

Trees of Stanford and Environs



Brachychiton acerifolius, Flame Tree

Trees of Stanford and Environs

Ronald N. Bracewell

with a foreword by Donald Kennedy

Stanford Historical Society · *Stanford, California*

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Stanford Historical Society
P.O. Box 20028
Stanford, CA 94309
650.725.3332
<http://histsoc.stanford.edu>

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Editor: Karen Bartholomew
Designer: Tony Gee
Tree maps: John Rawlings
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Agonis flexuosa, Willow Myrtle

Foreword

Visitors to the Stanford campus—and not infrequently those of us who live here—seek help in identifying some unusual tree or other, picked out from the extraordinary variety of native and exotic trees planted here. In most places, such an inquiry would quickly generate a referral to the Biology Department. Here, although we have some biologists who are pretty good on trees, the questioner is much more likely to be sent to the Terman Professor of Electrical Engineering, emeritus. Ron Bracewell knows them all, knows where they came from, and why they got planted here. He's just amazing.

This, the second edition of his comprehensive treatise on the trees of the campus, adds enormous value to an effort to make the natural history of Stanford's academic reserve more and more accessible. Ingeborg Ratner has produced a useful guide to the campus walks she and her faculty husband Leonard regularly take, with illustrations and references to plants and birds. The bird fauna is now the subject of a regularly updated Web site reachable through the Alumni Association's portal

<http://birds.stanford.edu>

This work makes the rest that much more valuable.

The extraordinary depth of Bracewell's treatment will surely raise a question for the reader: Why did an electrical engineer become such a fountainhead of arboreal information? The way he tells it, that started in a second-grade elementary school class in nature study, in the Sydney suburb in which he spent his boyhood. They went outdoors into the field, and soon young Bracewell was collecting caterpillars along with the leaves from the plants on which they were found. Once you start with insects, you have to start thinking about what they're eating—and that led naturally to a deepening familiarity with plants. That developing youthful curiosity eventually grew into something so relentless that, once at Stanford, Bracewell pursued the task of identifying every one of the campus trees—taking time from a distinguished career in a science that was as different from botany as it could possibly be.

If you know this campus, however, another connection between Stanford's trees and Bracewell's interest begins to emerge—accompanied by a wisp of nostalgia. For reasons having quite a lot to do with California his-

tory and plantation experiments, we have lots of eucalyptus trees—dozens of species. They are, of course, native to Australia, and Ron and Helen Bracewell naturally took a special interest in them—extending beyond identification to the planting of several kinds that had not already been established. Read the accounts of the campus eucalypts in this book and you will get the very special flavor of the volatile oils the different species produce, as well as the loving concern Ron has for each one.

Trees of Stanford and Environs is very much more than an identification guide. It is a remarkable storehouse of information on the systematics and general biology of the trees described. It is authoritative, thoughtful, and engaging—not only in its scientific quality but in the wonderful way it has captured so much of the associated history. You can find unexpected things here: the insect problems with the eucalyptus trees the Board of Trustees had planted across Galvez Street from the Stadium; the attempts in World War II to harvest cork from campus cork oaks; the 1891 memo from Senator Stanford to David Starr Jordan insisting on native oak names for the men’s and women’s dormitories. What we have here, in short, is a treasure-trove that invites exploration.

Donald Kennedy
President, Stanford University, 1980–1992

Preface

My main purpose in writing *Trees of Stanford and Environs* has been to supply locations where one can visit and become familiar with a particular tree, and then to tell something interesting about that tree.

Residents and visitors can enjoy and help preserve the heritage entrusted to us by gaining an intelligent understanding of Stanford's profusion of fascinating plant life. As students we can, in three or four years, get to know most of the trees, visiting many of them in their different seasons, and we can lay the basis for lifelong enjoyment of things that grow. A taste for the outdoor botanical environment leads inevitably to contact with campus birds, mammals, reptiles, insects, and other higher forms of life, and equips one to assess serious environmental concerns, both those of natural origin and those that people generate as they multiply.

Not many communities can boast a tree book, or tree collection, of their own. When we encounter such places—the California cities of Palo Alto and Santa Barbara, or the University of California campuses at Berkeley, Davis, Santa Cruz, and Los Angeles—we know we are dealing with a place of culture and tradition. A role model for tree books is *Trees in Canberra*, where you can look up any city street, identify its trees, and locate specific species. Imagine the value to residents developing new landscaping to be able to select plants that please them, on the basis of their own observations of the mature forms as they develop in the local microclimate.

Our predecessors planted the trees that we enjoy today, and some among us will be responsible for watching over and developing that inheritance. Leland Stanford (1824–1893) inspired a vision of a future in which trial could teach what trees and shrubs would grow here. He also gave the land. He passed us a torch that only those who have familiarized themselves with our trees will be able to carry.

My own interest in trees goes back to nature study in school when I was nine. Collecting caterpillars from trees, feeding them leaves, and watching them pupate or spin cocoons until great moths and butterflies emerged, focused my attention on the living environment. Horned caterpillars from the privets, cup-moth larvae with their stinging turrets from gum trees, silk worms from mulberries, and marvelous green grubs from the camphor trees

remain clear in my memory. The school is still there but urban encroachment has wiped out the earlier fauna.

Arriving at Stanford in 1955, I set about identifying the 50 or so species represented in Stanford's extensive eucalypt collection and found myself interacting with other enthusiasts, especially Graham Duncan (Saratoga Horticultural Research Foundation), Woody Metcalf (U.C. Berkeley forester), Allan Reid (landscape architect), and Joe Williamson (*Sunset* magazine). Over the years I accumulated a page on each species, together with leaf silhouettes and distribution maps. In 1973, I produced *Trees on the Stanford Campus* in the form of an invitation to contribute data. The easily photocopyable material found its way into homes and offices and into the library system with an authorization to copy "for any purpose of the library." Copies are shelved under QK484.C2B7 1984.

The first contributor was Dirk C. Schroder (1901–1982), who retired as horticulturist in 1971 after planting 20,000 trees at Stanford and preparing eight large maps showing the locations of trees, shrubs, and ground cover. He kindly annotated the 1973 version of this work. My next valuable informant was arborist William Parker (1907–1986), a mine of information and great tree lover. According to his 1972 tree count, there were 27,558 trees in the inner campus, plus an unknown number in the faculty residential area. He conducted tree walks, originating the handouts from which the present Inner Quad and Cantor Center sheets are descended. The database now maintained by Herb Fong and Karen Stidd of Facilities Operations is very much larger.

A key figure at the very beginning was the gardener Thomas H. Douglas, who was responsible for on-site work, tending tens of thousands of tree seedlings in the nursery, leveling the Quad, and planting the eight islands. The challenge of this work is well covered by his notes as kept in the Stanford Archives (SC125, Box 1). Douglas and his work also are discussed in an article on the Stanford arboretum in *Sandstone & Tile*, Vol. 27, No. 2, Spring/Summer 2003, published by the Stanford Historical Society.

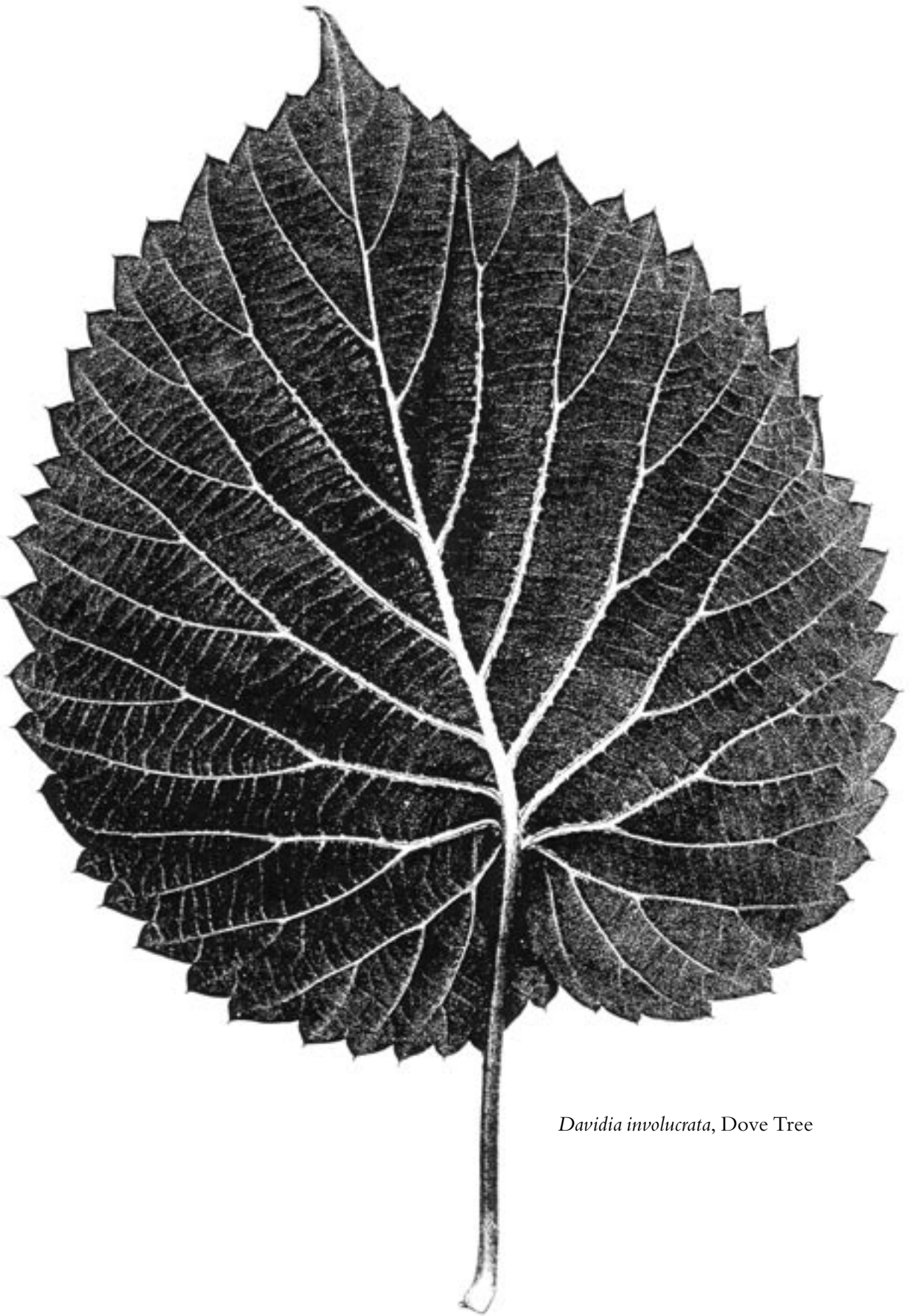
A prerequisite for a tree book is generations of university gardeners and campus residents who have created a heritage. Stanford, with its residential neighborhoods, has one of the richest collections of trees of any academic area. Student groups also have contributed by celebrating Arbor Day (March 7 to 14 in California) on White Plaza. With a view to rallying student interest, I developed a seminar, *I Dig Trees* (SES 75), given under the auspices of the Dean of Undergraduate Studies, first presented in spring quarter 1977. The Wilbur Hall tree walk was developed at that time. Students proved to be enthusiastic at individually meeting the course goal of harvesting seeds from a tree, germinating them, and finding a home to plant them. The Tree

Height Finder (p. 293) was conceived as a student-oriented tool for discovering the tallest tree of each species and maybe the campus grand champion.

The present much-revised edition was commenced under encouragement from the Stanford Historical Society as represented by former presidents John Harbaugh and G. Robert Hamrdla, current president Susan Schofield, and Publications Committee members Karen Bartholomew (chair), Jean Deken, Maggie Kimball, Margaret McKinnon, and Roxanne Nilan. Karen, Jean, Margaret, and Margot Pratt provided innumerable improvements to the text. I am indebted to Herb Fong, Karen Stidd, and Carol Sweetapple for providing information, and to Ingrid Graeve and Andy Butcher who supplied information to John Rawlings and to Sara Timby, who worked with him. John is at the Stanford Library, and is an enthusiastic member of the Santa Clara/San Mateo Chapter of the California Native Plant Society. He supplied dozens of updates as he explored the campus checking the presence and location of dozens of trees. He also worked over old tree walk diagrams and unified the tree map artwork. I am most indebted to Karen Bartholomew for initiating this Historical Society project and greatly improving the text both as to presentation and content. My wife, Helen, accompanied me on many a jaunt through the shrubbery and I thank her for patience and support.

Ronald Bracewell

L. M. Terman Professor of Electrical Engineering Emeritus

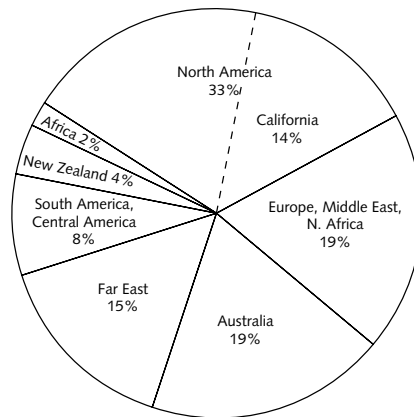


Davidia involucreta, Dove Tree

Introduction

How Our Flora Breaks Down

Today, Stanford trees include more than 350 species belonging to 150 genera and ranging over 60 plant families. This is a remarkable total. Many of the tree families on the campus are represented by only one species; the best represented is the myrtle family, followed by the pea, rose, palm, and pine families. Geographical origins are shown below. About one-third of the tree species are North American and, while many of these are California natives, others reveal nostalgia on the part of horticulturally inclined settlers who migrated from the American Midwest and East Coast. Similarly, a large contribution of familiar trees from European homelands can be seen. Many of these traditional trees, such as the oak, ash, elm, cypress, and cedar, occur in parts of the Middle East and North Africa and are included with Europe for the purposes of the provenance diagram.



Geographic provenance of campus species.

The lack of summer rainfall at Stanford does not generally suit trees from eastern North America and Europe, so while many have been tried and some have succeeded, better results have often been achieved with trees introduced from Australia. In the 1840s, importation of Australian trees directly across the Pacific Ocean began as a conscious effort based on similarity of climate, and is continued today at the hands of the University of California at Santa Cruz Arboretum.

The large Far East representation is not explained so simply. Sea trade between California and China flourished in the 19th century, but the Chinese and Japanese plants on campus are not direct descendants of wild plants, as the Australian plants are. These are mainly items introduced from Europe via the eastern U.S. that had already been selectively cultivated in the Far East. An interesting feature of the Chinese tree flora results from the failure of the ice ages to bring ice to China (thus, there are three times as many hardwood genera in China as in all of North America). North America's ice sheet 18,000 years ago covered 13 million square kilometers, about the same as Antarctica at the time.

Much of the Mediterranean coast has a dry summer like ours, but has more than our 18 inches of rain; substantial stretches have over 40 inches (south of Naples, east coast of the Adriatic Sea, southwest Turkey, Lebanon). Only a small portion of the Spanish and Algerian coasts and their hinterlands have less than we have. Stanford presents a culture shock to any plant from Italy, Yugoslavia, Greece, or Central Turkey. Nevertheless, the rich Mediterranean flora, of the order of 25,000 species offers a wide choice to California gardeners who can add some water.

Central and South America and southern Africa seem to be underrepresented at Stanford. Are there other gems, such as the jacaranda, the pepper tree, and the podocarpus, simply waiting to be brought? Ongoing experiment will give answers.

Our Habitat

Climate and weather have a controlling influence on our flora, but the outdoor experience of looking at trees is not likely to teach you much about the weather that you don't already know. However, looking at the earth, noting the topography, the soil, the flow of water and of frosty air, can be generally instructive, apart from the basic relationship with trees.

What a lesson there is in the rounded pudding stones that turn up in campus backyards and in excavations for buildings! Never miss a chance to peer into a trench. Not so long ago, the source of pudding stones was located in the strata of Loma Prieta, the mountain about 30 miles to the south, below which the great earthquake of 1989 took place. Layers of conglomerate in the mountain were made of plum-sized, rounded stones cemented together by time. As the layers weathered, chunks rolled downhill and suffered abrasion in the creek beds until the large chunks themselves were rounded, just as the pebbles locked inside had been rounded eons before. They rolled across to the western side of the San Andreas fault. Moving north as the fault slipped at two-thirds of an inch per annum, the large round puddings containing their twice-rounded plums rolled down the hills, back across to our

side of the fault onto the land that was to become the campus, and became embedded in the adobe margins of San Francisco Bay.

As you start to pay attention you will find that wherever there is adobe there are also fist-sized cherts, light and dark reds and yellows (the Jasper of Jasper Ridge). Where did they come from? Masonry walls can be a source of information about what is under the ground; occasionally you will see garden retaining walls made of large blocks of black lava that were easier to find when homes were first being built on campus; and one conspicuous wall at the Skilling Auditorium is made of instantly recognizable local greenstone. The lava beds can be found as small outcroppings on the hillsides, while the surface greenstone, with its highly special flora and fauna, studied for years by Paul Ehrlich, is rather extensive.

Poking through the shrubbery is a good way to begin making outdoor acquaintance with the physical world. Although we tend to regard people and their environment as distinct things, our bodies and brains are themselves constituents of the physical world. The oxygen and carbon atoms of the soil, the rivers, and our bodies were forged inside a star. The hydrogen atoms of H₂O, the molecule constituting most of the mass of our bodies, were made in the Big Bang. We are a celestial product.

Spanish Heritage

Many of our student residences have Spanish names, a tradition that goes back to the naming of Encina and Roble Halls by Leland Stanford. Since Encina and Roble are Spanish names of trees, it seemed of interest to include, in the List of Contents by Genus, the Spanish names of other common trees; half of the student residences and eating clubs with Spanish names appear on this list. Several other residences have Spanish bird names: Alondra, Cardenal, Faisan, Loro, Mirlo, Paloma.

Most of the Spanish street names are of people. At the religious level San Francisco, San Juan, Santa María, Santa Teresa, Santa Ynez, Dolores, and Santa Fe; at the earthly level Alvarado, Arguëllo, Casanueva, Constanzo, Coronado, Crespi, Dueña, Estudillo, Gálvez, Junípero Serra, Lasuén, Ortega, Palou, Raimundo, Salvatierra, Serra, Valdez. Not named for people are Alta, El Camino Real, El Escarpado, Escondido, Gerona, Lagunita, Lomita, Pampas, Panamá, Pueblo, Sonoma, and Valparaíso. Only Cedro Way, Los Arboles Avenue, and Roble Drive have arboricultural connections.

The Future

We especially need trees that will not demand maintenance such as summer watering or heavy pruning, that are resistant to and do not harbor pests or diseases, can stand our modest extremes of heat, cold, and wind, do not

drop litter, are attractive to look at in various seasons, do not invade drains or heave pavements. At the same time we like variety and interest. It is not easy to introduce a new tree, but if a campus resident were to raise uncommon seedlings, very probably a planting site could be found to try them out. It is a great thing to father a tree. My favorite Roman, Lucretius, who lived in the 2nd century BC, wrote, *Serit arbores, quae alteri prosint saeculo*. (He plants trees that they may be of benefit to another century.) As Lucy said to Linus (according to Charles Schulz), “The planting of a tree shows faith in the future.” English diarist John Evelyn (1620–1706) wrote, “Men only plant trees when they grow wise, that is when they grow old, and realize the desirability and necessity of it.” He had a point, but let us encourage the Lucys in our midst.

The Tree List

The Tree List in Order of Botanical Names constitutes the core of this book and the *List of Genera* condenses this main list to permit easy scanning. Should the name of the genus not be known, the *List of Common Names* allows the main entry to be located. In cases of special interest, locations in neighboring cities have been given. Information on missing species, new locations, or specimens of great age, size, or historical interest will be welcomed by the author.

Illustrations

A leaf drawing does not unambiguously identify a tree, but *full size* silhouettes do much better than do drawings that have been reduced by an assortment of scale factors. Try photocopying leaves as an art form and also as a substitute for saving collected specimens that are bulky to file. Large illustrations of pine cones, marked GBS, were taken from G. B. Sudworth, *Forest Trees of the Pacific Slope*, originally published in 1908 by the U.S. Forest Service (Dover reissue 1967). Illustrations marked JHS are from J. H. Simmonds, *Trees from Other Lands in New Zealand: Eucalypts*.

Organizations and Web Sites

Several organizations in the Bay Area that are connected in one way or another with trees are listed below and their special interests can be found at their Web sites:

Berkeley, UCB Botanical Garden*, <http://botanicalgarden.berkeley.edu/>

Berkeley, Tilden Park*, www.nativeplants.org

California Native Plant Society, www.cnps.org

California Native Plant Society, Santa Clara/San Mateo chapter,
<http://www.cnps-scv.org>

Davis, Arboretum, <http://arboretum.ucdavis.edu/>
Gamble Garden, 1431 Waverley Street, Palo Alto, www.gamblegarden.org
Menlo Park trees, www.treesformenlo.com
Palo Alto trees, www.city.palo-alto.ca.us/trees/
Palo Alto, Canopy, www.canopy.org
San Francisco, California Academy of Sciences, www.calacademy.org
San Francisco, Friends of Recreation & Parks, www.sfparks.org
San Francisco, Friends of the Urban Forest, www.fuf.net
San Francisco, Pacific Horticultural Foundation,
www.pacifichorticulture.org
San Francisco, Strybing Arboretum and Botanical Gardens*,
www.strybing.org
Santa Cruz, UCSC Arboretum*, www2.ucsc.edu/arboretum
Stanford, <http://grounds.stanford.edu/>
Walnut Creek, Ruth Bancroft Garden*, www.ruthbancroftgarden.org
Woodside, Filoli*, www.filoli.org

*Good places to visit.

Organizations not limited to the Peninsula include:

U.S. Department of Agriculture, <http://plants.usda.gov>
American Association of Botanical Gardens and Arboreta,
www.AABGA.org
Association of Societies for Growing Australian Plants (with photos),
<http://farrer.csu.edu.au/ASGAP/>
International Society of Arboriculture (ISA), www.isa-arbor.com

General information:

Botanical gardens around the world can be consulted. Here are some:

New York Botanical Garden, www.nybg.org
Royal Botanical Gardens, Kew, www.rbgekew.org.uk
Royal Botanical Gardens, Canada, www.rbg.ca
Royal Botanical Garden, Sydney, www.rbg Syd.gov.au
List of all botanical gardens: www.tau.ac.il/lifesci/botany/gardens.htm
National Register of Big Trees: www.americanforests.org
Plant forums in many countries: <http://gardenweb.com/forums/>
A million plant names and references: www.ipni.org
Australian Plant Name Index: www.anbg.gov.au/cpbr/databases/apni.html
For admirable information about campus birds: <http://birds.stanford.edu>

Some Reference Books

An indispensable reference for trees likely to be encountered on campus is

the *Sunset Western Garden Book* (K. N. Brenzel, editor, 2001), originally edited by the late Joseph F. Williamson, garden editor of *Sunset* magazine for many years, and long-time coworker Dick Dunmire. *An Illustrated Manual of Pacific Coast Trees*, by H. E. McMinn and E. Maino (University of California Press, 1935, 2nd ed. 1967), is another. For some poetic writing see *A Natural History of Western Trees* by Donald Culross Peattie (Houghton Mifflin, Boston, 1953). The City of Palo Alto has issued an attractive tree book from time to time. *Trees of Los Altos*, a 1970 booklet, was updated and reissued in 2004 with 138 new examples of specific species (Los Altos Community Foundation). *Nature Walks at Stanford*, a charming, even poetic, illustrated book by Ingeborg Ratner (2nd ed. 1999), accompanies the weekend walker on eight walks, referring copiously to the birds as well as to the trees on each route.

For the local natives there are six principal sources:

- L. Abrams and R. Ferris, *Illustrated Flora of the Pacific States* (Stanford, 1923–1960).
- The Jepson Manual: Higher Plants of California* (U.C. Press, 1993).
- E. McClintock, *The Trees of Golden Gate Park and San Francisco* (Heyday Books, Berkeley, 2001).
- P. A. Munz and D. D. Keck, *A California Flora* (University of California Press, 1968).
- J. H. Thomas, *Flora of the Santa Cruz Mountains of California* (Stanford University Press, 1968).
- Trees of Palo Alto* (Chamber of Commerce, Palo Alto, California, 3rd ed. 1959).



Magnolia grandiflora, Southern Magnolia

List of Genera and Notes

The contents of the book follow the order of this table. If the genus is not known, go first to the *List of Common Names* that follows this table. Some common Spanish names have been included here.

GENUS	SPECIES	COMMON NAME
<i>Abies</i>	<i>bracteata</i>	Santa Lucia Fir (ABETO)
	<i>cilicica</i>	Cilician Fir
	<i>concolor</i>	White Fir
	<i>pinsapo</i>	Spanish Fir
ACACIA NOTES		
<i>Acacia</i>	<i>baileyana</i>	Cootamundra Wattle
	<i>dealbata</i>	Silver Wattle
	<i>decurrens</i>	Green Wattle
	<i>longifolia</i>	Sydney Golden Wattle
	<i>melanoxylon</i>	Blackwood Acacia
	<i>pravissima</i>	Ovens Wattle
	<i>retinodes</i>	Wirilda
	<i>verticillata</i>	Prickly Moses
MAPLE NOTES		
<i>Acer</i>	<i>buergeranum</i>	Trident Maple
	<i>campestre</i>	Field Maple (MOSCÓN)
	<i>circinatum</i>	Vine Maple
	<i>griseum</i>	Paperbark Maple
	<i>macrophyllum</i>	Bigleaf Maple
	<i>negundo</i>	Box Elder
	<i>palmatum</i>	Japanese Maple
	<i>platanoides</i>	Norway Maple (ACIRÓN)
	<i>pseudoplatanus</i>	Sycamore Maple (FALSO PLÁTANO)
	<i>rubrum</i>	Red Maple
	<i>saccharinum</i>	Silver Maple
	<i>Acmena</i>	<i>smithii</i>
<i>Aesculus</i>	<i>californica</i>	California Buckeye
	<i>carnea</i>	Red Horse Chestnut
	<i>hippocastanum</i>	Horse Chestnut (CASTAÑO DE INDIA)

GENUS	SPECIES	COMMON NAME
	<i>octandra</i>	Yellow Buckeye
	<i>pavia</i>	Red Buckeye
<i>Agonis</i>	<i>flexuosa</i>	Willow Myrtle
<i>Ailanthus</i>	<i>altissima</i>	Tree of Heaven (ARBOL DEL CIELO)
<i>Albizzia</i>	<i>julibrissin</i>	Silk Tree
<i>Alectryon</i>	<i>excelsus</i>	Titoki
<i>Alnus</i>	<i>cordata</i>	Italian Alder
	<i>rhombifolia</i>	White Alder (ALISO)
<i>Angophora</i>	<i>costata</i>	Smooth-Barked Apple
<i>Araucaria</i>	<i>araucana</i>	Monkey Puzzle
	<i>bidwillii</i>	Bunya Bunya
	<i>cunninghamii</i>	Hoop Pine
	<i>heterophylla</i>	Norfolk Island Pine
<i>Arbutus</i>	<i>menziesii</i>	Madrone (MADROÑO)
	<i>unedo</i>	Strawberry Tree
<i>Arctostaphylos</i>	<i>manzanita</i>	Manzanita
<i>Azara</i>	<i>microphylla</i>	Boxleaf Azara
<i>Baccharis</i>	<i>pilularis</i>	Coyote Bush
<i>Baeckia</i>	<i>behrii</i>	Baeckia
BANKSIA NOTES		
<i>Banksia</i>	<i>integrifolia</i>	Coast Banksia
<i>Bauhinia</i>	<i>variegata</i>	Purple Orchid Tree
<i>Betula</i>	<i>pendula</i>	European White Birch (ABEDUL)
	<i>jacquemontii</i>	Whitebarked Himalayan Birch
<i>Brachychiton</i>	<i>acerifolius</i>	Flame Tree
	<i>discolor</i>	Lacebark
	<i>populneus</i>	Kurrajong
	<i>rupestris</i>	Bottle Tree
<i>Brahea</i>	<i>armata</i>	Mexican Blue Palm
	<i>edulis</i>	Guadelupe Palm
<i>Brugmansia</i>	<i>insignis</i>	Angel's Trumpet
<i>Butia</i>	<i>capitata</i>	Pindo Palm
<i>Callistemon</i>	<i>brachyandrus</i>	Bottlebrush
	<i>viminalis</i>	Weeping Bottlebrush
<i>Calocedrus</i>	<i>decurrens</i>	Incense Cedar
<i>Carpinus</i>	<i>betulus</i>	European Hornbeam (CARPE)
	<i>caroliniana</i>	American Hornbeam
<i>Carya</i>	<i>illinoensis</i>	Pecan
<i>Cassia</i>	<i>eremophila</i>	Desert Cassia
<i>Castanea</i>	<i>sativa</i>	Spanish Chestnut (CASTAÑO)

GENUS	SPECIES	COMMON NAME
<i>Castanospermum</i>	<i>australe</i>	Moreton Bay Chestnut
<i>Casuarina</i>	<i>cunninghamiana</i>	River She-Oak
	<i>equisetifolia</i>	Horsetail Tree
	<i>glauca</i>	Swamp She-Oak
	<i>stricta</i>	Drooping She-Oak
<i>Catalpa</i>	<i>bignonioides</i>	Catalpa
<i>Ceanothus</i>	<i>arboreus</i>	Tree Ceanothus
<i>Cedrus</i>	<i>deodara</i>	Deodar Cedar (CEDRO)
	<i>libani atlantica</i>	Atlas Cedar
	<i>libani libani</i>	Cedar of Lebanon
<i>Celtis</i>	<i>australis</i>	European Hackberry (ALMEZ)
	<i>occidentalis</i>	Common Hackberry
	<i>sinensis</i>	Chinese Hackberry
<i>Ceratonia</i>	<i>siliqua</i>	Carob (ALGARROBO)
<i>Cercidium</i>	<i>floridum</i>	Blue Palo Verde
	<i>canadensis</i>	Eastern Redbud
<i>Cercis</i>	<i>occidentalis</i>	Western Redbud
	<i>cultivars</i>	Flowering Quince
<i>Chamaecyparis</i>	<i>lawsoniana</i>	Port Orford Cedar
<i>Chamaerops</i>	<i>humilis</i>	Mediterranean Fan Palm
<i>Chilopsis</i>	<i>linearis</i>	Desert Willow
<i>Chionanthus</i>	<i>retusus</i>	Chinese Fringe Tree
	<i>virginicus</i>	Fringe Tree
<i>Chorisia</i>	<i>speciosa</i>	Floss-Silk Tree
<i>Cinnamomum</i>	<i>camphora</i>	Camphor Tree
	<i>glanduliferum</i>	Nepal Camphor Tree
CITRUS NOTES		
<i>Citrus</i>	<i>aurantifolia</i>	Lime
	<i>japonica</i>	Kumquat
	<i>limon</i>	Lemon
	'Meyer'	Meyer Lemon
	'Minneola'	Tangelo
	<i>paradisi</i>	Grapefruit
	<i>reticulata</i>	Mandarin Orange
<i>Cordyline</i>	<i>sinensis</i>	Orange
	<i>australis</i>	Palm Lily
<i>Cornus</i>	<i>capitata</i>	Evergreen Dogwood
	<i>nuttallii</i>	Pacific Dogwood
<i>Corylus</i>	<i>avellana</i>	Filbert, Hazelnut (AVELLANO)
<i>Cotinus</i>	<i>coggygria</i>	Smoke Tree

GENUS	SPECIES	COMMON NAME
<i>Crataegus</i>	<i>laevigata</i>	Hawthorn (ESPINO)
	<i>monogyna</i>	Hawthorn, Hedgerow Thorn
	<i>phaenopyrum</i>	Washington Thorn
<i>Cryptomeria</i>	<i>japonica</i>	Cryptomeria
<i>Cupressus</i>	<i>arizonica</i>	Arizona Cypress
	<i>funbris</i>	Mourning Cypress
	<i>macrocarpa</i>	Monterey Cypress (CIPRÉS)
	<i>sempervirens</i>	Italian Cypress (CIPRÉS COMÚN)
	<i>torulosa</i>	Himalayan Cypress
<i>Cyathea</i>	<i>cooperi</i>	Australian Tree Fern
<i>Cycas</i>	<i>revoluta</i>	Sago Palm
<i>Cydonia</i>	<i>oblonga</i>	Quince, Fruiting (MEMBRILLO)
<i>Dasyllirion</i>	<i>wheeleri</i>	Desert Spoon
<i>Davidia</i>	<i>involucrata</i>	Dove Tree
<i>Dicksonia</i>	<i>antarctica</i>	Tasmanian Tree Fern
<i>Diospyros</i>	<i>kaki</i>	Japanese Persimmon
<i>Dodonaea</i>	<i>viscosa</i>	Sticky Hopbush
<i>Eriobotrya</i>	<i>deflexa</i>	Bronze Loquat
	<i>japonica</i>	Loquat
<i>Erythrina</i>	<i>crista-galli</i>	Cockspur Coral Tree
	<i>humeana</i>	Natal Coral Tree
<i>Escallonia</i>	<i>montevidensis</i>	Escallonia
EUCALYPTUS NOTES		(EUCALIPTO)
<i>Fagus</i>	<i>sylvatica</i>	European Beech (HAYA)
<i>Feijoa</i>	<i>sellowiana</i>	Pineapple Guava
<i>Ficus</i>	<i>carica</i>	Fig (HIGUERA)
<i>Fortunella</i>	<i>margarita</i>	Kumquat
<i>Fouquieria</i>	<i>columnaris</i>	Boojum Tree
<i>Fraxinus</i>	<i>americana</i>	White Ash (FRESNO)
	<i>angustifolia</i>	Raywood Ash
	<i>excelsior</i>	European Ash
	<i>latifolia</i>	Oregon Ash
	<i>ornus</i>	Flowering Ash
	<i>uhdei</i>	Shamel Ash
<i>Fremontodendron</i>	<i>californicum</i>	Arizona Ash, Modesto Ash
	<i>californicum</i>	Flannel Bush
<i>Garrya</i>	<i>elliptica</i>	Coast Silktassel
<i>Geijera</i>	<i>parviflora</i>	Wilga
<i>Ginkgo</i>	<i>biloba</i>	Maidenhair Tree
<i>Gleditsia</i>	<i>triacanthos</i>	Honey Locust (ACACIA DE TRES PÚAS)

GENUS	SPECIES	COMMON NAME
<i>Grevillea</i>	<i>robusta</i>	Silky Oak
<i>Hakea</i>	<i>laurina</i>	Pin-Cushion Hakea
	<i>suaveolens</i>	Sweet Hakea
<i>Heteromeles</i>	<i>arbutifolia</i>	Toyon
<i>Ilex</i>	<i>aquifolium</i>	English Holly (ACEBO)
<i>Jacaranda</i>	<i>mimosifolia</i>	Jacaranda (FRAMBOYÁN AZUL)
JASPER RIDGE NOTES		
<i>Juglans</i>	<i>californica</i>	California Black Walnut (NOGAL)
	<i>regia</i>	Walnut
<i>Juniperus</i>	<i>chinensis</i>	Hollywood Juniper
<i>Koelreuteria</i>	<i>paniculata</i>	Goldenrain Tree
<i>Lagerstroemia</i>	<i>indica</i>	Crape Myrtle
<i>Lagunaria</i>	<i>patersonii</i>	Norfolk Island Hibiscus
<i>Larix</i>	<i>eurolepis</i>	Dunkeld Larch (ALERCE)
LATIN PRONUNCIATION		
<i>Laurus</i>	<i>nobilis</i>	Grecian Laurel (LAUREL)
<i>Leptospermum</i>	<i>laevigatum</i>	Tea Tree
	<i>scoparium</i>	Manuka Tea Tree
<i>Ligustrum</i>	<i>lucidum</i>	Glossy Privet
<i>Liquidambar</i>	<i>orientalis</i>	Oriental Sweet Gum
	<i>styraciflua</i>	American Sweet Gum
<i>Liriodendron</i>	<i>tulipifera</i>	Tulip Tree
<i>Lithocarpus</i>	<i>densiflorus</i>	Tanbark Oak
<i>Livistona</i>	<i>chinensis</i>	Chinese Fan Palm
<i>Lyonothamnus</i>	<i>floribundus</i>	Catalina Ironwood
<i>Macadamia</i>	<i>ternifolia</i>	Queensland Nut
<i>Maclura</i>	<i>pomifera</i>	Osage Orange (MACLURA)
<i>Magnolia</i>	<i>grandiflora</i>	Southern Magnolia
	<i>liliflora</i>	Lily Magnolia
	<i>soulangiana</i>	Saucer Magnolia
	<i>stellata</i>	Star Magnolia
<i>Malus</i>	<i>baccata</i>	Siberian Crab Apple
	<i>floribunda</i>	Japanese Flowering Crab
	<i>purpurea</i>	Aldenhams Crab
<i>Maytenus</i>	<i>boaria</i>	Mayten Tree
PAPERBARK NOTES		
<i>Melaleuca</i>	<i>armillaris</i>	Bracelet Honey Myrtle
	<i>elliptica</i>	Granite Honey Myrtle
	<i>linariifolia</i>	Flaxleaf Paperbark
	<i>nesophila</i>	Showy Honey Myrtle

GENUS	SPECIES	COMMON NAME
	<i>stypelioides</i>	Prickly Paperbark
<i>Melia</i>	<i>azedarach</i>	Chinaberry
<i>Metasequoia</i>	<i>glyptostrobooides</i>	Dawn Redwood
<i>Metrosideros</i>	<i>excelsa</i>	Pohutukawa
<i>Michelia</i>	<i>doltsopa</i>	Michelia
<i>Morus</i>	<i>alba</i>	White Mulberry (MORERA)

MUSHROOM NOTES

<i>Myoporum</i>	<i>laetum</i>	Ngaio
<i>Myrica</i>	<i>californica</i>	Pacific Wax Myrtle
<i>Myrtus</i>	<i>communis</i>	Common Myrtle (MIRTO)
<i>Nerium</i>	<i>oleander</i>	Oleander (ADELFA)
<i>Nolina</i>	<i>recurvata</i>	Elephant-Foot Tree
	<i>matapensis</i>	
<i>Nyssa</i>	<i>sylvatica</i>	Sour Gum, Pepperidge, Tupelo
<i>Olea</i>	<i>europaea</i>	Olive (OLIVO)
<i>Parkinsonia</i>	<i>aculeata</i>	Jerusalem Thorn
<i>Parrotia</i>	<i>persica</i>	Persian Parrotia
<i>Paulownia</i>	<i>tomentosa</i>	Empress Tree
<i>Persea</i>	<i>americana</i>	Avocado (AGUACATE)
<i>Phoenix</i>	<i>canariensis</i>	Canary Island Date Palm
<i>Photinia</i>	<i>serrulata</i>	Photinia
<i>Phyllostachys</i>	<i>nigra</i>	Bamboo
<i>Picea</i>	<i>abies</i>	Norway Spruce (ABETO)
	<i>glauca</i>	White Spruce
	<i>orientalis</i>	Oriental Spruce
	<i>pungens</i>	Colorado Spruce

PINE CONES AND FIBONACCI NUMBERS

<i>Pinus</i>	<i>brutia</i>	Afghan Pine
	<i>bungeana</i>	Lacebark Pine
	<i>canariensis</i>	Canary Island Pine (PINO)
	<i>contorta</i>	Lodgepole Pine
	<i>coulteri</i>	Coulter Pine
	<i>densiflora</i>	Japanese Red Pine
	<i>edulis</i>	Piñon (PINO PIÑONERO)
	<i>halepensis</i>	Aleppo Pine (PINO CARRASCO)
	<i>jeffreyi</i>	Jeffrey Pine
	<i>mugo</i>	Swiss Mountain Pine
	<i>muricata</i>	Bishop Pine
	<i>nigra</i>	Austrian Black Pine (PINO SALGAREÑO)

GENUS	SPECIES	COMMON NAME
	<i>patula</i>	Jelecote Pine
	<i>pinea</i>	Italian Stone Pine (PINO PIÑONERO)
	<i>ponderosa</i>	Ponderosa Pine
	<i>radiata</i>	Monterey Pine
PAPER NOTES		
	<i>sabiniana</i>	Gray Pine, Digger Pine
	<i>sylvestris</i>	Scotch Pine
	<i>thunbergiana</i>	Japanese Black Pine
	<i>torreyana</i>	Torrey Pine
<i>Pistacia</i>	<i>atlantica</i>	Atlas Pistache
	<i>chinensis</i>	Chinese Pistache
<i>Pittosporum</i>	<i>crassifolium</i>	Karo
	<i>eugenioides</i>	Tarata
	<i>tenuifolium</i>	Kohuhu
	<i>tobira</i>	Tobira
	<i>undulatum</i>	Mock Orange
<i>Platanus</i>	<i>acerifolia</i>	London Plane Tree (PLÁTANO FALSO)
	<i>orientalis</i>	Oriental Plane (PLÁTANO DE LEVANTE)
	<i>racemosa</i>	California Plane, Sycamore
<i>Podocarpus</i>	<i>gracilior</i>	Fern Podocarpus
	<i>macrophyllus</i>	Shrubby Yew Pine
<i>Populus</i>	<i>alba</i>	White Poplar (ÁLAMO)
	<i>canadensis</i>	Carolina Poplar (ÁLAMO)
	<i>fremontii</i>	Fremont Cottonwood
	<i>nigra</i>	Lombardy Poplar (CHOPO NEGRO)
<i>Prunus</i>	<i>armeniaca</i>	Apricot (ALBARICOQUERO)
	<i>caroliniana</i>	Carolina Cherry Laurel
	<i>cerasifera</i>	Cherry Plum
	<i>domestica</i>	Plum
	<i>dulcis</i>	Almond
	<i>ilicifolia</i>	Holly-Leaf Cherry
	<i>laurocerasus</i>	English Laurel
	<i>lusitanica</i>	Portuguese Laurel
	<i>lyonii</i>	Catalina Cherry
	<i>persica</i>	Peach
	<i>serrulata</i>	Ornamental Cherry
	<i>yedoensis</i>	Yoshino Flowering Cherry
<i>Pseudotsuga</i>	<i>menziesii</i>	Douglas Fir
WOOD NOTES		
<i>Psidium</i>	<i>cattleianum</i>	Strawberry Guava

GENUS	SPECIES	COMMON NAME
<i>Punica</i>	<i>granatum</i>	Pomegranate (GRANADO SILVESTRE)
<i>Pyrus</i>	<i>kawakamii</i>	Evergreen Pear
OAK NOTES		
<i>Quercus</i>	<i>agrifolia</i>	Coast Live Oak (ENCINA)
	<i>chrysolepis</i>	Canyon Live Oak
	<i>coccinea</i>	Scarlet Oak
	<i>douglasii</i>	Blue Oak
	<i>ilex</i>	Holm Oak, Holly Oak
	<i>kelloggii</i>	California Black Oak
	<i>lobata</i>	Valley Oak (ROBLE)
	<i>palustris</i>	Pin Oak
	<i>robur</i>	English Oak (ROBLE COMÚN)
	<i>rubra</i>	Red Oak
	<i>suber</i>	Cork Oak (ALCORNOCQUE)
	<i>virginiana</i>	Southern Live Oak
<i>Quillaja</i>	<i>saponaria</i>	Soapbark Tree
<i>Rhamnus</i>	<i>alaternus</i>	Italian Buckthorn
<i>Rhus</i>	<i>diversiloba</i>	Poison Oak
	<i>integrifolia</i>	Lemonade Berry (MANGLE)
	<i>lancea</i>	African Sumac
<i>Robinia</i>	<i>pseudoacacia</i>	Black Locust (ACACIA COMÚN)
<i>Salix</i>	<i>alba</i>	Golden Weeping Willow (SAUCE BLANCO)
	<i>babylonica</i>	Weeping Willow
	<i>laevigata</i>	Red Willow
	<i>lasiandra</i>	Yellow Willow
	<i>lasiolepis</i>	Arroyo Willow
	<i>matsudana</i>	Corkscrew Willow
<i>Sambucus</i>	<i>callicarpa</i>	Coast Red Elderberry
	<i>mexicana</i>	Blue Elderberry
<i>Sapium</i>	<i>sebiferum</i>	Chinese Tallow Tree
<i>Schinus</i>	<i>molle</i>	Pepper Tree
	<i>polygamus</i>	Chilean Pepper Tree
	<i>terebinthifolius</i>	Brazilian Pepper
<i>Sequoia</i>	<i>sempervirens</i>	Coast Redwood
<i>Sequoiadendron</i>	<i>giganteum</i>	Big Tree
<i>Sophora</i>	<i>japonica</i>	Pagoda Tree
<i>Sparmannia</i>	<i>africana</i>	African Linden
<i>Syagrus</i>	<i>romanoffianum</i>	Queen Palm
<i>Syringa</i>	<i>vulgaris</i>	Lilac (LILA)

GENUS	SPECIES	COMMON NAME
<i>Syzygium</i>	<i>paniculatum</i>	Brush Cherry
<i>Tamarix</i>	<i>juniperina</i>	Tamarisk
REDWOOD FAMILY NOTES		
<i>Taxodium</i>	<i>distichum</i>	Bald Cypress
	<i>mucronatum</i>	Montezuma Cypress
<i>Taxus</i>	<i>baccata</i>	Yew (TEIXO)
<i>Thuja</i>	<i>occidentalis</i>	American Arborvitae
	<i>orientalis</i>	Oriental Arborvitae
	<i>plicata</i>	Western Red Cedar
<i>Tilia</i>	<i>americana</i>	American Linden (TILIO)
	<i>cordata</i>	Little-Leaf Linden
	<i>platyphyllos</i>	Large-Leaf Linden
<i>Tipuana</i>	<i>tipu</i>	Tipu Tree
<i>Torreya</i>	<i>californica</i>	California Nutmeg
<i>Trachycarpus</i>	<i>fortunei</i>	Windmill Palm
<i>Tristania</i>	<i>conferta</i>	Brush Box
<i>Tristaniopsis</i>	<i>laurina</i>	Kanuka, Water Gum
<i>Ulmus</i>	<i>americana</i>	American Elm (OLMO)
	<i>glabra</i>	Wych Elm (OLMO DE MONTE)
	<i>minor</i>	English Elm
	<i>parvifolia</i>	Chinese Elm
	<i>pumila</i>	Siberian Elm
<i>Umbellularia</i>	<i>californica</i>	California Bay, Laurel (LAUREL)
<i>Washingtonia</i>	<i>filifera</i>	California Fan Palm (PALMA)
	<i>robusta</i>	Mexican Fan Palm
<i>Wisteria</i>	<i>sinensis</i>	Chinese Wisteria
<i>Xylosma</i>	<i>congestum</i>	Xylosma
<i>Yucca</i>	<i>filifera</i>	Yucca
<i>Zelkova</i>	<i>serrata</i>	Sawleaf Zelkova
<i>Zizyphus</i>	<i>jujuba</i>	Jujube



Geijera parviflora, Wilga

List of Common Names

The common name of a tree is the name used by the person you are talking to. So any species may have several common names; for example, common names for *Melia azedarach* range over: Australian white cedar, azedarach, bead tree, chinaberry, false sycamore, holy tree, Indian lilac, margosa, pride of India. Moreover, the same common name may be used for more than one species. This work generally gives only one common name, usually leaning toward local usage.

COMMON NAME	GENUS	COMMON NAME	GENUS
Afghan Pine	<i>Pinus</i>	Basswood	<i>Tilia</i>
African Linden	<i>Sparmannia</i>	Bay	<i>Laurus, Umbellularia</i>
Alder	<i>Alnus</i>	Beech	<i>Fagus</i>
Aleppo Pine	<i>Pinus</i>	Beefwood	<i>Casuarina</i>
Almond	<i>Prunus</i>	Bigleaf Maple	<i>Acer</i>
American Elm	<i>Ulmus</i>	Big Tree	<i>Sequoiadendron</i>
American Linden	<i>Tilia</i>	Birch	<i>Betula</i>
American Sweet Gum	<i>Liquidambar</i>	Bishop Pine	<i>Pinus</i>
Angel's Trumpet	<i>Brugmansia</i>	Blackbutt	<i>Eucalyptus</i>
Apple	<i>Malus</i>	Black Gum	<i>Eucalyptus</i>
Apple Box	<i>Eucalyptus</i>	Black Locust	<i>Robinia</i>
Apricot	<i>Prunus</i>	Black Oak	<i>Quercus</i>
Arborvitae	<i>Thuja</i>	Blackwood Acacia	<i>Acacia</i>
Argyle Apple	<i>Eucalyptus</i>	Bloodwood	<i>Eucalyptus</i>
Arroyo Willow	<i>Salix</i>	Blue Elderberry	<i>Sambucus</i>
Ash	<i>Fraxinus</i>	Blue Gum	<i>Eucalyptus</i>
Atlas Cedar	<i>Cedrus</i>	Blue Oak	<i>Quercus</i>
Atlas Pistache	<i>Pistacia</i>	Blue Palm	<i>Brahea</i>
Austrian Black Pine	<i>Pinus nigra</i>	Boojum Tree	<i>Fouquieria</i>
Avocado	<i>Persea</i>	Bottlebrush	<i>Callistemon</i>
Baeckia	<i>Baeckia</i>	Bottle Tree	<i>Brachyichiton</i>
Bald Cypress	<i>Taxodium</i>	Box	<i>Eucalyptus, Tristania</i>
Bamboo	<i>Phyllostachys</i>	Box Elder	<i>Acer</i>
Bangalay	<i>Eucalyptus</i>	Box Leaf Azara	<i>Azara</i>
Banksia	<i>Banksia</i>	Brazilian Pepper	<i>Schinus</i>
		Bronze Loquat	<i>Eriobotrya</i>

COMMON NAME	GENUS	COMMON NAME	GENUS
Brush Box	<i>Tristania</i>	Chinese Pistache	<i>Pistacia</i>
Brush Cherry	<i>Syzygium</i>	Chinese Tallow Tree	<i>Sapium</i>
Buckeye	<i>Aesculus</i>	Chinese Wisteria	<i>Wisteria</i>
Buckthorn	<i>Rhamnus</i>	Cider Gum	<i>Eucalyptus</i>
Bunya Bunya	<i>Araucaria</i>	Cilician Fir	<i>Abies</i>
Bushy Yate	<i>Eucalyptus</i>	Coast Banksia	<i>Banksia</i>
Cajeput	<i>Melaleuca</i>	Coast Live Oak	<i>Quercus</i>
California Bay	<i>Umbellularia</i>	Coast Red Elderberry	<i>Sambucus</i>
California Black Oak	<i>Quercus</i>	Coast Redwood	<i>Sequoia</i>
California Black Walnut	<i>Juglans</i>	Coast Silktassel	<i>Garrya</i>
California Buckeye	<i>Aesculus</i>	Cockspur Coral Tree	<i>Erythrina</i>
California Fan Palm	<i>Washingtonia</i>	Coffeeberry	<i>Rhamnus</i>
California Laurel	<i>Umbellularia</i>	Cootamundra Wattle	<i>Acacia</i>
California Nutmeg	<i>Torreya</i>	Coral Tree	<i>Erythrina</i>
California Pepper	<i>Schinus</i>	Cork Oak	<i>Quercus</i>
California Plane Tree	<i>Platanus</i>	Corkscrew Willow	<i>Salix</i>
California Redbud	<i>Cercis</i>	Cottonwood	<i>Populus</i>
California Sycamore	<i>Platanus</i>	Coulter Pine	<i>Pinus</i>
Camphor Tree	<i>Cinnamomum</i>	Coyote Bush	<i>Baccharis</i>
Canary Island Date Palm	<i>Phoenix</i>	Crab Apple	<i>Malus</i>
Canary Island Pine	<i>Pinus</i>	Crape Myrtle	<i>Lagerstroemia</i>
Canyon Live Oak	<i>Quercus</i>	Cypress	<i>Chamaecyparis, Cupressus, Taxodium</i>
Carob	<i>Ceratonia</i>	Date Palm	<i>Phoenix</i>
Carolina Cherry	<i>Prunus</i>	Dawn Redwood	<i>Metasequoia</i>
Carolina Poplar	<i>Populus</i>	Deodar Cedar	<i>Cedrus</i>
Catalina Cherry	<i>Prunus</i>	Desert Cassia	<i>Cassia</i>
Catalina Ironwood	<i>Lyonothamnus</i>	Desert Spoon	<i>Dasyilirion</i>
Catalpa	<i>Catalpa</i>	Desert Willow	<i>Chilopsis</i>
Ceanothus	<i>Ceanothus</i>	Digger Pine	<i>Pinus</i>
Cedar	<i>Calocedrus, Chamaecyparis, Cedrus, Melia, Thuja</i>	Dogwood	<i>Cornus</i>
Cherry	<i>Prunus, Syzygium</i>	Douglas Fir	<i>Pseudotsuga</i>
Chestnut	<i>Aesculus, Castanea, Castanosperum</i>	Dove Tree	<i>Davidia</i>
Chilean Pepper	<i>Schinus</i>	Drooping She-Oak	<i>Casuarina</i>
Chinaberry	<i>Melia</i>	Eastern Redbud	<i>Cercis</i>
Chinese Elm	<i>Ulmus</i>	Elder	<i>Acer</i>
Chinese Fan Palm	<i>Livistona</i>	Elderberry	<i>Sambucus</i>
Chinese Hackberry	<i>Celtis</i>	Elephant-Foot Tree	<i>Nolina</i>

COMMON NAME	GENUS	COMMON NAME	GENUS
Elm	<i>Ulmus</i>	Granite Honey Myrtle	<i>Melaleuca</i>
Empress Tree	<i>Paulownia</i>	Grapefruit	<i>Citrus</i>
Encina	<i>Quercus</i>	Grecian Laurel	<i>Laurus</i>
English Elm	<i>Ulmus</i>	Green Wattle	<i>Acacia</i>
English Hawthorn	<i>Crataegus</i>	Guadelupe Palm	<i>Brahea</i>
English Holly	<i>Ilex</i>	Guava	<i>Feijoa, Psidium</i>
English Laurel	<i>Prunus</i>	Gum	<i>Angophora, Eucalyptus, Liquidambar, Nyssa</i>
English Oak	<i>Quercus</i>	Gungurru	<i>Eucalyptus</i>
English Walnut	<i>Juglans</i>		
Escallonia	<i>Escallonia</i>		
European Ash	<i>Fraxinus</i>	Hackberry	<i>Celtis</i>
European Beech	<i>Fagus</i>	Hawthorn	<i>Crataegus</i>
European Hackberry	<i>Celtis</i>	Hazelnut	<i>Corylus</i>
European White Birch	<i>Betula</i>	Hedgerow Thorn	<i>Crataegus</i>
Evergreen Pear	<i>Pyrus</i>	Hibiscus	<i>Lagunaria</i>
		Himalayan Birch	<i>Betula</i>
Fan Palm	<i>Chamaerops,</i>	Holly	<i>Ilex</i>
	<i>Livistona, Washingtonia</i>	Holly-Leaf Cherry	<i>Prunus</i>
Fern Podocarpus	<i>Podocarpus</i>	Hollywood Juniper	<i>Juniperus</i>
Field Maple	<i>Acer</i>	Holm Oak	<i>Quercus</i>
Fig	<i>Ficus</i>	Honey Locust	<i>Gleditsia</i>
Filbert	<i>Corylus</i>	Honey Myrtle	<i>Melaleuca</i>
Fir	<i>Abies, Pseudotsuga</i>	Hoop Pine	<i>Araucaria</i>
Firewheel Tree	<i>Stenocarpus</i>	Hopbush	<i>Dodonaea</i>
Flame Tree	<i>Brachychiton</i>	Hornbeam	<i>Carpinus</i>
Flannel Bush	<i>Fremontodendron</i>	Horse Chestnut	<i>Aesculus</i>
Flaxleaf Paperbark	<i>Melaleuca</i>	Horsetail Tree	<i>Casuarina</i>
Floss-Silk Tree	<i>Chorisia</i>		
Flowering Ash	<i>Fraxinus</i>	Incense Cedar	<i>Calocedrus</i>
Flowering Plum	<i>Prunus</i>	Indian Cigar	<i>Catalpa</i>
Fremont Cottonwood	<i>Populus</i>	Ironbark	<i>Eucalyptus</i>
Fringe Tree	<i>Chionanthus</i>	Ironwood	<i>Lyonothamnus</i>
		Italian Alder	<i>Alnus</i>
Ghost Gum	<i>Eucalyptus</i>	Italian Buckthorn	<i>Rhamnus</i>
Giant Sequoia	<i>Sequoiadendron</i>	Italian Cypress	<i>Cupressus</i>
Gimlet	<i>Eucalyptus</i>		
Glossy Privet	<i>Ligustrum</i>	Jacaranda	<i>Jacaranda</i>
Gold Cup Oak	<i>Quercus</i>	Japanese Maple	<i>Acer</i>
Goldenrain Tree	<i>Koelreuteria</i>	Japanese Persimmon	<i>Diospyros</i>
Golden Weeping Willow	<i>Salix</i>	Jeffrey Pine	<i>Pinus</i>

COMMON NAME	GENUS	COMMON NAME	GENUS
Jejecote Pine	<i>Pinus</i>	Mayten Tree	<i>Maytenus</i>
Jerusalem Thorn	<i>Parkinsonia</i>	Mealy Stringybark	<i>Eucalyptus</i>
Jujube	<i>Zizyphus</i>	Mediterranean Fan Palm	<i>Chamaerops</i>
Juniper	<i>Juniperus</i>	Mexican Blue Palm	<i>Brahea</i>
		Mexican Fan Palm	<i>Washingtonia</i>
Kanuka	<i>Tristania</i>	Michelia	<i>Michelia</i>
Karo	<i>Pittosporum</i>	Mock Orange	<i>Pittosporum</i>
Karri	<i>Eucalyptus</i>	Modesto Ash	<i>Fraxinus</i>
Kohuhu	<i>Pittosporum</i>	Monkey Puzzle	<i>Araucaria</i>
Kumquat	<i>Citrus, Fortunella</i>	Monterey Cypress	<i>Cupressus</i>
Kurrajong	<i>Brachychiton</i>	Monterey Pine	<i>Pinus</i>
		Montezuma Cypress	<i>Taxodium</i>
Lacebark	<i>Brachychiton</i>	Moort	<i>Eucalyptus</i>
Lacebark Pine	<i>Pinus</i>	Moreton Bay Chestnut	<i>Castanospermum</i>
Larch	<i>Larix</i>	Mulberry	<i>Morus</i>
Laurel	<i>Laurus, Prunus, Umbellularia</i>	Mulefat	<i>Baccharis</i>
Lawson Cypress	<i>Chamaecyparis</i>	Myrtle	<i>Agonis, Lagerstroemia, Myrica, Melaleuca, Myrtus</i>
Lemonade Berry	<i>Rhus</i>		
Lemon-Scented Gum	<i>Eucalyptus</i>	Natal Coral Tree	<i>Erythrina</i>
Lilac	<i>Syringa</i>	Nepal Camphor Tree	<i>Cinnamomum</i>
Lillypilly	<i>Acmena</i>	New Zealand Xmas Tree	<i>Metrosideros</i>
Lime	<i>Tilia, Citrus</i>	Ngaio	<i>Myoporum</i>
Linden	<i>Sparmannia, Tilia</i>	Norfolk Island Hibiscus	<i>Lagunaria</i>
Live Oak	<i>Quercus</i>	Norfolk Island Pine	<i>Araucaria</i>
Locust	<i>Ceratonia, Gleditsia, Robinia</i>	Norway Maple	<i>Acer</i>
Lodgepole Pine	<i>Pinus</i>	Norway Spruce	<i>Picea</i>
Lombardy Poplar	<i>Populus</i>	Nutmeg	<i>Torreya</i>
London Plane Tree	<i>Platanus</i>		
Loquat	<i>Eriobotrya</i>	Oak	<i>Grevillea, Lithocarpus, Quercus</i>
		Oleander	<i>Nerium</i>
Madrone	<i>Arbutus</i>	Olive	<i>Olea</i>
Mahogany	<i>Eucalyptus</i>	Orange	<i>Citrus, Pittosporum</i>
Magnolia	<i>Magnolia</i>	Orchid Tree	<i>Bauhinia</i>
Maidenhair Tree	<i>Ginkgo</i>	Oregon Ash	<i>Fraxinus</i>
Mallee	<i>Eucalyptus</i>	Oriental Arborvitae	<i>Thuja</i>
Mandarin Orange	<i>Citrus</i>	Oriental Plane	<i>Platanus</i>
Manna Gum	<i>Eucalyptus</i>	Oriental Sweet Gum	<i>Liquidambar</i>
Manuka	<i>Leptospermum</i>	Ovens Wattle	<i>Acacia</i>
Manzanita	<i>Arctostaphylos</i>		
Maple	<i>Acer</i>		

COMMON NAME	GENUS	COMMON NAME	GENUS
Pacific Dogwood	<i>Cornus</i>	Purple Orchid Tree	<i>Bauhinia</i>
Pacific Wax Myrtle	<i>Myrica</i>		
Pagoda Tree	<i>Sophora</i>	Queen Palm	<i>Syagrus</i>
Palm	<i>Brahea, Butia, Chamaerops,</i> <i>Erythea, Livistona, Phoenix, Syagrus,</i> <i>Trachycarpus, Washingtonia</i>	Queensland Nut	<i>Macadamia</i>
		Quince	<i>Chaenomeles, Cydonia</i>
Palm Lily	<i>Cordyline</i>	Raywood Ash	<i>Fraxinus</i>
Palo Verde	<i>Cercidium, Parkinsonia</i>	Red Buckeye	<i>Aesculus</i>
Paperbark	<i>Melaleuca</i>	Redbud	<i>Cercis</i>
Paperbark Maple	<i>Acer</i>	Red Cedar	<i>Thuja</i>
Pear	<i>Pyrus</i>	Red Gum	<i>Angophora, Eucalyptus</i>
Pecan	<i>Carya</i>	Red Horse Chestnut	<i>Aesculus</i>
Pepperidge	<i>Nyssa</i>	Red Maple	<i>Acer</i>
Peppermint	<i>Agonis, Eucalyptus</i>	Red Oak	<i>Quercus</i>
Pepper Tree	<i>Schinus</i>	Red-Spotted Gum	<i>Eucalyptus</i>
Persian Parrotia	<i>Parrotia</i>	Redwood	<i>Metasequoia, Sequoia,</i> <i>Sequoiadendron</i>
Persimmon	<i>Diospyros</i>		
Peruvian Pepper Tree	<i>Schinus</i>	River Red Gum	<i>Eucalyptus</i>
Photinia	<i>Photinia</i>	River She-Oak	<i>Casuarina</i>
Pin-Cushion Hakea	<i>Hakea</i>	Roble	<i>Quercus</i>
Pindo Palm	<i>Butia</i>	Rusty Gum	<i>Angophora</i>
Pine	<i>Araucaria, Pinus,</i> <i>Podocarpus, Sciadopitys</i>	Sago Palm	<i>Cycas</i>
Pineapple Guava	<i>Feijoa</i>	Santa Lucia Fir	<i>Abies</i>
Pin Oak	<i>Quercus</i>	Sawleaf Zelkova	<i>Zelkova</i>
Piñon	<i>Pinus</i>	Scarlet Oak	<i>Quercus</i>
Pistache	<i>Pistacia</i>	Scotch Pine	<i>Pinus</i>
Pistachio	<i>Pistacia</i>	Shamel Ash	<i>Fraxinus</i>
Plane Tree	<i>Platanus</i>	She-Oak	<i>Casuarina</i>
Plum	<i>Prunus</i>	Shrubby Yew Pine	<i>Podocarpus</i>
Plume Cryptomeria	<i>Cryptomeria</i>	Siberian Elm	<i>Ulmus</i>
Pohutukawa	<i>Metrosideros</i>	Silktassel	<i>Garrya</i>
Poison Oak	<i>Rhus</i>	Silk Tree	<i>Albizzia</i>
Pomegranate	<i>Punica</i>	Silky Oak	<i>Grevillea</i>
Ponderosa Pine	<i>Pinus</i>	Silver Wattle	<i>Acacia</i>
Poplar	<i>Populus</i>	Smoke Tree	<i>Cotinus</i>
Port Orford Cedar	<i>Chamaecyparis</i>	Smooth-Barked Apple	<i>Angophora</i>
Portuguese Laurel	<i>Prunus</i>	Soapbark Tree	<i>Quillaja</i>
Prickly Paperbark	<i>Melaleuca</i>	Sour Gum	<i>Nyssa</i>
Privet	<i>Ligustrum</i>	Spanish Chestnut	<i>Castanea</i>

COMMON NAME	GENUS	COMMON NAME	GENUS
Spanish Fir	<i>Abies</i>	Walnut	<i>Juglans</i>
Spruce	<i>Picea</i>	Washington Thorn	<i>Crataegus</i>
Sticky Hopbush	<i>Dodonaea</i>	Water Gum	<i>Tristania</i>
St. John's Bread	<i>Ceratonia</i>	Wattle	<i>Acacia</i>
Stone Pine	<i>Pinus</i>	Wax Myrtle	<i>Myrica</i>
Strawberry Guava	<i>Psidium</i>	Weeping Bottlebrush	<i>Callistemon</i>
Strawberry Tree	<i>Arbutus</i>	Weeping Willow	<i>Salix</i>
Sugar Gum	<i>Eucalyptus</i>	Western Red Cedar	<i>Thuja</i>
Sugar Maple	<i>Acer</i>	White Alder	<i>Alnus</i>
Sumac	<i>Rhus</i>	White Ash	<i>Fraxinus</i>
Swamp She-Oak	<i>Casuarina</i>	White Fir	<i>Abies</i>
Sweet Bay	<i>Laurus</i>	White Mulberry	<i>Morus</i>
Sweet Gum	<i>Liquidambar</i>	White Poplar	<i>Populus</i>
Sweet Hakea	<i>Hakea</i>	Wilga	<i>Geijera</i>
Swiss Mountain Pine	<i>Pinus</i>	Willow	<i>Chilopsis, Salix</i>
Sycamore	<i>Acer, Platanus</i>	Willow Myrtle	<i>Agonis</i>
Sydney Golden Wattle	<i>Acacia</i>	Windmill Palm	<i>Trachycarpus</i>
		Wirilda	<i>Acacia</i>
Tallow Tree	<i>Sapium</i>	Wisteria	<i>Wisteria</i>
Tamarisk	<i>Tamarix</i>	Woolly Butt	<i>Eucalyptus</i>
Tanbark Oak	<i>Lithocarpus</i>	Wych Elm	<i>Ulmus</i>
Tangelo	<i>Citrus</i>		
Tarata	<i>Pittosporum</i>	Xylosma	<i>Xylosma</i>
Tasmanian Blue Gum	<i>Eucalyptus</i>		
Tasmanian Tree Fern	<i>Dicksonia</i>	Yate	<i>Eucalyptus</i>
Tea Tree	<i>Leptospermum</i>	Yellow Buckeye	<i>Aesculus</i>
Thorn	<i>Crataegus, Parkinsonia</i>	Yew	<i>Taxus</i>
Tipu Tree	<i>Tipuana</i>	Yew Pine	<i>Podocarpus</i>
Titoki	<i>Alectryon</i>	Yoshino Cherry	<i>Prunus</i>
Tobira	<i>Pittosporum</i>	Yucca	<i>Yucca</i>
Torrey Pine	<i>Pinus</i>		
Toyon	<i>Heteromeles</i>	Zelkova	<i>Zelkova</i>
Tree Fern	<i>Cyathea, Dicksonia</i>		
Tree of Heaven	<i>Ailanthus</i>		
Trident Maple	<i>Acer</i>		
Tulip Tree	<i>Liriodendron</i>		
Tupelo	<i>Nyssa</i>		
Valley Oak	<i>Quercus</i>		
Vine Maple	<i>Acer</i>		

List of Species

The abbreviations of the botanical names (genus in capitals, species in lower case) point to entries in the main list that starts on page 32.

<i>abies</i> , PICab	<i>azedarach</i> , MELaz	<i>POPca</i>	<i>crista-galli</i> , ERcr
<i>acerifolia</i> , PLac	<i>babylonica</i> , SALba	<i>canariensis</i> , PHca,	<i>cunninghamiana</i> ,
<i>acerifolius</i> , BRac	<i>baccata</i> , MALsp,	<i>PINca</i>	CAScu
<i>aculeata</i> , PAac	<i>Taba</i>	<i>capitata</i> , BUca, COca	<i>cunninghamii</i> ,
<i>africana</i> , SPaf	<i>baileyana</i> , ACABA	<i>carica</i> , FICA	ARAcu
<i>aggregata</i> , EUag	<i>behrii</i> , BAbE	<i>carnea</i> , AEcar	<i>cuspidata</i> , TAbA
<i>agrifolia</i> , QUag	<i>betulus</i> , CARbe	<i>caroliniana</i> , CARca,	
<i>alaternus</i> , RHal	<i>bidwillii</i> , ARAbi	<i>PRca</i>	<i>dealbata</i> , ACAde
<i>alba</i> , CONu, MOal,	<i>bignonioides</i> , CATbi	<i>cattleianum</i> , PSCa	<i>decidua</i> , LAeu
<i>POPal</i> , SALal	<i>biloba</i> , Gibi	<i>cerasifera</i> , PRce	<i>decurrens</i> , ACAde,
<i>altissima</i> , AIal	<i>boaria</i> , MAYbo	<i>chinensis</i> , JUch,	CALde
<i>americana</i> , FRam,	<i>botryoides</i> , EUbo	<i>LIVch</i> , PISch	<i>deflexa</i> , ERde
<i>PEam</i> , TIam,	<i>brachyandrus</i> , CALbr	<i>chrysolepis</i> , QUch	<i>densiflora</i> , PINde
<i>ULam</i>	<i>bracteata</i> , ABbr	<i>cilicica</i> , ABci	<i>densiflorus</i> , LITde
<i>angustifolia</i> , FRan	<i>bridgesiana</i> , EUbr	<i>cinerea</i> , EUcin	<i>deodara</i> , CEDde
<i>antarctica</i> , DIan	<i>brutia</i> , PINbr	<i>circinatum</i> , ACEci	<i>discolor</i> , BRdi
<i>aquifolium</i> , ILaq	<i>buergeranum</i> , ACEbu	<i>citriodora</i> , EUcit	<i>distichum</i> , TAdi
<i>araucana</i> , ARAar	<i>bungeana</i> , PINbu	<i>cladocalyx</i> , EUcl	<i>diversicolor</i> , EUdi
<i>arboreus</i> , CEaar		<i>coccinea</i> , QUco	<i>diversiloba</i> , RHdi
<i>arbutifolia</i> , HEar		<i>coggygria</i> , COco	<i>doltsopa</i> , MIdo
<i>arizonica</i> , CUar	<i>caesia</i> , EUcae	<i>columnaris</i> , FOco	<i>domestica</i> , PRar
<i>armata</i> , BRar	<i>californica</i> , AEcal,	<i>communis</i> , MYco	<i>douglasii</i> , QUdo
<i>armeniaca</i> , PRar	<i>JUca</i> , MYca,	<i>concolor</i> , ABco	<i>dulcis</i> , PRar
<i>armillaris</i> , MELar	<i>TOca</i> , UMca	<i>conferta</i> , TRco	
<i>atlantica</i> , CEDli,	<i>californicum</i> , FRca	<i>congestum</i> , XYco	<i>edulis</i> , BRed, PINed
<i>PISat</i>	<i>calleryana</i> , PYka	<i>contorta</i> , PINcon	<i>eldarica</i> , PINbr
<i>aurantifolia</i> , CIsP	<i>callicarpa</i> , SAMca	<i>cooperi</i> , CYco	<i>elliptica</i> , GAel,
<i>australe</i> , CASau	<i>camaldulensis</i> , EUcam	<i>cordata</i> , ALco, TICO	<i>MElel</i>
<i>australis</i> , CELau,	<i>campestre</i> , ACEca	<i>costata</i> , ANco	<i>elongatus</i> , PODgr
<i>COau</i>	<i>camphora</i> , CICA	<i>coulteri</i> , PINcou	<i>equisetifolia</i> , CASEq
<i>avellana</i> , COav	<i>canadensis</i> , CERca,	<i>crassifolium</i> , PITcr	<i>eremophila</i> , CASer

erythronema, EUer
eugenioides, PITeu
eurolepis, LAeu
europaea, OLeu
excelsa, METex
excelsior, FRex
excelsus, ALEX

ficifolia, EUfi
filifera, WAFi, YUfi
flexuosa, AGfl
floribunda, MALsp
floribundus, LYfl
florida, CONu
floridum, CERfl
fortunei, TRfo
fremontii, POPfr
funebri, CUfu

giganteum, SEgi
glabra, ULgl
glanduliferum, CIGl
glauca, CASgl, PICgl
globulus, EUgl
glyptostroboides,
METgl
gracilior, PODgr
granatum, PUgr
grandiflora, MAGgr
griseum, ACEgr
gunnii, EUgu

halepensis, PINha
heterophylla, ARAhe
hindsii, JUca
hippocastanum, AEhi
humeana, ERhu
humilis, CHAhu

ilex, QUil
ilicifolia, PRil

illinoensis, CARil
indica, LAin
insignis, BRin
integrifolia, BAin,
RHin
involucrata, DAin

jacquemontii, BEja
japonica, CISP, CRja,
ERja, SOja
jeffreyi, PINje
jujuba, ZIJu
julibrissin, ALju
juniperina, TAJu

kaempferi, LAeu
kaki, DIka
kawakamii, PYka
kelloggii, QUke
kousa, CONu
kruseana, EUkr

laeliae, EULA
laetum, MYla
laevigata, CRLa,
SALLa
laevigatum, ESMo,
LEla
lancea, RHla
lasiandra, SALLa
lasirolepis, SALLa
latifolia, FRla
laurina, HALa, TRla
laurocerasus, PRLa
lawsoniana, CHAla
lehmannii, EUleh
leucoxydon, EUleu
libani, CEDli
liliflora, MAGli
limon, CISP
linariifolia, MELli

linearis, CHili, EUli
lobata, QUlo
longifolia, ACAla
lucidum, LIGlu
lusitanica, PRLu
lyonii, PRLy

macarthurii, EUMaca
macrocarpa, CUMA
macrophyllum,
ACEma
macrophyllus,
PODMA
maculosa, EUMacu
manzanita, ARCMa
margarita, FOMA
mas, CONu
matsudana, SALma
megacornuta, EUMeg
melanoxydon,
ACAME
melioidora, EUMel
menziesii, ARBme,
PSme
mexicana, SAMme
microphylla, AZmi
mimosifolia, JAMI
minor, ULmi
molle, SCmo
monogyna, CRmo
montevidensis, ESMo
mucronatum, TAMu
mugo, PINmug
muricata, PINmur

negundo, ACENE
nesophila, MELne
nicholii, EUNI
nigra, MOal, PHni,
PINni, POPni
nobilis, LAno

nuttallii, CONu

oblonga, CYob
occidentalis, CELoc,
CERoc, PLac,
PLra, THoc
octandra, AEoc
oleander, NEol
orientalis, LIQor,
PICor, PLor,
THor
ornus, FRor
oxyacantha, CRLa

palmatum, ACEpa
palustris, QUPa
paniculata, EUPa,
KOPa
paniculatum, SYpa
papyrifera, BEpe
paradisi, CISP
parviflora, GEpa
parvifolia, EUPar,
ULpa
patens, EUPat
patersonii, LAPa
patula, PINpa
pavia, AEpa
pellita, EUpe
pendula, BEpe
persica, PApe, PRar
phaenopyrum, CRph
pilularis, BAPI
pineae, PINpi
pinsapo, ABpi
platanoides, ACEpl
platypus, EUpl
plicata, THpl
polyanthes, EUpo
polygamus, SCpo
ponderosa, PINpo

populneus, BRpo
pravissima, ACApr
procera, ULmi
pseudoacacia, ROps
pseudoplatanus,
ACEps
pulverulenta, EUpu
pumila, ULpu
pungens, PICpu
purpurea, MALsp

racemosa, PLra
radiata, PINra
recurvata, NOre
redolens, ACAme
regia, JUre
resinifera, EUre
reticulata, CIsp
retinodes, ACAret
retusus, CHire
revoluta, CYre
rhombofolia, ALrh
robur, QUro
robusta, EUro, GRro,
WAro
romanzoffianum, SYro
rubra, QUru, MOal
rubrum, ACEru
rupestris, BRru

sabiniana, PINsa
saccharinum, ACEsa
saccharum, ACEsa
salubris, EUsa
saponaria, QUsa
sativa, CASSa
scoparium, LESC
sebiferum, SAPse
sellowiana, FEse
sempervirens, CUse,
SEse

serrata, ZEse
serrulata, PHse, PRse
sideroxydon, EUSi
siliqua, CERsi
sinensis, CELsi,
CIsp, WIsi
smithii, ACMsm
soulangiana, MAGso
speciosa, CHosp
stellata, MAGst
stricta, CASst
stypheleoides, MELst
styraciflua, LIQst
suaveolens, HASu
suber, QUsu
sylvatica, FAsy, NYSy
sylvestris, PINsy

tenuifolium, PITte
terebinthifolius, SCTe
ternifolia, MACte
thunbergiana, PINth
tipu, TIti
tobira, PITto
tomentosa, PAto
torreyana, PINto
torulosa, CUTO
triacanthos, GLtr
tulipifera, LIRtu

uhdei, FRuh
undulatum, PITun
unedo, ARBun

variegata, BAVA
velutina, FRve
vera, PISch
verticillata, ACAve
viminalis, CALvi,
EUvi
virginiana, QUvi

virginicus, CHivi
viscosa, DOvi
vulgaris, SYvu

wheeleri, DAWh

yedoensis, PRye

Araucaria bidwillii, Bunya Bunya



Forest Trees of Australia (Nelson-CSIRO, 1985)



List of Tree Families

This table lists, against each family, the genera that appear in this book. The table draws attention to relationships between trees that are not always obvious and are instructive to contemplate. It is also helpful to those interested in comparing flowers and other features of tree species that are related. The best-represented families are the Myrtle family (15 genera), Pea (14), Rose (14), Palm (8), and Pine (6). Families marked with a * contain both evergreen and deciduous trees.

Coniferous Gymnosperms

ARAUCARIACEAE (Araucaria family)

CUPRESSACEAE (Cypress family)

PINACEAE (Pine family)

PODOCARPACEAE (Podocarpus family)

TAXACEAE (Yew family)

TAXODIACEAE (Taxodium family)

Araucaria

Calocedrus, Chamaecyparis, Cupressus, Juniperus, Thuja

Abies, Cedrus, Larix, Picea, Pinus, Pseudotsuga

Podocarpus

Taxus, Torreya

Cryptomeria, Metasequoia, Sequoia, Sequoiadendron, Taxodium

Other Gymnosperms

CYCADACEAE (Cycad family)

GINKGOACEAE (Ginkgo family)

Cycas

Ginkgo

Palms and Lilies

AGAVACEAE (Agave family)

PALMAE (Palm family)

Cordyline, Dasylirion, Nolina, Yucca

Brahea, Butia, Chamaerops, Livistona, Phoenix, Syagrus, Trachycarpus, Washingtonia

Ferns

CYATHEACEAE (Cyathea family)

DICKSONIACEAE (Dicksonia family)

Cyathea

Dicksonia

Deciduous Broadleaf Trees

ACERACEAE (Maple family)

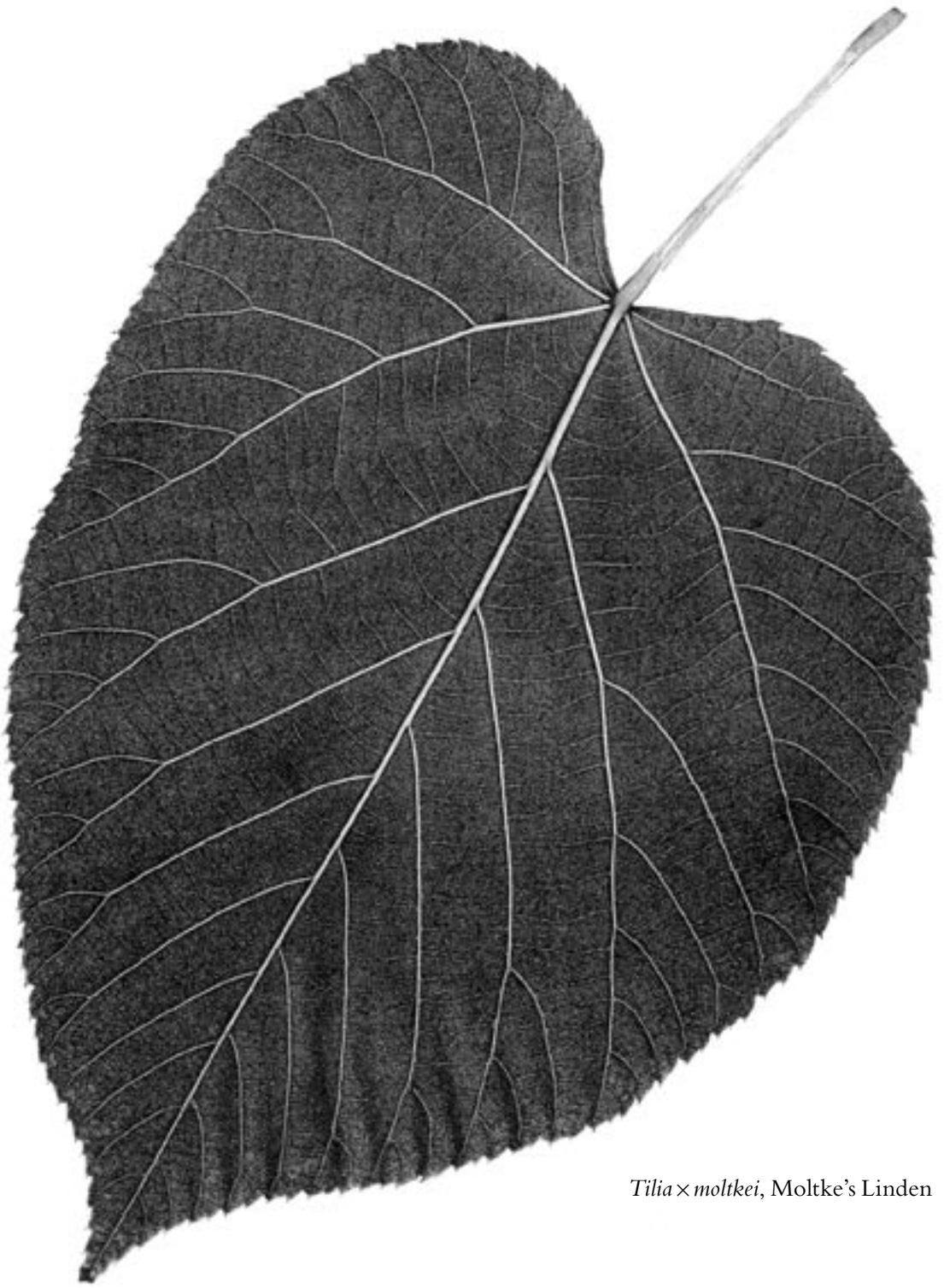
Acer

*ANACARDIACEAE (Sumac or cashew family)	<i>Cotinus, Pistacia, Rhus</i>
BETULACEAE (Birch family)	<i>Alnus, Betula, Carpinus, Corylus</i>
BIGNONIACEAE (Bignonia family)	<i>Catalpa, Chilopsis, Jacaranda, Paulownia</i>
BOMBACACEAE (Bombax family)	<i>Chorisia</i>
CAPRIFOLIACEAE (Honeysuckle family)	<i>Sambucus</i>
CORNACEAE (Dogwood family)	<i>Cornus</i>
EBENACEAE (Ebony family)	<i>Diospyros</i>
EUPHORBIACEAE (Spurge family)	<i>Sapium</i>
*FAGACEAE (Oak or beech family)	<i>Castanea, Fagus, Quercus</i>
HAMMAMELIDACEAE (Witch hazel family)	<i>Liquidambar, Parrotia</i>
HIPPOCASTANACEAE (Horsechestnut family)	<i>Aesculus</i>
JUGLANDACEAE (Walnut family)	<i>Carya, Juglans</i>
*LEGUMINOSAE (Pea family)	<i>Albizzia, Bauhinia, Cassia, Cercidium,</i> <i>Cercis, Gleditsia, Parkinsonia, Robinia,</i> <i>Sophora, Tipuana, Wisteria</i>
LYTHRACEAE (Loosestrife family)	<i>Lagerstroemia</i>
MELIACEAE (Mahogany family)	<i>Melia</i>
*MAGNOLIACEAE (Magnolia family)	<i>Magnolia, Michelia</i>
MORACEAE (Mulberry family)	<i>Ficus, Morus</i>
NYSSACEAE (Tupelo family)	<i>Davidia, Nyssa</i>
*OLEACEAE (Olive family)	<i>Chionanthus, Fraxinus, Syringa</i>
PLATANACEAE (Plane tree family)	<i>Platanus</i>
PUNICACEAE (Pomegranate family)	<i>Punica</i>
*RHAMNACEAE (Buckthorn family)	<i>Zizyphus</i>
*ROSACEAE (Rose family)	<i>Chaenomeles, Crataegus, Cydonia, Malus,</i> <i>Prunus, Pyrus, Sorbus</i>
SALICACEAE (Willow family)	<i>Populus, Salix</i>
SAPINDACEAE (Soapberry family)	<i>Alectryon, Dodonaea, Koelreuteria</i>
SIMAROUBACEAE (Quassia family)	<i>Ailanthus</i>
SOLANACEAE (Nightshade family)	<i>Brugmansia</i>
TAMARICACEAE (Tamarisk family)	<i>Tamarix</i>
TILIACEAE (Linden family)	<i>Sparmannia, Tilia</i>
ULMACEAE (Elm family)	<i>Celtis, Ulmus, Zelkova</i>

Broadleaf Evergreens

*ANACARDIACEAE (Sumac or cashew family)	<i>Pistacia, Rhus, Schinus</i>
APOCYNACEAE (Dogbane family)	<i>Nerium</i>
AQUIFOLIACEAE (Holly family)	<i>Ilex</i>
CASUARINACEAE (Sheoak family)	<i>Casuarina</i>
CELASTRACEAE (Staff tree family)	<i>Maytenus</i>
ERICACEAE (Heath family)	<i>Arbutus, Arctostaphylos</i>

ESCALLONIACEAE (Escallonia family)	<i>Escallonia</i>
*FAGACEAE (Oak or beech family)	<i>Lithocarpus, Quercus</i>
FLACOURTIACEAE (Flacourtia family)	<i>Azara, Xylosma</i>
GARRYACEAE (Silktassel family)	<i>Garrya</i>
LAURACEAE (Laurel family)	<i>Cinnamomum, Laurus, Persea, Umbellularia</i>
*LEGUMINOSAE (Pea family)	<i>Acacia, Castanospermum, Ceratonia</i>
*MAGNOLIACEAE (Magnolia family)	<i>Liriodendron, Magnolia</i>
MALVACEAE (Hibiscus family)	<i>Lagunaria</i>
MYOPORACEAE (Myoporum family)	<i>Myoporum</i>
MYRICACEAE (Sweetgale family)	<i>Myrica</i>
MYRTACEAE (Myrtle family)	<i>Acmena, Agonis, Angophora, Baeckia, Callistemon, Eucalyptus, Feijoa, Leptospermum, Melaleuca, Metrosideros, Myrtus, Psidium, Syzygium, Tristania, Tristaniopsis</i>
*OLEACEAE (Olive family)	<i>Ligustrum, Olea</i>
PITTOSPORACEAE (Pittosporum family)	<i>Pittosporum</i>
PROTEACEAE (Protea family)	<i>Banksia, Grevillea, Hakea, Macadamia, Stenocarpus</i>
*RHAMNACEAE (Buckthorn family)	<i>Ceanothus, Rhamnus</i>
*ROSACEAE (Rose family)	<i>Eriobotrya, Heteromeles, Lyonothamnus, Photinia, Prunus, Pyrus, Quillaja</i>
RUTACEAE (Rue family)	<i>Citrus, Fortunella, Geijera</i>
STERCULIACEAE (Sterculia family)	<i>Brachychiton, Fremontodendron</i>



Tilia x moltkei, Moltke's Linden

Tree List in Order of Botanical Names

In the following list the genus comes first, then the species, then a common name, and then an indication of the geographic area where the tree is native. The second line mentions the family to which the genus belongs. If you do not know the genus name but have a common name, go to the *List of Common Names* on page 18. If you do not know the genus but know the species, go to the *List of Species* on page 24.

Abies bracteata Santa Lucia Fir *California*
PINACEAE A fir of rather limited distribution in the Santa Lucia Mountains just south of
(Pine Family) Monterey. Its distinguishing feature, as reflected by its alternative name

bristlecone fir, is the possession of needle-like bracts up to an inch long protruding from between the cone scales. The specimen on Serra Mall to the left of the entrance to the Lou Henry Hoover Building was planted just before 1900. The area was known as Encina Garden at the time when Encina Hall was the men's residence.

Saint Lucy, a 3rd century Sicilian martyr, was venerated by early navigators in the Caribbean and other parts of Spanish America. Seeing that the Santa Lucia fir is a local native of good appearance, one might expect it to figure more prominently in future plantings of conifers. Another specimen is at 654 Creek Drive, Menlo Park, once the home of the late horticulturist and garden writer Albert Wilson.

Abies cilicica Cilician Fir *Turkey, Syria*

The 1-inch needles of Cilician fir are dark glossy green on top and paler green below, but most of the underside is covered by two broad, whitish bands. Under a hand lens each band is seen to consist of half a dozen or so lines of separate white dots, the stomata that control gas exchange with the air.

Rich in history, long before and long after it was defined as a Roman province, Cilicia is on the Turkish coast, just north of Cyprus, and is now a cruise-ship destination. Its firs are not commonly planted; we are indebted to Saratoga Horticultural Research Foundation for cultivating them.

Two beautiful 6-foot individuals are in the area bounded by Green Library, Meyer Library, and Galvez Module; another, 12 feet tall, is east of the Clock Tower surrounded by a sea of prostrate tea-tree.

White Fir

Sierra Nevada, Rockies *Abies concolor*

A familiar fir of the Sierra Nevada around the 6000 foot level, for example at Stanford Sierra Camp on Fallen Leaf Lake, and one of the most popular Christmas trees. The single needles are up to about 2 inches long and are twisted at their point of attachment. The 2- to 4-inch cones stand upright on the upper branches and fall to pieces as the triangular winged seeds are released, leaving a core behind. Lost from campus in recent years, but common at Stanford Sierra Camp. This is an historic site pioneered by original Stanford faculty, and affords a great opportunity for getting to know many native trees, including incense cedar, red fir, white fir, hemlock, juniper, Jeffrey pine, lodgepole pine, sugar pine, white pine, alder, aspen, cottonwood, hemlock, canyon live oak, vine maple, and willows.

Spanish Fir

Spain *Abies pinsapo*

A very pleasing tree indeed with plump stiff blunt leaves arranged like a bottlebrush. It is impossible to resist stroking the foliage. A well known and noble example is at 634 Alvarado Row. There is a memorable specimen in Frost Amphitheater, which was planned in 1937 by comptroller Almon E. Roth (1886–1964) with Leland Stanford's arboretum concept clearly in mind. It is located on the slope near the west side of the stage. Another specimen can be seen in Palo Alto in the lawn opposite 112 Kingsley Avenue near the Embarcadero Road underpass.

The word "fir" in English is cognate with tree names in various Northern European languages (e.g. German *Föhre*) and since the genus *Abies* did not extend to Northern Europe the word fir in English literature does not necessarily imply *Abies* as specified by Linnaeus. Scotch fir, for example, belongs to *Pinus*, not to *Abies*. What fir meant to King James is open to discussion; his translators used the word to render the Hebrew *brosh*, which today means cypress. The Latin *abies* is similarly of obscure denotation. Before Linnaeus introduced the binomial system, *abies*, *pinus* and *quercus* were common names, used as the locals pleased. In fact fir and *quercus* are themselves related (as are four and *quattuor*).

Acacia Notes

The name is derived from the Greek Ἀκακία in reference to the sharpness of the leaves of the plant known to the Greeks. There are over 700 species of *Acacia* in Australia, where *A. pycnantha* is the national floral emblem. There are many more in Africa; in ancient

Egypt acacia was associated with life after death, and the custom of burying an acacia spray with the departed is continued today in some societies.

One species, *A. greggii*, is native to the continental United States, surviving on as

little as 3 inches rainfall in the Mohave Desert; it has been drawn on as a source of gum. The valuable *A. koa* grows in Hawaii; the champion koa, in the District of Kau, stood at 140 feet in 1969. Giant trees 30 feet around can be seen. Traditional artifacts from acacia included dugout canoes and surfboards.

The wood is generally very hard and attractive for carving; koa wood, known as Hawaiian mahogany, is an example. Many species exude copious gum (such as gum arabic, obtained from several North African acacias) that has pharmaceutical and industrial uses as well as being added to food. The gum from *A. decurrens*, found on campus, is chewable, but tends to stick to the teeth. In 1827 Peter Miller Cunningham (1789–1874) wrote in *Two Years in New South Wales*, “Acacias are the common wattles of this country. . . . Clear transparent beads of the purest Arabian gum are seen suspended in the dry spring weather, which our young currency bantlings eagerly search after and regale themselves with.”

Seeds of some species are eaten. Survival on “bush tucker” is taught by the Australian military and has caught the interest of the public, so that “wattle seed,” for example, is obtainable in health food stores.

There are two kinds of acacia, those with bipinnate leaves only and those that develop phyllodes instead of leaves. *Phyllode* is botanical Greek for “like a leaf.” If you can catch a seedling at the stage where it still has a few feathery leaves, and phyllodes are beginning to form on the same stalk (see illustration, page 36), it is a sight to behold. Several acacias live for only 20 years or so and, with the coming and going of fashions in the landscape architect community, few if any have been planted on campus in the last quarter century. Consequently, many locations not-

ed in the 1973 version of this book are no longer occupied, though regeneration has occurred here and there. Pruning after flowering preserves vigor.

Specimens noted in 2000 include *A. decurrens* and *A. longifolia*, whose attraction is their splendid floral display as early as February or even January, demonstrating a faith in the future not shared by many of our deciduous trees. *A. melanoxylon*, which is not short lived, is a reliable frost-resistant occupant of difficult locations. In Europe, feathery Australian acacias are commonly called mimosa, in particular by florists. In America, the silk tree is often called mimosa. In neither usage is the glossy *Mimosa* intended. Acacia pollen being heavy is not carried far by the breeze, but gets the blame for irritation caused by pollen from less showy flowers (those of the live oak for example).

The Greek Ἀκάκια is thought to have applied to the biblical shittah tree, of whose wood the ark of the covenant was fashioned. Many copies of the ark have been made to the precise published dimensions, but none was as dangerous as the original. When the Philistines captured the ark and placed it in the temple of Dagon in Ashdod (west of Jerusalem), the image of Dagon suffered damage and so many Philistines died of emerods (more likely dysentery) that the ark was expelled on a cow-drawn cart, driverless for safety; on arrival within the land of Israel at Beth Shemesh, it was unfortunately unloaded by unauthorized Jewish farmers, 70 of whom died. On the ark’s way back to Jerusalem, Uzzah, a good man whose name has been remembered for more than 3000 years, inadvertently touched the ark to balance it, and was struck dead. So also were Nadab and Abihu, sons of Aaron. When Moses and Aar-

on originally brought the ark to Israel, the tent that enclosed the ark at campsites during the wanderings in the desert had to be open at the top; the ark was so potent that it caused

the air above the tent to glow red at night. Only the high priest had the knowledge for tending it safely.

Cootamundra Wattle

New South Wales

Acacia

A shapely tree with silvery foliage and masses of brilliant golden flowers in late winter. It can be separated from green wattle and silver wattle by having four (occasionally five) pairs of pinnae (the major segments into which the leaf is divided). Each pinna is further subdivided into many tiny silvery flat pinnules about ¼ inch long. Just below the point of attachment of each pair of pinnae there is a gland with a dark spot that is visible from the upper surface of the pinnae. This small tree is a candidate, with *Cassia eremophila*, for first prize among yellow-flowered trees. See it at 880 Lathrop Drive. Three are south of The Knoll behind the west-most of two trailer annexes. It is an introduced exotic on Jasper Ridge.

baileyana

LEGUMINOSAE

(*Bean family*)

Silver Wattle

Tasmania, Victoria, New South Wales, Queensland

Acacia dealbata

Green Wattle

New South Wales, Queensland

A. decurrens

The brilliant yellow displays in February and March, which distinctly precede the coming of spring and add color to the winter's end, are mainly from these species. I have concluded that I cannot tell one from the other and look forward to being instructed.

The feathery leaves are divided into a dozen or so pinnae each with three dozen or so pinnules about ¼ inch long. At the point of attachment to the branch, the leaf stalks of green wattle run on as definite ridges on the branch. Green wattle also has a rough, dark or black trunk. Many of the campus trees do not exhibit the silvery-gray foliage of silver wattle, but neither do they possess the prominently ridged stems and dark trunk of green wattle. There is a large leaning specimen on Governor's Avenue where it makes a corner at Lake Lagunita and substantial numbers can be found in the area of Frenchman's and Gerona Roads. There is one on Campus Drive at the southeast corner with Lomita Drive, and it is also reported on Jasper Ridge.

Sydney Golden Wattle

Eastern Australia

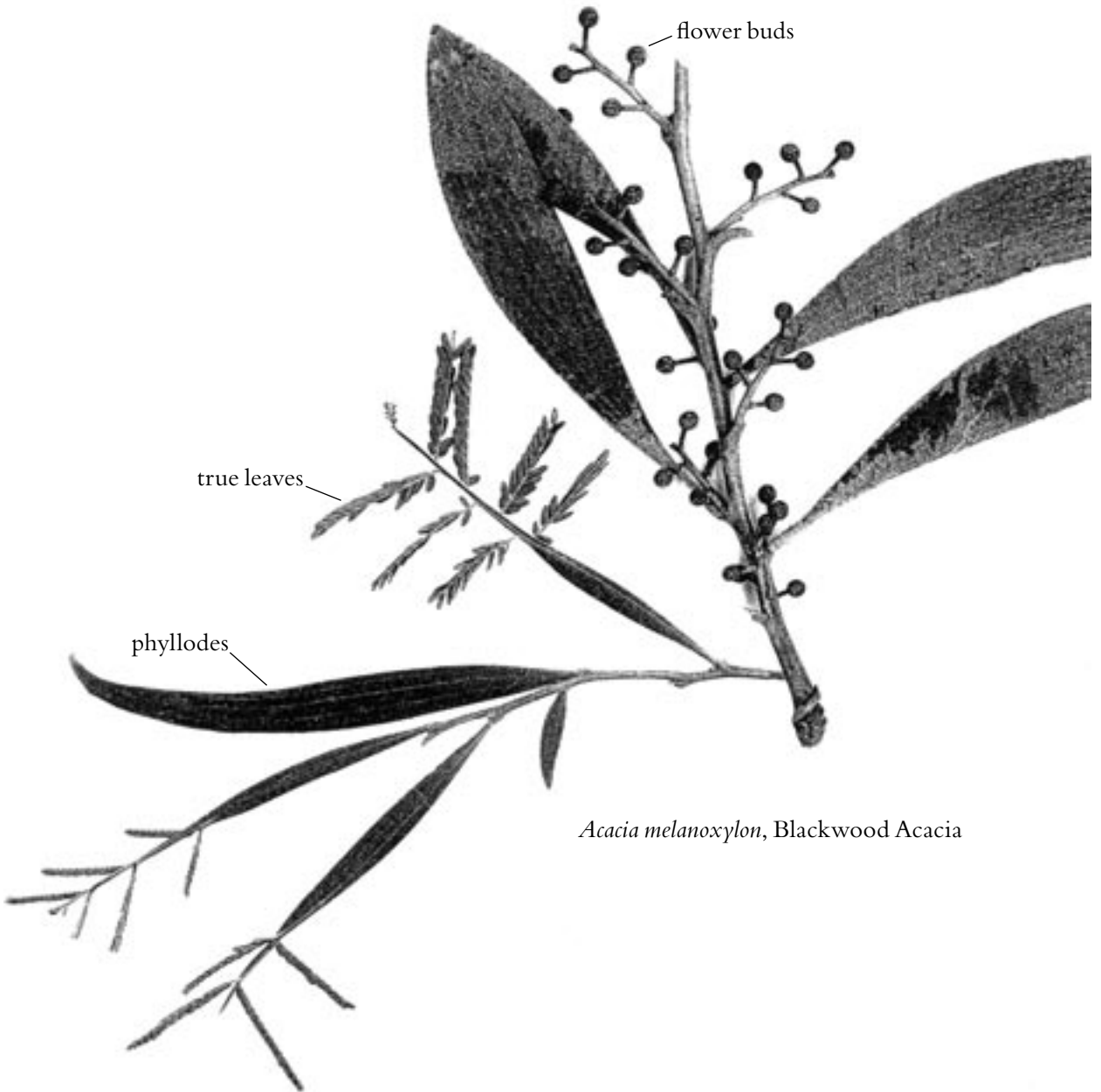
Acacia

Widely used as a rapidly growing screen, Sydney golden wattle appears in the form of small trees at the Bechtel International Center (between Mayfield Avenue and Lagunita Drive), as shrubs between Roth Way and Serra Street, and in front of 340 Bonair Siding in a landscape featuring Australian and New Zealand plants. Three largish trees are opposite 770 Santa

longifolia



Acacia baileyana, Cootamundra Wattle



Acacia melanoxylon, Blackwood Acacia

Ynez Street. The germinating seedlings exhibit a pair of feathery leaves, but from then on only 4- or 5-inch long phyllodes are produced; they are almost straight on one side and each with a few parallel veins. A gland will be found near the base on one edge. The yellow flowers, in the form of catkins an inch or 2 long, make a pleasing display from March to May, especially against the new foliage whose light green color is often sufficient to identify this species at a distance. The seeds were reportedly roasted and eaten by the Tasmanians in the 18th century.

Acacias have been used to stabilize sand dunes; Golden Gate Park was created, starting in 1871, from windswept sand dunes that had little natural vegetation. After the dunes were leveled and the swamp filled in with the aid of horse-drawn scoops (as also used for leveling the Quad site by cutting along Escondido Mall and filling along Serra Street to create the descent to the Oval), San Francisco's sand was stabilized with hundreds of thousands of acacias, especially Sydney golden wattle, which tolerates sand, salt wind, and summer dryness and makes a fine floral display. The park was created by engineer-designer William H. Hall, as recounted by Elizabeth McClintock in *The Trees of Golden Gate Park and San Francisco* (Heyday Books, Berkeley, 2001).

Blackwood Acacia

South Australia, Tasmania, Victoria, N.S.W.

*Acacia
melanoxylon*

A substantial tree, often seen more than 50 feet tall and with a trunk more than a foot in diameter. The flower display in March is occasionally impressive but may go unnoticed as the pale cream color is not striking. Generally speaking, blackwood acacia dispenses with leaves, clothing itself with matte gray-green phyllodes 3 to 6 inches long with pronounced parallel venation, but seedlings and young sprouts from the trunk often exhibit feathery leaves emerging from the phyllodes in a very surprising way. The numerous pods are often a conspicuous feature of the tree. If examined, they will reveal shiny black seeds ringed by a red horseshoe-shaped umbilical cord that can be used as a tow-rope by ants. It can be seen on Dueña Street at Building 520, and at the intersection of Lomita and Lagunita drives and elsewhere at Kingscote Gardens. An impressive specimen around 80 feet tall is on the lawn opposite 60–70 Pearce Mitchell Place. Numerous others are to be found in the older residential area, and on Hanover Street, Palo Alto (2151, 2301, 2349, and 2357). The reputedly tallest blackwood acacia in the United States in Kohee State Park, Hawaii, reached 78 feet some years ago. We may have overtaken it.

The tree was much admired by John Muir while exploring around Melbourne in 1903–1904. The wood, which is of teak quality and very dark but variegated, is produced commercially. At Stanford, where blackwood acacia

volunteers regularly, valuable wood for turning and hobby use is occasionally available from trees that have sprung up where they were not wanted. *A. redolens*, reported from Ongerup, Western Australia, in 1964, resembles *A. melanoxylon* but has bright yellow flowers and is used as a spreading ground cover on campus, for example on the steep banks of Lathrop Drive and on the dry, steep dividing strip from 749 to 773 Mayfield Avenue.

Acacia pravissima **Ovens Wattle** *Victoria, New South Wales*
A small tree with slender weeping branches clothed with half-moon shaped phyllodes about $\frac{1}{4}$ to $\frac{1}{2}$ inch long with a tiny mucro. The phyllodes resemble those of *A. cultriformis* but are clear green, not gray. There is a gland on the curved edge of the leaf, near the base. A 20-foot specimen that flowered profusely from late winter until early summer died at age 30 (not unusual for wattles) in the Stanford Avenue greenbelt. I visited the native haunt in the Ovens Valley and found abundant plants, few over 8 feet. As is noticeable elsewhere, a species that is a specialist at occupying a locally restricted, difficult habitat may excel in other places where protected from competition.

Acacia retinodes **Wirilda** *South Australia, Tasmania, Victoria*
Not common on campus, this acacia is readily recognized by the olive-green color and texture of its shrubby foliage. Flowering is not profuse, in fact, flowers may be sparse. The phyllodes are in the same general size range as those of *A. longifolia* and *A. melanoxylon*, but can be distinguished by having only one vein. There is a gland that is well away from the base of the phyllode. Specimens can be found at the north end of the fire road joining 511 Gerona Road to Campus Drive West.

Acacia verticillata **Prickly Moses** *South Australia, Tasmania, Victoria, N.S.W.*
Light airy foliage gives this plant a pleasing appearance. The phyllodes take the form of soft needles less than an inch long grouped in whorls. They are prickly enough to be handled gingerly (but not like kangaroo thorn, which can hardly be handled at all); this acacia is one of those known locally in Australia as prickly Moses (a corruption of mimosa). The plant became a conservatory favorite in cold climates. An example on Campus Drive, north of the Cogen Facility, was lost recently to road realignment.

Maple Notes

The maple genus of deciduous flowering trees is one of the largest, amounting to over 150 species. Apart from the fossil record, the antiquity of the family is indicated by the va-

riety of sizes, shapes, and colors of the leaves, variety that is unmatched in other families. Different cultivars of a *single* species can have leaves with no lobes, with five lobes but barely any separation, with five deeply dissected lobes, with five lobes of which each has five big sharp teeth, or with separate leaflets on their own stalks.

Maples are distributed over North America, much of Europe, and East Asia but they can also be found in the southern hemisphere, especially on the islands of Indonesia. Their fall color, celebrated in North America, is limited as regards natural occurrence to those temperate regions where the summer is hot and the winter is severe. But they are widely valued outside their native areas for their appearance, their shade, and the possibilities, to be found among the numerous species, for meeting special conditions.

In our area the tall bigleaf maple (*A. macrophyllum*) is a familiar sight in the Santa Cruz Mountains in fall, when the large, long-stalked, deeply cut, lobed leaves turn pale yellow. The leaves are borne in opposite pairs, and attach to the branch without stipules, as with all maples. Its habitat reaches to the Sierra Nevada foothills and to Alaska. It is exceptional among Western hardwoods in being suited for lumbering.

The most distinctive feature of maples is the fruit; it consists of winged seeds, joined together in pairs. A winged seed is called a samara, which is Latin for an elm seed, but the maple seed is winged on one side only.

Maple fruits are commonly called keys, in reference to the shape of the keys used for winding up clocks and toys and opening sardine tins.

If you had never seen a maple key falling you might look at one and wonder whether it would settle serenely, tumble, or dive like a hawk. The flowers, forming in late spring, are bunched in various ways according to the species, may be hanging or erect, and may be male, or female, or both. Though the flowers are not striking in appearance, it is interesting to examine them closely and try to explain the differences. The presence of five tiny petals and the provision of nectar suggest pollination by bees, but absence of both these features, as with the box elder (*A. negundo*), indicates wind pollination.

Adoption of the maple leaf for the Canadian flag seemed an odd selection, given that maples are ubiquitous in North America. The Canada goose must have been considered, though of course that symbol also is shared by the places where the geese go in winter.

Discarded pallets collected by campus residents are often of pine, but occasionally small pieces of quality hardwoods such as oak, sweet gum, or maple can be rescued for small craft projects—it depends on where the original point of shipment was. Asian long-horned beetles got at the maples in Brooklyn in 1996, and by 2002 some 700 trees had been removed as a precaution; the most sensitive target is Central Park.

Trident Maple

With its rather extreme form of maple leaf with three conspicuous veins and three lobes at the most, trident maple is readily identified. It is a rather small tree, suitable for restricted areas, but is also used as

China, Japan

Acer

buergerianum

ACERACEAE

(*Maple family*)

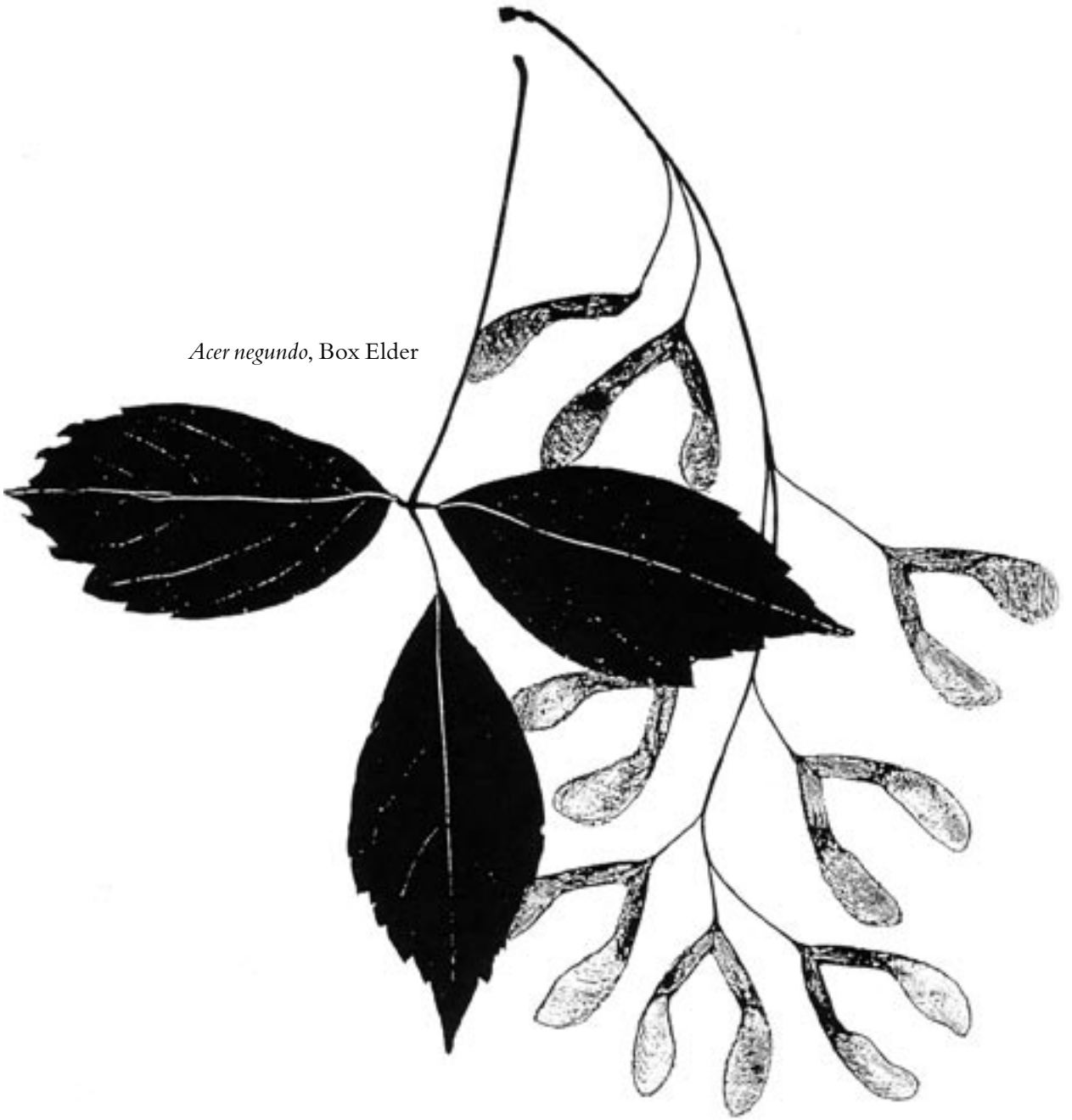
Acer buergeranum, Trident Maple





Acer macrophyllum, Bigleaf Maple

Acer negundo, Box Elder



a street tree at Stanford. There is one on your left as you go into Wilbur Hall at the main entrance on Escondido Road, and considerable numbers are on Alvarado Row near San Francisco Court. They line Pearce Mitchell Place from Mayfield Avenue to unit 17.

Most maple leaves have five structural ribs spanned by a flimsy membrane to take care of respiration and photosynthesis; the winter leaf drop then results in a minimum of waste. The basswoods, liquidambar, maples, planes, tulip trees, and other North American families use the five-rib design, but it is an interesting question, discussed under *Liquidambar styraciflua*, why Florida and Texas have maintained a strategy adapted to northern Canada.

Field Maple

Europe, Asia Minor

Acer campestre

The field maple or hedge maple is distinguished by rather rounded leaf lobes and by small keys, the edges of whose two parts form a straight line. It is a rather small tree and may be cut into a hedge. Examples can be seen on the west side of Stanford Avenue near Olmsted Road.

Vine Maple

Pacific Northwest

Acer circinatum

A small tree with large, many-lobed leaves, and having a clambering habit under forest conditions or when cultivated in shady places, where its fall color and red keys with widely spread wings (about 1½ inches long) are valued for their lively effect. Native around Stanford Sierra Camp.

Paperbark Maple

China

Acer griseum

Attractive flaking cinnamon bark, leaves with three leaflets, green above, silvery below, with some coarse teeth. Four specimens have been transplanted into the Mausoleum lawn.

Bigleaf Maple

Alaska to California

Acer

macrophyllum

The deeply cut leaves, about 6 inches across or more, have wiggly edges, a pale underside, and stalks 6 or so inches long. The samaras, which are red when young, have a furry body and the wings do not diverge much, in fact they may overlap. There is a specimen standing near the Norway maple northwest of Frost Amphitheater off Lasuen Street, and several between El Camino Real and Pampas Lane and between the Credit Union and Stanford Auxiliary Library. Specimens also can be seen in Atherton at Oak Grove and Middlefield Road. Bigleaf maple is a native tree of Jasper Ridge Biological Preserve and the foothills and creeks close to Stanford.

Box Elder

North America

Acer negundo

Leaves like an ash distinguish this maple. Three specimens of 'Variegatum',



Acer palmatum, Japanese Maple

which originated in France in 1845, can be seen adjacent to the Clock Tower in a circular bed at the southwest corner of the School of Education (corner of Escondido and Lasuen malls). The white-fringed leaves and balls of unusually colored samaras attract attention. *Acer negundo californicum* is native to stream banks around Stanford and may be found growing in San Francisco Creek at Junipero Serra Boulevard and Sand Hill Road and at Jasper Ridge. The leaf, which usually consists of three well-separated leaflets on their own stalks, paler and slightly hairy underneath, is distinctly unlike a maple leaf, but the paired keys are unmistakable. A feature of box elder is the strict division into male and female trees; most maples are bisexual (and in several different ways). Original box elder is not highly regarded in the Eastern states, but was used by Native Americans up and down the Missouri River for making sugar. The word *negundo* is from Sanskrit *nirgundī*, a name current in India for species of *Vitex*.

Japanese Maple

Japan, Korea

Acer palmatum

A most attractive, small deciduous tree with good autumn and spring color. The delicate, deeply dissected leaves are 2 to 3 inches across and have five or more lobes with more or less fancy margins. The flowers are purple and the ¼-inch keys have widely spread wings. The Japanese maple is available in dozens and dozens of varieties with different leaf shapes, color, and habit, and ranges from tree size to small tub subjects. In Japan, where the tree is known as Takao maple, there are hundreds of named forms resulting from the close attention it has received, and deserved, from man since unrecorded time. Children may enjoy picking up the fallen leaves and watching the variety of ways in which they sail to the ground. Before suggesting this experiment you might look at the leaves that have already fallen (which lie mostly the same side up) and ask whether the kids can suggest how they fall. On campus, seedlings volunteer under moist conditions. There is a pair at the entry to the passageway between Memorial Church and Building 60, and another a little further in. Examples of the 'Sango Kaku' variety can be seen at the northwest and southwest of the Bing Wing of Green Library.

Norway Maple

Europe

*Acer
platanoides*

Native to a vast region extending from southern Norway to the Pyrenees and from the Caucasus to the Urals, Norway maple has been introduced all across the United States. The five-lobed leaves are about 6 inches across and are placed oppositely on stalks up to 5 inches long. The sap in the leaf stalks is milky and sweet. Before the leaves appear, clusters of small yellowish green flowers make a display. Keys about 2 inches across quickly develop. A brilliant yellow display occurs in late autumn. Pliny tells us that the waxed tab-



Acer pseudoplatanus, Sycamore Maple

lets used in Roman times as note pads were of maple wood. Two trees south of Cantor Center and one near the southwest corner of the Main Quad are possibly ‘Schwedleri’ and/or ‘Reitenbachii’. My friend Margot Pratt shows kids how to wear a samara like spectacles, or break one in half, remove the seed, and stick it on like a rhino.

Sycamore Maple

Europe *Acer pseudoplatanus*

Look for specimens north of Frost Amphitheater toward Lasuen Street. The paired winged seeds, or samaras, as with those of other maples are fascinating objects and fun for children to drop from the top of the steps. This tree has been known for centuries in English literature as the sycamore, so the dictionary makers will never be persuaded to change the common name, even though the tree is certainly a maple. As with colonists everywhere, the English in America applied familiar names to unfamiliar plants and animals, thus the sycamores through which the candlelight was gleaming were not maples, but plane trees. This is the typical dilemma with common names: they can be ambiguous, or even tribigous. And there is nobody with authority to regulate the free market of words.

Red Maple

Eastern Canada, United States *Acer rubrum*

See six specimens of ‘Armstrong’ growing west of the entrance to the Beckman Center. A 40-foot red maple is at 474 Churchill Avenue, Palo Alto.

Silver Maple

Eastern North America, Texas *Acer saccharinum*

The characteristically shaped cordate leaves are about 5 by 5 inches, five-lobed with coarse teeth, and silvery below. The sap, which is not milky, is a source of maple sugar. A large specimen is at 579 Alvarado Row, on the right next to the fence. The silver maple growing at 733 Mayfield Avenue was planted in 1958 by faculty youngster and future arborist Phil Cannon. Three trees are near Palo Alto’s College Terrace Library, east side of the park.

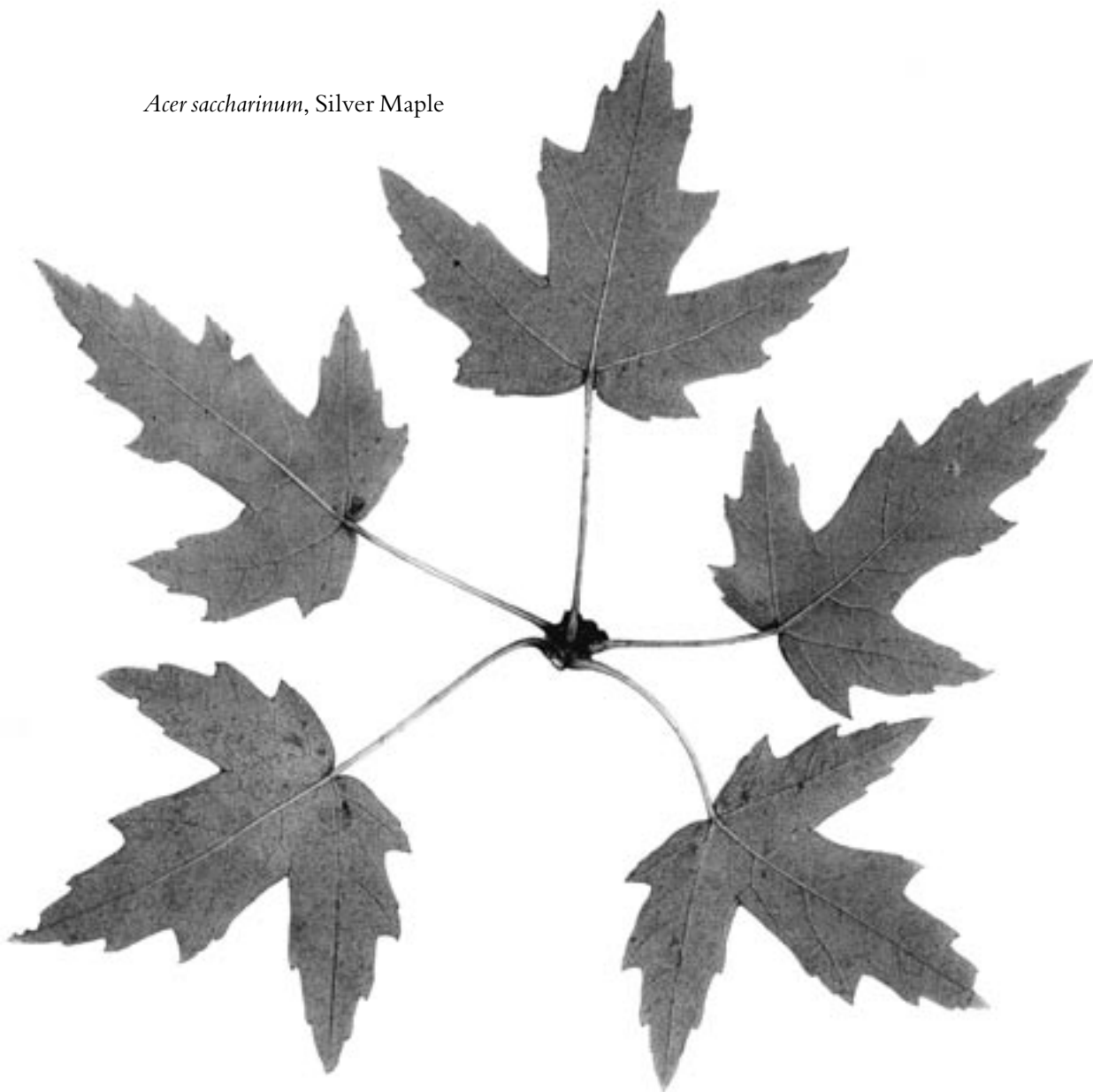
The famous sugar maple, *A. saccharum*, has similar leaves except that they are not cordate and have few teeth. The sap, which is not milky, is the source of the tasty maple sugar and maple syrup. The beautiful fine-grained wood is valuable and versatile. In our climate, sugar maples need summer water, but we have suitable lawns. I am not aware of any on campus.

Lillypilly

Victoria, New South Wales, Queensland *Acmena smithii*
MYRTACEAE
(*Myrtle family*)

An erect evergreen tree with dense dark-green foliage that often clothes the tree to the ground. Leaves are opposite and 3 inches long. The white flowers in September are very small but the fruit is a conspicuous, apple-shaped, lavender-pink, edible berry that offers a touch of winter color. One

Acer saccharinum, Silver Maple





Aesculus californica, California Buckeye

Aesculus × carnea, Red Horse Chestnut



specimen is behind Building 110, but is difficult to distinguish from the nearby grove of *Syzygium*, a related tree of similar appearance belonging to the myrtle family.

California Buckeye

Another tree native to campus and to Jasper Ridge, the buckeye has an unusual adaptation to our extreme climate with its rainless summer months. The leaves grow up to 16 inches long with five irregularly toothed leaflets. The tree avoids loss of water from transpiration through the leaves by dropping them in midsummer, sometimes when the large, fragrant, rosy flowers are still in bloom, making a remarkable sight. The giant fruits then slowly ripen and catch the eye as one drives by Lake Lagunita. They fall when it rains and can be grown into small plants the way avocado seeds are grown in jelly glasses. The heavy fruits are clearly not dispersed by wind, nor by birds or animals. Being round, they tend to run downhill and possibly into running water that can carry them to a new site. Buckeye flower buds may be cut and brought indoors in spring before they open and will then unfurl in their vase, just as the wooded hillsides near campus are acquiring their splendid light green foliage.

Occurrence of buckeyes, as on the Golf Course, may indicate the site of former habitation by Native Americans. They prepared the large seeds by macerating them in water to leach out tannins and the toxic substance saponin and subsequently grinding them into meal. Another method used was to steam them for several hours, slice thinly, and suspend them in a river in a basket until the poison was dissolved away. As this took several days, it is not clear that a newcomer to this type of food preparation would necessarily survive the first attempt. The crushed seeds were also used to stupefy fish.

Is the name *Aesculus* for the foreign horse chestnut, that is also edible (with care, just as with our buckeye), related to the Latin *esculentus*, which means edible?

Junipero Serra Boulevard, from Lake Lagunita to Fremont Road, is the place to see the fresh green developing against the contrasting drab oak background in February and March. Wild specimens also occur on Roth Way, and along San Francisquito Creek, for example near the Stanford Shopping Center.

Red Horse Chestnut

A cross between the common horse chestnut and the North American red buckeye (*A. pavia*), this tree is very striking when in bloom. The five-stemmed leaflets have rounded sawteeth. See an example in the southeast courtyard of Wilbur Hall and four at 817 Pine Hill Road. Two beautiful

California

*Aesculus
californica*

HIPPOCASTANACEAE

(*Horse chestnut
family*)

Aesculus × carnea

specimens inside the Frost Amphitheater fence on the north are distinguished by the presence of both pink and yellow flowers on the same spike. Many have been planted on the west side of the Shopping Center.

*Aesculus
hippocastanum*

Horse Chestnut

Balkans

Distinguished by its large palmate leaves with seven fingers that fatten toward the tips, the horse chestnut bears masses of $\frac{3}{4}$ inch flowers in upright spikes about 8 inches high. They are among the most beautiful of tree flowers and are favored by bees. The petals are white, blotched with red at the base. Native to Northern Greece and Albania, the tree must have been favored for shade, ornament, and fodder. The prickly green fruit contains a shiny chestnut-colored nut, up to 2 inches across, which small children like to feel. In England, the game of conkers is played by threading the nut on a string and swinging it at your opponent's nut. A record is kept of all the nuts that your nut has broken and a victorious conker can achieve very large scores because all the previous triumphs of a vanquished conker pass to its credit. Packages of horse chestnuts with an instruction card entitled "Don't go bonkers, Play conkers," proved to be exportable to South Africa. *A. hippocastanum* is now rare on campus, but an unusual grafted tree at 1017 Vernier Place has this species on the right and *A. × carnea* on the left. Standard chestnuts, *Castanea*, also have a prickly exterior but there are generally two (sometimes three) nuts enclosed, which, as a result, have a flat side.

*Aesculus
octandra*

Yellow Buckeye

Appalachians

Yellow buckeyes from the Appalachians, relatives of the California buckeye and the European horse chestnut, gave summer shade for several years to a favorite sitting place, the Tanner fountain in front of the Hoover Tower. Spectacular spikes of yellow flowers in summer were followed by glossy brown nuts that fell in early winter and were nice to play with, but inedible. Not much known in California, yellow buckeye provides material for wooden legs and piano keys in the East.

Considerable boldness is needed on the part of a landscape architect in choosing specimens for a conspicuous location, especially for formal geometry where the demise of one individual tree is rather noticeable. That is what happened to the original Tanner fountain carobs, which were replaced by yellow buckeyes when one or two carobs did not thrive. By the late 1980s the next replacement was sour gums *Nyssa sylvatica*. By 2000, those had been replaced by ground cover (professionally much safer). Surviving buckeyes from the fountain were moved into the field just north of Frost Amphitheater, where they are not thriving. The Buckeye State is Ohio.

Red Buckeye

Southern & Eastern United States

Aesculus pavia

Known as one parent of the popular red horse chestnut, red buckeye itself is uncommon. The only one noted on campus is a few yards northwest of the northwest corner of Littlefield Center (in the direction of Albers Wall). In March and April the spikes of its distinguishing red tubular flowers are conspicuous. Trees of the pine family are wind-pollinated, as of old, but most flowering trees now depend on insects. Some still depend on wind, while others depend on mammals and birds. Red buckeye is believed to be pollinated by hummingbirds.

Willow Myrtle, Peppermint

Australia

Agonis

A very attractive, willowy tree that grows to about 30 feet tall with hanging, narrow 6-inch leaves. The crushed leaves are fragrant, much subtler than peppermint. A modest example dating from 1972 is in the Stanford Avenue greenbelt opposite Peter Coutts Road. Illustration, see page vi.

flexuosa

MYRTACEAE

(*Myrtle family*)

Tree of Heaven

China

Ailanthus

A nice shady tree, tree of heaven has a flair for escaping from cultivation and is doing well along Junipero Serra Boulevard at the Golf Course. Bunches of red samaras color the trees late in summer. The trees also grow wild along hot roadsides in the foothills of the Sierra Nevada and are famous for being able to grow out of concrete in Brooklyn. Such indomitable suckering may of course not be welcome. This botanical marvel is now the subject of breeding experiments to develop tougher wood and fewer flowers to fit it for street tree planting in situations where few choices are open. Some cities with extreme climates and dense automobile pollution are heavily dependent on just a few species, e.g. the London plane and honey locust in New York, with the risk that one disease could wipe out nearly half the trees planted over several decades. "It will grow where all else fails, and it's better to have an *Ailanthus* than nothing" (Dr. Howard S. Irwin, Executive Director of the New York Botanical Garden). As of 1972, it was illegal to plant the tree of heaven along New York city streets.

altissima

SIMAROUBACEAE

(*Quassia family*)

The tree of heaven is not planted by design at Stanford but volunteers freely. The leaves have a distinctive odor and trees bearing staminate flowers have a smell that is objectionable to some. For this reason, female trees are preferred for planting in those areas where the tree of heaven is cultivated.

Three females and a male are opposite 267 Santa Teresa Lane. A large multitrunked specimen is at Phi Sig house, 1018 Campus Drive East. Another giant is at the southeast corner of the Kingscote Gardens building. A group is on the north side of Applied Physics/Ginzton Lab, behind some Chinese pistache trees.



Albizia julibrissin, Silk Tree

Silk Tree

Temperate Central Asia

Albizzia

julibrissin

LEGUMINOSAE

(*Pea family*)

The feathery foliage resembles that of some acacias, and the flowers, consisting of a puff ball of pink stamens, are also similar. However, the flower is much larger and the stamens, unlike those of the acacia, are united at their bases. There are glands on the leaf stalks and at night the leaflets fold up. Late in the season numerous pods will be found containing collectible, shiny brown seeds. Separating the seeds from the pods is a therapeutic activity and a bowl of the seeds, as with honey locust and acacia seeds, can have the same effect as worry beads. Children with good hand-eye coordination might enjoy racing to separate the seeds from a pod or two.

A very attractive grouping, spectacular in late spring, is situated between the inner and outer quadrangles in the northwest corner. *Albizzia* and Chinese pistache are among the deciduous trees that exercise extreme caution before venturing forth new leaves; but in early April you can recognize these few remaining leafless species on campus, the *Albizzia* by last year's seed pods and the pistache by the voluminous masses of pollen cones. Several specimens can be seen on San Francisco Terrace. *Julibrissin* is the Persian name of the tree but it ranges across Asia to China, and the hardy 'Rosea' comes from Korea. It is widely planted in southern Europe. The seeds germinate readily if left to stand overnight in a cup to which boiling water is added.

In the trecento and quattrocento, the noble Albizzi family competed for power over Florence and are remembered to this day by the Via degli Albizzi situated in the part of the city that retains the old rectangular Roman street layout. No true humanist would use the ignorant spelling *Albizia*. Francesco degli Albizzi brought the silk tree into gardens in 1749.

Titoki

New Zealand

Alectryon

excelsus

SAPINDACEAE

(*Soapberry*

family)

The name is pronounced TEA-Tokey. Not a common tree around here; for many years there was only one on campus, said to have been brought here by Dr. David Starr Jordan in 1893. When Campus Drive was created, it found itself in the dividing strip opposite his house (Serra House, which was later moved to Salvatierra Walk). The tree was subsequently removed. The pinnate leaves are about a foot long; the leaflets may have coarse saw teeth, or no teeth at all, on the same tree. Like those of ginkgo and eucalyptus trees, the flowers have no petals but depend instead on a show of rusty wool. Strange fruits resembling raspberries appear, from which protrude, but only halfway, hard, shiny, black seeds the size of a cherry stone and quite spherical. The Greek 'ΑΛΕΚΤΡΟΥΩΝ means rooster, that which gets you out of bed (*lektron*). There is a descendant raised from a seed from Jordan's tree in the Stanford Avenue greenbelt opposite the intersection with Peter Coultts



Alectryon excelsus, Titoki

Road. Other examples of titoki can be seen in San Francisco's Golden Gate Park. Stanford's Grounds Department intends to replant a recently lost campus specimen.

Italian Alder

Southern Italy, Corsica *Alnus cordata*
BETULACEAE
(Birch family)

Canoes of alder, a tree known from antiquity, swam the torrents of the Po river, according to Virgil. Here is how alders came to be growing on the Po. Phaëthon asked permission from Helios, his father, to drive the chariot of the Sun. But Phaëthon drove so dangerously that Zeus had to shoot him down with a thunderbolt. He crashed into the Po, where his sisters standing on the bank were so grieved that they turned into alders.

This alder resembles our local white alder but differs in having leaves that are heart shaped, simple fine teeth, and blotched gray-green bark. About a dozen are along Crothers Way on the south side of Encina Commons, between Arguello Way and Galvez Mall.

White Alder

California to British Columbia *Alnus*
rhombofolia

The deciduous white alder is native to campus, for example along San Francisco Creek and at Jasper Ridge. The prominently ribbed leaves, which have coarse teeth with smaller teeth on them, are shiny dark green above and pale green below and have a pleasant aroma when rubbed. Winter buds are conspicuous in the leaf axils. The male catkins, which produce attractive flower clusters, and the 1-inch cones resembling birch cones, add interest. The bark is light gray. There are several along the south wall of the Bing Wing of Green Library toward the School of Education, some quite old. A row of three is on Peter Coutts Road midway between Raimundo Way and Page Mill Road. A dozen or more are in the big lawn on Peter Coutts Circle, and another large one is at 1047 Cathcart Way. Mountain alder (*A. tenuifolia*) can be seen at Stanford Sierra Camp as a small tree with its feet in the waters of Fallen Leaf Lake.

Smooth-Barked Apple

New South Wales, Queensland *Angophora*
costata
MYRTACEAE
(Myrtle family)

A striking and relatively common tree in Australia, often reaching impressive girth on almost soil-free sandstone, and generally regarded as a gum tree (or eucalypt) by the inhabitants, as witnessed by the common names red gum and rusty gum that refer to the bark color at peeling. The bark is often streaked with reddish kino. The relationship with *E. ficifolia*, the red-flowering gum, is closer than that existing between some species placed within *Eucalyptus*; however, the crushed leaves are devoid of aroma. The seed capsules have five ribs terminating in teeth. A sizable *Angophora* 13 yards south of Palm Drive's east entry gate at El Camino Real and 25 yards in

from the bike path may be compared with adjacent eucalypts. As a fine specimen in a fine location, it would seem to deserve occasional pruning. It has opposite leaves, tiny white petals and a sharply ribbed seed capsule. A 1962 specimen on Serra Street between the Recycling Center and Pampas Lane, which by 2003 had become an area of neglect, is conspicuous as the tallest tree thereabouts. The tallest rusty gum in the United States, at Honaunau Forest Reserve, Hawaii, had reached 132 feet in 1969.

Araucaria **Monkey Puzzle**

Chile

araucana
ARAUCARIACEAE
(*Araucaria*
family)

This odd tree, known in French as *désespoir des singes*, is worth taking children to see. Monkey puzzle became very popular in English gardens after being introduced in 1795. The 1- to 2-inch long, sharply pointed leaves are similar to those on the bunya bunya, but are more densely arranged, overlapping to completely obscure the trunk and branches. Two specimens in front of the Mausoleum, 6 feet tall in 2003, are successors to trees documented there in 1913 and in the 1970s. Mature specimens are hard to find, but some are listed in *The Trees of Golden Gate Park and San Francisco* (E. McClintock, 2001).

Monkey puzzle tree, whose nuts are eaten in Chile, and a Brazilian tree whose seeds are planted by tapirs, are South American species of *Araucaria*. The others are from Australia, Norfolk Island, Vanuatu, and the New Caledonia region, a curious dichotomy no doubt related to continental drift. A petrified forest in Arizona testifies to the great age of the genus. A new member of the family, *Wollemi pine*, has been discovered in the bush less than 50 miles from Sydney. Visitors are blindfolded before going to the secret location by helicopter. The few dozen trees appear to have identical DNA, which raises fears for their resistance to disease. The genus is named for the Araucanian natives of Chile.

Araucaria **Bunya Bunya**

Queensland

bidwillii

A remarkable round-topped conifer, similar in look to the monkey puzzle tree and more common in cultivation, has small triangular leaves and enormous green cones resembling, and at least as large as, pineapples. The great 2-inch long nuts are edible, preferably roasted. Fallen cones are hard to find at Stanford. The tree exudes transparent resin, sometimes in the shape of icicles. Two are in Dohrmann Grove along Serra Mall, and one is at Kingscote Gardens. A skyline specimen is at the Buck Estate. There are two at 811 Hamilton Avenue, Palo Alto, and two more in the median strip on Trinity Drive near Whitney in Menlo Park. Three old giants are next to the water tower at Holbrook-Palmer Park in Atherton. The tree is named for J. C. Bidwill (1815–1853). Illustration, see page 27.

Hoop Pine

New South Wales, Queensland, New Guinea

*Araucaria
cunninghamii*

Australia's largest conifer, reaching 100 feet in cultivation and 200 feet in the wild, hoop pine resembles Norfolk Island pine, especially in the characteristic cage-like arrangement of the leaves. It is a principal species for planting as a crop. One is at the south end of the Arizona Garden, an area satisfactory for cactus, but not ideal for a tree accustomed to a 40- to 60-inch annual rainfall; a 3-foot youngster is on the Art Gallery's south side. A handsome old specimen, perhaps 60 feet tall, is at Burgess Drive and Laurel Street in Menlo Park, near the civic center. Nearby is a bunya bunya tree.

Norfolk Island Pine

Norfolk Island

*Araucaria
heterophylla*

An extremely attractive, highly formal tree with very unusual leaves arranged to form a smooth cylindrical cage about half an inch in diameter around the twigs. They are sold in tubs as Christmas trees and can, for a time, be grown indoors. A 10-foot multitrunked specimen is at 924 Mears Court, and two are in the south central area of Wilbur Hall. Two specimens, one 10 feet tall and the other 15 feet, are next to the large pecan tree in the parking lot of Palo Alto's Lucie Stern Community Center, near the Junior Museum, and another is at 3065 Greer Road, Palo Alto.

The tallest specimen in the United States is at Lanai City, Hawaii, where it had reached 140 feet in 1969. This might surprise Easterners who raise them as houseplants. Before the Chicxulub meteorite impact 65 million years ago, araucarias were growing in Colorado and New Mexico, as witnessed by fossils. The Norfolk Island pine was named by James Cook when he first saw them towering to 200 feet in October 1774. The Australian araucarias produce valuable wood.

Madrone

West Coast

*Arbutus
menziesii*
ERICACEAE
(*Heath family*)

Fabled in song and story as a most attractive member of the mixed evergreen forest of the coast ranges, including the Stanford area, the madrone is a rare plant on campus, clearly having disappeared from planting lists. Perhaps this was because of its familiarity in the nearby woods which, of course, have now receded. Yet the live oak has not suffered such neglect, being perhaps the most frequently planted species on campus these days. Ways must be found of establishing madrones and protecting them from disease, especially the soil fungus *Phytophthora*. (Meanwhile the cultivar 'Marina' is considered a horticultural equivalent.) The striking smooth bark darkens in spring to a rich brown and peels in small oblongs, exposing a clear greenish undersurface that soon colors to orange. On older trunks the tessellated bark remains in place and is interesting to feel.

Charming clusters of small, waxy, and white bells appear in spring, and



Arbutus unedo, Strawberry Tree

orange berries attract birds in the fall. People may eat the apple-flavored berries too.

From what one sees today in the nearby forests it is surprising to learn that the madrone can exceed 100 feet and has very hard wood, formerly valued for furniture. Today in the Bay Area it is valued as a hot-burning, ash-free firewood, priced accordingly. Three large trees are on the stadium berm facing Galvez Street, opposite Gate 8. A handsome specimen is among shrubbery south of Ventura Hall (left of the driveway).

Strawberry Tree

Mediterranean, Ireland *Arbutus unedo*

A pleasant, small shrubby tree on which both red and yellow edible strawberries hang at the same time in fall. Three 12-foot trees are in the circle at Galvez and Escondido malls, and many more are along the east wall of Sweet Hall. The cycle path at the east end of Esplanada Way is lined with strawberry trees clipped as a hedge. The overripe berries that follow the strings of rose-colored bells have the best flavor when they are turning dark crimson. Of course there are numerous small seeds; the only reasonable way to cope is to swallow fast.

The tree was well known in Southern Europe from ancient times for its edible fruit; indeed Lucretius (d. 168 BC), telling the way things were in the beginning, states that girls could be bought with arbutus berries. "And Venus joined the bodies of lovers in the woods; a girl shared a man's appetite, or perhaps succumbed to his insistence, or took a bribe: acorns, arbutus berries, or choice pears." (*De Rerum Natura*, Book V, lines 962–966). The names *arbutus* and *unedo* were both used by the Romans. *Madroño*, the Spanish name of *A. unedo*, was also applied to California's *A. menziesii*.

A. × 'Marina' (a hybrid of unknown parentage distributed by Saratoga Horticultural Research Foundation) strongly resembles *A. unedo* but has larger leaves and rosy pink flowers. A fine specimen is in the raised planter on the right of the western entrance to Meyer Library and another is on Lomita Drive at the entrance to the parking lot adjacent to Harmony House. Other specimens are on Lomita Mall east of the Gordon and Betty Moore Materials Research Building and one is to the left of the Santa Teresa Street entrance to the Humanities Center. There are three great ones west of the Center for Educational Research (CERAS).

Manzanita

Northern California *Arctostaphylos*

See tree-sized specimens in the Junipero Serra Boulevard greenbelt east of Stanford Avenue. There is nothing straight about this 6- to 20-foot-tall native plant; the crooked branches are covered with attractive deep-red bark. The related native *A. densiflora*, and varieties derived from it, are wide-

manzanita
ERICACEAE
(*Heath family*)

ly planted as low hedges. Pale pink urn-shaped flowers resemble those of *Arbutus*. The large red berries are edible, were eaten by Native Americans, and are tasty to bears, which is where the connection with the Arctic comes in. From the Greek viewpoint, bears inhabited the north (*arktos* means bear and also the constellation of the Great Bear, Ursa Major). *Staphylos* meant, and still means, grape; hence the common name bear-berry. A dozen or more species of *Arctostaphylos* can be seen growing at the University of California at Santa Cruz Arboretum.

Azara **Boxleaf Azara**

Chile

microphylla
FLACOURTIACEAE
(*Flacourtia* family)

A small tree or shrub whose tiny yellow flowers, with a fragrance reminiscent of vanilla, come very early. By the end of March the fruits, which will be red, are forming. The ¼-inch oval leaves have a few small teeth and each is accompanied by a smaller circular leaf that is technically a stipule. The arrangement of the leaf sprays is rather quaint. There were specimens on Memorial Way below a trail leading to Frost Amphitheater and a row on Pasteur Drive approaching the entrance to Stanford Hospital, but all are now gone. A beautiful specimen can be seen in Woodside at Filoli, perfuming its woodland garden in February.

Baccharis **Coyote Bush, Mulefat**

California Coast

pilularis
COMPOSITAE
(*Sunflower*
family)

One of the first woody plants to advance into idle cleared land, coyote bush (or brush) is a familiar native that can survive on salty beaches or in rock-hard adobe through the rainless summer and produce a heavy crop of fluffy white seeds in fall when the rains come. It is then a conspicuous sight on chaparral slopes and roadsides. Examination will reveal that there are two sorts of plant, male and female. For horticultural use a prostrate ground cover is available; a male clone is chosen. The plants on campus all appear to be wild, and subject to frequent removal. Look on the margins of cleared land, for example in the Junipero Serra greenbelt, southeast of the intersection with Stanford Avenue. The name mulefat refers to the browsing habits of deer. Kidneywort is another name. By the late 1800s, coyote bush, first described by the French botanist Alphonse de Candolle, was known around the temperate world as an ornamental plant.

Baeckea behrii **Baeckea**

Australia

MYRTACEAE
(*Myrtle* family)

A tall shrubby multistemmed plant densely ornamented with small white flowers, it can be maintained at a reasonable height by removing a fraction of the heavier stems each year. The wood is dense, hard, and strong. There are specimens in the Stanford Avenue greenbelt opposite Peter Coutts Road.

Banksia Notes

Banksias (named for Sir Joseph Banks (1743–1820), who saw them at Botany Bay in 1770) belong to the Proteaceae (Protea family); all have striking long-lived flowers in various combinations of color that attract birds and also last well when cut. Some are shrubs, some are substantial trees. The sizable woody fruit spikes remain on the tree for years, can be turned and polished on a lathe, are available for this purpose in California, and are loved in Australian song and story as “banksia men.”

On his return to Kew, Banks produced *Florilegium*, a masterpiece of botanical art, now rare, but held by the Filoli Library.

Banksias thriving in private areas are known to include *asplenifolia*, *ericifolia*, *marginata*, *ser-rata*, and *spinulosa*. Species that have failed include *speciosa* (frost sensitive) and *media*. Seedlings are obtainable from the University of California at Santa Cruz Arboretum, where a Banksia field presents the largest collection of these interesting plants outside Australia. Plantings on Maui supply the cut-flower trade on the United States mainland. Other members of the protea family include the grevilleas and, from South Africa, the bushy leucodendrons, leucospermums, and proteas that may be viewed at 775 Esplanada Way.

Coast Banksia

East coast of Australia

Banksia

A tall specimen is growing on the Stanford Avenue greenbelt path behind 838 Santa Fe Avenue. The ½- by 4-inch leaves are furry silver beneath with mostly untoothed edges. The compound flowers in the form of greenish yellow bottle brushes about 4 inches long by 2 inches in diameter are decorative and even in winter a few may often be seen, but they are too high to be reached except by squirrels. The innumerable individual flowers consist of a closed tube containing a 1-inch-long, persistent, wiry pistil. The tube opens into four parts, each bearing an anther, without benefit of a stamen. Just before the tube opens the anthers deposit pollen on a holder for presentation to pollinators. The stigma, immediately above, then awaits cross-pollination. The trees grow on coastal sand dunes and tolerate salt spray.

integrifolia

PROTEACEAE
(*Protea family*)

Purple Orchid Tree

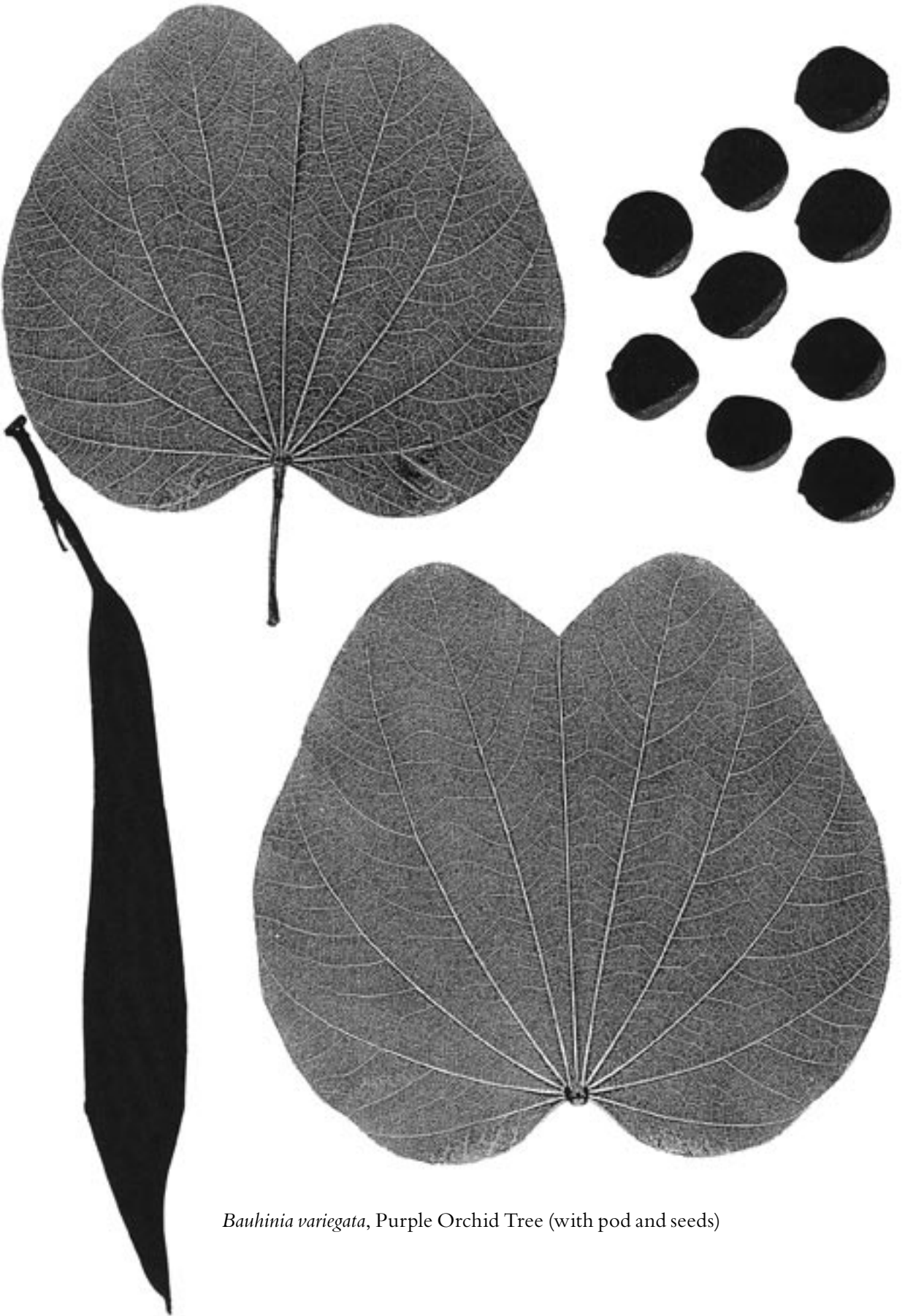
India, Sri Lanka, China

Bauhinia

Two specimens can be seen at 24A and 25A Rains Houses, where they are tucked into secluded corners and are thriving, judging by their substantial size and prolific fruiting. They are seen only occasionally in the Bay Area, being more suited to Southern California. The interesting, edible leaves are 4 to 5 inches across, and indented at both base and apex, somewhat resembling a butterfly's wings. This geometry facilitates the closing of the leaves. The large flowers come in various tones of lavender, and the tough seed pods, up to 6 inches long, contain remarkable seeds that are like buttons about ½ inch in diameter. The wood is sold under the name of ebony in India.

variegata

LEGUMINOSAE
(*Pea family*)



Bauhinia variegata, Purple Orchid Tree (with pod and seeds)

Betula pendula 'Dalecarlica', Cutleaf Weeping European White Birch



Betula pendula
BETULACEAE
(Birch family)

European White Birch

Europe, Northern Asia

A popular garden tree in residential areas, noted for its grace and elegance, immediately identifiable at a distance by its white or silvery bark with characteristic pattern of black fractures. Stern Hall's southeast courtyard is a forest of birch, and many more are on the east side of the Graduate School of Business. Two cutleaf weeping birches ('Dalecarlica') on the east side of The Knoll's front lawn were planted in 1918; more can be seen in the mixed birch grove at Salvatierra Street and Coronado Avenue.

By July or August the female catkins, about $\frac{1}{4}$ inch in diameter, are ripening into seed cones. While the cone is ripening there is a sharp-moving boundary between ripe (brown) and unripe (bright strawberry red). If taken to pieces the cones will be found to be composed of scales shaped like a fleur-de-lis. Under each scale are three seeds in the form of tiny nuts with two transparent wings, some plumper than others. The cones exhibit very fine spirals conforming to the same Fibonacci numbers as do pine cones (see *Pine Cones and Fibonacci Numbers*, page 191). At the same time similar objects about $\frac{1}{8}$ inch in diameter are also present on the tree. These are the male catkins that will live through the winter to produce pollen in the spring. Canoe birch (*B. papyrifera*) and other American birches are available, but not in the range of horticultural varieties developed in Europe.

For dioecious trees (male and female flowers on separate plants) that make use of the wind to carry pollen from the male to the female organs, cross-pollination occurs freely, provided there is a female tree nearby to receive the pollen, but self-pollination is not absolutely excluded. Birches are monoecious (separate male and female flowers on the same plant). It seems strange that monoecious trees that evolved later should have their pollen-producing anthers placed so close to the pollen-receiving stigma, given that the idea is to receive pollen from another tree, if the evolutionary consequences described by Darwin are to result. Various temporal, spatial, and other less obvious devices have evolved to work against self-pollination and can be studied in the spring; for example, you can watch a grevillea flower day by day to see how it protects itself.

As a deciduous tree, the European white birch (also known as silver birch) is hard to beat for airiness and beauty.

Betula
jacquemontii

Whitebarked Himalayan Birch

Himalayas

From the Himalayas comes *B. jacquemontii*, whose pure white trunk is free of dark markings. There are six in the courtyard at the south end of the School of Education, another nearby, and a row at the west facade of the Graduate School of Business.

Flame Tree

New South Wales, Queensland

Brachychiton

A flame tree planted in 1891 in the outer northwest island of the Inner Quad was famous for the brilliant display it put on in May–June, covering the ground with a mantle of red bells. In most years only part of a flame tree blooms, but even this is striking, as the leaves all drop off in the flowering zone. Every few years the whole of the big flame tree burst into glorious bloom and the ground was red with the waxy bells, which are good for leis. The leaves themselves are handsome, large, and of several different shapes. After a wind, black boat-shaped pods fall and the seeds can be extracted from a brittle honeycomb structure. If sown in moist peat moss they begin to germinate after six weeks or so. Extraordinarily beautiful photographs of the blossoms have appeared in *Stanford* magazine (1978 Fall/Winter). A flame tree flowering alongside a jacaranda is a marvel to behold; a jacaranda is now growing in the Inner Quad's inner northwest island.

acerifolius

STERCULIACEAE

(*Sterculia*

family)

There is no doubt that the flame tree is frost sensitive, and the Inner Quad specimen ultimately succumbed. But it performed nobly for over 100 years and was replaced in the same sheltered spot in 1998; by 2003 the new tree was over 20 feet tall and 9 inches in diameter. A young flame tree was added to the inner southeast island in 2003; another addition is behind the memorial bench at the perimeter of the Arizona Garden. Occasional trees are found in the neighborhood, for example at 416 O'Keefe Street, Menlo Park. It was planted in 1958 and was 2 feet in diameter and 40 feet tall by 2003. Illustration, see frontispiece. See also the cover.

Lacebark

New South Wales, Queensland

Brachychiton

Resembling the flame tree in general appearance, but having a distinctive bark when mature, lacebark is immediately distinguishable by the flowers, flower buds, and pods. The bell-shaped, nectar-bearing flowers have about five pointed lobes and are about 1½ inches across, red inside and on the outside on the fringe, but mostly enclosed in a rusty down sheath that apparently consists of the fused sepals. The buds are enclosed in the same down and so is the pod, which is canoe shaped and 4 or 5 inches long. Some of the leaves are five-pointed with pale felt underneath and could easily be mistaken for leaves of *Platanus racemosa* (California plane tree), but others have three lobes or only one, and others again are very fancy with lobes upon the lobes. There are two on and near the cycle path connecting Santa Fe Avenue to Stanford Avenue, and three young ones along the Campus Drive East side of the Student Services Center at 563 Salvatierra Walk (only an inch in diameter in 2003). A tree of very formal and distinguished appearance, drought resistant and less frost-sensitive than the flame tree, lacebark deserves a place in the Inner Quad.

discolor



Brachychiton discolor, Lacebark



Brachychiton populneus, Kurrajong

Brachychiton populneus **Kurrajong** *Victoria, N.S.W., Queensland, Northern Territory*
A much appreciated tree in Australia, the kurrajong furnishes shade and shelter in dry areas, is lopped for fodder in time of drought, and is a source of honey. Clusters of pale bells give way in due course to surprisingly large woody follicles about 3 inches long, from which the seeds may be extracted. The seeds germinate readily, but in collecting them be careful of the short bristles, which are in high repute among small boys as itching powder; the name *Brachychiton*, which means short shirt, refers to this protective coating. In Scotland, where *sark* is the ordinary word for shirt, *cutty sark* means the same as brachychiton. The elegant form of this handsome tree often shows a green trunk. A mature specimen is on Serra Mall in the grove in front of the Lou Henry Hoover Building; look for it northwest of the *Abies bracteata*. Two will be found growing in very restricted conditions inside the north entrance to Wilbur Hall; an uncrowded specimen is in the Eating Clubs lawn east of Arguello Way.

Brachychiton rupestris **Bottle Tree** *Queensland*
The bottle tree both looks like a bottle, contains potable sap, and is a characteristic sight of the dry inland savanna of Queensland, where the roots, shoots, and wood provided food for Aborigines. In Queensland the trees have pronounced entasis, expanding to as much as 6 feet in diameter well above eye level. A specimen in the inner southeast circle of the Inner Quad had, when young, large but very delicate leaves with several lobes barely wider than the leaf vein, cut right back to the point of attachment of the long slender petiole. By 2000, the leaves had lost this charm. The small white flowers which, like *Eucalyptus*, have no petals, will appear one of these summers. The development and flowering of this specimen, which was raised by arborist William Parker in 1972, will be watched with great interest. Another example is on Stanford Avenue opposite Peter Coutts Road.

Brahea armata **Mexican Blue Palm** *Baja California*
PALMAE
(*Palm family*)
A young specimen of this fan palm with fine light-blue yard-long leaves, 6 feet tall in 2002, can be found in the inner southeast island of the Inner Quad. The finely-ridged leaves are mostly less than an inch wide and taper gradually to pointed tips. The leaf points are not dangerous to brush against; the epithet *armata* refers to two rows of ¼-inch-high sharp teeth densely packed on the yard-long leaf stalk. This palm is named for Tycho Brahe (1546–1601), the Danish astronomer who was descended from the author's ancestors (Planetary Influences on Electrical Engineering, *Proc. IEEE*, vol. 80, pp. 230–237, 1992).

Guadalupe Palm

Guadalupe Island, Baja California

Brahea edulis

Two specimens of this fan palm can be seen north of the Mausoleum. Its leaves are about 3 feet long, folded as a fan, and with a stalk free of spines. It has great masses of black shiny fruit. Our trees were shipped from Baja California to Stanford around 1900.

Angel's Trumpet

Brazil

Brugmansia ×

Angel's trumpet (formerly *Datura suaveolens*) grows outside the north entrance to the Faculty Club. The golden hanging trumpets, which come in summer through fall, are enormous, as are the leaves. This probably is variety 'Charles Grimaldi'. Nearby along the path is a second specimen, possibly the species *B. sanguinea*, with orange-red flowers and lobed leaves. The poisonous jimsonweed (*Datura stramonium*) is a close relative that grows all over California, and indeed most of the United States, and has ritual uses among Native Americans, for example, the Zuñi.

insignis

SOLANACEAE

(Nightshade

family)

Pindo Palm

Brazil to Argentina

Butia capitata

A glance tells you this palm is different. Its frosted blue-gray color is unlike that of the California fan palms and gives the trees a distinguished hoary appearance. The pinnate leaf segments have a tendency to cluster in pairs. The leaf is not toothed, but the lowest leaf segments may resemble spikes. If you can find the dates, they are said to be edible. There is a specimen in the outer southeast circle in the Inner Quad.

PALMAE

(Palm family)

Bottlebrush

Southeast Australia

Callistemon

A prickly bottlebrush with 1-inch needle leaves and flower clusters 1 inch in diameter and length around 2½ inches appeared on Serra Street around 1960 just outside the nursery (now occupied by the Recycling Center). As G. W. Leibnitz said about an anonymous item by Isaac Newton, "By its paw shall you know the lion," so the paw print of Dirk Schroder is evident. A descendant from seed is on the west side of the Stanford Avenue greenbelt about 40 yards northeast of the intersection of the Stanford and Santa Fe Avenues bike paths. It is inadvisable to brush against this small tree. The attractive brushes are gold tipped, each ¼-inch scarlet stamen displaying its own golden anther. The closed seed capsules remain queued on the branches, so that their age can be counted in years. At any time, however, abundant seed can be collected by putting a branchlet into a paper bag for a week.

brachyandrus

MYRTACEAE

(Myrtle family)

Weeping Bottlebrush

New South Wales

Callistemon

A small tree with pleasing willowy foliage, leaves ¼ inch wide and 3 inches long, and striking red bottlebrush flowers, mostly in summer. When the

viminalis

Calocedrus decurrens, Incense Cedar



flowers go, groups of seed capsules encircle the branchlets like knobby sleeves, where they remain for years without releasing their powdery seed. The sleeves of previous years can be tracked back along the branches where they may in due course become engulfed by new wood. Gardeners may find that pruning the dead flowers improves flowering. Hummingbirds and orioles visit the flowers for the nectar, as do destructive squirrels. Australians steeped the flowers in water to make a bush remedy for sore throats. Several examples are growing at the Police Station facing Serra Street and across the street in Escondido Village. The Junipero Serra Boulevard greenbelt uses *C. viminalis* as part of the screening shrubbery. A specimen of *C. citrinus*, the tough shrub with the same showy bottlebrushes, can be seen near the group of *C. viminalis* at the Police Station.

Incense Cedar

Cascades, Sierra Nevada

The incense cedar is familiar to many in its natural habitat around 6000 feet, for example at Stanford Sierra Camp on Fallen Leaf Lake, where enormous examples over 3 feet in diameter with deeply furrowed cinnamon bark abound and reach ages of several centuries. Ancient fire that decimated the white firs and Jeffrey pines scarred but did not wipe out the cedars. You can't help viewing them with reverence. By comparison, the ones on formerly drought-stricken Santa Teresa Street are unimpressive. Young trees are very decorative, and may also be seen on Santa Teresa Street. At this stage they resemble *Thuja* in having the small scale-like leaves arranged in flat sprays, but can be distinguished by noting that the leaves run down the twigs at the place of attachment. Pollen-bearing yellow flowers bring color to the tips of the leaf sprays. Cones about an inch long have only five scales and release winged seeds in August, sometimes in heavy quantities that leave the sidewalk speckled with oil spots where the seeds have been trodden on. Good examples are in the median of Campus Drive East near Lasuen Street. Two dozen large specimens appeared on the Cedar Terrace (south end of the Science and Engineering Quad) in 1999, exhibiting staminate flowers in 2000. What with additions in 2003 to make a total of 30, a mighty grove is on its way. In Palo Alto, a mighty specimen is at 327 Tennyson Avenue.

Calocedrus

decurrens

CUPRESSACEAE

(*Cypress family*)

European Hornbeam

Southeastern United States

Carpinus, a name that presumably means small-fruited, receives honorable mention by classical Latin authors, for example by Vitruvius, who extols the wood's durability and strength, features that favor its use for hammer and chisel handles today. Until recently it was also used widely to make gear wheels and other machine parts benefiting from impact resistance. The smooth bark is light gray. The finely-toothed leaves resemble birch and alder

Carpinus

betulus

BETULACEAE

(*Birch family*)

leaves but the conspicuous catkins, though similar in plan, are distinguished by large papery three-lobed bracts whose dominant central lobes may be almost as long as the leaves. There are 18 of variety 'Fastigiata' in the formal planting of Knight Plaza (between the Graduate School of Business and the Knight building) and many more at the Cantor Center.

*Carpinus
caroliniana*

American Hornbeam

Europe, Asia Minor

A row of nine at the east end of Littlefield Center (south end of Lasuen Street) allows comparison with the nearby European species. The trees are completely deciduous, which makes them difficult to recognize in winter by Californians not familiar with hard winter climates where one becomes accustomed to noticing the form of winter buds.

*Carya
illinoensis*

Pecan

Eastern North America

JUGLANDACEAE
(*Walnut family*)

A majestic specimen of a tree that is familiar in the Southeast but rare in the Bay Area, though the nuts are popular, is growing at the parking lot of Palo Alto's Lucie Stern Community Center, midway between the Junior Museum and the Lou Henry Hoover Girl Scout House at Rinconada Park. The great, deciduous leaves are over a foot long, composed of 13 or so well-spaced, coarsely toothed leaflets, each with a brief stalk. The bark is dark and corrugated and the imposing trunk is 30 inches in diameter. Why this impressive native tree is rare here may have to do with the low humidity, but it also appears that inside knowledge is required to establish a tree from seed, which is the recommended method. Another nice pecan grows at 3675 La Calle Court at the corner of Barron Avenue in Palo Alto. A specimen closer to campus at 2344 Hanover Street, Palo Alto, is shorter, having lost its competition with overhead wires. There are other American species of *Carya*, generally known as hickories.

*Cassia
eremophila*

Desert Cassia

Australia

LEGUMINOSAE
(*Pea family*)

Said to represent the finest of Australian wild flowers, desert cassia grows as a small tree in extreme desert conditions where avoidance of evaporation has reduced the leaves to needles. Consequently, the abundant bright yellow bell flowers, which endure for quite some time, present a spectacular show. Seed pods, resembling those of acacias, contain hard shiny seeds. This small tree believes that the summer will kill it, so it providentially supplies fresh shoots from its base. Even though the top is not killed here in the Bay Area, you might as well prune to favor the new shoots. The tree produces volunteer seedlings at 836 Santa Fe Avenue, but has not reached tree size here. *Cassia artemisioides* may occur in private gardens.

Spanish Chestnut

North Temperate Zone

Castanea

A tall, broad, deciduous tree much appreciated in Europe for its abundant spiny, edible fruit, and the social activity that accompanies the roasting. *C. mollissima*, Chinese chestnut, is also suitable locally. Chestnut trees require plenty of space; there are no known examples on campus, but specimens might be found on one or more of the Chestnut streets in nearby cities. The chestnut in the King James Bible, a tree from which Jacob took cuttings for fraudulent purposes, more likely refers to the white poplar. The name chestnut (Fr. *châtaignier*, Ger. *Kastanie*, Russ. *kashtan*, Sp. *castaña*) came from the name of a Greek town Kastania (modern Turkish Kestane).

sativa

FAGACEAE

(Oak or Beech family)

Moreton Bay Chestnut

Queensland, New South Wales

Castanospermum

A tall tree with dark-green glossy pinnate leaves. The leaflets, of which there are about six pairs, are from 2 to 5 inches long and carried on short stalks of their own. The pea flowers, which are yellowish red and more than an inch long, appear in April–May and form large hard pods containing three to five chestnut-sized brown seeds, which are edible if roasted; the green pods have been reported as poisonous to cattle. The hard decorative timber is in high repute for fine cabinet work under the name black bean. There are no known specimens on campus.

australe

LEGUMINOSAE

(Pea family)

River She-Oak

Victoria, New South Wales, Queensland

Casuarina

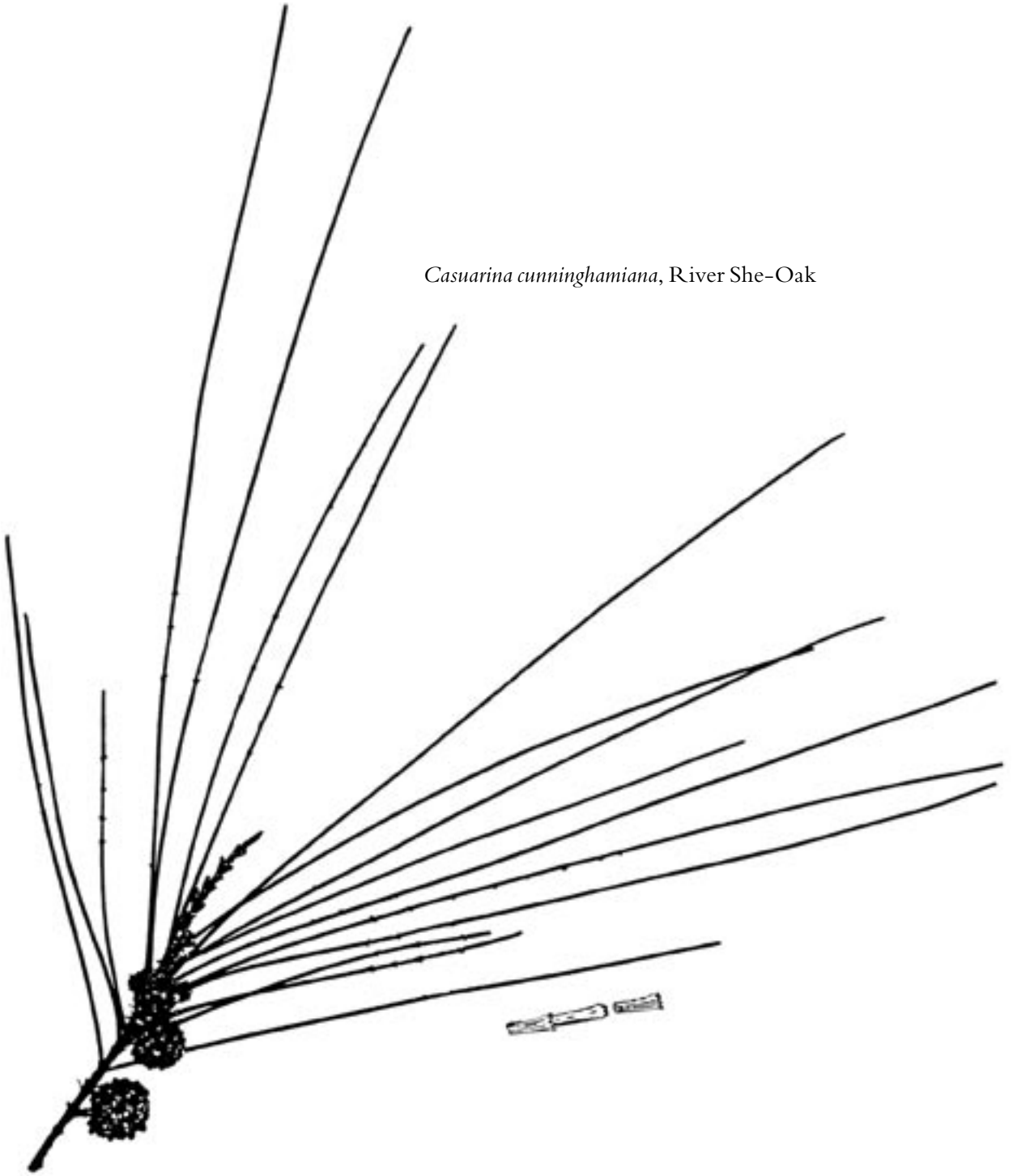
Superficially resembling pines because of their needles, the casuarinas also bear small cones and form beds of dry needles resembling the mat under a pine tree. Their dark-red tough wood is responsible for the occasional name beefwood, while the wide medullary rays suggested the name oak. Though the timber was shipped to Britain, it was not equal to oak imported from Britain; hence the prefix she- (sorry ladies, but we are talking about 1800). The wood was used in the past for making boomerangs and clubs. Small red flowers on female trees make it clear that something unusual is going on and examination of the needles with a lens reveals tiny leaves in the form of teeth surrounding the needles at junctions that are clearly visible to the naked eye. River she-oak has nine leaf teeth, plus or minus two, the needles are $\frac{1}{50}$ inch in diameter with $\frac{1}{4}$ -inch segments, the cones are about $\frac{1}{4}$ inch in diameter but may be larger, and the outside surface of the valves is smooth. To count the teeth it helps to pull the needle apart at a joint. Evidently the tree's photosynthesis function has been taken over by the chlorophyll in the stems. The cones are barrel shaped and formed of rings of bivalves, the number in each ring being about the same as the number of leaf teeth. The arrangement does not follow the spiral plan of the conifers. Each bivalve opens meridionally to release one winged seed.

cunninghamiana

CASUARINACEAE

(Casuarina family)

Casuarina cunninghamiana, River She-Oak



In its natural habitat it grows in river beds and on their banks. In New South Wales, its principal native habitat, where it grows to 100 feet high and 4 feet in diameter, river she-oak is a protected species on account of growing on and stabilizing river banks. Nine specimens of casuarina can be seen growing in harsh conditions on the south side of Roth Way; even so, two have reached 60 feet in height. Another group of nine, males and females, is on Lasuen Street midway between Campus Drive East and Arboretum Road and there are a dozen nearby on the closed road that bisects the intersection of Lasuen Street and Campus Drive. There are also a dozen on the south side of Campus Drive West between Lomita Drive and Old Anatomy, seemingly the remnant of a double row. The casuarina is a battler, it has survival value in neglected areas, and it is easy on the eye.

The name *Casuarina* was given by Linnaeus in 1759 because of resemblance to the plumage of the cassowary, a 5-foot-high, shy flightless bird native to New Guinea, northeast Australia, and some adjacent islands. The species name refers to Alan Cunningham, a colorful botanical explorer of the early 1800s, who is memorialized by an obelisk in the Royal Botanical Gardens, Sydney.

Horsetail Tree

Northern Australia, Indonesia

*Casuarina
equisetifolia*

Horsetail casuarinas have been widely planted on tropical beaches around the world (for example in Florida and the Caribbean, where they are known as *pinos australianos*) because of their ability to grow in sand and withstand wind and salt. They can reach over 100 feet. The needle segments are ¼ inch long, and the number of leaf teeth is commonly seven. The cones are about ½ inch long and tend to have about eight bivalves in each tier. The outside surface of the valves is furry as seen with a lens. Casuarinas are being bred for desert reclamation in Egypt and are said to be the best fuel wood in the world, giving off mainly heat and CO₂ and very little ash or smoke. The dense, dark wood was used for fueling locomotives before oil arrived. Many specimens were raised from seed from Stanford trees in the old nursery on Serra Street just north of the Fire Station. Groups of horsetail tree may be found to the west of Lasuen Street between Campus Drive East and El Camino Real. A male specimen (no seed cones) is at the north side of the Faculty Club dining room.

Swamp She-Oak

Western Australia, Victoria, N.S.W., Queensland

*Casuarina
glauca*

A tall specimen stood for a century next to the flame tree in the outer north-west island of the Inner Quad (see cover photograph). A victim of oak root fungus, it was removed in 2003. The interesting fallen cones, which are about ½ inch long, could sometimes be picked up there. There are about 14

to 16 leaf teeth at each joint of the needles, and the segments are about $\frac{3}{8}$ to $\frac{1}{2}$ inch long. Two other trees, one small and one large, with 12 to 14 leaf teeth, are situated on the east of Palm Drive to the south of Arboretum Road. Leaf teeth and segment length are about right for *C. glauca*, but the trees may be a hybrid with *C. cunninghamiana* as one parent.

Casuarina **Drooping She-Oak** *Tasmania, Victoria, Northern Territory*

stricta

A small weeping tree with cones up to 2 inches long and an inch in diameter. The overall appearance of male trees is colored by dangling terminal spikes of pollen-bearing flowers that are about 3 inches long. The needle segments are up to about $\frac{3}{4}$ inch long. Leaf teeth number about 11. This is one of a small number of selected trees offered in quantity at a very low price by the California Department of Conservation, Division of Forestry. There is one on the east side of Lasuen Street between Campus Drive East and Arboretum Road, which can be contrasted with the horsetail casuarinas across the road. There is another tree a hundred yards or so to the southwest that is also immediately detectable by the slightly rusty appearance of the foliage. Both these trees are male trees, so no cones are seen. To collect cones, go to the end of Wing Place and take the footpath into the greenbelt fronting Junipero Serra Boulevard.

Catalpa

Catalpa

Southern United States

bignonioides

BIGNONIACEAE

(*Bignonia*
family)

In spring the catalpas are noticeable for their foot-long pods $\frac{1}{8}$ inch in diameter, known as Indian cigars, hanging from the leafless branches. The name catalpa is from a Creek word. If you open the pod you will be surprised by the several dozen unusual seeds, which are over an inch long with teased-out tufts at both ends making a total length of over 2 inches. By comparison the centrally situated kernel is extremely small, even hard to find. They have a serene mode of falling through the air that results in three out of four landing the same way up. Also in the pod is an interesting stiff divider that looks as though it should be useful for something. When the large leaves come they are heart-shaped, 6 or more inches long, and they smell. The white 2-inch upright frilly bells have purple spots; when a tree is in full flower in June it is a fine sight. The durability of the wood is fabled in North American history. The seed pod and seeds are strikingly similar to those of *Chilopsis*, though larger, while *Jacaranda*, the other on-campus genus of the family has a strikingly different seed pod and seeds. There are several old trees on Mayfield Avenue in the vicinity of Casa Italiana, 562 Mayfield Avenue. A young tree at 1330 California Avenue, Palo Alto, produces leaves as large as 12 inches. Nearby, there are two mature specimens at 2349 Dartmouth Street.

Tree Ceanothus

Ceanothus cultivars and hybrids are widely planted as ground cover and shrubs but some can be trees. Look for a tree form, probably variety 'Ray Hartman', north of Cordura Hall at Campus Drive West. Another specimen is on Panama Street at Forsythe Hall.

California

*Ceanothus
arboreus*
RHAMNACEAE
(*Buckthorn
family*)

Deodar Cedar

Generally speaking, the graceful deodar cedar can be distinguished from the Atlas cedar by its overall appearance or silhouette, its supple apex that bows with the wind or droops, and branches that tend to sweep down to the ground. Its tufts of needles may be twice as long (up to 2 inches). Six trees are on the south side of Meyer Library, and more can be seen on Serra Mall by the Graduate School of Business. One of a group on the south side of Burnham Pavilion on Serra Street has a marker dating it to 1915; its girth is nearly 14 feet. Deodar cedars line the old road (now a pedestrian path) to the Mausoleum that takes off from Palm Drive, not far from its intersection with Campus Drive. In the arboretum just north of the Mausoleum is an interestingly shaped giant dating to 1889; nearby is a natural dwarf apparently planted at the same time. A pendulous dwarf form is on a lawn south of the Old Union.

Himalaya

Cedrus deodara
PINACEAE
(*Pine family*)

Atlas Cedar

Widely planted on campus these striking cedars have a distinctive form and color. The needles, about an inch long, are gathered in tufts on short stalks. The cones stand upright on the branches, are barrel shaped, and about 3 inches long. The upright growing tip distinguishes it from the deodar cedar. Atlas cedar may be seen in the Dohrmann Grove on Serra Mall at Lasuen Mall and in the New Guinea Garden.

Atlas Mountains, Algeria

*Cedrus libani
atlantica*

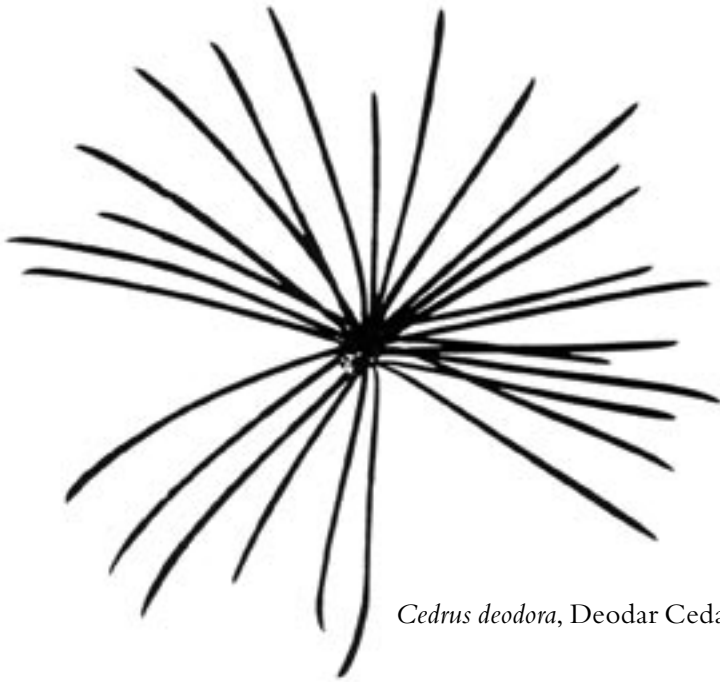
The blue form, *Cedrus libani atlantica* 'Glauca', can be seen southeast of the Old Union and in front of the Cantor Center (10 feet in girth). Two others are immediately outside the west entrance to the Inner Quad; there are a dozen flanking the closed road north of the intersection of Campus Drive East and Lasuen Street. The large specimen in the lawn in front of Hoover Tower apparently was planted by President Benjamin Harrison in 1891. A fine example of a pendulous blue Atlas cedar is at 849 Pine Hill Road, near Bowdoin Street. In the fall a copious mat of large male cones accumulates below the cedars.

Cedar of Lebanon

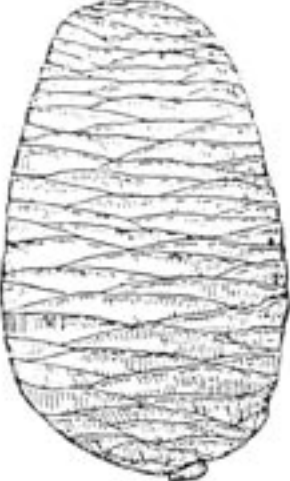
Cedar of Lebanon is closely related to Atlas cedar. Cedar logs, also pine and cypress, were transported in sailing ships from Byblos on the Lebanese coast

Asia Minor

*Cedrus libani
libani*



Cedrus deodora, Deodar Cedar



Cedrus libani atlantica, Atlas Cedar (four male cones, two females)

to ancient Egypt, which lacked wood, and where attempts at transplantation had been unsuccessful. Later, a straight cedar road was cut through the mountains from Mount Lebanon to the sea, but by this time Byblos had been ruined by economic collapse in Egypt, and the Aramaean ports of Tyre and Sidon had taken over. King Solomon made himself a chariot of “the cedar which is in Labanon” (and still is today on the flag). Cedar was heavily used for construction, for example in Jerusalem in the Temple of Solomon. The cedar wood that the Israelites used in their wanderings in Sinai would have been a kind of juniper; certainly the ancient Roman *cedrus* was a juniper—its oil was used as a pesticide to preserve books. In his travels, Odysseus found both Circe and Calypso burning cedar for its fragrance. Two groups of three are at the west face of the Meyer Library. Two giants planted in 1927 stand guard at 345 Forest Avenue at Gilman Street in Palo Alto.

European Hackberry

Mediterranean

Celtis australis

The leaves have sharp saw-teeth, are rough on top, and furry underneath. The ¼-inch edible fruit are dark purple and hang on stalks over an inch long. Five specimens can be seen on Pine Hill Road at the Bowdoin Street end and compared to *C. occidentalis* up the street. Six specimens are behind Kimball Hall. A large specimen planted in 1890 was near the west corner at Quarry Road and Campus Drive West, the location of the gardener’s shed at the time the Inner Quad was being leveled and planted. It may be the same tree that now finds itself near an automatic gate in the parking lot west of the intersection.

ULMACEAE

(*Elm family*)

Common Hackberry

Eastern United States, Quebec

Celtis

A deciduous tree with dark, corrugated bark and asymmetrical leaves up to 5 inches long, shiny on top and paler below, disposed in two rows and having well-spaced fine saw-teeth. The orange-purple pea-sized fruits have a single seed and not much flesh. Still, Peking man in paleolithic times was already using hackberries as food. A related species, desert hackberry, was eaten by the Papago Indians raw, dried, or ground up. Several specimens can be seen at 835 Pine Hill Road and on toward the Alvarado Row end.

occidentalis

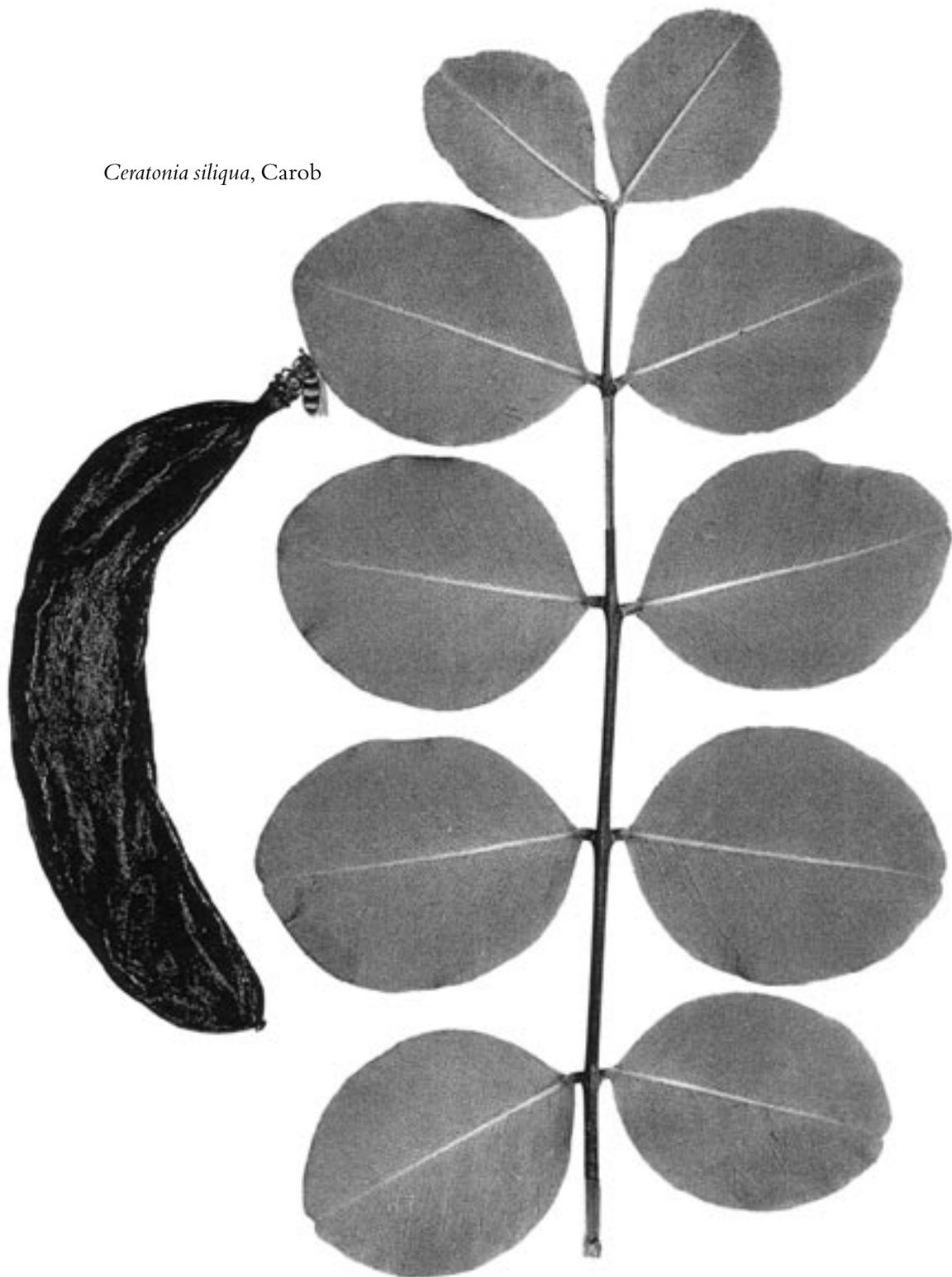
Chinese Hackberry

China, Japan, Korea

Celtis sinensis

Not as large a tree as *C. occidentalis* and with somewhat smaller leaves. The light gray bark on the trunk is smooth or finely rough and has distinctive level scars every 3 inches. Many of the trunks have furrows that widen toward the base. There are 11 on Via Pueblo in step with the columns on the Center for Integrated Systems. Chinese hackberries line Museum Way from Lomita Drive to Lasuen Street. Three dozen can be seen at the Arrillaga

Ceratonia siliqua, Carob



Family Sports Center, on the sides facing Taube Tennis Center and Avery Aquatic Center. Chinese hackberries recently have been infected with the imported Asian woolly hackberry aphid. Stanford's Grounds staff has been banding the trees with a sticky product that keeps out of the canopies the ants that would protect the aphids from predators such as ladybird beetles.

Carob, St. John's Bread

Mediterranean

Ceratonia

siliqua

LEGUMINOSAE

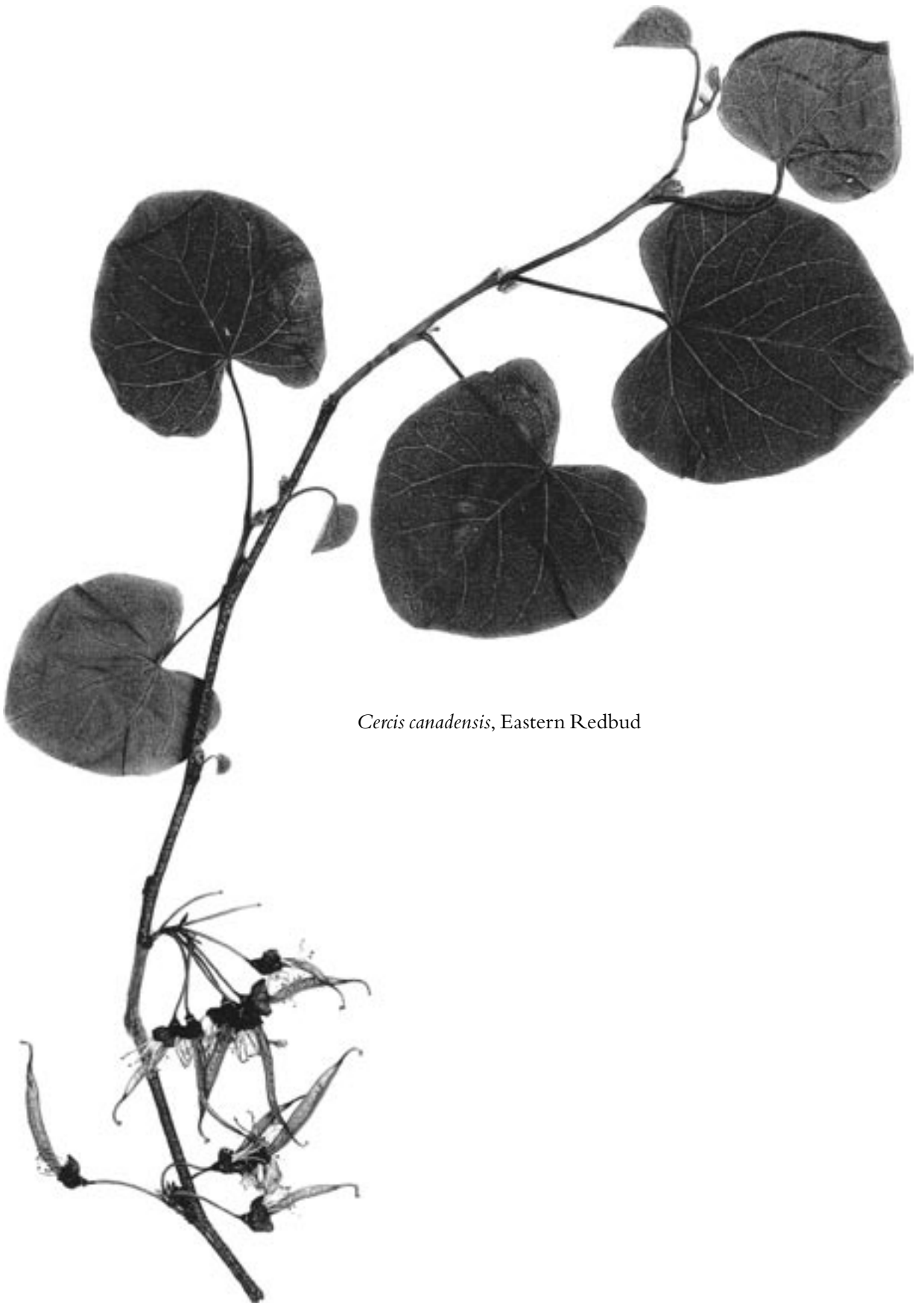
(*Pea family*)

A small to large tree with shiny, almost round, leathery pairs of leaflets about 2 inches in diameter. The flowers, which are without petals, occur in 2-inch racemes. The thick, flat pods, which are around 6 inches long, contain the edible flesh upon which St. John reputedly subsisted in the desert: locust beans, with a supplement of honey. They also sustained the Prodigal Son and the Duke of Wellington's cavalry. Today the carob furnishes ingredients for popular beverages and a wide variety of food products.

The seeds, which weigh five to the gram or 144 to the ounce, were the carats carried by ancient goldsmiths in their purses. The barleycorn ($\frac{1}{3}$ inch) is still the unit for shoe sizes and double-spaced typing, having survived from days when biological standards of reproducibility (feet, cubits, paces) sufficed for weights and measures. Dimensions in old-fashioned botanical texts (e.g. *A Manual of the Flowering Plants of California*, W. L. Jepson, 1963) were often expressed in lines (half a barleycorn), while typesetters still routinely use the term pica, which is equal to one line. The siliqua was a small Roman weight equal, according to one author, to one or two chickpeas.

In 1973 there were five specimens on Galvez Street in the lawn southeast of Frost Amphitheater behind a group of honey locusts (*Gleditsia triacanthos*); only one of the trees had bread. By 2002 only two remained in what is now a well-kept lawn south of Arrillaga Alumni Center, and both are males. You have to go elsewhere for the fruit. One tall and one small are at 645 Salvatierra Street. Two trees are at the east end of the large Jordan Quad parking lot, and several are in the entry parking lot at 1101 Welch Road. There is one outside the entrance to the Round Room at Memorial Church and one in the lawn north of the Old Union. Half a dozen ancestral seniors can be visited for a preview of the future on Curtis Street between Santa Cruz and Menlo avenues, Menlo Park, and there are more big ones lining Kipling Street between Lytton and University avenues, Palo Alto.

Fallen pods can be gathered under the female trees. Eat the pods whole, but be careful of the seeds, which are very hard. Sometimes desert trees do not like to be watered and abhor being placed in lawns. The eight carobs originally installed in the 1960s around the Claw fountain of Aristides Demetrios in the White Plaza pool promptly displayed their resentment of the lawn water by perishing.



Cercis canadensis, Eastern Redbud

Blue Palo Verde

California, Mexico

Cercidium

This is a small summer-deciduous tree of the Sonoran desert with just a few very small leaflets, showy yellow flowers, and 3-inch-long pods. A palo verde might be expected to be green, but in this case the bark is bluish green; the intricate structure of the branches lends interest to its appearance. A specimen can be seen in the interior courtyard at the Cantor Center.

floridum

LEGUMINOSAE

(*Pea family*)

Eastern Redbud

Eastern United States

Cercis

More often planted than western redbud and more showy. It volunteers freely on campus, for example on Stanford Avenue. The seed pods are narrower than those of California redbud and fall off earlier. The heart-shaped 5-inch leaf blade is broader than it is long, darker green above than below, and has a sharp tip. California redbud has a similar leaf but rounded at the tip or slightly notched. The related *C. siliquastrum* is called the Judas tree since Judas Iscariot reportedly hanged himself from one. See eastern redbuds on Santa Teresa Street at the New Guinea Garden. In Palo Alto, a specimen at 1031 Hamilton Avenue is actually around the corner on Chaucer Street.

canadensis

LEGUMINOSAE

(*Pea family*)

Western Redbud

California

Cercis

A multistemmed deciduous shrub or small tree, native to the Sierra foothills and elsewhere, with magenta flowers that appear in March before the leaves. The flower color alone distinguishes it at a glance from eastern redbud. Flat brown pods, which are still hanging on the tree when the flowers appear in March, contain a few hard, brown, shiny seeds that will take years to germinate unless soaked with boiling water. As boiling water is very rare in nature, this raises an interesting question. There was a rare clump of four situated in the southwest corner of Santa Teresa Street and Lomita Drive; when the New Guinea sculpture garden was relandscaped in 1994 only one remained, but eastern redbuds were brought in as reinforcements. Western redbud also is at 300 Lowell Avenue, Palo Alto, to the right of the driveway. Just before 2000, dozens of California redbuds were planted in Lomita Mall east of and between the McCullough and Gordon and Betty Moore buildings. You can collect the hard smooth seeds by the hundreds; a bowl of them run through the fingers is at least as therapeutic as a string of worry beads.

occidentalis

Flowering Quince

Eastern Asia

Chaenomeles

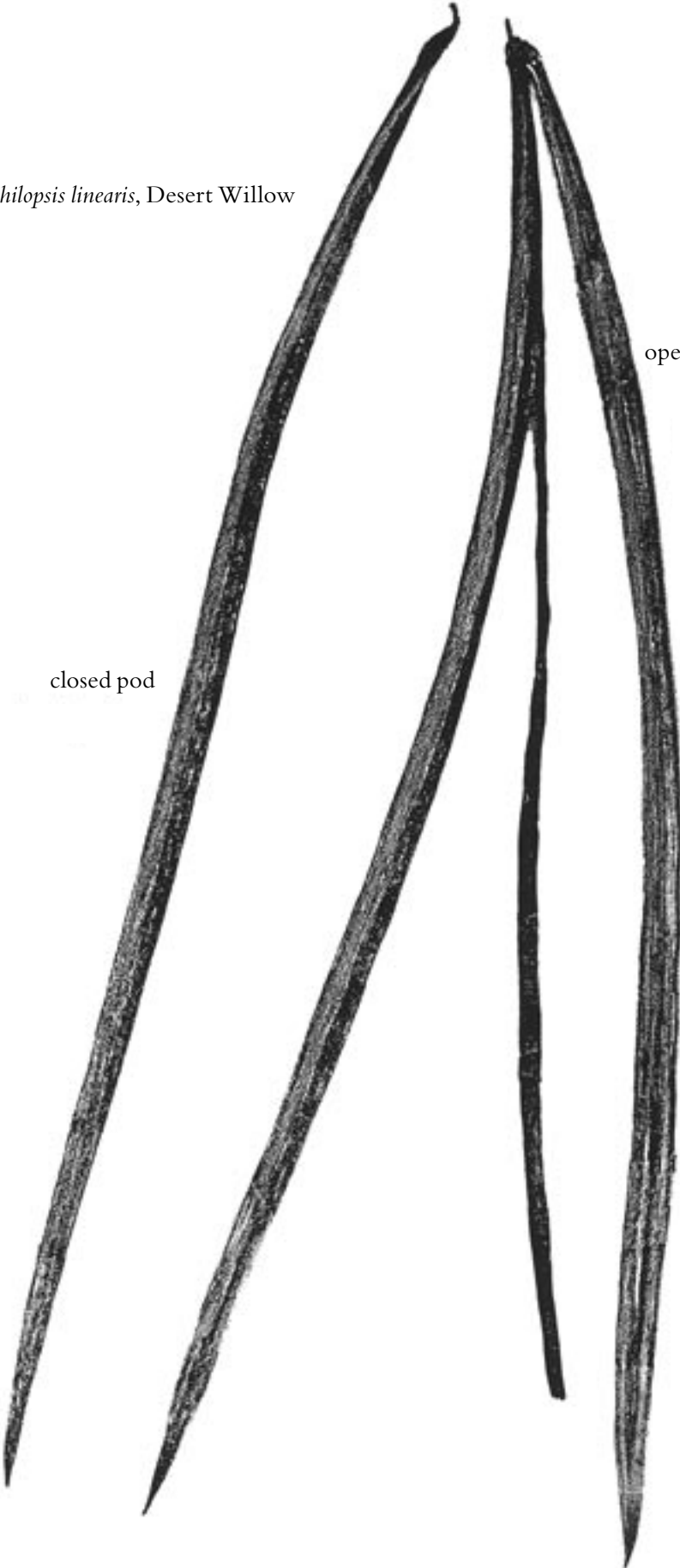
An upright shrub, flowering quince is among the earliest campus woody plants to bloom each year (January to February, before putting out leaves). Some varieties have thorns, some are thornless. 'Stanford Red', drought tolerant but also accepting regular watering, is commonly planted, and can be seen along Galvez Street and on Campus Drive East at the Track House.

cultivars

ROSACEAE

(*Rose family*)

Chilopsis linearis, Desert Willow



closed pod

open pod with divider

Port Orford Cedar

North America, Japan

*Chamaecyparis
lawsoniana*
CUPRESSACEAE
(*Cypress family*)

Known as a splendid timber tree growing close to 100 feet high on the Oregon-California border, it is, surprisingly, available in the form of ornamental cultivars that range in height down to 3 feet. The tall trees are the principal source of shingles and shakes in California. As siding it is cheaper than redwood but less durable. The closets of older campus homes are invariably lined with cedar, so as to repel clothes moths; the aromatic fragrance, which is very long-lived and probably carcinogenic, is a warning to insects. Because of its occurrence in Japan and Taiwan, the tree's adaptability to bonsai treatment was long ago discovered by Oriental gardeners. Several other species of *Chamaecyparis* have contributed to the dozens of available cultivars. *Chamaecyparis* is closely related to the cypress (*-cyparis* is just a spelling variant of cypress), but differs by displaying its twigs as flattened sprays covered with tiny stem-clasping scales and by dropping its cones annually. The prefix *chamae-* is borrowed from an ancient Greek word *chamaidrus* meaning a stunted tree. The word *drus* taken on its own meant tree; in fact English tree and Greek *drus* have a common origin.

The fungus *Phytophthora ramorum* is killing Port Orford cedars in Oregon, a nontrivial matter given that a large tree in 2002 brought as much as \$50,000. By 2002 it had spread to Big Sur and Berkeley. Sudden oak death syndrome, not previously noted with conifers, was also reported on a redwood. The Irish potato blight reminds us of the consequences of *Phytophthora*.

A grove of two dozen old Port Orford cedars can be seen at 776 Dolores Street and there are several, old and new, at Kingscote Gardens, including two narrow old specimens near the pond. In Palo Alto, a specimen to the right of the front door at 1127 Hopkins Avenue can be compared to the incense cedar hedge left of the driveway, and an excellent gold-leaf variety of *C. lawsoniana* is at 1133 Harker Avenue on the left side.

Mediterranean Fan Palm

Mediterranean

*Chamaerops
humilis*
PALMAE
(*Palm family*)

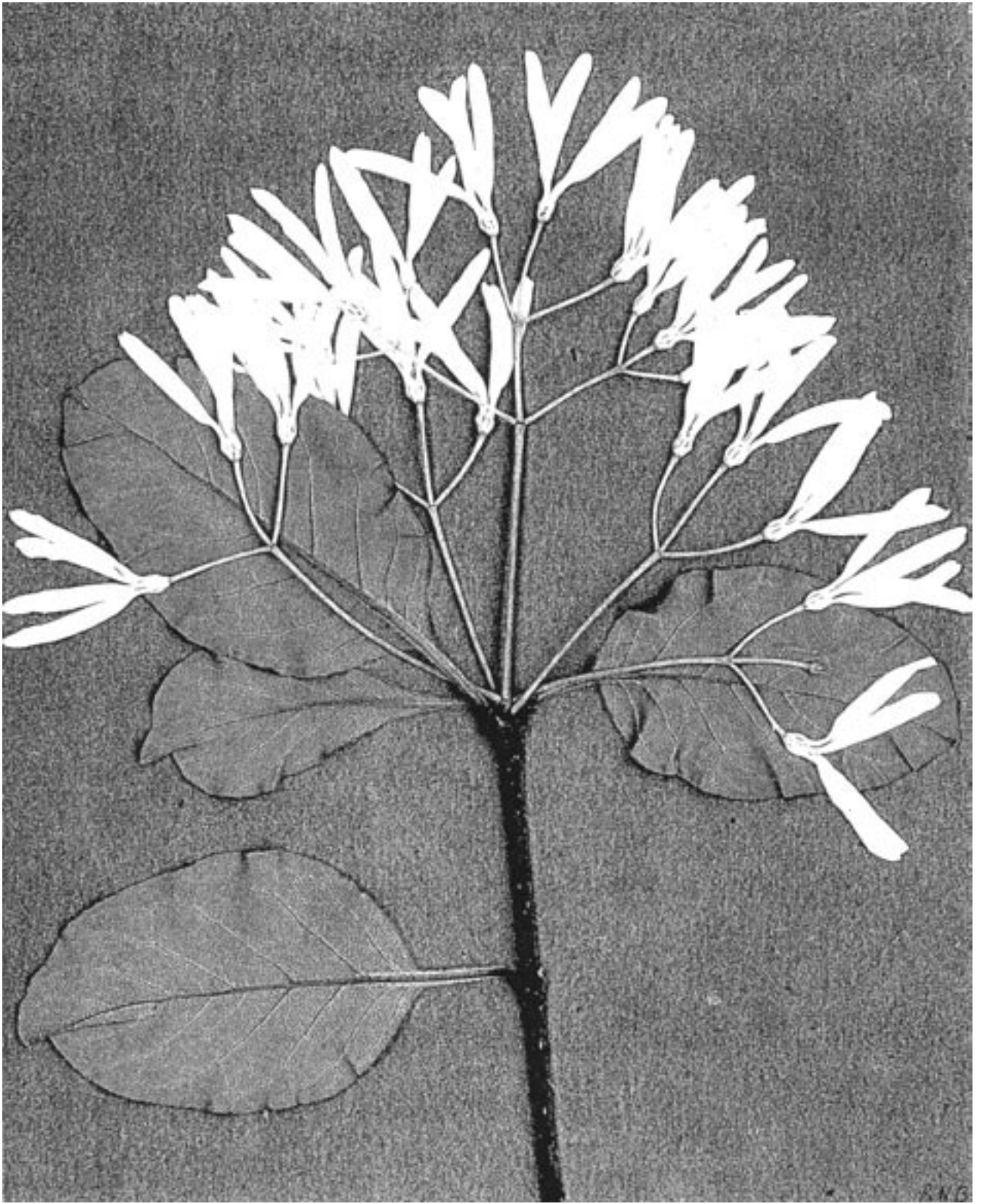
Usually a small bushy plant, as seen on campus. The leaf stalks are armed with short, sharp teeth, and the leaves, which form a fan rather than a feather, can be woven into fans, hats, mats, etc. Several clumps grow at the New Guinea Garden's west side and nine more are in the three square lawns on Galvez Mall near Encina Hall. Another is at Encina's northeast corner.

Desert Willow

Southwestern United States, Mexico

*Chilopsis
linearis*
BIGNONIACEAE
(*Bignonia family*)

A small deciduous tree with hanging, sharp-pointed seed pods about 10 inches long by ¼ inch diameter, with two short bracts. As with catalpa, the pod splits to reveal a stiff divider about ⅛ inch wide. The very narrow leaves are 3 to 4 inches long by less than ¼ inch wide. There are well over 50 of



Chionanthus retusus, Chinese Fringe Tree

the tiny kernels, which are only about 1/8 inch long and concealed in a hair-fringed shell about an inch long. The kernels can be located by crushing on paper which, when held up to the light, will reveal a tiny oil spot. The attractive flowers, resembling those of both the catalpa and jacaranda, hang as 1½-inch-long trumpets. One of the five wavy-edged lobes of the trumpet appears to be designed as an insect landing strip. The four hard-to-find anthers are tucked away inside.

See several street trees on Campus Drive East to the west of the entrance to ΣAE house. The dissection of a desert willow pod would be fun for school children and could lead to a discussion of the hairiness (in-pod insulation? or aid in dispersal by wind? or something else?); the canoe shape (slows the fall? or makes a protective tent for a fallen kernel?); why is the pod so long and why does it hang on the tree for so long (for protection against some pest? or for slow release of seeds to guard against infrequent showers of rain in the desert?); what is the function of the divider (stiffen the 8-inch-long pod? or is it merely a relic of a primitive two-celled ovary from times before the pod evolved to today's extreme length?). Such class discussion following a field trip would promote environmental awareness and also exemplify Galileo's theme that knowledge can be obtained directly from nature by experiment as well as from people.

Chinese Fringe Tree

Taiwan

Chionanthus retusus
OLEACEAE
(Olive family)

A very attractive group of four fringe trees planted in 1968 graces the secluded patio, designed by Thomas Church, north of the southwest corner of the Main Quad, off Lomita Mall. By late March they are in flower, the long narrow petals having a very charming appearance. The fruits are dark-blue oval berries borne in terminal clusters. Following the success of that popular planting, many more Chinese fringe trees have been installed. By 2001, 11 new specimens about 20 feet tall were flowering in the courtyard behind Sequoia Hall, but did not bear fruit. Several specimens are on the south side of Mudd Chemistry, two large ones are at the entrance to Forsythe Hall, and a pair can be seen at 579 Alvarado Row. A row of five on the south side of Gravity Probe B (west side of Via Palou Mall) produce copious fruit looking like bunches of small grapes. Five more flank the main entrance to Schwab Residential Center.

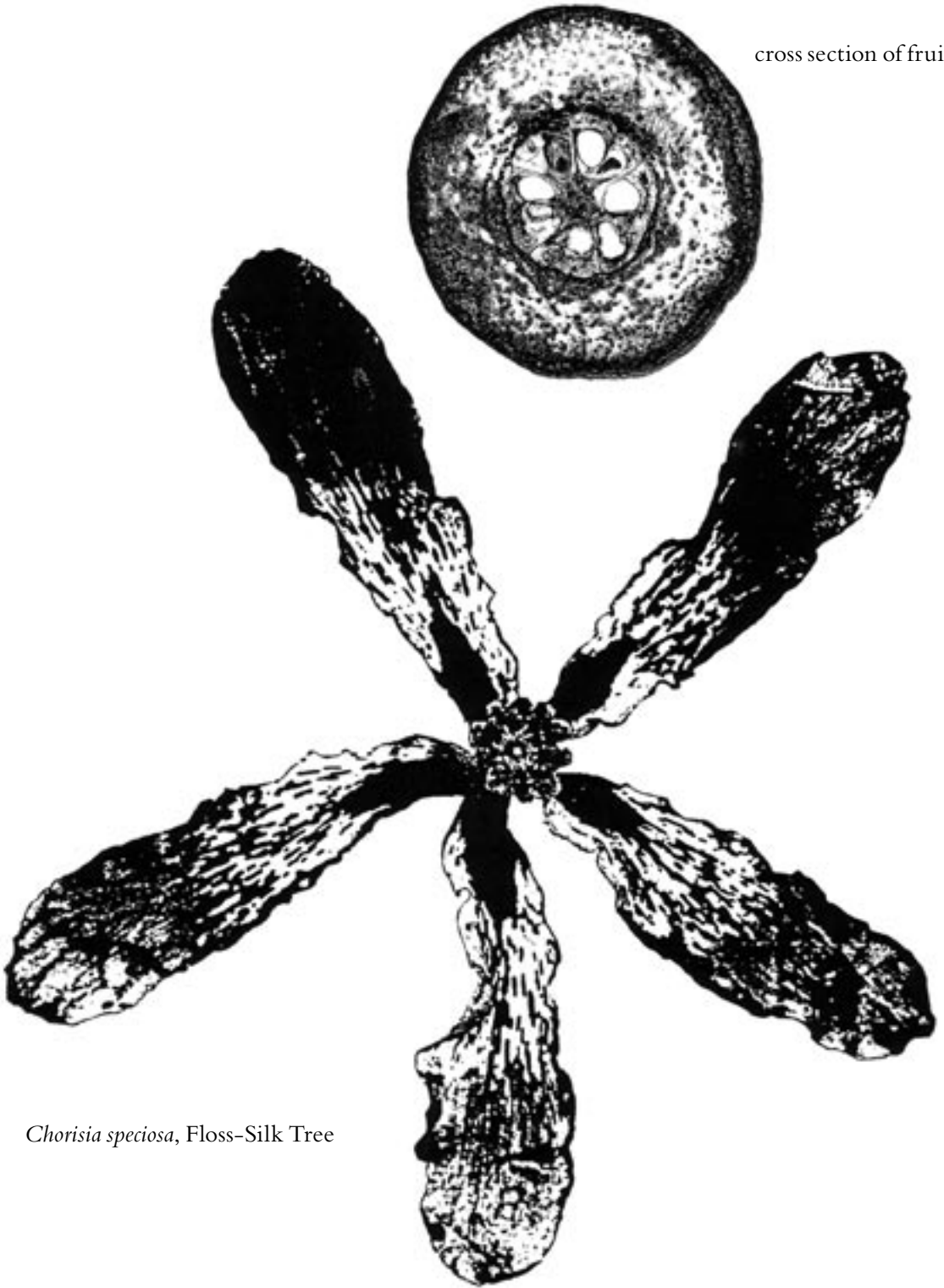
Fringe Tree

North America

Chionanthus virginicus

The native fringe tree has leaves and flower panicles up to twice the size of those of the Chinese tree. A location on Quarry Road was landscaped away; a new tree is, alas, in the backyard at 659 Salvatierra Street.

cross section of fruit



Chorisia speciosa, Floss-Silk Tree

Floss-Silk Tree

Brazil *Chorisia
speciosa*
BOMBACACEAE
(*Bombax* family)

A striking tree in September/October when it is covered in large, flimsy flowers with five 3-inch pink-and-white petals each having brown dashes showing the way toward the central structure. This structure is an imposing hollow column representing a fusion of stamens, topped by a battlement of 10 anthers and supported by five large fuzzy basal staminodes. The stigma, hidden within the anthers, reveals its location as the fruit grows. The petals are used in Brazil as threads in upholstery. Faintly serrated light-green leaflets grouped in fives or sevens are overpowered during the flowering season. The upper trunk and branches are green, but the most distinctive feature is the wicked-looking array of stout spines that crowd the trunk; near the base they protrude by an inch or more. What the tree's ancestors had in mind to guard against, as they evolved and thus fit themselves for survival, offers food for thought; perhaps an arborivorous dinosaur!

There is one in the outer southwest island in the Inner Quad that is visited by hummingbirds; one on the south side of the Post Office, with a hole through its trunk, that bears fruit; and one near the Clock Tower (with seven trunks!). Another specimen is on Galvez Mall east of Green Library. But the most striking site is Parking Structure 1 on Campus Drive West and Roth Way, where two rows of seven each are rooted in the dim interior. The trees evidently think they are in their ancestral jungle and have performed quite differently from the isolated specimens that grow in full sunlight elsewhere on campus. They had pushed upward to the full height of the structure by 2002 and fruited more than once.

The fruit have the general appearance of large green-colored avocados, but can be even larger, reaching 8 inches in length and weighing up to 1¾ pounds. When unripe, they have the texture of a juicy cucumber, with a seed-bearing core. On ripening, pods open to expose masses of white cottony or kapok-like material that ultimately fall to the floor far below and perhaps act as a barrier to rodents seeking the tiny seeds. Commercial kapok, exported mainly from Java, for innumerable uses, comes from Asian members of the bombax family (such as *Ceiba pentandra*).

The tree was named for Ludwig Choris (1795–1828), who sailed around the world as an artist with Otto von Kotzebue (1787–1846); Choris is of local interest for having left paintings (held by the Bancroft Library, U.C. Berkeley) of Native Americans, made in 1816 at the Carmel and San Francisco missions (portraits, dance groups, war dance costumes). See *The Tall Tree*, Palo Alto Historical Association, Vol. 3, No. 2, October 1969.

Cinnamomum camphora **Camphor Tree** *China, Japan*
 LAURACEAE
 (*Laurel family*) A member of the laurel family, which like all such members (for example the California laurel) contains aromatic essential oils. Crush a leaf and smell it. Camphor is distilled from the wood. The shiny green leaves are distinctive, helping to identify the tree at a distance. Small yellow flowers are followed by black berries. Two venerable but declining patriarchs are in the inner northeast island of the Quad, several are in front of Encina Hall, and many are on Embarcadero Road near Newell Road, Palo Alto.

Cinnamomum glanduliferum **Nepal Camphor Tree** *Himalayas*
 Three trees related to the commonly grown camphor tree are standing along the Engineering buildings on Escondido Mall opposite the back of Memorial Church. The leaves have a characteristic camphor smell but have not had the best appearance, perhaps because of frost. Street tree specimens can be seen in Palo Alto at 355 Parkside Drive and nearby houses.

Citrus Notes

Various species names have been given to citrus trees in the course of time but they are of no use in ordering from a nursery. Practical identification is done in terms of varietal names, which are far too numerous to list, and in any case only a limited selection is available in a given area. Several oranges, varieties associated with *C. sinensis*, especially ‘Valencia’, are grown in home gardens. ‘Meyer’ lemons, which are not as acid as the ‘Eureka’ lemons sold in stores, are also popular in homes, as are grapefruit (*C. paradisi*), kumquats (*C. japonica*), mandarins (*C. reticulata*), and limes (*C. aurantifolia*). There are oranges in two planters at the Post Office, kumquats behind buildings 20 and 40, and other citrus including lemons in Citrus Court (northeast corner of Outer Quad) and in other Quad spaces. Grapefruit, and possibly limes and mandarins, are also growing in private gardens.

Oranges are probably native to Southeast Asia and did not reach Rome until the 4th

century. The lime, credited with combating scurvy at sea in the hands of Captain James Cook, is also thought to have originated in Southeast Asia. The lemon (*C. limon*) arrived in the Mediterranean at the beginning of the second millennium, and can be traced back to northern India. The grapefruit was said to have originated in Jamaica. On the other hand, the shaddocks (pomelo, *C. maxima*) taken to the West Indies by Captain Bligh were thought to be native to the South Pacific, but were named for Captain James Shaddock for having smuggled them from Southeast Asia. The kumquat (*C. japonica*) comes from southern China and is treated separately under *Fortunella*. The horticultural development of the citrus group has evidently obscured the actual geographic origins. For cultural information visit <http://fruitsandnuts.ucdavis.edu/>.

Sometimes etymology tells what our ancestors thought about botanical origins. The word orange traces back through French to

Provençal *auranja* to Arabic *nāranj* to Persian *nārang* to Sanskrit *nāraṅga* to Dravidian territory and is remembered in modern Tamil by the word *naṅu* meaning sweet. What is now an orange should have been a norange. We get the word mandarin from Portuguese *mandarin*, from Malay *měntěri*, from Sanskrit *mantrin* = counselor; hence the relationship to the Chinese official and the sacred mantra.

Lemon comes to us via French from Arabic *laymūn*. What the Pilgrim Fathers thought came from Turkey, and the French thought came from India (*la dinde*) in fact came from America; etymology is more a hobby than a science. Kumquat (also known as *Fortunella japonica*) is from Cantonese *kam* = gold, *quat* = orange, while loquat is from *lō-kwat*, which means rush orange.

Palm Lily

New Zealand

Cordyline australis

AGAVACEAE
(*Agave family*)

This large member of the lily family is decorated with scented white flowers in May and June and later has small pale white berries containing black seeds. Fiber from the leaves was used by the Maoris for twine, nets, and woven goods. There are examples are in the Inner Quad, in the New Guinea Garden (planted in 1994), and at 553 Mayfield Avenue. Compare it with *Agapanthus*, *Dracaena*, *Phormium*, and *Yucca*, which belong to the same family. *Cordyline* is distinguishable from *Dracaena*, which it most resembles, by having three seeds per berry rather than one.

Evergreen Dogwood

Himalayas

Cornus capitata

CORNACEAE
(*Dogwood family*)

A small evergreen tree, leaves a paler green underneath, with prominent ribs. The extraordinary red fruit body is composed of 30 or 40 pink, fused, roughly six-sided fruits each with a stubby, central-style remnant. It is interesting to watch the different stages of development of the fruit, which is eaten in India, starting from a tiny granulated green knob subtended by four bracts whose shadows can be seen long after the bracts fall. The wood was familiar in ancient Greek times for use in javelins, as reported in the *Aeneid*. See behind Inner Quad Building 40 and next to a lamp at the northwest corner of Lagunita Court.

Pacific Dogwood

Pacific Coast

Cornus nuttallii

Large white flowers in April and good fall color of the leaves and bunches of red drupes commend this native tree. Examination reveals that the conspicuous part of the flower is not composed of petals at all but is composed of four (or five or six) large cream or partly pink bracts. The tree grows wild in the Santa Cruz Mountains south of here and deserves to be honored more extensively at Stanford. Native dogwood resents disturbance by normal gardening activities and is highly susceptible to anthracnose, a leaf fungus disease that can cause stem cankers; therefore nurseries supply vari-

eties of eastern dogwood *C. florida*, whose fruit was formerly eaten by Native Americans, *C. kousa* from Japan and Korea, Tatarian dogwood *C. alba*, and Cornelian cherry *C. mas*. In recent years, Stanford has planted *Cornus nuttallii*/*C. florida* hybrids. There is a row along the east face of the Center for Integrated Systems, Via Palou Mall; 'Eddie's White Wonder' is at the entrance to the Art Gallery and at the intersection of Lomita and Serra malls. Additionally, *Cornus florida* varieties, particularly 'Rubra', can also be seen at Bing Nursery School, the back of the Humanities Center on Santa Teresa Street, and between buildings 100 and 110 of the Main Quad.

Corylus avellana
 BETULACEAE
 (Birch family)

European Filbert, Hazelnut *Europe, Asia Minor*

Hazelnuts are an important crop in Europe and are familiar in America in chocolates and other confectionery. In addition they are used for oil, and the rose-colored timber has many uses, not only for making a variety of wooden objects but also for pyrotechnics and charcoal crayons. Over the course of time, in places ranging from the heat of Sicily to the chilly coast of Norway, practically every possibility must have been pursued. It will not come as a surprise, therefore, to learn that the leaves offer forage to cattle and goats. A specimen at Stanford found in the planter in the space east of Hoover Tower, near the sundial, is a cultivar 'Contorta', with twisted branchlets and other parts, giving rise to the name Harry Lauder's walking stick. A related species, California hazelnut (*C. cornuta californica*) is native to the Santa Cruz Mountains, including Jasper Ridge.

Cotinus coggygria
 ANACARDIACEAE
 (Sumac or cashew family)

Smoke Tree *Eurasia*

Several striking smoke trees can be seen on Alvarado Row at 797 Esplanada Way. The one with purple leaves next to the speakers' stand in White Plaza is 'Royal Purple'. Both the green and purple forms are part of the hedge on Escondido Road at the Escondido Village Maintenance Building. At flowering time the large, durable, fluffy volumes, composed of very long hairy pedicels, must be seen to be believed. At home in dry, hot desert and tolerant of subfreezing temperatures, smoke bush is uncommon here and unlikely to do well in gardens that are watered; still, it is often seen in England, so why not? The leaves in fall assume splendid variegated coloration that mixes fading green, brownish red, and ruby.

Crataegus laevigata
 ROSACEAE
 (Rose family)

Hawthorn *Europe, North Africa*

These small deciduous, spiny trees (also known as *C. oxyacantha*) were popular with campus residents years ago and may be spotted in spring by their covering of flowers, generally pink and double. They are rather thorny and picking up the prunings can be a hazard. The round-lobed leaves are finely

toothed, and the ¼-inch or larger red fruits contain *two* stones. Several horticultural varieties are available. A pleasant row of 10 neat pollards can be seen toward the southeast end of Salvatierra Street opposite a row of 10 great magnolias, and there is one on Lomita Mall at the southeast corner of Varian Physics. The fruits contain little edible meat, but enough to have been added to flour in Europe in World War II. As with rose hips, haws can be used for making jellies. In English, the earlier meaning of the word haw was hedge, or the area enclosed by a hedge. The related word in Dutch occurs in Den Haag (The Hague). The distinguishing feature that conveniently separates the three hawthorns is the number of stones.

Hawthorn, Hedgerow Thorn

Southeastern Europe, Caucasus

Crataegus monogyna

The leaves are not toothed, but have rounded lobes and the red ¼-inch fruits contain *one* stone. Hawthorn flowers have a faint odor that is repulsive to bees, but attracts flies (who take care of the pollination). A wild plant that can be used for a hedge spiny enough to contain cattle is a valuable resource that conserves the labor and materials needed for fencing and has been in use at least as far back as Roman times. A tree named *krataigos* is in the Greek lexicon, but what tree it denoted is uncertain. The *Mayflower* of 1620 was named for the hawthorn flower. See two examples at the intersection of the Sonoma Terrace and Stanford Avenue bike paths.

Washington Thorn

Southeastern United States

Crataegus phaenopyrum

This native American hawthorn has clusters of white hanging flowers followed by red fruits. As winter comes on, the lobed 2½-inch shiny leaves turn red or orange, and after they fall, the fruit remains. The leaves differ noticeably from the hawthorns; they have the same number of lobes, three to five, but they are sharply pointed. The fruits are about the same size, ¼ inch or more, and contain *five* stones. There are handsome specimens on Santa Fe Avenue where it runs into Esplanada Way and at 680 Salvatierra Street. Squirrels are apt to make a mess in winter nibbling at the fruit.

Plume Cryptomeria

Japan

Cryptomeria japonica
‘Elegans’
TAXODIACEAE
(*Taxodium* family)

Feathery evergreen conifer with interesting warm-colored fibrous bark and striking bronze foliage in winter. The tiny needle leaves form fluffy thick masses. Examples can be seen at the entrance to the Old Chemistry Building on Lomita Drive. A group is at the Palo Alto Art Center, 1313 Newell Road, near the Green Room entrance. The general appearance is rather different from that of the standard species, which has stiff sharp needles with a roughly triangular cross-section where they join the stem. The needle also runs down the stem a little. The cones resemble redwood cones but are a

little smaller and more nearly spherical. Each scale ends in three to five claws and has an additional claw in the middle. The standard form may be seen at the right side of the driveway at Bolivar House (582 Alvarado Row, planted 1892); a group of three is at Old Chemistry. Giant specimens of Japan's largest tree are seen at Nikko, Japan.

Cupressus arizonica **Arizona Cypress** *Southwestern United States, Mexico*
CUPRESSACEAE
(*Cypress family*)
This tree of the desert mountains is distinguished from the Monterey cypress mainly by its glaucous leaves and cones. It is popular for planting in the Southwest and also as a shapely Christmas tree. Smooth-barked Arizona cypress, *C. a. glabra*, has succeeded on campus but has been sacrificed to construction except at Hanna House and at Escondido Elementary School in the fenced play yard bordering Stanford Avenue.

Cupressus funebris **Mourning Cypress** *China*
This cypress has its leaves arranged in flattened hands that droop noticeably. The cones are very small, ½ inch or so in diameter. There is a double-trunked specimen on the west side of Palm Drive, about 40 yards from the intersection with Arboretum Road, and very close to the footpath, as you walk south. On the east side of the Arizona Garden is a row of old specimens planted soon after seeds were brought back to Europe from China; the Dudley Herbarium, a Stanford collection relocated to the California Academy of Sciences in 1976, contains vouchers deposited in 1896. For the history of the herbarium, which was previously upstairs in the south wing of the Stanford Museum, and the generations of indefatigable plant collectors associated with it, see an article by Sara Timby in the Fall 1998 issue of the Historical Society's *Sandstone & Tile*.

Cupressus macrocarpa **Monterey Cypress** *Monterey, California*
Away from its foggy coastal habitat this tree does not always do well; specimens can be seen here and there that have been killed by cypress canker, a fungus that is following Monterey cypress plantings around the world. The branchlets give a pleasant aroma when crushed. Older ones are at the southeast corner of 505 Lasuen Mall, and six on Santa Teresa Street diagonally east of the New Guinea Garden. One of the old cypresses after which "Pine" Hill was named stands at 858 Lathrop Drive. Once the most widely cultivated tree at Stanford, 200 or more Monterey cypresses were formerly maintained in and around the Quad but few remain. In 1975 Palo Alto reported 50 to 100 dead or dying. Monterey cypress should not be planted on campus. The San Francisco Presidio, now a 1480-acre national recreation area, has a 3800-tree forest, planted a century ago, that is flourishing under the foggy

conditions that it likes. However, the forest is threatened by a proposal from the United States Fish and Wildlife Service to restore the sand dunes that once covered the Presidio (*New York Times*, March 9, 2003). These dunes also covered the site of Golden Gate Park (see *Acacia longifolia*).

Italian Cypress

Mediterranean

*Cupressus
sempervirens*

The narrow, upright Italian cypress is seen in many places on campus, for example at the south side of the Durand Building on Panama Mall. A group of nine tall specimens is at the bend of Santa Fe Avenue, and a lengthy planting is at Mayfield Avenue and Coronado Avenue. Several survivors planted by the university's first gardener, Thomas Douglas, are behind the Mausoleum. The rotund specimen in the Cantor Center lawn near Lomita Drive and Roth Way is an outstanding example of the wide-branching form, *C. sempervirens horizontalis*, listed in botanist LeRoy Abrams' 1913 survey of campus conifers.

The globular cones are about the size of a large olive and the leaves are tiny scales, like those of the Monterey cypress, packed on the twig to give a four-sided feel. A classical tree frequently mentioned by Greek and Roman writers, along with elm and white poplar, as suited to burial places. "And in sad cypress let me be laid," sang the clown in *Twelfth Night*, 4:12, probably referring to the wood, which was used to make insect-repellent chests. Even earlier, it was used by Noah in the construction of the ark. Italian cypress has been widely planted around the world. Tuscany is famous for its cypresses, although the tree apparently is not native to Italy. The doors of St. Paul's church, Rome, installed in the 13th century, exemplify the extraordinary durability of the timber.

A major catastrophe struck in Tuscany when, in the 1970s, one-quarter of all the cypresses were sick or dead. While *Coryneum cardinale*, the fungus afflicting the Monterey cypress, may be a cause, other factors (such as pollution) may be involved. The Tuscan landscape of cypresses and olive groves, unchanged for centuries, was radically affected. The lesson for us on campus where we have already had bad experiences with cypresses, elms, pines, and ashes, is to aim for diversity.

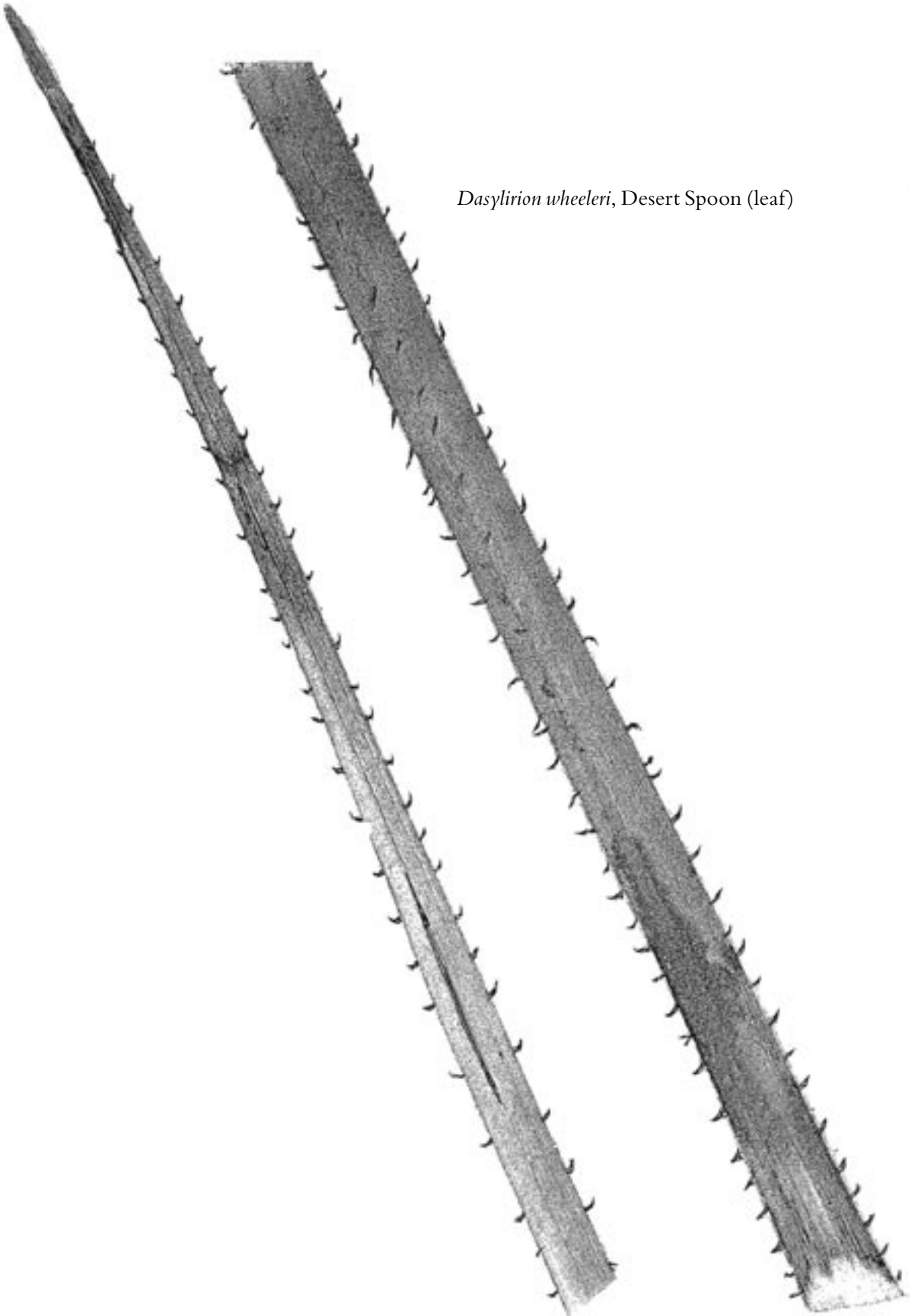
Himalayan Cypress

Himalayas

*Cupressus
torulosa*

There is a handsome specimen on the west side of the Arizona Garden and another in the row of mourning (or funereal) cypresses on the opposite side. The tree resembles the mourning cypress in having drooping branches and very small cones, but the sprays are not flattened and the terminal branchlets are arranged differently.

Dasyliirion wheeleri, Desert Spoon (leaf)



Australian Tree Fern

Australia

Cyathea

This tree fern is similar in appearance to *Dicksonia*. A distinguishing feature is that the spore-bearing organs under the leaflets are closer to the midrib rather than being closer to the leaf margin as with *Dicksonia*. The comparatively smooth trunk is textured with oval leaf scars. There is a row along the north side of Green Library.

cooperi

CYATHEACEAE
(*Cyathea* family)

Sago Palm

China, East Indies

Cycas revoluta

These decorative single-trunked, small trees appeared in several islands of the Inner Quad when it was repaved in 1984. In appearance like a tree fern, they remind us of the look the young palms must have given to the Quad a century ago. Leaves are 2 feet long with innumerable recurved leaflets. In the fall an impressive crown of new leaves prepares to unfurl at the apex and becomes most interesting to watch, more so than the corresponding happenings of the tall palms whose tops are out of sight. The sago palms will reach only 6 feet or so and would be suitable for the New Guinea Garden. Cycads are not palms; some are males and some females and in due course they will produce and drop cones.

CYCADACEAE
(*Cycad* family)

Quince, Fruiting

West Asia

Cydonia

Quinces, which are not much good to eat raw, but can be cooked up like apple pie, grow on small deciduous trees with large, attractive flowers. The quinces themselves resemble downy, fragrant, yellow pears. The trees have not been planted on campus in recent years; two bushy clumps are on the north side of the Cantor Center and a robust, attractive large-leaved variety is opposite 613 Salvatierra Street.

oblonga

ROSACEAE
(*Rose* family)

Desert Spoon

Southwestern United States, Mexico

Dasyliirion

Usually considered to be an agave, this plant is now treated as belonging to the Nolinaceae by the Desert Botanical Garden, Phoenix, Arizona. It appears as a mass of impenetrable, 3-foot, swordlike leaves tapering from ½ inch to zero with wicked thorns every ¼ inch. Each leaf terminates in a stem-clasping spoon. A specimen growing in the inner southwest island in the Inner Quad may be an original planting from 1890.

wheeleri

AGAVACEAE
(*Agave* family)

Dove Tree

China

Davidia

A small deciduous tree of handsome appearance with deep green toothed leaves to 6 inches, furry and paler underneath, with odor like mint. The small flowers do not depend on petals to advertise themselves but instead exhibit two large white drooping bracts in May, giving the appearance of

involucrata

NYSSACEAE
(*Tupelo* family)



Dicksonia antarctica, Tasmanian Tree Fern
(leaf simulation)

nesting doves (to some); others, who use the name handkerchief tree, are reminded of laundry hanging on the line. In 2000 one appeared in the Inner Quad in the mulberry (outer northeast) island; three are on the east side of the Center for Integrated Systems. For the fascinating tale of the introduction of the dove tree to Europe, see Elizabeth McClintock's *Trees of Golden Gate Park and San Francisco* (Heyday Books, Berkeley, 2001). Illustration, see page xii at front of this book.

Tasmanian Tree Fern

Southeastern Australia

Dicksonia antarctica

A rather surprising tree from cool, moist gullies, which is planted in shady out-of-the-way locations, for example at the north side of the Faculty Club. The fronds may be up to 6 feet long and a yard wide; when dead they are cut back to stubs and give the trunk a characteristic appearance. The pinnae bear pinnules and they in turn are further dissected. See *Cyathea*.

DICKSONIACEAE
(*Dicksonia* family)

How does nature pack the complexity of a tree into a tiny seed? I tried to instruct a mechanical printer to compose a fern leaf, dot by dot, consciously aiming to specify the fewest leaf dimensions and briefest set of instructions for using those data. The illustration of the computed leaf shows how rich a pattern can be specified in detail by the few lines of BASIC below. A lengthy description of the leaf in English can be imagined, and botanists do indeed attempt to unambiguously describe leaves using an extensive technical vocabulary. Nature presumably records the program for an ideal leaf in DNA symbols, though the encoded ideal is often frustrated by a variety of hazards arising during growth.

```
FOR I=0 TO 4; READ A(I),B(I),C(I),D(I),E(I),F(I); NEXT I
X=0; Y=0
FOR I=1 TO 30000
  R=RND; K=(R>0.01)+(R>0.08)+(R>0.85); Tmp=A(K)*X+B(K)*Y+C(K)
  Y=D(K)*X+E(K)*Y+F(K)
  X=Tmp; U=1760*X; V=44700*Y DIV 28; PLOT(U,V)
NEXT I
DATA 0,0,0,0,0.16,0,0, 0.2,-0.26,0.23,0.22,0,0.2
DATA -0.15,0.28,0.26,0.24,0,0.2, 0.85,0.04,-0.04,0.85,0,0.2
```

Japanese Persimmon

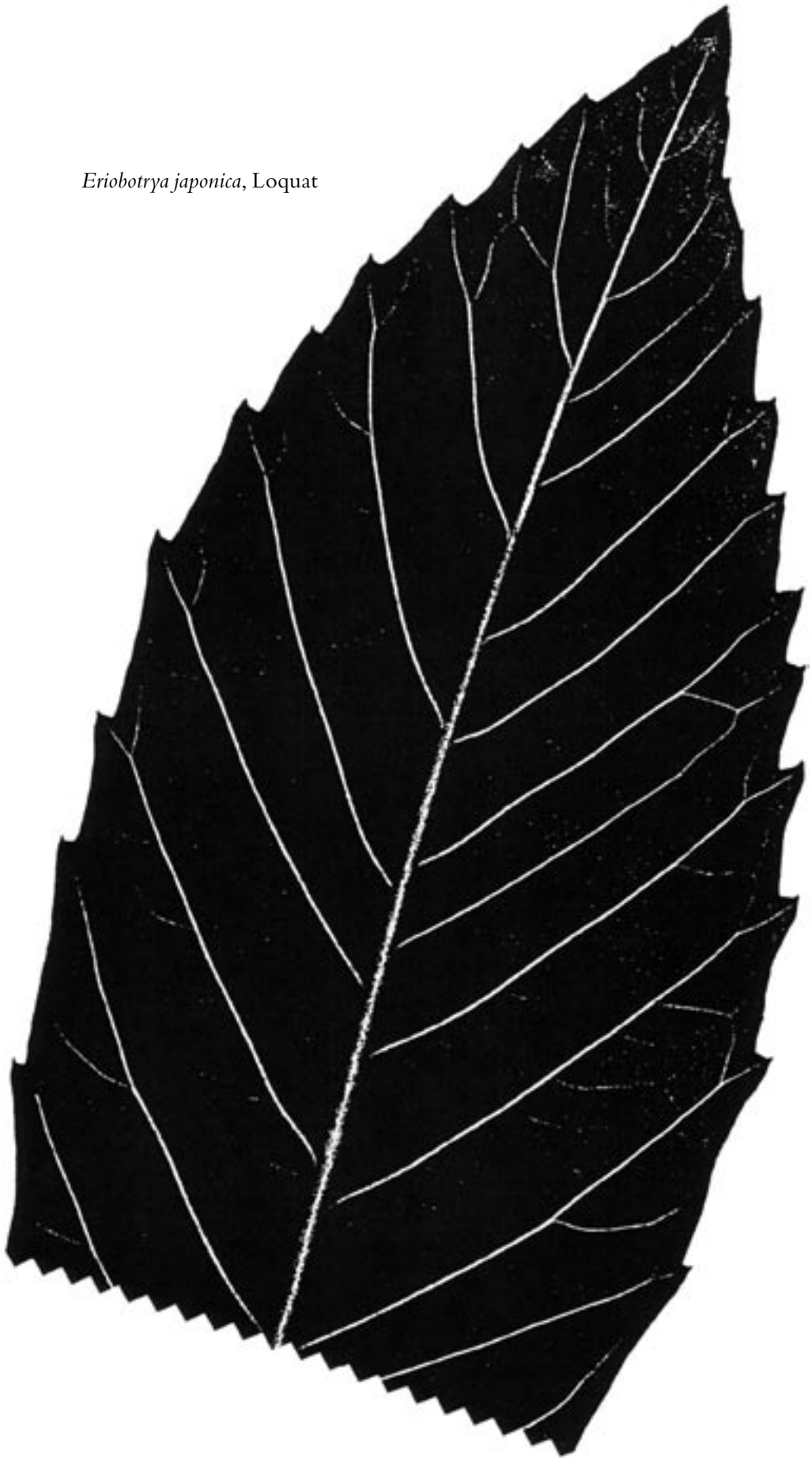
China, Japan

Diospyros kaki

Grown for ornament, persimmons stand out in private gardens where they often occupy a place of distinction. After the leaves fall in autumn, the bright orange fruits light up the trees, so it is easy to find them. Variety 'Hachiya' has fruit 4 inches long and 3 inches across that are very good to eat when just ripe, for those who have acquired the taste, and are so abundant that owners will probably give you some on request. See them at 658 Mayfield Avenue, due south of The Knoll on Lomita Drive, and one to the northeast of the

EBENACEAE
(*Ebony* family)

Eriobotrya japonica, Loquat



Bookstore, 50 feet east of the dawn redwoods. Variety ‘Fuyu’, with oblate tomato-shaped fruit, grows in the small enclosure at the southeast corner of the Old Union Courtyard. Both varieties are sold in local markets. Persimmons can be sun-dried after peeling and prepared in many other ways, depending on the variety, of which there are many. For more about persimmons see www.crfg.org/pubs/ff/persimmon.html. The American persimmon (*D. virginiana*) has a distinctly smaller, walnut-sized fruit but gave us the name persimmon, which derives from an Algonquin word. It is mainly collected from wild trees. Another species, the ebony tree *D. ebenus* that grows in India and Sri Lanka, is the tree that yields the very hard and very dark timber most often called ebony (as is *Bauhinia*, which is also grown in plantations as a crop in Madagascar and Mauritius).

Sticky Hopbush

Arizona, Australia, New Zealand, South Africa

Dodonaea

Not to be confused with the hop vine (*Humulus lupulus*) used for flavoring beer, hopbush is planted for its resistance to tough conditions. The sticky purplish leaves are up to 4 inches long, the flowers are in modest greenish racemes, and the ¾-inch fruits with three wings form in clusters resembling hops. The broad geographic distribution of native haunts of the sticky hopbush makes you wonder. Plants are at the Carnegie Institution on Panama Street. Groups of hopbushes can also frequently be recognized along the freeways once the distinctive color has been noted. Variety ‘Purpurea’ from New Zealand is near the southwest corner of Littlefield Center.

viscosa

SAPINDACEAE

(*Soapberry family*)

Bronze Loquat

Taiwan

Eriobotrya

Behind Memorial Church and along the south side of the School of Education the small trees with shiny leaves are bronze loquats, so-called from the color of the young leaves. The small fruits are not as messy as big loquats and are not worth trying to eat, but if you break one open you will immediately recognize the slippery brown seeds.

deflexa

ROSACEAE

(*Rose family*)

Loquat

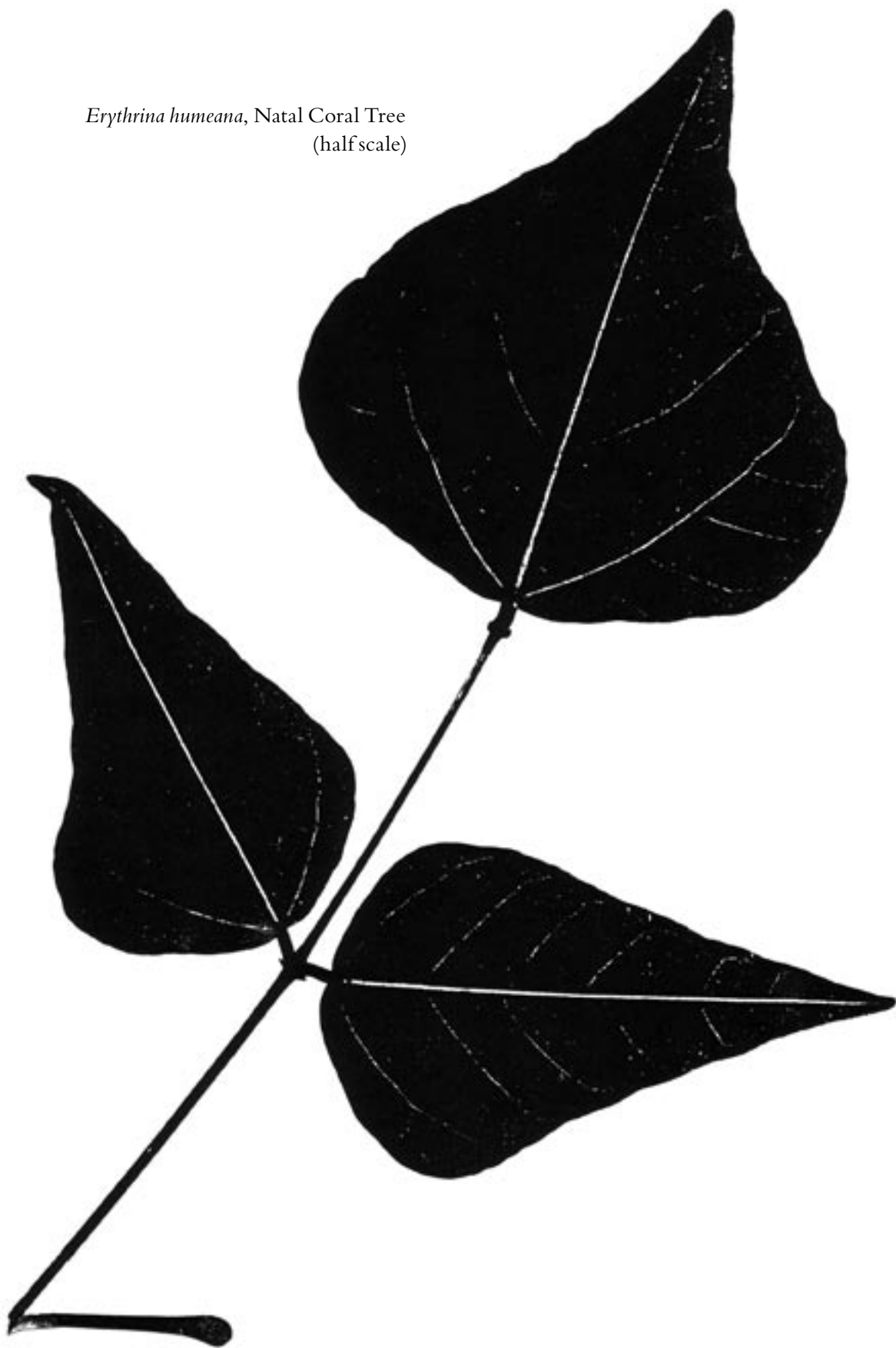
China

Eriobotrya

Behind the southeast corner of the Main Quad there is a quiet spot where, at the right season, you will find some knowledgeable person eating the loquats. Sometimes the big shiny brown seeds nearly fill the orange-yellow skin of the fruit, which is an inch or more in diameter, but a juicy ripe loquat is very good. The leaves are as much as a foot long, toothed, lens-shaped, and furry beneath. The fruit may have fur too, but it rubs off. Spontaneous seedlings appear freely, for example at the northwest corner of the Faculty Club. A very large spreading specimen that produces volunteer seedlings is at the northeast corner of the intersection of Palm Drive and Arboretum Road.

japonica

Erythrina humeana, Natal Coral Tree
(half scale)



Using the shortcut to Greek mentioned under *Melaleuca elliptica* look for an English word beginning with *erio-*. As a matter of fact there is one, and very interesting reading it is too. Furthermore, we find that *erion* is Greek for wool. By the same method one finds that *botrus* is Greek for grape: the loquat is a woolly berry! Of course, before popping a loquat in your mouth you have to shine it by rubbing off the fuzz. See *Citrus Notes*, page 92, for the Chinese etymology.

Cockspur Coral Tree

South America

Erythrina

E. crista-galli, aptly named cockspur coral tree for its thorns, is growing in the Arizona Garden and also as a street tree next to 690 Waverley Street, at the intersection with Forest Avenue, in Palo Alto.

crista-galli

LEGUMINOSAE

(*Pea family*)

Natal Coral Tree

South Africa

Erythrina

A small spectacular tree in late summer through fall growing in White Plaza outside the southeast corner of the Old Union Clubhouse. Each leaf has three spade-shaped leaflets, the whole being about 2 feet long. A few small but nasty thorns will be found on the leaflet midribs and the leafstalks. The hard shiny seeds, which are indigestible, are designed to attract birds, who then aid seed dispersal. The flowers are recognizably pea flowers but are bundled in such a way as to open in sequence. There are dozens of species and cultivars that are widely used in the tropics. See a young specimen, possibly a hybrid, with similar but smaller and wickedly thornier leaves, on Lagunita Drive 100 feet west of Braun Music Center.

humeana

Escallonia

South America

Escallonia

Small trees available in numerous varieties and hybrids, found in older campus homes but inconspicuous around the inner campus. But, if you notice the aroma of a curry being cooked and you prowl upwind, you will find an *Escallonia*. The leaves are dotted with glands and may be sticky to the touch. A large bank of *E. montevidensis*, with sticky dark green leaves and reddish stems, is on the north side of the Cogen facility, visible from Campus Drive West. In recent years, the shrubby, pinkish-flowered *E. × exoniensis* and cultivars have become the escallonia of choice and are now widely planted, including in the Inner Quad circles. Chihuahuan sage (*Leucophyllum laevigatum*) with 1-inch rose-colored flowers, which is grown as a sheared hedge guarding the bicycle racks at the David Packard Building, has a similarly attractive aroma of curry released by clipping. While the prunings are lying on the ground passers-by have the impression that the mouth-watering scent is being wafted from a South Indian bazaar hidden somewhere near the Packard cafeteria.

montevidensis

ESCALONIACEAE

(*Escallonia*
family)

Eucalyptus Notes

Eucalypts from Australia are a feature of the campus scene. Hundreds were planted as avenues on campus, dating back to the acquisition of the land by Leland Stanford: Gum Tree Lane, later to be known as Governor's Avenue, stretched for 1½ miles with more than 700 Tasmanian blue gums from San Francisquito Creek to Lake Lagunita and on through the stables to the Red Barn. Two decades later the trees were cut to tall stumps, partly to force regrowth with multiple stems and partly for fuel. That wood was a principal fuel in California does not readily come to mind in these days when gas and electricity are conveniently available for heating and cooking. By the 1950s the unpaved avenue was used as a shady walk and, by nearby residents, as a wood lot. One tree, a short distance south from Santa Teresa Street, had a girth of 26 feet. Governor's Avenue has been thinned from time to time to make room for road construction and new buildings. In January 2003 eight original giants that shaded the Medical Plaza at 1101 Welch Road and nearby were removed. The largest had a major diameter of 8 feet. Beneath one of a pair left standing next door at Blake Wilbur Clinic is a granite marker reading as follows:

GOVERNOR'S LANE

This tree lined lane once served as a direct access from the original Stanford home to the Lake Lagunita area. This lane follows a true north/south alignment and provides one of the most significant landscape artifacts on the Stanford Campus.

Long since abandoned as a usable route, the Governor's Lane is in the process of being re-established as a pedestrian, vehicular and visual corridor. Over the next few years, dying Eucalyptus trees will be replaced and a pathway constructed to provide a continuous link as it once stood.

One may wonder who undertook this public commitment.

A curved drive leading upstream along San Francisquito Creek from the Stanford residence (originally the home of George Gordon, d. 1869) used a mix of *Eucalyptus* species. Searsville Road, which ran from the Oval to Sand Hill Road, was planted mainly with *E. camaldulensis*, with some *E. viminalis* and *E. globulus*. Until its death in 2002, the very tall *E. viminalis* at Varian physics, with a girth of 23 feet, was a relic of Searsville Road, as is a blue gum in the parking lot between Ginzton Laboratory and Panama Street. Other eucalypts were planted in the 1890s as a savanna in the arboretum.

Experience with blue gums over more than 30 years led the Board of Trustees in the early 20th century to plant a triangular area across Galvez Street from the football stadium as an investment. That the trees were planted 6 feet apart indicates that harvesting was intended within a few years; however the crop was never harvested. Consequently, competition for sunlight and moisture, interspersed by occasional drought and severe freezes, made the weakened grove (now quaintly named Toyon Grove) a prime target for the longicorn beetles that arrived in 1988, four years after their discovery in Orange County.

These extraordinary beetles can smell a fallen branch, or sawn wood, from a distance, and come promptly to deposit eggs under the bark. On hatching, the legless, eyeless, large-headed larvae cut tunnels through the inner bark, fanning out both up and down from the hatching site in ever-widening tunnels separated by paper-thin partitions. They crawl with their bellies parallel to the bark surface,

waving their heads from side to side as they gnaw, cutting an elliptical tunnel; the space behind the larva is left stuffed with compacted, undigested sawdust. When they are ready to pupate, they burrow into the sapwood for protection from grub-seeking birds. If cut wood is removed to a wood-pile for later use as firewood, the larvae will continue feeding for months until beetles emerge, wherever the new site happens to be. If the attack is made on a living tree then kino, a sticky resin, will be exuded to engulf the intruders, if the tree is in good health. If not, it will soon die because the tightly packed and numerous tunnels cut off the flow of sap from the roots. Wasps from Australia have been released in California as a control measure. The Toyon Grove was thinned and the trees that were removed were burned or buried; today the grove is still functioning for the purposes to which football fans have become accustomed. Larvae have also been found in wood fallen from coast live oak. A different longhorned beetle caused 700 maples in Brooklyn to be taken down in 1996, and in 2002 two maples were reported as infected five miles away in Central Park.

At the Stanford centenary celebration President Donald Kennedy recognized a historic turning point by burying a longicorn beetle below the 1991 brass plate under the west arch of the Inner Quad, the same location as for the opening ceremony of 1891. This Australian species of longicorn appeared in El Toro, California, possibly from Chile. On a sinister note, the California Department of Forestry reported that “The insect is loose and it’s just a matter of time before it infests every eucalyptus stand we have in California . . . the bug may be deliberately spread by ecological zealots who would like

to rid the California landscape of the ubiquitous eucalyptus.” What with the release of syngaster wasps in 1989 by the University of California at Riverside, and the natural ability of healthy trees to respond with kino, there is room for restrained optimism. As for ridding the state of aliens (see *Paperbark Notes*, page 171, on xenophobia), pause to learn that of 112 wintering locations of the monarch butterfly in California, three-quarters are in eucalyptus groves!

Longicorn larvae are in abundant supply in infested wood and, although only an inch long, probably are flavorsome when lightly roasted, but they are as nothing compared with the famed witchetty grubs, larvae of other longicorns that are as thick as your finger and 4 inches long, and have been an Australian staple for millennia. California’s own longicorns happily don’t feed on eucalyptus cambium and are very popular with beetle collectors.

Meanwhile, the psyllids have struck again. A few years ago psyllids from Peru devastated our pepper trees, particularly on Stanford Avenue, where many trees were removed. Now, another psyllid, the lerp insect from Australia, has infested several species of *Eucalyptus*. The tiny insects are found on the leaves, sheltered by a 1/8-inch-diameter white tent known as a lerp. It is hard to believe that the barely visible insect feeding contentedly inside can do so much damage to the foliage as a whole; it evidently releases a bad enzyme while feeding. Wasps that specialize in parasitizing lerp insects have been released and it remains to be seen what the net damage will prove to be. The fallen lerps are sugary and edible, but when they fall on a hard surface they stick to the shoes and make a mess when tramped into the house.

The different *Eucalyptus* species far outnumber the species of oaks and pines, the next most abundant genera on campus. The many eucalypts are conveniently grouped according to the type of bark.

Ironbarks, except when young, have hard, rough, fissured bark, very dark to jet black, that does not drop off. See them around the Meyer Library and along Panama Street (*E. sideroxylon*).

Boxes have rough but fibrous bark, usually light gray. An example is red box *E. polyanthemos* (whose wood is red, as was well known when trees were cut for use); it is one of three or four species whose foliage is sold by florists as silver dollar gum, and flourishes on both sides of Campus Drive East from Escondido Road to Serra Street.

Stringybarks have long-fibered bark that was used for cordage, roofing, and the slab walls of early cabins:

*Of stringybark slabs were the walls of our hut
From stringybark saplings the rafters were cut
And the roof that long sheltered my brother and me
Was made of the bark of the stringybark tree.*

Bloodwoods are a group with rough, tessellated bark that is persistent but drops a few scaly flakes, *E. ficifolia* for example. The common name refers to veins of resin (kino) resembling congealed blood, but the timber is ranked as durable. According to an 1892 report in the *Proceedings of the Linnean Society of New South Wales*, aboriginals warmed the kino of the local bloodwood (*E. gummifera*) to spread on wounds.

Gums, in the restricted sense, have thin

smooth bark that peels off in strips, sometimes very long sheets, leaving variegated color patches where the new bark beneath is revealed. The word “gum” refers to the substance sold as kino, a dark resinous substance that contains tannin and is insoluble, as distinct from gums that are water-soluble carbohydrates. Kino was used for treating dysentery, being lumped in the pharmacopoeia with other dark red resins, under *Sanguis Draconis* (dragon’s blood).

Kino oozes from wounds in the bark, drowning insects if such happen to be the cause; the pitch from wounded conifers functions for the same purpose. Blue gums (*E. globulus*), red gums (*E. camaldulensis*), ribbon gums (*E. viminalis*), sugar gums (*E. cladocalyx*), and red-spotted gums (*E. maculosa*) are the numerous representatives on campus. The bark types are often distinguishable at a glance but the appearance changes with age and, in the case of gums, with season. Of three gums of the same species growing side by side, one may have a stocking of rough bark, one may have peeled to the ground, and one may be peeling only on the branches and upper trunk. Sometimes boxes and stringybarks look much the same but they feel different. Red-spotted gum not only has a distinctive feel but gives you an urge to help it shed its thin brittle plates.

Mallee refers to low-growing, bushy species with multiple stems, although you can force one to become a small standard tree by pruning. Occasionally a species that is normally upright produces a sport that seems to have the mallee gene (if there is such) and develops many trunks from ground level.

A single-trunked tree that is cut or frozen off at ground level may develop several

strong trunks, but ultimately one will gain dominance, and many years later the plant will be back to a single trunk. Examples of this were seen on Lathrop Drive and Sonoma Terrace with the red-flowering gums after the freeze of 1972. Mallees do not have this apical dominance.

As soon as eucalypts came to the attention of European explorers, the great height of several species drew attention. It is now established that the world's tallest broad-leaved trees are eucalypts. A mountain ash (*E. regnans*) in Tasmania was carefully measured at 321 feet in 1956 and one in Victoria at 374 feet in 1981. Even greater heights were reported in the 19th century for trees that were felled and measured by pacing. The diversity and abundance of accounts in encyclopedias old and new convey the dramatic impression made on early observers. The trees in the great grove on the Berkeley campus, planted in 1877, are 200 feet tall. Captain Joseph Aram's impressive blue gum in San Jose on Schallenberger Road at Old Bayshore Highway was planted in 1856 and is the oldest California specimen of which there is record. At the other end of the size spectrum, dozens of denizens of arid areas never reach 10 feet, and in many cases much less. An attractive specimen of *E. albidula* on Stanford land at 3185 Alpine Road has not reached 3 feet at 35 years of age, but has a spread of 3 feet and is obviously in good health.

Years ago spectacular economic returns arose from transplantation of exotic plants to other countries; pineapples, rubber, tea, coconuts, tulips, yams, and dates come to mind, and sea captains, alert to the demand for seeds and seedlings, were the vectors of this worldwide flow. Undoubtedly there re-

main treasures in foreign jungles that have not been tested on campus, but the bygone era of mass testing has largely sorted the offerings. In the case of *Eucalyptus* in California, ornamental use has proved to be the main outcome. Wood for domestic heating is on the market but it is expensive. Many species provide a copious flow of nectar for birds and honey bees. For an authoritative history see Robert L. Santos, *The Eucalypts of California* (Alley-Cass Publications, 1997), and Walt Simmons, *Familiar Strangers* (Salmo Gardener Publications, 1998).

Discriminating among the many different species first requires identification, for which the campus offers considerable scope. In the paragraphs that follow, identification is not based purely on a botanical description but depends on guidance to a location where different species can be seen and come to be known by sight. Technical descriptions for help with difficult cases are available in Blakeley's *A Key to the Eucalypts* (3rd ed., Canberra, 1965); *Dictionary of the Royal Horticultural Society* (London, 2nd ed., 1956); *Hortus Third* (L. H. Bailey et al., Macmillan, 1976); and D. J. Boland et al., *Forest Trees of Australia* (Nelson, 4th ed. 1985). Also indispensable are G. M. Chippendale, ed., *Eucalyptus Buds and Fruits* (Canberra, 1968); and S. Kelly, *Eucalypts* (vols. 1 and 2 1969, 1978).

For popular, illustrated articles on the history of eucalypts in California see "The Trees that Captured California," *Sunset* magazine, pages 44–49, August 1956, and Roberta Friedman, "Strangers in Our Midst," *Pacific Discovery*, pages 24–30, Summer 1988. In the Bay Area, Max Watson was an influential distributor of eucalypt seedlings that he raised from imported seed, providing many of the rare species on campus.

Testimonials

Senator Ellwood Cooper's opinion:

In India, and other parts of Southern Asia, vast areas are left without culture or occupation, overrun with jungle and forest, and totally unfit for man's abode on account of their producing character. Already have the malaria-destroying exhalations of *Eucalyptus globulus* been practically proved beyond a doubt in Europe, Africa, and America. It is confidently stated that in the fatal Roman Pontine Marshes, and the no less fatal swamps of Lombardy and other parts of Italy, the *Eucalyptus globulus* has rendered healthy, localities in which to sleep a single night was all but certain death.

—Ellwood Cooper

Forest Culture and Australian Gum Trees

1876

Stalin's advice:

«In order to avoid the evils of swamps and combat malaria,» Comrade Stalin told me, «you must plant eucalypts. This is a very good tree and it grows in many regions of our country. Mosquitoes keep well clear of this tree which grows quickly and absorbs the water of marshes.»

—Enver Hoxha

With Stalin: Memoirs

Tirana, 1979

Eucalyptus aggregata **Black Gum** *New South Wales, Victoria*
MYRTACEAE
(*Myrtle family*)

This is a tree from places with cold winters and a candidate for paper production in West Texas, where any tree is difficult to grow and whose main virtue is that land is cheap. The leaves are on the narrow side, up to ½ inch wide and up to 2½ inches long. The fruits come in groups of four to eight each, not much more than ⅛ inch in diameter. The flowers are small and undistinguished except for being fragrant, uncommon in a eucalypt. To encounter the pleasant aroma at ground level can be puzzling because the flowers are too high to be seen and one is more likely to look for a nearby shrub as the source. However, there will be tiny fallen opercula in the ground litter to verify the source. The bark is hard and fibrous, dark orange but not black.

There is a 40-foot specimen, 25 inches in diameter, in the Stanford Avenue greenbelt behind 836 Santa Fe Avenue, planted in 1973. Black gum is known to withstand temperatures of 12°F. Such trees were not preferred among those that were chosen for experimental plantings in the Bay Area, for obvious reasons. But cold resistance does not disqualify a tree as an ornamental; in fact, several of our commoner campus eucalypts are not bothered by temperatures below zero. Temperature alone is not an adequate indicator of cold

resistance. If the temperature drops below 32°F. and stays there day and night for three days, as happened in 1972, many plants will die. Also, if the temperature drops from 50°F. to below zero in a few hours (which thankfully does not happen here but does in West Texas), otherwise-hardy trees will be killed.

Bangalay

New South Wales, Victoria

*Eucalyptus
botryoides*

This sizable tree has finely rough bark on the trunk and larger branches and may be confidently identified on campus from the flower buds and fruit, which come in sevens for the most part, and with a strap-shaped peduncle. The flower buds are about ½ inch long, consisting of a cylinder and a hemispherical lid that looks just a little oversized. The seven-seed capsules, when ripe, look very crowded, not having pedicels. (*Botrys* is Greek for grape and *botryoides* means like a bunch of grapes.) Once these distinctive features have been witnessed the tree will be recognizable from either the buds or fruit alone. The leaf veins may be hard to see but are inclined at 60 degrees to the midvein and therefore short (not like those of the river red gum, whose veins run more nearly longitudinally). *E. robusta* is closely related, with similar features that are more exaggerated in a characteristic way. There are three specimens about 20 feet south of the southwest corner of Hoover Tower on Crothers Way. One of these was sawn off at ground level when it was about 16 inches in diameter; in 2001 one sprout was 25 feet tall and 6 inches in diameter, the others have been pruned off, offering a chance to compare juvenile leaves with mature leaves.

Apple Box

Victoria, New South Wales, Queensland

*Eucalyptus
bridgesiana*

Resemblance of the gray furrowed bark to that of the apple tree gives this tree its name. However, it is a tall forest tree rising with a straight bole to the lofty branches, which are also rough-barked out to the branchlets. Specimens are growing east of the Mausoleum. The buds are in sevens and the domed fruit has protruding valves. The leaves, up to 5 inches long, are narrow and commonly curved.

Gungurru

Western Australia

*Eucalyptus
caesia*

This attractive ornamental grows to 10 feet, or perhaps more, and is clothed with blue-green foliage. The flower buds in threes have a bluish bloom and open to reveal spreading skirts of pink stamens tipped in abundant yellow anthers, the whole rather resembling a Degas painting of a ballet dancer. Since the buds, flowers, and fruits are often all present at the same time, and the whole show occurs at eye level, this small tree attracts attention in a small garden. It is available in the Bay Area, has been showcased by the University of California at Santa Cruz Arboretum, and can easily be grown from seed.

In its native habitat it grows in clefts in granite plateaux. Strangely, the roots can be ground into edible flour. There is a mature specimen at 3185 Alpine Road, opposite Ladera.

*Eucalyptus
camaldulensis*

River Red Gum

Australia

River red gum, one of the eucalypts most commonly seen in California, grows along rivers over most of Australia, from the wet tropics to cool temperate regions, withstands arid conditions, and if flooded for long periods does not succumb. It has two root systems: one for surface moisture, if any, and deep penetrating roots for subsurface water. In tests in overseas climates with low rainfall it outperformed Tasmanian blue gum for wood production and is now seen all around the Mediterranean; in several countries it is the only eucalypt used. The wood is hard, dense, and red—hence the common name. The Latin name, given in 1832 by Frederick Dehnhardt (1787–1876), refers ultimately to a congregation of monk hermits founded a thousand years ago in Tuscany at Camáldoli. At the time, Dehnhardt was head gardener to the Count of Camálduli in Naples.

Red gums were planted as an avenue on Searsville Road and in scattered locations. Other old specimens can be seen across Galvez Street from the football stadium. Meanwhile, river red gum continues to be a popular choice for new planting on dry sites, for example on the west side of Campus Drive East between Serra Street and Escondido Road, where it has been under serious attack by the lerp insect, a species of psyllid.

Buds in sevens, with conical opercula, can always be found, though sometimes there are as many as 10. In case of doubt, look for juvenile leaves; while not so very different in shape from the mature leaves (a little shorter and broader), the juvenile leaves are distinctly bluish and identify campus red gums at a glance. The papery opercula, pushed off by the growing flowers, fall on the ground, sometimes with the sound of light rain. The benign litter soon blows away. If you are observant and catch the flower buds as they are developing you can find a tiny second operculum. Just as the operculum represents the fused petals of an ancestral plant, so the outer operculum represents the bracts that surrounded those petals. When the eucalypts long ago dispensed with petals as an attractant to pollinators, economically relying on the sex organs alone for color, the operculum was assigned the role of covering the delicate growing stamens. Hence the name eucalyptus, meaning well covered. The name of the nymph Calypso (unconfirmed daughter of Atlas), who troubled Odysseus, has the same Greek origin.

Operculum in Latin means lid, the same word that is used for the hard trapdoors that protect small marine molluscs and are found on beaches as white discs with spiral engraving.

Argyle Apple, Mealy Stringybark

Victoria, New South Wales

Eucalyptus cinerea

Covered with silvery blue foliage, this tree stands out in campus landscapes and attracts people looking for cut foliage for indoor use. Specimens can be seen on Stanford Avenue where Peter Coutts Road connects; on the south side of Bowdoin near the parking lot of the cluster houses; at 836 Santa Fe Avenue; and on Campus Drive East between Escondido Road and Serra Street. Some of these trees have a few mature leaves up at the top but most are covered by paired lanceolate leaves and paired, roundish, juvenile leaves. If you need to explain to somebody the difference between juvenile, intermediate, and mature leaves, take them to a mealy stringybark; December is a good time, a few new flowers are pushing their bud caps off and new leaf buds are revealing their interesting geometry.

Although eucalyptus leaves are usually described as alternate, you can find branchlets with intermediate foliage where the earlier leaves are opposite, or paired, and there follows a progressive separation of the leaves of a pair as new leaf buds developed on the branchlet. As the eye moves to the tip of the branchlet, opposite is seen to have changed to alternate.

Flowers and fruit appear in threes in the leaf axils, often on both sides of the stem. The fruits and stems are covered with the same light blue wax as the leaves. The bark is reddish brown, rough and stringy, not only on the trunk but well out into the branchlets, and pulls off easily. It is favored for nest building by birds and rodents, who will travel considerable distances to collect it. The tree is native on dry rocky slopes with poor soil and winter frosts, and forms an open savanna of small trees that you pass through when descending into Canberra on the road from Sydney. So it does well on the Stanford adobe, and maybe too well in a small garden where it gets water. The name “apple” is applied to various trees, including Angophoras, whose bark resembles that of an apple tree, especially if the leaves are opposite. The common name Argyle apple, in use since 1867, refers to Argyle County in New South Wales. The alternative name mealy stringybark, which is less mysterious, refers to the ashen color denoted by *cinerea*. Of course, ash comes in different colors; the fur of the koala (*Phascolarctos cinereus*) certainly does not match the leaves of *E. cinerea*.

Lemon-Scented Gum

Queensland

Eucalyptus citriodora

A strikingly handsome tree with a slender trunk and thin white bark, soaring more than half its total height to the lowest branches. The white flowers occur in panicles rather than cymes, but are generally too high to see (unlike the panicles of *E. polyanthemos*). Gum tree leaves vary a lot in smell when you crush and sniff them because the mix of oils varies from one species to the next, but with the lemon-scented gum the oil is virtually pure

Eucalyptus citriodora, Lemon-Scented Gum JHS



E. A. King

citronellal, known as a germicide and mosquito repellent, but with a marvelous aroma for humans. In colder sites on campus, trees well over 30 feet have succumbed to our occasional freezes.

Between the Durand and McCullough buildings are three tall trees. A handsome pair in the courtyard behind the northwest Quad corner shows how a tall trunk with no branches at all up to a substantial height leaves a detectable record of bygone branches in the form of dimples and pimples on the otherwise smooth trunk. As a branch becomes shaded from sunlight as a result of growth in height, abscissic acid (a plant hormone), causes a brittle zone to form at the trunk. Wind then breaks the branch off cleanly. Higher up on these two trees are branchlets that were killed by freezing; no living tissue remained to respond to the hormone. Consequently, these sticks will remain visible for years. In the past, research on abscissic acid received military support aimed at defoliating forests.

More recent plantings have been attempted on Serra Street at the Schwab Residential Center. Occasional juvenile leaves can be found near ground level that have a visibly rough undersurface made up of tiny projections containing lemon oil. After you feel the sandpaper-like texture, smell your fingers! Onlookers are astonished by the fragrance; you can put these leaves in your gin and tonic!

Sugar Gum

Southern Australia

*Eucalyptus
cladocalyx*

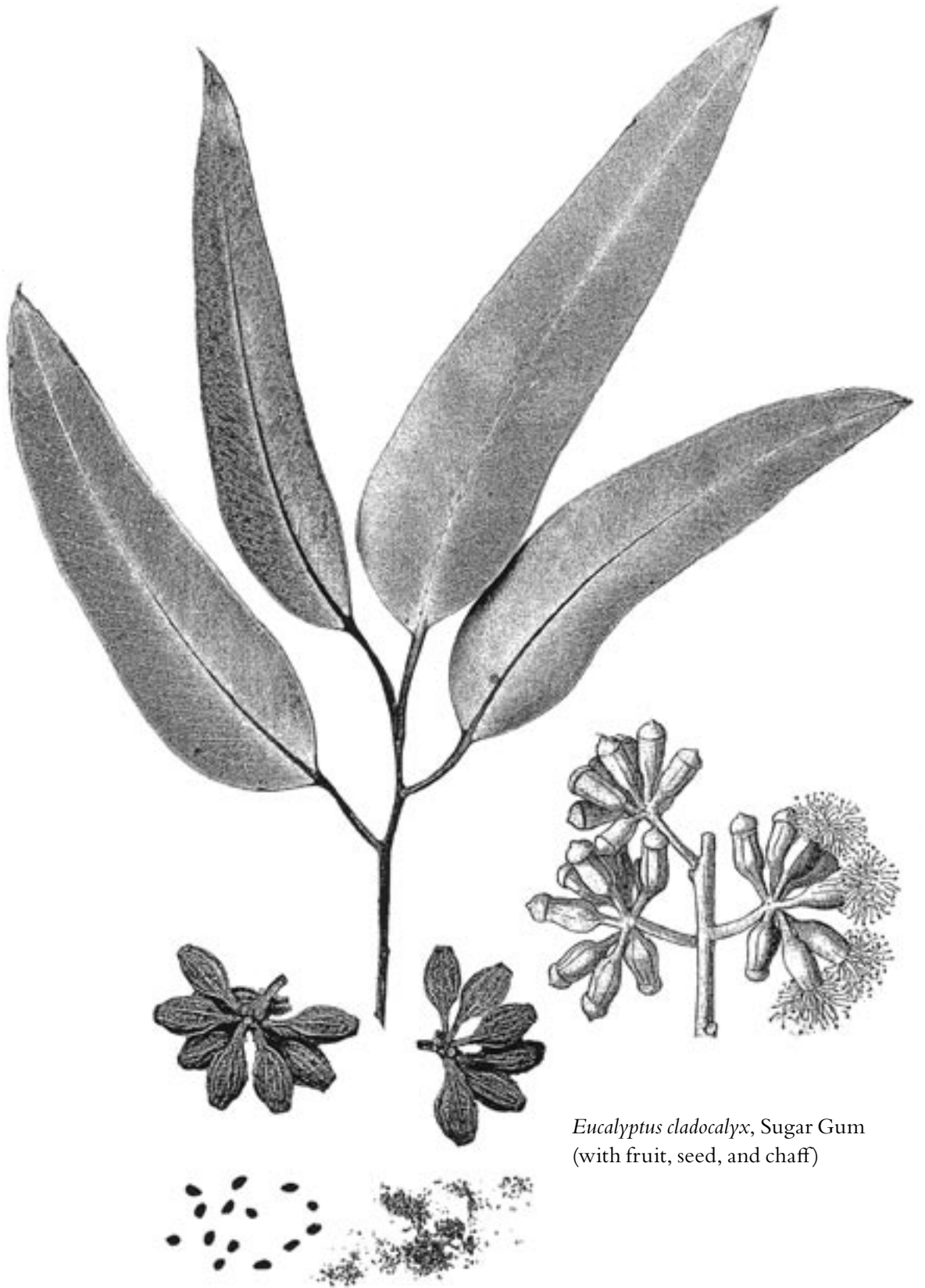
When plantation testing was at its height in California, sugar gum was fourth in popularity, amounting to about one tree in 25. So although old specimens are not common today, nevertheless there are always some not far away. A grove of large old sugar gums is situated on the north side of Campus Drive West between Palm Drive and Quarry Road. The tall smooth boles are free from lower branches and are in many cases recognizable on sight by warm-colored bark, with long vertical fissures and horizontal rows of dimples left over from insect bites years ago. On the ground you can pick up distinctive barrel-shaped fruit in clusters of up to 15 in number; these clusters in themselves suffice to give you confidence that you are under a sugar gum the next time you see them among the ground litter. Pampas Lane, opposite the Credit Union, offers a chance to test this claim. There also are nine well-spaced specimens in the southwest corner of Lasuen Street and Campus Drive East, where some natural regeneration was occurring in 2002. Other special features are the round juvenile leaves, about 2 inches in diameter, and the quaint opercula, but these are harder to find.

Karri

Western Australia

*Eucalyptus
diversicolor*

Karri is the biggest tree of Western Australia, commonly reaching 200 feet



Eucalyptus cladocalyx, Sugar Gum
(with fruit, seed, and chaff)

and known to have reached 250 feet. It belongs, with *E. delegatensis*, *E. regnans*, and *S. sempervirens*, to the select group of Earth's tallest trees. Girths around 27 feet are in the same class as the larger Tasmanian blue gums. The reddish-brown wood is hard, dense, and very strong (with a tensile strength of 8 tons per square inch). At one time the main streets of Sydney were paved with karri blocks, long since covered with asphalt, but visible occasionally where roadwork is in progress. The wear-resistant endgrain was presented to traffic. The wood was also exported to London for the same purpose. The sole tree seen on campus, at 645 Cabrillo Avenue, near Dolores Street, was planted by Professor W. F. Durand in 1910. It is now 4 feet in diameter. It may be the one referred to in a nursery list of May 1916 under accession number 157.

Red-Flowered Mallee

Western Australia

Eucalyptus erythronema

One of the most attractive of the mallees, both for the almost white, smooth bark on the multiple divergent stems and for the striking red flowers. The buds and fruit are interesting to look at, too. A fine specimen with many trunks is on the west side of Campus Drive East halfway between Serra Street and Escondido Road and another is on Campus Drive East 45 yards from Bonair Siding walking toward the Police Station.

Red-Flowering Gum

Western Australia

Eucalyptus ficifolia

People often mention to me that they have a eucalyptus tree and to get more information I ask them what color the flowers are. "What flowers?" is a common response. But not if they are talking about a red-flowering gum, which may be the best known ornamental eucalypt. The flowers come in an impressive terminal arrangement of many parts forming a hemispherical dome, or corymb, outside the leaf canopy. These flower heads can be pressed. The mature leaves are broad and glossy, and the juvenile leaves are opposite and hairy, which looks odd, but is a feature of several species. With luck you may find some perfoliate juvenile leaves whose stem perforates the leaf. I think this represents the fusion that formed immediately above the cotyledons and below the first juvenile leaf pairs to have leaf stalks. Spinning gum (*E. perriniana*) has the distinction of preserving perfoliate foliage into adult life. Unlike most eucalyptus seeds, which are tiny (well over 1000 per ounce in most cases), those of *E. ficifolia* have wings.

The fruit, or gum-nut, is as big as the bowl of a small pipe, more than an inch across, is often used in dry arrangements, and is useful to a Boy Scout as a woggle to fasten his neckerchief. Once my wife, Helen, and I were speeding along the edge of the Southern Ocean toward Albury, Western Australia, when she noticed a turnoff marked Ficidad Road. This led to the

Eucalyptus globulus, Blue Gum
(bud with operculum, left;
seed capsule, right)



home of the red-flowering gum, an uninhabited area of beach dunes, where all the trees are low and straggly. It is almost certain that the ornamentals in commerce are hybrid, having an admixture of *E. calophylla*, a distinctly different, but related, larger tree with the same large fruit but little or no pink in the flowers. Supporting this theory is the diversity of flower color of the numerous trees on Lathrop Drive and Sonoma Terrace—worth inspecting for the colorful show in summer. A fine big specimen is at 830 San Francisco Court. On a color triangle the hues range between scarlet-orange, crimson-pink, and white. *E. ficifolia* is not frost tolerant; the campus specimens are all on slopes where cold air can drain downhill.

Blue Gum

Tasmania *Eucalyptus*
globulus

Introduced to San Francisco in 1853 from Australia at a time when trans-pacific shipping was booming because of big gold discoveries, the Tasmanian blue gum soon attracted attention because of its rapid growth. By 1860 substantial 50-foot trees, originally planted as ornamentals, attested to the astonishing ability of this plant to create wood in a hurry. By the 1870s planting was under way for fuel, windbreaks, and shade. California Senator Ellwood Cooper published *Forest Culture and Eucalyptus Trees* (Cubery & Co., San Francisco, 1876), giving an enthusiastic report of his experimental plantings near Santa Barbara, with details of planting, harvesting, and costs and sales. Cooper visited Tasmania and saw the giant trees in their native habitat; his book reports two fallen specimens of *E. amygdalina* with measured heights of 460 and 512 feet respectively. (No living tree is known today that tops the tallest living *Sequoia*.) The fame of the virgin forests quickly spread around the world. A single plank 75 feet long and 10 feet wide was shipped to the London Exhibition of 1862 (and later returned). A 165-foot plank that was also to be sent could not find a shipper. In 2001 the tallest reported in the United States was 160 feet tall and 38 feet in girth, growing in Petrolia, California.

Circular No. 2 issued by the California State Board of Forestry in 1907 showed photographs of 24-year old blue gums over 3 feet in diameter and 175 feet tall and included extensive tables of the yield of dozens of plantations that by then existed.

After oil was discovered in Pennsylvania in 1859, it was only a few decades until wood fuel disappeared from use in California, except for domestic firewood. In 2003, blue gum and oak were both selling at around \$200 per cord (128 cubic feet, or about 2 tons). Plantations for fuel were in many cases never harvested. The closely packed grove across from the football stadium, planted by the Stanford Trustees in 1916 as an investment, is one such. There are remnants of another on Alpine Road at Piers Lane, near the site of

the isolation hospital that was built in 1912 and used during the worldwide influenza pandemic of 1918–1919. We forget that wood was California's principal fuel; today half the world's wood is still harvested for fuel.

Two thousand miles of blue gums have been planted in Southern California to protect citrus groves from cold winds. Many blue gum plantations in California have been returned to farm land, but survivors did prove to be salable on the stump, to Japan. The logs are loaded onto special factory ships and arrive in Japan, value-added, reduced to chips and ready for manufacture into chemicals and paper. The technology for making paper from eucalypts was developed in Australia during World War II when outside supplies were cut off. A similar wood-chip trade exists from Tasmania, where Japan has invested in a port and railway into the interior for getting the blue gums, three-quarters of which have now been removed. For economic reasons, old growth forest of other hardwoods is being logged, to be replaced by Monterey pine and other fast-growing tree crops despite protest by the community. Balancing economics against environmental concern is precarious: the Green movement in Australia was effective in blocking the construction of a hydroelectric dam in the Tasmanian wilderness but the needed electricity is now generated by a coal-fired power station. In California commercial blue gum planting is now history, as ornamental planting has shifted attention to other eucalyptus species.

In Peru, the blue gum is the main source of poles, railroad ties, and timber for industrial use. Ecuador celebrated the genus with a postage stamp. By 1981 both Brazil and China had planted six million trees as a source of fuel, railroad ties, fence posts, poles, tool handles, pulp, and oils.

Portugal and Spain are now the main world source of eucalyptus oil, made from blue gum leaves, and used in medicine, candy, cosmetics, anti-septics, disinfectants, deodorants, and solvents, and for the manufacture of menthol and other chemicals. The leftover blue gum wood goes mainly into paper. Most of the oil extracted is cineole (eucalyptol); other components, sold separately, include phellandrene and citronellal. All members of the myrtle family have oil glands containing various essential oils in their leaves, flowers, and other parts.

In Ethiopia, the capital city Addis Ababa used to be migratory, moving on when the time taken to forage for firewood and leaves for cooking did not leave enough time for cooking. The introduction of the blue gum not only stabilized Addis Ababa on its present site but generated a principal economic activity.

In Egypt, where blue gums are known as fever trees, it was forbidden to gather leaves from street trees for home medication. People took

the leaves because they knew that the trees had been responsible for curing malaria (= bad air) in the Pontine marshes. In California, Senator Ellwood Cooper was responsible for cleaning up malaria-ridden Bakersfield; he had demonstrated to his own satisfaction that eucalyptus oil was germicidal by putting two jars containing meat out in the open, one containing blue gum leaves. At that time he did not know that malaria is carried by mosquitoes, not by bad air; but by drying up the swamps he was successful. In southeast Africa there is “the great grey-green, greasy Limpopo River, all set about with fever-trees” (Kipling). These may have been acacias. The name malaria was first applied to the disease when it was noticed that outbreaks of fever on Elba followed an offshore wind from the Maremma, a malarial area of Tuscany uninhabitable since Roman times. The correlation with wind was evidently explained by transport of mosquitoes rather than bad air. On second thought, the air was not good.

At Stanford, the long arm of Governor’s Avenue ran a mile due north from Lake Lagunita without interruption to the old Gordon residence on San Francisquito Creek; it was planted in the late 1870s with blue gums that now have girths up to 23 feet (for example between Searsville Road and Panama Street). More than 700 trees were planted 20 feet apart. When I counted them in 1972 there were 427 on the long arm and 143 on the short arm that continues for one-third of a mile from Lake Lagunita to the Red Barn. The short arm does not run due west; it was laid out, like the central campus streets, with a transit equipped with a magnetic compass. Consequently, the angle between the two arms is 75 degrees, not a right angle. Dry years in the 1970s and 1980s and freezes in 1972 and 1978 weakened many trees that then succumbed. Many well-spaced specimens dating from the planting of the arboretum stand in the wedge north of Campus Drive East and Galvez Street, and on to El Camino Real. Trees with heights of 110 feet and girths of well over 20 feet can be seen. Eight members of Governor’s Avenue that shaded the Welch Road Medical Complex were removed in January 2003. They had an average stump diameter of 5.6 feet; the largest had a diameter of 7.9 feet, or a girth of 25 feet. That is about as big as campus trees come, redwoods included.

Juvenile leaves are broad, roundish, and have a thin coat of bluish wax that insulates seedlings against cold. These leaves occur in pairs on opposite sides of the stem. The next pair up the stem emerges at right angles to the previous pair. Examination makes it apparent that there are four strands inside the stem. Twirling the stem between the fingers confirms a square cross-section. Mature leaves are more green than blue, long and narrow in proportion, and can be over a foot long. I once put a stamp on one and it

was delivered in Los Altos Hills. The mature leaves are said to be alternate, as distinct from opposite, but close inspection reveals that in fact they are still grouped in pairs, the members of one pair being separated by only a short length of stem. The next pair is generated from the other two of the four strands. They may not be at right angles to the preceding pair, however. If better exposure to sunlight is obtainable, the stem will be twisted 90 degrees so that the leaf stalks are arranged more or less in a plane. Juvenile foliage is found near the base of tall old trees if there has been some damage to the bark. If you take a stroll in the arboretum (the area roughly north and south of Arboretum Road), visiting these numerous blue juvenile outbursts, you will find one with hexagonal stems, six strands, and triplets of leaves instead of pairs. Each triplet up the stem is rotated 60 degrees.

The abundant flowers are creamy white and the large fruits, nearly an inch across, have a pale blue waxy coating, protruding ridges and warts, and an operculum to match. Very occasionally you may find a tree with red flowers. In Tasmania, the fruits come in ones, but here they often come in threes. This is thought to be due to hybridization with *E. bicostata*, a related three-flowered tree whose range extends across Victoria and well into New South Wales.

Campus squirrels eat the seeds. Instead of removing the cap to release them, as nature does, some squirrels know where to gnaw on the back of the fruit so as to enter each of the four (sometimes three or five) loculi where the seeds reside. Since squirrels did not evolve in the *Eucalyptus* forests, they must have learned from their parents. See fallen fruit subjected to this surgical operation.

Good indigenous blue gum seed, valued for wild-tree genetic variability, sold for \$9000 per pound in 2001. (Compare with about \$50 per ounce for the best caviar.) The price is likely to go up in response to demand for large-scale worldwide revegetation projects, creating a business opportunity for farmers in Australia.

Since 1927 a multistemmed relative has been sold in California under the name *E. globulus* 'Compacta', bushy blue gum, or dwarf blue gum. It is certainly bushy, with dozens of trunks and foliage reaching to the ground, but is certainly not compact or dwarf. The original mutant germinated around 1890 in the East Bay; since then its seedlings have bred true. The original mutant is now about 80 feet tall with a 50 foot spread. Bushy blue gum is used as a screen in highway planting, for example where El Camino Real borders the campus. It has migrated back to Australia where it is distributed by the state Forestry Commissions for use in windbreaks and as a home for koalas.

Cider Gum

Tasmania *Eucalyptus gunnii*

In the Hobart Town Almanac for 1830 we read “Specimens of that species called the cider-tree, from its extruding a quantity of saccharine liquid resembling molasses. When allowed to remain some time and to ferment, it settles into a coarse sort of wine or cider, rather intoxicating if drank to any excess.” When the Royal Greenwich Observatory—where the brass meridian was laid down that defines the international zero for longitude (after serious competition with the Paris meridian)—was moved to Herstmonceux Castle, the Astronomer Royal of the day, fresh from his post as Commonwealth Astronomer at Mt. Stromlo, Canberra, had cider gums planted on the outer edge of the moat. Seeds from these trees were germinated at Site 515 (3185 Alpine Road), where two substantial trees are to be found. One day some Stanford seeds should be returned to Mt. Stromlo to complete the circumnavigation. Our trees are doing very well in pure adobe without watering; a proportion of small, bluish juvenile leaves enhances the general appearance. Cider gum is a frost-tolerant tree, one of few eucalypts to be seen in English gardens. Examples are on Pasteur Drive near Sand Hill Road.

Kruse’s Mallee

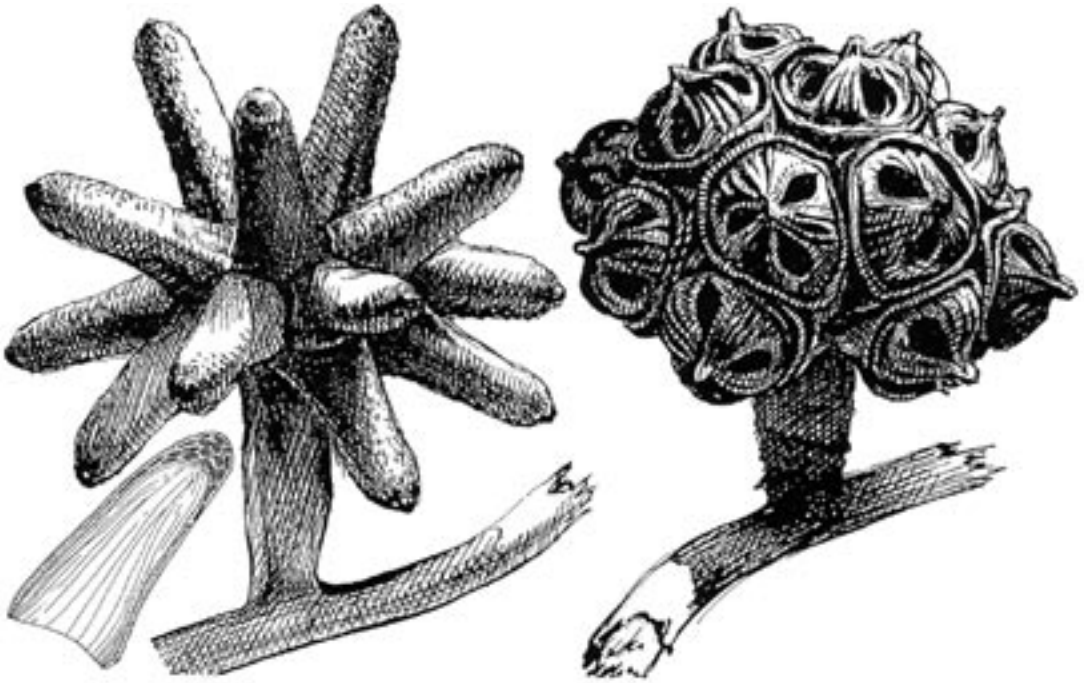
Western Australia *Eucalyptus kruseana*

Kruse’s mallee, a name embedded in literature, is also known as bookleaf mallee, but I have never heard it referred to in speech as other than *kruseana*. It is a popular ornamental that grows to a height of about 8 feet and bears small, light blue-green, rounded leaves that clasp the stem in pairs. It has two botanical peculiarities among eucalypts: it is one of only three or so species that retain their juvenile foliage indefinitely, and it is the only species that has petals (admittedly they are only small triangular teeth and have to be looked for carefully). It is frost resistant, survives with only 8 inches of rain, and is not particular about soil (or adjacent curbs, hydrants, or blacktop, as evidenced by the location of our only specimen, on Campus Drive at Bonair Siding). It has been used elsewhere as a small street tree.

Darling Range Ghost Gum

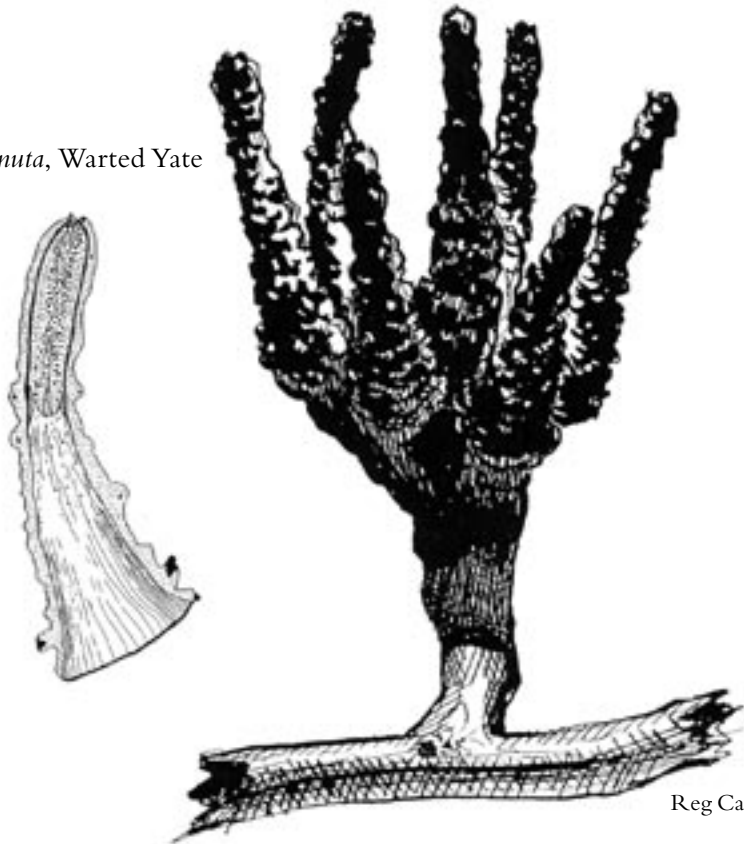
Western Australia *Eucalyptus laeliae*

This is a big tree with sickle-shaped leaves up to 3 inches long and gray bark that sheds to reveal a smooth, fresh yellow surface that quickly whitens and becomes powdery, as with *E. maculosa*. The undistinguished buds and fruit, in sevens, also resemble those of *E. maculosa*. Three large specimens about 2 feet in diameter, are to be found in the *E. sideroxylon* forest, just southeast of Green Library. A sapling, 1 inch in diameter in 2001 and 8 feet tall, is just to the west, inside the hedge enclosing the outdoor coffee kiosk. This species was first reported in 1968 near Perth and named after a vestal virgin, Laelia, about whom nothing is known.



Eucalyptus lehmannii, Bushy Yate (flower buds, left; fruit, right)

Eucalyptus megacornuta, Warted Yate



Reg Campbell

Bushy Yate

Western Australia *Eucalyptus
lehmannii*

When the need arises for a screen tree that bears foliage down to ground level, is not much more than 10 feet tall, spreads as a screen to more than 10 to 20 feet across, tolerates low rainfall, does not mind wind loaded with salt spray, can grow on salty mudflats, and ignores the calcareous accumulation of ages of small shellfish, one turns to the bushy yate. Thousands have been planted to hold back the wind and spray and to hide the desolate wetlands as we drive to San Francisco Airport on Bayshore Freeway. There are thousands more through Berkeley and beyond and on Highway 101 around Santa Barbara. Punctuated at intervals by taller river red gums that catch the eye, the low unclipped hedge of bushy yates passes virtually unnoticed.

Close inspection will show that there are two forms of the bushy yate in the Bay Area, a situation that I reported in *Australian Plants*, vol. 6, page 214, 1971. The drawing by Reg Campbell (the artist who painted the portrait of Russel V. Lee at the Palo Medical Foundation) of a specimen collected on campus has opercula large enough for kids to fit on their fingertips like thimbles and play “witches’ fingers.” These caps have three or four distinct edges, rather like those on a banana. Of seven bud and fruit samples in my possession, four have 15 buds, the others have 13, 14, and 16. These features agree with illustrations published by several authors.

In 1980 D. J. and S. G. M. Carr found that the thousands of windbreak trees planted in Australia as *E. lehmannii* did not agree with the holotype. They proposed replacing *E. lehmannii* by the existing name *E. conferruminata* (which means “welded together”). They reported that on the southwest Australian coast the latter always occurs as a tree. Photographs of *E. conferruminata* show buds with long narrow horns in large numbers (19 to 35). In the Bay Area, for example along Shoreline Boulevard, Mountain View, there are many bushy yates, often of treelike stature, with such buds.

Oregon Expressway was lined on one side by bushy yates until the road was widened. Three substantial multitrunked 30-foot-high specimens remain on the north side of 2411 High Street, Palo Alto, a dead-end section of High Street near Oregon Expressway that only can be reached from Colorado Avenue. The fallen opercula are long, narrow, smooth, curved horns that are red on the sunlit side but otherwise yellow. The branches droop close to ground level, as appropriate for a windbreak. If you examine a few untended trees it will strike you that the habit of having foliage to ground level results from natural splitting of lower branches to form props; the effect of this in the wild is to steady the whole plant against windthrow.

Tree people will have noticed that each eucalypt tends to have 1, 3, 7, or 15 buds, following the formula $2^n - 1$, where n may vary from 1 to 5. Bushy yate often has 15 and in other cases tries to reach 31 but at the higher numbers

some buds may fail to develop. The fruits fuse together to form irresistible collectibles that can be as big as a fist and are suitable for dry arrangements.

Sunset magazine ran an article advocating the bushy yate as an accent tree for small gardens and showed a specimen pruned to a small erect form. It is not clear which of the two forms this article referred to. Three campus specimens with the large opercula in public locations have been lost to development and should be replaced. Meanwhile, three standard trees, one with the large straight opercula and two with the thin curved opercula, have been planted on Serra Street along the east fence of the Recycling Center.

*Eucalyptus
leucoxylon*

White Ironbark

Southern Australia, Victoria, New South Wales

Bark is a useful feature for identification but is not a good guide to botanical affinity; for example, the thick, black, persistent, hard bark of the red ironbark (*E. sideroxylon*) looks nothing at all like the pale, thin, deciduous bark of *E. leucoxylon* and yet the two trees are very closely related. The buds, in threes, have longer pedicels that in due course give the shape of the fruits a stouter connection at their place of attachment. Old specimens are at 562 Salvatierra Walk and in the area between Bonair Siding and Maples Pavilion; others dating back to the 1960s are on Pampas Lane opposite the Credit Union and on Raimundo Way near Stanford Avenue. Some of these trees have a sprawling habit with foliage at eye level and others are taller with straight trunks. The specimen that was featured in the Stanford calendar of May 1981 stands alone on Maloney Field at El Camino Real. Heavy planting took place in the 1990s on Campus Drive East to screen Castaño and Lantana residences from the road. The horticultural variety used has copious bright red flowers, but an occasional reversion to the white wild form is seen. Illustration, see page 307.

*Eucalyptus
linearis*

White Peppermint

Tasmania

White peppermint is a distinguished ornamental with a smooth light-colored trunk and branches, growing to about 40 feet. Its lanceolate leaves are only about ¼ inch wide and around 4 inches long, and distinctly more delicate than the leaves of *E. nicholii*, the willow-leaved peppermint. The leaves of both, when crushed, have the scent of piperitone (a liquid unsaturated cyclic ketone C₁₀H₁₆O of camphoraceous odor found in various essential oils and used chiefly in making menthol and thymol). The small flower buds, which come in clusters of 10 or so, have a hemispherical cap that gives them a stubby club shape. The seed capsules are ⅜ inch across, have a flat rim, and typically four depressed openings inside. There are two large specimens viewable on the west side of Raimundo Way, between N. Tolman Drive and Peter Coutts Road, and three at the southeast corner of

563 Salvatierra Walk. The name *E. linearis* Dehnhardt, given in 1832, technically gives way to *E. pulchella* Desfontaines of 1829.

Camden Woolly Butt

New South Wales

*Eucalyptus
macarthurii*

Finely fibrous box-type bark, reaching to high branches, marks this tree as different from most campus trees. The biconical buds are relatively small, while the fruit resemble those of river red gum except that the valves do not protrude above the rim of the capsule. The leaves are rather narrow, up to about $\frac{5}{8}$ inch, and have a short terminal bristle. There are two on Crothers Way, close to the Hoover Memorial Building.

Red-Spotted Gum

Victoria, New South Wales

*Eucalyptus
maculosa*

Sunset magazine popularized the red-spotted gum by growing a splendid specimen in front of its headquarters in Menlo Park (Willow Road at Middlefield Road), with a clean white bole and carefully maintained crown. Alas, it is now gone. When Frenchman's Hill was developed for faculty residences in 1969, a network of footpaths was provided that would allow walking or biking to school while avoiding the roads. Some of the paths would be shaded by the highly esteemed red-spotted gums. This planting of 170 trees stretched from Amherst Street to Raimundo Way. An experimental eucalypt planting of 1958 that previously screened Ryan Laboratory from Stanford Avenue included one red-spotted gum on Raimundo Way that stood as an elder citizen until 2002, but the rest of that early planting, including *E. lehmannii*, *E. maidenii*, *E. platypus*, disappeared when Ryan Laboratory was replaced by housing. A striking feature of the new trees is the fresh white surface of the bark revealed yearly after peeling. You can rub the white powder off with your finger and decorate your face, just as the Australian Aborigines did for a corroboree.

A complaint about leaves falling into a swimming pool and an insurance problem over fence damage, compounded by a concern that a branch might fall on a schoolchild, caused Faculty-Staff Housing to call a town meeting in July 1985 at which replacement of the whole planting by Chinese pistache was advocated. In similar circumstances, city officials receive legal advice that they may be liable if they ignore a danger of which they have been previously warned, for example if a branch should later fall on a child. The administrative response followed in adjacent cities is to obtain independent outside advice from a professional tree inspector, to follow the recommendation for remedial pruning or removal of trees judged to be dangerous by regular arboricultural standards, and to keep records. This procedure shields administrators against damage suits, provided they can show a record of compliance with professional advice.

In the event, the outcome was that residents wanting a particular tree removed should obtain the acquiescence of neighbors. About one in seven of the trees went; some of the replacement pistaches died but others, such as those on the path leaving Raimundo Way just west of Vernier Place, have flourished. Meanwhile, no branch has fallen on a child, nor indeed has any eucalypt dropped a branch on any person on campus. (Damage to parked cars and fences by falling trees has occasionally occurred, mainly due to oaks. In 2002, Prince Charles bemoaned politically correct interference that led to the felling of chestnut trees in England because of fears that falling chestnuts would cause injuries.) From a cost-of-removal standpoint, *E. maculosa* is not in the class of large eucalypts. The Midpeninsula Open Space District removed 19 tall eucalypts at Rancho San Antonio Open Space Preserve at a cost of \$1900 each (*San Jose Mercury News*, August 5, 1992). (See entry *Ulmus minor* for the \$1500 cost of removing an elm in 1985.) On the other hand, after the freeze of 1978, when the temperature at Stanford did not rise above freezing for three days, 100 *E. globulus* on Governor's Avenue were harvested by a Santa Rosa logging company at no cost to Stanford (*Palo Alto Times*, May 30, 1978).

*Eucalyptus
megacornuta*

Warted Yate

Western Australia

It is hard to resist picking up the giant opercula that fall from this small, upright, colorful tree. They are big enough for kids to stick on their fingers and pretend to be a witch, just as with *E. lehmannii*, but more threatening. The flower buds, packed in sevens on a long strap-shaped peduncle, are very strange in themselves, and suitable for dry arrangements. The ensemble of seven long-stamened, greenish yellow flowers, is often likened to a shaving brush. An example is on the north side of Raimundo Way, roughly opposite Wing Place. Others were destroyed by building construction; schoolyards would be a good place for replacements.

*Eucalyptus
melliodora*

Yellow Box

Victoria, New South Wales, Queensland

My recollections of this splendid tree go back to when I was working for a beekeeper on Scott's Main Range, New South Wales, in 1939. His practice was to scan the valley slopes with binoculars for signs of flowering so as to judge where to move his hives for the next season. Like several species, yellow box, a premium tree, tends to flower in alternate years. The "yellow" refers to the sapwood color and the "box" to the nonpeeling, finely matted bark texture. It is a well-behaved street tree with a good silhouette and, when the nectar flow starts, fragrant. A specimen growing in open lawn was lost to construction of the Stauffer Chemistry buildings. The last exemplar, at the northwest corner of Mudd Chemistry, also has been sacrificed.

Willow-Leaved Peppermint

New South Wales

*Eucalyptus
nicholii*

A well-behaved small tree that does not drop its dark, matted bark, and drops only tiny fruit. The short, narrow leaves, which have a distinctive aroma, disappear into ground cover. There are five specimens on Raimundo Way opposite Cottrell Way, and other young ones on Campus Drive East at the Taube Tennis Center, and one on the Peter Coutts embankment (south side) between Stanford Avenue and Raimundo Way. For nearby mature trees go to 550 Oxford Street at Staunton Street, Palo Alto. Young trees recently were planted along the north side of Green Library's Bing Wing.

Gray Ironbark

New South Wales

*Eucalyptus
paniculata*

As you walk north on the closed section of Lasuen Street from Arboretum Road toward El Camino Real passing well-spaced blue gums but just before you reach the vernal pond on the right, you will see two old gray gums on the left. The bark is rough and dark, but the leaves are too narrow for a blue gum, though possibly indicative of an ironbark. However, the fallen fruit exhibit the terminal panicles of sevenfold clusters characteristic of the gray gum. This uncommon organization of the fruit may be compared with that of a branchlet of *E. polyanthemos*.

Small-Leaved Gum

New South Wales

*Eucalyptus
parvifolia*

Distinctive features of this tree are attractive, opposite, bluish juvenile leaves not much more than an inch long and $\frac{1}{2}$ inch wide. This juvenile foliage is persistent, but the mature leaves, when they come, though longer (about $2\frac{1}{2}$ inches), are even narrower. Consequently, this tree is recognizable instantly. The bark is smooth leaden-gray and peels in long strips. An untended specimen at 3185 Alpine Road (site of the author's radio astronomy research mapping temperatures of the Sun and studying extragalactic nebulae) developed enormously long and heavy branches descending to ground level, once referred to in a Stanford publication as resembling a wave rolling over the parking lot. In its native habitat it endures frost every night in winter and is one of the eucalypts that doesn't mind living in Britain, though this may be due to ability to survive lack of sunshine as much as to frost tolerance.

Swan River Blackbutt

Western Australia

*Eucalyptus
patens*

For some reason six of these large forest trees were slipped into a shady location about 40 feet from the east wall of the School of Education in 1991. By 2001 the three survivors were about 4 feet tall, and still holding out their extraordinary large subamplexicaul(!) juvenile leaves for such rays of sunshine as filtered through the existing canopy. Let's wish them luck. They are certainly triers.



Eucalyptus pellita, Large-Fruited Red Mahogany (opercula)

Large-Fruited Red Mahogany

Queensland, New South Wales

*Eucalyptus
pellita*

This tree, which resembles *E. resinifera*, has the pleasant habit of dropping collectible, woody opercula that children like to play with and that adults think they should be able to do something with. They are about ½ inch across. Appropriately enough, a specimen was planted in the Stanford Elementary School yard, which was later built over by Pearce Mitchell Houses. The tree still stands on Salvatierra Street close to Santa Ynez Street against the old schoolyard wall. Two others grow in the north corner of the Bonair Siding parking lot.

Round-Leaved Moort

Western Australia

*Eucalyptus
platypus*

The flat foot (platypus) refers to the flat straplike peduncle, more than an inch long and up to ½ inch wide that supports the cluster of seven buds. The opercula are long and narrower than the fruit and contain greenish stamens. If left to itself the tree prefers to grow low and multistemmed as a mallee, but the eight specimens on Campus Drive between Bonair Siding and Maples Pavilion are in a location where a thicket is undesirable and they have been pruned accordingly. The trunks are smooth with patchwork coloring ranging from orangish through light gray to dark gray, according to years of age. Two specimens in need of attention are on Serra Street against the fence of the Recycling Center. The tree belongs to the series of Cornutae; the resemblance to *E. cornuta*, *E. lehmannii*, *E. macrandra*, and *E. megacornuta* is easily recognizable. The wood is extremely hard and dense, very good for making bullroarers.

Red Box

New South Wales, Victoria

*Eucalyptus
polyanthemos*

One of the popular choices on campus, having florist-quality, silver-blue, easily collected foliage. The flower-bud panicles, formed of dozens of silvery pillules can also be picked in great bunches. Almost circular juvenile leaves, 2 inches or more in diameter understandably have given currency to the name silver dollar gum. As with other common names, this one is not very useful for distinguishing from the other quite different gums commonly referred to by the same name. The trade name red box refers to the color of the heartwood and to the finely matted bark texture. As the tree grows, the juvenile leaves give over to mature lanceolate (noncircular) leaves that are quite different in appearance, though still often colored blue by the fine waxy coating that cold-climate eucalypts often secrete for protection. An imposing specimen opposite 69–70 Pearce Mitchell Place, which flowers in late winter, has no silver dollars at all. Many specimens can be seen on both sides of Campus Drive East between Serra Street and Escondido Road; tall trees dating back to the Pine Hill residential development line the north side



Eucalyptus robusta, Swamp Mahogany

of Estudillo Road. A double-trunked specimen, possibly our largest, grows at Rains Houses building 208, on the east side of the complex next to the wisteria-covered pergola.

Silver-Leaved Mountain Gum

New South Wales

*Eucalyptus
pulverulenta*

At a distance, *E. pulverulenta*, the powdery one, can be mistaken for *E. cinerea*, the ashen one, because of the similarity in general coloration. The bark, stripping off in ribbons, is quite different. This plant clearly has little interest in becoming an upright tree, and is happy to send its branches down as well as up. To be polite you could say it is a designer tree. It is covered with small, round, light-blue juvenile leaves. The buds and fruit are in threes and not so very different in shape from those of *E. cinerea*. The two trees can be compared in close proximity at the corner of Stanford Avenue and Peter Coutts Road. A really wild, tall specimen planted by William Bark in 1960 is at the corner of Alvarado Row and Pine Hill Road. Sprawling versions are on Campus Drive East between Escondido Road and Serra Street. Trees trained in standard upright form can be obtained from nurseries.

Red Mahogany

New South Wales, Queensland

*Eucalyptus
resinifera*

A tall, single-trunked tree with rough, reddish, stringy bark that extends over the branches and has dense, red wood that reminded early Australian colonists of Jamaican mahogany. The leaves are broad, glossy green on top and paler green below. A row of eight neat trees planted about 1950 is to be found on Campus Drive near Maples Pavilion in front of the Sports Cafe.

Swamp Mahogany

New South Wales, Queensland

*Eucalyptus
robusta*

As with *E. pellita* and *E. resinifera*, this tree has rough, fibrous bark, and leaves that are glossy above and paler below. The buds, which are grouped in sevens, more or less (commonly 10), are often pink, produce flowers and fruit that are distinctly larger than the other so-called mahoganies.

The flower buds are instantly recognizable by their long beak. When the operculum is forced off by the expanding stamens, the flower dries up, the seed falls, and three or four sunken spokes can be seen radiating from the base of the persistent style, presenting a pattern that can be recognized at a glance. Each bud has a substantial stalk and the group of buds as a whole has its own inch-long strap-like peduncle. A row was planted on the southwest side of Foothill Expressway as it approaches Arastradero Road in Palo Alto. A fine specimen is conspicuously located at the southeast corner of Palm Drive and Arboretum Road.

Plantation trees on Maui are harvested at the rate of three a day, the logs are sawn at dawn, and at the end of the day two prefabricated houses, floor,

walls, and roof all of the same wood, are towed to the building site. (Not from that day's logs—a year elapses while the lumber is stacked in the open to season.) To cope with the tendency of very hard wood to repel nails and possibly split, one carpenter does nothing but drill slightly undersize holes through the joists, studs, and rafters while a second inserts nails and drives them. An alternative procedure used for house building in Western Australia is to nail up the frame while green and allow the house to season and complete its shrinkage on the building site.

The hardness of eucalyptus logs that discouraged California saw millers accustomed to redwood and fir is dealt with on Maui by the use of a pair of bandsaws; the one used yesterday is in the loft being sharpened while the other is engaged in today's cutting.

Eucalyptus salubris **Gimlet** *Western Australia*
A very attractive specimen is on Raimundo Way on the rise opposite Wing Place, and there is another at the east end of Esplanada Way near the Chinese tallow trees. The bark is smooth, has a sheen, and is a light warm color. The leaves are more than 10 times longer than their $\frac{3}{8}$ inch width, which gives the canopy a special appearance. Compare with the dark-barked, narrow-leaved peppermints *E. nicholii* on Raimundo opposite Cottrell Way. The ripe flower buds have a cylindrical calyx tube (less than $\frac{1}{4}$ inch in diameter and twice as long) that narrows slightly at its upper end, where there is a darker ring; the conical operculum is about as long as the calyx tube. The bud shape sets this tree off from the other campus eucalypts.

Eucalyptus sideroxylon **Red Ironbark** *Victoria, New South Wales, Queensland*
As the tree ages the bark becomes perfused with kino that oxidizes to black and cements a rough, fissured bark that never peels or drops litter. The wood is heavy, red in color, and hard, considered by George Bentham to be as hard as iron. Bentham published the still-current *Flora Australiensis* in 1878 at the age of 78; he was the nephew of the more famous legal philosopher Jeremy Bentham, who may still be seen in his chair at University College, London, and who is trundled annually from his closet to preside over a faculty meeting. Since George's day, ax steel has risen to the challenge; even so, a 2-inch cube will take 20 tons to crush (if you can imagine 10 sedans balanced on one cubical peg). In the wild, the flowers are normally white, but most of those on campus have cheerful bright red flowers. Variety 'Rosea', which has consistently pink flowers and grayish foliage, can be seen on Crothers Way along the north side of the Green Library. In 2002 the Terman Engineering Center squirrels learned to sip the nectar; they then carelessly dropped complete bunches of blossoms onto Panama Mall. The Meyer Library was

surrounded by 88 specimens at the time of building. By 2000 there were 56 survivors, some very large, producing a shady environment. The 32 absentees met various fates including landscape considerations. Many of the replacements are cedars, which permits the virtues of the coniferous and broadleaf evergreen canopies to be assessed.

In 1968 there were 103 young ironbarks on Panama Street. Some were lost to accidents as time passed but by 2002 supplementary planting had brought the total back to 83. The shady avenue of dark trunks and red flowers adds a pleasant unifying touch to an architecturally challenged neighborhood.

Manna Gum

Tasmania, S. Australia, Victoria, New South Wales

*Eucalyptus
viminalis*

From Lomita Mall, looking toward Varian physics, one could, until 2002, see the well-remembered centenarian manna gum, 7 feet in diameter, a residual of the avenue that ran magnetic southwest from the northwest corner of the Quad as part of Searsville Road. With its white trunk and vast spread it was a noteworthy giant. Other patriarchs can be seen at the southeast end of Nelson Mall; on Searsville Path where it meets Sand Hill Road; and at the Children's Health Council. Younger trees are not uncommon, north and east of Terman Engineering Center, for example. The lengthy ribbons of sunburnt bark that peel to reveal the fresh white trunk, and the threefold cream flowers, or the fruit, suffice to identify it. Manna gum provides the fodder for koalas living in the zoos of San Francisco and San Diego.

Other species that may be found interesting to visit are as follows: *E. cornuta*, Stanford Avenue greenbelt behind 834 Santa Fe Avenue; *E. viridis*, with *E. megacornuta* and *salubris* on Raimundo Way; and, at 3185 Alpine Road, *E. albida*, *cypellocarpa* (also opposite 1015 Woodland Avenue, Menlo Park), *loxo-phleba*, *morrisbyi*, *ochrophloia*, *pauciflora*, *squamosa*, *stellulata*, and *urnigera*.

European Beech

Europe, West Asia

Fagus sylvatica
FAGACEAE
(Oak or beech
family)

To trace the origin of the word "beech" is an exercise in Indo-European linguistics showing, surprisingly, that beech and Latin *fagus* are descended from the same root. Latin got the word from Greek *phegos* which, besides meaning the beech tree, meant edible, and sometimes meant oak. The place-name Buckingham refers to the beech forest. As you look at the beechnuts hanging in their burrs with the soft curly spikes, contemplate the beechnuts and acorns that were once the food of Europeans' forefathers. Try one of the three-sided nuts. Beech mast is now food for pigs in Europe.

Those found on the inner slopes of Frost Amphitheater are copper beeches, a horticultural variety of the European beech. A young tree is thriving northwest of the intersection of Galvez and Escondido malls, with leaves just

over 2 inches, some of them prickly, that turn dull brown in the fall. Also see copper beech in Palo Alto at the Art Center, 1313 Newell Road near the Green Room entrance, and at 3756 Cass Way, visible in the backyard on the right side of the house. Of great interest on campus is a raised bed in the center of the small courtyard at the north end of the Education Building containing a pendulous dwarf purple beech 'Purpurea Pendula', with bright red fall color. Also of interest is the unusual young tree, variegated purple and pink, at 901 Mears Court.

The black beech of New Zealand, which has no ancestors in the temperate regions of the Southern Hemisphere, is cheerfully known as *Nothofagus solandri* (from Greek *nothos* meaning illegitimate). It goes back to the time before South America and Australia (also South Africa) parted company with the Antarctic continent, which was then not glaciated. The extensive black beech forests of New Zealand climb to the snow line and show rich winter color. Though the leaves are much the same as those of the northern beeches, they are not much more than ½ inch long. The tree should grow well in California, where calcareous soil can be avoided; there is a fine specimen of *N. solandri* in the walled garden at Filoli in Woodside. Other related species are in New Zealand, and more in Australia and Chile.

In Roman times, the North European barbarians were writing in runes on beechen tablets and it is thought that the English word "book" traces back to this practice; the German *Büche* for beech and *Buch* for book have a closer resemblance, while Old English *bōc* stood for both. It is striking that the trees along the back tier of Frost Amphitheater on which inscriptions have been inflicted are the beech trees.

*Feijoa
sellowiana*
MYRTACEAE
(*Myrtle family*)

Pineapple Guava

South America

This rather striking small tree or large shrub exhibits two contrasting tones of green, being silvery underneath the leaves, and in late spring adds an accent of bright red flowers. The flower gets its effect from its bunch of long stiff stamens as also do the related eucalypts, which have learned to dispense entirely with petals as a means of attracting pollinators. In the case of *Feijoa*, the petals are succulent and may be eaten. Later in the fall the oval gray-green pineapple-flavored fruits ripen. There are many on campus, including two about 12 feet tall at 591 Salvatierra Street, and a tall one at 743 Cooksey Lane; three or four are being clipped as a low hedge on Abbott Way at Rogers House. Several can be seen at Rains Houses to each side of the Hacienda Commons. The time to locate them by their flowers is early June. To get ripe fruit, pick it up from the ground, or shake the tree. Even then you may need to keep the fruit on a sunny window-sill before eating it. Squirrels do not have the necessary patience and leave prematurely picked fruit on top of

our fence. Feijoas are rich in vitamin C and make a good addition to a fruit salad. The plant was named for da Silva Feijo, an 18th-century Spanish naturalist. For more information visit <http://fruitsandnuts.ucdavis.edu/>.

Fig

Mediterranean

Ficus carica

The biblical sycamore was a fig, *F. sycomorus*. (The sycamores that were gleaming in the candlelight were plane trees *Platanus occidentalis*, while in Britain the name sycamore denotes the maple *A. pseudoplatanus*.) For examples of *Ficus carica* in residential gardens visit 711 Salvatierra Street and 926 Cottrell Way. Occasional escapes from backyards are encountered. There is one on the north side of Memorial Hall, one in the easternmost of the Encina Commons courtyards, and another at the top of Frenchman's dam near Raimundo Way on the creek that runs down Stanford Avenue.

MORACEAE
(Mulberry family)

Kumquat

China

Fortunella

The word *quat* in Cantonese means orange and *kam* means gold. This small citrus grows in passageways leading from the eastern entry to the Inner Quad, into the northeast corner of the Main Quad. The golden oval fruit, about an inch in diameter, ripen in March and may be eaten whole. They can be preserved whole in syrup and retain their rich color.

margarita
RUTACEAE
(Rue family)

In 1846 on an expedition to China for the Royal Horticultural Society, Robert Fortune brought back the kumquat, as well as the white wisteria and other novelties. Later he introduced the tea plant to India. His adventures on these travels are related in his interesting books in the Stanford Library.

Boojum Tree

Baja California

Fouquieria

A prickly, strange-looking green-trunked succulent that can reach 50 feet, with showy flowers and leaves that fall off, leaving spines behind. An alternative genus name is *Idria*. The Arizona Garden has two; one is near the memorial bench.

columnaris
FOUQUIERIACEAE
(Ocotillo family)

White Ash

Eastern United States

Fraxinus

Pinnate leaves about 10 inches long with five leaflets, smooth green on top and pale and possibly furry underneath. The fruit is a hanging winged seed 1 to 2 inches long. There is a large one west of Encina Commons off Galvez Mall (planted in the 1890s), one at the south end of Lasuen Street on the side toward the Oval, and others in the vicinity.

americana
OLEACEAE
(Olive family)

Raywood Ash

Southern Europe to Western Asia, North Africa

Fraxinus

The narrow-leaved ash exists in several horticultural varieties of which 'Raywood' is best known locally. In the fall, the leaves rather resemble

angustifolia
'Raywood'



Ficus carica, Fig



Fraxinus angustifolia 'Raywood', Raywood Ash

those of the Chinese pistache but differ by having finely saw-toothed leaflets, darker above, with palpable midrib and veins. Examples can be seen at Rains Houses at the north end of the semicircular lawn, nearby at the north end of Hacienda Commons, and on the parking lot side of the Haas Public Service Center. In Menlo Park, three trees are at 1885 Oakdell Drive, and in Palo Alto two trees are at 1440 California Avenue, between Columbia and Dartmouth streets.

Fraxinus excelsior **European Ash** *Europe, Turkey*

The hard and resilient wood of the ash suits it for axe handles, skis, tennis racquets, ladders, and similar uses, making it one of the most valuable trees in European forest production. It may be distinguished from the other ashes on campus by the relatively long strings of samaras which themselves are long, being about 1½ inches. At the outer end of the single wing there is a tiny notch. The oval leaflets are 7 to 11 in number, about 4 inches long, with a toothed margin. They are dark glossy green on top but pale underneath and with some slight furriness on the midribs of the leaflets. If a leaf is pulled from the tree in summer the leaflets curl tightly. The next season's leaf buds, which are already well formed early in summer, are black. A dozen European ash stand in the large parking lot at Jordan Quad. In Spain the name of this tree is *fresno*.

Virgil says, *Fraxinus in silvis pulcherrima, pinus in hortis, populus in fluviis, abies in montibus altis*. "The ash is the most beautiful tree in the woods, the pine in gardens, the poplar by rivers, and the fir on high mountains."

Fraxinus latifolia **Oregon Ash** *Pacific Coast*

Oregon ash is a major timber tree in the coastal forests north of the border with Oregon, but is also native in a spreading form to the neighborhood of Palo Alto. The leaves, up to 12 inches long, may have five to seven leaflets of which the terminal leaflet is longest and may be 6 inches long. The margins are wavy, but practically without teeth, and the side leaflets may be stalkless. Samaras are borne on female trees and are about 1½ inches long. Several large rough-barked trees at the corner of Roth Way and Lasuen Street may be Oregon ash.

Fraxinus ornus **Flowering Ash** *Southern Europe, Asia Minor*

An unusual tree here and not showy. The smooth pinnate leaves are about 8 inches long with seven leaflets, some fuzz on the midrib, and flowers with four petals. See a specimen east of Memorial Church behind Building 50, and in Palo Alto at the house at 1102 Channing Avenue, the first street tree around the corner on Harriet Street.

Shamel Ash

Mexico *Fraxinus uhdei*

This is a large timber tree from Mexico and, as with the Chinese elm and other deciduous trees grown in mild climates, may not drop its leaves in the fall. At Stanford in spring there is a conspicuous difference between the fully leaved Shamel ashes and the burgeoning Modesto ashes. Later in the summer it may be hard for a casual observer to distinguish our two most common ashes, as both may have five leaflets. Shamel ash leaflets are generally more numerous (five to nine as against three to five), a darker green and longer (4 inches as against 3). The leaf margins are also different.

There are eight large Shamel ash in front of the Bookstore, three of which are male trees (the two on the west and the one closest to the Post Office). On the females, samaras about an inch long will be found hanging inconspicuously in the foliage in spring. By October several of the female trees are heavy with brown fruit and few leaves, and by November there is voluminous but inoffensive litter. The presence of both male and female trees tells us we are not dealing with a cloned variety, as with *Fraxinus velutina* 'Modesto'. The Shamel ash was introduced in Riverside by Dr. Archie Shamel about 1925. In Palo Alto, an old giant is at 1636 Edgewood Drive at the corner of Patricia Lane.

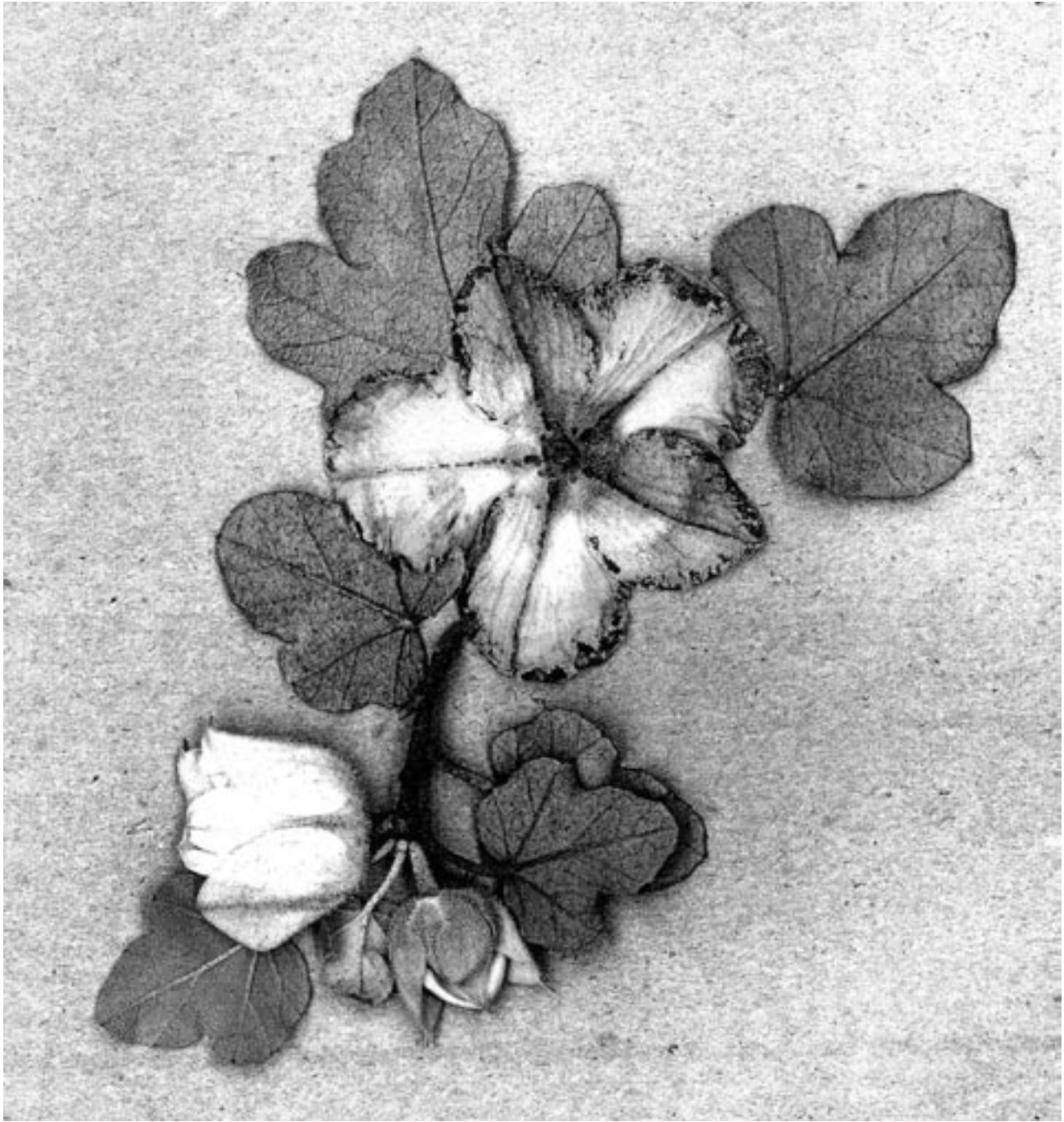
Modesto Ash

United States, Mexico *Fraxinus*

This deciduous smooth-trunked tree has 6-inch leaves with five leaflets that are furry underneath. It also has velvety branchlets. There may be specimens of the wild species on campus, but the cultivar 'Modesto' has been widely used. The cloned trees are male; consequently, no winged seed contributes to the litter, not that its absence is very noticeable amidst the copious leaf fall. A good group can be seen on the avenue (formerly known as Via Crespi) between Green Earth Sciences and the Durand Building. Others are to the northwest of Herrin Hall (Biology), west of Old Chemistry, and on the south side of Escondido Mall near Mitchell Earth Sciences. It is used as a street tree in Palo Alto, including Greer Road between California Avenue and Amarillo Avenue.

velutina
'Modesto'

The ash is one of the last trees to come into leaf in the spring (Chinese pistache, linden, catalpa, and silk tree are others), often delaying two months behind the plum trees, and when in leaf casts a relatively thin shade, letting through a luminous green light. As the Modesto ash often succeeds where other species fail, vast numbers have been planted in California. But the 'Modesto' clone has come under attack by a mutilating disease that leaves the trees partially defoliated through the summer. Consequently, disease is a serious economic matter. This experience points up the need for diversity: new species, as well as new clones.



Fremontodendron californicum, Flannel Bush

Flannel Bush

California *Fremontodendron californicum*
STERCULEACEAE
(*Sterculia* family)

Best known in shrub form in highway planting, where its large, bright yellow blossoms are unmistakable. As you travel west on Junipero Serra Boulevard approaching Alpine Road, see big ones on the right just before crossing the bridge over San Francisquito Creek. Two others are on the berm on Santa Teresa Street at the corner with Los Arboles Avenue and a small one is at 860 Tolman Drive. The small lobed leaves, which are up to 2 inches long, green above and pale felt below, have a velvety feel. Loma Prieta is the nearest point to Stanford where flannel bush is native. The plant is named for John Frémont (1813–1890), who was active in California at the time of the assault on Mexican authority and was elected state senator in 1850.

Coast Silktassel

Coast Ranges *Garrya elliptica*
GARRYACEAE
(*Silktassel* family)

Native in the immediate neighborhood, for example at Jasper Ridge Biological Preserve, silktassel is a desirable shrub or small tree that should be planted more freely. The tassels are clusters of catkins many inches long that festoon the plants in winter. Male and female kinds can be distinguished, on separate plants, the male strings being longer. Both kinds are constructed as strings of bells. White woolly berries with bitter purple juice ripen in summer. The oval leaves are about 2 inches long, have wavy edges, are green on top and woolly underneath. Silktassel was collected in Oregon and published in 1834 by David Douglas (of Douglas fir fame) and has been grown in England ever since. Seen on Lomita Drive at the edge of the New Guinea Garden across from Harmony House and at the berm on Santa Teresa Street near Governor's Avenue, silktassel is worthy of respect as an ancient member of one of only four plant families not found outside North America, a circumstance probably connected with the Chicxulub meteorite of 65 million years ago. Another specimen is in the stairwell to the lower level of Mitchell Earth Sciences, on the side facing Panama Mall.

Wilga

Australia *Geijera parviflora*
RUTACEAE
(*Rue* family)

Wilga is a small shade tree growing to about 20 feet with very attractive weeping foliage. Although the leaves may be up to 6 inches long they are no more than ¼ inch wide. The small whitish flowers are not very conspicuous. Wilga grows in dry areas of all Australian states, where the sheep enjoy nibbling the leaves while squatting on their haunches. Wilga would be a good low-maintenance tree for the campus; it is happy with much less rain than falls here. It was introduced to the Bay Area by the Saratoga Horticultural Research Foundation. There are three at 940 Cottrell Way and other specimens can be seen in residential gardens on the slopes of Pine Hill. It is used as a street tree in downtown Palo Alto, including the section of Waverley



Ginkgo biloba, Maidenhair Tree
(with a sprig of maidenhair fern, upper left, for comparison)

Street between University and Lytton avenues, on Hamilton Avenue from Waverley to Ramona Street, and on High Street near Hamilton. Illustration, see page 17.

Maidenhair Tree

China

Ginkgo biloba
GINKGOACEAE
(*Ginkgo*
family)

In the fall, the clearest pure yellow is seen displayed on the numerous maidenhair trees, every single one of which growing on campus can then be discovered with ease. Examination of the fan-shaped leaf suggests something a trifle unusual, apart from the resemblance of the shape to the maidenhair fern, and indeed the tree turns out to be a gymnosperm, having a naked, edible seed as with conifers, but antedating today's conifers. The fallen fruit being messy and smelly, it is customary to plant only male clones.

The trees were planted in Chinese temple grounds from time immemorial for the edible kernels, but for decades the only campus female was one in the thicket between the Faculty Club and Kingscote Gardens. Mayfield Avenue is planted with very attractive male ginkgos near Frenchman's Road and there are more in many other locations. In Palo Alto, a beautifully shaped, mature specimen is between 1457 and 1459 Hamilton Avenue, and ginkgos line Greenwood Avenue between Hutchinson Avenue and Newell Road. The first in America date back to 1784 in Philadelphia, which was in those years the locus of American botanical interest. The ginkgo was brought by Engelbert Kaempfer in 1691 to Utrecht, where a tree from those days is still standing. For colorful and extremely charming and exhaustive background, including a photo of Goethe's poem to a lady comparing himself to a ginkgo, see <http://www.xs4all.nl/~kwanten/> by Cor Kwant.

Recently 16 or more ginkgos appeared at the east end of the Green Library and by 2001 half of them were bearing cherry-sized yellowish seeds—whether by carelessness or design. The thin layer of flesh, which has an astringent taste, encloses a single, thin-shelled, keeled pit with a satin finish and containing a two-toned kernel that is equally attractive in appearance. A 1½-inch stalk emerging from a leaf axil has two flowers that, by fall, may ripen as a pair, but half will ripen as singles. The female flower has no petals, no calyx, and no pistil—it is just a tiny ovary less than ¼ inch across, with a rounded surface and a nipple that is receptive to pollen. This is a truly primitive flower, with ancestry dating back to before the days of insects or other pollinators. The pollen-bearing flowers, which grow on separate male trees, have the form of catkins. With dioecious species such as the ginkgo, if you do not want fruit, you try to raise only male trees; on the other hand, if you want fruit, kiwi fruit for example, you need both males and females.

More commonly, flowers possess both male organs (anthers) that produce pollen and female organs (stigmas) that receive pollen; the ensuing seeds are

then sheltered in an ovary. This seems like an economical plan, putting the key organs together, except that it tends to frustrate the fostering of genetic diversity resulting from attraction of insects or birds to carry pollen from one tree to another. Avoidance of self-pollination is a key feature of bisexual flowers; it is achieved by temporal, geometrical, or chemical means. A fig encloses over a thousand tiny flowers, male and female, but cross-fertilization is cleverly discouraged by delaying pollen release until the female flowers have passed beyond receptivity. Self-pollination may happen anyhow, and in some cases may be counted upon.

Ginkgo leaves give a glimpse of the origin of leaves as we know them today. There are no branching or anastomosing veins, just a few forks near the stalk. The leaf is clearly a bundle of stalk fibers, splayed out flat as in a fan with 80 or more veins, and terminating in a wavy edge without converging to an apex as everyday leaves do. Get a leaf of flax, a reed, and a palm leaflet, for close comparison with a leaf from the Green Library ginkgos.

Although the tree is now native to China, where it is known, among other names, as *yin hsing* (silver apricot), the name *ginkgo* is from archaic Japanese *gin-kyo*. Fossil leaves are found in Asia, Australia, Europe, and America (as at the Ginkgo/Wanapum State Park on the Columbia River 30 miles east of Ellensburg, Washington), showing that the design dates back 150 million years.

Ginkgo biloba extract is a widely sold supplement, prepared in different ways by various manufacturers. The product does not come under the rules of the Food and Drug Administration and does not have to state on a label what the substance consists of, what the quantities or side effects are, or what interactions are known to occur in conjunction with other dietary intakes or health conditions. It is not necessarily illegal to make unsubstantiated claims on the label. You may sue for false advertising and invite the Federal Trade Commission to investigate, but the FTC is not funded to seek out false advertising. Studies aimed at finding evidence for the effect of specified doses of particular supplements on individual diseases are under way, in many cases by the manufacturer.

Gleditsia **Honey Locust**

Mississippi Valley

triacanthos
LEGUMINOSAE
(Pea family)

A deciduous tree whose compound leaves appear in March. A distinctive feature is the large, flat, pointed pod, around a foot long and an inch wide, containing sweet pulp and many shiny brown oval seeds $\frac{3}{8}$ inch long. The pods are edible when fresh; some continue to hang on after the leaves fall. Two are in the lawn with two male carob trees south of Arrillaga Alumni Center. Wicked spines, some with stout side spurs in threes, can be seen on the branches. So extraordinary are the larger and more complex of these

armaments that it makes you wonder what the tree had in mind to guard against. The wood is durable in the ground, hard, strong, and suitable for craft work. A spineless variety can be seen at Wilbur Hall. The national champion honey locust is in Chambersburg, Pennsylvania, and was 120 feet tall in 1967.

Silky Oak

New South Wales

Silky oaks were freely planted on campus at one time for their fast growth, ability to survive neglect, and spectacular golden flowers. Two survivors are at the edge of the New Guinea Garden along Lomita Drive, one is in the grove north of the Lou Henry Hoover Building, and others are in the arboretum. In Palo Alto it can be seen at 1115 Hamilton Avenue. When in flower around the first of May they are easy to locate but they are also identifiable by the unusual leaves and the feathery texture of the foliage. About 100 unusual flowers, arranged in a 4-inch long raceme, have no petals; the stamens are latched like safety pins to isolate the anthers until the stigmas are fertilized. The black hooked pods contain winged seeds.

The leaves fall in the spring making a spectacular mess that would be less noticeable if they fell in the fall. In some years seedlings can be found and transplanted. They do very well in offices, growing rapidly and looking rather like ferns. The trees are widely planted around the world as ornamentals and in Kenya are planted between tea bushes for shade. The wood, often referred to as silk oak, has conspicuous shiny medullary rays. At one time, nearly every lift in Sydney was paneled with veneer peeled from silky oak logs.

Grevillea ‘Noel’, with recognizably similar (red) flowers and pods, is a vigorous bush. It has been planted as a ground cover on the bank south of the southeast corner of the Main Quad, in Lomita Mall, and north of the Art Gallery and Lou Henry Hoover Building. Varietal names are customarily capitalized and not italicized, and since 1959 the use of Latinized species names (ending in *-ii* or *-iana*, for example), referred to as specific epithets in the official wording, has been a no-no (nursery labels reading ‘Noellii’ notwithstanding).

Grevillea

robusta

PROTEACEAE

(*Protea* family)

Pin-Cushion Hakea

Western Australia

You will fall in love with the blossoms, especially if you have never seen a spherical flower before. The bright red pompom bristles with firm cream-colored kinky stamens and keeps very well if picked—generally one of the 4-inch leaves is intimately meshed with it. Several mature standard trees have been lost, probably because of cold locations. Survivors are still being sought. The woody beaked fruits contain two black winged seeds that can easily be germinated and grown, but not in poorly drained adobe.

Hakea laurina

PROTEACEAE

(*Protea* family)



Grevillea robusta, Silky Oak

Sweet Hakea

Western Australia

*Hakea
suaveolens*

A dense shrub growing to about 10 feet with attractive soft green feathery new growth in spring, but not a plant to walk into in the dark. The leaves harden into forked needles sharpened to a point. The flowers are small, white, and sweetly scented and lead to beaked woody fruits containing two winged seeds. One wonders what evolutionary step favored the investment of so much wood to protect only two seeds. A row on Escondido Road, west of Campus Drive East, has been lost to relandscaping.

Toyon

California

*Heteromeles
arbutifolia*
ROSACEAE
(Rose family)

A well-liked native shrub or small tree whose natural habitat includes the campus. Its good-looking leathery leaves are about 3 inches long with finely toothed edges. The small white flowers are not conspicuous but the red berries brighten the winter. In spring, seedlings may be dug up in many places and easily grown. Numerous plants of natural origin can be found throughout the arboretum and the greenbelt, usually hugging the base of another tree. The berries have been eaten both raw and cooked, and are very popular with cedar waxwings.

English Holly

Europe, North Africa, West Asia

Ilex aquifolium
AQUIFOLIACEAE
(Holly family)

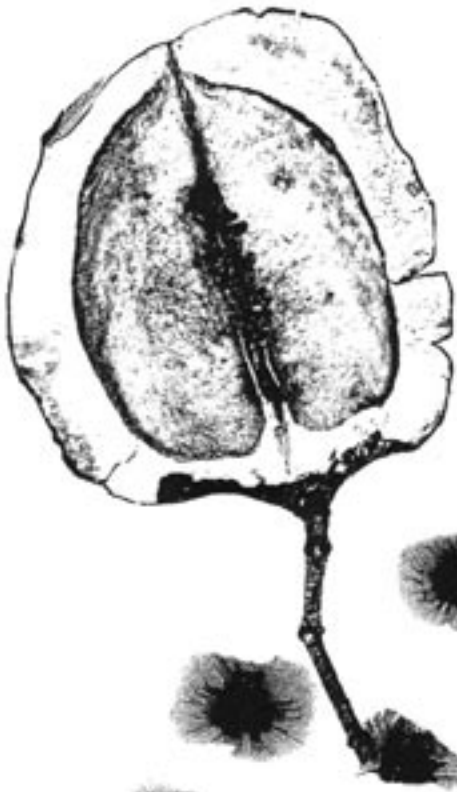
The familiar foliage plant of Christmas decorations with dark green shiny leaves, characteristically shaped, and with red berries. Several hollies grow inside Frost Amphitheater on the bank south of the stage; an old male and female are on the lawn north of The Knoll; and holly trees can be found in many other places around the campus, including the entrance to the School of Education and the north side of Encina Hall. Shrubby American species of *Ilex* containing caffeine were formerly prepared in the manner of tea.

Jacaranda

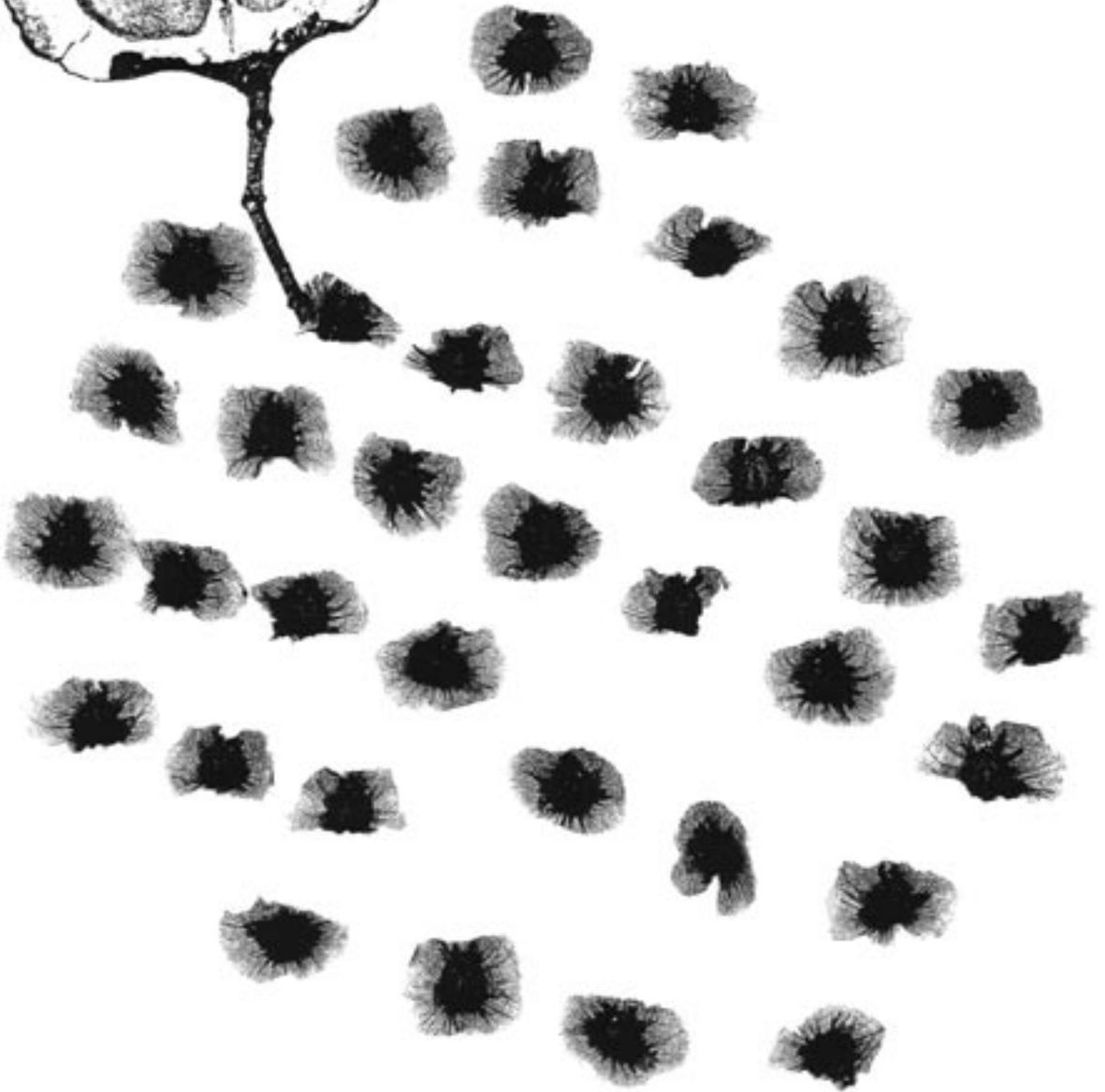
Brazil

*Jacaranda
mimosifolia*
BIGNONIACEAE
(Bignonia
family)

This magnificent tree is famous for its 2-inch lavender bells in summer and the carpet of fallen blossoms that forms around it. Before flowering, the foliage, which is extremely finely divided, is also highly attractive. The wood is purple with dark venation. There were very few on campus, but attention has been given to establishing more of them. An insignificant specimen is on the path leading into Frost Amphitheater at its southeast corner. In the 1990s one was planted in the inner northwest island of the Inner Quad and there was a mass planting in the four semiprotected courts adjacent to Bowdoin Street (enclosed by the Rains Houses), where about 60 have survived. Several also were planted opposite Pearce Mitchell Houses on Salvatierra Street. There is one in the northeast corner of Sequoia Hall courtyard on



Jacaranda mimosifolia, Jacaranda
(seed capsule and seeds)



Via Pueblo. Examples grow in the residential area at 909 and 973 Cottrell Way. In Palo Alto a beautiful specimen probably planted in the 1930s is nestled in the courtyard of the Roth Building at 300 Homer Avenue.

The round, flat, seed cases, more than 2 inches across when ripe, with a bump in the middle for the seed, are in good supply at Rains Houses. They can be extremely difficult to open by hand. You should try. I am not talking about unripe, aborted, or spent pods—only hard ripe pods that have not yet opened of their own accord. While the fruit is not as heavily into protective armor as its compatriot the Brazil nut, the ancestors of the jacaranda clearly had something serious in mind as they evolved. If you feel you will be successful in opening a closed capsule, first examine the outside bumps and form an idea of what you will see.

Use the dictionary pronunciation for jacaranda—do not reveal ignorance by using a Spanish pronunciation for a Brazilian native word; better to cause confusion by using the Portuguese zha-ka-rã-DAH.

Jasper Ridge Notes

Jasper Ridge Biological Preserve, located on 1200 acres of Stanford land about 3 miles from the center of campus, is of particular interest to plant enthusiasts. The natural flora of the area can be visited and appreciated. Native shrubs, wildflowers, ferns, and grasses are of special interest; docents will show them to you and provide trail guides and maps. As for trees, many of those on Jasper Ridge grow on campus, either as original inhabitants or as transplants. As an additional experience, you can see them in their native state and in their own plant communities (call 650.327.2277 to arrange a tour).

Jasper Ridge is bracketed on the north by San Francisquito Creek, which eventually empties into San Francisco Bay. Near the east side is Los Trancos Creek, which runs alongside Alpine Road and joins San Francisquito Creek where Piers Lane meets Alpine Road. Separating the ridge from the Santa Cruz Mountains on the southwest side is the San Andreas Fault (Portola Road) and

Corte Madera Creek, which runs into Searsville Lake.

As a geological entity Jasper Ridge has the peculiarity of differing from its surroundings by a narrow outcropping of serpentine that slices across the preserve and is exposed to view on the approach via Escobar Road, Portola Valley. Associated with the more common greenstone are cherts, familiar in the residential area and greenbelt as cherry-to fist-sized, somewhat rounded, stones in various shades of red and yellow; they surface when residents dig into the black campus adobe. Jasper Ridge was named for our red cherts. (Of the 12 semiprecious stones that adorned the square breast plate of Aaron, the one in the bottom left hand corner was a jasper.) Stone similar to the serpentine from Jasper Ridge was used for the circular walls at the eastern corners of Skilling Auditorium and on the steps leading down to the north from the Mitchell Building.

The plant community supported by the

soils derived from the serpentine is the home of creatures, notably butterflies, that can live only in association with that community. Thus we have geological districts that are in effect islands that imprison these butterflies. As with the analogous Galápagos Islands, life forms have taken paths that have been of significance to observational studies of evolution, as Charles Darwin originally noted when he voyaged on the *Beagle* to the Galápagos. When William H. Brewer surveyed California in the 1860s the native grasses were already under pressure from Spanish

oats, but on Jasper Ridge many natives have managed to survive for study, though admittedly heavily outnumbered by nonnatives.

The History of Jasper Ridge, by Dorothy Regnery, a 1991 centennial publication of the Stanford Historical Society, offers an account of the role played by Jasper Ridge in the development of this area since the earliest European settlers arrived in the 18th century.

Here is a list of Jasper Ridge trees, including woody shrubs that can take the form of small trees.

<i>Acacia baileyana*</i>	Cootamundra Wattle	<i>Pistacia atlantica*</i>	Pistachio
<i>Acacia dealbata*</i>	Silver Wattle	<i>Populus balsamifera</i>	
<i>Acer macrophyllum</i>	Bigleaf Maple	<i>trichocarpa</i>	Black Cottonwood
<i>Acer negundo californicum</i>	Box Elder	<i>Prunus emarginata</i>	Bitter Cherry
<i>Aesculus californica</i>	Buckeye	<i>Prunus ilicifolia</i>	Holly-Leaf Cherry
<i>Ailanthus altissima*</i>	Tree of Heaven	<i>Prunus virginiana</i>	
<i>Alnus rhombifolia</i>	White Alder	<i>demissa</i>	Western Chokecherry
<i>Arbutus menziesii</i>	Madrone	<i>Pseudotsuga menziesii</i>	Douglas Fir
<i>Baccharis pilularis</i>	Coyote Bush	<i>Quercus agrifolia</i>	Coast Live Oak
<i>Cercocarpus betuloides</i>	Mountain Mahogany	<i>Quercus chrysolepis</i>	Canyon Live Oak
<i>Cornus glabrata</i>	Brown Dogwood	<i>Quercus douglasii</i>	Blue Oak
<i>Cornus sericea</i>	Redtwig Dogwood	<i>Quercus kelloggii</i>	California Black Oak
<i>Crataegus monogyna*</i>	Hawthorn	<i>Quercus lobata</i>	Valley Oak
<i>Crataegus laevigata*</i>	English Hawthorn	<i>Quercus wislizenii</i>	Interior Live Oak
<i>Eucalyptus globulus*</i>	Blue Gum	<i>Rhus integrifolia*</i>	Lemonade Berry
<i>Euonymus</i>		<i>Robinia pseudoacacia*</i>	Black Locust
<i>occidentalis</i>	Western Burning Bush	<i>Salix laevigata</i>	Red Willow
<i>Ficus carica*</i>	Edible Fig	<i>Salix lasiolepis</i>	Arroyo Willow
<i>Garrya elliptica</i>	Coast Silktassel	<i>Salix lucida lasiandra</i>	Yellow Willow
<i>Heteromeles arbutifolia</i>	Toyon	<i>Sambucus mexicana</i>	Blue Elderberry
<i>Juglans</i>		<i>Sequoia sempervirens</i>	Coast Redwood
<i>californica hindsii</i>	Calif. Black Walnut	<i>Ulmus minor*</i>	English Elm
<i>Oemleria cerasiformis</i>	Oso Berry	<i>Umbellularia californica</i>	California Bay
<i>Olea europaea*</i>	Olive		
<i>Physocarpus capitatus</i>	Pacific Ninebark		*Not native to Jasper Ridge
<i>Pinus radiata*</i>	Monterey Pine		

California Black Walnut

Central California

Juglans

Closely related to a shrubby species *J. californica*, which is widely distributed in Southern California, the black walnut is an erect single-trunked tree that is found in nature only on a few sites of Indian habitation (including Jasper Ridge), which makes one think that it may be a product of human selection. The numerous leaflets are quite unlike those of English walnut in general appearance, being lanceolate and 3 inches or so in length, with fine teeth. The bark is dark and rough and has a noticeable smell when abraded. The nut is smooth and hard and is embedded in a thick green husk that will stain the fingers. A large specimen grows at 541 Los Arboles Avenue, and many more are in the Sand Hill Road greenbelt, opposite the Stanford Shopping Center. In Palo Alto it can be seen at 950 Boyce Avenue.

californica

hindsii

JUGLANDACEAE

(Walnut family)

Walnut, pecan, and oak trees benefit when squirrels eat their nuts and acorns because the squirrels do not find all of the nuts that they so assiduously bury; some of the nuts germinate, contributing to the next generation of trees. Today we are the beneficiaries of millennia of unconscious plant breeding by squirrels that have selected for tasty kernels and thin shells; but the shells of the black walnut could still use more genetic help. In the Southern Hemisphere, by contrast, macadamia nuts and Brazil nuts developed formidable armor, especially the Brazil nuts, which are not only resistant to cracking with the teeth but are also enclosed, several at a time (up to 20 or so), in a tough woody coco weighing up to 5 pounds.

Walnut

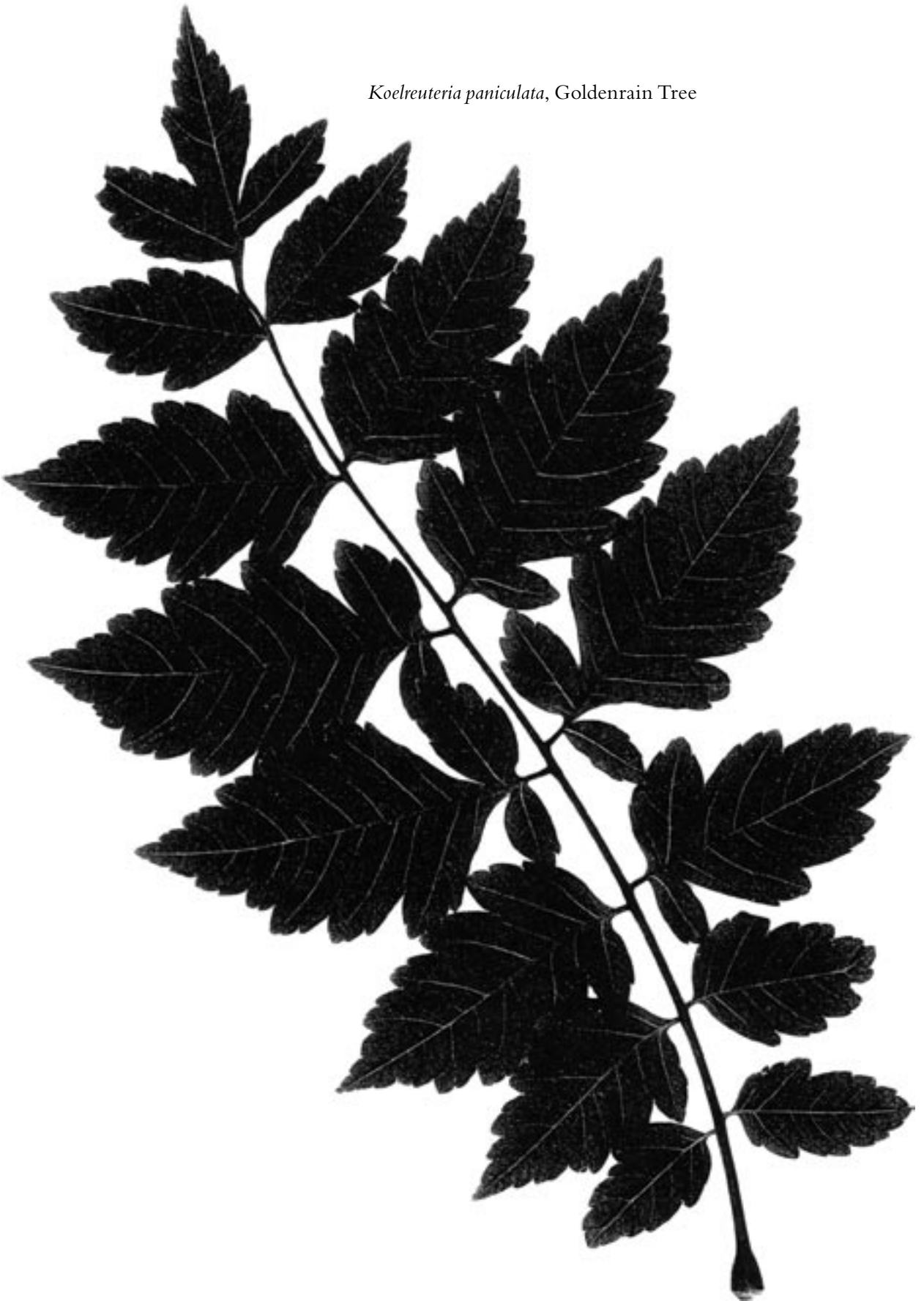
Europe, Asia

Juglans regia

The smooth gray bark and the seven ovate leaflets, the end one being the largest, distinguish the traditional walnut from the Californian walnut. In the walnut plantations, however, the line of demarcation can clearly be seen where the trees were grafted onto rootstocks of California black walnut. When the fruit is ripening you can eat the flesh outside the shell; in fact the shell itself and its contents are edible then, though sour. Heavy crops of excellent edible nuts are produced but they are a favorite with the squirrels and you have to move fast to compete with them. Generally speaking, you cannot move that fast. The wood is highly prized for objects that are still made of wood, pianos and gunstocks for example.

The *Ju-* stands for Jupiter and the *glans* is Latin for acorn. Evidently the English word gland refers to an anatomical object shaped like an acorn. In European languages nut is cognate with *Nuss* (German), *noix* (French), *noce* (Italian), *nuez* (Spanish), *noz* (Portuguese), all of which mean walnut. This must be telling us something about the ancestral European diet. Walnuts are nutritious, averaging over 6000 calories per kilogram, about the same as for almonds, Brazil nuts, cashews, hazelnuts, macadamias, and pecans. Yet in

Koelreuteria paniculata, Goldenrain Tree



Great Britain the walnut was an immigrant, as witnessed by the prefix *wal-* meaning foreign; the name Wales imbeds the same root. The specific name *regia* (royal) harks back to the Greek for the nut. The term *English* walnut arises understandably from the fact that California has its own walnut, but the tree that bore the ancient nut of kings is not an English tree.

Three *Juglans regia* and two California black walnuts can be compared side by side in Menlo Park on Oak Avenue near Olive Street. Walnut Drive, Palo Alto, has three English walnuts as street trees at the end near Embarcadero Road; plantings in several more city locations are under the direction of Canopy; and there is a pair at 712 Harvard Avenue, Menlo Park, and others at nearby houses.

Hollywood Juniper

Eastern Asia

Juniperus chinensis
'Torulosa'
CUPRESSACEAE
(*Cypress family*)

This interesting juniper, with character in its branches and leaves, which are completely reduced to stem-clasping scales, can be seen at the entrance to Old Chemistry, at the east entrance to Building 500 (opposite 505 Lasuen Mall), and on Lomita Mall south of the northwest corner of the Main Quad. There are many varieties of *J. chinensis*, including several prostrate types that are chosen as ground cover where lawn water is scarce. The parent species in China, which can approach 100 feet, must resent the torture inflicted on its progeny by man.

Native Americans reportedly ate berries from the local junipers (*J. occidentalis*, which can be seen at Stanford Sierra Camp, bravely growing out of apparently solid rock), as well as preparing them in other ways, but in Europe the berries are best known as a flavoring for gin and for enhancing the flavor of venison and sausages. *Gin* is not a short form of juniper, but of Geneva, as still labeled on Dutch stoneware gin bottles. The native juniper can be seen in Palo Alto at 1043 Parkinson Avenue, in front of a Douglas fir.

Goldenrain Tree

China, Korea, Japan

Koelreuteria paniculata
SAPINDACEAE
(*Soapberry family*)

One of the five official memorial trees from ancient times in China, the goldenrain tree was reserved for the tombs of scholars. The compound leaves are about a foot long with 7 to 15 leaflets, each of which is itself more or less deeply lobed or serrated. The large foot-long clusters of yellow flowers, which can be used for making a yellow dye, give way at the end of the summer to conspicuous brown, papery pods resembling Chinese lanterns with internal pockets containing three hard, ¼-inch black fruits, each almost filled by one seed. The leaves turn yellow, brown, and, finally, reddish before falling. The tree is resistant to frost and is suitable for alkaline soils. A fine planting grows along the east side of Schwab Residential Center.

Lagerstroemia Crape Myrtle

China

indica
LYTHRACEAE
(*Loosestrife*
family)

A very attractive shrub or tree with showy flowers throughout summer. The flowers form terminal clusters, have a crinkled surface like crape, and come in a variety of colors in the general neighborhood of pink. The flower cluster, with its center of bright yellow anthers, is contained within a crown of six bracts; later, when a fruit forms, this crown holds the fruit. The bundles of fruit have their own ruddy color, retain the old stigma, and, at a glance, are easily mistaken for the bundles of buds that precede the flowers. All three stages may be present at once. The thin bark peels annually, exposing a beautiful, touchworthy, satiny sheen.

Until recently it was not very common on campus, but an old specimen with multiple stems can be seen at 611 Alvarado Row. Groups were planted in 1975 on Campus Drive East where it approaches Junipero Serra Boulevard and one in the inner northwest island of the Inner Quad when the Quad was paved in 1984. A disfiguring mildew (*Erysiphe lagerstromiae*) needs to be controlled by copper fungicide in spring, and with lime-sulfur in winter, but mildew-resistant plants have become available. Conspicuous plantings that appeared in Menlo Park on El Camino Real near Menlo Avenue were bound to attract attention. In the 1990s, bulk plantings of sizable trees began, for example on Galvez Street between Serra Street and Campus Drive East, and a parking-lot row between Lagunita Eucalipto and Murray House (with white flowers). A row of 10 encloses Knight Plaza on the east side. This formal space, between the north end of the Graduate School of Business and the south side of the Knight Building, is graced by 22 fern podocarpus, 18 hornbeams, and a colonnade.

Lagunaria Norfolk Island Hibiscus

Queensland, Norfolk Island

patersonii
MALVACEAE
(*Mallow family*)

Rather a surprising spectacle when in bloom in midsummer and covered with flowers that are an inch or more across in colors grading through rose-pinks to lilac, this stately tree grows to about 25 feet. The flowers distinctly resemble the hibiscus, the stamens projecting from a central column, and indeed the tree is of the same family. The leaves are dull green, very pale underneath, and about 2 inches long. The seed capsules open to reveal five compartments and should be handled with care because of the fine sharp hairs (used as itching powder to be shaken down the neck of the kid at the desk in front of you by knowledgeable but uncouth mischief-makers). The cow-itch tree (*Mimosa imbricata*) of India bears pods covered with sharp hairs but has nothing to do with *Lagunaria*. Nor has it anything to do with cows—the name is a corruption of cowage, a local name in India. Propagation of the deceptive name cow-itch for sweet Norfolk Island hibiscus in some Bay Area tree books must be a conspiracy to cover up the true use of itching powder.

There should be more Norfolk Island hibiscus on campus. Two are growing 4 feet apart on Serra Street at the Fire Station, not far from the Recycling Center parking lot. Several specimens have been planted in recent years in the Quarry Road north parking lot near its Welch Road entrance and back toward the path that leads to the Arizona Garden.

Dunkeld Larch

Alps, Carpathians, Siberia *Larix × eurolepis*

Various species of larch are distributed widely in the circumarctic forests, some extending as far south as the Pacific Northwest and the Atlantic Northeast. The larch is a tree of many uses: house framing, railroad ties, shipbuilding, pilings (as at Venice), telephone poles, turpentine production, and the manufacture of baking powder. In the British Isles *Larix decidua* is the most planted exotic tree. Larch is also a widely valued and versatile ornamental, and is used for street planting in cold mountainous places. It is deciduous, unlike most conifers. Stanford has little to show of this respectable tree. Dunkeld larch was discovered at Scotland's Atholl Estates after a group of Japanese larch (*L. kaempferi*), imported in 1885 by the 4th duke, were pollinated by the nearby European species (*L. decidua*) in the estate's commercial woodlands. The larch in the circular island at the south end of the Braun Music Center archway is a disoriented hybrid (*L.* 'Varied Directions') of Dunkeld larch. It exhibits the characteristic well-spaced tufts of short needles. When the leaves fall there is a display of charming, upright, 1-inch cones whose scales follow the Fibonacci pattern (see page 191). Collect a twig and use the dark winter buds to study the larch's spiral phyllotaxy. The drooping specimen on the east side (in back lawn) of Harmony House off Lomita Drive is *L. decidua* 'Pendula'.

PINACEAE

(Pine family)

Latin Pronunciation for Tree People

When Carolus Linnæus (1707–1778) popularized the genus/species system for botanical classification, he wrote in Latin; even his Swedish name Carl Linné was latinized. His botanical names are familiar in print but only occasionally does a botanical name need to be spoken out loud and many of those names we recognize we may have never uttered. Have you ever said *Carpinus betula* or *Fraxinus velutina*? Try now. When people say out loud a botanical name that I know only from reading, their pronunciation can surprise me.

So how should Latin plant names be pronounced? This question has no answer. Then, how *are* they pronounced? Before the days of Linnæus (taking the æ from his title pages), educated Europeans knew Latin; it was necessary. There were more books on their shelves in Greek and Latin than in English and French combined. Latin had provided legal terms since the heyday of Rome and in England the pronunciation of Latin vowels had shifted in step with the shifts in general English. Where Chaucer wrote *wif*

and *lif* and said *wēf* and *lēf*,* we now say *wīf* and *līf*. In his day the courts issued a decree 'nē-sē and adjourned 'sē-nā 'dē-ā; we now say, consistently, 'nī-sī and 'sī-nē 'dī-ē. There is a move to replace legal Latin terms with sharply defined English equals, but many traditional Latin words, e.g., et cetera, cum laude, and alumni, have become naturalized and will never die.

Later a second stream of Latin terms entered English through the study of medicine. Classes in anatomy at Padua and Bologna, to which students traveled from all over Europe, were conducted in Latin and the treatises on anatomy used words for the bones, muscles, organs, and other body parts that have remained standard to this day. Words such as biceps, retina, nasal, canine, and uvula are fully naturalized. Medical and botanical terms are generally pronounced in the spirit of legal Latin, i.e., 'bī-sēps not 'bē-kēps.

The teaching of Latin in Britain and Ireland goes back a long way and thus reflected the same vowel shifts that affected legal Latin. However, the experience of travelers to the continent who had only Latin in common with their colleagues inspired a reformation in pronunciation of the classics as taught to scholars. Early in the 20th century, schools began to adopt classical Latin pronunciation. How the ancient Romans actually spoke is an interesting problem in itself. In Italy, Latin has been spoken continuously in the Roman church and offers good clues; of course, Italian pronunciation shifted over time, in its own way, just as in England, giving us church Latin. Caesar became

Cesare in modern Italian and is pronounced 'chā-zā-rā (roughly) whereas in Caesar's day the pronunciation was closer to 'kēsār.

Latin words were adopted by Greeks, Goths, and Slavs, leaving clues as to how Latin sounded to them. Meter in poems, and puns, preserve evidence, while graffiti give an idea of what semiliterate people heard. Classical Latin pronunciation for English speakers is more or less settled today, but is not very influential outside Latin classes. Occasionally you will hear 'lau-dā, 'fōrtā, or alumni with an ē on the end from people who took some Latin, but it is hard for such speakers to say alumnae with ī on the end and be intelligible.

Botanical texts such as P. A. Munz and D. D. Keck, *A California Flora*, and W. L. Jepson, *The Jepson Manual: Higher Plants of California*, both from University of California Press, tell whether the stressed vowel is long (grave accent) or short (acute accent). In this notation, the hornbeam and ash mentioned above are rendered as *Carpinus bétula* and *Fráxinus velútina*. This is helpful, but major reference texts such as *Hortus Third* (Macmillan, 1976); *Dictionary of Gardening* (Royal Horticultural Society, 1967); and *Sunset Western Garden Book* (2001), do not offer this help.

The fifth volume of the *Dictionary of Gardening* does give more general comments but as regards syllable length lamely refers the reader to a Latin dictionary. If you take this trouble, say in the case of *S. sempervirens*, you find that the *i* is short (all three *e*'s are long). Surely we are not expected to put the stress on the syllable *per*. Well, yes, according to some. This outcome and the outcomes of rules cited by Jepson are just not practical.

*Pronunciation is indicated as in *Webster's Collegiate Dictionary*.

Even if the quantity of the stressed vowel is given, the quality remains unstated; would one say *kär'pīwəs*, which is botanical, or *kär'pēwəs*? In California, Spanish names of streets and towns have continued to be pronounced approximately as in Spanish, so a rule-based pronunciation of *Casuarina* with the *i* pronounced *ī* is likely to be disobeyed in favor of *i* pronounced *ē*. Rule-based pronunciations can give unacceptable results for

other reasons: *Pinus nīgra* cannot be given a classical pronunciation.

Many generic names are formed from a personal name or place name terminated by *-i*, *-ii*, *-ana*, or *-iana* and quite a few genera and species derive from Greek; rules then defer to local custom and personal judgment. Ultimately, the courteous way to conduct a conversation is to follow the pronunciation just used by the person you are talking to.

Grecian Laurel, Sweet Bay

Mediterranean

Laurus nobilis

LAURACEAE

(*Laurel family*)

The laurel wreath used to be given to successful poets at the Pythian games that were held in ancient Greece in honor of Apollo. Later, Roman generals liked to be crowned with laurel, and the leaves themselves are still worked into designs connected with the Olympic games. We still recognize “laureates” today. In Greek, the word for laurel is *daphne*, which was also the name of a nymph, and this is how it came about. One time Apollo saw Daphne going by and chased after her, but the resourceful nymph, whose father was a river-god, got Dad to change her into a tree. Evidently she preferred this. At that time, Apollo used to keep the hair out of his eyes with a headband made of any kind of greenery, but after the striking experience of her skin turning to bark as he got his hands on her, he switched exclusively to garlands from the new tree remarking, “Well, since you can’t be my wife you can certainly be my tree.” In any case, by the time of Pliny (AD 23–79), according to his *Natural History*, the laurel was still dedicated to Apollo.

The leaves, which need scrubbing, have a fragrance that they retain when dried and are used in flavoring soups and stews. Eating laurel leaves, Roman authors said, enabled one to foresee the future. California laurel, *Umbellularia californica*, is used for cooking too, and may be sold in packages labeled simply Bay Leaves, but a whole leaf often is too much. Laurel has small yellowish flowers followed by ½-inch black berries.

Specimens can be seen on Santa Teresa Street, three each at the northeast and northwest corners of Lagunita Court dormitory. A specimen with six trunks is on the southeast side of the Angel of Grief (northeast of the Mausoleum). Twenty laurels (in two rows of 10) are between Lantana and Castaño halls, on the west side. Several more are between those and the Manzanita Dining Commons.

Leptospermum
laevigatum
MYRTACEAE
(*Myrtle family*)

Tea Tree

Tasmania, Victoria, N.S.W., Queensland

A small bushy tree with small gray-green elliptical leaves about an inch long and ¼ inch wide. Small white flowers in spring are followed by woody ¼-inch seed capsules. The dark gray bark is shaggy and clothes fantastically distorted trunks. Under ordinary cultivation the display of flowers may be very handsome but most of the tea trees on campus are old and in tough locations. The name “tea tree” reflects the use of the leaves collected at Botany Bay for an infusion used at sea by Captain Cook to protect against scurvy; he must have been running low on the limes issued to him by the Admiralty.

There was a massive bank of hedge on Campus Drive East where it joins Junipero Serra Boulevard, but much of it was killed in the freeze of December 1972 and all the trees were removed. An outstanding, endangered, ancient grove at Terman Engineering Center survived building operations for many years but the scene-shifters ultimately triumphed. Look for survivors between the Ford Center barbecue and the adjacent parking lot. One of the best trees for stabilizing beach sand, tea tree can be established by spreading ripe prunings whose seed capsules are ready to drop their seed.

Leptospermum
scoparium

Manuka Tea Tree

New Zealand, Australia

Famous as the progenitor of some dozens of popular garden shrubs, the manuka tea tree itself has white flowers. The cultivars, some of which have double flowers, range in flower color through pinks to extreme deep reds and may have bronze foliage. The leaves are little more than prickles about ½ inch long. Some of the many available varieties were developed in New Zealand, and some have originated in other places, including California (e.g. ‘Ruby Glow’). There are four dozen white doubles on the south side of the service station at Serra Street and Campus Drive East, planted as a screen, and another white-flowering group at the southeast corner of Kimball Hall. Cultivars are popular in the faculty housing area. See red ones at 837 Cedro Way, 824 Tolman Drive, and 691 Mirada Avenue. Pink varieties are at 680 Salvatierra Street and 817 Pine Hill Road (with red).

Ligustrum
lucidum
OLEACEAE
(*Olive family*)

Glossy Privet

China

Formerly widely planted as a street tree in Palo Alto, the glossy privet may be seen on Alvarado Row near Esplanada Way, along most of Cedro Way, and at many older homes. A tall old glossy privet grows near the entrance to Memorial Church (in the inner southwest island); growing below it, a pair of slender closely spaced trunks appear to belong to a privet of a different species. Panicles of blue-black berries ripen in spring after a fine show of small white flowers that give off a noticeable aroma.

Oriental Sweet Gum

Turkey *Liquidambar
orientalis*
HAMAMELIDACEAE
(*Witch hazel*
family)

The deciduous leaves are finely toothed, as with American sweet gum, but there is a strong tendency for the lobes to possess minor lobes. A row that was planted in 1957 on Santa Fe Avenue off Mayfield Avenue offered the opportunity of comparison with three American sweet gums that inadvertently got mixed in, probably from stock that was planted on nearby Esplanada Way. As an indication of sensitivity to frost, all the Santa Fe specimens died in the freeze of December 1972. The inner bark yields a fragrant resin known to the Greeks in antiquity as sturax and to us as storax. Several trees could have been the source of storax in the olden days, but today it is prepared from liquidambar.

Leaf shape alone gives a clue to identity, but there is a time in March–April when all the Oriental sweet gums are in full leaf and the natives are quite bare. There is also a difference in fall color. At first glance it is possible to mistake a sweet gum for a maple especially if no seed balls are in evidence. However, one can tell from the leaves, which are alternate, have two tiny stipule scars at the base of the stalk, and have a small gland on each tooth.

Two specimens that grew on the south side of Ginzton Laboratory are now gone, victims of frost or perhaps construction of the Gravity Probe-B building. No other specimens are known on campus.

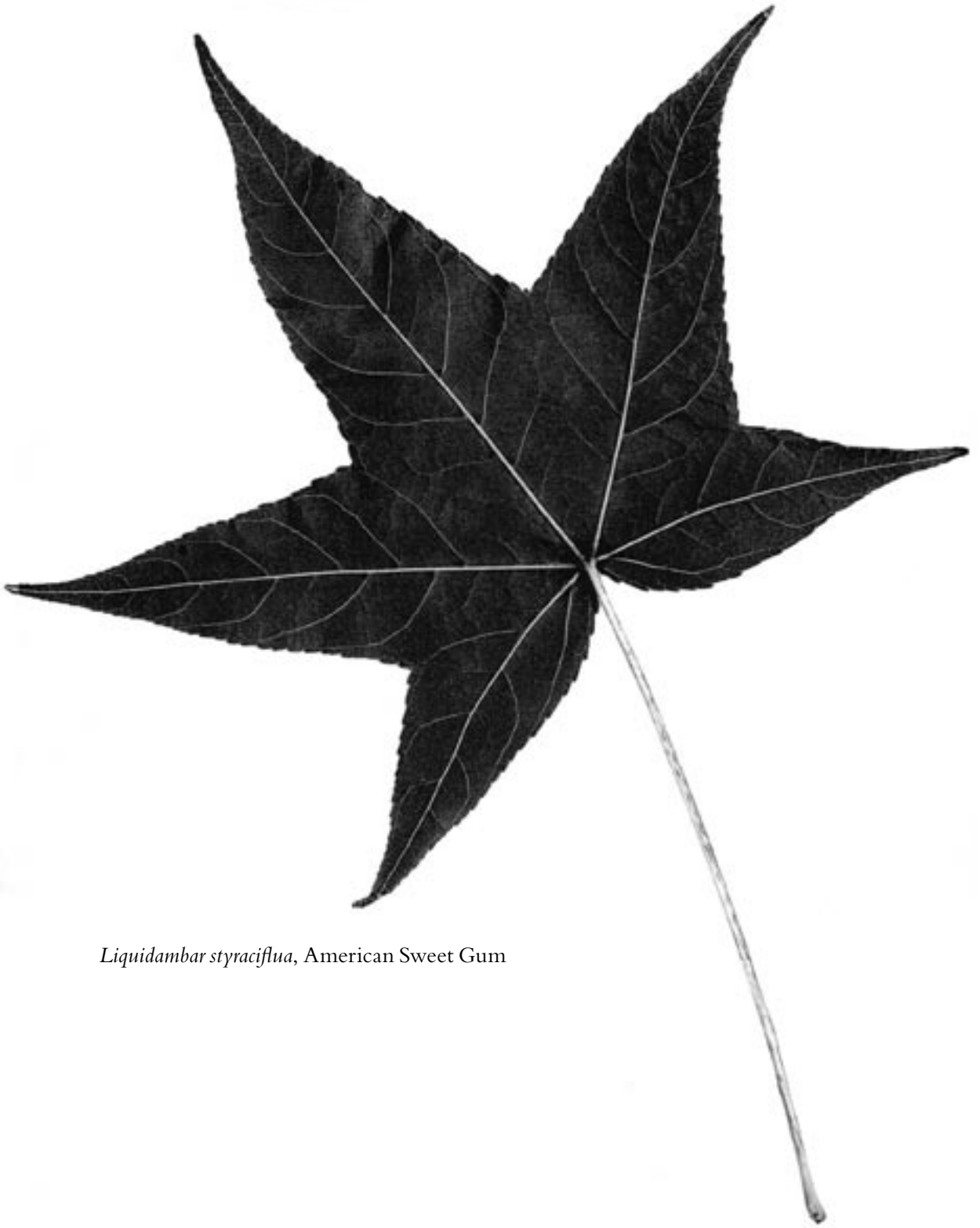
American Sweet Gum

Eastern North America *Liquidambar
styraciflua*

One of the most spectacular trees for fall color on campus, sweet gum, or liquidambar as it is often called, has become a frequent choice in landscaping projects on campus. Not only is the fall color attractive, a wonderful range of tints appearing even on one tree, but the colored leaves are long lasting. The foliage and general shape of the tree are also handsome in the summer. The five-lobed leaves are finely toothed, paler underneath, and have a little white fur where the stalk attaches. Separate male and female flowers without petals form clusters but are not very noticeable. However, the inch-size brown fruit balls dangling on their stems are a conspicuous feature. They comprise large numbers of individual capsules containing winged seeds and are protected by sharp spikes left over from the old styles. The seed balls fall in quantity and are not pleasant to walk or cycle over.

Sweet gum received its name in reference to its fragrant resin, which has been used for chewing gum, mixing with tobacco, perfumery and, in 18th-century England, as a medicine for “opening obstructions”; you can get a whiff of the pleasant odor by crushing a leaf. The phrase “possum up a gum tree” refers to the sweet gum. The wood is useful for craft projects.

L. styraciflua can be seen near the entrance to Green Library and north of



Liquidambar styraciflua, American Sweet Gum

Green Earth Sciences. Many are at Wilbur Hall and along Welch Road from Pasteur Drive to Quarry Road. A group grows at 904 Mears Court. There are lots on Lathrop Place.

Prior to 1960, sweet gums planted on campus were raised as seedlings, but now grafted varieties introduced by Saratoga Horticultural Research Foundation are used, mostly 'Palo Alto', a grove of which can be seen in the Amy Blue Garden between 651 and 655 Serra Street. 'Burgundy' and 'Festival' also have been planted on campus.

You may wonder what a winter-resistant deciduous tree like the sweet gum is doing in tropical Florida and South Texas. It is presumably because Arctic winds are funneled south between the Rockies on the west and the Appalachians on the east into a narrowing continent.

Adele Panofsky, known for creating the display of the skeleton of *Paraleoparadoxia* at the Stanford Linear Accelerator Center, consulted me about replacing some of the honey-colored wood paneling of her home, which was known to have been sawn years ago from gum-wood, presumably eucalyptus, but which species? On my advice, she took a sample to the Forestry Research Institute in Sydney, one of few laboratories that can identify a tree from a wood sample without knowledge of the leaves, flowers, or fruits that characterize botanical texts. This ability came from the need to identify durable wood, cut years ago for posts and fences by farmers in New South Wales, when only the wood remained of trees that Dad had chopped down in his youth. Coming back the next day, Adele learned that her gum paneling was *American* sweet gum! Good marks to the lab! Tree identification from wood samples is offered free by the Forest Products Laboratory, Madison, Wisconsin; visit www2.fpl.fs.fed.us/WoodID/idfact.html.

Tulip Tree

Eastern United States

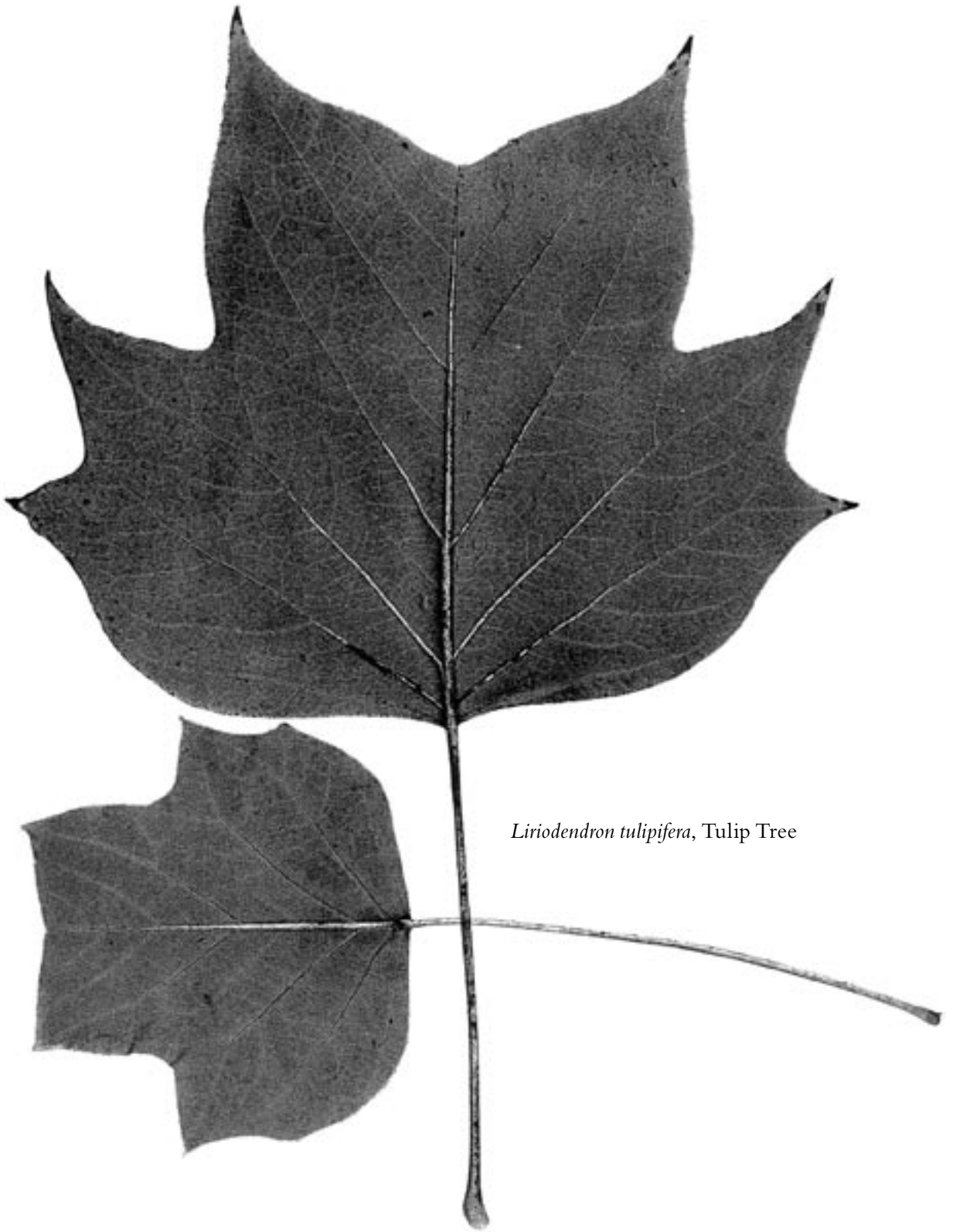
Liriodendron

tulipifera

MAGNOLIACEAE

(*Magnolia* family)

A handsome deciduous tree, one of the largest in the United States, that has been widely planted around campus since the late 1960s, tulip tree is immediately recognizable by its 6-inch leaves with a notch at the tip instead of the point that maple and plane leaves have. The notched leaf, which looks unusual and is certainly helpful in identifying the tree at a glance, can be thought of as bearing the same relationship to, say, a maple leaf that an even-pinnate leaf bears to an odd-pinnate leaf. In the case of the pinnate leaves the lobes of their ancestors have deepened to reach the midrib and veins. To those unfamiliar with the tree it is always a surprise to have the large, good-looking flowers pointed out; they are generally too high to reach but occasionally squirrels knock them down and you can puzzle over the curious innards. Owing to natural camouflage the flowers do not attract attention from a distance but are about 2 inches wide and high, carried upright like a



Liriodendron tulipifera, Tulip Tree

tulip, and pleasantly colored in green, cream, and light orange. A cluster of winged seeds is left standing erect on the stalks into the winter.

Tulip trees are at the north end of White Plaza; southeast of Memorial Church; between the Center for Educational Research and the Law School; and in the Law School courtyard. Peter Coutts Circle is tulip-tree heaven. A spectacular Palo Alto giant is at 1250 Lincoln Avenue.

Tanbark Oak

California, Oregon

Lithocarpus densiflorus
FAGACEAE
(Oak or beech family)

Native to the coast ranges including the area immediately adjacent to campus, the handsome tanbark oak has been widely utilized in California for its lumber and for its bark, used in tanning hides. Many trees are rich sources of tannins, colored astringent substances that contribute flavor to red wines and tea, temporarily stain the sidewalk below olive trees, and are a traditional ingredient in ink.

Tannin was a bulk industrial product for converting skins to leather. Before 1970, Australia was supplied with tannin by plantations of Australian acacias in South Africa, which has hundreds of species of its own, a quaint fact that illustrates the market zeal that had gone into testing the world's flora for a profitable crop. Owing to the replacement of leather soles by rubbery plastic, to the reduced need for horse harness, and to chemical substitutes, the tannin industry has shrunk. However, since cattle are still being raised and skinned for food worldwide, leather remains a cheap commodity. You can make tannin yourself by soaking acacia bark in water. If skins of furred animals are not available, try making leather from fish skins.

The largish plump acorns of tanbark oak are set only shallowly in their cups, which are characteristically woolly, reminiscent of the prickly burr of a chestnut. In fact, the tanbark oak is no longer classified as an oak by botanists but has a genus name of its own to recognize its status between the oak and the chestnut. It differs from the chestnut in having an acorn in a cup and from the oak in having erect terminal catkins containing male flowers in threes rather than pendulous strings of single male flowers. The leaves are leathery, toothed, up to 4 inches or so long, and have pale tan felt underneath that can be rubbed into balls with the finger. Examples, behind the stage in Frost Amphitheater, once numerous, have left a remnant.

Chinese Fan Palm

China

Livistona chinensis
PALMACEAE
(Palm family)

Similar to the *Washingtonias* in having the leaves arranged as a fan, the Chinese fan palm in the outer northeast island of the Inner Quad is conveniently placed for comparison with three California fan palms (*Washingtonia filifera*) in the same island. The leaf stalks are spiny.

Lithocarpus densiflorus, Tanbark Oak



Catalina Ironwood

Channel Islands

Native to the islands off the Southern California coast, Catalina ironwood is a dramatic small tree with fernlike foliage and curiously peeling bark in strips of contrasting browns and grays, interesting to feel. The compound leaves have about five narrow leaflets, each deeply sculpted into triangular lobes. Large clusters of small white flowers are noticeable in summer and remain hung up in an untidy manner for months. The fruit is a ¼-inch woody capsule containing two pairs of seeds. The dense red wood is suitable for small projects.

Uncrowded specimens can be seen in the Stanford Avenue greenbelt between Santa Fe Avenue and Sonoma Terrace bike paths, and there are about a dozen on the south side of Bowdoin Street between Pine Hill Road and Stanford Avenue. A group is east of Encina Hall, at the northwest corner of the Eating Clubs; a single tree is at Encina's northeast corner.

*Lyonothamnus
floribundus
asplenifolius*
ROSACEAE
(Rose family)

Queensland Nut

Queensland

There are specimens nearby but not on campus. The nuts are very hard, and if broken with a hammer, explode like shrapnel. They have been grown since 1881 in Hawaii, where a thin-shelled cultivar developed. Hawaii is the source of most of the nuts sold in California, though some are now grown locally; in 2001 almost half the Australian crop went to the United States. They are a delicacy (not cheap) and a good source of iron, magnesium, and thiamine. The Queensland nut has the distinction of being the only plant native to the Australian continent that has developed into an edible item of commerce, despite 50,000 years of continuous human consumption of a wide variety of roots, fruits, seeds, and leaves (but see *Acacia* species and *Araucaria*). Native people of the United States had several crops, especially corn and beans. Even so, the sunflower is almost the only crop (as distinct from gathered fruit and nuts such as grapes, walnuts, pecans, and hickory nuts) that originated in the area of the continental United States. Cranberries were indigenous and recognizable to the Pilgrims, who already had a name for them; likewise blueberries and bilberries, mentioned by Shakespeare. Other pre-Columbian dishes of the native North Americans came from Central and South America.

*Macadamia
ternifolia*
PROTEACEAE
(Protea family)

Southern Magnolia

Southern United States

The huge, white, fragrant flowers always seem slightly surprising on this substantial evergreen tree. The leaves are large, shiny green above and about 8 inches long. When the leaves are young they have an intense matte russet finish below. When the leaves grow larger, the under surfaces approach light green, only downy traces of the original felt remaining. As flowering trees

*Magnolia
grandiflora*
MAGNOLIACEAE
(Magnolia family)



Lyonothamnus floribundus asplenifolius,
Catalina Ironwood

go, the magnolia is of primitive design, still retaining characteristics of the cone arrangement for protection of the seeds, which form within an interesting large 4-inch fruit that opens in due course to reveal the large bright red seeds. This ripening can be watched if the fruit is placed in a cup of water on your desk. The brilliant red seeds, when they emerge from the protection of the cone, remain attached by fine cords and dangle provocatively to the delectation of birds. If sawn through, the fruit can be used as a printing block by children. Mississippi is the Magnolia State, but both Mississippi and Louisiana claim it as their state flower. In the South the tree is often referred to as the bull bay.

Southern magnolias are in front of the Post Office, and one is at Muwekma-tah-ruk, 543 Lasuen Mall (adjacent to Braun Music Center). One said to have been a gift by Lou Henry Hoover is at 570 Alvarado Row, 10 are at the east end of Salvatierra Street, and four are in front of Encina Hall. Four of the best on campus are on Escondido Road at the entrance to Branner Hall. There is a screen of variety 'St. Mary' running the length of Sequoia Lane. Illustration, see page 7.

Lily Magnolia

Large tulip-shaped purple flowers distinguish this deciduous, modest-sized magnolia, which has long been under cultivation in Japan and China, whence it was brought to Europe in the 18th century. See it at the School of Education north courtyard and in front of Bechtel International Center.

China *Magnolia
liliflora*

Saucer Magnolia

The most often seen deciduous magnolia on campus. The large saucer-shaped flowers are pink on the outside and white inside and appear before the large oval leaves. Spring color becomes noticeable in January, even before the acacias. Young plants often bloom conspicuously when only 2 to 3 feet tall. The tree is a garden hybrid between *M. denudata* and *M. liliflora*, both Oriental trees, and it originated in the garden of M. Soulange-Bodin near Paris around 1820. Many named varieties are now available. The most accessible examples are a group of three at the foot of the Post Office flagpole and a group of eight where Dueña Street enters Escondido Mall. At the Bookstore, one specimen can be seen on the east side and two on the north. A magnificent specimen is at 821 San Francisco Court. A very large centenarian is at 101 Middlefield Road, Palo Alto, opposite Hawthorne Avenue; this patriarch, with branches hanging over 125 Middlefield, has 11 thick trunks, about 2000 flowers, and great scars from decades of pruning.

Magnolia ×
soulangiana

Magnolia stellata **Star Magnolia** *Japan*
A deciduous shrub about 10 feet tall whose open flower, about 3 inches across, has a dozen or more pink petals. Lily and star magnolias may not be numerous but they hold their place in February with the other harbingers of spring. See star magnolia in the Amy Blue Garden between 651 and 655 Serra Street. Four are growing in the Law School Courtyard. Half a dozen young plants in Serra Grove, on the side of Sequoia Hall facing Serra Mall, were already flowering in 2003.

Malus spp. **Apple, Crab Apple**
ROSACEAE
(*Rose family*)
Crab apples of different species grow wild from England to Japan and in America and have a long history of cultivation. Consequently there are now innumerable varieties of these reliable ornamental trees to choose from. Campus plantings include *M. baccata* (Siberian crab), *M. floribunda* (Japanese, or showy, flowering crab), and *M. purpurea* (Aldenhams crab). Crab apples can be seen in the Old Union Courtyard. Japanese flowering crabs are in the Bechtel Courtyard lawn at Littlefield Center and at the back of Tresidder Union at Santa Teresa Street. The varieties 'Callaway' and 'Prairifire' are at Bing Nursery School.

Trees for ornamental purposes or for shade have been developed by selective cultivation for thousands of years in some parts of the world; fruit trees have an even longer history. However, it is rare to find fruit trees in our public spaces. Apples, avocados, guavas, jujubes, kumquats, lemons, loquats, olives, oranges, persimmons, pomegranates, strawberry trees, and walnuts are among the few exceptions.

At 657 Santa Ynez Street are four apple varieties: 'Spitzenberg', 'Roxbury Russet', 'Cox's Orange Pippin', and 'Pitmaston Pineapple'. Continuing around the corner onto Salvatierra Street we find 'Ashmead's Kernel', 'Golden Russet', and 'Irish March'.

In the United States, 2500 apple varieties are grown by a total of about 9000 growers, but 15 varieties account for 90 percent of the crop. At the time of writing the store price was about a dollar a pound. The growers sell them for 30 cents a pound, their cost of production is 40 cents a pound. Federal subsidy makes up for this "market loss."

As the world's No. 1 fruit, the apple has a history far older than all others, having been picked by Eve, who was cynically deceived by the serpent in the Garden of Eden. Atalanta the huntress, cared for by a she-bear after having been exposed at birth, could outrun anyone but was snared by Milanion with the aid of apples unfairly provided by Aphrodite. Snow White was the victim of a poisoned apple prepared by the wicked queen. Watch out ladies! On the bright side, an apple figured in saving the life of William Tell's son.

Mayten Tree

A slow-growing evergreen decorator tree with small, finely toothed leaves, typically $\frac{1}{4}$ by 1 inch, that hang in an attractive pattern. Bunches of modest greenish yellow flowers are followed by small capsules mostly containing one $\frac{1}{8}$ -inch orange-colored seed. The specific name is from Latin *bovarius*, descriptive of the cattle market in Rome, and refers to the habit of Chilean cattle of pruning the reachable branches. Several specimens can be seen off Serra Mall in the alley on the west side of Hoover Tower. An old untended specimen is situated on Sand Hill Road near where the Searsville Path meets it. (This was the site of Antonio Buelna's adobe, which was the first structure erected on the Rancho San Francisquito grant of 1839.) Three are north of the fountain in front of the Bing Wing of Green Library, and a single memorial tree is nearby, closer to Cummings Art Building. A group can be seen in the park on Alvarado Row opposite Pine Hill Road.

Chile *Maytenus boaria*
CELASTRACEAE
(Staff tree family)

Paperbark Notes

Paperbarks populate salt marsh behind coastal sand dunes in Austronesia and because of this ability the cajeput tree, a paperbark, has been used successfully to colonize the Florida swamps. Xenophobes, however, have tried to eradicate the aliens by burning them; they should have noticed that the layers of thermal insulation are there for a purpose. The cajeput trees' response to fire is to seed prolifically. Brazilian pepper is another hated alien.

Efforts have been made to rid the swamps of a small Mozambican fish that drove out the existing fish by fair competition in which it won by considerably protecting its young in its mouth. The *previously* dominant fish population was from Angola! Reminds me of my Oxford friend Daphne, who said that alien trees like the gaudy Canadian maple should be expelled from Britain because the English landscape wasn't meant to look like that in the autumn. Well, good-bye you Italian cypresses, Chinese and Japanese conifers, and a hundred other ornamentals brought

home to Britain by adventurous plant collectors since the 1700s. Nonnative trees have been brought to California for reasons of variety, nostalgia for days back East, and special purposes such as ability to grow in extreme conditions: rainless summers, salt spray, swampy saline bay mud loaded with calcareous skeletons of molluscs (Bayshore Freeway), poor soil, and so on. A concomitant good of outlandish trees is reduced likelihood of attack by pests that are native to the importing area. Still, a *Stanford Daily* editor wrote, "Stanford should ... begin cutting down healthy eucalyptus trees and planting native species in their place" (February 13, 1995).

The move to dry out the Everglades to allow agricultural and urban use began in 1948 with a congressional order to the Corps of Engineers to drain the South Florida swamps. By 2000, the diversion of fresh water into the sea amounted to 1.7 billion gallons a day. On November 3, 2000, Congress reversed that order; the Corps of Engineers is expected

to restore the swamp and its sawgrass in 30 years. The cajeput trees will voluntarily depart, and ocean fish repelled by the fresh water will return to Florida Bay (subject to future governmental ebb and flow). By 2002, plans were under way to pump vast quantities of water into wells for release in dry years. But these plans mandated by Congress run counter to the interests of sugar growers (who dump 80 tons of phosphorus annually), and developers, under whose influence the

state government enacted a 10-year delay in 2003.

Bark from several paperbark species can be used for watercolor drawing or Chinese calligraphy, mosaic paintings can be made by assembling small flakes of assorted pastel tones, and bark packaged in rolls is sold for use similar to parchment in cooking. The bark is also useful for rafting across crocodile-infested rivers.

-
- Melaleuca* **Bracelet Honey Myrtle** *Western Australia*
armillaris Bracelet honey myrtle has needle-like leaves an inch long or less and hooked
MYRTACEAE at the tip. The small, white, five-petaled flowers combine to form a spike 1
(*Myrtle family*) to 2 inches long. After the fruit has set, the capsules cluster tightly around
the stem. On casual inspection the flowers resemble those of *Callistemon*; the
difference is that the stamens are arranged in five fused bundles instead of
being separate on a continuous ring, as for *Callistemon*. As with other myr-
tles, the leaves have oil glands and give off a pleasant aroma when crushed.
Specimens on Mirada Avenue have disappeared.
- Melaleuca* **Granite Honey Myrtle** *Western Australia*
elliptica Generally a large shrub, this paperbark has oval leaves about ½ inch long and
is distinguished by rather large red bottlebrushes. Campus specimens have
disappeared in recent years. The Greek *melas* = black and *leukos* = white
refer to a black-and-white appearance that results when dark bark peels to
reveal fresh white patches. Incidentally, you can often interpret Greek stems
without a Greek lexicon—in this example, just look up the words beginning
with *leuco-* and *mela-* in your English dictionary. Quiz: what do *Cryptomeria*,
Eriobotrya, and *Lithocarpus* derive from?
- Melaleuca* **Flaxleaf Paperbark** *Eastern Australia*
linariifolia The paperbark trees have very interesting bark that tears off readily and is
composed of sheets of thin “paper” interleaved with thin sheets of a sponge-
rubbery substance. Undoubtedly this bark plays a role as thermal insulation.
The flaxleaf paperbark has stiff, narrow leaves about 1½ inches long, with a
rib. The white flower spikes, in the form of a bottlebrush, are about 2 inches
long. The tree has been extensively planted in the Frenchman’s Hill housing
area; an accessible group is on Peter Coutts Road southwest of Raimundo

Way, others are at turnarounds on Vernier Place, Wing Place, and Tolman Drive. Specimens at 850 Cedro Way are our oldest and largest. A striking row is on Foothill Expressway on the northeast side approaching Arastradero Road in Palo Alto.

Showy Honey Myrtle

Western Australia

*Melaleuca
nesophila*

Showy honey myrtle, from Doubtful Island, Western Australia, has beautiful mauve pincushion flowers surrounded by bright yellow anthers, the whole forming a ball about an inch in diameter suitable for cutting. After the flowers go, the seed capsules ripen in a smooth globular mass also about an inch long and remain on the stems for some time. The small oval leaves are a matte blue-green, about ½ by 1 inch, and clothe the plant to the ground in the early years. The arching stems and twigs are all covered with soft, multilayered, papery bark. The leaves, as with many members of the myrtle family, have a pleasant fragrance when crushed. Specimens growing on Campus Drive East at Bonair Siding were cut back severely by the freeze of December 1972, when daytime temperature did not rise above 32°F for three days. *Melaleuca* leaves are a source of “tea-tree” oil, used for rheumatism and other disorders; it would be nice if the name tea tree was restricted to *leptospermums*, used by Captain Cook as a source of tea leaves, but many *melaleucas* are referred to in Australia as tea trees. A large sheltered specimen is in the northwest courtyard of Stern Hall.

Prickly Paperbark

New South Wales

*Melaleuca
stypelioides*

A group of tall paperbarks planted by arborist Bill Parker in 1970 can be seen on Palm Drive between Palo Road and the entry gates, on the east side. There is another on Stanford Avenue opposite Peter Coutts Road. The bark is furrowed and hard, the leaves are small and prickly and the flowers are creamy white bottlebrushes.

M. hypericifolia is undoubtedly growing on campus also. *Melaleuca* flowers and fruits resemble those of *Callistemon* but can be distinguished with a hand lens by noting that the stamens are not separate individuals but, at their base, are joined together in groups.

Chinaberry

Persia to Australia

*Melia
azedarach*
MELIACEAE
(*Mahogany
family*)

This deciduous tree is very pretty when covered in lilac blossoms in May and is also fragrant. The bipinnate leaves are well over a foot long but the general effect is delicate because the pointed leaflets, which are slightly toothed, are relatively small, not much over an inch long. The chinaberry has probably the largest leaves of any trees on campus (excepting palms and tree ferns); leaves can be 24 inches long with 59 leaflets. The cherry-sized berries, yel-



Metasequoia glyptostroboides, Dawn Redwood

low when ripe, contain a white, bony, fluted nut that can be dried in the sun, attractively polished, and is used for rosaries in Asian temples, especially in Iran, Malaysia, and Sri Lanka. It is fun to plant one of these nuts and see what happens when it germinates.

Although the fragrant sprays of flowers are big, the flowers themselves are small, consisting of five or six lilac petals and a dark tube bearing 10 anthers. Chinaberry grows in very dry conditions in Persia but is also a native of the coastal rain forest of New South Wales and Queensland, where, from the appearance of the durable timber, it is known as white cedar. It is successful when planted in areas of severe drought and has been introduced in the Mediterranean and throughout the Americas, growing wild in the Southern United States. In English literature, the tree shows up as bead tree, neem, pride of India, Indian lilac, and margosa. Under the name neem tree it is widely distributed in India, where it has assorted historical uses in medicine and has a role in rainmaking. A specimen north of the Mausoleum, near the giant deodar cedar, is quite old. Six trees of Australian origin that I planted in April 1976 on Stanford Avenue opposite Peter Coutts Road have performed very well in heavy adobe without watering.

Dawn Redwood

The story of this living fossil from its discovery in 1941 to the point where sizable specimens all over the world now guarantee its survival is worth hearing. The tree was well known from Arctic fossils and at first considered to be redwood; if you look at the tree you will agree that the leaves resemble those of the coast redwood, *Sequoia sempervirens*, and the cones are rather similar also. However, if you examine the leaves carefully you will conclude that the arrangement is decussate (arranged in pairs each at right angles to the next pair above or below) with an extra quirk whereby a twist between each pair brings the spray of leaves into one plane. The redwood leaf is quite unlike that. Well, a Mr. Wang collected leaves and cones from living specimens in Central China in 1944—apparently as many as 1000 had survived in the mountains between Sichuan and Hubei—and within two or three years a move was afoot in China to distribute the tree.

The specimen in the grounds of the Lou Henry Hoover House off Cabrillo Avenue, which was planted by President and Mrs. J. E. Wallace Sterling on November 6, 1953, when 4 feet high, was raised by Prof. Ralph W. Chaney from seed collected from China, and has now borne seed itself. A very fine specimen at the Palo Alto Post Office on Waverley Street near Hamilton Avenue, planted March 7, 1949, was one of the earliest to be brought from China. Younger trees are at Escondido Elementary School; one behind 856 Esplanada Way; three near the northeast corner of the Book-

China *Metasequoia glyptostroboides*
TAXODIACEAE
(*Taxodium* family)



Michelia doltsopa, Michelia

store (already fruiting) and three nearby toward the Center for Educational Research at Stanford (CERAS); and two big ones in the park opposite 828 Lathrop Drive.

In the fall, these trees turn bronze and drop their leaves. Dawn redwood leaped from the stage of botanical exploration to worldwide cultivation in record time. The Wollemi pine (*Wollemia nobilis*, Araucariaceae) discovered in 1994 within 50 miles of Sydney, thought to have been extinct since the Carboniferous Era, is repeating the performance.

Pohutukawa, N.Z. Christmas Tree

New Zealand

Metrosideros

The New Zealand Christmas tree is widely grown in gardens in Southern California, especially on the coast, where it puts on a fine display of red blossoms under conditions of wind and salt spray that are very trying for other ornamentals. There are several on 19th Avenue, San Francisco. Flowers resembling those of eucalyptus come in terminal clusters with masses of red stamens over an inch long. Leathery oval leaves are shiny above and downy below. One, in the outer southwest island of the Inner Quad, has been sternly clipped into a round tabletop. A relative, *M. villosa*, is growing in the courtyard of the east pavilion of the Stanford Hospital. *M. collina* colonizes lava flows in Hawaii, where the native serves as the island's official flower.

excelsa

MYRTACEAE

(*Myrtle family*)

Michelia

Tibet, West Yunnan

Michelia

A tree like an evergreen magnolia with large leathery leaves and flowers with a dozen or more most fragrant 3½-inch-long, broad white petals with the feel of light kidskin. The dozens of stamens are arranged spirally on a central core—a reminder that this primitive tree family harks back to the days when conifers were only just beginning to diversify. A young specimen in a lawn east of the Stauffer III building and halfway to the southwest corner of Old Chemistry, is marked by a stone honoring Emeritus Professor Bud Homsy. Twelve feet tall in 2003, it is flowering, and is named “Bud’s Tree.” A splendid 25-foot tree at 560 Lemon Street, Menlo Park, is covered with spectacular blossom by early February, while the pale greenish brown ½- by 2-inch flower buds are waiting in abundance in preparation for a long flowering season. Another attractive specimen is at Palo Alto’s Gamble Garden Center, in front of the Carriage House.

doltsopa

MAGNOLIACEAE

(*Magnolia family*)

White Mulberry

China

Morus alba

A deciduous tree whose leaves, the food of the silkworm, have rounded teeth and may be deeply lobed, or may have no lobes at all. Several varieties of fruitless mulberries are available. Specimens can be seen at the south wall of the Old Union Clubhouse (four), at the east end of Mitchell Earth

MORACEAE

(*Mulberry family*)

Morus alba, White Mulberry



Sciences (several), in the residential area at 950 Mears Court, and on Escondido Road near Kimball and Castaño halls. Five dozen white mulberry trees planted in 1955 encircle Wilbur Hall; those in the lawn at the northeast corner have massive, conspicuous surface roots. The leaves are generally large, generously lobed, and glossy on top.

If you have mulberry leaves you can grow silkworms, which is fun for youngsters as first the worms and then the moths do their own thing. And, if you grow your own silkworms, you can make silk. One silkworm produces about ½ mile of incredibly strong monofilament that is routinely reeled from the cocoon without a break. Vast sums were invested to no account to introduce silk production into Britain, and in Virginia mulberry planting was at one time required by law. Several million trees were planted in California before 1900. No luck; raw silk still has to be imported from Japan, China, or Russia. Native silkworms, such as feed on the tulip tree of the Eastern states, were also considered. A steel wire of the same diameter as a silk thread (3 microns) breaks under less load than silk can carry; in addition, steel cannot be stretched much more than 1 percent without breaking, while silk can stretch 20 percent before breaking. Such extreme physical properties permit an Australian rainforest spider *Nephila* to catch small birds and bats in its web. To make silk, the secret of success of spiders in this world, is not easy. Before rebuilding its web, a spider finds it necessary to recycle the used silk by eating it.

The pale mulberries are not as good to eat as the deep purple ones of the black mulberry *M. nigra* (leaves dull green above and furry below), but the only one on campus is in the back lawn of 582 Alvarado Row (Bolivar House), formerly the home of V. P. Twitty. While there look at one of our rare examples of standard *Cryptomeria japonica*.

The venerable mulberry planted circa 1890 in the outer northeast island of the Inner Quad is an American red mulberry *M. rubra*, as witnessed by the small, rough-topped leaves that are paler below and with hairy veins.

Mushroom Notes

People exploring the shrubbery are apt to come upon interesting mushrooms, because wherever there are trees there are fungi. There are lots of books on mushrooms and you need several because they do not agree very well among themselves. Recommended is *Mushrooms Demystified, a Comprehensive Guide to the Fleshy Fungi*, by David Arora,

2nd ed. (Ten Speed Press, Berkeley, 1986), which has local emphasis.

Mushroom taxonomy is nothing like that of trees. With trees, the genus names are relatively stable, and exceptions such as the change from *Sequoia gigantea* to *Sequoiadendron giganteum* stand out. With mushrooms it pays to look up the species name in an index

because mycologists have often retained the species name while shuffling the genera. For example, the succulent blewits (contraction of “blue hats?”) can appear in books as *Lepista nuda*, *Tricholoma nuda*, and maybe even *Clitocybe nuda*. Another difference between mushrooms and trees is that a flora of native trees is not much use on another continent, whereas a guide to European mushrooms is quite usable in California. This tells us that nature carried spores around the world long before Man began the distribution of exotic trees.

As there are some very tasty snacks to be gathered in November, and as there is something essentially pleasing about not having to pay, one is likely to be tempted to try the wild mushroom. There are strict rules. The first is to become familiar with the deadly ones. There are lots of species that will make you sick (nausea, vomiting, diarrhea, stomach cramps, etc.), but there are a few that kill. You have to know those first. The way for Stanford people to do that is to attend the annual Bay Area Fungus Fair that takes place somewhere in the Bay Area at the height of the collecting season, about a month after the first rains. Trying to depend on books alone will subject you to serious risk. To learn more, visit www.MykoWeb.com, a beautiful site.

Deadly Mushrooms Seen at Stanford

Amanita phalloides, Death cap

Searsville Rd., Stanford Ave.

Amanita ocreata, Destroying angel

Searsville Rd., Stanford Ave.

Amanita muscaria, Fly agaric

Arboretum, Stanford Ave.

Boletus satanas, Satan’s bolete

Palm Drive, Faculty Club

It is not difficult to learn to identify these deadly mushrooms, and it is essential to do so as a first step. It is not sufficient to have in hand a specimen that agrees exactly with one book’s description of an edible mushroom; it is necessary in addition to have personal knowledge that eliminates the possibility that the specimen also agrees with the description of a deadly mushroom. One negative indicator is the presence of a volva, a sheath at the base of the stem, usually just buried, that may come out attached to the stem if the mushroom is picked. But it may remain in the soil and needs to be sought.

Rule 1. Obtain personal knowledge of the *Amanita* genus and of *Boletus satanas* from experienced individuals with samples. Meanwhile steer clear of anything with white gills, a volva, anything with a red or yellow cap, or anything that stains blue when poked.

Rule 2. Before trying a new mushroom, put half in your pocket for identification in the Emergency Room.

Rule 3. Cook the other half and discard it if it smells like phenol, creosote, turpentine, or otherwise nasty. Nibble a small piece without swallowing. If it tastes bad discard it.

Rule 4. If you have eaten a small piece, wait until the next day for the appearance of unwanted symptoms.

Rule 5. ONLY ONE MEMBER of the family to try.

Remember, ALL mushrooms can be eaten, at least once.

Here is a list of mushrooms that I have collected and eaten at Stanford; remember that some of these are recommended against and that some may make some people sick.

Botanical Name	Common name	Q*	Where seen
<i>Coprinus comatus</i>	Shaggy mane	3+	Bookstore, Alvarado, Nixon
<i>Lepiota rhacodes</i>	Shaggy parasol	3+	Alpine Road, J. Serra Blvd.
<i>Lepista nuda</i>	Blewits [†]	3+	Stanford Ave.
<i>Agaricus campestris</i>	Field mushroom	3+	Mayfield Ave. et alibi
<i>Agaricus arvensis</i>	Horse mushroom	3	Stanford Ave.
<i>Lepiota naucina</i>	Woman on motorcycle	3	Mayfield Ave., Stanford Ave.
<i>Lycoperdon pyriforme</i>	Pyriform puffball	3	Searsville Rd.
<i>Pleurotus ostreatus</i>	Oyster mushroom	3	Woods
<i>Marasmius oreades</i>	Fairy ring	3	Lawns
<i>Laetiporus sulphureus</i>	Chicken of the woods	3	Santa Fe Ave., Searsville Rd.
<i>Armillariella mellea</i>	Honey mushroom	2	Mayfield Ave., Stanford Ave.
<i>Coprinus atramentarius</i>	Inky cap	1	Graduate School of Business
<i>Coprinus micaceus</i>	Glistening inky cap	1	Mayfield Ave.
<i>Suillus pungens</i>	Slippery Jack	1	Lathrop Dr., Stanford Ave.
<i>Volvariella speciosa</i>	Dunghill agaric [‡]	1	Alpine Rd., Stanford Ave.
<i>Agaricus xanthodermus</i>	Yellow stainer [§]	0	Common (poisonous to many)
<i>Agaricus californicus</i>	California agaric	0	Ubiquitous (poisonous to many)

*Q = quality, best to worst

[†]Growing with blewits one may find brownits that look the same except for absence of lilac color.

[‡]Strongly recommended against because it can be confused with a deadly *Amanita*.

[§]The first thing to do with a mushroom looking like a store-bought mushroom is to rub the cap and the stalk and wait for a few moments. If a yellow stain appears, discard it, whether it is identifiable as *A. xanthodermus* or not.

Campus mushrooms that I have not tasted are innumerable. You need considerable fortitude, and time, to try a wild mushroom. You can learn from people who collect but never eat a wild mushroom on the strength of a friend's assurance. Keep remembering, ALL mushrooms can be eaten, at least once!

Ecological Significance

Mushrooms, apart from their culinary aspects, have a close relationship with trees. Fungi are major actors in the digestion of plant debris and the return to the soil of ele-

ments that trees depend upon. Some of them get an early start and begin consuming necrotic wood while the main tree is still alive. Shelf fungi that protrude like ledges from tree trunks bear witness to internal activity

that is taking place and some of these fruiting bodies, like chicken of the woods (*Laetiporus sulphureus*), are chewable, though most of them are woody. Honey mushrooms, also known as oak root fungus, are quite happy to digest living wood; the crowded, tan-colored, succulent caps that appear above ground level, often heavily sprinkled with white spores, are simply the reproductive parts of a main fungus body that is unseen below the ground, or under the bark, and is consuming wood. After killing a tree, the fungus will fruit annually for many years on the dead stump. So not only do the visible mushrooms bear evidence of the benign role that they play as scavengers but also of destructive influences. In a dark room, honey mushrooms emit a pale green glow.

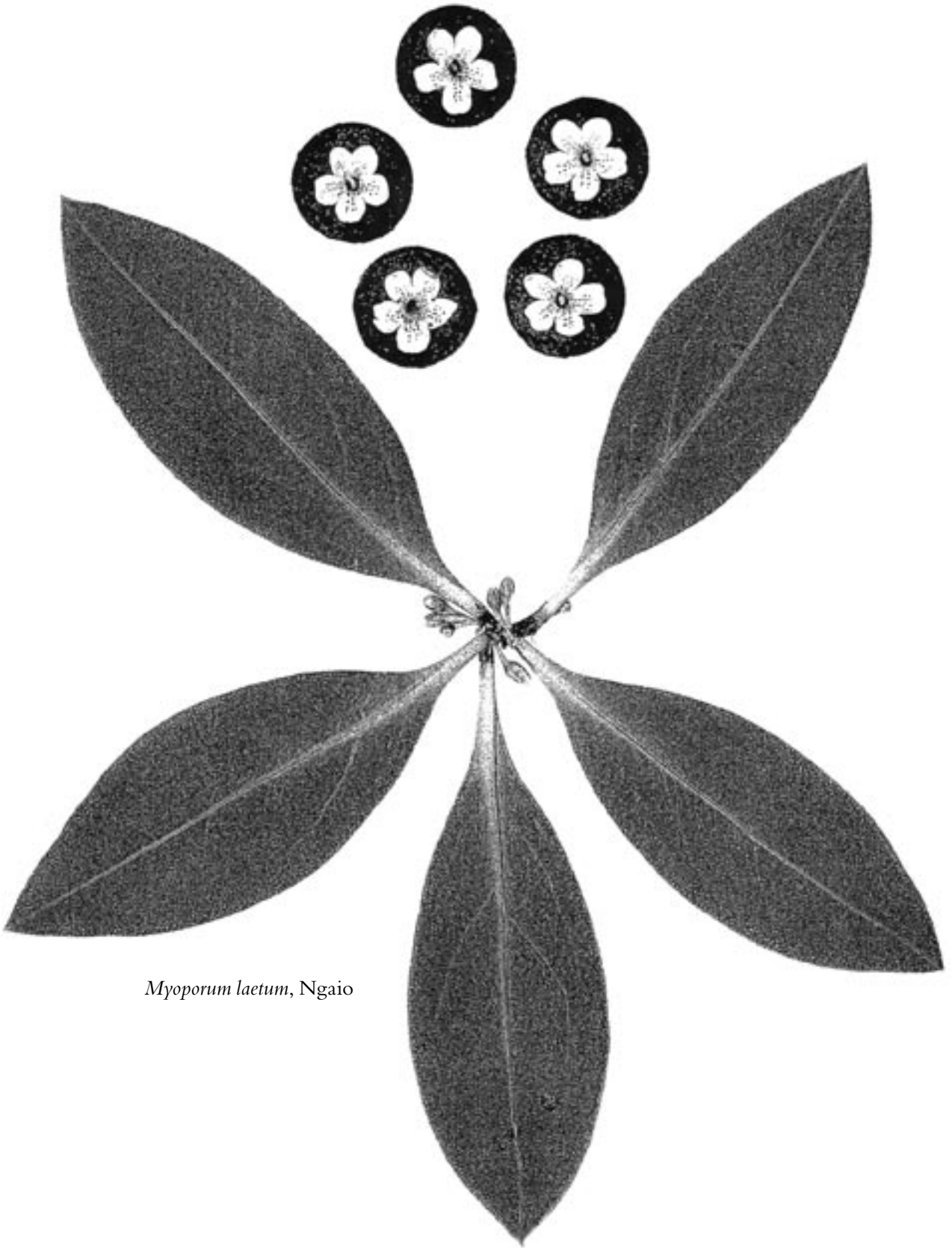
Phytophthora, which is implicated in some serious tree diseases, is also the agent responsible for the potato blight that set off the Irish emigration. Dutch elm disease, chestnut blight, dogwood anthracnose, powdery mildew, botrytis, rust, leaf curl, molds, and verticillium are among the many fungi that gardeners do battle with, often with chemical fungicides that are nasty in themselves. This battle is not likely to be won; the fungi are resourceful. What are we to make of coc-

cidomycosis, caused by spores that can be spread by earthquakes? Other fungi that we live with cause ringworm on the skin and disfigure our toenails.

Mycorrhizae in great pine forests, the redwoods, and also with beech, birch, and oak, enjoy a mutually beneficial relationship with root fungi, whose white threads can be seen enclosing the root tips of trees with a white growth. Instead of digesting the roots, mycorrhizae accept carbohydrates manufactured by the foliage in exchange for minerals and nitrogen. Now that this symbiosis has been understood by plant researchers, many crops are aided by addition of mycorrhizae to the soil. Those interested in the understanding gained by a knowledge of Greek roots may use the quick method (see *Melaleuca elliptica*) by looking up mycologist and rhizome in an English dictionary.

It appears that the living world is more interrelated than was thought a generation ago and that the implications of the interdependence are not much understood. One can certainly reflect cautiously on what might happen if our garden pests were all killed. Meanwhile, the fungi are with us and are a real component of tree study.

<p><i>Myoporum</i> <i>laetum</i> MYOPORACEAE (<i>Myoporum</i> family)</p>	<p>Ngaio</p>	<p style="text-align: right;"><i>New Zealand</i></p> <p>A very useful rapidly growing shrubby screen plant, identifiable by the translucent oil dots that can be seen by holding the glossy leaves to the light. It has small white bells with petals bearing avenues of reddish brown spots; the fine scale tells us that the spots are for the guidance of small flies searching for the nectar in the tiny bells. The flowers come in clusters and are followed by reddish purple berries. Groups of ngaio can be seen on Campus Drive East between Escondido Road and Serra Street, nearby at the southwest corner of the service station at Serra Street and Campus Drive East, and at 749 Mayfield Avenue.</p>
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Myoporum laetum, Ngaio

Myrica californica
MYRICACEAE
(Sweet-gale family)

Pacific Wax Myrtle *Pacific Coast*

Although wax myrtle can grow in tree form, those on campus are clearly intended to be managed as broad, dense shrubs. The lanceolate leaves are finely toothed, 2 inches or more in length, glossy green above and pale below. As one approaches Littlefield Center going south on Lasuen Street seven are off to the right of the archway and one to the left. The fruits occur in clusters of ¼-inch dark purple nuts with a waxy bloom. The nearest points where wax myrtle is native are Big Basin and the vicinity of Santa Cruz.

Myrtus communis
MYRTACEAE
(Myrtle family)

Common Myrtle *Mediterranean, Iraq*

The evergreen common myrtle is generally grown as a clipped hedge with neat, glossy dark green opposite leaves, a little paler below, pointed at both ends, virtually stalkless, and about an inch long. Held to the light, the leaves show many small translucent dots containing oil whose fragrance is released by crushing. Leaves of the myrtle family are often characterized by fragrance. The modest white flowers have lots of long, yellow-tipped stamens, while the elongated berries are blue-black, terminated in some remnants of the flower and containing many white kidney-shaped seeds. Hedges often do not have the chance to flower, but at 622 Salvatierra Street, on the corner with Valparaiso Street, a spreading, mature tree dating back to the early years of campus housing exhibits many trunks with papery bark in warm colors, reminiscent of its relative the melaleuca.

Nerium oleander
APOCYNACEAE
(Dogbane family)

Oleander *Mediterranean*

Common as a screening shrub with colorful white, pink, or red flowers; can be grown as a tree. Four-inch seed pods are generously packed with a seemingly disproportionate amount of fluff for traveling on the breezes. Leaves, flowers, and fruit are poisonous but presumably taste pretty bad judging from the fact that they are grown in some schoolyards. The tree form can be seen behind Building 100 (with the lemon-scented gums) and at the intersections of Welch Road and Pasteur Drive. There is a low hedge on Dueña Street by the Old Union and a tall hedge at 727 Mayfield Avenue.

Nolina recurvata intermedia
AGAVACEAE
(Agave family)

Elephant-Foot Tree *Texas, Mexico*

There is a 7-foot individual in the Arizona Garden near the boojum tree; it may reach 30 feet. The narrow, slightly recurved leaves approach 3 feet in length. It is expected to develop an expanded conical base; it will then be interesting to compare it with the *Yucca filifera* nearby. A 15-foot tree in the inner southeast circle of the Inner Quad, long taken as *Y. schottii*, now appears to be *N. matapensis*, which was collected in Mexico by Stanford botanist Ira Wiggins and published in 1940.

Sour Gum, Pepperidge, Tupelo

Eastern & Southeastern U.S.

Nyssa

A small deciduous tree with good fall color and lanceolate leaves that are glossy green above and paler below. The small, dark blue plums, about ½ inch long, were eaten by Native Americans. Sour gums can be found on the south side of the Outer Quad near the men's and women's restrooms. It is used as a street tree at Gamble Garden Center, along Churchill Avenue and Waverley Street in Palo Alto.

sylvatica

NYSSACEAE

(*Tupelo family*)

Olive

Mediterranean

Olea europaea

Closely associated with Athens and the ancient world, the olive tree is known to all for its patriarchal, battered appearance and the fruit and oil it has dependably yielded for ages. Even young trees acquire a gnarled look, as can be seen on the row that grows on Campus Drive East, south of Escondido Road. Abundant crops of olives are produced that may be freely collected and served to one's friends. It just takes a little patience to process them: they have to be soaked and washed dozens of times to leach out the bitterness, or they can be salted. By crushing the ripe fruit one ought to be able to obtain small quantities of oil; I have never been able to. All through the spring the olive tree furnishes food for the jays, robins, squirrels, and rats. The birds bang the black fruit on the sidewalk to separate the pit, and the squirrels eat an olive the way we eat corn, rotating it with both hands.

OLEACEAE

(*Olive family*)

The word "oil" is from Latin *oleum*, olive oil. Olive sprigs form a pervasive background in Etruscan tomb art. According to Pliny, the tree was sacred to Minerva/Athena, and rightly so. Athena had driven her spear into the Acropolis and an olive tree sprang forth, in reward for which the attendant gods named Athens for her. A wreath of olive leaves then became the victor's trophy at the Olympic games. Cultivation goes back to neolithic times, when it must have been noticed in times of hunger that fallen fruit lying in puddles tasted a little less revolting. Olive seeds were brought to California by Father Junipero Serra.

A large ancient specimen is at the entrance to Lagunita Court and a group of even more venerable olives survives behind the Mausoleum, under the eyes of the Syrian sphinxes. When Mrs. Stanford saw these stone apparitions arrive from Europe, she modestly ordered their replacement by more respectable ones. (The rather attractive bare-breasted sphinxes were not banished, just reoriented.)

Campus Drive East, when it was created, was planted with large numbers of olives. Sizable trees transplant readily as witnessed by the 1999 grove at the Science and Engineering Quad. A gnarled specimen between the Hoover Tower and the Bing Wing of the Green Library is a survivor of three that were planted by Mrs. Timothy Hopkins about 1891.

Parkinsonia Jerusalem Thorn, Mexican Palo Verde *Tropical America*

aculeata
LEGUMINOSAE
(Pea family)

A deciduous desert tree, with characteristic pea-family pinnate leaves modified for dry conditions. The leaflets, normally up to a foot long, are much reduced in size (about 1/8 inch) and very numerous (40 to 80) if present at all (the plant often gets along with the interestingly shaped leaf rachis only). Yellow 1/2-inch flowers come in racemes standing several inches high. The seed pods are several inches long, constricted between the seeds. No examples are known on campus, but in Palo Alto three specimens are in front of 586 College Avenue and another is at Palo Verde Elementary School, 3450 Louis Road. Walk in the main entrance and see the tree on the right in the courtyard just beyond the principal's office.

Parrotia Persian Parrotia *Iran*

persica
HAMAMELIDACEAE
(Witch hazel family)

A small deciduous tree noted for yellow leaf color in fall, changing to crimson. The ovate, almost sessile, paper-thin leaves, 4 inches long and a little less in width, have a crenulated edge that sometimes culminates in a pointed tip. The clustered flowers are noted for red anthers. The tree has nothing to do with parrots; it is named for naturalist J. J. von Parrot, who is noted as the first person recorded (1829) to have climbed 14,000-foot Mount Ararat (since Noah landed there!). A row of four about 15 feet tall grows along the north side of Herrin Hall. A multitrunk specimen is at 413 Ferne Avenue, Palo Alto, to the left of the driveway.

Paulownia Empress Tree *China*

tomentosa
BIGNONIACEAE
(*Bignonia* family)

A rather striking tree with great hairy leaves and flowers in the form of delicately figured 2-inch trumpets that appear just before the leaves. The tree conveys a distinctly tropical impression when in leaf (it is deciduous), but is at home in a cold climate. There is a specimen in the inner northwest island in the Inner Quad. It was named for Anna Paulovna (1795–1865), daughter of Tsar Paul I, not to be confused with the airborne ballerina Anna Pavlova, after whom the famous Australasian dessert was named.

As winter progresses, fruits form but some flowers remain; they take the form of a tube that represents the fusion of petals in prehistoric times and sit in a brown suede cup. If you carefully pull the corolla out of the cup a 1/2-inch pistil emerges, attached to the domed green ovary in the cup. Tearing the tube open, you will see four stamens growing from the inside wall of the tube, not directly from the ovary as with other flowers. On ripening, the ovary develops into a fat green fruit the shape of a surveyor's plumb bob. Flowers, fruit, and last year's opened fruit can be seen on the tree in December, and masses of fine hairy seeds can be shaken loose.

Avocado

Tropical America

Persea

americana

LAURACEAE

(*Laurel family*)

As one approaches the Inner Quad from Serra Mall, there is a shady grove of noble but waning avocado trees left of Memorial Court known to generations of alumni. The ripe avocados that may be found from time to time often attract enterprising harvesters, and with luck one may find windfalls. The sheltered courtyard situation has enabled the trees to thrive with occasional signs of frostbite on the glossy oval leaves, up to 4 by 10 inches in size. Two of the trees are thought to be 'Fuerte'; the others are Guatemalan.

In 1979 seven of the old avocado trees were to be sacrificed to facilitate reconstruction of Building 120 of the Main Quad, a tricky project that involved gutting the building while leaving the external sandstone blocks in place. Replacement cost of the trees was estimated at \$18,360. Academic Secretary Eric Hutchinson led a revolt during which he threatened that Bracewell would chain himself to the first avocado to be bulldozed. As a compromise, six of the seven were reprieved (*Stanford Daily*, Jan. 15, 1980). A similar survival ratio was noticed later when the picturesque red-spotted gums on Frenchman's Hill were to be axed and residents protested. In the case of the avocados, however, two replacements were later planted and by 2000 they were in vigorous, healthy condition, identifiable by their smooth trunks, and bearing fruit.

As is well known to secretaries, the seeds of store-bought avocados can be germinated and grown as good office plants. A mighty three-trunked tree west of Memorial Church, much too close to the stone work to have been placed by a landscaper, may have been started in a campus office.

A dozen or more cultivars are available in markets, ranging from the smaller, dark purple 'Hass' to the large green 'Pinkerton'. 'Bacon' and 'Zutano' are other California varieties. Florida avocados, which derive from the West Indies rather than from Guatemala, are less favored. Jaguars eat avocados. Their use at sea gave rise to the term "naval butter." The name avocado derives from Náhuatl *ahuácatl*, meaning testicle. The Spanish name for the tree is *aguacate*.

Canary Island Date Palm

Canary Islands

Phoenix

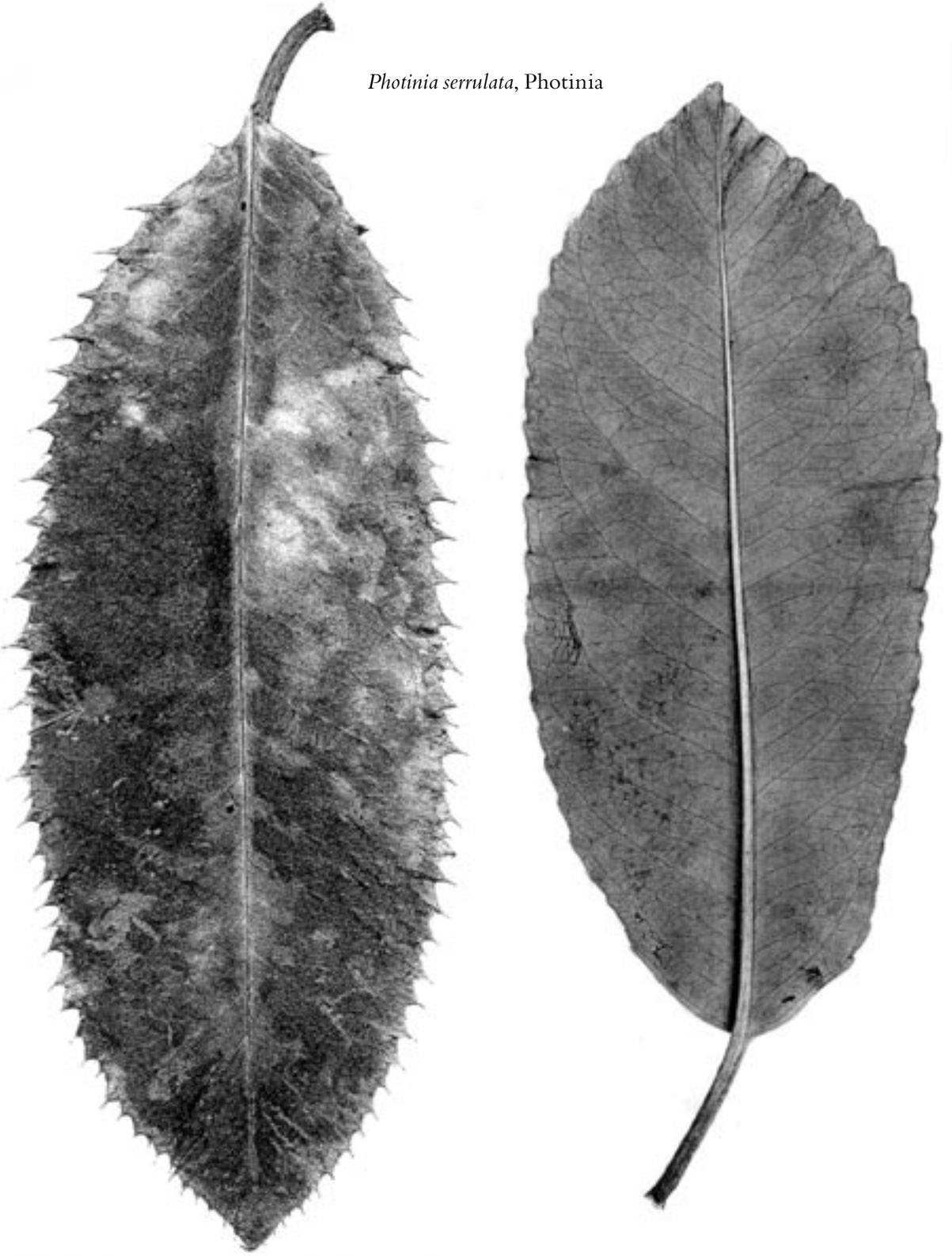
canariensis

PALMAE

(*Palm family*)

Yes, Palm Drive is lined with this tree from the Canary Islands. The leaf structure is like that of a feather, rather than being folded like a fan as with *Washingtonia*, and the leaf stalk is so short as to be hardly noticeable on the tree. Closer examination will reveal a stalk bearing long, stout spines. The dates, about $\frac{3}{4}$ inch long, fall from the female trees but are inedible—well, objectionable to humans. They come in orange bunches. After weathering on the ground, they leave behind piles of characteristically grooved date

Photinia serrulata, Photinia



stones. Comparisons may be made with fan palms in the Inner Quad and one north of the Bookstore.

Palm Drive got its palms in 1893 at the suggestion of university president David Starr Jordan. *P. canariensis* trees originally alternated with *Washingtonia filifera*; eventually the fan palms were eliminated. There are now 166 palms lining the entry road.

The sawn-off leaf stubs that give the trunks their characteristic appearance are homes to birds and a variety of seeds that germinate in the collected litter. I noted two live oaks, one Atlas cedar, a blackberry, an ash, and five daughters growing in comfortable pockets of the Canary Island palm between Braun Music Center and Muwekma-tah-ruk (543 Lasuen Mall).

As with pine cones and pineapples, the diamond network on the trunk of the palm is not symmetrical; there are eight columns running down to the left and 13 running more steeply down to the right. This is the phenomenon discussed under *Pine Cones and Fibonacci Numbers*, page 191.

Isolated specimens are abundant, for example at the entrance of Thermosciences (Building 500). Seedlings volunteer freely from date pits disseminated by birds and rodents, and if there is no objection to the site, they have been allowed to live.

It is possible to transplant these palms even when they are very large. In 1981, many gaps that had occurred in Palm Drive were filled with large trees instead of being replaced by young plants. Opportunities were taken to rescue old palms that had become unwanted elsewhere. For example, two 50-foot specimens were transplanted from 532 Channing Avenue, Palo Alto. The name *Phoenix* comes from Phoenicia, a section of the east Mediterranean coast. The Phoenicians, who were Canaanites, adopted a seafaring life and acquired a ruddy weather-beaten complexion that earned them their name, *phoinikos* (meaning “red” in Greek).

Photinia

A large shrub with attractive coppery reddish foliage in spring commonly used for roadside planting. A survivor from early planting in the arboretum, east of the Angel of Grief, has reached small tree stature. The large oval leaves, up to 8 inches, are sharply toothed at first but later leaves are less so. Large white flower clusters are replaced by bunches of red berries in summer and fall. See photinia at 853 Esplanada Way, and on Santa Ynez Street opposite 713. An old specimen is at the right front corner of the Gould Center, 575 Salvatierra Street, near Campus Drive East. Peter Coutts Circle is ringed with specimens maintained in tree form. Examples of *P. × fraseri*, a smaller tree with simpler nonprickly leaves, are on Bowdoin Street opposite the Stanford Campus Recreation Association.

China *Photinia*
serrulata
ROSACEAE
(Rose family)

*Phyllostachys
nigra* ‘Henon’
GRAMINEAE
(Grass family)

Bamboo

Eastern Asia, Himalayas

Visit the area between the two buildings of the Center for Clinical Sciences Research, southwest of the School of Medicine, to see splendid plantings of immense bamboos. The three double-row groupings of *P. nigra* ‘Henon’ each stand about 50 feet tall. Two long rows of *Bambusa oldhamii*, giant timber bamboo, are nestled between Mudd Chemistry and the new Lokey Laboratory Building at Roth Way and Campus Drive West. Specimens were nearly 30 feet tall when planted in 2003. Even though grasses are not ordinarily deemed to be trees, height still counts. For another tall grass, visit 511 Gerona Road, where a long row of 15-foot pampas grass, *Cortaderia selloana*, can be seen.

Picea abies
PINACEAE
(Pine family)

Norway Spruce

Europe, Siberia

The spruce has single needles, as does a fir, but they are diamond-shaped in cross-section and no top or bottom can be distinguished. New needles are bluer than the green ones of the previous year. The needles are carried on “pegs,” which remain on the twig after the needles fall. These little pegs are squarish and have flat tops. The popular Norway spruce has needles about an inch long with almost blunt tips, and has cones about 6 inches long that hang very attractively at the ends of branches. Fir cones, of course, stand upright on the branch. Norway spruce is an important plantation tree in Britain, Germany, and other parts of Europe, and in the United States is a very widely planted ornamental. A fine spruce grows on the south side of the Old Union and another at 694 Alvarado Row. One is on the east side of Lasuen Street north of Museum Way, next to a coast live oak. Other specimens to be expected on campus are Engelmann spruce (*P. engelmannii*) and Sitka spruce (*P. sitchensis*). Tens of millions of Sitka spruce have been killed by beetles as a result of a 7°F. temperature rise in Alaska since the 1970s. Fortunately, this warming has not been global so far.

Picea glauca

White Spruce

Canada, Northern United States

Inventories of Stanford conifers in 1909 and 1913 listed six species of spruce and nine species of fir (*Abies*). By 2004, the numbers had dwindled to four species of each. *P. glauca* is one of several that prefer very cold winters; perhaps the 40-foot specimen that once stood near the current site of the Biology Greenhouses did not like our mild climate. Two nearly 5-foot examples of *P. glauca albertiana* ‘Conica’, dwarf Alberta spruce, are in the lawns at the Fire Station on Serra Street, one on each side of the driveway. A bushy specimen on Galvez Mall, east of Green Library and near the *Chorisia speciosa* and some benches, may be a different variety of *P. glauca*.

Oriental Spruce

Asia Minor, Armenia, Caucasus *Picea orientalis*

See a specimen of Oriental spruce in the lawn north of the Old Union between the coast redwood and the Colorado blue spruce, where it can be conveniently compared with the Norway spruce on the south side of the Old Union. The green needles are about $\frac{3}{8}$ inch long; new needles are yellowish. Twigs that have lost their needles retain small pegs that are smaller and more slanted than those of Norway spruce. The cones are about $2\frac{1}{2}$ inches long and about $\frac{3}{4}$ inch in diameter.

Colorado Spruce

Wyoming, Utah, Colorado, New Mexico *Picea pungens*

More common in cold climates but Colorado spruce can be found in the Bay Area, often installed by transplanted gardeners who grew up with them or those who are setting out live Christmas trees. The short needles of *Picea pungens* are sharply pointed, ranging in color from green to gray green to blue green; the toothed cones are slightly more than an inch in diameter, cylindrical, around 3 inches long. Examples are in Serra Grove between Sequoia Hall and Serra Mall, and at 1012 Vernier Place. Most campus specimens appear to be the blue-gray subspecies *P. pungens glauca*, Colorado blue spruce. See one on the north side of the Old Union. An attractive tree at 828 Lathrop Drive was planted in 1964. One of the two specimens at 225 Santa Teresa Lane is approaching 35 feet in height. A mature specimen is adjacent to the garage at 775 Mirada Avenue; trees also can be seen at 788 Cedro Way and 850 Esplanada Way. Many other cultivars of this formal tree, which is the most popular spruce, are available, including interesting dwarf and pendulous forms.

Pine Cones and Fibonacci Numbers

Unlike the carved stone pineapples seen on some gateway pillars (see two examples on top of the prismatic pilasters at the east end of the Art Gallery), the diagonal lines sloping down to the left on a real pineapple do not have the same inclination as those sloping down to the right. The same effect is seen on a pine cone, on magnolia fruit, and in a sunflower. Mathematically inclined readers might like to speculate on how this widespread phenomenon arises. In the illustration of a general purpose cone (see page 193) the columns of scales sloping down to

the left are five in number, while there are eight columns sloping less steeply down to the right. Two columns have been emphasized to show what is meant by "column." Of course to count the number of columns parallel to either of the ones emphasized you need to have a cone in your hand so that you can turn it round. Armchair sculptors do not know this; see 34 bad pine cones spanning the Art Gallery pilasters.

Leonardo da Pisa, more often known today as Fibonacci, is famous for having introduced the Arabic number system to Eu-

$$\pi = 3.1416 = \overset{\cdot}{7}.1\overset{\cdot}{5}16 = \overset{\cdot}{3}.1\overset{\cdot}{4}1\overset{\cdot}{6} = \overset{\cdot}{2}.8\overset{\cdot}{8}\overset{\cdot}{8}\overset{\cdot}{6} = \Gamma;H,\Lambda$$

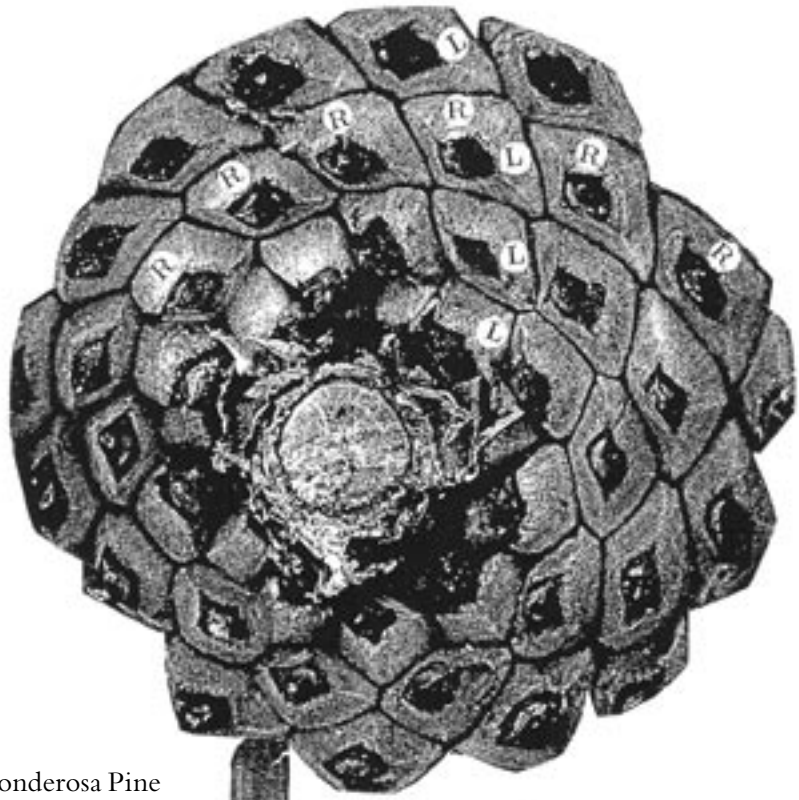
Modern Western numerals	0	1	2	3	4	5	6	7	8	9
From Fibonacci's <i>Liber Abaci</i>	0	1	2	𐞀	𐞁	𐞂	𐞃	𐞄	𐞅	𐞆
Current Arabic	٠	١	٢	٣	٤	٥	٦	٧	٨	٩
Modern Hindi	०	१	२	३	४	५	६	७	८	९
Greek sexagesimal	Ο	Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	

rope in 1202. Row (ii) shows what Fibonacci brought back to Pisa from the commercial center in Algeria, while the modern Arabic numerals of row (iii) (known in the Arab world as Indian numbers) do not match the European numbers. Row (iv) shows modern Hindi numbers while row (v) shows the Greek sexagesimal numbers in use by astronomers and geographers for precision calculations under the Roman Empire, e.g., for preparing the table of sunrise and sunset in Britain that was available at the time of Hadrian (AD 76–138). As an example of these notations we can write pi to four decimal points as shown above.

The Fibonacci series 1 1 2 3 5 8 13 21 34 55 ... (which was introduced to represent a population of rabbits in succeeding generations, starting from a single pair and breeding under certain conditions) exhibits the numbers 5 and 8 as consecutive elements; but not only that, columns numbering 3 and 5 are seen in some pine cones while 8 and 13 are seen on palm trunks; these pairs of numbers are also consecutive elements in the Fibonacci series. The artichoke, *Monstera deliciosa*, and other fruits, also mysteriously follow

Fibonacci's bidding. On sunflowers, higher pairs occur, in some cases up to 55 and 89. At the other extreme, the tiny incense cedar cones hardly have enough scales to exhibit spiral columns. One might not therefore expect lodgepole pine cones, which are only an inch or so in diameter, to show higher Fibonacci numbers, but in fact their scales correspond to 8 and 13 in the series. Obedience of the pines to Fibonacci is quite strict but, because of accidents in the early development of the primordia, occasional irregular cones can be found. Not everyone finds it easy to count the columns but it is good fun; as an exercise you might like to take a willow wand and note how the leaf stalks spiral eight times around the stem by the time you get to the 13th leaf.

Though not often mentioned by botanists, pine cones exhibit a property called chirality, or handedness. If you think of the columns as analogous to screw threads, the cone has two threads, one left-handed, the other right-handed, the right-handed one having a longer pitch. With patience you can collect cones of opposite chirality on campus.



Pinus ponderosa, Ponderosa Pine



Which Pine is That?

needles # size		small cones	medium cones	large cones
2	short	<i>contorta</i> [†] , <i>edulis</i> , <i>mugo</i> , <i>sylvestris</i>		
	medium	<i>densiflora</i> , <i>muricata</i> [†] , <i>nigra</i> , <i>thunbergiana</i>	<i>brutia</i> , <i>halepensis</i> *, <i>pinia</i> *	
3	medium	<i>bungeana</i>	<i>ponderosa</i> [†] , <i>jeffreyi</i> [†] <i>radiata</i> *	
	long		<i>canariensis</i> *, <i>patula</i>	<i>coulteri</i> , <i>sabiniana</i>
5	long		<i>torreyana</i>	

Use this table to narrow the search, then go to the text entries for additional clues. The species mostly seen are marked *. Prickly cones are marked †.

Pinus brutia **Afghan Pine** *Afghanistan, Pakistan, Southern Russia*
eldarica *P. brutia* can be seen as a group of five (accompanied by two Monterey pines) in the southeast corner of the Schwab Residential Center. It was formerly considered to be a variety of the Aleppo pine, with which it can be compared. The needles are locked together in *twos*, the cones are without prickles, and 5 inches long.

Pinus bungeana **Lacebark Pine** *China*
 See half a dozen in the pinetum on Serra Mall at Landau Economics with *P. muricata* and *P. canariensis*. There are *three* stiff, pungent, dark green needles up to 4 inches long with a turpentine odor when crushed, and 3-inch cones.

Pinus canariensis **Canary Island Pine** *Canary Islands*
 Needles in bundles of *three*, and up to a foot long, give a graceful appearance to this popular and handsome pine. The branches are arranged in fairly regular tiers, which may be up to several feet apart, and in an open location the lower branches will be retained. In its native habitat, Canary Island pine produces strong, dense heartwood (it sinks in water), which is stronger and more durable than that of most pines; for this reason plantations have been established for timber production in many countries with suitable climates. However, in California it is grown for ornament. The bark has attractive color contrasts due to furrows of yellow ochre between dark ridges. The cones are up to 8 inches long. A group planted in 1960 can be seen at the

Post Office and alongside the Law School. Six 40-footers were spirited away before dawn from Lomita Mall near the southwest corner of the Main Quad in connection with a relandscaping in 2001. Several are distributed in White Plaza, and others around buildings 651 and 655 on Serra Street.

Lodgepole Pine

Western United States

Pinus contorta

Needles in *twos*, about 2 inches long, and small prickly cones that are wider than they are long distinguish the lodgepole pine. It is grown to supply Christmas trees. The bark is distinctively mottled in yellow ochre and brown, and flakes off in small plates. *Pinus contorta* comes in several subspecies ranging from high altitudes in the Sierra Nevada and other Western mountain ranges to the Pacific Coast, where it is known as shore pine or beach pine. Lodgepole pine was first reported to botanists by David Douglas (1798–1834). It is a familiar tree above Stanford Sierra Camp at Fallen Leaf Lake. Campus specimens, including one at 551 Salvatierra Walk, have disappeared in the last 20 years.

Coulter Pine

California

Pinus coulteri

Coulter pine is conspicuous by its large cones (it is often called bigcone pine), which may be over a foot long and are covered with long, wicked, incurving claws. The needles are in *threes*, about 9 inches long and have a deep bluish tinge. Coulter pine is widespread in the coast ranges of Southern California, but is also common in the Santa Lucia Mountains just south of Monterey, and reaches as far north as the Bay Area. The cone scales have a rather attractive two-tone coloration. Why this native has not been accorded more respect on campus is a mystery. A mature specimen is 40 feet west of the ΣAE parking lot on Campus Drive East, among a group of *P. halepensis*. It is named for the Irish botanist Thomas Coulter (1793–1843).

Japanese Red Pine

Japan

Pinus densiflora

Represented on campus by two specimens crowded together at the foot of the staircase in the courtyard of Tresidder Union, Japanese red pine has needles around 4 inches long in bundles of *two*. The small cones are 2 inches long.

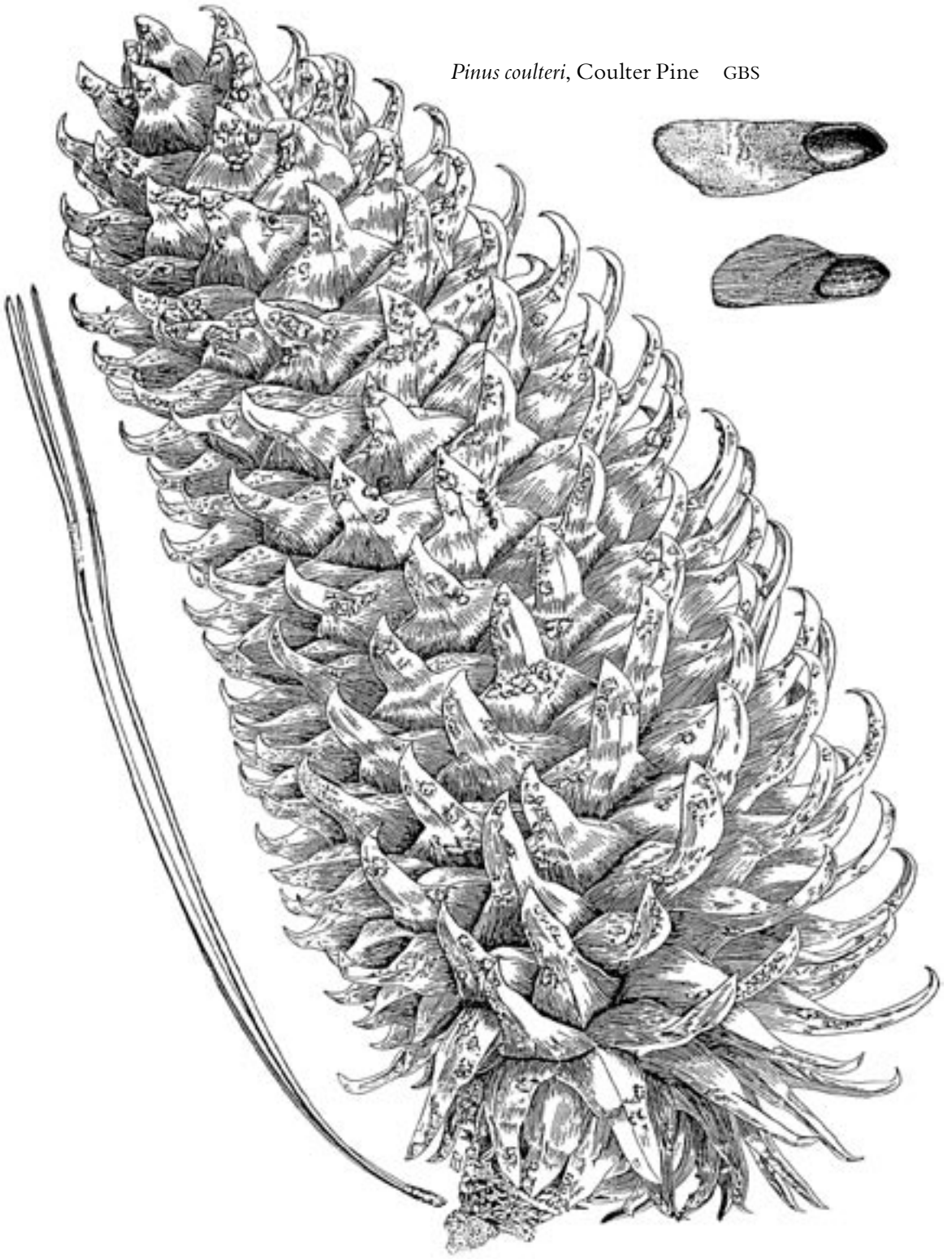
Piñon

Wyoming to Southern California

Pinus edulis

The piñon, or nut pine, is a small ornamental tree with inch-long needles in *twos* and stocky cones about 2 inches high. The edible seeds are harvested in the wild for sale. There is a specimen at 525 Los Arboles Avenue, visible from Searsville Road, partly obscured behind a fence.

Pinus coulteri, Coulter Pine GBS



Aleppo Pine

Mediterranean *Pinus halepensis*

A *two*-needled pine with short, thin needles and small cones, each about 3 inches long. Bunches of *three* needles are not uncommon. Fine trees can be seen between Roble Field and the parking lot off Panama Street, in the cluster parking lot west of The Knoll, and another north of Landau Economics. There is an older grove of leaning specimens on Mayfield Avenue east of Florence Moore Hall around Levin Field; at a certain height, several of the trees take a bend, which is interesting to try to explain. The same tendency toward the vertical can be seen in some of the 20 stone pines in Stone Pine Plaza; in this case, the lower parts of the trunks are not parallel, the random departures from vertical being presumably due to circumstances at the time of planting. The Aleppo Pine has ancient associations with human culture; it was the source of a resin used in Egypt for embalming and is referred to in the Bible under the name fir (in correct accordance with the traditional meaning of that word). It is a common pine in southern Italy, where its ability to withstand drought is in its favor. It was a major timber producer in Cyprus but has now been replaced by exotics. In Palo Alto, see two grand giants, one at 833 La Para Avenue and another at 1231 Parkinson Avenue.

Jeffrey Pine

Sierra Nevada *Pinus jeffreyi*

Jeffrey pine is a noble tree of the Sierra above 5000 feet, reaching from Oregon to Baja California, and seen in typical form at Stanford Sierra Camp on Fallen Leaf Lake. There are *three* needles to a bunch, each about 8 inches long. The cones are the same length more or less, and are nice to handle, despite incurved prickles. The bark is constructed in flakes shaped like pieces of a jigsaw puzzle which, unlike ponderosa pine, smell like vanilla when freshly broken off. Larger trees develop a distinctly yellowish tinge in the bark. The 202-foot state champion (1984) is in Stanislaus National Forest. It may be possible to distinguish Jeffrey pine from ponderosa pine in the wild, but cultivated specimens of unrecorded provenance can be hard to tell apart; e.g., see the young specimen at the Carnegie Institution on Panama Street.

Swiss Mountain Pine

Central Europe *Pinus mugo*

The needles are in *twos* and 2 inches long and the dainty cones are small, up to 2 inches long. The tree is usually grown as a shrubby dwarf. One is left of the entrance at Bechtel International Center. A group is at the east entrance to Wilbur Hall, off the parking lot, and a somewhat prostrate pair is at Wilbur Hall's main entrance off Escondido Road. Bonsai trees are in the round planters in front of the Law School entrance off Canfield Court.

Pinus muricata Bishop Pine

California Coast

Bishop pine is sometimes known as pricklegone pine because of the prickles on the handsome, small cones that reach about 3 inches in length and have the same arrangement as those of its giant relative, the Monterey pine. Many of the cones occur in pairs. This pine grows wild north of San Francisco Bay and south of Monterey. The 4-inch needles are in bundles of *two*, and the developing candles in spring have a distinctive purplish cast. Bishop pine is favored as a moderately sized alternative to Monterey pine, but has proved to be subject to sudden death from beetle attack, especially where planted in groups. The tiny ips beetles, also known as engraver beetles, emerge on warm summer days after a youth spent safely chewing at the cambium layer below the bark. One may notice piles of powder on the bark, forced out of tunnels that later will be a home for unfriendly fungi. One survivor is in the median on Serra Street northeast of the Fire Station, and a few others are scattered among pines in the perimeter planting of Escondido Village. Few others remain. Eight succumbed in the 1970s behind 836 Santa Fe Avenue alone. Two young ones form part of a conifer display at the south face of Landau Economics on Serra Street.

Donald Culross Peattie, in *A Natural History of Western Trees* (1950), wrote:

In Marin County, just north of the Golden Gate, it is often known as Umbrella Pine. For there it takes on, in billowy groves, a beautiful umbracular shape, not wholly unlike that of the Italian Stone Pines one sees in the backgrounds of Renaissance paintings. But the trees beside Mount Tamalpais look less premeditated and “set” than those beside the Bay of Naples, more unkempt and wild, as befits a tree breathed on eternally by the prevailing westerlies off the North Pacific.

Pinus nigra Austrian Black Pine

Austria, Hungary

The Austrian is a *two*-needled pine, with stiff, dark, 5-inch needles and 3-inch cones. Some can be seen right of the stairs on the east side of ΣAE house off Campus Drive East. Black pine takes its name from the dark gray bark which distinguishes it from the reddish barked Scotch pine, that other pine distributed across the whole of Europe (and Siberia). Races of black pine are also found in the Pyrenees, Corsica, Calabria, Slovenia, the Balkans, Turkey, and Cyprus.

Pinus patula Jelecote Pine

Mexico

A rather strikingly different pine with light green, very long needles, up to 14 inches long that hang in fans almost straight down. The needles are in

bunches of *three* or more. The cones are about 4 inches or so long, with shiny scales. See it at 840 Lathrop Drive; at 883 Lathrop, a Jelecote is left of the *P. canariensis*. In Palo Alto, three are in the parking lot divider on the north side of the Main Library on Newell Road. Two can be seen at 224 Greenmeadow Way, on the right side along the fence.

Italian Stone Pine

Northern Mediterranean *Pinus pinea*

An attractive tree of very characteristic round-topped shape without an apical leader which, one might say, looks like a stone. More likely, the very hard-shelled nut accounts for the English name (the Italian name is *pino domestico*). In its natural distribution, the tree hugs the entire north Mediterranean coast from Lebanon to Portugal. The needles are in *twos*, 5 to 8 inches long, while the cones are about 5 inches long with blunt scales. Widely planted around the world, including its native region, the stone pine cannot now be found in stands definitely known to be natural.

It is extensively used on campus, for example behind the church. An impressive older specimen (12 feet in girth) stands on Galvez Street outside the Burnham Pavilion, and another farther along Galvez Street in the lawn behind the Arrillaga Alumni Center. There is one at 762 Dolores Street. There are six old ones that used to shelter Roos Brothers men's store in the 1950s between the Bookstore and 505 Lasuen Mall (which used to be the Career Development Center, and before that was the Bookstore and also accommodated a cobbler once upon a time). Three big specimens northwest of Green Earth Sciences that date back to expansion of the High Energy Physics Lab in the 1960s—and that already bear delicious nuts—were supplemented by a further seven when Green Earth Sciences was built.

Twenty large specimens planted in the Stone Pine Plaza at the Science and Engineering Quad in 1999 will form a splendid canopy and their first crop of pine nuts, when it comes, will be welcomed by squirrels and other rodents (the nuts are more or less inaccessible to birds). Many pine seeds have significant wings that are clearly helpful in dispersing the seeds as they fall from the tree tops on windy days. By contrast, the heavy pine nut doffs its wing. This indicates that wind no longer plays a role in seed dispersal. Does this mean that the stone pine depends on running water to move the heavy seeds or does it mean that the collecting hand of woman superseded the breeze?

P. edulis, which grows in Southern California, yields a bountiful crop of nutritious kernels that provided a staple for Native Americans, and wild nuts are still collected today. The *P. pinea* nuts are known as *pinóli*, *pignóli* (which also means “persnickety”), or sometimes *pinóchi*, in Italy, where they are much used in pastries and vegetarian dishes. Evidently Pinocchio was a pine

nut. The non-Italian word *Pignolia* is mentioned as a trade name in Webster's Dictionary of 1929 and currently attaches to pine kernels imported from Pakistan and China.

Why should this pine be broad and rounded like a stone, while other pines are narrow and taper upward to an apex? As a rule, flowering trees spread their crowns, while conifers tend to rise above them as conical spires; we may accept this distinction as one of the many differences, in leaves, fruit, and wood for instance. But why should a pine be not like other pines? Surely the stone pine evolved from ancestors that received sunlight falling from high in the sky, while other pines disposed their foliage on tall masts suited to collecting light from a sun that did not rise very much above the horizon.

Pinus ponderosa

Ponderosa Pine

Western North America

Widely distributed through the Rocky Mountains into Canada, in the Cascades, and in the mountains of California, Utah, Arizona, and New Mexico, ponderosa pine stands in the United States outnumber those of any other tree, except Douglas fir. Its range includes parts of the Santa Cruz Mountains a few miles south of Stanford. The 6-inch dark green needles are *three* to a cluster and the prickly cones are about 5 inches long. The tree is closely related to the Jeffrey pine. The champion of all pines, a ponderosa, is in Sierra National Forest with a height of 175 feet (1968). An old specimen with a 4-foot girth is in the northwest corner where Campus Drive crosses Palm Drive, 50 feet from the path leading to the Mausoleum and 27 feet from the Palm Drive footpath. Younger specimens are in Lathrop Park, well uphill from 809 Lathrop Drive.

Pinus radiata

Monterey Pine

Monterey, California

Needles are in *threes* about 5 inches long, and the cones are about the same length and noticeably asymmetrical in attachment to the branch. The asymmetry is associated with dwarfing of the base scales on the side to which the cone leans. Monterey pine grows in two patches just south and just north of Monterey Bay, near Cambria a little farther south, and on some of the offshore islands. It is never more than about 3 miles from the sea or far from sea level except on Guadalupe Island off the coast of Baja California, where it grows between 2000 and 4000 feet. It was formerly used as lumber in California but became very popular for landscape use. Monterey pines are all over the campus, many exhibiting signs of distress such as dieback, fungus, borers, whose depredations were already noted in 1927, and massive pitch exudations. See specimens on Serra Mall near the Hoover Tower, Serra Street between Pampas Lane and El Camino Real, and Campus Drive East alongside Pearce Mitchell Houses.

In spite of its modest impact in its native environment, it has become an important timber tree in New Zealand, Chile, Australia, and South Africa, where it is free from insect pests. The dark, regularly spaced pine plantations are, as a result of the absence of insects for food, rather eerie places: there are no spiders, no birds, and no insectivorous mammals. Plantations are thinned two or three times providing saleable wood chips and poles, and felled at 40 years for sawn timber, particle board, and paper production.

Paper Notes

The impact of paper production on the world's forests may be worked out from the U.S. consumption of 90 million tons per annum (about 2 pounds per person per day). To make paper from wood, the first step is to pulp the wood and then release the wanted cellulose fibers from the lignin matrix. The long cellulose fibers are deposited from an aqueous mixture onto a vibrating sieve that felts them together as a sheet. Lignin can be oxidized into nasty water-soluble pollutants characterized by chlorine or heavy metals, depending on the process. Much water is used, and regulators inflict much pain on paper makers; improved chemistry should help. Regulators inflict further pain on woodcutters through job loss and on home builders through building costs (though wood products amount to little more than half of paper products—toilet paper, paper bags, towels, envelopes, cartons, books, newspapers, ...). In addition to pollution, another environmental cost of papermaking is the cutting of trees in both affluent and poor countries.

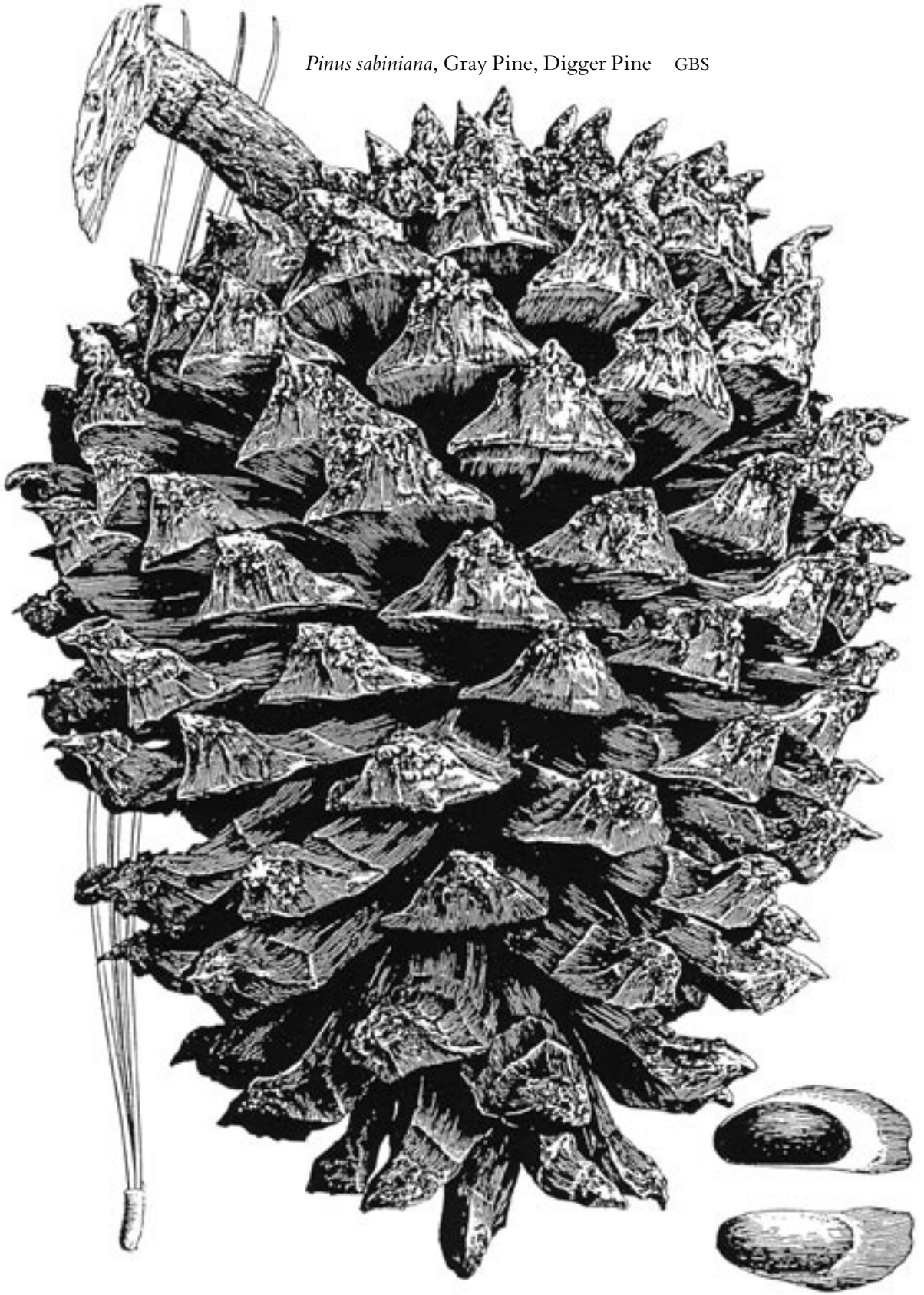
Stanford Recycling Center recycled over 3100 tons of paper in 2001, which is impressive, even if it includes previously recycled cardboard and cartons. The center's claim that "Stanford saved 51,373 trees" cannot be correct, and casts doubt on the other statistics. One can't help wondering whether the tons of junk mail discarded daily at Stanford, plus the increasing reams fed each day into photocopiers, could not be significantly reduced by thoughtful action. No restraining pain is felt by the Postal Service or the advertisers who make a profit from using the cut trees. It is not clear that the present mix of regulation and market forces can control environmental damage associated with the world's trees. A citizens' revolt against junk mail seems remote. Thoughtful action could help, but *by whom?* Responsible public analysis needs to compare wood lost to paper with wood growth in forests (thought to be about 5 percent). As Horace said, "*Nos numerus sumus et consumere nati*" (we are numbers, born to consumption of resources). That was BC!

Gray Pine, Digger Pine

The *three*-needled digger pine, also known as bull pine, foothill pine, gray pine, and grayleaf pine, is native to the slopes of the Santa Cruz Mountains in the area where they run down to the south end of San Francisco Bay, for example at Los Gatos and Loma Prieta. It also occurs elsewhere in the coast

California foothills *Pinus*
sabiniana

Pinus sabiniana, Gray Pine, Digger Pine GBS



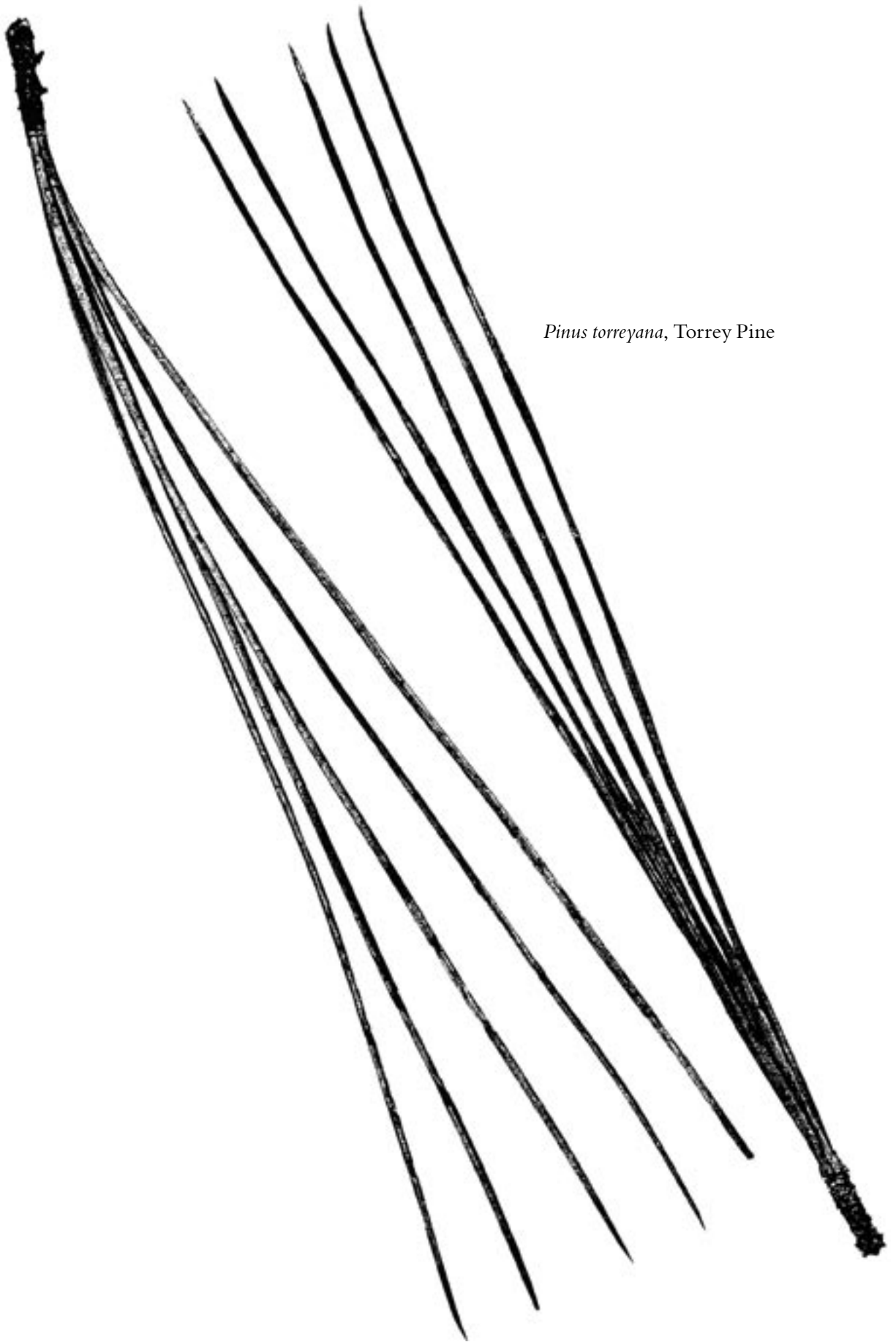
ranges and Sierra Nevada foothills. The gray-green needles are around 10 inches long. The massive cones fall directly from the tree and can be found in nonweedy areas. An ingenious snap-fit design enables the seed to be removed from and then snapped back into its wing. As the wing is unsuitable for sailing on the wind, perhaps the seed counts on jettisoning the wing promptly to reduce hindrance to the means of dispersion it has in mind. Its plan may be to be washed downhill and buried by the rains. The cone design, with heavy spurs and sticky pitch, seems intended to foil animals from extracting the seeds by the natural route but the squirrels solve this problem by dismantling the cone scale by scale from the core out. On the other hand, perhaps as the cone armament evolved the cones became less palatable to beasts large enough to eat cones whole.

The seeds were a major source of food to the inhabitants of areas not far from campus but the acorn and buckeye were the source of flour at the various Native American sites actually on Stanford land. Although digger pine is very attractive, it has received little attention in campus planting. A sizable specimen 70 yards east of the corner of Museum Way and Lomita Drive is a survivor of several mentioned by George B. Culver in *Stanford Illustrated Review*, April 1927. A significant group will be found by going to the end of Lathrop Place and taking the path alongside 950 into the greenbelt, where a trail runs along Junipero Serra Boulevard between Stanford Avenue and Frenchman's Road. One is south of Crothers Memorial Hall.

Scotch Pine

Europe, Asia *Pinus sylvestris*

A principal timber tree of Europe, Scotch pine has *two* thin twisted blue-green needles up to 3 inches long and cones that are only about 2 inches long and have tiny prickles. The scaly bark is dark red with some brighter colors higher up. The inner bark is edible and was depended upon at times in Europe. In the English language this tree was originally known as a fir but, as we know, the botanical restriction of the name fir to the genus *Abies* is now commonly observed (see *Abies pinsapo*). Old customs cannot be changed easily, however; to the Romans *pinus* meant fir or pine. (It may be a long time before Douglas fir is dropped as the name for *Pseudotsuga menziesii*, except of course in those places where it is known as Oregon pine). Even today, in German, this pine is still called *Föhre*, while other pines are called *Kiefer*. Last seen in Frost Amphitheater in 1956, since when no other Scotch pine has been noticed on campus; however there are some on the Berkeley campus at Mulford Hall and an old double-trunked giant, visible from Alma Street and East Meadow Drive, and equipped with floodlights, grows at 46 Roosevelt Circle, Palo Alto. Another is at the Palo Alto Main Library on Newell Road on the side facing the Art Center.



Pinus torreyana, Torrey Pine

Japanese Black Pine

Japan *Pinus thunbergiana*

A tall timber tree in Japan but on campus usually dwarfed or quaintly shaped, this pine can be seen at the south end of the Graduate School of Business (where there are several), north of the Bookstore, at the northeast corner of Dinkelspiel Auditorium in company with *P. canariensis*, and at the Mechanical Engineering (Building 500) doorway on Lasuen Mall. It has *two* twisted, green needles to the bundle and the 3-inch cones are not prickly. Conspicuous silly white candles adorn the tree in winter.

Torrey Pine

Southern California coast *Pinus torreyana*

The Torrey pine is native to a restricted stretch of coastal cliff at Del Mar, just north of La Jolla, plus part of Santa Rosa Island, a smaller habitat than that of any other living pine. It has *five* needles about 12 inches long and a 6-inch cone bearing seeds that are larger than most. The seeds are edible and can be picked up from the ground. Stanford's specimens are northwest of the intersection of Palm Drive and Arboretum Road. One reached 114 feet and is a candidate for national champion. In its native windswept habitat the tree is contorted and barely reaches 20 feet. However, the Ward Torrey pine in Carpinteria, planted in 1894, was 100 feet tall when I measured it with a surveyor's tape and transit in the late 1960s, but in 1993 was reported at 126 feet. One of our giants, planted in 1898, is approaching that height in 2004 and has a girth over 10 feet. Our second specimen, a short distance to the northwest, has a similar girth. Two dozen Torrey pines dating from 1988 can be found in groups along the Bowdoin Street frontage of Rains Houses.

Atlas Pistache

North Africa *Pistacia atlantica*
ANACARDIACEAE
(Sumac or
cashew family)

Unlike the popular Chinese pistache, which is noted for its fall color, the African species is evergreen. It is not represented in the academic area but may be seen at Jasper Ridge Biological Preserve.

Chinese Pistache

China *Pistacia chinensis*

A deciduous tree with pinnate leaves 9 inches long made up a dozen narrow-pointed leaflets that take on a brilliant red color in fall. The onset of color is conspicuously nonsynchronous. Small red drupes are produced on the female trees, finally turning china blue, so that both colors can be seen at the same time. By early April the pistache leaf buds are still ignoring the advent of spring, but they are distinguishable (on Bowdoin Street) from the adjacent ashes by conspicuous pollen cones. Male trees are preferred, but as the trees are raised from seed, it is troublesome to segregate them. Chinese pistache is not resistant to verticillium wilt but has no insect problems and has well-behaved roots.



Pistacia chinensis, Chinese Pistache

Examples are in the east courtyards of Wilbur Hall, and behind Memorial Church on Escondido Mall. Numerous trees provide good fall color on Bowdoin Street. The very handsome specimens on Santa Teresa Street at Lomita Drive and in front of the Humanities Center were planted in 1954 by Jack Shoup, director of the Alumni Association. Among recent additions is the row of nine on the south side of the David Packard Building; more are behind the William Hewlett Teaching Center.

P. vera from Syria and parts east is distinguished by tending to have only three leaflets and, of course, much larger fruits containing the popular pistachio nuts of commerce. In Persia the name was *pistah*. The tasty nut arrived in the Mediterranean a long time ago; the Greeks had a name for it, *pistakion*, whose Latin form *pistacium* was the basis of Linnaeus' name *Pistacia* for the genus. The Atlas pistache *P. atlantica* is used as stock onto which to graft *P. vera*. It was pistachio nuts that Jacob sent to Egypt. Another species (*P. lentiscus*), the mastic tree, is mentioned in the book of Daniel, where the dirty old Elders falsely accuse Susannah of adultery.

Karo

New Zealand

*Pittosporum
crassifolium*

A shrub or small tree with silvery gray appearance due to pale felted undersurfaces on the 2- to 4-inch leaves. Small deep magenta flowers occur in spring. It is not clear why important New Zealand trees that grow in San Francisco and Santa Cruz are poorly represented at Stanford; for example kauri (*Agathis australis*), kowhai (*Sophora tetraptera*), and rimu (*Dacrydium cupressinum*). A trimmed hedge of Karo separates Branner Hall's front garden from the parking lot to the west. A single specimen is on the path off Alvarado Row opposite San Francisco Court, near the drinking fountain.

PITOSPORACEAE
(*Pittosporum*
family)

Tarata

New Zealand

*Pittosporum
eugenioides*

As you enter the Old Union courtyard from Panama Mall you pass under five taratas growing as small shade trees. There are others on the opposite side of the street. The hedge form can be seen a few yards to the east. Tarata leaves are quite distinctive, even at a distance, because the wavy edges of the glossy 2- to 4-inch leaves give a curious effect of being dappled in two tones of green. There is a resemblance to the smaller leaves of the kohuhu which, with the tarata, also has shiny black twigs supporting the new leaves. But the flowers are quite different, having narrow yellow petals spreading from a small cup, and being arranged in conical clusters.

Kohuhu

New Zealand

*Pittosporum
tenuifolium*

This small tree is most often clipped as a hedge, but a specimen in tree form is on the north side of Bechtel International Center. Perhaps the nicest plant-



Pittosporum eugenioides, Tarata

ing is the perimeter hedge in Branner Hall's front entry. The thin, glossy 1- to 2-inch leaves have wavy edges. New growth is borne on shiny dark twigs, and the spring flowers are unusual in being almost black.

Tobira

China, Japan

*Pittosporum
tobira*

A small tree with glossy, leathery leaves about 3 inches long, small cream-colored flowers, and fruit with sticky orange seeds. The leathery leaves, often curled down at the edges, distinguish it from the pittosporums of the Southern Hemisphere. A fine specimen is in the Old Union Courtyard, north side near Building 590. The variegated variety, which grows to about 6 feet, can be seen on the south side of the Post Office. Tobiras that are used as clipped hedges, as around the men's room that is visible from the east side of Memorial Church, look neat but the flowers are sacrificed.

Mock Orange

Tasmania, Victoria, N.S.W., Queensland

*Pittosporum
undulatum*

This attractive small tree is distinguished by a very pleasant fragrance in spring, somewhat resembling orange blossom and not unlike daphne. The white ½-inch flowers are followed by yellow-orange marble-sized fruit that open to display orange seeds. As with other species of *Pittosporum*, the seeds are supplied with mucilage that causes them to stick to birds, thus aiding their dispersal. The glossy 4- to 6-inch leaves, paler underneath, have undulating edges that are not exactly the same as tarata leaves (which come with black twigs) but the difference is more easily seen than written; see several in line with taratas north of Inner Quad Buildings 100 and 110 for convenient comparison. Several large specimens of mock orange grow on both sides of Wilbur Hall's main entrance off Escondido Road, and on the south side of the Art Gallery. There is a large one on the east side of the church, within 4 feet of the masonry, surely planted by a bird. Several unrelated shrubs are known by the name mock orange.

London Plane Tree

Platanus ×
acerifolia
PLATANACEAE
(*Plane tree*
family)

This popular street tree is supposed to have originated in England in the 17th century as a hybrid between the American buttonwood (*Platanus occidentalis*) and the Oriental plane of the Mediterranean. One of its virtues was that soot-encrusted bark flaked off each year. It was introduced to America in colonial times and was the tree adopted for planting on Market Street, San Francisco, after much controversy, and on University Avenue, Palo Alto, where it replaced the glossy privet. There are many hundreds on campus. One group is on Santa Teresa Street around Lagunita Court dormitory, and another in front of Roble Gym. On Galvez Street adjacent to Memorial Hall, one can see remains of a 1938 plantation. Another extensive group is north and west



Platanus racemosa, California Plane, Sycamore

of Frost Amphitheater. London plane is widely used as a street tree in Palo Alto; one of the most beautiful is at 1250 Lincoln Avenue.

The London plane is famous for its reliability; since these groupings are planted in a regular manner it is easy to conclude from their almost universal survival that, indeed, the performance bears out the repute. Landscape architects dealing with trees less likely to survive to maturity, like to group them artistically in irregular triangles and pentagons; should one succumb, the defunct stump is eradicated and the outcome is still artistic. The old campus plantings and those on University Avenue used seedlings. El Camino Real was planted with 'Bloodgood', which has proved to be susceptible to sycamore mildew; this causes the leaves to turn yellow and drop off during the summer.

Plane tree leaves are generally five-lobed and, if anything, the leaf teeth are coarser and the lobes not as deeply cut as those of the California plane, but the main distinguishing feature is the absence of leafy green stipules at the base of the leaf stalk. The pendant seed balls are about an inch in diameter. By the time the seed balls litter the street, the light-weight seeds have already been forced out into the air currents by a release mechanism depending on the drying out of the packing, which consists of fine hollow straws.

Oriental Plane

Mediterranean

Platanus orientalis

Possible specimens of this parent of the London plane are on Arguello Way near Stern Hall. The cuts between lobes tend to be rounded and the seed balls are in ones. A favorite tree in antiquity, the plane was mentioned by Plato and Horace as providing shade under which one could drink.

California Plane, Sycamore

California

Platanus racemosa

This tree and the buttonwood (*Platanus occidentalis*) of the Southern and Western states are both called sycamores because of the general resemblance to the European sycamore (*Acer pseudoplatanus*), but the relationship is remote, as evidenced by the 1-inch-diameter seed balls that are clearly seen when the leaves fall. European sycamore has the usual keys of a maple; in learning to distinguish these trees it is helpful to think of this one as the California *plane* tree. Still, nearly everybody calls it a sycamore, and one can wink at the inconsistency seeing that the European sycamore, in turn, has no connection with the original Biblical sycamore (*Ficus sycomorus*) of Egypt and Asia Minor.

The leaves of *P. racemosa* generally have five lobes, but some have three and could be described as W-shaped. The base of the short leaf stalk is clasped by a distinctively two-pointed green stipule that offers a reliable identification until it drops off; the young leaves unfurl covered with rusty wool, some or

much of which can still be found at the junction of the veins of older leaves. A noble specimen of massive proportions, 10½ feet in girth, stands on the south side of the Old Union courtyard, just outside the arcade, and half a dozen vintage specimens grow on the side edges of Frost Amphitheater's grand lawn. There are many on Stanford Avenue as it approaches Junipero Serra Boulevard and, more recently, a section of what was Governor's Avenue acquired about 75 trees spaced 15 feet apart, west of the Center for Clinical Sciences Research.

The most unusual campus specimen, at 524 Gerona Road, was planted by the original homeowners in the late 1930s and trained as a giant bonsai, with the two trunks artistically counterbalancing each other before they soar upward. The California plane is a native of Santa Clara County.

Podocarpus **Fern Podocarpus** *East Africa*

gracilior
 PODOCARPACEAE
 (*Podocarpus*
family)

The attractive foliage of this relative of the yew has become well known as a result of a wave of popularity that set in on campus just before 1970. Examples seem to pop up everywhere, especially in restricted spaces around buildings and nooks with not much sunlight. At first the plants seem hardly able to support themselves, but later they may become large trees. The leaves are about 4 inches long by ¼ inch wide and light green on young plants. Specimens can be seen on Dueña Street. A giant is left of the Bechtel International Center entrance and another is at 817 Pine Hill Road. It is the street tree at 752 Tolman Drive and nearby. In Palo Alto, large handsome specimens are at 1106 and 1181 Hamilton Avenue and at 1543 Walnut Drive. The popular name fern pine is well established but I cannot bring myself to use it. An alternative name *Afrocarpus elongatus* dates back to 1974.

Podocarpus **Shrubby Yew Pine** *China, Japan*

macrophyllus
maki

A hedge in the Science and Engineering Quad separating the olive grove from the stone pines may be the *maki*, or smaller, form of *P. macrophyllus*. A tall specimen on the north side of Durand Building near the west corner is the plain species.

Populus alba **White Poplar** *Europe, Western Asia*

SALICACEAE
 (*Willow family*)

Named for its white felt-like hairs on the undersides of the leaves and light color of young bark, white poplar is a favorite street tree in Italy. It is distinguished by its 2- to 5-inch-long lobed leaves with some blunt teeth. The soft wood is used for making matchsticks. See the attractive group at 1100 Welch Road; others are near the intersection of Gerona Road and Mirada Avenue. One grows on the south side of Bowdoin Street opposite the Stanford Campus Recreation Association in company with a *P. fremontii*.

The botanical name *Populus alba* is taken directly from the Roman name for the tree. The word *populus* also means “people” and is said to be of Etruscan origin. If so, “people” and our letter *F* are among the very few traces of Etruscan times found in modern English.

Carolina Poplar

Two trees at the main entrance to Green Library, on the south side of the Bing Wing, are reputed to be of this transatlantic hybrid species, as is a specimen to the right of Sigma Chi, 550 Lasuen Mall. Poplars and willows are principal actors in phytoremediation, a technique of treating contaminated groundwater. Poisonous metals such as zinc, arsenic, and mercury are sought by the roots; as a consequence, removal of a few cubic yards of plant material offers an economic alternative to bulldozing thousands of cubic yards of contaminated soil.

Populus × canadensis

Fremont Cottonwood

The leaf is triangular, about 3 inches long, and has a toothed edge but the teeth are rounded. The leaf petiole is flattened. This cottonwood is found in parts of California that are drier than here. A wild population grows along the creek that runs on the west side of Stanford Avenue, below Frenchman’s dam (across from Ryan Court); large trees can be seen below Junipero Serra Boulevard at the highway bridge near Alpine Road. Specimens also are on Serra Street between El Camino Real and Pampas Lane. A Fremont cottonwood near Sutter’s Fort State Park, Sacramento, was 82 feet tall in 1968.

Western North America

Populus fremontii

Lombardy Poplar

A tall, narrow tree with branches growing almost straight up. The leaves are kite-shaped with finely toothed edges and flattened leaf stalks. The trees are genetically identical, cloned offspring of a male ancestor, propagated by cuttings that were brought to London from Tunisia in 1758 and introduced in Philadelphia in 1784. The roots will invade drain pipes or sewers if given a chance. A group grows on Sand Hill Road at Saga Lane, Menlo Park, opposite the Stanford Linear Accelerator Center entrance.

Asia

Populus nigra
'Italica'

Apricot

An important commercial feature of the Santa Clara Valley before the days of silicon, the apricot tree can be found as an orchard survivor in residential areas and on campus is planted in home gardens. Squirrels and blue jays are eager to get the fruit before you do. The fallen pits are harvested by rodents who gnaw the smallest possible hole that gives access to the kernel and amass the curiously shaped leftovers in their abominable retreats. Peaches

Northern China

Prunus armeniaca
ROSACEAE
(Rose family)

(*P. persica*), nectarines (which are basically fuzz-free peaches), and plums (*P. domestica*) are found in backyards, but there is also a peach against the north wall of the Old Union near two hawthorns. Almond trees (*P. dulcis*), which are rather like peach trees, occur in residential areas, and fruit readily where cross-pollination can occur. The flowering varieties have double flowers. Bitter almonds, reputedly inedible, have been found in the Stanford Avenue greenbelt, possibly as a result of bitter almond root stock being used for grafts, and are possibly dangerous to eat. The soft kernels, when dried, certainly have a distinctive taste. Apricot trees require some maintenance.

Prunus caroliniana **Carolina Cherry Laurel** *North Carolina to Texas*
Carolina cherry laurel is found on the west side of Tresidder Union opposite the Faculty Club, and the south side of Ginzton Laboratory at Via Palou Mall. It also is used as a tall hedge in campus residential areas. The lanceolate leaves, glossy above and pale below, with a tendency to be revolute or undulate, are 2 to 4 inches long. Spikes comprising a dozen or more small white flowers cluster in the leaf axils. Shiny black fruits about $\frac{3}{8}$ inch long are almost filled by a slightly pointed nut which nevertheless contains enough meat to be attractive to birds.

Prunus cerasifera **Cherry Plum** *Asia*
Locate these trees in early spring (February) when the various named varieties burst into very attractive blossoms in tones of pink and white. Leaves soon flush out, some green, some copper-colored, only the fallen petals reminding us of the brief show. Later the small plums ripen, often in very heavy crops, and they are good to eat. Numerous small seedlings spring up if the soil is moist. Variety 'Atropurpurea' has coppery leaves and red plums and reproduces spontaneously. See them on Santa Teresa Street at Lomita Drive.

P. cerasus, the sour cherry, was brought back to Italy by Roman General Lucullus after fighting Mithradates. He also brought back the name *Cerasus*, the latinized form of the Greek town name Kerasos, in Pontus (Eastern Black Sea). *P. laurocerasus*, the cherry laurel, has shiny leaves that are used for giving desserts a bitter-almond flavor.

So many varieties of flowering *Prunus* exist that listing under species is hardly useful. The middle of February is the time to survey the local scene. A row of a dozen or so pink flowering *Prunus* can be seen at 820 and 828 Pine Hill Road. Also visit 650 Mayfield Avenue, including the Dolores Street side and the whole length of Mayfield Avenue fronting Florence Moore Hall. The flowering plums around Memorial Church are *P. × blireiana*.

Holly-Leaf Cherry *California Coast Ranges, Channel Islands, Mexico* *Prunus ilicifolia*
Native to the immediate neighborhood of the campus, including Jasper Ridge Biological Preserve, this evergreen shrub or small tree can be seen growing as a thicket at the northeast corner of the Cantor Center and on Serra Street between Campus Drive East and Pampas Lane. Two of the finest examples are under a coast live oak canopy 30 yards south of the California Native Garden (Lomita Drive and Roth Way, east of the Keck Building). The shiny dark green leaves are 1 to 2 inches long and have prickly edges. They are paler underneath. The small white flowers come in spikes a few inches long and later develop into dark red sweet juicy cherries. The roots and leaves are used in cooking in Mexico. The pits furnish an edible mush that must be leached in running water for several hours to remove traces of cyanide. This widely distributed plant was named in 1843 by Thomas Nuttall of Philadelphia, who collected on the Mexican coast. See *P. lyonii*.

English Laurel *Eastern Europe, Asia Minor* *Prunus laurocerasus*
Numerous specimens planted around 1900 grow in the Inner Quad as small, spreading trees with furrowed mid-gray bark. The leaves are glossy and leathery, slightly toothed and up to 6 inches long. *P. laurocerasus* came to Europe from Turkey in the 16th century, reached England in the 17th, and California in the 19th. Understandably, it is not called English laurel in England but rather common laurel or cherry laurel. The white flower spikes stand up conspicuously in spring; March is the time to notice that all the islands, except the two nearest to Memorial Court, are distinguished by at least one laurel. Later, the small blackish blue conical berries conspicuously litter the Quad and attract birds.

Laurel leaves contain amygdalin, a compound of prussic acid (HCN) and glucose, which is also found in bitter almond kernels (see *P. armeniaca*) and, to a high degree, in cassava. The last English alchemist, Dr. James Price (1752–1783), demonstrated a catalyst for transmuting mercury into verifiable silver and gold, but a year later, under pressure to make more precious metal, he prepared a lethal potion by macerating laurel leaves and drank the fatal cup. Do not confuse this poisonous tree with the California laurel (*Umbellularia californica*), leaf fragments of which can be used in cooking.

Portuguese Laurel *Portugal, Spain, Canary Islands* *Prunus lusitanica*
Portuguese laurel is a tidy small tree that can be seen in campus homes. A fine old example is in the Roble Gym courtyard (southwest corner). Several are near the Mausoleum on the left and behind; around Wilbur Hall; and one is in the Kennedy Grove on the end toward Tresidder Union, where it flowers beautifully in April–May.

- Prunus lyonii* **Catalina Cherry** *Catalina and nearby islands*
 Catalina cherry has toothed leaves that are not prickly like those of *P. ilicifolia* and in fact mature leaves may be practically smooth-edged. The flowers are in long spikes as with *P. ilicifolia*; the fruit is a black edible cherry with large stones. The tree regenerates freely on campus, with the help of birds. Catalina cherries line the bike path from Santa Fe Avenue to Stanford Avenue and more were planted in the ears of The Oval in 2002 (near the Business School and Herrin Biology). Named in 1911 by Harold Lloyd Lyon, a Hawaiian sugar expert, the tree was soon assigned subspecies status under *P. ilicifolia* with names such as *integrifolia* and *occidentalis*. Since the toothed- and smooth-leaved forms cross readily in cultivation, the common names need to be taken with a grain of salt.
- Prunus serrulata* **Ornamental Cherry** *China*
 Following the 17 October 1989 earthquake, ornamental cherry varieties ‘Amanogawa’ and ‘Mt. Fuji’ (‘Shirotae’) donated by the Gifu Cherry Blossom Association were planted in the Oregon Courtyard (outer southeast Main Quad) in recognition of support from Stanford alumni and friends from the state of Oregon. Another cultivar, ‘Kwanzan’, can be seen on the north side of Braun Music Center; around Ventura Hall; and on both sides of the rear of Memorial Church. ‘Shogetsu’ can be seen in the attractive Amy Blue Garden between buildings 651 and 655 on Serra Street.
- Prunus* × **Yoshino Flowering Cherry** *Japan*
yedoensis Flowering cherries are found at the entrance to the Humanities Center on Santa Teresa Street (1952); between Forsythe Hall and Parking Structure 2; and in the Citrus Court behind the northeast corner of the Main Quad. Variety ‘Akebono’ is in White Plaza at the Braun Music Center and by the pond in the Amy Blue Garden.
- Pseudotsuga menziesii* **Douglas Fir** *Canada to Mexico*
 PINACEAE
 (*Pine family*) Native to the foothills running down to the campus, and a main constituent of the mixed evergreen forest of the Santa Cruz Mountains, the Douglas fir is the principal lumber tree of the United States (now that pines and redwoods have largely been exhausted). It is the leader in plywood production and contributes many other products, such as bark wax for shoe polish. At over 200 feet, Douglas fir is almost the tallest U.S. tree. Ponderosa pine reaches about the same height, giant sequoia about 50 feet more, while the tallest coast redwood, at Humboldt Redwood State Park, is 369 feet. Douglas fir occupies the most land area—for the time being. Douglas fir plantations were established in England in the early 19th century as a source of masts.

The Douglas fir is identifiable with certainty by its characteristic pendent 3-inch cones, which are not as woody as most, and show long, thin three-pointed bracts protruding between the cone-scales. The general form and texture of the foliage permit it to be recognized at a glance from a distance. Clearly, problems for future generations can be created in built-up areas by the use of large trees, but more honor should be accorded this noble native of our area by planting of a few groves.

See a specimen north of where Memorial Way runs into Galvez Street. There is a pair about 70 feet tall located approximately 70 yards from the north end of the avenue of Atlas cedars (and a single incense cedar) that runs toward Palm Drive from the intersection of Campus Drive and Lasuen Street. A specimen is at the west entry gate at Palm Drive and El Camino Real, and another can be seen at 824 Mayfield Avenue. In Palo Alto, two Douglas firs near campus are at 1612 California Avenue; also see 869 Melville Avenue, 1043 Parkinson Avenue, and 1585 Mariposa Drive.

Scotsman David Douglas (1798–1834) collected plants from Hudson Bay to California for the Royal Horticultural Society (London), bringing back many wild flowers (such as *Clarkia*, *Gilia*, *Mahonia*, *Mimulus*). Moving on to Honolulu, he unfortunately fell into a pit trap, into which a young bull had fallen, and was gored to death in 1834, aged 36.

Wood Notes

Wood is being consumed at a prodigious rate by the construction of homes. Japan, though smaller in area, consumes more wood than the United States, obtaining supplies from the felling of trees in other lands (as far away as Australia, Brazil, and California). The world's forests are dwindling, but the demand for cheaper houses, more chemicals, more paper, and, in underdeveloped countries, more fuel, creates local financial imperatives to continue taking trees. Wider familiarity with trees, such as can be gained by residence at Stanford, helps build a better-informed community from which policy makers are drawn.

Uninformed claims that the world's forests will soon be depleted do a disservice by generating equal and opposite reaction. For

example, the claim that reduction of forests will interfere with replenishment of oxygen in the air has a negative impact when the statement does not continue on to mention that an old-growth forest that is many generations old and has reached long-term equilibrium—a theoretical concept denoted by the term “climax forest”—uses up a compensating amount of oxygen as the dead generations decay, oxidize, and return CO₂ and CH₄ to the air, just as garbage landfills do. The belowground dry-equivalent biomass was found in 2000 in a French Douglas fir plantation to be one-fifth of the aboveground biomass. The effects of cutting mature trees that have made their oxygen donation, and using them for building construction, delays the day when the lumber decays, to the net

benefit of atmospheric oxygen. Correct assessment requires quantitative attention to the sides of the equation, including the effect of plantations.

To broadcast the negative and suppress the positive has contributed to the disrepute evidenced by derogatory terms such as “enviro” and “pseudoenvironmentalist,” when action to care for the environment would be to our benefit. The ozone hole has been blamed on manmade chlorinated hydrocarbons, but it is odd that the hole is in the Southern Hemisphere. Forest fires in Brazil and elsewhere

make a significant contribution of carbon compounds to the atmosphere; harder to assess on a global basis are individual events such as the burning of a peat forest in Indonesia in 1997–1998 that released a billion tons of carbon into the air, about one-fifth of the annual release from burning coal and oil. Wood-rotting fungi also synthesize chlorinated organic compounds that are released as a contribution to the environmental chlorine cycle. Natural fires and fungi add poorly known terms to the equation and make a policymaker’s life uncomfortable.

Psidium Strawberry Guava

Brazil

cattleianum
MYRTACEAE
(Myrtle family)

Strawberry guava is a shrub to small tree with dark red, cherry-sized, edible fruit. In squirrel-infested areas where anything edible, from plums to olives, is at risk, the guavas are left untouched. Evidently squirrels learn from others what may be eaten. The fruit is pleasant for humans to eat, with lots of pale seeds, but not as tasty as the larger, yellowish, common guava (*P. guajava*). A specimen of strawberry guava is in the Stanford Avenue greenbelt opposite Peter Coutts Road.

Punica Pomegranate

Southeastern Europe to Himalayas

granatum
PUNICACEAE
(Pomegranate family)

A small deciduous tree, the pomegranate, or many-seeded apple, brings a cheerful touch of green in spring, later is spangled with scarlet flowers 2 inches across, and in winter, after the leaves have fallen, displays its bright red, leathery, apple-sized fruits, which can be kept for decoration. Juicy pulp capsules reminiscent of a salmon egg enclose the soft seeds. Alas, the fruit is often picked while too sour to eat, but many try, as the broken pieces lying around will attest.

Old pomegranates can be seen in the Inner Quad in the two outer east islands, in the outer northwest island, and in the Old Union Courtyard. A specimen is on the west side of Building 300.

The pomegranate is a delectable ancient fruit mentioned by Homer and by other Greek authors; it was sung of by Solomon, who was partial to pomegranate wine, and who refers to pomegranates several times in the same breath as wine and nuts. They evidently appealed to him, seeing that he had hundreds of graven pomegranates adorning the pillars of his own

house. In Persia, Darius ate pomegranates, says Herodotus. Centuries later silver shekels bearing a pomegranate were minted in Jerusalem. Clearly the pomegranate was much more valued than it is in our times, when the whole world benefits from the voyages of the great navigators.

The fruits were referred to by the Roman author Columella as *mala Punica* because they came to Rome from Carthage, or so it was thought. In any case that is why Linnaeus chose the name *Punica*. Richard Burton, translator of the scandalous *Arabian Nights*, the first literate infidel to make the pilgrimage to Mecca, found there the biggest and most fragrant of all; but since then, those of Kabul have received the most praise. Crusaders brought them back to England. Grenadine, the syrup colored and flavored with squeezed pomegranate seeds, and grenade are from the same Latin root. Perhaps children used overripe fruit for throwing. Pomegranates were already growing in California by the mid-18th century.

Pomegranate was once prescribed for eliminating intestinal worms but had other powerful and mysterious properties. When Hades carried off Kore, the daughter of Demeter, she took a pomegranate with her to nibble on. Regrettably, after she was rescued, she was obliged to return each year to the nether world where she had partaken.

Evergreen Pear

Taiwan

Pyrus

This small tree, with very attractive glossy 3-inch leaves, broadly oval and with a point, puts on a good display of white blossom in spring, but bears only minute pears. At Stanford it normally does not drop its leaves in winter, but many did in the unusual freeze of December 1972, as did the Chinese elms. In December the first flowers appear, and the first week of January the trees are in full bloom, offering the only sign of approaching spring. By contrast, as late as March or April, the ashes, birches, erythrinias, catalpas, liquidambar, London planes, and pistaches are conspicuous on campus by their reluctance to venture even new leaves, let alone flowers. Four specimens grow around the northwest corner of Dinkelspiel Auditorium and a row of five is on the north side of Braun Music Center.

kawakamii

ROSACEAE

(Rose family)

A spectacular formal planting of 60 of the deciduous cousin *P. calleryana* 'Chanticleer' is in the circular walled garden behind Schwab Residential Center adjacent to Vidalakis Hall. At Rains Houses, sheltered walkways leading from Bowdoin Street at both ends of Hilgard Court are lined with groups of 16 *P. calleryana* that retain colored leaves to the end of the year, with no thought of flowering. At the north front of Braun Music Center are several deciduous *P. calleryana* 'Bradford'. All have orbicular leaves and begin flowering in early February.

Pyrus kawakamii, Evergreen Pear



Oak Notes

Having evolved a root system capable of sustaining a large tree in soil that receives no summer rain, the coast live oak regrettably succumbs to (edible) oak root fungus (*armillaria*) if watered. The striking phenomenon of old giants dropping dead in the middle of the green lawns of new developments has been witnessed in neighboring communities year after year with monotonous regularity. The reputation of coast live oak wood as fuel is unmatched and, for better or worse, is in ample supply.

The coast live oak also nurtures oak moth caterpillars, which descend on silk threads in spring. In some years they defoliate the trees, giving forth a sound like light rain. The trees recover but the oak moth can be controlled with Dipel, Thuricide, or Biotrol, sprays containing *Bacillus thuringiensis*, a bacterium that in nature is parasitic on specific larvae. The idea that a species of insect can cohabit with a tree host for millions of years, adapting slowly so that today it can live only on that host, suggests that there may be a benefit to the tree. There may be a third party involved, maybe a bird or a soil organism or something else.

Sudden oak death syndrome in the California and Oregon coastal regions, which by 2002 had reached the Bay Area, is a killer mold (*Phytophthora ramorum*), reminiscent of Dutch elm disease and other fatal scourges. It is known to affect black oak, coast live oak, and tanbark oak, having killed tens of thousands; whether it can kill redwoods is a current concern, and resources have been insufficient to survey the situation. The risk in planting local natives that may succumb to local pests is mitigated by the universal practice of bringing new species of trees in

from outside; but sometimes the exotic pests are not far behind. The innumerable old coast live oaks of the Palo Alto area are all about the same age, which suggests that they descend from survivors of a previous generation that suffered a catastrophe long ago. Whether fungus, insect, freeze, drought, or fire was responsible is not known; consequently there is no clear answer to what current planting policy should be, nor is it clear who will formulate policy, forest pathologists being in short supply. We can guess what future practice *will* be—Palo Altans will keep planting *Quercus agrifolia*.

The savanna of coast live oaks, valley oaks, and blue oaks supported by the Stanford foothills has been under study since the 1980s by David Schrom and Joan Schwan of Magic, Inc., in collaboration with Stanford and with the participation of community residents. This kind of volunteer activity offers an opportunity to involve students. A student-propelled group drawing on the Arbor Day or Canopy organizations for background could conduct its own discussions on which species it likes and how to mesh with Facilities Operations as to where planting might be feasible. Oaks that are one or two centuries old predominate. Those over two centuries old are less numerous, as is understandable from the dead skeletons that are still standing and the decaying piles left from years ago. Of concern, however, is the deficit of younger trees as compared with what there must have been 100 years ago. The blue oak is the most threatened of the three.

A good many seedlings are lost because cattle graze the hills, taking anything that is green in the dry season. They also make it difficult for acorns to germinate under parent

trees by packing down the soil in the shade where they lie down. Therefore cattle-free zones have been established. Positive action by planting acorns is also under way. In areas where there are cattle, protective cages can be used, but the cage has to be robust enough to support a leaning cow scratching its hide. Aboveground attack by rodents wishing to gnaw through the bark at ground level has to be resisted by wire mesh finer than the size of a mouse, while attack by underground rodents requires mesh basketry penetrable by roots only. By the year 2000, more than 2000 trees had been established, mostly from direct seed planting.

The experience gained by this enterprise will be of wider use in the effort to preserve the characteristic rolling-hill scenery of open savanna associated with much of California and widely appreciated by the population. To deter the Spanish oaks from sucking up the moisture that the oak seedling needs, a black plastic sheet may be put down and covered with the wood chips that are available from shredding operations on the university grounds. This is effective in producing an opening in the oat cover but proved to be a serious setback when the major grass fire of 1995 occurred. The lesson learned was to substitute river pebbles for wood chips—heavier work for the volunteers! Why not join them and meet a healthy class of people?

A four-year effort to count the oaks in Palo Alto concluded in 2002 that there were 11,000 coast live oaks and 2000 valley oaks, while blue oaks and black oaks totaled 100 or so. The largest, with an 80-inch diameter, was a coast live oak. The Rinconada Oak, a coast live oak and Palo Alto heritage tree, is 75 feet tall, 52 inches in diameter, has a spread of 120 feet, and is more than 200 years

old. Marked with a plaque, it is located in front of the swimming pool building on the Embarcadero Road side of Rinconada Park. The coast live oak is represented on the seal of the City of Menlo Park.

Acorns were a significant part of the diet of the Native Americans. Because of their tannic acid content they need to be leached before they are roasted and ground into meal, after which they can be prepared in many different ways, as can be found today from one end of the Mediterranean to the other. The world's acorn harvest now exceeds that of all other nuts taken together, and is consumed mainly by pigs.

The main oaks native to California are *Q. agrifolia*, *chrysolepis*, *douglasii*, *durata*, *engelmannii*, *garryana*, *kelloggii*, *lobata*, \times *morehus*, *palmeri*, *sadleriana*, *tomentella*, and *wislizenii*, of which five are described here. In addition, Stanford has four oaks from outside California (*coccinea*, *palustris*, *rubra*, *virginiana*) and three from overseas (*ilex*, *robur*, *suber*).

Did you know that Encina Hall, that well-known Stanford landmark, is a monument to the coast live oak? Stanford's tribute to the valley oak is preserved in the names Roble Field, Roble Hall, Roble Gym, and Roble Pool.

In a telegram sent to David S. Jordan dated May 16, 1891, Leland Stanford wrote:

I approve the proof sheets of your prospectus but have decided to name the dormitories after live oak and white oak which are the principal natural trees of this valley. For the boys dormitory Encina Hall and for the girls dormitory Robles Blancho [*sic*] Hall, being the Spanish names for the live oak and the white oak.

Coast Live Oak, Encina

California Coast Ranges

Quercus

agrifolia

FAGACEAE

(Oak or

beech family)

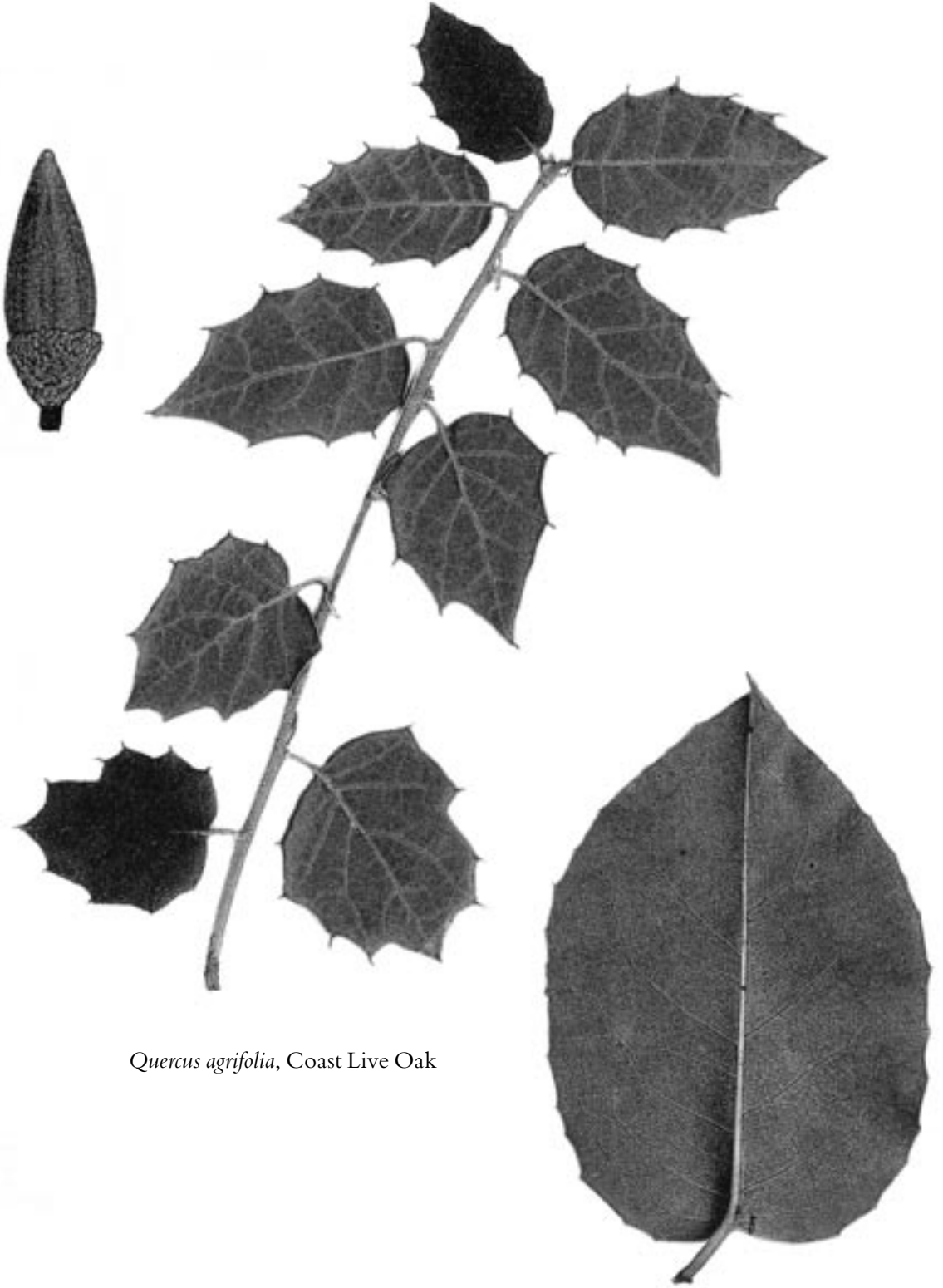
Visitors to the campus from other states often remark on the gnarled old oaks, of which magnificent specimens abound. Two species are common on campus and native to it, the evergreen live oak and the deciduous valley oak (*Quercus lobata*).

The word *quercus* means oak in Latin and survives in Italian as *quercia*. The prefix *agri* refers to a field (as in agriculture). Therefore, *agrifolia* means field-like leaf. The leaves more resemble the leaves of a holly (family Aquifoliaceae) than they do a field; so why is our favorite tree not named *Q. aquifolia*? Though the meanings are often of interest, it would be tedious to give the meanings of all the generic and specific names of our trees, which in any case are obtainable from any Stanford botanist or from W. T. Stearn, *Botanical Latin* (4th ed. 1995).

The coast live oak (not to be confused with the live oak *Q. virginiana* of the Southern United States) has tough convex leaves 1 to 2 inches long with a few spiny teeth. In spring the oaks liberate great quantities of pollen from hanging catkins. The separate female flowers later produce acorns about 1½ inches long and ½ inch in diameter. Widely distributed by squirrels, and stored by woodpeckers in custom-drilled holes in tree trunks and wood siding, the acorns germinate freely all over the campus, especially where there is some ground cover.

The coast live oak is in vogue for landscaping, and is the most popular single species of large tree at Stanford. It reaches an age of 200 to 300 years; an idea of the rate of growth may be gained from the row along Lasuen Mall next to the Quad, which is said to have been planted in 1918. An ancient tree on Serra Mall and Lasuen Mall at the southwest corner of the Graduate School of Business, which was adopted by the class of 1895 as the Pioneer Oak, is still standing. Gone is one of the university's most beloved specimens, which stood guard at the Mausoleum until it was removed in 1993, a victim of leaf and twig diseases cryptocline and diplodia. Estimated to be 300 years old, it measured 70 feet tall, with a trunk diameter of 55 inches and a branch spread of 120 feet. Wood from the tree was incorporated into the round table (the unusual spiral pattern) in the rotunda of Green Library's Bing Wing. An example of apparent success moving a mature *Q. agrifolia* can be seen at Homer Park, across from 315 Homer Avenue, Palo Alto. The 35-foot-tall specimen (weighing nearly 35 tons!) was transplanted to the site in August 2003.

Other fine examples of *Q. agrifolia* include two in front of Lagunita Court; the patriarch south of Arrillaga Alumni Center; and one with a fun plaque at the southwest corner of Campus Drive East and Galvez Street. A decades-ago fallen tree, still growing vigorously, is behind the Mausoleum.



Quercus agrifolia, Coast Live Oak

Canyon Live Oak, Gold Cup Oak

Western United States

*Quercus
chrysolepis*

This widely distributed oak is native to the immediate area of campus, including Jasper Ridge Biological Preserve. Being evergreen, it is likely to be mistaken for the common coast live oak (*Q. agrifolia*), but the lobeless leaves are distinctly smaller. Some leaves may bear teeth, but on more mature growth the margin may be smooth. Woolly fuzz may be found on young shoots and beneath new leaves and on the attractive cup containing the acorn. The handsome shiny dark brown acorns drop from the tree, leaving the cups behind. The timber is of the highest quality, denser than other oak timber, and in the days of wagons was prized for making whiffletrees. Resemblance of the wood to ivory suited it for inlays. Another common name is maul oak. Specimens over 11 feet in diameter in Angeles and Stanislaus National Forests establish *Q. chrysolepis* as the largest American oak. Huck-leberry oak (*Q. vaccinifolia*), which often hybridizes with *Q. chrysolepis*, is a main component of the chaparral at Stanford Sierra Camp on Fallen Leaf Lake; it grows only about 3 feet tall.

Though the attractive acorns of gold cup oak could once be collected in a grove southwest of the intersection of Roth Way and Lomita Drive, the trees were lost during construction of chemistry labs in the area. Magic, Inc., recently planted two 1-gallon *Q. chrysolepis* on the stadium berm.

Scarlet Oak

Eastern United States

*Quercus
coccinea*

A deciduous tree with deeply seven-lobed leaves 3 to 6 inches long, each lobe having several sharp points where the veins continue out into space in the form of bristles. The acorn is $\frac{1}{2}$ to $\frac{3}{4}$ inch long and a good half is contained by the cup. The attractive leaf shape combined with the clear green light that filters through the tree in summer makes this a very pleasing tree. In addition it provides a spectacle in fall. *Q. coccinea* resembles *Q. palustris* in youth but outgrows the pyramidal shape of pin oak, becoming more rounded. Leaves are similar, but larger; scarlet oak lacks the numerous short “pin” side shoots of its relative. *Q. coccinea* also resembles *Q. rubra* but the red oak has larger leaves with more lobes. Acorns and technical manuals help with identification. See scarlet oaks on the east side of Murray House along Governor’s Avenue. In Palo Alto, the scarlet oak at the edge of the park next to the College Terrace Library on Wellesley Street was full of mistletoe in 2004; another tree is at 1610 Portola Avenue. Illustration, see page 277.

Blue Oak

California

*Quercus
douglasii*

Native in the immediate vicinity of campus, the deciduous blue oak grows along with coast live oak and valley oak. The leaves are noticeably blue-green and are lobed shallowly, if at all. Off Santa Teresa Street, there is a



Quercus douglasii, Blue Oak

parking lot in front of Roble Hall carved out of an original grove of blue oak. A similar grove is up the hill where Lomita Court leaves Lomita Drive. A majestic blue oak is to the right of the Dinkelspiel Auditorium entry stairs; two large specimens at 247 and 267 Santa Teresa Lane guard the front of two faculty homes opposite Governor's Corner. More blue oaks are in the Tresidder Union parking lot across from the Faculty Club, and they dot the native landscape between Campus Drive West and Sand Hill Road.

Sometimes the leaves of blue oak are lobed so as to resemble valley oak (*Q. lobata*), but in such cases the dome-shaped habit and modest height (around 40 feet) clearly differentiates it from the more irregularly picturesque and often gigantic valley oak. It is named after David Douglas (see *Pseudotsuga*).

Holm Oak, Holly Oak

Mediterranean *Quercus ilex*

An evergreen oak with lanceolate leaves of variable size and toothiness, like coast live oak; smooth dark green above, furry below. The large edible acorns are (almost) half enclosed by a cup covered with fine scales. The holm oak was in good repute with Ovid, who sang its praises for having dripped with honey in the Golden Age. A large specimen is at Mitchell Earth Sciences on Panama Mall, right next to the building at room 132. Two *Q. agrifolia* crowding it offer an opportunity for comparison. Three smaller trees are at the southwest corner of Braun Music Center, facing the Tresidder parking lot, also near some coast live oaks. Two large *Q. ilex* are on Quarry Road, just north of Vineyard Lane. In Palo Alto, it is the dominant street tree at 377 Diablo Court and neighboring houses.

California Black Oak

California, Oregon *Quercus kelloggii*

Native to the hills not far from campus, black oak is a deciduous tree with deeply lobed leaves (usually seven lobes) and a number of bristles on each lobe where the veins terminate. The leaf shape is similar to that of *Quercus coccinea*, but the color is a deeper green, glossy on top and lighter beneath. The acorn is about 1½ inches long, about half enclosed in the scaly cup. California black oak accounts for about one-fifth of all hardwoods in California. To see fine examples, sign up for a tour of Jasper Ridge Biological Preserve. Six young trees are on Bonair Siding at the edge of the Maples Pavilion parking lot.

Valley Oak, Roble

California *Quercus lobata*

This is the other great oak, besides coast live oak, occurring on campus as part of its natural habitat. It is a large deciduous tree, just as picturesque, with distinctly lobed leaves and long acorns. Valley oak forms the greatest tribe of U.S. oaks, and the chief valley oak lives at Covelo, California, north of



Quercus lobata, Valley Oak

Willits. In 1984, its height was measured at 163 feet, with a girth of 29 feet. At Stanford, many old valley oaks have fallen victim to development. A fine specimen is between 708 and 712 Salvatierra Street; a younger tree is north of the Bookstore with a pepper tree and a deodar cedar. Dozens of young trees have been planted in the center divider of Quarry Road near El Camino Real. In Palo Alto, see three beauties at 300 Homer Avenue, 450 Sequoia Avenue, and 3775 La Donna Street.

The Spanish name *roble* is derived, by the normal process of dissimulation, from *robur*, the Latin name of the common Old World deciduous oak with lobed leaves. Conspicuous brown balls, as big as golf balls but not much resembling an acorn, are often noticed among the foliage. They are galls, popularly known as oak-apples, that result from a wasp depositing an egg, along with some plant hormone, to stimulate the growth of a protective home for the larva. Among the litter, one may find jumping galls about a millimeter in diameter that use the same strategy as the Mexican jumping bean, namely to reach shelter from the sun; when they land in a shady spot they cease jumping. If you take some home and put them in the bedroom they quiet down, but they start jumping when a bedside lamp is lit.

Pin Oak

Eastern United States

Quercus palustris

In its native habitat, pin oak is a tall deciduous tree used for firewood. The leaves are about 4 inches long with very deeply cut bays between the seven lobes, each of which has a couple of bristles. The leaves are glossy above and paler below and do not all necessarily fall in winter. The acorn is plump, set in a shallow cup and only about ½ inch long. See two on Lomita Mall near the southwest corner of the Main Quad, three southwest of Crothers Hall on Galvez Mall, and an avenue of more than two dozen on Governor's Avenue from Elliott Program Center toward Campus Drive West.

English Oak

Europe, Africa, Asia

Quercus robur

Famous in song and story, English oak grows wild in all countries of Europe and into the Middle East, so the name is a misnomer and (as also with the California pepper tree) will ultimately have to be dropped. Still, that may take some time. In England the tree is known as common oak or pedunculate oak, the latter name referring to the peduncles or long stalks on which the clusters of 1-inch acorns hang. It is also known as *aik* in Scotland, *woke* or *woak* in the west of England and *yak* in the south, *róvere* in Italy, and *roble* in Spanish. The word acorn denotes oak-corn. The leaves are 2 to 5 inches long with many rounded lobes, smooth above, paler and bluish below, and without stalks. English oak is known from historical records to live to a great age, probably a thousand years, and to a great size, a height of 128 feet and a girth



Quercus palustris, Pin Oak

of 43 feet having been recorded. A 50-foot specimen is just north of Roth Way, midway between Palm and Lomita drives, next to a redwood. A row of 16 'Fastigiata' lines Buckeye Lane at Schwab Residential Center.

Red Oak

Eastern North America

Quercus rubra

A tree rather resembling scarlet oak but with larger, sturdier leaves with more lobes and a less deeply enclosed acorn. Two red oaks can be seen at the entrance to the Round Room at the Church and there are three on the south side of the fountain in front of the Bing Wing of Green Library. Another, immediately to the south of the Ginzton Laboratory, has produced volunteer seedlings. A grove is at the park opposite 820 Lathrop Drive; six trees are on the west side of Rains Houses, just off Escondido Road at Running Farm Lane.

Cork Oak

Mediterranean

Quercus suber

Cork oak leaves are gray underneath and toothed, and the acorns are not particularly bitter. The bark is very interesting. In Spain and Portugal, where the tree is grown as a crop covering millions of acres, the bark is stripped off at intervals of several years and sold in quantities of hundreds of thousands of tons annually for the manufacture of corks, linoleum, and insulation. A tree bears for 200 years.

During World War II, my friend Woodbridge Metcalf investigated cork production and stripped the bark from cork oaks in various California locations. One of those stripped was at Stanford and it was very interesting indeed to visit the tree, west of Encina Hall, and to view the regeneration that had taken place. The line of demarcation between original and new bark was quite apparent, rather above eye level. By 1979, the regeneration had *more* than replaced what was once removed, but by the 1990s this heirloom had been removed (but an unstripped contemporary remains).

Old evergreen cork oaks grow here and there on campus, for example on the bank of Frost Amphitheater. Cork oaks have been extensively planted in recent decades. Young ones can be seen in the courtyards of Wilbur Hall and nearby on Escondido Road. Numerous young street trees have been planted on both sides of Quarry Road between El Camino Real and Vineyard Lane. Three mature specimens are on the northwest side of the Stanford Shopping Center on London Plane Way at Sand Hill Road. A lone specimen in the center of Lasuen Mall at the Graduate School of Business has a plaque honoring former dean Arjay Miller at its base erroneously identifying it as a *Q. agrifolia*. Compare it to coast live oaks nearby, or visit 3785 El Centro Street, Palo Alto: the dense, shapely cork oak is left of the *Q. agrifolia*.



Quercus rubra, Red Oak

Southern Live Oak

Southeastern United States

*Quercus
virginiana*

For decades there were only three of these attractive trees on campus, although they are well known on the Atlantic and Gulf coasts where they are known simply as live oaks. The appearance of the acorns in the fall is truly quaint, by local standards, since they are relatively tiny and hang in pairs on stalks over an inch long. The leaves are unusual too, having no lobes or prickles, being slightly rolled under at the edges, glossy dark green on top and pale underneath, and as little as 2 inches long. The older trees are just east of Frost Amphitheater's northeast entrance, not far from Arrillaga Alumni Center. There are now 30 young ones at the Ford Center: several on Arguello Way and the rest along the north wall and in and around the circular lawn of Ford Plaza. Three are in the lawn at Littlefield Center, and numerous specimens are at the Cantor Center.

Soapbark Tree

Chile

*Quillaja
saponaria*
ROSACEAE
(*Rose family*)

A small evergreen tree with small glossy dark green leaves, some of them with a few teeth; easily mistaken for a young live oak at a quick glance. There are two specimens at the sides of the Center of Turbulence Research, 481 Panama Mall (across the street from the Old Union). Other examples can be seen in Palo Alto at 318 Ferne Avenue (left of driveway) and across the street at 323 Ferne (left of the hydrant).

Italian Buckthorn

Mediterranean

*Rhamnus
alaternus*
RHAMNACEAE
(*Buckthorn
family*)

Like the coffeeberry that grows in the hills near Stanford, the evergreen Italian buckthorn has 2-inch lanceolate, leathery, glossy leaves, with sparse teeth and with a paler color below, and clusters of ¼-inch fruits that are red before turning black. Two rows, running toward Old Anatomy, are growing at the northwest corner of the Cantor Center. Curiously, this plant is under pest control in New Zealand. California coffeeberry, *R. californica*, is widely planted on campus in a shrub form and can be seen at several locations on Serra Street, including the Art Gallery and Sequoia Hall. At Stanford Sierra Camp, one may see *R. rubra*, the Sierra coffeeberry.

Poison Oak

British Columbia to Baja California

*Rhus
diversiloba*
ANACARDIACEAE
(*Sumac or
cashew family*)

Occasional plants, spread by birds, are seen in the inner campus, but they are soon removed because many residents are familiar with this easily recognized menace that is frequently encountered in the nearby state parks. The three-lobed leaves may resemble blackberry leaves (but there are no spines), and turn red in the fall. Not everyone is affected by touching the leaves, but the oily secretion can make a nasty, red, painful, and long-lived

Robinia pseudoacacia, Black Locust



rash. Petting your dog after releasing it in a park is a common source of woe. Well-established specimens can be found in overgrown areas behind the Mausoleum and the Angel of Grief. A century ago, poison oak was named *Toxicodendron diversilobum*, a name that may still be seen.

Lemonade Berry

Coastal California

Rhus integrifolia

See a fine example in shrub form at the east end of the cycle path between Stanford Avenue and Santa Fe Avenue, and a tree form on the right side of the driveway to the Communication/Networking Services utility building behind Ventura Hall. Specimens of the handsome *Rhus ovata*, sugar bush, are on the left side of the same driveway with more lemonade berry. The name lemonade berry refers to a Native American practice of making a lemon-like drink by dissolving a sugary substance found on fresh berries. The dark red wood was referred to as mahogany.

African Sumac

South Africa

Rhus lancea

An attractive small tree with drooping, narrow three-pronged leaves and dark bark that can be grown multitrunked. A specimen from about 1996 can be seen at 665 Alvarado Row. A group is at the entrance to Dining Services, Pampas Lane. Two specimens are on the east side of Campus Drive West between Santa Teresa Street and Searsville Road, several are on Quarry Road near the Psychiatry Building, and others are in the center divide of Campus Drive West near Welch Road. Two old specimens on the north side of Braner Hall were noted by Bill Parker as significant trees.

Black Locust

Appalachians, Ozarks

Robinia pseudoacacia
LEGUMINOSAE
(*Pea family*)

A largish tree of very pleasant appearance in April, when it is clothed in new light green leaves and strings of faintly fragrant pea flowers. The compound leaves have about 13 thin oval leaflets, each 1 to 2 inches long, and at the base of the leaf stalk wicked spines about ½ inch long are found on older trees. More recently the spineless variety 'Inermis' has been favored. Last season's thin brown pods, which are about 3 inches long, contain a few flat brown seeds. The wood was used where hardness and durability were wanted; for example, in the United States Native Americans used it for bows. Introduced into France in 1601 by botanist Jean Robin, the tree became well known in Europe. In France it is used as an ornamental, has been extensively planted for firewood, and the flower clusters are dipped in batter and deep-fried. It is naturalized over much of Italy under the name acacia (pronounced a-HAH-shah in Tuscany), and the flowers are eaten by children for the nectar. Native Americans ate the flowers and cooked the pods and seeds.

Look for one on Memorial Way near the honey locust and carob trees. A variety with pale pink flowers grows inside Frost Amphitheater on the slope west of the stage. A dozen of variety ‘Frisia’ have been planted as the forest in the lawn of the inside courtyard at Clark Center, and 11 more are outside. New growth is nearly orange, mature leaves yellow.

Older plantings at the northwest end of Mayfield Avenue have been supplemented by colorful varieties at both ends of the stretch between Santa Ynez Street and Santa Fe Avenue. These new additions are *R. × ambigua*, a cross between *R. pseudoacacia* and *R. viscosa*; the name of this Mayfield Avenue cultivar is ‘Decaisneana’. Another showy cultivar of *R. × ambigua* known as ‘Idahoensis’, with bright-colored flowers, can be seen in the area around Mirada Avenue and Frenchman’s Road, and there is an extensive formal planting of 60 trees (1999) surrounding the Stone Pine Plaza (Science and Engineering Quad). Many more young locusts are on the North-South Mall, from Gilbert Biosciences to Keck Science Building. The plants close to Keck are *R. × ambigua* ‘Purple Robe’.

Salix alba tristis
SALICACEAE
(Willow family)

Golden Weeping Willow

Europe, Asia, Africa

There are not many willows on campus although willows native to the area are common in San Francisquito Creek. Golden weeping willow formerly grew at 1047 Campus Drive East in the ΣAE parking lot and nearby, but seems to have disappeared from campus in recent years. The leaves, which are about 3 inches long, ¼ inch wide, and pale green underneath, are carried on bright yellow twigs. Cuttings, up to several feet in length, may root directly in moist soil.

In *The Story of Gardening*, Richard Wright records that the Salictum, or willow collection, became another diversion for country gentlemen. “Nor can we leave the willow without remarking on how its weeping form became the symbol for the correct Victorian female attitude. The modest bending of their slim, pendulous branches, their response to the least breath of wind, readily typify the acquiescence that Victorian ladies were supposed to display.” Reminds me of postfeminism.

Salix babylonica

Weeping Willow

China

It was thought that the traditional weeping willow reached Europe, where it was named by Linnaeus, from Mesopotamia, maybe because Alexander Pope, on opening a consignment of fruit from Smyrna tied with a red willow withe, planted the cutting and said, “Perhaps this will produce a tree that we do not have in England.” But it is now believed to have originated in ancient times in China. The word willow is used in the King James Bible of 1611, e.g., in Job 40:22 and Psalm 137, but the English name willow did

not then necessarily refer to the genus *Salix* established by Linnaeus (1707–1778); it included other brookside trees such as the poplar. See weeping willows on Galvez Mall east of the southeast corner of Green Library; south of Redwood Hall in Jordan Quad; and on the Golf Course, visible from the intersection of Links Road and Vista Lane.

- Red Willow *Western United States* *Salix laevigata*
 Yellow Willow *Pacific Coast* *Salix lasiandra*
 Arroyo Willow *Western United States* *Salix lasiolepis*

A good place to see some of the native willows is in the inlet to Lake Lagunita. All the species have leaves with shiny green upper surfaces and are silvery gray beneath. When the wind blows in the willows the pattern of contrasts is very characteristic. The male trees have catkins composed of numerous tiny staminate flowers which, if examined with a lens, are seen to consist only of the stamens plus the hairy bract from which the stamens emerged. The female trees have similar catkins whose numerous flowers consist only of a pistil plus bract. The fruit is a two-valved capsule with many hairy seeds. Yellow willow is native to Jasper Ridge Biological Preserve.

Guide to Western Willows

Feature	<i>S. laevigata</i> Red	<i>S. lasiandra</i> Yellow	<i>S. lasiolepis</i> Arroyo
bark	rough	rough	smooth
last year's twigs	red	reddish, shiny	reddish to dark brown
stipules	minute or none	round, ½ to 1 inch	none, or ovate to roundish
leaf stalk		glands at leaf junction	
catkins	1 to 4 inch long	1 to 2½ inch (male) 1 to 4 inch (female)	¾ to 1½ inch no stalk; appear before leaves
stamens	four to six	four or five	two

- Corkscrew Willow *China, Korea* *Salix matsudana*
 Very curly branches, after leaf drop, form attractive decorations that can be bought from local florists. After enjoying your arrangement, pop a branchlet into moist ground and make a tree of your own. One in the lane between 834 and 836 Santa Fe Avenue died in 2004; others are yet to be found. ‘Tortuosa’



Sapium sebiferum, Chinese Tallow Tree

Coast Red Elderberry

San Mateo County to Washington State

The five or seven leaflets are finely toothed, and some of them may have opposite leaflets based at distinctly different points on the main vein. The red berries, which are supposed to be poisonous, are a conspicuous feature along Northern California's Redwood Highway in summer. Campus specimens have been lost in recent years. Plain *S. racemosa* applies to the European red elderberry. The West Coast red elderberry was described under the name *S. callicarpa*; the revision *S. racemosa callicarpa* reminds a reader that there is little difference between the European and Pacific Coast plants.

*Sambucus
callicarpa*
CAPRIFOLIACEAE
(*Honeysuckle
family*)

Blue Elderberry

Mexico to British Columbia

A native plant on campus and at Jasper Ridge Biological Preserve, blue elderberry can easily be located in wild places and roadsides when in flower, or later when the ¼-inch blue-black berries appear. They come in rich clusters and have a white bloom. The compound leaves are quite characteristic, being about 8 inches long with about seven toothed leaflets. There is a large one behind the Mausoleum among the California bay trees, another on Galvez Street opposite Memorial Way, one in the northwest corner of Lasuen Street and Roth Way, and a large four-trunked specimen at the start of a path that leaves Lasuen Mall heading southwest from the Graduate School of Business south toward Serra Mall. A specimen reported just to the south of 3181 Alpine Road by Dorothy Regnery in 1989 was then about 9 feet around, 20 feet tall, and a candidate for the *National Register of Big Trees* maintained by American Forests of Washington, D.C.

*Sambucus
mexicana*

The quantities of berries that can be collected in the neighborhood are edible when fresh and also readily processed into jelly. Following custom, my daughter scrapes off the large flower clusters for use, after shaking out the insects, as an alternative to vanilla. Elderberry wine is made from *S. canadensis* in the Eastern United States while a variety of *S. nigra* is the basis of the internationally known Sambuca liqueur. The plant has hollow stalks that are slightly toxic, and red or white berries are to be strictly avoided. The name derives from *sambuke*, a Greek musical instrument, possibly the sackbut, a pipe whose pitch was changed by a slide.

Chinese Tallow Tree

China

A very attractive deciduous tree with good red fall color. The flowers are in 4-inch catkins that cover the tree in midsummer in a handsome but restrained display. Leaves are about 2 inches long resembling poplar leaves plus a long tapered point; they dangle on long stalks in the same way. At the point of attachment of leaf to stalk two raised glands can be seen and there are two

*Sapium
sebiferum*
EUPHORBIACEAE
(*Spurge family*)

Schinus molle, Pepper Tree



small stipules and a bud at the other end of the stalk. The seed capsules have a thin green skin that can be scraped off with a fingernail to reveal a pale green nut with six fine ridges on its surface and three white, ¼-inch seeds inside. Tallow trees are widely grown in the tropics, where their seed yields vegetable tallow used for candles, soap, and oil. Mysteriously, campus seed capsules have no tallow. Two mature specimens are at the eastern dead-end of Esplanada Way; there are 17 on the west and 20 on the east side of Kimball Hall, Escondido Road. A younger specimen at the entrance to Ginzton Laboratory on Via Palou is strikingly beautiful in the fall. Several specimens are in the courtyard behind the northwest corner of the Outer Quad.

Pepper Tree

Peru *Schinus molle*
ANACARDIACEAE
(*Sumac* or
cashew family)

The pepper tree has long been popular for planting all over the campus and some fine old gnarled specimens can be seen. Its clear green foliage, sometimes accompanied by cheerful rosy red fruit, make it a pleasure to look at. Always crush a leaf and sniff the aroma as you go by, but eating the peppercorns may be harmful. Rub your hand over the bark too. Another good tree for sniffing and feeling is the lemon-scented gum. A list of these trees should be made the basis of a tour for blind people. The trunk of the madrone would have to be on the list, and the stringybark tree and the cork oak; seed pods of the various bean family members (silk tree, honey locust, carob, red-bud, for example) are interesting too.

A group of old pepper trees stands east of Palm Drive between Arboretum Road and Campus Drive. Young trees growing in lush conditions are on Stanford Avenue south of Bowdoin Street; they were planted in response to a serious attack by psyllids that knocked out many trees. Pepper trees also can be seen on Galvez Mall at the northeast corner of Green Library and across Roble Drive from the New Guinea Garden. They line Raimundo Way between Stanford Avenue and Cedro Way. In Palo Alto, see a full, dense specimen at 3721 La Donna Street. The tree is from the Peruvian Andes: help stamp out the common name California pepper!

Chilean Pepper Tree

Chile *Schinus polygamus*

This pepper tree belongs to a different group from the other two pepper trees that are more widespread on campus. It has spines on the ends of the shoots, and the leaves are not pinnate but simple and only about an inch long. When crushed they do not have a strong odor. The very small yellow flowers make a fine display in summer and are followed by clusters of dark purple peppercorns. Examples are north of the Cantor Center, in the redwood grove east of Herrin Hall (Biology), and just outside the fence of the southeast side of Frost Amphitheater.

Sequoia sempervirens, Coast Redwood



Sequoiadendron giganteum, Big Tree, Giant Sequoia

Brazilian Pepper

South America

*Schinus
terebinthifolius*

This very handsome evergreen tree, quite different from the better known Peruvian pepper tree, has compound leaves that have 7 to 11 shiny green leaflets that are paler below and show a pleasing pattern of veins when held up to the light. They are an inch or so long and have occasional small teeth. The midrib, but not the leafstalk, has noticeable wings. When crushed, the leaves have an interesting smell. The clusters of small fruits consist of red papery globes loosely enclosing a single seed. For mention of Brazilian pepper in the Everglades, see *Paperbark Notes*, page 171. Several once-fine specimens on the south side of Bowdoin Street between Campus Drive East and Pine Hill Road, having been cut back or frozen back, have resprouted with many trunks. A multitrunk specimen is between 4055 and 4073 Ben Lomond Drive, Palo Alto, next to the fence.

Coast Redwood

Coastal California

*Sequoia
sempervirens*
TAXODIACEAE
(*Taxodium*
family)

Redwoods are native to the campus and densely clothe the slopes rising to the west. The coast redwood is America's tallest tree, reaching 350 feet or so and living to well over 1000 years. The local virgin stands were all cut long ago, so that the present wild trees on the foothills, substantial though they may appear, are quite young. By the time the 19th century was drawing to a close, redwood lumber provided, in the California coastal region, almost the sole material for siding, railroad ties, boards, shingles, and fence posts; it was the cheapest lumber available. No wonder little old-growth forest remains. When William H. Brewer, author of *Up and Down California in 1860–1864* visited the Santa Cruz Mountains, he reported one that was “nineteen to twenty feet” in diameter. (Brewer also reported that the grasslands of California were then already dominated by Spanish oats, as they still are today.)

Guinness World Records awards tallest-redwood status at 369 feet to the Stratosphere Giant, discovered by Chris Atkins in 2000 in Humboldt Redwoods State Park. The Mendocino Tree (368 feet), in Montgomery Woods State Preserve, is not far behind. In Redwood National Park, the Harry Cole Tree (366 feet) and National Geographic Society Tree (366 feet) are respectable contenders. The Paradox Tree (366 feet) in Humboldt Park also is right up there, as are numerous others, the exact locations of which are not widely publicized. Michael Taylor, Robert Van Pelt, and others have measured many of the giants using direct tape drop (when they are allowed to climb the trees), as well as laser survey devices and other schemes.

It is estimated that in 1830 the area occupied by the redwoods was equivalent to that of a coastal strip 375 miles long and a mile wide; today only about 5 percent of old growth forest remains. Political forces representing commercial logging interests, including jobs, have not displayed any more

concern for the environment than one would expect. We all want houses and other wood products such as cartons and paper towels, but few of us want to preserve primeval forests; well, that is democracy. Private benefactors willing to buy out legal property owners have become key players.

Redwoods have been regularly planted on campus and continue to be popular. An example is the dense planting in 2003 of redwoods, along with deodar cedars, along Campus Drive West at the Clark Center (Bio-X). In many locations, however, they do not receive the moisture that they depend upon when growing in the fog belt and, as a result, do not thrive; if regular summer irrigation is withheld they may die. Obviously redwoods should not be planted with coast live oaks, which expect a rainless summer and if kept moist will die of root rot. It would be interesting to locate the biggest redwood on campus. A specimen probably planted in 1924 at 1509 Portola Avenue, Palo Alto, measured 114 feet in 1995. The backyard coast redwood at 3759 La Donna Street, an official Palo Alto heritage tree, measured 125 feet tall with a diameter of 64 inches in 1999.

Numerous redwoods are in the area of Salvatierra Walk and the back of the Law School that were in the gardens of early faculty homes that once occupied the area. A fine grove is between the Faculty Club and Kingscote Gardens; one of Stanford's best single specimens is in the lawn north of the Old Union. Two trees that have not lost their lower branches grow at 849 Pine Hill Road.

A group of five, the largest with a 15-foot girth, is off Serra Mall east of Herrin Hall with a plaque reading as follows:

STANFORD PALOS ALTOS

THESE REDWOODS WERE PLANTED IN 1915 BY STANFORD BOTANY PROFESSOR AND PIONEER AMERICAN PLANT PHYSIOLOGIST GEORGE J. PEIRCE, FACULTY MEMBER FROM 1897 TO 1933. IN ACCORDANCE WITH PROFESSOR PEIRCE'S INTENTION, THE UNIVERSITY NAMED THESE NATURAL MONUMENTS "STANFORD PALOS ALTOS." THEY SYMBOLIZE STANFORD'S STRENGTH, INDEPENDENCE, AND ENDURING QUALITY.

EL PALO ALTO, FOR WHICH THE CITY OF PALO ALTO IS NAMED AND WHICH APPEARS ON STANFORD'S SEAL, STANDS BESIDE SAN FRANCISQUITO CREEK IN PALO ALTO.

Our neighboring city's landmark El Palo Alto redwood was said to be 1064 years old in 2004. Its diameter is 7½ feet and height 110 feet (in 1951 it measured 134 feet). Originally double trunked, it lost the second one in 1886, either in a huge storm or, more likely, during construction of a new trestle bridge by Southern Pacific Railroad.

Redwood splinters contain some nasty substance that causes inflammation, something that is known to termites, who do not feed on redwood fence posts or house piers until all other available wood is eaten. On a certain sunny fall day, just after the first rains, all the winged termites emerge and fill the air. After the mating rituals are over, the discarded wings form an impressive amount of litter.

The name *Sequoia* honors Sequoyah (circa 1770–1843), the man of Georgia who reduced the Cherokee language to writing by means of a syllabary that he invented. In a language with only four vowel sounds, one symbol, oriented in the four cardinal directions, can stand for four different syllables. The Inuit have also adopted this way of writing.

The Tree

Stanford, California

A special redwood hybridized in 1975 by the Incomparable Leland Stanford Junior University Marching Band. Foliage varies from year to year: usually green, sometimes sparse and other times dense, always juvenile. Height is also known to fluctuate. A rare ambulatory variety, this tree has trouble putting down roots. It is generally found only at Stanford, although intermittent sightings in remote locations have been reported. Seems to thrive in the presence of discordant music. Fruit resembling a hat, tie, and glasses tends to appear during football season. Trunk is limber, swaying in the wind or to the beat, and features two prominent holes thought to be useful in ambulation. Even though there is only one known specimen, to date The Tree has not been placed on the endangered species list. Survived vicious attack by bears in 1996.

Sequoia × stanfordiana
(*S. sempervirens* × *H. sapiens*)
DEKENACEAE
(*Cradle family*)

Big Tree, Giant Sequoia

Sierra Nevada

The well-known big trees need no introduction, but they are not common on campus. They grow to around 300 feet and live to over 3000 years. The bark and cones resemble those of the coast redwood, except that the cones are at least twice as big, but the leaves are quite different, being small and packed tightly like tiles around the branchlets. There is a sizable but declining specimen between 676 and 694 Alvarado Row dating to 1930. In Canfield Court, east of the Bookstore, there is a specimen growing in company with a coast redwood and a deciduous dawn redwood, allowing convenient comparison. Two specimens are left of the driveway at 525 Los Arboles Av-

Sequoiadendron giganteum
TAXODIACEAE
(*Taxodium family*)

enue. Another pair is on the east side of Keck Science Building at the California Native Garden. Three are at 817 Pine Hill Road. In Palo Alto, see a giant in the backyard of 1519 Mariposa Drive. Every one of these specimens is handsome.

Perhaps campus residents are deterred by visions of trunks wide enough to drive a car through, but growth is relatively slow; as a result the big tree does not drop much litter (a problem with coast redwood) and the tiny awl-shaped leaves, at most $\frac{1}{2}$ inch long, melt inoffensively into shrubbery. Big trees are not as hungry for water as coast redwoods. Fossil evidence shows that the big trees once grew in Europe.

Since the big tree is sometimes referred to as *Sequoia gigantea* and sometimes as *Sequoiadendron giganteum*, a humble gardener may wonder why it is that common names are often decried as ambiguous, or conversely as non-unique, whereas botanical names are not. In this case, the big tree seems to have not one botanical name, but two. There is an international code of botanical nomenclature that copes with this situation as follows: S. F. L. Endlicher (1804–1849) published the name *Sequoia sempervirens* in 1847 while J. Decaisne (1807–1882) published the name *Sequoia gigantea* in 1853. It is not wrong to write *Sequoia gigantea* Decaisne. However, J. T. Buchholz (1888–1951) subsequently wrote that, in his judgment, the big tree should be moved to a new genus, so it may now be referred to as *Sequoiadendron giganteum* Buchholz, using the spelling taken from his publication (which seems to flout the rule that when a genus is divided into two genera the gender of the new genus should remain unchanged). Botanists describe this situation as synonymy. With the passage of time *Sequoiadendron* has become the usage of choice among botanists, though in gardening books the term giant sequoia may still be seen.

Big trees may not be as tall as coast redwoods but, with their greatly larger girths, may contain twice the weight of wood, around 1300 tons. The mass of such a tree is hard to appreciate. Imagine 45 automobiles, each weighing 2 tons, balanced precariously on top of one another to match the height of a big tree; that would be 90 tons, rather more than the weight of a big whale. The weight of a mature big tree is more than 14 times greater.

On Lomita Drive at Harmony House, there is a crazy cultivar named ‘Pendula’, about 10 feet tall, that looks more like a praying mantis than a tree. The younger half of the trunk is horizontal; there are a few short vertical leaders, but they are doomed to fall of their own weight and hang down as all their numerous predecessors have done. A striking young *S. giganteum*, rapidly reaching upward in the form of a narrow cone, is in Serra Grove, off Serra Mall at Sequoia Hall. Distinguished by its intense blue coloration, it is a cultivar named ‘Hazel Smith’.

Pagoda Tree

China, Korea

*Sophora
japonica*

LEGUMINOSAE
(*Pea family*)

Deciduous tree of generally pleasing appearance with long clusters of pale yellow flowers in summer. The compound leaves have 11 leaflets, more or less, each 1 to 2 inches long and having a tiny sharp point. Kidney-shaped beans are contained in meaty spherical envelopes, each with the characteristic umbilical scar familiar in beans. These spheres are much more widely spaced than beads on a string, so at first sight the pod looks nothing like a pod. Four specimens, about 25 feet tall, flank the Cowell Houses entry gate off the parking lot on Bowdoin Street near Campus Drive East. Several trees are on San Francisco Court, and six on Galvez Mall in the dividing strip between Sweet Hall and Stern Hall. The pagoda tree is one of the five trees established by the Chou dynasty of the 1st millennium BC as memorials for the departed (see also *Koelreuteria*).

African Linden

Africa, Madagascar

*Sparmannia
africana*

TILIACEAE
(*Linden family*)

A tall evergreen shrub with tropical appearance and multiple canes of insubstantial wood that begins flowering by late January. The flowers, almost 2 inches across, have five white petals around a yellow center. The light green leaves vary in size up to a hand span across and in shape have a variable number of lobes, up to seven. The edge has blunt serrations and the base is cordate. Not noticeably furry to the eye, the leaves nevertheless have a distinctly velvety feel. The floral center has a trigger mechanism for actively pressing pollen onto visiting insects. Two specimens are to the right of the steps leading up to Cummings Art Building from Lasuen Mall.

Queen Palm

Brazil

*Syagrus
romanzoffianum*
PALMAE
(*Palm family*)

This feather palm, formerly in the genus *Arecastrum*, has branches well over 10 feet long with pinnae an inch wide and over a foot long. Clusters of 1-inch orange dates follow the waxy flowers, which come in long panicles tucked between the leaves. The dates contain a stone showing the monkey face that is seen on coconuts. The gray bark is relatively smooth and ringed with ridges at intervals so that the trunk looks as though it has been turned in a lathe. A specimen stands in the inner southwest island in the Inner Quad adjacent to the entrance to Memorial Church and another is just north of Buildings 1 and 10. See three at 625 Mayfield Avenue. In Palo Alto, see it at 333 Miramonte Avenue.

Lilac

Eurasia

*Syringa
vulgaris*

OLEACEAE
(*Olive family*)

The fragrant lilac has been tried on campus, but not many specimens seem to have survived; perhaps Stanford's winters are not cold enough. The wood, even though of small dimensions, is prized for small craft jobs. The single-

flowered ‘Lavender Lady’, which was developed for warmer climates, is growing and blooming in Hilgard Court at Rains Houses, at unit 28 and behind unit 26.

*Syzygium
paniculatum*
MYRTACEAE
(Myrtle family)

Brush Cherry

New South Wales, Queensland

An erect narrow tree thickly clothed with glossy opposite leaves about 2 inches long with a good reddish color at first. The white flowers have petals but, as with other members of the family, such as *Eucalyptus* and *Tristania*, their main effect depends on the stamens. However, the fruit is quite different being a fleshy red “cherry,” which is perhaps thirst quenching but has no particular flavor. Large specimens can be seen at the northeast and southeast corners of Varian Physics; on the right side of the entrance to Bechtel International Center; and in many other locations. Two really big ones, each about 2 feet in diameter, are at 619 Mayfield Avenue. The lillypilly (*Acmena smithii*) is a related plant with pale-colored fruit from a similar rainforest environment and has pleasant crunchy flesh (but not much).

Syzygy, the only word in the dictionary with three y’s and no other vowels, describes an astronomical situation of three celestial bodies in alignment, as occurs at the time of an eclipse. The language of botany presumably refers to the Greek meaning “yoked together.” But what are yoked together?

*Tamarix
juniperina*
TAMARICACEAE
(Tamarisk
family)

Tamarisk

Eastern Asia

Tamarisks are small, deep-rooted trees valued for their adaptability to extreme desert climates, where they have become naturalized in the United States. They can also withstand salt spray. The leaves are just scales; pink flowers in spring hang in bunches. Some can be found on Junipero Serra Boulevard, between Stanford Avenue and Frenchman’s Road.

Redwood Family Notes

The “Redwood family” is our parochial name for the Taxodiaceae, but if you think for a moment you will realize that this name is suitable only in California. Genera of the family found on campus are *Sequoia* (coast redwood), *Sequoiadendron* (big tree), *Meta-sequoia* (dawn redwood), *Cryptomeria*, and *Taxodium*. You can’t help noticing that the whole family is named for *Taxodium*, which for us is a rare plant. The reason for this is that the bald cypress, native to the margins of the

Gulf of Mexico, was known to the botanical world for two centuries before the redwood. Although the name El Palo Alto records a sighting of a redwood dating back to Gaspar de Portolá’s expedition of 1769, to him it was just a “big stick.” The botanical description by David Don (1799–1841) appeared only in the 1840s.

Genera not known to be present on campus are *Athrotaxis* (from Tasmania), *Cunninghamia* (the biggest tree in China, China fir),

Sciadopitys (Japanese umbrella pine), and *Taiwania*. These trees are all favorites in various botanical gardens.

The name *Taxus* is Latin for yew, while

Taxodium, meaning yew-like, is formed by drawing on the protean Greek *eidos*, meaning form or shape, that also manifests itself as *-oid*, *-oides*, and *-ode*.

Bald Cypress

Southeastern United States

Related to the redwood, but deciduous, the bald cypress puts on a new coat of light green feathery leaves in spring. By autumn it produces cones resembling those of a redwood, except that they fall apart as they release their seeds. When the leaves fall they fall in complete sprays. The wood is soft and light and resistant to termites and dampness, as is redwood, and it is definitely not a cypress. Bald cypress is famous for its ability to live in swamps, which it does by raising pneumatophores from its roots to form “knees,” presumably to breathe. For stability, it also develops buttresses. A specimen, now gone, grew on the east side of the Angel of Grief (northeast of the Mausoleum) but it did not have knees or buttresses, which of course would be unnecessary to it in that situation. The University of California at Berkeley has specimens, several of which are along Strawberry Creek, southwest of the Eucalyptus Grove.

Taxodium

distichum

TAXODIACEAE

(*Taxodium*

family)

Montezuma Cypress

Mexico

Alas, a graceful specimen reputed to be one of this species, planted in 1973 at 1089 Vernier Place, has disappeared. One that thrived for many years in William Durand’s garden at 623 Cabrillo Avenue also is now gone.

Taxodium

mucronatum

Yew

Europe, Asia, North Africa

Once one becomes familiar with the yew it is readily recognized by its dark-green dense appearance. The needles are about an inch long, paler underneath, and may be in flat sprays. Male and female trees occur; the flowers are small and scaly, but the fruit is a very noticeable red fleshy aril containing a hard-shelled poisonous seed. The leaves are also poisonous to animals that eat them, and Julius Caesar reported that the Gaulish chieftain Catuvolcus committed suicide by eating yew. See three specimens at the front of Kingscote Gardens and another across the driveway from the southwest corner of the building. In Palo Alto, a 25-foot-tall multitrunk *T. baccata* grows at the Museum of American Heritage, 351 Homer Avenue. The tree undoubtedly was planted soon after Dr. Tom Williams, one of Palo Alto’s early physicians, built the structure as his home in 1907.

Taxus baccata

TAXACEAE

(*Yew* family)

T. baccata ‘*Stricta*’ (also called ‘*Fastigata*’), the Irish yew, was among the early university plantings and still can be seen framing doorways of some

older campus buildings (e.g., the entrance to Roble Gym and Dance Studio); also see it used as the backdrop to the pond at Kingscote Gardens. More than 200 Irish yews from cuttings of plants that originated at Muckcross House, Ireland, form the Yew Allee at Filoli in Woodside. The yews planted as a hedge on Serra Mall along the Lou Henry Hoover Building are cultivars of *T. cuspidata*, Japanese yew.

The wood is famous for hardness, durability, and versatility. Bows were made of yew in antiquity, according to Virgil, and yews also armed English longbowmen. Yews were planted all over England as a military measure, and survive today, in protected places, especially churchyards, where their dark and somber appearance is an unintended consequence of old wars. Virgil also comments on their appearance:

*Est via declivis funesta nubila taxo
Ducit ad infernos per muta silentia sedes.*

“A downhill path is shaded by the funereal yew, it leads through soundless silence to the nether regions.” The cypress, the goldenrain, pagoda, and mayten trees have also been planted as memorials.

Thuja occidentalis American Arborvitae *Eastern North America*
CUPRESSACEAE
(*Cypress family*)
The leaves, which have a pleasant scent when crushed, are in the form of small overlapping scales hugging branchlets arranged in flat sprays disposed more or less horizontally. Numerous horticultural varieties are available, including variegated, golden, and dwarf forms. The cones are about ½ inch long. The commercially important lumber is traded as northern white cedar. American arborvitae has been known as white cedar, a name that is also applied to incense cedar, Port Orford cedar, California juniper, and other trees. Specimens planted in the 1890s in the arboretum apparently have been lost, but one venerable survivor is at the Bakewell Building, 355 Galvez Street, at the north end near three fine *Taxus baccata* ‘*Stricta*’.

Thuja orientalis Oriental Arborvitae *China, Korea*
As with American arborvitae (*T. occidentalis*) many varieties are cultivated ranging from extreme dwarf forms 2 to 3 feet tall to very fancy shapes and colors. The flat leaf sprays are disposed in vertical planes. When ripening, the fleshy cones may exhibit a luminous blue bloom that attracts attention; when crushed, they have a pleasant fragrance. There are many old neglected specimens on campus, for example between Museum Way and Campus Drive. These are mostly stunted, presumably because of the lack of summer water, but they clearly possess ability to survive. Six more recent specimens

flank three sets of steps leading up to the Main Quad from Serra Mall. Five of them are variegated in color; the sixth is different.

Western Red Cedar

Pacific Northwest *Thuja plicata*

Western red cedar is the tree whose wood shelters those campus homeowners whose houses are shingled. The wood is red, soft, not very dense and rather brittle, but insects do not relish it and it does not rot readily. On the sunny side of the roof it slowly oxidizes into gray powder, taking 10 to 20 years to lose perhaps $\frac{1}{8}$ inch of thickness, while shaded areas develop moss that fosters rot by retaining dust and rain. This wood is also used for the cedar-lined closets found in many old campus homes. The two-toned appearance arises because there is a rather sharp boundary between the pale sapwood and the red lignified heartwood. It is the heartwood that has the spicy aroma and flavor. The $\frac{1}{8}$ -inch scale-like leaves are in overlapping pairs, unlike the cypress, and the flat branchlets are arranged in glossy flat sprays, darker on the underside. The ripe cones are brown, about $\frac{1}{2}$ inch long.

Western red cedar, which grows to 220 feet tall and over 10 feet in diameter, was the basis of a distinctive woodworking culture on the Pacific Coast from Northern California to lower Alaska involving dugout canoes up to 40 feet long and 6 feet broad, totem poles up to 60 feet tall, and houses up to 45 by 180 feet. One house 580 feet long was recorded. House construction was of planks of enormous dimensions. The technology for lumber production with stone age tools is not trivial. Mussel-shell adzes, antler wedges, and hammerstones constitute rather modest equipment for felling, splitting, and dressing forest giants. These days chain saws are allowed; see the totem pole in Dohrmann Grove near the Art Gallery and another at Canfield Court.

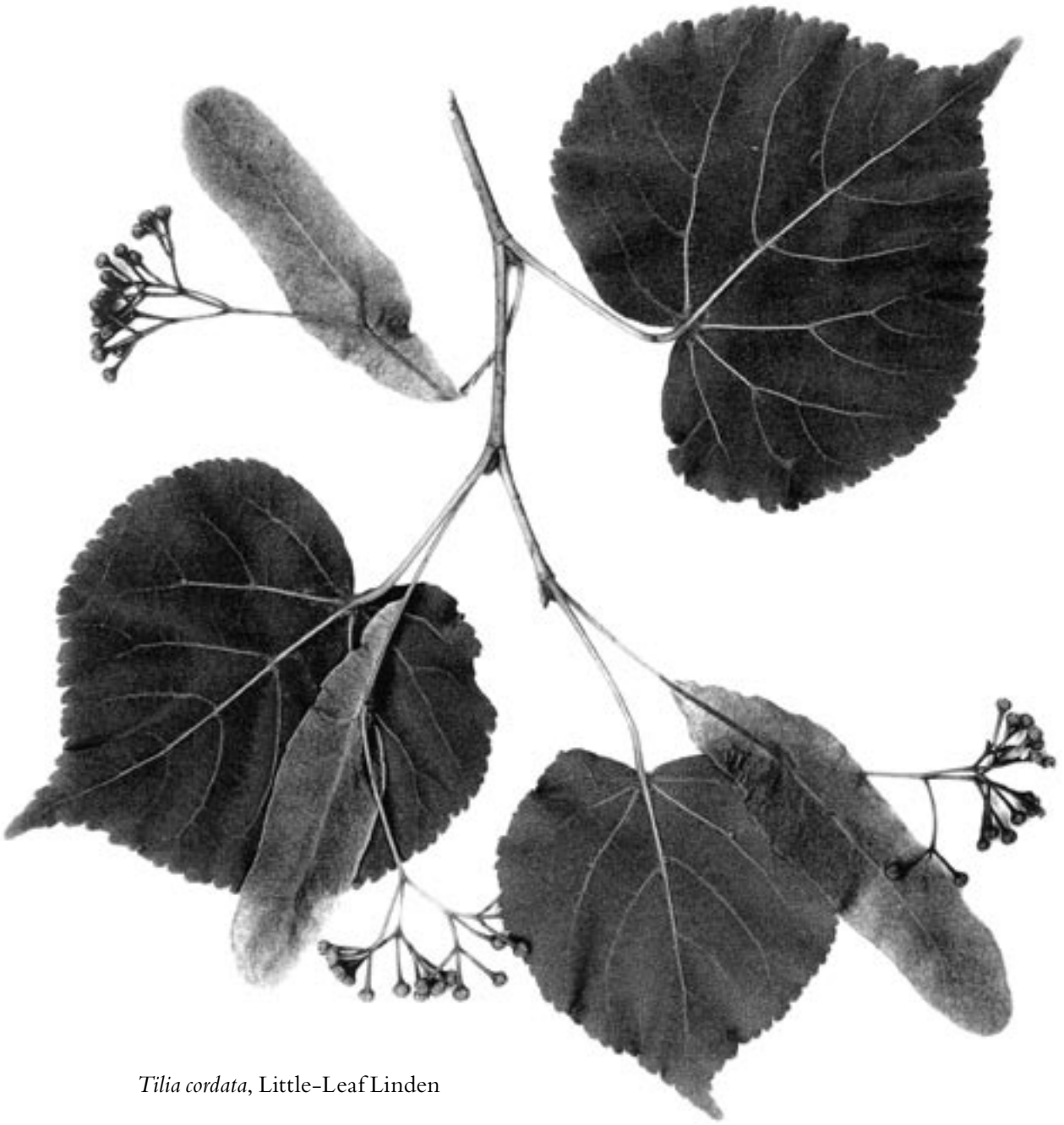
A handsome large specimen can be seen at Kingscote Gardens on Lagunita Drive, at the edge of the lawn next to the giant bunya bunya tree and the driveway. Another fine specimen is at 611 Alvarado Row, to the right of the house.

American Linden

Eastern United States & Canada *Tilia*

American linden, also known as basswood, has enormous leaves up to 8 inches long, while the distinctive bracts from which the flowers and fruit hang are not only larger but look less like leaves than those of the little-leaf linden (*T. cordata*). There is a reason for the special design; when the spherical fruits, generally in threes, are ready to fall, the leaflike bract falls with them, acting as a parachute, and making an opportunity for the seed to travel with the breeze. Linden honey is in high repute; a side effect is that many birds attracted by nectar also eat insects. The close-grained, knot-free but soft wood has many uses, including the making of pianos. The usable fibrous

americana
TILIACEAE
(*Linden*
family)



Tilia cordata, Little-Leaf Linden

bast gives rise to the name basswood. *T. × moltkei*, of which *T. americana* is one parent, can be seen on Salvatierra Street at 583, 585, 611, 613, and 625. There are no reported examples of *T. americana* on campus, but it may be in the residential area. Illustration, see page 31.

Little-Leaf Linden

Europe *Tilia cordata*

A pleasant deciduous tree with heart-shaped toothed leaves about 3 inches across and with a point. The leaf is dark green above, paler underneath, and has rusty tufts of down in the rib axils. The leaves alternate between left and right handed, successive leaves being mirror images of each other. A distinctive feature of lindens is the way the flower stalk rises from the middle of a special leaf-like bract. The flower buds are $\frac{3}{16}$ -inch green knobs, the small white flowers are fragrant, and the fruit is a brown furry $\frac{1}{4}$ -inch nut, its length slightly greater than its diameter, in a five-ribbed hard shell containing a single kernel. Viewed end-on, the cross section is a pentagon.

If you have ever been to England you will have noticed that the most outstanding examples of wood carving in cathedrals, chapels, and stately homes seem to have been done by one man, Grinling Gibbons (1648–1720). All this work was carved from the wood of the lime tree, as the linden is known there. The fibrous bast was widely used for cordage and matting.

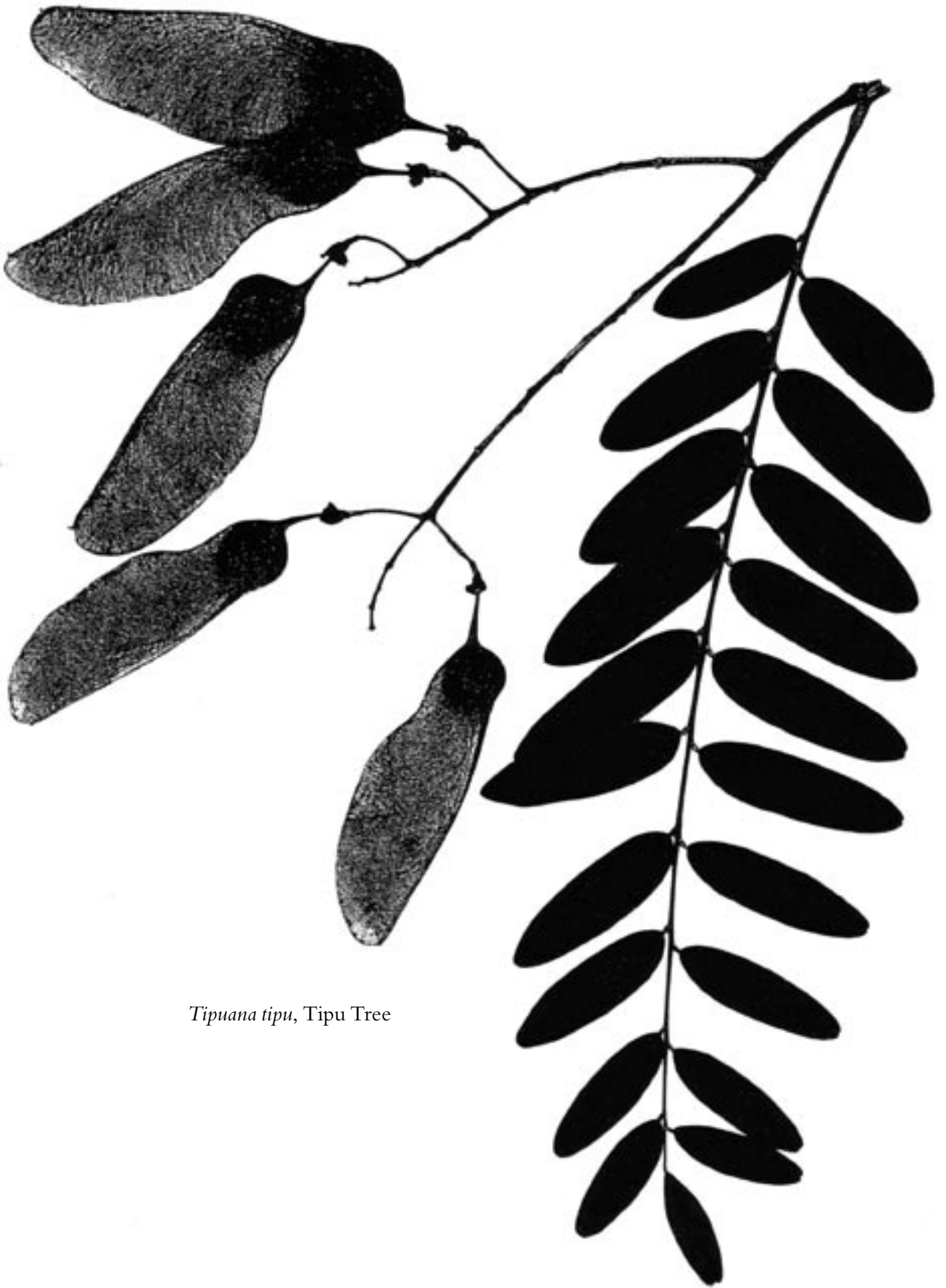
Four trees grow at Muwekma-tah-ruk, 543 Lasuen Mall, four are across the street at Storey House, and five more are next door at 550 Lasuen Mall. The following are all similar and appear to be hybrids: Two tall lindens on the north side of the southernmost Stauffer Chemical Engineering Building, a shady row of nine (reputed to be ‘Greenspire’) along the southwest side of $\Delta\Delta\Delta$ House at the corner of Campus Drive East and Bowdoin Street (1967), and half a dozen at the entrance to Green Earth Sciences at the start of Panama Street.

Tipu Tree

Brazil, Bolivia *Tipuana tipu*

A medium-sized tree with attractive foliage made up of $\frac{3}{4}$ -inch by 2-inch short-stalked, slightly staggered oval leaflets numbering 23 or a few less. The phyllotaxy is reminiscent of many eucalyptus branches whose opposite leaf pairs acquire a quarter turn between pairs. In the case of the tipu tree this quarter turn twists the leaflet pairs into the same plane. The leaflets are slightly paler below. Meanwhile the bright yellow flowers produce 3-inch-long by 1-inch-wide pods, like half a maple key, almost as thin as the leaves and at first sight easily mistaken for leaves, though they are a slightly lighter green and add a noticeable accent to the side of the tree in direct sunlight. At the base of each pod a single lump reveals the presence of a hard case containing three kernels. I do not know whether the leaves would have been

LEGUMINOSAE
(Pea family)



Tipuana tipu, Tipu Tree

tasty to a browsing prehistoric animal, in which case the tree might gain an evolutionary advantage by being ingested and later dispersed, or whether the foliage is distasteful, in which case the pea is wearing a disguise.

In the northeast corner of Bowdoin Street and Campus Drive East an expansive specimen inside Rains Houses (at 38 Kirkpatrick Court) overhangs the walls of a secluded courtyard and is visible from both streets. A second specimen occupies the corresponding courtyard 45 yards north. Three more form a splendid group in a lawn at the Hacienda Commons area of Rains Houses. Sometimes referred to as rosewood, an unacceptable name considering that industry already has three rosewoods confirmed by dictionaries (African, Australian, and Brazilian).

California Nutmeg

California *Torreya*
californica
TAXACEAE
(Yew family)

A dark evergreen tree with the general appearance of a yew. The leaves are flat needles about 2 inches long with two pale lines on the undersurface and with a sharp point; they were used for tattooing by the Pomo. The nutmegs that give the tree its name are like large olives with very little meat. California nutmeg is native to the Santa Cruz Mountains between Stanford and the ocean. Stanford botanist William Dudley reported a California nutmeg near the Arizona Garden in his 1909 inventory of conifers; it has disappeared in recent years. California nutmeg would be most suitable for use on campus, and Magic, Inc., is trying to reestablish it. In 2003 the group planted one small tree on the stadium berm and another south of the vernal pond located near Palm Drive and El Camino Real (along the pedestrian extension of Lasuen Street).

The wood was used for bows by Californian Indians, as was the wood of the related yew in England, and the nuts were eaten after suitable preparation. Since yew seeds are poisonous, it would be unwise to experiment incautiously. When crushed, the foliage smells like bay leaf.

There are other species of *Torreya* in the world; the nuts of *T. nucifera* in Japan were eaten and provided oil, *T. taxifolia* in Florida was thought to be probably extinct in its original habitat, but the University of California at Santa Cruz has come to its rescue by planting a small grove in its arboretum. Taxol, a substance isolated from the California nutmeg, was found to be of interest in treating cancer, creating a worrying dilemma, since the wild tree is not abundant. The dilemma has been resolved, however, by successful synthesis of this substance. This is fortunate because the only other known natural source of taxol is a fungus associated with the roots of the quarantined Wollemi pine.

Trachycarpus fortunei Windmill Palm China
PALMAE
(Palm family) Leaves like fans, rather smaller than on other fan palms, with slender toothed stalks characterize the windmill palm. The scars of old leaves are enmeshed in a tangled mass of hair that decays with age to reveal a trunk that tapers downward. Original specimens, circa 1890, can be seen in the inner and outer southeast circles of the Inner Quad.

Tristania conferta Brush Box New South Wales, Queensland
MYRTACEAE
(Myrtle family) Closely related to *Eucalyptus*, brush box (also called Brisbane box) is a tough, useful tree with warm-colored smooth bark becoming rough toward the base. In its native habitat, in moist coastal gullies, it grows to over 100 feet and reaches many feet in diameter. A sample of the wood is likely to sink in water. A principal use is as a small, rugged street tree. Each flower has about five petals (white), is about an inch across, and has a distinctive appearance resembling a starfish from the way the stamens are arranged on radiating axes. The flowers are in cymes of seven, as are the seed capsules, which look very much like *Eucalyptus*. A comparison with any seven-fruited *Eucalyptus* will reveal the latter's cymose ancestry. That the *Eucalyptus* flower represents a later stage of evolution is evidenced by its loss of petals. Crush a leaf and smell it; no hint of *Eucalyptus*.

Enter Wilbur Hall from the east to find six specimens in the courtyards. There are four more in the northwest courtyard. Two examples are at the intersection of Santa Teresa and Dueña streets, adjacent to Tresidder Union. The trees flower in June. *T. conferta* is the original name for what some botanists now call *Lophostemon confertus*.

Tristaniaopsis laurina Kanuka, Water Gum Victoria, New South Wales, Queensland
This is a small, well-behaved tree of tidy appearance, smaller than brush box and with a noticeable display of yellow flowers arranged in cymes and with five small petals. The glossy, leathery green leaves about 4 inches long form a dense crown. The dark bark peels to reveal a fresh satin finish. In its native habitat, water gum is found along coastal water courses and reaches about 20 feet. The timber, which is sold under the name of kanuka (which is also the common name of the much taller New Zealand *Leptospermum ericoides*), is used for golf-club heads and wooden screws. It would be a very suitable tree for courtyard plantings where the use of taller plants leads ultimately to dank and sunless conditions. At the Medical Center, five 10-foot trees are adjacent to the sidewalk at 1180 Welch Road near Pasteur Drive. In Palo Alto, see a beautiful multitrunked specimen at 1441 Edgewood Drive and another fine example at 1820 Cowper Street.

American Elm

North America *Ulmus*

American elms are very much like the English elms on Salvatierra Street, but can be distinguished in spring by the hairy edges of the flat fruits. Two large trees in the backyard of 579 Alvarado Row are visible from Lane C at Campus Drive. Also see American elm in Palo Alto at 966 Moreno Avenue; a specimen near 4229 Ponce Drive is listed as a city heritage tree.

americana
ULMACEAE
(Elm family)

Wych Elm

Europe, Central Asia *Ulmus glabra*

Wych elm, sometimes known as Scotch elm, is distinguished from English elm by having shorter leaf-stalks and larger fruits. The seed is situated in the center of the wing and there is a notch that does not reach the seed. The leaves are asymmetrical at the base, rough to the touch on top, and may have three points. It is not a common tree now in these parts, but an avenue of wych elms was planted on Museum Way in 1891. Two unimpressive specimens are in the northeast corner of Roth Way and Palm Drive; one on Lasuen Street between Roth Way and Museum Way; and one on Lasuen Street that may be a survivor of the avenue on Museum Way.

The variety 'Camperdownii' can be found in the Canfield Court lawn near Meyer Library. About 6 feet tall in 2003, it has weeping limbs that reach to the ground. At Filoli in Woodside, Camperdown elms south of the swimming pool pavilion form a dense, high canopy. The original tree appeared as a sport of *U. glabra* in 1850 at Camperdown House near Dundee, Scotland.

English Elm

Western & Southern Europe *Ulmus minor*

Decades ago, large old avenues of English elm extended from the Bookstore in the direction of Salvatierra Street, Mayfield Avenue, and Alvarado Row. They are distinguishable from the closely related American elm (*U. americana*) by corky ridges on branchlets or on the numerous suckers that can generally be found springing from the extensive root systems. Suckers are particularly vigorous after root damage caused by trenching or building construction, and can be seen forming thickets in hedges and shrubby places. *U. minor* (also known as *U. procera*) is widely distributed throughout Europe; the name English elm is mainly confined to the United States. The common elm in England is the small-leaved elm *U. campestris*.

In the spring, before the leaves appear, tiny flowers form and from them spring bunches of bright green fruit consisting of ½-inch disks with a seed at the center. The bright green clusters, which may be mistaken for leaves, add a very delicate color to flower arrangements. When ripe, the fruit will be a papery brown samara and will blow about in conspicuous drifts. A child's pastime is to take a mature leaf and scratch out alternate stripes between the ribs using the fingernail, to leave a decorative pattern.

Both English and American elms are subject to Dutch elm disease, which has spread across the United States from the East and which is due to a fungus that is spread by bark beetles. Resistant strains have been under development for many years, but meanwhile the plantings in many cities are doomed. The small-leaf Chinese and Siberian elms and the zelkovas are resistant. According to a 1975 count by D.S. Schroder, there were 146 small-leaf elms and 533 English elms on campus.

In early 1977, 183 trees with Dutch elm disease were cut down on campus at a cost of \$15,000, paid by the State of California. Not all the elms were taken down; walk down Salvatierra Street as far as 627; see one at the north wall of 505 Lasuen Mall and two at 549 Lasuen. In 1985 the elms of San Jose were attacked, especially those along South 7th Street near San Jose State University. After consuming the foliage, large numbers of yellow and black caterpillars were falling from the trees and heading off to find good places to pupate. According to the California Department of Forestry, there were over 24,500 elms in Santa Clara County in 1985. At a cost of \$1500 to remove a single tree, or \$100 to dose a tree with pesticide, this outbreak was not a trivial matter (*San Jose Mercury News*, August 22, 1985).

Diseased elms should be buried, but homeowners wishing to store firewood should know that the beetles are attracted to the potential new breeding site by smelling the saw cuts. The wood should be stacked on rails, covered with 6-mil clear (not black) plastic down to the ground and for 1 foot outward, and sealed in by dirt shoveled onto the surround. This hides the wood's odor. Larvae that are already inside will be foiled by the rapid drying of the cambium layer that they need to feed on. The few beetles that may emerge will be contained by the plastic. This procedure, known in the trade as tarping, is recommended also for eucalyptus firewood containing, or hospitable to, longicorn beetle larvae.

*Ulmus
parvifolia*

Chinese Elm

China, Korea, Japan

A widely used shady tree with attractively blotchy bark in browns and grays and, in freshly peeled areas, orange. Unlike other elms on campus, it does not generally lose its leaves in winter. It flowers in winter and the following fall the seeds, which are rafted in the center of papery ovals about $\frac{1}{3}$ inch across, pile up in wind drifts. See Chinese elms between the Post Office and Bookstore, and in great planters along the front and back of the hospital. A fantastically shaped, fully deciduous individual is at 926 Cottrell Way.

The papery winged seeds come down in the fall and rustle about White Plaza as a rather benign litter. However, the squirrels like to eat the seeds while they are still on the tree, and in November the quantity of rubbish that

rains down from the elms, including twigs, branchlets, and leaves, is impressive. At such times the Tresidder Union patio may look as though a tornado has passed through.

Siberian Elm

Siberia, China, Central Asia

Ulmus pumila

Siberian elm is distinguished from Chinese elm by the irregularly ridged bark and the fruit, which ripens in early summer as a papery oval about ½ inch across. There is a deep notch that reaches almost to the seed lodged in the middle. Specimens can be seen at the service station (Serra Street at Campus Drive East), in the courtyard behind the northwest corner of the Outer Quad, and on Escondido Road at the west end of Wilbur Hall. In Palo Alto, Siberian elm is the street tree at 1570 Bryant Street.

California Bay, Laurel

California, Oregon

Umbellularia

Native to the Stanford campus and Jasper Ridge Biological Preserve, California laurel is instantly identifiable by crushing a leaf, even an old fallen leaf. The pungent aroma is quite pleasant but sniff deeply with care; it can be overpowering. Try a leaf in your stew (maybe half a leaf—see *Laurus nobilis*, the Grecian laurel, or bay tree). Grape-sized purplish fruits contain a single seed. Warning: *Prunus laurocerasus*, a member of the rose family, is poisonous but is commonly referred to as a laurel; do not confuse it with the California laurel or Grecian laurel.

californica

LAURACEAE

(*Laurel*
family)

The wood is homogeneous and almost as dense and hard as that of *Q. chrysolepis*. It is attractive for craft projects and can readily be antiqued with genuine tiny beetle holes just by letting it lie around outside for a season or two while green. Pin borers, so called because the escape holes left by the emerging beetles are so straight that a pin can be inserted, leave piles of fine frass on green firewood stacked below.

There is one at Lasuen Mall on the south side of Building 500. Those occurring naturally along San Francisquito Creek are multistemmed. Four examples, two of them quite old, are at the Children's Health Council off Sand Hill Road. Two old ones are 100 feet south of the Angel of Grief; more are nearby and behind the Mausoleum. Also see California laurel in the Junipero Serra Boulevard greenbelt east of Stanford Avenue.

California Fan Palm

Southern California

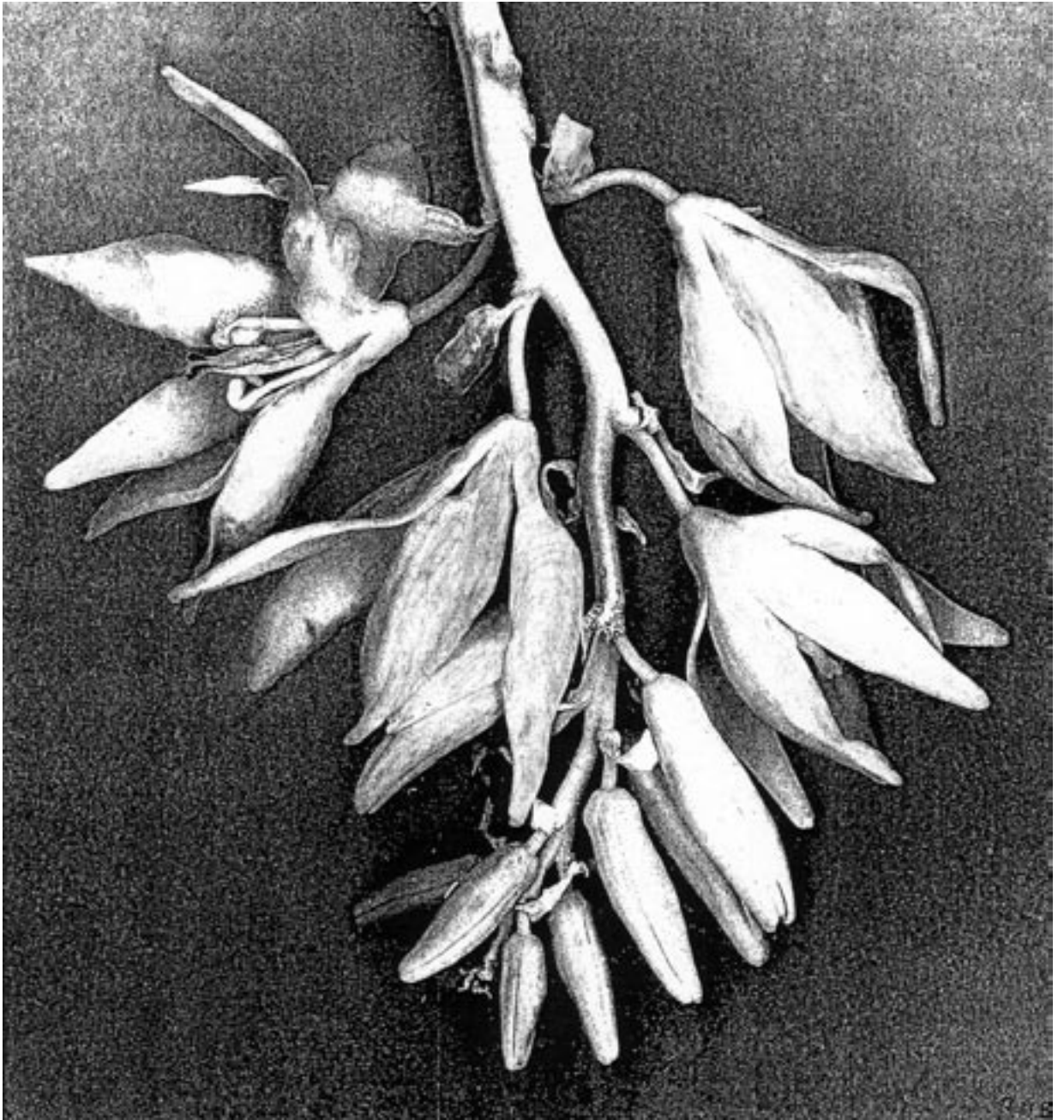
Washingtonia

Stouter and shorter than the much more common Mexican fan palm and hairier on the leaf margins. Specimens can be seen in six islands of the Inner Quad. In Palo Alto, the three specimens at 918 Moreno Avenue can easily be compared to the Mexican fan palm nearby at 924 Moreno.

filifera

PALMAE

(*Palm family*)



Yucca filifera, Yucca

Mexican Fan Palm

Mexico *Washingtonia
robusta*

An avenue of 10 was planted at the west gateway to the Inner Quad around 1968 when Lomita Mall was laid out. They were about 20 feet tall when planted, so the resulting overnight effect was impressive. Several senior members are to be found behind Building 460 and in the islands in the Inner Quad, where they were second only to the late *Casuarina glauca* in height. There are hooked spines on the leaf stalks. The flower clusters are rather interesting, if you can find one low enough to see it properly. They are later followed by large bunches of shiny black $\frac{3}{8}$ -inch dates. A wave of popularity for new plantings of tall specimens of this fan palm set in just before 2000. There is a spectacular group of 36—six rows of six each—at Schwab Residential Center in the interior courtyard adjacent to the east building. In 2002, the Science and Engineering Quad was furnished with 22 trees approaching 40 feet in height. To tell which fan palm is which, just remember that *W. robusta* from Mexico is less robust than the California fan palm.

Chinese Wisteria

China *Wisteria
sinensis*
LEGUMINOSAE
(Pea family)

Well known as an attractive blue-flowering vine climbing over arbors or on walls, the wisteria nevertheless develops a substantial trunk and can be grown as a freestanding tree. Visit attractive examples at Governor's Corner, at the pavilion east of Hoover Tower, near Hacienda Commons at Rains Houses, and in the Amy Blue Garden at 651 and 655 Serra Street.

Xylosma

China *Xylosma
congestum*
FLACOURTIACEAE
(Flacourtia family)

Xylosma is highly regarded as a handsome, adaptable small tree or shrub for garden accent. It has shiny, yellowish-green leaves up to 10 inches long and bronze-colored new growth. See one on the left as you enter Wilbur Hall from Escondido Road. A fine massed planting is on San Francisco Court where it enters Alvarado Row; another is nearby on San Francisco Terrace. A magnificent row is in the center divider of El Camino Real near the southern border of Redwood City. On campus, it is usually a sheared hedge, as at the Via Palou parking lot and the modules at Galvez Mall.

Yucca

Mexico *Yucca filifera*
AGAVACEAE
(Agave family)

A remarkable old yucca stands north of the Cantor Center, with a great swollen base, and a substantial trunk towering up to 20 feet or more to a branching crown, which is pretty impressive considering it is just a lily. It is thought that this specimen was transplanted in the university's early years from the nearby Arizona Garden, a collection of cacti and succulents designed and installed by Rudolph Ulrich in the early 1880s. (Ulrich's garden was adjacent to the site of a planned mansion for Leland and Jane Stanford.

After their son died, the couple abandoned those plans, using the site instead for the family mausoleum.) In spring, gigantic clusters of white flowers form, which are very pretty in themselves if you can get close enough to see the individuals. These clusters are well over a yard long. Other ancient specimens of *Yucca filifera*, as well as *Y. schottii*, are in the Arizona Garden.

For information about the garden, visit <http://grounds.stanford.edu>. Click on Stanford Points of Interest, then Special Sites.

Zelkova serrata
ULMACEAE
(Elm family)

Sawleaf Zelkova

Japan

Resembling an elm in its spreading form but with smooth gray bark like elephant hide, sawleaf zelkova is now a desirable substitute, where elms would be suitable, as it is free from the diseases that are wiping out the English elm all over the country. The toothed leaves are rough above and smooth below, about 4 inches long and 1½ inches wide. Rather characteristic small drupes develop in the leaf axils. A good specimen is at 825 San Francisco Court. An avenue of 14 between the David Packard Building and the Center for Integrated Systems along Via Palou Mall extends south with many more trees past Ginzton Lab and Hansen Lab.

Zizyphus jujuba
RHAMNACEAE
(Buckthorn family)

Jujube

Africa, Asia, Australia

The Greeks and Romans knew this small deciduous tree as the *zizyphon* or *zizyphum*, and the Arabs as *zizouf*; the English is just a corruption of the same word. It was always valued in the Mediterranean for its “dates,” which can be stored and have a pleasing acid flavor. Meanwhile, unknown to the classical world, the very same plant was receiving attention in China, where it was developed into a principal source of edible fruit. The Chinese varieties are those now available in commerce.

There are several battered and untended jujubes south of The Knoll off Lomita Court near the west modular building, and a nice one just inside the northeast gate of Frost Amphitheater. The leaves are an inch or so long, alternate, with three prominent veins, and with small flowers in threes in the leaf axils. It is not known what variety these plants are, but they fruit freely, producing numerous seedlings (such as at Stanford Avenue opposite Peter Coutts Road) that are available for transplanting to more accessible locations. Homer’s lotus eaters are thought by some scholars to have been consuming jujubes, possibly fermented. There is apparently no connection with Sisyphos, son of Odysseus (some said), who did time in Hades pushing a stone up a hill, from whose top it invariably rolled back to the bottom.



Agathis robusta, Queensland Kauri

Supplemental Tree List

The following trees and shrubs were discovered after production of the *Tree List in Order of Botanical Names*, beginning on page 32, was well under way.

- Acacia redolens* Prostrate Acacia, Bank Catclaw *Western Australia*
LEGUMINOSAE This decorative blue-leaved acacia with puffy yellow flowers in spring
(Pea family) spreads as a dense ground cover, reaching a foot or so in height. Because it hardly requires water, it is well suited to the steep embankment on the uphill section of Mayfield Avenue and on the bank opposite 822 Lathrop Drive. It also grows on Campus Drive West, just north of Santa Teresa Street. If plants continue to do well, more may be expected in the future.
- Acer ginnala* Amur Maple *Northeast Asia*
ACERACEAE Named for the Amur River, which runs between eastern Siberia and Manchuria, this small, cold-weather maple has small toothed leaves (often only 2 inches long), two rather small side lobes, 1-inch keys (winged fruit), small fragrant flowers, and good fall color. To see half a dozen (an inch in diameter in 2004), look immediately to your right as you enter the Junipero Serra Boulevard greenbelt by the path at the end of Casanueva Place.
- Agathis robusta* Queensland Kauri *South Queensland*
ARAUCARIACEAE This giant rain-forest tree comes in both male and female forms and its cones resemble those of other araucarias. Leaves, about 4 inches long, have strictly parallel, very fine venation. Three young trees grow between Galvez Mall and Green Library, just south of the ginkgo plantation. They were about an inch in diameter in 2004; in due course, they could reach heights up to 160 feet and trunk diameters up to 8 feet. The famous kauri of New Zealand, a tremendous tree in both height and girth, is related. Neither is related to the karri, another record setter for height.
- Aloe arborescens* Tree Aloe *South Africa*
LILIACEAE This succulent, to 18 feet, has long, spiky flower clusters of bright vermilion to yellow from December through June. Examples in the Arizona Garden and New Guinea Garden are still short in height.

Kashmir Cypress

A striking 7-foot specimen of this drooping blue-green cypress planted in 2003 can be seen in the large front lawn of Kingscote Gardens. The cones measure ½ inch long.

Bhutan

*Cupressus
cashmeriana*
CUPRESSACEAE
(*Cypress family*)

American Persimmon

Four old trees, with dark, deeply ridged bark divided into square plates, grow in the greenbelt between San Francisquito Creek and Sand Hill Road, not far from Ronald McDonald House. Two of these are opposite where London Plane Way intersects the greenbelt bike path, one 12 yards in from the path and the other 20 yards beyond. A third tree is 40 yards toward El Camino from London Plane Way; the fourth is closer to Ronald McDonald House.

Eastern United States

*Diospyros
virginiana*
EBENACEAE
(*Ebony family*)

Eucryphia Tree

An evergreen shrub with white flowers in late summer. Toothed leaves are sometimes simple and sometimes divided into three to five leaflets. Seven 'Mount Usher' eucryphias are at Frost Amphitheater: three on the north side, just west of the east restroom, and four halfway down the west border. All have squirrel damage and have been caged for protection.

Chile

Eucryphia ×
nymansensis
EUCRYPHIACEAE
(*Eucryphia
family*)

Kentucky Coffee Tree

A deciduous tree with leaves 1½ to 3 feet long divided into 1- to 3-inch-long leaflets. A single specimen, about 50 feet tall but leaning dramatically, is in the greenbelt between San Francisquito Creek and Sand Hill Road, about 100 yards toward El Camino Real from London Plane Way and 25 yards in from the bike path.

Central & Eastern United States

*Gymnocladus
dioica*
LEGUMINOSAE
(*Pea family*)

Chilean Wine Palm

Trees for our descendants: Four Chilean wine palms, which look like small Canary Island date palms, grow on Serra Mall at Campus Drive West, near the Gates Building. If conditions suit them, these slow-growing palms might reach 50 feet someday.

Chile

*Jubaea
chilensis*
PALMAE
(*Palm family*)

Chinese Flame Tree

Chinese lantern fruit capsules in late summer are more colorful than those of *K. paniculata*, goldenrain tree. Several grow in the large lawn of Willis Court at Rains Houses, but they are not thriving.

China

*Koelreuteria
bipinnata*
SAPINDACEAE
(*Soapberry family*)

- Magnolia virginiana* Sweet Bay *Southeastern United States*
 MAGNOLIACEAE A small tree that has fragrant white flowers. One grows on the south side of Green Library across from Koret Court, and two are near the northeast corner of Dinkelspiel Auditorium.
 (*Magnolia family*)
- Michelia champaca* Champaca *Himalayas*
 MAGNOLIACEAE This handsome tree has yellow-orange fragrant flowers suitable for perfumery in summer and winter, and sporadically in other seasons. The 2½- by 9-inch light green leaves are pale below. Several trees planted in recent years now have trunk diameters around 2 inches. Examples can be seen at the east end of Sequoia Hall, at the west-facing end of Encina Hall, behind Memorial Church, and in a small lawn on Lomita Mall near Panama Mall and Mitchell Earth Sciences.
 (*Magnolia family*)
- Pinus* species Pines
 PINACEAE In 2003 Magic, Inc., of Palo Alto planted on the stadium berm three seedling pines that are apparently new to campus: *P. maximartinezii* (big-cone piñon pine), *P. roxburghii* (chir pine), and *P. wallichiana* (Himalayan white pine).
 (*Pine family*)
- Prosopis glandulosa* Honey Mesquite *Southwestern U.S., Texas, Mexico*
 LEGUMINOSAE This tree with drooping branchlets vaguely resembles the pepper tree, *Schinus molle*. A fine 15-foot specimen grows at the Carnegie Institution's Department of Plant Biology on Panama Street, behind the Keck Laboratories next to a redwood.
 (*Pea family*)
- Prunus subhirtella* Weeping Higan Cherry
 'Pendula'
 ROSACEAE This graceful tree has branches sometimes sweeping the ground and pink flowers in late winter. Considered by many a worthy tree even if it never bloomed. Two specimens grow in planters between Hoover Tower and the adjacent exhibition pavilion.
 (*Rose family*)
- Pseudobombax ellipticum* Shaving-Brush Tree *Mexico to Guatemala*
 BOMBACACEAE The green bark of this tree is similar to that of the nearby *Chorisia speciosa*, but without the spikes. The tree, named for its showy 6-inch-long flowers with many 4-inch stamens, can grow to 30 feet in the wild but is shorter in cultivation. In 2003, a tree was planted at the edge of the Arizona Garden, on the side closest to Palm Drive.
 (*Bombax family*)
- Quercus cerris* Turkey Oak *Central & Southern Europe*
 FAGACEAE This fast-growing deciduous oak has dark furrowed bark and 4-inch irregularly lobed leaves, shiny green above and lighter below. A 40-foot spe-
 (*Oak or beech family*)



Cupressus cashmeriana, Kashmir Cypress



Quercus cerris, Turkey Oak

cimen grows in the greenbelt between San Francisquito Creek and Sand Hill Road, about 45 yards toward El Camino Real from London Plane Way and 35 yards in from the bike path.

Bur Oak

Manitoba to Texas to Maine

Quercus macrocarpa

This slow-growing deciduous oak is the common spreading shade tree of the Great Plains. A highly variable tree, it tolerates a wide range of conditions. The acorns are fringed at the end. Two trees grow about 25 yards from the intersection of Campus Drive East and Galvez Street, along the path to Frost Amphitheater.

Blackjack Oak

New York to Iowa, south to Gulf Coast

Quercus marilandica

A 40-foot specimen of this often scrubby oak grows about 70 yards from the intersection of Campus Drive East and Galvez Street, 12 feet from the Frost Amphitheater perimeter fence and just west of the entry gates. It's naturally found in inhospitable conditions but grows larger in good conditions, as this example attests. The triangular leaves are variable, often elongated to 6 inches, with three lobes at the tip.

Oaks

Quercus
species

Several oak species new to campus, or rarely seen here, were planted in 2003 by Magic, Inc., of Palo Alto. The plants were small, and in some cases only acorns: *Q. coccifera calliprinos* (Levantine live oak), *Q. engelmannii* (Engelmann oak), and *Q. parvula shreveii* (Shreve oak). Three Mexican oak acorns also were planted: *Q. greggii*, *Q. diversifolia*, and *Q. mexicana*.

Fern Tree

Brazil, Mexico

Schizolobium parahybum
LEGUMINOSAE
(*Pea family*)

This small tree has about 15 pairs of $\frac{3}{8}$ -inch by 1-inch leaflets, plus one terminal leaflet, the whole set extending to about a foot. These sets are borne in pairs on an axis 5 feet or more long. To add to its striking appearance, the 2-inch-diameter tree in the garden on the north side of the Faculty Club displays all its foliage in the form of a fountain. Compare this tree with its close relative *Caesalpinea gilliesii* on the north side of the Bookstore.

Trumpet Tree

Tropical America

Tabebuia
species
BIGNONIACEAE
(*Bignonia family*)

One tree of this tropical genus grows in the lawn at the front left of Harmony House on Lomita Drive. The compound leaves contain five leaflets. Clusters of showy trumpet-shaped blooms, purple-pink with yellow throats, appear in spring. Species identification of our plant is uncertain.

- Talauma hodgsonii* **Talauma** *Himalayas*
 MAGNOLIACEAE This unusual tree with large, leathery leaves to 9 inches wide and 2 feet long has replaced a crape myrtle in the inner northeast island of the Inner Quad. (Magnolia family) Flowers have purplish blue sepals and fleshy, ivory white petals.
- Tilia platyphyllos* **Large-Leaf Linden** *Europe*
 TILACEAE This tree's leaves, up to 5 inches, are longer than those of *T. cordata*, little-leaf linden, and the leaf margins usually are more sharply and regularly serrate. (Linden family) The leaves' undersides generally are light green, while those of *T. cordata* normally have a whitish (glaucous) cast. Five old specimens can be seen at 575 Salvatierra Street near Campus Drive East, and one across the street, remaining from a former row (1904). Two tall trees with trunk diameters more than 3 feet are at Columbae House, 549 Lasuen Mall.
- Ulmus 'Frontier'* **Frontier Elm**
 ULMACEAE This tree, a hybrid of *Ulmus carpinifolia* (smooth-leaf elm) and *U. parvifolia* (Chinese elm), was introduced by the U.S. National Arboretum in 1990. It (Elm family) is highly resistant to Dutch elm disease, and should grow about 25 feet tall, with a spread of 15 feet. The small leaves turn an unusual red-purple in fall. Flowers are rarely seen and the tree does not produce seed. Stanford is experimenting with four of these trees at the end of Escondido Road in front of Stern Hall.
- Xanthorrhoea quadrangulata* **Grass Tree** *Southern Australia*
 LILIACEAE The 2-foot woody stem, topped with grasslike leaves 2 to 4 feet long, will slowly lengthen until the plant reaches 12 to 15 feet. See it near a bench on Galvez Mall, east of Green Library. (Lily family)
- Yucca aloifolia* **Spanish Bayonet** *Southern United States, Mexico, West Indies*
 AGAVACEAE Single-stemmed or branched, this yucca eventually reaches 10 feet in height; stems are more slender than those of other arborescent yuccas at Stanford. (Agave family) Leaves, 12 to 20 inches long with yellow margins, are arranged in a crowded spiral around the stem. Showy white blooms 4 inches across, some tinged red to purple, appear in dense erect clusters fall to winter. Look for this commonly cultivated yucca in the Arizona Garden and New Guinea Sculpture Garden.



Tilia platyphyllos, Large-Leaf Linden

Some of Stanford's Noteworthy Trees

This list of noteworthy trees at Stanford is a compilation by the author and editors of this book, staff members of the Stanford Grounds Department, and other interested tree lovers. See the *Tree List in Order of Botanical Names*, beginning on page 32, for more information on each species. Map on inside back cover shows approximate locations of these trees.

- 1 **Santa Lucia Fir** *Abies bracteata*
In the grove on Serra Street, left of the entrance to Lou Henry Hoover Building. Planted before 1900, this is thought to be Stanford's only specimen of the rare, slow-growing tree.

- 2 **Spanish Fir** *Abies pinsapo*
A superb full specimen partially obscures 634 Alvarado Row; it probably was planted around 1908, when the house was built.

- 3 **Bunya Bunya** *Araucaria bidwillii*
The skyline specimen at the Buck Estate is distinctive and obvious, but to see bunya bunya up close visit the two along Serra Mall in Dohrmann Grove, not far from the Art Gallery.

- 4 **Kurrajong** *Brachychiton populneus*
A large kurrajong is on Serra Mall, 50 feet northwest of the *Abies bracteata* in the grove in front of the Lou Henry Hoover Building; foliage is reminiscent of the camphor tree.

- 5 **Bottle Tree** *Brachychiton rupestris*
Located near Memorial Church in the inner southeast circle of the Quad, this dry-country tree has a bulging sap-filled trunk, as befits a bottle. Now nearly 3 feet in diameter, it could expand to 6 feet, but don't wait.

- 6 **Guadalupe Palm** *Brahea edulis*
Two fine examples of this rare, extremely slow-growing palm are just north of the Mausoleum. These c. 1900 specimens originally grew at the first women's dormitory; they were transplanted in 1996 to make room for new Sequoia Hall.

- Deodar Cedar *Cedrus deodara* 7
 Three deodar cedars at Burnham Pavilion, along Serra and Galvez streets, date to 1915; two are about 4 feet in diameter, the much-pruned double-trunk specimen is 5 feet across.
- Atlas Cedar *Cedrus libani atlantica* 'Glauca' 8
 In the lawn in front of Hoover Tower, this tree was planted by President Benjamin Harrison during a campus visit in 1891.
- Port Orford Cedar *Chamaecyparis lawsoniana* 9
 Several examples, new and old, of this graceful conifer can be seen at Kingscote Gardens, including columnar forms near the pond, one with gold tips.
- Floss-Silk Tree *Chorisia speciosa* 10
 An interesting green-trunk tree with impressive spines and spectacular flowers, in the outer southwest island of the Quad. See the main text for other good examples.
- Monterey Cypress *Cupressus macrocarpa* 11
 The giant at 858 Lathrop Drive is one of the old cypresses for which Pine Hill is named. Probably planted in the 1890s by the university's first gardener, Thomas Douglas.
- Karri *Eucalyptus diversicolor* 12
 The splendid specimen at 645 Cabrillo Avenue was planted by Professor W. F. Durand in 1910. In its native habitat, *E. diversicolor* grows to be one of the world's tallest trees.
- Blue Gum *Eucalyptus globulus* 13
 The remaining sections of Governor's Avenue and the portion now called Panama Street (near Campus Drive West) hold a few remnants of more than 700 Tasmanian blue gums planted along the lane by Leland Stanford in the late 1870s.
- Manna Gum *Eucalyptus viminalis* 14
 This spectacular eucalyptus towers over the artificial turf field at the end of Mel Nelson Lane. Park at the Sunken Diamond.
- White Ash *Fraxinus americana* 15
 In the lawn west of Encina Commons, along Galvez Mall, this white ash was planted in the 1890s.

- 16 **Chinese Fan Palm** *Livistona chinensis*
A single specimen grows in the outer northeast island of the Inner Quad; it's the palm with rings on the trunk.
- 17 **Dawn Redwood** *Metasequoia glyptostroboides*
Stanford President and Mrs. J. E. Wallace Sterling planted this specimen in 1953 at the Lou Henry Hoover House, in the lawn near Cabrillo Avenue, southwest of the California Historical Landmark plaque.
- 18 **Red Mulberry** *Morus rubra*
Featured in the back cover photo, this knobby-trunk tree was planted around 1890 in the outer northeast island of the Quad.
- 19 **Tree Bear Grass** *Nolina matapensis*
A Mexican plant discovered in the 1930s and named by Stanford botanist Ira Wiggins, who undoubtedly planted the 15-foot yucca-like specimen in the inner southeast circle of the Inner Quad.
- 20 **Avocado** *Persea americana*
On the west side of Memorial Church is a mighty three-trunked avocado.
- 21 **Canary Island Date Palm** *Phoenix canariensis*
Stanford's formal entry street, Palm Drive, is lined with 166 palms. The vast majority are Canary Island date palms, but several of a thin-trunked relative, possibly *P. sylvestris*, are mixed in.
- 22 **Italian Stone Pine** *Pinus pinea*
Many beautiful specimens on campus, including one on Galvez Street west of Burnham Pavilion; another beauty is nearby in the courtyard lawn behind the Arrillaga Alumni Center.
- 23 **Gray Pine** *Pinus sabiniana*
A century-old specimen leaning like the tower in Pisa is on Museum Way between Lomita and Palm drives.
- 24 **Torrey Pine** *Pinus torreyana*
At present only a bit shorter than the national champion Torrey pine in Southern California, our 1898 Goliath is located at the northwest corner of the intersection of Palm Drive and Arboretum Road. Other tall ones are nearby.

- California Plane, Sycamore *Platanus racemosa* 25
 The sycamore in front of 524 Gerona Road, initially trained in bonsai style but allowed to grow huge, is stunning; the natural specimen on the south side of the Old Union also is great.
- Coast Live Oak *Quercus agrifolia* 26
 Numerous exceptional examples of this native tree. Visit the Pioneer Oak (the tree adopted by the Pioneer Class of 1895) at the intersection of Serra Mall and Lasuen Mall, near the Graduate School of Business. Don't miss the plaque that marks the Gordon Hampton oak at the southwest corner of Galvez Street and Campus Drive East.
- Blue Oak *Quercus douglasii* 27
 A native oak with a definite blue cast in its foliage. A worthy example grows to the right of the entrance to Dinkelspiel Auditorium.
- Valley Oak *Quercus lobata* 28
 Native here, but not as plentiful as the coast live oak. Patriarchs in the central campus have suffered from adjacent construction and asphalt; a beautiful specimen spreads its limbs in the faculty housing area between 708 and 712 Salvatierra Street.
- Coast Redwood *Sequoia sempervirens* 29
 One of Stanford's best redwoods grows in the lawn north of the Old Union, near Duena Street and Panama Mall.
- Western Red Cedar *Thuja plicata* 30
 A good example of a tree accustomed to the moist Northwest grows at Kingscote Gardens, next to the driveway in the large lawn adjacent to the bunya bunya tree.
- Windmill Palm *Trachycarpus fortunei* 31
 Original plantings still grow in the inner and outer southeast islands of the Inner Quad; specimens this tall are rarely seen.
- Yucca *Yucca filifera* 32
 A remarkable specimen is just north of the Cantor Center. Two large ones in the nearby Arizona Garden also should be visited.

- 33 California Fan Palm *Washingtonia filifera*
Examples from 1890 are in several of the Inner Quad circles. See map, page 279, for details.
- 34 Mexican Fan Palm *Washingtonia robusta*
A group of three towers over the Quad just west of Memorial Court, behind Building 460.



Quercus coccinea, Scarlet Oak

Tree Maps

The maps on the following pages enable one to visit and get acquainted with particular trees and learn their names. A major step on the path to familiarity is learning a name; thus armed, the explorer can look up information and talk to others about discoveries.

These maps, along with the list of *Noteworthy Trees* on page 272, can be used to create pleasant outings or guided tree walks. To be a guide, it is not necessary to be an expert. Experience shows that groups should be limited to about a dozen people; if there are more, you will find the laggards strolling up to a tree just as you are moving off with the main group to your next fascinating stop. Those bringing up the rear have, however, been enjoying their own conversation and don't seem to mind missing your commentary, no matter how brilliant.

The following seven maps provide a good start for those planning tree tours. The areas mapped are centrally located, and have both a diversity and density of trees. All are oriented with north down, as if approaching from Palm Drive, except the Cantor Center map, which is oriented toward Museum Way. Scale varies somewhat, but fixed features—buildings, pathways, streets, sculpture, lawns, and numerous lampposts—should allow fairly precise location.

Residents of neighboring cities are in the same climatic zone as Stanford and will find our tree collection relevant to their own interests. Conversely there are specimens of interest to campus dwellers that are located off campus. A dozen Palo Alto tree walks are available in printed form and on the Web from Canopy, a tree advocacy group, at 650.964.6110, www.canopy.org.

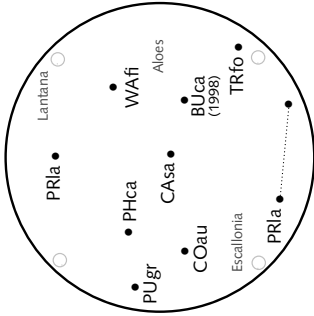
Stanford tree maps:

- Inner Quad, page 279
- Cantor Center (Museum), pages 280–81
- Green/Meyer Library Area, pages 282–83
- School of Law/Canfield Court, pages 284–85
- Old Union, pages 286–87
- Wilbur Hall, pages 288–89
- Escondido Mall/South Quad, pages 290–92

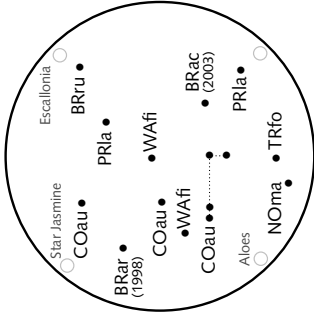
INNER QUAD

Memorial Church

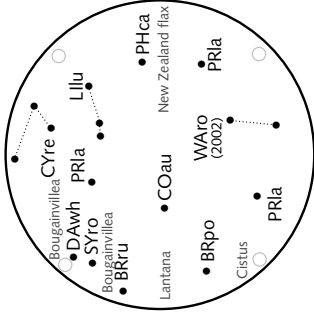
1—outer southeast



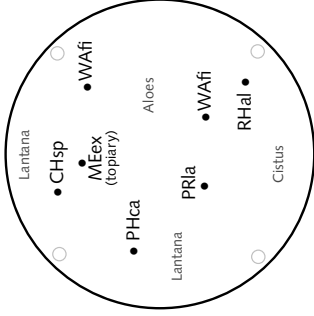
2—inner southeast



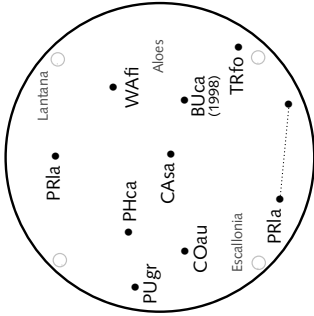
3—inner southwest



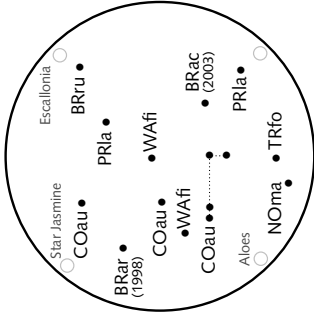
4—outer southwest



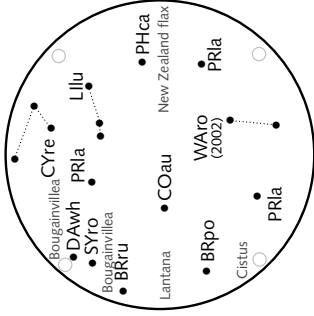
5—outer northeast



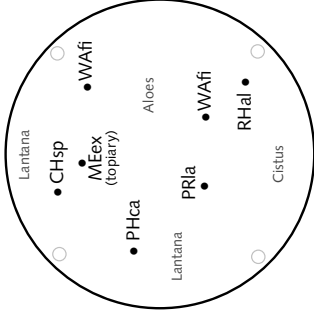
6—inner northeast



7—inner northwest



8—outer northwest



- BRac = *Brachycton acrifolius*, **FLAME TREE**
- BRar = *Brahea armata*, **MEXICAN BLUE PALM**
- BRpo = *Brachycton populneus*, **KURRAIONG**
- BRru = *Brachycton ripetris*, **BOTTLE TREE**
- BUca = *Burita capitata*, **PINDO PALM**
- CAja = *Camellia japonica*, **CAMELLIA**
- CAsa = *Camellia sasangua*, **CAMELLIA**
- CHsp = *Chorisia speciosa*, **FLOSS-SILK TREE**
- Cica = *Cinnamomum camphora*, **CAMPFOR TREE**
- COau = *Cordyline australis*, **PALM LILY**
- CRja = *Cryptomeria 'Lobbii Nana'*

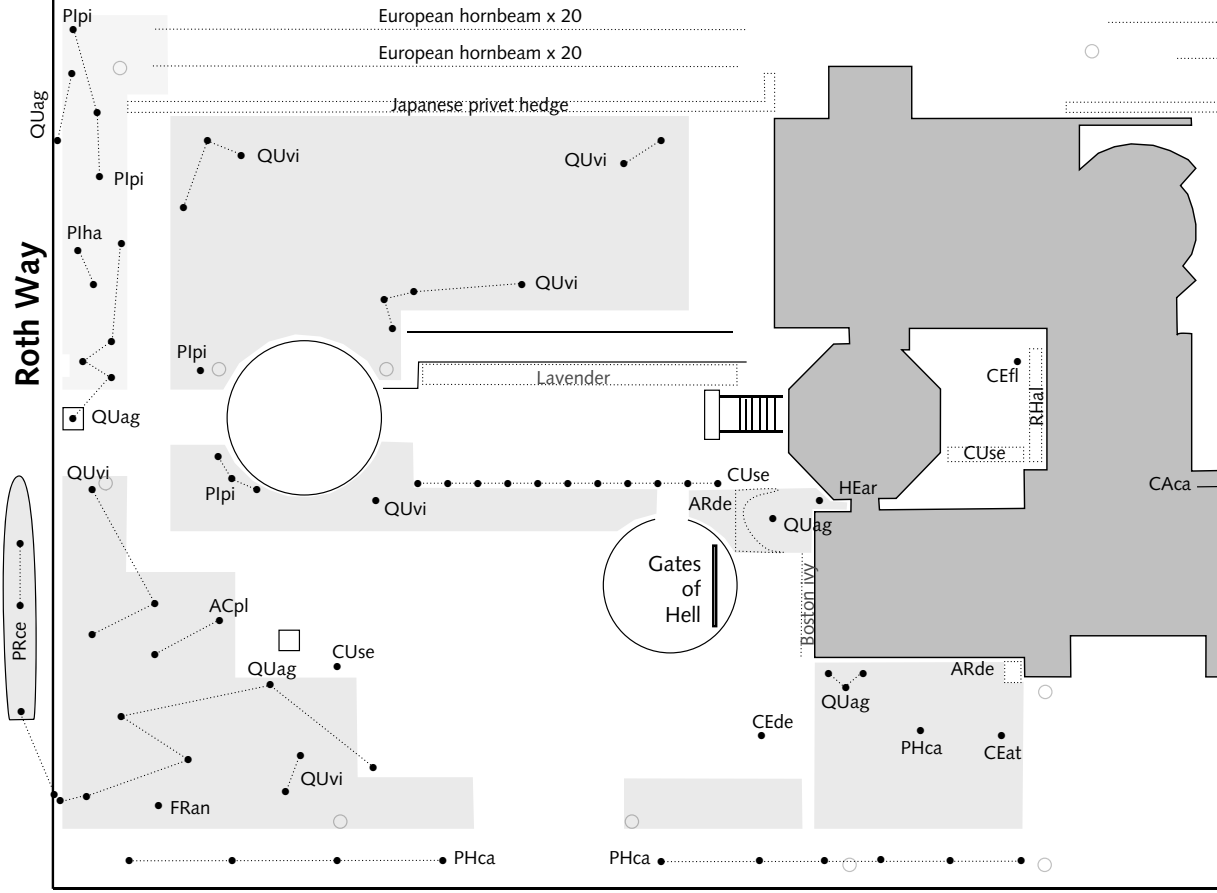
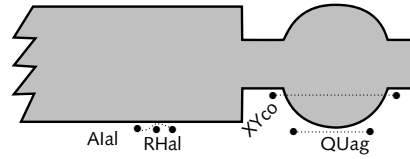
- Cyre = *Cycas revoluta*, **SAGO PALM**
- DAin = *Davidia involucreta*, **DOVE TREE**
- DAwh = *Dasylirion wheeleri*, **DESERT SPOON**
- JAmi = *Jacaranda mimosifolia*, **JACARANDA**
- JUsp = *Juniperus* species, **JUNIPER**
- LAln = *Lagerstroemia indica*, **GRAPE MYRTLE**
- Liliu = *Ligustrum lucidum*, **GLOSSY PRIVET**
- Lich = *Livistona chinensis*, **CHINESE FAN PALM**
- MTeex = *Metrosideros excelsa*, **POHUTUKAWA**
- MOru = *Morus rubra*, **RED MULBERRY**
- NOMA = *Nolina matapensis*, **TREE BEAR GRASS**

- PAto = *Paulownia tomentosa*, **EMRESS TREE**
- PHca = *Phoenix cananensis*, **CANARY ISLAND DATE PALM**
- PRla = *Prunus laurocerasus*, **ENGLISH LAUREL**
- PUgr = *Punica granatum*, **POMEGRANATE**
- RHal = *Rhamnus alaternus*, **ITALIAN BUCKTHORN**
- SYro = *Syagrus romanzoffianum*, **QUEEN PALM**
- TAho = *Talauma hodgsonii*
- TRfo = *Trachycarpus fortunei*, **WINDMILL PALM**
- YUsc = *Yucca schottii*, **MOUNTAIN YUCCA**
- WAFi = *Washingtonia filifera*, **CALIFORNIA FAN PALM**

- WArO = *Washingtonia robusta*, **MEXICAN FAN PALM**
- Ground covers *Arctostaphylos uva-ursi* 'Point Reyes', *A. 'Emerald Carpet'*, and *Duchesnea indica* (Indian Mock Strawberry) are planted in the circles.

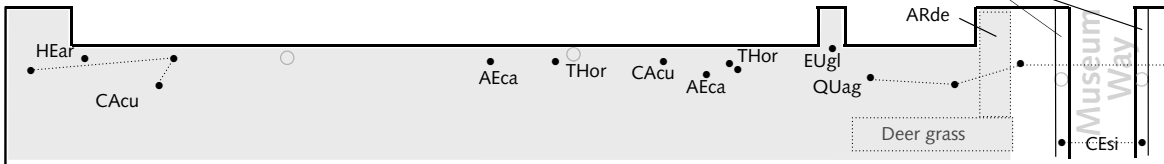
- Fingado Memorial Bench (1931)
- Lamppost

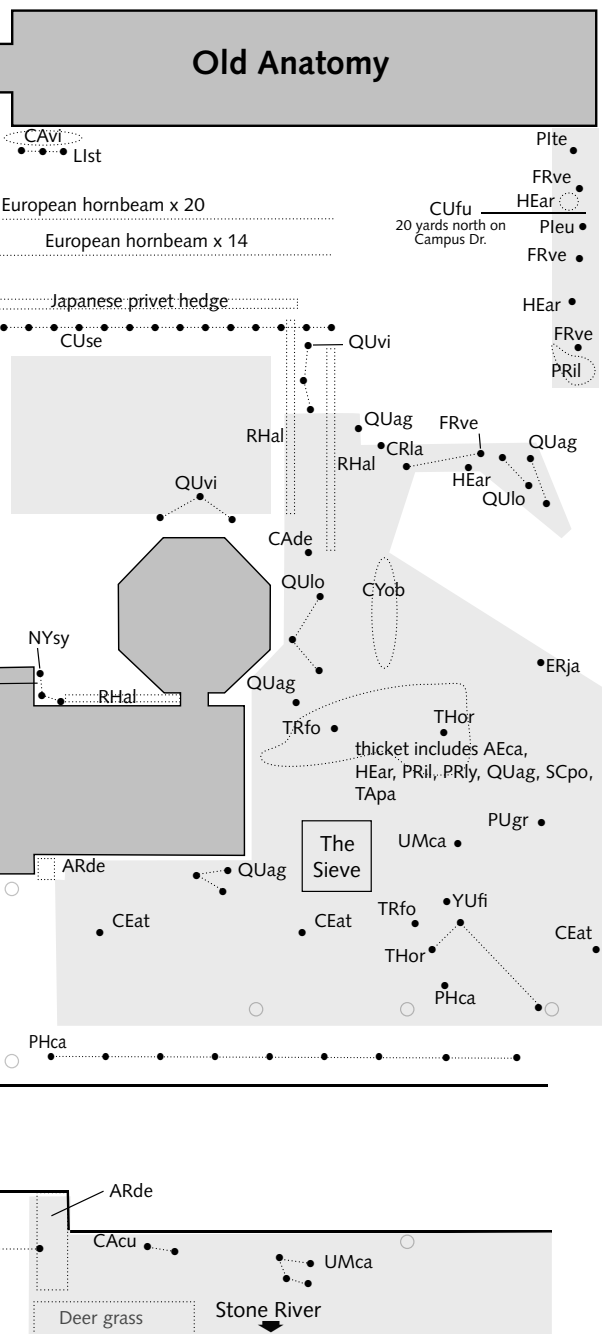
CANTOR CENTER (MUSEUM)



Lomita Drive

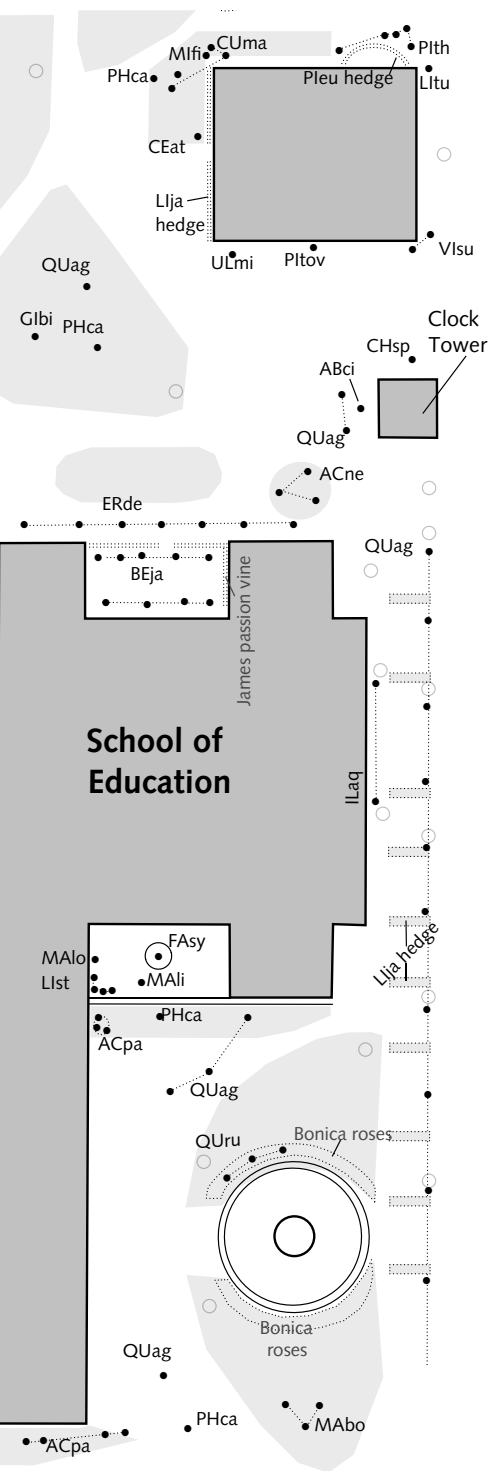
Arctostaphylos 'Pacific Mist'





- ACpl = *Acer platanoides* 'Schwedler,' NORWAY MAPLE
- AEca = *Aesculus californica*, CALIFORNIA BUCKEYE
- Alal = *Ailanthus altissima*, TREE-OF-HEAVEN
- ARde = *Arctostaphylos densiflora* 'Howard McMinn,' VINE HILL MANZANITA
- CABe = *Carpinus betulus* 'Fastigiata,' EUROPEAN HORNBEAM
- CAca = *Carpenteria californica*, BUSH ANEMONE
- CAcu = *Casuarina cunninghamiana*, RIVER SHE-OAK
- CAde = *Calocedrus decurrens*, INCENSE CEDAR
- CAvi = *Callistemon viminalis*, WEEPING BOTTLEBRUSH
- CEat = *Cedrus libani atlantica* 'Glauca,' ATLAS CEDAR
- CEde = *Cedrus deodara*, DEODAR CEDAR
- CEfl = *Cercidium floridum*, BLUE PALO VERDE
- CEsi = *Celtis sinensis*, CHINESE HACKBERRY
- CRla = *Crataegus laevigata*, ENGLISH HAWTHORN
- CUfu = *Cupressus funebris*, FUNERAL CYPRESS
- CUse = *Cupressus sempervirens*, ITALIAN CYPRESS
- CYob = *Cydonia oblonga*, QUINCE
- ERja = *Eriobotrya japonica*, LOQUAT
- EUgl = *Eucalyptus globulus*, BLUE GUM
- FRan = *Fraxinus angustifolia* 'Raywood,' RAYWOOD ASH
- FRve = *Fraxinus velutina* 'Modesto,' MODESTO ASH
- HEar = *Heteromeles arbutifolia*, TOYON
- Llja = *Ligustrum japonicum* 'Texanum,' JAPANESE PRIVET
- List = *Liquidambar styraciflua*, AMERICAN SWEET GUM
- PHca = *Phoenix canariensis*, CANARY ISLAND DATE PALM
- Pleu = *Pittosporum eugenioides*, TARATA
- PIha = *Pinus halepensis*, ALEPPO PINE
- PIpi = *Pinus pinea*, ITALIAN STONE PINE
- Pite = *Pittosporum tenuifolium*, KOHUHU
- PRce = *Prunus cerasifera* 'Atropurpurea,' CHERRY PLUM
- PRil = *Prunus ilicifolia*, HOLLY-LEAF CHERRY
- PRly = *Prunus lyonii*, CATALINA CHERRY
- PUgr = *Punica granatum*, POMEGRANATE
- QUag = *Quercus agrifolia*, COAST LIVE OAK
- QUlo = *Quercus lobata*, VALLEY OAK
- QUvi = *Quercus virginiana*, SOUTHERN LIVE OAK
- RHal = *Rhamnus alaternus*, ITALIAN BUCKTHORN
- SCpo = *Schinus polygamus*, CHILEAN PEPPER TREE
- TApA = *Tamarix parviflora*, TAMARISK
- THor = *Thuja orientalis*, ORIENTAL ARBOVITAE
- TRfo = *Trachycarpus fortunei*, WINDMILL PALM
- UMca = *Umbellularia californica*, CALIFORNIA BAY
- XYco = *Xylosma congestum*, XYLOSMA
- YUfi = *Yucca filifera*, YUCCA
- Lamppost

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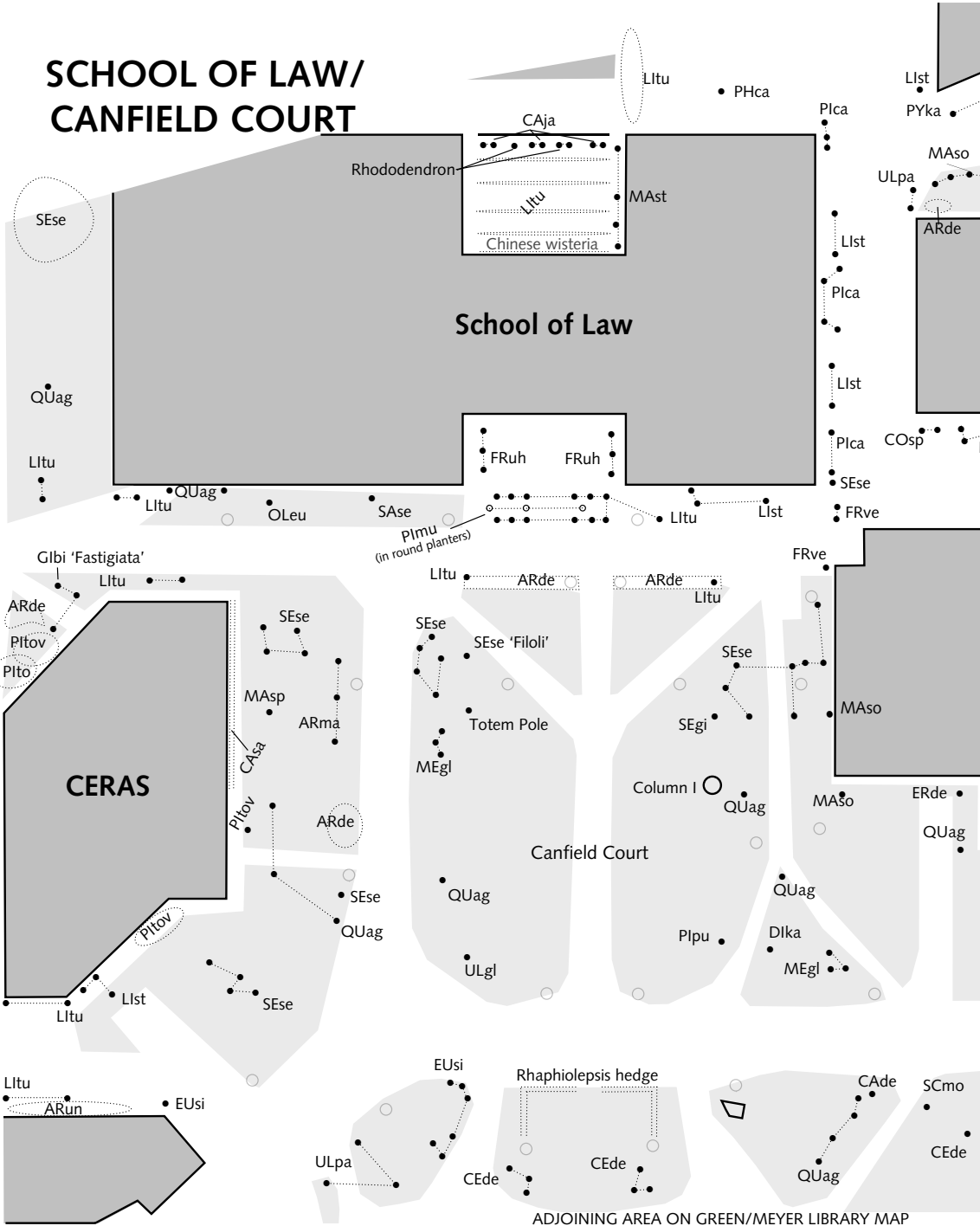


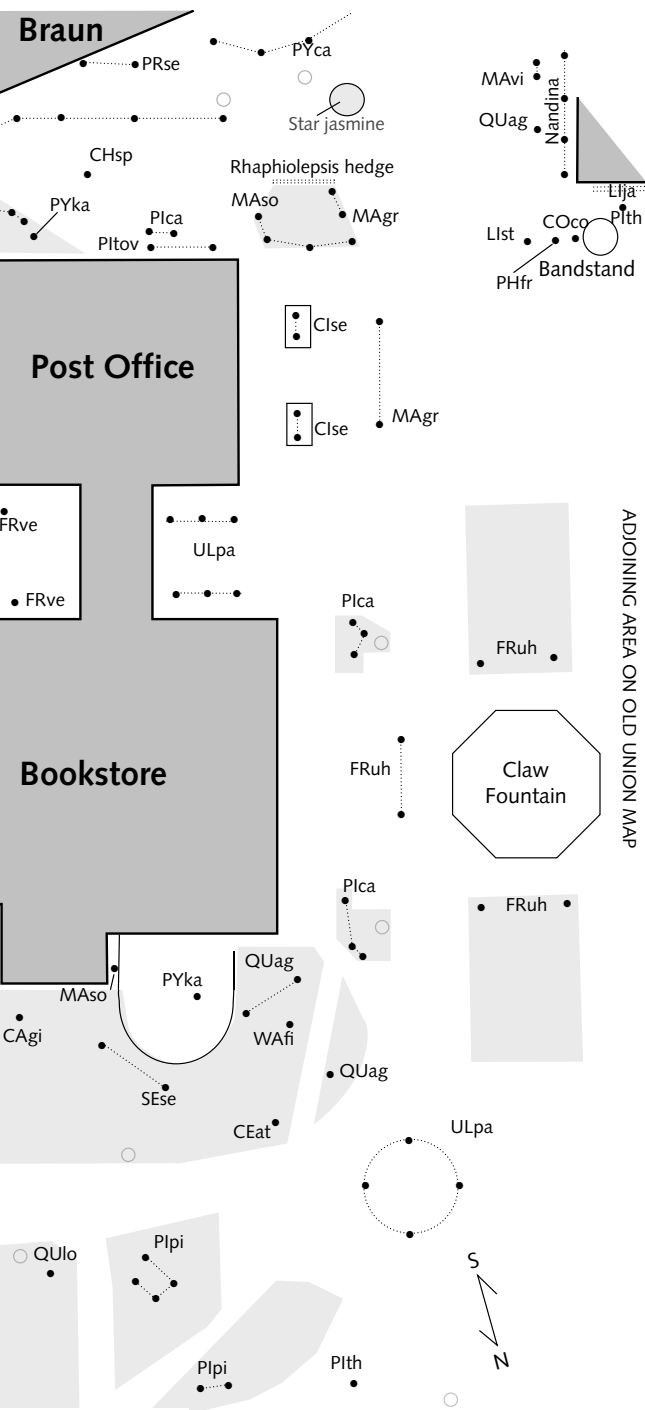
John Rawlings 2003

ADJOINING AREA ON ESCONDIDO MALL & INNER QUAD MAPS

- ABci = *Abies cilicica*, CILICIAN FIR
- ACne = *Acer negundo*, BOX ELDER
- ACpa = *Acer palmatum* 'Sango Kaku', JAPANESE MAPLE
- AGro = *Agathis robusta*, QUEENSLAND KAURI
- ALrh = *Alnus rhombifolia*, WHITE ALDER
- ARde = *Arctostaphylos densiflora*, MANZANITA
- ARhe = *Araucaria heterophylla*, NORFOLK ISLAND PINE
- ARma = *Arbutus* 'Marina'
- ARun = *Arbutus unedo*, STRAWBERRY TREE
- BEja = *Betula jacquemontii*, HIMALAYAN BIRCH
- CEat = *Cedrus libani atlantica*, ATLAS CEDAR
- CEli = *Cedrus libani libani*, CEDAR OF LEBANON
- CHsp = *Chorisia speciosa*, FLOSS-SILK TREE
- COLa = *Cotoneaster lacteus*, COTONEASTER
- CUma = *Cupressus macrocarpa*, MONTEREY CYPRESS
- CYco = *Cyathea cooperi*, AUSTRALIAN TREE FERN
- DRma = *Dracaena marginata*
- ERde = *Eriobotrya deflexa*, BRONZE LOQUAT
- EUca = *Eucalyptus camaldulensis*, RIVER RED GUM
- EUIa = *Eucalyptus laeiae*, DARLING RANGE GHOST GUM
- EUnl = *Eucalyptus nicholii*, WILLOW-LEAVED PEPPER-MINT
- EUPa = *Eucalyptus patens*, SWAN RIVER BLACKBUTT
- EUpo = *Eucalyptus polyanthemus*, RED BOX
- EUsi = *Eucalyptus sideroxylon*, RED IRONBARK
- FAsy = *Fagus sylvatica* 'Purpurea Pendula', WEEPING COPPER BEECH
- Gibi = *Ginkgo biloba*, MAIDENHAIR TREE
- ILaq = *Ilex aquifolium*, ENGLISH HOLLY
- Llja = *Ligustrum japonicum* 'Texanum', JAPANESE PRIVET
- List = *Liquidambar styraciflua*, AMERICAN SWEET GUM
- Litu = *Liriodendron tulipifera*, TULIP TREE
- MABo = *Maytenus boaria*, MAYTEN TREE
- MAlil = *Magnolia liliflora*, LILY MAGNOLIA
- MAlol = *Mahonia lomariifolia*
- MAvi = *Magnolia virginiana*, SWEET BAY
- Mifi = *Michelia figo*, BANANA SHRUB
- NEol = *Nerium oleander*, OLEANDER
- OLEu = *Olea europea*, OLIVE
- PATo = *Paulownia tomentosa*, EMPRESS TREE
- PHca = *Phoenix canariensis*, CANARY ISLAND PALM
- Pleu = *Pittosporum eugenioides*, TARATA
- PIha = *Pinus halepensis*, ALEPPO PINE
- Pith = *Pinus thunbergii*, JAPANESE BLACK PINE
- PItov = *Pittosporum tobira*, TOBIRA
- PITov = *Pittosporum tobira* 'Variegata'
- POca = *Populus x canadensis*, CAROLINA POPLAR
- PYka = *Pyrus kawakamii*, EVERGREEN PEAR
- QUag = *Quercus agrifolia*, COAST LIVE OAK
- QUru = *Quercus rubra*, RED OAK
- SABa = *Salix babylonica*, WEEPING WILLOW
- SASe = *Sapium sebiferum*, CHINESE TALLOW TREE
- SCmo = *Schinus molle*, PEPPER TREE
- ULmi = *Ulmus minor*, ENGLISH ELM
- ULpa = *Ulmus parvifolia*, CHINESE ELM
- Vlsu = *Viburnum suspensum*, SANDANKWA VIBURNUM
- XAqu = *Xanthorrhoea quadrangulata*, GRASS TREE
- ZEse = *Zelkova serrata*, SAWLEAF ZELKOVA
- Lamppost

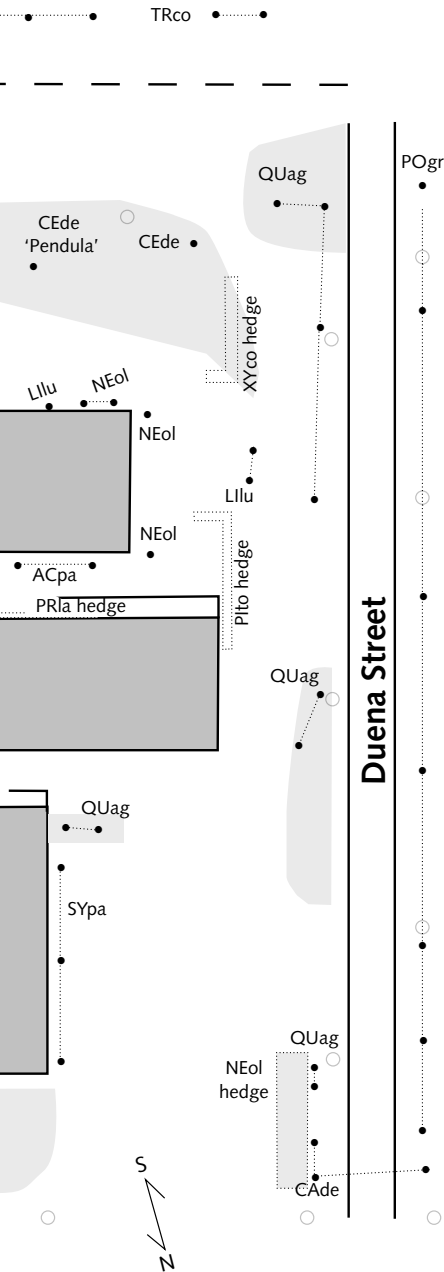
SCHOOL OF LAW/ CANFIELD COURT





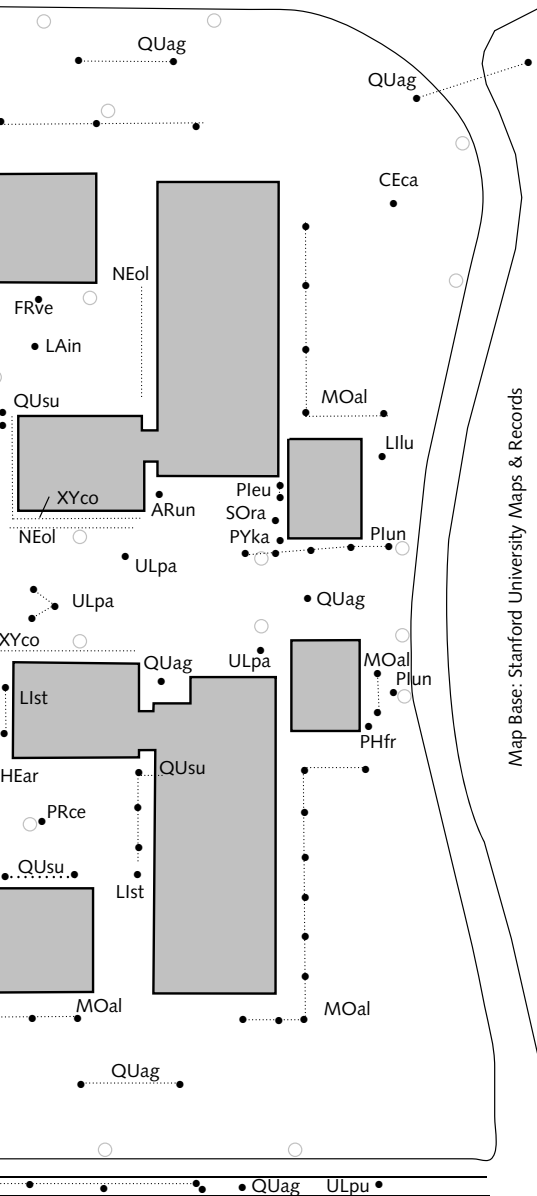
John Rawlings 2003

- ACpa = *Acer palmatum*, JAPANESE MAPLE
- ARde = *Arctostaphylos densiflora*, MANZANITA
- ARma = *Arbutus 'Marina'*
- ARun = *Arbutus unedo*, STRAWBERRY TREE
- CAde = *Calocedrus decurrens*, INCENSE CEDAR
- CAGi = *Caesalpinia gilliesii*, YELLOW BIRD OF PARADISE
- CAja = *Camellia japonica*, CAMELLIA
- CAsa = *Camellia sasanqua*, CAMELLIA
- CEat = *Cedrus libani atlantica 'Glauca'*, ATLAS CEDAR
- CEde = *Cedrus deodara*, DEODAR CEDAR
- CHsp = *Chorisia speciosa*, FLOSS-SILK TREE
- Clse = *Citrus sinensis*, VALENCIA ORANGE
- COco = *Cotinus coggygria 'Royal Purple'*, SMOKE TREE
- COsp = *Cornus* species, DOGWOOD
- DLka = *Diospyros kaki*, JAPANESE PERSIMMON
- ERde = *Eriobotrya deflexa*, BRONZE LOQUAT
- EUSi = *Eucalyptus sideroxyylon*, RED IRONBARK
- FRuh = *Fraxinus uhdei*, SHAMEL ASH
- FRve = *Fraxinus velutina 'Modesto'*, MODESTO ASH
- Gibi = *Ginkgo biloba*, MAIDENHAIR TREE
- Llja = *Ligustrum japonicum 'Texanum'*, JAPANESE PRIVET
- Lllu = *Ligustrum lucidum*, GLOSSY PRIVET
- List = *Liquidambar styraciflua*, AMERICAN SWEET GUM
- Lltu = *Liriodendron tulipifera*, TULIP TREE
- MAbo = *Maytenus boaria*, MAYTEN TREE
- MAfl = *Malus floribunda*, JAPANESE FLOWERING CRAB
- MAgr = *Magnolia grandiflora*, SOUTHERN MAGNOLIA
- MAso = *Magnolia x soulangiana*, SAUCER MAGNOLIA
- MAsp = *Malus* species, CRAB APPLE
- MAst = *Magnolia stellata*, STAR MAGNOLIA
- MAvi = *Magnolia virginiana*, SWEET BAY
- MEgl = *Metasequoia glyptostroboides*, DAWN REDWOOD
- NAdo = *Nandina domestica*, HEAVENLY BAMBOO
- NEol = *Nerium oleander*, OLEANDER
- OLEu = *Olea europaea*, OLIVE
- PHca = *Phoenix canariensis*, CANARY ISLAND PALM
- PHfr = *Photina x fraseri*, FRASER'S PHOTINIA
- Pica = *Pinus canariensis*, CANARY ISLAND PINE
- Pleu = *Pittosporum eugenioides*, TARATA
- Pimu = *Pinus mugo*, SWISS MOUNTAIN PINE
- Pipi = *Pinus pinea*, ITALIAN STONE PINE
- Pipu = *Picea pungens glauca*, COLORADO BLUE SPRUCE
- Pith = *Pinus thunbergii*, JAPANESE BLACK PINE
- Pito = *Pittosporum tobira*, TOBIRA
- Pitov = *Pittosporum tobira 'Variegata'*
- PRse = *Prunus serrulata*, FLOWERING CHERRY
- PYca = *Pyrus calleryana 'Bradford'*, BRADFORD PEAR
- PYka = *Pyrus kawakamii*, EVERGREEN PEAR
- QUag = *Quercus agrifolia*, COAST LIVE OAK
- QUlo = *Quercus lobata*, VALLEY OAK
- SASE = *Sapium sebiferum*, CHINESE TALLOW TREE
- SCmo = *Schinus molle*, PEPPER TREE
- SEgi = *Sequoiadendron giganteum*, BIG TREE
- SEse = *Sequoia sempervirens*, COAST REDWOOD
- ULgl = *Ulmus glabra 'Camperdownii'*, CAMPERDOWN ELM
- ULpa = *Ulmus parvifolia*, CHINESE ELM
- Wafi = *Washingtonia filifera*, CALIFORNIA FAN PALM
- Lamppost



John Rawlings 2003

- ACpa = *Acer palmatum*, JAPANESE MAPLE
- CAde = *Calocedrus decurrens*, INCENSE CEDAR
- CAoc = *Calycanthus occidentalis*, SPICE BUSH
- CEat = *Cedrus libani atlantica* 'Glauc', ATLAS CEDAR
- CEde = *Cedrus deodara*, DEODAR CEDAR
- CEsi = *Ceratonia siliqua*, CAROB
- COau = *Cordyline australis*, PALM LILY
- CRla = *Crataegus laevigata*, ENGLISH HAWTHORN
- DAin = *Davidia involucrata*, DOVE TREE
- Dika = *Diospyros kaki*, JAPANESE PERSIMMON
- ERhu = *Erythrina humeana*, NATAL CORAL TREE
- FRuh = *Fraxinus uhdei*, SHAMEL ASH
- Lllu = *Ligustrum lucidum*, GLOSSY PRIVET
- List = *Liquidambar styraciflua*, AMERICAN SWEET GUM
- Lltu = *Liriodendron tulipifera*, TULIP TREE
- MABo = *Maytenus boaria*, MAYTEN TREE
- MAfl = *Malus floribunda*, JAPANESE FLOWERING CRAB APPLE
- MAsy = *Malus sylvestris*, APPLE
- MOal = *Morus alba*, WHITE MULBERRY
- NEol = *Nerium oleander*, OLEANDER
- OLEu = *Olea europea*, OLIVE
- Plab = *Picea abies*, NORWAY SPRUCE
- Pica = *Pinus canariensis*, CANARY ISLAND PINE
- Pleu = *Pittosporum eugenioides*, TARATA
- Plor = *Picea orientalis*, ORIENTAL SPRUCE
- Pipu = *Picea pungens glauca*, COLORADO BLUE SPRUCE
- Pito = *Pittosporum tobira*, TOBIRA
- PLra = *Platanus racemosa*, CALIFORNIA PLANE
- POgr = *Podocarpus gracilior*, FERN PODOCARPUS
- PRla = *Prunus laurocerasus*, ENGLISH LAUREL
- PRpe = *Prunus persica*, PEACH
- PUgr = *Punica granatum*, POMEGRANATE
- QUag = *Quercus agrifolia*, COAST LIVE OAK
- SEse = *Sequoia sempervirens*, COAST REDWOOD
- SORa = *Solanum rantonnetii* 'Grandiflorum'
- SYpa = *Syzygium paniculatum*, BRUSH CHERRY
- TRco = *Tristania conferta*, BRUSH BOX
- ULpa = *Ulmus parvifolia*, CHINESE ELM
- XYco = *Xylosma congestum*, XYLOSMA
- Lamppost



Map Base: Stanford University Maps & Records

- ACbu = *Acer buergeranum*, TRIDENT MAPLE
- ACpa = *Acer palmatum*, JAPANESE MAPLE
- AEca = *Aesculus x carnea*, RED HORSE CHESTNUT
- AGam = *Agave americana*, CENTURY PLANT
- ARhe = *Araucaria heterophylla*, NORFOLK ISLAND PINE
- ARun = *Arbutus unedo*, STRAWBERRY TREE
- BRpo = *Brachychiton populneus*, KURRAJONG
- CEca = *Cercis canadensis*, EASTERN REDBUD
- CEde = *Cedrus deodara*, DEODAR CEDAR
- CHhu = *Chamerops humilis*, MEDITERRANEAN FAN PALM
- ERja = *Eriobotrya japonica*, LOQUAT
- EUCi = *Eucalyptus cinerea*, ARGYLE APPLE
- FRve = *Fraxinus velutina* 'Modesto', MODESTO ASH
- GLtr = *Gleditsia triacanthos*, HONEY LOCUST
- HEar = *Heteromeles arbutifolia*, TOYON
- JUch = *Juniperus chinensis* 'Tortulosa', HOLLYWOOD JUNIPER
- LAI = *Lagerstroemia indica*, CRAPE MYRTLE
- Llja = *Ligustrum japonicum* 'Texanum', JAPANESE PRIVET
- Lllu = *Ligustrum lucidum*, GLOSSY PRIVET
- List = *Liquidambar styraciflua*, AMERICAN SWEET GUM
- Litu = *Liriodendron tulipifera*, TULIP TREE
- MAbo = *Maytenus boaria*, MAYTEN TREE
- MAfl = *Malus floribunda*, JAPANESE FLOWERING CRAB APPLE
- MAGR = *Magnolia grandiflora*, SOUTHERN MAGNOLIA
- MOal = *Morus alba*, WHITE MULBERRY
- NEol = *Nerium oleander*, OLEANDER
- PHca = *Phoenix canariensis*, CANARY ISLAND DATE PALM
- PHfr = *Photinia x fraseri*, FRASER'S PHOTINIA
- Pich = *Pistacia chinensis*, CHINESE PISTACHE
- Picr = *Pittosporum crassifolium*, KARO
- Pleu = *Pittosporum eugenioides*, TARATA
- Plmu = *Pinus mugo*, SWISS MOUNTAIN PINE
- Plsp = *Pittosporum species*
- Pito = *Pittosporum tobira*, TOBIRA
- Pitov = *Pittosporum tobira* 'Variegata'
- Plun = *Pittosporum undulatum*, MOCK ORANGE
- PRce = *Prunus cerasifera*, CHERRY PLUM
- PRlu = *Prunus lusitanica*, PORTUGUESE LAUREL
- PYca = *Pyrus calleryana*, CALLERY PEAR
- PYka = *Pyrus kawakamii*, EVERGREEN PEAR
- QUag = *Quercus agrifolia*, COAST LIVE OAK
- QUdo = *Quercus douglasii*, BLUE OAK
- QUsu = *Quercus suber*, CORK OAK
- SCmo = *Schinus molle*, PEPPER TREE
- SORa = *Solanum rantonnetii* 'Grandiflorum'
- THor = *Thuja orientalis*, ORIENTAL ARBORVITAE
- TRco = *Tristania conferta*, BRUSH BOX
- ULpa = *Ulmus parvifolia*, CHINESE ELM
- ULpu = *Ulmus pumila*, SIBERIAN ELM
- WARo = *Washingtonia robusta*, MEXICAN FAN PALM
- XYco = *Xylosma congesta*, XYLOSMA
- Lamppost

ACme = *Acacia melanoxylon*, BLACKWOOD ACACIA
 ACpa = *Acer palmatum*, JAPANESE MAPLE
 ACpl = *Acer platanoides*, NORWAY MAPLE
 Alal = *Ailanthus altissima*, TREE OF HEAVEN
 ALju = *Albizia julibrissin*, SILK TREE
 ARde = *Arctostaphylos densiflora*, VINE HILL MANZANITA
 ARun = *Arbutus unedo*, STRAWBERRY TREE
 BUmi = *Buxus microphylla*, JAPANESE BOXWOOD
 CAde = *Calocedrus decurrens*, INCENSE CEDAR
 CEat = *Cedrus libani atlantica* 'Glauca', ATLAS CEDAR
 CEde = *Cedrus deodara*, DEODAR CEDAR
 CEsi = *Ceratonia siliqua*, CAROB
 CHre = *Chionanthus retusus*, CHINESE FRINGE TREE
 Cigl = *Cinnamomum glanduliferum*, NEPAL CAMPHOR TREE
 COca = *Cornus capitata*, EVERGREEN DOGWOOD
 COfl = *Cornus florida*, FLOWERING DOGWOOD
 COLa = *Cotoneaster lacteus*, COTONEASTER
 Elpu = *Elaeagnus pungens*, SILVERBERRY
 ERde = *Eriobotrya deflexa*, BRONZE LOQUAT
 ERja = *Eriobotrya japonica*, LOQUAT
 EUci = *Eucalyptus citriodora*, LEMON-SCENTED GUM
 EUja = *Euonymus japonicus*, EVERGREEN EUONYMUS
 FOMA = *Fortunella margarita*, KUMQUAT
 FRor = *Fraxinus ornus*, FLOWERING ASH
 FRve = *Fraxinus velutina* 'Modesto', MODESTO ASH
 GAel = *Garrya elliptica*, COAST SILKTASSEL
 Glbi = *Ginkgo biloba*, MAIDENHAIR TREE
 JUchp = *Juniperus chinensis* 'Pfitzeriana', PFITZER JUNIPER
 JUcht = *Juniperus chinensis* 'Tortulosa', HOLLYWOOD
 JUNIPER
 Lltu = *Liriodendron tulipifera*, TULIP TREE
 MAbo = *Maytenus boaria*, MAYTEN TREE
 MAfl = *Malus floribunda*, JAPANESE FLOWERING CRAB
 APPLE
 MAGr = *Magnolia grandiflora*, SOUTHERN MAGNOLIA
 MAso = *Magnolia x soulangiana*, SAUCER MAGNOLIA
 Mlch = *Michelia champaca*, CHAMPACA
 MOal = *Morus alba*, WHITE MULBERRY
 MYco = *Myrtus communis*, COMMON MYRTLE
 NEol = *Nerium oleander*, OLEANDER
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 OSfr = *Osmanthus fragrans*, SWEET OLIVE
 OShe = *Osmanthus heterophyllus*, HOLLY-LEAF
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 PEam = *Persea americana*, AVOCADO
 PHca = *Phoenix canariensis*, CANARY ISLAND DATE PALM
 PHpu = *Philadelphus pubescens*
 PHte = *Phormium tenax*, NEW ZEALAND FLAX
 Plca = *Pinus canariensis*, CANARY ISLAND PINE
 Plch = *Pistacia chinensis*, CHINESE PISTACHE
 Pleu = *Pittosporum eugenioides*, TARATA
 Ppip = *Pinus pinea*, ITALIAN STONE PINE
 Plth = *Pinus thunbergii*, JAPANESE BLACK PINE
 Pito = *Pittosporum tobira*, TOBIRA
 PtoV = *Pittosporum tobira* 'Variegata'
 Plun = *Pittosporum undulatum*, MOCK ORANGE
 PRbl = *Prunus x blireiana*, FLOWERING PLUM
 PRce = *Prunus cerasifera* 'Krauter Vesuvius', CHERRY PLUM
 PRla = *Prunus laurocerasus*, ENGLISH LAUREL
 PRse = *Prunus serrulata*, FLOWERING CHERRY
 PUgr = *Punica granatum*, POMEGRANATE
 QUag = *Quercus agrifolia*, COAST LIVE OAK
 QULO = *Quercus lobata*, VALLEY OAK
 QUPa = *Quercus palustris*, PIN OAK
 QUru = *Quercus rubra*, RED OAK
 QUsa = *Quillaja saponaria*, SOAPBARK TREE
 QUsu = *Quercus suber*, CORK OAK
 RHin = *Rhaphiolepis indica*, INDIAN HAWTHORN
 SAsE = *Sapium sebiferum*, CHINESE TALLOW TREE
 SEse = *Sequoia sempervirens*, COAST REDWOOD
 SYpa = *Syzygium paniculatum*, BRUSH CHERRY
 ULpa = *Ulmus parvifolia*, CHINESE ELM
 ULpu = *Ulmus pumila*, SIBERIAN ELM
 UMca = *Umbellularia californica*, CALIFORNIA BAY
 WArO = *Washingtonia robusta*, MEXICAN FAN PALM
 XYco = *Xylosma congestum*, XYLOSMA
 ○ Lamppost

Tree Height Finder

A simple way to find the approximate height of a tree is to measure the length of its shadow and use a multiplier. To get the multiplier, scratch a mark on level ground and suspend a 36-inch yardstick vertically so that, with its bottom barely reaching the ground, the tip of its shadow falls on your mark. Then rotate the yardstick down onto the shadow and measure the shadow length. Say the shadow is 45 inches long; then the multiplier is $36/45$ or 0.8, and the tree's height H is 0.8 times the length L of the shadow. The shadow of a nail at a height H projecting from a vertical fence post can be used, in which case the yardstick measurement of the distance L of the shadow of the nail from the post takes less time and the multiplier is H/L . You can use the shadow of your finger held against a building or measure your own shadow to get a quick estimate, or, to get a quick approximation, pace out your own shadow and make use of your own known height (roughly 2 paces).

To measure a tree's shadow the simplest thing is to count paces from the middle of the trunk. Prepare for this at home by setting out a 100-foot baseline and counting your personal number of paces per hundred feet—a number between 30 and 40. Surveyors are trained to walk consistently at a brisk pace, swinging their arms, and taking a reproducible stride longer than for normal walking. Practice your surveyor's stride until you get consistent results on your 100-foot baseline. Knowing the multiplier and the length L of the tree's shadow, then the tree height $H=L \times \text{multiplier}$. If you do this often, use a surveyor's steel tape.

Personal determination of the multiplier can be avoided using the chart presented here for the spring months (page 295), with the known date and Pacific Daylight Time.

A precision of about 5 percent is about as good as can be expected. One error arises because the tip of the shadow may not be at the same level as the base of the tree. Another is due to the penumbra, which makes the shadow edge fuzzy, especially on broken ground. The penumbral problem is eliminated by viewing the Sun through a heavily overexposed slide and pacing to a position where the crown of the tree is seen at the center of the Sun's disk. Add in the height of your eye above the base of the tree.

Another error arises when the crown is not directly above the center of the base of the trunk. For a sufficiently important purpose requiring

higher precision, such as proving that Stanford's Torrey pine is taller than Berkeley's, you will need to revert to the method used in medieval times for measuring the height of enemy fortifications from outside the moat, as illustrated in trigonometry textbooks.

Other measurements

Another important tree measurement is the size of the trunk. Because the trunk is often expanded at the base it is customary to measure at a height of 4 feet 6 inches, referred to as breast height. Since tree trunks are often not circular, diameter is not directly measured. The most convenient thing is to measure the circumference (girth) with a cloth tape; but people have a better feel for diameter than circumference, so it is usual to present the "diameter at breast height" (dbh) that is calculated by multiplying the measured circumference by $7/22$ (division by π).

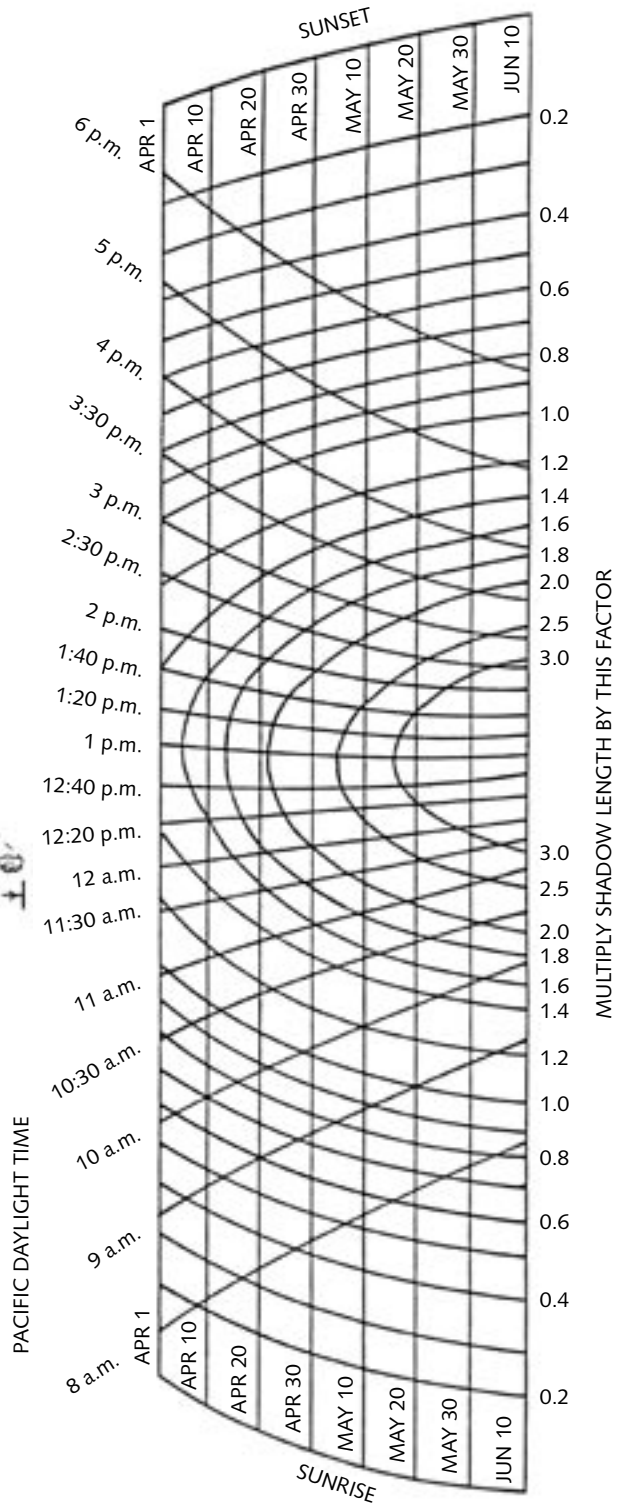
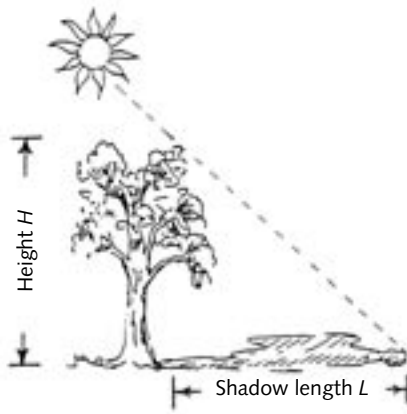
The cross-section area, which is commercially significant because it relates to the volume of wood in a log, is the basis for determination of the replacement value of a damaged tree; the area is calculated by multiplying the square of the circumference by $7/88$. Trees with more than one trunk can be characterized as to volume by one effective dbh by taking the square root of the sum of the squares of the separate diameters at breast height; but if the trunk forks below 4 feet 6 inches then the horticultural custom is to present only the largest circumference.

The spread of the crown is useful as an indicator of the likely size at maturity; sometimes one wants shade, sometimes access, and sometimes one does not want adjacent lawn or garden to be shaded out. The drip line (within which rain falls as drops from the canopy) is often taken as defining the spread of the crown.

Nomogram for finding tree heights at Stanford, April 1–June 10

Latitude= $27^{\circ} 23.9'$ N, longitude= $122^{\circ} 11.3'$ W (Inner Quad)

1. Find out how many standard paces you take to cover 100 feet.
2. Pace out the distance from the end of the shadow to the point below the part of the crown casting the shadow.
3. Multiply the shadow length by the factor obtained from the nomogram for the date and time of day. In the sketch the Sun's altitude is 45° and the multiplier is 1.
4. Repeat at other times and directions for an indication of the precision achieved.



Index

The numerous building and street names in this index point to locations of individual trees. To find a specific tree in the *Tree List in Order of Botanical Names*, beginning on page 32, look for a combination of capital and lowercase letters representing its genus and species; for example, under Aborigines, BRru (short for *Brachychiton rupestris*) will be found on page 70. If you don't know the botanical name, check the *List of Common Names*, starting on page 18, which cross-references both.

For reasons of space, the *List of Genera and Notes*, starting on page 8, omits names of the 35 species of Eucalyptus; entries are in the main text starting on page 110. In lieu of a bibliography, this publication contains a partial list reference books on pages 5–6; see also the index entry “reference books.”

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Toyon Grove, Eucalyptus Notes (106, 107)

Track House, CHAcu

tree counts and surveys, x, CUse, EUgl, Oak Notes (222), ULmi

Tree List in Order of Botanical Names (32–262), Supplemental List (264–70)

tree maps. See maps, tree location

Tresidder Union, MALsp, PINde, PRca, PRLu, QUdo, QUil, TRco, ULpa

Turbulence Research Center, QUsa

Ulrich, Rudolph, YUfi

Valparaiso Street, MYco

Van Pelt, Robert, SEse

Varian Physics, CRLa, EUvi, SYpa

Ventura Hall, ARBme, PRse, RHin

vernal pond, EUpan, TOca

Vernier Place, AEhi, EUmacu, MELli, PICpu, TAmu

verticillium wilt, Mushroom Notes (182), PISch

Via Crespi, FRve

Via Palou Mall, CHire, CONu, PRca, SAPse, XYco, ZEse

Via Pueblo, CELsi, JAmi

Virgil, ALco, FRex, TAbA

Vitruvius, CARbe

Watson, Max, Eucalyptus Notes (109)

Web sites, vii, 4–5, Citrus Notes (92), DIka, FEse, GIbi, LIQst, Mushroom Notes (180), YUfi

weights and measures, CERsi

Welch Road, CERsi, Eucalyptus Notes (106), EUgl, LApa, LIQst, NEol, POPal, TRla

White Plaza, CERsi, COco, ERhu, LIRtu, PINca, PRye, ULpa

Wiggins, Ira, NOre

Wilbur Hall, ACEbu, AEcar, ARAhe, BRpo, GLtr, LIQst, MOal, PINmug, PISch, PITun, PRLu, QUsu, TRco, Wilbur Hall tree map (288–89), XYco

Williams, Dr. Tom, TAbA

Wilson, Albert, ABbr

Wing Place, CASst, EUmeg, EUsa, MELli

witchetty grub, Eucalyptus Notes (107)

wood

identification, LIQst

production. See timber

rot, THpl

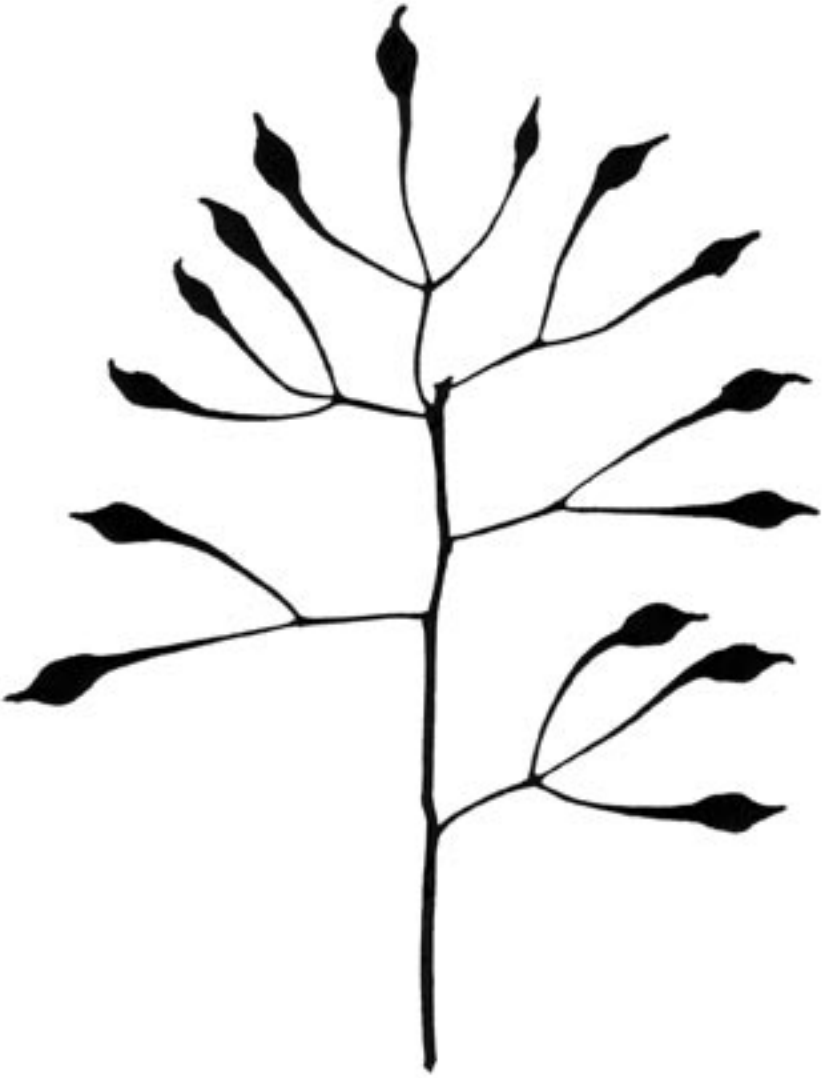
Wood Notes (217–18)

wood, various uses

construction, CEDli/li, CHAla, EUdi, EUro, LAeu, PSme, Wood Notes (217), SEse, THpl

wood, various uses (cont.)
decorative arts and crafts,
Acacia Notes (34), ACame,
ARBme, ACEsa, ARAhe,
CASau, CUse, EUpl, GLtr,
JUre, LIQst, LYf, Maple
Notes (39), QUag, QUch,
SYvu, THpl, TIco, UMca
fuel. See firewood
manufactured products, Acacia
Notes (34), AEoc, CICA,
COav, CUse, EUgl, FRex,
GRro, JUre, LAeu, LITde,
POPal, PSme, TIam, TRla.
See also pulp and paper
weapons and tools, CARbe,
CAScu, COca, QUch,
ROps, TAbA, TOca,
woodpeckers, QUag
Woodside. See Filoli
wreath, LAno, OLeu

xenophobia, Eucalyptus Notes
(107), Paperbark Notes (171).
See also non-native plants



Eucalyptus leucoxylon, White Ironbark

Some Noteworthy Trees

See pages 272–76 for specific locations and other information.

- 1 *Abies bracteata*, Santa Lucia Fir
- 2 *Abies pinsapo*, Spanish Fir
- 3 *Araucaria bidwillii*, Bunya Bunya
- 4 *Brachychiton populneus*, Kurrajong
- 5 *Brachychiton rupestris*, Bottle Tree
- 6 *Brahea edulis*, Guadalupe Palm
- 7 *Cedrus deodara*, Deodar Cedar
- 8 *Cedrus libani atlantica* ‘Glauca’, Atlas Cedar
- 9 *Chamaecyparis lawsoniana*, Port Orford Cedar
- 10 *Chorisia speciosa*, Floss-Silk Tree
- 11 *Cupressus macrocarpa*, Monterey Cypress (off map at 858 Lathrop Drive)
- 12 *Eucalyptus diversicolor*, Karri
- 13 *Eucalyptus globulus*, Blue Gum
- 14 *Eucalyptus viminalis*, Manna Gum
- 15 *Fraxinus americana*, White Ash
- 16 *Livistona chinensis*, Chinese Fan Palm
- 17 *Metasequoia glyptostroboides*, Dawn Redwood
- 18 *Morus rubra*, Red Mulberry
- 19 *Nolina matapensis*, Tree Bear Grass
- 20 *Persea americana*, Avocado
- 21 *Phoenix canariensis*, Canary Island Date Palm
- 22 *Pinus pinea*, Italian Stone Pine
- 23 *Pinus sabiniana*, Gray Pine
- 24 *Pinus torreyana*, Torrey Pine
- 25 *Platanus racemosa*, California Plane, Sycamore (one on map; one off map at 524 Gerona Road)
- 26 *Quercus agrifolia*, Coast Live Oak
- 27 *Quercus douglasii*, Blue Oak
- 28 *Quercus lobata*, Valley Oak
- 29 *Sequoia sempervirens*, Coast Redwood
- 30 *Thuja plicata*, Western Red Cedar
- 31 *Trachycarpus fortunei*, Windmill Palm
- 32 *Yucca filifera*, Yucca
- 33 *Washingtonia filifera*, California Fan Palm
- 34 *Washingtonia robusta*, Mexican Fan Palm