

A close-up photograph of tree bark, showing a dense pattern of lenticels. The bark is dark brown with lighter, textured areas where the lenticels are located. The lighting creates strong shadows, emphasizing the three-dimensional texture of the bark.

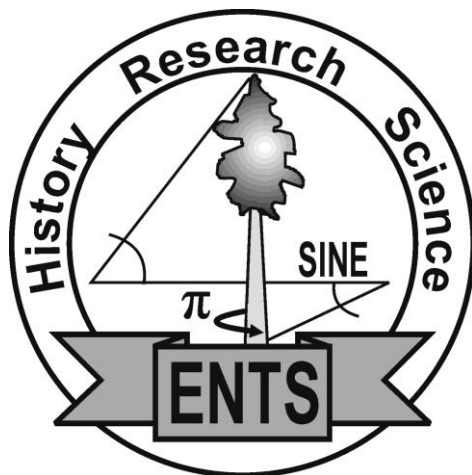
Bulletin of the Eastern Native Tree Society

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Mission Statement:

The Eastern Native Tree Society (ENTS) is a cyberspace interest group devoted to the celebration of trees of eastern North America through art, poetry, music, mythology, science, medicine, and woodcrafts. ENTS is also intended as an archive for information on specific trees and stands of trees, and ENTS will store data on accurately measured trees for historical documentation, scientific research, and to resolve big tree disputes.

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Membership is free when you sign up for our discussion group, ENTSTrees, at: <http://groups.google.com/group/entstrees?hl=en>. Submissions to the ENTS website in terms of information, art, etc., should be made to Edward Frank at: ed_frank@hotmail.com

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*COVER: Unlike many species, it is common for the deeply furrowed bark of the sugarberry to clearly show annual cork deposits.
Photo by Don C. Bragg.*

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FAMILIAR TREES SHOW UP IN THE DARNDDEST PLACES!!

This past spring break my family and I were thoroughly enjoying a trip through the Ouachita Mountains in central Arkansas. While looking for an old quartz crystal mine, we were driving up a rather rugged road when out of nowhere I glanced up to see a strangely familiar conifer crown towering above the oak-hickory forest (pictured below, photo by Don C. Bragg). A closer look confirmed my suspicions—*Pinus strobus*! Yes, here in the Middle-of-Nowhere, Arkansas, was a number of specimens of the tree I grew up with.

Turns out someone planted these eastern white pines along a small creek around 1910 (for what purposes I don't know), and they (well, at least the survivors I saw) seem to have done well over the last century. Central Arkansas is far outside of the natural distribution of this species, although you certainly can see individuals planted in yards and parks across the region. Regrettably, I did not have any of my measuring equipment with me, so I cannot report on specific sizes, but one was labeled as the Arkansas state champion. When I get a chance, I will return and report more—but the moral of the story is to always keep your eyes open, even in familiar terrain, as you never know what may have happened there decades ago!

Don C. Bragg
Editor-in-Chief



ANNOUNCEMENTS AND SOCIETY ACTIONS

*e*NTS Magazine Receives Library of Congress ISSN Number

Ed Frank, Native Tree Society webmaster and editor of *e*NTS: *The Magazine of the Native Tree Society* recently announced that that magazine has now officially been assigned an ISSN Number (ISSN 2166-4579) by the Library of Congress. According to the Library's website, the International Standard Serial Number (ISSN) is a standard identifier for serials (e.g., journals, magazines, newsletters, newspapers, annuals) whether published in print, online or other media. Another big step forward for the work of the Native Tree Society!

22nd Annual North American Dendroecological Fieldweek (NADEF)

**The Valles Caldera National Preserve in Jemez Springs, New Mexico
May 28th through June 5th, 2012**

The 22nd Annual North American Dendroecological Fieldweek (NADEF) will be held at the Valles Caldera National Preserve, Science and Education Center in Jemez Springs, NM. The fieldweek will run from May 28th through June 5th and registration fees will be \$800 US for students and \$950 US for professionals. Students should send a photocopy of their student ID with their registration. Your registration fee includes room and board for the entire week. Registration fees are due by March 30, 2012. If you have any questions about the fieldweek please contact:

Jim Speer
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Indiana State University
Terre Haute, IN 47809
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The group leaders and projects are:

- Introductory Group: Daniel Griffin and Alison Macalady (University of Arizona, LTRR). This group will learn the basics of dendrochronology, including more time spent on site and tree selection, crossdating, detrending, and understanding chronology development. This group will take the time to survey the techniques of the other projects.
- Fire History: Peter Brown (Rocky Mountain Tree-Ring Research) and Tom Swetnam (University of Arizona, LTRR). This group will examine the fire history of a site near the Valles Caldera National Preserve.
- Dendroecology: Amanda Stan and Larissa Yocom (Northern Arizona University). Working in conjunction with the Fire History Group, this group will examine the stand history and stand structure of a site near the Valles Caldera National Preserve.
- Dendroarchaeology: Ron Towner (University of Arizona, LTRR). This group will conduct a dendroarchaeological project on an ancient southwestern site.
- Dendroclimatology: Valerie Trouet (University of Arizona, LTRR), Scott St. George (University of Minnesota) and Rochelle Graham (Hydrologic Research Center). This group will conduct a dendroclimatic analysis of a site near the Valles Caldera National Preserve and examine maximum density measurements using the blue reflectance method.

Agenda

- Monday, May 28th Travel Day, Introductions, Introductory Lectures.
- Tuesday, May 29th Breakfast. Tour of the local area; introduction of the projects by the group leaders; lunch; split into groups; Evening lecture/exercise on crossdating/skeleton plotting
- Wednesday, May 30th Field day. Evening lecture: Cleaning and sharpening increment borers
- Thursday, May 31st Laboratory day, Evening lecture: COFECHA
- Friday, June 1st Laboratory day, Evening lecture: ARSTAN
- Saturday, June 2nd Laboratory day
- Sunday, June 3rd Laboratory day
- Monday, June 4th Laboratory day; 1 pm presentation of projects (PowerPoint). Closing celebration
- Tuesday, June 5th Travel day

NOTE: Please direct ALL questions regarding NADEF to Dr. Speer.

Programs at Cook Forest State Park

Advanced Tree Measuring Workshop

April 18-19, 2012

Cook Forest State Park, in conjunction with the Native Tree Society (NTS), will host a two-day Advanced Tree Measuring Workshop to the public and forest resource professionals focusing on learning the latest and most accurate methods of measuring big, tall, and noteworthy trees of Cook Forest and the Eastern United States.*

Join members from NTS, American Forests, and Laser Technologies, Inc. (LTI) as we learn various methods and accuracies of measuring trees using the traditional tangent based methods with tape & clinometer and similar triangles, and comparing them to sine based methods using clinometer and laser rangefinder. We will also learn the external baseline method, tripod corrections, diameter measurements, crown spread and crown area calculations with the following instruments: LTI TruPulse 200 and 360, LTI RD 1000 Relascope-Dendrometer, and MacroScope 25/45.

April 18

900am-915am - **'Opening Remarks'**, by Dale Luthringer (Environmental Education Specialist Cook Forest State Park-EES CFSP), meet at the Log Cabin Inn Environmental Learning Classroom.

915am-1015am - **'Dendromorphometry: The Art and Science of Measuring Trees in the Field'** Part of the mission of the Native Tree Society is to develop ever more accurate methods for measuring the dimensions of trees. This involves testing new equipment, developing mathematical models and measurement protocols, and analyzing the sources of measurement error. Join co-founder and Executive Director of NTS, Robert Leverett, at the Log Cabin Inn Environmental Learning Classroom, as he takes us through the methods developed and used by the members of NTS, and shares the successes that NTS members are enjoying.

1015am-1030am - BREAK (refreshments provided)

1030am-1230pm - **'Dendromorphometry: Methods & Materials'**, by Robert Leverett, Dale Luthringer, Laser Technologies, Inc. (LTI), and other NTS members, meet at the Log Cabin Inn Environmental Learning Classroom. Learn the latest tree measuring methods by comparing the old ways and learning the new with hands-on training using various measuring equipment in the field.

1230pm-100pm - LUNCH (please bring a lunch)

100pm-430pm - **'Measuring the Giants'**, by Dale Luthringer, Robert Leverett, and other NTS members, meet at the Log Cabin Inn Environmental Learning Classroom. Join us for an interpretive hike to re-measure the Seneca Pine, largest known white pine by volume in the state at nearly 11,500 board feet, and the Longfellow Pine, tallest known tree north of the Great Smoky Mountains, last listed at 184.7ft high!

430pm-630pm - DINNER (please enjoy dinner at one of our local area restaurants)

630pm-645pm - **'Evening Lecture Series Opening Remarks'** Dale Luthringer, EES CFSP, at the Sawmill Center for the Arts Classroom.

645pm-730pm - **'Noteworthy Old Growth Forests of Western Pennsylvania'** Dale Luthringer, EES CFSP, at the Sawmill Center for the Arts Classroom.

730pm-745pm - BREAK (refreshments provided, review resource material tables provided by LTI, American Forests, and the Old Growth Forest Network)

745pm-830pm - **'American Forests Big Tree Program'** Sheri Shannon, Education & Outreach Manager for American Forests, at the Sawmill Center for the Arts Classroom

830pm-845pm - BREAK (refreshments provided, review resource material tables provided by LTI, American Forests, and the Old Growth Forest Network)

845pm-930pm - **'The Old-Growth Forest Network: America's Next Idea'** — Dr. Joan Maloof, professor emeritus Salisbury University

April 19

900am-300pm - **'Dendromorphometry: Practical Application'**, by Dale Luthringer, Robert Leverett, and other NTS members. Meet at the Log Cabin Inn Environmental Learning Classroom where we will likely car-pool to old growth forest & big tree hotspots in the park for a strenuous, often off-trail, interpretive hike to search for new big/tall tree records and re-measure old champions. The following noteworthy trees are on the "bucket list": Feather Duster-10.9ft CBH x 174ft high, Cook Pine-12.5ft CBH x 162.3ft high, Gyasuta Pine-11.6ft CBH x 164.3, Burl King-11.1ft CBH x 158.5ft high, Cornstalk Pine-13.8ft CBH x 136.2ft high, Seneca Hemlock-tallest known hemlock in the Northeast, at 12.1ft CBH x 147.6ft high, and the two tallest known black cherries in the Northeast at 11.6ft CBH x 138.7ft high and 8.8ft CBH x 140.7ft high. Please pack a lunch & bring plenty of water.

*Cost is free, but registration is required. To register, please contact the Park Office at (814)744-8475 or dluthringe@pa.gov.



www.dcnr.state.pa.us/Calendar/




Answer to Last Month's "Puzzler" Tree Species!

Last issue, I asked people to identify the tree below...and the answer is <<DRUM ROLL...>>: spruce pine (*Pinus glabra*).
Photograph by Don C. Bragg.




New Publication Available:



United States
Department of
Agriculture

Forest Service



Southern
Research Station

Research Note
SRS-22

The Sine Method: An Alternative Height Measurement Technique

Don C. Bragg, Lee E. Frelich, Robert T. Leverett,
Will Blozan, and Dale J. Luthringer

December 2011

Abstract

Height is one of the most important dimensions of trees, but few observers are fully aware of the consequences of the misapplication of conventional height measurement techniques. A new approach, the sine method, can improve height measurement by being less sensitive to the requirements of conventional techniques (similar triangles and the tangent method). We studied the sine method through a couple of comparisons. First, we demonstrated the validity of the sine method under idealized conditions by comparing tangent and sine measurements on a stationary object of a known height. Then, we compared heights collected via climbing and lowering a tape from the highest point of a number of forest-grown trees with heights measured with the sine method. The sine method offers a viable, cost effective alternative to traditional measurement approaches, especially for large or leaning trees, and for trees with broadly spreading crowns.

Keywords: Height measurement, hypsometers, similar triangles, sine method, tangent method, trigonometry.

and others 2002). For instance, the modeling of seed dispersal depends on the trajectory of falling seeds and the distance traveled, which are partially a function of tree height and therefore an accurate measurement of the starting height of seeds in the canopy is critical (Dovciak and others 2005, Williams and others 2006). More recently, the study of why trees grow as tall as they do has emerged as a research topic (e.g., Domec and others 2008, Nabeshima and Hiura 2008), as has metabolic scaling across size classes (Russo and others 2007).

Popular interest in "big tree" lists (e.g., American Forests 2010, Forestry Tasmania 2009) has merged with aspects of science and conservation. Researchers occasionally use champion trees to define the upper limits of species height (e.g., Botkin 1992, Bragg 2008a, Parresol 1995, Shiffley and Brand 1984), and some agencies use exceptionally tall trees to help establish reserves (e.g., Forestry Tasmania 2009). Height can play a key role in developing accurate relationships between tree bole diameter and aboveground volume and productivity estimates (Newton and Ampomah 2007, Repola 2008). Certain allometric relationships are embedded within growth functions of many forest simulators—the gap models, as an example, use an increment function based in part on tree height (e.g., Botkin and others 1972, Moore 1989, Shugart 1984). Many large-scale biomass, carbon storage, and timber volume estimates are generated from diameter- and height-based equations applied to forest inventory data (e.g., Botkin and others 1993, Somogyi and others 2007). Remote sensing techniques to derive forest biomass and carbon sequestration require accurate ground-based tree height measurements for calibration and verification (Asner and others 2010, Boudreau and others 2008, Clark and others 2004, Lefsky and others 2002, Sexton and others 2009, Wang and Qi 2008).

All of these examples suggest the need for reliable quantification of tree size. Such details are not without consequence—for example, the inaccurate measurement

Introduction

Total tree height is an important measure of numerous forest conditions. Height is an indicator of the status of the tree within the population and is helpful in predicting stand development and successional patterns (Tester and others 1997, Purves and others 2008). The vertical structuring of adjacent trees largely determines the outcome of gap closure and the ability of understory species to reach the canopy (Webster and Lorimer 2005). Other functional aspects of forest ecology (e.g., water use by trees, light extinction through the canopy, wildlife habitat quality, and seed dispersal) depend partly on tree height (Boelman and others 2007, Dovciak and others 2005, Ford and Vose 2007, Parker

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Free to download at: <http://www.treeseearch.fs.fed.us/pubs/39981>

This will be a new occasional feature of the Bulletin of the Eastern Native Tree Society for free accessible publications of interest to the membership. Please send any other contributions to me at the address provided in the Author Instructions section.

THE TEMPERATE DECIDUOUS FOREST OF CHILE

Fred Paillet

Adjunct Professor and USGS Emeritus Scientist, Department of Geosciences,
University of Arkansas, Fayetteville, Arkansas

EDITOR'S NOTE: *This is another in a series of narratives by Dr. Fred Paillet, who travels the world observing forests and other natural features, and providing his keen insights and artistic talents to his adventures.*

Having always been smitten with our deciduous forests, I have often wondered how much different such forests can be in different environments (hence, the fascination with comparing our oak-hickory and northern hardwood regimes with the forests of Europe and Asia). But the ultimate experiment in parallel evolution was played out in the southern hemisphere. So an emphatic entry on my personal bucket list was a visit to the only southern hemisphere deciduous forest region cited in the literature as being comparable to our mixed mesophytic forests. That's the Valdivian forest of the Lake Region in Chile. The setting is similar to our Pacific Northwest. The Lake District starts at a latitude equivalent to Washington State. Vancouver Island has its southern hemisphere equivalent in Chiloe Island. From there on it's a land of fjords and rainforest-clothed mountains plunging into the Pacific. This is the domain of the southern beech (*Nothofagus*) which, as far as I can tell, bears no close resemblance to beech or any other northern temperate deciduous tree. Here's my impression on seeing this fabled forest, along with my dismay at seeing so much of that forest being converted to commercial stands of northern hemisphere conifers.

December 6, 1997

Arrive in Santiago in late morning; blistering hot, cloudless day with hazy images of Andean snowfields in the high mountains to the east. The plane coasts downwards with awesome ranges of rock and snow of the high Andes to the left and the green and brown mottled ridges of rugged lower mountains to the right. The sharp ridges right around Santiago look like the mountains around Los Angeles, except that the chaparral scrub is nowhere really continuous as it often is in California. On the flat valley floor, the vegetation is a grassy, recently burned savannah marked by the low and widely-spaced mounds of thorn trees (*Acacia caven*). Much of the land is irrigated cropland surrounding the urban sprawl of the great city. In the city itself, the street plantings are dominated by two imported species: sweetgum and planetree maple. Other less frequent but common plantings include tuliptree, sycamore, poplar, ash, elm, linden, and jacaranda. Except for the first and last, all of these seem to be the European and not North American species. The one urban bird in addition to the ubiquitous English sparrows and pigeons is the zorzal, a drab brown version of the North American robin.

December 7, 1997

Fly to Temuco under clear skies with only a few low, puffy clouds over green hills near the Temuco airport, and convective clouds building during the day. The flight follows the coastal plain—a flat patchwork of fields and islands of rugged and rocky mountains. Rivers are braided and colored a bright purple-red with sediment load. Rugged little insular ranges rise out of the pediment plain with knife-edge ridges and pockets of taller scrub and even forest on some of the steep south-facing slopes. The land changes rather abruptly from shades of brown and tan to a vibrant emerald green within about 100 km of Temuco. This is consistent with the maps in the literature which show the southern limit of central valley Mediterranean climate at about this position. Lots of timber cutting activities in the form of geometric clear-cuts stand out on the hillside. There is also an abrupt contact between patches of dark green (planted conifers), gray green (evergreen coigue), and lighter green (deciduous roble) on the forested hillsides. The latter two are the most common native *Nothofagus* species. While landing, notice the black and white wings of a medium sized bird (southern lapwings) and small flocks of a medium sized brown hawk (tiauque). Surmise these must be pretty common birds—and we find they are.

After checking in at the hotel, start out walking into the small Cerro Nielol National Park on the hill behind the hotel. In the distance to the east, the geometrically perfect snow-covered cone of Llaima stands out against the blue sky. The trees immediately behind the park entrance are planted English oaks and Monterey cypresses. But beyond that, there is a footpath up the hill through magnificent old-growth forest with a dense understory of shrubs and bamboo. The biggest trees are great evergreen coigues (*Nothofagus dombeyi*), with their layered crowns of small leaves. The upper branches have shaggy loads of epiphytes, including various mosses, basket-ball sized clumps of grass-like bromeliad, and little fuzzy-leafed vines. The latter are producing bright and very attractive orange bulb-like flowers (medallita). Beneath the huge coigues there are two other big trees: a smooth-barked tree with fleshy, opposite leaves with serrated edges (tapa; *Laurelia philippiana*); and a tree with thick, oval shaped leaves some of which have fallen bright red and orange onto the ground beneath (lingue; *Persea lingue*). Not many ferns but lots of thick moss in the shade. Areas where windthrow or landslide have produced openings are filled with a dense jungle of bamboo. In addition to the medallita flowers on the trees, there is a purple-pink violet (*Viola portalesia*) growing

from stems with narrow leaves and a form that is more like a vine than anything else.

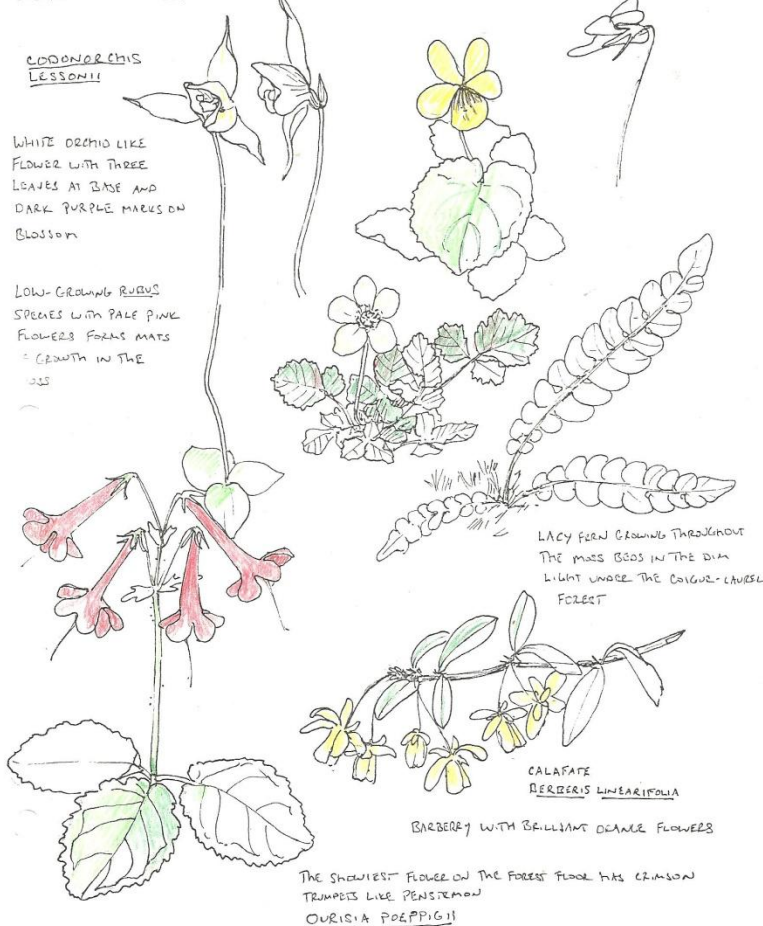
Towards the top of the ridge, the forest changes character. The bamboo thickets thin out, and the overstory coigues are replaced by somewhat smaller deciduous robles (*Nothofagus obliqua*). The scaly bark and larger leaves with their irregular edges give these trees an oak like appearance. In a small opening among the robles we find a little deep blue iris embedded in the grass. Another plant has a rosette of oval green leaves and a stem with multiple yellow "slippers." An elevated platform outside the restaurant at the top of the hill offers a good view of the shaggy canopies of the coigues on the hillside below. Except for that little bit of civilization, this is a good introduction to the temperate rain forest, but far too small for my interest.

December 8, 1997

Drive from Temuco to Villarica on another clear day with the volcanoes visible in the distance. Leave Temuco in mid-morning and drive across a country of fields and small woodlots towards Lake Villarica. The trees are almost exclusively robles—where not planted to Monterey pine or eucalyptus. The individual robles in fields are like oaks in North America—big rounded crowns and cylindrical trunks of plated bark. See numerous tuiques and lapwings along the way. Also spot a kestrel perched on telephone wires, and a Chilean mockingbird flying between fence posts. Stop to look at a large ibis-like bird—dull brown on the ground, but flapping black and white wings in flight (bandiduti). Also stop for a small rail sneaking through the grass in the ditch by the road. Two introduced plants from Europe are virtually continuous along the roadside: wild rose, *Rosa muschata*; and blackberry, *Rubus ulmifolia*.

After checking in at the hosteria and admiring the perfect snow cone of Volcan Villarica with its thin plume of white smoke, start a fishing float trip down the Rio Tolten, the outlet to Lago Villarica. Maps of the Wisconsin maximum ice cap in the Andes show that the ice cap was continuous well north of

DETAILS FROM THE OLD-GROWTH COIGUE FOREST
NEAR THE START OF THE LAGO VERDE TRAIL IN
HUIRACHUE NATIONAL PARK.
ALL ABOUT ACTUAL SIZE.



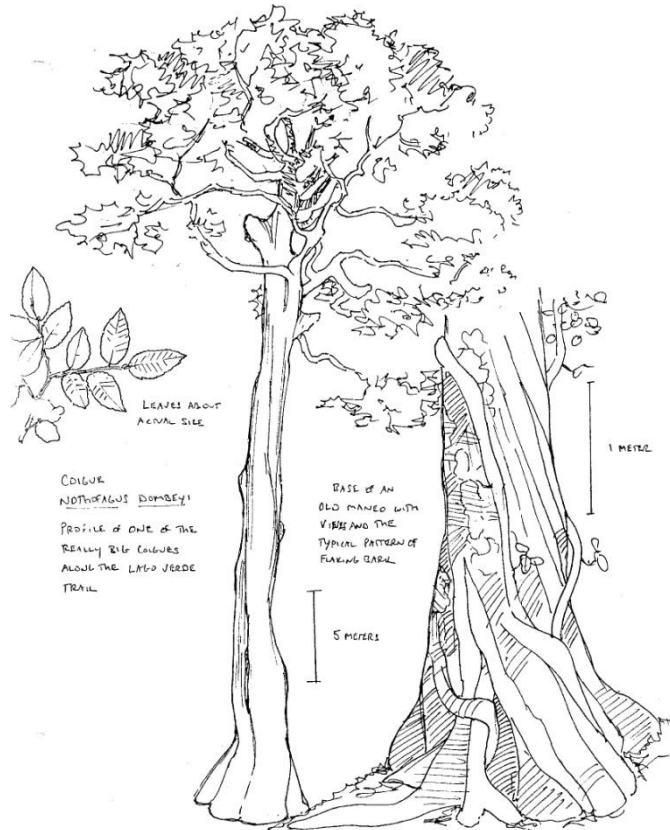
Valdivia, and that the big lakes like Villarica and Calafquen were formed by the terminal moraines of the ice tongues pushing out from the Andean ice sheet. The deep blue waters of the river flow through a trench worn in the bouldery till of the glacial moraines. The forest on either side of the river is obviously greatly disturbed with lots of pine and cypress, but most of this is hidden by the steep walls. When the valley opens up, the surroundings are pastures dotted with robles of various sizes. The one tree common along the edge of the river is boldo (*Peumus boldo*), with rounded leathery leaves like California coast live oak, shaggy bark peeling in long thin strips, and festooned with vines and epiphytes. The blazing orange of the medallita is much in evidence. Another prominent flower grows from clumps of iris-like leaves and has stems lined with three-petaled white flowers. The general plan

of each flower is like that of a flattened iris, but the appearance is most orchid-like.

The most dramatic aspect of the float trip—besides the great white cone of Villarica looming on the east—is the series of steep cut-banks in glacial sediments. These nearly vertical walls are made of layers of sand, gravel and cobbles, sometimes with water cascading out of the more permeable layers. The characteristic plant of these cliffs is the Chilean "rhubarb" with its giant leaves (*Gunnera manicata*). In the wetter cuts there are thickets of wild fuschia covered with red and purple flowers, and cascades of a yellow flower that looks identical to the familiar yellow monkey flower (*Mimulus* spp.) of Montana.

Birds along the way include Chilean swallows, a kingfisher, and a black-headed gull reminding me of Franklin's gull. The swallows are attractive, chickadee-like birds with black caps and white rumps. We also spot an ouzel-like brown bird with white facial stripes hopping from rock to rock below the wet gravel cliffs. The fishing is pretty simple—we troll a weight and a hook baited with a crawfish-like crustacean collected from rocks along the river. Roberto, our boatero, stops periodically to pick up fresh specimens. He is also getting

impatient with our interest in the scenery, constantly having to remind us to get back to fishing. The fish are all rainbow trout of about a pound in size, with the small heads characteristic of fast-growing fish. The flesh turns out to be deep orange-pink, characteristic of a very rich diet. The small gulls and a tiuque compete for the fish-heads we leave behind in the shallows.



December 9, 1997

Crystal clear day with only a few fair-weather clouds late in the afternoon. Drive east along the south side of Lake Villarica through Pucon and on up towards Lake Caburgua. The mountains on either side close in as a series of sharply serrated ridges with impossibly steep slopes and a fringe of trees on the crest. Some of these bear the unmistakable umbrella shape of the araucaria! Swift rivers full of standing waves and lined with the vivid yellow of introduced scotch broom pass by. The countryside gets a lot more interesting when we take a gravel road off of the main highway and start upwards towards the ridges. This steep country is a mosaic of pasture and woodland with robles dotting the fields and fences made from the upturned roots of robles cleared from the land. Stop to watch a golf-ball sized, fuzzy, orange-brown bumblebee work its way through the flowers on a fuschia. The surrounding ridges show great patches of standing and fallen dead timber. These are the bleaching trunks of giant trees killed by the great fires which roared through this area from coast to Andean crest about 1929. The old burn has the same patch-wise character of burns we see here in the mountains; the starkly white skeletons of long dead trees add the usual interest to what would otherwise be a monotonously continuous forest canopy. Another

interesting sight is the multi-colored and contorted layering of the soil exposed in the steep cuts on the uphill side of the road. These are layers of volcanic ash that range from dark brown to light pink, with various shades of red, purple, and orange in between.

The road winds around a steep ridge and down into the tight valley below Lago Tinquilco. The agricultural activity in this valley involves various shades of land clearing from completely open pasture, to partially cleared areas, to former burns maintained open by grazing. Fences are made by piling old dead wood in rows, and more formally by making palisades of old logs. When the road descends towards the lake outlet, massive old coigües appear with their characteristic layered and contorted crowns. Among these are smaller trees with large oval leaves and clusters of slightly fragrant white flowers. This is canelo (*Drimys winteri*). The brilliant orange-red flowers of a small tree of about the same stature as our eastern shadbush (notro, *Embothrium coccineum*) are abundant along the road throughout this stretch. These flowers have a very peculiar structure: the bulbous tips of long tubular buds swell into three bulges, split, and twist around themselves with the stamens embedded in the cupped ends of the twisted petals. These petals then fall away, leaving a simple long tube. All of these forms of the flower, including bud, full flower, and core after the petals are shed, have the same brilliant color, and form part of the vibrant mass of bloom seen from a distance. A Chilean flicker loops across the road just above the river crossing. At the guard station we get spectacular views of the mirror-like surface of the lake and the densely forested mountains beyond. A small olive fly-catcher like bird, probably a fio-fio, darts across the road and into the shrubbery.

After paying the entrance fee, drive the 4WD truck very slowly over an incredibly rough road through goat pasture with "perro manuso" (mean dog) signs prominently posted. The actual trail head is just across a rugged stream ford at the other end of the lake. The hike begins in a wonderful forest dominated by gigantic coigües. These trees are all as much as 1.5 m in diameter even above the basal swell, and are free of branches for at least 20 m. Beneath the main canopy grow two other trees: tepa with its strongly fragrant foliage, and the conifer manio de hojas corta (*Saxegothea conspicua*). The understory is very open, with almost no bamboo and few shrubs or tall ferns. Instead, there is a luxurious growth of plush moss and tiny ferns, studded with wildflowers. Among these are a big, pansy-faced yellow violet; an orchid-like white flower on the end of a tall stem rising from a small whorl of three leaves; and a *Rubus*-like flower with red-green compound leaves and a delicate, pale pink flower. The first few giant coigües have relatively clean trunks with thin, finely checked gray bark. Deeper into the forest and closer to the cascading water, the coigües and other trees are covered with moss and epiphytes, and draped in various lianas.

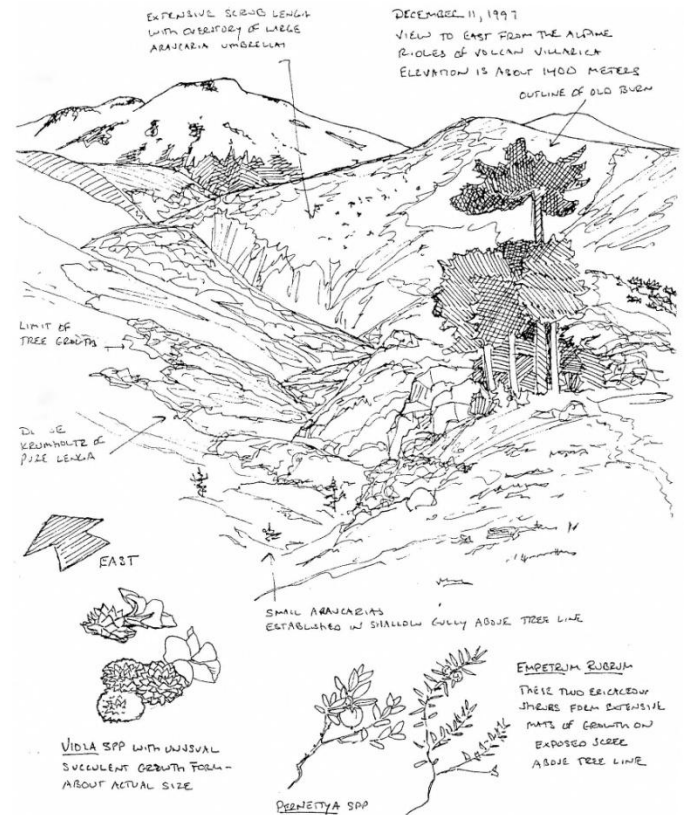
The trail passes by a spectacular waterfall among giant trees, and then switches back up through a copse of large laurels. Openings in the laurel on this steep west-facing slope frame views of the snow-capped summit of Volcan Villarica, and

allow places for dense patches of bamboo to develop. Along the way, there are more of the yellow violets and white orchids, plus a saxifrage-like plant with composite stems full of brilliant crimson red trumpets. The trail soon crests out in a deeply shaded valley where a dense forest of manio produces a barren understory. The striated and mottled bark of these conifers gives the forest an interesting and perhaps even sinister look. Iridescent lizards and beetles make attractive photographs in the small flecks of light that penetrate the forest canopy. Notice a number of tadpoles in a small trickle crossing the trail, so there must be frogs or toads here as well as the abundant lizards.

The dense forest abruptly ends at a fence line, and we head into an open grazed area full of shrubs and brush. Here the fuschia (chilco; *Fuchsia magellicana*) is abundant, but just barely breaking into bloom. Another odd shrub has elongated leaves and flowers in the form of golden yellow balls (Matico; *Buddleja globosa*). Arching branches lined with blue bell-like flowers belong to some member of the nightshade family (Natri de valdivia; *Solanum valdeviense*). Probably the most common shrub has opposite, sharply spined, holly-like leaves; this is chau-chau (*Desfontainia spinosa*). Another common shrub has broad maple-like leaves and the clusters of typical currant flowers (Parilla; *Ribes magellicum*). We climb up steeply past the new ranger station and back into dense coigue forest. Looking back there is a spectacular view of Volcan Villarica across ridges studded with old burns and giant coigues. The character of the forest changes, too, with the trees becoming somewhat stunted: the coigues are just as wide but not nearly as straight and tall. Manio and tepa are just about gone. Then a real change occurs: the canopy suddenly becomes a soft and vibrant green in contrast to the somber and dark green of the coigue. These new trees are lenga (*Nothofagus pumilo*). The lenga is a lovely tree, with medium brown scaly bark developed into irregular plates almost exactly like old-growth sugar maple. The new lenga leaves have just filled out and have that delightful new spring color. The raucous call of the little forest bird, the chacao, rings out in the understory, but we have been warned by the bird books not to expect to see him.

However, the best botanical treat is still in store. Just where the trail crests out into the basin holding the three lakes of Huerqueque, there is a giant araucaria (*Araucaria araucana*). Here is the great umbrella of long evergreen fronds suspended over a wide column of rough alligator plates. The forest is dotted with other such veteran araucarias, some with the perfectly symmetrical umbrella shape, and others with distorted crowns and side umbrellas of various shapes. The trail descends to cross the outlet from Lago Chico, surrounded by a forest that is mostly lenga and araucaria, with a waist-high understory of evergreen shrubs and stunted bamboo. The dominant shrubs are the chau-chau and a small leaved ericaceous shrub full of little white urn-shaped flowers (Chauce, *Gaultheria phillyreifolia*). This green mass is punctuated by local displays of yellow orange flowers on barberry shrubs (Michay, *Barberis linearis*). The young araucarias in the understory are of interest—some with symmetrical candelabra forms with whorls of 5 branches, and

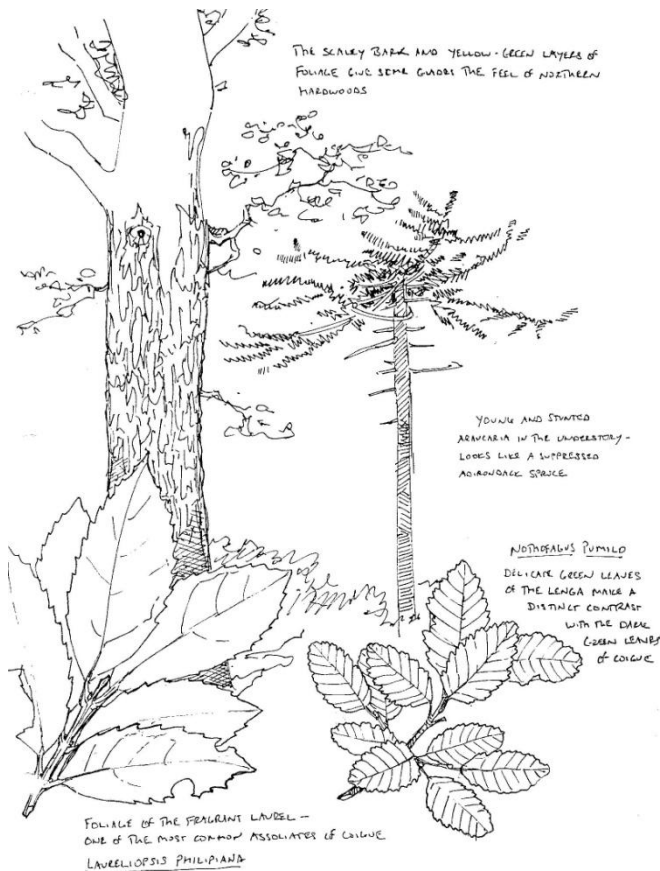
others with distorted and flattened crowns developed in response to competition and suppression—and with an uncanny resemblance to stunted red spruce one sees in the understory of northern hardwood forest. Except that the branchlets are about 5 times larger in diameter. Another peculiar aspect is the way that long decayed araucaria logs lay on the ground: the evenly spaced knots where branches join the upper trunk persist as whitened knobs that look like vertebrae on a partly-exposed dinosaur skeleton.



The rest of the walk takes us up and down steep slopes and around numerous windthrows through this lush and bizarre forest. The lengas are just gorgeous, and really do remind me of old-growth sugar maple in the texture of the bark, the twisted sinews of the trunks, the branching pattern, and the delicious spring greenery of the new leaves. Individual araucarias of various sizes are mixed in, and stand out in open groves on steep rocky ridges—especially on the slopes across from us at Lago Toro. We find a dead fio-fio lying on the trail along the way; there is an odd feeling of satisfaction at making such a positive identification when the dense brush makes the birding so frustrating. Stop to examine the shattered hulk of a great araucaria which has been brought down right across the trail by the winter storms. The base of the tree has twisted and shattered, revealing slabs of light blond wood and beetle chambers which help explain why this tree came down. A cross-section of one of these slabs shows 28 relatively evenly spaced growth rings in 32.5 mm of radial increase, indicating an average radial growth of about 1.15 mm per year. So an araucaria more than a meter in diameter is probably about 500 years old.

December 10, 1997

Layers of cloud and fog in the morning, slowly clearing out throughout the day. Spend the day walking around Villarica and getting to know the neighborhood. Enjoy the sounds of the Chilean mocking bird and house wrens at the Hosteria. Identify a robin-sized bird with thick bill, gray back and rosy red breast as a *rara*. More antics of the surprisingly tame and gregarious *tijuque*; their behavior just seems too undignified for serious raptors. Observe a pair of large diving waterfowl on the lake itself; these are great grebes—the male has a distinctive crest and a reddish neck for positive identification.



December 11, 1997

Low fog early burns off for yet another clear day with billowing thunderheads over the Andean crest to the east in the late afternoon. We head out early on a route behind (east side) of Volcan Villarica to view the forest there. Start up through pasture and roble woodland into the canyon of a small river draining this side of the mountain. As soon as the road starts to climb we are enveloped by diverse forest of coigue, laurel, olivillo (*Aextoxicon punctatum*), and other trees. Avellano (*Gevuinal avellana*) is present as a subcanopy tree. The intricate composite leaves and fuzzy flower clusters of *tineo* (*Weinmannia trichosperma*) are visible where their crowns protrude from the canopy, but this forest giant does not appear to be so abundant or gigantic as the textbooks lead one to believe. Perhaps this is because there is so little virgin Valdivian forest left at lower elevations. Brilliantly blazing *notros* appear along the road side. We also meet yet another

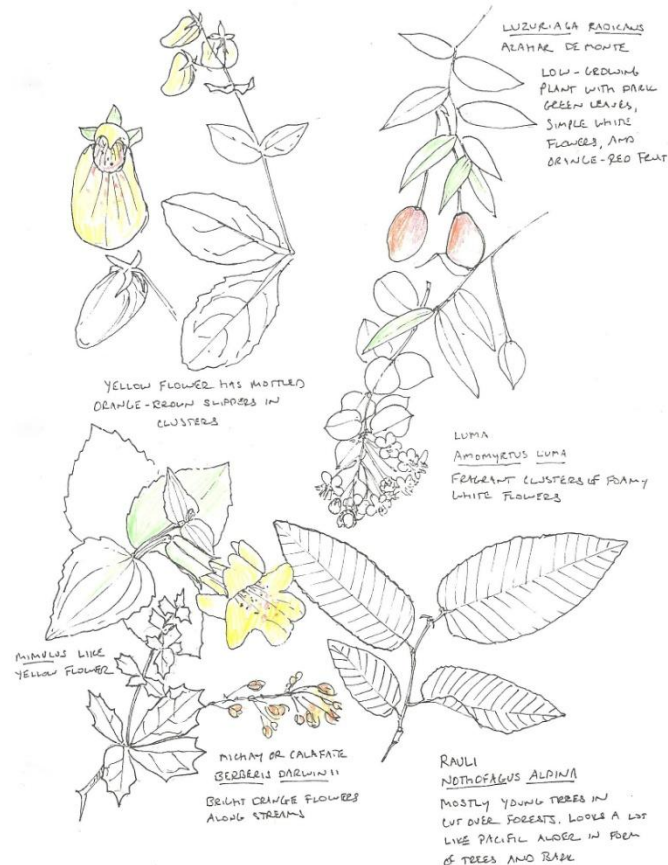
new tree: *rauli* (*Nothofagus alpina*). This tree has relatively large, regularly toothed and veined leaves, and a growth form that reminds me of Pacific coast white alder.

We stop at a series of five different waterfalls. The first is not all that high, but makes up for that in sheer volume of water and violence of the cascades. The next two are smaller, and are developed for tourism. Both have massive thickets of *fuschia* around the falls, and wet seepage of walls draped with wild flowers. Both also have great log jams of driftwood lodged below the falls, representing the debris washed down by violent winter storms. One has especially massive laurels growing in the misty woods around the base of the falls. The last waterfall is perhaps the best. A small flow plunges over one shorter fall, and then another which disappears into the misty valley below. This place seems the least visited of all, and the wildest we have been to yet.

After lunch, we head back and up over the road to Villarica National Park. The road starts out again in roble forest, and seems to go much higher than along the other routes we have taken, where the forest was dominated by coigue; perhaps this is related to our route further away from mesic stream bottoms. Old dead wood from previous land clearing or from the old burns is almost everywhere, and this disturbed forest is punctuated by little openings for pasture or with introduced trees. But we do eventually re-enter dense coigue and *rauli* forest, where *araucaria* becomes an occasional part of the mixture. This is distinctly different from Huerqueque where we first encountered massive old *araucarias*; in contrast we see lots of young *araucaria* "saplings" mixed in with dense stands of young hardwoods. At the same time, laurel and manio seem to be virtually absent. Overall, this area represents a distinctly drier aspect, and one with a vigorously regenerating forest rather than old growth. To complicate the picture further, there is a stunted stand of trees in one place about 950 m in elevation that turns out to be *nirre* (*Nothofagus antartica*). These trees are all only a few meters tall, and have crooked stems with bark hanging loose in long strings like hophornbeam.

The road leaves the small stream and cuts up a steep and densely forested slope after the park boundary to the crest of a broad ridge at about 1300 m. Here the forest is dominated by *araucaria* and *lenga* with an open understory and a low layer of *ericaceous* shrubs. We park and walk up the ridge through picturesquely gnarled old *lengas* and great umbrellas of *araucaria*. The latter have round female cones perched on the tops of branches in a few trees, and we can even find viable *araucaria* seeds on the ground with new tap roots just emerging from the base. A pair of white throated tree runners scamper up and down the tree trunks. The wonderful forest continues upwards first as an open *araucaria* forest with a few *lenga*, and then as a stunted *lenga* forest where the trees have weirdly twisted trunks, and many are too young to have anything but smooth, cherry-like bark. This eventually dwindles to a true *krummholz* with *araucarias* restricted to little rocky hummocks.

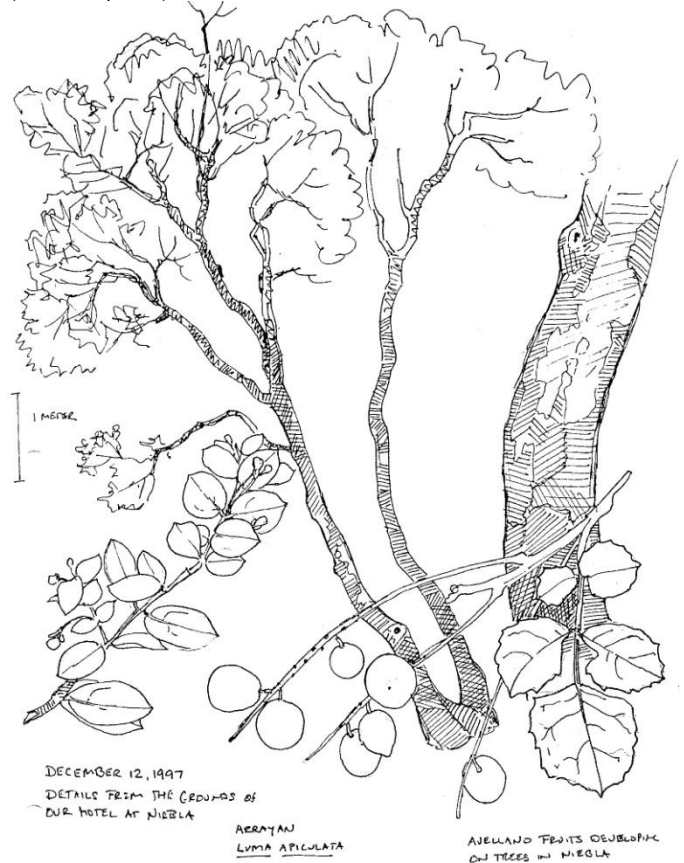
We pop out above the trees at about 1500 m. The trail leaves the forest on a knob crowned with araucarias, but the view back is mostly over a pure stunted forest of lenga. There are a number of small but healthy looking araucaria saplings scattered among the mats of low shrubs and clumps of sparse grass just beyond tree line. The tundra is dominated by a low ericaceous shrub with leathery oval leaves, and berries that range from pure white to light purple. But it is also surprising to find the familiar crowberry of high arctic tundra growing in the opposite hemisphere (*Empetrum rubrum*, with tiny berries just appearing). The wildflowers here consist of bright orange-yellow plant looking much like stonecrop, and a truly bizarre form of violet. This plant grows in little fleshy, cactus-like rosettes from which spring perfect pale-pink violet blooms. The best discovery of all is a large bird circling high above. The white neck ruffle, white wing patches, and wingtip "fingers" confirm that this really is an Andean condor!



There is just enough time to continue up to the first snow patches. Our path follows the ridge between two streams heading off in different directions. The brook to our right is crystal clear and lined with green plants. The one to our left is muddy and flows between unstable banks without a speck of vegetation. The clear stream is framed by vibrantly green terraces of grass and moss. A dwarf version of the flower we saw at Huerquehue with the bright red trumpets grows right in little trickles of water seeping out of the streambanks. As great crenulated thunderheads begin to pop up over the mountains to the east, it is time to return down off the slopes and head back to the hosteria.

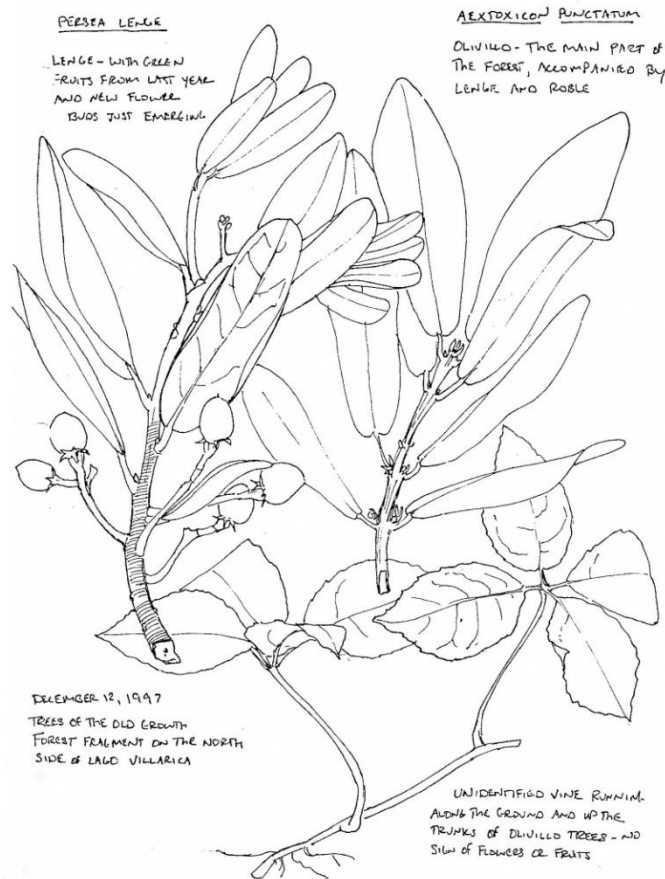
December 12, 1997

A dense cloud deck moves in for a while with a few light showers, and then moves out towards the end of the day. The plan for the day is to visit the area of "selva virgen" over on the north side of Lago Villarica, with stops along country roads for birding as opportunities arise. The first stop is an extensive marsh complex with coots, mallard ducks, the usual swarm of swallows, and two new birds: spectacled and patagonian tyrants. In the process, we flush a small rail (black crane) from the ditch by the road, and then a small, creamy-brown quail-like bird (seedsnipe) parades across in front of the truck. See numbers of yellow finches and zorzals in the pastureland and woodlots along the way. Much of the countryside is planted to Monterey pine, locally called simply "pino", or Douglas-fir, known as "pino de Oregon." These industrial woodlots are being harvested and replanted on the steep hillsides. The tall and colorful flower spikes (white and pink) of introduced foxglove are plentiful in the replanted woodlots. Even see a few woodlots that have been planted to chestnut (*Castanea sativa*), presumably because of the high values placed on chestnut wood by the flourishing local furniture industry. Just before we reach our destination, a gray, coyote-like animal with prominent white tip to a bushy tail darts across the road and dives into the brush. This is probably el zorro grande (*Canis culpaeus*).



The virgin lowland rain forest we plan to visit lies beyond a typical patch of pasture and across a wild stream—where the owner recounts the many times when the footbridge we use has been washed away. The path leads cross the bridge and onto a sort of delta created by the little river. This forest is

dominated by huge olivillo (*Aextoxicon punctatum*) trees with moss-covered columnar trunks that extend up a good 30 m without branching. Even when discounting the cloudy day, the light in the understory of the forest is extremely dim. The only undergrowth of note is a vine almost identical to Virginia creeper in habit, except that the compound leaves consist of four rather than five leaflets. Amid the olivillo stand is a single roble of absolutely gigantic proportions: well over a meter in diameter and perfectly cylindrical, and extending upwards without a single branch into the high canopy. Above us, a dense and shaggy canopy extends into the mists, and makes one wish there were hours to explore those slopes, while recognizing how tough that would be without a road or trail. We spend a few moments along the lake shore, where there are some lovely twisted and epiphyte laden boldos hanging over the water. On the way back to the truck, watch a noisy flock of six or so cachanas (wild parrots) feeding in the tops of robles.



Late in the day take another walk along the banks of a small tributary of the Rio Tolten that joins a few kilometers south of the lake. The river flows through well used pastureland interspersed with pine and fir plantations, but the river itself is furnished with a band of forest, coigues, robles, and other trees leaning out over the water. We meet two new trees here: the pelu-pelu (*Sophora microphylla*) with its intricately twisted seed pods, and the long-needled manio (*Podocarpus salignus*). We also see the greenbrier-like (but fortunately without thorns) vines of the copihue (*Lapagaria rosea*), but recognize that it is far

too early to see the big crimson flowers for which this plant is famous. The one bird we observe at length is the ouzel-like cinclodes. On the way back, we cut across fields and woodlots. The cut stumps of Douglas-firs culled from the planted forests show the expected large growth increments, but also that a number of stumps have callused over extensively. This must represent the presence of root grafts which keep these stumps alive even after the top has been completely removed. The trip back across fields is also accompanied by calling and harassment by circling lapwings. We can't find any nests, so conclude that the lapwings have staked out these pastures but haven't quite begun nesting yet.

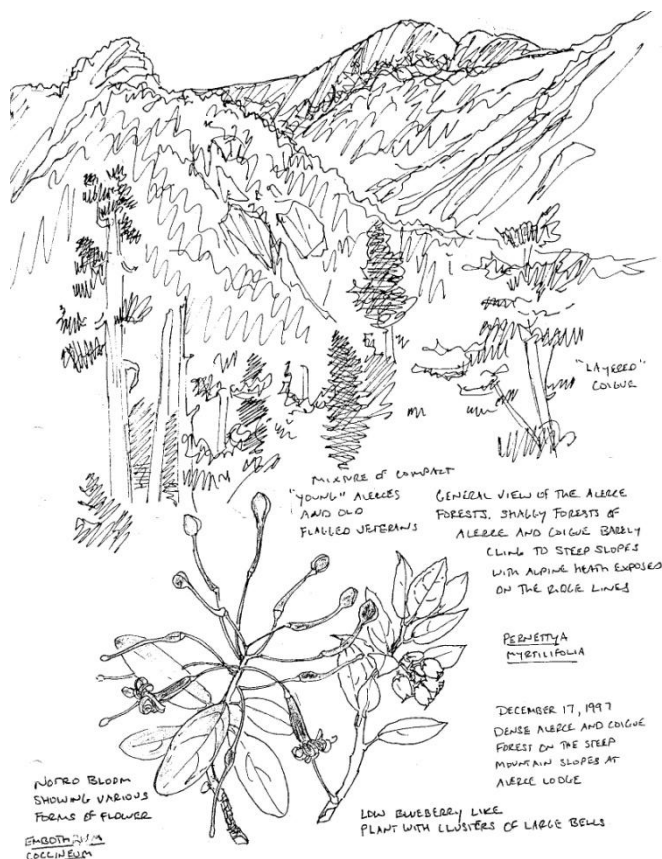
December 13, 1997

Early fog and low cloud lifts out in the late morning, followed by lots of sunshine, and thunderheads over the mountains to the east at sunset. This morning we head straight up the north-facing side of Volcan Villarica for a hike in the high-altitude forest and lava flows. The road up parallels recent lava flows until we reach remnants of pure old coigue forest, full of dead standing timber, and abruptly edged by open lava fields. Here we finally see the great magellanic woodpecker cruising through the trees with typical looping woodpecker flight—a black bird flashing prominent white wing patches, and providing the occasional glimpse of red head.

Our parking lot is furnished by a new development for a lava tube cave. We walk across fresh cinder and lava to cross a small but rugged gully carved into the fresh cinder, and up into the old growth coigue perched on the other side. At the edge of the forest there is a colorful display of yellow violets, resulting from the combination of sunny exposure and fertile volcanic soil. The trail continues up through massive but stunted coigues for less than a kilometer before the forest begins to contain mostly lenga. Everything is wet because of the mist overnight, and the dense stand of bamboo bending over the trail from either side. All the way we are accompanied by the calls of the two lenga forest birds: the chacau and the huet-huet. Perhaps a kilometer further, the bamboo thins, the last coigue disappears, and the understory becomes composed of a meter-tall layer of ericaceous shrubs. Here we stop, and Glen performs the miracle of calling in a chacao. He does this by tapping two sticks together, which is supposed to pique the curiosity of the little bird. We can hear the explosions of sound from each call coming closer—and then there he is! A little ball of olive-brown fluff with a small spot of red-brown on the breast. Seems absurd that such a little thing can be the source of such a big sound.

The forest continues to become more and more stunted by degrees until we are in a true krummholz. At the same time, the brush layer thickens, and the little bushes become heavily laden with purple-white berries. On some branches there seem to be more berries than leaves. Yellow-flowered barberry is also a prominent part of the shrubbery. One other shrub is puzzling at first—it has fleshy banana-like fruit. However, we soon notice this plant also has typical notro flower buds; we have climbed up and backwards in time to the point in the season when the notro has not shed the previous year's fruit,

and is just now beginning to bud for the spring. At this altitude, leaves are still just opening. Since the season is so young, the berries on the low shrubs must be left over from last year; if they are so sweet and edible as the literature suggests, how have they managed to survive the winter in such good shape? The stunted and twisted lenga trees are themselves things of grotesque beauty. They are no taller than we are, and are draped with long strands of old man's beard lichen. As we start back, the mists begin to lift in earnest, providing photographs of banks of cloud moving through the elfin forest, and across rugged volcanic crags on either side. Even so, the discovery is not over because we encounter a large, orange-brown tarantula crossing the trail about where we called in the chacao on the way up. The quality of the color is almost identical to that of the big Chilean bumble bee – pretty attractive for a big hairy spider!

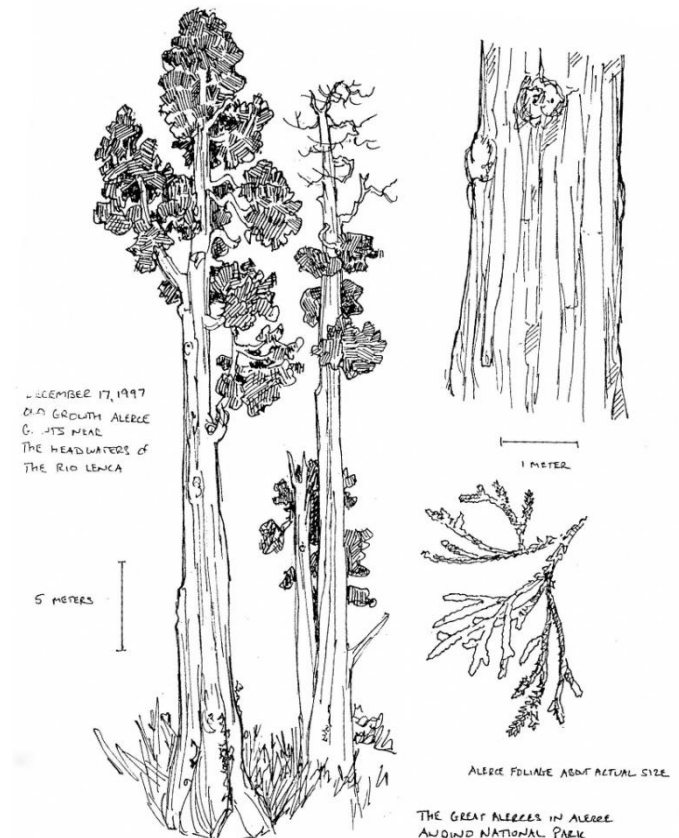


Late in the day we drive across the ridge south of Villarica to visit a peninsula in Lago Calafquen near the resort town of Lincan-Ray. On the way we see the meadowlark-like loica perched on a fence post. This bird has the size, shape and facial stripes of our meadowlark, but a day-glow red breast that is unmistakable. Except for that, this is a pretty disappointing trip. The peninsula park is heavily disturbed and full of introduced trees and shrubs. We do get a good view of the north side of Vulcan Villarica and the mountains beyond, and we do find one tree we haven't seen much of yet: ulmo (*Eucryphia cordifolia*). This tree seems to be relatively uncommon around Lake Villarica, but is supposed to become a

major lowland forest component south of 40 degrees in latitude.

December 14, 1997

Bus ride to Valdivia on a warm, clear day with many fair-weather cumulus clouds. Drive through the countryside, with a progression of small towns, planted woodlots, pasture, orchards, and raspberry plantations. Note patches of a gold-orange flower in the ditches, growing clusters at the top of stems like wood lilies. These seem so closely tied to roadside areas that I suspect they are introduced, but turn out to be a native flower (*Alustremeria aurantica*).

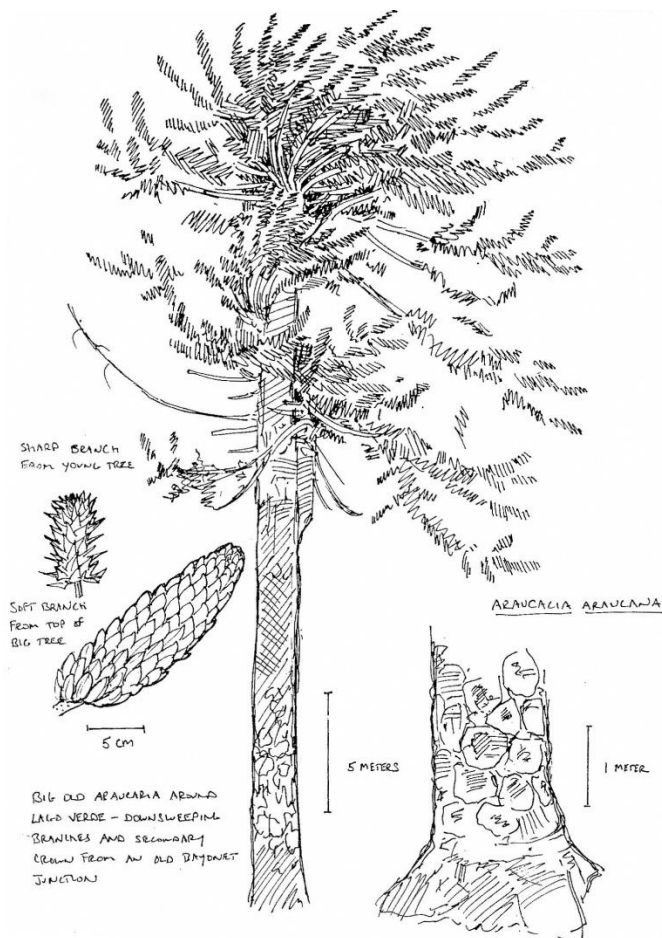


December 15, 1997

Crystal-clear and cool morning with a strong breeze from the east develops into a warm day with a thin layer of high cloud at sunset. Walk along the beaches and bluffs at Niebla, where the estuary connected to the rivers converging at Valdivia meets the open ocean. The vegetation here is greatly disturbed, with lots of pine and cypress, and the one prominent native shrub being arrayan (*Luma apiculata*). Get a close look at a pair of loicas on the lawn at the old fort, and observe that the female has a much duller breast and a prominent white neck patch. The overall aspect is very similar to the Pacific coast in middle California – augmented by the presence of such typical California conifers. The same steep bluffs of distorted low-grade metamorphic rocks, and the same mixture of headlands and narrow beaches. Formations of brown pelicans glide by, and a few sandpipers play in the surf. A number of great grebes are fishing just outside of the surf line. The surf is

terrific here, as indicated by the violence of the waves breaking right on the beach, and the coarseness of the sand. The breakers reach right up to the base of the cliffs, so that the beach is swept completely clear of debris twice daily. The rocks are festooned with a dark green seaweed and hosts of tiny mussels. Among these rocks we see the larger coastal cinclodes—darker and even tamer than their riverside cousins.

The one real interesting feature of the coast is the presence of pelagic birds feeding on shoals of fish. The position of the shoals can be identified by rafts of seabirds floating on the water. Above the rafts are flocks of strong-flying birds that seem to be some kind of petrel. They have dark brown or gray backs, light faces and necks, and short, rounded tails. The flocks of these birds—a dozen or more—fly rapidly and then hover for a time before diving in unison. This is not a reckless fling into the ocean as with the pelicans, but a powerful dive-bomb from considerable height. My best guess from the bird book based on size, range and general coloration is the mottled petrel. We also see a few south American terns fishing. One works close to shore, swooping and abruptly diving. When he finally makes a score, the dozens of brown-hooded gulls lazing around take note, and mob the one poor tern for his prize. He goes right back to fishing while those pesky gulls squabble over their booty.

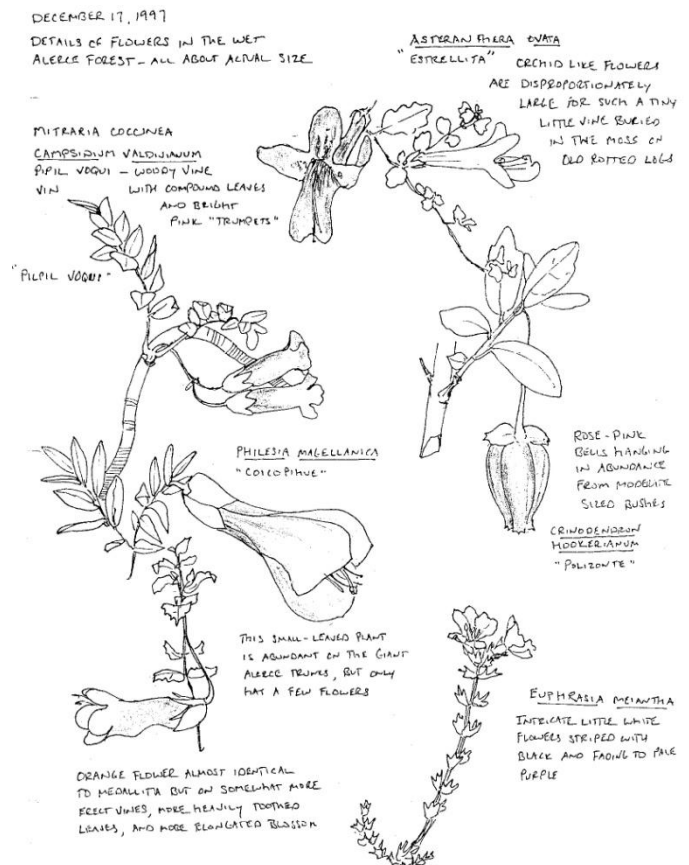


December 16, 1997

Bus back to Temuco and then flight to Puerto Montt on another hot summer day. More of the same cultivated fields and pastures. It becomes more and more evident what a widespread tree the introduced European chestnut has become.

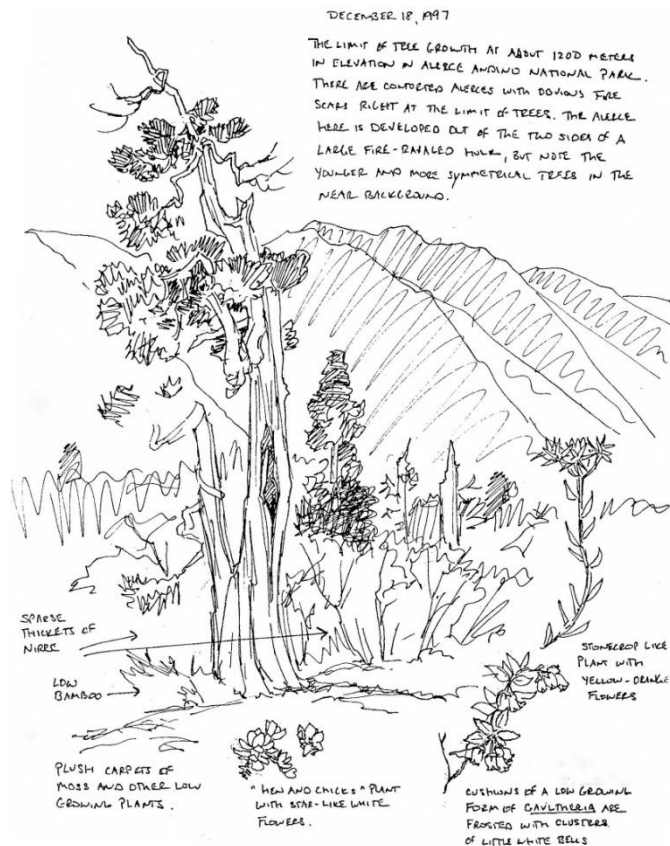
December 17, 1997

Journey up to Alerce Mountain Lodge on a misty morning with clouds wrapped around mountain summits, and clearing completely after sunset. The overcast burns off as we ride around the north end of the inlet to the town of Lenca. The tide is far out, and local inhabitants are gathering sea weed to be dried by the roadside and exported for use in cosmetics and pharmaceuticals. Even though the water appears to be shallow from the gentle slope of the exposed beach, a pair of porpoises are seen surfacing just a few yards offshore. There must be some sort of prey to bring them so far from the open ocean.



The side road up into the mountains out of Lenca runs for a kilometer or so through pasture and then enters an area of mostly scrub forest with lots of arrayan and other native shrubs. This disturbed forest only gradually increases in stature as we climb upwards over a rough logging road. But one difference is apparent—the massive loads of epiphytes suggest that the climate is much wetter here than further north in the Lake District. In addition, most of these epiphytes seem to be blooming. There is a close cousin to the medallita, and several climbing vines with showy red or pink flowers: (Estrellita, *Asteranthera ovata*; Coicophue, *Philesia magellanica*;

and Pipil voqui, *Campsidim valdivianum*). Most common of all is a shrub literally covered with big rose-pink bells (Polizonte, *Crindendron hookerianum*). Yet another interesting flower is a rather drab yellow aster with typical heart-shaped aster leaves—hardly worth noting except that these plants attain the stature of small trees. We cross a tributary of the Rio Lenca and climb a steep hill with deep till soils exposed on either side—suggesting that this is a moraine left by a pause or re-advance of glaciers which once extended all the way to sea level. Then we catch our first sight of a single huge alerce tree (*Fitzroya cupressoides*) left from logging. This tree has a great epiphyte covered base, and a profile suggesting an old-growth western redcedar rather than a giant sequoia. Soon we are among other alerces in a forest mixed with coigue, canelo, and laurel at an elevation of about 800 m.



In the afternoon we take a walk through the alerce forest without gaining much elevation in the valley. The alerces seem to have developed in swaths, with one area having many medium-aged trees, and an adjacent area being an old landslide covered by alerce “saplings.” These “young” trees are only three or so meters tall, but are probably hundreds of years old already. The coigue tree growing with these alerces seems to be the same old coigue we have seen elsewhere, and not the coigue de magellanes (*N. betuloides*) which is supposed to come into the high altitude forest at these latitudes. The few canelo trees are just beginning to produce flowers. All of the growth here has a stunted form, perhaps as a result of the shallow and infertile soils. Exposures along the road show about 10 cm of

peaty soil on top of an orange horizon of iron deposition, which in turn overlies a deep yellowish till zone. The combination of waterlogged conditions and lack of volcanic substrate probably account for the low fertility of the soil. Even the bamboo seems to be stunted here. We find a parasitic tree growing from footholds up on the side of bigger trees. It has a compound leaf with five petals and clusters of small green berries, later turning bright blue according to Adrianna Hoffman (*Pseudopanax laetevirens*). There is manio present here, but only as a small, stunted understory tree (the conifer, *Podocarpus nubigena*). There are lots of fio-fios and hummingbirds active in the forest, but we bag one definite new bird: the Patagonian sierra finch. These attractive birds with blue-gray hoods and wings and yellow back and breast are constantly singing from open perches.

December 18, 1997

Perfectly clear at dawn with clouds developing over the surrounding mountains during the day, and clearing again before sunset. The morning starts with a bang, as a magnitude 5.5 earthquake originates a few kilometers offshore from Chiloe Island. The quake feels like a large truck has just slammed into an adjacent loading dock—except that there is no truck or loading dock at this resort. This day we hike up the mountain north of the lodge for a possible view of the Patagonian Andes to the east and south. The steep slope up for the first 500 m of elevation gain soon leaves the laurel and canelo behind, while coigue becomes ever more abundant. Even so, alerce is always a part of the forest. Yellow violets are abundant, but practically the only wildflower of note. The sound of the chacao rings out in the coigue forest.

The trail finally reaches the crest of the ridge which is covered by a uniformly twisted stand of old, stunted coigues and a dense understory of bamboo. In places the ridge narrows and becomes rocky; in these places there are lots of small but ancient looking alerces. But the clouds begin to congeal and mists start to roll through the forest. In between clouds there are views of roads and villages along the Seno (Sound) de la Reloncavi far below. We reach the limit of trees where the ridge abuts against the main mountain mass. At tree line there are as many stunted and twisted alerces as there are coigues. But the mossy glades above the trees are full of low stands of nirre. These little trees look just like sparse scrub birch in the Alaskan arctic, and never seem to attain tree form. It is also interesting to note that lenga seems to be entirely absent from this region—coigue and alerce forest extends right up to the limit of tree growth, with a fringe of shrub nirre.

The region above tree line is a wet tundra full of deep moss patches and areas of low scrub. Small alerces even grow up here, too. The yellow stonecrop-like flower we saw on Volcan Villarica is here again. Among the moss carpets there is plant with many rosettes of pale, fleshy leaves with a small white flower. Although we don't have a good map, the top of this mountain can't be above 1300 m, so tree line is much lower here than it was at Huerquehue. On the way to the top the clouds close in completely, visibility is reduced to a few meters, and there is nothing to do but climb down below the

clouds. Spend the rest of the day wandering around among the alerce and associated trees marveling at the density of the moss and epiphyte loading on these magnificent trees. Notice the abundance of two plants overlooked earlier. One is a low shrub with blueberry-like leaves and profuse clusters on urn shaped flowers generally larger and showier than the *Gaultheria* so abundant at Huerquehue (probably *Pernettya myrtilloides*). The other is the luma (*Amomyrtus luma*), a small tree with foamy clusters of white flowers that fill the air with a heavy sweet fragrance.

December 19, 1997

Flight from a cloudy and misty Puerto Montt to a warm and clear Santiago. The ride down from the resort is uneventful, except for the sudden appearance of a jet black, ferret like animal on the roadside; assume this is some form of weasel. The misty skies at Puerto Montt clear to the north for views first of great isolated volcanoes and low mountains, and then the high Andes.

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The shortleaf pine-dominated forests of part of the Ouachita Mountains in central Arkansas include many hardwood species, including white oaks, red oaks, gums, hickories, and flowering dogwood (to name a few). Photography by Don C. Bragg.



LOBLOLLY PINES OF GUM SPRINGS RECREATION AREA, KISATCHIE NATIONAL FOREST, LOUISIANA: MARCH 2012

Don C. Bragg

Research Forester, USDA Forest Service, Southern Research Station, Monticello, Arkansas

The Kisatchie National Forest covers much of central Louisiana, and has large areas of longleaf, loblolly, and shortleaf pine, as well as extensive tracts of native hardwoods and baldcypress. A recent trip to some USDA Forest Service facilities near Winnfield had brought me a tantalizing glimpse of some large loblolly pines on stream terraces along Highway 84 just east of the Gum Springs Recreation Area. I finally had the opportunity to measure some of these trees in March of 2012.

The stand I examined appears to have been largely unmanaged in recent decades, although it is decidedly not ancient, and there have been trees harvested from this stand in the past (as the stumps I saw testified to). However, it has not been entered for logging in some time, as is apparent from the considerable

size of many of the trees. The stand is predominantly hardwood, with some cypress along the many small stream channels found along these terraces. However, many large loblolly pines dominate the overstory in this stand. This report will provide information only on pine (almost all loblolly, except for a single shortleaf pine).

This stand had been burned (with a prescribed fire) within the week prior to our visit—one large log still smoldered as we measured trees. Many of the other pines had scorched trunks, and old fire scars on many of the pines indicated that this stand had a history of burning. The understory (or lack thereof) made accessing the stand easy, and the absence of hardwood leaves permitted good viewing of the tops of the pines.

Examples of some of the large loblolly pine found in this stand near Gum Springs Recreation Area on the Kisatchie National Forest. Photograph by Don C. Bragg.



All tree heights were measured using TruPulse 200LR laser rangefinders, and diameters were measured with steel tapes. Although a number of good-sized hardwoods and cypress were present, we only measured pine (they are to be included in a separate research project). While not exceptionally tall, many of these second-growth pine had substantial girths and large crowns (Table 1).

Table 1. Pine dimensions from terrace site near Gum Springs Recreation Area, Kistachie National Forest, Louisiana.

Species	DBH (inches)	Circumference (feet)	Height (feet)
Loblolly pine	33.2	8.7	105.0
Loblolly pine	28.6	7.5	117.0
Loblolly pine	35.3	9.2	127.5
Loblolly pine	34.7	9.1	108.5
Loblolly pine	33.7	8.8	124.5
Loblolly pine	27.8	7.3	129.0
Loblolly pine	27.8	7.3	115.5
Loblolly pine	25.5	6.7	120.5
Loblolly pine	41.4	10.8	133.5
Shortleaf pine	29.8	7.8	118.5
Loblolly pine	31.0	8.1	122.5
Loblolly pine	34.8	9.1	111.0
Loblolly pine	31.1	8.1	112.0
Loblolly pine	28.2	7.4	124.5
Loblolly pine	32.4	8.5	119.5
Loblolly pine	28.0	7.3	119.0
Loblolly pine	35.3	9.2	108.0
Loblolly pine	35.6	9.3	115.0
Loblolly pine	33.8	8.8	119.5
Loblolly pine	37.7	9.9	109.0
Loblolly pine	34.3	9.0	121.0
Loblolly pine	31.6	8.3	128.0
Loblolly pine	39.3	10.3	116.0

The shortleaf pine was the only one we found on the terrace, not surprising given the tendency for this site to periodically flood (there is a lot more shortleaf on the higher slopes adjacent to this site). The biggest loblolly pine we measured had a DBH of 41.4 inches and a height of 133.5 ft. Judging from its bark, bole form, and crown, I believe this specimen is probably one of the older pines at this site, but it is not likely more than 125-150 years old. Most of the pines, based on my experiences elsewhere, are likely between 80 and 100 years old.

This stand of timber, although not ancient, is indicative of the productivity of these terrace sites for pine, and their ability to accumulate biomass is rarely surpassed in eastern North America.

This article is in the public domain.



A pair of loblolly pines showing charring by the recent prescribed fire. Photograph by Don C. Bragg.



A large, windthrown loblolly pine smolders from a prescribed fire set earlier in the week at this site near Gum Springs Recreation Area on the Kisatchie National Forest, Louisiana. Photograph by Don C. Bragg.

2012 Forest Summit and ENTS Rendezvous

Plans are underway for the next Forest Summit, hosted by Holyoke Community College in Holyoke, Massachusetts, and the fall ENTS Rendezvous, in mid-October. Please watch the Native Tree Society Bulletin Board and website for future updates and further details! Contact Bob Leverett or Gary Beluzo for more information.

IN A RAMBLING MOOD

Robert T. Leverett

Founder, Eastern Native Tree Society

Here's an old post by Bob from May of 2010...--The Editor

I'm in a rambling mood. For those who will indulge me, I hope that some of what follows makes sense. I often see myself as living in the space between other people's hierarchical structures—sometimes an awkward position when trying to make contributions as a concerned citizen or be a volunteer of some type within an existing organizational structure. In a sense, ENTS exists in an in-between world. We're not an official forestry organization, although we're forest-based. We're not an official tree organization, although we are tree-based. We're not in a hierarchy of scientific organizations, although we are science-based. We're not an academic institution, although we have distinguished academicians in ENTS. I could go on, but you get my drift. We exist in a between space.

These days, I think a lot about how we can make ever more useful contributions to a wider appreciation of forests and trees, but since we're not a recognized professional research or academic institution, it is not always clear how our efforts will be received within the stuffy hierarchies that exist. But where there is a will,

there is a way. A number of Ents either work directly for a government agency or an environmental group or volunteer their time. I fall in the latter category, and while things don't always happen on my schedule, when looking back I am satisfied that a lot has happened from my volunteer efforts. But what does this really have to do with ENTS? In many efforts, I would have been less effective, or even marginalized, had I not had support from fellow and lady Ents. You all were giving it, even if you were unaware of it. My influence was magnified manifold times by being able to invoke ENTS. So thinking along those lines, maybe ENTS serves us best in its capacity to empower each of us acting as individuals to achieve well beyond what we could accomplish without the ENTS umbrella.

I'm unsure how many members feel comfortable invoking the name of ENTS or would unhesitatingly call on ENTS to

help in some situation where we have expertise, but it is the right of every member to do so. That is a point that cannot be over-emphasized. The founders of ENTS have no monopoly on wearing the cloak of ENTS. It is an effective cloak to be worn, and I emphasize that, since it continues to net us very important projects.

As our accomplishments grow, the calls for us to incorporate as a nonprofit also grow. I understand and am sympathetic to the thinking, and I expect that incorporation

as a not-for-profit will come in time. Maybe it is inevitable. If it is I hope nothing is lost in the move. In our present form, we are free as birds. Our spirits soar. We pursue our passions without interference from the heavy hand of government breathing down our necks. We don't have to organize, incur debt, be liable, meet rigorous schedules, hire bean counters, or compete within a stifling bureaucracy or organizational hierarchy headed by individuals with large egos to feed. Without this conventional and societally promoted baggage, can we be effective? Yes, we can (and have)—up to a point. But we also can't effectively raise money, which limits how far some members can go in committing their time or

traveling at their own expense to distant locations. It is a dilemma. Financial constraints are a problem that makes it much more difficult for us to perform on big projects. If we want to take on bigger jobs, we're personally called on to make larger personal sacrifices. That is often not possible for key individuals.

However, every time I think that it is time to move toward incorporation, I shut my eyes and watch our precious freedoms winging away, our youthful innocence ending. I suppose it doesn't have to be that way as long as we don't allow ourselves to become entrapped in hierarchical thinking. Having spent years in that world, I know what I'm talking about. But remaining as free spirits from inside an organization that feels the pressure to increase its rules and procedures to function within the hierarchy is much easier said than done.



INSTRUCTIONS FOR CONTRIBUTORS

SCOPE OF MATERIAL

The *Bulletin of the Eastern Native Tree Society* accepts solicited and unsolicited submissions of many different types, from quasi-technical field reports to poetry, from peer-reviewed scientific papers to digital photographs of trees and forests. This diverse set of offerings also necessitates that (1) contributors specifically identify what type of submission they are providing; (2) all submissions should follow the standards and guidelines for publication in the *Bulletin*; and (3) the submission must be new and original material or be accompanied by all appropriate permissions by the copyright holder. All authors also agree to bear the responsibility of securing any required permissions, and further certify that they have not engaged in any type of plagiarism or illegal activity regarding the material they are submitting.

SUBMITTING A MANUSCRIPT

As indicated earlier, manuscripts must either be new and original works, or be accompanied by specific written permission of the copyright holder. This includes any figures, tables, text, photographs, or other materials included within a given manuscript, even if most of the material is new and original.

Send all materials and related correspondence to:

Don C. Bragg
Editor-in-Chief, *Bulletin of the ENTS*
USDA Forest Service-SRS
P.O. Box 3516 UAM
Monticello, AR 71656

Depending on the nature of the submission, the material may be delegated to an associate editor for further consideration. The Editor-in-Chief reserves the right to accept or reject any material, regardless of the reason. Submission of material is no guarantee of publication, but does imply the consent to do so.

All submissions must be made to the Editor-in-Chief in digital format. Manuscripts should be written in Word (*.doc), WordPerfect (*.wpd), rich-text format (*.rtf), or ASCII (*.txt) format.

Images can be submitted in any common format like *.jpg, *.bmp, *.tif, *.gif, or *.eps, but not PowerPoint (*.ppt). Images must be of sufficient resolution to be clear and not pixilated if somewhat reduced or enlarged. Make sure pictures are at least 300 dots per inch (dpi) resolution. Pictures can be color, grayscale, or black and white. Photographs or original line drawings must be accompanied by a credit line, and if copyrighted, must also be accompanied by a letter with express written permission to use the image. Likewise, graphs or tables duplicated from published materials must also have expressly written copyright holder permission.

PAPER CONTRIBUTIONS (ALL TYPES)

All manuscripts must follow editorial conventions and styling

when submitted. Given that the *Bulletin* is edited, assembled, and distributed by volunteers, the less work needed to get the final product delivered, the better the outcome. Therefore, papers egregiously differing from these formats may be returned for modification before they will be considered for publication.

Title Page

Each manuscript needs a separate title page with the title, author name(s), author affiliation(s), and corresponding author's postal address and e-mail address. Towards the bottom of the page, please include the type of submission (using the categories listed in the table of contents) and the date (including year).

Body of Manuscript

Use papers previously published in the *Bulletin of the Eastern Native Tree Society* as a guide to style formatting. The body of the manuscript will be on a new page. Do not use headers or footers for anything but the page number. Do not hyphenate text or use a multi-column format (this will be done in the final printing). Avoid using footnotes or endnotes in the text, and do not use text boxes. Rather, insert text-box material as a table.

All manuscript submissions should be double-spaced, left-justified, with one-inch margins, and with page and line numbers turned on. Page numbers should be centered on the bottom of each new page, and line numbers should be found in the left margin.

Paragraph Styles. Do not indent new paragraphs. Rather, insert a blank line and start the new paragraph. For feature articles (including peer-reviewed science papers), a brief abstract (100 to 200 words long) must be included at the top of the page. Section headings and subheadings can be used in any type of written submission, and do not have to follow any particular format, so long as they are relatively concise. The following example shows the standard design:

FIRST ORDER HEADING

Second Order Heading

Third Order Heading. The next sentence begins here, and any other levels should be folded into this format.

Science papers are an exception to this format, and must include sections entitled "Introduction," "Methods and Materials," "Results and Discussion," "Conclusions," "Literature Cited," and appendices (if needed) labeled alphabetically. See the ENTS website for a sample layout of a science paper.

Trip reports, descriptions of special big trees or forests, poetry, musings, or other non-technical materials can follow less rigid styling, but will be made by the production editor (if and when accepted for publication) to conform to conventions.

Table and figure formats. Tables can be difficult to insert into journals, so use either the table feature in your word processor, or use tab settings to align columns, but DO NOT use spaces. Each column should have a clear heading, and provide adequate spacing to clearly display information. Do not use extensive formatting within tables, as they will be modified to meet *Bulletin* standards and styles. All tables, figures, and appendices must be referenced in the text.

Numerical and measurement conventions. You can use either English (e.g., inches, feet, yards, acres, pounds) or metric units (e.g., centimeters, meters, kilometers, hectares, kilograms), so long as they are consistently applied throughout the paper. Dates should be provided in month day, year format (June 1, 2006). Abbreviations for units can and should be used under most circumstances.

For any report on sites, heights must be measured using the methodology developed by ENTS (typically the sine method). Tangent heights can be referenced, especially in terms of historical reports of big trees, but these cannot represent new information. Diameters or circumference should be measured at breast height (4.5 ft above the ground), unless some bole distortion (e.g., a burl, branch, fork, or buttress) interferes with measurement. If this is the case, conventional approaches should be used to ensure diameter is measured at a representative location.

Taxonomic conventions. Since common names are not necessarily universal, the use of scientific names is strongly encouraged, and may be required by the editor in some circumstances. For species with multiple common names, use the most specific and conventional reference. For instance, call *Acer saccharum* "sugar maple," not "hard maple" or "rock maple," unless a specific reason can be given (e.g., its use in historical context).

For science papers, scientific names MUST be provided at the first text reference, or a list of scientific names corresponding to the common names consistently used in the text can be provided in a table or appendix. For example, red pine (*Pinus resinosa*) is also known as Norway pine. Naming authorities can also be included, but are not required. Be consistent!

Abbreviations. Use standard abbreviations (with no periods) for units of measure throughout the manuscript. If there are questions about which abbreviation is most appropriate, the editor will determine the best one to use. Here are examples of standardized abbreviations:

inch = in	feet = ft
yard = yd	acre = ac
pound = lb	percent = %
centimeter = cm	meter = m
kilometer = km	hectare = ha
kilogram = kg	day = d

Commonly recognized federal agencies like the USDA (United States Department of Agriculture) can be abbreviated without definition, but spell out state names unless used in mailing

address form. Otherwise, spell out the noun first, then provide an abbreviation in parentheses. For example: The Levi Wilcoxon Demonstration Forest (LWDF) is an old-growth remnant in Ashley County, Arkansas.

Citation formats. Literature cited in the text must meet the following conventions: do not use footnotes or endnotes. When paraphrasing or referencing other works, use the standard name date protocol in parentheses. For example, if you cite this issue's Founder's Corner, it would be: "...and the ENTS founder welcomed new members (Leverett 2006)." If used specifically in a sentence, the style would be: "Leverett (2006) welcomed new members..." Finally, if there is a direct quotation, insert the page number into the citation: (Leverett 2006, p. 15) or Leverett (2006, p. 16-17). Longer quotations (those more than three lines long) should be set aside as a separate, double-indented paragraph. Papers by unknown authors should be cited as Anonymous (1950), unless attributable to a group (e.g., ENTS (2006)).

For citations with multiple authors, give both authors' names for two-author citations, and for citations with more than two, use "et al." after the first author's name. An example of a two-author citation would be "Kershner and Leverett (2004)," and an example of a three- (or more) author citation would be "Bragg et al. (2004)." Multiple citations of the same author and year should use letters to distinguish the exact citation: Leverett 2005a, Leverett 2005b, Leverett 2005c, Bragg et al. 2004a, Bragg et al. 2004b, etc.

Personal communication should be identified in the text, and dated as specifically as possible (not in the Literature Cited section). For example, "...the Great Smoky Mountains contain most of the tallest hardwoods in the United States (W. Blozan, personal communication, March 24, 2006)." Examples of personal communications can include statements directly quoted or paraphrased, e-mail content, or unpublished writings not generally available. Personal communications are not included in the Literature Cited section, but websites and unpublished but accessible manuscripts can be.

Literature Cited. The references used in your work must be included in a section titled "Literature Cited." All citations should be alphabetically organized by author and then sorted by date. The following examples illustrate the most common forms of citation expected in the *Bulletin*:

Journal:

- Anonymous. 1950. Crossett names giant pine to honor L.L. Morris. *Forest Echoes* 10(5):2-5.
- Bragg, D.C., M.G. Shelton, and B. Zeide. 2003. Impacts and management implications of ice storms on forests in the southern United States. *Forest Ecology and Management* 186:99-123.
- Bragg, D.C. 2004a. Composition, structure, and dynamics of a pine-hardwood old-growth remnant in southern Arkansas. *Journal of the Torrey Botanical Society* 131:320-336.

Proceedings:

Leverett, R. 1996. Definitions and history. Pages 3-17 in *Eastern old-growth forests: prospects for rediscovery and recovery*, M.B. Davis, editor. Island Press, Washington, DC.

Book:

Kershner, B. and R.T. Leverett. 2004. *The Sierra Club guide to the ancient forests of the Northeast*. University of California Press, Berkeley, CA. 276 p.

Website:

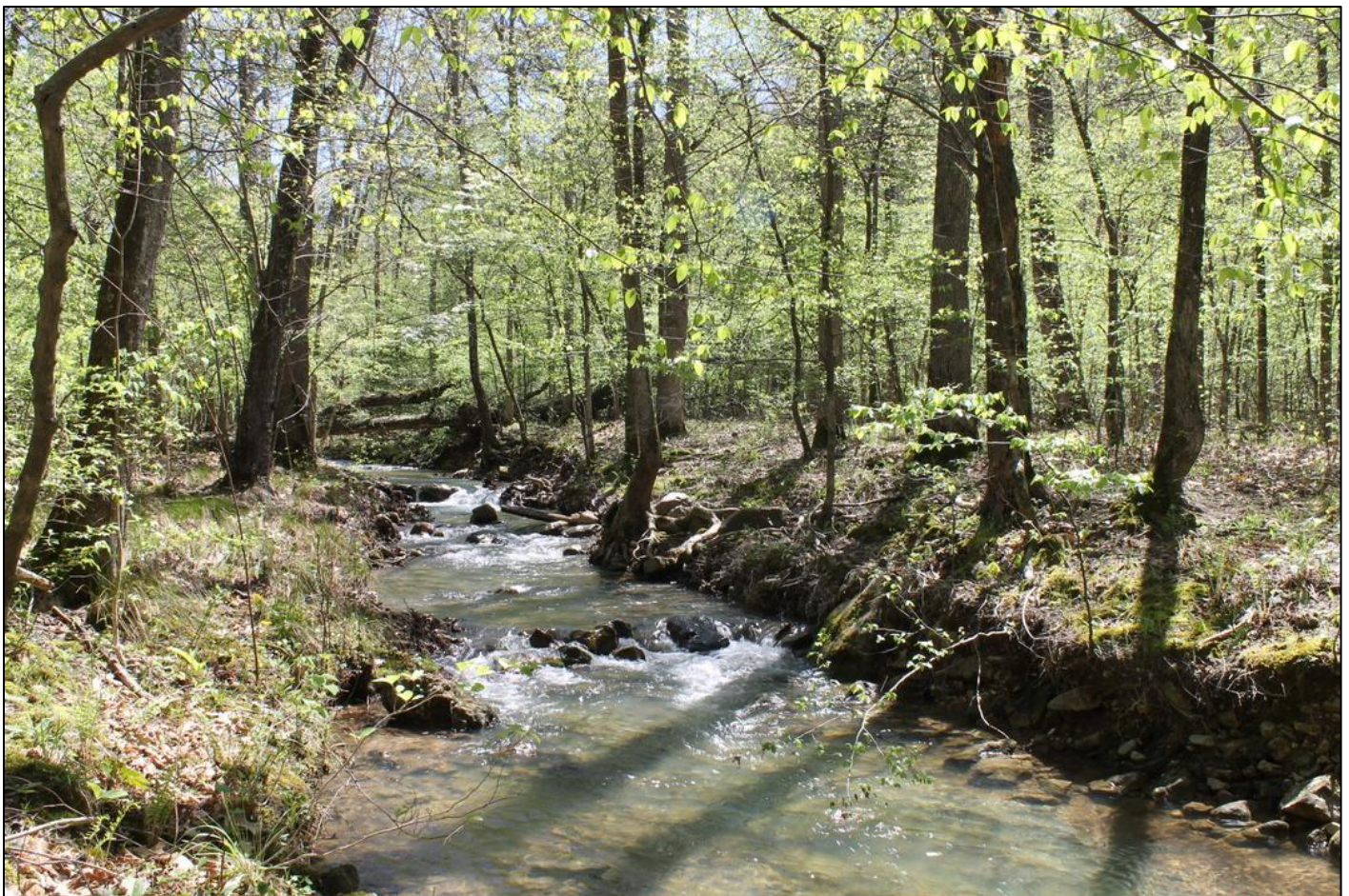
Blozan, W. 2002. *Clingman's Dome*, May 14, 2002. http://www.uark.edu/misc/ents/fieldtrips/gsmnp/clingmans_dome.htm. Accessed June 13, 2006.

Use the hanging indent feature of your word processor (with a 0.5-in indent). Do not abbreviate any journal titles, book names, or publishers. Use standard abbreviations for states, countries, or federal agencies (e.g., USDA, USDI).

ACCEPTED SUBMISSIONS

Those who have had their submission accepted for publication with the *Bulletin of the Eastern Native Tree Society* will be mailed separate instructions to finalize the publication of their work. For those that have submitted papers, revisions must be addressed to the satisfaction of the editor. The editor reserves the right to accept or reject any paper for any reason deemed appropriate.

Accepted materials will also need to be accompanied by an author contract granting first serial publication rights to the *Bulletin of the Eastern Native Tree Society* and the Eastern Native Tree Society. In addition, if the submission contains copyrighted material, express written permission from the copyright holder must be provided to the editor before publication can proceed. Any delays in receiving these materials (especially the author contract) will delay publication. Failure to resubmit accepted materials with any and all appropriate accompanying permissions and/or forms in a timely fashion may result in the submission being rejected.



Chasing away the chill of winter, a warm spring day along a creek in the Ouachita Mountains of central Arkansas witnesses abundant sunshine striking a soon-to-be shaded forest floor, allowing for spring ephemerals to blossom. Photo by Don C. Bragg.