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MARC SANCHEZ: You're listening to Brains On. I'm Marc Sanchez and I'm filling in today for our regular host Molly Bloom. She's on a special assignment for a few months, so producer Sanden Totten and I will be filling in for the next few episodes. And by special assignment, I mean, she had a baby. Congratulations to Molly and her husband, Andy, and a big welcome to the world to Lulu.

And if that's not exciting enough, stick close because today's show is an all out super duper, crazy mystery sound extravaganza. I know some of you might be shaking your heads in disbelief, but it's true. Today's show is nothing but mystery sounds. So let's get to it. It's time for the mystery sound. Here it is.

So, what do you think? I don't know, when I first heard it, it kind of sounded part robot and part ghost so I thought maybe ghost-robot. Yeah, probably not, probably not. Keep thinking about it and we'll hear the answer a little bit later in the show. Right now, I want to play some mystery sounds that came to us from listeners just like you, and you, and you over there, hey, hey, hi, I see you. Keep sending those sounds in because we love them.

The first listener mystery sound comes from London, although that's probably not going to help you. Just have a listen. OK, that went by pretty fast. Let's hear it one more time. It definitely had kind of a machine-like quality to it, not human. All right, here is the answer.

IVY NICHOLS: That mystery sounds the sound of my sewing machine. I first learnt sew when I was about 7 and then I got a sewing machine for my ninth birthday. I like it because it's quite fun, creative activity and and it makes a really nice noise. My name is Ivy Nichols. I am nine years old and I live in London.

MARC SANCHEZ: Hey, thanks, Ivy. That was great

ALL: (SINGING) Ba ba ba ba ba ba ba ba ba ba Brains On.

MARC SANCHEZ: All right, this next one is tricky and it's subtle, so listen closely. Are you ready? Here it is. That's kind of a toughie, right? When I first listen to that one I thought, Oh, man, I got this. I know exactly what this is. It's fire. Well, it turns out it's not quite right, in fact, that's totally wrong. So if you guessed fire, quick, change your answer. This was sent to us from a brother and sister duo in Fort Worth, Texas. Here they are with the real answer.

SUBJECT 1: That was the sound of our silkworms eating mulberry leaves. I like that sound because it sounds like rain and it's soothing. There were almost 80 silkworms eating at once.

SUBJECT 2: Last summer, we bought silkworm eggs and watched them grow. It was fun. We even made necklaces out of some of the cocoons. I'm Novella from Fort Worth, Texas and I'm 7 and 1/2 years old.

SUBJECT 1: I'm Lucas from Fort Worth, Texas and I'm 10 years old.

MARC SANCHEZ: Thanks for sending that in Lucas and Novella. I'd never even thought about silkworms making noise, who knew? Well, I guess we all know now thanks to your mystery sound. OK, now, it's time to get back to that sound I played at the beginning of this episode. Let's take one more listen before we hear the answer. Any new guesses? All right, here with the answer is Dr. Josef Parvizi

DR. JOSEF This sound is sound of brain, human brain. You are hearing brain waves.

PARVIZI:

MARC These brain waves come from a device Dr. Parvizi created with the help of his colleague at Stanford University,
SANCHEZ: Chris Chafe. Chris is actually a musician and composer who is really interested in how computers can analyze and create music. Together, they built this device that can listen to your brainwaves and they call it a brain stethoscope. Dr. Parvizi uses it to help treat patients with epilepsy. That's a condition where someone keeps having unprovoked seizures.

And if you listen closely, you can actually hear to brain waves. That's for the two hemispheres of the brain, two halves. Dr. Parvizi and his team decided to give the left hemisphere a lower sound. Personally, I think it sounds like a robot, and that higher pitch down, that's the right hemisphere. So far, we've been listening to normal brain activity. This is what a healthy brain sounds like. Dr. Parvizi listens to people's brainwaves before, during, and after they have a seizure.

DR. JOSEF A seizure is when brain waves no longer have their normal rhythm. That causes impairment of consciousness for
PARVIZI: a patient who's having seizure. Usually when a seizure begins, patients feels sometimes sense of nausea, sense of deja vu. Sometimes they have tingling in one side of their body, sometimes they see vision, sometimes they start having twitches in one arm or so, and sometimes seizures just come like a storm and patient goes into convulsions. This is the time when a patient falls down and shakes all over the body.

MARC Dr. Parvizi likens having a seizure to being at a football game where all the fans are yelling the same thing. So
SANCHEZ: normally, you might hear cheers and whoops, and hollers and whistles, and you'd hear these sounds at different times. They're asynchronous. So even when that rowdy group of fans in section H all starts to chant, defense, defense, they're still not quite saying at exactly the same time. But imagine if everybody in the entire stadium started yelling the exact same thing at the exact same time. That's what happens in brain cells during a seizure. They all start firing at the same time.

You hear how the higher pitch sound is kind of acting the same, that's the right side of the patient's brain during a seizure. And listen to the left side, that's the lower robot side. It still sounds normal like it did earlier. And then we hear the right side slow down. That's how we know the seizure on that side has ended. But, then the left side picks up. And after about a minute,

DR. JOSEF Now, you're hearing that both hemispheres are kind of tired. The cells are not firing in the same way as before,
PARVIZI: and at this point, the patient is severely confused, looking around, or slightly not making sense of what is happening.

MARC These brainwaves come from a woman who used to have several seizures every week. They were tiring for her
SANCHEZ: brain and her body.

DR. JOSEF This patient was being monitored with electrodes that are implanted inside the brain to see where the seizures
PARVIZI: begin, can we find a source. And fortunately, in this case, we found the source of the seizures and we removed the source, so you take out the cells that are causing seizures, and patients became completely seizure-free.

[MUSIC PLAYING]

MARC SANCHEZ: Have you guys been hearing mystery sounds where you live? I knew it. You can send them to us email your recordings to brainson@mpr.org. That's brainson@m-- as in Minnesota-- pr.org. We love hearing your mystery sounds and questions. In fact, that's how we decide what our shows are about.

If you want to follow us on social media, we're on Instagram and Twitter @brains_on or you can search for us on Facebook. We're there too. Go on, give us like. And we've got some really super big news coming up. So if you want to be totally on top of your Brains On game, you've got to head over to our website and sign up for our newsletter It' time for us to say thanks to you for sending in your amazing questions, comments, drawings, and high fives. Here's the latest installment of the brain's honor roll.

[MUSIC PLAYING]

[LISTING HONOR ROLL]

SUBJECT 4: You're listening to Brains On,

SUBJECT 5: Where were serious about being curious.

MARC SANCHEZ: All right, you guys, pay attention. It's time for, Ready for the next mystery sound? Here it is. Whoa, that is some deep bass going on there. Let me see if I can get that deep. No, I cannot. I cannot get that deep. What do you think makes that noise? Why don't you think about it for a little bit and I'll be back with the answer at the end of the show.

The state of Michigan is home to four Great Lakes, Lake Erie, Lake Superior, Lake Huron, and the obvious one of the bunch, Lake Michigan. But wait a minute, this is a mystery sound episode. Those are not mysteries, although Erie does sound mysterious. OK, Michigan is also where one of our listeners recorded this next mystery sound. Here it is.

That thing sounds big and possibly dangerous. I don't know, definitely not silkworms. I mean, if that's the sound of a silkworm, we should all run and hide because it sounds like a giant fire breathing monster silkworm. And besides, you already heard what silkworms sound like, remember. Here's six-year-old Corinne Bailey with the answer, which is definitely not silkworms.

CORRINE BAILEY: This is the sound of my grandpa starting his tractor. I like that sound because I get to ride with my grandpa on the tractor. We use the tractor to pick up crops and plow. My name is Corinne Bailey from Stanwood, Michigan and I'm 6 years old.

MARC SANCHEZ: A tractor. I told you it wasn't silkworms. Thanks, Corrine. In other non-silkworm related events, we have our final listener submitted mystery sound. This one comes to us from the capital of Arizona, Phoenix. Who's ready for it? Me too. Here it is. What do you think of that one? It sounds, I don't know, rich to me. Here with the answer is 7-year-old Quinn from Phoenix, Arizona.

SUBJECT 6: That was the sound of money shaking in my purse. I like that sound because it kind of sounds like waves from the ocean. My name is Quinn from Phoenix and I'm seven years old.

MARC Just imagine waves and waves of money. But wait a minute, that sounded like a lot of change. So waves of
SANCHEZ: money might actually be pretty painful in this situation. I guess I'll just settle for waves and waves of water, Yeah. All right, thanks, Quinn for sending that in.

Now, let's get back to the mystery sound we heard a little earlier in the show. I know you've been thinking about it, but just in case you forgot, here it is one last time. That one almost sounds, I don't know, not of this world and actually, it's not or at least not anymore, sort of. How about if paleontologist Tom Williamson gives you the answer.

TOM What you heard was the sound of Parasaurolophus duckbill dinosaur. People have suggested that these dinosaurs
WILLIAMSON: made sounds. This belongs to a group of crested duckbill dinosaurs or Lambeosaurine duckbill dinosaurs, and they all have these big crests that stick out of the tops of their heads. And the crests are, they're hollow, at least, they're invested with tubing but the tubing is actual extension of their respiratory chambers. So that means when they breathe, the air that they draw in actually passes through this torturous labyrinth of tubing inside of these crests.

The tubing, especially in Parasaurolophus is easy to look at because the whole structure is made out of bone. And so it's preserved in the fossils. So it could be that the other dinosaurs had extensive respiratory tract like this but-- and modern animals do too, but it isn't encased in bone where you can preserve it as a fossil.

One thing that when you see a picture, you don't get a sense of is the scale. We found a skull in the mid-nineties, in 1995. It's missing the front of the snout. But if you attach the front of the snout with the duckbill part all the way back to the tip of the crest, it's six feet long. I mean, this thing is gigantic. So the crest itself is over 3 feet long. So it's almost looks like an alien, this weird skull.

MARC Now, there's no way to be 100% certain that this is what Parasaurolophus sounded like. I mean, nobody was
SANCHEZ: around to document the sounds but Tom Williamson is confident he's coming close with his computer-simulated model. His team took x-rays of a nearly complete skull then they used those X-rays to create a model, and based on the size and shapes and curves of that model, they were able to come up with the sound of Parasaurolophus.

TOM Any time you have any, sort of, a long tube, if you can excite it to create a sound, it will be naturally resonant. It
WILLIAMSON: will broadcast at a particular frequency. So the longer the tubing, the lower the frequency, sort of, naturally wants to vibrate at. The nickname of this dinosaur is the trombone dinosaur.

MARC Such a cool noise. Can you imagine a sound like that coming out of the top of your head every time you took a
SANCHEZ: breath? Not a very good asset when you're playing hide and seek I would think, but nonetheless, totally amazing. So that's it for the mystery sound extravaganza. What do you guys think? You can let us on our Facebook page and you can tweet at us and check out our Instagram feed at [brains_on](#).

We get a lot of cool drawings inspired by Brains On episodes cool, dinosaurs, and robots, and spaceships. If you want to send us one, we would love to see it. Head over to our website [brainson.org](#). Click on the Contact link and you'll find our address and email. While you're there, how about signing up for our e-newsletter. It's a great way to keep up with all things Brains On, and keep sending in your questions and mystery sounds. Who knows, you might even end up on the future show.

Thanks for listening to this episode of Brains On. Well, that's not quite the end. For those of you who stuck around this far, we've got an extra special treat. Get your dancing shoes on because, really, what would a mystery sound extravaganza be without a mystery sound remix?

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