

Announcer: Bulletproof Radio, a state of high performance.

Dave Asprey: You're listening to Bulletproof Radio with Dave Asprey. Today's cool fact of the day is that new research shows your brain displays the same kind of activity during dreams as it does during a trip on say hallucinogenic mushrooms. The chemical in those mushrooms that does the work is called psilocybin. A study done by Imperial College London in 2014 found that under psilocybin, activity in the primitive brain network linked to emotional thinking and memory became more pronounced, and several different areas of that network like your hippocampus and anterior cingulate cortex get to be active at the same time and that's very similar to the activity of people who are dreaming. Coincidentally, the guest today has pioneered research on psilocybin and discovering and naming four new species and writing a definitive field guide to finding the mushrooms that contain that chemical.

In case you haven't guessed already, I'm talking about none other than Paul Stamets. He's a speaker, author, mycologist, medical researcher and entrepreneur, and considered an intellectual and industry leader in habitat, using mushrooms as medicine, and producing fungi and considers himself a mycological warrior after 40 years plus in the Pacific Northwest, where I live, and where we're recording today's show here at Bulletproof Labs Alpha on Vancouver Island. He's been studying and researching the world of mushrooms. He's been on the Ted stage, a very, very well-known guy, and he's come to believe that habitats have immune systems just like we do in our guts, and that mushrooms are the cellular bridge between people and the environment. He believes that our close relationship to fungi can be the basis for novel pairings in the microbiome that lead to better sustainability in the environment and better immune systems for us. He's changing paradigms around the world, definitely a game changer. Paul, welcome to the show.

Paul Stamets: Well, thank you very much. I'm so honored to be here, Dave.

Dave Asprey: Why mushrooms?

Paul Stamets: Why not?

Dave Asprey: I mean, 40 plus years you have this intense interest.

Paul Stamets: Well, I was always attracted to that which was forbidden, and mushrooms were the forbidden fruit in my family. My earliest memory of mushrooms was with my twin brother. After the summer rains, we had a cottage on Lake Erie, Northern Ohio, and I was pelting my twin brother with puff balls that were mature and upon impact, they would explode with spores. I remember my mother coming out saying, "Don't throw puff balls at your twin brother. If the spores get into his eyes, they'll make him blind." As she went back into the house, I pelted my twin brother with more puff balls. That turns out not to be true, by the way, but many of the myths about mushrooms, that's one of them. I

was fascinated by that, and then my brother John who was my oldest brother. We grew up in a small town in Columbiana, Ohio, and our family is pretty educated family. We had a complete laboratory in the basement.

Dave Asprey:

Wow.

Paul Stamets:

Yeah, we had three rows of chemical shelves, and my brother John was a serious chemist and I was the youngest one in the family. I was not allowed to play in the laboratory but he tolerated me to be on the short wave radio. My father served on the aircraft carrier The Intrepid, and then after World War II, he got The Intrepid main radio. And so we had it in the basement.

Dave Asprey:

You got a chemistry lab and an aircraft carrier radio in your basement.

Paul Stamets:

I mean, yeah. We're talking about big banks of cathode-

Dave Asprey:

You had the coolest parents ever, in other words.

Paul Stamets:

Yeah. It was cool because all these coded messages behind the iron curtain, series of numbers. It was just really weird. You hear these numbers like, "Six, 22, four." Very strange strings of codes. I was around my older brother John, that I'd greatly admired him. He went on to Yale to study neurophysiology and chemistry. My brother Bill went on to Cornell, and then I was left with a laboratory with my other... My twin brother and I were left in the laboratory unattended. It was my dream come true that I could then suddenly play in the laboratory, and my dream has always been to live in the country and have my own laboratory, do my own research. My brother John went down to Mexico and Colombia and came back with these fantastic stories about tripping on psilocybin mushrooms.

Dave Asprey:

This is, what? In the '70s?

Paul Stamets:

Yeah. Well, actually 1969.

Dave Asprey:

It was pretty early to that then?

Paul Stamets:

Yeah. He had amazing experiences, and of course he came back and I was all even more interested in the subject. John greatly inspired me. Really the pivot point in my life was John comes back from Yale with a book called Altered States of Consciousness.

Dave Asprey:

I've read it.

Paul Stamets:

You've read it? Oh my gosh. You're like the second person ever. Actually Charles Tart got ahold of me just recently because he heard that I mentioned this at a MAPS Conference. I said, "John, I really want to read this book." He was on break for two weeks. He lent me the book, he said, "But I have to have this book

back. It's really important." I read the book, and my friend Ryan, he and I pulled together all the time, he's my best buddy. Ryan saw me reading this book, and Ryan wanted to borrow it, so he borrowed the book.

Then Ryan had a very conservative father and family and mother, and then after about a week or so, I said, "My brother's coming back. I need my book back." Ryan hemmed and hawed and kept on avoiding the subject, and after about three or four conversations, I knew something was wrong. I said, "Ryan, I need that book back. My brother is asking for it. He's back. He's got to go back to Yale. That's one of his textbooks." Ryan then finally answered, "I can't give it back to you." I said, "Why?" He says, "My father found it and burned it."

Dave Asprey: Oh gosh.

Paul Stamets: I said, "Your father burned my brother's book?" Then thereupon, I decided to take lemon and make it into a lemonade. I thought, "If this book was so powerful in its concepts that it caused Ryan's father," who I did not like. He was alpha conservative, John Bercher. "Made him inspired to burn this book because it was a threat. These ideas were threatening, then I think I found my field of interest." That was a big pivot point.

Dave Asprey: The ultimate act of counter rebellion.

Paul Stamets: Well, it was the forbidden fruit. Being attracted to that which is bizarre and enigmatic. That's what mushrooms are. Most mushrooms come up and rot within four or five days, and to have something in your view scape for such a short period of time like with animals and plants, you're habituated and you're familiar with them because of a long term contact. Mushrooms can feed you, they can kill you, they can heal you, they can send you on a spiritual journey, and for something that which is so powerful but so ephemeral is natural to fear that which you don't understand. Mushrooms were relegated and thinking to that mysterious, shamanic of the cognoscente of indigenous peoples and tribal peoples. Some people were the experts, and other people were learning and trusting the experts to guide them.

Dave Asprey: There's a sign of death and decay as well in that they grow in dead things. It becomes to be a sign of life, but historically-

Paul Stamets: It's a sequence. I think we should reframe the concept of decomposition, which is celebrate decomposition. You and I are going to decompose.

Dave Asprey: Oh yeah.

Paul Stamets: Everybody listening to this, you are going to decompose.

Dave Asprey: In fact, you're going to become food for vegans.

Paul Stamets: That's very interesting. How many molecules, how many atoms have been resorted into the foods that vegans are consuming that came from animals? All of them.

Dave Asprey: All of them.

Paul Stamets: That's a really important concept is to understand that through the processes of decomposition, soil lenses are created. As the soil lenses emerge and enlarge, they have greater carrying capacity for bio diversity. Fungi came to land first. I've been saying this for years. Over 500 million years ago, fungi were the first organisms come to land. Just this past month, they found new fossil records that pushes back the entrance of fungi onto land to a billion years ago. This is hundreds of millions of years before plants.

These truly are really terraformers. They are micro terraforming habitats. As the mycelium, the fine threads go on the rocks and munch rocks, then plants then can follow and take advantage of those minerals. And with a mycorrhizal fungi, the plants give the fungi all sorts of sugars and the fungi harvest growth limiting minerals to the plants. The photosynthetic cycles then can spin up.

Dave Asprey: I look back at where I grew up. I was in New Mexico and anytime we saw a mushroom it was, "Oh, it's a toadstool it probably poisonous, step on it or kick it. We don't want it on our lawn. They're universally bad."

Paul Stamets: Just for the record, I'm opposed to kicking mushrooms.

Dave Asprey: No, I am too.

Paul Stamets: The kids, it's different. The kids get a free pass. There's something about throwing mushrooms and kicking them.

Dave Asprey: Fair point.

Paul Stamets: But adults, I don't like kicking pickers.

Dave Asprey: Yeah. It's not something that I do anymore, but that was sort of the mindset like you see when it's danger. Then you read, Andrew Weil who also lives up in our neck of the woods up here on the islands. He writes about how once you change your mindset towards mushrooms, you walk around, you see them everywhere. But when you don't have that mindset, they're invisible to you. You have an eye for them or you don't. When you're open to looking around and just go, "There's one there," I say at my kids. I'll walk through a forest and I might see a couple, I'm like, "Do you see there's like 47 mushrooms right there." I didn't really look, I guess .

Paul Stamets: It's a form of pattern recognition. Then Morel hunters know this all very well, is that, you can go into a burned area and it's gray and black and brown and there

are gray, black and brown morels all around you invisible until you suddenly see them. Then you have this pattern recognition phenomenon where you overlay your memory of the image of a morel on the landscape around you, and then they start popping out of the visual landscape. That really begs the question, how many other things are visible-

Dave Asprey: It does

Paul Stamets: ... that, are actually all around us? That's why I think these psilocybin mushrooms do. They opened the floodgates to the census to a greater awareness, a greater consciousness. The times when I trip on mushrooms, I increasingly wonder, this is the greater reality. We live in a shallower, more narrowly focused reality than what is existent all around us all the time. That's what's been awakening this occurring. I think with a lot of people is realizing that these psilocybin mushrooms are so important to the evolution of our species and more so, critically important at a time that we need to reinvent ourselves out of this climate chaos and the destruction of the planet that we're involved in.

Dave Asprey: Yeah, there is an unseen world and people say, "Oh, that sounds like BS." But when I was 16, like most 16 year olds boys from my generation, I liked to drive fast. I bought a radar detector way back in the day and I realized all of a sudden I'm driving through the city and I cannot see it smell or taste it. But there's areas that the thing beeps and there's areas where it doesn't beep and there are grocery store doors. You realize I'm traveling through an invisible electromagnetic forest that I don't sense, but it is fundamentally there because of happenings.

Now I've got night vision gear and far infrared gear, which is really cool. You go outside and you say, I don't see anything. Then you put this on and all of a sudden you can see every star in the sky and you can see things a mile away at night. Well, animals can see that, some of them can. You put on the infrared and you realize you can see people's ribs cause they're cooler than their fat. This is invisible to us, but it is real. If there's something like a mushroom that can help us perceive things that we don't normally, that's great, but how do you know that you're perceiving something that's real versus just whatever?

Paul Stamets: Well, how do you know that what you're perceiving, which we think is real, is real and not a normal state of consciousness?

Dave Asprey: It's usually not, it's in what we know.

Paul Stamets: Well, when I'm tripping on psilocybin mushrooms, I look into the stars, I see three-dimensional. There's a three dimensionality about it, where I look in the stars on a normal consciousness, is more two dimensional. These are points of light but I don't have that sense of depth perception. But neurogenesis with psilocybin I think has enormous potential. That is what a lot of my research...

For all these years I was covered by Drug Enforcement Administration license. Folks, nature provides, I don't. I've never had any problems with the DEA or anything like that, but I'm self-censored. Much of my earlier work with psilocybe mushrooms and psilocybin mushrooms. There's about 200 species of psilocybin active mushrooms in the genus psilocybe is... Psilocybe means baldhead.

So of those species, there's probably about 25 to 35 species here in North America. Looking at the common encounters with those mushrooms that spark such an extraordinary experience leaves a memory that is so strong with you that you speak about it, you share it. It was life changing and stories propel. These myths and myths are oftentimes are based on facts and knowledge. There's so much of what's been known folklorically that has now been discovered to be scientifically valid. A really simple one and the one that I heard from indigenous peoples and my European ancestors, have this in their folklore, when lightning strikes, mushrooms come up. Also, that's a cute thing.

Out in the plains, lightning strikes and means rains and things like that. Well, a group of Japanese researchers found out that if they grow Nameko mushrooms and Shiitake mushrooms on logs and they zap it with 50,000 volts of electricity, it substantially in some cases doubles the yield of mushrooms. Then you have to think now, indigenous people had this... It's really interesting to me when you have different groups of indigenous people geographically separated, all come to the same opinion.

Dave Asprey: Yes.

Paul Stamets: Myths are based on things that are factually accurate. That's what I see now science is converging because I'm not religious, but I'm spiritual. I see that science and spirituality are now merging into a greater state of awareness. What astronomer is not amazed by the enormity of the universe that we're now able to decipher and document. It's increasingly, such an extraordinary tale of how small we are and how vast the universe is. It makes our uniqueness... Well, it's still egocentric, we think we're so unique,. But I believe that matter begets life, life becomes single cells, single cells become strings, strings fork. That's mycelium and that the way of matters to create multicellular organisms.

The multicellular organisms are based on networks. The first networks will be that of fungal mycelium and mycelium gave birth to animals 650 million years ago. You and I are actually mycelial beings and we are descendant of fungi, fungi are our ancestors. When you see mushrooms and they're out in the woods, these are ancient elders that have their forms, tens of millions, if not hundreds of millions of years ago. These are not just a recent appearance like Homo sapiens, the 200,000, 2 million years ago. These mushrooms predate us in their forms, hundreds of millions of years prior to us in some cases, tens of millions of years.

Dave Asprey: Now, I've written that we're essentially like Scoby from Kombucha. Where you look at what's going on inside the human body. We're a walking petri dish. I may

have more a bacterio centric view than you do where our mitochondria of the same spectra that took over some kind of cells and they're still calling the shots on our day to day behavior things. But I can't necessarily explain the branch nature of what happens in the brain. I know that when we run additional electricity over our brains, and I do this at my neuroscience institute in Seattle, and I've done this for 20 years. You run a little bit more current over your brain and it causes neurogenesis. It raises BDNF the same way that taking certain kinds of mushrooms like the lion's mane that you make. We know that it does something. Is it your supposition there that inside our bodies, like some of ourselves are fungal in origin?

Paul Stamets:

Oh, absolutely. We're coding for the same compounds. Serotonin is very common and tryptamines and these precursor compounds, even tryptophans are resonant throughout nature. I always thought that really good graduate thesis, which someone probably has done, but is one that I wanted to do way back 20 years ago, is the dimethyltryptamine pathways in nature. If you tracked all the dimethyl in psilocybin is a form of DMT. If you track those tryptamine pathways, you would see that all nature is connected. There's a universality of biomolecular bridges using tryptamines that permeates all of nature. That speaks to me like nature of consciousness that nature is aware. We're still Neanderthals with nuclear weapons. We really have not wakened up to the enormity of our presence and the miracle of our existence. But because of our prefrontal cortex and the drive for survival, it's almost like we were conditioned to have a very utilitarian and impractical skillset in order to achieve the level that we have now when we can go full circle to embrace the mother that gave us birth.

They're interesting. Homo sapiens migrated into Europe about 40,000 years ago. Homo erectus came 200,000 years earlier. Neanderthals became extinct only about 40,000 years ago. Within 4,000 years of human contact, Neanderthals became extinct. Neanderthals had fire and they buried their dead. It was not thought that they buried the dead until just recently. It's very interesting to me that during a time of climate change, 200,000, 2 million years ago, Homo sapiens evolved out of Africa. I read a study just recently that they believe that the mating pairs of Homo sapiens actually... Pre Homo sapiens actually was down to about 200 mating pairs.

Dave Asprey:

Wow.

Paul Stamets:

Some people say it was up to 20,000, but we all narrowly almost became extinct.

Dave Asprey:

Because of an asteroid hit or something?

Paul Stamets:

No, because of a climate change. Then because our cortex, our brains doubled in size. We had the now better abilities to adapt to climate change. Well, we're going through climate change right now. The Stoned Ape hypothesis that Terence McKenna Stoned Ape Theory, I think is a hypothesis because you have

to... Hypothesis is speculation without fact and theory is a hypothesis that is evolved to be supported by factual-

Dave Asprey: It's been tested and repeatable, right?

Paul Stamets: The Stoned Ape hypothesis is very plausible to explain why there was a massive amount of neurogenesis and our brains expanded. And in by doing so, we were out to out-compete other primates and we are here today very likely from the millions upon millions of encounters with psilocybin mushrooms as our primate ancestors walked across the Savannah, hungry for food. You find poop or scat, you are hungry. It looks edible, is the biggest mushroom growing on poop. You eat it, you share it with your family, you're catapult into this experience. That didn't happen once or twice. It has happen millions upon billions of times over millions of years. I think that because of epigenesis and neurogenesis, the epigenetic influence in our genome coding for new proteins that lead to new neurons and new neural development, that repetitive stimulation and reward over and over and over again, is a plausible explanation for the increase in the human brain. It's very highly controversial. Terence and Dennis who have made a lot of fun of that but-

Dave Asprey: Dennis has been on the show.

Paul Stamets: Yeah, it has increasing plausibility. I really think that association is not causation. Circumstantially, we know that this is true. Anyone who's been in the tropics, they've encountered these mushrooms and they're-

Dave Asprey: They're everywhere.

Paul Stamets: ... they're everywhere.

Dave Asprey: I've done shamanic things with Mayan and Aztec traditions and native like North American traditions and studied other things around the world. Like you said, they all do come to the same basic picture of, "Oh, there's a lot of stuff out there." All of them have some sort of plant medicine, quite often fungal in origin, but not always. It's been a part of even the European stuff where it's largely been stamped out. You go back to the druids, they drink some weird stuff, usually fermented.

Paul Stamets: Painting their faces blue.

Dave Asprey: Yeah. There's something happening there. Even the little notions of smurfs, why do you think they had red and white spotted hats? Like a common mushroom, right? Those are the Amanitas. If this is part of our cultural heritage, right now though, it's illegal, but very commonly done unless you live in Denver, Hallelujah, but-

Paul Stamets: Or Oakland.

Dave Asprey: Or Oakland. Oh, is Oakland... I didn't realize pass that. Beautiful, thank you Oakland. Now here's the question though, I know a group of people who are convinced that they are going to deal with their traumas or achieve enlightenment or something through frequent multiple times a week or once a week use of mushrooms or Ayahuasca or Ibogaine or any of these other things like that. Is there such a thing as too much psilocybin?

Paul Stamets: Wow. I've never been asked that question, but from my experiences and the reason why psilocybin mushrooms are so interesting, so it's psychotherapists, psychologists, and even the FDA is that they're not addictive.

Dave Asprey: They're not addictive.

Paul Stamets: You have a massive dose of psilocybin mushrooms, you're on the ground, you're seeing God, you've connected with nature, the next day you look at those mushrooms, you go, "No frigging way am I eating those again."

Dave Asprey: How could you do them every day?

Paul Stamets: "I'm not eating those for a month." I think that sort of gut response also the microbiome is important. Most of your receptors are in your gut, for a neurogenesis. When you feel queasy right after you eat mushrooms, I think there's a microbiome is waking up, until all of that. I would say microdosing, I don't see the frequent use of psilocybin mushrooms as microdosing. Microdosing is defined basically as one 10th to one 20th of a liftoff dose.

Dave Asprey: Okay. It's a very different fixer, that's more-

Paul Stamets: That's a bit more like a vitamin.

Dave Asprey: It's from neurogenesis, growing new neurons in the brain as well as for the gut bacteria that you're saying.

Paul Stamets: Right. Then you-

Dave Asprey: Interesting.

Paul Stamets: ... acclimate it. You can cut up the microbiome, you can set up the microbiome. There's a great study that came out, randomized placebo, double blind controlled study on Turkey tail mushrooms, the mushroom mycelium showing that it enhances the activity of Lactobacillus acidophilus and [Bethrow 00:25:51] bacterium.

Dave Asprey: It's a prebiotic?

Paul Stamets: Yes, a prebiotic. Stifles Clostridiums, staphylococcus and some of the inflammatory bacteria. This makes a lot of sense to me because a lot of people...

Most people love mushrooms, but about two to 5% of the population, they don't like mushrooms. It makes them feel queasy, they don't like that. I realize now that that's actually a scientific observation. It maybe their microbiome is incompatible with the mushrooms as a prebiotic. The majority of us, the Umami effect of the flavor, enhancing, et cetera. Actually, your microbiome is like, "Yes, this helps me achieve a better homeostasis and health." Some people are mismatched. That mismatching may be the case now with psilocybin mushroom taking on high doses several times a week. I don't see it. I think you need to reset. I think you have to re-normalize, you need to wash your receptors, and then stimulate them again.

It's like the tide of the water washing onto the land. That washing and then retreating and then resetting. It makes the experience continually novel and fresher. I think that stimulation, pause stimulation, I just know from lots of other work that I've done, that sort of pulse therapy is much more effective than-

Dave Asprey: Everything for diet, for exercise, for fasting. It doesn't matter if it's not cyclical, it probably doesn't work well.

Paul Stamets: My friend Pam turned me onto this pulse exercising, which I've modified a little bit, but you go like crazy for one minute on the machine-

Dave Asprey: Yeah. It's way better.

Paul Stamets: ... and then you wait and then you slow for two minutes to get your heart beat back down. All the studies have come out saying continuous exercise for an hour and a half doesn't get you what-

Dave Asprey: It's terrible.

Paul Stamets: ... 20 minutes will give you.

Dave Asprey: The ROI is bad. Oh, I got a hack for you. This is from a Headstrong and John Gray, the Mars, Venus guy taught it to me. You do your one minute and instead of just going slow for two minutes, lay on your back, laying down versus even sitting up completely changes your nervous system. One minute laying on your back, stand up. One minute, lay on your back. Just try it for a week and see the difference. It's crazy. Wow. I would've never expected it, but he's right.

Paul Stamets: Takes me 15 seconds to get off the machine.

Dave Asprey: Exactly.

Paul Stamets: I had my numbers up here on that. But now that's an idea of stimulation, pause, reset. Stimulation, pause, reset. That allows for growth. I wouldn't say is a universal truth, but it's damn close to one.

Dave Asprey: Well on the good bacteria friend, I'm an early adviser of an investor in a company called Viome. I've known because I lived in a house with toxic mold, and it really jacked up my biology a long time ago, especially in my gut bacteria. I was on antibiotics for 15 years. I'm not a prime example of a healthy gut bacteria guy. I've known that fungus in the gut can cause problems for people, but I also know that there may be a role for fungus in the gut, but no one had ever looked at the fungal or the microbiome. In fact, there was a guy from Case Western invented the word microbiome.

Now Viome is measuring fungus, mold, yeast, bacteria, phages viruses, all at the same time. We're starting to get a lens into that. But my question for you as someone who spent 40 plus years looking at mushrooms, talk to me about yeast versus mold versus the whole kingdom of mushrooms and mycelium and all the other forms they come in and the gut. What do you know about that? What do we know about that?

Paul Stamets: Well, it's an extraordinarily diversified kingdom, is about now putatively up to 5 million species of fungi. 2 million has been the previous estimates and just recently, it's been bumped to 5 million. There's about 10 to 12 million species on this planet. Fungi outnumber plants six to one or more in the 140,000 species that we have identified. So far, there's 14 to 15,000 mushroom forming fungi. Mushroom fungi are basically fungi that you can see and feel a reproductive structure that's fleshy. So is a really a facultative definition. If the reproductive structure has a fleshy form that contains spores, then that's a mushroom forming fungus.

Molds produce typically conidiophores. These are little microscopic stalks that branch and have spores adorned at the branches. Yeast tend to be unicellular. They actually form beads or a chain, like of a beads on a string, but they very quickly dissociate. If they're multicellular, they're short in their multicellularity, but they typically are individual. The *Candida albicans* is the big one-

Dave Asprey: For yeast infections, on men and women.

Paul Stamets: Right. That is very interesting to me because we have descended from fungi, our best antibiotics against bacteria come from fungi, but the antifungal antibiotics are toxic to us because of our closer ancestry to fungi. My general statement, I think it's true, is a war against nature, is a war against our own biology. You have to look at, at synchronicity, symbiosis and mutualism. When you're looking at fungi going across the landscapes, you have to look at eco types. The forest rolling fungi are the largest organisms in the world. The honey mushroom in eastern Oregon, mycelial mats, 2200 acres in size. It's only one cell wall thick, surrounded by hundreds of millions of microbes per ground. I do CFU, Colony Forming Unit analysis. You best at measuring the bio diversity of microorganisms in the soil. You do serial dilutions and you do this little math equation, and you figure out how many organisms are on a soil. Good garden soil have 2 million to 10 million microbes per gram. Poor anemic soils who have a tiny percentage of that.

When these fungi navigate over thousands of acres of landscapes and they're only one cell wall thick, how is it that they are not parasitized by all these other organisms? They have developed an innate immune system and because they can code for antibiotics naturally, and they're able to achieve these masses because they're in constant biomolecular communication with their ecosystem and resonant within the genome of defenses that these fungi fungal networks have developed is the ability to stave off competitors. But more interestingly, well, that's good. That's where a lot of our antivirus come from.

But more interestingly is the mutualism that's occurring, and is in fantastic, fantastic microscopic photography. Two friends of mine, Patrick Hickey and Nick Reed, and another mycologist, his name escapes me, but it shows that the mycelial networks are used as highways for bacteria. And in real time, you have to see these videos to believe it. In real time, the bacteria are screaming up and down using the mycelium as a corridor. Now, if the mycelium is selecting the transport system, a bacteria is selected by the mycelial mats, I believe to allow the transport of bacteria that leads to biodiversity, decrease the plants the foliate to create the debris fields that feed the mycelium because they're deterministic and helping their progeny survive. That's the way of nature. We are vehicles for spreading genes to future generations.

Dave Asprey: Didn't bacteria come before fungus though?

Paul Stamets: Actually, 13.8 billion years ago is the big bang. The earth form about 4.5 billion years ago, 3.8 billion years ago was LUCA, the Last Universal Common Ancestor. "Oh hey, LUCA." LUCA was a proteobacterium. Then from LUCA, then we have the branches of life that formed. LUCA was this sort of... it was a unicellular organism, the first multicellular organisms so far discovered. Now it's been pushed back to a billion years is that of mycelium.

Dave Asprey: Oh, so the fungus came first.

Paul Stamets: LUCA came first and then a multicellular organizations presented themselves in the form of fungi. This whole fungal bacterium dichotomy is really very interesting. Our mitochondria come from bacteria, same with fungi. This is a partnership that we've had for a long time.

Dave Asprey: I love that you position this is a partnership and my perspective has been maybe a little bit darker where I'm saying, well, for billions of years there's been a struggle for survival or a fight between bacteria and fungus. To this day there's researchers like Abby Constantine from the WHO who says flat out, "Many cases of cancer are simply sack fungi in the brain." Some kinds of brain cancer are a fungal infection. They act like fungus, and we can't tell the difference between some of ourselves under a microscope and some forms of fungus.

Paul Stamets: They look the same.

Dave Asprey: Yeah. It's amazing. You are treating with anti-yeast or antifungal medication and suddenly cancer goes away. Not all cancers, some of them are mitochondrial in origin, but things like this. You look at antibiotics from-

Paul Stamets: It's a gross, gross over simplification. It really speaks to the fact that human cells and fungal cells look very similar under the microscope. But to make the jump that cancer is a fungus, is an extraordinarily, I will say this, academically naive and poorly thought out concept, is far more complicated than that.

Dave Asprey: Oh, it's a fall. Yeah.

Paul Stamets: If you follow the logic here, we came from fungi. You are healthy.

Dave Asprey: You're a fungi.

Paul Stamets: You're a fungus. That means you're a walking form of cancer. It doesn't [crosstalk 00:36:40] like that.

Dave Asprey: Yeah, it doesn't make sense. To be really clear, what a Constantine was saying was that some select forms of cancer were fungus out of control in the body, not all cancer was fungus.

Paul Stamets: When you have disequilibrium, then you'll have populations of organisms that's been out of control out of homeostasis.

Dave Asprey: It's like an invasive species on our property. We have Scottish broom here, which doesn't belong and ...

Paul Stamets: It can be a consequence and a symptom of illness that's exploitive. I see this a lot, especially with the work that I'm doing now with bees, that's been just phenomenal.

Dave Asprey: I'm glad you mentioned that because I wanted to go there. Tell me more about bees and fungus and what's going on there. Because in fact, I first became aware of your interest in bees when our mutual friend Lee Stein, actually, Bernie man picked up the phone said, "We got to talk to Paul. He's not here." We called you and had a really brief conversation. Let's go into the bee [inaudible 00:37:39].

Paul Stamets: It's one of the most wonderful scientific discovery stories that I know of and I happened to be in the middle of it. A little bit egocentric. It's a bizarre set of circumstances that I've led to, I think what is a paradigm shifting discovery. This'll be the first podcast that I'll be mentioning something that enables and empowers everybody on this planet to do something. Can I string the story?

Dave Asprey: Yeah.

Paul Stamets: It's complicated enough, but it makes sense. At the end of it, it'll make sense.

Dave Asprey: Tell me the story. It's fascinating.

Paul Stamets: I grew up in Ohio in this laboratory and my brother John Influenced me and I wanted to become a scientist. Okay. I spent a lot of time in the Old Growth forest, for three years, I was a logger. I set chokers, I cut down the Old Growth forest. Then I went back to school after three of my buddies were killed in a high end skyline. We were on skylines, taking logs up canyons. We were doing three log loads. The trees were that big, three logs on a logging truck. I had a passionate interest in the Old Growth. I feel a debt of gratitude and I spent a lot of time in the Old Growth forest. The series of events are when walking through the old growth forests, I encountered a bear scratch on a tree. With my friend Dusty and the bear scratch was the best photograph of bear scratch I've ever seen, is in the South Fork of the Hoh River and the trail that time forgot and time did forget this trail folks.

I like to orienteer in a bushwhack. My friends warn people that, "Watch out when Paul goes out in the woods." I don't mind being lost. If there's enough daylight, you've got a river, you've got a mountain. How long really can you be lost? Some people are really good at getting lost for several days. Fortunately, I like to orienteer get hyper aware of my senses I've orienteer. We're orienteering and we find this tree with this bear scratch. I told my friend, Dusty, I said, "Well, that's really interesting. This bear scratched this tree because according to the Washington State Department of Natural Resources and the forestry department, uh, that tree is going to die from a Polypore mushroom." The Polypore mushrooms called the Red Belted Polypore, Fomitopsis pinicola. I said, "Let me do a story." We live on a Skookum Inlet between Olympia and Shelton. There's salmon runs that are really wild salmon runs coming through and there's no bears to be seen.

There was bears all over run salmon runs, in the western North America. That is a free lunch, right? I told her, "Well, the reason why there's no bears there, I ran into my neighbor and I asked my neighbor, what do you do?" He goes, "I kill bears." I go, "What do you mean you kill bears?" He said, "I actually hired by the Department of Natural Resources to kill bears, get bear scratch trees." The funding for the schools in Washington state for over a hundred years, the primary funding was selling of timber off of public lands. So in the great stupidity slash wisdom, they decided that bears were a threat to the economics and the sustainability of the public school system, so kill the bears so they don't scratch the trees, so the Red Belted PolyPore won't kill the tree and hurt the school budget. He was hired to kill hundreds and hundreds of bears.

Dave Asprey: You just inspired every student in Washington state to boycott their school because it's killing bears.

Paul Stamets: That's why there's no bears in the area. I said, "Well, let's come back here in two years and let's see if there's Red Belted Polypore." We came back in two years

and sure enough, the Red Belted Polypore was coming out of the tree, which had now fallen over, but this mushroom has grown. Okay, that's one. I'm going to tell you different events. Okay. Keep that event in your mind. The Red Belted Polypore, bear scratches, school budgets get threatened thus kill all the bears. Okay.

We go forward. I got involved with the US Defense Department Bio Shield about defense program called project Biodefense. I wrote an article in HerbalGram on the novel Antivirals Found in Mushrooms. Whopping one page long, six references, no scientific literature, I published it in June of 2001 September 11th. Several months later occurred the huge threat from the US government perceived was bio-terrorism. Weaponizable viruses in particular, like smallpox, within... They had the anthrax attacks soon after 9/11. Bio-terrorism became a huge concern. I worked with a Bio-shield about defense program has submitted 2,392 samples. Out of that massive shotgun sample sets, I had 10 or 12 super active species of the mycelium, not the mushrooms. The mycelium is growing in the ground, navigated for years, decades before mushroom comes up and rots in five days. The mushrooms don't have a good immune system, in my opinion. The mycelium does because it's fighting-

Dave Asprey: The roots are the strong part.

Paul Stamets: The roots are the strong part. It gives them-

Dave Asprey: Reading the flowers [inaudible 00:43:06].

Paul Stamets: ... about their fruit body and the fruit body that is perishable, it's fragrant animals eat it, spread spores, right?

Dave Asprey: Yeah.

Paul Stamets: Entices Michael Vawser to come and eat it. In the set in my Bioshield of biodefense and you can google Stamets and smallpox and NPR, National Public Radio's interview with me, deputy director of the FDA and the head of the Bioshield program. We had an extraordinarily powerful hits against viruses, pox viruses, Orthopoxviruses, smallpox, flu viruses, a flu H1N1, eight, three and two-

Dave Asprey: These are medicinal mushrooms you're having?

Paul Stamets: These are Polypore mushrooms that are growing on trees in the Old Growth forest.

Dave Asprey: The ones that the bears are spreading?

Paul Stamets: Exactly. I submitted all these other mushrooms, some button mushrooms and oyster mushrooms and Shiitake. Now, is localized in these Polypore mushrooms.

Dave Asprey: Wow.

Paul Stamets: I file patents on this that got issued... Crazy stories behind that. Okay. I iThenticated that the diluted extracts of mycelium, the water and ethanol had extremely potent antiviral activities, far exceeding that of pharmaceuticals. A natural product had a stronger effects than a pure pharmaceutical in this case compared to Ribavirin and Cidofovir. These are two well-known antiviral drugs. The side by side comparisons blew them out of water and it was diluted. These extracts are diluted a hundred to one because they're in 35% ethanol and these are in vitro human cell wall assays in laboratory sponsored by the US government. They had to dilute the alcohol down to 0.35%.

Dave Asprey: Mostly kills the cell, right?

Paul Stamets: Yeah. It's a hundred to one dilution. A hundred to one dilution where you beat these antiviral positive drug control.

Dave Asprey: Basically, soak the mushrooms in alcohol, pour off the alcohol... I'm simplifying it, filter it a little bit further with water by a chondrium.

Paul Stamets: Is the mycelium.

Dave Asprey: So not the mushroom but mushroom roots. How do you even gather mycelium versus the virus? You dig them up? How do you filter in the soil?

Paul Stamets: Extensive laboratory [crosstalk 00:45:07].

Dave Asprey: You have a lab that does that.

Paul Stamets: Yeah. A laboratory which [inaudible 00:45:09]. It's in my books, Growing Gourmet and Medicinal Mushrooms. Anyone listening can look up the book, so you all can do this yourselves. This is not...

Dave Asprey: You're making mushroom [crosstalk 00:45:18] easy.

Paul Stamets: I was going to say it's not rocket science. Actually there is some heavy science involved. But like anything else, once you do them a few dozen times, you get pretty good at it. Okay. There's that story. The antiviral effects against weaponizable viruses, viruses that can infect humans. Okay. We go forward. I'm raising bees in 1983 and I have two beehives.

Dave Asprey: We're still trying to get good beehives here, so that's cool. You're doing that, okay.

Paul Stamets: I was growing this garden giant mushroom in my garden and in July I came out to water... The mushrooms require a lot more water than the plants. It's in the garden for shade and it's called the garden giant because it's a good companion

with plants. I'm watering it and there's all these bees are on the ground and on my mushroom bed, there's wood chips elsewhere, and I looked at them really closely and there's a lot of them. It was a continuous convoy of bees from my beehives to my mushroom bed for 40 days from dawn to dusk. And it shrunk. The bed of mycelium was about 12 inches deep, and in 40 days it shrunk it to about 20% of the steph.

Dave Asprey: They're eating the [crosstalk 00:46:31] of it.

Paul Stamets: They were eating it. I looked really closely and removed the wood chips aside and I can see them sipping on these little droplets, little do droplets, those are extracellular metabolites on the mycelium. I made note of this. It was published in Harold Smith magazine in 1988. All these dates are important, very important to me. Then in 1993, I published it in my book Growing Gourmet and Medicinal Mushrooms. Speculating, they're probably getting the sugar sweet exudates.

Dave Asprey: These are all polysaccharides, yeah.

Paul Stamets: Polysaccharides and mycelium produces sugars as it breaks down wood and other material. I forgot about it. That's the other story on this. Then my good friend Louie Schwartzberg is a slow mo, fast mo photographer. He does for Nat Geo, National Geographic and Walt Disney. He had his donored film on pollinators, on bats, hummingbirds and bees. He came to me and said... And butterflies. He came to me and said, "Oh my gosh, Paul the monarch butterfly is in so much trouble, and their bees are in so much trouble. The bees are dying off in massive numbers. He knew of my work with entimopathogenic fungi. I have a breakthrough that all over the web is this Paul Stamets can take down Monsanto with this discovery. It's an exaggeration. It is a disruptive technology that's never made it to market. I'm open sourcing it now.

Dave Asprey: Thank you and beautiful.

Paul Stamets: But it takes a lot of money to mobilize and create a business to compete with Monsanto or those type of companies. He knew that I had a knowledge of the intersection between insects and fungi. He said, "Paul is there anything you can do to help the bees." The Varroa mite is the biggest problem. It's an unfortunate quote unquote perfect storm of stressors against bees is loss of habitat, is neonicotinoids, is glyphosphates interfere the microbiome of the bees.

Dave Asprey: Oh yeah, screw it.

Paul Stamets: It's factory farming. Apis mellifera, the honeybee from Europe is not native to the United States or in North America. Even to this day, the wild bees, which tend to often to be ground dwelling.

Dave Asprey: Yeah, without hives.

Paul Stamets: Without hives, without much honey, at all and the 200 to 300 bees in a colony, bumblebees, they give 70 to 80% of the benefits that farmers benefit from today still, even with all the honeybees around.

Dave Asprey: You saw when you walked in here to the labs, we have every pollinator species we can get. There's hundreds of bumblebees all over it.

Paul Stamets: I saw some bumblebees in the way in, I was really happy going, "Well this is going to be ecotopia in here.

Dave Asprey: We feed those guys a lot. Yeah. Okay.

Paul Stamets: He asked me, "What can you do?" I go, "Well, I know how to get rid of mites with this entimopathogenic fungi." I actually had a waking dream. I had all these different things swirling and I love that space between unconsciousness or the dream state and wakefulness, that sort of milieu that you can just float in between the two realms and allows us for a random access thinking. Then something synaptically, "Bam. I had this idea." I say, "Oh my God, I wonder if these extracts, using the Bio Shield biodefense program can help the bees because the Varroa mites are vectoring viruses. The Deformed wing virus is the most harmful of the viruses. So like having a pancake on your back. These mites were that big. The Varroa mites, is called Varroa destructor because it destroys. Once the beehives has 70% mite infestation, is terminal. The beehives won't survive. Now I met farmer, I met beekeepers who lost 90% of their hives this past year. 75% is called bee apocalypse. It is at pandemic, no, epidemics and they string them together as a pandemic. Oklahoma lost 84% of us beehives the year before last.

Dave Asprey: It's horrifying.

Paul Stamets: If you're a cattle rancher or herd raising sheep, if you lost 85% of your flock, is not economically devastating, it's morally devastating and it's depressing. When I realized the Varroa mites so that I can control the entimopathogenic fungi, and also I had these extracts that reduced viruses. I wonder if those viruses would be reduced by the extracts I gave it about shield program. The viruses are harming humans. What about the same extracts where they reduce the virus as harming bees? I had this waking epiphany, "Oh my God, I think I know how to save the bees with these Polypore mushrooms that bear scratches." I scoured the literature, everything I could and I could not find any reference tying bees to mycelium. Now there's 250,000 PhD entomologists in the world. There's 50,000 mycologists.

Dave Asprey: How could they not study that?

Paul Stamets: They freaking believable.

Dave Asprey: Bee Propolis is an anti... As a broad spectrum antimicrobial that they used to protect themselves.

Paul Stamets: They talk about tree resin and things like that, but no one... In the literature, there was no association that mycelium could help the immune system of bees. I looked and looked and looked.

Dave Asprey: And you'd seen it. You know they're eating it [crosstalk 00:52:04].

Paul Stamets: I had some beekeepers write me saying, "Now we know why bees go to saunas piles in the summertime again for the sugars." Now I think the bees realized that immune enhancement occurs when they engage these fungal networks. I went ahead and I then contacted the University of California-Davis and the chief entomologists, a renowned bee scientist whose name I will not repeat. I realized something really important is that you don't call up one of those scientists and introduce yourself with the statement, "I had a dream." He said basically-

Dave Asprey: They were like Watson and Creek did for DNA. It's a valuable state.

Paul Stamets: "I don't have time for this. A bizarre idea. Goodbye, later." Okay. Then I called up Dr. Steve Shepherd at Washington State University. I was at the Ted Conference. I said, "Okay, I got to have a different approach. That last time didn't work too well." I called up Steve and I said, "Listen, I'm at the Ted Conference. I'm actually walking out of the Ted Auditorium right now to talk to you because I have this idea." I said, "You can look me up. Google my name, smallpox, Stamets, NPR. You look up all my patents that I have, et cetera."

Dave Asprey: Yeah, you're a pretty credible guy.

Paul Stamets: Yeah, I try to convince him that, "Don't hang up the phone on me, dude. Give me 20 minutes." I didn't take 10 minutes where he said, "Don't go anywhere else." We started submitting samples in collaboration with WSU. This has now led to just recently we published in nature, a scientific reports nature. Only 7% of the articles submitted in the Scientific Journal Nature get accepted. It is considered to be the Premiere Scientific Journal and we published in nature. I'm the primary author, two authors from the USDA, US Department of Agriculture. Jay Evans, who's a renowned virologist, bee virologist with the USDA, he's been publishing for 20, 30 years. Steve Shepherd said, "In 40 years of research, I've never seen anything like this that extends the life of bees, doubles their lifespan."

And in nature are extracts of these Polypore mushrooms, Reishi mushrooms. One treatment put in the sugar water, 1% of the extract. One drop per a hundred drops. All beekeepers feed sugar water, most of all beekeepers do sugar waters for their hives. You're putting 10 mils per liter or one drop per a hundred drops, reduce in some cases these viruses, 45,000 to one with one treatment. All this PCR, all that data is extremely solid.

Dave Asprey: Will any Reishi mushroom do it or does it have to be the ones from the trees?

Paul Stamets: Reishi mushroom and the Amadou mushroom. We tested about 10 species, five of these Polypores have demonstrably positive effects in reducing these viruses. There seems to be species specificity factors. Very interesting. Certain species of these polypore mushrooms are more active against certain species of virus. There's a Lake Sinai virus, there is the Israeli AP area virus, there's the Deformed Wing virus, there is the Varroa Destructor virus, so the different clades of viruses. But we were able to... First through PCR showed all the viruses that were harmful, reduced by 90% and then we look at specific viruses and then we reduced the Deformed wing virus 850 or something to one. Lake Sinai virus, 45,000 to one, all under one treatment. This is amazing because now I can make the argument, and this is really important. That natural products can offer a greater bio shield of benefits than a pure pharmaceutical.

We showed up with the Bioshield program and now we're showing with bees. Now the bees study, this is the animal clinical study. Bees are the second most of all studied animal in the world, humans being number one. But everybody missed this. We all grew up with Winnie the Pooh. We all knew that bears went into rotted logs where there are bees to get honey. This is the way of nature is... You follow the mycelial path, you then come into a mutualism with fungi and their armamentarium of benefits when to watch in their guild, in the fungal guild. Now you have partners with bacteria that are helping you, fungi that are helping you. It's a very big picture.

Now, I did file patents on this and I got my first patent award on the United States. Truthfully, my ego swelled for about five minutes because I couldn't... They do what's called The Patents Award for three reasons. No prior art, no one ever mentioned that mycelium will benefit bees, immune system against viruses and they use the most sophisticated search engines in the world now, on every language, Russian, Chinese, Japanese, nothing was out there. I went, "Wow, I cleared that hurdle. No prior-

Dave Asprey: To name and something new came into the world. All right.

Paul Stamets: Then I thought, how is that possible? We all grew up with Winnie the Pooh. This really brings home the concept that we are in the Neanderthals with nuclear weapons. We are so advanced in some of our technologies and so poorly advanced in some of the most fundamental understandings of nature. What does that say to us, and what does it tell us about a species, about the reservoir of knowledge resident within nature that we're missing?

Dave Asprey: It's crazy.

Paul Stamets: The European Union approved 20 countries. I got Eurasia, including Russia. I now control 30% of the agriculture in Russia, Putin, you need to talk to me. I should be careful about what I say. Now, in the end, so I still have Europe,

Australia, New Zealand, United States. I open source it for South America, India, the majority of the world is open sourced.

Dave Asprey: You have the pattern and you're saying, "World use this." You don't have to get paid.

Paul Stamets: Yeah. What I've created now is, "Okay, how do we get citizen scientists to employ this?" I created a bee feeder and I'm making 100,000 of them. This is for citizen scientists. You can go to beemushroomed.com, b-e-emushroomed.com.

Dave Asprey: Mushroom or mushroomed?

Paul Stamets: Mushroomed, like if there be mushroomed, [Awkward and Waston 00:58:31] made the phrase, it means you're inspired by mushrooms.

Dave Asprey: Got it.

Paul Stamets: Is be mushroomed, I'd be mushroomed, I'm affected with it.

Dave Asprey: I love it.

Paul Stamets: Loving mushrooms. We put B-E-E, two Es, mushroomed.com. I'm giving these away. The first time-

Dave Asprey: You giving away 100,000 of these.

Paul Stamets: Well, I'm giving away 10,000 initially. This is going to cost me a frigging ton of money.

Dave Asprey: That's what I was going to say.

Paul Stamets: I'm giving it away to citizen scientists, you can sign up.

Dave Asprey: You're really going to save some bees.

Paul Stamets: We're going to try to create these bee feeders all over the world. They are designed to have ad-ons of plugin technologies. There is an entrance and they have the sugar water with the extracts. It'll count the number of bees going in and out. It'll hopefully in the future characterize the top pollen they're carrying, the type of bees because we have wild bees come to our bee feeder. Now all wild bees in the world are infected according to Dr Jay Evans, he has not seen a virus-free bee in more than 10 years. Because what happened is when the infected bees from the Varroa mite, when they get these Deformed Wing virus, they go to a flower, they leave viral particles on the flower then a bumblebee comes in, it's on the same flower, they get infected.

Now this virus that came out of Asia, first the United States in 1984 I believe, has now spread throughout the entire world. Commercial beekeepers have some major responsibility for this because as factory farming, they move them-

Dave Asprey: They move the bees around that spreads the virus.

Paul Stamets: Yeah, 80% of the beehives, the commercial beehives United States go to the Almond Orchards of California. We see bees on a flower as the last days of their lives. The bees used to fly for nine days and now their average fly time is four days. The colonies are stressed, they don't have enough pollen. The newly Hass bees, which are nurse bees, abandon the brood and the nurse bees can't hold the mites in check, but then the brood is left unattended. The mites then inject more viruses, the bee flight reduces, the colony is immunologically impaired. Just like if you're sick, you're not doing the dishes, you're not taking care of your kids. Then you have this ecosystem that becomes an open opportunity for other pathogens. Other viruses come in, other fungi come in, homeostasis is disrupted.

The idea with a bee feeder is that I am going to have these eventually with low rad and be able to go into the cloud. My ideas with Google Earth, you'll be able to zoom down into your neighborhood and every time a bee goes into the bee feeder there'll be a spark. You can see sparking of all over the earth. Now you can actually monetize this with a cryptocurrency because... I thought I'd come up with a cryptocurrency called The Fungo. Then if you are a hay farmer and in Oklahoma and you realize hay farmers are only getting in that county, 5% of bee visits compared to normal, you can predict that crop is going to be failing. Then on the put or on the futures market, you can bet that the crop won't be as good, the prices will be higher. There'll be a first crypto currency that's tied to ecological benefit.

That's my idea. Now the crypto currency came from me smoking a really good joint and thinking about what I was going to do this. I was going to monetize this, but I wanted to create a feedback loop of money. That's something that's ecologically appropriate and economically scalable. That was my idea for this. The first 10,000 bee feeders are going out.

Dave Asprey: Tell me to give people the option to pay for them.

Paul Stamets: No.

Dave Asprey: Okay.

Paul Stamets: No, I can speak, I think quite frankly about this, is that you can feed your children legally more foods than you're allowed to feed a bee. Bees are considered to be minor livestock. Mushroom mycelium is not listed as a permitted food for bees.

Dave Asprey: You have to have a permitted food to feed a bee?

Paul Stamets: Right.

Dave Asprey: Unbelievable.

Paul Stamets: For humans, we have foods, drugs and nutraceuticals, for livestock there's just food and drugs. Mushrooms are not an approved food for livestock.

Dave Asprey: Interesting.

Paul Stamets: The USDA and the FDA technically will not allow this to be involved in commerce. I took the IQ to approach.

Dave Asprey: I love it. You're a martial artist.

Paul Stamets: I'm marketing this to wild bees because USDA and the FDA has new jurisdiction over wild bees. Wild bees are infected. Wild bees are doing the heavy lifting, 70, 80% of pollination benefits the farmers received is from wild bees. The idea is help the wild bees and by empowering citizen scientists. We have done all these studies and in immunological pathways are not due to an antiviral molecule, is to up regulation of the immune system that codes for immunity factors that target viruses and pathogens. There's not a category for that. There's drugs like antibiotics, antivirals. There is not a category for feeding animals, immune enhancing compounds that stimulate an immune response. It's in a gray area. The FDA and USDA's credit, they're boxed in by regulatory classifications for which we don't fit into a classification. But come hell or high water, the earth is in trouble.

I'm not going to let some bureaucrat... What bureaucrat in the FDA and USDA whose legacy will be that they stopped the single most important invention for saving biodiversity in the planet because they refuse to allow that it permitted. Is that going to be your legacy? Is that what you're going to be known for? Because this is scalable, it's something that we can launch. It can save biodiversity all over the planet. The RoboBees, they came out with... I don't know if you heard about, they came out with RoboBees. The RoboBees chopped the wings off of the native bees.

Dave Asprey: That's not a good thing.

Paul Stamets: Not a good thing. It's like the Robobees go to a flower and they end up chopping the other bees that are native into pieces. Well, that's not a good solution.

Dave Asprey: No.

Paul Stamets: This is an example of an invention. I believe that my experiences with psilocybin mushrooms, re-generated neurons that allowed for an epiphany that can have

global benefits and become a paradigm shift. I plan to open source all of this eventually. I had a very high powered banking group out of Switzerland that have had a banking fund for over 250 years. I had the most frustrating phone call I think I've ever had in my life. They were real excited because I wrote an Op-Ed for the *New York Times*, December 28th, 2018. They read it. "Oh, Paul's going to open source this." I said, "Yeah, that's my intention." They got ahold of me and said, "We're this Swiss bank. We have all these clients, we want to open source this." I go, "Great, help me scale." They were just dancing around so much. They weren't saying like, "We want to help you, Paul."

Dave Asprey: They were bankers.

Paul Stamets: They were working for a client. I finally said, "I don't want to open source this without some very clear sub licensing agreements." It would make no sense for me to open source it to Monsanto, they will then greenwash just like BP was Beyond Petroleum, how much of their budget is an advertising on Beyond Petroleum versus their budget actually in investing in Beyond Petroleum is clearly a scam in order to trick and improve their image. I think it really backfired on them. But when I said to them emphatically, "I don't want these companies to greenwash. If I open source this, they don't jump on the bee bandwagon to hide their other practices." They said to me, "What's wrong with that?" I said, "Could you say that again?" "What's wrong with these companies using your technology to repair or improve their public image?" I said, "Because it's fundamentally flawed."

Dave Asprey: We have to stop spraying the glyphosate that's destroying our soil before we do anything, right?

Paul Stamets: I clearly saw them as being representative of these companies is what I suspected, the conversation didn't go anywhere. I want to be able to open source it, but control it, so it empowers people and the commons and not empowers bad actors who continue to hide their practices for the sake of an economic return. The problem that we really faced is short term benefits at long-term expenses. What indigenous peoples in first nations have done so well is thinking about seven generations, thinking downstream. This is something that's antithetical to the microsecond trading on the New York Stock Exchange where that people are making money in milliseconds, microseconds. This long-term vision of being able to protect the ecosystem, we need to have a new ecological metric, not measured in board feet of timber, not measured in trading of stocks, but based on the wealth of the biodiversity of the ecosystem that is giving us enormous benefits. This is something I hope to elaborate.

We're making 100,000, there's a purchased order. We're taking in 10,000. Why we're taking in 10,000 is we don't have the warehouses big enough to put all this in, this a huge amount of stuff. I have the certain economic bandwidth. I'm hoping that I believe in the Karma return on investment. I believe that Karmically, this is going to come back to benefit me economically. I'm not being a purist here, being an eco-warrior without economic... I can-

Dave Asprey: You have host defense. You have a sizeable company that you've built over the last 20 years that's doing great stuff, right?

Paul Stamets: It is.

Dave Asprey: It's okay to make money helping people. It's amazing.

Paul Stamets: I want to have something that will inspire people because saving the bees is the number one bridge issue between liberals and conservatives.

Dave Asprey: Who hates bees?

Paul Stamets: Who hates bees? No one hates bees. When the bees are going out and traveling through the landscape, there are also environmental communication with loss or organisms that we don't understand right now as part of the fabric of nature. As we lose biodiversity, we're leaving reverse of an airplane. It's like that. At what point will we have catastrophic failure? We are in that moment right now, it's all hands on deck. I want to die with a smile on my face and this is an actionable solution. I'm willing to put my money where my mouth is. Anyone who wants to go to beemushroomed.com, do it soon. We have about four or 5,000 people on the list and we start launching this in August.

Dave Asprey: B-e-emushroomed.com. Okay.

Paul Stamets: Is a non-commercial site.

Dave Asprey: That is beautiful Paul. I did not realize you put up that site. You've almost certainly read *The Secret Life of Trees*. The secret life of trees talks about a network effect in forests that is unbelievable. If you're listening to this, you haven't listened to or read that book, you owe it to yourself to do that. Trees are relatively simple in the way they behave compared to the way these mycelial webs do. The mycelial webs are integral to the way the trees communicate, integral to the way the bacteria in the soil communicates. It feels like you've reached that same level of knowledge around a fungus and soil and how it's interacting with bees and with viruses. Our soil is going away at very rapid rate and you go down to LA, it feels like half the soil down there because this is all under houses. There isn't anything left of fungus.

Paul Stamets: Before I lose this thought, there's a two recommendations I make. Please interview if you can Suzanne Simard. She's a UBC. She's a renowned mycorrhizal biologist, mycorrhizal fungal expert. Her work is just phenomenal. If I remember the carbon transfer and the nutrient transfer benefits. Her big claim to fame with another mycologist by the name I think of Anna Brandt, both BC researchers is that deciduous trees growing in the rivers will translocate nutrients up to 14% nutrients to treat like hemlocks that are nurse logs in the Old Growth forest. It was always wondered how is it those small trees survive in the low light conditions of the Old Growth forest. They radioactively tagged and

they found nitrogen and carbon being transferred from deciduous trees to conifer trees over hundreds of feet. The mycelium was actually having a mothering influence to protecting biodiversity.

Dave Asprey: It was growing the forest.

Paul Stamets: In the forest. Then Simard, she's a... I'm just intellectually this in love with her. She's just such a great person. She was at this at the very beginning. Then Suzanne Simard and myself are in a new movie by Louie Schwartzberg called Fantastic Fungi. Then the Magic Beneath Our Feet. Louie's been working on this for 15 years with me. It just premiered at the [Malley 01:12:29] film festival.

Dave Asprey: Oh, cool.

Paul Stamets: Fantasticfungi.com. You can see trailers on what we've been doing together, but it's this big picture that Louis Schwartzberg is just a master cinematography and it's been a labor of love with these investors who... First group of investors I know who their return on their investment was the goodwill of spreading the message rather than the money that they're receiving back. People believe in this, when they see it, they think it's so much more important than getting money in their bank account is more important to spread the knowledge. It helps the economy of consciousness, the economy materially. That's where I think we need to have now a revolution and a paradigm shift in our consciousness. I think that these mushrooms are a vehicle for that.

Dave Asprey: Paul, it's been a profound pleasure to have you on Bulletproof Radio. I've got a final question for you. How long are you going to live given what you know about mushrooms?

Paul Stamets: How long will I what?

Dave Asprey: How long are you going to live? What's your lifespan?

Paul Stamets: What is my lifespan? I cannot predict my lifespan. I've had so many near death experiences. The fact that I'm talking to you today is in itself highly improbable. I have come as close as it comes... I had a hang gliding accident, unconscious falling down a 1200-foot cliff, upside down, small tree and small rocks saved my life. I've had two assassination attempts. Both times I was able to stop the people. I don't know how long I'm going to live, but I do feel that the impact that we have on future generations, and I feel the keen sense truly of future generations is calling back in time, calling to you Dave, calling to me, calling to all of us, those listening, that we have an enormous influence on the future. It is time for us to take up that responsibility and to think downstream.

Dave Asprey: What a fantastic and unexpected answer. Paul Stamets, founder of Host Defense, Perfect Fungi. Your big thing right now is Beeshroomed.

Paul Stamets: Bee mushroomed.

Dave Asprey: Sorry. I knew I was going to go wrong.

Paul Stamets: Don't use the word shroom around me buddy.

Dave Asprey: Bee mushroomed.

Paul Stamets: Beemushroomed.com. I will do this to the limits of my ability. We decided to open up for the commons. I will commercialize only in order to create a financial vehicle to be able to give it away. You have to be profitable to be charitable. I have to create the revenue stream to be able to afford to do this. I can't distribute a hundred million bee feeders. That's what it's going to take to turn this pandemic around to save the bees is my estimate. 100,000 bee feeders, a hundred million bee feeders, 100 million citizen scientists all over the world uploading their data, sharing observations and proving it.

Dave Asprey: Well, that whole feeding your kids and your grandkids because we have pollinators out there seems pretty important. I'm behind you and I'll put this up in the show notes.

Paul Stamets: All right. Thank you so much. All right Dave.