Smithsonian Folklife Interview

Jane Smith
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Interviewer: Don Gedney

[Interviewee seated in her laboratory]

Don Gedney (DG): Jane, I'd like to have your name, your position—your job--, your address here, your zip code, your e-mail address.

Jane Smith (JS): Oh, I forgot to put my e-mail on that. Sorry.

DG: Why don't you just go through with your name, address, e-mail, phone number?

JS: Okay.

DG: And your title.

JS: My name is Jane Smith. I'm a research botanist. And my address is the Pacific Northwest Research Station in Corvallis, Oregon; Forestry Sciences Lab. You want full street address?

DG: Yep.

JS: 3200 Southwest Jefferson Avenue. [Correct s herself] Jefferson Way. Corvallis, Oregon, 97331.

DG: Okay. Did you give your phone?

JS: Phone number is area code 541-750-7387. And my e-mail address is.JaneSmith01@fs.fed.us.

[Recorder turned off; then turned back on.]

JS: I grew up in southern California, and my parents liked to go camping a lot, so I developed a love for the outdoors very early, and pretty much decided by the time I was in junior high school that I did n to want to be at a desk job all of the time; and I started thinking about botany and forestry. And my husband, excused me, my brother went into forestry, and I thought, well, I don't want to follow the exact same thing that my brother did. So I selected botany. And we both ended up going to Humboldt State University in northern California, and I chose it primarily because it was a beautiful area; lots of redwood trees. And just loved it.

DG: And your degrees?

JS: I got a degree in botany from Humboldt State University, and from Oregon State University I have a degree in forest ecology, a master's degree; and just finished my Ph.D. in botany and plant pathology.

DG: From OSU?

JS: Uh huh. Two months ago.

DG: Congratulations.

JS: Thank you.

[Recorder is turned off and turned on again]

DG: Okay Jane.

JS: Well fungi are important because they connect with the trees. The mycorrhizal fungi especially connect with the roots of the trees. And they do that because they don't photosynthesize like other plants, so they need to get their nutrients from somewhere. And the tree photosynthesizes and gives the fungus below ground the sugars and carbohydrates that they need, kind of like… I like to think of it, you know we hear a lot about the Atkins diet now? And fungi live on sugars and carbohydrates. And so the trees are out there photosynthesizing and sending that nutrient source down below the ground for the fungi. And in return the fungus is out there, spreading its hyphae through the soil to access nutrients that the tree would not be able to get by itself.

DG: And what are fungi?

JS: Fungi are a unique group of organisms. They're in a completely separate kingdom from plants or animals. They're in a kingdom all of their own, and they're just extremely diverse, fascinating little creatures.

DG: Are all mushrooms, like things we eat—morels, toadstools, and so on… Describe some of the different kinds of fungi.

JS: There are lots of different types of fungi. We have the chanterelles and the morels that many people go out and collect in the spring and the fall. We have truffle species; those are the little, kind of potato-like fungi that grow below ground that the squirrels feed upon. Squirrels, [boles?], a lot of small mammals depend upon those for their life source. And many of those are edible for people as well, and people go out and seek those out, much as they do in France and Italy.

DG: Are there other fungi that never surface like this, that stay completely below the ground?

JS: There are a lot of fungi that we still have never put names on, that we just… They don't actually produce fruiting bodies. Many of them are microscopic and we just don't know a lot about them.

DG: So if I would dig up a shovelful of forest soil, would I always find some fungi in it?

JS: There would always be fungi in any soil that you brought up above ground. And it's… Without those fungi, without the bacteria and everything, that soil would not be a living mass. That's what allows the trees to grow.

DG: Well underground, besides fungi, what about the critters?

JS: There are just numerous things going on below ground, that the connections are just so incredible. We've got nematodes which the fungi feed upon sometimes. They'll actually trap these little nematodes in their hyphae, and then they feast upon those. All sorts of insects and micro arthropods feed upon the hyphae of the fungi, and then when the fungi produce the fruits, that's what the squirrels eat. And then the squirrels then eat those fruits and run through the forest, and wherever they defecate they leave the spores, because the spores pass through the guts of the squirrels unharmed. And those spores then germinate and colonize the trees again. And so we have this incredible symbiosis that's happening, both with the animals as well as with the trees.

DG: Can you kind of go through a cycle, with the nematodes and animals and the fungi and the tree roots getting what they can. How's it all work?

JS: How does it all work? I'm not quite sure what you're asking. Sorry, Don.

DG: What I'm saying is…

[Recorder is turned off and turned back on.]

JS: Okay, so…

DG: Like to sum up the relationship between trees, fungi… here's the way it works. Something like that.

JS: Okay. So that the trees are photosynthesizing. That means they're out there capturing energy from the sun, and transferring that energy below ground to the fungus.

DG: That's what? Sugars or starches or what?

JS: Sugars and carbohydrates. And in return— because this is an exchange system—the fungus is out there breaking down nutrients and transferring those nutrients—the phosphorous, the nitrogen—back to the tree. And the tree would not be able to obtain those nutrients by itself. So it relies on the fungus, on all these different fungi that it associates with, in order to survive.

DG: And if there are no fungi… If for some reason or other the fungi are destroyed, what happens to tree growth?

JS: If the fungi were destroyed, if they were no longer there in the soil, the trees will not survive. They cannot survive without their fungal partners.

DG: Talk about nurseries now.

JS: In nursery situations, when they're growing the young seedlings, oftentimes the soils have been fumigated. And so they need to add that very important fungal component back into the soil. And so they often inoculate their seedlings with fungi that preferably are from the same sites that they're going to put those seedlings back out on, so that they grow well.

DG: Good.

[Recorder turned off. Turned back on again while JS is in mid-sentence.]

JS: … the outside of the root, and penetrates between the outer cell layers, but doesn't actually penetrate into the root cells. And between those cell layers is where the area of nutrient exchange happens. So that's the area where it's receiving the sugars from the tree, and it's giving back the nutrients to the tree.

[Recorder is turned off and turned back on.]

DG: Okay, let's talk about where the fungi… Fungus, fungi?

JS: Fungi [pronouncing it with hard 'g'] or fungi [pronouncing it with soft 'g'].or…

DG: Funguses, get their nutrients from.

JS: Well the fungi are relying on other organisms, including other types of fungi, to break down the decaying leaf matter, the dead animals, dead insects in the soils, and once they break all of that down, then the mycorrhizal fungi can gather up those nutrients and take them back to the tree.

DG: So if we would have a mall display, what ideas do you have about how the role, the interdependency between trees and fungi and so on could be shown?

JS: One thought that I had for a display on the Mall would be to emphasize to people how much is happening below ground that they don't see. That there's so much… So much o what happens is we see the trees growing from the ground up, but we don't visualize everything that's going on below ground. So perhaps there could be some displays where, maybe some big tunnels that kids could crawl through or people could walk through and see how the root systems were working, and how the roots connect with fungi, and how the fungi connect with small mammals above ground, and also [boles?] going down through ground, and perhaps that could be created in a way that people could see it, and not have it be just this black box that's not understood.

DG: What about a diorama with lights that move, and neon lights and so on?

JS: A diorama would be another great idea to have, where you could have… It could be more easily accessible, and people could push buttons and look at different aspects. Perhaps a film of something could occur.

DG: What might some of the buttons be?

JS: Oh, I think you could have a button for seeing truffles and mushrooms; and see how those truffles and mushrooms connect with small mammals; and then how spores are dispersed, what the different spores look like. They're really very beautiful. And also how then the spores would connect… When the spores germinate they would connect back in with the trees.

Fungi are incredibly important to forest management, because it's the connections between all the different organisms that create the forest. We can't just have, we don't just have trees without fungi, we don't have fungi without the trees, we need the small mammals in there; and different aspects of forest management impact the trees, the fungi, new seedlings. It's just an inter-connected world.

DG: Tell me something about fire and fungi.

JS: We're just starting to… Well, we've just completed a couple of studies, looking at the impacts of prescribed fire on the mycorrhizal fungi. And what we're finding is that the harsher the treatment, the more the soil is disturbed by the fire, then that kills more of the fungi within the soil. But we definitely need fire back into these ecosystems where we've suppressed fire for the last hundred years, and they've just got so much brush. But it's a matter of, how do we bring the fire back in without it destroying the… without killing the trees and without killing the fungi.

[Recorder turned off, then started again]

Well, I think the connections between fungi and insects are also very fascinating. And many of the insects feed upon the hyphae of the fungi, the hyphae that are spread through the soil. And so there could also be in the display, springtails and mites, and all the different little insects that people just don't really think about.

DG: And tell me something about them. Like how a few might protect themselves. They look like lobsters, a few look like lobsters?

JS: Some of them do. Some of the springtail insects do look a lot like lobsters. They coil up and then they spring out, and they're really cute, especially when you see them under the microscope and you can see all of their little parts.

DG: And some have chemicals that let them resist, that protect them?

JS: Many of the insects do have chemicals that resist, that allow them to not be eaten by certain prey.

DG: Then I'll add…

JS: That's an area that I don't know a lot about.

DG: I know. And some look like tanks? And all different shapes and forms?

JS: [nods] Um hm.

DG: And there's… In one teaspoon there could be five thousand different nematodes or insects. I think that's about right.

JS: That's probably about right. That sounds like something Andy [Malinky?] would have quoted.

DG: That's where I got it.

JS: Okay.

END OF INTERVIEW