

Nature Trails

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An adult *Plethodon shermani* male from Wayah Bald in the Nantahala Mountains of western North Carolina.

Salamander Courtship

Lynne Houck, Professor, Department of Zoology,
Oregon State University, Corvallis, Oregon

**Friday, 18 February 2011, 7:30pm, Room 100
Willamette Hall, UO Campus**

To find terrestrial salamanders one has to turn over rocks. The young Lynne Houck was most definitely not a rock turner. Her mother had a deathly fear of spiders, and would scream for her husband whenever she saw one. Houck and her sister learned this lesson well, and since any rock could be assumed to have a spider under it, they left rocks alone. Houck's early life, in Hollywood, California, was thus blissfully free of spiders and their creepy, crawly ilk, which would have included salamanders if she had had any idea of their existence. It was not until she took a biology field course during her junior year at the University of California at Berkeley that Houck knew anything about salamanders, but that first exposure was contagious.

Renowned evolutionary biologist and salamander expert David Wake taught that course. He was featured on a NOVA program a few years ago: <http://www.pbs.org/wgbh/nova/evolution/evolution-action-salamanders.html> and led a study that showed huge declines in numbers of terrestrial salamanders in areas of Central America and Mexico, which his group concluded had to be due to global warming forcing those species with specialized requirements into regions of higher elevation to which they are not well suited.

Houck was able to wangle a job in Wake's lab as a senior undergraduate, and did both her Master's and Ph.D. degrees at UC-Berkeley under Wake's direction. So Houck has been doing research on salamanders ever since that undergraduate experience – a total of 37 years. Early in her career she realized that, although she enjoyed anatomy and physiology, if she wanted to do field work she needed to steer clear of those areas. She elected to focus on reproductive behavior. Accordingly, her present research interests encompass many aspects of reproduction in salamanders. She works mainly on a group of related species that are native to eastern North America, in the genera *Plethodon* and *Desmognathus*.

If you're at OSU, why eastern salamanders, I asked? The answer to that question has to do both with her geographical past and to the finer aspects of her research program. After her time in Berkeley, she and her husband took positions at the University of Chicago. Since it can take years for an individual salamander to become sexually mature, looking at the evolution of reproductive behavior in these animals has to be comparative. Luckily, much research had already been done on eastern terrestrial salamanders, and there is a large group of closely related species



within which evolutionary relationships have been established. So these became her research animals. Her group gets their salamanders from the mountains of western North Carolina. It's a 14-hour drive from Chicago to the Highlands Biological Station, ground zero for their collection forays. Houck and her husband Steve stayed at the U of Chicago for 23 years before coming to OSU in 1997. In that period, she made enough progress in her program utilizing this group of eastern salamanders that it would have been folly, perhaps even academic suicide, to start afresh with a new set of species native to our area.

In Houck's work on reproductive behavior in her salamanders she discovered that pheromones produced by males enhance the sexual receptivity of females. (I was oblivious to the importance of this until she told me that these are the only pheromones with such an effect in vertebrates. ALL vertebrates!) Now, most pheromones are small, volatile organic molecules that one individual of a species entrusts to

the wind to communicate with others of its kind, but Houck's salamanders use proteins instead, and must touch each other to transfer them. She had been able to show that they were indeed proteins, but she was stuck at that point.

The story of how she got unstuck illustrates how effective a communicator Lynne Houck can be. She was on a flight to Chicago, returning from a conference at Park City, Utah, exhausted by days of meetings interrupted by skiing (or was it the other way round?). Just before takeoff she glanced at what the guy next to her had in his hands and blurted out "That looks like a gas chromatogram." "Yes," he said, "that's just what it is." Turned out he was a biochemist, Richard Feldhoff, interested in blood proteins in mice. And he was able to quantify them. Before the plane landed in Chicago Houck had convinced him to analyze her protein pheromones. He did, and was able to give her molecular weights and then sequences. Not too long after that Feldhoff gave up mice for salamanders. Now he spends more time looking for them in and around Highlands than Houck does. He has become one of her principal collaborators. She has even convinced Richard's wife to help.

From the amino-acid sequences of the pheromones came the gene sequences, then development of an expression system, and production of the proteins, in turn enabling studies showing proof of activity. I asked her if there were other aspects of salamander

behavior she wanted to pursue. She chuckled and said the more she learns about their reproductive behavior the more questions she has, so, no. Now she wonders how the proteinaceous pheromones work once they get into the female. Do they exert their behavioral effect directly, or do they generate a molecular cascade, causing something else to bring about the enhanced receptivity?

We will hear all about these lovely little creatures and their courtly ways when Professor Houck talks on “Salamander Courtship” to the ENHS on 18 February 2011 in Room 100 Willamette Hall, U of O Campus. Please join us. John Carter

Prince or Knave? By Reida Kimmel

Yesterday when I was trying to bring some order to the chaos on my desk I came across my little “Seafood Watch” guide to sustainable choices in purchasing fish and shellfish. Checking it over, I found farmed rainbow trout listed as one of the recommended choices. I have avoided buying it for years, and not just because those ‘golden trout’, looking like something dreamed up by Kraft Foods, give me the shudders. I associate farmed fish with a lot of non-earth-friendly practices like polluting water and killing a lot of other fish to feed the farmed fish. I decided to find out more about trout farming and went to the Web, font of all knowledge, however superficial. Wild trout eat a variety of invertebrates, zooplankton, eggs, other fish, and even carrion. Farmed trout are started on rotifers and brine shrimp which can be raised by the hatchery and then grow into a diet of pellets composed of fish oils, fish meal, vegetable proteins and wheat. The fishmeal is obtained by grinding up fish that people do not like to eat, so called trash fish, most of it harvested by Pacific Ocean fisheries. Sustainable? Not very, but at least the trout do not live in pens polluting the ocean with excrement and diseases.

Whether or not we choose to eat them, rainbow trout, *Oncorhynchus mykiss*, are a fascinating species. On the rivers of the West Coast, from Alaska to California, the large slender ocean-going form called steelhead, returns to fresh water to breed, to the delight of anglers. Fishing for rainbow trout in lakes and streams is a part of many families’ happy summer memories. What are these fish we think we know so well? Last fall, I read *An Entirely Synthetic Fish: How Rainbow Trout Beguiled America and Overran the World*, by Anders Halverson. I had always assumed that rainbow trout were native to all of the United States, and that the uniquely Northwestern native fish were cutthroat trout, *Oncorhynchus clarkii*. I was surprised to learn that

rainbow trout naturally occur only along the northern Pacific Rim and in the inland Northwest. The type specimen for the species came from Kamchatka, in 1792. Modern genetic analysis tells us that the rainbow is more closely related to Pacific salmon than to brown trout (*Salmo trutta*), native to Europe and Asia, or Atlantic salmon (*Salmo salar*). That is why rainbows, there are fourteen sub-species of them, are now placed in the *Oncorhynchus* genus with Pacific salmon.

The taxonomy might be boring, but the story of rainbow trout after their ‘discovery’ is not. American sportsmen fell in love with the pretty fish, not because it was so tasty but because it was fun to catch, a good fighter. Not long after the Gold Rush, men were exploring Northern California’s rivers looking for living gold, rainbow trout, to see if they could raise fish in captivity and send them East to establish populations in the popular angling sites there. Fish hatcheries were established in California in the 1870s and the first fish were shipped to New York State and Michigan in 1875 and 1876. Rainbow trout fishing and farming became an instant success. Hatcheries all over the country supplied rainbows to stock ever more rivers and lakes. Often these fish were not genetically pure. Eggs and milt from different sub-species got mixed. People did not know better, or care. Neither did the trout. They love to hybridize. The species native to the East were often decimated by the introduced rainbows, and if competition for food were not enough to suppress the indigenous species, the frequent, repeated, stocking of streams and lakes with rainbows just overwhelmed the natives. In the Northwest, sturdy folk packed hatchery trout into fish-free high lakes, where previously frogs and newts had been the top predators. The fish stockers came on foot and horseback, and finally in airplanes, year after year, because those cold high lakes cannot sustain breeding populations of fish.

A hundred and thirty-six years after the first hatcheries began to export smolts, rainbow trout are farmed all over the world, from Europe and Iran to Chile, Australia and New Zealand. In addition, steelhead are farmed in ocean pens in Chile and Norway. Disease and pollution are huge problems in Chile. It’s not a pretty picture, and I am still ambivalent about buying trout. And now I know that those delicious wild trout we so relished on our camping trips were really not so wild, probably just a few days or weeks out of the hatchery. How different were they from the fish I scorn at the market?

Frozen leaves

By John Carter

During that spell of subfreezing weather back in December, did you notice how the Rhododendron leaves were curled up? They were shaped almost like little green cigars. As I looked at the ones in my yard it occurred to me that they had also been curled up like that last summer, during those few days when Kris had not already seen their distress and given them the drink their posture was crying out for. That connection made me think back to what I used to study – freezing stress in plants. There's a reason for that similarity between the way the leaves looked last month and how they looked in July: the freezing weather caused a kind of water stress in the leaves. It's not exactly the same, because in hot weather the water goes completely out of the plant and during a freeze it just moves within the plant. But that journey, sometimes only of a few microns, on the part of a bunch of water molecules can have a profound effect. If enough of them are induced to make the trip, the plant can be damaged or even killed. The leaf curl helps minimize water loss. After they have lost a certain amount of water they curl into that cigar – or cinnamon-stick - shape to keep from losing more.

So why does it happen that way? Why doesn't the water inside the cells just freeze where it is? Why does it move to spaces between cells and then freeze? First, it's actually very hard to get water to freeze exactly at its freezing point. There has to be an ice crystal already present, or some impurity that mimics an ice crystal, to get the liquid water to start freezing. Without such a nucleator liquid water will supercool – remain liquid – to many degrees below its normal freezing point. On the outside of a plant there are always plenty of nucleators, so ice first forms on the outer surface – sometimes on a leaf, sometimes on a stem, other times at ground level. But inside the plant cells there aren't any effective nucleators, so the water inside the cells remains liquid even though the temperature drops below the freezing point. So at some temperature just below 32 F, with ice present somewhere on the plant, there is now a driving force for movement of the water inside the plant cells to the ice outside the cells.

How does the water move? We have to think really small now. As small as a plant cell is, a water molecule is much, much smaller – so much smaller

that there is room for 'billions and billions' of them in a single cell. Water molecules are there in basically two forms: bound water and free water. The bound water is interacting with the many other things in the cell: proteins, lipids, sugars, ions, nucleic acids, etc. The individual molecules in the free-water fraction move around a lot. They can move back and forth across membranes and cell walls, and into and out of the gas phase. They leave and return to the cell at an equal rate until there's ice around, and then the journey becomes more one-way. When a water molecule that has moved out of the supercooled liquid state and into the gaseous state comes in contact with ice, it sticks. It can come back off, but it comes off the ice much more slowly than it comes off of the supercooled water inside the cells. So ice that forms on the surface of the plant attracts water from the cells of the plant, which shrinks those cells and makes room for more ice outside them. The growing ice front can work its way inside the leaf through whatever openings it finds – xylem, stomata, wounds, what have you – and expands into the growing spaces between the cells of the leaf leaving drought-stressed cells behind. It only takes a few degrees below freezing to cause a large fraction of the water within cells to move to the ice between cells. This generates a large drought stress, and behold! The Rhododendron leaves begin to look like they did last summer.

Lucky for us, and for the Rhodies, those leaves can develop a decent tolerance to this freezing/drought stress as they acclimate during the fall, so that they don't die as a result. This acclimation process is complex, sensitive to such environmental factors as day length and average temperature, water status going into the fall, and presence or absence of pathogens. Different parts of the same plant can differ in their ability to acclimate – roots, for instance, are much less able to acclimate than stems. Mature plants can acclimate better than juvenile ones. And obviously there can be large differences between related species. The most freezing-tolerant Rhodie I'm aware of is *R. catawbiense*, which, when fully acclimated can withstand about -60 F. I'm not sure how low the temperature would have had to go to kill the leaves of my Rhodies, but I would bet quite a bit lower than what they experienced last December, since even the native, coastal Rhododendron can survive to around 10 F when it's fully acclimated.

Out and About

“Out & about” is a periodical encouragement to Eugene Natural History Society members to get out and experience our magnificent Oregon



Petroglyph Rock at Malheur National Wildlife Refuge

I know, Malheur is for the birds. Each spring snow geese, sandhill cranes and all manner of waterfowl pass through Malheur National Wildlife Refuge, one of the best in the west. But have you seen this rock right by the road on the way to Krumbo Reservoir?

Learn more about the birds at Malheur at the John Scharff Bird Festival in early April. Get in on the trip to an increasingly rare event - watch the male sage grouse strutting and drumming on their lek to impress the ladies. www.migratorybirdfestival.com

Events of Interest in the Community

Lane County Audubon Society

Saturday, 19 February, 8am-12 noon. Third Saturday Bird Walk—Wintering raptors. Join Leila Snow to look for wintering raptors in the Fern Ridge and Eugene Airport areas. Watch for Northern Harriers, American Kestrels, White-tailed Kites, Red-shouldered Hawks, and numerous other raptor species. Meet at S. Eugene High at 19th and Patterson, rain or shine, at 8:00am and return by 12 noon. A \$3 donation is suggested, as well as a share of gas costs for carpooling. Please note: As a precaution, do not leave valuables in your parked car. Questions? Contact Leila at leilas@ori.org or 541-968-5533.

Tuesday, 22 February, 7:30pm. Jabirus, Jaguars, and Plush-capped Jays: The Pantanal Wetlands and Iguacu Falls. By Bob Fleming. The Pantanal, in western Brazil just south of the Amazon Basin, is home to caimans, jaguars, pirhanas, and many species of tropical birds. Join Bob Fleming on a visually stunning tour. 1645 High St., Eugene.

Mount Pisgah Arboretum

34901 Frank Parrish Rd., Eugene, 97405. Located off I-5 Exit 189, 15 minutes southeast of Eugene. Call Peg Douthit-Jackson at 541-747-1504 or email mtpisgjp@efn.org for more information or to sign up for any of the following Arboretum activities.

Saturday, 12 February, 1pm - 3pm. Nature Photography in a Digital World: a Two Day Workshop (second part). Led by David Stone. Fee: \$25 (MPA members \$20).

☐ **Saturday, 26 February, 1 - 3pm. Winter Wonderland: A Family Walk.** What are the plants, animals, and fungi up to this winter here at the ☐ Mount Pisgah Arboretum? Nature guide extraordinaire Tom Bettman ☐ leads this fun walk for all ages. ☐ Fee: \$5 (\$2 kids). No RSVP needed.

WREN

For more on these activities call 541-683-6483 or email info@wewetlands.org.

Wednesday, 23 February, 6 – 8pm. WREN will be presenting **Our Wonderful Wetlands** at the February Cosmic Pizza Family Night.

Nearby Nature

Call 541-687-9699 or email info@nearbynature.org.

Saturday, 12 February, 6-7:30 pm. Nearby Nature Quest: Treefrog Tunes. Meet at the Amazon Park playground and go on a special treefrog tunes walk. Learn all about (and listen for!) Pacific treefrogs with ecologists Peg Boulay and Bruce Newhouse. FREE for members, \$2/person or \$5/family for non-members. Pre-registration suggested: 541-687-9699.

Saturday, 12 February, 1-4 pm. Nearby Nature Restoration Celebration. Join students from U of O's Environmental Studies Department for trail crew and litter pick up in Alton Baker Park. Dress for the weather and bring a re-usable water bottle. Please call ahead at 541-687-9699 or email info@nearbynature.org if you plan to attend. Sponsored in part by REI.

Monday, 21 February, 8:30 am-3 pm. Nearby Nature No School Day Program: Talons and Tweets. Find out who has been tweeting in Alton Baker Park. Try your luck with some beak techniques, explore our talon collection, and make your own bird wings. \$30 members/\$35 non-members, ages 6-9, maximum 12 kids. Register at 541-687-9699, ext. 2.

Monday, 21 February, 1-4 pm. Nearby Nature Restoration Celebration. Join OCCU employees for trail crew and litter pick up in Alton Baker Park. Dress for the weather and bring a re-usable water bottle. Please call or email (see above) if you plan to attend. Sponsored in part by REI.

Monday, 7 March, 7:30 pm. Author Richard Louv Speaks in Eugene. EMU Ballroom at UO. In his best-selling book *Last Child in the Woods: Saving our Children from Nature Deficit Disorder*, author Richard Louv shared lots of compelling arguments for why kids need to spend time outside. But guess what? It turns out that nature isn't just good for kids...it's important for everyone! Louv's talk will be based on his new book, *The Nature Principle: Human Restoration and the End of Nature-Deficit Disorder*, due out in May 2011. FREE

Thursday, 10 March, 6:30-8 pm. Nearby Nature Spring New Volunteer Orientation. Meet in the Tykeson Room at the Eugene Public Library. Love nature? Enjoy kids? Want to make a difference? Learn all about leading school nature walks in Alton Baker Park this spring as well as other Nearby Nature volunteer opportunities. No experience needed--free training provided in early April. Questions or can't make the meeting? Call, email, or see <http://www.nearbynature.org/volunteering>.

North American Butterfly Association, Eugene/Springfield Chapter

Next meeting is in April.

North American Rock Garden Society, Emerald Chapter

Saturday, 12 February, 1 pm. Exploring Wyoming's Bighorn and Beartooth Mountains. By Christine Ebrahimi.

Christine, botanist and plant lover, spent several weeks during the summer of 2009 exploring the beautiful Bighorn and Beartooth Mountains of Wyoming with her family. With wildflowers at their peak, they saw alpine treasures that we all covet including *Aquilegia jonsesii*, *Telesonix jamesii*, *Kelseya uniflora* and carpets of *Eritrichium nanum*, just to name a few. Eugene Garden Club, 1645 High St. Free, open to all.

Emerald Chapter, Native Plant Society of Oregon

Monday, 14 February, 7:30 pm. Historic and Current Ethno-botany as practiced by Native and Rural Americans.

EWEB Training Room at 500 E. 4th Ave., Eugene. **Eric Jones** shows us the uses of native and naturalized plants combined with implications for management and restoration of habitats. He cites the West Eugene Wetlands Ethno-botanical project as an example of the challenges and benefits. For information, call 541-746-9478.

Saturday, 5 March, 9:00am. Field Trip: Mount Pisgah. View early wildflowers and habitat restoration work on the floodplain of the Coast Fork of the Willamette River. The walk is 3 miles; we will see dwarf isopyrum (*Enemion stipitatum*) in bloom. Bring snacks and water. Location: Mount Pisgah Arboretum. More information: 541-345-5531.

Public Interest Environmental Law Conference

Thursday-Sunday, 3-6 March. Turning the Tides: Creating a Green and Clean Future. □ □ 29th Annual PIELC.

University of Oregon Law School. More info? Go to www.pielc.org

THANKS

Many thanks to our loyal volunteers who spend a lunch hour every month folding, sealing, labeling, and stamping Nature Trails. Peg Morrow, Bonnie Ullmann, Brian Eames, Charliine Durchanek, and Chuck Kimmel are regular helpers. Others just drop by from time to time. What could be a lot of work becomes a fun time to get together and chat and Nature Trails is readied in record time!

We welcome new members! To join ENHS, fill out the form below. You will receive *Nature Trails* through December of next year. Membership payments allow us to give modest honoraria to our speakers, as well as to pay for the publication and mailing of *Nature Trails*.

MEMBERSHIP FORM

**Eugene Natural History Society
P.O. Box 5494, Eugene OR 97405**

Name _____ <http://biology.uoregon.edu/enhs/>
Address _____
E-mail (if you want to receive announcements) _____
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ANNUAL DUES: Contributing 20.00
Family 15.00
Individual 10.00
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: The Eugene Natural History Society

The following information is voluntary, but appreciated:
Would you like to: lead field trips teach informal classes work on committees?
What would you like to hear a talk on? _____
Do you have special experience in natural history: _____

INTERESTS
 Archaeology Astronomy Bird Study Botany Conservation Geology History of Science
 Herpetology Meteorology Mosses & Lichens Mushrooms Nature Walks
 Wildflowers Zoology
 Other _____

ENHS bike path work party. Sunday, 20 March. Meet at 10 am on North Bank Bike Path under the north end of Ferry Street Bridge, or in the parking lot in front of McMenamins North Bank restaurant off Centennial Loop. Families welcome; nature study entertainment provided. Bring gloves and be clothed for the weather. Work usually lasts until about noon, after which many of us stay for lunch and conversation at McMenamins. Contact for info: David Wagner 541-344-3327.

The ENHS ADDRESS HAS CHANGED. We have a new post-office box: 5494. Our new zip code is 97405.

Eugene Natural History Society
P.O. Box 5494
Eugene, Oregon 97405

ENHS Schedule of Speakers and Topics for the rest of 2010-2011

18 Feb 2011 – Lynne Houck – Salamander Courtship
18 Mar 2011 – Scott Bridgham – Climate Change/Terrestrial
Ecosystems
15 Apr 2011 – Tom Titus – Amphibians and Reptiles at the
Center of the Universe
20 May 2011 – John Fischer – La Nina, El Nino, and La Nada:
The Big Weather Makers in the
Northwest

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