

Nature Trails

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Talking It Through: A Story of Discovery about Tree Communication through Mycorrhizal Networks

Dr. Suzanne Simard

**Professor, Department of Forest and
Conservation Sciences, University of British Columbia**

**Friday, 16 October 2015, 7:30pm, Room 100 Willamette
Hall, University of Oregon Campus**

Lecture cosponsored by the U.S. Forest Service



Dr. Suzanne Simard is a Professor in the Department of Forest and Conservation Sciences at the University of British Columbia, Vancouver, British Columbia, Canada. She did her undergraduate work at UBC and got her PhD in Forest Sciences at Oregon State University. She worked as a research scientist at the British Columbia Ministry of Forests before joining the faculty at UBC. Simard's research interests span

almost as broad a range as the forests she loves to inhabit. They include plant community ecology, soil microbial ecology, plant-soil microbial interactions, mycorrhizae, forest regeneration, mixed broadleaf-conifer ecology and stand management, competition and vegetation management, stand dynamics, and silviculture systems.

Some of Simard's ancestors were loggers and foresters years ago so her forestry roots are deep and old. There is actually a mountain named after her family. Simard Mountain was once cloaked in old-growth cedar-hemlock, which she roamed in her youth with her family. It was this deep relationship with the old forests, then the impact of losing them to clearcutting, that inspired her work on studying healing connections in nature. She has also dabbled in mycorrhizal fungi for a long time, even before she knew how to spell the words, because when she was little she loved to play in the dirt. It's hard not to come in contact with mycorrhizal fungi if you play in the dirt. In a chapter of an about-to-be-published book entitled *We Discover*, edited by Marc Guttman, Simard gives a compelling statement about how her formative experiences have shaped her career:

My own deep early connection to the forest, and my personal and professional experiences that exposed the necessity of maintaining this connection, were foundational to the questions I was able to eventually ask as a scientist. My scientific discoveries have since unfolded like a treasure hunt, where one clue, one happenstance, and one experience led to a discovery which led to yet another clue, another discovery, and so on. It is clear to me that serendipity, not robotic hypothesis testing, was essential for revealing the unseen connections in forests. Who I am, what I

experience, and what I discover has led to the next questions to explore. I am delighted that our discoveries about connection and communication in forests resonate with people. People seem cheered with this new knowledge. They laugh, smile, and sigh with relief. I think it makes them feel hopeful – knowing that nature has evolved with complex mechanisms for coping with stress. The research we have conducted is only scratching the surface of how nature works. But as we peek into the inner workings of forests, I have become convinced that nature will help us heal and adapt to climatic changes, provided we treat it with respect.

Because mycorrhizae are so central to Simard's talk to us, a brief diversion here may prove helpful.

Mycorrhizal fungi are organisms that can exist only when joined with the tiny, actively growing parts of the root system of a host plant. This is not quite true, since spores of these fungi do exist as independent bodies in the soil, but for these spores to germinate and develop into mature fungi they must receive energy and signals from the root. After having germinated, the mycorrhizal fungus grows hyphae, which are orders of magnitude smaller in diameter than the plant roots they serve. The hyphae, the collective length of which grow to many times the length of the roots of the host plant, are good at gathering water and nutrients, especially phosphorus and nitrogen salts, and they share their bounty with the plant host, which in turn feeds the fungus. The vast majority of terrestrial plants form these symbiotic partnerships. A mycorrhiza is an association between a fungus and a plant root, not the fungus itself.

Simard's research has had a fundamental impact on the way forest ecosystems are viewed by scientists. Her thesis research, conducted in her beloved forests near Simard Mountain, was the basis for a *Nature* article. To give you an idea of what her peers think of her work, *Nature* is arguably the most highly respected journal in all of science, and her thesis research has been cited well over 500 times – more than ten times as often as the average paper published in *Nature*. In her thesis work she looked at the transfer of fixed carbon from one tree to another through root systems interfaced with ectomycorrhiza (a class of mycorrhizal fungi that form extracellular interactions with their host plants, such as Douglas fir and birch). She showed that plants that support ectomycorrhiza can interact with one another through their root systems – and this communication occurs not only between plants of a single species, but

among plants of different species. Her later research has shown that not only does this hidden communication involve exchange of carbon, water, and nutrients, but plants also use their root-fungal web to alert their neighbors to imminent attack by predators. When one plant is beset by an enemy it produces compounds that are translocated through the root-fungus web to its neighbors, which in turn transmit the same signal to their neighbors, and pretty soon plants in the entire region have turned on their chemical warfare systems to stave off the attack. The biggest Douglas fir tree in a forest in the Pacific Northwest is interacting through this web of roots and fungi with all the other firs within sight and probably beyond. Simard refers to such a tree as a mother tree. Her work demonstrates ecological interconnectedness in a new and compelling way. Big trees help little trees, healthy plants help hurt plants, crowded plants discourage competition; everything is connected to everything else.

Simard is a founding member of the Belowground Ecosystem Group, formed in 2004. Developing an understanding of belowground ecology, a critical, rapidly developing, and yet still poorly understood field, will provide a new approach to questions regarding the impacts of climate change, carbon sequestration, biodiversity, and sustainable management of forests and other ecosystems. UBC

faculty in the Group work together and also collaborate with other Canadian researchers toward the goal of linking structure and function in belowground ecosystems. New molecular and stable isotope techniques are providing deeper insights into the structure of the complex network formed by plant roots and their microbial compatriots. As important as the *structural* work is, equally if not more important is learning how these networks impact the *activities* in soil that literally are the basis for the functioning of terrestrial ecosystems.

Simard's research has made it big in the popular media, including CBC TV, Black Forests Productions, PBS Nature, NPR, and the New Yorker. You can see and hear her deliver a TED-Ed talk if you go to <http://ed.ted.com/lessons/the-networked-beauty-of-forests-suzanne-simard>. Having watched this talk I can assure you that not only will she share with us some research that is current and cutting-edge, she will do it with wonderful visual aids and with a mesmerizing delivery. Join us at 7:30pm on Friday, 16 October, in room 100 Willamette Hall on the U of O campus to hear Suzanne Simard's presentation "Talking It Through: A Story of Discovery about Tree Communication through Mycorrhizal Networks." You really don't want to miss this talk, and you might come early if you want to be sure of a seat.

John Carter

The U.S. Forest Service is cosponsoring Suzanne Simard's visit. We share her passion for our forests' many mysteries!"

The Dead on My Dashboard by Tom A. Titus

Day of the Dead has nearly arrived. I know this because some serious rain finally came, and last weekend I picked the first chanterelles. If we lived in central or southern Mexico, we'd be looking forward to October 31, a national holiday for remembering the deceased. I don't live in Mexico, am not of Mesoamerican descent, don't have a religious affiliation, and don't even care for Halloween. But I'll clue you into a little secret—I have my own ongoing memorial to those who have passed on.

Hyperbole doesn't come naturally to me, but some things just need saying. There isn't a more interesting dashboard in Lane County than the gray dust-covered ledge beneath the windshield inside my little red pickup. The passenger side dash is slightly recessed to form a rectangular basin containing an assortment of natural history artifacts. The pieces residing there are borne of my idiosyncratic, some would say bizarre, interests and have arrived at this place of

honor from various waypoints along my personal life road. Some might think these bits and pieces are a little weird.

The first piece to be ensconced was a shriveled Great Basin spadefoot. In size, shape, and color, mine resembles a piece of well-cured horse dung, but the characteristic white hourglass pattern on the back is still visible. I love it for its dry irony. Spadefoots are iconic arid-adapted frogs that shun the rain-soaked western third of Oregon. They are distributed from the rain shadow on the eastern flank of the Cascades across the intermountain west, hence the Latin name *Spea intermontana*. Although sometimes referred to as spadefoot "toads," the frog family tree clearly shows that they are not close relatives of toads. Spadefoots breed quickly, develop rapidly as embryos and larvae, and can tolerate an astonishing 50% reduction in body water. They also have evolved the amazing ability to accumulate urea, a toxic nitrogenous by-product excreted by all vertebrates in the urine, to levels that normally would cause an

inhibition of muscle contraction. But this magnificent suite of dry land amphibian adaptations has its limits. While cleaning out the garage at Mom and Dad's house in southeastern Oregon, I found this unfortunate specimen dead and dry as a stone beneath a space heater in the corner. My dashboard memorial now had its first occupant.

One of my onboard specimens is noteworthy in its absence. Some years ago I was on a field trip around southeastern Oregon with my herpetology class. Near Paisley Caves, Krystal found a mummified long-nosed leopard lizard, a species restricted to the sandy true desert scrub of southeastern Oregon. I was excited about her find, then did what any self-respecting instructor would do under the circumstances—stole it. Of course the appropriated lizard came to hold a hallowed place on my dashboard. A few years later Krystal had graduated to become a herpetology teaching assistant, and I was on an overnighiter to the Johnny Gunter Cabin in the Coast Range. I had one of Kim's fresh-baked loaves of bread to cover breakfast and lunch. First thing in the morning I got into the truck and smelled bread. Even before my morning coffee I recognized something was amiss. On the floor of the cab lay Kim's once beautiful bread, the plastic bag chewed through and the loaf mangled and half eaten. Worse yet, *my* stolen leopard lizard had been ... stolen! Then I realized that the driver's side window was partially down. On the dusty hood were footprints of the perpetrator. Krystal was mad, Kim was mad, and I was mad. I'm guessing the only one satisfied with the empty space on my dash was the woodrat.

The most recent members of my collection are a pair of dried rough-skinned newts that came into my cab last summer. Krystal actually gave me one (she is a forgiving soul), and the other was from a herpetology student. Both corpses were found while looking for western fence lizards in boulders on the reservoir side of Blue River Dam. The rocks had been exposed by a winter drought that caused dramatically low water in the lake. At normal water levels, the newts were living an aquatic life of leisure. Apparently they thought the period of low water could be ridden out by taking shelter in the rubble. This was a mistake. In the heat of an early summer they became newt jerky, their brown skin, once laden with neurotoxin, now stretched tightly over tiny ribs,

the orange pigment on their shriveled bellies still visible. Although I prefer rough-skinned newts alive, these two are now ensconced in *le petit musée* that is my dashboard.

Not all of my relics are herpetological. There are three mammals, those furry flea-ridden things with serious teeth, the better to bite you with my dear. Two are little brown bats, fluffy and light as feathers. Each met a premature end trying to roost in the stovepipe at the Johnny Gunter cabin; I found their mummified remains in the woodstove. There is also a California ground squirrel skull. I found this gem when my brother and I were plumbing that same cabin to honor Mom's Mother's Day request. Because my brother is claustrophobic and I don't know how to plumb, I had to wriggle beneath the house with floor joists only an inch above my chest, trying to think of something other than earthquakes, while he coached me from the outside. I crawled up next to some ground squirrel remains and managed to slip the skull into my pocket. Sometimes being a natural historian is hard work.

I suppose the Dead on My Dashboard really are museum pieces. Except that each dried out or skeletonized specimen is open to the world, and you won't find any shiny interpretive plaques. But each piece has a story that is an interesting mix of biology and sociology. I'd like to say that my dashboard isn't a reliquary. I'd like to say the shriveled pieces covered with road dust aren't talismans or icons. I'd like to say that I'm not that superstitious. But in the years those revered remains have rested on my dashboard, no one has broken into my cab. Uh-oh; did I jinx myself? Better knock on wood.



Just a Little Wild by Reida Kimmel

When I was little my friends and I loved to play in various grandmothers' overgrown jungle-like gardens, redolent with the scents of phlox, roses and

heliotropes. The old shrubs, covered in honeysuckle, were our caves. Nature was safe and nurturing. Then when I was eight, we moved from our small city to the country, and the world opened for me. Our hilly fields seemed like mountains, and every summer,

heifers or draft horses arrived to graze our scrubby pastures. I followed after my father as he tried in vain to eradicate “bullbriars” and bittersweet from the stone walls and trees. From the topmost pasture, we could see the river. One fall day, my mother and I walked to the little pond that drained into the river. There were undistinguished looking blackish ducks swimming near shore. Mother explained that they were black ducks, in trouble because the mallard ducks were “crowding them out.” That was the first time I had heard that anything in the natural world could be in danger of disappearing. Those troubles were for the long-gone dinosaurs.

As a teenager I rode my horse Pop along the country roads and through abandoned farm fields now reverting to woodland. Fall was especially magical. The air was chilly in spite of the sun, and the scents of apples, fallen leaves and crushed grasses were wonderful beyond all else in my memory. We would stop while Pop and I gorged on all the apples I could pick or he could grab from the ground. But this natural world that I so adored and love to this day was really not a natural world. Three centuries before, settlers had brought their stock, fruit trees, grasses and yes, invasive nuisances to New England and profoundly transformed that landscape. Of the native trees, the sugar maples, red maples, oaks and ash trees remained to give the glorious colors of fall, but already there were troubles. The chestnut trees died in my mother’s childhood. Some chestnuts lived on, after a fashion, in our woods. Sprouting, perhaps from deep roots, they grew to just the age to reproduce, and then died. I collected the leaves. I witnessed the plague that destroyed the American elm, iconic street tree of the Northeast and Midwest. Now New England’s ash trees are in danger of succumbing to an invasive boring beetle, and stressed sugar maples are dying from the crown downwards.

But these sad facts do not mar my beautiful memories. I had learned to love a wild world that wasn’t even wild. But it was full of animals, trees and flowers. It was beautiful. That was good enough. Perhaps it preserves sanity to compartmentalize, removing sad knowledge latterly gained from pictures of a past, idealized world. It is hard to believe how old I was before I took an interest in the beauty of the world not farmed, not gardenized. I went on my first hike on my honeymoon, walking up the first mountain I had met. My horse-training mentor in California introduced me to the chaparral’s wildflowers, Latin names and all. But still I was a creature of the farmlands, pilfering guavas, lemons and apricots from abandoned orchards with my now elderly accomplice Pop.

After too many years of cities – Providence, Chicago, Philadelphia, Baltimore – Chuck and I were determined always to live “away”, or at least a bit away. We had our Oregon farm, domestic, tamed nature, replete with our crops and weeds, and on weekends, hikes or skiing, camping in the wild lands. Our son grew up surrounded by nature, tame and wild. We had the best of both worlds thirty and more years ago. But even the wildest places we visited, Strawberry Mountain, Three Sisters Wilderness, or Eagle Cap in Oregon’s far northeast, were pretty squarely on the beaten path. We hated the presence of the horse campers, their beasts of burden laden with everything “necessary” for wilderness adventure: hot dogs and buns, chairs, pounds of paper and plastic goods. But most especially we loathed their mess. The people left trash, the horses left muddy stream crossings, and a great deal of dung replete with viable weed seeds. Decades later the situation has not improved. There are more people to enjoy wild places, and glitzy new equipment to enjoy it with, from mountain bikes to all manner of gas-powered off-road vehicles. Wildlife and vegetation bear the ravages of human intrusion, noise, trampling, erosion and vandalism. In many areas, it is impossible to patrol the wilderness areas and keep motorized vehicles out of protected areas. The only way to change this has to be education and a redirection of recreational activities. Imagine the huge areas encompassed by the Bob Marshall Wilderness in Idaho, Utah’s vast dry basin and range land, the proposed Owyhee Canyonlands Wilderness in Oregon. These areas garner the support of locals because they bring tourism dollars. They cannot be off limits to everyone except the nice people. There must be limits for all. How do we get people to accept limits? It’s easy to teach kids to love the outdoors if they have opportunities like camping, nature courses and outdoor survival classes. To teach them to understand about the natural world, I dream of a mandatory earth science course in all our schools with Aldo Leopold’s *A Sand County Almanac* as a text. Published in 1949, the year after his death, it remains prophetic, current, and profoundly moving on many levels, a beautifully written book full of hard truths. Clearly it will be harder to get a conservation message across to adults, but the media, the internet, and recreational equipment suppliers could help make the point that there are places that just must be left alone. There are so few places on this planet that are relatively untouched by human interference. And there are ever so many thrilling, challenging and beautiful places close at hand, tamed and changed, but still very wonderful. Think of climbing Smith Rocks, hiking the McKenzie River

trail, rafting a rough river, or fishing on the North Umpqua. We all can enjoy a bit of the wild, on this river, on these bike trails, on this mountain, here on the periphery, but we must keep out of the interior of

the wilderness areas. There nature should be left alone. No tinkering. No “improvements.” We won’t be around to see the results, but perhaps our great-great-grandchildren will thank us.

The ENHS booth will be at the Mt. Pisgah Arboretum Mushroom Festival on Sunday, 25 October, and we would love to have some new faces as booth sitters. No experience necessary, we’ll make sure you’re paired with a seasoned veteran. There’ll be a sign-up sheet at the meeting on the 16th, but if you can’t be at the meeting and still wish to volunteer, contact one of the board members – especially Dave Wagner. Numbers and addresses are in the board list at the end of the newsletter.

Events of Interest in the Community

Lane County Audubon Society

Saturday, 17 October, 8am. Third Saturday Bird Walk will be determined by interesting bird sightings posted to OBOL and other pertinent information available before the day of the walk. We will post the location on the LCAS Facebook page (<https://www.facebook.com/pages/Lane-County-Audubon-Society/330177413824?ref=hl>) and on the website (www.laneaudubon.org). All ages and skill levels are welcome. To carpool, meet at 8:00 a.m. at the South Eugene High School parking lot (corner of 19th and Patterson). We plan to return by noon. Remember that it's not a good idea to leave valuables or your vehicle registration in your car if you leave it at the lot. A \$3 donation is appreciated to help support Lane County Audubon's activities. For more information, contact Jim Maloney at 541.968.9249 or jimgmal@comcast.net.

Tuesday, 27 October, 7:30pm. Highlights from a Life List in Photos with Dave Stone. “When I started seriously birding 10 years ago, people asked me if I was keeping a ‘list.’ ‘My photos are my list!’ I declared. Well, a couple of years ago I said to myself ‘OK, buddy, how many birds are on your list?’ At last count, I have good photos of over 250 species. Not too shabby if you know how hard it is to get a good photo of a bird in flight or in the brush. Don’t worry, I’m not going to show 250 bird photos during my presentation. How many will I be showing? You’re just going to have to come and count them! If you’re the type who keeps a list of birds you’ve seen on TV, for instance, you can start a list of birds you’ve seen at an Audubon Program Meeting.” Eugene Garden Club, 1645 High St.

Mt. Pisgah Arboretum

Sunday, 25 October, 10am-5pm. Mushroom Festival. The west coast’s largest mushroom exhibit, scarecrow contest, hayrides, live music, great food and wine, plants and crafts for sale, free parking and shuttle. Suggested donation \$8, children under 12 free, no dogs.

The Cascade Mycological Society

Thursday, 22 October through Sunday, 25 October. Mushroom Adventure Weekend. Food, Fun, Discovery, and More. CMS is sponsoring Mushroom Adventure Weekend to provide opportunities to touch, taste, forage for, and learn about Western Oregon’s bounty of wild and cultivated mushrooms. Set aside **22-25 October** for exploring the world of mushrooms. *Mushroom Adventure Weekend* will expand the annual Mt. Pisgah Arboretum Mushroom Festival event into a multiple-day fungi fest, featuring wild mushroom forays, cultivation workshops from [Fungi for the People](#), mushroom tastings at local restaurants, a presentation by Food Writer and Mycophilia author [Eugenia Bone](#), cooking demonstrations, a screening of the award winning slime mold documentary “[The Creeping Garden](#)” at the Bijou, and more! Hotel discounts during the four days of activities are available at five area hotels if booked prior to 9 October.

Friends of Buford Park and Mt. Pisgah

Monday Morning Regulars, 9am-noon. Contact volunteer@bufordpark.org for more information.

Tuesdays and Thursdays, 9am-noon. Nursery Work. Meet and work at the Native Plant Nursery at Buford Park. Enter Buford Park from Seavey Loop Road. Turn LEFT after crossing the bridge and drive 1/4 mile to the nursery.

WREN (Willamette Resources and Educational Network)

For current WREN events go to <http://wewwild.blogspot.com/>

The University of Oregon’s Museum of Natural and Cultural History

Exhibit Hours: Tuesday through Sunday, 11am-5pm

Current Exhibits

- Explore Oregon: 300 million years of Northwest natural history.

- Road Trip! The Roadside Geology of Oregon.
- Site Seeing: Snapshots of Historical Archaeology in Oregon.
- Oregon - Where Past is Present. 15,000 years of Northwest cultural history and 200 million years of geology.
- Highlights of the Jensen Arctic Collection.
- Tradition Keepers – Shayleen Macy. Artist Shayleen Macy is a Wasco/Yakima/Warm Springs member of the Confederated Tribes of Warm Springs and a graduate of the University of Oregon's BFA program.
- Geophotography.
- Scientific at the Core.

Ideas on Tap. First Wednesday of the Month, 7-9pm, now at Sprout! Marketplace, 418 A St., Springfield. Quench your thirst - for beer and for knowledge – at **Ideas on Tap.** Enjoy local craft beers and thought-provoking discussions about science, ecology, history, and more.

Native Plant Society of Oregon, Emerald Chapter

Thursday, 15 October, 7pm. The Stunning Flowers and Landscapes of South Africa. Bitty Roy and Michael Wherley will show us why South Africa is where plant people go on pilgrimage. There are expanses of desert blooms, savannah and grasslands, odd forests, and the fynbos, a Mediterranean shrubland with about 10,000 species, a large fraction of which are endemic. They will illustrate the flowers within the context of their landscapes, as well as some of their pollinators and herbivores. Conference Room at Lane County Mental Health. For more information call 541-521-3964.

North American Butterfly Association, Eugene-Springfield Chapter

Monday, 12 October, Refreshments 7pm, Presentation 7:30pm. Biology and Conservation of Monarch Butterflies in the Pacific Northwest. David James, Associate Professor of Entomology at Washington State University, Prosser, will discuss current research being conducted on Monarch butterflies in the Pacific Northwest. This will include recent findings on summer breeding populations and migration routes to and from the Pacific Northwest. Also highlighted will be the west coast Monarch tagging program supported by Washington State Penitentiary and citizen scientists throughout the region. The Eugene Garden Club at 1645 High St.

Nearby Nature Go to <http://www.nearbynature.org/events> for information on NN activities, or call 541-687-9699.

Thursday, 22 October, 3-6pm. Haunted Hike Pumpkin Carving. It's almost time for the Haunted Hike and we need your help: we've got 80 pumpkins to carve! We'll be setting these up along the path for the Haunted Hike to light the way between our costumed critters! We'll be carving in the Learnscape outside the Alton Baker Park Host Residence.

Saturday, 24 October, 5:30-9pm. Haunted Hike. Curious about local nightlife? Wonder who's tiptoeing through the treetops? Who's crunching in the compost? If your kids like to pretend and they think night creatures are cool, then they'll love Nearby Nature's 19th annual Haunted Hike in Alton Baker Park! Pre-register at 541-687-9699.

ENHS welcomes new members! To join, fill out the form below. Membership payments allow us to give modest honoraria to our speakers, as well as to pay for the publication and mailing of *Nature Trails*. Our web address: <http://biology.uoregon.edu/enhs>

MEMBERSHIP FORM

Name _____
 Address _____
 City _____ State & Zip _____ Phone _____

E-mail (if you want to receive announcements) _____

I (we) prefer electronic copies of NT rather than paper copies. ___ Yes ___ No

If yes, email address (if different from the one above): _____

ANNUAL DUES: Family 25.00
 Individual 15.00
 Life Membership 300.00
 Contribution _____

Annual dues for renewing members are payable in September. Memberships run from September to September. Generosity is encouraged and appreciated.

Make checks payable to:
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DUES ARE DUE! And don't forget, members approved a raise to \$15 for individuals and \$25 for families at our May 2015 business meeting.

ENHS OFFICERS AND BOARD MEMBERS 2015-2016

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ENHS Schedule of Speakers and Topics for 2015-2016

16 Oct. 2015	– Suzanne Simard	– Talking It Through: A Story of Discovery about Tree Communication through Mycorrhizal Networks
20 Nov. 2015	– Nora Terwilliger	– Galapagos Islands
11 Dec. 2015	– Paul Bannick	– Journey With Owls
15 Jan. 2016	– Madonna Moss	– Archaeology of Pacific Herring
19 Feb. 2016	– Greta Binford	– Spiders
18 Mar. 2016	– August Jackson	– Pollination Biology
15 Apr. 2016	– Rebecca Vega-Thurber	– Coral Reef Decline
20 May 2016	– Mark Blaine	– Copper River Salmon
Alternate	– Dean Walton	– History of Oregon Naturalists