

Mold Matters: Exploring the World of Fungi

Interview With Brantley May

KS

Kendra Seymour

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Hello everyone, and welcome back to another episode of Your Indoor Air Podcast, brought to you by Change the Air Foundation. My name is Kendra Seymour and today I'm joined by Brantley May. And we're going to do a deep dive into the world of mold. We're even going to highlight some of those common players that you might see like Cladosporium, Aspergillus, Stachybotrys, Chaetomium, you get the idea. So if you're living in a home with mold or water damage, or if you've ever done any kind of testing or remediation, this episode will be of interest to you. Thank you so much Brantley for being here.

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Brantley May

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Of course, glad to help.

KS

Kendra Seymour

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Yeah, you are the perfect person for this conversation because of your background and your passion. It really makes you uniquely qualified. For those who don't know Brantley, yet... He is a building scientist and a council-certified Indoor Environmental Consultant with a specialty in Mycology. And certified by the McCrone Research Institute and Ochsner Medical Center for examination and identification of fungal spores and pollen via microscopy. Brantley is certified by the Building Performance Institute as a Building Analyst, Building Envelope Professional, and Infiltration and Duct Leakage Expert. He also holds several certifications related to the identification of mycotoxins, water damage, odor control, structural drying, infectious disease control and energy efficiency issues. And is a student of Mechanical Engineering, he is also a state-licensed mold assessor who carries credentials for teaching and proctoring exams of other professionals to receive their state accreditations and

certifications in the mold and environmental-related services. Brantley, like, your background, it blows my mind. Everything that you've accomplished and you're doing. So again, I can't wait for us to kind of jump right in. But I'm wondering, to kind of reorient the listeners or people who maybe are watching this on our YouTube channel. When we talk about mold. some people think, well, it's just an allergy. It's not that big of a deal. Others panic, because maybe they know about mycotoxins, which are poisons produced by certain kinds of mold under certain conditions. And obviously, when you hear the word poison, that's kind of alarming to think about. So I wonder if we could start off with you kind of just laying a quick foundation of what we mean when we talk about mold and all the parts that make up the mold colony. Because I think it's only then that when we really begin to understand the science behind mold, that we can make those informed decisions on how best to deal with it safely and correctly.

BM

Brantley May

2:36

Yeah, well, you hear a lot of different terms when it comes to mold. So you're gonna hear spores, mycotoxins, VOCs, hyphal fragments, mycelium, there's so many things that go into it. And as a mycologist (which mycology, by the way, is the study of fungus), there is... It's no different than talking to a doctor and hearing arm, leg, eye, nose, gut, brain, and then you know, whatever else, it's just parts of the mold that make up the mold. And I'm probably going to be referring to mold more as fungus throughout this thing, because it's a more broad term. And a lot of times when you're looking at your lab results, they're not just mold. There are also other fungi in there. So when it comes to fungi, the spore itself is the reproductive system. So it's no different than a piece of pollen or a seed or an egg. And over the millions of years, mold has gotten very, very good at disseminating spores, so it can reproduce just like pollen. Right now my car is, like, covered in yellow stuff. Because, you know, it's just that time of the season for pine. So when it comes to spores, right, those are the ones that are really the biggest concern for us. Because that's what's most likely to be in the air just because that's how God has developed these things over the millions of years. Just to let them go and

go other areas to reproduce. Now when that spore lands on a surface, and it's able to grow because of, you know, the proper nutrition and the water and whatever temperature it is. When that spore starts to grow, it's immediately going to germinate and start branching out what we call hyphae, which are basically like roots of mold, right? So the hyphae go into whatever they're trying to eat. And as soon as they recognize, "Oh, this is actually a pretty good spot to live", they're going to start branching out that hyphae and be... Create this network of hyphae. The network of hyphae are called mycelium. And so, it's no diff... Mycelium is basically like the plural version of hyphae. It's the same thing. It's like foot and feet. Right? So when the spore lands, it germinates and you get this network of mycelium and whatever it's growing in. And part of what it does (when it's trying to digest and protect itself), it secretes all sorts of chemicals and gases. Kendra you and I produce gases, too, under our armpits and out of our butt. It's, you know, and it's... The... That's no different, right? So, when it's eating and it's digesting, the mVOCs... The M stands for microbial. VOC is volatile organic compound. So the mVOCs are just gases that come off of the, you know, the fruiting body, whatever, whatever during the digestion phase. So, you're basically smelling mold farts when you walk in, and you're like, "Oh, man, it smells musty in here." Yeah, those are molds eating, and then whatever waste after they've used the energy, it goes out just like we do. So, interesting thing about mVOCs... A lot of people think, "Oh, well, if I don't smell mold, I don't have mold." Right? Well, mVOCs, are only produced (now that you understand the reasoning) when it's actively growing, when it's actively eating. So if it's dry, they're not going to produce mVOCs, because they're not digesting anything, they're dormant. Likewise, I've seen a lot of mold remediators. This is a pro tip that I give to them, when they go in after a job and they still smell it. Or if people think that they solved the water problem, if I'm going in and I smell mold, I say, "No, there's still something wet here." Because it must have moisture to continue to grow. So anyway, diverting from that... So it's going to produce these mVOCs. But similar to that, it's also going to produce something called mycotoxins, which the more technical term for mycotoxins are secondary metabolites. And the reason they call them secondary metabolites... Think about metabolites being like your metabolism,

right? So you're eating and digesting things. It's a secondary metabolite because it's a type of chemical that the fungi use. It doesn't need it to digest that thing or to break it down. But it's a secondary proponent to that to help. And it also is supposed to help with protection for the environment. These are nonmobile beings. So for example, you and I, Kendra, if we need to protect ourselves, we can run away. We have feet, we're mobile, I can punch, I can bite, right? So, things like a tiger don't need to learn how to produce toxins. But things that are immobile. Over the millions of years, they design themselves to say, "Well, how else can I defend myself? So they produce these these toxins." And so it's going to produce these toxins halfway to kind of help digest things, but the other half to kind of protect itself. And these are the mycotoxins that affect us. And so you have from the beginning of the spore that goes down into the substrate (whatever it's trying to eat). It grows this network of mycelium. It starts producing these enzymes and secondary metabolites to start digesting things and protecting itself. And when it's ready to reproduce, up is going to sprout what we call the fruiting body. So all the while, everything we've been talking about has been happening underneath. You don't even see it yet, just like a mushroom, it's all happening underneath. When it's ready to reproduce, guess what pops up out of the grass? It's a little mushroom. And that's exactly what the mold does. And once you start getting enough of them, you know, like 1,000 of them in a cluster or 100,000 in a cluster, you're gonna start seeing them with your naked eye, they're incredibly small. And so that fruiting body is going to then produce more spores, and the cycle is going to continue. So that's kind of the process and learning the process, I guess, kind of helps you learn all the nomenclature too.

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Kendra Seymour

8:38

Yeah, that is probably one of the best summaries I have ever heard anyone give and I loved all your analogies. And I think too, by the time you see mold, there's a lot of mold spores and a lot of lot of things that have been going on. So I know one of the questions we see all the time is, "Do all molds produce mycotoxins?"

BM

Brantley May

9:00

Hmm... So that's been a debate amongst mycologists for a very long time. So all molds, from what we know, produce secondary metabolites. Now, whether or not those secondary metabolites are dangerous to us, is where it starts getting a little hairy. So, for example, I think I'm gonna broaden that a little bit. So do they all produce mycotoxins? I'm going to actually ask: Are all molds harmful? And that might help it a little bit. Help a little bit more understand what's going on here. So are they all harmful to our health? No, they're not. There are lots of fungi out there that actually play crucial roles in our lives, and they don't bother you. So take *Penicillium*, for example. That's... It can be it can be a very dangerous mold. But there are species of *Penicillium* that are actually very beneficial for us. So if you take something like penicillin, right? Penicillin is the antibiotic made by *Penicillium chrysogenum*. So that species in particular creates the secondary metabolite. It's kind of like a brother or a sister to a mycotoxin called penicillin. Well, penicillin, since it's been found and extracted has saved over 200 million lives. That's probably more than mold has actually killed. So I think mold right now, is at a net positive for helping us. You know what I mean? If you look at it like that. But at the same time, you know, you take something like *Penicillium citrinum* (which is extremely damaging), it will wreck you. If I eat that as a pill, I'm gone. Because as such strong mycotoxins... So it depends on the species that you're dealing with. *Penicillium camemberti*. *Camemberti* is what we use to make brie. So it helps us ferment cheese, it grows right on top of it, and it roots into the cheese with its hyphae. And the enzymes from the mold break down inside of the cheese and make it all nice and soft and gooey and delicious. And it's perfectly fine for us. Matter of fact, the Mycelium is nutrient rich. If you take something like yeast, a lot of people are scared of yeast, but it's just another fungus. And it makes nice and... My wife makes nice and healthy breads like sourdough. We use yeast. She, she literally took her, you know, her starter, and she put it right on the counter, didn't do anything with it. And it naturally took the bacteria and the yeast from the air and started fermenting. And we've been using that for two years, you know, to make bread, and it's perfectly fine. If you take beer, which I really love the

brewing science and it's really, really interesting. They use *Saccharomyces cerevisiae*, which is a type of yeast to brew all the beers (except for... those are more ales, lagers use a different yeast). But the point is, though, that it's everywhere, and it's actually really nutrient-rich, and it changes the taste. But, "Wait a second, I thought you can get yeast infections. And I thought you can get an overgrowth of yeast in the gut." Well, that's not *Saccharomyces*, that is *Candida*. Completely different yeast. So it's kind of like if I asked you, you know, because I know this subject. But if I were to ask you, Kendra, are felines dangerous?

KS

Kendra Seymour

12:31

Yeah, if it's like a cat or tiger or mountain lion.

BM

Brantley May

12:37

Right. Exactly. So it's the same thing. So are they all dangerous? No, there's a lot that really, really help us. But the ones that we're worried about are the species that we look out for that we see a lot in water-damaged buildings.

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Kendra Seymour

12:48

Yeah. And we're gonna get more into that. I think, too. It's a good you know, we always hear this, you know, mold is everywhere. That is true, right? Even inside your home, you can open a window, you have mold spores wafting in. The difference is we want to avoid mold growth in your home. That water damage in your home, and any byproducts that maybe they put off into the environment. So there's... We live on Earth, you know, we're not living in these clean bubble rooms. Right? And so I think that's helpful context that you provided. So I love that. One of the things, excuse me, that I think I see a lot... If you've ever done any kind of testing, especially if you've done like, like ERMI, or any kind of PCR dust testing, is people will sometimes see some categories on their reports. And it's sometimes language like indoor molds versus outdoor mold, or

water damage mold versus outdoor mold. And those are, I don't think scientific definitions, but it's stuff that people are seeing. So talk to us about some of that terminology. What's the difference? Is there a difference? Because I think people get confused when they see that.

BM

Brantley May

13:58

Yeah, well, we see that a lot, especially with the ERMI. But then also even lab reports that look at it under a microscope, they say the same thing. A lot of professionals say it, "Oh, this is an indoor mold. This is an outdoor mold. This is a water damage indicator. This is common." So here's the thing, everything is outside. Right, if I were to go dig in my grass right now, I bet you can find some *Stachybotrys* with a tape lift of the soil. It's there. Right? So the... I understand the reasoning behind saying indoor and outdoor, even though it's not scientifically accurate. But indoor molds, more referred to "indoor molds" refer more to ones that are commonly seen from water damage events that can proliferate indoors and that take advantage of that situation indoors. So if I saw *Stachybotrys*, if I saw a few dozen in an air sample or something like that, I would say "Yeah, this is a water damage indicator." Because this indicates that there's an abnormal level. It's all about the concentration right? At an abnormal level in here, very weird. And there's... There must be something around here, that's causing this to proliferate. Outdoor molds, "outdoor molds" are ones that are... Aren't as likely to take advantage of those indoor water damage events. And so it's not... It's very unusual to see them in high levels inside. So take something like if I were to take *Epicoccum*, for example. You see air samples every now... And you'll see *Epicoccum* is certainly an outdoor mold. But *Epicoccum* doesn't like eating drywall, you know, so, or studs. So if you have a lot of water damage, it'll land right there and be like, "Meh." And so you don't see it grow in this crazy number. So if I looked at an air sample, and I saw a lot of *Epicoccum*, inside, I'm going to say, "Oh, man, there must be a lot of outdoor air coming in." Right? So that's why we consider them outdoor/indoor. But here's the problem with things like the ERMI. There are molds that are categorized in that group two outdoor mold, that are also inside. They... It's not like they don't want to grow inside with water

damage issues. For example, I'm pretty sure a Cladosporium Cladosporioides species is in the common molds in the outdoor mold section. Which actually even out and make your your ERMI look better if they're over there. However, Cladosporioides is the most common Cladosporium species and it's everywhere. I see it in air conditioning systems all the time. I see it in vents, I see it from condensation problems on windows. It's a very, very common water damage issue. So why is it over there? Well, that's because the ERMI is thinking very black and white. *This is indoor, this is outdoor*, and there is some gray area that really can't be derived with such a simple index. Just you know, we're weighing those two by... side by side.

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Kendra Seymour

16:57

I think this is a good time to mention, too... This is why when you hire an Indoor Environmental Professional, or an IEP, that you're looking for someone who is skilled. Because it's paying attention to this... the specific types of mold, the amounts in context of the bigger picture, right? So what was that thorough investigation of the home? What did it reveal? What was the history of the home? And it's not as simple as I'm going to run a test (a single test) and get all the information that I need. It really is this bigger puzzle. And for anyone listening, if you head on over to our website, ChangeTheAirFoundation.org, we do have resources on how to find a good e... IEP. And we're going to have a new section called "Start Here". And it's going to take you through this process. So we're not... We're not going to leave you hanging but it's a good point. Because any task really has to be viewed in conjunction with the bigger picture. I'm wondering too before... Because we're gonna get into some of these molds because if you've ever hired Brantley... He actually travels with a microscope and he, like, analyzes in real-time. Brantley, I know you were up at my house not too long ago, and we were out taking samples all over and outside picking stuff up. And it was fun to just have that perspective of... of, you know, what is growing and where. But when we talk about mold, we really need to talk about moisture, because that's where it starts inside our homes. Now some people will, you know, have a leak, and they catch it quickly. And they freak out. And they think something

like *Stachybotrys*. Which you know, is sometimes referred to as like black mold if you've heard the media talk about it. And I think that's going to grow right away. But not all molds grow at the same rate. And so I wonder if it's worth (before we dive into specifics) talking to us a little bit about... You know, you have those molds that are kind of primary colonizers and secondary colonizers and tertiary colonizers. Because different mold spores require different levels of moisture to grow. So can you give us just a quick background on on that?

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Brantley May

19:03

Yeah, well, this is why I get this question a lot in class because I teach professionals and they say, "Why do we..." I mean, we talked about a lot of mold in our classroom. And they're like, "Wait a second, if there's 200,000 of them flying around at any given time -- species -- why do I always see the same three in the house? You know, it doesn't make any sense?" Well, there's a few reasons for that. Something like *Stachybotrys*, for example is... It has a very... So they're called ecological niche in the scientific community, an ecological niche. Ecology is basically, ecology tells you where something grows, why something grows, how it grows, when it grows. You know, what does it like to eat and what temperature does it like, how much moisture does it like? And intuitively, you can look at something like a polar bear versus an American Brown Bear. Right? So intuitively, you know, if I'm walking around in South Florida, and someone says, "Oh, I spotted a bear." I'm not going to be like, "Oh, must... It could have been a polar bear." You know what I mean? No, it's because they don't like this environment. That's not their ecological niche. They like it cold, and they like eating fish and blah, blah, blah. So *Stachybotrys*, unfortunately, their ecological niche happens to be around 72 degrees to 82 degrees. *Hmm, what temperature? What temperature level is that? Right?*

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Kendra Seymour

20:34

So inside our homes? Yeah.

BM

Brantley May

20:36

Yeah, exactly. They like to... They're very, what's called cellulolytic. So cellulose is, you know, what trees are made of, and plants are made of and stuff. And they're the kind of bottom feeders. So once, you know... A leaf outside, right? Because this is where they... Where they usually are. Outside a leaf falls off the tree, right, and then it turns brown, and it starts to decay. And then once it starts going into the soil, so many... So many microorganisms have touched that leaf, by the time it's kind of turned halfway digested... halfway digested into the soil. Now, there's *Stachybotrys*, and they're like, "My turn." And they help bring it all the way down to soil ground, right? And so they're right there in this wet spot of the soil. And they like eating things that are already kind of decayed and broken up. And so they like wet moi... really moist... This perfect temperature 70-80 degrees. Well, okay, when things get wet in our... In our environment, there's no UV, (which they don't respond well to UV light, because they're in the soil). And what is drywall? It's basically just ground-up, halfway eaten-up paper, right? And when it gets wet to that level that they like, they're gonna grow and their maturity rate's around 6 to 10 days. So that's when they're fully matured, ready to reproduce again, 6 to 10 days. So they're very aggressive. And everything here is perfect for them. They're going to out-compete many other ones, especially because their secondary metabolites, their myc... their mycotoxins, like trichothecenes and stuff are very powerful. So they'll outcompete the bacteria and everything else. That's why you see it most often. But then you also have other ones that are slower, or prefer things more dry. And so maybe, professionals (when you're out at a job), you'll see the *Stachybotrys*, solid black at the bottom. And you think that's the only mold there is. No, no, no, if you go up right above where the moisture was wicking up in the drywall (now it's less moisture up here, but still wet) there's going to be a whole 'nother type of mold right there because that's their ecological niche. Right, it's going to be a little drier. So that's where you'll see the *Aspergillus* and *Penicillium*, maybe even some of the *Alternaria*. So there is an ecological niche and the environment. And whatever it's eating on, whatever the humidity is,

whatever the moisture level is, if it's a glue or, or a paper or, you know, tile or whatever. That's going to change what type of mold you'll see.

KS

Kendra Seymour

23:10

Yeah, that's really interesting. And it's a great segue into, like, our next segment. Which I... What I did is, I went through and I looked at some, you know, air samples and PCR technology, and I pulled out some molds that people are seeing. Because one of the first things somebody gets when they get a report is they will say something like, "Is this one of the bad molds?" Now you've kind of established for us some broader and more scientific thinking around that. But I wonder if we couldn't jump into some specific molds that you're seeing now. We can do this a couple of ways. I can throw out some ones that are common that people are seeing. Or do you want to start us off with talking about some, you know, different types of molds that you're seeing?

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Brantley May

23:52

Go for it.

KS

Kendra Seymour

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Okay, so one of the ones that we see a lot, Cladosporium. Talk to us about that. You... Whatever you feel inspired to cover as a mycologist. What it looks like. I guess we could talk about how color also isn't a great indicator of determining the different types of mold. But yeah, Cladosporium, where does it like to grow? Does it need a lot of water, like you talked about? What are we seeing? Are there health effects that are sometimes associated (knowing you are not a doctor or healthcare practitioner)? But...

BM

Brantley May

24:24

Right. Yeah, so the... Here's the thing about Cladosporium. It's the most common mold in the world... worldwide. It is, what we say, ubiquitous.

It's everywhere. So to say, "Is it dangerous?" It's really hard to answer that. Because if I say yes, that means you can't go outside. So is it dangerous? Mmm... It depends. You know, the problem with Cladosporium is because it's so extremely diverse. It's... It can grow anywhere. So it can grow on almost anything. It'll grow right on the dust. It'll grow on paper, textiles... Food is also wood, food is also glue. So very common to see like in your shower. You know if you're looking at moldy caulking, if you're looking around your windowsill, very common to see. And air conditioning systems, it really has a high tolerance for environmental conditions. So it's very common to see it growing at 40 degrees Fahrenheit. So it's incredibly diverse. So when... Whenever you get... Whenever you're looking inside your air conditioner, for example, and you see this black mold, you're like, "Oh, my God is that Stachybotrys?" I can already tell you without even being there. No. Because Stachybotrys is very thermophilic. *Thermo-* meaning heat, *-philic* meaning loving. And so it's not growing in your air conditioner. That's for sure. Right? It's kind of like, if I were to intuitively ask you Kendra. "Oh, my God, I saw a bear. Is it a polar bear!!" You're like, "Brantley, you're in Florida. No." You know, so very similar thing. So its ecology is so diverse, that it's very common. So to say, "Is it is it a health concern?" The only thing I could tell you is, it does have species, certain species, right? We talked about different species or different things. It does have species that are known to be allergenic. There are some species that are known to produce mycotoxins although they're a little lighter compared to some of the other ones. But that is there. So the problem is when you get it growing in the house, and it's like an abnormal level. So having it come in from opening up the doors is fine. But if you have a moisture issue in the house that's causing it to proliferate, then it's a problem.

KS

Kendra Seymour

26:46

Yeah, and I think too, like mold can impact you (I've said this when we... when I opened). It's more than just an allergy that can cause allergic-type responses. But then it can also, you know, cause a whole host of other issues. Toxigenic, you can even get into pathogenic things which we won't get into today. But that is... That's really interesting and something

to keep in mind. Now, I want to segue into to, like, the genus level. We... Let me back up here. When people sometimes see an air testing report, it'll group *Aspergillus*, *Penicillium* together. And that is really, I think, confusing. And I understand why the lab does that. And maybe you can explain that to us. Because really, *Aspergillus* is one genus, and then there's *Penicillium*. And then there's hundreds and hundreds of species in between all of them. And they're all kind of grouped together. And it... It kind of doesn't tell you what you need to know, necessarily. So can you unpack both those for us?

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Brantley May

27:45

Yeah, so you want to know about *Aspergillus* and *Penicillium*, specifically, and why they group them?

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Kendra Seymour

27:50

Yeah, let's start there. Because you...

BM

Brantley May

27:51

Okay, let's start there.

KS

Kendra Seymour

27:52

You'll see them grouped together if you have an air testing, you know, report. And so let's start there. And then we can kind of break them apart as you go.

BM

Brantley May

27:59

Sure. Yeah. So *Aspergillus*, *Penicillium*, they're almost indistinguishable by looking at their spores. Technically speaking, you can actually probably identify them separately most of the time, but it's not reliable enough. So they group them together. They're very similar. So it's okay to group them together. And they, you know... They produce a lot of the

same mycotoxins and stuff. So yeah, we'll group them together, because we can't otherwise. But when it comes to that group, here's something very important that a lot of people don't realize Kendra. And this is coming from the lab. Just doing these readings and analyzing myself. You know, there's more things in that group that aren't Aspergillus or Penicillium?

KS

Kendra Seymour

28:50

Oh, yeah?

BM

Brantley May

28:51

Mmm hmm... Yep, we put Mucor in that group. We put Rhizopus in that group. There's a lot of ones. Matter of fact, if you look at a lot of labs, it'll say, Aspergillus, Penicillium-like.

KS

Kendra Seymour

29:01

Right.

BM

Brantley May

29:02

There's so many different types of mold spores that have that same circular, round, same size, like, kind of, like, nonsignificant look to them. That there's so many things that get thrown in that group. It's, you know... It's not helpful if you're trying to figure out exactly what species you're dealing with, that's for sure.

KS

Kendra Seymour

29:25

Yeah. Well, and I don't know if people, like, fully realize this. When you do any kind of, like, a surface sample tape or... for air testing, and it gets sent to a lab where a person (an actual person), like, analyzes it under a microscope. Counting all of, you know, the spores and things that they see. And so there is an error of margin there. They don't even count the

whole slide. So again, you know, testing is really one piece of the puzzle because it can't tell you everything you need to know. So let's focus on Aspergillus, and what that does because people see that sometimes. And what kind of health effects? Where might it grow? I know that I've read that that can actually grow from just humidity in the air, certain species of Aspergillus. So you don't even need like a long-term leak, like a faucet or overflowed, you know, toilet. So break that down for us a little bit.

BM

Brantley May

30:23

Yeah, so Aspergillus, there are a lot of ones. Unfortunately, some of the most common ones that will grow in our house are the one... are the species that are more problematic when it comes to our health and the risks. So moisture level-wise, you're right. They are what we would say xerophilic. *Xero-* is dry, *-philic* is loving. And I know that sounds weird, like "Mold, dry loving? That doesn't make sense." Well, it handles very dry environments, compared to other fungi. Right? *Stachybotrys* isn't going to grow from, you know, humidity, for example, it's just not nearly enough. It likes to sit in the soil where it's nice and super wet. So that is what we call a hydrophilic mold. You know, it's... It likes a lot of water. But these molds, yes, just enough humidity in the air is enough for it to start growing and thriving. And its optimal environment is around 65 to 78 degrees Fahrenheit, which is precisely where we keep our homes. So, elevated humidity, keeping your house in normal range, you're likely to see this mold pop up. It's, it's so common outside, too, that it's going to come in. It's coming in and out. It's part of your normal indoor environment, that's totally fine. But if you have humidity, it's... it's going to start growing. And most of these molds are asexual, which means they don't even really need a partner to reproduce. So one turns to two, two turns to four, four turns to eight. And next thing you know, your whole house is covered in mold.

KS

Kendra Seymour

31:58

Yeah, I've seen this happen. A couple of quick stories, the... And I've shared this before, so I apologize, listeners, if you've heard this. But I

think it's pretty relevant. The school I worked at many years ago, during budget cuts started turning off the HVAC system on the weekend to save money, and then after 4 pm. So if you were working... I remember I'd be working late. And I would, like, start sweating. And I remember it was... this... August is the start of the school year. And we had a long weekend and teachers had set up before school starts. Everyone went home for the long weekend. And when we came back, one of the wings (the kindergarten wing, in fact), there was mold growth all over everything over the furniture over the bulletin boards. And it was obviously tied to some humidity issues. I'm in Northern Virginia where it's very humid. And you know, they remediated that overnight. That is another story, we won't get into it. Because that is obviously problematic. But if you... Also during COVID, I remember seeing a story about a mall, I think it was in India. And they had shut off the system as well to save money. And there was 10s of 1000s of dollars of damage, because there's all these luxury purses and shoes just covered in mold. And it was from the humidity. So it's crazy.

BM

Brantley May

33:19

Yeah, well, I'll tell you too just coming from the fact that we do energy efficiency stuff. It's also (most of the time), more costly to turn everything completely off, instead of turning it up just a few degrees. Because you have what's called latent heat, which is the amount of moisture that accumulates in the air. And you also have sensible heat, which you know, comes through the walls and the windows and stuff like that. And if you just let it all come in, when your unit turns on to try to get rid of it... It takes so much energy to get rid of it instead of you just keeping it at bay over the weekend with you know, the unit still running. A lot of people think that it helps but it actually in turn makes it worse for energy. So it's bad on both fronts.

KS

Kendra Seymour

34:01

Please come talk to our school system. Because in the winter over a long weekend, if... you know we'll have a Monday off. Or a Friday and Monday

off. If that Tuesday, it's super cold, they'll actually do a two-hour delay because they need the extra time to heat up the buildings. And it's just crazy. So maybe you can come talk to our school board.

BM

Brantley May

34:19

Yeah, yeah.

KS

Kendra Seymour

34:20

Anything. Anything you want to mention about Penicillium before we move on?

BM

Brantley May

34:24

It's very similar. I mean, I know we talked about it a lot, but you could see it in the same... the same environments pretty much. Yeah.

KS

Kendra Seymour

34:31

I never say this one. Right. So please correct me. Alternaria?

BM

Brantley May

34:36

Alternaria. Yeah, yeah, it's... Some people say Alternaria. Some people say Alternaria. Yeah, that one's... That one's very, very interesting. It's probably one of the prettiest spores underneath the microscope, too. It's huge.

KS

Kendra Seymour

34:48

Pretty?

BM

Brantley May

34:48

You can't miss it. Oh, it's gorgeous. Yeah, yeah, it's got this long beak on it. And it's... It's multicellular, it's very, very cool. But it's a very potent allergen. It's probably the most potent allergen that's out there. Yeah, very, very potent. And, you know, *Alternaria* can... has over 50 mycotoxins associated with it. It's crazy, crazy how dangerous this thing is to other... I always think in the form of like, environmentalism and how dangerous it is the other microbes, you know? It's built up quite a defense system. Yeah. Which is why I think it affects us so badly. But, you know, you don't really see it growing as commonly with some of these other ones. Because it usually gets out-competed in the rate of growth, how fast it grows. And it's also... Its perfect ecological niche isn't quite like some of the other ones we see in here. Like *Stachybotrys*, *Chaetomium*, *Aspergillus*, you know, it can handle a wide range of things, but it's... By the time it hits a surface like a piece of drywall, a lot of times something else is... prefers that more. So you don't see it actually very often in an environment inside but it does occur.

KS

Kendra Seymour

36:00

Yeah. So it's... So it's a lethal beauty in your mind. And Brantley, you have sent me pictures of mold and describing it as beautiful and that's what I love about you. Because I've grown to appreciate mold but it did, you know, transform my life completely. So I'm on the other side of things now that I can appreciate the beauty. But I don't know if I'll go as far to say you know, any of them are beautiful, but I do appreciate the purpose they serve. Now, we did talk a little bit about this, but I... It is worth just focusing in on a little bit more. *Stachybotrys*, what do you want the takeaways to be here for people? Because that is, as you said, a.. you know, a water damage mold. It can have very devastating health effects for people, but add any other context that you think might be important.

BM

Brantley May

36:47

Yeah, so if you have enough moisture to have *Stachybotrys*, you probably have about two or three other molds in there. And you probably have bacteria. I mean, it's like it really only grows... So we use something

called water activity. Right? And, the water activity that's optimal for *Stachybotrys* is 0.98. You can think about that as the surface being 98% wet. And so it's it's dang near 100% wet surface completely saturated. If you have *Stachybotrys* growing, that requires 98% moisture, you better be aware that something crazy is going on. So that's why it's definitely a water damage indicator. And, you know, it needs to be taken seriously. Because it's going to cause other problems like you know, wood rot, termites are going to come in. And we haven't even discussed things like, you know, Actinobacterias and all those other things. I mean, there's so many problems. And *Stachybotrys* is such a huge indicator of that, you just got to be very careful when you see it. And if someone comes in your house and sees an abnormal level of *Stachybotrys*, and they tell you it's your air... it's in your air conditioner, or it's you know, from humidity or the condensation on your windows, they're probably wrong. And so you want to keep looking, that's the biggest thing I see. I just did a job maybe about three weeks ago with my inspector here in Florida. And she said, "Oh man, we were getting high levels of *Stachybotrys* in the house. A remediator came out, found mold in my air conditioner. And so we had everything remediated. Spent \$10,000 to clean the house and the unit... Replaced the unit." So \$10,000 to clean the house and then however much to replace the air conditioner. So they're probably like \$25,000 in here. And they thought they solved the problem. But the guy came in. Obviously, he doesn't understand the science because that wasn't *Stachybotrys* in the air handler. And we came in and we found the... her entire cabinetry behind her kitchen. From one side of the house to the next was *Stachybotrys*. And it was horrible that everything had to come out; the walls, the cabinets, and everything. And, so it's an indicator for sure. But I also want to mention this, that there are situations where I'll track one or two on my shoe coming in from outside. And so seeing it on a dust sample, seeing it in the air doesn't necessarily mean you 100% have an issue. Think about where all these mold inspectors go, right? If I'll go into a house, no matter how dressed up I am. If I'm going into a house that's under construction, and I'm checking on it, and there's billions of spores flying around or if there's a really bad situation... I just had to crawl through a crawlspace and then I come to your house afterwards, it's not going to be abnormal to see one or two spores of

Stachybotrys in the sample. So you have to use your, like, thorough inspection mixed with the air sample. I usually don't start considering Stachybotrys a problem until I see around 2, 3, 4, 5, 6 in the air samples. I'm like whoa, this is really weird. But if I see one in an air sample, I might raise my eyebrow. But I'm not going to be concerned until I can match that with something I see on-site.

KS

Kendra Seymour

40:06

And you know, you're looking for moisture. And see, what you describe is what I find so frustrating. Is that, as the consumer, you have to be your own advocate. And you have to develop a basic understanding, which is why we're building out resources every day at the Foundation. Because that person spent 10 grand, they didn't fix their problem. And it's because I think people tend to think they go for the obvious problem, "Oh, I maybe see the mold here. That's it." And they don't realize that mold is often hidden. It's under floors, it's behind walls, it's in attics, where people don't go very often, it can be in your crawlspace, or basement, or areas that aren't frequently visited. And, you know, I think everyone assumes that it's like in the movies, where if I have a mold problem (this is just a good general tip), I'm going to see a giant wall of mold. Now that does happen, but I bet you can attest to the fact in all your years doing this, that more often than not, you find it because you find the moisture, and then it's behind... You know, the majority of that mold growth is behind the wall or underneath the floor. I don't know. Do you have any thoughts on that? Because it just drives me crazy.

BM

Brantley May

41:12

Oh, yeah, I agree. Oh, yeah. So not only is it the water damage stuff that can be tricky, but it's also the humidity stuff. We were at a job yesterday, I just posted a few videos of it on my Instagram and Tiktok. There's... There was mold hiding in plain sight, all around her because of humidity. And so if you... We pulled out her bed, and on her bedframe, just covered in mold, humidity-related mold all over the back of it all over underneath it. And she wasn't feeling good. And if you go in her closet, it looks okay.

But if you look closer, which you'll see in the videos, there's mold growth happening everywhere, right? It was all over her shoelaces. Without a flashlight, you probably would miss it. And it's not causing any smells either. So it was very, very tricky to diagnose the house if I'm only going in there and only looking for leaks, or only looking for something visible. I mean, we had to get on our hands and knees with a flashlight and get on my back and go crawl under the bed and look to see what was going on to... in order to find it.

KS

Kendra Seymour

42:13

Well, okay, not to go on a tangent, but let's take a moment to talk about the relative humidity. What should it be at in our homes, ideally, to kind of prohibit some of that Aspergillus and other things from causing problems? Is there a number you recomm...

BM

Brantley May

42:26

Below 60%.

KS

Kendra Seymour

42:27

Below 60%? I've even seen some say really you want to below 50%. For those listening, there... You can go on like any website that sells you know, home improvement stuff, or I won't name names, but you can buy a hygrometer for like 11 bucks. And they're pretty decent, right? They can you know, plus or minus probably 5%. And it's a great way... You can keep them on, one on each level to monitor your humidity, I wouldn't rely (and Brantley maybe can speak more to this)... Sometimes people's systems have like... They'll give you, like, a general composite humidity score. And I just don't think that's very helpful. Because, you know, your basement may have a different humidity level than your main floor or even room to room. So are there any other thoughts on monitoring humidity that might be helpful to our listeners?

BM

Brantley May

43:13

Yeah, so I wouldn't trust your thermostat. Because, you know, not only the composite. But they're also those thermostats are set for... To program with an offset, meaning like, it'll just come factory set at something. And then it's the HVAC guy's job to use his hygrometer, (which hygrometer is just a humidity monitor), and basically calibrate it. And look at this and say, "Okay, I need to offset this by 6%," or whatever. They don't do that. They just install it. The other thing too, is a lot of times there's a hole (this is what we see a lot in Florida), there's a hole that's put behind the thermostat, so the wires go in. But no one ever seals that hole back up. Well, the thermostat's your humidity monitor and your temperature sensor. And so those walls connected to the attic and stuff bring in heat and humidity, and it'll show, like, a really high level. Or if you're in a northern climate, it might show a very low level, if it's cold... cold, dry air coming in. So I don't really rely on them. I... Like I said... Like you said, 15 bucks. Go grab yourself a humidity monitor, stick it on the counter or something like that. There are a lot of people that want to get more intense and say, "Oh 50%." I just had someone post... I was looking at one of my... on a TikTok video where someone said "Don't allow your humidity to go more than 44% or you'll have mold." Like, that's just not true. 60% is what all the engineers and the scientists and everyone has agreed on is when the risks start to increase. And it's not just because at 61% mold is gonna start growing. That's not really how it works. What's happening is once you hit 60% threshold and you start going up, your chances of condensation increase. Your chances of cool surfaces having a higher humidity increase. So if you keep it below 60%, you're actually fairly safe. And you also don't want to go below 30%. So that's the other thing too. Is there are other air quality problems that are associated with buildings once you start going below 30. So 30 to 60, I would say is your range. And then 40 to 50, I would say optimal.

KS

Kendra Seymour

45:20

Yeah.

BM

Brantley May

45:21

That's optimal.

KS

Kendra Seymour

45:22

Yeah. And be aware, like, areas like your closet may... That stagnant air may have higher humidity, and so your humidity is probably not uniform throughout your home. So I'll do a quick plug. If you are interested in learning more about humidity and condensation issues, I did a great interview with Carl Grimes that I'll link in the show notes that people can check out because he does a great job explaining. We take you through five common scenarios, even a scenario that happened to me recently. So, alright... So let's move on to Chaetomium because that's another one that... it causes my blood pressure to rise. I don't want to see that growing in my home. What can you tell us about that one?

BM

Brantley May

45:59

What you know about Stachybotrys you pretty much know about Chaetomium.

KS

Kendra Seymour

46:02

Yeah. Well...

BM

Brantley May

45:59

Yeah, very hydrophilic. And it's very, very cellulolytic, which means it likes the paper and likes the wood and stuff like that. It likes to eat dead and decaying things. It's very, very similar to Stachybotrys. The dangerous thing about Chaetomium is two things. One, very rapid maturity rate. So we talked about Stachybotrys, just being six to more likely 10 days. Chaetomium is five. So if you don't get that water damage issue cleaned up, it's fully matured, ready to reproduce in five days. You'll probably start seeing it in about three. So it's very, very quick to mature and it's freaky. And, you know, the other thing that's kind of

weird about it is, you know, we don't really track it down too much with our mycotoxin panels. There are mycotoxin panels out there clinically, that actually don't have the mycotoxins that *Chaetomium* produces. Everyone's so worried about Tricothecene and this and that. Well, Chaetoglobosin (which is a mycotoxin from *Chaetomium*) is very problematic. Yet, it's kind of like low on the radar. Doesn't make sense. You're like, wait a second, "Why is it like, more common to see from water damage than *Stachybotrys*? It's a faster growth rate. It has just as dangerous mycotoxins yet it's not on the panels." And so you might actually go take mycotoxin panels environmentally or clinically, you don't see it, and you think you're all good. And all the while you have a *Chaetomium* problem in the house.

KS

Kendra Seymour

47:34

Yeah, this is a good time to mention that mold growth in your home, regardless of type, should be safely removed. So it's not like, "Oh, well, that's only you know, and *Asperg*... I'm not going to worry about that because it's a *Cladosporium*." Like, mold growth in your home should be removed safely and the water source corrected. So we're getting into specifics here because I think it's of interest to people. It can, you know... People tend to panic and we just want you to understand the science. But this always comes back to controlling moisture and removing any growth and byproducts safely. Let's kind of... We're going to kind of bring this part of it to a close. But let's talk about *Fusarium*. It's not always showing up on tests. But I do find that it... People end up talking about it. So what's going on with that? Are you seeing it indoors a lot?

BM

Brantley May

48:21

No, very rare to see inside. Yeah, most *Fusarium* species are what we say... what we call parasitic. So, meaning that it needs a host and it prefers to live off of a host. And when I say host, I mean plants. So it's very much a preference to be on, you know, grains or some sort of, you know, bush or something like that. Certain flowering plants. I mean, you just don't really see it... It doesn't want to eat the dead stuff. So you don't

really see it on... inside on the logs of your house, you know, the studs and stuff. So it's very rare. I mean, sometimes we'll see it happening in crawl spaces, because there are certain species that like to be in soil, and you'll see it coming inside. But it gets out-competed with other things and it's just not its ecological niche so much. But it is very important because it has some very, very problematic mycotoxins. Deoxynivalenol is probably one of the most problematic mycotoxins. But you know, coming from the environment, it's hard to find, you know, in an environment. But people get affected by it. You're... You... You respond. Your body responds very heavily to this from what I've heard.

KS

Kendra Seymour

49:43

Yeah, and you'll see a lot of the research on this. Is Fusarium, specifically is around, like, animal feed and livestock and things like that. Because it can... It can cause some serious problems. Alright, the last one, let's talk about Trichoderma. Where are you seeing that? Are you seeing it? What happens with that one?

BM

Brantley May

49:59

Yeah, Trichoderma is also very pretty under a microscope. There are these... It looks very similar to Penicillium or Aspergillus. It has gotten misidentified a few times from my experience, and it's green. So this is one of the ones (you know, we talked about a lot of molds, they could be different colors, this and that). Trichoderma's green. You're not gonna see it any other color. So if you pull back your carpet and you're looking at your subfloor, and you're like, "Whoa, what's this is green stuff?" Could be Trichoderma. It travels in clusters. So instead of like one little spore, it'll travel in this huge globular cluster of stuff. Which is important because it is outside too sometimes. You know, your lab counts things based on how many spores that they see. But it really only travels in clusters. So you might get your lab result back and be like, "Oh, my God, there's, you know, dozens of them in here." And it could have just been one cluster that came in from outside. So it's very tricky sometimes to figure out if it's the house or not. But with that being said, Trichoderma is

going to like varying environments. But it's similar to Chaetomium and Stachybotrys where it likes to eat on the wood and the paper. It likes a higher moisture level as well. So you're not gonna see it growing from humidity. But it also produces Trichothecenes, which is a dangerous mycotoxin similar to Stachybotrys.

KS

Kendra Seymour

51:21

Yeah, I think this is a good time to just to, like, offer a little context. Because you kind of alluded to it... That we have said color is not a great way to determine the type of mold. The same species of mold can be multiple colors. You know, different species or genus of mold can be the same color. So color is not a great indicator, it can give you a clue. But you know, people think well that mold in my home is not black, so I'm good. No, don't... That's not a great indicator.

BM

Brantley May

51:50

Oh, there's one more thing I want to mention too, actually. So, since forever, most labs have... used to categorize Memnoniella (which is a type of mold)...they used to categorize it with Stachybotrys. So, labs are... are almost no longer doing that anymore, up until recently. And professionals have not caught up to that. And if you get a lab result back where they don't give you the determination on the lab (where it says, like, normal, elevated whatever, and the environmental stats), watch out for Memnoniella. Because they'll just look at it as another spore and they don't really know any better. But labs are now identifying them separately when they used to be grouped. So you... If you see Memnoniella in there, you treat it like Stachybotrys because it's pretty much the same thing.

KS

Kendra Seymour

52:34

Wow, that's a great tip.

BM

Brantley May

52:36

Yeah, I've seen... I've seen that over the past, like, two or three months. I've seen few reports now where inspectors have just missed it because they don't know it. And the labs aren't... don't send out a memo saying, "By the way, we've separated these two genera now." So you know, if you... if you don't know this mold, and it's just there.

KS

Kendra Seymour

52:53

Wow. Okay, so hopefully, everyone listening, we haven't completely freaked you out. But I know there's gonna be people out there who are like, "Alright, I don't want this growing. I'm gonna go grab my bottle of bleach, my spray, my whatever. I'm going to kill it. Problem solved." But why? Why is killing mold like that (or any of its byproducts) not the best idea.

BM

Brantley May

53:20

Ah, well, if you kill it, it's still there. That's the first thing, right? It doesn't just make the toxins go away. It doesn't make it non-allergenic anymore. It's like... It's like saying, "Oh, I got an oak tree. I'm like terribly allergic to Oak and I have an Oak tree, in my... growing in my living room. Just gonna cut it down, and then not drag it away," you know? So it's gonna make it worse. Pollen is going to fly everywhere. So it's no different than just trying to kill it. You're actually going to cause it to produce more mycotoxins. You're going to cause it to disseminate easier and then it's all kind of still there. And you haven't also, most likely... You haven't solved the cause of it. Right? You have to get the moisture out. So no moisture, no mold. The best thing to do is to safely (which is usually what a professional will do) is safely remove it. And then once it's removed, you have likely disturbed the area quite a bit. You have to decontaminate the area where you've removed it, and then make sure it's dry and that the moisture doesn't come back.

KS

Kendra Seymour

54:21

Yeah, I think here... Here's a PSA that kind of sums up some big points that I hope people take away from what we just said. One, don't trust someone who says, "I can tell by looking at it, it's not a dangerous kind of mold." And two, if somebody says, "I stopped the moisture source or the mold is dead or dormant. You don't have to worry." Don't trust that person either. Because you... Like you said, mycotoxins, they're not living so you can't kill them. The mVOCs aren't living so you can't kill them. Those fungal fragments, can't kill it. So it's always about removal. We have resources again on our website, ChangeTheAirFoundation.org on remediation. And we're going to be dropping a Remediation 101 series that's really designed for the layperson. And takes you through the process so that you know, we can make sure that you're removing those... That growth and water damage safely from your home. I love it. Brantley as we wrap up, are there any final thoughts you want to leave people with about mycology other than mold can be beautiful? What else do you want to leave us with?

BM

Brantley May

55:27

It's very complex. There's a lot of variables. And looking at a test, it's very difficult to interpret what's going on in the house. It's not the end all be all. If you really feel like there's something happening in a home, I would actually 100% skip the test. Not even... A lot of people even use it as a preliminary to say, "Oh, let me test before I get an inspector." Well, what's the point of doing that? Because it's not even telling you what you need to know. I would say get an inspector, get a professional out there that can actually look and see what's going on in the building. And visually observe what's happening, try to find the sources of moisture, and do their own testing. Because they'll do the testing that's really best for you, after they've already determined what could be happening in the house. And they'll give you a plan of action. Whereas a piece of paper from a lab doesn't give you a plan of action on how to solve it.

KS

Kendra Seymour

56:17

Yeah, I love that. And just one final thing for listeners, because I think you'll find this helpful. Keep in mind, not all IEPs are created equal. And so you're going to have some that come in, and they're going to take five random air samples in the center of various rooms. They're in and out in 45 minutes. And that is not going to give you the best picture. We're not going to get into that today because we have lots of resources on our website. But if you... If you go to our website and you download or search in the search bar for questions to ask when hiring your IEP, I take you through everything that you need to know. Places you can start looking because certifications are minimal requirements. It's, you know, about asking these questions and assessing kind of their understanding and what they can do for you and their approach to the home. So we're not leaving you hanging there. Definitely head on over to our website and check that out. Brantley, I have loved this. This has been so interesting. I'm sure our listeners have learned a lot, too. If people wanted to get into contact with you or find out more information, how can they do that?

BM

Brantley May

57:18

So you can go to our website at EnviroHealth.co. EnviroHealth.co is my mold inspection and building forensic website where we actually help people try to find these types of issues. If you want to just learn, I'm trying my best to post on social media, so you can find me on TikTok, Brantley May. You can find me on Facebook, Brantley May. Instagram, I think actually... I think my Instagram is "BrantleyIAQ" (Brantley Indoor Air Quality). So just if you're trying to get more tips, I've just shared, like, three videos yesterday of what we were finding and how to look for signs of moisture that could be really helpful. But if you have more professional inquiries, reach out on our website, and we'll do our best to help.

KS

Kendra Seymour

58:06

Excellent, and we'll link to all those in the show notes so you guys can find them. Thank you so much for being here. I really enjoyed our time

and I love your passion for what you do because it's not just a job to you. I can tell it's something that you are... you find very interesting and you care about. So thank you so much.

BM

Brantley May

58:23

Of course. Thanks for having me.

KS

Kendra Seymour

58:25

And for everyone listening do me a favor. If you found this interview helpful, head on over to [ChangeTheAirFoundation.org](https://www.ChangeTheAirFoundation.org) and sign up for our newsletter because it really is the best way to get great information like this directly into your inbox. We'll see you next time. Thanks so much.