

Transcript of Interview of Sarah Schenck and Steven Lawrence with Francesca Rheannon of Writer's Voice

Our microbiome, what does it do and what's happening to it?

We could not digest our food without microbes.

It's really the microbes in our guts and in our stomachs that are processing our food and making those nutrients available to us.

They synthesize our vitamins and they perform the incredibly critical function of, they're our immune system.

Our microbes provide our defenses against outside pathogens and other organisms that can cause us disease and distress.

And here's the scary part, which is encapsulated by your title, The Invisible Extinction.

You say in the film that we've lost possibly 50% of our internal biodiversity and that it's happening even faster than climate change.

What does that mean for us?

We learn the answer to that question this hour.

We talk with Sarah Schenck and Stephen Lawrence about their film, The Invisible Extinction.

It's about the threats to our life-supporting microbiome and the scientists racing to save our vanishing microbes before it's too late.

This is Writers' Voice, in-depth conversation with writers of all genres, on the air since 2004.

Thanks for joining us this hour on the station and at writersvoice.net.

I'm Francesca Rheannon.

Our microbiome, the collection of microbes that live in and on our bodies, is under threat.

Antibiotics, processed foods, and even stress can disrupt the delicate balance of our gut bacteria, leading to a range of health problems.

That could be a factor in the rise of diabetes, obesity, food allergies, and even developmental disorders like autism.

People living in modern societies are experiencing what our guests this hour call an invisible extinction of the biodiversity of organisms in our bodies.

In their film, *The Invisible Extinction*, Sarah Schenck and Stephen Lawrence follow two scientists, Gloria Dominguez-Bello and Marty Blazer, into places like the Amazon jungle.

They also follow other researchers in China and Israel, all of whom are on the hunt to find out what is killing our microbes and what we can do about it.

Sarah Schenck is a writer, director, and producer who makes films to advance public health.

Previous films include *Virgin and Slippery Slope*, and an episode for the PBS weekly news program *Need to Know* that focused on childhood obesity.

Stephen Lawrence is a producer-director who's been making documentaries for over 30 years, including *The Cat Rescuers*, winner of the 2018 Hamptons International Film Festival Animal Rights Award.

He's worked with Michael Apted on several films, including *The Long Way Home* and *Married in America*, and he created the Emmy award-winning series *Born in the USSR*.

We began our conversation with Sarah Schenck as Stephen was delayed for a few minutes.

Sarah Schenck, welcome to Writer's Voice.

It's great to be here.

Thank you for inviting us.

The Invisible Extinction is just an amazing film.

First of all, it's a really beautiful film.

The topic is scary, but the film cinematographically is really gorgeous.

...

Oh my gosh, I'm so glad you asked that question because we had the privilege of working with some wonderful artists.

I'm guessing you might be talking about not only the shooting of the film, but also the animation and graphic design?

Yes, all of it.

We probably auditioned, I'm going to say close to two dozen companies to create the visual aesthetic for the film, specifically the world of the microbiome, like the microscopic world inside ourselves that you can't really visualize, but is so important.

It's really a main character in the film.

A London animation, graphics and animation company called Bluesville, they were the first of all of these very talented and hardworking groups of people who were able to capture, for example, the way that it might look in our fantasy of how a baby passes through the mom's birth canal.

We had so many different versions of that and we wanted it to be somehow magical and exciting but also give a sense of the absolutely fundamental role that microbes play in that transit from being in utero to being out in the world.

That's really the very first time that most babies acquire their, it's called

the inoculum, the swathing with microbes because for the most part, the uterus is a sterile environment.

Babies are not exposed to microbes until they're being born.

What we know is that the microbes in a mom's vaginal canal are ideally optimized to prepare the baby to start eating and surviving outside the womb, whereas kids who are born via C-section, like me, I was actually born via C-section, often don't get those same microbes that help us adapt as humans to this outside world.

Yeah, and I have to say, just the C-section apart because we'll get back to that, the microbes are beautiful in this film.

Thank you.

That's, you know, if you're amenable, we can put a link to Bluesville and some of our other key collaborators in the description of your podcast because they really went above and beyond and added a whole level of beauty and mystery and magic to the film that was really a beautiful gift to us as filmmakers.

And it is so important, I think, to do that when you're tackling a subject like this.

And the subject, as our listeners will know by now, is microbes, the microbiome.

Tell us what is the microbiome?

You are asking the key question.

I didn't know what the microbiome was.

And it is kind of most simply put, it is a collection of all the tiny microscopic organisms that live on us and in us.

And when I say organisms, they are living creatures, usually single-celled, and that is bacteria, but it's also fungi, it's viruses, and parasites.

So anything that's a teeny tiny single-celled organism, viruses, there's all sorts of debates in the scientific community that viruses are really just a couple of pieces of DNA that aren't really alive unless they're with a host.

But leaving those kind of esoteric conversations to the side, that's what the microbiome is, that collection of organisms that live on our bodies, on our skin, and primarily in our guts, but really throughout our bodies.

And they're a very big part of our mass.

We wouldn't be able to live without them, isn't that right?

They're right on target.

And the easiest functions for us to talk about are we could not digest our food without microbes.

It's really the microbes in our guts and in our stomachs that are processing our food and making those nutrients available to us.

They synthesize our vitamins and they perform the incredibly critical function of, they're our immune system.

Our microbes provide our defenses against outside pathogens and other organisms that can cause us disease and distress.

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First of all, what does that mean for us?

Oh, just a minute here.

Steve is joining and now we are joined by Stephen Lawrence.

Thank you so much for coming on.

You are a co-producer with Sour Shank, who we've already started talking with.

And now that you're here, Steve, and I want to ask the both of you, what moved you to do this film, *The Invisible Extinction*?

SL: *For me, the film is personal.*

My reason for making the film is that I was a victim, let's say, of overuse of antibiotics, which had a terrible impact on my health.

And this happened to me many years ago, going back about 30 years when no one was talking about the microbiome.

The word didn't even exist as part of the public discourse.

And even today, very few people are aware that we have an inner ecology that is absolutely fundamental to our health, from our earliest days through the development of our immune system in early childhood and throughout our adulthood.

And there are huge issues in the world now with sustainability.

We're facing a climate catastrophe, the outer ecology that we all know, but very few people are aware that our inner ecology has been decimated to a great extent.

And I wanted to make a film that would raise awareness about this so that people would start to understand the importance of their gut microbes and take action to help themselves and to understand that science is moving in the direction of trying to protect and restore this important, essential, and until most recently, invisible part of ourselves.

Yeah, and it's such an important issue.

And I think personal to all of us, we were just, Sarah and I were just

speaking, Sarah was saying that she was born by C-section.

I had not revealed that I already, I had a C-section, and in fact, I could really see some of the impacts.

My son made me think about some of those struggles that he's had growing up.

And so Sarah, tell us, why did you get into doing this film?

Well, funny that you should mention your son, because my impetus for making the film was that I have two beloved daughters who I can't even believe it, they're both older teenagers now, but when I began making the film, they were quite small.

They were two and a half and four.

And my younger child, we tested for allergies because my older daughter got a bunch of hives once when she was exposed to cashews, and it turned out she had nut allergies.

And so the pediatrician, when our second child came along, said, you know what, before you start introducing any nuts, let's just test her and see how she's doing.

So our second child, we tested for a whole variety of allergies and she had none.

And she ate, we were introducing foods gradually as one does at that point.

And she was eating everything without an issue and it was great.

And we all got strep throat and we actually got it.

We moved apartments and we got strep not once but twice in one year and everybody had to take amoxicillin, the antibiotic, to get rid of it, which is common medical practice.

And about six months later, our younger daughter went into anaphylaxis.

We were at a family party, she had a pecan cookie and she started getting red, she started coughing and it took us a very long time to realize she was having an anaphylactic reaction and her airways were shutting down.

And we got her to the emergency room and they said, your child has a severe nut allergy.

And I was like, what?

You know, it was a strange situation that we'd actually tested her and she had no allergies.

And they said, no, no, no, we don't know why, but people can develop allergies at any time and we just don't know why.

And I was so alarmed and really terrified about my daughter's health that I started looking around.

I thought there's some reason why, we don't know why yet, but there's some reason.

And it was that moment coincided with the first publication of the Human Microbiome Project, which was a National Institutes of Health sponsored major multi-institutional research project looking at the microbes of healthy people of a very diverse range, different ages, races, genders of healthy people.

What did their microbes look like?

And the reason we were able to do this as a country was that high speed DNA sequencers, which used to be phenomenally expensive, the technology had become much more affordable.

They're still expensive, but suddenly instead of it being tens or hundreds of thousands of dollars to look at someone's microbes, it was

suddenly a much more financially viable process.

And so our Institutes of Health said, you know, just like we map the genome, let's map the microbes in healthy people's bodies.

And in fact, the first thing I heard about the microbiome was a big article in the New York Times announcing the results of this NIH sponsored Human Microbiome Project.

And it was utterly fascinating.

And it did really revolutionize the way, I mean, not only the way I understood the functioning of the human body, but it really launched a huge international outpouring of new research studies and new ways of looking at health and disease.

So I'm sorry that was a really long answer, but that is, it was a conjunction of my own child's serious health issues and developments on the research front that really enabled us to start seeing much more specifically what microbes do in our bodies and when things go wrong with our microbes, how devastating it can be to our health and wellbeing.

And it's so interesting because both of you have personal connections to this story.

You also follow in this film, the invisible extinction, you follow two microbiologists, Gloria Dominguez-Bello and Marty Blazer, who happened to be married to each other, but they also have kids who have had real issues as a result of being exposed to antibiotics in one case and in another case, or maybe several of them, to C-sections.

So we've already now identified some of the causes of why we are having this inner extinction in our bodies.

Antibiotics, huge, huge problem.

C-sections also.

But I would bet the antibiotics may be the major culprit here.

Is that correct?

Yes.

I think that, yes, I think Marty Blazer and Gloria would agree on that.

Do you want to say a little bit more about, you know, how did antibiotics get to this point where they're wiping out half of our microbiome?

Well, they are miracle drugs and they came into common use during World War II and afterwards, and they've saved probably hundreds of millions of lives that would have been lost previously.

But the antibiotics that have been used for all these years are predominantly broad spectrum and they wipe out a lot of your microbes.

And they have been used, not necessarily indiscriminately, but often unnecessarily handed out as treatments for illnesses where they're not appropriate for a cold that is viral.

And look, they were so miraculous when they first came out that they became popularized as kind of a cure-all, not just in the US, but around the world and especially so in China.

And so we're in this moment where the consequences are finally being studied and are becoming obvious and there's a great need for stewardship of antibiotics.

So they remain useful, development of new antibiotics to address a problem that we focus on in the film a bit, which is antibiotic resistant bacteria, which can be lethal and are currently killing over 20,000 Americans each year.

SS: Before we go on, can I make one small clarification, Steve?

Sure.

So what Steve said is very important and is one of the cornerstones of our film, but we want to make sure that viewers understand clearly that antibiotics are, they are actually wonder drugs.

We desperately need to preserve the use of our antibiotics.

They're precious, important treatments.

And some people talk about them as the medical miracle of all time.

And there's a good reason to think that.

What our film specifically opposes and wants to make sure regular people like ourselves, Steve and I aren't scientists, we're not physicians.

We are people who wish we had known earlier in our own lives that the overuse and the misuse of antibiotics is something to be staunchly avoided.

And that's because half of, as you learn in the film, a third to half of all antibiotic prescriptions in the United States are completely useless.

And that means they're being prescribed for illnesses that won't respond to antibiotics.

When you use an antibiotic for a condition that doesn't, won't respond to it, you're losing healthy microbes in your body with no potential gain.

So there's collateral damage happening to your immune system and your body's ability to function with absolutely no upside.

So one of the things that we would consider a great success as filmmakers is if we can reduce the number of antibiotic prescriptions being given to people who have no potential for benefit.

And in the United States, the number is a third to half of all antibiotic prescriptions.

In other countries like China, China is using five times the number of antibiotics in humans as we use in the United States.

So it's really an alarming situation and we want to do our part to reverse it.

If you've just joined Writers Voice, we're talking with Sarah Schenck and Stephen Lawrence, the filmmakers, the directors of *The Invisible Extinction*.

Now yes, and you haven't yet mentioned actually the fact that something like 70 to 80% of all antibiotic use is to farm animals, animals that are being raised in these concentrated feeding stations to make them grow better and also to keep them from getting sick because they're being crammed in so many thousands of them.

And that's a terrible contributor to this issue.

You're so right.

And just one small clarification.

I thought when I started making the film that the reason we gave antibiotics to animals was what you said, which is that they're all squished together and they get sick and we want to prevent them from getting sick.

That's not actually the case.

The primary use for these hundreds of thousands of tons of antibiotics, you're right, it's 70 to 80% of all antibiotics in the United States go into livestock feed and it is to make the animals get fat faster and bring them to market faster.

So it's cheaper.

What Marty would say is we are losing the use of our antibiotics for cheap meat because they noticed in the beginning when they gave

antibiotics to cure animals infections, that was back in the 1950s, they noticed, oh wow, these animals are growing bigger, faster, and we can save money as farmers doing that.

Of course, when scientists started looking at that, they thought, oh, if these antibiotics are making our animals fat faster, what are they doing to our children?

One of the other alarming statistics in the movie is that by the age of three, most children have gotten three courses of antibiotics and it stays, it's kind of stays at that pace until kids are 18.

One course of antibiotics a year.

And what we know is that a lot of the time kids don't need these courses of antibiotics.

If you have an ear infection, you can often ask your pediatrician, is it okay if I wait a day or two before doing the antibiotic?

And we're again, trying to encourage people to have a little bit more nuanced and thoughtful usage and conversations with their doctors about how and when to use antibiotics.

That's right.

And Steve, there's also a relationship of this, I mean, just like animals are getting fat, people are getting fat and diabetes.

So connect the dots for us.

Well, there isn't hard proof of that yet in microbiome science.

There's a lot of correlation and Marty Blazer is optimistic that the research will pan out in the end.

I mean, certainly we know that your microbiome mediates how you process sugar and you can reduce sugar spikes and possibly reverse diabetes.

You can right now reverse pre-diabetes through eating a diet based on your microbes.

So we know there's a relationship between diabetes and obesity.

We see in the film as one goes up, so does the other.

But it may be a few more years before the hard science is available to prove that point.

Anyway, it was Marty's eureka moment, as Sarah mentioned, of wondering if we're doing this to our animals, are we also doing it to our kids?

And certainly obesity has grown enormously in the United States over the past generation or two and it's a problem globally.

I just wanted to circle back very briefly to the question you were asking about antibiotic use in livestock.

It is illegal now to just give animals in the United States antibiotics.

They have to be ill to be treated with antibiotics.

And they've also been banned in China for that reason.

But that doesn't mean that the law is enforced.

And we don't know when it will be enforced, if it will be enforced.

This is a challenge.

But if you talk to scientists like Marty and Gloria, despite the fact that there are antibiotics that get into the water supply, that get into the food supply, they still feel that it is human use of antibiotics, prescribed antibiotics, or people getting antibiotics, perhaps in other countries without prescriptions, that are driving loss of the microbiome more so than use in animals.

Now, one of the most fascinating parts of this, in general, fascinating film, *The Invisible Extinction*, is when the two microbiologists, Gloria Dominguez-Bello and Marty Blazer, go to the Venezuelan Amazon to visit indigenous tribes.

What do they find there about the microbiome of those tribes, and why, Sarah?

They find that there is a rich diversity in their microbiomes that we have, by and large, lost.

The statistic there is that people living in traditional cultures, for example, in the traditional peoples that you see Gloria working with in the Amazon, they have twice as many species of microbes that we have.

And it looks like that diversity is protective from a health standpoint.

Many of the chronic illnesses that researchers are increasingly connecting to a diminished microbiome, things like asthma, as well as diabetes, obesity, food allergies, they are virtually unheard of in these traditional populations.

So we salute Gloria's idea of safeguarding these microbes, most especially for the traditional peoples themselves.

I think it's the Ye'kwana, I'm sorry if I'm mispronouncing that, the Ye'kwana, with whom you see her working.

Of course, they want antibiotics because people in the Amazon, traditional peoples, die at 50 because of infectious diseases, accidents, things that we don't worry about so much anymore.

What Gloria would say is that antibiotics are a human right, and we cannot deny traditional people's antibiotics because we want, for their own sakes or for our sakes, to preserve their microbes.

It is a human right for them to get antibiotics when they need and want them.

But we do want to see if we can minimize the damage to their microbiomes while also hopefully gaining insights into how we can help all people lead longer and healthier lives.

And you talked before about the development of antibiotic-resistant bacteria.

You have one woman you follow in the film, a woman who got this antibiotic-resistant infection called C. diff.

She was very, very sick, and she got cured with a fecal transplant.

So first, talk about this method of cure, fecal transplant.

And then, you know, she had another problem that came about, and it's so interesting why she thinks that problem happened.

Well, fecal transplants were used centuries ago in China and were not adopted into Western medicine.

One of the Chinese doctors in the film, You Xin, points out that fecal matter was used in a soup to cure Chinese people of diarrhea.

So here we are in the 21st century, and I don't know exactly when it was first used in the United States, maybe 15 or 20 years ago.

It was discovered that giving, infusing a person with C. diff, infusing them with a healthy fecal transplant, meaning healthy microbes from a healthy donor, has something like a 95% cure rate for an infection that can be resistant to antibiotics, and if it doesn't kill you, will make you absolutely miserable, as it did Teresa in our film.

Teresa, because her C. diff was not being cured by antibiotics, got a recommendation from her gastroenterologist to try a fecal transplant, and this was in the early days of FMT.

And she decided to use her daughter as the donor.

It was recommended that that was a safe thing, someone in your family.

And a certain amount of screening was done in those days.

But her daughter was overweight, and after Teresa got the fecal transplant, she began to gain weight herself.

And she came to the conclusion that, and it wasn't just a little bit of weight, it was a lot.

She went from, I think, 127 to 187, and then higher.

She came to the conclusion that the new microbes, the alteration in her microbes, getting microbes from her daughter, who had a tendency towards obesity, had resulted in making her obese.

And so she enrolled in a study at Mass General Hospital in Boston to see if FMT, fecal transplant, from healthy donors, can help people who are obese lose weight.

Yes, and we won't tell people the outcome of that.

No spoilers.

Yeah, exactly.

And we'll take a short break now from our conversation with Steve Lawrence and Sarah Schenck about their film, *The Invisible Extinction*, to hear the trailer from that film.

Welcome back to *Writer's Voice*.

I'm Francesca Riannon.

And now back to our conversation with filmmakers Sarah Schenck and Stephen Lawrence about their documentary *The Invisible Extinction*.

Now, you mentioned China, and it's so interesting when you go to China, that's the part of the film *The Invisible Extinction* that deals with the

connection between the loss of microbiome diversity with autism.

And in this case, there is some real improvement with treatment.

So talk about what you discovered in China.

That's a tough one.

We did discover, or we did follow this very brave doctor who again is another, she's a physician and she's leading this work using poop transplants to arrest and ideally reverse autism in kids, in part because she has, one of her sons has severe autism and she was seeking a way to make his life better.

So that technique of using fecal transplants for autism was pioneered in the United States and in Australia.

And it isn't being used generally in children because we have stricter regulations for experiments involving minors.

And so it was a wonderful opportunity to see what's happening in this realm of research in this incredibly important part of the world.

This is before COVID and we are really, whatever's happening in one part of the planet, whether it's COVID or something else, it's going to affect other parts of the planet.

And it would be great if it could happen in positive ways like research in one country benefits everyone around the world who is faced with those same challenges.

It's important for us to also mention, because there are so many families who are touched by autism, who are looking ardently for ways to make their loved one's lives better, that while you do see Ningning, the boy in the film, distinctly improve in terms of his interpersonal interactions as well as his schoolwork, it's not clear how much those benefits can be sustained over time without constant reinfusion.

There are people here at Arizona State University working with fecal

transplants in adults with autism and their research is looking promising, but it's definitely still a long way to go.

And I feel like for people who are listening to your podcast, Francesca, I also want to kind of like pull back the curtain a little bit from the filmmaking process.

When we were making the film, Yuxin, the doctor in China who's doing this experiment, we actually tracked a couple of different kids who were going through using fecal transplants to treat the autism and Ningning was the one who improved by far the most.

One of the young girls we followed really didn't have any meaningful improvement.

And it's very early days for this treatment.

While it is absolutely proven to cure C. difficile, it's the most effective treatment for C. difficile It has not been proven to work in many of these other conditions where it's being used in an experimental form for autism, but also for food allergies as well, a particular interest of mine, as well as bowel conditions, GI issues.

And I think we do need to let the research lead us before we get too excited about what's going to happen with that work.

Let me just throw in a couple of points here.

A significant number of children with autism have GI problems.

They have irritable bowel syndrome.

And when that's bad, and I can tell you this from experience, it's very distracting.

And the child in the film, Ningning, is one of those.

And we can't say scientifically exactly what is going on there.

But there is some thought that when you relieve that distress, which a fecal transplant can do in some cases, that that could help a child begin to concentrate better and improve their cognitive skills, et cetera, et cetera.

Anyway, the other thing is that FMT is also being used as part of cancer treatment now.

It's been discovered that in the treatment of some cancers, particularly melanoma, that when you're using immunotherapy, if you optimize the microbiome through a fecal transplant from a healthy donor, you can improve the efficacy of the immunotherapy in some patients.

I think there are specific genetic mutations that are involved here where people are better candidates for the fecal transplants.

But the larger point here is that there is a lot that is unknown about the microbiome.

There's millions and millions of bacteria, viruses, fungi in us, and what they do to us, how they help us, and how that help actually happens on an organic, on a biological level.

So we're in the early days of the scientific revolution.

And that's what the film is looking at.

This is a very exciting moment in medicine and in science where the microbiome is being discovered and mapped.

And there's a lot ahead that people can look forward to.

And that's so fascinating.

I mean, you know, we should say that this is not just a revolution in science, but in scientific world view, because it really brings in a much more holistic and system-wide, systemic view of illness and health.

And I think that's a real key aspect of this.

I wanted to also kind of come back to the C-sections, which we had taken up a little bit earlier, because there's another treatment, not a fecal transplant, but a different kind of treatment that is being used.

Talk about that to improve the microbiome picture of infants who are born via C-section, to improve their microbiome.

And I'd like to ask you, you know, is there any indication that that works?

And tell us what it is.

Well, there's three, there's studies going on, not only here in the United States, but also in Sweden and in China of using vaginal swabbing to C-section babies to see if we can improve their microbiological profiles.

And what does improve mean?

There is a correlation between C-section birth and a number of chronic diseases, including obesity, diabetes, asthma.

And so the question is, if we are able to make C-section babies look more microbiologically, like vaginally born babies, can we also reduce the incidence, the higher incidence that C-section babies have of those diseases?

I feel sometimes like when I talk about this stuff, Francesca, it gets really technical sounding.

And so, and that was a challenge for us in making the film, is how to use phrases and words that most people understand and that aren't off-putting in their, you know, in their kind of geeky science technicality.

And so in talking about C-sections, what we know now is that the research, the studies haven't been done.

One of the studies that came out of the Netherlands showed that not

only do the vaginal microbes during a vaginal birth have a good effect on kids, but rectal microbes, and I hope it's not grossing people out, because hopefully we can start seeing poop as sometimes is not a good thing, but poop is sometimes is part of a healthy, our healthy body's ecosystem.

When a baby is born vaginally, that baby is exposed not only to mom's vaginal microbes, but also to her rectal microbes.

And those in combination seem to have a very beneficial impact on the developing baby's adaptation to the world, ability to digest breast milk and just to thrive.

So that, as far as we know, was the only research that was looking at both rectal and vaginal microbes.

The work that Gloria has been doing, which is now out of University of North Carolina, that study is ongoing and we are eagerly awaiting results from that.

The early studies have shown that there is babies that are swabbed with vaginal microbes, even if they're born via C-section, are looking more like vaginally born babies.

But in terms of those longer term health benefits to being born vaginally, we're going to need to wait and see if those come through.

I also, I'm sorry, I'm feeling like I have to make another little waiver here.

Two researchers we met, quite prominent scientists, who had kids born vaginally, excuse me, they had kids born via C-section, they vaginally swabbed their babies.

We don't advise doing that, especially without having a very serious conversation with your obstetrician, because there are bad things that you can transfer microbiologically when you swab a baby.

So I'm sorry, I just had to put that out there because we don't want people to listen to your show and just kind of go DIY, do it yourself,

swabbing their babies.

But it is absolutely something to talk about with your obstetrician gynecologist.

That's great. No, I think that is very important.

This is Writer's Voice, and we're talking with filmmakers Sarah Schenck and Stephen Lawrence about their documentary, *The Invisible Extinction*.

It's about the threats to our microbiome and what scientists are discovering about how to save it.

So now, another fascinating thing that you mention in the film is that microbes may help protect us from coronavirus and also future pandemics.

How does that come about?

How did you discover that?

Well, there is no hard proof yet that the microbiome will specifically protect us from COVID.

It's part of the larger idea that it is absolutely documented that our microbes are a key part of our immune system.

And so we know, you know, COVID is a dangerous disease.

And so we need our immune systems functioning at a tip-top level.

You know, I mean, one of the things we saw early on in COVID was that individuals, for example, who had diabetes or had advanced pulmonary disease, those individuals had a much harder time fighting off COVID and were likelier to get more severe, life-threatening COVID.

Or obesity as well.

It's true.

And then finally, there's a very exciting part of the film, which follows Gloria, who is spearheading the creation of an international microbe vault to safeguard the microbiome that is a threat for further extinction.

I mean, they are taking microbes—she took microbes from the indigenous people she studied in Venezuela and reminded me a lot of the Svalbard seed vault, which you also liken it to in the film.

So tell us about this project and what it can do for humanity.

Well, with the cooperation of indigenous tribes in Venezuela, in Peru, and other places, and with cooperation of the governments, Gloria is creating a microbiota vault.

They are looking for a home for it in a neutral territory where it can be carefully climate-controlled.

And the idea is to have a Noah's Ark of our ancestral microbiome, because it is vanishing.

And as Sarah mentioned, these indigenous tribes that have been fairly isolated until now, they are integrating faster and faster into larger societies where they will be exposed to antibiotics and changes in their diets.

Perhaps their diets are incredibly rich in fiber, which is so critical to a healthy microbiome.

And the hope is that these microbes that they still have inside them will provide cures for diseases, for the modern diseases that we have.

And there's a tremendous amount of research to be done in this area.

But it's a very important, timely project, and you can learn about it at their website, microbiotavault.org, I believe.

That's great. We'll link to that.

And so finally, I'd just like to ask the both of you to weigh in on any personal changes that you might have made in your life as a result of what you learned in doing this film, *The Invisible Extinction*.

Sarah, you want to start maybe?

Sure.

I am embarrassed to admit that, gosh, it was a long time ago, about probably 20-some years ago.

I was in Everglades camping and I got terribly sick.

And I called up my GP here in New York City and I said, please, you've got to call in a prescription, an antibiotic prescription for me.

I am dying.

And he said, way ahead of the curve, he said, I'm sorry, I can't do that.

I can't do that without examining you.

It's just not a good idea.

Do not pressure your doctor to give you antibiotics unless there's a good reason to.

And if there's a good reason to, if you need antibiotics to cure a disease, then yes, you should take the antibiotics.

Related to that is demand.

We're going to put links on our website, demand of our government to develop better diagnostics.

So when you go into the doctor, they can give you, people say you have

to take antibiotics for strep throat.

It can cause a heart issue.

But what Marty told us recently is that there's certain types of streps that are viral that aren't going to respond to antibiotics.

Let's figure out how to get better diagnostics.

So we know that when we're told we need to take antibiotics, that it really is the only and the right decision.

There shouldn't be all this confusion about when we really need to take antibiotics and when they're actually not only useless, but actually damaging our latent defenses.

Another thing that I do, I used to not like fermented foods.

And when I say fermented foods, that means foods that have live organisms in them, like kimchi, sauerkraut, kombucha, certain kinds of yogurts.

But you have to look at the containers because if they're not in the refrigerated section and they don't say live probiotics in it, it doesn't have them.

But those seem to have a real beneficial role.

And actually they are quite tasty and delicious.

Steve just made a little public service announcement for fiber.

You and I, Francesca, cannot digest fiber.

Fiber is only digestible by microbes.

So what we're doing when we eat fruits and veggies and other high fiber foods is we are feeding our good microbes.

So that's, I mean, we have made a point as a family to just always at every meal be having some kinds of fruits and veggies.

And I think the other things that you think of as good health practices, getting out there and moving, being in the fresh air, in contact with soil and water, being in contact with the natural world, animals seem to be beneficial.

Those are all things that contribute to a healthy, diverse microbiome in each of us.

Steven, would you like to add maybe some personal changes that you made?

Yes.

There have been several.

First thing is that going back about four or five years ago, I was pre-diabetic, even though I'm quite thin, but I think this has to do with my microbes and the number that Anabox did on my microbiome over many years.

Anyway, there's a segment in our film about two scientists in Israel, Aran Segal and Aran Elanov, who have discovered the role that the microbiome plays in diabetes and pre-diabetes.

And I went through their tests and they have an app for this now.

And I discovered that apples, which I love and was eating a lot of, were causing sugar spikes for me.

And that if I ate apples with nuts, with a protein at the same time, those spikes would not happen.

And I adopted that diet.

There were other guidelines.

And within a year, my HA1C, which is the marker for pre-diabetes, had come down significantly.

Like Sarah, I am incredibly cautious about use of Anabox.

I can't tell you how many times I've had arguments with doctors and residents in hospitals who said, take this antibiotic.

And I said, no, you have not proven to me that I need it right now.

And then, as someone who has had IBS over many years as the result of antibiotic use, I just want to say something because it's connected to a study that just came out from the UK, which is about how there is a correlation between regular laxative use and dementia.

And the thought of the scientists who did that study is that laxatives are damaging our microbial diversity and that loss of microbial diversity could be connected to dementia.

So this is just another way of saying this field is changing quickly.

Discoveries are happening.

Correlation is the first step, and cause is the next.

And that's what science does.

And I think that's one of the glories of our film, that it shows scientists at work, at work on behalf of humanity, doing that very hard and idealistic work to protect and improve our health.

And it is a wonderful film, The Invisible Extinction.

Thank you so much, Sarah Schenck and Stephen Lawrence.

You are the co-directors and co-producers as well, is that right?

Yes.

It's a wonderful film.

I can't recommend it highly enough.

It's absolutely wonderful.

Now just as a last thing, can you tell us where people can in fact view the film?

For viewers in the United States, the film is available on demand on most of the platforms out there, Amazon, iTunes, Google Play, Vimeo on demand.

It's also available in many countries around the world on different platforms, and it would take too long to get the details.

But Vimeo on demand is the one that is available in almost every country.

So anybody who's listening to this podcast in another country, you should be able to rent the film or download it.

Well that's great.

And I want to finally say, my granddaughter is visiting me with her friend, and I showed the film with them because I had to view it in order to be able to talk with you guys.

And they also love the film.

And in fact, both of them started thinking about ways that they could change the way they eat and how they think about their health as a result of viewing the film.

So it's really wonderful.

Thank you so much.

Francesca, it was a great pleasure talking with you.

Thank you, Francesca.

Sarah Schenck and Stephen Lawrence.

Go to writersvoice.net to find out where you can view *The Invisible Extinction*.

And that wraps up our month of programming for what we call Earth Month.

Although of course, every month is Earth Month, just like every day is Earth Day.

We talked with Stephen Markley about his acclaimed new novel about the climate crisis, *The Deluge*.

Before that, we spoke with Nancy Lawson about her book *Wildscape*, trilling chipmunks, beckoning blooms, salty butterflies, and other sensory wonders of nature.

And before that, we spoke with Lila Philip about beavers, a keystone species that we need to protect as we face the challenges of climate change.

Her book is *Beaverland, How One Weird Rodent Made America*.

You can listen to any or all of those episodes by going to writersvoice.net.

And here's a note about an upcoming interview you won't want to miss.

Next week, we talk with IPCC scientist Joelle Gerges about her powerful book, *Humanity's Moment*, a climate scientist's case for hope.

She takes us on her personal journey as she collaborated with other scientists to produce the latest IPCC report about the climate

emergency, her searing grief at what we've lost and will lose, but also her conviction that we are reaching a social tipping point in support for global climate action.

That's next week.

Then in May, we'll talk with Elon Stavans about the people's tongue, American English, with novelist Katie Simpson-Smith about the weeds, travel writer Jane Marshall about searching for Happy Valley, a modern quest for Shangri-La, and much, much more, right here on Writers' Voice.

That's it this week for Writers' Voice.

Go to writersvoice.net to listen to or download past shows, plus find out more about our guests or read book excerpts.

I'm your host, Francesca Rheannon.