



Lingua Botanica

A Journal for FS Botanists & Plant Ecologists



So there I was... Sitting in my car in the early evening darkness of October's new moon in front of the ornate and historic Candler Building (<http://www.ci.atlanta.ga.us/DEPT/URBAN/candler.htm>) in the heart of downtown Atlanta waiting for my honey to get off work when, in the periphery of my vision, I saw a brown blur which was immediately followed by a dull thud on the car window just behind my head. Whether you have a healthy paranoia of big cities or are acclimated to the urban landscape, the list of unappealing things that might explain the brown thud are probably similar. And yet in reflecting on that list, an American Woodcock (*Scolopax minor*) did not score in the top 50th percentile. Nevertheless, there sitting on the sidewalk to my immediate left was a dazed and confused ball of feathers with much too much bill. Woodcocks are nocturnal birds that typically inhabit hedgerows and thickets and it is probable that this poor creature was migrating at the time of its untimely run in with 17 floors of marble (of course, it may have also bounced off the 52-story Georgia Pacific building across the street...). I immediately got out of my car to help the pitiful thing and the story ends happily enough with the bird eventually finding its way into the night, away from tall buildings and blinding streetlights. It was a *mirabile dictu* experience (this was not, after all, a possum, rat, or pigeon) and it made me think about urban plant-life. "A Tree Grows in Brooklyn" (which was probably an *Ailanthus*...) records our fascination with wild urban silva, but the truth is that hundreds of native and exotic vascular and nonvascular plants inhabit the cracks and imperfections of our cities. We see *Panicums* and *Poas* pushing through the pavement, kudzu clambering over concrete, and *Grindelias* in the gutter grates. But what would it take to impress/surprise you? *Botrychiums* at the bus-stop? *Fritillarias* against the fireplugs? *Penstemons* filling parking structures. As botanists, our heads turn to admire the anarchy symbolized by flowers escaping the concrete and asphalt. Rare or common, native or exotic, we know that a single flower presages a new generation of entropic roots and stems and that they will eventually win. Do a friend a favor, let them in on the secret. Rage against the machine, seed the cities. the editor.

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Useful URLs

Discover Life: Homepage of the All Taxa Biodiversity Inventory (ATBI), now at work in the Great Smoky Mountains National Park. Check out *Spiders in the Great Smokies* on page 13 to get a feel for what ATBI is all about.

<http://www.discoverlife.org/>

FungalWeb: An online searchable database for the hardcore myco. The site also comes with many great links and images.

<http://www.fungalweb.com/mainframe.asp>

Virtual Parks in QuickTime Panography: This is the coolest site! You have to have QuickTime (a link to the free download is on the virtualparks site). Basically, the site provides 360 degree panoramic images that you can control (zoom in or out, pan left or right) of several parks and forests in the west (mostly California and Utah). Check out the **Inyo National Forest** panographs!

<http://www.virtualparks.com/>

Ketzel Levine's Talking Plants: National Public Radio's new program featuring plants-o-plenty. You can stream RealAudio versions of past programs. Great fun...

<http://www.npr.org/programs/talkingplants/>

Post-fire Recovery of Terrestrial Lichens in Florida Scrub, with Emphasis on the Endangered Species *Cladonia perforata*

YAHRR, Duke University, Durham, NC From The Fourth IAL Symposium

Prescribed fire is a common tool in the maintenance of natural landscapes and high diversity in Florida scrubs, plant communities well-known for supporting many fire-adapted endemic plants and animals. However, the role of fire in lichen communities has not been studied. *Cladonia perforata*, an endangered terrestrial lichen, co-occurs with several other congeners on bare sand of endemic-rich rosemary scrub. A prescribed fire at Archbold Biological Station on the southern end of the Lake Wales Ridge impacted three separate populations of *C. perforata* in July 1993, leaving only remnant unburned patches scattered among completely burned areas. I investigated the rate and mode of post-fire recovery of *C. perforata* in comparison with co-occurring common species in order to inform management decisions consistent with maintenance of these lichen populations. Detailed GPS maps of individual patches of this lichen were made in January 1997 and compared with those made in August 1999. Abundance of all lichen species was monitored yearly during the winters of 1997-1999. Although all of the other terrestrial species in the same habitat recovered from juvenile stages, no juvenile forms of *C. perforata* were recorded. The area occupied by *C. perforata* increased by more than 200% on average, over the three sites. However, population growth (abundance measures for all species) is so far too slow to have documented and did not change markedly over this interval. Therefore, dispersal of unburned *C. perforata* into burned areas may be the primary method of short-term population recovery.

Save the Dietary Supplements!

Marc Borbely, Washington Post, 14 November 2000

The World Wildlife Fund (WWF)--which claims the panda as its mascot and 4.7 million sentient mammals as its supporters--has launched a campaign to protect some embattled weeds.

The group wants to protect wild goldenseal, American ginseng and other medicinal plants from over-harvesting, hoping that the herbal products' popularity will boost overall support for conservation of lands and plant species to which the public is otherwise indifferent.

"These are visible, well-recognized plants that we're trying to use to raise the awareness level of the conservation problems that face other native American plants," says WWF botanist Christopher Robbins. "Ginseng is a household name, and we feel we can really get a lot of mileage out of [it] to raise general awareness among consumers."

There is widespread agreement among environmentalists that the plants require protection. The National Audubon Society has listed goldenseal and American ginseng--along with black cohosh, blue cohosh, echinacea and slippery elm--as the wild herbs conservationists deem most vulnerable to overpicking. The federal Fish and Wildlife Service last year restricted export of wild ginseng, citing a declining presence throughout much of North America, in part due to poaching.

In the Great Smoky Mountains National Park, the largest of three major national parks where ginseng grows, 10,515 illegally harvested roots--worth about \$53,200, or \$5 per root--were seized between 1991 and 1999, according to the service. That represents only 1 percent of the actual amount poached, officials estimate.

Some harvesters are unaware of the regulations and become poachers unwittingly, Robbins says. Others include "the rural sort of old-timer who believes that his or her access to the woods should not be restricted," he says.

There isn't a single mention of plants on WWF's endangered species Web site, which says the group works to ensure "that the world our children inherit will be home to rhinos, tigers, giant pandas, whales, and other wildlife species, as well as people." Plants, presumably, are "other."

Robbins says environmentalists' focus on animals is starting to change. "WWF is beginning to realize that some of these high profile plants are just as valuable and relevant in creating these campaigns," he says.

"Since plants don't have soft brown fur and cute little brown eyes, they don't get much attention compared with animals," says Steven Foster, a medicinal plant specialist who is joining forces with the WWF. Foster is a board member of United Plant Savers, a nonprofit group dedicated to protecting native medicinal plants in the United States and Canada.

Robbins thinks consumers might support a new tax to protect wild plant habitats, spending a penny or two more on every product containing wild American herbs.

Wild American ginseng--25 to 50 times more expensive than its cultivated cousin because consumers in Asia consider it more therapeutically valuable--is picked on public or private lands by individuals who sell it to local dealers, who then pass it on to

manufacturers for processing. According to the Audubon Society, 95 percent of wild American ginseng is exported to Hong Kong.

Proceeds from the herb tax would support federal anti-poaching activities, such as increasing the number of park rangers enforcing regulations. Most ginseng products sold in the United States would not be affected by the tax because they usually contain imported Asian ginseng. Other herbal products, however, are processed from American plants.

The herbal industry isn't keen on the tax idea.

"I think it's a weak approach," says Michael McGuffin, president of the American Herbal Products Association, a trade group. There already is a permit system for harvesting herbs on federal lands, and there's no evidence that poaching is rampant, he says. "I don't want my industry to bear the burden of a few illegal poachers."

Some consumer and health groups charge that the sales and marketing of herbal remedies is deceptive, since in most cases their safety and efficacy has not been proved. (Not so, replies the American Botanical Council. Wayne Silverman, the chief administrative officer of the group, which receives some of its support from the herbals industry, calls this criticism "a myth.")

Robbins says the question of the herbs' therapeutic value is immaterial to the protection campaign.

"We don't need to know whether or not ginseng is truly efficacious to know that the resource and the species is being truly exploited."

Thieves Plunder "Protected" Forests in Russia

Gary Strieker CNN.com 3 November 2000

Khabarovsk, Russia: Outlaws are plundering protected forests, cutting timber without licenses and targeting endangered tree species in the Far East of Russia.

Federal authorities are unable, or unwilling, to stop it. But some Russians bear public witness to what's happening to their forests. One is Anatoly Lebedev, an environmental activist with his own TV show on a local network. He believes organized crime and corruption are behind the alarming increase in illegal logging.

Authorities here have confiscated a truckload of a rare pine prized for furniture making, cut illegally from a protected reserve. But it's unlikely the lawbreakers will be punished, according to Lebedev.

"It means that just the people concerned with this timber, including officials and illegal loggers, will share the money which comes from the selling of the timber," he said.

There is little control and much corruption. Even Chinese logging crews have been able to cross the border to steal timber from Russia's forests.

Conservationists say this is like other crime waves in Russia, resulting from the collapse of the Soviet Union.

"What has happened since the decline of the Soviet Union is the absence of state control and the breakup of large timber enterprises that were under state ownership," said Lebedev, an activist with the Bureau for Regional Public Campaigns.

Bankrupt state logging enterprises, including their processing mills, are now history, replaced by hundreds of small operators focused on exporting raw timber to hungry markets in Asia.

Exporting raw logs is the sole source of revenue for most timber companies in Russia's Far East. Some 90 percent of timber production here is exported as unprocessed logs to Japan, China or South Korea.

There is a new processing mill in the region, one of few, that provides jobs and tax revenues without exporting raw timber.

Lebedev says expanding such timber processing operations is one way to curb illegal logging.

"We hope that as soon as logging companies will invest more money to processing they will create new jobs and turn people from illegal operations to the processing facilities," he said.

Others say Russian authorities must attack corruption and re-assert control over timber resources.

"That's really the crisis. It's a crisis of control. It's a lack of control in the forest, and it's devastating the ecosystems here," said Josh Newell of Friends of the Earth, an international environmental activist group.

He and other environmentalists say sustainable use of Russia's forests could eliminate widespread poverty and drive economic growth in this region. But the alternative -- what's happening now -- is a worsening environmental disaster.

Forest Values in Finland

Finnish Ministry of Agriculture and Forestry, 1999

The forests harbour not only commercial and ecological values. They also offer a chance for recreation and nature observation. The social aspect of sustainability is thus well covered in Finland.

Finns like moving about in nature; hiking or trekking in the woods, or skiing in wintertime along marked trails. Forests are a source of mental and physical well-being, adventure and sensations; a place to observe plants and animals in their natural surroundings.

Everyman's right of access, based both on ancient traditions and partly even on law, gives everyone the right to move about freely outdoors on foot, on skis, by bicycle or on horseback. Motor vehicles are allowed only with permission from the land owner. Everyman's right of access applies to Finns and other nationalities alike.

It is also allowed to pick wild berries and mushrooms on somebody else's land. Finns know how to make use of nature's offerings: millions of kilograms of berries and thousands of litres of mushrooms are picked every year. There are several edible berries growing wild in the Finnish forests: blueberry, lingonberry, cloudberry, cranberry, raspberry, wild strawberry, sea buckthorn, crowberry and bog bilberry. At best, one hectare may give several tens of kilos of lingonberry. There are even more edible mushrooms: bolete, chantarelle, milk cap, russula and horn of plenty. Some of this produce is sold retail, and sometimes picking berries and mushrooms is a locally important source of income.

In certain parts of northern Finland, gathering lichen for decorations is a commercially important activity. At best, the value of the lichen may exceed the value of the timber derived from the same area. Lichen is exported to a number of countries, especially Germany. Gathering lichen is not included in everyman's rights, it requires permission from the land owner.

Reindeer in northern Finland are fed lichen in the winter. Usually the reindeer are allowed to forage freely. Reindeer husbandry in Lapland goes back more than one thousand years. There are about 7,000 reindeer farmers; the annual production of reindeer meat amounts to 2—3 million kilos, with a value of about 50 million Finnmarks (EUR 8.4 million).

There are about 300,000 registered hunters in Finland. Hunting is not included in everyman's rights, but requires membership of a hunting association. The association then makes a deal with local land owners about using a certain area for hunting. There are different hunting seasons for various kinds of game. The most important game are elk, hare, duck and fowl.

Forests are the Finn's spiritual home

Forests are for the Finns a part of their national identity and for many artists their source of inspiration. In art, forests are often depicted as comforting arms offering shelter from danger and grief. The Finnish mentality is often likened to a forest or a tree. The pervading desire to get back to nature can be seen in the holiday period, when almost every Finn seeks rural harmony at his summer cottage. There are more than 400,000 summer cottages in Finland, most of them located in the middle of a forest or next to a lake.

Forests play a central role in Finnish literature. The Finnish national epic, *Kalevala*, which is a compilation of ancient poems carried over generations as oral tradition, tells in its second poem about how different tree species were assigned to their sites when the earth was created: *Hills he sowed for pines/ sowed mounds for spruces/ and heaths for heather/ and hollows for young saplings./ On lowlands he sowed birches/ alders in light soils/ sowed bird cherries in new soils/ and rowans on holy ground/ and willows on rising ground/ junipers on barren lands/ and oaks on the banks of streams.* (translation: Keith Bosley)

Finland's national writer Aleksis Kivi, who lived in the 19th century, describes in his most famous work, *Seven Brothers*, the life of seven orphaned young men who spend their days wandering and hunting in the woods. When they grow up, each of them builds a home and farms the land, but the forest always stays in his mind. The brothers are like the Finnish society of the time: moving towards agriculture but still in many ways depending on the forests. The landscape in Kivi's work is the one of his own childhood: deep woods, huge boulders, heaths, meadows and streams.

A great many other Finnish writers and poems have depicted forests and trees in their work, often as a symbol of freedom and safety. The *Year of the Hare*, by the novelist Arto Paasilinna, deals with man's relationship with nature. The story ends with the main character fleeing from society into the woods. Veikko Huovinen's *Tale of the wood-folk* pays a tribute to the Finnish forest and its inhabitants, the trees.

The forests have also inspired many Finnish artists. Especially painters at the end of the 19th century chose to depict the wilderness. Akseli Gallen-Kallela's Kalevala motifs present pristine nature, along with the wild landscape and the tough inhabitants of the Finnish woods.

The internationally well-known Finnish architect, Alvar Aalto, created a unique modernistic style the aesthetics of which are based on minute planning of the building in relation to its surroundings, humane proportions and feel for the material at hand. He wished to make his buildings echo the forms and shapes of the Finnish lake-sprinkled landscape and to bring out the inherent qualities of wood. Some of Aalto's designs for curved wooden furniture are still in production.

Education gives forestry know-how

The roots of forestry training and education in Finland reach back almost 150 years. Today, two universities offer training at the highest academic level. Eight Polytechnics turn out more practically trained Bachelors of Forestry.

In different parts of the country, there are vocational schools and institutions training foresters and loggers. For instance, a harvester driver needs knowledge and skills in the area of ecology and environmental considerations in addition to a knowledge of forestry and modern technology.

Finnish forest research was initiated in the early 20th century. This extensive work for increasing our knowledge of the forests has gained international recognition.

Comprehensive forest research for practical needs

One of the first acts after Finland had gained independence was to found a forest research institute. Its tasks included producing basic factual knowledge pertaining to the forests. Many of the scientists of the time have gone into history thanks to their prominent research.

The Forest Research Institute was the first body to launch a systematic inventory of forest resources on a national scale. The first National Forest Inventory (NFI) was carried out during the period 1921—1924. Since then, Finland's forests have been surveyed eight times, and the ninth inventory currently underway started in 1996. The NFI gives information on the forest resources, stock volume and growth, health, land use, forest ownership and, the latest addition, biodiversity. The inventory results constitute a unique time series covering the development of the Finnish forests for almost 80 years. Over time, the methods have improved; today satellite imaging is used, and the results are applicable to more limited areas. They can even be used at municipal level.

Forest research looks at all the links in the chain, from forest ecology to market surveys of the final products. Forestry research in Finland is carried out by the Forest Research Institute METLA, universities and polytechnics, and private research institutions.

Asa Gray 1810-1888

W.F. Gabel, 1979, Two Hundred Years of Botanical Nomenclature

Asa Gray, one of the foremost botanists of his time, was born in Paris Furnace, New York in 1810. Although not college trained, he had a remarkable literary style, noted for its lucidity and elegance. He studied medicine in a physician's office and obtained the degree of M.D. in 1831.

In New York City he became acquainted with John Torrey, who secured for him the position of curator of the New York Lyceum of Natural History. This began his career as a professional botanist, and he soon joined Professor Torrey as junior author of the proposed *Synoptical Flora of North America*. In 1836 Gray published his *Elements of Botany*, the first of a long series of textbooks. He taught for a while at the University of Michigan, visited Europe, and in 1842 was appointed Fisher Professor of Natural History at Harvard, where he made his botanical mark on the world. In 1848 he published the first edition of his *Manual* which was in its 7th edition in 1914.

He was a noted taxonomist, bringing some semblance of order out of the chaos which preceded him, and was also one of the first plant geographers.

He was also a champion of Darwin and defended the theory of natural selection. Gray became friendly with Sir Charles Darwin in 1855, following a meeting with the scientist at Kew Gardens, Surrey, London, some years previously. In 1856, Darwin imparted to Gray some of his thoughts on evolution. Subsequent to the publication of the famous *Origin of Species* in 1860, Gray, ever the diplomat, wrote to Sir Joseph Hooker of the Linnaean Society that "it is done in a masterly manner." Later in correspondence with Darwin he wrote that "I never learnt so much from a book as I have from yours."

The friendship flourished, although Gray's religious convictions prevented him from fully accepting the theory of evolution. Some years later Darwin dedicated his *Forms of Flowers* to his loyal American friend.

For 10 years he was the president of the American Academy of Arts and Sciences, and in 1871 he was elected president of the American Association for the Advancement of Science. He died in 1888, but his many works stand today as truly great contributions to American botany.

Last Chance for the Whitebark

Mark Matthews, High Country News, 4 December 2000, www.hcn.org

Missoula, Montana: High atop Beaver Ridge on the Montana-Idaho border, a neglected tree species is making its last stand.

Moss-adorned 60-foot-tall snags that were once thriving whitebark pine trees stand like ghosts in this forest now dominated by subalpine fir.

Years ago, the pine with the cones that point skyward provided tons of big nutritious seeds that at least 110 different animal species, ranging from small birds and mice to grizzly bears, loved to eat. Now, the few solitary, centuries-old trees that still cling to life here and in the neighboring Bitterroot-Selway Wilderness are facing local extinction.

In Glacier National Park, the species is down to 5 percent of its historic range. In areas around Missoula, 60 percent to 80 percent of the trees have died. In the Bob Marshall Wilderness, trees are also dying at a fast clip.

A tree is overlooked

For decades, the stark gray snags crowding the ridgelines like moss-covered gravestones failed to ring an alarm.

Ecologists first thought the massive die-offs were part of the tree's natural cycle. Timber scientists weren't very interested in the slow-maturing, low-value tree that grows at high elevations.

The die-offs began in the 1930s, when mountain pine beetles swarmed through the forests, a natural cyclical phenomena. The tiny beetles dig egg chambers in the cambium of a tree. Under regular circumstances, whitebark pine would resist the beetles by clogging the egg chambers and entry holes with pitch. But the tree came under stress at the same time from an exotic disease from France called white pine blister rust.

Fire ecologist Steve Arno first noted the massive decline in the 1960s. Arno eventually recruited Bob Keane, an ecologist with the Forest Service's Fire Sciences Laboratory in Missoula, Mont., to unravel the tree's ecological secrets.

For four summers, Keane camped in the Bob Marshall Wilderness, observing an astounding relationship between the whitebark pine and its wildlife neighbors.

Biologists had already recognized the tree as an important wildlife food source - particularly for bears. Red squirrels cache the seeds, then bears pilfer those caches. Bears crave the oily seeds so much that, if offered the option, they will choose them over salmon.

In Yellowstone National Park, whitebark pine seeds account for up to 48 percent of a grizzly bear's annual diet during a productive cone crop year. When the late summer seed crop is abundant, bears are rarely seen at low elevations. When the crop fails, there is always a dramatic increase in human-bear encounters in the valleys.

Keane monitored an even more curious animal-tree relationship that was first brought to light by biologist Diana Tomback of the University of Colorado at Denver.

Whitebark pine cones develop facing skyward and hold onto their seeds so that they never fall to the ground. There has never been a documented case of a seed germinating beneath a parent tree. Even if they could get free, the seeds do not have wings that would allow them to float to open areas. Instead, a feathered friend - the Clark's nutcracker - disperses the seeds.

Come late summer, Clark's nutcracker will break open a cone, extract a mouthful of seeds and fly to an open area to bury them. Each bird picks up to 110,000 seeds every summer, hiding them in about 8,000 different spots.

"The bird is a caching machine," Keane says.



LAST STAND: Whitebark pine stands near Stark Mountain lookout in west-central Montana (Mark Matthews photo)

Either the bird can't remember all the locations of the caches, or it isn't hungry enough to eat all the seeds, because each bird ends up ingesting only about 85,000 seeds a year, giving the rest a chance to germinate.

But the nutcracker doesn't hide its caches in any old clearing, Keane discovered. The seeds develop into trees only in disturbed soil, as in a recently burned area free from competition from other plants - which is the main reason why whitebark pine has not been able to rebound after its crises with disease and insects.

"Modern fire-suppression tactics over the last 80 years have stopped fires from reaching the high mountain tops where the tree lives," Keane says.

Fire would not only prepare suitable caching areas, it would also keep the shade-tolerant subalpine fir in check.

"When subalpine fir even see a fire, they just throw up their hands and lie down," Keane says. From his research in the Bob Marshall Wilderness, Keane estimates that subalpine fir now dominates 22 percent of the traditional whitebark pine habitat. Historically, the fir only grew in about 8 percent.

"Without fire, fir will overtake an area in three to four decades," he says.

A complex prescription

On Beaver Ridge, saw crews were busy last summer thinning firs from some areas to stimulate growth and cone production in whitebark pine, as well as clear-cutting 1- to 2-acre plots to create nutcracker caching sites. After setting prescribed burns, workers will replant some areas, and leave others to the nutcracker.

But thinning and reseedling will prove fruitless in the future unless wildfire is allowed to return to the ecosystem, says Keane:

"The only way to perpetuate the species is to open up areas for caching. That means fire, because innovative methods like thinning and clear-cutting won't always work. First of all about 49 percent of the whitebark range is located in wilderness areas where you can't even use a chainsaw."

But there are major problems with prescribed, or controlled, burning. The time frame for prescribed burns at high altitudes is short because of heavy snows. Many sites can't even be reached by vehicle until mid-June. On Beaver Ridge, snow often tops the 22-foot-high weather tower long after spring arrives in the valleys.

"Usually, when the whitebark pine area comes into prescription, the lower forests are at a tinderbox dry condition," Keane says. "The best treatment is to let wildfires in wilderness go at high elevations and drift upslope and burn themselves out at the tree line. And only control them if they come near people or property."

Keane will never live to see whether his efforts to save the whitebark pine are successful. It often takes 10 years before a burn site becomes conducive to whitebark seedling survival. Grasses and forbs must first create enough ground cover to hold soil moisture. Then it takes another 20 to 40 years before seedlings become functional trees. And then another 20 years before they start producing cones.

But once they get established, trees that escape the rust, beetles and crown fires can "live for a very long time," Keane says, often for centuries.

For more Whitebark Information, Contact: Bob Keane at the U.S. Forest Service Rocky Mountain Research Station, Fire Sciences Laboratory.

An Old Story -- Botanists Find 'Living Fossil' Tree

By Paul Tait, Reuters News Service, 15 December 2000

Sydney, Australia: Australia has a new addition to its unique list of flora and fauna after the discovery of a species of tree described as a living fossil dating back at least 90 million years, botanists said Friday.

The tree, which grows to above 130 feet tall, has been christened unofficially the Nightcap Oak after its discovery in the Nightcap Range rainforest near Byron Bay, 400 miles north of Sydney.

The tree's history spans more than 90 million years, back to when Australia was part of the Gondwanaland super-continent linked to what is now Antarctica, New Zealand and South America, said Dr Peter Weston of Sydney's Royal Botanic Gardens.

"It's a very, very old lineage indeed," Weston told Reuters.

Weston identified the new tree after a stand of about 20 mature trees was discovered by botanist Robert Kooyman in August.

Weston said it was remarkable that such a unique tree could have gone unnoticed in a rainforest which has been well researched and documented by botanists.

"I was really amazed...this rainforest has been scoured to within an inch of its life by some very good botanists," he said.

He said the tree belonged to the Proteaceae family, of which native Australian banksias, waratahs, macadamias and grevilleas and South Africa's proteas are members.

Weston said the tree was a "relatively non-descript" rainforest tree with dark green leaves, nuts about the same size as macadamias -- a delicacy in Australia -- and small white flowers in dense clumps.

Kooyman said the flowers smelled faintly of sweet aniseed.

One of the larger trees in the Nightcap Range had a circumference of more than 29 inches.

The exact location of the Nightcap trees is being kept a closely guarded secret so the trees can be protected.

The New South Wales state government said it was considering a request to grant the tree emergency protection under the state's legislation covering threatened species.

Cuttings from the trees have been taken and are being cultivated at Sydney's Royal Botanic Gardens.

Botanists were excited in 1994 by the discovery of Australian flora's first "living fossil," the Wollemi Pine which dates back 150 million years.

Weston said it was likely Australia, known for its unique wildlife which includes kangaroos and koala bears, probably still contained many species of undiscovered fauna.

"That something that big can escape detection until now...what small, interesting plants are there now that we know nothing about?," he said.

FACTOID: The US Forest Service reports that it used 27 different herbicide formulations totaling 35,992.75 pounds for the control of noxious weeds in Fiscal Year 1997.

Reintroducing Hawaii's Silverswords

Robert Robichaux, Steven Bergfield, Marie Bruegmann, Joan Canfield, Patrice Moriyasu, Tanya Rubenstein, Timothy Tunison, and Frederick Warshauer. *Endangered Species Bulletin*, May/June 2000

Of the many endangered plant species in the Hawaiian Islands, silverswords have the highest profile due to their radiant beauty and the severity of the threats confronting them. The large-scale reintroduction of greenhouse-grown seedlings is raising hopes for the recovery of these spectacular endemic species, although serious challenges remain.

The Mauna Kea silversword (*Argyroxiphium sandwicense* ssp. *sandwicense*) had an historic range that encircled Mauna Kea volcano at 8,500-12,500 feet (2,600-3,800 meters) elevation on the Island of Hawai'i. Based on records of early naturalists, this silversword grew in abundance and was a dominant plant of the subalpine ecosystems. In the late 1700s, European voyagers introduced sheep and other alien (nonnative) ungulates to the island. The alien animals spread rapidly, with the sheep population on Mauna Kea eventually exceeded 40,000. As alien ungulate populations increased, silverswords declined severely in distribution and abundance, presumably due to heavy browsing. The small natural population of silverswords that persists on Mauna Kea now contains only 42 plants, all of them confined to cliffs and rock faces that are inaccessible to ungulates.

Mauna Loa silversword (*Argyroxiphium kauense*) suffered a similar fate. Historically, this species was common in moist to wet ecosystems between 5,000 and 8,900 feet (1,500 and 2,700 meters) on Mauna Loa and Hualalai volcanoes. Following the introduction and spread of pigs, mouflon sheep, and other alien ungulates, however, the Mauna Loa silversword suffered a severe decline. The surviving individuals, numbering fewer than 1,000 plants, are confined to three small natural populations widely scattered across Mauna Loa.

In addition to direct threats from alien ungulates, Mauna Kea and Mauna Loa silverswords may face serious indirect threats from alien insects, especially ants and wasps. These alien predators have the potential to decimate populations of native bees and moths that serve as pollinators, thereby greatly limiting seed set in silverswords.

Partnership for Recovery

Though the threats are daunting, the outlook for recovery of Mauna Kea and Mauna Loa silverswords has brightened considerably in recent years. Key to this reversal of fortune has been a public/private partnership between the Volcano Rare Plants Facility, Hawaii Division of Forestry and Wildlife, Fish and Wildlife Service, National Park Service, Biological Resources Division of the U.S. Geological Survey, and Hawaiian Silversword Foundation. The Rare Plant Facility has grown the large number of silversword seedlings destined for reintroduction, closely tracking the pedigree (or parentage) of each one. Different agencies in the partnership have then overseen the outplanting effort in different parts of the historical ranges. The non-profit Silversword Foundation has worked closely with all of the partners to facilitate the collaborative initiative. By sharing expertise, resources and enthusiasm, and by emphasizing on-the-ground actions, the partnership has made major strides recently with silversword reintroduction.

In 1999, we outplanted more than 2,500 silverswords on Mauna Kea, bringing the total reintroduced population to about 4,000. (About 1,500 Mauna Kea silverswords were successfully outplanted by the Division of Forestry and Wildlife between 1973 and

1998.) We planted the seedlings at multiple sites in the State Forest Reserve. Survivorship has varied among the sites and with the time of planting, but has been exceptionally high in some cases. Of the 1,200 seedlings planted in late fall on the east slopes of Mauna Kea, for example, more than 99 percent have survived their critical first 9 months on the volcano.

We also outplanted more than 1,000 silversword seedlings on Mauna Kea and Hualalai in 1999. They went to protected sites in Hawaii Volcanoes National Park, Kulani Correctional facility, and State Forest Reserves. Again, survivorship has varied among the sites, but has exceeded 90 percent at some locations.

To ensure high genetic diversity in the reintroduced silversword populations, we have implemented a controlled crossing program in which we hand-pollinate flowering silverswords in both the field and greenhouse to produce seeds. Although hand-pollinating the plants can be challenging at times, especially on Mauna Kea, where we must perch precariously on steep cliffs and rock faces, the program has enabled us to significantly increase the number of founders (or parents) for the reintroduction effort, and to balance their genetic representation among the seedlings that are outplanted.

Over the next year, we plan to outplant another 2,000 silverswords on Mauna Kea and Hualalai. This, we will soon be about 40-60 percent of the way towards achieving our long-term goal of reintroducing more than 15,000 Mauna Kea and Mauna Loa silverswords throughout their historical ranges.

The major threat to the recovery of silverswords (and many other endangered plant species in Hawaii) continues to be alien ungulates. Even at low numbers, these animals can have severe impacts. On the upper slopes of Mauna Kea, for example, where alien ungulate populations have been greatly reduced by a court-ordered removal program, browsing still causes significant seedling mortality, and serious damage to adult silverswords, at some of the outplanting sites in 1999. Because alien ungulates are still abundant on Mauna Kea and Hualalai, all of our outplanting sites for Mauna Kea silverswords must be protected by fencing, which ultimately constrains the scope of the reintroduction effort. Alien insects may also continue to pose a significant threat to the health of native pollinator populations.

The large-scale reintroduction strategy for silverswords, implemented through public/private partnership, highlights both the opportunities and challenges for recovery of other endangered plant species in Hawaii.

Progress Summary of Great Smoky Mountains National Park Spider Inventory

Fred Coyle, Western Carolina University

Fred Coyle at Western Carolina University has been devoting nearly all of his research efforts since 1995 to an inventory of the spiders of Great Smoky Mountains National Park. Most of the funding for the project has come from the National Science Foundation, but seed grants were also provided by Western Carolina University and the National Park Service. Although Coyle began this project before the Great Smoky Mountains All Taxa Biodiversity Inventory (ATBI) plan was developed, the products of his inventory

project should contribute nicely to the ATBI goals. Here is a thumbnail sketch of the project (which will probably take three more years to complete) and results to date:

The key objectives are to determine what spider species live in GSMNP and how they are distributed among the Park's habitats. The result will be distributed via the Internet in the form of an electronic database (Biota), and a spider identification guide useful for testing ecological hypotheses and species richness estimators, facilitating further research on spiders, managing resources, and educating Park visitors. Coyle and his students have collected about 2380 samples (about 1930 1-hour ground, aerial, beat, and sweep samples and 450 1 meter square litter samples) containing an estimated 45,000 adult spiders from 17 intensively sampled focal sites representative of 16 of the Park's major biotic community types and from numerous accessory sites representing additional habitats. The number of sample units per focal site ranges from 48 (spruce-fir) to 1112 (cove hardwood). Coyle's sampling protocol, a modified Coddington protocol, has been field tested in tropical and temperate forests and involves a team of collectors using four standardized methods that sample spiders in all microhabitats and vegetation strata except the forest canopy. The protocol yields large and statistically tractable replicate data sets which reflect the relative abundance of species in the sites and habitats studied and hopefully will provide comparable views of species richness, taxonomic composition, and guild structure across diverse communities and regions. To date, about 85% of the adult spiders have been sorted into morphospecies, about 40% of the adults have been identified, and 15% have been entered into the Biota database. The adults identified to date comprise 474 species, 38 of which (8%) appear to be undescribed).

Four papers based on this inventory are in press and five others are in preparation. These papers include analysis of the habitat distribution patterns, life cycles, and behavior of some of the common and speciose spider genera in the park, descriptions of the spider assemblage structure of selected sites, and evaluations of the effectiveness of species richness estimators.

(editors note: Its not about plants, but this short piece is illustrative of the ATBI process and its results)

Astragalus in Mourning:

DR. RUPERT C. BARNEBY (1911-2000)

From BEN 261, ex Barbara Thiers [bthiers@nybg.org], Taxacom@usobi.org

Dr. Rupert Charles Barneby, Curator Emeritus in The New York Botanical Garden's Institute of Systematic Botany and one of the Garden's most senior and distinguished scientists, died Tuesday, December 5. He was 89 years old. Barneby's association with The New York Botanical Garden spanned nearly a half century. He arrived as a visiting scholar in the 1950s and shortly thereafter accepted a staff position as Honorary Curator of Western Botany. He went on to become a Research Associate and an Editorial Consultant for *Brittonia*, the Garden's esteemed scientific journal covering systematic botany.

A self-taught botanist, Barneby rose to become a world expert in Leguminosae (the bean family) and Menispermaceae (the moonseed family). He spent his career at the Garden curating and studying the world's best collection of New World Leguminosae.

Gregory Long, President of The New York Botanical Garden, said, "Rupert Barneby was one of the most productive botanists of the twentieth century, a giant in the field of botanical research. Over the last half century, he has been an inspiring mentor, a meticulous scholar, and a creative editor who has made an enormous contribution to the botanical world. We at The New York Botanical Garden are indeed fortunate that his kind, generous, gentle manner graced our lives."

In 1999, the International Botanical Congress presented Barneby with its prestigious Millennium Botany Award for a lifetime of contribution to science. In 1980, he was the winner of the Henry Allan Gleason Award, an annual award from The New York Botanical Garden for an outstanding recent publication in the field of plant taxonomy, plant ecology, or plant geography. In 1989, the American Society of Plant Taxonomists awarded Barneby with the Asa Gray Award for his contributions to systematic botany. In 1991, The Garden honored Barneby by institutionalizing his legacy through the establishment of the Rupert C. Barneby Fund for Research in Legume Systematics. The Engler Silver Medal, botanical science's highest honor for publications, was awarded to Barneby in 1992 for his monographic work *Sensitivae Censitae: A Revision of the Genus *Mimosa* Linnaeus (Mimosaceae) in the New World*.

Since the publication of his first botanical paper in 1941, Barneby published more than 6,500 pages of papers, monographs, and journals. Among his most influential works are *Atlas of North American *Astragalus**; *Daleae Imagines*; *Intermountain Flora, Volume 3, Part B*; and *Silk Tree, Guanacaste, Monkey's Earring: A Generic System for the Synandrous Mimosaceae of the Americas (3 Volumes)*.

"Rupert Barneby was an incredible scholar and one of the nicest people I have known. He was one of the most productive and erudite students of botany and horticulture on the staff of The New York Botanical Garden in its 109-year history. He will be remembered by thousands of colleagues for his uncommon generosity in sharing his inexhaustible knowledge and precise editorial skills. He has left an authoritative legacy of publications and will be sorely missed by botanists around the world," said Professor Sir Ghilleen Prance FRS, VMH, the former Director of the Royal Botanic Gardens, Kew.

Barneby was known for his talent for discovering or rediscovering rare and local species. In the course of his five decades of research, Barneby described and named over 1,100 different plant species new to science. A botanist is fortunate to have a new species of plant named in his honor. Barneby had not only 25 different species named after him, but also, three genera (groups of species sharing common characteristics, such as roses or oaks) of plants: *Barnebya*, *Barnebyella*, and *Barnebydendron*.

Barneby was a member of the American Society of Plant Taxonomists, the International Association for Plant Taxonomy, and the New England Botanical Club, and a Fellow of the California Academy of Sciences.

"Rupert Barneby was a great student of plants in the style of George Bentham and the other encyclopedic workers of the nineteenth century, who would tirelessly analyze all we knew about enormous groups of plants and reduce that knowledge to lucid prose, working day after day, month after month, and year after year. He always had time to encourage and help students and colleagues, giving them the benefit of his extraordinary classical education, friendly personality, and love for plants. He will be

greatly missed," said Dr. Peter Raven, Director of the Missouri Botanical Garden and close friend and colleague.

He lived among literati as easily as he did among scientists. Considered his close friends were W.H. Auden, Christopher Isherwood, Julian Huxley, and others.

Rupert Barneby was born October 6, 1911, in Monmouthshire, England. He attended Cambridge University where he received his B.A. in History and Modern Languages in 1932. He came to the United States in 1937 and established permanent residency in 1941. In 1978, he was awarded an honorary Doctorate of Science degree from The City University of New York. In accordance with his wishes, there will be no funeral. The Garden will hold a memorial celebration in January.

Banner Plant: *Botrychium lunaria*

Each month, a different plant graces the banner of *Lingua Botanica*.

This edition's Banner Plant image was submitted by Mary Stensvold, R10 Regional Botanist

This photo was taken in an upper beach meadow in the northern part of the Tongass National Forest. Common moonwort ferns are charismatic little plants that are often overlooked because of their small size and because they blend well with the texture and color of surrounding vegetation. *Botrychium lunaria* is one of about 30 species of *Botrychium* known in North America. They are distributed throughout the world, however they seem to be most common in the northern part of the northern hemisphere.

The aboveground portion of the fern is comprised of two fronds, a fertile frond and a sterile frond. The sterile frond has fan-shaped to half-moon shaped paired pinnae. The name moonwort is derived from this characteristic half-moon shape. The fertile frond supports clusters of spherical sporangia. The stems of the two fronds are joined to form a common stalk. Plants range in size from 3 to 25 cm tall, and are often variable morphologically. This variability is most often seen in pinna size, shape, orientation, and margin shape. The plants pictured here are typical in size, pinnae number and morphology. Common moonworts grow in an array of habitats including sandy seashore meadows, fjellfields, well-drained meadows, abandoned fields, and roadsides.

Common moonworts play magical roles in European folklore. It is said that they can open locks when used as a key, pull the shoes from horses that step on them, and cause people to become invisible.

Afterword:

Homemade Holiday Gift Suggestion for Botanists (especially Idaho botanists...)

A Potato Bazooka

Bob Simon's Backyard Ballistics website is <http://www2.csn.net/~bsimon/backyard.html>

You may want a couple of buddies to go in buying the material with you, or make 3 at the same time, as the pipe comes in 10 foot chunks. I bought all material at a local "Home Depot" for about \$15.

Note on choice of material: I have seen and heard of plans for spud guns using PVC pipe. In fact, an article in the February issue of "Modern Gun" uses PVC. I chose to use schedule 40 ABS plastic. The black pipe usually used for sewerage. If you want to know why I chose ABS, take a chunk of PVC pipe. Hit it with a 25 lb sledge hammer. It fragments into many *sharp* pieces. Try this with ABS. The sledge hammer bounces off the pipe and smashes into your foot. But it didn't break! (The pipe, that is, I don't know about your foot). PVC also gets brittle with exposure to sunlight. ABS just gets hot. Only ever use schedule 40! That's the thick stuff. It costs a little more, but not that much more. The bill of material says 10 foot lengths, only because that's as small a piece as is normally sold.

*Web master's note: There does seem to be some confusion about what pipe is safest to use. Finding pressure rated ABS pipe is nearly impossible in many areas. Most **spud shooters are therefore constructed of PVC pipe**. If you stick to conventional propellants and do not use oxidizers, PVC should perform with adequate safety.*

Bill of material

- 1 10 foot piece of 2 inch diameter schedule 40 ABS pipe
- 1 10 foot piece of 3 inch diameter schedule 40 ABS pipe
- 1 3 inch to 2 inch reducing bushing
- 1 3 inch coupling
- 1 3 inch threaded (one side) coupling
- 1 3 inch threaded end-cap
- 1 can ABS solvent-weld pipe glue. NEVER USE PVC GLUE on ABS!!!
- 1 Coleman sparker - these are easily found in any sporting goods store that has a decent camping section. They are normally made for putting inside a Coleman lantern or stove so you don't need matches.

Construction

Step 1 - Cut the combustion chamber to size. Cut off a 14 inch section of the 3 inch diameter pipe. You don't need the rest of the 10 foot length, so save it for future bazookas, or make one with a couple of buddies splitting the cost.

Step 2 - glue the 3inch to 2 inch bushing into one side of the 3 inch coupling, glue the other side of the coupling to one end of the 14 inch combustion chamber. Make sure the joints are clean first and be liberal with the glue.

Step 3 - glue the threaded coupling to the other end of the combustion chamber (using the slip-joint side, obviously) make sure the glue doesn't run into the threads.

Step 4 - Cut the "barrel" to size. Cut off a 36 inch (3 foot) length of the 2 inch pipe. Glue this into the other end of the bushing you've glued to the combustion chamber. You should now have the complete gun, but it's not ready for firing just yet.

Step 5 - Using a file, taper the "muzzle" for the last half an inch on the outside. This will serve to cut the potato as it's rammed in.

Step 6 - You'll need to mount the sparker inside the end cap. If you got the Coleman one, it is threaded and has two nuts with it. There is also an angled piece of metal meant to hold the ignitor inside a lantern. Take the knurled knob off the end of the shaft. Be careful - there's an extra flint inside the knob. Unscrew the nut and discard the angled bit of metal. Drill a hole dead center in the ABS end cap of a diameter to take the shaft of the ignitor. Mount the ignitor inside the end cap, put the nut on the outside of the shaft and tighten until the ignitor is held in place. The shaft will slide back and forth, but won't come out. Put the end knob back on and tighten the lock screw.

Step 7 - Make sure the glue has "cured". I left mine overnight before firing.

Step 8 - make a ram rod. I used surplus 1/2 inch PVC pipe, 4 feet in length. A broom handle, etc. will do. Measure and make a mark about 2 feet 8 inches down the ram rod.

To fire: remove end cap. Ram a potato from the muzzle end. The tapered end will cut the potato to size. Make sure it has a good seal as you ram it down with the ramrod. Ram to the mark you made. I've found most misfires happen when there are gaps between the potato and the barrel where gasses can escape. Spray 2 - 5 seconds worth of cheap hair spray (white rain, aqua net) I'd use an "unscented" one if you can, or the gun stinks after a few shots! Start at 2 seconds and build up! After the hair spray, quickly screw in the end cap. One twist of the ignitor knob sends the spud skyward!

Safety

Once you shoot this, you'll see the potato comes out with enough force, you wouldn't want to be on the wrong side! Usual safety about pointing the muzzle etc. still apply. This is for fun only. I don't make any guarantee you won't blow your arse off. (You may laugh it off, however). Personally, I'd never use acetylene, starting fluid (ether), black powder, lighter fluid, gasoline etc. as a propellant, but you may not value your body parts as much .

You can get 3 shots off a big spud. Partially baked ones are fun - they seal in better and shoot farther, but they do break up and the barrel is a mess to clean up afterwards.

Clean up

Soap and water. Push a small towel through (here's a case where it's OK to clean from the muzzle). I've been shooting mine since 12/94 and have been having a barrel of laughs. The spuds will go nearly 200 yards! I plan to make the "220 swift" variety by coupling a one inch barrel to the three inch combustion chamber. I wonder if you put the barrels on threaded couplings you could have interchangeable barrels. Sort of an "Idaho Contender".

The opinions expressed in *Lingua Botanica* are not necessarily those of the USDA Forest Service or the editor. Pass your copy of *Lingua Botanica* around. Contributing submissions are always welcome.

"Living is like licking honey off a thorn" Louis Adamic

To subscribe to the *Lingua Botanica*, just send an email to Wayne Owen at <wowen@fs.fed.us>.

