't have access to a 3D printer?

Ruby: Yeah. I'm assuming that's most of us. So I prepared some ideas you can do with stuff you probably already have. Are you ready?

Gus: Yep.

Ruby: Okay. First off -- Since we're all staying home and not seeing many people -- It's really important to reach out to people right now, like your family, friends, teachers, and neighbors. You can facetime or even (gasp) call them on the phone. I know, who even talks on the phone anymore? But talking on the phone is totally underrated. It's like listening to a podcast-- but even better because there's somebody listening on the other end! Total mood booster.

Ruby: Or you can send mail! There's nothing better than getting a card in the mail. You can even send cards to people you don't know. Maybe write a letter to somebody in a nursing home -- since most older people are more at risk, they're not going outside or having visitors like they used to. That can get lonely-- but getting something in the mail could be a wonderful surprise. You could also write a thank you note to your local hospital -- or grocery store!

Ruby: Speaking of thank yous...You can make a sign to thank your mail carrier. Or, if you have some sidewalk chalk you could draw a picture for your neighbors. Or leave encouraging words -- like, you're doing great buddy!

Ruby: You can also donate! Right now, some people don't have enough money for things like food, because the place where they work (and earn money) is closed. But you can donate money to a food bank that will buy food and give it to people who need it.

Ruby: Or you can help out the adults in your life. If you're an older sibling, I bet your parents would love help keeping the younger ones occupied. Especially if they have to work from home.

Maybe plan a day of fun activities for your sibs and call it Camp Stay At Home! Or write and act out a play together. Or just help your parents with chores - like cleaning or yard work.

Ruby: Those are just a few ideas. But I know there are plenty more. Get creative!

Molly: Yeah. In fact, if you've got a great way to help -- we want to hear it! Tell us about your hero helper idea at [brains on dot org slash contact](https://brainson.org/contact).

Gus: You don't need a cape to write in -- but it never hurts. Thanks Ruby!

Ruby: Farewell citizens of Brains On. I'm off to go call my relatives! I love you grandma!

(Rock music and applause)

Hank: Oooh wee! It's me! Hygiene Hank!

PJ: And your bubble bustin' buddy -- PJ McSuds! Boo yah!

Hank: We're back again to help you destroy dirt...

PJ: ...vanquish viruses...

Hank: ...And keep your fingers fresh!

PJ: That's right Hank. Word is that cowardly little coronavirus is still out there making trouble. But we know how to knock-out that nitwit. Don't we, hank?

Hank: That's right. We just...

Both: Wash! Our! Hands!

(Crowd erupts with applause!)

Hank: Hand-washing helps stop viruses from spreading.

PJ: That's right! Because soap molecules trap dirt and germs, break viruses apart and send 'em down the drain! Boo yah!

Hank: And the best way to wash is to lather for 20 seconds. That's like a full body slam to a virus. Ohh yeah!

PJ: Now Hank, you know ol' PJ isn't afraid to scrub down anytime, any place.

Hank: No doubt, compadre!

PJ: But lately, things are getting a little rough in knuckle-opolis, if you know what I mean.

Hank: I... uh... I'm not sure I catch your drift.

PJ: Things are getting dinged up in epidermis-town!

Hank: Say what now?

PJ: I'm getting furiously flaky in finger-ville!

Hank: Okay. Uh. I'm totally lost. What's going on?

PJ: <deadpan> My hands are dry.

Hank: Ohhhh! Right. Come to think of it -- my mits are getting crusty too. In fact, we had a World Handwashing Federation fan write us about this very same conundrum. Check it Out!

Colton: Hi my name is Colton, I'm age 10 and I live in Roda, Spain. And because of COVID-19, I'm washing my hands a lot. And on the backs of my hands, they get all dry and they crack up and bleed. And my mom says it's because I'm washing my hands a lot. And my question is, how does water dry out your hands?

Hank: Excellent question, compadre!

PJ: We're gonna tag in some help for this one. Her name is Jenna Lester and she teaches dermatology at the University of California in San Francisco. Boo yah!

Hank: That means she's an expert in all things skin and hair.

Jenna: Sure PJ and Hank, I can handle this one.

Hank: Take it away Jenna!

(Boxing ring sounds)

Jenna: You would think that water is wet. So water wouldn't make your hands dry, so why does adding water ultimately dry your hands out? That's because our bodies give off oils to help protect our hands and seal in moisture. And when you wash them or when you use hand sanitizer, it washes away a lot of those oils or breaks them down. The way I like to think about this is our skin is like a brick wall. And if you think about a brick wall, you have the bricks and then you have this cement that is keeping the bricks together. The oils and different fats or proteins on our skin act like the cement keeping our skin cells together. And the water dissolves the cement and it causes the brick wall to crumble a little bit and that crumbling is like cracking

and it allows things out that we're trying to keep in like moisture. And that's why water ultimately can cause things to be dry and crumbly, like a brick wall.

(DING DING DING)

PJ: Ohhhh! She's dropped facts all over the place!

Hank: She smashed that question with skin science!

PJ: She dropkicked knowledge straight into my brain! Boo yah!

Hank!: How about it Jenna, wanna tackle one more? Here's another query from a WHF superfan.

Fionnlagh: My name is Fionnlagh. And I'm from Glasgow in Scotland. And my question is why when we wash our hands a lot? Does the top of our hands go dry and rough, but not the palms?

PJ: Let 'em have it, Jenna.

Jenna: That's another great question and has to do again with that brick wall. So the top of your hand, although compared to the rest of your body is pretty thick, the palms of your hands is a lot thicker. So it takes a lot more water to crumble that brick wall. And it can happen still. But as you've noticed it happens at a slower rate if at all.

Hank: So Jenna -- tell it to us straight. Is there something we can do to keep our precious paws from drying out?

Jenna: Well, you certainly shouldn't stop washing your hands.

Hank: Stop washing? Never!

PJ: Wouldn't do it. Couldn't do it.

Jenna: So let's think about how to build that brick wall back again.

PJ: Now you're talking!

Jenna: And a lot of that comes from just moisturizing actually. So you can seal in any of that good stuff. So anytime you wash your hands after you dry them, you should put a moisturizer on your hands and that will help keep your skin flexible and moisturized.

(DING DING DING)

Hank: Wow! You clobbered that question!

PJ: And gave us a new power move...

BOTH: Maximum Moisturizing!

Hank: Until next time compadres...

PJ: Use your wits and clean those mitts. Boo yah!

Molly: So Gus, you ready for an ear challenge? It's the...(Mystery Sound)

Molly: Are you ready Gus? Yeah. All right, here it is.

(Mystery Sound)

Molly: Okay, Gus, what is your guess?

Gus: I think maybe they were like putting their hand through beads, or like flipping a rainmaker.

Molly: Well, those are really good guesses. We're gonna hear it again and give you another chance to guess in just a bit.

Molly: We've talked a lot about heroes today -- so your imagination should be all fired up to help us out.

Gus: We're doing an episode about colors and we want you to come up with a superhero based on a color.

Molly: What's this hero's name? What are their powers? How is the color involved? Gus, do you have a color hero idea?

Gus: Yeah, it's light blue. And their powers are super speed. They can surf on clouds. And they can jump into people's bodies and control them and stuff.

Molly: That is an amazing hero. I would definitely watch a movie about that. So listeners, tell us about your hero. Just go to [brain on dot org slash contact](http://brainondotorg/contact). You can also send us mystery sounds, drawings and questions like this.

Lily: Hi, my name is Lily. And I'm from the Blue Mountains in Australia. And my question is how do shells get their the shape?

Gus: We'll answer that at the end of the show.

Molly: Plus -- as always -- we'll salute *our* heroes -- the kids who power our show with their ideas and curiosity. It's the Brains Honor Roll.

Gus: So keep listening.

Molly: This is Brains On! I'm Molly.

Gus: I'm Gus.

Kara: I'm Kara!

Gilly: And I'm Gilly!

Kara: We're two lovable viruses who are 100% ready to steal the show!

Gilly: That's right. This is...

Both: Going Viral with Kara and Gilly!

Gilly: First. Kara. Let's catch up. What have you been up to lately? Any good infecting?

Kara: I haven't done too much infecting lately becauuuuuuse, (drumroll) I adopted a pet carbon atom! Her name is Debra. She's SO cute.

Gilly: Oh! So great. Where'd you find her?

Kara: You know, I've been looking around for a while, hitchhiking on cells and bacteria when I can.

Gilly: Little road trip? Nice to get away.

Kara: Right, since viruses can't move on our own, we need other things to move us around,

Gilly: Not super convenient.

Kara: But in the end, Debra actually came to me! She's right here, say Hi Debra,

Gilly: Oh I didn't see her at first, there she is! (baby voice) HI DEBRAAAAA!

Kara: Oh she's feeling shy,

Gilly: Aw, it's hard to meet new infectious things (baby voice) when you're just a wittle itty bitty teensy weensy carbon atom. I mean, dang, we're small, but atoms are still so much smaller! Wow. OK. Let's do the show.

Kara: Today! We have SUCH a really special show! for you! with a really, really special guest and actually Oh my gosh we are such big fans, i actually, oh my --

Gilly: Kara, deep breath, get it together. Mr Zimmer, we are so glad to have you on — can you give us a little intro?

Carl: My name is Carl Zimmer, and I'm a writer. I write for the New York Times and I write books, including one called a planet of viruses.

Gilly: See? Can you tell why we love this guy???

Kara: Ok. Carl. Can I call you Carl? Everytime we meet one of our heroes we like to do a hero hug.

Gilly: Whaddya think, Carl? Bring it in?

Carl: Thanks, Kara and Gilly but I think I'm going to I keep my distance.

Kara: O....kay. I guess we'll infect -- I mean *hug* you -- later.

Gilly: Anyway, We're still so excited you're here today!

Kara: So excited that we thought we'd do a mashup of two of our favorite things.

Gilly: Favorite thing number 1! people who write about viruses! That's you Carl - hi!

Kara: Favorite thing number 2! Fan Maaaaail! These are some super smart questions we've gotten from our devoted viralinos. Hit it!

Hello, my name is Cenia. And I'm from Ottawa, Canada. Do viruses eat?

My name is Sebastian and I live in Norway. How many virus species are there in the world?

Hi, my name is Iris. My question is, are some viruses good?

Kara: Fascinating questions, viralinos. So, first, eating — not something I think much about, but maybe that's just me. What about you, Gilly?

Gilly: No — I always wondered why humans are constantly shoving stuff into their face holes?

Carl: Viruses don't eat. And some people have said, well, viruses don't eat, are they really alive?

Kara: Rude! Just because we have different activity choices than “some people”??

Gilly: It's OK Kara, I mean -- *are* we alive? Honestly, I'm not sure. It's one of the great mysteries of our time. Like, is a taco a sandwich? Speaking of food -- take us back to the eating, Carl.

Carl: Viruses are really different than the rest of life. You know, like, a cell, it has its own fuel, and it can make its own fuel. And it can use that fuel to do all sorts of things that need energy. But, you know, a virus doesn't have that all. All a virus is, is just a package of genes inside of a container, like a protein shell, maybe or an oily membrane. That's it.

Kara: Yeah. I'm just a package of genes -- and a dream.

Gilly: We pretty much invented traveling light.

Kara: Yep all I pack is my jeans — my jorts, or jean shorts, jean jackets, jean vests...

Gilly: Kara, no — not denim! Carl means your genes with a g, your genetic instructions.

Kara: Oh right those genes. The ones we viruses shove into cells! Then, we hope for the best. I've never really asked a cell what happens next...

Carl: basically the cell just takes over. And the cell just uses the instructions and the virus's genes, and uses its own energy, its own fuel to build new viruses.

Kara: BOOM! life hack! Other things eat to get energy. But us viruses, we don't need energy! We just make big ol' cells do all our work for us! So we don't need food! We're super resourceful like that.

Gilly: K. Next let's talk virus species.

Kara: I feel like I never get invited to my family reunions for some reason, I have no idea how many of us there are!

Carl: There are a lot of viruses. Some scientists estimate that there are several hundred million species of viruses. Some scientists have actually estimated that there might be trillions of species of viruses.

Kara: Trillions of species? Wow.

Carl: If you could stack them up in a little tower, they would go out past the moon, out of our solar system, out of our galaxy, and go many, many light years away. So that's, you know, more viruses than there are grains of sand, more than there are stars in the sky. So we really do live on a planet of viruses.

Gilly: I knew it.

Kara: We rule.

Gilly: Which brings us to the goodness of viruses! So, are viruses good?

Kara: I mean, I know we're good at karaoke and crossword puzzles and flying out of noses during sneezes. But like, are we good for the world?

Carl: So there are lots of other viruses like you, Kara and Gilly. And if people say, well, is a virus good or bad? You know, we have to say, Well, good or bad for who? For you, you know, you may want to make lots more viruses. And so if you can make more viruses that's good for you as a virus. For me. If you're making viruses in my lungs, that's not so good for me.

Gilly: ... Yeah. I could see that.

Carl: But you know, there are some viruses that are actually good for the things that they're living inside. So, viruses live inside of us.

Kara: Oh, yeah, living in a human, that's the dream — I'm hoping one day I wake up in the back of a throat,

Gilly <wistfully>: Or maybe in a small intestine,

Kara: Oh — sorry, Carl, we're getting carried away. Those are viral infections that might make humans sick.

Gilly: Probably not so good for you. What kinds of things are those “good-for-humans viruses” up to?

Carl: They don't infect the human, they infect the bacteria that *live* in us humans.

Gilly: OK so wait -- tell us more about these bacteria — how many live inside of you humans?

Carl: Maybe, 30 trillion bacteria. And, they get infected by viruses. As the bacteria get infected by the viruses, that keeps their populations down, so that you don't have one population that's exploding and maybe making us sick, because bacteria can make us sick too. So I'm very happy to have viruses inside of me as long as they're helping me to stay healthy.

Kara: Carl, I bet your viruses love you right back!

Gilly: Definitely. Thank you so much talking with us today, Carl! So fun.

Carl: Hey, my pleasure, good talking to you.

Kara: One more try for a hero hug?

Carl: No, thanks. I'll just wave.

Kara: Fair.

Gilly: That's all we've got for you, Viralinos. You know what to do.

Kara: Stay infecty and don't get sanitiiiiiiized!

Molly: Ok, Gus. We got our podcast back and it's time to revisit that mystery sound one more time. Here it is again.

(Mystery sound plays)

Molly: All right. So last time you were thinking beads, rainstick. Do you have any new thoughts about what it might be?

Gus: Maybe they're using like, a metal scooper to scoop beads or like those tiny little beans that you can use for crafting? And they're super, super dried up? And they're like, hard as tiny rocks?

Molly: Yeah. I do know what you mean. So you're thinking like, you hear like little round things? Is what you're what you're hearing.

Gus: Yeah.

Molly: Okay. Well, here is the answer.

Azalea: My name is Azalea. And I'm from Portland, Oregon. And the sound you just heard was me swishing around corn kernels in a box that I made called a calming box. And it makes you feel really good when you put your hands in it.

Gus: Oh, yeah.

Molly: So you were close. It was corn kernels, which is very close to that dried bean idea.

Gus: Yeah, corn kernels feel very good to put your hand in.

Molly: They definitely do. So do you have anything like that? That sort of helps you calm down when you're feeling maybe a little anxious or just need like to take a breath?

Gus: Hmm. Have something sorta like that? It's a little stuffed duck.

Molly: So who is the stuffed duck like a pal you've had for a long time?

Gus: No, I found it. It's been in our house for a long time. It's about 20 years old. But I found it like about a week ago. It looks like if Donald Duck was yellow.

Molly: Very nice. And you have a name for him yet?

Gus: No, I just call him ducky.

(Theme music plays)

Molly: As we all adjust to how our lives have changed, it can help to think of ways you can support others.

Gus: Some people are making masks, others are making donations or writing letters.

Molly: And some are helping to keep their family happy and entertained.

Gus: Hand washing is important, but it can strip away the natural oils in your skin -- so remember to moisturize.

Molly: Scientists think there are hundreds of millions, or even trillions of different viruses in the world, and some of them are even helpful.

Gus: But there's only one way for a virus to do anything: it needs to infect a cell since it can't create energy or make copies on its own.

Molly: That's it for this episode of Brains On.

Gus: Brains On is made by Super Sanden Totten. The Magnificent Marc Sanchez. Mighty Molly Bloom and the Marvelous Menaka Wilhelm.

Molly: We had engineering help from Andrew Walsh and John Miller and production help from Ruby Guthrie, Kristina Lopez and Paulina Velsaco. Special thanks to Phyllis Fletcher, Eric Ringham, Anna Weggel and Tracy Mumford.

Gus: Brains On is a nonprofit public radio podcast.

Molly: You can help us keep making new episodes by heading to brains on dot org slash fans.

Gus: Now before we go, it's time for our Moment of Um...

Lily: My question is: how do shells get their shape?

Mike: My name is Mike Sanchez. I am the naturalist center educator at the New Mexico Museum of Natural History and Science. I consider myself an amateur concologist: a person who studies seashells. They study the animals that make the shells as well. Mollusks, those are snails, clams, squid and octopus. When you see a sea shell that's an empty thing that is the, what's left from an animal that made it. The animal is progressively getting larger and larger and

larger. And as it is it has to have a bigger and bigger house. The shell, then, is its protection. So the animal is kind of like I said a squishy animal, but it has an organ that is called the mantle. And the mantle, what it does is it lays out a thin layer of protein, that is then acts as the mold that will then make the shape of the shell. Now, in seawater, there is also another mineral called calcium carbonate. They pull that calcium carbonate from the seawater into their blood, and then they lay that down on the protein layer in order to then make the seashell. When the mantle comes out, it's kind of like putting your hand in a glove, your fingers always, always line up. When you look at a seashell, and you see the color on it, what they're finding is that the mantle can taste those little color patterns, and as the mantle then comes out, it then touches those little areas with a color pattern. And it knows exactly how to line up in order to make the shell look like the way it should. Even and symmetrical is very important for shells because otherwise if you can imagine trying to carry around something that isn't easy to move because it's lumpy or twisted around or snags and things, it would be very difficult for the animal to be able to carry.

Molly: These names come in all shapes and sizes. It's time for the Brains Honor Roll. These are the remarkable listeners who take the time to share their curiosity, questions, mystery sounds and drawings with us.

(Honor Roll)

Molly: We'll be back soon with more answers to your questions.

Gus: Thanks for listening!