



# Lingua Botanica

The National Newsletter for FS Botanists & Plant Ecologists



I have an incredible amount of respect for former Forest Service Chief Jack Ward Thomas. He was a bellwether for our agency, especially for biologists. The most important thing that Chief Thomas said during his tenure was, "Tell the truth and obey the law." This is as sound an ethical foundation as you are likely to find. Unfortunately, the quote I most often hear attributed to him is "Ecosystems are not only more complex than we think, they are more complex than we can think." The problem with this snappy little aphorism is that it's wrong. Not only is it wrong, it's also misleading and counterproductive because it implies to some people that we should not act, and has been used by others as an excuse to avoid change. While it may be true that we do not now fully understand all the workings of the smallest parts of all natural ecosystems, it is not true that one needs complete knowledge of a system to understand it. Physicists don't require full knowledge of cosmology to make fabulous predictions about the universe, engineers don't require full knowledge of their materials to build fantastic structures, and doctors don't require full knowledge of a particular patient's physiology to heal them. These same assertions could be made about artists, musicians, and poets. In all of these cases, the best practitioners (virtuoso poets and physicists alike) require substantial knowledge, but ask any virtuoso and they will tell you that intuition plays a critical role in transforming the practitioner from merely capable to inspired. Furthermore, not everyone is a Hawking or Pinsky. Most illuminating and creative work is done by motivated, competent, and dedicated men and women that enjoy what they do. Why should we think the ecosystem sciences would be any different? The human mind, when engaged, is a miracle. And that miraculous organ, when engaged, has a nearly infinite capacity to understand, to intuit, and to find solutions. Ecosystems are not deep dark mysteries. They are complex systems governed by rules. Don't be afraid to know what you know. Free your mind to be inspired.

- the editor.

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## Useful URLs

**Plant Cam:** Visit Caribbean Gardens in Naples, Florida and watch them feed the gators!  
<http://www.naplesnews.com/webcam/caribbeangardens/>

**The Drifting Seed:** A triannual newsletter for people interested in seeds dispersed in tropical oceanic currents. Brought to you by SeaBean.com  
<http://www.seabean.com/newsletters/index.htm>

**Virtual Tour of the U.S. Botanic Garden:** Take a trip and never leave the farm...  
<http://www.usbg.gov/virtual-tour/index.cfm>

**The Effects of Fire on Flora:** Get this fun GTR, published in 2000.  
[http://www.fs.fed.us/rm/pubs/rmrs\\_gtr42\\_2.html](http://www.fs.fed.us/rm/pubs/rmrs_gtr42_2.html)

**The Partners in Planning Page:** A user's guide to the 1982 Planning Rule.  
<http://www.fs.fed.us/biology/planning/guide/index.html>

**Invasive Species List-Serves:** Need more email? Or rather, would you like more email that mattered? If so, sign up for one of these two email lists that are all about weeds.  
<http://tncweeds.ucdavis.edu/listserv.html>    <http://www.nps.gov/plants/alien/maillist.htm>  
<http://www.aphis.usda.gov/ppq/weeds/weedslistserver.html>

**Mathematical Biology Pages:** Great Tutorial Pages, complete with Shockwave ® animation. Stimulating and educational! Check it out today (don't be afraid...)  
<http://www.bio.brandeis.edu/biomath/menu.html>

**Hearing the Whisper:** See for yourself. Beautiful.  
<http://www.newsfromnowhere.com/revenantphotographyA.html>

## The BIG BIG Botany Story Issue

An upcoming issue of *Lingua Botanica* will be dedicated to your stories about botany, about botanizing, about your motivation to become a botanist, and about the wonders you've encountered while doing your botany job. Stories are one of the most important ways that we transfer knowledge and understanding, and they are the best way to explain to others the pleasure and awe we share for plants.

You need not be a Forest Service botanist to contribute. If you've had an enlightening or transformative or just funny experience related to botany, we want to hear about it. You don't have to be an eloquent writer to participate, just be honest.

Keep it clean (this is a family publication), pseudonyms are acceptable if you prefer, make sure anyone mentioned in your story is okay with what you say about them (don't slander or embarrass anyone), and your stories may be used in other FS publications. There is no minimum size, but try to keep your tales to less than two pages.

**Submit your stories to the editor [wowen@fs.fed.us](mailto:wowen@fs.fed.us)**

## **New Washington Office TES Assistant Named**

**David Pivorunas**, Regional Botanist for the US Navy Southwest Region in San Diego, California has accepted the position of TES Program Assistant in the Washington Office. David starts in July. Lets all welcome him!

## **Going Against Convention, Scientist says Orchids are Older than they look.**

New York Botanical Garden International Plant Science Center

Like many great beauties, orchids are coy about their age. Scientist had long assumed that orchids were young in evolutionary terms. Most organisms start out simple and get gradually more complex over the course of evolution. Thus orchids, which can be extremely complex, appeared to be the late-evolving ingenues of the plant world. A scientist at The New York Botanical Garden, however, is challenging this view, using new molecular tools to ask a lady slipper her age.

The results have been surprising.

"Orchids had been considered the apex of plant evolution, just as humans were thought of as being the most evolved animals," says orchid expert Ken Cameron, Ph.D., Assistant Curator at The New York Botanical Garden and Acting Director of The Lewis B. and Dorothy Cullman Program for Molecular Systematics Studies. "Just from looking at them, you would think this to be the case. Although the great majority of orchid species (mostly epiphytes living in trees) are probably of fairly recent origin, the orchid family as a whole is more ancient than traditionally believed, as exemplified by a handful of surviving relict species."

Dr. Cameron uses DNA analysis to reconstruct the family tree of orchids—which sometimes differs from the family tree scientists had earlier concocted based on plant appearances alone. (For example, the orchid family has traditionally been grouped with lilies, though Dr. Cameron's DNA data shows little relation between the two; instead, orchids seem to be more closely related to Asparagales, the order that includes the familiar vegetable asparagus. DNA analysis also called into question the classification of two tribes of orchids that had been grouped on the basis of floral characteristics; Dr. Cameron's evidence suggested that the orchids fell into two different distinct groups—one epiphytic, the other ground-dwelling—regardless of what their flowers looked like.)

By evaluating the geographical pattern of both primitive and advanced orchids, Dr. Cameron noticed an interesting pattern: The most advanced groups were geographically isolated, while the more primitive groups were spread across Africa, South America, and Australia. These three continents were once combined, and the presence of the same primitive orchids on all three suggests that orchids were there before the break-up of the continents.

"Orchid seeds can be dispersed by wind or other mechanisms," Dr. Cameron says, "but the pattern in the data is exactly what you would predict if orchids had been present on a supercontinent that split to form Africa, South America, and Australia."

This new finding is a good example, he says, of how molecular botany can be used to evaluate "big picture" questions in evolution.

## Wild orchid species named after princess

Ranjana Wangvipula, Bangkok Post, 2 April 2003

Three wild orchid species recently discovered in northern Thailand were yesterday given the genus name of ``*Sirindhornia*'' in honour of HRH Princess Maha Chakri Sirindhorn, whose prominent work includes plant conservation.

The new pink-coloured species, growing only in the mountainous region, were discovered by Thai botanists in 1999.

After a thorough three-year examination in Denmark, it was confirmed they all belonged to a new genus, said Weerachai Nanakorn, director of the Botanical Gardens Organisation.

Two of the species, *Sirindhornia pulchella* and *S. mirabilis*, can only be found in Thailand.

The human ear-shaped *pulchella* was discovered on Doi Chiang Dao mountain in Chiang Mai province while the *mirabilis*, which looks similar to overturned gramophone speakers, was found on Doi Hua Mut mountain in Tak province.

The third species, *Sirindhornia monophyla*, can be found in northern Thailand, Burma as well as in China's southern region.

The species is unique for its white round-shaped flowers with pink spots.

Mr. Weerachai said so far up to 1,125 species of wild orchids have been found in Thailand. They are protected by law and their sale is banned.

``However, there have been occasional violations,'' said Environment Minister Praphat Panyachartrak, who announced the discoveries yesterday.

## The Effects of Fire on Rare Plants

Forest fires, and the way the Forest Service manages fires, have been in the news a lot for the last couple of years. Lawmakers are concerned, the Chief of the Forest Service is concerned, people that live in forest communities are concerned, but should conservation biologists be concerned? There is no doubt that uncontrolled wildfires in forests that are congested with excessive fuel-



loads are very dangerous and have taken a heavy human and economic toll in recent years. However, fire intensity and severity varies greatly depending on many factors, and the effect of fire on forest communities and rare species may not always be immediately apparent. The majority of concerns over the impact of fires on rare species have focused on rare plants. Most animals can move out of the way of approaching wildfires and avoid the immediate and direct effects of fire (not to discount the often significant, short-term impact on their habitat). Plants, on the other hand, are generally not able to escape. But does that mean

that “fire” is bad for plants? As it turns out, in most cases it is not. This counterintuitive fact has led to some misleading information about the overall impact of wildfire on the biological resources of public lands.

To fill the fire-effects information gap and to support the programs of the Forest Service and other agencies, I classified the effects of fire on the 186 Federally listed, proposed, and candidate plant species that are known or suspected of occurring on National Forest System Lands across the nation. Effects information came primarily from U.S. Fish and Wildlife Service documents, state Natural Heritage Programs, and NatureServe reports. Plants were classified into one of four fire-response classes: Requires Fire, Tolerates Fire, Not Affected by Fire, and Adversely Affected by Fire.

### **Plants that Require Fire (++):**

Twenty-five percent (47 of 186) of all listed, proposed, and candidate species actually require fire to maintain and sustain their native populations. In most of these cases, fire is necessary to maintain the ecological conditions that the plant requires to thrive. For example, Smooth Coneflower (*Echinacea laevigata*) requires frequent fires to maintain its preferred open-canopy habitat. In contrast, some rare plants such as Kincaid’s Lupine (*Lupinus sulphureus* ssp. *kincaidii*) depends on pollinators (such as the rare Fender’s blue butterfly) that require fire-maintained habitats for their survival.

### **Plants that Tolerate Fire (+):**

Sixty-five plants on the list of listed, proposed, and candidate species (35 percent) tolerate fires without long-term adverse impacts to their local populations. Some of these plants, like *Spiranthes diluvialis*, occur in habitats that burn infrequently or at long intervals. Others, such as Winkler’s cactus (*Pediocactus despainii*) are typically dormant during the primary fire season in the places they live and are therefore usually not exposed to fire.



### **Plants that are Not Affected by Fire (0):**

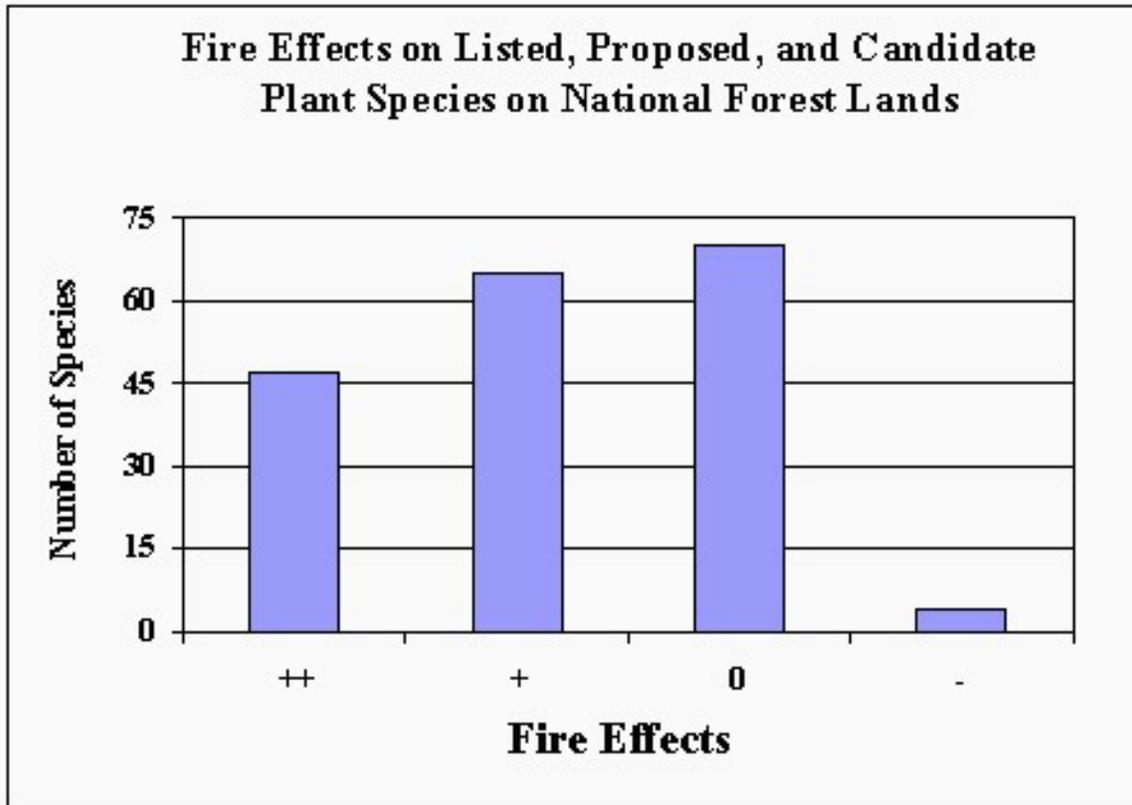
Thirty-eight percent (70 of 186) of the plants considered are not affected by wildfire at all. These plants typically occur in habitats that never experience fire. For example, aquatic plants like the mat-forming quillwort (*Isoetes tegetiformans*) never experience fire. Many plants live in habitats with so little plant-life that there is essentially no fuel to carry a fire. There are several desert species (such as *Astragalus desereticus*) and beach or dune species (such as *Cirsium pitcheri*) that fit in this category. There are also several species on the list that occur in the tropical forests of the Caribbean National Forest, such as the El Toro Babyfoot Orchid (*Lepanthes eltorensis*), that have never experienced a natural fire.



(*Isoetes* image © University of Georgia, Athens)

### Plants that are Adversely Affected by Fire (-):

There are just four plants (about two percent) of the 186 listed, proposed, and candidate species occurring on National Forest lands that are actually harmed by fire. All four species occur in the Southeast in southern Appalachian late seral (old-growth) forest types. Two of these species are rare trilliums (*T. persistens* and *T. reliquum*). The large-flowered skullcap (*Scutellaria montana*) is immediately threatened by land conversion (suburbanization) and exotic species. The rock gnome lichen (*Gymnoderma lineare*) is one of only two lichen species protected by the Endangered Species Act.



- ++ Plants that require fire to maintain their populations or requisite ecological conditions.
- + Plants that tolerate fire without adverse population consequences.
- 0 Plants that are not effected by fire.
- Plants that are adversely affected by fire.

Data derived primarily from U.S. Fish and Wildlife Service documents and NatureServe Explorer Reports. n=186.

## Lichen Conservation in the United States and Canada

Eric Peterson, Ecologist (& Lichenologist), Nevada Natural Heritage Program, Carson City

Over the last half century, conservation has expanded its focus well beyond big game or cute-and-fuzzy animals. Now many conservation organizations are concerned with vascular plants as much as mammals. Some are even beginning to incorporate bryophytes and fungi. The fungi most rapidly gaining conservation attention are lichens.

Lichens are often considered dual organisms: a combination of a fungus (mycobiont) and one or more microscopic photosynthetic partners (photobionts). The photobionts may include green algae, cyanobacteria, or both. The exact definition of 'lichen' and 'lichen species' has been the source of a lot of arguing, but as the understanding of lichen genetics and of the relationships between the partners increases, definition concepts seem to be narrowing.

Within a single lichen body (thallus) there is a single species of mycobiont, but potentially multiple species of photobionts. Each mycobiont species is capable of associating with a limited set of photobiont species, which may not necessarily form a phylogenetic group. For the mycobiont, the association is obligate. The association may be obligate for some photobionts, but for many the association is facultative. Morphology of the lichen seems to be determined mainly by the mycobiont. Thus, a lichen species is now pretty much defined by the mycobiont species. A small number of mycobionts can associate with green algae *or* cyanobacteria and can have very different morphologies depending on the photobiont. These have traditionally been treated as separate species of lichen. However, recent trends have been to consider these morphotypes as a single species.

Comparisons between lichens and mycorrhizae are valid. Both are relationships between fungi and photosynthetic partners where both partners benefit. For lichens, the mycobiont receives photosynthates from the photobiont; the photobiont gains fitness by being able to survive in more harsh environments. (Still, many people regard the photobionts as prisoners of 'controlled parasitism', as the relationship slows their growth rate and apparently limits sexual reproduction.) Also, like mycorrhizae, the lichen association is not limited to a single group of fungi. Most lichens are ascomycetes, but some basidiomycetes form lichen relationships (including mushrooms).

As photosynthetic organisms, lichens are often considered to be plants by a non-phylogenetic definition. Following on the heels of vascular plants, this is likely one reason that lichens are gaining conservation attention more quickly than other fungi.

The work of Conservation can be roughly squeezed into 3 categories: philosophical, scientific, and administrative. 'Philosophical' efforts promote conservation of organisms and habitats for their own sake, on the idea that they have inherent value, and these efforts are generally lead by 'interested amateurs' (e.g. bird-watchers, native plant society members, etc. who lack a strong scientific background) and the environmental movement. 'Scientific' efforts form the field of conservation biology, a synthesis of ecology, genetics, and a variety of other fields that intersect in the study of sustaining species and ecosystems over time. 'Administrative' efforts include decision making and actions of land managers (including habitat restoration) and the legal structure from which those decisions are made. These categories are highly interactive: interested amateurs and environmentalists are generally the driving political force affecting legal requirements from which land managers must make decisions. They do so by publicizing their own philosophies along with scientific information. Land managers also draw on science when making administrative decisions. Many people involved with conservation can admit to participating in more than one category.

Conservation of lichens and other fungi has been slow, in part, due to the fewer number of people aware of them. Until the last few decades, the number of scientists studying lichens in North America could probably have been counted on your fingers.

While lichenologists are still rare, their populations are expanding. At the same time, the number of ‘interested amateurs’ is skyrocketing. More recently, land managers (and even law-makers) have begun to be aware of lichens.

Conservation efforts for lichens are now underway across the United States and Canada. Two lichens have been added to the U.S. federal Endangered Species list: *Cladonia perforata* (endangered, added 1993, occurs in Florida) and *Gymnoderma lineare* (endangered, added 1995, North Carolina & Tennessee). And the Committee on the Status of Endangered Species in Canada has listed *Erioderma pedicellatum* (vulnerable, decision 2002, Nova Scotia, Newfoundland, and recently rediscovered in Scandinavia).



The lichen *Gymnoderma lineare*, listed as Endangered in the United States. Photograph © Stephen/Sylvia Sharnoff, used with permission.

The Northwest Lichenologists (<http://www.proaxis.com/~mccune/nwl.htm>), a predominantly scientific group, offers a certification program for people conducting lichen surveys. The California Lichen Society (<http://ucjeps.berkeley.edu/rlmoe/cals.html>), a mixed group of scientists and interested amateurs, has recently initiated a conservation committee. The American Bryological and Lichenological Society also have a conservation committee. Several less formal lichen groups and individual lichenologists around the continent have examined the rarity of species and supported conservation of some of them. And on a global scope, a number of North American lichens have been proposed for a Global Red List of Lichens (<http://www.artdata.slu.se/guest/global.htm>).



*Erioderma pedicellatum* from Salmonier Nature Park, Canada. Image © government of Newfoundland, CA.

The Northwest Forest Plan stimulated the biggest leap forward for lichens, by establishing survey and management requirements for 81 lichen species on federal lands in Washington, Oregon, and northern California. The number has since been reduced, as some species were found to be more common than originally thought and other species found to be more rare have not been added.

Most of these efforts have one important thing in common which is not obvious: communication and coordination with Natural Heritage Programs (NHPs). NHPs were begun by The Nature Conservancy in the 1970’s as science-based offices for

researching and assessing rarity of species and tracking known locations for the rarest. Most NHPs have since transitioned to state or provincial government where they go by a variety of names including Conservation Data Centers, Natural Diversity Databases, Natural Areas Inventories, etc. The programs have kept their scientific basis through this transition to government. Many are even housed within universities. NHPs now exist in all states of the U.S. plus the Navajo Nation, most Canadian provinces, and a number of countries in Central and South America. Programs across the Americas are networked through the non-profit organization NatureServe ([www.natureserve.org](http://www.natureserve.org)).

In many states, NHPs maintain the lists of species protected by state laws. Federal agencies are increasingly relying on NHP species lists and location data. A number of U.S. Fish and Wildlife Service offices refer directly to NHP data for rare species information and use it to guide management and planning decisions pertaining to the Endangered Species Act. In Washington, Oregon, and northern California a proposed change to the Northwest Forest Plan may tie U.S. Forest Service and Bureau of Land Management sensitive species lists directly to NHP lists. Since NHP scientists regularly and continuously maintain their databases, the NHP lists are more flexible for the removal of more common species as well as the addition of other rare species. And since these lists are maintained by separate, science-based state organizations, federal agencies may find the NHP lists to be more defensible than current Survey and Manage lists. Natural Heritage Programs also work with native plant societies, and various animal conservation organizations. Thus, NHPs bring together scientific, philosophical, and administrative thrusts of conservation.

Like most conservation organizations, Natural Heritage Programs paid little attention to fungi at first, but are gradually incorporating them now. Natural Heritage Programs were recently surveyed for the number of lichen species and the number of other fungal species tracked or watch-listed (considered for tracking or may deserve tracking in the foreseeable future). The information received from responding programs is presented in Table 1. Many programs do not track lichens or other fungi, but that is not due to unwillingness. Rather, they stated that they simply lack adequate data to begin tracking lichens and fungi.

These results are just a snap-shot in time as the numbers are changing rapidly. With the proposed changes to the Northwest Forest Plan, there is a flurry of work in western states to more seriously examine lichens and other fungi. Many of the organizations supporting lichen conservation are also involved with NHPs. The California Lichen Society's conservation committee is working closely with the California Natural Diversity Database. Actually, the California Lichen Society is a de facto southwest lichen society and the conservation committee has discussed working on rare lichens in Nevada and Arizona. And many of the less-formal lichen groups and individual lichenologists who have promoted conservation of species have done so at least in part through NHPs.

Interest in lichens is expanding and conservation efforts will increase. Natural Heritage Programs are poised to gather and solidify the scientific data, supporting lichen conservation.



**Table 1:** Numbers of taxa on watch lists and tracking lists of responding Natural Heritage Programs. A \* indicates one program that tracks a rare cyanobacterium endemic to a thermal spring.

Location	Watch				Sensitive (Tracked)			
	Vascular Plant	Bryophyte	Lichen	Fungi	Vascular Plant	Bryophyte	Lichen	Fungi
Alberta	49	6	0	0	482	403	478	0
Arkansas					448	0*	0	0
California					2056	28	6	0
Colorado	22	0	0	0	511	96	23	1
Delaware	147	13	0	0	403	52	0	0
Florida							1	
Georgia	239	0	0	0	621	24	2	0
Idaho		11	6	0	270	15	23	
Kansas					450	0	0	0
Kentucky	112	1	0	0	359	17	1	0
Maine	23	0	0	0	373	0	0	0
Massachusetts	193	0	0	0	256	0	0	0
Michigan					417	0	16	0
Mississippi	42	0	0	0	384	3	0	0
Missouri					493	106	26	0
Montana	215	49	112	0	337	62	2	0
Nevada	69	0	0	0	243	5	1	0
New Mexico	-	-	-	-	289	0	2	0
New York	65	0	0	0	588	163	0	0
North Carolina	456	36	8	0	582	133	24	0
Ontario					737	272	102	0
Oregon	157	37	24	125	408	60	15	2
Pennsylvania		0	7	0		0	0	0
Saskatchewan	2	0	0	0	470	0	2	0
South Carolina							1	
South Dakota	0	0	0	0	212	0	0	0
Tennessee	0	0	0	0	465	36	1	0
Texas	508	0	0	0	453	0	0	0
Utah	633	0	10	0	435	0	0	0
Vermont	151	2	0	0	535	13	0	0
Virginia	432	0	0	0	609	28	4	0
Washington	150	0	0	0	363	79	113	57
Wisconsin	138	0	0	0	335	79	0	0
Wyoming	25	0	0	0	482	0	0	0

## **Fossil Find Sheds Light on Ancient Plants**

BBC News, 1 April 2003

A plant fossilised in 400 million-year-old Scottish quartz is giving scientists more clues about their evolution from the sea onto the land.

The plant is so well preserved that it has allowed scientists from the Carnegie Institution in Washington DC to detect the presence of lignin - a key chemical in the development of virtually every land plant.

It is this chemical, a woody polymer, which gives the stems and roots of plants the stiffness needed to grow higher.

The find in Rhynie, Aberdeenshire, is thought to be the first time that scientists have been able to extract lignin from a plant fossil of this age.

Dr George Cody, who led the study, said: "We think this is a rather significant result from an amazing locality.

"There's nothing else like it in the world."

Stem evolution

There is evidence of land-based plants dating from approximately 475 million years ago.

However, it was not until the Devonian period, at approximately 400 million years ago, that they are thought to have somehow evolved to produce more rigid stems and roots capable of supporting a larger plant.

Most plant fossils can only be examined in two dimensions, essentially because they are formed when plants are compressed flat in sediment.

Rhynie is one of the most important locations in plant fossil history because it was the site of hot springs.

These occasionally bubbled over and entombed surrounding plants in silica deposits, preserving them instantly in three dimensions.

The preservation is so perfect that individual plant cells can be viewed.

Earliest find

Dr Charles Wellman, a lecturer in paleobotany from the University of Sheffield, told BBC News Online: "The find tells us what we would have assumed about plants of this period.

"Without lignin, you could never get these big stems.

"We know this happened during the Devonian period - by the end of the Devonian you had trees, and you could never have had these without lignin.

"This is likely to be the earliest material evidence of lignin."

## **Native Plant's Growth Baffles Scientists**

Gregory Crofton, Tahoe Daily Tribune, 20 May 2003

Figuring out what makes the Tahoe yellow cress (*Rorippa subumbellata*) flourish may be as much of a challenge as determining what exactly is causing Lake Tahoe's clear waters to cloud.

The lake and the Tahoe yellow cress likely developed in tandem over millions of years. The delicate, flowering plant exists nowhere else in the world. Its growth fluctuates

with the varying level of the lake, thriving when the level of Lake Tahoe drops -- but no one knows why.

Botanists and U.S. Forest Service employees on Monday crouched under blue skies inside a fenced area at Baldwin Beach to begin a long-term study to unlock the plant's mysterious growing habitats. Yellow cress can survive underwater or in the middle of a dry, coarse-grained beach.

The plant is listed as endangered in California and Nevada, and it is considered by the federal government to be a candidate for the endangered list. If botanists discover better ways to protect yellow cress, it would likely eliminate the possibility of laws being adopted that could limit recreation or any activity in its habit.



"We are here to keep the population viable," said Gail Durham, a U.S. Forest Service botanist. "We are committed to try and conserve this species."

Botanists from BMP Ecosciences, of San Francisco and South Lake Tahoe, are leading the study, which will likely last 10 years. On Monday, the study began with 600 nursery grown yellow cress going in near the mouth of Taylor Creek.

Each plant was nestled next to a color-code flag. It indicates to the scientists the genetic leaning of the plant so its success or failure can be tracked. This week, 1,500 yellow cress will be planted on South and East shores of Lake Tahoe. Next year, that number could double.

"Everything you see here is our best first attempt," said Bruce Pavlik, of BMP Ecosciences. "It's a full blown experiment."

In the 1980s, a group of scientists transplanted yellow cress from nursery to sand. Some of it took, but the experiment lacked any scientific framework.

"It was more an effort to garden than a study," Pavlik said. "I think at that time the whole science of doing this type of restoration really wasn't developed."

Durham said fences will stay up all summer to protect test plots at Sand Harbor, near Zephyr Cove and Emerald Bay.

According to Durham, the largest number of yellow cress test plants are being planted near Taylor Creek because the area provides the broadest variety of growing conditions. Yellow cress is more prone to grow at South Shore near the mouth of the Upper Truckee River.

"Fourteen thousand of 20,000 (plants) are there," Durham said. "It's the main mother site."

Botanists will check back on their plants in two weeks. After that, they'll go back every month to check them. The yellow cress experiment, which will cost \$35,000 this year, is funded by the Forest Service and the California and Nevada state parks.

A conservation strategy for the plant, more than a year in the making, was released last year. It calls for public and private groups to work together to protect the rare plant.

## **Cycad Expert Admits Guilt**

January 2003, TRAFFIC Report, TRAFFIC North America and the World Wildlife Fund

Peter Heibloem, a high profile plant expert and businessman in Queensland, Australia, was sentenced in June 2002 to three years' probation and a (US) \$25,000 fine for his role in a million-dollar plant smuggling ring. Heibloem, after months of proclaiming his innocence, entered into a plea agreement and pleaded guilty to one federal charge of conspiracy to smuggle merchandise into the United States, in exchange for 11 other charges being dropped.

Heibloem runs the Eudlo Cycad Garden <<http://www.suncoast.com.au/Palmwoods/News/99-02/p6a.html>> and is the author of *Cycads of Central Africa*. He was charged, along with 11 others from four continents, in one of the largest rare-plant smuggling investigations in U.S. history. The estimated value of the CITES-listed cycads and orchids smuggled in the case for more than \$840,000.

Others charged in the case include Ernest Bouwere, Donald Joseph Wiener, Jose "Pepe" Portilla, John Baker, Ian Turner, Rolf Kyburz, Rolf Bauer, Jan Van Vuuren, Antonius Juniarto, Iwan Kolopaking, and Terrence Leung. The investigation, which ran from August 1999 through July 2001, was a cooperative effort among the U.S. Fish and Wildlife Service, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service and Office of Inspector General, and their partner agencies in South Africa and Australia.

## **Taking Chips Off the Oldest Blocks**

Rick Weiss, Washington Post, 16 June 2003

When they finally found it, high in California's rugged White Mountains, the tree looked a lot like the other stunted and windblown evergreens scattered about: a twisted mass of sun-bleached wood, stubborn green needles and gray crusts of bark.

But this particular bristlecone pine was different. Nicknamed Methuselah, it has clung to its rocky patch of ground near the Nevada border for the past 4,768 years, making it the oldest known living tree on the planet.

Its precise location is known to just a few -- a necessary protection against souvenir hunters and tourists with penknives, the U.S. Forest Service says. But having been sworn to secrecy, Jared Milarch, 23, approached the world's most ancient tree in October and introduced it to the modern world of science. He was there to clone old Methuselah -- to cultivate genetically identical seedlings and then distribute them for study, celebration and show.

Last week Milarch and his dad, both Michigan arborists, flew into Washington with two Methuselah seedlings that grew out of that partly successful effort -- three-inch tufts of baby green needles to be donated to the U.S. Botanic Garden at the foot of Capitol Hill.

But that's just the beginning, Milarch says. He envisions Washington's streets eventually lined with clones of many of the nation's most extraordinary trees -- even dead ones, like Maryland's famous Wye Oak (see *Lingua Botanica* v3 #2, 2002), which

scientists managed to clone shortly before it blew down last year. The District would become a living museum of some of the biggest and oldest trees in the land.

"It beats Jurassic Park," Milarch said last week at Mount Vernon, where the bristlecone seedlings will be cared for in a greenhouse until they are formally donated to the botanic garden next month.

Just a few decades ago, Washington was known as the City of Trees, but no longer. Urban development and pollution have taken a heavy toll, and today 23,000 of the District's onetime trove of approximately 130,000 street trees have been reduced to patches of dirt. The loss goes beyond shade and aesthetics. Trees clean the air and reduce runoff and soil erosion.

Now the Milarches -- in conjunction with the National Tree Trust and the Casey Trees Endowment Fund, a local philanthropy -- are developing a plan to rebuild and maintain the District's urban canopy with a novel emphasis on "champion trees," a term reserved for the largest individuals of each species.

The Milarches, through their nonprofit Champion Tree Project, have been working with the Tree Trust to make clones of all 850 or so national champions registered by the group American Forests. Several have been planted at historic sites including Arlington Cemetery, the U.S. Capitol, Mount Vernon and the Sept. 11, 2001, memorial at the Pentagon. But if the new partnership works out, many more of Washington's streets and parks could be sporting genetic knockoffs of the nation's biggest trees.

It takes more than genes to make a champion, of course. Location, care and just plain luck all contribute to a tree's longevity and size, so there is no guarantee that a clone of a champion will thrive in the middle of Thomas Circle. But a tree is unlikely to grow into a champion unless it has the right genetic stuff, such as resistance to disease and drought, horticulturists agree. So if properly selected, the odds of robust survival are good.

Equally important, said Barbara Shea, president of the Casey endowment's board, the buzz generated by the seedlings' origins may inspire community members to give a little extra care to the trees, a crucial ingredient in the survival of any urban tree.

Imagine making clones of the country's biggest white ash, a fabulous giant now growing in New York State, and planting some on New York Avenue, Shea said. Or using clones of Maryland's hulking Wye oak to fill some of the leafless stretches of Maryland Avenue.

"We Americans love the biggest, the best, the fastest," Shea said. "If these trees do nothing else other than get people excited about planting and caring for urban trees, then that's a success."

One species that won't be growing outdoors in Washington is the bristlecone; they thrive in high altitudes, rocky soil and intense sunlight, and the amount of rain that has fallen just this spring is more than they would want in a decade. But the quest to clone Methuselah offers a case study in the psychological power that special trees can have.

Scientists first stumbled upon Methuselah in 1957 while taking tiny "core samples" that allow them to count the plants' annual tree rings. Although the average bristlecone pine is about 2,000 years old, Methuselah proved to be more than double that.

The tree's existence was publicized in a 1958 article in National Geographic, but its specific location in Inyo National Forest near Bishop, Calif., was later kept secret by

the Forest Service because of fears of vandalism and the threats that heavy foot traffic posed for its roots.

Visitors can hike the Methuselah Walk that passes nearby, but the tree is not marked so hikers don't know which one it is. Fewer than 50 people today can identify the tree, according to John Louth, forest manager of the Ancient Bristlecone Pine Forest.

As one of those people, Louth guided Jared Milarch and a few helpers in October after the group gained special permission from federal officials. On a Milarch home video, Louth can be seen addressing the group before beginning the four-mile hike to the site: "I need your word you are not going to publicize full frontal pictures of this tree," he said solemnly.

The goal was to snip a half dozen branch tips, each one about four to six inches long, pack them in ice and then FedEx them to plant cloner Chris Friel at the University of California at Davis. Timing was crucial. After about 24 hours, the delicate cells needed to grow into a new tree would die.

When they got to Methuselah, they stared in silence at first. "The wow factor was really there," Milarch said. The tree was already growing around the time the stone blocks were being put up at Stonehenge in England and before the Egyptian pyramids were built. It was more than 3,000 years old at the time of the fall of Rome.

Some in the group were detailed as lookouts. If other hikers came around, Louth told them, then all must scatter so as not to give away the tree's identity. Milarch snipped the cuttings and grabbed some pine cones as a backup in case the cloning effort failed, and the group began the hike back to their car.

At the same time, another member of their group, Terry Mock, was on the other side of the mountain, snipping samples from "the Patriarch." Though only about 1,500 years old, it is the national champion bristlecone -- the largest known specimen, with a girth of 39 feet -- and was also to be cloned.

Then, crisis struck. A flat tire made them miss the last FedEx pickup. A photographer in the group agreed to drive the samples to the San Francisco area where, around midnight, she handed the cooler with its precious contents to another driver, who made the rest of the journey northeast to Davis.

That morning Friel got to work, placing the cells in a special culture where they could grow. No one had ever cloned a bristlecone, and he could only guess at the best formula.

Ultimately, the effort failed. But other scientists, including Monterey tree propagator Bill Werner, were able to tease seeds from the pine cones and germinate them. The result was a total of 15 seedlings from Methuselah and Patriarch, five of which are earmarked for Washington greenhouses.

The seedlings are not clones -- genetically identical copies -- but they are close. Bristlecones often pollinate themselves, making offspring that are near replicas of themselves. Even if a nearby bristlecone provided the pollen, the average age of the parents was probably a respectable 3,000 years.

After obtaining necessary permits, the Milarches brought the bristlecone sprouts to Washington in special tubes that fit into their shirt pockets.

The seedlings' value as ambassadors for greenery is evident every time a passing stranger is told about their family lineage. It's the same reaction David Milarch sees each time he takes someone to see the champion elm growing near his home in Michigan. First

it's awe, he said. Then there's a desire to touch and even hug it -- a desire he hopes to engender in urban settings.

"That's the power of big trees," David Milarch said. "People are more willing to care for them, because they have so much potential."

Anyone who doubts the emotional and educational potential of historic trees need go no farther than Woodley Hills Elementary School in Alexandria, where Dean Norton, the Mount Vernon Estate's director of horticulture, helped get a clone of the national champion green ash planted this spring. Norton surrounded the planting spot with a rope, marking a circle about 22 feet in circumference -- the size of the trunk of the parent ash -- then released a helium balloon on a tether 96 feet long, the height of the parent champion tree, so the kids could picture the enormity of the seedling's genetic twin.

"All 600 kids came out to celebrate," Norton said. "There was the band, the chorus, kids read poems. And for the rest of the year, the kids were marching around the tree, protecting it."

Quite the opposite, he said, of how trees are usually treated on playgrounds.

## **Bloodroot Studied for Commercial Potential**

Environmental News Service, 20 May 2003

ATHENS, Georgia – Scientists believe the antimicrobial properties of bloodroot make it worthwhile to research how to propagate the native Eastern wildflower as a commercial crop. Researchers at the University of Georgia say the commercial opportunities for bloodroot are growing, with some European companies already using it in animal feed to improve appetite and digestion.

"Bloodroot is not terribly hard to grow, but it has not been produced on a commercial scale," said Jim Affolter, a horticulturist who is leading the studies in the University of Georgia College (UGA) of Agricultural and Environmental Sciences.

"It is not rare, but it is not common, either," he said. "Natural populations could easily be decimated if industry production sent people out to scour the forests the way the ginseng market has done."

The plant is rich in alkaloids that have antibiotic properties, Affolter explained, in particular sanguinarine.

Some European companies have used sanguinarine as a feed additive for livestock, in the same way antibiotics have been used as growth promoters for U.S. livestock.

As more and more companies look for alternatives to antibiotics, Affolter sees the potential for "an enormous market."

To grow bloodroot for its sanguinarine, UGA researchers are focusing on three unknowns. They are searching for where exactly in the plant and when during its growth cycle sanguinarine concentrations are highest.

Second, the researchers want to know how bloodroot, which flowers in woodland areas in early spring, responds to differing sunlight levels.

And third, says UGA horticulture researcher Selima Campbell, the researchers need to figure out how to grow the plant for commercial cultivation.

"Right now, bloodroot is wild-gathered," Campbell said. "It is a slow growing plant, so gathering it by the ton would definitely stress natural populations. It is crucial to develop a way to propagate the plants."

## Alice Eastwood in the Eastern California Flora

Larry Blakely Newsletter of the Bristlecone Chapter, CNPS, September 2001

Eastwood's willow occurs in moist areas at high elevations in the Sierra Nevada. This especially attractive shrub, bearing woolly stems and leaves, and with lots of red in its stems and buds, may be found growing abundantly in Onion Valley. It was named in honor of Alice Eastwood (1859-1953), long associated with the California Academy of Sciences (CAS) in San Francisco, by a contemporary of hers, the highly regarded bee specialist T. D. A. Cockerell (of the University of Colorado). The name was published within a larger 1910 publication by the California-Nevada botanist A. A. Heller. *Salix eastwoodiae* is one of 8 California plant species named for Eastwood that contain 'eastwood' in the specific, subspecific, or varietal names; *Erigeron aliceeae*, another California plant named for her, invokes her given name. Only the willow occurs in the Eastern Sierra. (1), (1a), (2), (3).



In 1892, while botanizing in Utah and Colorado (the latter being the state in which she came to maturity as a botanist), Eastwood discovered a new *Gilia* that she named *G. triodon* in an 1893 publication. (This plant also occurs in eastern California; Mary DeDecker made 11 collections of it in Inyo Co., over the years 1969 - 1995.) All of us who have struggled to identify *Gilias* would readily agree that it is a difficult and diverse group. Members of several current genera, such as *Linanthus* and *Loeseliastrum*, were, in Asa Gray's time, included within *Gilia*. Many botanists over the years have made attempts to sort out the variability and come up with better groupings of this disparate mélange of species. In 1905, the year before the disastrous San Francisco earthquake - so fateful for Eastwood, the German botanist August Brand came to believe that Eastwood's plant was sufficiently different to warrant a new genus, which he named *Aliciella* in recognition of her as the discoverer, and also out of gratitude for Eastwood's help with specimens. People aren't usually honored with plant names based on their given name, but there already was a genus *Eastwoodia*, with one species, for a shrub of the sunflower family (*Eastwoodia elegans* Brandege) which Eastwood discovered in central California. It was named for her in 1904, 10 years after Eastwood became Curator of Botany at the CAS, by her mentor and predecessor, Katherine Brandege. (4), (5), (6).

Brand's genus *Aliciella* was not widely accepted and was relegated to footnote status throughout most of the 20th century. In a recent attempt to straighten out the Phlox family problem children, based on DNA analyses, J. Mark Porter, Rancho Santa Ana botanist, has revived the genus name and placed many former members of *Gilia* in it. Broad-leafed *gilia* (or holly *gilia* as Mary called it) is one of several of the new *Aliciellas* that occur in our region - and one of the most striking. It is always a pleasure to encounter along arid Eastern Sierra washes with its large glossy dark green leaves, forming a beautiful background for its bright dark pink flowers. It was first collected in 1874 by C. C. Parry in the vicinity of the Virgin River in Utah. Parry sent his collection to Harvard, where it was named by Asa Gray's brilliant but somber protégé Sereno Watson. Now, entering the revived genus, it takes on an association with the renowned 'Miss Eastwood' (as she was known to her multitudinous and far flung associates). (4), (7), (8).

Eastwood was largely self-educated, with no formal schooling beyond high school in Colorado. College degrees weren't necessary for this brilliant and energetic self starter. She developed a consuming interest in botany early in life, which carried her through an outstanding career. She was Curator of Botany at the CAS for over half a century, retiring in 1949 at age 90. In the course of those years she nurtured numerous budding botanists and horticulturists, saved precious museum specimens and records during a heroic day in 1906, built up a vast plant collection - twice - before, and again after, the big quake. She became deeply engaged in all matters pertaining to botany - from the most basic levels of taxonomy to the most practical aspects of horticulture. And, she once wrote to a friend, "...I love all those who love plants." (9) She traveled much of California on foot, horseback, stage coach, and later, automobile in her quest for new specimens for the Academy, and new species for science (she named 125 species of California plants). While many contemporaries (e.g., Jepson, McMinn) gave floral and other measurements in inches and feet [and even the archaic "line" (1/12 inch)], Eastwood used the metric system in her publications. She published more than 300 scientific papers, articles of more general interest, and books. (10)

She was by all accounts a woman of robust stature and ample voice, "endowed with unusual energy", "she could endure the hardships of arduous field work", and it was said that she could sustain travel at 4 mph on foot, easily covering 20 miles a day in the field (40 on a horse). Early on she was discouraged from going on excursions with an all-male hiking club, but the men later gave her full welcome when it was found that she could keep up with the best of them.

No doubt stemming from the poverty experienced during her youth, she was always of a frugal nature. It appears that, through the first decade or two of the 20th century, her monthly income was in the \$55 - \$75 range. A minor real estate investment (a vacant lot in young Denver) brought her a handsome return when she sold it during a boom period. She invested the proceeds prudently, which brought her a measure of financial independence, but only because of her frugality. She often returned to the Academy near penniless after a lengthy field trip.

On the evening of April 17, 1906, Enrico Caruso thrilled the San Francisco Mission Opera House audience with another stunning performance as Don José in Bizet's *Carmen*. Eastwood, a lover of opera and other musical art forms, just might have been in attendance. The city finally slept after all its varied forms of night life had ended. The disaster struck in the morning. Buildings shuddered, collapsed, and soon the fires began.

Alice hurried to the Academy building, frantically searching for a way in. Finally, she and a few others gained access to the interior. Alice and a friend climbed the spiral staircase (by climbing up the metal railing, as most of the stone steps were in a heap on the ground floor) to the herbarium on the 6th floor. They gathered up the very most important specimens, and escaped as flames roared in from neighboring buildings. She then searched desperately for someone with a cart to help her move her bundles of scientific treasure - she had charge of all that would be saved of the museum - as the city was being absolutely destroyed around her. Jack London, eyewitness to the quake's immediate aftermath, described the awful scene of which Eastwood was a part: "All the shrewd contrivances and safeguards of man had been thrown out of gear by thirty seconds' twitching of the earth-crust... The hills of San Francisco are steep, and up these hills, mile after mile, were the trunks dragged..." Alice wrote, "The sound of the trunks being dragged along I can never forget. This seemed the only groan the ruined city made." As for the horror elicited by the quake itself, Caruso wrote "I . . . go to the window, raise the shade and look out. And what I see makes me tremble with fear. I see the buildings toppling over, big pieces of masonry falling, and from the street below I hear the cries and screams of men and women and children." In her daring venture, Eastwood saved 1497 of the most important plant specimens including 1211 irreplaceable type specimens. All else was lost - the largest botanical collection in the western US. But amid the horror of human suffering and death, an important bit of human heritage had been rescued for the future. (11)

Eastwood apparently collected little in the Eastern Sierra (she is listed as a collector of 48 specimens from Alpine and Mono Cos., and 3 from Inyo Co., in the CalFlora Occurrence Database), but her protégé, and later successor, John Thomas Howell spent much time here (he is listed as collector of 1165 specimens for Inyo Co., in the same database). Mary DeDecker's specimen cards contain frequent notation of his findings in the area. I don't know if Mary ever met Alice, but Howell was well known to Mary and was an important mentor to her. Early in her studies of the Eastern Sierra flora, Mary was advised to send her specimens to the CAS (and also to the Rancho Santa Ana Botanic Garden) for any help she might need with identification. (12)

Eastwood was a broad-minded and caring person who promoted women's interests and initiated important conservation projects. She was a great promoter of the love of plants, the outdoors, and the preservation of natural resources. In an obituary in 1953, Tom Howell wrote, "The honor she most deeply appreciated was the naming of the beautiful recreation area on Mount Tamalpais, Camp Alice Eastwood, by the California Division of Beaches and Parks and the Tamalpais Conservation Club, of which she had been a founder and was a past president." (13)

She did not care much for convention, either in dress or social habits, but was nevertheless a master of social skills. At age 94 she wrote, "I count my age by friends, and I am rich in friends." (14)

A free-thinker in matters of religion and philosophy, she disdained dogmas. She wrote, "To me the feeling that comes from the order and law of the universe is truly religious and I think that every scientific person must be religious without any belief in a dogma of any kind." (15)

She never married, but twice in her life she was prepared, apparently, to give up botany for marriage; both times death of her suitor prevented it. One was the eminent

geologist Grove Karl Gilbert. It appears that, among men who found her attractive, one was none other than Willis Jepson, another great California botanist of the first part of the 20th century. According to Eastwood's private correspondence, he visited her in 1893 in the CAS herbarium "faultlessly attired", "acted in an embarrassed way", and "was scared out of his wits"; "I was most agreeable", wrote Eastwood. (16) As it turned out, Jepson never married either. (17)

Alice Eastwood's accolades were numerous.

In 1903 she was one of only two of the few women listed in American Men of Science to be denoted, by a star, as being considered to be among the top 25% of professionals in their discipline. Her entry bore a star throughout all subsequent editions during her life. (18)

C. S. Sargent, Director of the Arnold Arboretum at Harvard University, wrote, in 1923 letters to Eastwood, ". . . [you are] the only really efficient botanist in California." and ". . . [you are] the only reliable person in California and I feel much more confident of obtaining anything botanical from you than I do . . . from anyone else." (20)

Marcus Jones, the nettlesome but well regarded and highly productive Western botanist, delighted readers of his self-published (and self printed!) works with caustic snippets about his contemporaries in a series he called "Botanists I Have Known". In one of his short sketches he even tore to shreds the near saintly image of C. C. Parry. But for Alice Eastwood, he had only praise. In 1933 he wrote, "Her work, like mine, is mostly done and the falling leaves will soon obscure our graves, but it will be many a day before botanists will cease to venerate her magnificent work for the Academy. I have known her for a generation, and we have worked over the same field, but I have found her too big for jealousies and petty squabbles, which have disgraced a certain envious critic" [an apparent jab at Jepson]. Alice remained active for nearly two more decades, but Jones died in the following year, at age 82, in an accident while driving to his home in Claremont after a day's collecting trip to the San Bernardino Mountains. (21)

In a volume honoring her 50 years service as Curator of Botany at the CAS, an event celebrated in 1942, F. M. MacFarland, past president of the Academy, wrote, at the conclusion of his tribute: "Her frank, direct approach to every problem and her modest, kindly spirit have won for her the esteem and love of countless loyal and devoted friends who wish for her many more years of productive activity in the field she loves." (10) Another wrote, "There has never been anyone like her on earth and there never will be, if I am permitted to prophesy." (22) In 1950 the outstanding historian of botany and natural history in general, Joseph Ewan, wrote: "indubitably the best known woman botanist in this country today". (23) Her greatest tribute came in 1950 when she was made a president of the VIIth International Botanical Congress, held in Sweden, where she was proud to preside from a study chair used by Linnaeus. She died three years later at age 95.

In a 1906 letter to Science magazine, reporting on the devastating effects of the earthquake, Eastwood wrote: "My own destroyed work I do not lament, for it was a joy to me while I did it, and I can still have the same joy in starting it again." (24) But she did more than start again. Already, in 1942, the number of plant specimens in the CAS herbarium had grown to over 300,000, nearly three times the number lost in 1906, a result of the untiring efforts of the indefatigable Miss Eastwood.

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11. Caruso's and London's reactions to the earthquake may be found at the **Museum of the City of San Francisco** website:  
Enrico Caruso and the 1906 Earthquake  
Jack London and the Great Earthquake and Fire
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## **Botanist Receives the Chief's Volunteer Award for 2003.**

Perennial New Mexico botanist Pearl Burns received the Chief's Volunteer Award last week at a ceremony in Washington, DC. The commendation presented with her award reads:

“For over two decades of superior dedication promoting conservation and appreciation of native plants and wildflowers by working as a Forest Service Volunteer. Pearl is the coordinator and primary leader for the annual celebration of wildflower hikes. She has trained other volunteers by taking them on wildflower identification hikes. She also has developed and presented a series of in-depth classes for native plant and wildflower identification. Pearl is 80 years old and her efforts have enabled thousands of people to learn and appreciate forest ecosystems and management issues.”

### **The Sandias: Prickly Pear's Beauty Hides Sharp Edge**

Pearl Burns and Tom Ferguson, Albuquerque Journal, 12 June 2003

Cactuses are well known for their spines, but the spines called "glocids" are the ones that will get you. Take a good look at a prickly pear, and you will see the difference.

In the genus *Opuntia* there are two main groups of cactuses: chollas and prickly pears, and both have branching, jointed stems that grow in segments. The prickly pear segments, or pads, are flat, fleshy and round to elongated. Along the edges and on the surfaces of the pads are rows of pits called areoles. Spines, which are really modified leaves, arise from any areole, but flowers and new pads grow only from those on the edges.

Two kinds of spines grow from the areoles. The obvious ones are long — up to 7 inches on some species, but most about 1 to 3 inches. The number of these spines depends on the species and varies from none to as many as 10.

The other spines, called glocids, are tiny barbed hairs. They are in clusters along the pad edges and the bases of the larger spines. Be careful where you sit: The barbed hairs will penetrate clothing in large numbers and require embarrassing help to remove.

*Opuntia polykantha* has rounded pads and yellow flowers. The 1-to-3-inch-wide flowers have many waxy petals, many stamens and one centered style ending in several stigmas arranged with radial symmetry. Most subspecies have yellow flowers, but the subspecies *juniperina* has red flowers.

Another red-flowered species *O. erinacea* also grows in the area. The fruits are rounded knobs with flat or depressed outer ends. They may turn reddish with age. On *O. polykantha*, two to six glocids grow close to the pad surface at most areoles, and one longer spine grows outward from the surface.

These plants grow in arroyos and on dry hillsides up to elevations of 8,000 feet. They bloom in May and June.

NOTE: The fruits or "tunas" of prickly pear cactus are made into jelly, but caution in handling must be used due to the spines. The young edible pads, called nopalitos, can be found fresh or canned in some stores.

## National Botany Program Highlights

What's going on with botany in the Washington Office?

- ☀️ Contributed to the framing of the diversity language for the proposed planning rule. Most importantly, we've made sure nonvascular plants are included.
- ☀️ Made two presentations at the Association for Southeastern Biologists meeting.
- ☀️ Made a presentation on finding rare plants after wildfires at the US Botanic Garden.
- ☀️ Attended the "Innovations in Species Conservation" symposium in Portland, Oregon.
- ☀️ Attended a meeting on the status of the R6 Regional Botanist position.
- ☀️ Facilitated a meeting between the US Fish and Wildlife Service Office of Scientific Authority and Forest Service Washington Office Staff Directors to discuss ginseng and medicinal plant conservation under CITES.
- ☀️ The Regional and National Botanists got together in late March in Tucson to review and coordinate on some national issues. Among the topics were: The Use of Genetics in Conservation of Rare Plants; National Highway Policy and Listed Plants; A Review of the Native Plant Conservation Campaign; and the Place of Bryophytes in the Survey and Manage Protocol. We also had a demonstration of the THEO herbarium software (available free at [www.nynhp.org/theo/theo.htm](http://www.nynhp.org/theo/theo.htm)).
- ☀️ Agenda topics for the National Botany Program Conference call in May included: An update on the NRIS Plants Protocol, A round-up of the Innovations in Species Conservation Symposium, Prioritizing Native Plant Conservation Initiative grant applications. The next call will be in July.
- ☀️ Region 9 has updated its sensitive species list. Region 4 expects to have an update this summer.
- ☀️ Its almost certain at this point that NRIS will develop a rare plant application in the coming year. Thanks to the RRICs for all their support.

### Federal Botany Jobs

Check for these and other jobs of interest to botanists at <http://usajobs.opm.gov/>.

Remember, botanists make excellent leaders!

As of 19 June 2003, there are ten open Forest Service line officer positions

<b><u>AGRONOMIST, HORTICULTURALIST, BOTONIST (INTERDISCIPLINARY)</u></b>	\$38,936 - 61,248	GS-0430-09/11	Jul 14, 2003
AGRICULTURAL MARKETING SERVICE			6-57-527-3
Open to Federal employees	Full Time,Permanent		
GASTONIA, NC			
<b><u>BOTANIST</u></b>	\$45,285 - 58,867	GS-0430-11/11	Mar 15, 2005
NAVY FIELD OFFICES			SW-INV-0430
Open to Everyone	Full Time,Permanent		
Southwestern States, US; WESTERN & PACIFIC ST, US			

<a href="#"><u><b>BOTANIST</b></u></a>	\$23,442 - 45,706	GS-0430-05/07	Sep 30, 2003
U.S. ARMY CORPS OF ENGINEERS			NC-DEU-03-626
Open to Everyone	Full Time,Permanent		
NEW ORLEANS, LA			
<a href="#"><u><b>BOTANIST</b></u></a>	\$23,442 - 45,706	GS-0430-05/07	Sep 30, 2003
U.S. ARMY CORPS OF ENGINEERS			NC-DEU-03-627
Open to Everyone	Full Time,Permanent		
NEW ORLEANS, LA			
<a href="#"><u><b>BOTANIST</b></u></a>	\$38,589	GS-0430-09/	Dec 31, 2003
FOREST SERVICE			DEMO R510NP-014DP-03T
Open to Everyone	Full Time,Temporary		
Northern California, CA			
<a href="#"><u><b>BOTANIST</b></u></a>	\$38,589	GS-0430-09/	Dec 31, 2003
FOREST SERVICE			DEMO R505NP-062DP-03T
Open to Everyone	Full Time,Temporary		
NORTHERN CALIFORNIA, CA			
<a href="#"><u><b>BOTANIST</b></u></a>	\$47,110 - 73,403	GS-0430-11/12	Jul 14, 2003
AGRICULTURAL MARKETING SERVICE			24-57-763
Open to Everyone	Full Time,Permanent		
GASTONIA, NC			
<a href="#"><u><b>BOTANIST</b></u></a>	\$38,936 - 61,248	GS-0430-09/11	Jul 14, 2003
AGRICULTURAL MARKETING SERVICE			24-57-767
Open to Everyone	Full Time,Permanent		
GASTONIA, NC			
<a href="#"><u><b>BOTANIST (INTERDISCIPLINARY)</b></u></a>	\$58,189 - 75,646	GS-0430-12/12	Jul 10, 2003
FOREST SERVICE			R6-300-3G
Open to Federal employees	Full Time,Permanent		
PORTLAND, OR			
<a href="#"><u><b>BOTANIST (INTERDISCIPLINARY)</b></u></a>	\$58,189 - 75,646	GS-0430-12/12	Jul 10, 2003
FOREST SERVICE			R6-300-03D
Open to Everyone	Full Time,Term appt NTE 13 mos		
PORTLAND, OR			
<a href="#"><u><b>BOTANIST (SUPERVISORY)</b></u></a>	\$61,251	GS-0430-13/	Jul 8, 2003
U.S. FISH AND WILDLIFE SERVICE			FWS1-03-104
Open to Federal employees	Full Time,Permanent		
HONOLULU, HI			
<a href="#"><u><b>PLANT PHYSIOLOGIST, BOTANIST (INTERDISCIPLINARY POSITION)</b></u></a>	\$47,110 - 73,403	GS-0430-11/12	Jul 14, 2003
AGRICULTURAL MARKETING SERVICE			6-57-497-3
Open to Federal employees	Full Time,Permanent		
Gastonia, NC			

<b><u>BOTANY</u></b>	\$16,528 - 120,245	GS-0430-01/15	Dec 31, 2003
Field Operating Ofc of Ofc of Secretary of Army			WTEJ03000400OC
Open to Everyone	Full Time,Permanent		
Throughout the U.S., US			
<b><u>ID PLANNER</u></b>	\$46,689	GS-0430-11/	Feb 24, 2004
FOREST SERVICE			R544-031-03
Open to Federal employees	Full Time,Permanent		
site to be determine, US			

Also, The Lassen National Forest will soon be advertising a GS-430-11, Forest Botanist position. The position is permanent full time, located in the Lassen National Forest's Supervisor's Office in Susanville, California. If you are interested in this position and would like to receive a copy of the Vacancy Announcement please contact the Lassen National Forest, ATTN: Tom Frolli at (530) 252-666

### **Banner Plant: *Castilleja christii***

Each month, a different plant graces the banner of *Lingua Botanica*. This month's image and natural history courtesy of Kim Pierson, Sawtooth National Forest.

*Castilleja christii* (Christ's Indian paintbrush) is a showy, yellow flowered perennial endemic to subalpine meadow and sagebrush habitats in the upper elevations of the Albion Mountains, Cassia County, Idaho. The single population of this species is restricted to the summit of Mount Harrison and covers approximately 200 acres of land managed by the Sawtooth National Forest, Minidoka Ranger District. It is currently ranked as one of Idaho's rarest taxa. *Castilleja christii* is a Candidate for listing under the Endangered Species Act and is a Sensitive plant species on the Regional Forester's Sensitive Plant List for the Intermountain Region. In the spring of 2002, the Sawtooth National Forest signed a Conservation Assessment and Strategy for *Castilleja christii*. This strategy outlines several key criteria for conservation including: protect and maintain the only known population of *Castilleja christii* to ensure its long-term viability and conservation; gain additional biological and ecological information; and develop interpretive opportunities to educate the public, user groups, forest personnel, and permittees on the uniqueness of *Castilleja christii*.

### **After-Image: Botanizing the Yakutat Alligator**

From Mary Stensvold, Alaska Region Regional Botanist

Vegetation is gradually cloaking an abandoned WWII-era tracked landing craft in southern Alaska. The craft is located near a sandy Pacific Ocean beach on the Tongass National Forest in the vicinity of Yakutat. Several thousand of these landing craft were built during the 1930's and 1940's; this is one of a dozen or so remaining in existence. The Military dubbed these 36,400 pound landing craft "alligators". Between 1965 and

1972 this alligator was used for the marine transport of fishermen, supplies and salmon in the Yakutat area. It is “parked” at Cannon Beach in the edge of an early seral forest of Sitka spruce. Mosses, grasses and several young Sitka spruce trees dominate the flora of the landing craft. This summer we hope to prepare a checklist of the alligator’s flora. It would be interesting to compare the flora growing on this iron-rich substrate to the flora growing on the aluminum-rich substrate of a nearby WWII-era airplane (see those pictures at <http://www.geocities.com/kruzov/>).



The opinions expressed in *Lingua Botanica* are not necessarily those of the USDA Forest Service or the editor. The USDA prohibits discrimination in all its programs and activities. Pass your copy of *Lingua Botanica* around to all your friends. Contributing submissions are always welcome. For myself I hold no preferences among flowers, so long as they are wild, free, spontaneous. - E. Abbey  
*Lingua Botanica* is archived at <http://www.fs.fed.us/biology/resources/pubs/plants/index.html>  
The Forest Service National Botany Program is at <http://www.fs.fed.us/biology/plants/index.html>  
To subscribe to the *Lingua Botanica*, just send an email to Wayne Owen at <[wowen@fs.fed.us](mailto:wowen@fs.fed.us)>.

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