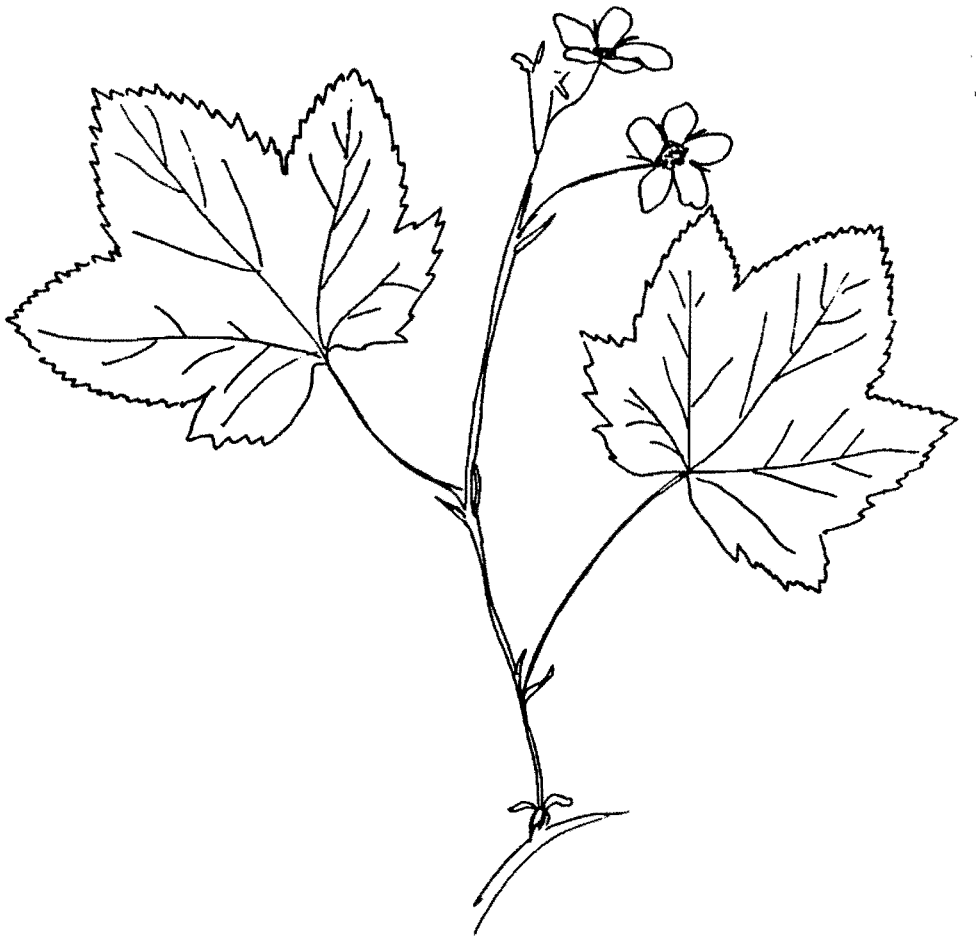


A Natural History Guide to the Lewis and Clark College Campus

Eric A. Wold and David P. Craig

BARNES & NOBLE
NO REFUND W/O LABEL
10300 $ 1.00

To
tree-huggers
bird-watchers
and
conservationists

you are hope despite the times

Awaken people's curiosity. It is enough to open minds; do not overload them. Put there just a spark. If there is some good flammable stuff, it will catch fire.

Anatole France

A Natural History Guide to the Lewis and Clark College Campus

David P. Craig and Eric A. Wold

Tree Walk Illustrations by Anita Garlock

Acknowledgements

There are many people inside and outside of the Lewis and Clark Community who aided us in completing this guide and the tree walk. We thank Ground's Supervisor Jim Gillespie for his cooperation and assistance over the years. The carpentry division cut the wood posts for the tree walk. The Berry Botanic Garden kindly allowed us to use their engraving machine on our tree labels. The Student Academic Affairs Board (SAAB) granted us $600, enabling us to purchase supplies, pay for printing costs, and pay Anita Garlock a modest amount for her illustrations. Dr. John Tucker of the University of California at Davis identified oak specimens for us. We would especially like to thank Dr. Ed Guerrant, Dr. Don McKenzie, and Dr. Steven Seavey for their encouragement, advice, and help with identifying trees. Anita Garlock deserves more thanks than we can ever bestow on her. Without her willingness to draw leaves, fruits, and flowers for the Tree Walk, our lives would have been much more complicated. Finally, our thanks goes out to the many people in Academic Computing who willingly aided us with formatting strategies.

Both authors contributed equally to this guide.

About the illustrations:

Anita Garlock was extremely generous with her time and talents. She drew all the illustrations for the LC Tree Walk, and because of budgetary constraints, she received very little money for it. Karen Harris kindly contributed all wildflower drawings for the book, except for Thimbleberry, which was drawn by Pam Vernon. David P. Craig drew the three bird illustrations.

TABLE OF CONTENTS

List of Illustrations (does not include Tree Walk):

Foreword

by Kim R. Stafford

Will we destroy what the explorers Lewis & Clark discovered? Do we take care of what we brag about: this green corner of the world alive with birds? What does it mean to inhabit a campus in the forest, a place where swallows gather, and the towhee calls a question from the shadows of salal? What does it mean to study art in a garden verging on the wild, to study history near trees older than our state? Have you seen our hidden sugar maple grove with rusted buckets hanging from their taps? Do you know the yew tree on the reflection pool's north bank, which will dust you with a blessing of pollen in the spring? You may follow a path east from here to the river, or west to Tryon creek, and return to your room filled with fog and sunlight. What can it mean to read the greatest book, to hear the wisest lecturer, if you are not rooted somehow to this place? Like the great blue heron that flies daily over campus from its city rookery on Ross Island, you are in touch with the wild here, and your human imagination is not alone on Earth.

Living here, receiving these gifts from the wild, what are our responsibilities? There may come a time when our forests are reduced to a few hidden groves, like those Dawn Redwoods from the fossil record they found in a ravine in China, living as they always had, shaggy with thin leaves, swaying gently in the old work of the green world. We will know they are sacred, and hold the greatest living secrets of time. But you can touch the soft leaves of this tree here. You will find it with this book. And because we are in touch with this wild world, this may be the decade when we waken. This may be the time we acknowledge the citizenship of trees. Looking back at us, our youngest grandchildren may say, "Those were the ones who entered the grove, and were changed."

A friend told me, "We are a people growing onward from this fascination with ourselves. We are falling in love with the earth." We take this choice not out of fear--though we might, for we die if the trees die. But we make this choice from the kindred sensation we share for Earth with cedar, towhee, mole, and honeybee. Every first leaf in spring, every sapling rises up to claim the earth: This is my home. This is my rightful place.

They say that on that one day Chief Joseph was allowed to visit his native Wallowa Valley, before being returned to the desolation of the reservation, he cried out, "I ask only for a place to throw my blanket on the earth. Allow me this." America denied him. He raised his head, and was led away.

Every creature asks only this--a place to throw a shadow on the earth, to root, to sip rain, to grip a twig for singing. This is not much, but everything. And we are the ones who say yes, and no.

The writers of this book prove their education has meaning by looking at the complex blessings of the world close at hand. With this book, they give us the fervent green gift of this place.

Preface

The Lewis and Clark College Campus is a fantastic place for nature lovers. Surrounding the bustle of campus life is an expanse of lawns, pools and watercourses, a scenic view of Mount Hood, and a diverse mix of trees and flowering shrubs. At the edge of the thoughtfully landscaped areas are beautifully forested ravines that allow one to become familiar with much of the area's native flora and fauna.

With well over 100 tree species growing on the 65 acre campus, Lewis and Clark surely is among the most botanically rich grounds in Portland. The campus also affords the opportunity to observe many different bird species. Proximity to the Willamette River and Tryon Creek State Park, one of the country's largest state parks within city limits, are prime reasons why many birds can be seen on the campus and adjacent woodlands.

The writing of this guide was motivated by several different desires. Foremost, we wanted to create a helpful guide to the birds and trees for curious students and faculty. Biology students, especially those novices of field biology who have difficulty making basic identifications, should find this guide especially valuable. In fact, it was from our own early frustration in identifying and mapping all the tree species on campus for a biology class project that we conceived the idea of writing a tree guide. The idea of a tree guide later blossomed into this guide, which includes the common campus birds, as well as several essays about natural history. We were completely amused and enthralled by the prospect of writing a guide about what we enjoy the most: natural history.

Finally, we feel it is critically important for all of us to appreciate our immediate surroundings, in this case an urban landscape, as well as the more pristine areas in the world. For only by appreciating and understanding the environment in which we live daily can we become successful stewards of our increasingly emperiled land and its natural resources.

E.A.W. and D.P.C.
June, 1990

Chapter **1**

The Natural Heritage of the Lewis and Clark Campus

> *Climb the mountains and get their good tidings. Nature's peace will flow into you as sunshine flows into trees. The winds will blow their own freshness into you, and the storms their energy, while the cares will drop off like autumn leaves.*
>
> *John Muir*

Several of the essays which appear in this chapter were originally written by David P. Craig for the school newspaper, the *Pioneer Log*, in the winter and spring terms of 1990. The essays have since been edited to make them more suitable for this guide.

Reflections on our natural history

For almost half century students have been walking below the Manor House and pausing to gaze east at Mount Hood. Framed by the beautiful campus, it is an uncommonly spectacular view that has moved our poets, inspired many a grand thought and been a symbol of the outdoors and wilderness cherished by many of us. This view we enjoy today has remained virtually unchanged over thousands of years, but the surrounding campus has been profoundly altered in the last forty-eight years.

As a student, busy and active in college life, it is easy to forget about what happened last term, much less entertain ideas about college activities and events from years past. This is unfortunate because our campus has a unique natural history that is worthy of attention. Understanding the changes that have occurred in our history can accentuate appreciation of our rich surroundings, teach us principles valuable in contemporary life, and provide a background for reflection on our growth and progress.

In 1924, 65 acres of tree covered slope were developed by Mr. and Mrs. Lloyd Frank (of the the popular department store, Meier & Frank) under the direction of architect Herman Brookman at the cost of over 1.25 million dollars. The Frank family left the Fir Acres estate in 1934, and eight years later it was purchased for the new Lewis & Clark College campus. During those eight years the once intensively gardened estate was neglected and went feral. Tangles of blackberries covered the flower beds, English Ivy carpeted large areas of the forest, and many of the once beautiful and exotic trees had broken down or become entangled by shrubs.

Students, faculty, and friends of the college all worked diligently to clean up the landscape and convert the private estate into a beautiful college campus. When they started classes in September of 1942, wildlife was present everywhere. Jack rabbits and cottontails scurried through the brush, while wild Mallards and water snakes had taken over the reflecting and swimming pools. Raccoons and skunks lived in the ravines and visited garbage cans nightly. Gophers, White-footed Mice, moles, shrews, and five species of squirrel were abundant. Long-tailed Weasels, foxes, and even deer were occasionally found on the tract.

Bird life was also remarkable. In fact, on a three-hour outing the local Audubon club identified 45 species. The great Pileated Woodpecker and Ruffed Grouse nested in the campus woods and were frequently seen, while the Yellow-breasted Chat nested in blackberry tangles. The entire campus was a nature lover's paradise. North and west of the old gymnasium (a building replaced by the Pamplin Sports Center) was a tract of unspoiled forest. The area was covered with large firs and maples, the forest floor was carpeted in spring with wildflowers, and ferns and Oregon Grape were abundant everywhere.

These historical passages of natural history were discovered in an unpublished school history written in the early 1960's by this campus's first biology teacher, Dr. Benjamin Thaxter (Thaxter is partially published in *Lewis & Clark College 1867-1967*, Martha Montague, 1968). Thaxter's accounts of the early days document a campus similar, but significantly different from our own. Today the Ruffed Grouse and Yellow-breasted Chat are entirely gone. The most common of the squirrels, the Gray

Digger or Douglas Ground Squirrel, once had a colony in the dovecote of the Albany Quadrangle, but was deemed a nuisance and extirpated. The unspoiled forest Thaxter described is now athletic fields, a stadium, and parking places. With this habitat destroyed, the resident Pileated Woodpeckers, Ruffed Grouse, and many other forest creatures left. In Thaxter's own words, "Woodland beauty had to give way to campus development!"

It is obvious that our campus has lost an important part of its natural heritage with its progress and development. The philosophy of "more buildings is more progress" has eliminated untold amounts of wildlife habitat throughout the world. Although we often focus on the rapid deforestation of the Amazon, or of Oregon's ancient forests, we have a responsibility to recognize more subtle ecological pressures closer to home. The spread of suburbia into open fields, wetlands, and hill-sides, the clearing of woodlots for parking lots and athletic fields may not seem to be much of a loss. But if we think of these activities in a cumulative sense than it is vividly clear why we have fewer massive trees, wild flowers, woodpeckers and squirrels.

It should be sobering to realize that the fields we play in, the lots we park on, and the buildings we learn in were built at the cost of destroying a mature forest habitat. This realization is not as abstract as realizing that many fast-food chains make their hamburgers from beef raised in cleared rainforest, or that wood products in your home are from rainforest trees. The place where we live is a product of the same attitudes that are the single greatest danger to thousands of species in the world today: the degradation and destruction of habitats for short-term gains by humans. Recognizing the impact we have had on Palatine Hill can teach us lessons about humanity's impact on the globe, and learning to appreciate our immediate natural surroundings will be a key step in beginning to alter the idea that progress requires the development of land for human uses. Our push for progress has destroyed many habitats and many species are gone forever. If the pace of progress continues at its current rate, many predict we will have fundamentally degraded the planet we live on so severely that our own species may perish. By destroying the habitat of the grouse, we destroy an integral part of our own home.

> *Whatever befalls the earth befalls the sons of the earth. Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself.*
>
> *Chief Seattle*

Spring fever with the birds and the bees

During the last few weeks of winter term, when the blahs are bluest, look for signs of a new season. Spring is near and the evidence will be everywhere! In addition to all the people who begin wearing shorts and T-shirts in order to prime themselves for Spring Break, there are animals and plants that are preparing for the next growing, or reproductive, season. The Lewis and Clark campus is an spectacular place for many reasons, but one of its most remarkable elements is simply its physical beauty. Lewis and Clark College is an appropriate name for our college, for just as the explorers Merriwether Lewis and William Clark found an immense frontier of new flora and fauna in the Pacific Northwest, so can the observant student make many natural discoveries on campus.

The campus has some large natural areas that, coupled with one of Portland's most diverse assemblages of introduced tree species, provides an incredible amount of habitat for native animals. In winter many of these animals remain relatively secluded, so it is not always easy to observe them. But with the longer light period and warmer temperatures of spring, many species become more conspicuous, making themselves easy to watch and appreciate. In late January the first Song Sparrows start singing near the library, and by February House Sparrows visit the nest boxes under the eaves of Bodine. There is usually an influx of American Robins that move across the lawns in large loose flocks of twenty or more as well. Some of these robins are resident (live on campus all year), but many of them are migrating from the south. Our campus supports around thirty avian species for much of the year, but it is possible to sight forty-five species in a single day if you're lucky. On the floral side of life, Oregon Grape, the Oregon state flower, is a common evergreen shrub all over campus. If you recognize it (the leaves are similar to holly), you will find the buds swelling, ready to burst out in splashes of yellow, in the early periods of spring.

The first few weeks of spring is an excellent time to get out and observe the naturalness of the campus. Anna's Hummingbirds usually make their return about this time, Rufous-sided Towhee males begin singing, Band-tailed Pigeons perform pre-nuptial flights over the reflecting pool, and Mallard Ducks search out nest sights. In addition, the flora of campus changes rapidly during the early spring. A close look at most of the deciduous trees will reveal that thousands of green buds are ready to pop out with new leaves. Finally, bees and other insect species will burst forth, providing food for many organisms and sometimes irritating the largest resident mammals-the students!

Alien life swamps campus

It's a another peaceful spring day, the birds are singing, the bees are buzzing, and flowers are blooming everywhere. Now as you read along in your natural history guide you will learn that our little LC community is being swamped by alien life. How can this be?!

Surprisingly enough, some of the birds, bees, flowers, and trees are the very creatures that are alien! The term alien is a subjective definition for a species that has been introduced by humans to an area that is not part of its normal distribution. Often times the species were brought as ornamental decorations or as reminders of an immigrants homeland. Other species were thought to have commercial value if they could be successfully established for harvest or used for sport.

After introduction or escape most of these exotic species died out, but the few that survived are perniciously entrenched and will no doubt forever be part of the local flora and fauna. Because exotics did not evolve in the area to which they were introduced, they are frequently devoid of enemies which keep natural populations in check. For example, many introduced plant species have few or no herbivorous insects which utilize them as a food source. This lack of herbivory allows these plant species to grow at rapid rates, often times faster than any native plant can grow.

The presence of an established exotic species is no small matter. In fact, exotics are a primary factor contributing to the current rate of extinction, which is faster than at any other time in history. A lucid example of how an alien species can affect

native species is the introduction of the Nile River Perch to Lake Victoria. The "authorities" hoped that the perch would be the basis for a commercially lucrative, African fishery. The introduction of that single species of fish, however, is now responsible for the extinction of over 125 species of endemic Victorian fishes. Palatine Hill has not suffered any such cases of large scale extinction, yet the impact of a few exotics, right here in our own backyard, is profound indeed.

So who are these outlaws, these aliens invading our home? A few of the most common, and especially nasty, are English Ivy, Himalayan Blackberry, English Sparrow, and the European Starling. English Ivy is the green plant that grows everywhere. It clings to the Manor House, to the rock walls of lower campus, and it scrambles across the ground filling many of the the garden beds. This is where ivy belongs.

Ivy is a major problem when it leaves the beds and walls to invade natural areas like the Copeland canyon and the surrounding nature trails. To the uninformed eye, a forest covered in ivy looks fantastically lush, because it is all green. However, once you are able to recognize ivy you will note that it is choking out the ferns and the native wildflowers of the forest. Furthermore, you will see that ivy slowly pulls down the forest trees and increases their chance of windfall. The ivy has been around the campus for at least 60 years. It is now so well established that it would take thousands of hours to tear it down and control its spread. There is a heavy cost for the "Ivy League" look.

Himalayan Blackberry arrived in Oregon with the arrival of homesteaders in the Willamette Valley. Oregon City, just south of campus along the Willamette River, was the original site of introduction in Oregon. The berries of this fruiting bramble are very popular with many birds. Birds down in Oregon City ate the berries, flew up the valley, and unloaded some seeds along the way. After several years, the range of the exotic expanded immensely, ranging far from Oregon City. This process undoubtedly brought Himalayan Blackberry to Palatine Hill soon after it was disturbed for human development. This plant is not as pervasive as ivy, but it borders many of the natural areas and fills the end of the canyon just below Templeton. Unlike ivy, the blackberry does have some redeeming features. Its fruits provide food for birds and the thickets it forms shelters many small animals.

A pair of introduced birds share many similar, unpleasant habits with the aforementioned plants. One species, the English, or House Sparrow, has a drab gray breast, a brown back, brown wings, and a brown head. The males also have a little black bib and chestnut ears. House Sparrows were well established in the Portland area by 1889, following the introduction made in the 1850's in New York. The other exotic, the European Starling, is the loud, shiny blackbird with the yellow beak. In the winter it molts to a more mottled plumage and its beak turns black. Starlings were also originally introduced in New York and then spread slowly across the continent, arriving here around the 1950's.

Both of these birds usually stay in the proximity of human development. In fact, nearly all of the birds which nest in buildings are members of these two species. Both of these species, which are burrow nesters, require cavities to raise their young in. In an intensively landscaped area, such as our campus, there are few natural cavities left. Most cavities originate when a mature tree loses a limb and subsequently decays. But here on campus, dead trees and fallen limbs are quickly removed for both safety and aesthetic reasons.

Because the two introduced species are excellent, aggressive competitors for the few tree holes remaining, many of our resident species of wildlife are suffering. The two introduced species have the unusual advantages of breeding earlier and establishing residency in the limited burrows before the other birds have even migrated to the area. Even when chickadees or Violet-green Swallows are able to establish a nest, the exotics will kill their young and evict the adults. If it sounds grim, it is. The presence of the House Sparrow and European Starling is directly related to decreased populations of all cavity nesters throughout North America.

Luckily, there are simple ways to increase the probability for native species to successfully nest. Anyone can help halt the invasion of these nasty avian aliens. It is as simple as building a bird house! There are some excellent books in the library and many of the professors in the biology department have the detailed measurements needed for designing a bird house that will target a desired species. Certain sized boxes, different sized entrances, and the placement of the house will attract different species. There are some boxes already on campus, but there can

never be too many. The best time to build a box is in late winter or early spring, so the house will be ready to be put up by the last weeks of March or early April. If you are lucky and a bird does nest in the box, it will be important to clean the box out in the fall, so that another bird can nest the next year. The building of nesting boxes provides the single requirement that prevents some species from being more common on campus.

In our increasingly urbanized world there is an immeasurable value in naturalness for the mental escape and renewal it provides. By enriching the wildlife habitat in our own backyards, we enrich our own lives.

> *When we see land as a community to which we belong, we may begin to use it with love and respect. There is no other way for land to survive the impact of mechanized man, nor for us to reap from it the aesthetic harvest it is capable, under science, of contributing to culture.*
>
> *Aldo Leopold*

The pond

There is a little pond on campus. Really it's just a decorative catchment for the larger reflecting pool on the tier above. We all go by this small, unassuming body of water during our lower campus strolls, whether it be when cutting across to classes from the Copeland and Platt-Howard dorms, or trying to find a parking place in the cobblestone turn-around. The water is often rather scummy looking and most people pass by without a second glance. The ultimate-frisbee warriors of lower campus avoid, at all costs, letting the almighty disc drop into this place and most would cringe when considering an accidental fall into this lively little pool.

Maybe there is some primeval basis for our general fear of scummy water, but our reluctance to explore such places is probably tied to Victorian social foundations of cleanliness. Too bad! The pond of lower campus is an amazingly wild, exotic, and fascinating place that is always full of new and unexpected surprises.

For example, how did a three foot long carp arrive in the pond? No doubt, one of our local fisherpeople is up to a bit of prank. Otherwise this fish had a migration even more phenomenal than a Walt-Disney-True-Life-Adventure salmon! Many an aquarist, tired of their fish or needing to unload a tank before they leave for summer, has dumped in a goldfish or two. Occasionally there have even been tropical exotics like an Amazonian Oscar or a pair of Central American Convict Cichlids. These tropical fish usually survive through summer but die when the water turns cool in the autumn.

An interesting lesson in natural selection can be observed by watching the goldfish. The brightest orange fish and those with ornamental fins tend to disappear into the jaws of the roving bands of the campus spaniels and labradors. The water loving dogs jump in and chase the fish they can most easily spot. The dogs tend to tear up the water lilies and other aquatic plants that the fish use as cover, so the only fish that regularly escape are the golden brown individuals. On the warm days of spring the goldfish spawn prolifically in the shallows, but observation over the last four years suggests only the darkest brown colored young survive.

Another interesting pond pisciform is the Mosquito Fish, *Gambusia affinis*, that I introduced in the spring of 1987. These guppy looking fish are originally native to northern Central America, but have been widely introduced throughout North American wetlands as a biological control for mosquitos. These little fish have voracious appetites for the mosquito larvae that develop in almost every body of standing water. Although introduced species are generally undesirable elements, the alternative to using fish as a mosquito control technique is to spray petroleum or toxic chemicals on mosquito infested water. These alternatives tend to nonselectively kill everything. The Mosquito Fish has an interesting life history. It is a sexually dimorphic species; the females are larger than the males, which have an anal fin adapted to function as a hemipenis.

Occasionally, Bullfrog (*Rana catesbeiana)* tadpoles have been transplanted into the pool. These provide glimpses at the developmental miracle of amphibious metamorphosis. In these temperate waters, bullfrog tadpoles often take two years before they are ready to sprout their back legs, the first step towards a terrestrial life. The majority of the newly developed frogs will leave the small pond, but there is one old lunker frog that hangs out in the southern corner.

Other animal life that visits the pond includes the Rough-skinned Newt, a pair of Mallard ducks, a multitude of the campus songbirds, Opossum, and occasionally a Raccoon, as told by the tracks they leave behind.

The plant life of the pond is also very interesting. It is primarily dominated by three or four varieties of exotic lily pads, in addition to Parrot's Feather, Pennywort, *Anacharis* sp., and *Equisetum* sp.. A recent addition to the planter boxes in the back of the pond is Wapato, *Sagittaria* sp.. This species once extended throughout the lower Columbia River system and was the primary starch staple of many of the aboriginal people. When Lewis and Clark descended the Columbia in 1805, they lauded this plant in their journals and purchased large quantities from the Multnomah Indians of Sauvie Island on their return journey to the East. Today Wapato is rather scarce, a result of introducing Eurasian Carp in 1888. The carp's foraging method of rooting up aquatic vegetation, and the explosion of their population, spelled demise for this attractive and useful plant.

Later, cattle grazing in the shallow waters further degraded habitat conditions of the Wapato. When you look for the arrow shaped leaves of this plant, think of the heritage it represents to the school as a special food for our college's namesakes and the example it provides of a vanishing species.

If you really want to get into the pond, you will discover another world-a complex microsystem of minute plants and animals that are just barely able to be detected by the human eye. Rotifers, euglenas, ostracods, daphnia, algae, and much more can all be found in a single jar of pond water. If you collected a jar of this water and watched it throughout the year, you would observe cyclic changes very like the seasonal and successional changes of the more familiar macro-world.

Water is necessary for the basic processes of life, and it is also a source of intrigue and delight when it collects into a small pond. Stop by our little pond and croak with the frog, splash with the fish, and reflect on the heritage of Wapato.

The canary in the mineshaft

There is a story about mining in the old days that needs to be shared today, here at Lewis and Clark, and here in the Pacific Northwest. The digging of tunnels into the Earth would often expose pockets of lethally noxious gas, or poor mine vents could cause a build-up of carbon monoxide from engine exhaust. To test for the presence of these invisible threats, the miners would send a canary, in a small cage, to the bottom of the shaft, let it sit there a few minutes, and then pull it back up. If the canary came up alive and chirping it was o.k. to enter the shaft. But sometimes the end of the rope held the silence of a dead bird. The miners would not enter for the fear of their own lives.

The Lewis and Clark campus has no mines, nor are there many mining tunnels in the ground west of the Cascades. But we do have thousands of acres of clear-cut forest, much which was once old growth. Today the debates over the last remaining stands of ancient forest are raging from the courts to the campus, and from the bar-room to back-rooms of our elected official's offices. Our region is in the nation's eye over this issue of conservation, especially since the recently issued Jack Ward Thomas "Spotted Owl" report. The scientists tell us that to

prevent the owl's eminent extinction, the current rate of logging must be arrested.

Here we can connect back to the canary and the mineshaft. Many have recognized that harvesting an old growth forest is akin to mining ancient trees. Just as digging for valuable ores forever changes a place, so does removing ancient forest. A mineshaft can be refilled with earth and there is a full hole, but there is no more undisturbed earth. A clear-cut can be replanted and there follows a tree plantation, but there is no more forest. As the canary is to the mineshaft, so is the Spotted Owl to a clear-cut. The scientists' report tells us that the Spotted Owl is in danger of coming out of the old growth mineshaft dead. Gone as a species forever. Do we put it down the shaft to die? Today the forests are almost silent for lack the Spotted Owl's "canary chirp". We should cut no more pristine old growth trees for fear of our own lives.

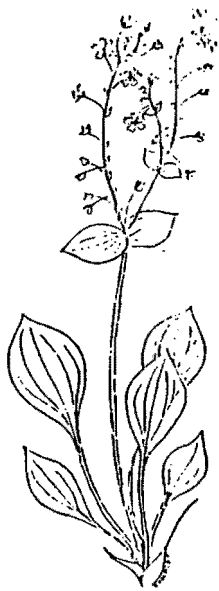
Just as yesterday's miners recognized the ability of birds to warn of danger, so can we study our local avifauna to understand our own conditions. Birds are unique in that they have very sensitive metabolisms, such that small amounts of environmental toxins will quickly and dramatically affect their survivability. A particularly conspicuous group of birds species, which are closely wrapped into the food web, are swallows and swifts. They feed primarily on insects which have most often either been secondary consumers of plants or predators of other organisms. The point is the insects will concentrate levels of environmental toxins that, in turn, may affect the lives of the swallows and swifts.

A drop in the numbers of swifts and swallows does not necessarily pin-point the presence of nasty toxins in the world. Another growing challenge for these species is the ability to find a place to breed. The Tree and Violet-green Swallow require cavity nests (see Aliens swamp LC) and the swifts naturally nest in large, standing, hollow trees. Lately the swifts and swallows have been suffering from a lack of appropriate breeding sites. Though they are here in our area, over the years their numbers have been decreasing, which may be in part due to pesticide problems in Mexico and Central America.

During the last week of March and into April, the "canaries" of this campus have been arriving. Swallows and swifts are true masters of the air; they are able to soar out of sight on their tiny wings, and manoeuvre with such precession as to snatch a mosquito from thin air. They are immensely important in controlling the numbers of these insects, and we are fortunate to have them here on campus.

The local swift species is known as Vaux's Swift. These birds fly their entire lives except when it is time to raise young or save energy in the communal roosts of migration. They can even sleep on the wing and their sex life is an exciting tumble through the sky. Normally they nest in the hollowed trunk of a large forest tree, but as these are increasingly scarce, some use artificial constructions like the chimney of the Manor House. Look for about four pair of birds diving in at dusk to incubate their eggs, feed their young, and to roost. In the fall, after the breeding season, there may be hundreds diving in, as these birds communally roost during their migration south to the neotropics.

The case of the swallows is not so dramatic as that of the Spotted Owl, but some of the principles are the same. If we allow the swallows to disappear here, we will get a lot more mosquitoes, and potentially miss a "canary's warning".



The LC Tree Walk

The earth laughs in flowers.

Ralph Waldo Emerson

The ability to adeptly identify trees is a valuable skill for any natural historian. The natural historian who can identify trees will often be able to make many associations between elements of a given habitat. Furthermore, with a basic understanding of ecological principals, this same person may possibly be able to speculate on plant-animal interactions in a forest with a given composition.

But tree identification need not be a scholarly venture at all. Trees are interesting, and often times beautiful, manifestations of nature. Each tree species has its own personality, ready to share itself with anyone who is willing to spend time with it. From the perfectly symmetrical Giant Sequoia to the scraggly and menacing sillhouette of the White Oak, each species exudes a uniqueness of character.

The Tree Walk will hopefully aid the scholarly and non-scholarly with their passion to appreciate the uniqueness and biological role of many native and ornamental species. Descriptions and illustrations of over fifty species are included in this guide. The order of the species descriptions in this guide correspond with to the relative order of the trees on the path, which was designed to start at the Ponderosa Hall bus stop (R-20). Each tree on the path has a wooden post placed in the ground in front of it, with a name plate attached. The information conveyed on the plate is as follows:

LC Tree Walk
#44
Douglas-fir
Pseudotsuga menziesii

The information conveyed on the plate is straightforward. The top line tells you that you are, indeed, on the tree walk which this guide was prepared for. The second line refers to the order in which the tree occurs on the walk. The third line gives the tree's common name, and the bottom line gives the scientific name.

While looking at the trees, keep your eye out for plant-animal interactions. Watch to see if birds eat the fruits or seeds of certain species. Crack open a pine cone and see if there are insects which inhabit them. An interesting project for a biology student would be to identify and characterize the leaf herbivores and the creatures which inhabit the cones of conifers. You might also attempt to find evidence of other invertebrates which inhabit the bark of trees.

Tree reproductive biology is also a fascinating topic to ponder. Can you distinguish between flowers which rely on wind-pollination from those that have animal pollinators? Are there any trends in the timing of when wind-pollinated trees flower, or when leaves emerge in relation to the flowers? What advantages might there be in flowering earlier than other species? Try sitting near a flowering tree and see how many species of insect visit the flowers. Do you think certain insect species transfer pollen better than other species?

The list of questions which can be asked about trees and tree biology is long indeed. Hopefully the **LC Tree Walk** will inspire many of you to inquire about trees and the roles they play in their natural environment.

Enjoy exploring the fantastic diversity of trees on campus!

Authors' notes: When the campus was initially surveyed for species diversity and abundance, only trees with a diameter of 5cm or greater at breast height were recorded. Furthermore, the ravines were not surveyed. Because of this, all values recorded on the chart *Campus species, listed by genus* under the "No. of trees" column should be considered minimum values. The format and species descriptions for the field guide are primarily derived from Randall et. al. (1985) and Preston (1989).

Getting from Common Name to Genus

Common Name	Genus
Alder	*Alnus*
Apple	*Malus*
Ash	*Fraxinus*
	Sorbus
Basswood	*Tilia*
Bay	*Umbllularia*
Beech	*Fagus*
Birch	*Betula*
Box	*Buxus*
Cascara	*Rhamnus*
Cedar	*Calocedrus*
	Cedrus
	Chamaecyparis
	Thuja
Cherry	*Prunus*
Chestnut	*Castanea*
Cottonwood	*Populus*
Cypress	*Chamaecyparis*
	Cupressus
Dogwood	*Cornus*
Elderberry	*Sambucus*
Elm	*Ulmus*
Fir	*Abies*
	Pseudotsuga
Ginkgo	*Ginkgo*
Golden Chain	*Laburnum*
Gum	*Liquidambar*
	Nyssa
Hawthorne	*Crataegus*
Hazel	*Corylus*
Hemlock	*Tsuga*
Holly	*Ilex*
Juniper	*Juniperus*
Larch	*Larix*
Laurel	*Laurus*
Lilac	*Syringa*
Lime	*Tilia*
Locust	*Robinia*

Common Name	Genus
Madrone	*Arbutus*
Magnolia	*Magnolia*
Maple	*Acer*
Oak	*Quercus*
Pear	*Pyrus*
Pine	*Pinus*, *Sciadipitys*
Plane	*Platanus*
Plum	*Prunus*
Poplar	*Populus*
Redwood	*Metesequoia* *Sequoiadendron*
Sassafras	*Sassafras*
Sequoia	*Sequoiadendron*
Spruce	*Picea*
Sumac	*Rhus*
Willow	*Salix*
Yew	*Taxus*

Campus Species, Listed by Genus

Scientific Name	Common Name	No. of Trees
Abies **(Pinaceae)**		
A. concolor var. *lowiana*	Low's Fir	1
A. grandis	Grand Fir	20
A pinsapo	Spanish Fir	1
A. procera	Noble Fir	5
Acer **(Aceraceae)**		
A. campestre	Field Maple • Hedge Maple	11
A. circinatum	Vine Maple	6
A. ginnala	Amur Maple	3
A. macrophyllum	Big Leaf Maple	453
A. negundo	Boxelder • Ash-leaved Maple	1
A. palmatum	Japanese Maple	4
A palmatum var. *dissectum*	Japanese Lace-leaf Maple	2
A. platanoides	Norway Maple	16
A pseudoplatanus	Sycamore Maple	2
A. rubrum	Red Maple	7
A. saccharinum	Silver Maple	1
Albizia **(Leguminosae)**		
A. julibrissin	Silktree • Mimosa	1
Alnus **(Betulaceae)**		
A. rubra	Red Alder	67
Aralia **(Araliaceae)**		
A. sprinosa	Devils-Walkingstick	1
Arbutus **(Ericaceae)**		
A. menziesii	Pacific Madrone	1
Betula **(Betulaceae)**		
B. pendula	European Weeping Birch	30
Buxus **(Buxaceae)**		
B. sempervirens	Common Box	1
Calocedrus **(Cupressaceae)**		
C. decurrens	Incense Cedar	13
Castanea **(Fagaceae)**		
C. sativa	Spanish Chestnut	1
Cedrus **(Pinaceae)**		
C. atlantica	Atlas Cedar	6
C. deodara	Cedar Deodar	14
C. libani	Cedar of Lebanon	1

Native area	Example
Colorado - New Mexico, s. California	K-16
British Columbia - California	H-15
Spain	K-18
Washington & Oregon	I-12
Europe, Britan	P-18
w. North America	J-12
China, Japan, Manchuria	?
w. coast North America	J-14
e. & c. North America	V-20
Japan, Korea	J-10
Japan, Korea	K-10
Europe	P-20
w. Asia	Q-20
e. North America	D-13
e. North America	Q-11
s. Asia	G-10
Alaska - California & Idaho	R-20
e. North America	Q-18
British Columbia - California	W-19
Europe, Britain & Asia Minor	V-20
Europe, n. Africa & w. Asia	J-13
Oregon - Nevada & California	U-21
s. Europe, Asia, & n. Africa	T-11
Atlas Mtns., Algeria & Morocco	K-12
Himalayas	K-10
Near East, Lebanon	K-12

Campus Species, Listed by Genus

Scientific Name	Common Name	No. of Trees
Celtis **(Ulmaceae)**		
C. occidentalis	Hackberry	15
Cercidiphyullum **(Cercidiphyllaceae)**		
C. japonicum	Katsura Tree	3
Cercis **(Leguminosae)**		
C. siliquastrum	Red Bud	?
Chamaecyparis **(Cupressaceae)**		
C. lawsoniana	Port Orford Cedar	15
C. obtusa	Hinoki Cypress	1
C. pisifera	Sawara Cypress	13
Cornus **(Cornaceae)**		
C. kousa var. *chinensis*	Chinese Kousa Dogwood	2
C. nuttallii	Pacific Dogwood	18
C. florida var. *rubra*	Red-flowering Dogwod	10
Corylus **(Betulaceae)**		
C. cornuta var. *californica*	California Hazel	7
Cotinus **(Anacardiaceae)**		
C. obovatus	American Smoketree	2
Crataegus **(Rosaceae)**		
C. douglasii	Black Hawthorne	9
Cupressus **(Cuprussaceae)**		
C. arizonica	Rough-barked Arizona Cypress	2
Fagus **(Fagaceae)**		
F. sylvatica	European Beech	3
Fraxinus **(Oleaceae)**		
F. americana	White Ash	3
F. latifolia	Oregon Ash	2
F. oxycarpa	Raywood Ash	17
Ginkgo **(Ginkgoaceae)**		
G. biloba	Ginkgo	1
Gleditsia **(Leguminosae)**		
G. tricanthos	Honeylocust	7

Native area	Example
e. North America	?
Japan & China	L-08
?	?
California & Oregon	G-11
Japan	E-11
Japan	K-13
China	M-20
w. North America	W-18
e. coast United States	U-19
w. North America	V-21
s.e. United States	?
e. & c. North America	A-19
s.w. United States	L-15
Europe, s. Britain	L-17
e. United States	N-21
w. North America	D-14
?	W-16
China	K-08
c. North America	M-19

Campus Species, Listed by Genus

Scientific Name	Common Name	No. of Trees
Ilex **(Aquifoliaceae)**		
I. aquifolium	English Holly	16
Juniperus **(Cupressaceae)**		
J. chinensis	Chinese Juniper	1
J. communis	Common Juniper	11
J. recurva	Drooping Juniper	1
J. scopulorum	Rocky Mountain Juniper	1
J. sp.	Sunburst Juniper	2
Laburnum **(Leguminosae)**		
L. anagyroides	Golden Chain	1
Lagerstroemia **(Lythraceae)**		
L. indica	Crepe-myrtle	3
Larix **(Pinaceae)**		
L. occidentalis	Western Larch	3
Laurus **(Lauraceae)**		
L. nobilis	Laurel	74
Liquidambar **(Hamamelidaceae)**		
L. styraciflua	Sweet Gum	30
Liriodendron **(Magnoliaceae)**		
L. tulipifera	Tulip Tree • Yellow Poplar	3
Magnolia **(Magnoliaceae)**		
M. campbellii	Campbell's Magnolia	1
M. grandiflora	Evergreen Magnolia	10
M. tripetala	Umbrella Tree	1
Malus **(Rosaceae)**		
P. spp.	Apple	36
P. spp.	Crab Apple	2
Metasequoia **(Taxodiaceae)**		
M. glyptostroboides	Dawn Redwood	1
Nyssa **(Nyssaceae)**		
N. sylvatica	Black Tupelo • Blackgum	2
Photinia **(Rosaceae)**		
P. serrulata	Chinese Photinia	1

Native area	Example
w. Asia, Europe	I-19
Japan, China, Mongolia	K-13
n. Europe, North America, s.w. Asia	E-22
China, Himalayans, Burma	J-13
Rocky Mtns. North America	L-13
	L-11
c. & s. Europe	S-19
Asia, n. Australia	K-20
British Columbia - n. Montana	K-09
Mediterranean	J-12
e. United States & Central America	V-18
e. North America	V-18
Himalayas	R-16
s. United States	D-10
e. North America	R-17
Horticultural varieties	E-10
Horticultural varieties	W-21
China	L-21
e. North America	D-14
Asia	I-14

Campus Species, Listed by Genus

Scientific Name	Common Name	No. of Trees
Picea **(Pinaceae)**		
P. abies	Norway Spruce	12
P. pungens	Blue Spruce	3
Pinus **(Pinaceae)**		
P. lambertina	Sugar Pine	3
P. nigra	Austrian Pine	?
P. ponderosa	Ponderosa Pine	25
P. sylvestris	Scot's Pine	?
Platanus **(Platanaceae)**		
P. orientalis	Oriental Plane	4
Populus **(Salicaceae)**		
P. alba	White Poplar	1
P. canescens	Gray Poplar	5
P. nigra	Lombardy Poplar	19
P. trichocarpa	Black Cottonwood	44
Prunus **(Rosaceae)**		
P. spp.	Cherry	79
P. spp.	Plum	17
Pseudotsuga **(Pinaceae)**		
P. menziesii	Douglas Fir	237
Pyrus **(Rosaceae)**		
P. spp.	Pear	1
Quercus **(Fagaceae)**		
Q. accutissima	Sawtooth Oak	1
Q. alba	White Oak	2
Q. alba X Q. prinus	White X Chesnut Oak	1
Q. coccinea	Scarlet Oak	5
Q. garryana	Oregon White Oak	1
Q. rubra	Red Oak	5
Q. palustris	Pin Oak	8
Q. prinoides	Dwarf Chinkapin Oak	1
Rhamnus **(Rhamnaceae)**		
R. purshiana	Cascara • Buckthorne	1
Rhus **(Anacardiaceae)**		
R. typhina	Staghorn Sumac	5
Robinia **(Leguminosae)**		
R. pseudoacacia	Black Locust	10

Native area	Example
Scandanavia, n.w. Russia, Europe	M-15
Colorado - New Mexico	H-12
Oregon to n. California	D-18
Austria, Italy, Yugoslavia, & Greece	
British Columbia - Mexico	D-12
w. & n. Europe, Russia	
Greece, Bulgaria, Yugoslavia, & Albania	P-17
w. & c. Europe, Asia	T-11
w. Europe	F-14
n. & c. Europe	S-12
Alaska - California	H-10
Horticultural varieties	J-11
Horticultural varieties	G-14
Canada - California	L-16
Horticultural varieties	U-19
?	?
c. & e. North America	T-19
n.e. United States	K-17
n.e. United States	T-19
British Columbia - California	U-19
n.e. United States	P-15
n.e. United States	S-14
s.e. United States	K-17
British Columbia - California	H-17
e. North America	B-13
c. United States	V-21

Campus Species, Listed by Genus

Scientific Name	Common Name	No. of Trees
Salix **(Salicaceae)**		
S. matsudana	Contorted Willow	3
S. sitchensis	Sitka Willow	12
Sambucus **(Caprifoliaceae)**		
S. racemosa	Red Elderberry	1
Sassafras **(Lauraceae)**		
S. albidum	Sassafras	1
Sciadopitys **(Sciadoptiys)**		
S. verticellata	Umbrella Pine	1
Sequoiadendron **(Pinaceae)**		
S. giganteum	Giant Sequoia	5
Sorbus **(Rosaceae)**		
S. aucuparia	European Mountain Ash	16
Sophora **(Leguminosae)**		
S. japonicum	Japanese Pagoda Tree	1
Syringa **(Oleaceae)**		
S. vulgaris	Common Lilac	2
Taxus **(Taxaceae)**		
T. brevifolia	Pacific Yew	14
Thuja **(Cupressaceae)**		
T. plicata	Western Red-cedar	146
T. occidentalis	Northern White-cedar	40
Tilia **(Tiliaceae)**		
T. americana	American Basswood	3
T. tomentosa	Silver Lime	2
Tsuga **(Pinaceae)**		
T. heterophylla	Western Hemlock	18
Ulmus **(Ulmaceae)**		
U. campestris (?)	English Elm	5

Native area	Example
China	T-11
British Columbia - California	T-17
United States	U-19
e. & c. United States	K-08
Japan	K-13
Sierra Nevada, California	C-13
Europe, n. Africa, Asia Minor	H-15
Japan	S-16
e. Europe	J-13
British Columbia - California	K-11
w. North America	G-11
n.w. North America	Q-20
e. North America	G-13
s.e. Europe & s.w. Asia	G-14
n.w. North America	E-9
Europe	M-07

Campus Species, Listed by Genus

Scientific Name	Common Name	No. of Trees
Umbellularia **(Lauraceae)**		
U. californica	California Bay	1
Zelkova **(Ulmaceae)**		
Z. serrata	Keaki • Japanese Zelkova	3

Native area	Example
California & Oregon	K-09
Japan	E-8

1

Sycamore Maple

Acer pseudoplatanus [Aceraceae]

APPEARANCE: Grows to 90' tall, with a wide-spreading crown and scaly bark.

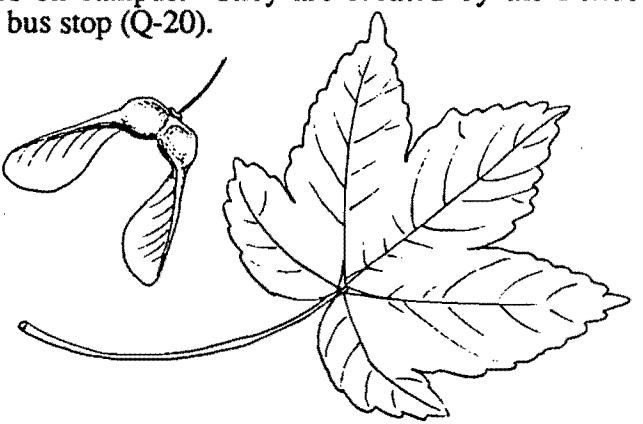
LEAVES: 4" to 7" across, 5-lobed, bluntly toothed, but varies much in size and depth of lobing with the age and vigour of the shoot.

FLOWERS: Yellowish on hanging racemes 3" to 6" long; thin-looking as petals are very short.

FRUIT: In short-stalked bunches; green variably tinged with red, on some trees conspicuously bright red in summer; glabrous; wings at about 90 degree angle, each 1.3" to 2" long.

HABITAT AND RANGE: Native to western Asia but introduced to Europe long ago, where it is naturalized. A common ornamental in the United States.

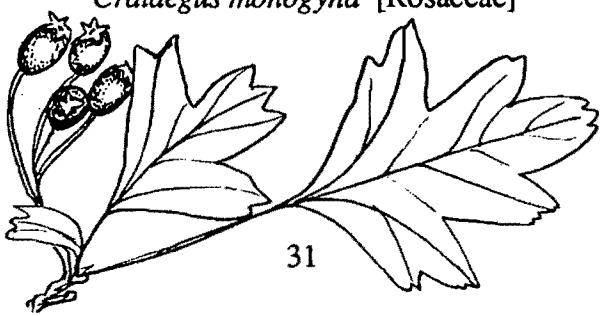
ABUNDANCE ON CAMPUS: There are only 2 Sycamore Maples on campus. They are located by the Ponderosa Dorm bus stop (Q-20).



2

One-seed Hawthorn

Crataegus monogyna [Rosaceae]



Norway Maple

Acer platanoides [Aceraceae]

APPEARANCE: Grows to about 60' or 70' with a broad crown.

LEAVES: 5" to 7" in diameter; usually ; 5- to 7-lobed; margins have large, pointed teeth and the sides of the center lobed roughly parallel.

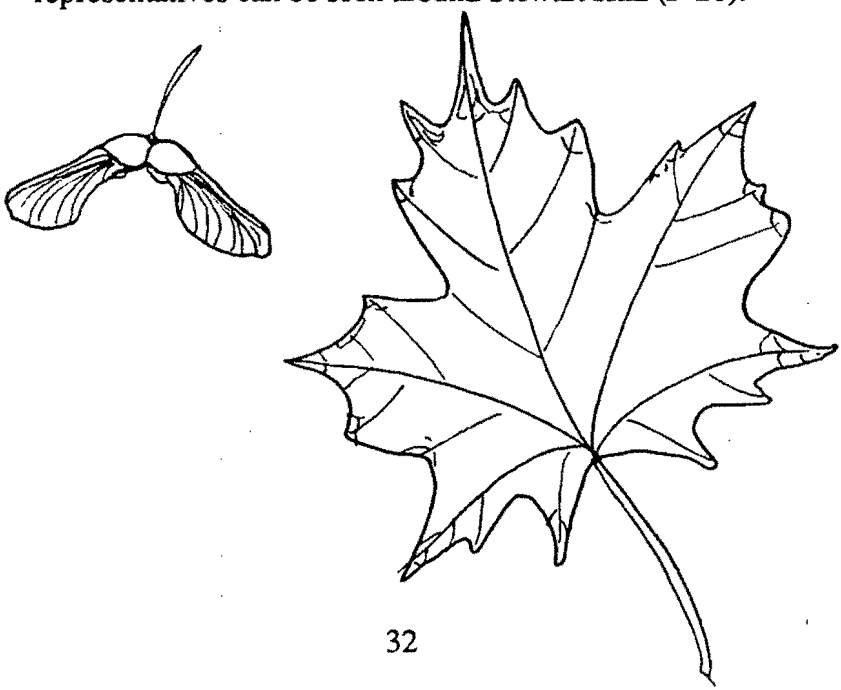
FLOWERS: Greenish-white; appear after the leaves; 5 oval petals and a big, green disc; in erect, pubescent panicles of about 30-40 flowers.

FRUIT: Yellow-green with widely spread wings; each wing 1.5" to 2" long; fruit sometimes persistent throughout winter.

HABITAT AND RANGE: Native to Europe from Norway southwards, but not to Britain. Cultivated in streets, parks, gardens, and shelterbelts in Europe and North America.

REMARKS: There are many different varieties on campus. Many of these varieties have deep reddish-purple leaves. Varieties with green and reddish-purple leaves can be found on campus.

ABUNDANCE ON CAMPUS: There are over 15 representatives of this species on campus. Several representatives can be seen around Stewart Hall (P-20).



Incense-cedar

Calocedrus decurrens [Cupressaceae]

APPEARANCE: An evergreen tree 70' to 110' tall, and 3' to 5' in diameter with a conical crown of frond like branches.

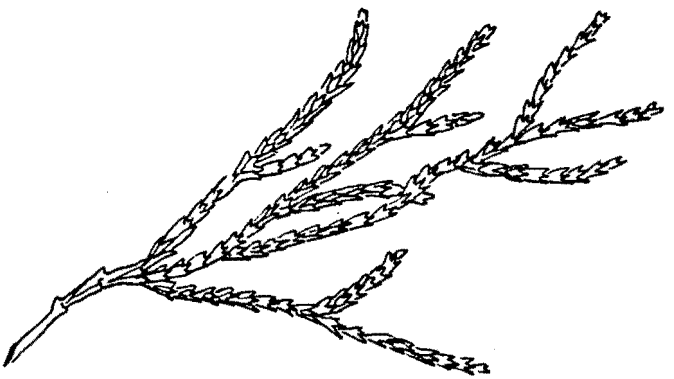
LEAVES: Small; scalelike; appear whorled in 4's; the lateral leaves are folded or keeled and almost ensheathing facial leaves; foliage arranged in flattened, elongated, fingerlike sprays.

CONES: Pendant, 0.75" to 1.25" long; ovoid, somewhat flattened; appear to be composed of 3 scales, but actually have 6; the two basal ones are aborted, the central pair is fused together, and the two large remaining scales are the only ones which are fertile.

HABITAT AND RANGE: Does best on moist, porous soils. Found on both slopes of the Oregon cascades, the northern Coast Range, and the length of the Sieera Nevada Mountains in California; also lower California. Elevational range 1,000 to 8,000 feet. In mixed stands with Sugar, Ponderosa, Jeffrey, and White Pine; White Fir; and Douglas-fir.

REMARKS: "Pecky rot" caused by *Polyporus amarus* causes extensive damage to heartwood and limits use as lumber source.

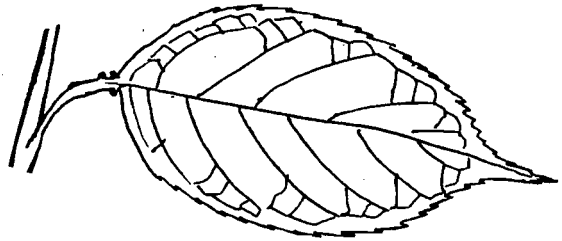
ABUNDANCE ON CAMPUS: There is only one stand of Incense-cedars on campus, located behind Juniper Dorm (U-21).



5

Cherry

Prunus spp. [Rosaceae]



6

Black Locust

Robinia pseudoacacia [Leguminosae]

APPEARANCE: A medium-sized tree 40' to 80' tall and 1' to 3' in diameter; open, irregular crown.

LEAVES: Pinnately compound; alternate; deciduous; 8" to 14" long; 7-21 ovate-oblong, entire, glabrous leaflets; each leaflet 1.5" to 2" long, 0.8" wide; dark blue-green above and paler below.

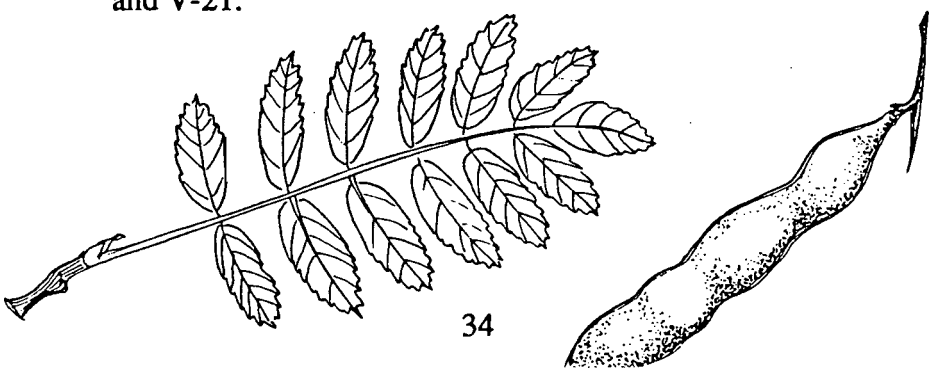
FLOWERS: Fragrant; white; in racemes; perfect; calyx bell-shaped; corolla 5-petalled; stamens 10; ovary 1-celled; appearing after leaves.

FRUIT: A smooth, dark brown, flat, linear-oblong pods, 2" to 4" long, 0.5" wide; 4-8 flat brown seeds about 3/16" long.

HABITAT AND RANGE: Prefers moist, rich soils, but hardy on poor, dry sites. Ranges throughout Appalachian Mountains in eastern United States, as well as in Missouri and Arkansas.

REMARKS: This species is seriously threatened in wild by locust borer (*Cyllene robiniae*).

ABUNDANCE ON CAMPUS: There are only ten individuals on campus. Good representatives are at M-10 and V-21.



7

Bigleaf Maple

Acer macrophyllum [Aceraceae]

APPEARANCE: A medium-sized tree 40' to 100' tall and 2' to 4' in diameter; when growing in the open usually branches within the first 15 feet into several large branches, forming a dense, round, spreading crown; but in a dense stand, may be a tall, straight tree.

LEAVES: Simple; palmately 5-lobed; 6" to 12" in diameter; margins entire or wavy-toothed; surfaces dark green above, paler below; petiole long, exudes a milky sap when sqeezed.

FLOWERS: small, yellow; in pendulous racemes; both perfect and unisexual flowers on the same tree.

FRUIT: slightly diverging wings 1.25" to 2" long; wings densely hairy over seed cavity, nearly glabrous elsewhere; maturing in autumn.

HABITAT AND RANGE: Moist, well-drained soils; from western British Columbia south through western Washington and Oregon to southern California. Elevational range: sea level to 5,500 feet.

REMARKS: Bigleaf maple has the largest leaves of any of the maples and it is one of the largest species in the genus.

ABUNDANCE ON CAMPUS: Bigleaf maple is the most prevalent tree species on campus.

8

European White Birch

Betula pendula [Betulaceae]

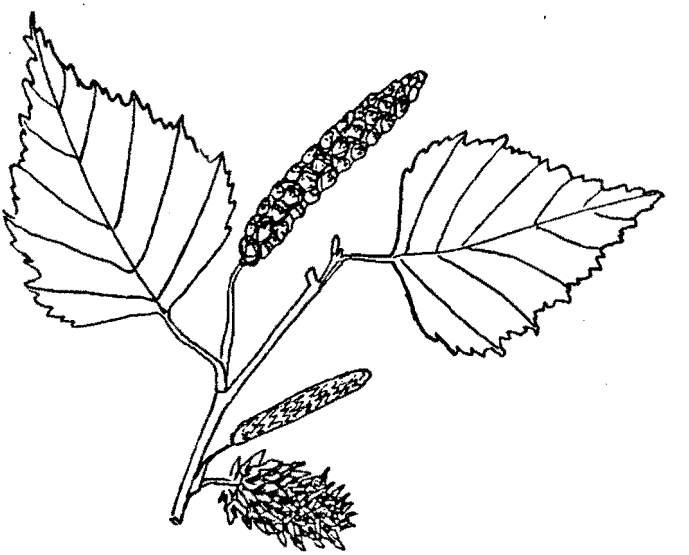
APPEARANCE: A medium sized tree up to 60' tall and 2 feet in diameter. Its branches are spreading and ascending or pendant. The crown in older trees lose their pointed crown of youth to become domed-shaped, with long, pendulous branchelets.

LEAVES: Varies depending on the variety. One variety on campus has ovate leaves, 1" to 2" long and 1.5" wide; with a rounded to wedge-shaped base and course, irregularly toothed margins. A second variety has deeply cut, lobed leaf margins in which the margins of the lobes are coarsely toothed.

FRUIT: Catkins cylindrical, pendant, on slender peduncles, 1" to 1.5" long; male catkins 2 to 4 together on ends of small shoots.

HABITAT AND RANGE: Native in all areas of Europe and Asia Minor. Abundant on heaths and gravels, hills and moorlands, wood-edges and scrub, and in gardens on light soils.

ABUNDANCE ON CAMPUS: There are a many European White Birches growing in the landscaped parts of campus. They can be seen at V-20 and E-11.



10

Tuliptree • Yellow Poplar

Liriodendron tulipifera [Magnoliaceae]

APPEARANCE: A large, handsome tree 80' to 150' tall and 4' to 6' in diameter; clear, straight trunk; open, oblong, or conical crown with small branches.

LEAVES: Simple; alternate; deciduous; 4" to 6" long; characteristically 4-lobed, resembling a tulip in outline; petioles slender; 5" to 6" long; stipules large, conspicuous.

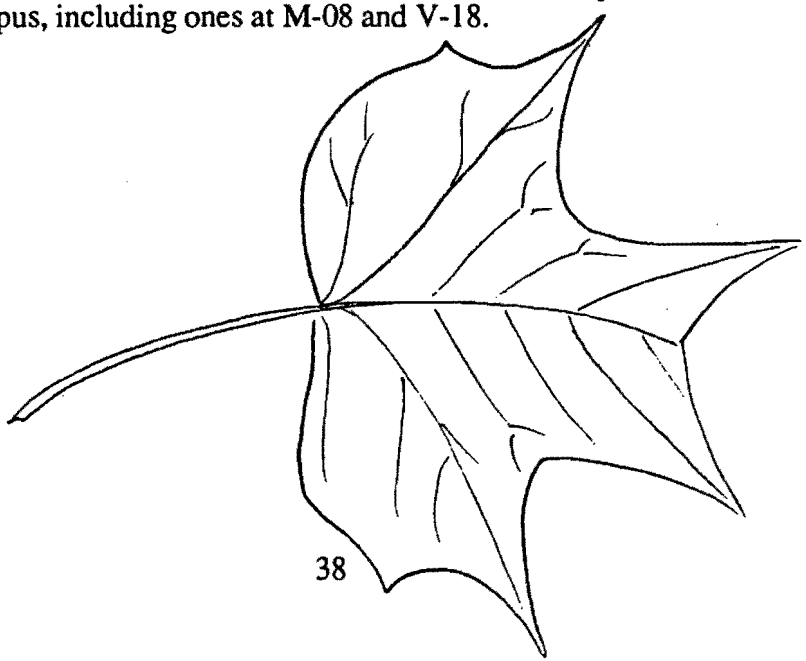
FLOWERS: Perfect; appearing after the leaves; yellow-green; cup-shaped; 1.5" to 2" long; 3 sepals; 6 petals in 2 rows; stamens and pistils numerous and spirally arranged around a central axis.

FRUIT: A large (2.5"-3" long) erect, conelike aggregate of spirally arranged samaras; each samara 1.5" long, 4-angled, terminally winged, deciduous from the slender, more or less persistent, central axis.

HABITAT AND RANGE: Typical of moist forest sites; grows in mixtures with other hardwoods; grows throughout eastern United States; from southern Michigan to Louisiana and eastward to Atlantic Ocean.

REMARKS: Only 2 species in this genus are now in existence, one a native of central China, *L. chinense*. The United States' native attains the greatest height of any of our broadleaf species and perhaps the greatest diameter.

ABUNDANCE ON CAMPUS: There are 3 Tuliptrees on campus, including ones at M-08 and V-18.



11

Sweetgum • Redgum

Liquidambar styraciflua [Hamamelidaceae]

APPEARANCE: A medium to large sized tree 80' to 110' high and 2' to 4' in diameter; small, oblong crown with small branches; long, clear, frequently buttressed trunk.

LEAVES: Simple; alternate; deciduous; star-shaped; deeply and palmately 5- to 7-lobed; 4" to 7" long; lobes toothed and acuminate; lustrous and bright green above; paler beneath.

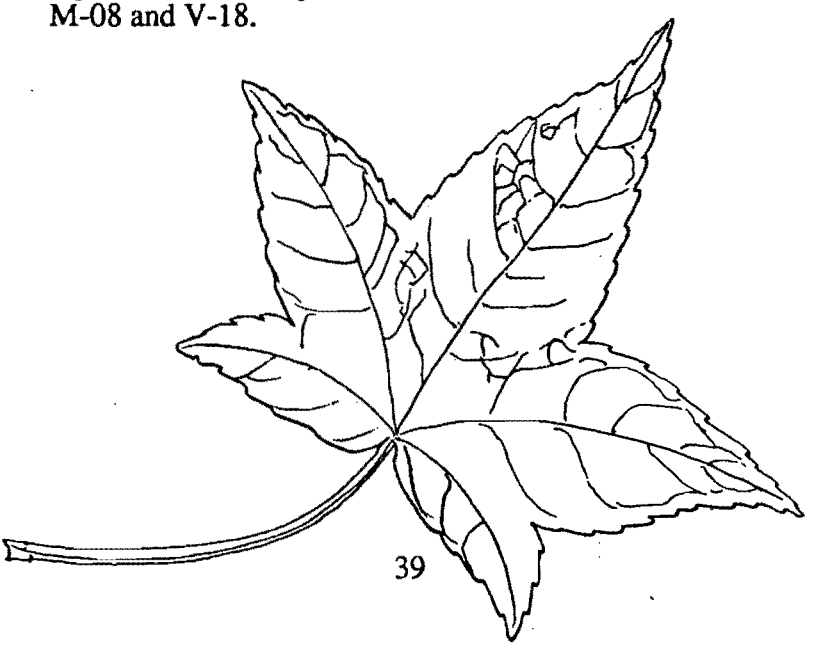
FLOWERS: Monoecious; both male and female flowers in heads; male in terminal racemes 2" to 3" long without calyx or corolla; female in solitary, long-stalked heads; 2-celled ovary; apearing with the leaves.

FRUIT: A long-stemmed, burlike head of capsules; 1.5" in diameter; each capsule contains two small seeds; maturing in 1 year but persistent through the winter.

HABITAT AND RANGE: Grows on rich, moist bottomlands or swampy sites; ranges throughout southeast United States; from eastern Texas up to southern Illinois and Indiana and eastward.

REMARKS: This genus is composed of 4 species, 2 in Asia and 1 in Central America. A very important lumber tree in the Southeast; it is exceeded only by the Oaks in volume of lumber cut.

ABUNDANCE ON CAMPUS: This species is well represented on campus with 30 individuals. It can be seen at M-08 and V-18.



12

Red-flowering Dogwood

Cornus florida var. *rubra* [Cornaceae]

APPEARANCE: A shrub rarely 30' tall and 1' in diameter; bushy, flat crown.

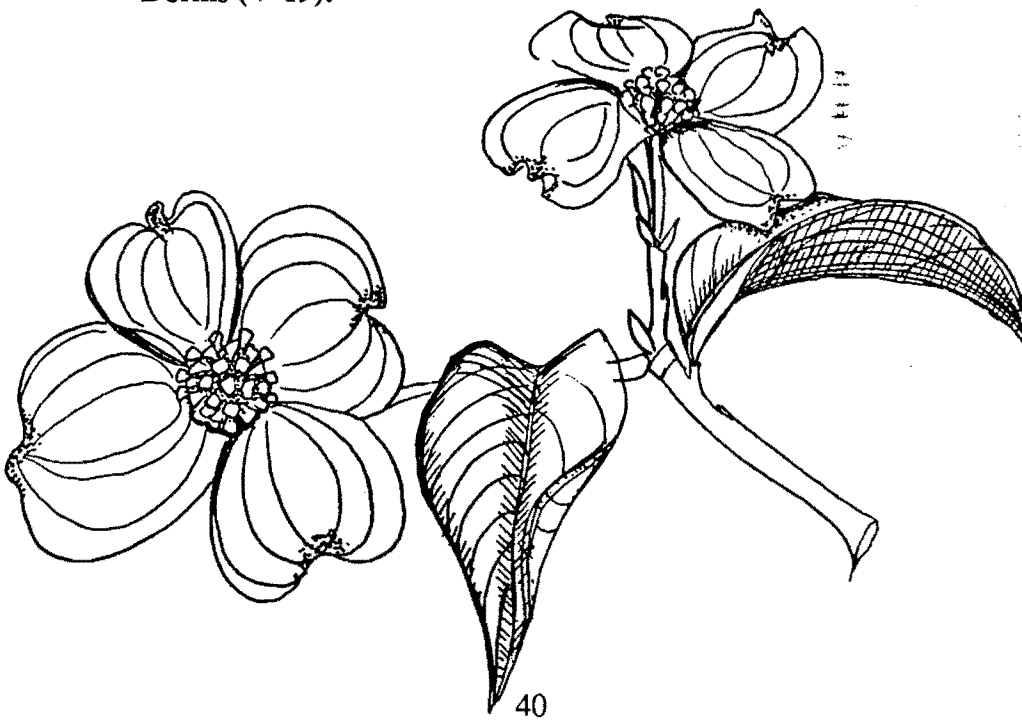
LEAVES: Simple; opposite; deciduous; 3" to 6" long and 1.5" to 2" wide; oval; entire; thick; bright green above, paler beneath.

FLOWERS: Perfect; small, greenish white flowers in clusters; surrounded by 4 showy, 2" to 4" petallike, notched, pinkish-red bracts; appearing with leaves. Clusters often mistakenly identified as single flower.

FRUIT: An ovoid, scarlet drupe 0.5" long; in clusters of 3 or 4; containing a 2-celled pit.

HABITAT AND RANGE: The parental stock of Red-flowering Dogwood is the Flowering Dogwood (*C. florida*), which is nartive to the eastern United States. It grows on moist sites as an understory species.

ABUNDANCE ON CAMPUS: There are 10 representatives on campus. They can be seen on the west side of Templeton (N-18) and between Alder and Manzanita Dorms (V-19).



13
Oregon White Oak
Quercus garryana [Fagaceae]

APPEARANCE: A tree 40' to 80' tall and 2' to 3' in diameter; broad, compact crown with large branches.

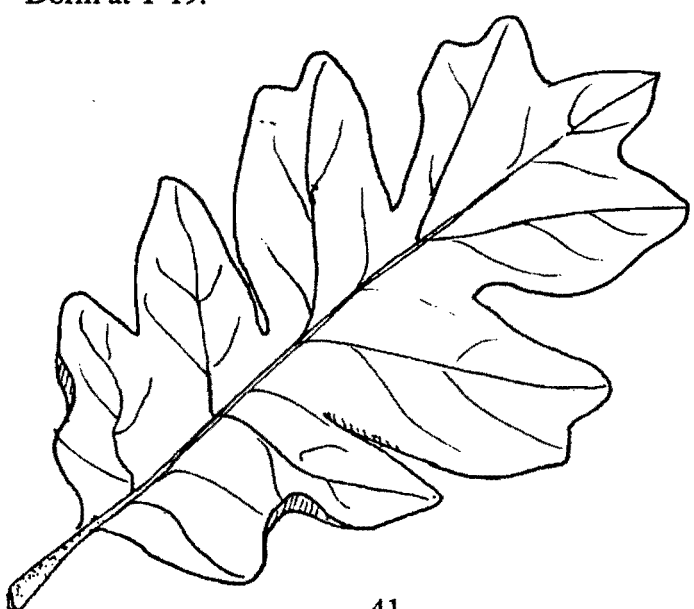
LEAVES: Deciduous; 3" to 6" long, 2" to 4.5" broad; obovate or oblong; thick and leathery; dark green above, palert and somewhat hairy below; petiole 0.5" to 1" long, pubescent.

FRUIT: Acorn oval or barrel-shaped; 0.75" to 1.5" long; enclosed at base or to one-third of length in shallow cup with hairy, thickened scales; glabrous; matures in one season.

HABITAT AND RANGE: On dry to moist, well-drained gravelly soils in the valleys and lower foothills from southwestern British Columbia and Vancouver Island southward principally on the west side of the Cascades; to north-central California.

REMARKS: Oregon White Oak is the most abundant and widely distributed oak in Oregon. It is the only native oak found in eastern Oregon (Sherman County) where it is associated with Ponderosa Pine and Western Juniper. It is also the only native oak to Washington and British Columbia.

ABUNDANCE ON CAMPUS: There is only 1 example on campus. It is located between Tamarack Lounge and Spruce Dorm at T-19.



14

Scarlet Oak

Quercus coccinea [Fagaceae]

APPEARANCE: A medium-sized tree 60' to 80' tall and 1' to 3' in diameter; open, rounded crown.

LEAVES: Deciduous; obovate to oval; 3" to 7" long; deeply 5- to 9-lobed with wide, circular sinuses; lobes toothed and bristle-tipped; bright green and shiny above, paler and glabrous below except in axillary tufts; petioles slender.

FRUIT: Maturing in 2 years; sessile or nearly so; acorn 0.5" to 1" long, red-brown, subglobose, usually with distinctive concentric rings near apex; enclosed for one-half or less of length of thick cup with lustrous scales.

HABITAT AND RANGE: Grows on dry and sandy sites. Native to Ohio River Valley and most states to the south and east of the valley.

REMARKS: Easily transplanted; a common ornamental; hybridizes with many species in genus.

ABUNDANCE ON CAMPUS: There are approximately twenty representatives on campus. Scarlet Oak can be seen at T-19 and V-18.

15
Devils-walkingstick
Aralia spinosa [Araliaceae]

APPEARANCE: A shrub or small tree rarely 35' tall and 10" in diameter; with a few branches and a flat crown.

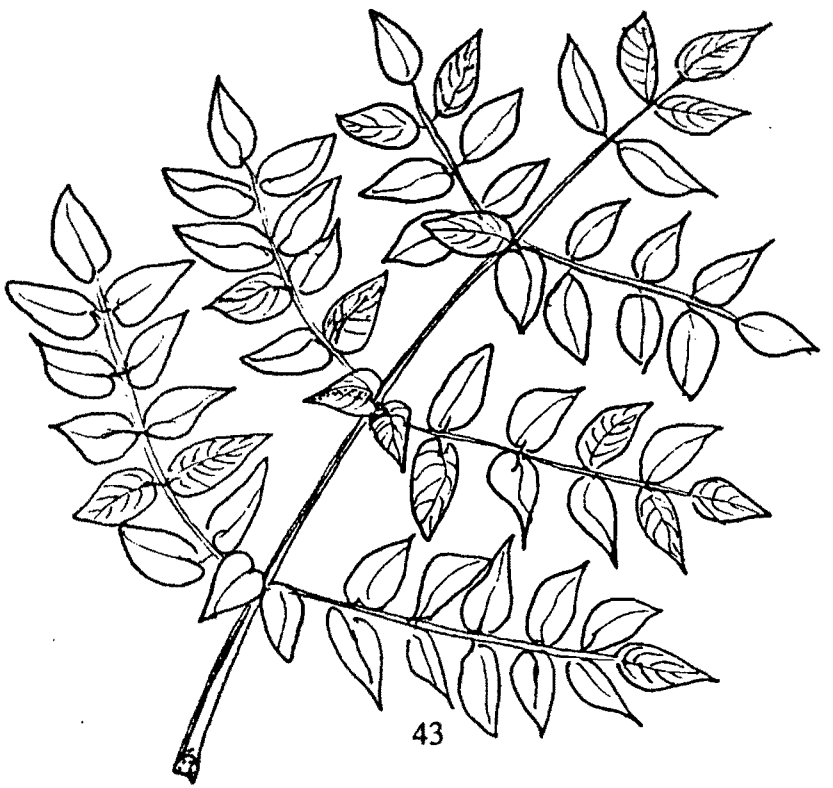
LEAVES: Alternate; doubly pinnately compound; deciduous; 2' to 4' long and 2' to 3' wide; pinnea usually bearing 5-6 pairs of ovate, serrate, thin, dark green leaflets 2" to 3" long; spiny stalks.

FLOWERS: Regular; perfect or staminate; small; in compound, terminal clusters 3' to 4' long; green-white.

FRUIT: Small, juicy, black berry 0.25" long; tipped with persistent style. Seeds: 2-5, oblong; compressed; red-brown.

HABITAT AND RANGE: Ranges from New York in the Northeast to northern Florida; as far west as eastern Texas and through Ohio River Valley.

ABUNDANCE ON CAMPUS: There is only one individual on campus. It is located on the southwest bank of the Templeton Parking lot at Q-18.



16

Ponderosa Pine • Western Yellow Pine

Pinus ponderosa [Pinaceae]

APPEARANCE: A large tree 150' to 180' high and 3' to 5' in diameter; yellow-brown bark in scaly plates; trunk straight.

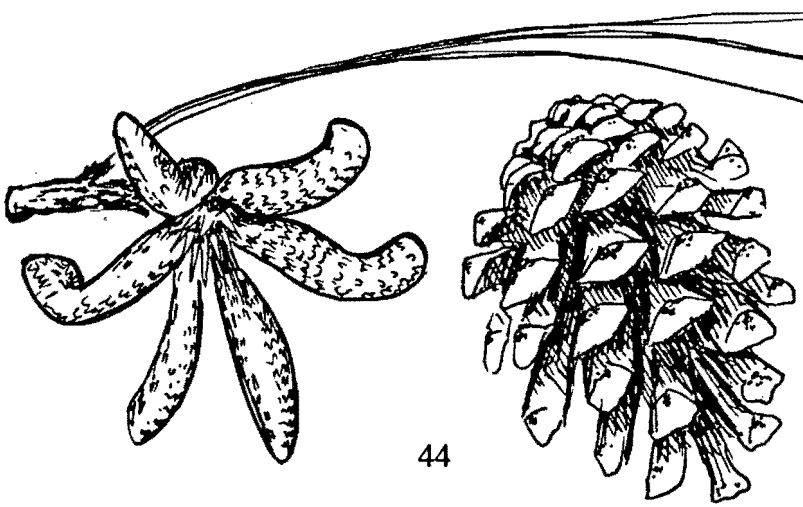
LEAVES: Needles in 3, sometimes 2, per fascicle; 5" to 10" long; persist about 3 years; cross section shows 2-5 resin ducts; sheath persistent.

CONES: 3" to 5" long; ovoid; green to purplish brown just before maturity, but turning brown; sessile; basal scales remaining attached to twig when cones shed; umbo dorsal, armed with a straight prickle.

HABITAT AND RANGE: Most commonly found on dry, sandy, or gravelly soils; in open, pure stands or more commonly the most abundant tree in mixed coniferous stands; Ponderosa Pine occurs in every state from the Rocky Mountains to the Pacific Coast, also in the Black Hills fo South Dakota, and from southern British Columbia to northern Mexico. Elevational range: as low as 200' on the floor of the Willamette Valley, and up to 9,000'.

REMARKS: A very important timber tree. Bark beetles that attack Ponderosa Pine include *Dendroctonus brevicomis* that attacks mature pines, and *Dendroctonus monticolae* that attacks younger pines. Porcupines deform pines by girdling.

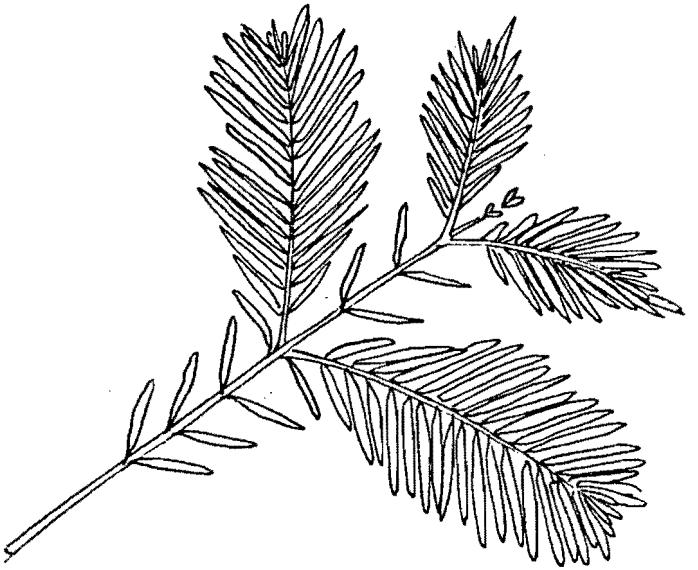
ABUNDANCE ON CAMPUS: There are a number of Ponderosa Pines on campus; they can be seen at P-20 and D-12.



19

Metasequoia • Dawn Redwood

Metasequoia glyptostroboides [Taxodiaceae]



19

Crepe Myrtle

Lagerstroemia indica [Lythraceae]

22

Silver Lime

Tilia tomentosa [Tiliaceae]

APPEARANCE: A medium sized tree to 80' tall.

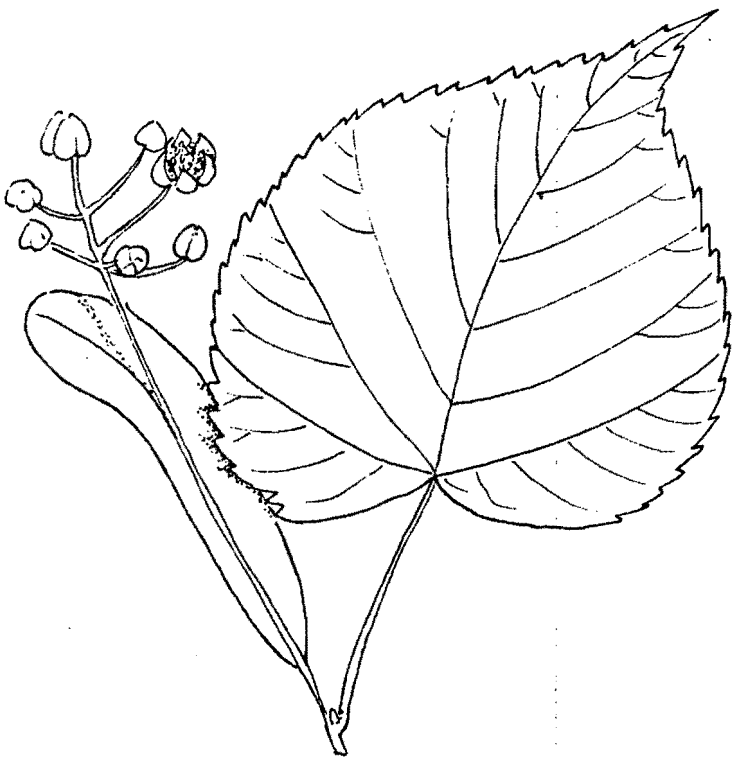
LEAVES: Dark gray-green and wrinkled above, gray and downy underneath and on the stem; rounded; abruptly acuminate; cordate one side, truncate the other; fairly big, sharp forward teeth; leaves held level, rather densely.

FLOWERS: Very fragrant; have a narcotic effect on bees; short-cylindric; 1.5" peduncle; five ovate, pale-yellow petals; rich golden anthers; on yellow-green obovate bract.

FRUIT: 0.25" to 0.5" long; downy with 5 ridges.

HABITAT AND RANGE: Native to southeastern Europe and southwest Asia.

ABUNDANCE ON CAMPUS: There are only 2 specimens on campus. They are located adjacent to each other just outside the Zehntbauer Swimming Pavilion (G-14).



American Basswood • Linden

Tilia americana [Tiliaceae]

APPEARANCE: A medium-sized tree 60' to 90' high and 2' to 3' in diameter; dense, rounded crown.

LEAVES: Simple; alternate; deciduous; 5"-6" long and 3" to 4" wide; broadly ovate; coarsely serrate; unequally heart-shaped base; glabrous; dull dark green above; paler beneath.

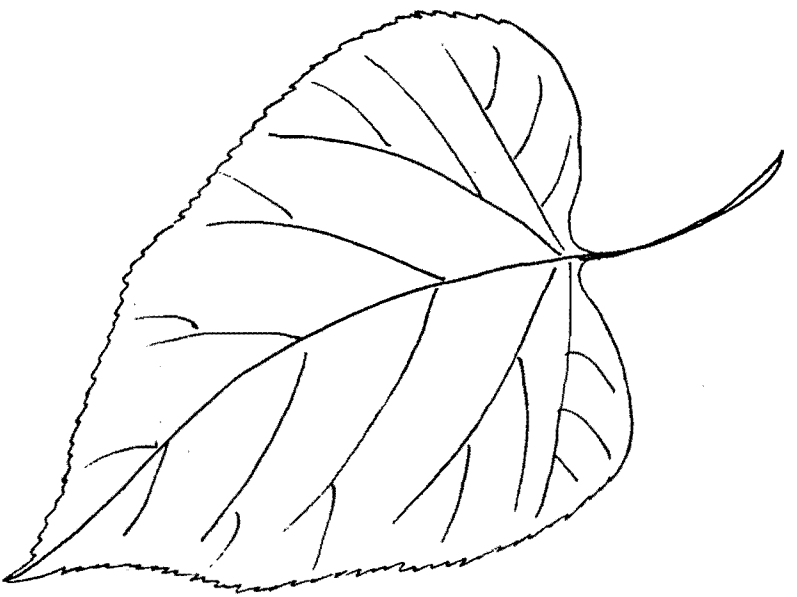
FLOWERS: Regular; perfect; in loose 6- to 15-flowered cymes; yellow-white; fragrant; 5 sepals; 5 petals; many stamens; 5-celled ovary; appearing after the leaves.

FRUIT: A gray, globose, wooly, nutlike drupe 0.3" to 0.5" long; in cymes and attached to leafy persistent bracts, which are 4" to 5" long and 0.5" to 0.8" wide.

HABITAT AND RANGE: Prefers moist sites; grows in eastern United States; from Minnesota in the north to Missouri in the south and all the way to eastern seaboard.

REMARKS: This species is prized as a source of honey. It is a common shade and ornamental tree.

ABUNDANCE ON CAMPUS: There are only three representatives of American Basswood on campus. They are all located along the cobblestone rode by the Thaxter classrooms (G-13).



24

Black Tupelo • Blackgum

Nyssa sylvatica [Nyssaceae]

APPEARANCE: A medium-sized tree 40' to 80' high and 1' to 3' in diameter; rounded crown, horizontal branches.

LEAVES: Alternate; simple; deciduous; 2" to 5" long; obovate; entire or wavy; thick, lustrous; dark green above, paler, often hairy below; scarlet in autumn.

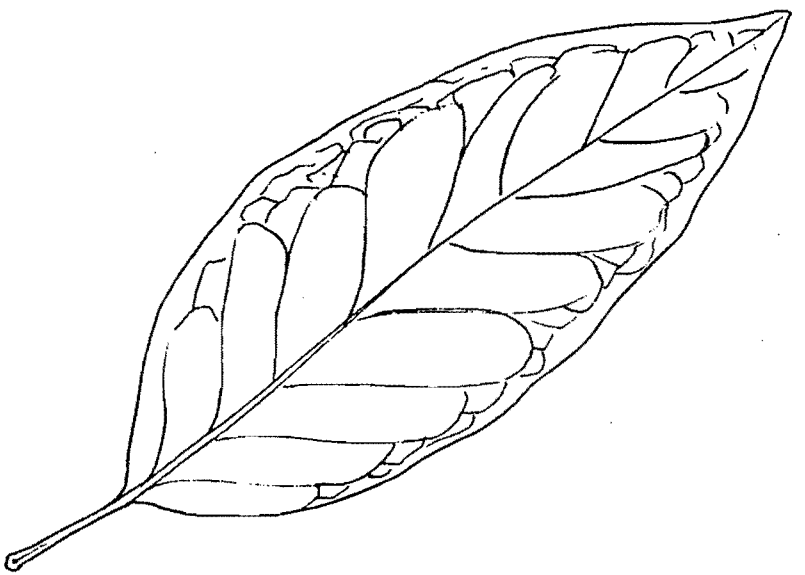
FLOWERS: Regular; polygamo-dioecious; small; staminate in heads; green-white; appearing with the leaves.

FRUIT: Fleshy, ovoid, blue-black drupe 0.3" to 0.6" long, indistinctly ribbed pit.

HABITAT AND RANGE: Grows mainly in moist soils and is never abundant. Native to the eastern United States from New England south to Florida and westward to Texas.

REMARKS: The genus *Nyssa* is placed in the family Cornaceae by some authors.

ABUNDANCE ON CAMPUS: There are only two individuals on campus. They are located on either side of the English Department Offices (E-14).



Oregon Ash

Fraxinus latifolia [Oleaceae]

APPEARANCE: A medium-sized tree 40' to 80' tall and 1' to 2.5' in diameter with a narrow or broad crown.

LEAVES: 5" to 14" long; 5-7 broad ovate, obovate, or elliptical leaflets; leaflets entire or finely toothed, light green above and usually hairy below, sessile or with petiolules up to 0.5" long.

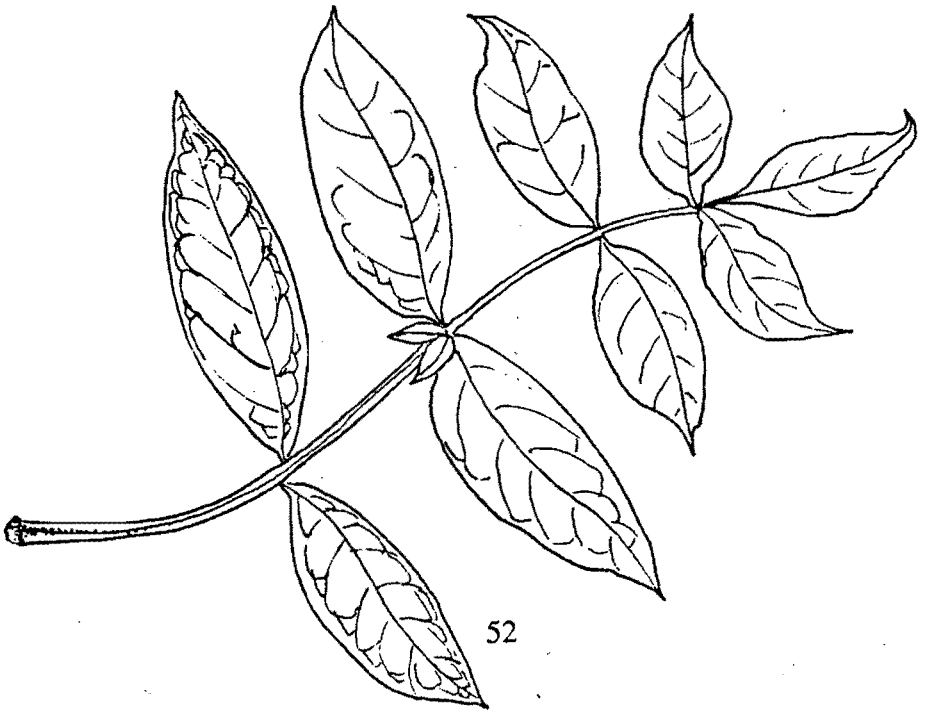
FLOWERS: In compact panicles; dioecious; corolla absent; appearing with leaves.

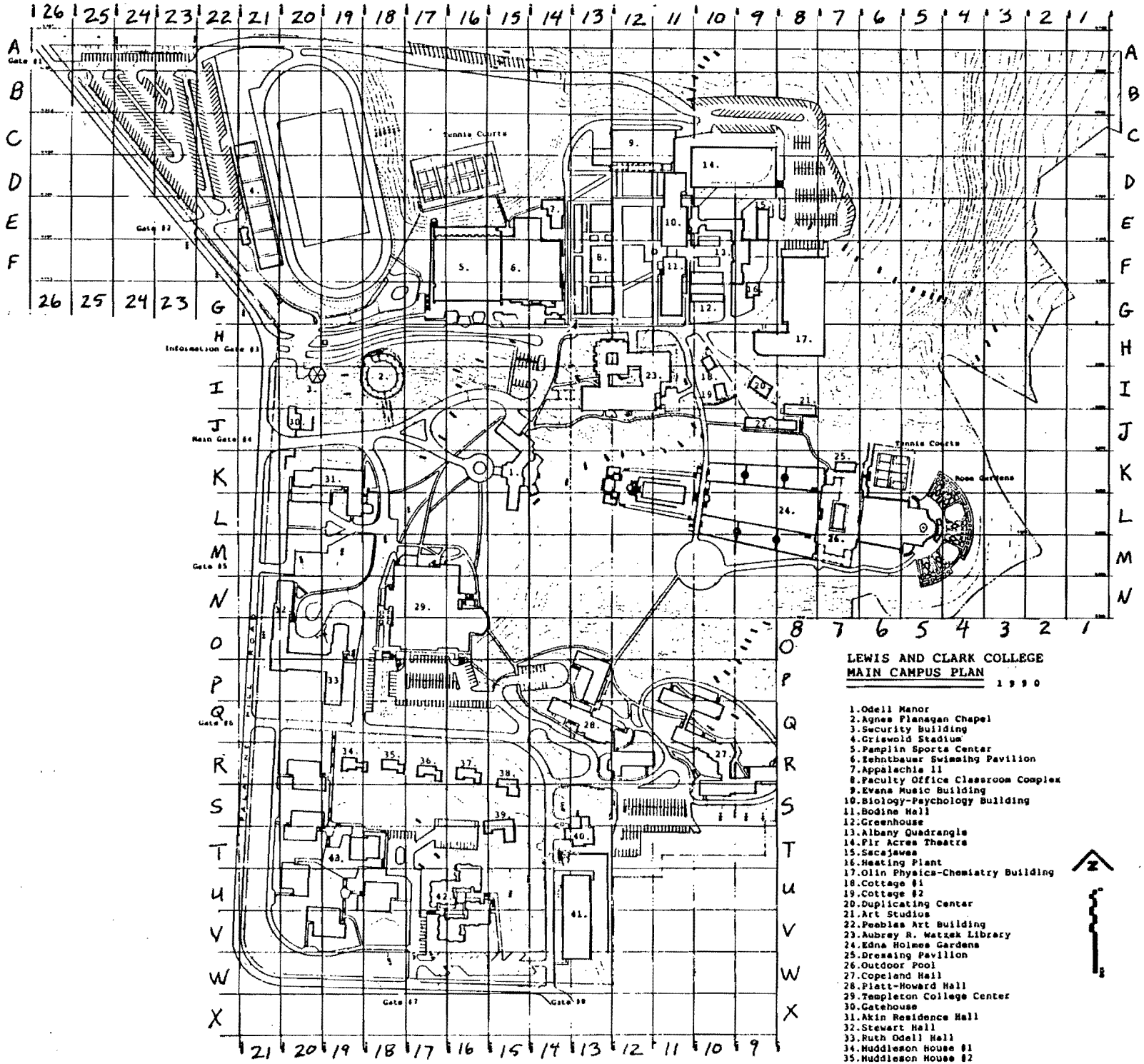
FRUIT: Single samara with a terminal wing; 1.5" to 2" long; seed cavity slightly compressed.

HABITAT AND RANGE: Found on moist, sandy, rocky or gravelly soils, usually near stream, on bottomlands, or around the margins of swampy areas; on the west side of the Cascade and Sierra Nevada Mountains from southwestern British Columbia southward to central California. Usually associated with Bigleaf Maple, Red Alder, Black Cottonwood, willows, Douglas-fir, and Grand Fir.

REMARKS: Fairly important food for deer and elk.

ABUNDANCE ON CAMPUS: There are only 3 tree-sized Oregon Ash on campus. One is located behind Appalachia II at (D-14).





LEWIS AND CLARK COLLEGE
MAIN CAMPUS PLAN 1990

1. Odell Manor
2. Agnes Flanagan Chapel
3. Security Building
4. Griswold Stadium
5. Pamplin Sports Center
6. Zehntbauer Swimming Pavilion
7. Appalachia II
8. Faculty Office Classroom Complex
9. Evans Music Building
10. Biology-Psychology Building
11. Bodine Hall
12. Greenhouse
13. Albany Quadrangle
14. Fir Acres Theatre
15. Sacajawea
16. Heating Plant
17. Olin Physics-Chemistry Building
18. Cottage #1
19. Cottage #2
20. Duplicating Center
21. Art Studios
22. Pamplin Art Building
23. Aubrey R. Watzek Library
24. Edna Holmes Gardens
25. Dressing Pavilion
26. Outdoor Pool
27. Copeland Hall
28. Platt-Howard Hall
29. Templeton College Center
30. Gatehouse
31. Akin Residence Hall
32. Stewart Hall
33. Ruth Odell Hall
34. Huddleson House #1
35. Huddleson House #2
36. Huddleson House #3
37. Huddleson House #4
38. Huddleson House #5
39. Gallagher House
40. McAfee House
41. Maintenance Building
42. Hartzfield Hall
43. Forest Hall

26
Staghorn Sumac
Rhus typhina [Anacarciaceae]

APPEARANCE: A shrub or small tree to 40' high and 1' in diameter; commonly in broad thickets.

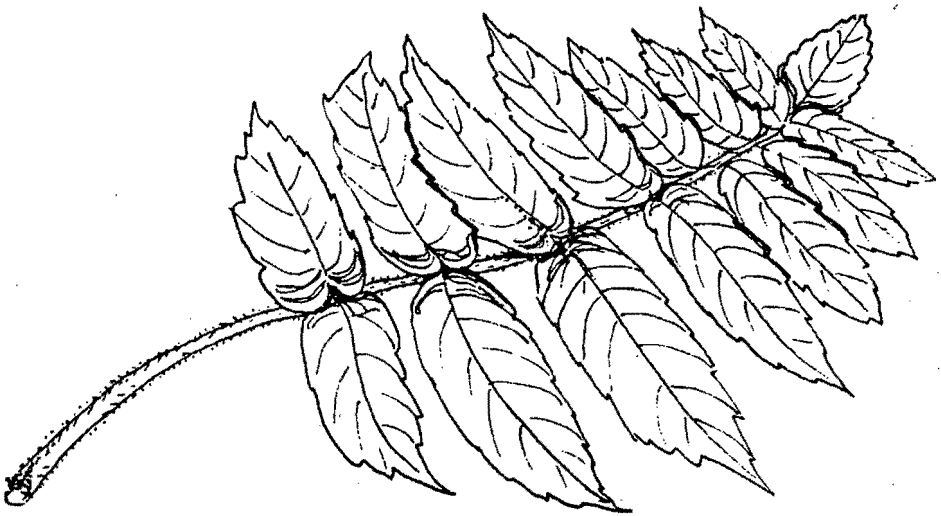
LEAVES: Alternate; deciduous; pinnately compound with 11-31 oblong, glabrous, serrate, dark green leaflets, 2" to 5" long.

FLOWERS: Regular; dioecious or polygamous; small; green-white; in dense, hairy panicles 6" to 12" long; after the leaves.

FRUIT: Compact, conelike clusters of red, hairy drupes, each 0.25" long.

HABITAT AND RANGE: Grows in eastern North America, from Minnesota in the Northwest to North Carolina in the Southeast and north through New England.

ABUNDANCE ON CAMPUS: There are approximately twenty individuals on campus, all located near the Pamplin Sports Complex and Evans Music Building (B-13). Unfortunatly, many Staghorn Sumacs have been removed so that the view of the tennis courts would be improved.



27

Austrian Pine

Pinus nigra [Pinaceae]

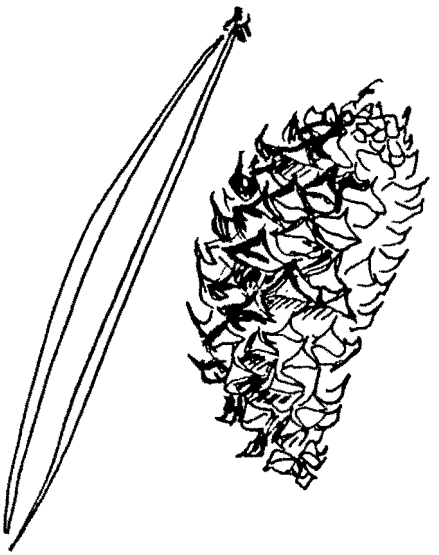
APPEARANCE: A medium-sized to tall tree; up to 100' tall and 2.5' in diameter; stout branches; pyrimidal crown.

LEAVES: Dark green needles to 6" long; 2 per bundle; dense, stiff.

CONES: Cone ovoid, 2" to 4" long; have scales tipped with a tiny prickle.

HABITAT AND RANGE: Grows in shelter-belts by coast or on calcareous soils. Ranges throughout Austria, Italy, Yugoslavia and Greece.

ABUNDANCE ON CAMPUS: There are not very many Austrian Pines growing on campus. One can be seen by the Evans Music Building (D-14).



28

Giant Sequoia

Sequoiadendron giganteum [Taxodiaceae]

APPEARANCE: This tree is the most massive and possibly the oldest of all living trees; commonly reaching a height of 250' to 280' and a diameter of 10' to 15'; crown scaggly and open; trunk clear with short, thick branches.

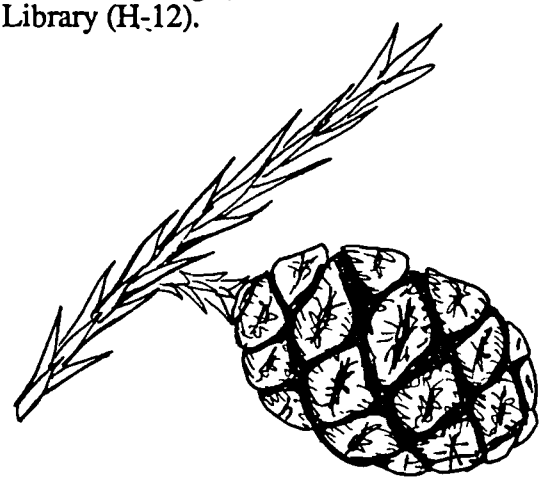
LEAVES: Spirally arranged; 0.25" to 0.5" long; ovate to lanceolate; rigid; sharp-pointed; glue-green; turning brown in 2 to 3 years but persisting for several years.

CONES: Woody, ovoid-oblong, pendent cones; 2" to 3.5" long; 24 to 40 wedge-shaped, roughly flattened scales; reach full size first year, but not maturing until second year; unique in that seeds may be retained in cones up to 20 years.

HABITAT AND RANGE: Native only in about 32 groves along the western middle slopes of the Sierra Nevada of California; in former geologic periods this genus was widely scattered through the forests of the Northern Hemisphere. Generally associated with Sugar, Ponderosa, and Jeffrey Pines; White and Red Fir; and Incense-cedar.

REMARKS: This genus derived its name from a Cherokee Indian, Sequoiah, who developed the first alphabet used by that tribe. The General Sherman Tree in Sequoia National Park is 272' tall with an average basal diameter of 30.7'. It is estimated to be 3,800 years old.

ABUNDANCE ON CAMPUS: There are 5 Giant Sequoias on campus. Individuals can be seen on the west side of Evans Music Building (C-13) and on the north side of Watzek Library (H-12).



29

Southern Magnolia • Evergreen Magnolia

Magnolia grandiflora [Magnoliaceae]

APPEARANCE: A medium-sized tree 25' to 80' tall and 2' to 3' in diameter; clear, straight trunk; pyramidal crown with small spreading branches.

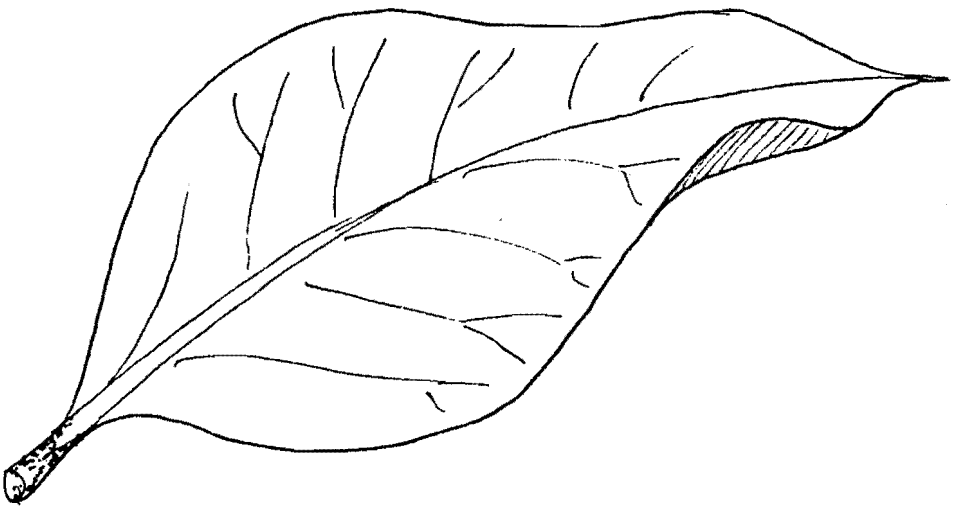
LEAVES: Persistent 2 years; narrowly oval to ovate; 5" to 8" long; acute to accuminate at apex; wedge-shaped at base; margin entire; thick and leathery; bright green and lustrous above with thick rust-brown down on underside.

FLOWERS: Fragrant; 6" to 9" in diameter; have 3 sepals and 6 to 12 large, showy white petals.

FRUIT: Conelike aggregate of follicles; ovoid; 3" to 4" long and 2" in diameter; red-wooly. Seeds are 0.25" long; red; suspended on slender, white thread.

HABITAT AND RANGE: In southern United States from South Carolina southward to mid-Florida; westward to eastern Texas.

ABUNDANCE ON CAMPUS: There are 10 individuals on campus. All are located in the Fir Acres Theater courtyard (D-10).



31

Loderi King George Rhodendron

Rhododendron griffithianum X R. fortunei

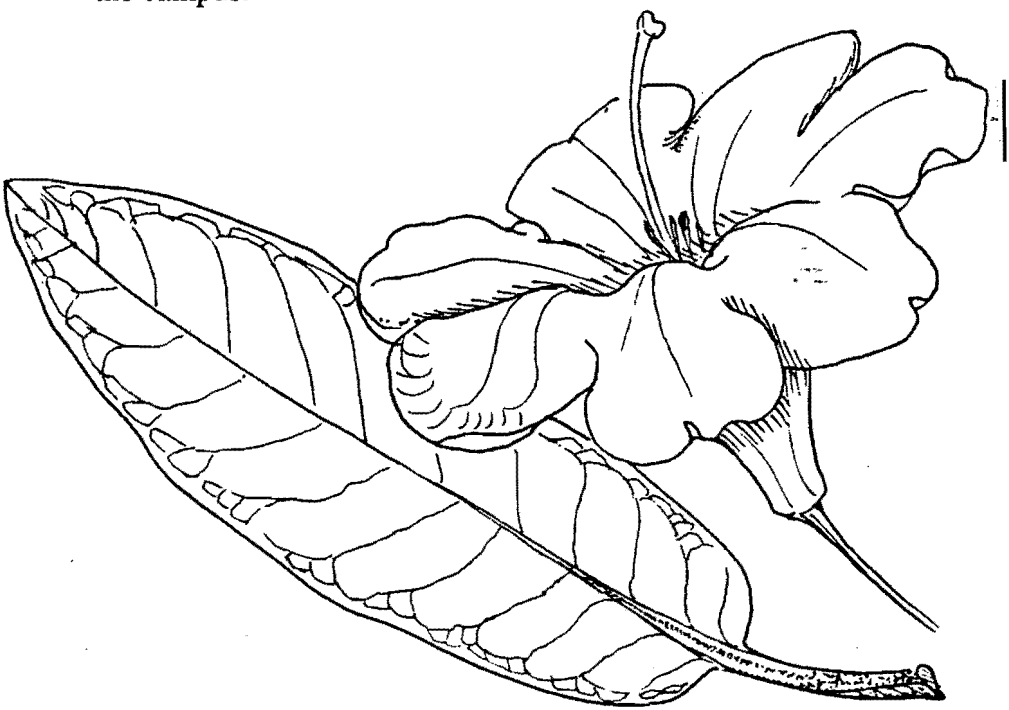
APPEARANCE: A shrub to small tree with a symmetrical, rounded appearence.

LEAVES: Lanceolate to oblong lanceolate; 6.5" to 8" long and 2.5" to 3" wide.

FLOWERS: The huge, funnel-shaped flowers open pale pink and then become white; deliciously fragrent and can be smelled from over 30' away.

REMARKS: The genus Rhododendron is native to Asia and North America. There have been countless horticultural varieties marketed around the world. In the Pacific Northwest there are three native Rhododendron species: *R. macrophyllum, R. occidentale, and R. albiflorum.*

ABUNDANCE ON CAMPUS: Varieties of this shrub can be seen from almost anywhere on campus. Indeed, Rhododendrons are the most common ornamental shrub on the campus.



34

Black Cottonwood

Populus trichocarpa [Salicaceae]

APPEARANCE: A large tree 100' to 200' in height, and 3' to 6' in diameter; with a clear, cylindrical trunk; crown open, rounded.

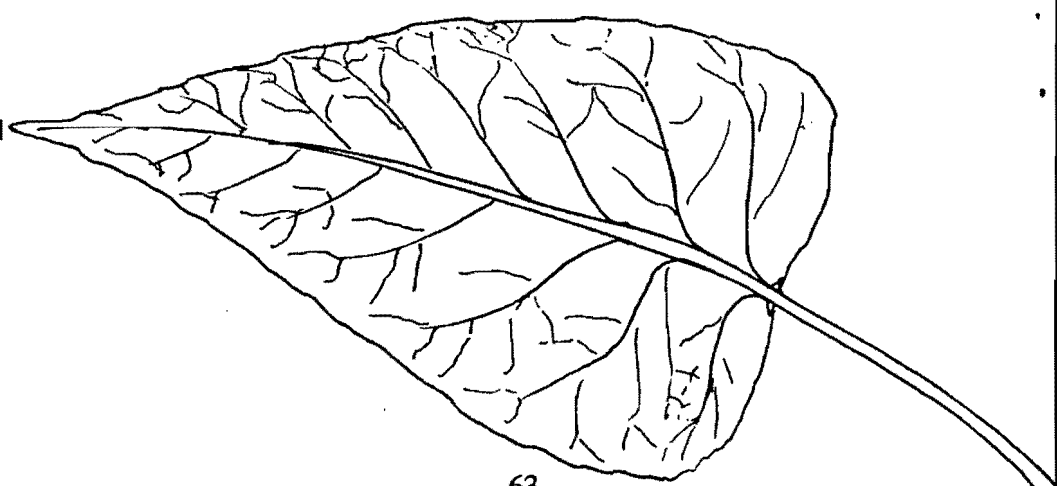
LEAVES: 3" to 6" long; ovate to ovate-lanceolate; base rounded or slightly cordate; margins wavyt to crenate-serrate; dark lustrous green and smooth above, silvery-white and commonly with rusty areas on the underside; petioles round, long.

FRUIT: Capsules subglobose, pubescent, 0.3" to 0.5" long; 3-valved; 1-celled; pubescent.

HABITAT AND RANGE: Occurs on moist sites along streams, bottomlands, and rivers. Ranges from sourthern Alaska and the southern Yukon, sothward to northern California and western Nevada, eastward to central Montana, local in Wyoming and southwestern North Dakota.

REMARKS: The largest of American poplars and the largest broad-leafed tree in the Pacific Northwest. The first forest plantations in Oregon were of Black Cottonwood. The plantations were established along the Willamette River and on some of the river islands.

ABUNDANCE ON CAMPUS: There are over 40 individuals on campus. Many of them are located on the hill by the tennis courts and behind the Evans Music Building. Cottonwoods can also be seen by Olin at H-10.



35

Silktree • Mimosa

Albizia julibrissin [Leguminosae]

APPEARANCE: A small tree witch may reach 40' tall.

LEAVES: Bipinnate leaves with many tiny leaflets (10-25 pinnae, each with 40-60 leaflets).

FLOWERS: Brightly colored with long pink stamens; have powder puff appearance.

FRUIT: The seed pod is flat, 3" to 6" long, and light colored with constrictions between each seed.

HABITAT AND RANGE: A native to western Asia, now commonly planted as a shade tree in Europe and China, in areas where it can be unaffected by frost. Escaped from cultivation in U.S. and is now naturalized from Maryland to Indiana and south.

ABUNDANCE ON CAMPUS: There is only one individual on campus. It is located on the south side of the greenhouse (G-10).

36
Vine Maple
Acer circinatum [Aceraceae]

APPEARANCE: An erect shrub up to 20' high, or less commonly a small tree up to 30' high; sometimes vinelike and usually forming dense thickets.

LEAVES: Simple; opposite; circular in outline, averaging 2 to 4" in diameter; with 5 to 9 (but usually 7) shallow, fanlike lobes which are serrated along margins; light green and glabrous above; paler below; turning red or orange in autumn.

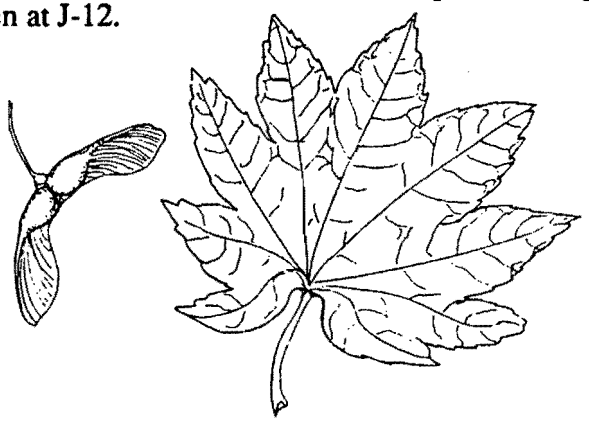
FLOWERS: petals greenish-white; calyx red; polygamo-monoecious; appearing with the leaves.

FRUIT: A propeller-like, double samara with the wing almost at 180°, 1.25" to 2" long; brownish-red to red when mature in autumn.

HABITAT AND RANGE: Common understory species in the forests west of the Cascades in the Pacific Northwest; also a pioneer species on cutover and burned-over lands. Found on moist sites in the sun or shade from soutwestern British Columbia southward through western Washington and Oregon to northern California; also in Wallowa Mountains of northeastern Oregon.

REMARKS: Valuable forage for deer and elk. Dense Vine Maple thickets often form formidable obstacle courses for hikers. In the fall Vine Maple turns various shades of red and yellow and can rival the most colorful species of the Eastern forests.

ABUNDANCE ON CAMPUS: This is a common species in the ravines but is rare on the maintained part of campus. Can be seen at J-12.



37

Blue Spruce

Picea pungens [Pinaceae]

APPEARANCE: A tree 80' to 100' tall and 1' to 2' in diameter; trunk symmetrical, tapering, knotty; crown typically dense and conical when young, becoming thin, ragged, and pyramidal with age; and extending to the ground on open-grown species.

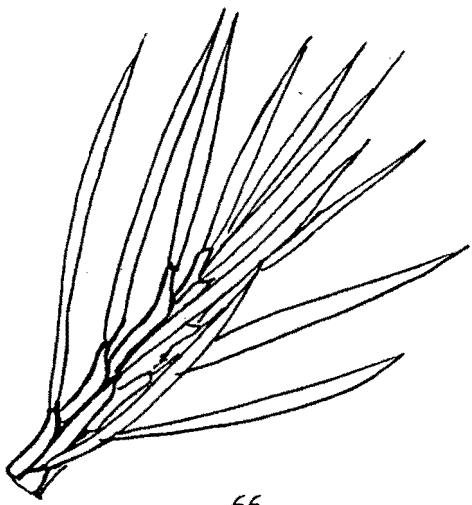
LEAVES: 1" to 1.25" long; 4-angled; blue-green, frequently with a silvery, glaucous bloom that persists for 3-4 years on young trees; extending nearly at right angles of all sides of twig; rigid, tipped with long, bristle-sharp point; 1 resin duct in an angle of leaf in cross-section.

CONES: 2.25" to 4.5" long (usually 3.5"); oblong-cylindric; sessile or short-stalked; cone scales tough, stiff, spreading; shiny, light chestnut brown; not falling until fall of second season. Seeds: 0.12" long; broad oblique wings about 0.5" long.

HABITAT AND RANGE: Grows on rich, moist soils, typically on stream banks; never abundant; in scattered pure groves or singly in mixture with Ponderosa Pine, Douglas-fir, Alpine Fir, Engelmann Spruce, and hardwoods. Occurs in southwest United States from 6,000' to 9,000' in Colorado, Arizona, New Mexico, Nevada, and Idaho.

REMARKS: Widely planted as an ornamental.

ABUNDANCE ON CAMPUS: All three individuals are planted on the north side of Watzek Library at H-12.



Noble Fir

Abies procera [Pinaceae]

APPEARANCE: A large tree 150' to 200' tall and 4' to 6' in diameter; crown broad and rounded; the trunk often clear of limbs for half to two-thirds its length.

LEAVES: 0.75" to 1.25" long, linear, massed on the upper side of the twigs; blue-green with white stomatal bloom on all surfaces; thickened to 4-angled in cross section, slightly grooved on the upper surface, or sometimes flat; apex round or pointed; base not constricted; base tends to parallel the twig.

CONES: Very distinctive; 4" to 6" long, about 2" in diameter, cylindrical; green to olive-brown in color; bracts longer than the cone scales, margins serrated, spinose tip about as long as the exposed portion of the scale; the bracts are turned downward and almost completely ensheathe the cone scales.

HABITAT AND RANGE: Mountain slopes and low ridges; on cool, deep, moist sites. Grows n pure stands, or in mixture with Douglas-fir; Western and Mountain Hemlocks; Silver, Grand, Sub-alpine, and California Red Firs; White and Sugar Pines. Found in Washington and Oregon in the Coast Range and the Cascade Mountains, and as far south as the Siskiyou and Scott Mountains in northwestern California.

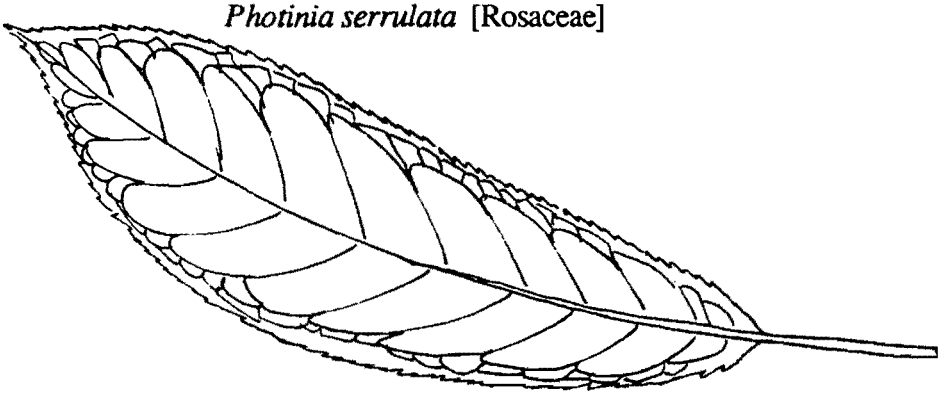
REMARKS: The thin bark makes Noble Fir easily susceptiible to fire damage.

ABUNDANCE ON CAMPUS: There are 5 individuals on campus. One is located at I-12, underneath Watzek Library.

39

Chinese Photinia

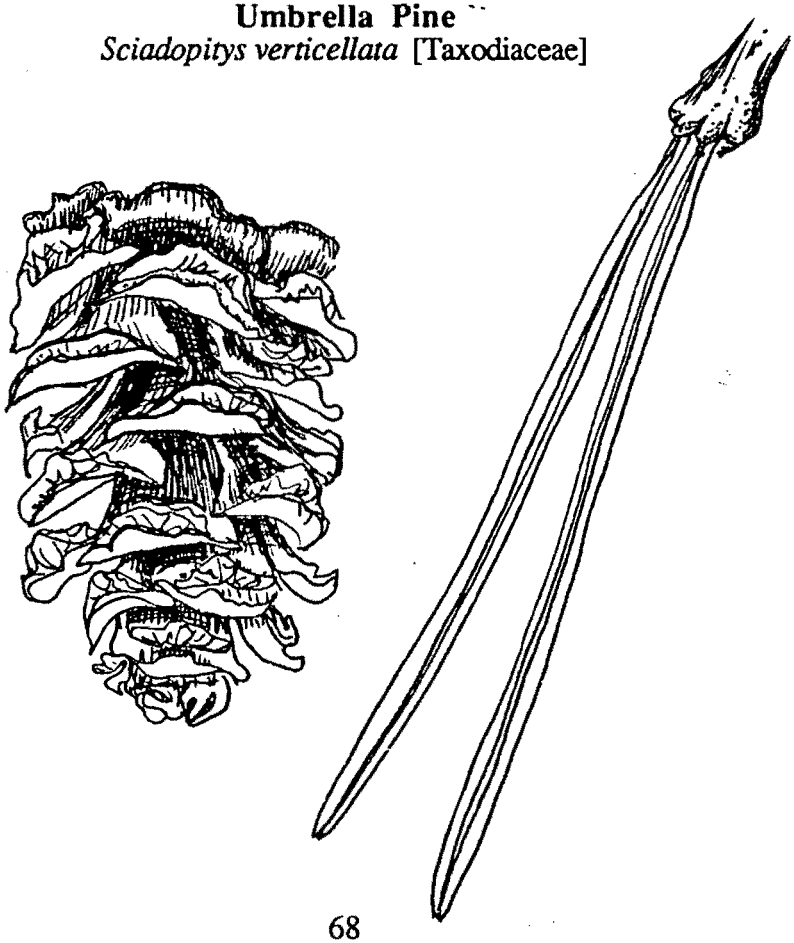
Photinia serrulata [Rosaceae]



40

Umbrella Pine

Sciadopitys verticellata [Taxodiaceae]



41
Atlas Cedar
Cedrus atlantica [Pinaceae]

APPEARANCE: A coniferous tree to 120' tall.

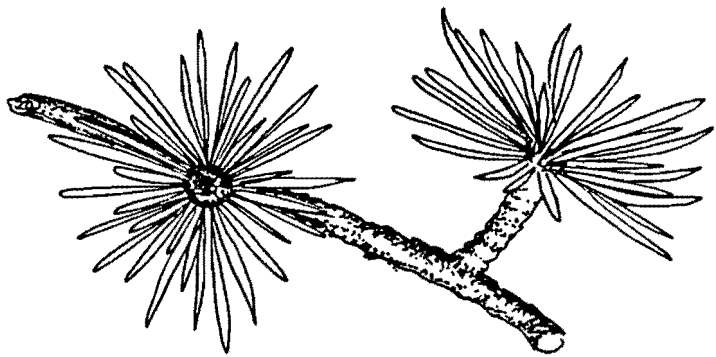
LEAVES: Foliage resembles that of larch; needles are about 1" long; foliage is blue-green.

CONES: Cylindrical; flat-topped; about 3.25" long and 1.5" to 2" wide; ripening to dark woody brown; disintegrate after maturity (2 years), making it virtually impossible to find an intact cone on the ground.

HABITAT AND RANGE: Native to Atlas Mountains of Algeria and Morocco in northern Africa.

REMARKS: Cultivated for ornament in parks and gardens in Europe and North America. The most common variety planted in the Blue Cedar, *Cedrus atlantica* var. *glauca.*

ABUNDANCE ON CAMPUS: There are only 6 examples of this tree on campus. It can be seen on the west side of Pamplin Sports Center (F-17) and on the north side of the reflecting pool (K-12).



43

Deodar Cedar

Cedrus deodara [Pinaceae]

APPEARANCE: A tall tree up to 250' high; small branches hang down distinctively and young twigs are downy.

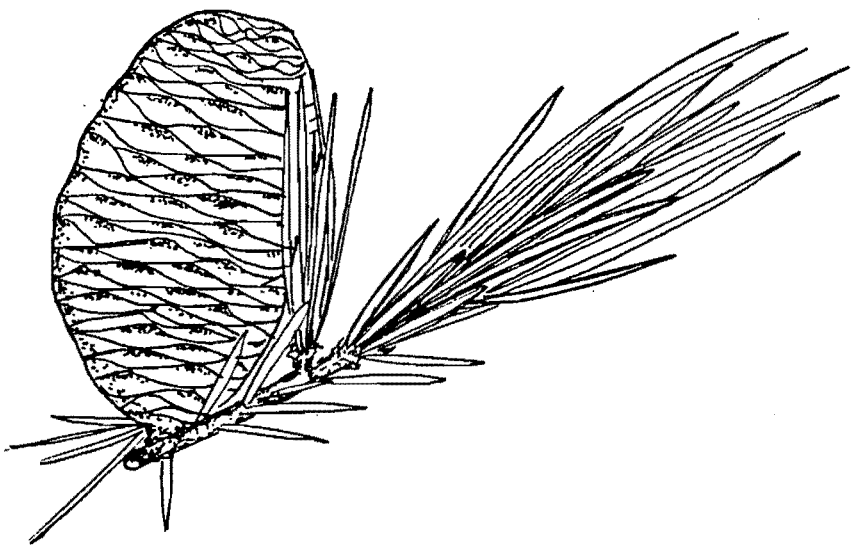
LEAVES: Foliage resembles a larch; needles are 1" to 2" long; green.

CONES: Cylindrical; flat-topped; about 4" long and 1.5" to 2" wide; ripening to dark woody brown; disintegrate after maturity (2 years), making it virtually impossible to find an intact cone on the ground.

HABITAT AND RANGE: Native to the Himalayan Mountains.

REMARKS: In addition to being a common ornamental, Deodar Cedar is also used as a timber tree in southern Europe.

ABUNDANCE ON CAMPUS: There are 14 individuals on campus. Most of them are concentrated around the reflection pool and along the cobblestone road east of the reflection pool. An example is at K-10.



44

Douglas-fir

Pseudotsuga menziesii [Pinaceae]

APPEARANCE: A large, evergreen tree attaining a height of 100' to 250' or more, and 3' to 6' in diameter; with a broad, pointed, pyramidal crown with irregularly disposed branches.

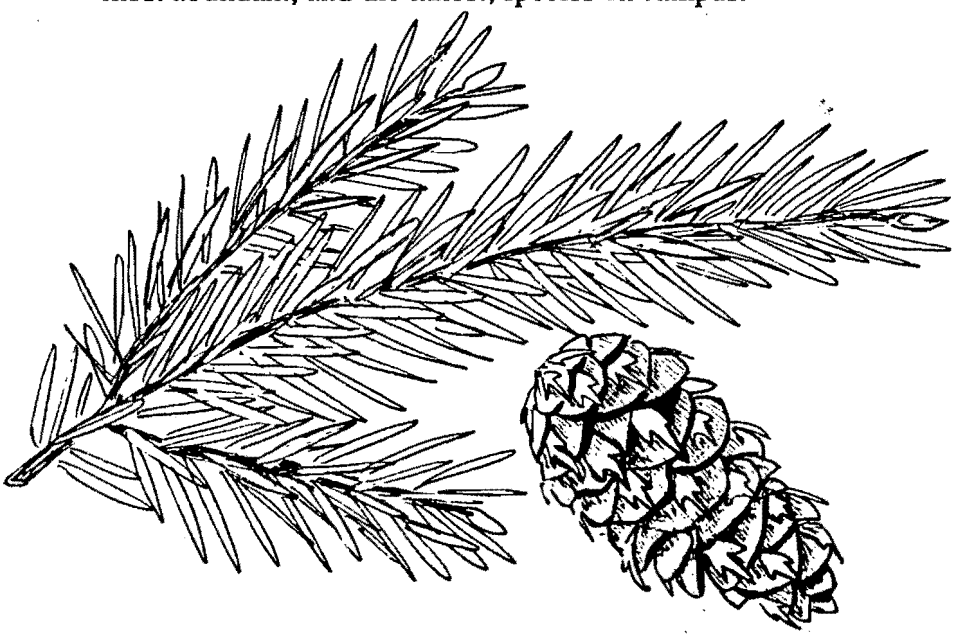
LEAVES: About 1" long (0.5 to 1.5"), spirally arranged; linear and flattened; slightly grooved above with 2 white bands of stomatal bloom on the underside; apex blunt or pointed; persistent 5-8 years or longer.

CONES: 3" to 4" long, have 3-pointed bracts extending beyond ends of scales.

HABITAT & RANGE: Will grow on a wide variety of soils, but in its range in western Oregon and Washington does best on deep, moist, sandy loams; poorest on gravelly soils. Ranges from British Columbia southward to central California and from Alberta southward through Rocky Mountains to northern Mexico.

REMARKS: Douglas-fir is the most important lumber tree in the nation; its strong, durable wood has many uses.

ABUNDANCE ON CAMPUS: Douglas-firs are the second most abundant, and the tallest, species on campus.



45

Japanese Maple

Acer palmaturm [Aceraceae]

APPEARANCE: A shrub or small tree to 25' tall in cultivation, but can grow much larger in its native environment.

LEAVES: 5 to 9 narrow, pointed toothed lobes; deeply cleft.

FLOWERS: 0.25" to 0.33" long; erect clusters of purple flowers.

FRUIT: In erect bunches; widely spread wings; about 0.8" long.

HABITAT AND RANGE: Native to Japan, China and Korea.

REMARKS: Many cultivars of Japanese Maple have been produced. On campus one such cultivar, *Acer palmatum* var. *dissectum* is common. It grows near the steps just east of the reflection pool (K-11).

ABUNDANCE ON CAMPUS: There are 4 individuals of tree size. All are located on lower campus. One can be seen in the Japanese Garden (J-10).

46

Scots Pine

Pinus sylvestris [Pinaceae]

APPEARANCE: A medium to tall tree that grows to 100' tall and 1.5' in diameter.

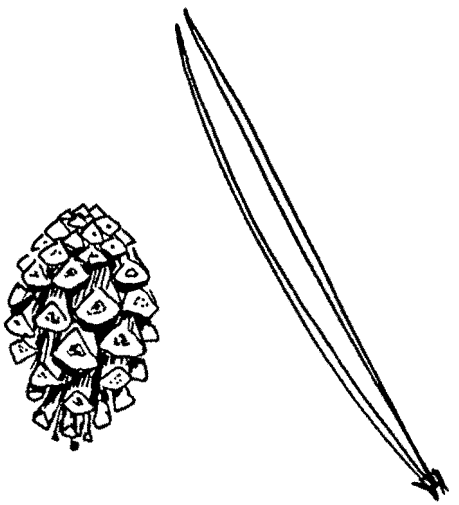
LEAVES: Needles are in bundles of 2; stiff, yellow-green, 1.5" to 3" long.

CONES: 2" to 5" long; flat-based; pale; smooth scales with rounded ends and roughened gray or red-brown centers from which radiate five fine folds.

HABITAT AND RANGE: Native to western and northern Europe and Russia, once more widespread through central Europe but now restricted by competition from other trees. A few native stands remain in Scotland, but not elsewhere in Britain.

REMARKS: Widely planted in Europe and North America for timber and ornament.

ABUNDANCE ON CAMPUS: This is an abundant tree on campus. They are especially common on lower campus, east of the outdoor swimming pool. Also planted in the Japanese Garden (J-10).



47

Sassafras

Sassafras albidum [Lauraceae]

APPEARANCE: A shrub to medium-sized tree 20' to 50' high and 1' to 2' in diameter; flat, open crown. Often forms dense, shrubby thickets.

LEAVES: Simple; alternate; deciduous; oval to obovate; aromatic; three forms on same tree, entire, 1-lobed, or 3-lobed; 3" to 6" long; thin; bright green above; glabrous and glaucous below.

FLOWERS: Dioecious; small; in racemes; yellow-green; appear with leaves in spring; corolla absent.

FRUIT: Stalked, ovoid, about 0.3" long, are blue with a hard seed enclosed in thin flesh.

HABITAT AND RANGE: An indicator of disturbed sites. Grows throughout eastern United States, from Michigan in the north to Louisiana in the south and all the way to the eastern seabord.

REMARKS: Aromatic leaves, twigs, bark, and roots yield oils used in soaps. Sassafras tea, a "spring tonic" of bygone years, is made by boiling roots or bark.

ABUNDANCE ON CAMPUS: There is only one individual on campus, located begind Peebles Art Building (J-9).

48

Ginkgo • Maidenhair Tree

Ginkgo biloba [Ginkgoaceae]

APPEARANCE: A tree which grows to 100' tall and 3' in diameter.

LEAVES: Fan-shaped, fernlike, deciduous leaves borne either spirally on the twigs or at the ends of spurlike shoots.

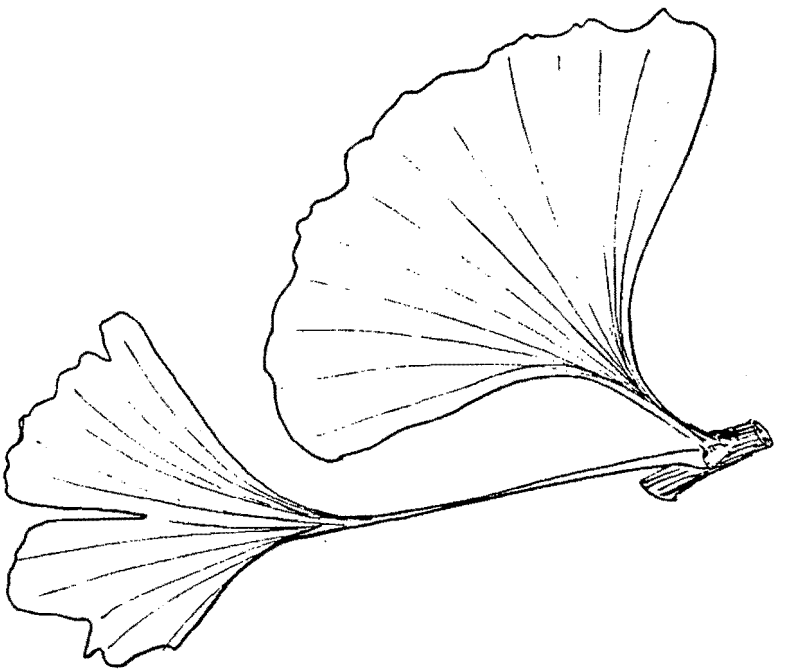
FLOWERS: Dioecious; of interest botanically because of the free-swimming antherozoids.

FRUIT: Orange-yellow to green, about 1" in diameter, and resembles a plum. Its fleshy, foul-smelling, outer pulp encloses a large, edible, silvery pit.

HABITAT AND RANGE: China.

REMARKS: Ginkgo is the only surviving species of one of the four orders of Gymnosperms. This interesting tree is extensively planted through all but the coldest parts of the United States and is remarkably free from disease or insects and is very tolerant of city smoke.

ABUNDANCE ON CAMPUS: There is only one representative of this species on campus; it is a female tree lcoated behind Peebles Art Building (K-08).



Chapter 3

Familiar Birds

The birds I heard today, which, fortunately, did not come within the scope of my science, sang as freshly as if it had been the first morning of creation.

Henry David Thoreau

There are many excellent field guide to the birds of the western United States and North America north of Mexico, but the specialized language and the geographic range maps covering large general areas can be very confusing to a beginning birder. This chapter of the guide is for all those with an interest in birds, with the special intent of helping the beginner. The most common birds at Lewis and Clark are briefly described with highlights noting their most common behavior, ecology, and good spots to find them. If these short notes are not sufficient in assisting identification or you are interested in learning more please check the reference list in the back of this guide. Birds are a delight to watch and are also outstanding study animals. They are relatively conspicuous, have complex behaviors, and have very sensitive physiology that can quickly indicate things about their surrounding conditions (e.g.. low raptor and pelican numbers were the primary clue to the detrimental effects of DDT in the environment).

At a place like Lewis and Clark, a student interested in birds can ask some very important ecological question and design a variety of meaningful research projects. With proper training and good records individual birds can be mist netted, banded, and then studied for long periods of time. Where does this species migrate in winter? How does it interact with other birds of the same species, or other species? Do different Song Sparrows build their nest differently? What affects a bird population's breeding success? The campus and surrounding area are worthy of regular censusing throughout the year (maybe a start a regular Christmas Count in conjunction with the Portland Audubon Society). How do the number of Olive-sided Flycatcher on lower campus today compare to data from last year, or fifteen years ago? What do different bird species eat

and does it vary with the seasons? How is this related to their behavior or morphology? There are very few House Finches in the forest, yet they are very common in more open and gardened areas. Why is this? How does the building and maintenance of birdhouses affect the number of cavity nesting birds on campus? These are but a few of the question that can be pursued with a pair of binoculars, bit of curiosity and, a little time.

Birds that frequent or occasionally use the bird feeders behind the Olin Physics/Chemistry Building, in the wood lot below the Manor House, and the feeders surrounding Bodine are marked with an asterisk (*). The feeder types include mixed seed, suet, and hummingbird feeders.

The following format is adapted from David B. Marshall's *Familiar Birds of the Northwest Forests, Fields and Gardens* available at the Portland Audubon Society.

Cooper's Hawk and **Sharp-shinned Hawk** are two accipiters, or bird eating hawks that frequent campus for much of the year. The Cooper's Hawk is larger (14-20") than the Sharp-shinned Hawk (10-14"), but both can be quickly recognized by similar habits. They have long tails and short, rounded, stubby wings that alternate between flapping and soaring. These awesome hunters are most likely to be seen as a blurred flash into one of the campus bird feeders where some song bird may lose its life. Occasionally these hawks will consume prey or rest in the trees behind Olin Physics/Chemistry Building, and in early spring they have been observed in dramatic, acrobatic courtship displays over campus.

The **Killdeer,** the only regularly occuring shorebird on campus, is a type of plover. Its name comes from its distinctive call "kill-dee, kill-dee, kill-dee". It can be found in spring and summer on the grassy field of Griswold Stadium, or on any of the campus's flat-topped buildings. In April 1990 a nest with three eggs was found on top of the Olin Physics/Chemistry Building. The nest was extremely well camouflaged in a gravel patch. The killdeer (8") has two strong black bands across a white chest with a dark to buffy brown back. If one ever approaches an active nest the adults will undoubtedly go into the "broken-wing" display, to draw the human "predator" away from the nest.

The **Band-tailed Pigeon** makes a loose nests in the tallest Douglas-fir trees on campus, especially those around the reflection pool and rose garden. Often times the birds are just heard and their soft "rook-a-roo" call is often mistaken for an owl. Look for these wild pigeons flying in small circles at tree top level across the open area below the Manor House.

The **Great Horned Owl** is rarely seen on campus, but is often heard hooting up around the Forest Dorms. These classic "hoo-hoo" owl calls are most common in winter and early spring when the owls are breeding. The majority of the calls seem to come from right around the big green water tower and over towards the convent.

The **Screech Owl** and its rapid series of bouncing whistles (like a ping-pong ball) is not regularly heard, but often times (again most commonly in winter) it can be heard in the immediate vicinity of the Law School. Often in the day time an owls presence can be located by a raging, ticking mob of robins, chickadees, warblers and other small birds that deem it a threat to their nests.

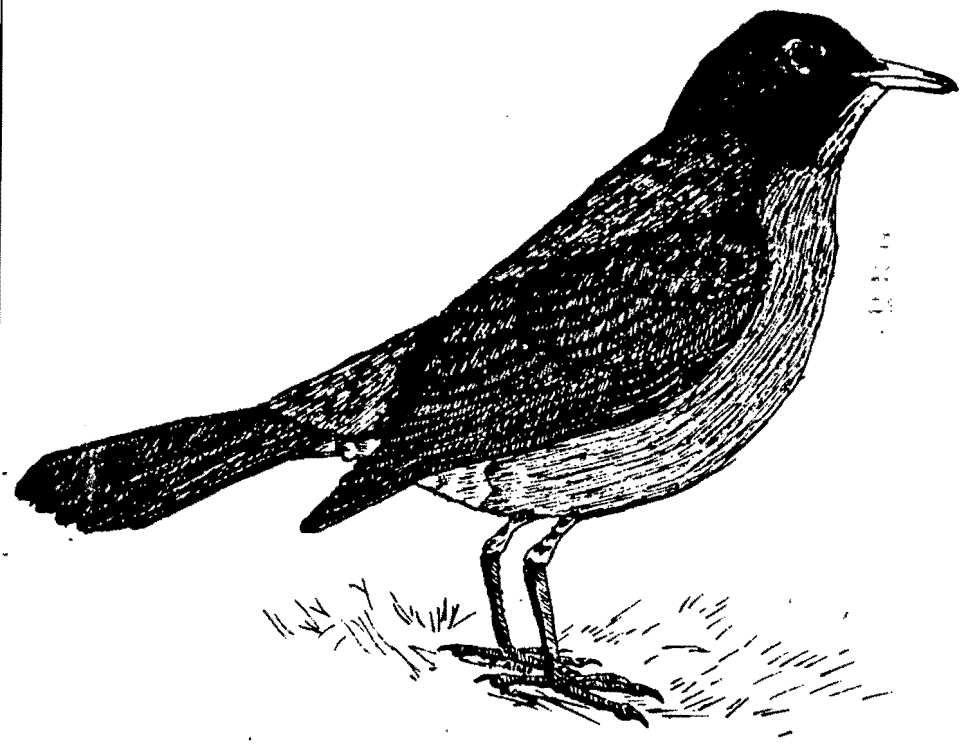
The **Vaux's Swifts** arrive in small numbers to campus sometime in April. These swallow like birds zig-zag all over the air space above and around campus, capturing their homogeneous diet of insects. Usually they nest in the standing hollow snags of mature, forested areas, but the whole scale clear cutting of so much of this forest type has destroyed many breeding areas. Swifts have adapted to human artifices like the tall chimneys of the Manor House for nesting sites. We are fortunate to have from two to five pair nesting here a year. In the fall, after fledging their young, the swifts collect into large groups for migration south to the neo-tropics. During September, at dusk, there is a chance to view an awesome natural phenomenon -- up to five hundred swifts diving into the chimney to roost for the night.

The **HUMMINGBIRDS** are our smallest birds and there are three fairly regular species that can be seen in the spring and summer. These little dynamoes are almost like huge insects or tiny helicopters. They are found where ever nectar is regular and abundant, which varies from year to year. They nest regularly on campus, with nests found in the rhododendrons of lower campus and in the mixed shrubbery on the south side of

the Templeton parking lot. One sure way to enjoy these birds is to hang a hummingbird feeder near a nice viewing window in your dorm or at home. It may take a few days for the hummers to show up, but when they do look closely at the metallic greens, rusty reds, and vividly bejeweled gorgets (the chins & throats).

The **Rufous Hummingbird*** arrives with the blooming of the Red-flowering Currant and other red tubular flowers, which are its favorites. It is the most abundant species on campus, but will only be seen in the spring in summer as it heads south to California for winter.

The **Allen's Hummingbird***, a species that is more abundant along the southern coast of Oregon, is also frequently seen on campus. It is indistinguishable from the Rufous, except for in the males, where Allen's has a green back.



The **Anna's Hummingbird*** is a species that has grown increasingly common in the last twenty years. These hummers are larger than the other two and are basically all green. A small number of this species has been overwintering on campus for the last few years largely depending on the feeders people leave out into the fall. Usually it is best to bring a feeder inside in late September, and not put it back out until late winter. If a feeder is left out over the winter, an Anna's may attempt to overwinter. During a moderate winter, the bird may survive. But if there is a prolonged freeze, or if the feeder is left empty for several days, the bird will surely die.

The **Northern Flicker*** is by far our most common and conspicuous woodpecker. An interesting note is that it only pecks wood for communication and for building nest cavities. Its primary diet consists of ants gleaned from the ground. The flickers will often perch on the tallest trees of campus and cry a "wicker-wicker-wicker" call that carries for long distances. Although they have not nested on campus recently, there is an old flicker cavity in one of the Western Redcedar trunks behind the northwest corner of the Manor House.

The **Downy Woodpecker*** is much smaller than the flicker and usually only seen in the upper portion of the campus trees. They pick at the moss and loosen pieces of bark with rapid taps that may cue you to their presence. If the bird flies away, you will notice that it has a black and white pattern with a red head notch, which closely resembles the **Hairy Woodpecker**. For unexplained reasons, Hairy's are very uncommon, so beginners should feel confident identifying any small woodpecker as a Downy, while experienced birders should closely scrutinize a suspect bird, to make sure that it is not a Hairy Woodpecker.

FLYCATCHERS are commonly present on campus, but are not usually physically conspicuous because of their cryptic plumage and forest homes.

The **Olive-sided Flycatcher** has been decreasing in local abundance for the last ten years, but is still heard calling "quick-free-beer" or "hic-three-beer" and "pip-pip-pip" from the largest conifers along the reflecting pool and into the canyons.

The **Western Wood Pewee** and **Western Flycatcher** are fairly common along the wooded edges and in the forested patches. Both are small and similarly colored, but they have distinctive calls. The pewee calls buzzy "pee-ar" , while the Western Flycatcher has a whistle like it is calling a cab,"pee-it".

SWALLOWS are spring and summer residents of campus that consume millions of flying insects during their skillful flights. (see discussion related to swallows in the second half of Aliens Swamp Campus, Chapter 1).

The **Violet-green Swallow** is so named because of its beautiful back color. This swallow is often confused with the Tree Swallow, but differs in the white band that nearly surrounds the base of the Violet-green Swallow's tail. Violet-greens regularly try to nest on campus in the birdhouses and vent holes of Bodine, Fir Acres Theater, and Evans Music Building.

The **Tree Swallow** on the other hand frequently feeds over campus and flies in mixed flocks of swallows over campus, but usually prefers to nest much closer to water than is available on campus. If there were some boxes up along the reflecting pool this might change. The Tree Swallow's back is more steel-blue than the Violet-green's and it has distinctive vocalizations.

The **Barn Swallow** is the only fork-tailed swallow on campus. The deep forked tail lends to the bird's grace in flight. It builds a cup shaped nest out of mud that is often attached to the sides of buildings, or under the eaves of buildings like Griswold Stadium.

The **Steller's Jay*** is the blackish-blue bird that is larger than a robin and which has a distinctive black crown. It is the western counter part of the eastern Blue Jay, which many LC students from east of the Rockies are probably familiar with. These jays are strongly associated with coniferous forests, but they do venture into other areas with heavy tree coverage. They have an outstanding collection of calls that range from a seldom heard, soft song to an imitation of the Red-tailed Hawk that sends other birds scattering.

The **Scrub Jay*** is a brighter blue jay which lacks a crown on the top of its head. This bird is frequently misnomered as a "bluebird" by beginners. It was once absent form the Portland area, but has been steadily establishing itself throughout residential areas north of its original California range. Like all jays, these are intelligent and crafty birds that have attitudes ranging from bold to wary.

The **Common Crow*** is a bird which just about everyone knows, and so it requires little description. Crows are regular foragers on campus in the early morning, especially in open areas. In the evenings they frequently fly silently over to their communal roosts in the woodlands surrounding campus.

The **Common Bushtit*** is that tiny little gray-brown bird which has a high-pitched twittering. It usually moves around in loose flocks. This species is the second smallest of campus (hummingbirds are smaller). Bushtit flocks partially break up in the spring, when pairs weave pendulous nests that resemble old wool socks! The nests are usually hung at the end, and just under, a bushy tree limb. One pair has repeatedly nested under a Deodor Cedar bow that over hangs the cobblestone walk, just west of Peebles Art Building.

CHICKADEES are small like the Bushtit, but are easily separated by their distinctive "chick-a-dee" call and the black-white-black masks on their head. In the fall and winter both chickadees forage in mixed species flocks that usually include bushtits, kinglets, nuthatches, and creepers.

The **Black-capped Chickadees*** have a gray-brown body and back, and are usually found in broad-leafed trees like the Big-leaf Maple and Black Cottonwood. Black-caps give the classic "chick-a-dee-dee" call that is their namesake.

The **Chestnut-backed Chickadee*** calls similar notes, but has a very nasal tone. They prefer to inhabit darker, more humid, coniferous forests than occur on campus. But they are frequently seen along forested edges, such as around the reflecting pool.

The **Red-breasted Nuthatch*** is responsible for the nasal "yank-yank-yank" call that comes from the coniferous areas of campus. These little bluish-gray bodied birds with the white line

over their eyes feed head first down the trunks of trees or hang under the underside of limbs. They are year round residents and can usually be found below the Fir Acres parking lot. Its close relative, the **White-breasted Nuthatch**, is not a regular resident, but does occasionally visit the oaks and cottonwoods near the tennis courts and near the Forest dorms. Both nuthatches are primarily insect eaters, but relish suet in the colder months of the year.

The **Brown Creeper** has a fascinating foraging behavior of spiraling up tree trunks to glean insects, and then flying down to a lower part of an adjacent tree, where it spirals up again. Their bark-colored plumage makes them difficult to spot, but they have a beautiful, high-pitched five note call that sounds like "Trees-trees-beautiful-trees". Their nest is nearly impossible to find. They hide it behind slabs of loose bark. Creepers can be consistently found between Hartzfeld dorm and the Physical Plant Building, and in the wooded area between the tennis courts and the cemetery.

WRENS are small, extremely energetic birds that feed almost exclusively on insects. They are basically brown and hold their tail erect, perpendicular to the body when alert.

The **Winter Wren** is one of the smallest birds of campus, but it has a big voice. It sings a pretty gurgle from forested areas with dense understories. It has a very short tail, no noticeable eyebrow, and a sharp two note "tick-tick" scolding call that is often the first sign of their presence along any of the ravine nature trails.

The **Bewick's Wren** is more common on the campus proper and can be distinguished from the Winter Wren by its relatively long tail and unmistakable white line over the eye. It has a buzzy scolding call and a wide variety of songs.

The **American Robin** is one of the most common birds of campus, and indeed, of suburban areas throughout the country. It barely needs description, but not everyone recognizes the differences that can often be distinguished between the bright, orange-brown breasted males and the lighter, buff breasted females. Robins are present on campus all year and are probably one of the most prolific breeders, usually successfully

fledging two clutches each year. They are easy to watch around the nest, and lend themselves well to beginning nest finders and students attempting to observe breeding behavior, since they are quite territorial. The robins, which breed in the bushes of lower campus and the rhododendrons all over, usually leave around September and October to be replaced by birds coming down from northern and mountain populations.

The **Varied Thrush** is very like the American Robin in form, but is easily recognized by the strong dark band a cross the breast and the orange patch behind the eye, which extends towards the ear. These birds are most common in late fall and winter after they have left their Cascade and Canadian/Alaskan forest breeding grounds. They have high, buzzy shrill notes which they deliver in a slow sequence that is unlike any other bird. These thrushes will mix in with winter foraging flocks of robins, and some remain on campus late into spring.

KINGLETS are small (a little larger than a bushtit), olive-gray birds that spend a lot of time foraging high in the canopy. There are two very similar species that can be found on campus. The **Golden-Crowned Kinglet** is present year round, but is most conspicuous while in mixed winter flocks with chickadees and nuthatches. The **Ruby-crowned Kinglet** is absent during the summer, but present in the spring and fall. These fine insectivorous birds have distinctive calls that are easy to learn, but the novice should have a field guide handy when first establishing the subtle differences in field marks.

The **Cedar Waxing,** with its soft, delicate, buffy-brown plumage, little crown and bright, waxy wing spots, is one of our most subtly attractive birds. Many times they will be absent for weeks, only to arrive unexpectedly in huge numbers. They forage on ornamental plant's berries, as well as the berries of many native trees and shrubs. They are particularly fond of Cottoneaster, Mountain-Ash and Hawthorne.

WARBLERS are small, brightly colored birds that are very active in their pursuit of insects. In North America there are many species; about ten are regular residents of the Pacific Northwest. Oftentimes habitat is a major clue for determining what species of warbler to look for. A good way to draw warblers out of the woodwork is to use the "pishing" call, or to imitate a Screech Owl. This will attract many small birds.

The **Wilson's Warbler** does well in the mixed second growth forest that surrounds campus. It is all yellow, except for a black cap on the top of males' heads.

The **Orange-crowned Warbler** is probably the most common warbler on campus but it lacks any distinctive markings. It is not as bright yellow as the Wilson's, and it has a more trill-like call than the Wilson's Warbler, whose call is chippy.

The **European Starling*** (is discussed in Chapter 1, Aliens Swamp Campus). This exotic is usually on upper campus, feeding in loose flocks on open lawns, or near Griswold Stadium. **Kill** if the opportunity is available.

The **House Sparrow*** (again see Chapter 1, Aliens Swamp Campus). These are not actually sparrows but part of the weaver family that is prominent in Africa. These are are the birds that most commonly nest in the vents of buildings like Stewart, Odell, and Bodine.

The **Brown-headed Cowbird*** is not an abundant bird, but has a special effect in the avian community: it lays its eggs in the nests of other birds. It is the only nest parasite on campus. The males have shiny, black bodies with brown heads, while the females are an overall dark grey-brown. On campus, they most often parasitize Song Sparrows.

The **Evening Grosbeak*** is a knock-out of a bird by any measure. The males have a dramatic contrast of bright yellow against black, and a large yellow-green parrot-like bill. The females are similar but more subdued. Grosbeaks almost always arrive in moderate to large flocks that will feed on campus for a week or so and then leave, not to be seen for months. These birds are not only knock-outs in terms of plumage, but are very aggressive in the feeder, especially if black sunflower seeds are present.

The **House Finch*** is the most common of the reddish birds that can be seen on campus. This species has naturally emigrated north from California to the Portland area since the early 1940's. It is a prominent species at any bird feeder and numerous pairs nest each year in places as contrasting as broken outdoor lamps and ivy covered walls. The **Purple Finch** is a

species that closely resembles the House Finch, and will also heavily utilize feeders where it occurs. They are found in mixed woodlands but for reason yet to be understood they are not very common to this locale.

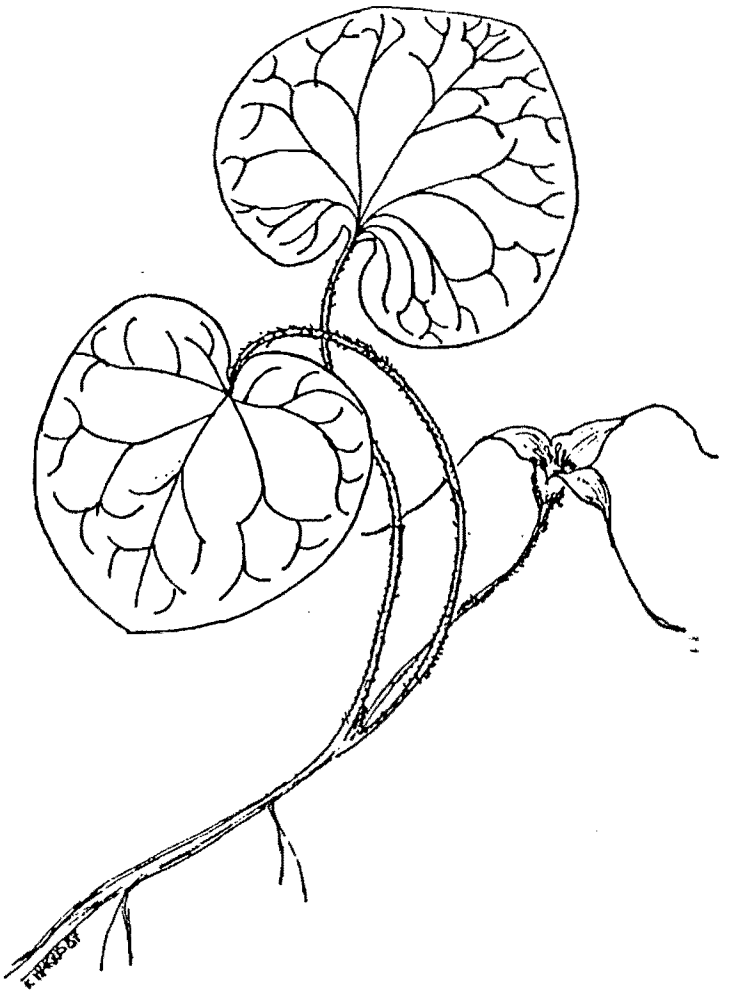
The **Pine Siskin*** is usually very abundant on campus but is sometimes unnoticed because of its treetop habits. Other times they temporarily disappear when the local conifer and alder cones are exhausted of seed. They are small gold-finch like birds that are primarily a drab gray-brown, but have a heavily streaked breast and yellow tinted streaks on the wings and tail. Pine Siskins often travel in flocks fifty or more. The flocks occasionally have an **American** or **Lesser Goldfinch** mixed in with the group.

The **Dark-eyed Junco*** is a species name that encompasses the many races of junco. On campus, and in the Pacific Northwest in general, the Oregon Junco race is by far the most common. They are medium, sparrow sized birds that are abundant during the winter and fall on campus, both in the feeders and in almost any patch of bushes. The black-hooded males and the lighter gray headed females normally leave the area in spring to breed in the mountains. A nest was found in spring 1988 at the base of a Western Redcedar next to the Manor House, however. A distinctive field mark for this species is the outer white tail feather (described as "chopsticks") that are exposed when they flare their tail to fly away.

The **Rufous-sided Towhee*** is a very common bird as long as there are sufficient shrubs and bushes for it to hide in and forage under. It is especially attractive with its generally black head and body, bright reddish flanks, white belly and a fiery red eye. These birds are rather shy and secretive, but in the spring males perch in the open to call out their name, "tow-eee!"

The **Song Sparrow*** is the widely distributed LBJ (Little Brown Job), that sings a large repertoire of melodic songs from stream edges in the ravines to the bank on the south side of Templeton's lower parking lot. These highly territorial birds are usually found alone, except when a male and female are together near the nest. They visit the feeders regularly, but rarely more than one at a time. Song Sparrows reside on campus the year round and are joined by other sparrows like the **Golden-**

crowned, Fox, and **White-crowned Sparrow** in the winter. White-crowns may be establishing themselves as breeders on campus. A pair was regularly seen into June 1990 around the pond.



A Checklist of the Birds

Normally bird checklists are compiled from many years of field notes. A group of regular observers, like an Audubon Chapter, would record the number of sightings of birds throughout the year in an area like Oaks Bottom making special note of breeding species. This checklist is similar, but the area of interest has been restricted to birds detected while on the property of Lewis & Clark Campus (see map on Pages 53-54). Legitimate detections include birds seen flying over or simply heard. To date there has been no permanent repository for bird records on campus, so this list is a largely a compilation of obnservation by the students and professor in the last four years (1986-90). Please notify the campus naturalists or a biology professor if you find a new species visiting or nesting on campus or if they are around at an unexpected part of the year. The species marked with an * have recently or still do nest on campus, the symbol (#) marks species once recorded, but not detetected recently. Exoctic species are underlined.

Season Designations

Sp-Spring	Su-Summer	F-Fall	W-Winter
March-May	June-August	Sept.-Nov.	Dec.-February

Abundance Symbols

A- Abundant
observed almost daily

C-Common
observed a few times biweekly

U-Uncommon
Observed a few times per year.

R-Rare
Observed once or twice a a year, but not every year.

	Sp	Su	F	W
CORMORANTS				
Double-crested Cormorant	U	-	-	U
HERONS				
Great Blue Heron	U	U	-	-
Green-backed Heron	R	-	-	-
SWANS, GEESE, DUCKS				
Tundra Swan	-	-	U	U
Canada Goose	-	-	U	U
White-fronted Goose	-	-	R	-
Mallard	U	U	U	U
Wood Duck	R	-	-	-
Common Merganser	-	-	R	-
BIRDS OF PREY				
Turkey Vulture	U	U	-	-
Sharp-shinned Hawk	U	U	U	U
Cooper's Hawk	U	U	U	U
Red-tailed Hawk	C	C	C	C
Bald Eagle	-	-	-	R
Peregrine Falcon	-	-	-	R
American Kestrel	U	-	U	-
Barn Owl	R	-	R	-
Western Screech Owl	U	U	U	U
Great Horned Owl	U	U	U	U
GROUSE, QUAIL				
Ruffed Grouse#*	-	-	-	-
California Quail	U	-	-	-
CRANES				
Sandhill Crane	-	-	R	-
GULLS				
California Gull	-	-	R	-
Ring-billed Gull	-	U	U	U
Glaucous-winged Gull	U	U	U	U
Herring Gull	-	-	-	R

	Sp	Su	F	W
PIGEONS, DOVES				
Band-tailed Pigeon*	A	A	C	C
Mourning Dove	U	C	U	U
Rock Dove	U	U	U	U
GOATSUCKERS				
Common Nighthawk	-	U	-	-
Vaux's Swift	-	C	A	C
Rufous Hummingbird*	C	C	-	-
Allen's Hummingbird*	C	C	-	-
Anna's Hummingbird*	A	C	C	-
KINGFISHERS				
Belted Kingfisher	R	-	-	-
WOODPECKERS				
Northern Flicker	C	C	C	C
Pileated Woodpecker	R	R	R	R
Red-breasted Sapsucker	R	R	R	R
Hairy Woodpecker	U	U	U	U
Downy Woodpecker	U	U	U	U
FLYCATCHERS				
Western Flycatcher	U	U	-	-
Western Wood Peewee*	C	C	-	-
Olive-sided Flycatcher#*	C	C	U	-
SWALLOWS				
Violet-green Swallow*	A	A	-	-
Tree Swallow*	A	A	-	-
Barn Swallow*	A	A	-	-
Cliff Swallow*	U	U	-	-
JAYS, CROWS				
Steller's Jay*	A	A	A	A
Scrub Jay*	A	A	A	A
Common Crow	A	A	A	A
CHICKADEES				
Black-capped Chickadee*	A	A	A	A
Chestnut-backed Chickadee	C	C	C	C

	Sp	Su	F	W
BUSHTITS				
Common Bushtit*	A	A	A	A
NUTHATCHES				
White-breasted Nuthatch	C	C	C	C
Red-breasted Nuthatch	C	C	R	R
CREEPERS				
Brown Creeper*	C	C	C	C
WRENS				
Winter Wren*	C	C	C	C
Bewick's Wren*	C	C	C	C
THRUSHES				
American Robin*	A	A	A	C
Varied Thrush	C	U	C	C
Swainson's Thrush	C	C	U	-
KINGLETS				
Golden-crowned Kinglet	U	U	A	A
Ruby-crowned Kinglet	U	U	U	C
WAXWING				
Cedar Waxwing	C	C	C	U
STARLING				
European Starling*	U	C	U	U
VIREOS				
Hutton's Vireo	U	U	U	U
Solitary Vireo	R	R	R	-
Warbling Vireo	U	U	U	-
WOOD WARBLERS				
Orange-crowned Warbler*	C	C	U	-
Yellow Warbler	R	R	R	-
Yellow-rumped Warbler	C	U	U	R
Black-throated Gray Warbler	R	R	R	-
Wilson's Warbler*	A	A	-	-
MacGillavriesbWarbler	R	R	R	R
Yellow-breasted Chat (#)*	-	-	R	-

	Sp	Su	F	W
BLACKBIRDS				
Red-winged Blackbird	C	C	-	-
Northern Oriole	U	U	-	-
Brewer's Blackbird	U	U	U	U
Brown-headed Cowbird	C	C	C	U
TANAGERS				
Western Tanager	U	U	-	-
GROSBEAKS, FINCHES, SPARROWS				
Black-headed Grosbeak	C	C	-	-
Evening Grosbeak	C	-	U	C
Purple Finch	U	U	U	U
House Finch*	A	A	A	A
Pine Siskin*	A	A	A	A
American Goldfinch	R	-	-	R
Lesser Goldfinch	R	-	-	-
Rufous-sided Towhee*	A	A	A	A
Dark-eyed Junco*	U	U	A	A
Golden-crowned Sparrow	R	-	C	C
White-crowned Sparrow	R	-	-	-
Fox Sparrow	-	-	R	R
Song Sparrow*	A	A	A	A
House Sparrow*	A	A	A	A

Chapter **5**

A Walk in the Woods

Familiarity with basic ecology will permanently change your world view.

Paul Ehrlich

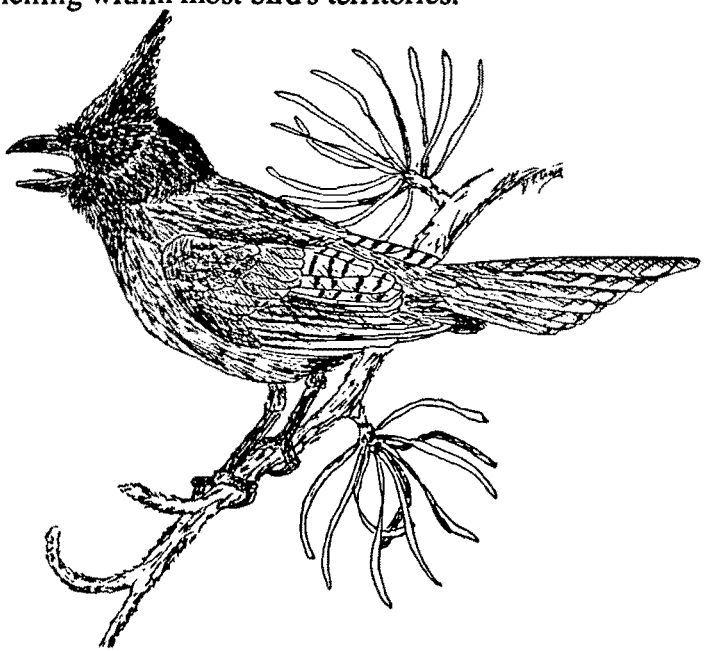
The wooded ravines which surround the Lewis and Clark campus are accessible from many different places. Exploring the ravines is easy since there is an extensive network of trails which wind through them. The most common access points along the trail system are on the north side of the bridge adjoining Platt-Howard/Copeland Halls to lower campus (N-11), by the Rose Garden (L-4), behind Olin Chemistry/Physics building (H-7), and from the lower campus parking lot (C-8). The section of trail which leads from Olin to the lower campus parking lot will provide the focus for the following discussion.

The Olin bird-feeders

In the fall of 1988, two students in Dr. Don McKenzie's Bioecology class placed three bird-feeders behind Olin. Placing the feeders there was a wise decision, for not only is the area prime for attracting birds, but it is also a place where many people can observe the birds without disturbing them.

Bird activity around the feeder varies tremendously throughout the year. From the end of fall through the early days of spring, life especially abounds at the feeders. During this part of the year, insect and other arthropod populations, which form a large part of many species' diets, are low. Because of the seasonality of this food resource, birds must seek out other food. For many species, the sunflower seeds and millet placed in the feeders are tasty, and easily accessible, treats during this time. Flocks of Pine Siskens, Chickadees, Bushtits, and Dark-eyed Juncos continually move through the feeders during the colder parts of the year. More solitary species, such as Song Sparrow, White-breasted Nuthatch, Rufous-sided Towhee, and Steller's Jay are also common at this time.

Seasonality of the bird's food resource is not the only reason why the activity around the feeders changes from season to season, however. The life-cycle of the birds also plays a significant part. During the breeding season, which generally lasts from about mid-March through July, adult birds set up territories which they readily defend. Birds who have territories far from the feeders are unlikely to journey away from their territory for long periods of time in search of food. If a breeding bird was off-territory for an extended period of time, it would risk losing a mate or a part of its territory to another breeding bird. Flying to the bird feeder is also unnecessary during the breeding season, since plenty of insects are available for munching within most bird's territories.



The action around the feeders offers fantastic opportunities to witness interactions between, and among, bird species. What happens when a Chestnut-backed Chickadee lands begins feeding next to a House Finch? Does the finch fly away, does it chase the chickadee away, or do the two species merely go about there own business? How does the presence of a Steller's or a Scrub Jay affect the behavior of other species? When many individuals of the same species are feeding simultaneously, is there an obvious "pecking order"? That is, are some individuals able to keep others from feeding on the seeds?

While interactions between bird species around the feeders are sometimes difficult to discern, less ambiguity surrounds the interactions between squirrels, which also eat from the feeders, and birds. In essence, when either of the two species of squirrel which utilize the feeders are present, a simple message is conveyed to the birds: *stay away!* Birds anxiously wait until squirrels leave before they attempt to get seeds from the feeder. Both the Eastern Fox Squirrel and the Chickaree, or Douglas Tree Squirrel, visit the feeders frequently. The sharp alarm call of the Towsend Chipmunk is also freqently a sign of small mammal activity around the feeders. In fact, throughout the 1989-90 school year, the feeder located in the woods between the carriage turn-around and the Manor House was almost exclusively used by Chickarees.

The area around the feeders is also interesting from a botanical standpoint. As you look over the balcony toward the feeders, notice the disturbed nature of the vegetation. Close to the building is a relatively bare area which remains from the days when this building was constructed. Tall Oregon Grape, an erect shrub with stiff, leathery leaves was planted in the cleared area. Two introduced species, Himalayan Blackberry and an *Equisetum* sp. are successfully invading. Bigleaf Maple saplings are also becoming fairly well established here. In several years, as succession proceeds on its way, one would expect that young maples and Red Alders, would dominate the canopy, while pioneer ground-cover species such as *Equisetum* would become less abundant.

Following the trail

On most days, the transition from the balcony of Olin into the woods by Peebles Art Building is characterized by a decrease in air temperature, a drop in light intensity, an overall feeling of coolness, and an increase in the number of shadows. The forest community of the ravine is dominated by Douglas-fir and Bigleaf Maple. Presently, the vertical stucture of the forest is quite simple. There are essentially four levels to the forest. The upper level is almost completely comprised of Douglas-fir. The second level consists primarily of Bigleaf Maple with a scattering of Western Redcedar and Western Hemlock. The third layer is composed of shrubs, many of which produce tasty berries. The most common species in the shrub-zone are Red Huckleberry, Thimbleberry, Common Wild Rose, and Salal.

All of these species' berries can be eaten as fruit, or used in jams. The lowest layer, the ground cover, is fairly diverse in areas but is often a dense mat of one exotic species, English Ivy. In general, proximity to campus buildings or other development projects (such as the houses closer to the Willamette River) correlates to a simpler forest structure. These areas are also more infested with introduced species than areas further from development.

The forest floor is also covered with decomposing plant material. In the autumn when leaves flutter from the canopy to the ground and when rotten branches snap off, the numerous bacteria and fungi begin their work. These organisms are specialized as instigators of the decomposition process. The fungis' mycelia, which is concealed within a soil or wood substrate, consists of masses of fine threads referred to as hyphae. Hyphae spread out over, or within, a rotting substrate such as leaves, logs, or diseased trees and secrete digestive enzymes to break down the dead plant material. Not only do fungi obtain their own food this way, but they help to break up the dead vegetation into smaller bits and pieces, called detritus. These detrital particles continue to break down, until they are at an elemental or nutritive levels that are rapidly reused by other organisms,continuing the endless cycle of nutrients in the forest.

Worms, snails, and small arthropods graze upon this detritus. In turn, centipedes, beetles, and other insects and their larvae feed by hunting the detritivores, and then find themselves food for larger organisms. The forest floor is certainly a bustle of life. It is enjoyable to get down on ones knees to rumage through the litter and soil in search of this easily overlooked realm of life.

Two of the more interesting areas of the ravines are the narrow creeks and the light gaps. The creeks are usually relatively distant from human disturbance, so more naturally occuring patterns of nature can be observed there. For example, vegetative zonation is sometimes apparant near the creeks. Vine Maple often grows in increasing numbers at creekside, and steadily diminishes as the distance to the water increases. The beautifully delicate Maidenhare Fern is found almost exclusively in the wet banks which is also home to several species of salamander. All species of salamandar, like their relatives the frogs, breed in or near water. During the breeding season, adult salamanders crawl over land to ponds, lakes, and streams. They migrate to these water sources most often at night, and during or after rains. The Rough-skinned Newt is probably the campus's most common salamander. This species is very versatile; it inhabits grasslands, woodlands and forest, but it never strays far from water. It breeds from December to July, so this would be a good time to look for them near the creek. It takes great effort to find these creatures, however. Salamanders tend to hide under rocks, logs, bark, moist leaf litter, and rotten wood. Finding a salamander usually requires getting on hands and knees and getting plenty muddy!

A whole host of animals besides salamanders and frogs rely on the all-important water supply of the creeks for drinking, bathing, as a mating site, and for food supplies. Within the water itself exist myriads of micro-organisms and larger aquatic animals. Innumerable microscopic invertebrates, water insects and their larvae are just some of the permanent residents, while frogs, salamanders, and their larvae are regular visitors. A insect known for its pestiness, the mosquito, is a common breeder in these waters.

The streams also contain primary producers. A variety of algae and subaquatic plants all flourish in these waters. These plants, coupled with large amount of detrital input from the

forest provide a rich energy base fr a myriad of animal life. Many insects, like the Mayfly and Dragonfly, have a developmental stage in streams that is very different from their adult forms. In this stage they are often called perriwinkles or midges by fisherpeople and kids. They act as leaf shredders, twig chewers, algae grazers, and moss chompers. There is an underworld of predators and prey that resembles the bar scenes from Star Wars, with a legion of scavengers to clean up afterwards. The curious invertebrate student can find a number of small worms, ostracods, and other little creatures, as well as three or four species of snail. Although no fishes have been found in the creeks recent years, the flow of the creek, and size of a few the pools, suggest they may harbor a sculpin or other small fish. With all this life present, there is no choice but to jump in, get wet, and experience stream life like never before!

Light gaps, which result when trees fall, are also interesting places to observe natural phenomena. When a tree falls, the light regime of the local environment changes remarkably. Plant species which are too shade intolerant to flourish in a dense forest are given a chance to grow in light gaps. However, the growth of these "pioneer species" triggers their own demise. As they grow, they recreate shady conditions, which allows shade tolerate species to dominate once again. The very trails which permeate the ravines are interesting because they are not only light gap areas, but they are also free of vegation, since people continually walk on them. The edge where the dirt (or mud!) meets the understory (which is, more often than not, English Ivy) is one of the most diverse areas of the forest. It is here where many wildflowers are able to successfully grow. The trail edges are vital for these plants survival in these ravines. Without these edges, the wildflowers would be choked out by the ivy.

Common Plants of the Ravines

Ferns and Horsetails

Adiantum pedatum	Maidenhair Fern
Athyrium felix-femina	Lady Fern
Dryopteris austriaca	Spreading Wood-fern
Equisetum arvense	Common Horsetail
Polystichum minitum	Sword Fern
Pteridium aquilinum	Bracken Fern

Herbs

Achlys triphylla	Vanilla Leaf
Asarum caudatum	Wild Ginger
Disporum hookeri	Fairy Bells
Fragaria vesca	Wild Strawberry
Galium trifolium	Fragrant Bedstraw
Geum macrophyllum	Large-leafed Avens
Hydrophyllum tenuipes	Pacific Waterleaf
Montia sibirica	Candy Flower
Rananculus sp.	Buttercup
Rumex sp.	Dock
Smilacina racemosa	Western Solomon Plume
Smilacina stellata	Starry Solomon Plume
Tellima grandiflora	Fringecup
Tolmiea menziesii	Piggy-back
Trillium ovatum	Trillium
Vancouveria hexandra	Inside Out Flower
Vicia sativa	Common Vetch
Viola glabella	Yellow Violet

Trees

Abies grandis	Grand Fir
Acer circinatum	Vine Maple
Acer macrophyllum	Bigleaf Maple
Alnus rubra	Red Alder
Fraxinus latifolia	Oregon Ash
Ilex aquifolium	English Holly
Laurus nobilis	English Laurel
Pseudotsuga menziesii	Douglas-fir
Thuja plicata	Western Redcedar
Tsuga heterophylla	Western Hemlock

Shrubs

Berberis aquilfolium	Tall Oregon Grape
Berberis nervosa	Dwarf Oregon Grape
Corylus cornuta	Hazelnut
Gaultheria shallon	Salal
Oemleria cerasiformis	Osoberry • Indian Plum
Rosa nutkana	Common Wild Rose
Rubus parviflorus	Thimbleberry
Sambucus racemosa	Red Elderberry
Symphoricarpos albus	Snowberry
Vaccinium ovatum	Evergreen Huckleberry
Vaccinium parvifolium	Red Huckleberry

Vines

Clematis sp.	Clematis
Herdera helix	English Ivy
Lonicera ciliosa	Orange Honeysuckle
Rubus procerus	Himalayan Blackberry

Common/Easily Seen Mammals

Didelphis marsupialis	Opossum
Procyon lotor	Raccoon
Eutamias townsendi	Townsend Chipmunk
Sciurus griseus	Western Gray Squirrel
Sciurus niger	Eastern Fox Squirrel
Tamiasciurus douglasi	Chickaree

Uncommon/Rarely Seen Mammals

Myotis lucifugus	Little Brown Myotis
Eptesicus fuscus	Big Brown Bat
Myotis eutis	Long-eared Myotis
Myotis californicus	California Myotis
Lasiurus cinereus	Hoary Bat
Plecotus townsendi	Western Big-eared Bat
Neurotrichus gibbsi	Shrew-mole
Scaponus orarius	Pacific Mole
Sorex vagrans	Vagrant Shrew
Mephitis mephitis	Striped Skunk
Mustela frenata	Longtail Weasel
Urocyon cinereoargenteus	Gray Fox
Glaucomys sabrinus	Northern Flying Squirrel
Thomomys mazama	Mazama Pocket Gopher
Neotoma fuscipes	Dusky-footed Woodrat
Rattus rattus	Black Rat
Microtus oregoni	Oregon Vole
Peromyscus maniculatus	Deer Mouse

Amphibians and Reptiles of the Ravines

Hyla regilla	Pacific Treefrog
Rana aurora	Red-legged Frog
Rana catesbeiana	Bullfrog
Ambystoma gracile	Northwestern Salamander
Ambystoma macrodactylum	Long-toed Salamander
Aneides fevreus	Clouded Salamander

Dicamptodon ensatus	Pacific Giant Salamander
Ensatina eschscholtzi oregonensis	Oregon Salamander
Plethodon vehiculum	W. Red-backed Salamander
Taricha granulosa	Rough-skinned Newt
Gerrhonotus coeruleus	Northern Alligator Lizard
Charina bottae bottae	Pacific Rubber Boa
Diadophis punctatus occidentalis	NW Ring-necked Snake
Thamnophis sirtalis concinnus	Red-spotted Garter Snake
Thamnophis ordinoides	Northwestern Garter Snake

Nearby Areas to See and Explore

Leave your dens, abandon your cars, and walk out into the mountains, deserts, the forests, the seashores....

Ed Abbey

For those of you, like us,who need to spend extensive periods of time with nature, here is a list of a few fantastic places which will begin to satisfy you. All of these places are very close, within a half-hour drive of campus at the fartherst, and provide a varierty of natural adventures that can't be enjoyed at Lewis and Clark.

Tryon Creek State Park: Located about two blocks from campus on Terwilliger. The park is adjacent to the Lewis and Clark Law School campus. The park is physically quite similar to the ravines on campus, but it is *much* more pristine, and has an excellent interpretive center open 7 days a week.

Camassia Reserve: This Nature Conservancy Reserve in West Linn is rich in floral diversity. The 24 acre reserve has several distinct habitats which will impress everyone with the amount of diversity concentrated in a small area and the number of rare species.

Sauvie Island: A bird-watchers paradise located west of Portland along Highway 30. The western half of the island is a wildlife refuge. Swans, Bald Eagles, and Sandhill Cranes are just a few of the species which can be seen here. Check in at the refuge headquarters on Reeder Road(?) to pick up a map, checklists, and intrepretive guides.

Ridgefield Wildlife Refuge: Located north of campus in Ridgefield, WA. Habitat is similar to that of Sauvie Island and home to one of the regions rarest plants, *Howelia aquatilus.*

Oaks Bottom Wildlife Refuge: Only a bike ride away from campus! This small reserve, located just over the Sellwood Bridge, is a great place to see Great Blue Herons, American Coots, and other waterfowl.

Forest Park: This northwest Portland park is dominated by Douglas-fir. The Portland Chapter of the Audubon Society on 5151 NW Cornell Road has a rehabilitation center near the park, as wellas one of the best colllections of natural history guides and gifts for sale in the Portland area.

Hoyt Arboretum/Washington Park: Do you visit the zoo, OMSI, or the Forestry Center? If yes, then keep driving up the hill a ways and take a tree-walk at the arboretum. Another place with labelled trees.

The Berry Botanic Garden: Only one mile from campus on SW Summerville, this garden is the center for plant conservation in the Pacific Northwest. The gardens are absolutely amazing and often have interrnships availabe to students interested in botany or conservation. Visit here by appointment only, 636-4112.

REFERENCES

Trees

Bailey, L. H. 1949. *Manual of Cultivated Plants*. The Macmillan Company: New York. Revised edition.

Brockman, Frank C. 1986. *Trees of North America*. Golden Press: New York. Revised Edition.

Greer, Harold E. 1982. *Greer's Guidebook to Available Rhododendrons: species and hybrids*. Offshoot Publications: Eugene.

Mitchell, Alan. 1974. *A Field Guide to the Trees of Britain and Northern Europe*. Houghton Mifflin Company: Boston.

Phillips, Roger. 1978. *A Photographic Guide to More than 500 Trees of North America and Europe*. Random House: New York.

Preston, Richard J. 1989. *North American Trees*. Iowa State University Press: Ames. Fourth Edition.

Randall, Warren R.; Robert F. Kenistron; Dale N. Bever; Edward C. Jensen. 1985. *Manual of Oregon Trees and Shrubs*. Oregon State University: Corvallis.

Ross, Charles R. 1978. *Trees to Know in Oregon*. Oregon State University Extension and the Oregon State Forestry Department: Corvallis. Revised.

Wildflowers

Hitchcock, Leo and Arthur Cronquist. 1987. *Flora of the Pacific Northwest*. University of Washington Press: Seattle.

Jolley, Russ. 1988. *Wildflowers of the Columbia Gorge*. Oregon Historical Society Press: Portland.

Animals

Burt, William and Richard Grossenheider. 1976. *A Field Guide to the Mammals of America North of Mexico.* The Peterson Field Guide Series. Houghton Mifflin Company: Boston.

Ehrlich, Paul, David Dobkin and Daryl Wheye. 1988. *The Birder's Handbook.* Simon & Schuster Inc.: New York.

National Geograpic Society. 1988. *A Feld Guide to the Birds of North America.* National Geographic Society: Washington D.C.. Second Edition.

Peterson, Roger Tory. 1990. *Western Birds.* The Peterson Field Guide Series. Houghton Mifflin Company: Boston. Third Edition.

Robbins, Chandler, Bertel Bruun and Herbert Zim. 1966. *A Guide to Field Identification Birds of North America.* Golden Press: New York.

Sharp, Brian. 1990. Population Trends of Oregon's Neotropical Migrants. *Oregon Birds.* 16 (1).

Stebbins, Robert C. 1966. *A Field Guide to Western Reptiles and Amphibians.* The Peterson Field Guide Series. Houghton Mifflin Company: Boston.

GLOSSARY

acuminate: Gradually tapering to the apex; long-pointed.
acute: Sharply pointed, but not drawn out.
aggregate: A compound fruit developing from separate pistils of the same flower.
alternate: Scattered singly along axis; not opposite.
anther: The pollen-bearing part of the stamen.
apex: Tip.
appressed: Lying close and flat against.
aril: An appendage or an outer covering of a seed.
axil: The upper angle formed by a leaf or branch with the stem.
berry: A fleshy or pulpy fruit with immersed seeds.
bloom: The powdery or waxy substance easily rubbed off.
bract: A modified leaf subtending a flower or belonging to an inflorescence.
bud: The undeveloped state of a branch or flower cluster.
calyx: The flower cup or exterior part of a perianth.
carpel: A simple pistil or an element of a compound pistil.
caudate: Furnished with a tail or a slender tip.
cell: A cavity of an ovary or anther.
compound: Leaves made up of several individual leaflets.
cone: A fruit with overlapping scales, usually woody.
cordate: Heart-shaped.
corolla: Inner part of the perianth, composed of petals.
crenate: Dentate with the teeth much rounded.
crown: The upper part of a tree, including the living branches with their foliage.
cyme: A flat-topped flower cluster, the flowers opening from the center outward.
deciduous: Not persistent; falling away as the leaves of a tree in autumn.
decurrent: Running down, as of the blades of leaves extending down their petioles.
decussate: In pairs alternately crossing at right angles.
dioecious: Unisexual, the staminate and pistillate flowers on different individuals.
divergent: Spreading apart; pointing away.
drupe: A stone fruit, such as a plum.
entire: Leaf margin without divisions, lobes, or teeth.
fascicle: Dense cluster or bundle.
fluted: Regularly marked by alternating ridges and groovelike depressions.

fruit: Seed-bearing part of a plant.
glabrous: Smooth, not pubescent or hairy.
glaucous: Covered or whitened with a bloom.
globose: Spherical in form or nearly so.
habitat: The place where a plant naturally grows.
hoary: Covered with a close, whitish, or gray-white appearance.
imperfect (flower): Containing one sex but not the other.
Indehiscent: Not splitting open; remaining closed.
inferior ovary: Appearing to grow below the adnate calyx.
irregular flower: Bilaterally symmetrical; similar parts of different shapes or sizes.
lanceolate: Lance-shaped.
lateral: Situated on the side; not an apex.
leaflet: One of the small blades of a compound leaf.
legume: Fruit of the pea family; podlike and splitting open by both sutures.
lobe: A somewhat rounded division of an organ.
monoecious: The stamens and pistils in separate flowers but borne on the same individual.
ob-: Latin prefix signifying inversion.
oblanceolate: Lanceolate, with the broadest part toward the apex.
oblong: About 3 times longer than broad with nearly parallel sides.
obovate: Ovate with a broader end toward the apex.
opposite: Situated directly across from each other at the same node.
orbicular: A flat body circular in outline.
ovary: The part of a pistil that contains the ovules.
ovate: shaped like the longitudinal section of an egg, with the broad end basal.
ovoid: Solid ovate or solid oval.
ovule: The part of the flower that becomes the seed after fertilization.
palmate: Radiately lobed or divided, veins arising from one point.
panicle: A loose, compound, or branched flower cluster.
pinnate: A compound leaf with leaflets arranged along each side of a common petiole.

pistil: Female organ of a flower, consisting of ovary, style, and stigma.
polygamo-dioecious: Nearly dioecious, but with some of the flowers perfect.
polygamo-monoecious: Nearly monoecious, but with some of the flowers perfect.
polygamous: Flowers sometimes perfect and sometimes unisexual.
pubescent: Bearing hairs of any sort.
raceme: A simple inflorescence of stalked flowers on a more or less elongated rachis.
regular flower: Radially symmetrical; similar parts of the same shape and size.
samara: An indehiscent, winged fruit.
sepal: A division of the calyx, usually bractlike.
serrate: Toothed, the teeth pointing upward or forward.
sessile: Without a stalk.
sheath: A tubular envelope, or enrolled part or organ.
simple: Leaves consisting of a single blade.
stamen: The pollen-bearing organ of the male flower.
staminate: Male flowers; provided with stamens but without pistils.
stigma: The part or surface of a pistil that receives pollen for the fertilization of the ovules.
stipule: An appendage at the base of the petiole, usually on on each side.
stomata: Plural of stoma. A stoma is an orifice in the epidermis of a leaf used to connect internal cavities with air.
superior ovary: Free from and inserted above calyx.
suture: A junction or line of dehiscence.
terminal: Situated at the end of a branch.
valve: One of the pieces into which a capsule splits.

Field Notes

Field Notes

Field Notes

Field Notes

Field Notes

All work was completed on the Macintosh computers at Lewis and Clark College. All writing was done using Microsoft Word Version 4.0. Times Font. The book was printed on an Apple Laserwriter II.

All duplicating was performed by the Lewis and Clark College Duplicating Center.

This is a not-for-profit undertaking. The price of purchase covers printing costs only.

First printed in June, 1990.

Printed on recycled paper.