Bulletin
of the
Native Plant Society of Oregon

Dedicated to the enjoyment, conservation, and study of Oregon's native vegetation

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How Old Is That Tree?

by Christopher J. Earle

Dendrochronology, from the Greek roots dendros (tree) and chronos (time), is the formal study of tree rings. As a dendrochronologist, I use trees to determine the timing of a wide variety of events relating to various problems in climatology, history, ecology, and even law (trees are often used as boundary markers). The most common problem I encounter, though, is a seemingly simple one: how old is a certain tree? You might suppose that it would be simple to answer this question: cut the tree down and count the rings. Well, for various reasons, it usually just doesn't work that way. In this article I will explain some of the various ways of determining a tree's age, and try to give some sense of the problems and uncertainties involved in aging trees.

Although tree age determination can be a fairly complicated process, there are basically two methods that can be used: (1) tree rings, and (2) everything else. We'll look at (2) first because it's a relatively short answer.

Everything Else

The best way of determining a tree's age is to find out when it was planted. Obviously, this is frequently not practical, but it occasionally works if the tree was planted by humans and historical information can give us a date. For example, a forestry plantation, a tree in an extensive garden, or a non-native tree planted when an area was first colonized, could all be aged from historical data. For some kinds of trees, such as cycads, palm trees, yuccas or giant cacti, historical information may provide the only means of getting a good age estimate.

Dating a tree without rings can also be done by measuring its growth rate or by using a chemical analysis, such as radiocarbon dating. Growth rate measurements tend to assume that the growth rate measured over a given recent time period can be extrapolated to the entire lifespan of the plant. Such estimates can be wildly inaccurate. Nonetheless, extrapolation has been used to estimate ages of 1000 to 4000 (!) years for yew trees in England (Hartzell 1991), and it was used by one early researcher (Chamberlain 1919) to infer an age of 2000 years for a cycad based on counting the number of leaf

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In This Issue

Oregon Flora Project Progresses

by Scott Sundberg

The summer of 2002 will long be remembered as a turning point in the history of the Oregon Flora Project. Significant progress has been made in many areas.

At the end of September Ann Willyard, Thea Cook and I submitted a report and database with lists of all plant taxa (species, subspecies and varieties) for all Oregon counties to the BLM. The report was the culmination of one year of work by several volunteers, 23 student employees, and ourselves. The lists were derived from 342,000 records from herbarium specimen labels from OSU and seven other herbaria, species lists, photographs, and published literature.

During the summer we completed work on a prototype rare plant guide. Fifty fact sheets were prepared. Each sheet summarized information on a western Oregon species and had a distribution map, species description, line drawings, photographs, habitat and best survey time information, and identification hints.

The online photo gallery is under development. Sherry Pittam has designed a web page to display photographs and we are gathering photographs with an emphasis on members of the heath family (Ericaceae) and rock garden plants.

Over the next couple of months we will put several things online through our website, www.oregonflora.org so please drop by for a visit!

Native Plant Society of Oregon

World Wide Web
http://www.NPSOregon.org

E-mail Discussion List
To join send a message to majordomo@tardigrade.net, with the following in the body of the message: subscribe npso

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Opinions expressed in this publication are those of the authors of the articles. They do not represent the opinions of the Native Plant Society of Oregon, unless so stated.

Call For Papers

by Cindy Roché, Kalmiopsis Co-editor

The new issue of *Kalmiopsis* will be coming out soon, which means that the editors are looking for articles for next year. There are openings for an Oregon Plants, Oregon Places article, Plant of the Year, and an article about historical botanists. We have one exciting feature article already promised (you have to wait, I'm not going to tell you the subject).

Oregon Plants, Oregon Places and Plant of the Year are your opportunity to showcase a part of Oregon or a species that is special to you! Do you like to draw or photograph Oregon native plants, or maybe make up botanical cartoons or write botanical poetry? Here is an opportunity for publishing your creativity (we said publish, not sell).

Please refer to previous issues of *Kalmiopsis* for length and content of articles, and to the 'notice to contributors' inside the back cover of volumes 7 to 9 for submission instructions. The submission deadline is December 1, but prospective authors may contact Cindy Roché to negotiate a (slightly) later date. (However, if another author submits first, your article may wait until the next issue to see the light of publication). Contact Cindy at 109 Meadow View Drive, Medford, OR 97504 or crupinaqueen@charter.net.

TANYA HARVEY

California groundcone (Boschniakia strobilacea) *is a strange and beautiful non-chlorophyll plant of the family Orobanchaceae. The deep, reddish-brown flower stalk looks like a pine cone until you get close enough to see the flowers. It is a parasite on madrone* (Arbutus menziesii) *roots. This one was photographed along the Rogue River trail near Wolf Creek in late May.*

State

January 11, 2002, Saturday

Board Meeting: The next State Board meeting will take place in Eugene. Exact time and location will be announced at a later date.

June 20–22, 2003

Annual Meeting: The Portland Chapter will host next year's meeting in John Day. More information will be published later in the *Bulletin*.

Blue Mountain

For information on the Blue Mountain Chapter call Jerry Baker at 541-566-2244.

Cheahmill

November 9, Saturday, 8:30 am

Field Trip: Foray to the Coast Range for mushrooms and truffles. Combined field trip with the Corvallis Chapter. McMinnville area folks meet at the Linfield Ave. entrance to Murdock Hall (2 blocks east of Hwy. 99W) on the Linfield College campus at 8:30 am. Corvallis area folks meet at OSU parking lot SW of the Beanery, 26th and Monroe, Corvallis, at 7:00 am. For more information, call Jack Murphy at 503-883-2704 or Dan Luoma at 541-752-8860.

November 21, Thursday, 7:00 pm

Meeting: Scientific Discoveries of the Lewis and Clark Expedition—the Flora and Fauna. Jerry Igo, President of the Mid-Columbia NPSO Chapter, Chair of the NPSO Education Committee and 2002 Recipient of the NPSO Fellows Award will show and discuss his recent video project. The video includes many beautiful scenes of flowers and habitats similar to those encountered by the historical Expedition in the very early 1800s. Carnegie Room, McMinnville Public Library, 225 N. Adams Street, McMinnville. Contact Susan Williams at 503-538-1865 or helgesusan@attbi.com.

Corvallis

November 9, Saturday, 7:00 am

Field Trip: Foray to the Coast Range for mushrooms and truffles. Combined field trip with the Cheahmill Chapter. Corvallis area folks meet at OSU parking lot SW of the Beanery, 26th and Monroe, Corvallis, at 7:00 am. McMinnville area folks meet at the Linfield Ave. entrance to Murdock Hall (2 blocks east of Hwy. 99W) on the Linfield College campus at 8:30 am. For more information, call Dan Luoma at 541-752-8860 or Jack Murphy at 503-883-2704.

November 11, Monday, 7:30 pm

Meeting: Arctic-Alpine Plants of South-Central Alaska. Loren Russell will show slides of his recent trip to Alaska. Avery House, Avery Park, Corvallis. For more information contact Esther McEvoy at 541-754-0893.

December 9, Monday, 7:00 pm

Meeting: Annual Holiday Desert Potluck and Slideshow. Please bring a desert to share and a 10-20 of slides to show the members. We will meet at the Avery House, Avery Park, Corvallis.

IMPORTANT NOTE TO FIELD TRIP PARTICIPANTS

Field trips take place rain or shine, so proper dress and footwear are essential. Trips may be strenuous and/or hazardous. Participation is at your own risk. Be prepared to sign a release form indicating this. For a sample copy check out the NPSO website. Please contact the trip leader or chapter representative about difficulty, distance, and terrain to be expected on field trips. Bring water and lunch. All NPSO field trips are open to the public at no charge (other than contribution to carpool driver) and newcomers and visitors are always welcome. National Forests require a Northwest Forest Pass for many field trip locations. Permits can be acquired at forest headquarters and ranger districts.

NOTICE TO FIELD TRIP CHAIRS AND LEADERS

The Forest Service and other agencies have set policies limiting group size in many wilderness areas to 12. The reason is to limit human impacts on these fragile areas. Groups using wilderness areas should be no larger than 12.

Emerald

October 28, Monday, 7:30 pm

Meeting: Sudden Oak Death—The Latest Information. Dr. Nancy Osterbauer, Regulatory Plant Pathologist with the Oregon Dept. of Agriculture, and Research Assistant Deirdre Jackson will tell us all we have been waiting to hear about the pathogen *Phytophthora ramorum*, now infecting oaks and other Oregon species. Potential and existing implications for our state will be discussed. There will also be a chance to purchase the *Lane County Checklist* ($12). Room 117, Science Building, Lane Community College, (turn off of 30th Ave. onto Eldon Schafer Drive, drive up the hill, park above buildings and walk down. Science Building is on southeast corner of campus.)

November 16, Saturday, 9:00 am

Field Trip: Moss Identification at Sweet Creek in the Coast Range. Robert Weiss, who has his own environmental firm out of Waldport, will lead a 2 to 3 mile hike along the Sweet Creek Trail. He will supply each participant with a list of 40 bryophytes found in the area. Bring hand lens, rain gear and lunch. Meet 9:00 am at South Eugene High School or 10:00 am at the

Sweet Creek trailhead. For more info call Robert Weiss at 541-563-3947 or Dave Predeek at 541-345-5531.

November 25, Monday, 7:30 pm

Meeting: Pollination in the Oak Savanna Community. Dr. Andy Moldenke, entomologist at OSU, will talk to us about pollination of oak savannah understory plants in the Willamette Valley. This plant community and its pollinators have suffered great disturbance, including the virtual elimination of several hundred species of native bees. Andy will discuss how this loss affects restoration efforts for this important (and beautiful) community. Room 117, Science building, Lane Community College, 4000 E. 30th Ave.

December 9, Monday, 7:30 pm

Meeting: Annual Holiday Gathering/Do-It-Ourselves Slide Show. Bring 5-10 slides and some snacks to share, if you wish. Come admire others' slides if you don't have your own. See December *Bulletin* for location and other details.

January 27, Monday, 7:30 pm

Meeting: Botanist in Paradise—New Zealand, Rarotonga, Thailand and Nepal. Dr. David Wagner, U of O Herbarium curator ('76-'93), cryptogam specialist (ferns, mosses and liverworts), has recently traveled to several far-away 'Shangri-las'. He will 'take' us up high mountains, through cloud forests and into other lovely wild habitats, to see ferns, orchids, rhodendrons and other gorgeous plants, both in slides and in 'rubbings.' Room 117, Science building, Lane Community College, 4000 E. 30th Ave.

High Desert

For information on the High Desert Chapter, call Stu Garrett at 541-389-6981.

Klamath Basin

For information on the Klamath Basin Chapter, call Sarah Malaby, 541-884-5703, smalaby@cs.com; or Mike Cutler, 541-850-9012, cutler@cvc.net.

Mid-Columbia

November 6, Wednesday, 7:30 pm

Meeting: The Aliens Are Coming! What's a Poor Native To Do? The latest overview of noxious weeds and invasive exotic vegetation in Oregon. Information from our recent Oregon Vegetation Management Association Conference at Sunriver. If you care about native habitats or your own backyard, come learn some things to do. Presented by Jerry Igo, a photo quiz will be included. Columbia Gorge Discovery Center. Exit 82 off I-84 in The Dalles and follow the signs.

December 4, Wednesday, 7:30 pm

Meeting: Wildflowers in The Columbia Gorge, an Historical Perspective. A slide show out of the past, honoring the photographic works of Keith Chamberlain, Jeannice Merz, Wilma Roberts, Stuart Chapin, Emory Strong, Russ Jolley, Barbara Robinson, Nancy Russell, James Holloway, Jerry Igo, paintings by Albert Bierstadt, and line drawings by Meriwether Lewis. Columbia Gorge Discovery Center. Exit 82 off I-84 in The Dalles and follow signs.

North Coast

For information on the North Coast Chapter, call Vivian Starbuck at 503-377-4141.

Portland

November 12, Tuesday, 7:00 pm

Meeting: Willamette Valley Fire Use and Restoration Techniques. Kathy Pendergrass from the U.S. Fish and Wildlife Service will give a presentation covering historical Willamette Valley vegetation patterns: Native American burning practices; plant responses to fire; and a variety of issues associated with current restoration practices in prairie plant communities. Fireside Room (#355) of the First United Methodist Church, 1838 SW Jefferson St., Portland. For more information contact Dee White, 503-775-2909.

Siskiyou

November 21, Thursday, 7:30 pm

Meeting: Southern Oregon Fire Ecology. Tom Atzet, Ecologist for the Siskiyou, Rogue and Umpqua National Forests, will discuss fire as an ecosystem process and observations on the response of the local flora. He will use examples from this summer's Biscuit Fire and historical and monitoring information from past events such as the Silver, Longwood and Squire Fires. Room 171 of the SOU Science Building, Ashland. For more information call Molly Sullivan, 541-512-1341.

Umpqua Valley

November 14, Thursday, 7:00 pm

Meeting: Bring botanicals for ID, botanical experiences, and ideas for future programs or field trips to share. Welcome new members. 7:00 pm at the Mercy Medical Center Community Education Building, 2459 Stewart Parkway (bright blue sign between Stewart Park Pharmacy and Officemax). For information call Jack Hausotter at 541-863-5347.

Willamette Valley

The Willamette Valley Chapter is looking for a President! Our bylaws limit the terms of the four officers to two years, so the current president is "termed out." Consequently, there will be no organized Chapter activities until a replacement is found. If you're interested, please call Karl Anderson at 503-315-7329, or Wilbur Bluhm at 503-393-2934.

William Cusick

For information on the William Cusick Chapter call Frazier Nichol at 541-963-7870.

Berry Botanic Garden Events

Portland's Berry Botanic Garden has a number of native plant oriented events. To register or to get more information on these and other events at the garden call Kris at 503-636-4112x22 or visit their website at http://www.berrybot.org.

Gardening for Birds
November 2, Saturday, 10 am - Noon

Slides and discussion will introduce you to some great native plants to incorporate into your garden. You'll also learn gardening practices that encourage birds and other wildlife to do more than just pay your garden a visit—they may decide to make it their permanent home. $10.

The Slippery Slope
November 9, Saturday, 10 am - Noon

Meet with erosion control professional Dawn Hottenroth to discuss strategies for mitigating or preventing erosion control problems. Whether the construction of your new home has left you with a bare, steep slope, or over time a troublesome erosion problem has wrought havoc in your yard, properly selected plantings or other site measures can offer the perfect solution. $15.

If Stones Could Speak
Oregon's Botanical History
November 13, Wednesday,
7 pm - 8:30 pm

Rick Dillhoff, of the Evolving Earth Foundation, will share his slides and enthusiasm in a journey through Oregon's botanical past. Learn what paleobotany, the study of fossilized plants, has to teach us about the climate of the past 50 million years and how it has produced the Northwest we know and love! $10.

Native Plant Management Conference

Rare Plants, Invasive Species, and Ecosystem Management: Native Plant Restoration and Management on Public Lands in the Pacific Northwest

February 11–13, 2003

LaSells Stewart Center, Oregon State University, Corvallis, Oregon

Please join us at this 3-day symposium on native plant management in the Pacific Northwest. Topics will cover rare and endangered species, invasive plants, species and habitat restoration, and ecosystems. The meeting will feature talks by experts. The target audience includes biologists, land managers, and the public to foster technological information exchange.

Michael Way, our keynote speaker, is a member of the International Team for the Millenium Seed Bank Project from the Royal Botanical Gardens, Kew. Michael is the International Coordinator for the Americas and is responsible for the development of seed conservation projects with partners in Mexico, Chile, and the USA. He has experience in habitat conservation, management and restoration. Michael will speak on "Population, species, or community: Where should land managers target plant conservation efforts?"

Sponsors include the Institute for Applied Ecology, Bureau of Land Management, U.S. Forest Service, and NPSO. Look on-line at www.appliedeco.org for additional details, directions, updates, and registration information.

Mount Pisgah Arboretum Events

Seavey Loop Rd., Eugene, call 541-747-1504 for information or to register.

Mushrooms in the Field Walk
November 2, Saturday, 10 am - Noon

Follow up our Mushroom Festival with a walk to further pique your interest in fungi. Join Chris Melotti and Molly Widmer of the Cascade Mycological Society as you learn to identify the fall mushrooms found near the Arboretum's forest trails. Suggested donation $3. Meet at the Visitor Center, rain or shine.

Mushrooming at the Mountain Workshop
November 9-10,
Saturday & Sunday, 10 am - 4 pm

This intensive class for beginning 'shroomers offers instruction on identification, picking, cooking, ecology, folklore, and more! Maggie Rogers leads the class with slideshows, discussion, and field identification. Come prepared to your knowledge of Oregon's diverse fungi. Fee: $60 ($50 MPA members). Pre-registration required.

Pine Needle Basketry Workshop
November 17, Sunday, 10 am - 3 pm

Devote a day to learning the traditional art of pine needle basketry and come away with a finished product. Learn history, techniques, and skills for creating your own beautiful basket with Pam Roberts, a talented local crafter and instructor. Materials provided. Fee: $30 ($25 MPA members). Pre-registration required.

Thanksgiving Nature Readings
November 28, Thursday, 10-11:30 am

Celebrate the harvest season and changing seasons at this annual event that brings together participants' love of nature and literature. Bring your favorite nature writings to share in a cozy setting with hot cider and good company. Suggested donation: $2. Meet at the Arboretum Visitor Center.

Highlights of the NSPO State Board Meeting October 5th in Coos Bay

by Kelli Van Norman, Secretary

The third quarter NPSO state Board of Director's meeting was held at the Coquille Tribal Offices in Coos Bay. Thank you to the South Coast Chapter and the Coquille Tribe for hosting the State Board's quarterly meeting. The next Board meeting is set for January 11 in Eugene. All Board members, committee members, and chapter presidents please mark your calendars and plan to attend.

The NPSO 2003 budget proposal will be reviewed at the January meeting. We have accomplished spending down our funds to a targeted carryover of $10,000, which means that we are on a tight budget and that we will have less money next year for grants. A subcommittee is putting together a list of NPSO donation categories such as the Education Fund, Conservation, the Internship Fund, and the Rare and Endangered Plant Fund with their details to be posted on the NPSO web page as a type of "gift catalog" for people who would like to make donations to NPSO. Our objective is to raise awareness about NPSO's goals and funds to encourage and support our goals.

Publishing the *Bulletin* and *Kalmiopsis* is expensive, but the Board believes these 2 publications are the "voice" of NPSO and are thus very important. We are very pleased to have the publication of *Kalmiopsis* back on track and would like to thank the *Kalmiopsis* editors, Cindy Roché and Linda Ann Vorobik. *Kalmiopsis* has a newly formed Advertising/Marketing Team who will be developing an advertising policy, rate schedule, and marketing plan for *Kalmiopsis*. NPSO's two Occasional Papers have been selling well and are $700 over budget. We encourage NPSO members and chapters to buy extra copies to give to your local libraries, museums, and colleges.

The health and momentum of NSPO chapters is of concern to the Board. The monthly meetings and field trips that each chapter hosts are the foundation of our organization. Several Chapters did not meet the July deadline to post notices about September meetings in the *Bulletin,* and several chapters are in need of executive officers. The Board is available to help any of the Chapters. Please contact us. We also encourage members to become involved with your local chapter. The Siskiyou Chapter, for example, has had great success recently and now has over 100 members, many of whom are actively participating in chapter events and issues.

NPSO has agreed to co-sponsor a conference on the Native Plant Restoration and Management on Public Lands in the PNW: Rare Plants, Invasive Species, and Ecosystem Management conference to be held in Corvallis on February 11-13 (see page 113 for more information). We encourage NPSO members to volunteer at the event. Contact Tom Kaye (kayet@peak.org), of the Institute for Applied Ecology, for more details about volunteering. The Corvallis Chapter will have a table with NPSO information at the conference.

The NPSO Board of Directors is often asked to endorse or oppose groups or ideas. At this meeting we voted to endorse the Old Growth Campaign (www.nwoldgrowth.org) and the Earth Charter (www.orionsociety.org/pages/om/02-1om/Earthcharter.html), and to write a letter of opposition to the Oregon Department of Agriculture and to Oregon State University regarding bio-engineered turf grass that is being tested for golf courses.

We are also quite pleased that an anonymous donor will contribute $10,000 toward an end-of-the-year challenge fund drive for the Oregon Flora Project through the Friends of the Oregon Flora Project. The NPSO Board of Directors decided to contribute our budgeted portion for the Oregon Flora Project as an additional $2,500 to the principal for a challenge total of $12,500. The Oregon Flora Project has made a great deal of progress this year in both initiating projects and producing products. (See back page for donation information.)

TANYA HARVEY

Great polemonium (Polemonium carneum) *blooming at Grasshopper Meadows near Oakridge.*

A New Hawthorn (*Crataegus*) for Oregon?

by Rhoda Love, Emerald Chapter

Oregon may have a new species of *Crataegus* according to J. B. Phipps and R. J. O'Kennon who have named and published a description of *Crataegus castlegarensis* in the journal *Sida* (vol. 20, number 1, 2002).

For the Oregon Vascular Plant Checklist, I designated 5 hawthorns for Oregon: three natives: (*Crataegus suksdorfii, C. douglasii* and *C. columbiana* (also known as *C. piperi*); one introduced European species, *C. monogyna*; and a hybrid between *C. suksdorfii* and *C. monogyna*. If *Crataegus castlegarensis* is verified, we will need to add another.

Phipps and O'Kennon describe the new species as very close to *C. douglasii*, differing in having hairy inflorescence branches and hypanthium; thorns on the twigs sometimes paired or in triads; fruits subglobose rather than longer than broad; and the fruits burgundy rather than dark purple. They have designated a type specimen collected on the Salmon River in Lemhi County Idaho, and their map indicates a broad range for the proposed taxon from the Okanagan country of British Columbia to the John Day Valley of Grant County Oregon, east to the Flathead Basin of northwest Montana, and south to northeast Utah and central Wyoming. They named this hawthorn "castlegarensis" because it is particularly common on the grounds of Selkirk College in Castlegar, BC.

As some *Bulletin* readers may know, I am interested in hawthorns, having once written a thesis on their insect predators. In addition, it is no secret that I am fascinated by the life and work of Louis F. Henderson, Curator of the U. of Oregon Herbarium from 1924-1939. (See NPSO Occasional Paper Number 2, third printing 2002.) With the naming of the new species and the designation of a specimen from Grant County Oregon, these two interests now intersect in the Valley of the John Day River, and I especially look forward to the NPSO Annual Meeting in John Day next June 20 to 22 as an opportunity to hunt for this newly-named species in the wild.

RHODA LOVE

What is the connection between Henderson, who died in 1942, and a hawthorn named this year? In the *Sida* paper, Phipps and O'Kennon have cited a specimen collected by Louis Henderson on April 30, 1925 near Picture Gorge as an example of the new taxon! This was Henderson's collection number 5146 procured on the Humphrey Ranch on the John Day near Squaw Creek. Henderson, himself a very keen observer, was puzzled by this collection which he felt unable to identify with certainty. His notes, thankfully preserved in the University of Oregon Archives and Special Collections, indicate his confusion: "*Crataegus columbiana* or *C. douglasii*? A small tree having the inflorescence strongly pubescent, but thorns large often triple; calyx lobes serrate, fruit unknown."

Some very helpful folks in John Day country, Jennifer Barker and Larry McGraw, have already been out scouting the area to try to find an example of *C. castlegarensis* in the Humphrey Ranch area. Come next April, I plan to get out there myself. If the search proves fruitful (!), perhaps NPSO can plan an Annual Meeting field trip to the area to see what we think of this possible new addition to the Oregon flora?

RHODA LOVE

Crataegus *fruits. Spencer Meadow, Gifford Pinchot National Forest, Skamania County, Washington.*

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scars on the trunk and multiplying by an estimate of how long it took the plant to produce a new leaf. A similar method has been applied to estimate the age of palm trees. One widely quoted age estimate of 200 years for a typical saguaro cactus (*Carnegia gigantea*) is based on observing how much a relatively large saguaro can grow over a period of a few years and then extrapolating to the observed size of full-grown cacti. There are numerous problems with extrapolation: trees change their growth rate in response to climate, disease, human activity, competition with other trees, disturbances such as fire, and even intrinsic factors related to the slowly changing size of the tree. Tree ring data show us that a tree may grow ten times as fast at some times as it does at other times. Therefore, age estimates based on extrapolation are basically nothing more than wild guesses. They provide no information.

Carbon dating has occasionally been used to measure tree ages. It is used surprisingly often by scientists who are unaware of the uses of dendrochronology, and is quite useful with certain trees native to the wet tropics, where there is little seasonal weather variation. In tropical climates, some trees never go through the seasonal period of reduced or halted growth that causes a tree ring to form. Radiocarbon (Carbon-14) dates can be reliable if the carbon in the heart of the tree is stable—that is, if it has remained in place since the tree started its growth. This seems to be a valid assumption for a tree with no heartrot and intact heartwood. However, some trees—such as palms—do not have a single definable area of their trunk that dates to the tree's early years, and such trees cannot be carbon dated. Supposedly a radiocarbon age of 2000 years has been obtained for the tumbo, *Welwitschia mirabilis*, but I have been unable to find details on this. There is another drawback to radiocarbon: it costs several hundred dollars and takes several months to get a date.

Tree Rings

Nearly all reliable estimates of tree age, especially for particularly old trees, are derived from tree rings. The principle used here is that in most trees that form rings, the rings are formed annually, so the number of rings in the tree will provide a fairly close approximation of the tree's age. In practice, there are a number of problems with this principle: (1) trees occasionally produce more than one ring a year; (2) trees occasionally go a year or more without producing a ring; (3) you have

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NPSO Items for Sale

Vascular Plants of Lane County, Oregon: An Annotated Checklist by C. Simpson, J. Koenig, J. Lippert, R. Love, B. Newhouse, N. Otting, S. Sundberg, D. Wagner, and P. Warner. Emerald Chapter, NPSO. This new county checklist includes more than 1,740 species and varieties representing 39 percent of the 4,460 plants currently recognized by the Oregon Flora Project at Oregon State University. It also includes a color map of Lane County's five major ecoregions; and information about rare and endangered species, noxious weeds, and escaped cultivated plants. Information is included for every species on habitat, ecoregion, occurrence frequency, and native or non-native origin. To order, send **$15** payable to Emerald Chapter, NPSO to Lane County Checklist, Emerald Chapter, NPSO, PO Box 902, Eugene, OR 97440-0902.

NPSO Membership Directory lists names, addresses, phone numbers, and e-mail address of NPSO members (April 2001). Available from Jan Dobak, 2921 NE 25th Avenue, Portland, OR 97212-3460. **$3 postpaid.**

Camas Tee Shirt from Cheahmill Chapter. Beautiful moss green or tan tee shirts with botanical drawing in color of *Camassia quamash* by Carlton, OR artist and Cheahmill chapter member Marilynn Karbonski. Short sleeve, high quality, **$15 plus shipping**. For ordering information call 503-852-7230, or send order to PO Box 291, Carlton, OR 97111.

The "Atlas of Oregon Carex" was NPSO's first Occasional Paper. The Atlas has 128 location maps, one for each Carex taxon in the state of Oregon. Also included are a synonymy, fun facts about sedges, a history of the project, and Oregon geography maps. **Price: $5.**

"Louis F. Henderson (1853-1942): The Grand Old Man of Northwest Botany" by Rhoda M. Love. NPSO's second Occasional Paper is the only existing publication with detailed coverage of the long and fascinating life of this John Muir-like western character. Included: 56 pictures,133 notes, chronology, list of plants named for Henderson. **Special:** First 25 orders in 2002 receive FREE 9-page annotated bibliography. **Price: $10.**

To order either or both Occasional Papers, send check for the appropriate amount (made payable to NPSO) to: **Occasional Papers, Native Plant Society of Oregon, PO Box 902, Eugene, OR 97440-0902.**

Oregon's Rare Wildflower Poster depicts Punchbowl Falls and three of the Columbia River Gorge's endemic wildflowers. Text on the back describes the natural history of the Gorge and the mission of the NPSO. Available from Stu Garrett, 21663 Paloma Drive, Bend, OR 97701, 541-389-6981. Individuals may order posters at **$12 each,** plus $3 per order for shipping. Posters are mailed in tubes.

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to somehow see the rings to count them, preferably without killing the tree; and (4) how was the tree first established and how fast did it grow in its earliest years? We'll look at these problems in turn, but first, a little information on how a tree grows.

The Life of a Tree

Plants are not born in the same way that most animals are. At the very beginning, a tree might be born either from a seed, or from a growing part of an existing tree. In any event, at some point we can say there is a young plant growing, though its age may already be unclear. Let's say it's a young tree and it will be producing annual rings. As it gets bigger, it produces more and more foliage. That foliage requires more and more water and that requires wider and wider rings to carry the water from the roots to the foliage. If you look at the stump of a young tree, you will see this process written in its rings—the rings are very narrow when the tree is small, but they get wider and wider with each successive year. If the tree is growing in the open and has sufficient light and water, this process will continue for decades, carrying the tree through seedling and sapling stages until it's a fine tall tree.

At some point, the tree will start to grow more slowly. It may be getting close to its maximum height, or it may be encountering competition from other trees. Whatever the reason, eventually it stops putting on more and more foliage and reaches a relatively steady state. Every year, it carries about as much foliage and uses about as much water as the year before. Once the tree reaches this stage, each annual ring that it produces will have about the same cross-sectional area as the previous annual ring. However, because of the width of the ring, that area will be spread out around a tree that is a little bit larger. Consequently, each ring is a tiny bit narrower than the ring before it. For most big conifers, this process can go on for hundreds of years. This explains why it is foolish to extrapolate a tree's age on the basis of relatively recent growth—most fairly old trees are putting on narrower rings now than at any previous time in their lives.

The Problems With Age Estimation Using Tree Rings

Problem 1: Trees occasionally produce more than one ring a year.

Most tree rings are light-colored on the inside and dark-colored on the outside; this alternation of light and dark is what makes the ring easy to see. The change in color occurs because early in the growing season, the tree produces large cells; as the growing season goes on, drought stress causes the tree to produce smaller cells. Because the cells are smaller, there is proportionally more cell wall material, and this causes the cells to appear darker. If there is a period of renewed rainfall in the latter part of the growing season, the tree may start to produce big cells again, and then small cells a bit later on as drought stress resumes. The effect is to produce a second ring, commonly called a false ring. A striking example of this involves Caribbean pine (*Pinus caribaea*) growing in the Dominican Republic under a climate with very little seasonal variation. These pines put on a ring every time there is a wet spell, commonly making 4 to 5 rings a year. So, just counting rings on these trees could lead you to overestimate their age.

In temperate and subtropical climates it is usually possible to spot false rings by detailed microscopic examination of the cell structure of the tree ring. It's hard to describe exactly what you have to look for, but after you've seen it a thousand times, you get a pretty good idea of what it is. This is what graduate students in dendrochronology do to earn their keep.

Problem 2: Trees occasionally go a year or more without producing a ring.

This happens because the tree suffers some sort of severe stress. For example, the tree could be struck by lightning, burned by a fire, attacked by insects, injured by human activity, or under stress due to adverse weather

A grove of giant Port Orford cedars, Chamaecyparis lawsoniana*, reproduced from a 1911 forestry magazine.*

(such as extreme cold or a severe drought). It can be very difficult to detect missing rings. It's done by means of a procedure called crossdating, which involves comparing ringwidth series from many different trees to identify common patterns. By crossdating, you can use trees that don't have missing rings to find where other trees DO have missing rings. Ah, the alert reader asks, "what if all of the trees are missing the ring for a year?" The answer is, that doesn't quite happen—but it can come close. When they were first putting together a long bristlecone pine (*Pinus longaeva*) chronology, there was one year (609 AD) that was missing—and it took hundreds of samples before that year finally turned up. It was a very dry, very cold year, but there were a few trees growing in sheltered locations that managed to form a ring anyway. Incidentally, some trees live in very harsh situations and have a lot of missing rings. If more than 10 percent of the rings are missing, it is very difficult to figure out the crossdating of a specimen and you are likely to underestimate the tree's true age.

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How Old Is That Tree?
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Problem 3: You have to somehow see the rings to count them, preferably without killing the tree.

There are two common ways to get a look at tree rings. One is a saw. The oldest tree ever known was a small, stubby bristlecone pine that was cut down to determine how old it was. It was found to have 4,995 rings. The remains of this little tree now reside at the Laboratory of Tree-Ring Research in Tucson, where they continue to inspire people to not cut trees down just to find out how old they are. However, saws are very useful for sampling trees that are already dead. For example, the oldest known examples of Pacific silver fir (*Abies amabilis*) are actually based on counts of tree rings from stumps in clearcuts. Of course, these trees are no longer alive, but the age data tell us how old they can get, and there are enough old-growth silver fir out there that comparably old trees are probably still alive.

The second way of seeing tree rings is with a tool called an increment borer. It's a hollow drill that takes out a core about 4 mm in diameter and up to 50 cm long. There is a fair bit of debate about how much this hurts the tree. Without going into great detail, it apparently doesn't do much harm to a large and healthy tree, but may kill small or sickly ones. The rule of thumb is, do not core a tree without a very good reason, and then communicate your findings in a suitable forum (such as scientific journals) so that someone else will not have to repeat the damage a few years hence.

Finally, people have looked at tree rings without harming the tree by using techniques such as nuclear magnetic resonance tomography (there was a paper on this in Jacoby & Hornbeck (1987)). Being an incredibly complicated and expensive procedure, it never really caught on. Still, such methods may someday become more common.

ROSTER OF THE ANCIENTS

Pinus longaeva 4844 yrs.

Fitzroya cupressoides 3622 yrs.

Sequoiadendron giganteum 3266 yrs.

Lagarostrobos franklinii ca. 2500 yrs.

Pinus aristata 2435 yrs.

Sequoia sempervirens ca. 2200 yrs.

Pinus balfouriana 2110 yrs.

Juniperus scopulorum 1888 yrs.

Cupressus nootkatensis 1834 yrs.

Pinus flexilis 1670 yrs.

Taxodium distichum 1622 yrs.

Pseudotsuga menziesii 1350 yrs.

Juniperus occidentalis 1288 yrs.

Thuja plicata 1212 yrs.

Thuja occidentalis 1032 yrs.

Tsuga mertensiana ca. 1000 yrs.

Agathis australis ca. 1000 yrs.

Araucaria araucana ca. 1000 yrs.

Pinus edulis 973 yrs.

Pinus heldreichii 963 yrs.

Pinus ponderosa 843 yrs.

Problem 4: How was the tree established and how fast did it grow in its early years?

Trees can establish either from seed or by vegetative means, growing from the branches, stem or roots of another tree. If a tree grows from a seed, then you can say that in one year there was no tree, and in the next year there was a tree; it had a definite beginning, and in theory we could determine when that was. If the tree arose from a growing part of another tree, then we can't even say for sure when the tree actually became a separate organism. Vegetative reproduction is common in trees, and in some groups it is much more common than reproduction from seed. For example, most of the giant Coast redwoods (Sequoia sempervirens) probably originated from roots of their forefathers. Aspens usually grow from the roots of their neighbors, and in fact it has been proposed that some of the largest and oldest organisms in the world are clones of aspen trees, which may contain thousands of individual stems and may live for thousands of years, even though individual aspen stems almost never live more than two hundred years. It is facts like this that demonstrate to me one of the most fundamental differences between plants and animals: the concept of an individual, that is born, lives, and dies, is usually irrelevant in the plant world. To plants, the individual is nothing; the genes are the touchstone, the defining thing that sets one apart from another.

Saplings may reach astonishing ages. Here in our Pacific Northwest rainforests, we have little trees that are called "advance regeneration." These trees live in the dark forest understory where they wait for big trees to die, to let a little sunlight through, so that the little tree can grow up into the forest canopy. One researcher found that Mountain hemlock (*Tsuga mertensiana)* seedlings less than 2 inches tall could be 20 years old, without having yet produced a single ring. Another researcher found that *Abies amabilis* saplings less than 4 feet tall and an inch in diameter could have over 100 rings. So, it is very easy to underestimate the age of a tree by a century or more simply by failing to get the longest possible tree-ring sample. The center few inches of a tree may contain the record of most of its lifespan!

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