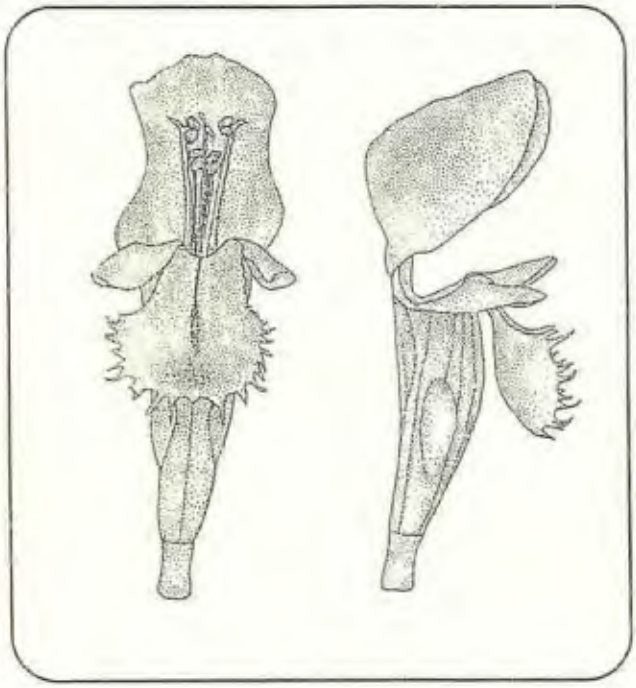
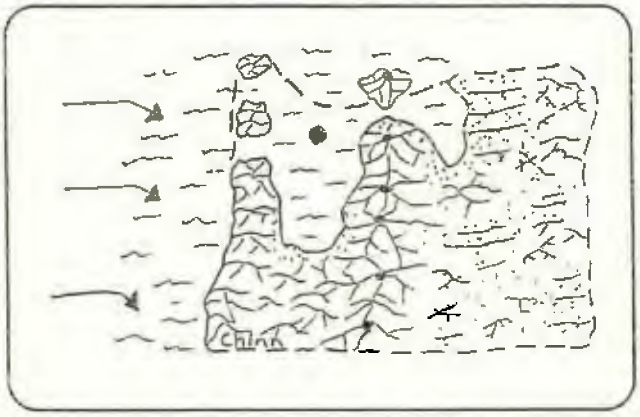
Second Edition

The View From Springbrook Park
Lake Oswego, Oregon

AN ILLUSTRATED NATURAL HISTORY





The roar, faint at first but quickly increasing in intensity, would have been audible for at least the half-hour before the flood struck . . . At the crescendo came destruction. The mass of compressed air - impelled by the towering head of onrushing water - hit first . . . how can we imagine a torrent of air exploding into existence, driven by a wall of water hundreds of feet high and moving at 50 miles per hour? . . . a swollen, surging mass composed of ice, rock, mud, and water, and standing over 500 feet tall . . . and again this tall where the waters were compressed and funneled . . . The torrent, rushing from Lake Missoula down through Wallula gap, ravaged and swallowed everything that lay in its path - a cornucopia gone mad, pouring forth destruction.

(A description of a great ice age flood 15,000 years ago by Dr. John E. Allen in *Cataclysms of the Columbia*, p. 88. See Chapter 2 of the present text for complete reference.)

April 9, 1825: "In the afternoon in company with Mr. Douglass I made a short visit to the shore . . . On leaping from the boat, the first object which attracted our notice, was Gualtheria shallon *(salal) growing in abundance among the rocks, and covered with its beautiful roseate flowers. We then entered a forest of gigantic pine trees, among a brushwood of* Menziesia ferruginea *and different species of American currant, and beautiful* Trilliums *and* Smilacinae *were beginning to expand their blossoms . . ."*

April 15, 1825: "In this day's excursion, we met a number of Indians in the wood, chiefly women and children who were employed in collecting vegetables, as the young shoots of different species of Rubus *and* Rosa, *and, above all, the tender shoots of the horsetail, (*Equisetum arvense*), which attains a large size and is much esteemed by the Indians."*

May 2, 1825: " . . . at 11 o'clock we arrived at Ft. Vancouver . . . It is situated in the middle of a beautifull prarie, containing about 300 acres of excellent land . . . Within a short distance of the fort I found several interesting plants, as Phalangium esculentum *(camas lily),* Berberis nervosa *(low Oregon grape),* B. aquifolium *(tall Oregon grape),* Calypso borealis *(an orchid) and* Corallorhiza innata *(an orchid). The root of the* Phalangium esculentem *(camas lily) is much used by the natives as a substitute for bread. They grow abundantly in the moist prairies, the flower is usually blue, but sometimes white flowers are found. The bulbs are about the size of the* Hyacinthus menseriptus, *and are collected by women and children . . . the tubers of a species of* Sagittaria *(Wappato or Arrowhead), which grows on the marshy banks of the river, affords an agreeable substitute for potatoes. In the neighbouring woods we found some of the choicest plants the N. W. coast can boast of."*

(From the journal of Dr. John Scouler on his botanical explorations with David Douglas, in *Botanical Exploration of the Trans-Mississippi West 1790-1850*, by Susan Delano McKelvey, Oregon State University Press, 1991, pp. 286-289. Terms in parenthesis, except 'Equisetum arvense,' have been added by EC. See also "Scouler Willow," in Chapter 5 of the present text.)

The Kalapuya Year. *The year begins with the first new moon in late August or early September. The twelve months reflect the seasonal changes of climate and natural resources:*

- *September - The first Kalapuya month, a time for collecting acorns, berries, and camas bulbs. Prairies are burned before harvesting the seeds of* Madia *(tarweed).*
- *October - "Hair (leaves) fall off." Kalapuya groups in the northern Willamette Valley camp close to lakes for the beginning of wappato harvesting.*
- *November - Preparation of winter houses for the coming cold weather.*
- *December - The Kalapuya settle into their villages for the winter.*
- *January - "Ts alantatsa - Burned breast." "It was cold and old people sit so close to fire that their breasts get singed."*
- *February - "Pretty near spring time." This is a lean time. Provisions run low.*
- *March - "It buds out (leaves, etc.)." Short camping trips are made to gather food. Camas leaves are finger high at this time.*
- *April - "Pyan." More trips are made in the valley as spring vegetation flourishes.*
- *May - "Flower-time." Camas flowers are at their peak in April and May. People leave their winter villages to establish summer camps. Spring salmon runs in the Willamette River.*
- *June - Berry picking, fishing, and early harvesting of camas bulbs.*
- *July - "Half-summer-time." Collection of hazelnuts and caterpillars in the hot dry weather.*
- *August - "Camass time." "Dig camass." Berries, nuts, and camas bulbs are gathered in preparation for winter.*

(Adapted from 'The Kalapuya Year' by Kathryn Anne Toepel, chapter 3, p. 20, in *The First Oregonians*, and Prof. Leo Frachtenberg's 1913 interview with Kalapuyan William Hartless at Chemawa, in *The Kalapuyans* by Harold Mackey. William Hartless' words are in quotes. See Chapter 3 of the present text for complete references.)

Coyote Builds Willamette Falls and the Magic Fish Trap

Coyote came to that place (around Oregon City) and found the people there very hungry. The river was full of salmon, but they had no way to spear them in the deep water. Coyote decided he would build a big waterfall, so that the salmon would come to the surface for spearing. Then he would build a fish trap there too. . . Where the Willamette Falls are now he found just the right place, and he made the Falls high and wide. All the Indians came and began to fish. Now Coyote made his magic fish trap. He made it so it would speak and say "Noseepsk!" when it was full. Because he was pretty hungry, Coyote decided to try it first himself. He set the trap by the Falls, and then ran back up the shore to prepare to make a cooking-fire. But he had only begun when the trap called out, "Noseepsk!" he hurried back; indeed the trap was full of salmon. Running back with them, he started his fire again, but again the fish trap cried "Noseepsk! Noseepsk!" He went again and found the trap full of salmon. Again he ran to the shore with them; again he had hardly gotten to his fire when the trap called out, "Noseepsk! Noseepsk!" It happened again, and again; the fifth time Coyote became angry and said to the trap, "What, can't you wait with your fish-catching until I've built a fire?" The trap was very offended by Coyote's impatience, and stopped working right then. So after that the people had to spear their salmon as best they could.

(By Louis Labonte, Clackamas storyteller, as told to H. S. Lyman, c. 1900. From *Coyote Was Going There: Indian Literature of the Oregon Country*, compiled and edited by Jarold Ramsey, University of Washington Press, 1977, p. 93. Storytelling was important for the continuity of each tribe's culture and was "designed to convey social and moral instruction as well as delight.")

Second Edition

The View From Springbrook Park Lake Oswego, Oregon

AN ILLUSTRATED NATURAL HISTORY

Text and Illustrations by

Ed Chinn

This publication was created as a public service for Lake Oswego Schools and Department of Parks and Recreation

Cautionary Note

Any natural area will have natural hazards, and basic common sense is necessary to avoid misfortune. Trees and limbs are in a constant state of growth and decline, and special caution is particularly necessary on windy days to avoid being hit by falling wood. The uses of plants in this book are given as historical and cultural information only. Regulations restrict picking and removal of plants and other materials. **The author advises against eating or picking plant material.** If this is done, it is at the reader's risk and should be under direct supervision of an authority. The accurate identification of plant material is not assured by this or any other guide since there are many plant look-alikes. Plants that are considered nonpoisonous may cause an unpredictable allergic reaction. This writer cannot accept responsibility for the reader's health. Children benefit from the experience of adults, and should be under their supervision.

Acknowledgements

Extreme gratitude is expressed to Prof. Emeritus **John E. Allen** and Prof. **Marvin Beeson**, Dept. of Geology, Portland State U. for their comments on geology; to **Barbara Watson**, former Coordinator, Indian Ed. Prog., Oregon City School Distr., to **Cece Kneeland**, Confederated Tribes of Grand Ronde, to Prof. **John Woodward**, Social Sciences Div., Mt. Hood Comm. College, and **Rod Ingman**, Marion County Historical Society, for their comments on Native Americans; to **Ayn Shlisky**, former Assoc. Ecologist, Gifford Pinchot Nat. Forest for her comments on forest ecology; to **Bonnie Brunkow**, Director and Curator, and to **Scotty Fairchild**, Head Gardener, both of Leach Botanical Garden, for their comments on plants; to **D. Gary Evans**, **Andy Harris**, and **Jill Grenda**, Dept. Parks and Rec., to **Catherine Clark**, Historic Review Bd., and to **Kay Kinyon**, Park Superintendent, all of the City of Lake Oswego, for information on Springbrook Park, and West Waluga Park (JG); to **Harriet L. Smith**, Lake Oswego author, and to **Susan Caldwell**, Oregon Field Office, The Nature Conservancy, for their comments on preliminary drafts. The author takes full responsibility for and regrets any errors and omissions in this book.

For encouragement and moral support I thank **Ruth Pennington**, Springbrook Park Assn of Neighbors; **Katy McCarney**, **Carol DeBoer**, **Paula Roberts**, **Susan Ford**, and **Mike McCarroll** of Uplands Elem. School; **Stephanie Wagner**, **Lee Casperson**, **Jack Crossen**, and **Dick Smith** of the Uplands parents' science group; the **Friends of Tryon Creek State Park** and **Mike Niss**, park naturalist. Inspiration was drawn from prior volunteers who have made possible the preservation and enhancement of natural parks for all. To **Cathy** for technical computer support, and to **Cathy**, **Leslie**, and **Julie** for support, encouragement, and kind tolerance of this three year project, I extend my deepest gratitude.

Preface to Second Edition

Copies of the *first* edition quickly vanished by Summer of 1994, not necessarily because it was in great demand. Rather at over $6 a copy charged by a local copy shop, my budgetary constraints limited initial printing to a mere 35 "vintage" editions. In Fall of 1994 the **Oswego Garden Club** through **Ruth Pennington** graciously offered to support printing of additional copies. The patience of Garden Club members has been severely tested as a year has passed without printing of an additional copy. The reasons for the delay were many: I had just volunteered to do illustrations for a wetland trail at West Waluga Park. Additional drawings of plants, rare in Springbrook Park albeit important to the natural history of Lake Oswego, needed inclusion. And important and complex subjects of Forest and Wetland Ecology needed amplification. Added to the above was an unusually large number of demands from family and work life quite worthy of a separate book! At last finished, this second edition includes new descriptions and detailed drawings of such interesting subjects as Pacific madrone, Oregon Oak, and mockorange found in Chapter 5. Important wetland plant species, and even a blue heron, are included as a result of voluntary work with **Jill Grenda** at West Waluga Park. Chapter 4 is greatly strengthened via the critical comments of **Ayn Shlisky** on Forest Ecology. The *First Supplement* to Chapter 4 quotes much of her commentary, edited but purposely left unaltered, for I could make no improvements on such a fine set of extemporaneous notes. The *Second Supplement* to Chapter 4 helps to convey the importance of wetlands and provides the more advanced student with an introduction to scientific methodology used for wetland assessment. To family, friends, and Oswego Garden Club members, *thank you for waiting.* EC Lake Oswego, OR Fall, 1995

Preface to Third Printing and Friends of Springbrook Park

Friends of Springbrook Park is a group of Uplands volunteers who are dedicated to the restoration of the nature area in their midst. We work in partnership with the City of Lake Oswego, Park Maintenance, Uplands Neighborhood Association, schools, and community to protect the park's valued natural resources. Almost every Lake Oswego neighborhood has a similar nature area or open space within its boundaries and is encouraged to form a similar group.

Our mission focuses on educational programs and coordination of volunteer projects. A walk through Springbrook Park reveals the many efforts on its behalf: ongoing invasive plant removal (ivy, holly, and blackberry); site restorations with native plants, kiosks, trail maintenance, trailhead improvements (Uplands and Sundeleaf); bird houses, native plant garden and stock nursery. This book's illustrations and plant descriptions are often featured in its kiosks. In response to reader and library requests, Friends received permission to print additional copies of the Second Edition and makes them available at cost as a public service. Continued volunteer help and financial support will benefit Springbrook Park now and for future generations.
--- Friends of Springbrook Park, April 2010

Springbrook Park is among Lake Oswego's oldest and largest natural areas and is a vital part of the Uplands neighborhood. This 52-acre urban nature area provides important environmental nature functions that benefit the entire area as it also offers passive recreation opportunities to local residents. It is ideally situated to provide an outdoor laboratory for a full range of students, since it is located adjacent to Uplands Elementary and Lake Oswego Junior High schools and nearby Lake Oswego High School. The park is in the Uplands Neighborhood of Lake Oswego, Oregon.

The park area was logged off in the 1950s. The recovering forest is a canopy of predominantly Big-Leaf maple and Red Alder, with some Western Red Cedar and Douglas Fir. The park is home to small wildlife and many birds, including the Spotted Towhee, which is part of on-going studies by Portland Audubon Society and Portland State University. There are also Coopers Hawks, Great Horned Owls, Barn Owls, White Tailed-Deer, and an occasional Coyote.

The park existed for 30 years without benefit of an assessment of its natural resources or a long-term plan to preserve, protect, maintain and enhance its valuable place in our community. Lake Oswego is growing and experiencing increased density, which is prompting residents to value and protect remaining natural areas.

In 2003, a group of interested neighbors recognized this need and worked with the City to develop a Natural Resources Management Plan that balances two important goals for Springbrook Park - conservation and usage. The plan recognizes Friends of Springbrook Park and directs the volunteer organization to provide ongoing support services that meet its mission to:

- **Protect and preserve the park's natural resources**
- **Enhance its user value**
- **Provide educational opportunities in schools and community**

The plan also identifies areas for protection and ensures that development and use of the park is appropriate for its natural functions. The management plan will evolve over time and will be based on assessments and inventories of current conditions and a description of the desired future conditions. It will delineate areas to protect, rehabilitate and restore, and describe appropriate use of the park and activities in it.

Consider becoming a Park Steward - Help Make the Plan Continue

Springbrook Park is the only natural area in Lake Oswego supported by a Friends group, a not-for-profit organization of volunteers who plan and supervise projects and programs. The generosity of all members makes it possible to provide ongoing rehabilitation, planting restoration, and educational materials. On-going educational programs continue with nearby schools, churches, and the Boy Scouts.

Membership, Donations, and Book Gifts For special occasions are a memorable way to honor friends and families throughout the year. Books are $7.50 each, at cost as a public service. To join or renew membership, please download the Membership Application from the website and mail to:

Friends of Springbrook Park
3360 Fir Ridge Road
Lake Oswego, OR 97035-2645

www.springbrookpark.org

Friends of Springbrook Park is a 501(c) 3 non-profit educational foundation made up of volunteer members. Together, your support will help preserve and enhance Springbrook Park by investing in its future now, and support the on-going educational programs for our children.

Information and Membership: Thomas Bland, blandt50@hotmail.com

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Chapter One

INTRODUCTION

- Purpose
- Setting
- Scope
- A Continuum

Purpose of this Book

Many of us go about our daily lives in a sort of knowledge vacuum, not aware that our environment is exceedingly rich in natural history. For example, some may regard the second growth vegetation of Springbrook Park as forbidding scrub, better to be bulldozed and replaced by open ball fields. Or some may disdain the rocky soil of their property, unaware that the site was once a flood channel 12,000 years ago. Yet for any individual, simple knowledge can transform the "forbidding scrub" into an enjoyable and peaceful forest glade, and the rocky real estate into a pridefully landscaped memento of the last great Ice Age. Thus, the raison d'etre of this book is to share knowledge of natural history with readers for their personal enrichment. This knowledge also has practical value for those who enjoy the outdoors or who are involved in landscaping chores.

The Setting

Despite the title, the major focus of this book is not on Springbrook Park but rather on the **natural history of the Lake Oswego area**. Springbrook Park is, however, a convenient *literary reference point* because the flora and fauna are for the most part representative of other natural parks in this area. Springbrook Park is also ideally situated in very close proximity to three major schools that already use the park as an educational resource.

The information provided is not restricted to Springbrook Park. With an appropriate change in the reference point, the information herein is applicable to all other natural parks in the area. Each park also has a few unique features of educational value. Thus, students at Bryant Elementary and Waluga Junior High Schools may similarly utilize nearby Bryant Woods Park as an educational resource, and may have better opportunity to study *wetland flora and fauna.* Iron Mountain Park p oss sses great potential for studies in *geology and plant distribution.* Cooks Butte Park may have greater *botanical diversity* for students of nearby Lakeridge High School. And Tryon Creek State Park, while within walking distance of only Forest Hills School, is a large treasure trove of natural history.

The reference point for this book, Springbrook Park, is a natural park of approximately 51 acres. Country Club Drive, Boones Ferry Road, and Wembley Park Road run along segments of the park's borders. The tennis center parking lot off of Diane Drive provides convenient entry. The parkland lies on the northern slope of Iron Mountain at an approximate elevation of 400 feet. A seasonal spring and small seeps drain into Springbrook Creek. The Springbrook Creek drainage basin includes additional springs, seeps, and small tributaries from Mount Sylvania, Iron Mountain, and a portion of Lake Grove.

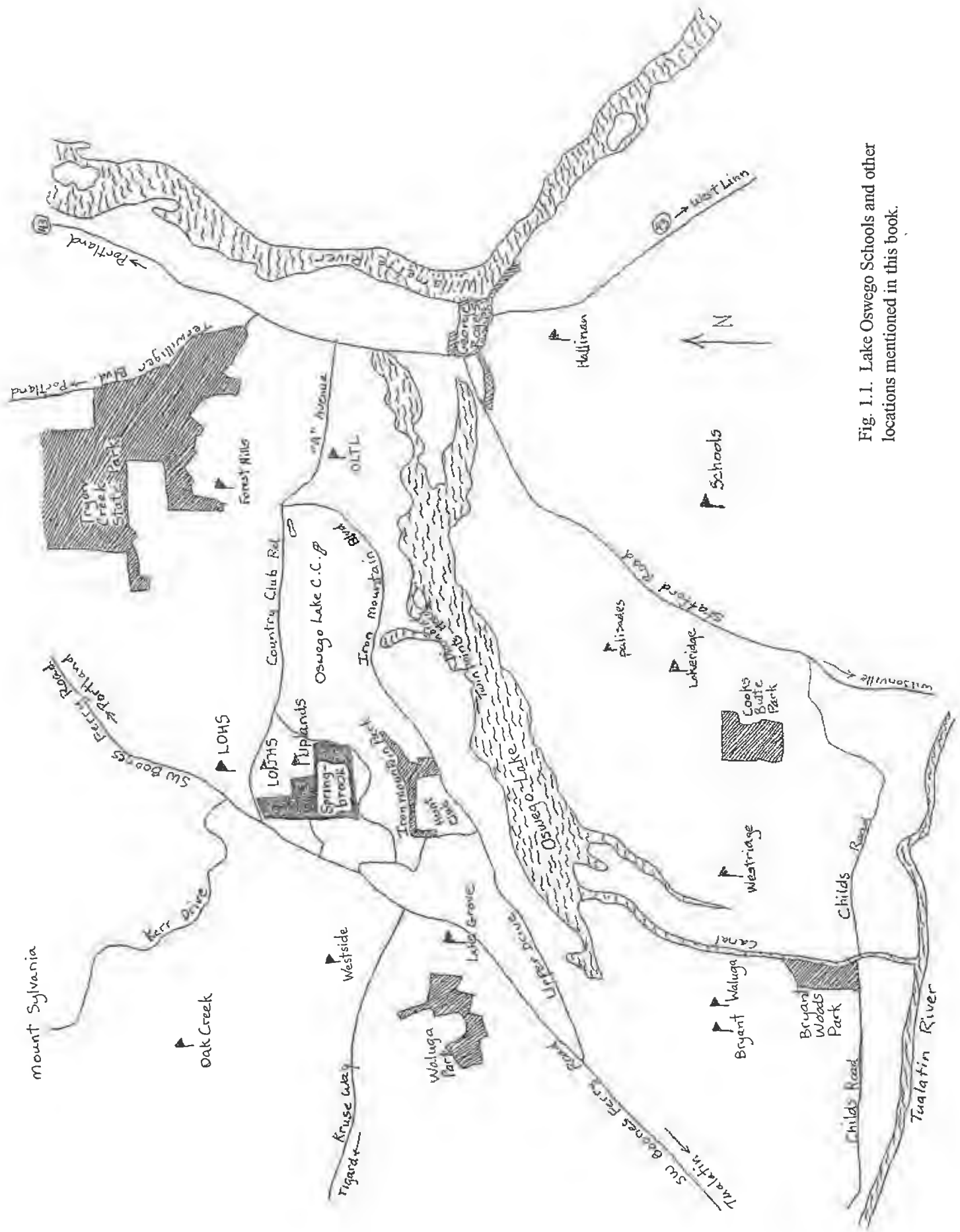


Fig. 1.1. Lake Oswego Schools and other locations mentioned in this book.

A sawmill operation originally owned and logged the entire area. The first 25 acres were purchased by the City of Lake Oswego for a park in 1929. In the 1970's, a developer proposed building houses on an adjacent 26 acres. Concerned citizens persuaded voters to approve purchase of the additional acreage in 1972. An indoor tennis center was later added by the city on 2 acres at the west edge of the park. In 1978, the city proposed major development of the park including 5 playing fields, tennis courts, and a community center. Residents of the Springbrook Park neighborhood opposed the plan, and voters subsequently approved, by a 3 to 1 margin, a charter amendment to preserve the park in the natural state (*Lake Oswego Review*, 4/1/82 and 4/29/82).

Springbrook Park with its second growth or recovery forest is very well situated as an educational resource. The park is directly adjacent to Uplands Elementary School and Lake Oswego Jr. High School grounds, and across the road from Lake Oswego High School. Students have the opportunity to utilize the park for studies in hydrology, ecology, geology, botany, and zoology. Native American ethnobotany and the current human impact on the park present excellent opportunities for the integration of the natural sciences with the social sciences.

Springbrook Park, like other natural parks, has intrinsic value for teaching citizens about the advantages of using native plants in landscaping. Proper landscaping with native plants is being increasingly encouraged as a means to reduce water usage and maintenance. Additionally, as more Oregon landscape succumbs to development, the use of native plants attracts wildlife and helps to retain the desirability and uniqueness of the Oregon environment. The landscaping around the Springbrook Park tennis center and selected homes along Wembley Park road are good examples of the practicality of this strategy.

Scope

The natural history of the Lake Oswego region is presented in four subsequent chapters: Geology, Native Americans, Plant Ecology, and descriptions of Plants. Limitations of time prevented inclusion of a chapter on **fauna**. A chapter on fauna would have included mammals such as the Douglas squirrels, racoons, Townsend moles, the introduced oppossums, and the transient Columbian black-tailed deer. Dozens of bird, reptile, and amphibian species, and hundreds of species of invertebrates (insects, isopods, arachnids, molluscs, and worms) are an integral part of the forest ecosystem. Interested teachers and students of zoology have excellent opportunity to continue work on this subject. The reader is also encouraged to peruse pages 80 to 125 of the recently published *A Forest in the City: Your Guide to Tryon Creek State Park* for descriptions of local fauna.

Chapter 2 on **geology** of the Lake Oswego area is based on readily available sources of research thanks largely to the efforts of Professors John E. Allen and Marvin Beeson, and colleagues at Portland State University and the Oregon Department of Geology and Mineral Industries. Very detailed information for the serious geology student has recently become available in the *Geologic Map of Lake Oswego Quadrangle*, available from the Nature of Oregon Information Center. Detailed descriptions of the ice age floods that left their mark on much of the Lake Oswego area are available in *Cataclysms of the Columbia*. A third recommended reference for the serious student is the recent fourth edition of *Geology of Oregon*.

Chapter 3 on **Native American cultures** has presented both a challenge and an opportunity to integrate many sources of information on multiple cultural groups into a single reference specific for the Lake Oswego area. To the author's knowledge no similar reference exists. More knowledge about the indigenous cultures of this area is needed. Good opportunities exist for students of social sciences and history, especially for those students of Native American background.

Chapter 4 on **plant ecology** represents a blend of general ecological principles such as habitat, forest strata, and succession, with the unique and complex ecology of Northwest forests. Opportunities abound for students of ecology to analyze ongoing successional patterns in the natural parks, to evaluate methods of restoration where needed, and to inventory and evaluate threatened wetland areas. The so far elusive dates of logging operations in Springbrook Park, and information on the types and sizes of logs removed, would provide greater insight into present and future successional stages. An interesting and valuable project may be the analysis of remaining stumps in the park as a method to "reconstruct" the original forest.

Chapter 5 on **plant descriptions** represents about 90% of the time required to produce this book. The illustrations are an attempt to record accurate botanical detail for the serious student while retaining aesthetic qualities of the plant subjects. The number of plants described in some detail is limited to about 80. These plants were selected for their frequency of occurrence, ecological significance, and/or cultural significance. Many more plant species deserve attention, but time

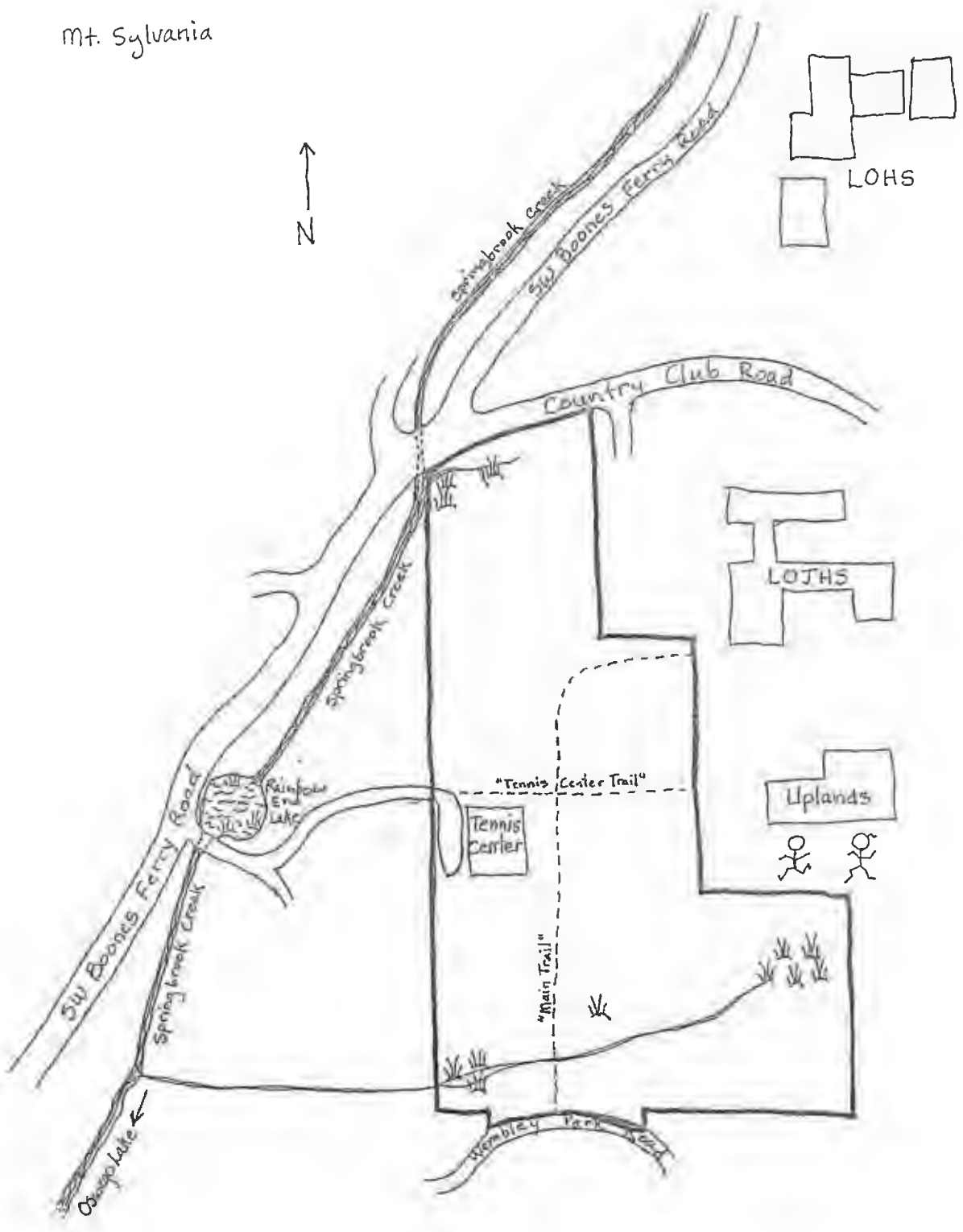


Fig. 1.2. Springbrook Park and Creek. Side trails are not shown.

limitations and the need to retain simplicity prevented inclusion of these species, as well as species of mosses, lichens, and fungi. As with the preceeding chapters, excellent opportunities exist for interested students and citizens to continue this work.

A Continuum

The present book is in a continuum of efforts by volunteers to enhance understanding and enjoyment of

the natural environment. The preservation and enhancement of natural areas for public use has, and will, heavily depend on voluntary efforts and donors. Two earlier references by volunteers, *The Lake Oswego Physical Resources Inventory* (1976), and *The Guidebook to Tryon Creek State Park* (c. 1976), will continue to be excellent and irreplaceable compendiums.

Prior and ongoing surveys of Springbrook Creek by teachers and students have been, and will continue to be, important for the understanding and enhancement of water quality of the Springbrook Creek watershed. Many other good opportunities exist for mutually beneficial interaction between the schools and Lake Oswego's natural parks.

Presently, this book is part of a larger effort to enhance the educational value of Springbrook Park for students, teachers, and citizens while honoring the charter amendment to keep the park in a natural state. Through efforts by teachers, city, and neighborhood association, plans are being implemented for an interpretive trail. And the future holds promise for better control of invasive plants such as ivy and Himalayan blackberry, restoration of disturbed areas with native vegetation, and specimen plantings of native species to demonstrate their practicality in neighborhood landscapes.

References

Allen JE. *Cataclysms on the Columbia.* Timber Press, Portland. 1986.

Beeson MH, Tolan TL, Madin IP. *Geologic Map of Lake Oswego Quadrangle, Clackamas, Multnomah, and Washington Counties, Oregon.* Oregon Dept. Geol. and Mineral Indus., Geol. Map Series, GMS 59.

Friends of Tryon Creek State Park. *A Forest in the City: Your Guide to Tryon Creek State Park.* Friends of Tryon Creek State Park, Portland, OR. 1994.

Ibid. *The Guidebook to Tryon Creek State Park.* Friends of Tryon Creek State Park, Portland, OR. c. 1976.

Orr EL, Orr WL, Baldwin EM. Geology of Oregon, 4th Ed. Kendall/Hunt, Dubuque. 1992.

Saarinen C, ed. *Lake Oswego Physical Resources Inventory.* City of Lake Oswego, OR. 1976.

Chapter Two

GEOLOGY

Two hundred million years ago, dinosaurs were roaming the earth. Springbrook Park was far from a leafy glade - it and nearly all of Oregon were part of the ocean floor hundreds of miles from the continental shoreline. About this time the Pacific Ocean floor began moving eastward relative to the North American continent. Masses of ancient rocks and fossils called "terranes" were transported with the ocean floor. As the ocean floor slid beneath the continental shelf (**subduction**), mud, sandstone, basalt, and portions of these terranes scraped off the ocean floor and became attached (**accreted**) to the North American continent.

Lake Oswego Geology Time Line	million yrs ago
• Subduction of oceanic plate beneath continental plate • Initially almost all of present-day Oregon is beneath sea level • Accretion of oceanic terranes to continental shoreline ensues	200
• Oceanic plate subduction moves west of present coastline • Foundation of Willamette Valley and Coast Range established	45
• Uplifting transforms ancestral Willamette Valley from a large ocean bay to a warm temperate plain	20
• Columbia River flood basalts cover much of the Willamette Valley • Limonite iron ore formed later under bog conditions	15-16
• Block faulting and folding alter Willamette Valley • Iron Mountain uplifted alongside Lake Oswego Fault	5-13 to present
• Boring Volcanoes, including Mt. Sylvania and Cooks Butte, erupt	0.7-2.5
• Ice age floods sweep through Willamette Valley • Lower Tualatin River channel becomes Oswego Lake	13,000-15,500 y.a.

Today remnants of terranes, representing some of Oregon's oldest rocks and fossils from 150 to 380 million years old, are found in portions of the Klamath and Blue Mountains. As the ocean floor sank beneath the continent, it became molten under intense heat and pressure. Volcanoes erupted, fueled by molten remnants of ocean floor roiling up from their journey beneath the continental edge. This dynamic process of subduction has continued to the present: the Coast Range is composed primarily of material scraped off the descending ocean floor, with the melted ocean floor returning as Cascade volcanoes .

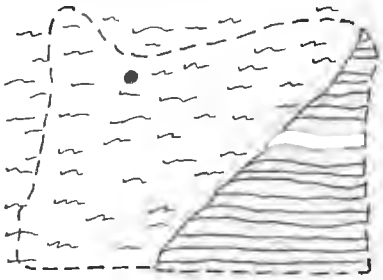
Subduction Zone Moves Westward - 45 Million Years Ago

About 45 million years ago, long after the dinosaurs became extinct, the accretion of an undersea chain of volcanoes established the foundation for the Coast Range and Willamette Valley:

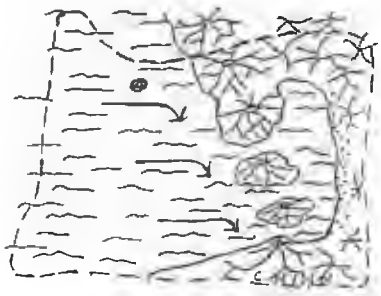
In Eocene time an undersea chain of volcanoes atop the Kula and Farallon plates collided with the westward moving North American plate where they were accreted. With a thickness of more than 2 miles, the volcanic rocks of the island chain form the basement of the Coast Range and Willamette Valley. After docking or making initial contact with North America, the island archipelago was rotated clockwise beginning in the early Eocene. With accretion, the old subduction zone east of the volcanic block was abandoned and a new one activated offshore to the west where it is today. (p. 204, Orr, *et. al.*)

This new subduction zone remains about 50 miles seaward of the present coastline, and continues to power the geologic machinery of the modern Coast and

200 million years ago most of Oregon was below sea level.



For the next 160 or so million years, the sea floor sank beneath the continent in a line of subduction (arrows), scraping off terranes and ocean floor material onto the continent. Molten remnants of ocean floor reappeared as volcanoes.



About 45 million years ago, a portion of the ocean floor containing an undersea chain of volcanic islands became accreted, and a new line of subduction developed where it remains today about 50 miles west of the coastline.

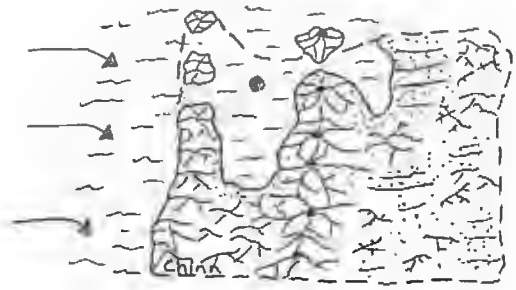


Fig. 2.1. Subduction of ocean floor beneath the continent.

Cascade Ranges. Movement of the subduction zone westward greatly enlarged the western portion of ancient Oregon. Now its outline fairly resembled the boundaries of present-day Oregon. Our still submerged Springbrook Park was at last part of the North American continent. Had our Park not been submerged, palm trees, avocadoes, pecans, and figs would have thrived in the warm subtropical climate.

Uplifting - 20 Million Years Ago

Over the next 25 million or so years, our submerged Park and ancestral Willamette Valley began to fill with gravelly sediments from the ancestral Coast and Cascade Ranges. Bones of saber-toothed tigers, camels, and giant pigs occasionally drifted in. Concurrently through the process of uplifting, the ancestral Willamette Valley was transformed from a large ocean bay into a warm temperate plain.

Thus Springbrook Park would be a marine world of molluscs, sea worms, and fish before finally becoming dry land for the first time about 20 million years ago. The first forests to shade our Park included dawn redwood (*Metasequoia*), ginkgo, maple, and sycamore. In the John Day region of central Oregon, fossil leaf imprints of dawn redwood and gingko help tell the story of these ancient forests. These two prehistoric trees were thought to be long extinct until botanists discovered their descendents in China. Today these "living fossils" have returned to Oregon as attractive landscape trees.

Flood Basalts - 15 to 16 Million Years Ago

Our Park would not remain tranquil for long. Over the next five million years gargantuan floods of molten basalt surged from vents in Idaho and northcentral and northeastern Oregon. Vast areas of central Washington and central and eastern Oregon were covered by up to several thousands of feet of molten basalt. Floods of basalt hundreds of feet high poured through an ancestral Columbia River valley, then down into the Willamette Valley, utterly smothering the parkland.

Thus thick layers of basalt underlie almost all of Lake Oswego. Springbrook Park, Uplands and Lake Oswego Jr. High Schools rest directly on five to eight layers of weathered basalt, each about 100 to 200 feet thick. The uppermost layer is classified as "Columbia River Basalt, Basalt of Sand Hollow," abbreviated **Tfsh**. However, Lake Oswego High School and Tryon Creek State Park rest on much older basalt - **Twh** or Basalt of Waverly Heights. Intriguingly, the Geologic map of Lake Oswego Quadrangle by Dr. Marvin Beeson, et. al. states, ". . . borehole data suggest a marine environment of deposition and further suggest that these sediments underlie much of the Tryon Creek area. . . Unit Twh is believed to represent a portion of an oceanic island that was accreted to western Oregon."

Some of the huge lava flows continued westward through the ancestral Columbia River Valley to enter the Pacific Ocean. During this time, the present Columbia Gorge west of the Cascades was probably more like an estuary. Today, the capes and promontories of the north Oregon coast represent remnants of these flows as first suggested by Dr. Marvin Beeson and co-workers. The succession of lava flows also diverted the Columbia River northward as they filled a succession of ancestral Columbia River valleys, according to work by Dr. John Allen. This may be seen today as the Columbia River turns north 50 miles from Portland to Kelso.

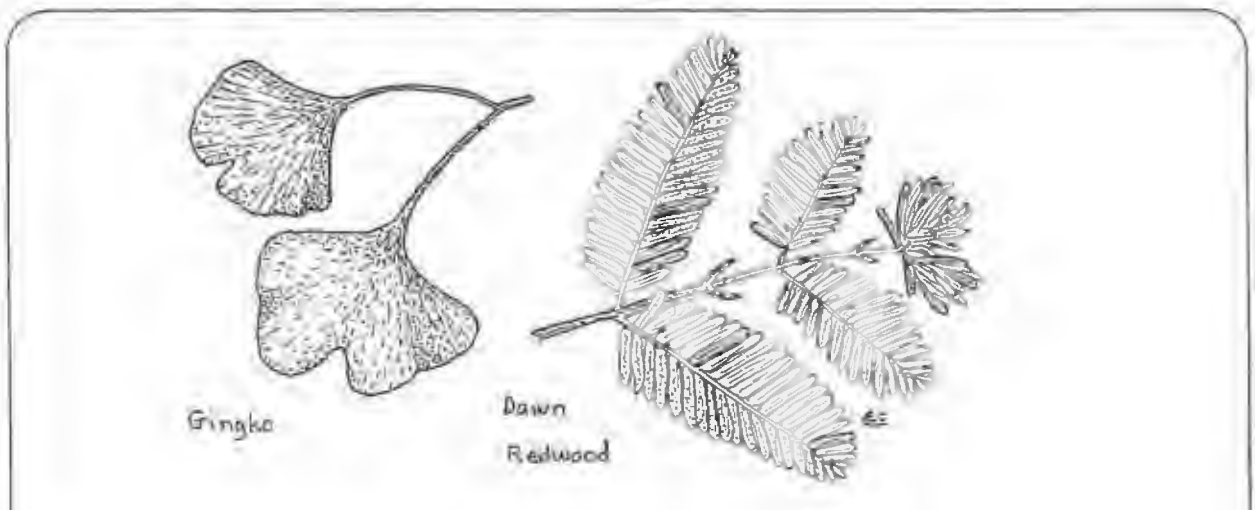


Fig. 2.2. Two trees of 20 million years ago.

The flood basalts recurred over a period of several million years. The exposed basalts weathered rapidly to lateritic and bauxitic soils in the warmer and more humid climate 15 million years ago. (Laterite is rich in iron oxide, Fe_2O_3 or hematite, that imparts a reddish color. Bauxite, an aluminum ore, is hydrous aluminum oxide, Al_2O_3) In these times, Springbrook Park likely supported a forest of black oak, hickory, and sycamore with scattered dawn redwood, ginkgo, elms, birches, and poplars. Small stands of swamp cypress stood in wetter areas.

During this time, the ancestral Willamette Valley was warmer than today, scattered with ponds, and partially sculpted by the youthful rivers. The parkland area was still quite flat although **there was a large low bog just to the south. Basalt also weathers under bog conditions to hydrous ferric oxide or limonite iron ore**. It was this iron ore that was subsequently mined and gave Iron Mountain its name. Perhaps for thousands of years this was a relatively tranquil place - until the next huge flood of molten basalt inexorably smothered everything in its path. But over the next few million years the massive floods of molten basalt ceased as the Cascades grow more and more majestic through resumption of their volcanic activity.

Block Faulting and Folding - 5-13 Million Years Ago to Present

Springbrook Park could have been literally torn in half as a result of block faulting and folding beginning 5 to 13 million years ago and continuing today. Block faulting and folding have caused sections of the Willamette Valley to rise and other sections to sink. This process is related to the ongoing subduction of the Juan de Fuca oceanic plate, and perhaps a more northerly movement of the ocean floor. This latter process may be dragging western Oregon northward and at the same time widening the Willamette Valley.

So starting about 5 to 13 million years ago, the Lake Oswego area has been jolted by a series of earthquakes. From Springbrook Park we would have seen the earth splitting along an east-west faultline, now called the **Lake Oswego Fault**. The fault ran right through the old bog south of the Park. With each jolt the land beneath the Park was uplifted until it lay on a small mountain that would be called **"Iron Mountain."** The old bog site, now uplifted on the steep southern face of Iron Mountain, had become transformed over a few hundred thousand years into a rich vein of limonite iron ore 2 to 20 feet thick, about a mile long and a half mile wide, averaging 38-45% metallic iron. The limonite ore bed was exploited in a short-lived but ambitious mining operation millions of years later.

About 15 to 16 million years ago, great basalt floods from Eastern Oregon covered much of the Willamette Valley, and eventually entered the Pacific Ocean.

Folding and block-faulting continue to alter the Willamette Valley. Western Oregon may also be moving northward, contributing to this process. The ancient Columbia River (dashed line) may have shifted northward due to the previous flood basalts (see above), and this movement.

Fig. 2.3. The Willamette Valley - covered by flood basalts, then altered by block-faulting and folding.

(Prof. Marvin Beeson indicates that the ore vein is represented by the Vantage horizon between the Grande Ronde and Wanapum basalts, subsequently buried by Frenchman Springs basalt about 15 million years ago. The **Prosser Iron Mine** entrance is now sealed about 100 feet below the crest of Iron Mountain.)

Block faulting and folding has greatly changed the Willamette Valley landscape. Like Iron Mountain, the Portland Hills, Bull, Cooper, Parrett, Chehalem, and Pete's Mountains have resulted from folding or uplifting. The Geologic Map of Lake Oswego quadrangle illustrates many known and putative faultlines. A presumed minor fault cuts just in front of Uplands School, then along the southern edge of Springbrook Park. The major east-west faultline running through present-day Oswego Lake is the Lake Oswego Fault. **The course of the Tualatin River changed to follow this faultline.** Thus, the geologic basis for Oswego Lake was now in place.

Our journey through time has taken us through nearly 200 million years of geologic history. We have seen Springbrook Park, once ocean floor, become part of the continent. It then became a part of a large ocean bay and eventually a warm and humid plain. Its early forests of dawn redwood and gingko were smothered by a succession of huge basalt floods hundreds of feet deep. Later the parkland was wrenched and uplifted as faultlines split across the Willamette Valley floor.

The Boring Volcanoes - 0.7 to 2.5 Million Years Ago

We have travelled forward in time so that it is now a "mere" 2 million years ago. The Park's forest is much like today's old growth forests. The forest floor is shaded by mighty western red cedar, western hemlock, grand fir, and Douglas-fir. Massive trunks of fallen old growth giants have become a nursery for ferns, huckleberry and young hemlocks. But this tranquil setting would be disturbed by yet another geologic event - fiery volcanoes!

From our vantage point in the Park, we would witness the earth tremble a mile and a half northwest as steaming fissures became fiery fountains of molten basalt. The vents would build a small shield volcano growing higher and broader with each flow down its

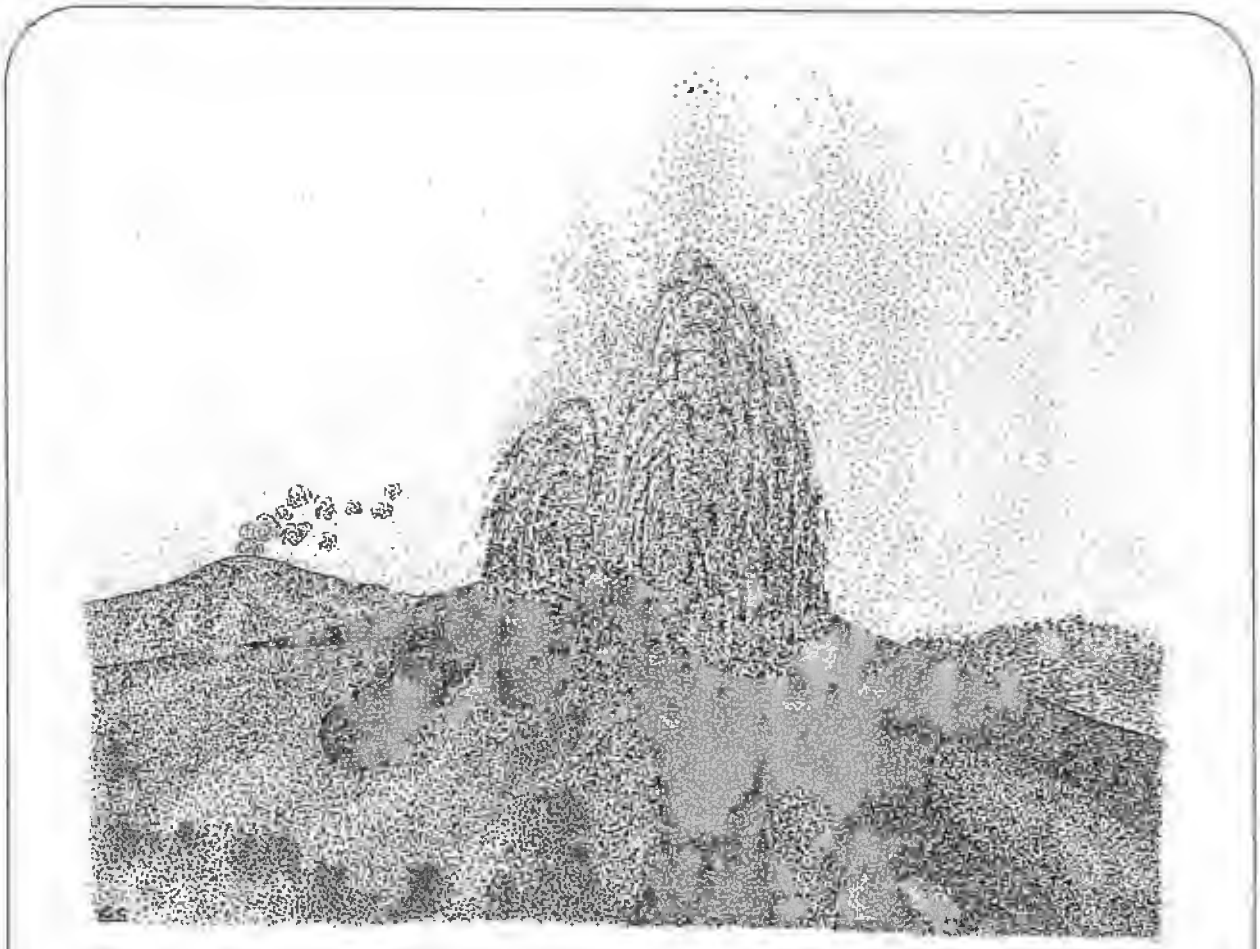


Fig. 2.4. Eruption of the Boring Volcanoes between 700,000 and 2.5 million years ago.

flanks. A million years later, this shield volcano would be called **Mt. Sylvania**. A blanket of Mt. Sylvania cinder and ash covered Springbrook Park, but lava flows only lapped at the lower elevations. At night, the sky glowed red and orange from another eruption two miles south. This second eruption was building a small shield volcano later known as **Cooks Butte**. About this time, a low volcanic vent also erupted in what is now Waluga Park in Lake Grove.

Mt. Sylvania (Mountain Park) and Cooks Butte are two of many Boring volcanoes particularly numerous around Boring, Oregon. The volcanoes erupted 700,000 to 2.5 million years ago, and include Mt. Tabor, Mt. Scott, Rocky Butte, and portions of the Tualatin Mountains (Forest Park). The basalt from these eruptions is known as "Boring Basalt" (**QTb**). Mt. Sylvania basalt underlies Mountain Park, Johns Woods, Oak Creek School, and extends west past Interstate 5. Basalt from Cooks Butte underlies the Palisades Crest neighborhood and Lake Ridge High School, but does not reach Palisades School. The latter rests on much older Columbia River flood basalt.

Bretz Floods-13,000 to 15,500 Years Ago

Our travel through time has taken us to near the end of the last ice age about 15 thousand years ago. We will soon witness a series of gargantuan glacial floods hundreds of feet high. These Missoula or Bretz floods are no less astounding than the huge floods of Columbia River basalt millions of years earlier. During the last ice age, glaciers extending from the Canadian Rockies created large dams 2,500 feet high in the Missoula, Montana area. "These dams formed more than 40 times . . . containing up to 500 cu. miles of water, one fifth the size of Lake Michigan," Dr. Allen writes in *Time Travel*. "Each flood lasted for a

Fig. 2.5. A Bretz flood plunges through the Lake Oswego gap into the old Tualatin River channel.

week or 10 days. For 2,000 years they came every 50 or 60 years, as new ice dams were formed by the advancing lobe of the ice sheet and then broke when the water became deep enough to float the ice."

The great floods swept over eastern Washington, overflowing the Columbia River Gorge on their way to the Pacific. Four hundred foot high walls of water burst into the Willamette Valley. The floods were laden with gravel and silt, and topped by icebergs. Floodwater rushed up the Willamette Valley where at the confluence of the Tualatin and Willamette Rivers, **a wall of water several hundred feet high plunged westward through the gap of present-day Oswego**

Fig. 2.6. Woolly mammoths along the old Tualatin River witness a Bretz flood (350 ft. above sea level) crashing over the Twin Point-Summit area (250 ft.) and into Iron Mountain to the left (520 ft). The Hunt Club area, out of view and to the left of the mammoths, was out of the main flood channel and is now covered by silt.

Lake. The raging flood waters scraped the flood channels to bare basalt and deposited millions of tons of gravel and silt where they slowed. The lowest portions of Springbrook Park were lapped by these great flood waters. Icebergs became stranded, and upon melting left ponds and boulders from the Northern Rocky Mountains.

From our Iron Mountain view point we would have seen unwary mammoths get swept away by flood waters and buried under silt. Later their unearthed skeletons would become valued relics of these prehistoric times. At some point the flow and ebb of these great glacial floods through the Oswego Lake channel would leave such a thick layer of gravel and silt that the Tualatin River could no longer flow into the old river channel of Oswego Lake.

The Bretz Floods left lasting and interesting impressions on the landscape. A large pond in the Country Club golf course closest to Country Club Road is believed to be an iceberg remnant. Igneous rocks such as granite boulders from the Canadian Rockies were found adjacent to the pond, presumably deposited by the melting iceberg. These types of misplaced rocks are called "erratics." Perhaps the most fascinating erratic carried here by way of glacial iceberg is the Willamette Meteorite!

Glacial flood channels were frequently scoured to bare basalt. Today these areas have thin, rocky soils and are called "**scablands**." Local scablands usually have unique vegetation adapted to the thin and rocky soils - Oregon oak (*Quercus garryana*) and madrone (*Arbutus menziesii*). The scouring effects of the Bretz floods may be seen in the contours of the Country Club golf course, Twin Point, and Diamond Head. Madrone trees are still relatively common around Bayview and Twin Point Drives. Captivating descriptions, photographs, and maps of the Bretz floods and aftermath are found in "Cataclysms on the Columbia," by Dr. John Allen, a leading expert on this subject.

Besides the scouring effect, the floods left deposits of fine silt and sand (**Qff**), coarser sands and gravel (**Qfc**), and mixed deposits (**Qfch**) in Lake Oswego below approximately 350 foot elevation. Flood deposits blanket downtown Lake Oswego, Lake Grove, Bryant, West Lake, Hunt Club, Country Club, and Marylhurst College areas, according to the Geologic Map of the Lake Oswego quadrangle. Hallinan, Forest Hills, Lake Grove, Bryant, Waluga, and Rivergrove Schools all rest upon flood deposits.

Thick deposits left by the Bretz floods caused the Tualatin River to change its course south of Lake Oswego. The **old Tualatin River channel then became a shallow lake** and marshland, inhabited by ducks and swans. Natives who later came to fish the lake called it "Waluga" after the swans' call. This tranquil setting would remain undisturbed for thousands of years. But in time enterprising settlers once again would connect the Tualatin River to its ancestral river bed by a canal, and rename the lake and its marshlands "Oswego Lake."

References

Allen JE. *The Magnificent Gateway*. Timber Press, Portland. 1984. (Geologic forces that shaped Portland and Columbia River Gorge areas are detailed using photos, maps, diagrams, and road tours.)

Allen JE, Burns M, Sargent SC. *Cataclysms on the Columbia*. Timber Press, Portland. 1986. (The Bretz floods are described in a readable manner suiting the non-geologist. Well-illustrated with photos and maps, the 1991 second edition is available in paperback.)

Allen JE. *Time Travel in Oregon - a Geologic Scrapbook*: 10-*Erratic Rolling Stones Mark Extent of Ice Flow Advance*, 16-*Oswego Lake Rocks Tell Ancient Geological Story*, 65-*Lava Flow Sent River Northward*, 74-*Modern Technology Helps Identify Origin of N. W. Basalt Flows*, 168-*Early Floods Left Sublime Landscapes*. (A collection of very readable *Time Travel* columns from the *Oregonian*, principally by Prof. Emeritus Allen.)

Beeson MH, Tolan TL, Madin IP. *Geologic Map of Lake Oswego Quadrangle, Clackamas, Multnomah, and Washington Counties, Oregon*. Oregon Dept. Geol. and Mineral Indus., Geol. Map Series, GMS 59. (This is a wealth of data for the Lake Oswego area.)

Beeson MH, Perttu R, Perttu J. *The Origin of Miocene Basalts of Coastal Oregon and Washington*. Oregon Geology 41: 159-166, 1979.

Chaney RW. *The Ancient Forests of Oregon*. Condon Lectures, Oregon State System of Higher Education, University of Oregon Press, Eugene. 1956.

Saarinen C, ed. *Geologic History*, in *Lake Oswego Physical Resources Inventory*, City of Lake Oswego, Oregon. 1976.

Orr EL, Orr WL, Baldwin EM. *Geology of Oregon*, 4th Ed. Kendal/Hunt, Dubuque. 1992. (An excellent reference for the geologist and non-geologist.)

Chapter Three

NATIVE AMERICANS

- Introduction
  - Diversity of Native Culture
  - Diversity of Social Organization

- Lake Oswego and Vicinity
  - The Chinookans
    - Multnomah
    - Clackamas
    - Clowewalla
  - The Kalapuyans
    - Tualatin

- The Tragic Impact of Explorers and Emigrants

Introduction

The first Oregonians arrived 10,000 years, and perhaps as many as 15,000 years, ago. Their ancestors migrated across the Bering Strait to North America over several time periods. Over many millenia, a multitude of distinct cultural groups became established in Oregon, each harmoniously adapted to the uniqueness of their natural environment. The diversity and complexity of Native cultural groups is well-illustrated by the high level of language development - 21 distinct languages including some 40 dialects. This linguistic diversity became one of the richest in the world and exceeded that of all present-day Europe (Zucker et. al., p. 40).

Descriptions of Native American culture in Oregon may be grouped according to four to six large Cultural Areas. Cultural Areas are defined by natural geographic features such as mountain ranges, valleys, and plains, and importantly, the cultural adaptations to the environment of these Areas. Six Cultural Areas are defined in *Oregon Indians - Culture, History and Current Affairs.* These Areas, with representative cultural groups in parenthesis, are: Lower Columbia Area (Chinookan), Coast Area (Tillamook, Siletz, Coos, Umqua), Inland Valleys Area (Kalapuyan, Molalla), Klamath Lakes Area (Klamath, Modoc), Plateau Area (Warm Springs, Umatilla, Cayuse, Nez Perce), and Great Basin Area (Northern Paiute).

An estimated 45,000 Native Oregonians existed prior to contact with European and American explorers. Social organizations were adapted to meet varied demands of the natural environment, economics, as well as seasonal changes. Independent villages were generally the largest social unit along the coast and the Columbia River, particularly in winter. Conditions in the summer, however, enabled the gathering of groups from diverse villages, or the formation of mobile bands. The designation of "tribe" may be used to define communities of villages or mobile bands associated by language, family relationships, economic and political ties, and common cultural identity.

The subsequent displacement of diverse Native cultural groups and the establishment of reservations has led to the more recent appellation "Confederated Tribes." This reflects the mostly forced relocation of people from multiple, distinct cultural groups to a common reservation. For example, the Confederated Tribes of Warm Springs include the Warm Springs, Paiute, and Wasco tribes.

Detailed historical records for specific tribes and bands are largely lacking and so information known for broader

cultural groups is provided in this Chapter unless otherwise stated.

The primary scope of this book is the natural history of the Lake Oswego area, including this Chapter on the original peoples of this area and their cultural adaptations to the natural environment. To keep this Chapter primarily focused on natural history, the innumerable complex and thought-provoking aspects of Native cultures can not be covered therein. Fortunately, the reader has several recent and comprehensive references available in libraries or bookstores (See *References*):

- *Oregon Indians - Culture, History and Current Affairs*
- *The Indians of Western Oregon*
- *The First Oregonians.*

Fig. 3.1. The Multnomah, Clackamas, and Clowewalla lived near salmon-bearing rivers. The Tualatin live further inland.

Lake Oswego and Vicinity

The Lake Oswego area was very likely shared by a number of Native groups when Lewis and Clark arrived in the early Nineteenth century. Lake Oswego is in a transitional geographic zone between the Chinookan people (Lower Columbia Cultural Area) who lived along rivers with major salmon fisheries, and the inland Kalapuyan people (Inland Valleys Cultural Area) who were more dependent on hunting and gathering of plant resources than on salmon. Additionally, the Lake Oswego area, including the important fishery at Willamette Falls in present-day Oregon City, was situated along a major historical trading route. Trading followed the Willamette River southward, extending as far as California. At the Columbia River, another major trade route connected to the important trade center and fishery at Celilo Falls, where other connecting routes extended as far north as Canada.

The Chinookans

The people known as the Chinookans inhabited the lower Columbia River Area, and all spoke dialects of two distinct but related Chinookan languages. The Chinookan tribes in Oregon included the Clatsop, Cathlamet, Cooniac, Cascades, Hood River, Dog River (Kwikwulit), and Wasco. Three tribes in the Lake Oswego area included the Multnomah (Wappato), Clackamas, and Clowewalla (See Fig. 3.1).

Historical accounts place approximately 11 Clackamas villages in the present-day Oregon City and Gladstone area, particularly along the east bank of the Willamette River, and on both banks of the Clackamas River. A Clowewalla settlement was on the west bank of the Willamette River about a mile below Willamette Falls in the vicinity of present-day West Linn. The Multnomah nation was centered on Wappato (Sauvie's) Island but also extended into the Willamette Valley.

The traditional Chinookan lifestyle was heavily influenced by the relatively abundant food supply provided by the salmon fisheries. The Chinookan people were expert fisherman, employing hooks, spears, weirs, and fish traps to capture salmon, sturgeon, and eels. At

Willamette Falls, fishing platforms and dip nets were used.

Perhaps up to several hundred people lived in clusters of cedar plank houses that comprised the Clowewalla and Clackamas villages. The villages were located near the Willamette and Clackamas Rivers, optimally situated for fishing and transportation. The permanent houses of cedar planks were often of impressive size. Chinookan plank houses averaged 40 by 50 feet but sometimes extended to a hundred or more feet in length. The wood of western red cedar was highly valued for houses. It was rot-resistant and split cleanly into planks and beams. The Chinookan use of cedar wood for housing preceeded modern use of cedar shakes and siding by hundreds if not thousands of years.

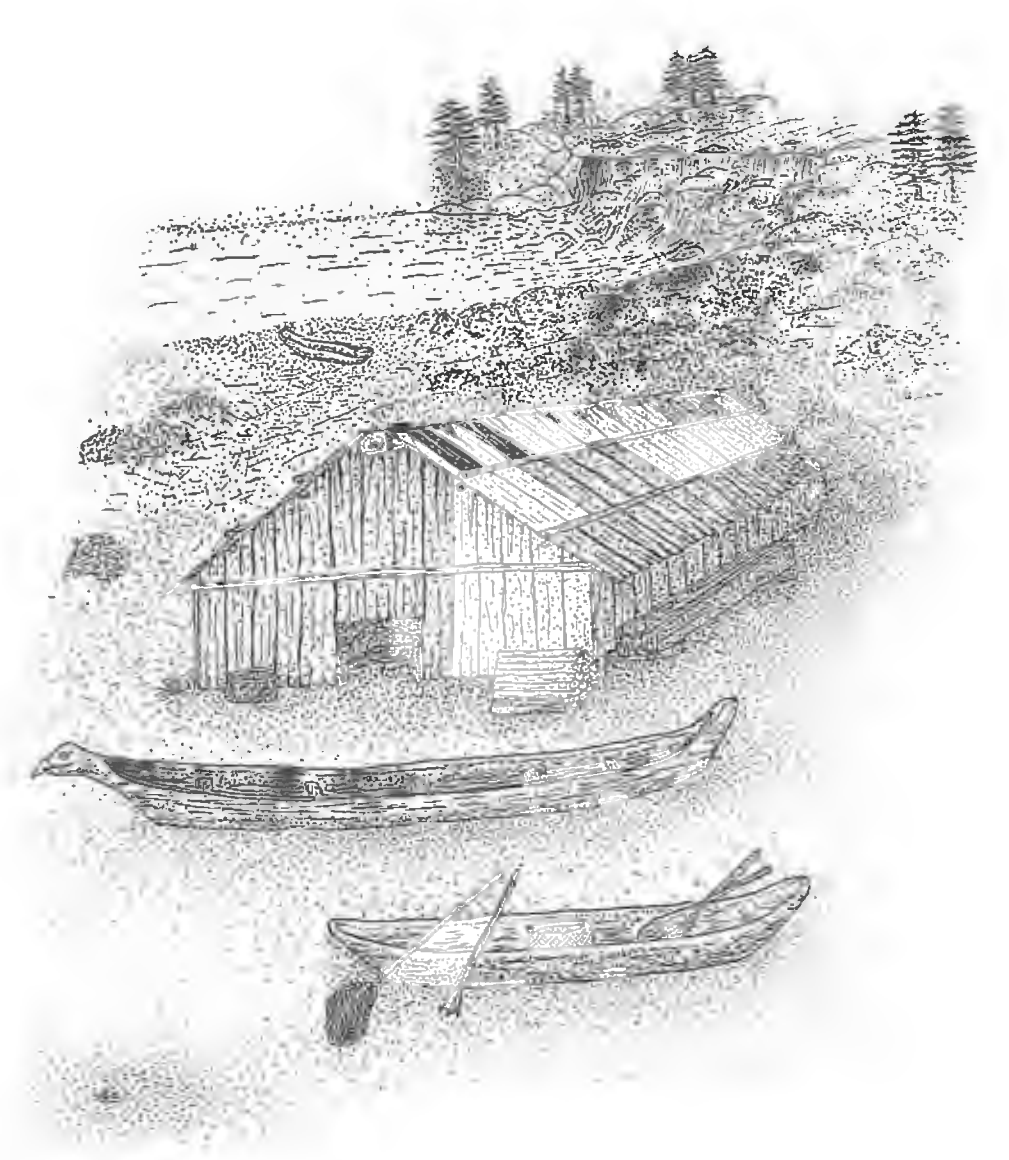


Fig. 3.2. Chinookan cedar plank house and cedar canoes.

John Woodward provides the following 1835 description by Samuel Parker of his stay in the house of Wanaxka, chief of the Clowewalla near Willamette Falls:

He (Parker) describes the house as a . . . "long, permanent building on the west side of the river, upon an elevation of 100 feet and near which were several buildings, of nearly the same dimensions. Besides the family of the chief, there were two other families in the same building, in sections of about 20 feet, separated from each other by mats hung up for partitions. Their houses are built of logs split into thick planks. These Indians do not sink any part of their buildings below the surface of the earth. The walls of the chief's house were about seven feet high, with the roof more steeply elevated than what is common in the U. S. . .They have only one door to the house, and this is in the center of the front side. . .The fireplace of the chief's apartment was sunk a foot below the surface of the earth, eight feet square, secured by a frame around, and mats were spread upon the floor for the family to sit upon." . . Parker added that the beds were on the sides of the apartment raised about four feet above the floor. Moveable ladders were used to ascend to the beds under which were stored "dried fish, roots, berries, and effects." (p. 178-179)

Inside we would have found the plank house to be home to a cohesive social group of several related families. Mats woven from cedar bark fiber or rushes were used as partitions, affording each family an area for a fireplace and for sleeping. Slabs of salmon were hung over the fire pit, curing in the swirling aromatic smoke of alder wood. Caches of hazel nuts, dried salal berries,

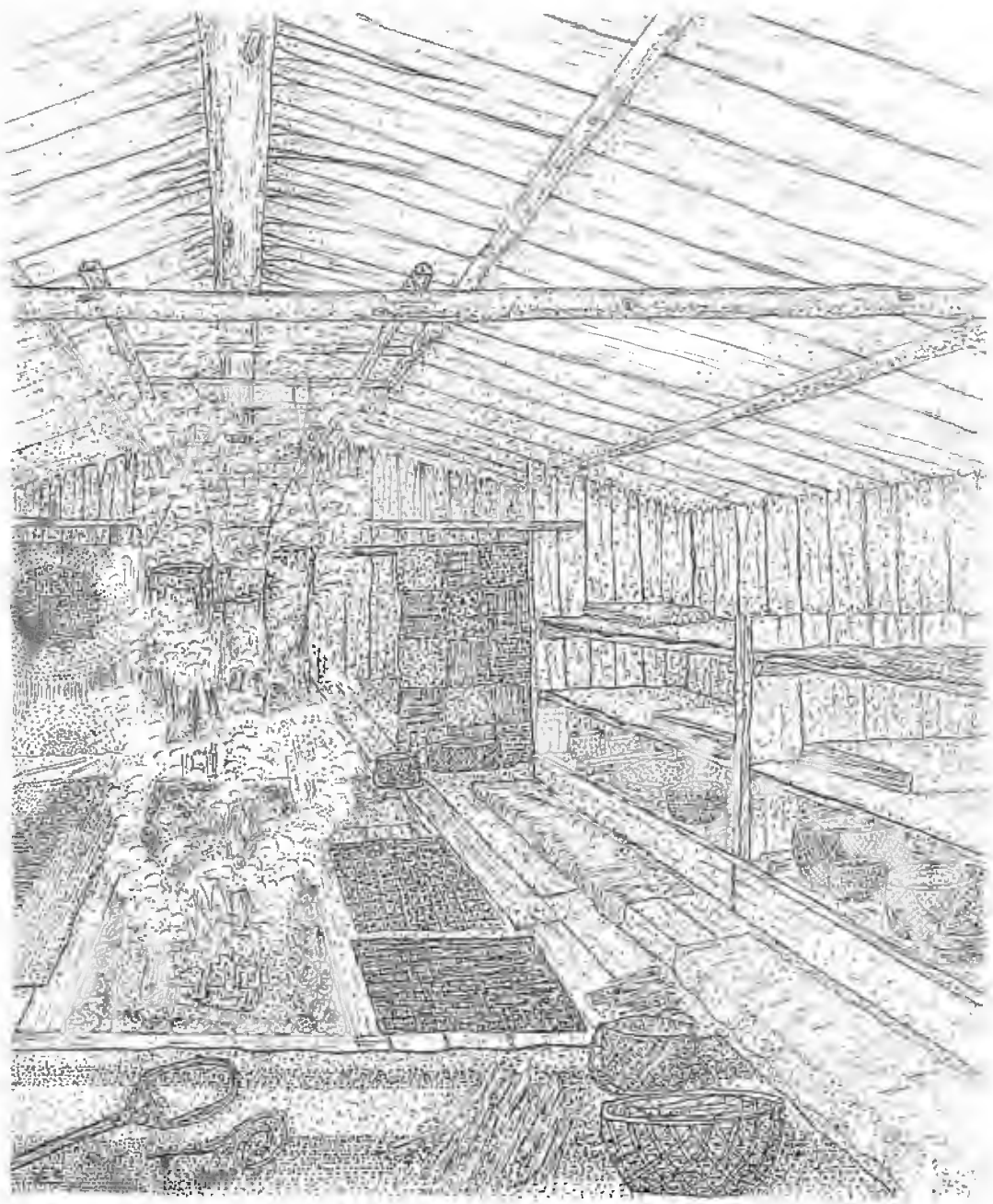


Fig. 3.3. Interior of a Chinookan plank house.

elderberry, Indian plums, service berries, camas bulbs, and wappato (arrowhead) roots were stored in baskets woven of cedar bark for winter use.

The women and children were kept busy shredding and grooming baskets of cedar bark. The finest grades of bark lined the infants' cradles and were used as towels. The women taught their daughters how to make skirts, capes, and dresses from the long, fine strands of cedar bark.

The men taught their sons how to carve alder and big leaf maple wood into canoe paddles, platters, spoons, and other utensils. The spears and harpoons were preferentially honed from the hard and resilient stems of dogwood and ocean spray, but Douglas-fir wood was also

used. The tough and flexible wood of the yew was crafted into bows and arrows.

Outside the plank houses fishermen hauled their catches of fresh salmon back to village in open baskets of woven vine maple stems. They caught fish and eels using nets made of nettle and cedar bark twine. These were made invisible to fish after being dyed using fresh alder bark. At the falls, a good quantity of fish and eels were captured by weirs and traps made of western hemlock and vine maple, and by fishermen standing on cedar plank platforms, wielding long-handled dip nets. River-going dugout canoes, skillfully honed from solid cedar logs using fire and adzes, carried the fishermen and their catches to and from the village. The canoes averaged 20 to 30 feet, but some were 50 feet in length.

In 1806, Meriwether Lewis wrote of wappato being roasted among embers until soft. Thus roasted, wappato "has an agreeable taste, and is a very good substitute for bread." Wappato provided by the Multnomah helped spare Lewis and Clark from starvation.

Later in the summer, salmonberry, thimbleberry, red huckleberry, blackberry, and gooseberry, were eaten fresh. The roasted stems of bracken and sword fern were peeled and the starchy flesh eaten. In the fall, camas bulbs were dug, and much of the salal berries, hazel nuts, elderberries, serviceberries, and Indian plums was dried and stored in baskets in preparation for winter.

The woodland and streamside flora were used for tonics and medicinals when illness appeared. A remedy for

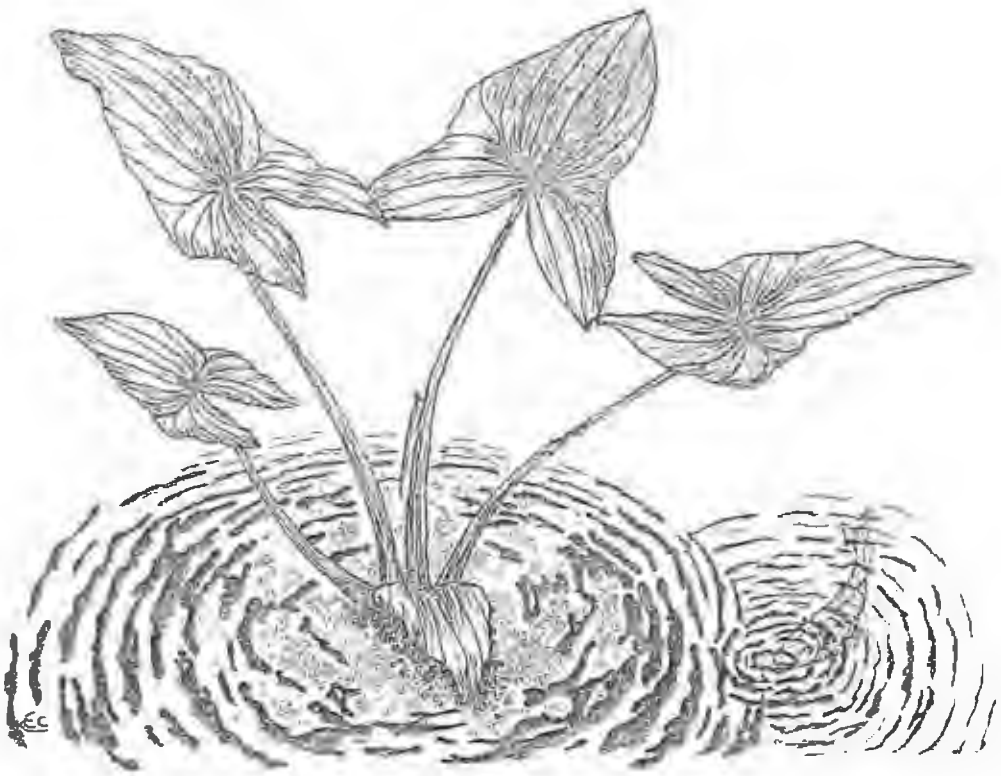


Fig. 3.4. Wappato (arrowhead) has a starchy tuber and was an important food source.

These canoes were also used for warfare and trade.

January and February were spent wintering in villages above the threat of river flooding. Spring and early summer were times to gather wappato tubers (Fig. 3.4) and tender sprouts of salmonberry and horsetail for cooking. The potato-like tubers of wappato (arrowhead) were dug from the shallows of rivers and lakes, perhaps Waluga (Oswego) Lake before it was dammed by settlers.

sore throat was made by boiling willow or cottonwood bark, using the salicylic acid content as an anti-inflamatory agent, just as we use aspirin (closely related acetyl salicylic acid) today. The cascara bark extract had widespread use as a laxative, as it still does in modern medicine. (Cascara bark stripping was once a significant industry in the Northwest.) Leaves of salal were chewed and applied to burns or sores, making use of the astringent property of tannic acid. The pitch of

Douglas-fir was applied to sores utilizing the disinfectant property recognized by Western medicine for turpentine which is derived from pitch. Douglas-fir bud tips were also chewed for sore throat perhaps as we use lozenges today. The use of other native plants for specific conditions such as coughs, rheumatism, ulcers, dysentery, and fever are further described by Erna Gunther. Many of these ethnobotanical notes are included in the subsequent chapter on Plants.

The Kalapuyans

The Kalapuyan people inhabited the inland Willamette Valley. They were comprised of 12 to 20 bands including the Yamhill (Yamel), Chepenefa (Mary's River), Calapooia, Yoncalla, Santiam, and Tualatin (Atfalati), all speaking a dialect of three distinct but related Kalapuyan languages. Of the Kalapuyans, the Tualatin were likely frequent visitors to the Lake Oswego area (See Fig. 3.1).

Similar to the Chinookans, the permanent Kalapuyan houses were for winter use. Stephen Beckham describes the Tualatin dwellings as *". . . rectangular houses which might contain several families. The men framed the house with poles and covered the exterior with planks or large pieces of bark. When they could find neither bark nor planks, they took twisted bundles of grass, placed them on a wood frame, and leaned that against the walls. To keep these structures warm in winter they often mounded dirt up against the walls."* (p. 45)

The Kalapuyans by Harold Mackey contains an informative interview with Chepenefa (Mary's River) Kalapuyan, William Hartless. The interview took place in 1913 and is now in the archives of the Smithsonian Institution under the title "Kalapuyan Ethnology." The following excerpts of this interview provide graphic imagery of a Kalapuyan house:

In summer no house. Occasionally grass houses or fir-boughs covered with grass. Winter houses: Made of bark, grass and dirt. Forked sticks placed into ground. Cross-pieces tied on then twist grass. This serves as wall. Dirt reinforces the grass about 2 feet from ground. Roof made of bark inclined somewhat. Roof flat. Bark upheld by means of sticks. Just like a shed. Door consists of a mat of rushes. Could be raised from bottom or else shoved aside. Door rather small a man had to stoop to enter. Fireplace right in center. Not dug out. Floor sanded. Smoke-hole a hole in bark. Beds along wall. Mats of tulu-grass. No stools. Houses some 60 feet long as many as ten families partitioned off. Door usually faced river. Meat, etc. kept in baskets, sacks tied to rafters. (p. 42)

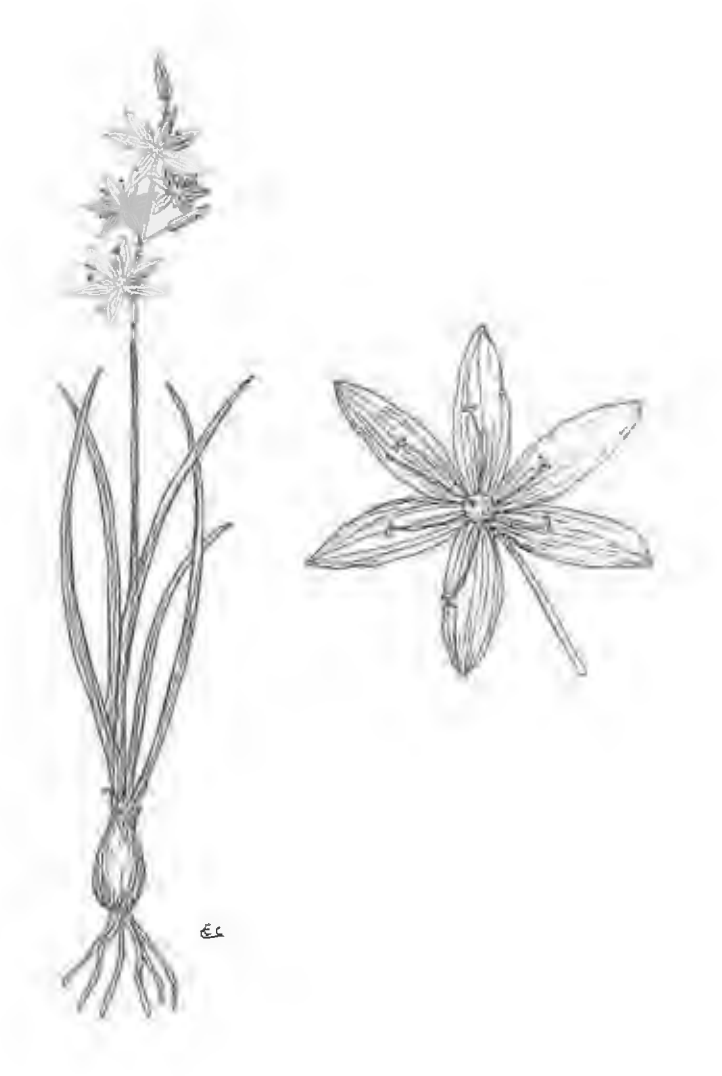


Fig. 3.5. Camas, a most important food.

The Kalapuyans showed great resourcefulness in dealing with the more open environment of the inland valley. Living upriver from Willamette Falls, the Kalapuyans had comparably small salmon runs. They were more reliant on hunting and plants as sources of food. The Kalapuyans made extensive use of burning to create open oak savannahs. This practice greatly increased the yield of acorns, hazel nuts, and grain seeds especially seeds of *Madia* or tar weed. The acorns first had to be ground into flour using stone mortars, then treated with boiling water to remove the bitter tannic acid. The more open oak savannahs created by burning also increased deer and elk populations by improving forage.

Ponds and shallow river areas were an important source of Wappato root. Other fruits and vegetables mentioned by Kalapuyan William Hartless in the ethnology interview include wild onion, salmonberry, thimbleberry, raspberry, salal berry, blackberry, blueberry, red huckleberry, wild cherry, honeysuckle, sunflower seeds (probably *Madia*), strawberry, and camas.

Camas bulbs were a staple food item for the Kalapuyans. Long hours were spent harvesting bulbs from meadows using sturdy sticks with antler handles. Kruse Meadows in Lake Oswego, and the Nature Conservancy's Camassia Natural area opposite West Linn High School, both known to support camas lily, may have been traditional sites for harvest. Camas bulbs, meats, other vegetables were customarily wrapped in leaves, and steamed or roasted in earthen ovens lined by fire-heated rocks. After being covered by mats and a layer of earth, a quantity of water was poured in through a small hole to generate steam. Camas bulbs were eaten right after cooking or sun-dried and packed into loaves for winter use.

The only historical mention of plant cultivation by Native groups in this region regards the tobacco plant. This practice was apparently fairly widespread. The ethnography interview of Kalapuyan William Hartless provides insight into the use of ashes to increase soil fertility:

No planting but tobacco. Rotten logs burned up and tobacco seeds put in without spading. Occasionally place stirred with stick. Each family planted for self. When leaves ripe they pull them out and dry them. (Mackey, p. 41-42)

Archeological studies by John Woodward indicate that the Clackamas and Kalapuyans shared common cultural practices including the use of earthen ovens. Archeological findings of oak wood, shells of hazel nut, and bones of deer and elk, as detailed in Woodward's thesis, support the notion that the Clackamas also used burning to create open areas favorable to oak, hazel nut, and large game. Additional evidence of burning by the Clackamas is provided by historical accounts of a mixed conifer-deciduous forest in the "Clackamas Valley" interspersed with *prairies*, in what otherwise should have been Western Hemlock Forest zone.

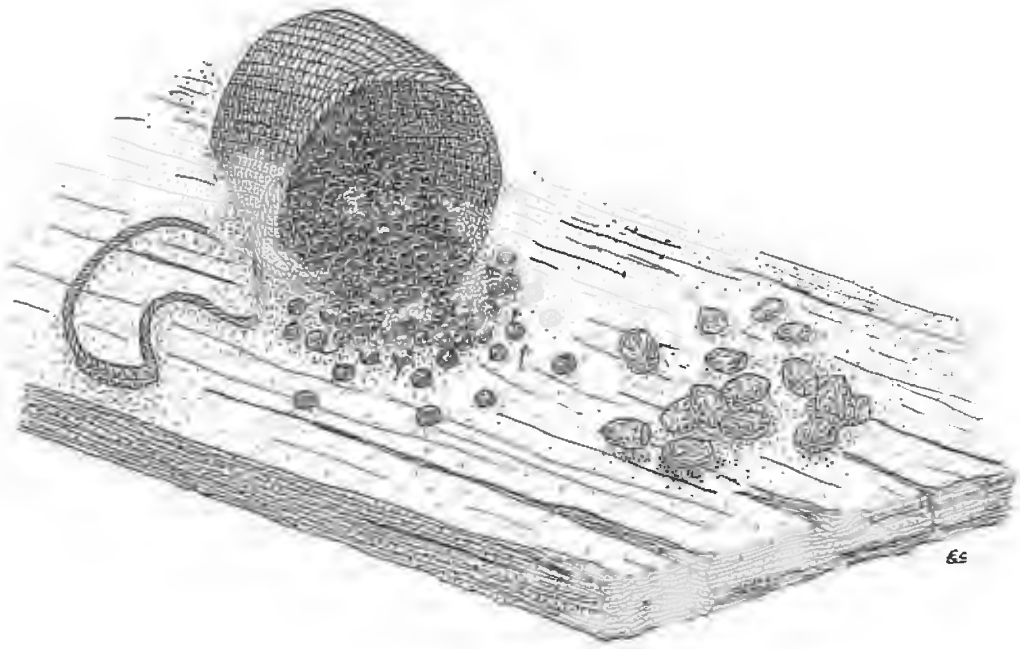


Fig. 3.6. Woven basket of cedar bark fibers, with salal berries and hazel nuts.

Tragic Impact of Explorers and Emigrants

Even before the arrival of Lewis and Clark, diseases brought by explorers had taken a heavy toll on many Native people in Oregon. In 1806 Lewis and Clark estimated the Clackamas to number 1,800. By 1850 their numbers had dwindled to less than 100. The Native peoples had no natural immunity to the many foreign diseases. Deadly epidemics of small pox, influenza,

8000-13000 B.C. Native people settle in Oregon
1492 Columbus "discovers" New World
1620 Pilgrims land
1775-1792 Maritime explorers - James Cook, John Meares, George Vancouver, John Gray
1805 Lewis and Clark Expedition
1840's Mass Emigration via Oregon Trail
1847 Beginning of the Indian Wars, Whitman Mission attacked
1850 Oregon Donation Land Act
1857 Grand Ronde Reservation established
1924 Full U.S. citizenship finally granted
1954 Termination of every tribe west of Cascades
1983 Restoration of the Confederated Tribes of Grand Ronde

measles, and malaria tormented and depleted the Native populations by an estimated 75 to 90 percent in Oregon. In some cases, whole villages were devastated as there was no one well enough to care for the ill.

Increasing numbers of emigrants caused additional deprivation for the surviving Native populations. The emigrants concept of land ownership was in direct conflict with the centuries-old traditions of seasonal food gathering, hunting, and construction of shelter. The new settlers drastically altered the land by fencing, land clearing, and raising livestock. Fields of the camas lily, a vital food source, were destroyed by these agricultural practices. Game animals such as deer and elk became increasingly rare due to overhunting and loss of habitat.

Distinguished historian, Terence O'Donnell poignantly describes a group of Clackamas in *An Arrow in the Earth,* a chronicle of the life of Joel Palmer, second Oregon Superintendent of Indian Affairs:

Not many months after Palmer arrived, Canadian artist Paul Kane came upon several Clackamas Indians sitting on a bluff above the river. His painting of the men is one of the most haunting in the genre of Indian portraiture. It shows four men huddled together, bowed down beneath brown cloaks, their heads touching as though to comfort one another, on their faces expression of stunned sorrow - figures at bay before a world they could no longer comprehend. When Kane first saw them there above the river, they were singing, a singing Kane later wrote, "peculiarly sweet and wild, possessing a harmony I never heard before or since." (p. 42-43)

The 1847 attack on the Whitman mission indicated how grave the conflict between emigrants and Native peoples had become. Several decades of bloody Indian Wars in Oregon ensued, resulting in tragic episodes of bloodshed and exile. In 1850 Congress passed the Oregon Donation Land Act. The Act provided 640 acres of land to any American male citizen and his wife. Native peoples were to negotiate with a Treaty Commission for ceded lands. Treaties made in 1851 and 1854 with the Clackamas and the Tualatin were to offer protection and compensation, but were never ratified. By 1855, *before any treaties had been ratified,* 7,437 emigrants had filed claims for over 2.8 million acres.

Many members of diverse Willamette Valley tribes, including the Clackamas, Tualatin, Clowewalla, and Mollala were soon-after relocated to the Grand Ronde Reservation in Yamhill County, about 50 miles southwest of Lake Oswego. Zucker et. al. describe the common plight of many Native people at that time:

Massive military roundups in 1856 sent Indians to the Grand Ronde and Siletz reservations (p. 85). Indians at Siletz and Grand Ronde thus faced a difficult legal situation: all of them had agreed to give up their lands in return for payments and government protection, but only a few had congressionally approved treaties. The majority were never repaid for the lands they had sorrowfully left and would experience further hardships in the coming years. (p. 87)

Subsequent federal policies resulted in the loss of nearly 1.5 million acres of Grand Ronde and Siletz lands often with negligible or no compensation. In 1954 the federal status of all western Oregon tribes was terminated in order to "bring into the mainstream" those remaining on reservations. Termination resulted in great hardship, and led to drifting of many Native Americans to cities in search of opportunity and jobs.

Despite generations of sorrow and hardship Native peoples have continued to pursue cultural and political uniquity, resulting in the on-going restoration of tribal

Cultural Exhibits

The award-winning Museum at Warm Springs has a large number of authentic displays including a plank house, tule mat lodge, and wickiup.

The Marion County Historical Society Museum has an excellent Kalapuyan display including basketry, tools, and a hand-hewn canoe recently excavated near Corvallis. (The Museum, within historic Mission Mill Village in Salem, also has unique displays of early pioneer life.)

The Oregon Historical Society Museum has on display an authentic cedar canoe, and a life-sized diorama of a Tillamook plank house and family.

status including the Confederated Tribes of Siletz in 1977, and the Confederated Tribes of Grand Ronde in 1983. Indeed recent treatises emphasize the modern resurgence, not only of the Native American populations in Oregon, but also of their proud traditions and beliefs.

References

Beckham SD. *The Indians of Western Oregon*. Arago Books, Coos Bay, OR. 1977. (Prehistory, history, and current issues are presented by a leading authority.)

Bliss LA. *Early History of Oswego*, Oregon. Lake Oswego Public Schools (Reproduced). 1961.

Buan C, Lewis R. (editors) *The First Oregonians*. Oregon Council for the Humanities, Portland. 1991. (A beautifully illustrated reference on traditional and contemporary Native cultures in Oregon.)

Gunther E. *Ethnobotany of Western Washington*. University of Washington Press, Seattle. 1981. (A classic reference.)

Jones RF. *Wappato Indians - Their History and Prehistory*. Privately Printed, 1972. (A good summary of subjective descriptions by early explorers, and archeology of the Multnomah culture.

Kent WE. *The Siletz Reservation 1855-1900*. Lincoln County Historical Society, Newport, OR. 1977. (Details the forced relocation of diverse tribes and bands to the Siletz Reservation, with resulting hardships and successes.)

Mackey H. *The Kalapuyans - A Sourcebook on the Indians of the Willamette Valley*. Mission Mill Museum Association, Inc., Salem. 1974. (History and archeology of the many important Kalapuyan bands of the Willamette Valley.)

O'Donnell T. *An Arrow in the Earth*. Oregon Historical Society Press, Portland. 1991. (A balanced perspective about the deep cultural misconceptions and conflicts that led to 30 years of tragic warfare. The four Clackamas men as painted by Canadian artist Paul Kane (1810-1871) are detailed on the book jacket.)

Ruby RH, Brown JA. *The Chinook Indians*. University of Oklahoma Press, Norman. 1976.

Ruby RH, Brown JA. *Indians of the Pacific Northwest*. University of Oklahoma Press, Norman. 1981.

Ruby RH, Brown JA. *A Guide to the Indian Tribes of the Pacific Northwest*. University of Okalahoma Press, Norman. 1992.

Smith HL. *Camas: The Plant that Caused Wars*. Smith, Smith, Smith Publishing Co., Lake Oswego, OR. 1978.

Smith HL. *Wonderful Wappato: The Wild Potato*. Smith, Smith, Smith Publishing Co., Lake Oswego, OR. 1982.

Woodward JA. *Salmon, Slaves, and Grizzly Bears: The Prehistoric Antecedents and Ethnohistory of Clackamas Indian Culture*. Ph.D dissertation in Anthropology, University of Oregon, 1974. UMI, Ann Arbor, MI. (Seasonal movements, diet, economy, and interactions with neighboring tribes, traders, and explorers, are deduced by archeological data and historical accounts.)

Zucker J, Hummel K, Hogfoss B. *Oregon Indians - Culture, History and Current Affairs*. Oregon Historical Society Press, Portland. 1983. (A wealth of information, including detailed information on treaties.)

A Girls' Game

My mother told me how they used to play a game long ago. They would go get flowers, they would break off just the flowers, and they would tie them to a long rope. Then of as many of them as were there, one would stand a little apart. One of them hung the flowers on her, they placed them all over her, until her body was just covered with flowers. Then they danced. One of these young girls would go to where that one was standing, and . . . would say, "Well, it does not seem to be right. What is the matter with your nose? one side is small. What is the matter with your head? it's crooked. What is the matter with your mouth? it is sort of twisted. Now you laugh! look at me! Don't make your eyes crooked." Until at last if the young woman would laugh at the one who did the talking, when she had not yet reached her, then she might laugh. "Now I have beaten you. Come now!"

(By Victoria Howard, Clackamas storyteller, as told to Professor Melville Jacobs at Grand Ronde, c. 1929. From *Coyote was Going there: Indian Literature of the Oregon Country*, compiled and edited by Jarold Ramsey, University of Washington Press, 1977, pp. 103-104.)

Chapter Four

PLANT ECOLOGY

- Ecology - Basic Concepts
  - Habitat
  - Community
  - Ecosystem
- Forest Communities
  - Physical Structure - Strata
  - Composition - Abiotic and Biotic Variables
  - Succession
    - Seral Stages
    - Climax Stage
  - Forest Zones
  - Indicator Species and Plant Associations
- Wetland Communities
  - Importance of Wetlands
  - Forested and Emergent Wetlands
- Oak and Madrone Communities
- Fresh Perspectives from a Forest Ecologist
- Wetland Methodology
- References

ECOLOGY - BASIC CONCEPTS

Ecology is the study of the interrelationships among organisms and their environment. "Ecology" is derived from the Greek words for "study" (logos) and "home" (oikos). The environment includes the living (**biotic**) components, and the chemical and physical (**abiotic**) components such as temperature and light. The **habitat** is where an organism or group of organisms live, and is defined by the biotic and abiotic components.

Ecological studies are carried out on many different levels. An ecological study could only involve an individual organism and its environment. On a broader scale, **population ecology** encompasses a group of similar organisms (i.e., *population*) and its environment. On an even broader scale, **community ecology** includes an assemblage of various populations occurring in the same environment. Several types of forest, wetland, and other communities are discussed in more detail in this chapter.

On perhaps the broadest scale, **ecosystem ecology** encompasses all the biotic and abiotic components that interact to form a stable, discrete ecological unit. An ecosystem is tied together by the flow of energy and nutrients. For example, a simplified forest ecosystem includes sunlight (energy input), water, minerals, green plants (primary producers), herbivores such as squirrels (primary consumers), and fungi and bacteria (decomposers).

In the last few decades, scientists have discovered that most ecosystems are very complex. Here in the Pacific Northwest, a complex interrelationship among conifers, mycorrhizal fungi, and nitrogen-fixing bacteria exists. By means of photosynthesis, the

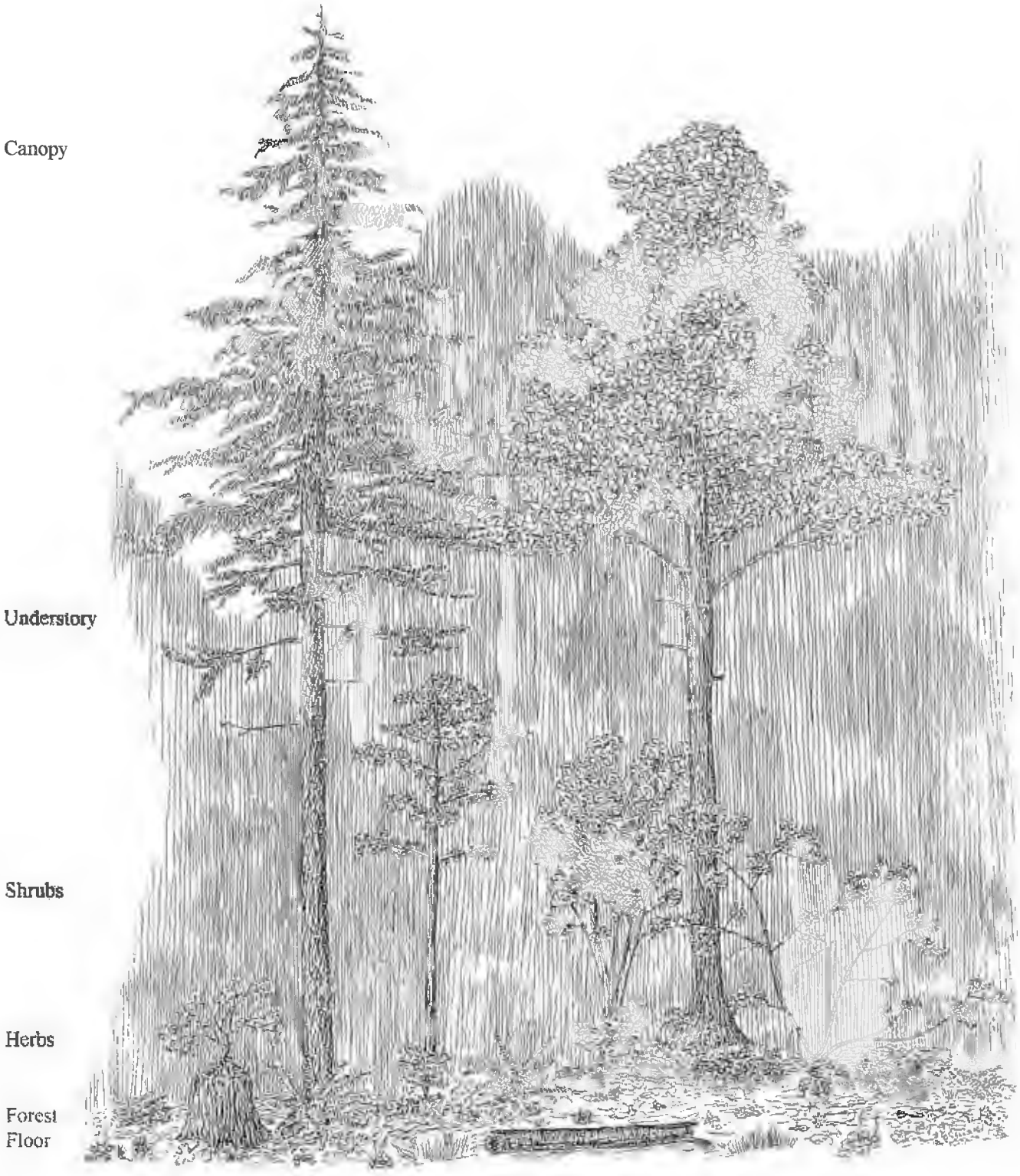


Fig. 4.1. Forest Strata

conifers provide sugars to the *mycorrhizal fungi* at the root tips. ("Myco" is derived from the Greek "mykes" meaning fungus. "Rhiza" is the Greek term for root. Mycorrhiza are masses of fungal hyphae associated with the roots of plants.) In exchange, the fungus transports water and minerals to the tree. The fungus also provides an extract that nourishes *nitrogen-fixing bacteria*. The bacteria complete the vital interchange of nutrients by providing vital organic nitrogen to both fungus and conifer. Thus tree, fungus, and bacteria all benefit mutually in this **symbiotic** type of relationship.

The complex biotic interactions in the mature forest community do not end here however. One reproductive strategy of fungi is to form "mushrooms" underground, popularly known as *truffles*. The truffles are avidly eaten by small mammals such as the mouse-like *red-backed vole*. In return for the truffle meal, the vole naturally disperses hundreds of thousands of fungal spores in its fecal pellets. And small mammals like the vole support predators such as the *northern spotted owl*. This illustrates how the survival of many species may be tied together by a complex of ecological relationships.

We still have only a limited understanding of the ecological relationships between many species and their environment. What metabolic changes did the phantom orchid (*Eburophyton austiniae*, see Chapter 5) develop in order to survive as a *saprophyte* without chlorophyll in rotting organic matter? What type of fungi might be attached to its roots to furnish nutrients? Are some saprophytes like the phantom orchid really more like parasites living off of tree roots? There are many ecological interrelationships still to be discovered by budding naturalists. And some of these discoveries will have important practical applications in the future.

FOREST COMMUNITIES

The cool wet winters and warm dry summers that characterize our Pacific Northwest region provide favorable conditions for the development of coniferous forests. In this climate, evergreen *coniferous* trees such as Douglas-fir are able to manufacture food during the colder, wetter months when *deciduous* trees have lost their leaves. Deciduous trees are able to thrive during the spring and early summer months, but in the heat of summer drought, all tree growth slows or comes to a halt. Therefore, even though conifers generally grow at a slower rate than deciduous trees, a longer life span, greater tolerance to shade, and longer growing season enable conifers to *eventually* outpace deciduous trees.

The environment is constantly changing however. Fires, windstorms, logging, and other disturbances encourage a wide diversity of tree species. Thus two forests in the same region may range from almost purely coniferous to almost purely deciduous depending on the severity of the disturbance and duration of recovery.

Forest Strata

Whether the forest is dominated by conifers or deciduous trees, the structure of the forest can be analyzed according to **strata** or layers. There are five main strata. The highest of the strata is the **canopy** formed by the crowns of the tallest trees. In a recovery forest such as that of Springbrook Park (logged between 40 to 70 years ago), the crowns of big leaf maple, red alder, black cottonwood, and scattered Douglas-fir trees form the canopy layer approximately 75 to 100 feet above the forest floor.

The **understory** layer is the next highest layer. It is composed of the crowns of shorter trees including cherry, Pacific dogwood, cascara, Oregon ash, mountain ash, willow, birch, and young conifers. The **shrub** layer is next. Shrubs are *woody* plants that are shorter than trees and frequently have multiple stems. Hazelnut, Indian plum, vine maple, serviceberry, mock orange, snowberry, thimbleberry, salal, western wahoo, ocean-spray, salmonberry, red elderberry, and blue elderberry are examples of native shrubs in Springbrook Park. Under favorable conditions, shrubs such as hazelnut, Indian plum, serviceberry, elderberry and vine maple grow as small trees and become part of the understory layer.

The **herb** layer is composed of *non-woody* plants including ferns, violet, trillium, grasses and sedges, fringecup, pig-a-back plant, wild carrot, horsetail, and wild ginger. Some tall herbaceous perennials such as baneberry appear shrub-like but lack true woody tissue. The term "**groundcover**" may be used to describe low herbs, shrubs, and vinelike vegetation covering the forest floor.

The lowest layer is the **forest floor**, composed of leaves, twigs, logs and other decomposing organic matter. **Fungi** within the humus layer and the mineral soil beneath are a little-seen but very important component of the forest community. Fungi provide nutrients for many plants via interconnections with plant roots called *mycorrhiza*. Without these fungi, many plants would fail to thrive.

Mosses, lichens, and bacteria can be found in all forest strata. They may grow in the canopy layer, on lower branches and trunks, and on logs, rocks and soil. **Mosses** differ from flowering plants in that they have no true vessels (they are *nonvascular*), have no true roots, and produce spores. Mosses favor moist places, but many have the ability to dry up and go dormant in the hot summer sun. But rainfall from a summer storm is quickly soaked up by the seemingly dead mosses, returning green coloration and lushness in an instant. Mosses play an important role in retaining moisture and nutrients. The germination of many seeds and spores depends on the moist and protective microenvironment of mosses.

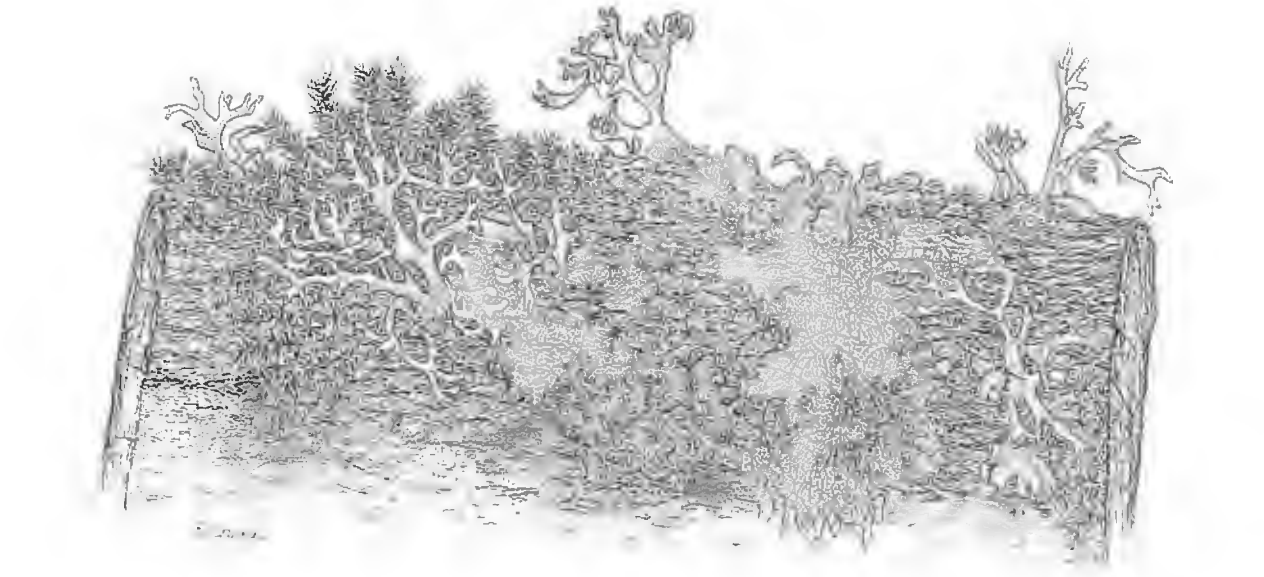


Fig. 4.2. Lichens and mosses are important components in forest ecosystems.

Lichens are a unique combination of two types of organisms - algae or cyanobacteria, plus fungi. These organisms live in a **symbiotic relationship,** i.e., a relationship that is presumed to be *mutually beneficial*. Thus the green alga or cyanobacterium provides starches and sugars using photosynthesis, while the fungus furnishes water and minerals to its partner. Since many of the algae and cyanobacteria can live perfectly well with*out* fungi, some scientists believe that lichens may represent a relationship more akin to slavery.

Research in Oregon experimental forests have shown that lichens are very important in contributing up to half of the organic nitrogen in the mature forest. Bacteria from the **Oregon lungwort** (*Lobaria oregana*, so named because the lichen is lobed and resembles the outer surface of a lung) incorporate or "fix" atmospheric nitrogen. As rainfall leaches the burgeoning bacteria from the lichens in the canopy layer, the forest below receives a nourishing shower of nitrogen-containing water. Nitrogen-fixing bacteria within the woody debris of the forest floor, and in root nodules of red alder, are additional important sources of organic nitrogen in the forest ecosystem.

The Composition of Forest Communities - Abiotic and Biotic Variables

Abiotic variables - moisture, temperature, light. The boundary of a forest community may be sharply defined, for example, by a previous forest fire, lava flow, or swampy conditions in a drainage. Very frequently, however, boundaries between communities are gradual and indiscrete. Transition from one type of community to another occurs little by little as environmental components such as temperature, rainfall, or drainage gradually change. Table 4-1 illustrates how plant composition changes with moisture gradient.

	DRY---Moisture Gradient---**WET**										
SPECIES	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Bracken fern	+	+								–	+
Salal	+	+	+	+	+						
Starflower			+								
Red Huckleberry			+	+	+						
Thimbleberry			+								
Red alder						+		+	+	+	+
Salmonberry				+		+			+	+	
Swordfern						+	+	+	+	+	
Vine maple						+	+				

Table 4-1. Variation of Plant Composition of Early Seral Communities with Moisture in the Western Hemlock Zone in Western Oregon. (Adapted from Franklin and Dyrness, p. 86.)

Thus by knowing the habitat requirements of plant species, we can understand why certain species of plants are found together in some locales, and not in others, to form *communities*. For example, in the 40 to 50 year old recovery forest of Springbrook Park, big leaf maple and red alder trees are very common but Oregon oak and madrone trees are very rare. Big leaf maple and red alder thrive in the generally moist conditions of Springbrook Park, easily overtopping any existing madrone and oak saplings. Conversely, Oregon oak and Pacific madrone thrive in the drier regions of Iron Mountain Park a scant mile away where the soils are too shallow and rocky for red alder and big leaf maple to thrive.

It is useful to look at a two dimensional graph to understand some of the variables that make up the required habitat of a plant species. In Fig. 4-3, one axis is temperature, the second axis is moisture. One circle represents species "A" that requires warmer and drier conditions. Species "B" requires cooler and moist conditions. The species have distinctive habitats with a small overlapping zone.

Sunlight is another important factor. Plants that can live in moist and shaded places tend to have *broad* leaf surfaces to catch the limited amount of filtered sunlight. For example, consider the *broad* leaves of trillium and wild ginger. Consider also how grand fir and Pacific yew, when living in the shade of

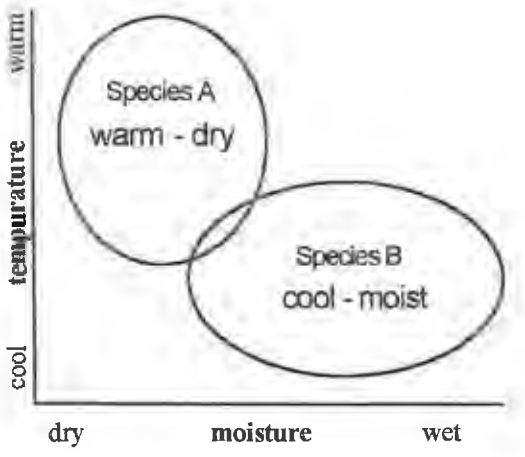


Fig. 4-3.

Douglas-fir, have *horizontal rows of flat* needles to collect sunlight. Western hemlock, one of the most shade tolerant of the conifers, has *flattened needles that are longer horizontally, and flattened branchlets* arranged to catch limited sunlight. Some conifers are able to partially adapt to sunlight conditions. The sun-loving Douglas-fir normally has a bottlebrush arrangement of needles in open sun, but tends to have a more horizontal needle arrangement in shade. And shade-tolerant western hemlock can acquire a bottlebrush needle arrangement in sunnier conditions.

The distribution of a variable, such as water over *time,* is also important. For example, skunk cabbage thrives in marshy conditions where the soil is *constantly* wet, whereas Oregon ash typically grows in *seasonally flooded* areas. So far, we have discussed three important factors (temperature, moisture, and sunlight) but in reality there are dozens if not hundreds of factors that determine whether a species will or will not survive, and will or will not thrive, in a given habitat, and therefore within a given community.

Biotic Factors - Competition and Symbiosis. Often, habitat requirements are a challenge to understand. For example sword fern, wood fern, and licorice fern may all be growing within a few feet of each other, but each occupies a different type of habitat. The sword fern is a large fern that is anchored in the *forest soil* by a dense fibrous root system. The smaller wood fern is found almost exclusively on old *stumps or logs.* The licorice fern with its creeping rhizome, peculiarly grows on the *moss-covered trunks* of big leaf maple. How much is this distribution determined by habitat requirements and how much is determined by competition?

From observations of plant distribution in the woodland, one can readily conclude (mistakenly!) that wood fern and red huckleberry *require* old stumps or logs to thrive. This is not true, as both of these plants, as well as licorice fern and sword fern, thrive exceptionally well in good garden soil. The fact that some plants grow in very restricted environments may have more to do with competition from other species that grow faster and/or larger in otherwise favorable habitat. Thus madrone and Oregon oak would likely be plentiful in Springbrook Park if fast-growing trees such as big leaf maple, red alder, and black cottonwood were not vigorously competing for the same habitat. Competition is also the reason why English ivy and Himalayan blackberry are sadly reducing available habitat for native plants.

Although competition may limit species distribution, other interactions among organisms are essential for survival. As previously mentioned, mosses provide a necessary microenvironment for germination of many tiny seeds and spores. Importantly too, many plants could not thrive without **symbiotic relationships** with fungi and bactera. It is estimated that 90% of vascular plant species in the world have **mycorrhizal** relationships. A healthy Douglas-fir has 30 to 40

species of mycorrhizal fungi attached to its roots. So important are these fungi that none of our coniferous trees can survive without mycorrhizal fungi (Maser, 1988). Another symbiotic interaction among truffle-producing fungi, the red-backed vole, and the northern spotted owl was previously described in the earlier section on ecosystems.

Successional Stages

Plant communities are dynamic entities. Disturbances such as fire and logging are common over a period of centuries. And each major disturbance can affect community composition for centuries. So for example, following a severe forest fire, a pioneer community of grasses and fireweed is usually replaced by a continuum of communities that includes shrubs, young trees, and with enough time, old growth trees. This process is referred to as **succession**. The stages of succession preceding the climax community are collectively referred to as **seral stages**.

Following a major volcanic eruption, after hot lava and cinders have cooled, among the first plants to colonize the new landscape will be lichens and mosses. These plants accelerate conversion of rock and cinders to soil. Eventually windborne seeds of grasses and other herbaceaous plants that can survive in thin soil will dominate. This progression of life on *previously uncolonized* substrate is called **primary succession**.

Secondary succession follows the disturbance of a previously colonized habitat. Good examples of secondary succession are landscapes undergoing reforestation following logging or fire. By knowing when a logging operation or fire occurred, we can determine how many years it took to reach a certain stage of succession. For example, logging took place in Springbrook Park approximately 40 to 70 years ago. By examining the remaining tree stumps, we can determine that the original forest was dominated by medium to large stately conifers. Thus the forest of today, dominated by big leaf maple and red alder trees, took about 40 to 70 years to develop, and is very different from the forest that fell to loggers.

The logging operation in Springbrook Park was a severe disturbance that in all likelihood included clearcutting and slash burning. (Some of the residual stumps still show severe fire damage.) The first stage of revegetation, referred to as the **Herb stage** (also called **Weed** or **Grass-Forb** stage), lasted about five years. These *non-woody* plants that dominated the logged landscape readily colonized the barren land by means of windborne seeds or spores. Furthermore, they could thrive in full sunlight, and grow and reproduce quickly. These plants included thistle, fireweed, bracken fern, grasses, and many other plants we may call weeds. Residual herb stage vegetation is found today along sunny main pathways that have been kept clear of shrubs and overhanging vegetation.

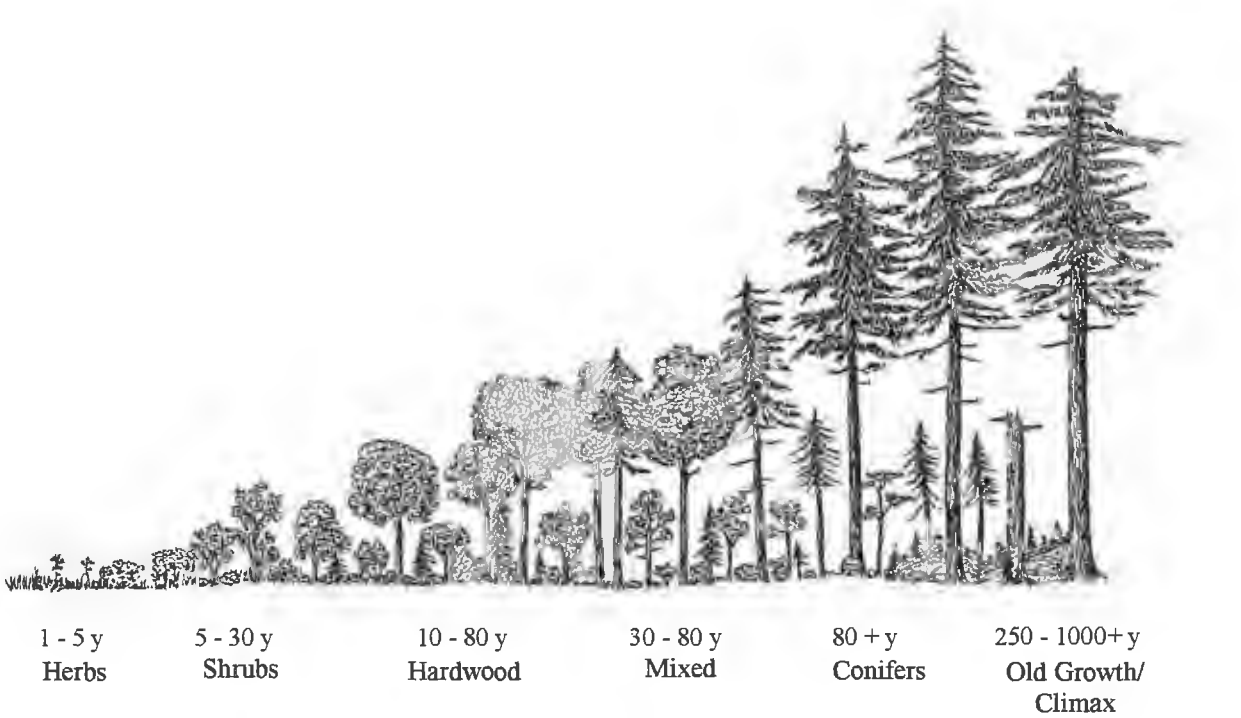


Fig. 4.4. Successional Stages of a Western Hemlock Zone Forest. Stages vary according to Forest Zone, local conditions, type and duration of disturbance, and forestry practices. Time periods are approximate.

While the herb stage vegetation was dominant, seedlings of shrubs were taking root. These *woody* plants became dominant after about five years, heralding the **Shrub stage**. The dominant shrubs would have included thimbleberry in drier areas, creek dogwood, nettle, and salmonberry in wetter areas, and also Indian plum, blackberry, currant, snowberry, ocean-spray, mockorange, salal, and serviceberry. Beneath the shrub layer, the herb layer would include more shade-tolerant plants such as large-leaved avens, wild strawberry, sword fern, and self-heal. The shrub layer still dominates along much of the forest edge.

The shrub stage lasted between 10 to 30 years after logging. During this time, deciduous tree seedlings were taking root and growing, eventually dominating the shrub layer and ushering in the **Hardwood stage**. (Deciduous trees are also called hardwood trees even though some trees like cottonwood have soft wood.) The hardwood trees that became dominant have several characteristics in common. These trees either have large numbers of windborne seeds (such as alder, Scouler willow, black cottonwood, big leaf maple) or they have seeds that were transported by birds, such as cherry and cascara. Another characteristic of these trees is vigorous growth, frequently 4 to 5 feet a year. Under the relatively dense tree canopy, *shade-tolerant* herbs such as trillium, yellow wood violet, fairy-bell, and wild ginger have thrived, and less shade-tolerant shrubs such as serviceberry and mockorange have declined.

The hardwoods may remain dominant for up to 80 years after logging, but during this time, conifer seedlings and saplings are slowly growing up through the understory layer. Occasional conifers that took root early in the herb or shrub stages, particularly sun-tolerant Douglas-fir, already overtop hardwood trees after 40 to 50 years. A forest undergoing transition from hardwoods to conifers may be considered to be in the **Mixed Hardwoods and Conifers stage**.

There are three main reasons why conifers eventually come to dominate deciduous trees in our region. A primary reason is related to cool, wet winters and warm, dry summers, as mentioned in the Introduction. This climate of the Pacific Northwest favors, over the long run, those trees that can continue to grow during the cold rainy season. This is the time of year when hardwood trees have shed their leaves and ceased growing, allowing sunlight to reach coniferous saplings and seedings below. By using this strategy, the slower growing coniferous trees eventually overtop the hardwood trees.

The second reason for the eventual domination of coniferous trees is the relatively low shade tolerance of hardwood seedlings. For example, in spring the forest floor of Springbrook Park is carpeted with hundreds of thousands of big leaf maple seedlings, suggesting (mistakenly) that a whole new generation of hardwood trees will eventually come to dominate. However by mid-summer, few big leaf maple seedlings can be located. These innumerable seedlings of spring succumbed to the heavy shade following leafing-out of the hardwood tree canopy. The astute observer notes few saplings of big leaf maple and red alder in Springbrook Park, even though these trees are the dominant tree species. Any hardwood saplings that are found will most likely be along the forest edges. In contrast, a fair number of more shade-tolerant Douglas-fir and western red cedar saplings can be located within the shade of the present forest.

The vigorously growing hardwood trees pay a price for early domination of the forest: their life span is relatively short, 60 to 85 years or so. The relatively short lifespan of these hardwoods is the third reason for eventual domination by conifers. Douglas-fir trees in contrast may live for 1,200 years. Therefore as old and weakened hardwood trees come crashing to the forest floor, the openings created in the forest canopy are instantly exploited by conifer saplings and seedlings.

About 80 or more years after the logging operation, the **Conifer Dominant stage** would once again be re-established. The crowns of Douglas-fir trees would constitute the majority of the forest canopy. Hardwood trees in the understory layer, such as dogwood, cascara, bitter cherry, maple, would be found in forest openings or forest edges. The forest floor would be steadily accumulating a thick layer of fir needles, twigs, and other debris. The herb layer would contain plants adapted to limited light conditions and thick humus layer, including such plants as Canadian dogwood, rattlesnake plantain (a native orchid), coral root orchid, and Indian pipe. Many of these plants do not occur in earlier successional stages because the environmental conditions of late successional stages are an essential part of their habitat requirements.

Old Growth Forest

After several hundred years, the undisturbed coniferous forest acquires a unique set of conditions that make it optimum habitat for at least 14 species of birds (including the northern spotted owl) and nine species of mammal. This type of forest environment is referred to as an **old growth forest**. Criteria for an old growth Douglas-fir forest in our area include:

1) Douglas-fir greater than 8 per acre of trees greater than 32 inches in diameter or greater than 200 years old. 2) Deep, multilayered canopy. 3) Conifer snags (dead standing trees) greater or equal to 4 per acre that are greater than 20 inches in diameter and greater than 15 feet tall. 4) Logs greater than or equal to 15 tons per acre including 4 pieces per acre greater than or equal to 24 inches in diameter and greater than 50 feet long. (Research Note PNW-447, U. S. Forest Service, July 1986).

Since an old growth forest represents an entire ecosystem and not just trees, **stand size** is another key element. Small stands are more heavily influenced by temperature, humidity, wind, and other environmental conditions outside the stand. This influence is known as the **edge effect**. The degree to which the surrounding landscape has been altered, for example by clearcut logging versus selective cutting, directly influences the severity of the edge effects. From a forester's perspective, the requisite minimum size of an old growth stand also depends on *management objectives*. For example, the habitat of the northern spotted owl requires a much larger stand size of old growth trees than does its prey, the red-backed vole.

Fig. 4.5. Twinflower, a dimunitive woodland beauty, and a favorite of Linnaeus.

The relatively large amount of dead wood in the form of snags and logs is a vital component of the old growth forest ecosystem. Snags provide important habitat for animals. For example, standing dead trees or snags provide cavity nesting sites for 39 bird and 24 mammal species in the Blue Mountains of Oregon. An estimated 70 species of birds in the Mt. Hood National Forest are in some way dependent on snags. Downed logs are an important reservoir of energy and nutrients. They function as "nurse logs" especially for seedlings of western hemlock. Nitrogen-fixing bacteria that inhabit these logs provide additional nutrients. The logs also become a storehouse of water as they undergo decomposition by fungi. On a hot and dry summer's day, it is possible to squeeze water out of the rotted wood of an old growth forest log.

With the large amount of organic debris present, fungi form vital links in the old growth forest ecosystem. For example, fungi provide water for, and exchange nutrients with, conifers via mycorrhizal connections with tree roots. Fungi provide food for small mammals (as a means of spore dispersal) in the form of truffles. And the small mammals are themselves food for predators such as the northern spotted owl.

The number of 3 to 4 foot diameter tree stumps in Springbrook Park suggests that the forest logged about 50 years ago was old growth. Perhaps the only living remnants of the old growth forest in the Park today are several western red cedars alongside Springbrook Creek, one measuring 15 feet in circumference 5 feet off the ground. These venerable conifers were spared by loggers likely because of their broken tops.

Climax Forest

If the old growth forest is left free of major disturbances for many hundreds of years, the dominant conifer in our region may become **western hemlock**, and not Douglas-fir. Western hemlock is very shade tolerant. With the help of nurse logs, western hemlock will grow in the understory of a forest dominated by Douglas-fir. Over many hundreds of years western hemlock trees will become the dominant conifer as the Douglas-fir trees decline, unable to reproduce from seed in the dense shade of the forest.

The **climax forest** is characterized by stable, self-regenerating forest composition, in the absence of major disturbances. The climax forest can be thought of as the endpoint (climax) of earlier successional, or **seral**, stages. However, because major disturbances are relatively frequent within a 500 to 1,000 year period, climax forests are not very common in nature.

The above scenario of a climax forest dominated by western hemlock is not assured for this region. Several other types of climax forest are possible. Since the Portland-Lake Oswego area lies at the northern end of the Willamette Valley, the amount of rainfall may be too low for western hemlock to vigorously thrive. In such a case, **grand fir**, which is more shade tolerant than Douglas fir and more drought tolerant than western hemlock, may become the dominant conifer. If the average rainfall still is not enough for the vigorous growth of grand fir, then **Douglas-fir** may remain dominant. Finally, if conditions are such that no single species can dominate, there may be two or more **co-dominant** conifer species in the climax forest, such as grand fir, Douglas-fir, and western hemlock, with western red cedar in wet areas.

Forest Zones in the Pacific Northwest are classified by the respective type of climax forest, including the moist *Sitka Spruce Zone* along the Northern Oregon coast. On the west side of the Cascades, the *Western Hemlock Zone* extends from about 2,200 to 3,500 feet, the *Pacific Silver Fir Zone* extends from about 3,000 to 5,000 feet, and the *Mountain Hemlock Zone* extends from about 3,500 to 5,000 feet. *Ponderosa Pine* and *Grand Fir Zones* are found on the drier east side of the Cascades. West of the Cascades in the drier and warmer Willamette Valley, grand fir and ponderosa pine may also be dominant or co-dominant conifers along with Douglas-fir.

Indicator Species and Plant Associations

Forest ecologists apply their knowledge of plant habitats to optimize forest management. For example, the presence of devil's club *(Oplopanax horridum)* indicates a wet environment that tends to be high in timber productivity. But at the same time, soils in these areas are predictably at severe risk for compaction, reduced root aeration, and erosion following tractor logging.

Thus, lists of **indicator plant species** for specific forest regions have been developed as an ecological tool to evaluate habitat conditions. In the western hemlock zone of Mt. Hood National Forest for example, the presence of lady fern or wild ginger indicates relatively moist sites, whereas the presence of serviceberry or ocean-spray indicates relatively warm and dry sites. This ecological tool is useful to understand plant distribution, or conversely to understand site (soil, temperature, moisture) conditions, irrespective of timber production concerns.

The ecological concept of **plant association** refers to a relatively stable, naturally occurring composition of plant species. Often it is the *climax plant community* with several dominant species. Like indicator species, plant associations are used by ecologists for site characterization. In the western hemlock zone of Mt. Hood National Forest for example, when shrubs are dominated by an *association* of low Oregon grape and salal, these sites can be predicted to be moderately warm and dry, and soils predicted to be deep and fine-textured. South facing slopes are also predictably hot in summer, and the forest floor relatively thin. Practical implications for forest management at sites with the low Oregon grape/salal plant association include moderate timber productivity, the need to provide shade for replanted seedlings during the summer on south facing slopes, and the need to conserve the organic layer of the forest floor after logging.

WETLAND COMMUNITIES

Wetlands bestow many important benefits to humans: 1) By intercepting and storing stormwater runoff, wetlands reduce peak flows and flood damage. 2) The water stored in wetlands helps to recharge the groundwater aquifer. 3) Wetlands improve water quality by filtration and sedimentation of solid particles. Excess pollutants are removed by vegetation and micro-organisms. 4) Wetlands lend an aesthetic quality to the landscape.

Two local wetland areas, one in the southern section of Springbrook Park, and the other in Waluga and West Waluga Parks, will be used as examples of wetland communities. However, many other wetland areas - those in Bryant Park, and those bordering Tryon Creek, Springbrook Creek, Oswego Creek, Willamette River, and Oswego Lake - offer excellent opportunities for study and appreciation.

Forested Wetlands in Springbrook Park.. In the southeast corner of Springbrook Park close to Upland School and hidden under a dense cover of vegetation is a *seasonal* spring that burbles forth each winter and spring (See Fig 1.2, Chapter 1). The spring is the headwaters of a small brook that flows downhill through the parkland, eventually merging into Springbrook Creek. These wetlands offer a convenient

setting for students curious to learn about the hydrology and plant communities of forested wetlands.

The mud-covered sneakers of many an Upland grade schooler attest to the seasonal flooding of a side trail just downstream of the spring. The muddy trail crosses through a small stand of *Oregon ash* and *black cottonwood* trees, with an understory of *creek dogwood* and *stinging nettle*. In this area are also found *false hellebore*, *pig-a-back plant*, and *wild ginger*. This wetland area has some important hydrologic and compositional features of **seasonally flooded wetland communities** in Oregon described by Franklin and Dyrness. Oregon ash is adapted to thrive, and is a characteristic species, in these seasonally flooded areas. Oregon ash and black cottonwood are also typical trees found in the *riparian* (meaning along water courses. such as the banks of the Willamette and Columbia Rivers) plant communities in our region.

Downstream of the seasonal spring in the southwest corner of Springbrook Park is a small wetland community of *skunk cabbage, water parsley, horsetail,* and *creeping buttercup*. This wetland community is nestled in a low, muck-filled portion of the seasonal brook, and is shaded by a canopy of black cottonwood and red alder trees. During the dry months of summer and fall, the flowing waters of the spring and tributary have ceased. But the community of skunk cabbage and water parsley continue to thrive because groundwater movement maintains this wetland as a seep. Thus the hydrology of this small wetland community is characterized by *permanently saturated soil* throughout the year. Although very small, this muck-filled seep has many characteristics of much larger **forested swamp communities** in Oregon described by Franklin and Dyrness.

Emergent and Forested Wetlands in Waluga and West Waluga Parks. The upland portion of popular Waluga Park in the Lake Grove district rests on a low Boring volcanic vent (See Chapter 1). An old quarry site is testament to past mining of the basalt for gravel. Lowland areas of Waluga Park rest on coarse sand and silt (Qff) deposited by the catastrophic Bretz floods some 15,000 years ago. These lowland areas extend west of Waluga Road to the new West Waluga Park. Importantly the lowland areas contain significant wetland acreage. Wetlands account for 3.8 acres in Waluga Park and 5.0 acres in West Waluga Park. Two primary types of wetlands occur - forested wetlands and emergent wetlands.

The **forested wetlands** of Waluga Park are dominated by shrubby *willows* admixed with *sedges, bulrush, reed canarygrass, hazel,* and *spirea* (Lake Oswego Natural Resource Inventory, 1991). *Oregon ash, black cottonwood, aspen, and cascara trees* are also present here. In West Waluga Park, the forested wetlands contain a combination of *Oregon oak* and *Oregon ash* trees. Oregon oak normally prefers much drier habitat, but uncommonly and uniquely associates with Oregon ash in some of the seasonally flooded areas of the Willamette Valley.

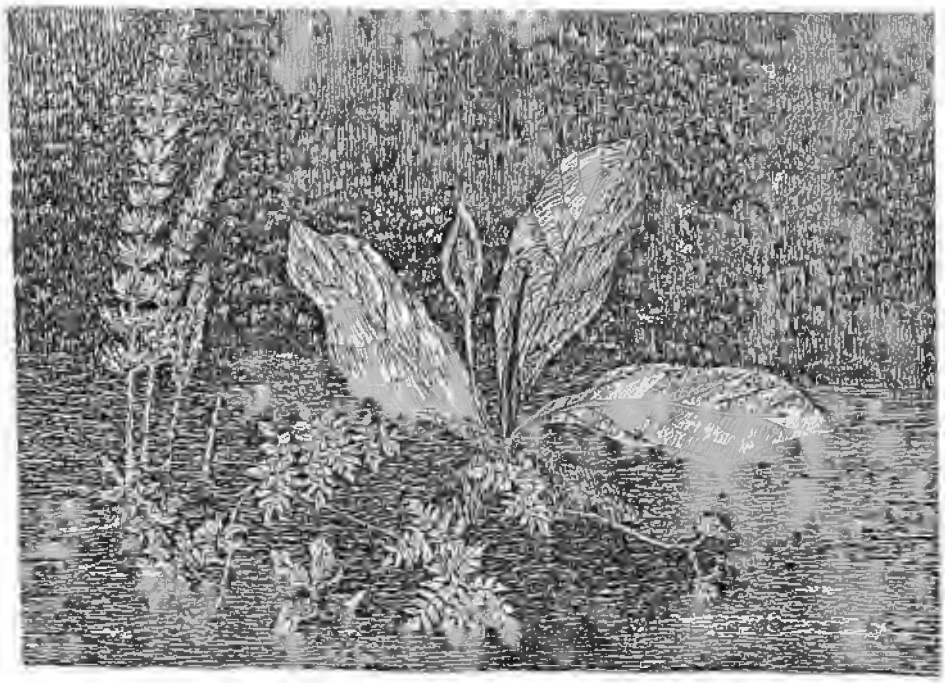


Fig. 4.6. In the SW corner of Springbrook Park is a wetland community of horsetail, water parsley, and skunk cabbage. Although small, this site has many features of previously described Forested Swamp Communities.

Of special interest in West Waluga Park is the marsh (or **emergent wetland**) dominated by *cat-tail*. This wetland has resulted from altered hydrology following placement of a sewer pipeline, and runoff from residential development north of the park. *Reed canarygrass, soft rush, sedges,* and *Douglas spirea* are part of this marsh community. Oregon oak trees once grew here but have since died due to the permanently elevated water table. Cat-tail, reed canarygrass, soft rush, sedge, and spirea are separately illustrated and described in Chapter 5.

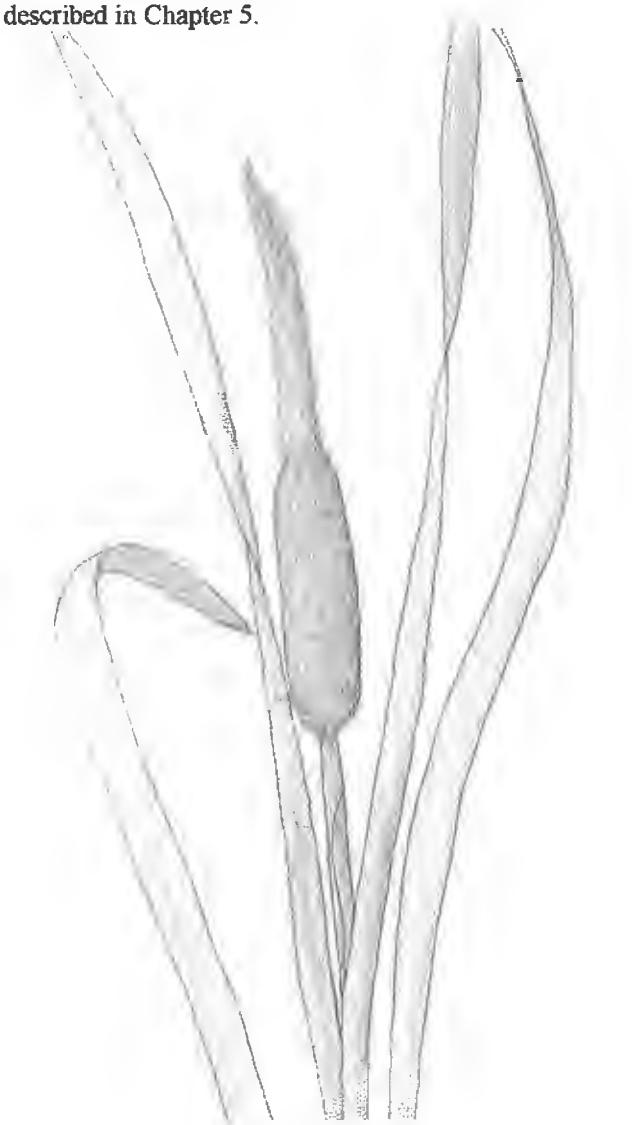


Fig. 4.7. Cat-tail in West Waluga Park marshland.

In the last three decades, the public has become acutely aware of the vital role wetlands play in maintaining good health and habitation for humans and wildlife. Rigorous methodology for evaluation and classification of vital wetlands has been developed, but is too complex to be presented at this juncture. Students wanting to learn more about this important subject should find practical the **Supplement of Wetland Methodology** at the end of this Chapter .

OAK AND MADRONE COMMUNITIES IN IRON MOUNTAIN PARK

Relatively **dry and rocky soil conditions** favor plants that are tolerant of full sunlight, heat, and drought conditions. These plants may have extensive fibrous root systems, stout trunk and limbs, waxy leaves, and leathery leaves for survival. However these adaptations usually come at the price of reduced vigor in heavy shade.

Although these drier conditions are lacking in Springbrook Park, the high and exposed rocky slopes of Iron Mountain Park less than a mile away provide a good example of these harsher habitats. Here, the Columbia River flood basalt has been uplifted along the Lake Oswego faultline. These uplifted layers of basalt thus form the steep sun-exposed, south-facing slope of Iron Mountain (see Chapter 2, pp. 2-3,4). In this area, the soil is classified by the Soil Conservation Service (1985) as *92-F, Xerochrepts and Haploxerolls.* "Xero" is derived from the Greek term "xeros" meaning "dry," for these soils are well-drained, and water runoff is rapid on the steep slopes where they are formed.

Towards the top of the slope in thin, well-drained soil, **Oregon oak** (*Quercus garryana*) is the dominant tree species. The oak trees here are somewhat stunted and scrubby, but are able to survive in conditions too harsh for big leaf maple and Douglas-fir. The thin **shrub layer** contains species tolerant of sun and drought - tall Oregon grape (*Berberis aquifolium*), ocean-spray (*Holodiscus discolor*), serviceberry (*Amelanchier alnifolia*), mockorange (*Philadelphus lewisii*), poison oak (*Rhus diversiloba*), snowberry (*Symphoricarpus alba*), and Scot's broom (*Cystisus scoparius*). Scot's broom, an introduced member of the pea family, produces abundant seeds and has become an aggressive pest in many natural areas.

The unique **madrone** tree (*Arbutus menziesii*) is found a little downslope of the rocky cliffs in Iron Mountain Park. Here in less harsh conditions, madrone is admixed with Oregon oak and Douglas-fir. The madrone, **a** member of the rhododendron family (Ericaceae), is the *largest native broadleaf evergreen* tree in the Northwest. Like Oregon oak, the madrone has leathery leaves and extensive fibrous root system that permit survival under harsher conditions. In the open, oak and madrone develop stout trunks and limbs.

Madrone trees are able to thrive in thin rocky soils of the scablands left by the ice age Bretz floods (Chapter 2, pp. 2-6,8). Their glossy, leathery leaves and smooth

Fig. 4.8. Madrone trees, shown above, are found mixed with Oregon Oak on the steep, sun-exposed, and rocky soil of upper Iron Mountain Park. Many plants common in this harsher environment are rare in the shaded and relatively moist conditions of Springbrook Park about a mile away.

reddish bark accent the unique scabland landscapes in the Willamette Valley. In Lake Oswego, madrone trees are relatively common in the scablands of the Summit Drive-Twin Points area. Some homeowners in Lake Oswego, Lake Grove, and elsewhere have cultivated their madrone trees to become large and beautiful specimens. These drought tolerant native trees are unique mementos of the natural history of this area. They are also appreciated by birds for their orange-red berries in the fall.

In summary, the more exposed and rocky areas of Iron Mountain Park offer a good opportunity to study community composition under relatively xeric conditions. Nearly all the vegetation in these communities is present, but relatively less common, in the more moist and shaded condtions of Springbrook Park. Visitors to the upper rocky areas of Iron Mountain Park may also look for the exposed veins of limonite iron ore, but they should remain wary of the ever-present poison oak.

First Supplement to Chapter 4:

FRESH PERPECTIVES FROM A FOREST ECOLOGIST

In the preceding chapter, the complex and dynamic processes of succession have been artificially simplified. This facilitates understanding of basic ecological concepts, but readers may get the less than accurate impression that successional patterns are simple and "clear cut." In reality, most natural processes are fluid and complex. The challenge for reader and writer alike is to construct a basic framework of understanding without losing the real-world perspective of complexity. Fortunately, this Special Supplement is from the real world perspective of a forest ecologist, and serves as a medium to a balanced understanding.

In the last 2 decades, dedicated Forest Service ecologists have fundamentally broadened our understanding of forest ecosystems. Many authors cited in this book are forest ecologists who are true pioneers in their scientific disciplines. In the same tradition, ecologist **Ayn Shlisky** *has studied successional patterns in the Mt. Hood and Gifford Pinchot National Forests. Because of her deep interest in public education, Ayn volunteered to critically review an earlier copy of Chapter 4. Her extemporaneous thoughts and hand-written comments were so well composed that they are presented below essentially unaltered. Since these perspectives are fresh from personal field observations, they are not necessarily intended to represent U.S.F.S. positions based on past information.*

Fig. 4.9. Indian Paintbrush, Gifford Pinchot National Forest, Washington.

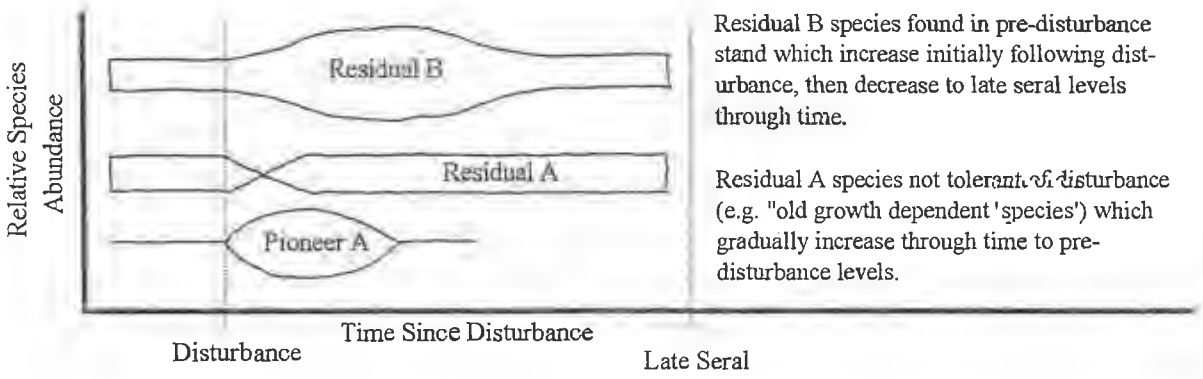
On the Dynamics of Secondary Succession:

"From my studies of succession in the Gifford Pinchot and Mount Hood National Forests, and from recent literature, it is apparent that succession is more complex than first thought . . . In reality although the herb-shrub-tree sequence is a simple model of dominance of a site during secondary succession, the composition of a site following disturbance is characterized by the balance

between 'residual' species and 'pioneer' or 'invading' species. After disturbance, many species survive from the previous stand ('residuals'). These species may be herbs, shrubs, or trees, and may make up a large part of the composition and sructure of the early seral stand.

"Different species have different abilities to withstand disturbance, and some (e.g. salal) actually increase in abundance relative to the late seral structures following disturbance. It would probably take a very extreme and/or frequent disturbance to initiate a true grass-forb stage. There are species, of course, that are only found following disturbance ('pioneers' or 'invaders'), which may be native or non-native, such as thistle, fireweed, etc., and are not found in late seral stands.

"Hence, succession is better characterized by a continuum in structure and composition. Following disturbance, 'pioneers' increase, and 'residuals' decrease (but are still present). Through time, in the absence of further disturbance, pioneers decrease, and residuals increase in constancy and may increase in abundance. (Many species found in late seral communities - e.g. salal, twinflower, rhododendron - often increase just following disturbance, and then decrease to late seral abundances.)



"Hence, we can characterize species by their response to disturbance, and at any one time following disturbance, characterize a stand by its proportion of residuals versus pioneers, depending on the type/frequency of disturbance and many other factors. The 'herb stage' may never exist purely if there are many residual shrubs (more often the case than not.) Also, adjacent communities have an influence on what will develop following disturbance due to seed sources and the wildlife present which may contribute strongly . . . The ability of a species to store seed in the soil (can range from 1-100+ years) and seed scarification requirements (e.g. some require fire . . .) are also critical."

On Climax Communities:

". . . this concept is the subject of much debate. In our lifetimes, the concept probably holds. However, if you consider the pollen records, it is evident that major shifts in 'climax' vegetation take place. With climate change, 'climax' potential changes, and may move from forest to shrub and back. Additionally, it is unknown what effects humans have had on climax potential. It is conceivable that through site disturbance, pollution, seed dispersal (e.g. introduction of exotics), etc., we have changed the potential, precluding the development of any previous community ever seen. So the concept of "climax" is time dependent and is based on assumptions about our effects on site potential."

On Indicator Species:

"It is often also helpful to know about the indicator value of seral species, as well as late seral species. (We are only just beginning to delve into successional relationships to plant associations . .). It is good to know what seral species are common when particular plant associations are disturbed. For example *Ceanothus velutinus* is not common in late seral stands of western hemlock/dwarf Oregon grape plant associations, but following disturbance and/or intense fire in this association, *Ceanothus velutinus* is favored. Conversely, the presence of *C. velutinus* in an early seral stand may indicate what type of disturbance occurred on the site. Other species may also prove to be effective indicators of type/intensity of disturbance."

Fig. 4.10. View of Mount Hood from Vista Ridge, Mt. Hood National Forest.

Second Supplement to Chapter 4:

WETLAND METHODOLOGY AND TERMINOLOGY

Identification and Delineation of Jurisdictional Wetlands

Intense public concern over the loss and degradation of the nation's wetlands resulted in Congress enacting the Clean Water Act. The Army Corps of Engineers and the Environmental Protection Agency were given responsibility for making *jurisdictional* (legally defined) determination of wetlands. The identification and delineation of jurisdictional wetlands often implies significant *political* and *economic* consequences. Jurisdictional wetland status may determine what type of activity or alteration, if any, is allowed at the particular site. *Mitigation* for the alteration or loss of jurisdictional wetland may involve creation of a new wetland, or enlargement of other existing wetland areas to replace loss of wetland habitat.

Rigorous methods for the identification and delineation of jurisdictional wetlands have been established. The methodology requires extensive training and field experience. The investigator should have a thorough background in the natural and physical sciences. The investigator must integrate and apply practical knowledge in botany, plant taxonomy, ecology, soil taxonomy, soil chemistry, and soil physics.

The investigator should have access to the following resources: federal manuals for wetland delineation, USGS topography maps, National Wetlands Inventory maps, county soil survey reports, state and county hydric soils lists and maps, state and local wetland maps, aerial photographs, region-specific *National List of Plant Species that Occur in Wetlands*, government and agency reports, and site-specific plans and engineering designs.

Therefore *this section on wetland identification and delineation is not intended as a guide.* Its purpose is limited to introducing interested students and citizens to basic methodology and terminology. There are good opportunities for students to be involved in ongoing series of focused wetland projects such as studies on the Springbrook Creek watershed carried out by LOHS students over the last 20 years. Such projects give students valuable educational experience, and provide government agencies with data useful for community planning and enhancement.

In 1987 the Corps of Engineers **Wetlands Delineation Manual** provided technical guidelines for identifying jurisdictional wetlands. With interagency cooperation from the U.S. Fish and Wildlife Service (USFWS) and the Soil Conservation Service (SCS), this manual was revised and adopted in 1989 as the **Federal Manual for Identifying and Delineating Jurisdictional Wetlands**. In Oregon, the Division of State Lands and the Corps of Engineers have jurisdiction over the filling and dredging of all wetlands.

Although a cat-tail marsh or other well-defined wetland does not require detailed technical guidelines for delineation, these guidelines are necessary for less obvious situations. For example, should a seasonal pond, a grove of seasonally flooded Oregon ash trees, or a soggy meadow be considered wetlands? If these areas are defined as wetlands, how are the boundaries delineated from adjacent non-wetland areas?

Three vital features define wetlands - **hydrophytic vegetation, hydric soils,** and **wetland hydrology**. The following selected criteria and definitions are based on the 1989 Federal interagency manual:

1. Hydrophytic vegetation is defined as *plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.* The USFWS in cooperation with interagency review panels published the National List of Plant Species That Occur in Wetlands in 1988. Many hundreds of vascular plant species are classified into four groups differentiated by their wetland indicator status:

A. **Obligate** wetland plants (**OBL**) that almost always occur in wetlands (est. probability > 99%).
B. **Facultative Wetland** plants (**FACW**) usually occur in wetlands (est. probability 67% - 99%).
C. **Facultative** plants (**FAC**) occur equally likely in wetlands or non-wetlands (est. 34% - 67% prob).
D. **Facultative Uplands** plants (**FACU**) usually occur in non-wetlands (est. 67% - 99% probability).

A plus (+) or minus (-) sign is sometimes used to indicate higher or lower probability within FACW and FAC, e.g., FACW+ or FAC-. A fifth category, **Obligate Upland** Plants (**UPL**) almost always occur in non-wetlands (est. 99% probability) under natural conditions. These usually do not appear on the

National List. A small sampling of the National List for Region 9 (Northwest) follows.

Scientific Name	Common Name	Indicator Status	Stratum
L. americanum	skunk cabbage	OBL	herb
O. sarmentosa	water parsley	OBL	herb
T. latifolia	cat-tail	OBL	herb
C. obnupta	slough sedge	OBL	herb
J. effusus	soft rush	FACW+	herb
C. stolonifera	creek dogwood	FACW	shrub
E. telmateia	giant horsetail	FACW	herb
S. douglasii	Douglas' spirea	FACW	shrub
P. capitatus	Pacific ninebark	FAC+	shrub
S. scouleriana	Scouler willow	FAC	tree
A. rubra	red alder	FAC	tree
T. latifolia	starflower	FAC-	herb
T. heterophylla	west. hemlock	FACU-	tree
A. alnifolia	serviceberry	FACU	shrub
S. albus	snowberry	FACU	shrub
A. circinatum	vine maple	FACU+	tree

Table 4.2. Wetland indicator status for selected species listed in the *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)*, 1988.

Each species is assigned to **a stratum** (herb, shrub, woody vine, or tree). The **dominant species** is defined as *the most abundant species that cumulatively account for 50% of the areal coverage. Additional species accounting for 20% or more of the total dominance for the stratum are also considered dominant.*

Hydrophytic vegetation is present if:

A) OBL species comprise all the dominants in the plant community, or
B) 50% or more of the dominants of all strata are OBL, FACW, or FAC, or
C) areal coverage of OBL and FACW species exceeds that of FACU and UPL species, or
D) a frequency analysis of all species within the community yields a prevalence index value of <3.0, where OBL = 1.0, FACW = 2.0, FAC = 3.0, FACU = 4.0, UPL = 5.0, or
E) If hydric soil and wetland hydrology criteria are met, the vegetation is considered hydrophytic.

2. Hydric Soils are saturated or inundated for prolonged periods, and develop under *anaerobic* conditions. Under anaerobic conditions, organic matter accumulates to a great extent, resulting in *organic soils*, such as peat or muck. Additionally in the absence of oxygen, iron is reduced from the ferric to the ferrous state, resulting in a gray, green-gray, or blue-gray color. Mineral soils of this color are known as *gleyed soils.*

Soil color is frequently an indicator of soil wetness. The three components of color (hue, value, and chroma) are measured against the standardized Munsell soil color chart. *Low chromas* of 2 or less (such as black, gray, darker shades of brown and red), are often diagnostic for hydric soils. The *matrix color* is the dominant soil color. *Mottle color* occurs as splotches resulting from alternate periods of saturation and aeration.

3. Wetland hydrology exists when the soil is saturated to the surface. The required height of the water table for saturation to the surface is dependent of the permeability of the soil. An area inundated with surface water for one week or more during the growing season also meets wetland hydrology criterion. Characterization of wetland hydrology is frequently less exact than for hydrophytic vegetation and hydric soils because hydrologic conditions often fluctuate daily, seasonally, and annually.

Putting theory to practice: Site Evaluation. One of three site evaluation methods - *routine, intermediate, or comprehensive* - is chosen depending on the size and complexity of the site. Site complexity also determines the method of selecting, and the number, of sample plots and transects. On the following page is a copy of a **site evaluation data sheet** used by the environmental engineering, restoration, and consulting firm of "Mackin, Moore, Pons, Lake, and Mudd."

Classification of Wetlands

Marsh.....Swamp.....Bog....Slough. What differentiates these wetlands from one another? Because these common terms lack precise definitions, a wetland classification system has been developed by the U.S. Department of Interior, Fish and Wildlife Service, Office of Biological Services (1985).

Five major wetland systems are defined: **Marine** (habitats exposed to open ocean), **estuarine** (tidal habitats with partial exposure to the open ocean, and periodically diluted by fresh water), **riverine** (habitats contained within a channel except those dominated by trees, shrubs, or persistent emergents, and those with ocean derived salts greater than 0.5%), **lacustrine** (permanently flooded lakes and reservoirs greater than 20 acres in size), and **palustrine** (nontidal wetlands dominated by trees, shrubs, persistent emergents, and similar tidal wetlands with less than 0.5% ocean derived salinity).

Project Site: Swampview Estates Date: 4/1/92
Applicant/Owner: Pete Bogg & Assoc County/State: Marshfield, OR
Plot Location: Proposed Lysichitum Blvd Plot/Transect #: 2 / 5

Has vegetation, soils, and/or hydrology been disturbed?: Yes No
Do normal environmental conditions exist in the plant community?: Yes No

Names of field investigators: Penny Wort, Justin Water, and Doug Spirea

VEGETATION

Species	Indicator Status	Stratum	%Cover	Dominant

_____% of dominant species OBL, FACW, and/or FAC.
Criteria met for hydrophytic vegetation?: Yes No

SOILS

Series/Phase: _____ Subgroup: _____
Hydric Soils List?: Yes No Histosol?: Yes No Histic Epipedon Present? Yes No
Mottled?: Yes No Gleyed?: Yes No Drainage Class: _____
Matrix Color (hue/value/chroma): _____
Other hydric soil indicators: _____
Hydric Soil Criteria Met?: Yes No Rationale: _____

HYDROLOGY

Inundation? Yes No Depth: _____
Saturation/Depth in probe hole: _____ Criteria Depth: _____
Other Hydric Critera: _____
Wetland hydrology critera met? Yes No Rationale: _____

JURISDICTIONAL WETLAND? Yes No Rationale: _____

Palustrine systems ("palus" is the Latin term for "marsh") includes marshes, swamps, bogs, and small shallow waters we call ponds. Like the other wetland systems above, the palustrine system is subdivided into classes. Eight **classes** are recognized: *rock bottom, unconsolidated bottom, aquatic bed, unconsolidated shore, moss-lichen wetland, emergent wetland, scrub-shrub wetland*, and *forested wetland*. These classes are further subdivided into **subclasses** and **dominance type**.

To illustrate the classification system, the *palustrine emergent wetland* includes erect, rooted, herbaceaous *hydrophytes* (meaning plants adapted to grow in water or very wet areas) such as cat-tail and sedge. Included in this classification are wetlands we know as marsh, meadow, fen, prairie pothole, and slough. Two **subclasses** are *persistent* and *nonpersistent*. **Persistent** emergent wetlands are dominated by hydrophytes like cat-tail that normally *remain standing* until the beginning of the next growing season. **Nonpersistent** hydrophytes, e.g. arrowhead or wappato, *seasonally recede* below the water surface, often during winter.

Thus, the cat-tail marsh in West Waluga Park would be technically classified as a *palustrine emergent wetland, persistent, dominated by Typha latifolia*. And a seasonally flooded wetland of Oregon ash would be classified as a *palustrine forested broad-leaved deciduous wetland dominated by Fraxinus latifolia*.

The wetland classification can be described in even greater detail by the use of **modifiers**: *water regime* (permanently flooded, seasonally flooded, etc.), *water chemistry* (salinity, pH), *soil type*, and if applicable, *type of man-made modification* (impounded, excavated, farmed, etc.). Although the foregoing classification is too complex for everyday usage, it provides precise terminology for classifying any wetland, and serves as a valuable tool for scientific study.

References

Allaby M. *The Concise Oxford Dictionary of Ecology.* Oxford University Press, Oxford. 1994.

Buol SW, Hole FD, McCracken RJ. *Soil Genesis and Classification, 2nd Ed.* The Iowa State University Press, Ames. 1980.

Carroll GC. *Forest Canopies: Complex and Independent Subsystem Analysis.* In Forests: Fresh Perspectives from Ecosystem Analysis. Proceedings of the 40th Annual Biology Colloquium, Oregon State University Press, Corvallis. 1979.

Cowardin LM, Carter V, Golet FC, LaRoe ET. *Classification of Wetlands and Deepwater Habitats of the United States.* Office of Biological Services, Fish and Wildlife Service, U.S. Department of Interior, Washington, D.C. 1985.

Federal Interagency Committee for Wetland Delineation. *Federal Manual for Identifying and Delineating Jurisdictional Wetlands.* U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service, Washington, D.C. 1989.

Fishman Environmental Services. *Wetland Determination and Delineation - Waluga Park and West Waluga Park.* 1992.

Franklin JF and Dyrness CT. *Natural Vegetation of Oregon and Washington.* Oregon State University Press, Corvallis. 1988.

Franklin JF and Waring RH. *Distinctive Features of the Northwestern Coniferous Forest: Development, Structure, and Function.* In Forests: Fresh Perspectives from Ecosystem Analysis. Proceedings of the 40th Annual Biology Colloquium. Oregon State University Press, Corvallis. 1979.

Gerig AJ. *Soil Survey of Clackamas County Area,* Oregon USDA Soil Conservation Service. 1985.

Halverson NM, Topik C, Van Vickle R. *Plant Association and Management Guide for the Western Hemlock Zone, Mt. Hood National Forest.* Pacific Northwest Region, USDA Forest Service. 1986.

Houle MC. *One City's Wilderness: Portland's Forest Park.* Oregon Historical Society Press, Portland. 1988.

Kozloff EN. *Plants and Animals of the Pacific Northwest.* University of Washington Press, Seattle. 1976.

City of Lake Oswego, OR. *Lake Oswego Natural Resource Inventory,* 1991.

Lesher RD and Henderson JA. *Indicator Species of the Olympic National Forest.* Pacific Northwest Region, USDA Forest Service. 1989.

Maser C. *Ancient Forests, Priceless Treasures.* Mushroom: 8-18, Fall 1988.

Maser C, Tarrant RF, Trappe JM, Franklin JF, eds. *From the Forest to the Sea: A Story of Fallen Trees.*

Gen Tech Report PNW-GTR-229, Pacific NW Res Station, USDA Forest Service. 1988.

Maser C and Trappe JM, eds. *The Seen and Unseen World of the Fallen Tree*. Gen Tech Report PNW-164, Pacific NW Forest & Range Exp Sta, USDA Forest Svc, 1984.

Mathews D. *Cascade-Olympic Natural History*. Raven Ed, Portland, OR. 1988.

Mitsch WJ, Gosselink JG. *Wetlands*. Van Nostrand Reinhold, N.Y. 1987.

Old Growth Definition Task Group. *Interim Definitions for Old-Growth Douglas-Fir and Mixed-Conifer Forests in the Pac NW & Cal*. Res Note PNW-447, Pacific NW Res Station, USDA Forest Svc. 1986.

Reed PB. *National List of Plant Species that Occur in Wetlands: NW (Reg 9)*. U.S. Fish & Wildlife Svc Biol Rpt 88 (26.9), Wa., D.C. 1988.

Shlisky, Ayn. *Pers Comm*. 1994

Chapter Five

PLANTS

- Scope of this Chapter
- How to Use this Chapter
- A Word of Warning
- Plant List of Common and Scientific Names
- Plant Descriptions, Alphabetical by Common Name

Scope of this Chapter

This book is written for budding naturalists. In achieving a balance between simplicity and completeness the number of plants described is limited to about 80 out of many hundreds of species that exist in Springbrook Park and the Lake Oswego vicinity. A large number of common "weedy" plants (e.g., thistles, plantain, tansy and tansy ragwort, dandelion, bitter cress, many grasses) have been omitted as these weeds can be readily observed in our lawns and gardens. Fungi, including mushrooms and bracket fungi, are not included, although as described in the chapter on Forest Ecology, they are vital to the health of the forest community. Some native species, such as arrowleaf and tarweed, are important from ecological and cultural perspectives, but are uncommon or non-existent in Lake Oswego parks; these are described in other chapters. Species that are rare or non-existent in Springbrook Park, such as Oregon Oak, madrone, cat-tail, yew, grand fir, and phantom orchid, are included because they are important in diversity or succession, and may be more common in nearby parks such as Tryon Creek State Park, Iron Mountain Park, or West Waluga Park. Less common or inconspicuous native plants, e.g. foamflower (*Tiarella trifoliata*), toothwort (*Cardamine pulcherrima*), and false Solomon's-seal (*Smilacina stellata*), Columbia tiger lily (*Lilium columbianum*) may be mentioned briefly under related species.

How to Use this Chapter

This guide is primarily intended for readers who are in the early stages of learning about plants, and who most likely do not know scientific names. Thus on the following pages, **plant descriptions are listed alphabetically by common name** despite the fact that plants may have several common names or may share the same common name with a different kind of plant. To minimize problems of nomenclature, the subsequent **List of Plants** provides a **cross-reference** of alternative common names and scientific names.

The beginning student will not likely know even common plant names, and will flip through the illustrations to find a "match." This is a perfectly valid approach. Accordingly, hundreds of hours have been devoted to produce realistic plant drawings for beginning students, and for more advanced students interested in botanical detail.

Plant descriptions are organized as follows: 1) **Common name(s)** ***(Scientific name)***
2) *Plant family. Origin of common and scientific names.*
3) Description of plant, habitat, and cultural uses.

Where feasible, closely related groups of plants are included under a single heading, e.g., several rose species are described together.

A Word of Caution

Any natural area will have natural hazards, and basic common sense is necessary to avoid misfortune. Trees and limbs are in a constant state of growth and decline, and special caution is particularly necessary on windy days to avoid being hit by falling wood. The uses of plants in this book are given as historical and cultural information only. Regulations restrict picking and removal of plants and other materials. The author advises against eating or picking plant material. If this is done, it is at the reader's risk and should be under direct supervision of an authority. The accurate identification of plant material is not assured by this or any other guide since there are many plant look-alikes. Plants that are considered nonpoisonous may cause an unpredictable allergic reaction. This writer cannot accept responsibility for the reader's health. Children benefit from the experience of adults, and should be under their supervision.

Lest the reader become unnecessarily fearful of the natural surroundings, many plant materials common in the home and garden have potential for harm. Some of these commonplace plant materials are mentioned to give the reader a proper perspective:

a. Seeds of peach, apricot, cherry contain amygdalin and release cyanide on digestion.
b. All parts of foxglove contain toxic glycosides such as digitoxin.
c. The larkspur plant contains delphinine (a glycoside) and aconitic acid, both toxins.
d. Parts of the following common plants are also considered toxic or poisonous: peony, hyacinth, azalea, green parts of potato, rhododendron, carnation, calla lily, cotoneaster, cyclamen, daffodil, hydrangea, iris, laurel, philodendron, privet, St. John's wort, rhubarb leaves, and English holly, ivy, and yew.
e. Any fruit or vegetable may cause an unexpected allergic reaction including wheat, strawberry, chocolate. (Allergens can sometimes provoke life-threatening reactions, but are not considered toxins or poisons.)

List of Plants

The list of plant names on the two following pages is a cross-reference. The list includes common names, alternate common names, and scientific names, all organized in alphabetical order. The common names used to alphabetically order individual plant descriptions are in **bold** print, followed by a brief comment on the habit (non-woody herb, vine or vinelike, shrub, or tree), general habitat, and relative *frequency* within *Springbrook Park only*. Scientific names are italicized. There are at least two entries for each plant described - the common name and scientific name. Additional entries include alternate common name(s), and names of related plants briefly described under the common name.

Common Name (habit, general habitat, frequency in Springbrook Park only)
Alternate common name, see Common Name
Scientific name, see Common Name
Name of Related Plant, see under Common Name

List of Plants

Abies grandis, See Grand Fir
Acer macrophyllum, see Maple, Big Leaf
Acer circinatum, see Maple, Vine
Achlys triphylla, see under Inside-out Flower
Actaea rubra, see Baneberry
Alder, Red (tree, common, widespread)
Alnus rubra, see Alder, Red
Amelanchier alnifolia, see Serviceberry
Arbutus menziesii, see Madrone
Aruncus sylvester, see under Ocean-Spray
Asarum caudatum, see Wild Ginger
Ash, Oregon (tree, mostly in wet places, restricted)
Ash, Mountain (small tree, widely scattered)
Athyrium filix-femina, see Fern, Lady
Avens, Large-Leaved (herb, common, open areas)
Baneberry (tall herb, uncommon, scattered)
Bedstraw, see Cleavers
Berberis nervosa, see Oregon Grape, Low
Black Cottonwood, see Cottonwood, Black
Blackberry, Evergreen (vinelike, woody, scattered)
Blackberry, Himalayan (vinelike, woody, common)
Blackberry, Pacific (vinelike, woody, common)
Blackberry, Trailing, see Blackberry, Pacific
Camas (bulb, rare or non-existent in Park)
Camassia quamash, see Camas
Canarygrass, see under Reed Canarygrass
Candyflower (herb, common in spring)
Carex aquatilis, Carex obnupta, see Sedge
Cascara (small tree, scattered)
Cat-tail (wetland herb, West Waluga Park marsh)
Cedar, see Western Red Cedar
Cherry (small to medium tree, common)
Chicory (herb, common along sunny paths)
Cichorum intybus, see Chicory
Cleavers (herb or vine, scattered)
Clematis, Western (vine, scattered, edge of woods)
Clematis ligusticifolia, see Clematis, Western
Corn Lily, see under Fairy-bell
Cornus nuttallii, see Dogwood, Pacific Flowering
Cornus stolonifera, see Dogwood, Creek
Corylus cornuta, see Hazelnut
Cottonwood, Black (large tree, common in wet areas)
Currant, Red-flowering (medium shrub, rare)
Currant, Wild (medium shrub, scattered, uncommon)
Crataegus species, see Hawthorn, English or Red
Creambush, see Ocean-Spray
Daucus carota, see Queen Anne's Lace
Disporum hookeri, see Fairy-bell
Dogwood, Creek (tall shrub, common in wetter areas)
Dogwood, Pacific Flowering (tree, uncommon)
Douglas-fir (tree, moderately common, scattered)
Duckfoot, see Inside-out Flower
Dryopteris austriaca, see Fern, Wood
Eburophyton austiniae, see Phantom Orchid
Elderberry, Blue (tall shrub, along sunny pathways)
Elderberry, Red (medium shrub, wet areas, common)
Equisetum species, see Horsetail
Euonymus occidentalis, see Western Wahoo
Fairy-bell (herb, moist areas, uncommon)
False Hellebore, see under Fairy-bell
False Solomon's Seal, see under Fairy-bell
Fern, Bracken (herb, scattered, locally common)
Fern, Lady (herb, common in moist areas)
Fern, Licorice (epiphyte on maple, common)
Fern, Sword (herb, very common)
Fern, Wood (herb, scattered on trunks or stumps)
Filbert, see Hazelnut
Fragaria vesca, see Strawberry, Woods
Fraxinus latifolia, see Ash, Oregon
Fringecup (herb, scattered patches, fairly common)
Galium aparine, see Cleavers
Garry Oak, see Oak, Oregon
Gaultheria shallon, see Salal
Geranium, Wild (herb, fairly common along paths)
Geranium robertianum, see Geranium, Wild
Geum macrophyllum, see Avens, Large-Leaved
Ginger, See Wild Ginger
Goatsbeard, see under Ocean-Spray
Grand Fir (tree, rare)
Hardhack, see Spirea, Douglas'
Hawthorn, English or Red (small tree, common)
Hazelnut (tall shrub or small tree, common)
Heal-All, see Self-Heal
Hedera helix, see Ivy, English
Holly, English (large shrub or tree, widespread)
Holodiscus discolor, see Ocean-Spray
Honeysuckle, Orange (vine, scattered, forest edges)
Horsetail (herb, restricted to wetlands)
Huckleberry, Red (shrub, on stumps, scattered)
Hydrophyllum tenuipes, see Waterleaf, Pacific
Ilex aquifolium, see Holly, English
Indian Plum (large shrub, fairly common, scattered)
Inside-out Flower (herb, relatively common in shade)
Ivy, English (vine, very common)
Juncus effusus, see Rush, Common
Laurel, see under Cherry
Lilium columbianum (Tiger Lily), see under Fairy-bell
Lonicera ciliosa, see Honeysuckle, Orange
Lysichitum americanum, see Skunk Cabbage
Madrona, see Madrone
Madrone (tree, rare; common in Iron Mtn Pk
Mahonia nervosa, see Oregon Grape, Low
Maple, Big Leaf (large tree, very common)
Maple, Vine (tall shrub or small tree, not common)
Mockorange (shrub, rare; common in Iron Mtn Pk)
Montia sibirica, see Candyflower

Mountain Ash, see Ash, Mountain
Nemophila parviflora, see under Waterleaf, Pacific
Ninebark (tall shrub, scattered, not common)
Oak, Oregon (tree, rare; common in Iron Mtn Pk)
Ocean-Spray (tall shrub, scattered, not common)
Oemleria cerasiformis, see Indian Plum
Oenanthe sarmentosa, see Water-Parsley
Oregon Ash, see Ash, Oregon
Oregon Grape, Low (shrub, common in some areas)
Oregon Oak, see Oak, Oregon
Osmaronia cerasiformis, see Indian Plum
Osoberry, see Indian Plum
Pacific Madrone, see Madrone
Pacific Willow, see under Willow
Phantom Orchid (saprophyte in thick humus, rare)
Philadelphus lewisii, see Mockorange
Physocarpus capitatus, see Ninebark
Pig-a-back Plant (herb, wetter areas, not common)
Plum, see under Cherry
Poison Oak and Ivy (shrub or woody vine, rare)
Polypodium glycyrrhiza, see Fern, Licorice
Polystichum munitum, see Fern, Sword
Populus trichocarpa, see Cottonwood, Black
Prunella vulgaris, see Self-heal
Prunus species, see under Cherry
Pseudotsuga menziesii, see Douglas-fir
Pteridium aquilinum, see Fern, Bracken
Queen Anne's Lace (herb, common, sunny areas)
Quercus garryana, see Oak, Oregon
Red Alder, see Alder, Red
Red Cedar, see Western Red Cedar
Red Currant, see under Currant, Wild
Red-flowering Currant, see Currant, Red-flowering
Red Huckleberry, see Huckleberry, Red
Red-Osier, see Dogwood, Creek
Reed Canarygrass (wetland herb, West Waluga Park)
Rhamnus purshiana, see Cascara
Rhus diversiloba, Rhus radicans, see Poison Oak, Ivy
Ribes sanguineum, see Currant, Red Flowering
Ribes species, see Currant, Wild
Rose, Bald Hip & Other Roses (shrub, scattered)
Rosa gymnocarpa, see Rose, Bald Hip
Rowan, see Ash, Mountain
Rubus discolor, see Blackberry, Himalayan
Rubus laciniatus, see Blackberry, Evergreen
Rubus parviflorus, see Thimbleberry
Rubus procerus, see Blackberry, Himalayan
Rubus spectabilis, see Salmonberry
Rubus ursinus, see Blackberry, Pacific
Rush, Common (herb, rare; common in W Waluga Pk
Salal (shrub, common in areas)
Salix species, see Willow
Salmonberry (shrub, wet areas, not common)
Sambucus cerulea, see Elderberry, Blue
Sambucus racemosa, see Elderberry Red
Sedge (wetland herb, rare; occurs in W Waluga Pk)
Self-Heal (herb, fairly common along paths)
Saskatoon Berry, see Serviceberry
Scouler Willow, see Willow
Serviceberry (shrub or small tree, not common)
Shield Fern, see Fern, Wood
Siberian Miner's-Lettuce, see Candyflower
Skunk Cabbage (herb, restricted to wetlands)
Snowberry (small shrub, common, scattered)
Soft Rush, see Rush, Common
Sorbus aucuparia, see Ash, Mountain
Spirea, Douglas' (shrub, rare; found in W Waluga Pk)
Spirea douglasii, see Spirea, Douglas'
Spring Beauty, see Candyflower
Starflower (herb, scattered, not common)
Stinging Nettle (herb, wet areas, not common)
Strawberry, Woods (herb, common)
Symphoricarpos albus, see Snowberry
Syringa, see mockorange
Taxus brevifolia, see Yew, Pacific or Western
Tellima grandiflora, see Fringecup
Thimbleberry (small shrub, scattered, common)
Thuja plicata, see Western Red Cedar
Tiger Lily, see under Fairy-bell
Tolmiea menziesii, see Pig-a-back Plant
Trientalis latifolia, see Starflower
Trillium (herb, common in some areas)
Trillium ovatum, see Trillium
Tsuga heterophylla, see Western Hemlock
Twisted Stalk, see under Fairy-bells
Typha latifolia, see Cat-tail
Urtica dioica, see Stinging Nettle
Vaccinium parvifolium, see Huckleberry, Red
Vancouveria hexandra, see Inside-out Flower
Vanilla Leaf, see under Inside-out Flower
Veratrum californicum (Corn Lily), see under Fairy-bell
Viola glabella, see Violet, Yellow Wood
Violet, Yellow Wood (herb, shade, common in areas)
Virgin's Bower, see Clematis, Western
Wahoo, see Western Wahoo
Water-Parsley (herb, wetlands,restricted)
Waterleaf, Pacific (herb, moist soil, common in areas)
Western Hemlock (tree, shaded woods, rare)
Western Red Cedar (tree, wetter areas, scattered)
Western Spring Beauty, see Candyflower
Western Wahoo (large shrub, common in some areas)
Wild Ginger (herb, moist areas, uncommon)
Wild Carrot, see Queen Anne's Lace
Willow (tree or shrub, scattered)
Woods Nemophila, see under Waterleaf, Pacific
Yew, Pacific or Western (tree, shaded woods, rare)
Youth-on-Age, see Pig-a-back Plant

Alder, Red (*Alnus rubra*)

Betulaceae - birch family. The scientific name is simply the Latin term for "alder" and "red." The red coloration is not readily apparent until the inner bark and sapwood are exposed. The buds also become reddish in late winter. The common name "alder" is derived from Old English "alor", in turn derived from the Latin term "alnus."

Red alder readily colonizes disturbed ground. The exceptionally light seeds (about 700 *thousand* per pound) are carried miles by wind. Red alder and big leaf maple grow very quickly, and are frequently the dominant trees in the first 30 to 80 years of a young forest before the conifers overtop aging deciduous trees. A mutually beneficial (symbiotic) relationship between nitrogen-fixing bacteria and the roots of red alder enriches the soil. Red alder has 70 to 100 foot upright trunks with smooth gray bark aesthetically splotched with various shades of lichen. The leaves are ovate and saw-toothed (doubly serrate). The male flowers or catkins disperse pollen in the spring, and by fall the female flowers have developed into woody pine cone-like structures that release countless tiny seeds to the wind.

Red alder is becoming increasingly popular for furniture wood, providing some relief for dwindling resources of tropical hardwoods. The woodworking virtue of red alder was widely known by Northwest peoples. Dishes, spoons, platters, canoe paddles, and cradles are some items crafted from alder wood. It is a good source of firewood and is preferred for smoking salmon. The inner bark yields a reddish-brown dye that made nets invisible to fish. Erna Gunther reports that at least one Native group drank tea from boiled red alder bark for relief of colds, stomach troubles, and sores. A relative of red alder, **paper birch** (*Betula papyrifera*) is sometimes found scattered in the woods. These birch trees are probably the result of naturalized seedlings from the suburban landscape since paper birch is normally native east of the Oregon Cascades.

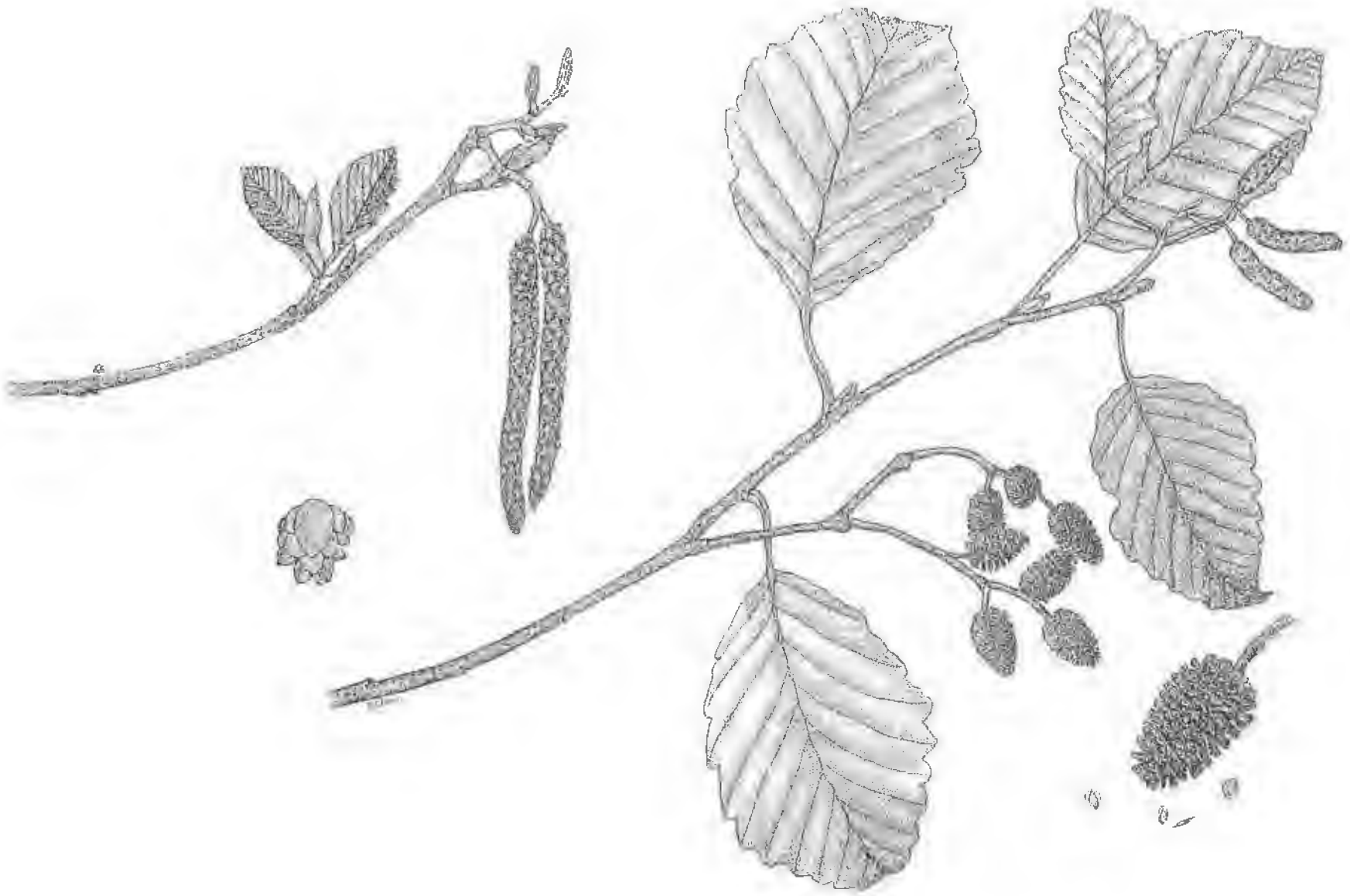


Fig. 5.1. Red Alder. **Above**: In early spring, pendulant male, and small cone-like female, catkins bloom before leafing-out; closeup of male bract. **Below**: By fall, female catkins mature into woody cone-like structures, releasing tiny winged seeds to the wind. Developing male catkins at right.

Ash, European Mountain, or Rowan (*Sorbus aucuparia*)

Rosaceae rose family. The European mountain ash, as well as our two native mountain ashes, are not true ash trees of the olive family (see Oregon Ash), but members of the rose family. Perhaps the similarity of the divided (pinnate) leaves is the origin of the misnomer. The bright red ("rowan" of Norwegian origin) color of the fruit is the likely basis for the alternative common name. The fruit is favored by birds and was once used as a bird ("avis" in Latin) catcher ("capere" in Latin) or bait for catching birds, thus explaining the specific name. The generic name Sorbus *is Latin, derived from the name of a plant in a related genus.*

European mountain ash is a small to medium tree with attractive dark green foliage and bright red clusters of fruit. Birds devour the fruit and disperse the seeds widely over woods, fields, and neighborhoods. The European mountain ash is similar to, and can hybridize with, the native **Cascade mountain ash** *(Sorbus scopulina)* that is more truly montane in this area. The Cascade mountain ash rarely has 13 or more leaflets whereas the reverse is true for the European species. The **Sitka mountain ash** *(Sorbus sitchensis)* is another native mountain ash normally found at quite high, including subalpine, elevations.

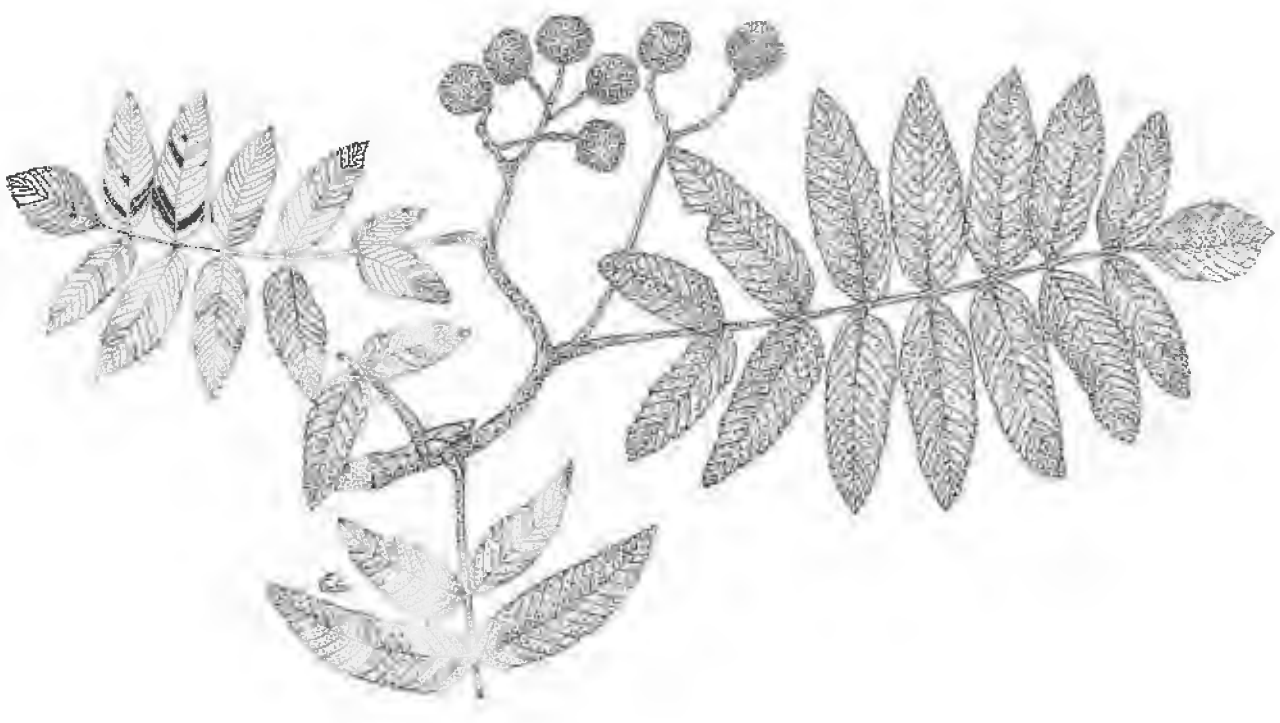


Fig. 5.2. European Mountain Ash

Ash, Oregon (*Fraxinus latifolia*)

Oleaceae - olive family. "Fraxinus" is the Latin name for the ash tree, derived from the Greek "phraxo" (to split) referring to the character of the hard wood. The specific name may have been derived from the appearance of the leaves or leaflets ("folia") that are relatively broad ("latis"). The common name is derived from Old English "aesc." Oregon ash is unrelated to the mountain ash, a member of the rose family.

Oregon ash is a straight growing deciduous hardwood tree attaining heights of 60 to 100 feet in wet soils near streams, swamps, and seeps. The opposite leaves are 6 to 12 inches long, and are divided into five to seven oblong leaflets in opposite pairs. The light green leaves turn to a bright yellow in fall. Oregon ash trees are of separate sexes (dioecious). The female trees are recognized by the clusters of tan, single-winged samaras shaped like canoe paddles. The winged samaras are dispersed by floating with currents of wind or water. The bark has distinctive vertical ridges with a woven appearance. The young, wide-ringed wood of the Oregon ash is resilient and is as favored for tool handles as that of the eastern ash. Some Native groups used the wood for canoe paddles and digging sticks. The boiled bark was reported by Erna Gunther to be a treatment for worms when the infusion was drunk.

Fig. 5.3. Oregon Ash. A branch from a female tree showing winged seeds (samaras).

Avens, Large-Leaved (*Geum macrophyllum*)

Rosaceae - rose family. The outermost lobe on the basal leaves ("phyllum") is large ("macro") and lobulated. This is an unusual design to better catch sunlight in the woods when overlapped by smaller leaves, and inspires both the common and specific names. The shredded roots of a Mediterranean species were used to impart a relish ("geyo" in Greek), explaining the origin of the generic name.

In the spring, the burgeoning and overlapping basal leaves of large-leaved avens resemble those of the related strawberry. But the plant is more distinctive when one or more tall stems arise, bearing bright yellow flowers of five petals. By the summer dry season, the expended flowers are replaced by balls of hooked seeds awaiting transport by animal fur, trousers, and shoe laces. The leaves of this woodland perennial were used in Native medicine as an astringent to dry up boils and open cuts.

Fig. 5.4. Large-Leaved Avens. Basal leaf at right, close-up of hooked seed, lower left.

Baneberry (*Actaea rubra*)

Ranunculaceae - buttercup family. It's glossy bright red ("rubra") berries and delicate light green foliage would make this shrub a very desirable garden ornamental were it not for the ***toxic*** *nature of the fruit. The common name "baneberry" is a good reminder that many members of the buttercup family contain toxic alkaloids such as anemonin. The generic name* Actaea *is derived from the Greek "aktaia" for "elder tree" referring to the similarity of the elder tree's compound leaves to those of the baneberry.*

Baneberry is a multi-branched shrub about three feet in height, bearing small white flowers in racemes. In middle to late summer, the bright red, shiny berries are eye-catching amongst the forest greenery. The gleaming berries, seemingly crafted of fine porcelain, have inspired an alternative name of "China Berry." Occasional baneberry plants produce pure white berries, that like the red berries, are favored and dispersed by birds. Some Native groups used crushed leaves to treat wounds and boils, suggesting astringent or antiseptic medicinal properties of the leaves.

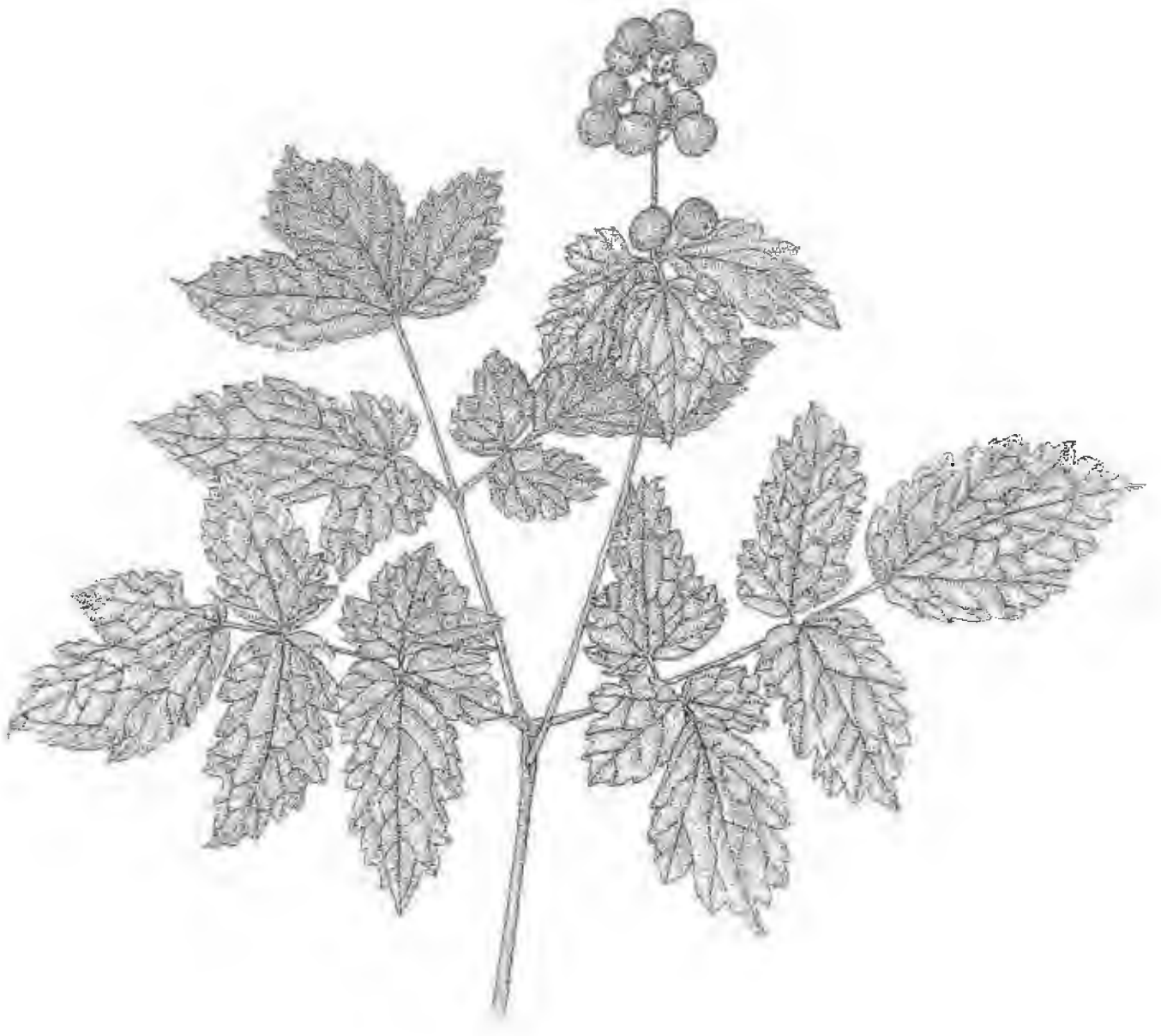


Fig. 5.5. Baneberry. The bright, shiny red (sometimes white) berries are beautiful but toxic.

Blackberry, Evergreen (*Rubus laciniatus*)

Rosaceae - rose family. The generic name means "red," referring to the ripe berry color of some members of this genus (e.g., thimbleberry, raspberry) and perhaps the semi-ripe fruit of other blackberries. The leaves of evergreen blackberry are laciniate, the specific name meaning "slashed into narrow lobes," and generally persist through the winter, giving rise to the common name.

The evergreen blackberry is native to Europe, and like the Himalayan blackberry, is an escapee from cultivation. Fortunately the evergreen blackberry with relatively slender reddish stems, lacks the highly aggressive growth habit of the Himalayan cousin. The leaves are distinctly divided into five leaflets, some of which are divided again to produce a jagged outline. Pink-white flowers are produced in spring, followed by blackberries in the summer.

Fig. 5.6. Evergreen blackberry.

Blackberry, Himalayan (*Rubus discolor or procerus*)

Rosaceae - rose family. "Rubus" refers to the red berries of other members of the genus (e.g., raspberry thimbleberry), and perhaps to the red color of semi-ripe blackberries. The specific name discolor refers to a change in coloration, perhaps in reference to the range of petal coloration from white to pinkish or the changing hues of the ripening fruit. The long thorny stems, so characteristic of this species, are the basis for the older specific name "procerus," meaning "very tall".

Himalayan blackberry was introduced with predictions that it would be a very productive berry plant. This has proven true. Along with virtue, however, comes the vice of highly aggressive growth resulting in ubiquitous impenetrable brambles. Birds spread the seeds widely, and once established, a formidable tangle ensues by means of thorny stems rooting on contact with the ground.. Himalayan blackberry leaves are distinctively divided into five ovate leaflets with serrated edges. The white to pinkish flowers have five petals.

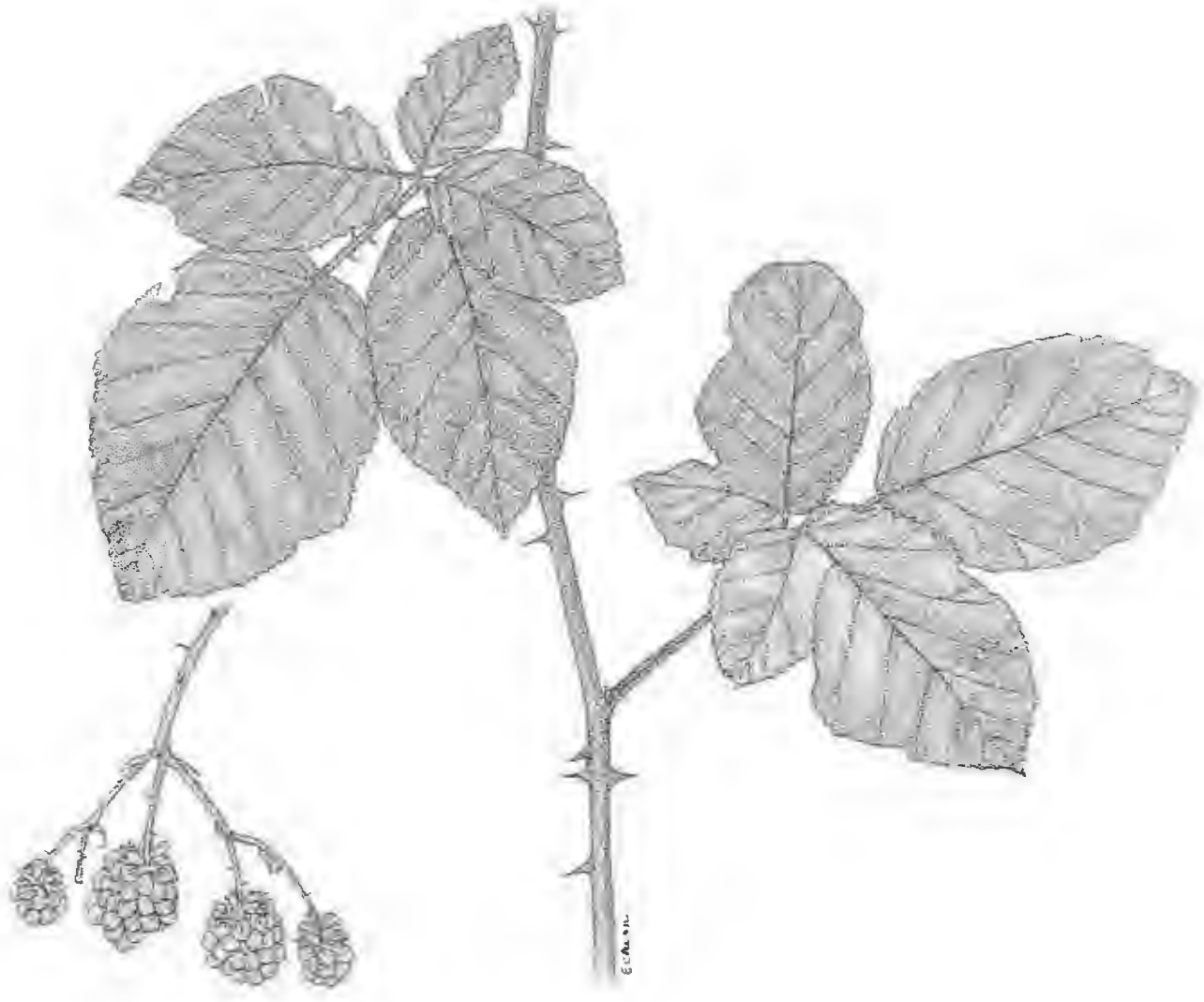


Fig. 5.7. Himalayan Blackberry, a common and highly aggressive escapee.

Blackberry, Pacific or Trailing. Also Dewberry. (*Rubus ursinus*)

Rosaceae - rose family. This is the only blackberry native to the Northwest. The generic name means "red" as explained previously. The specific name refers to the bear ("ursus"), and has to do with the widespread northern distribution of this species across North America under the northern constellation ***Ursa*** *major.*

The alternative common name of "trailing blackberry" appropriately describes the low, rambling nature of the slender vine-like stems. The leaves are thrice-parted, and the thorns small and slender. The plants may be either male or female, sometimes both, with the clusters of female flowers becoming berries that are at first whitish, then red, then black at maturity. The berries are thought by many Northwesterners to have the finest flavor of all native fruits. Native cultures have used the fresh and dried berries as food, and the leaves and vine for a tea.

Fig. 5.8. Pacific or Trailing blackberry, the only native blackberry in this region.

Camas (*Camassia quamash*)

Liliaceae - lily family. As a food source, camas lily bulbs were of great importance to Plains and Northwest Native cultures. Appropriately, the common, generic, and specific names are derived from the Native "quamash."

During the time of Lewis and Clark, there were great meadows of the blue-flowered camas. The creation of these meadows may have been aided by centuries of selection by Native harvesters who reportedly identified the white flowers of the poisonous **death camas** (*Zigadenus venenosus*) and rooted them out before they could seed. So impressed was Meriwether Lewis with the great camas meadows that in June of 1806, he wrote "from the colour of its bloom at a short distance it resembles lakes of fine clear water, so complete in this deception that on first sight I could have swarn it was water." In April and May, the camas bulb gives rise to a 1 to 2 foot tall raceme of violet-blue flowers of six petals, surrounded by several daffodil-like leaves. By summer's drought, the leaves have turned brown and dry. And in the place of the blue-flowered raceme is a stalk of dry capsules containing small black seeds that in a breeze sound like a baby's rattle. The seeds germinate readily after overwintering but it is four years until first flowering. Camas is not common in Lake Oswego, but has been identified in previous surveys of Cook's Butte Park and the Kruse Oaks/Bonita Meadows area. A pristine meadow of camas is by good fortune preserved by The Nature Conservancy in West Linn.

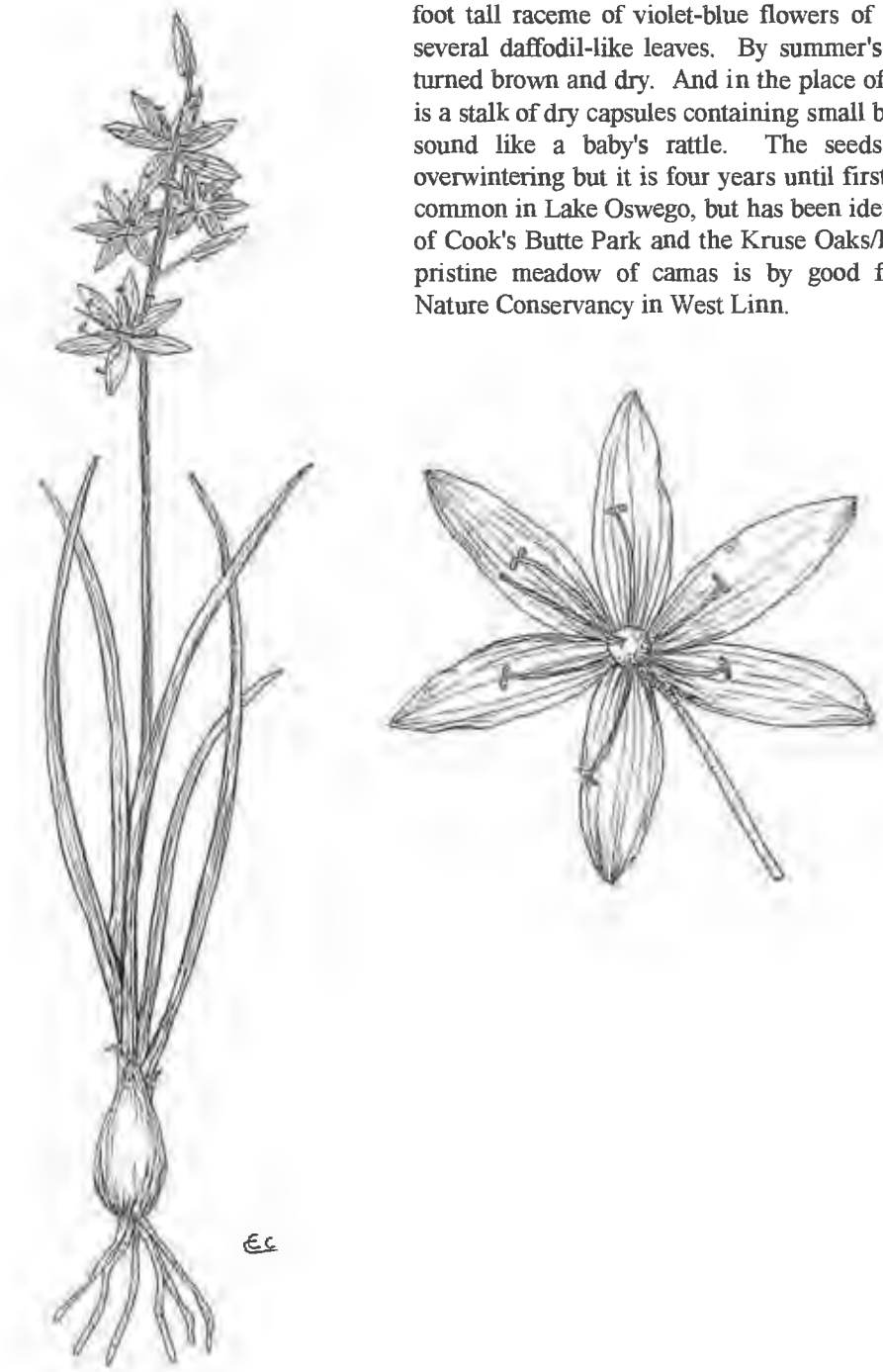


Fig. 5.9. Camas Lily

Candyflower, Western Spring Beauty, Siberian Miner's-Lettuce (*Montia sibirica*)

Portulacaceae - purslane family. The multiple common names indicate that this succulent herb produces beautiful blooms in spring, and can be eaten to boot. Italian botanist Guiseppi Monti (1682-1780) is the generic namesake for this plant that has widespread range from Siberia ("sibirica") to California.

Candy flower is a rapidly growing tender herb in the spring with a prodigious production of flowers and seeds by summer. If the life of the candyflower seems frenetic, it is because the plant must complete its life as an annual. Only a minority survive into the following years as perennials under favorable conditions. The whitish flowers of two sepals and five petals are about one centimeter across with deep pink striping reminiscent of peppermint candy. The unfurling raceme seems to hurl out blossoms one at a time tethered by slender pedicles. The green, sometimes reddish leaves, are oval to elliptical and usually pointed at the tip. The leaves on the flower stalk are paired and opposite, but most leaves are basilar in a rosette-like arrangement. Recorded Native uses were quite variable, including using the tea of the plant as a diuretic or as a general tonic. Hair was made glossy by rubbing the plant in water, and then rubbing the water in the hair.

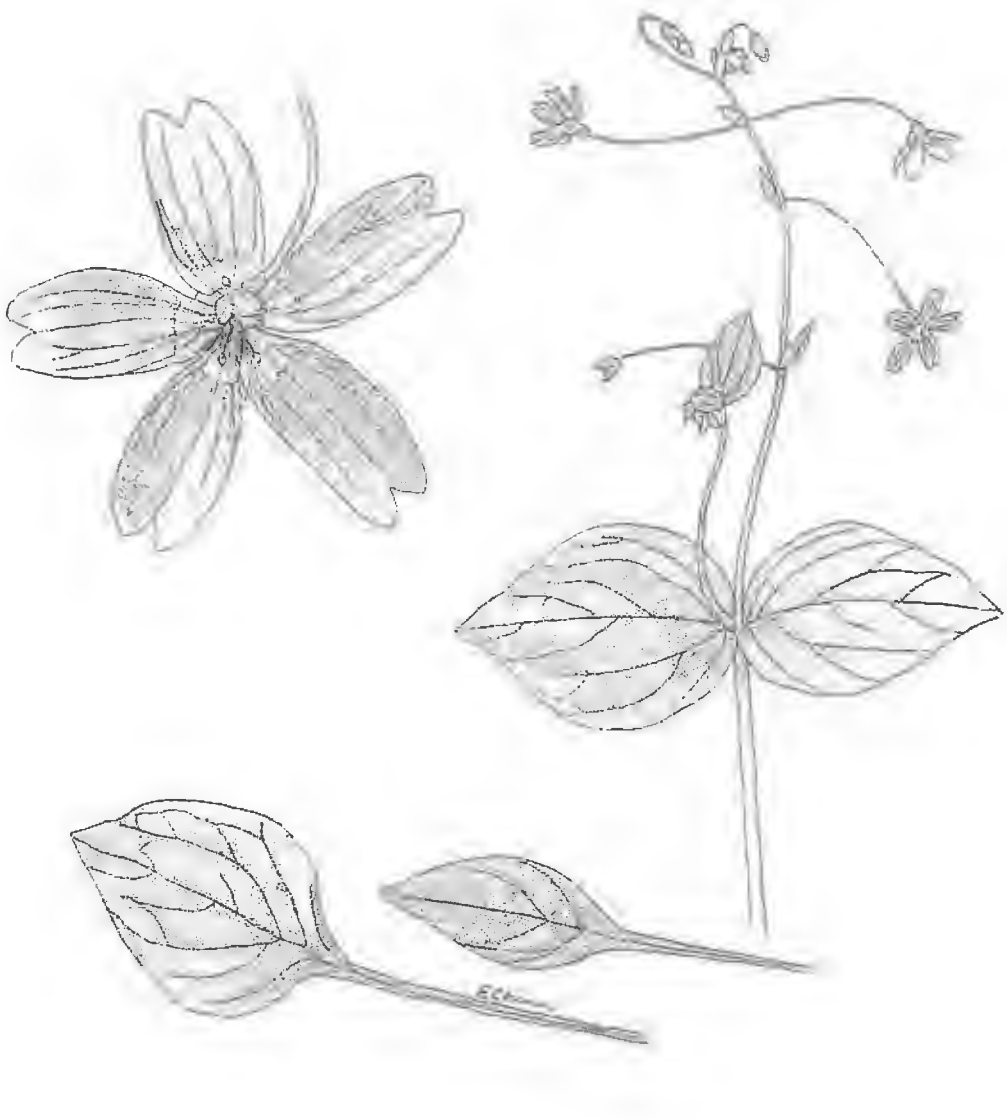


Fig. 5.10. Candyflower, Western Spring Beauty. Basal leaves (below) have long petioles.

Cascara (*Rhamnus purshiana*)

Rhamnaceae - buckthorn family. "Rhamnos" is the Greek name for buckthorn. The specific name honors Frederick Pursh (1774-1820), an American botanist. The common name is Spanish for "bark," the best known and useful part of the cascara tree.

Native people along the west coast of North America universally used the cascara bark as a laxative, a practice adopted by Western medicine and continued to this day. Spanish missions of long ago recognized the medicinal properties of this tree and annointed the active ingredient "cascara sagrada" (literally "bark sacred"). The harvesting of cascara bark was once a major industry in the Northwest. Extract of cascara tree bark can be found in the medication section of most neighborhood grocery stores. One commercial brand contains 150 mg. of "cascara sagrada" per tablet. Cascara trees are relatively small, growing up to 35 feet in height, with one or more erect trunks covered by nearly smooth, grey bark. The deciduous, oblong, and alternate leaves are distinctively shiny with 10 to 12 pairs of prominent parallel ribs. Inconspicuous green flowers in spring develop into juicy black, berry-like fruits by summer. Birds and other animals relish the sweet fruit, but some authors consider the fruit toxic to humans. Cascara trees, while not numerous, are more common than perceived, for they are inconspicuous amongst the larger trees to the casual observer.

Fig. 5.11. Cascara. Commercial extract of the bark is used as a natural laxative

Cat-tail (*Typha latifolia*)

Typhaceae - cat-tail family. The common name is inspired by the fuzzy and compact spike of tiny male flowers above, and female flowers below Typha *is derived from the ancient Greek name typhe for this wetland plant. The great Swedish taxonomist Carolus Linnaeus (1707-1778) designated* latifolia, *meaning "broad-leafed," as the specific name to describe the relatively wide (8 to 20 mm) strap-like leaves. (In contrast the leaves of lesser cat-tail,* Typha angustifolia, *the specific name meaning "narrow-leafed", are narrower at about 5 mm wide. "Bulrush" and "tule" are sometimes used as common names for cat-tail, but botanically these names refer to species of genus* Scirpus *in the sedge family, Cyperaceae.*

The cat-tail occurs in Eurasia, North Africa, and throughout most of North America in shallow, marshy wetlands. Underground stems (rhizomes) may result in extensive pure stands of cat-tail three to ten feet tall. Cat-tail marshes provide an important refuge for waterfowl, nesting marshbirds, and many other wildlife. The roots are rich in starch. They were eaten raw by the Lower Chinook, and after baking by the Chehalis The peeled inner stalks were also eaten by the Chehalis Also listed as edible in wild food guides are cat-tail root sprouts, green flower spikes, and pollen. Cat-tail was widely used by many Native groups for weaving mats and screens for winter houses, or as coverings for temporary shelters in summer Cat-tail was woven into blankets, capes, hats, and bags. The springy, resilient nature of the woven stalks also made them well-suited for mattresses and kneeling pads in canoes. Cat-tail seed fluff made a soft stuffing for mattresses and pillows. The fluff was also used for dressing wounds, and for diapers.

Fig. 5.12. Cat-tail is an important resource for food, clothing, and shelter for Native cultures of our region. The flower spike is composed of tiny male flowers above and female flowers below.

Cherry, Plum, and Laurel (*Prunus species*)

Rosaceae - rose family. The generic name "Prunus" is Latin for "plum." Many individual species of the genus Prunus *have been cultivated over countless centuries in many parts of the world - peach and nectarine, apricot, almond, cherry, plum, prune, and laurel.*

Wild cherry seedlings are constantly dispersed over fields, woodlands, and neighborhoods by birds and animals. Many, if not most, of the wild seedlings in our populated areas are probably escapees of cultivated cherries, especially *Prunus avium* (**sweet cherry** of European origin) favored by birds as the species name implies, and *Prunus cerasus* (**sour cherry**). Escaped varieties of sweet cherries are quite common, and may be distinguished from native cherries by relatively large leaves, between three to six inches long, and large sweet fruit. Other common species that have escaped to the wild include the **flowering plum** trees (several species) of neighborhood yards, and **English laurel** (*Prunus laurocerasus*) used to form dense hedges with glossy green leaves.

The native **bitter cherry** (*Prunus emarginata*) has oval leaves one to three inches long and produces bitter red to black fruit between 1/3 and 1/2 inch in size. Bitter cherry trees may attain a height of 50 to 80 feet and a diameter of 12 to 18 inches. The bark is shiny red-brown and peels in horizontal strips. **Chokecherry** (*Prunus virginiana*), another native, usually grows as a tall shrub and has 1.5 to 4 inch elliptical leaves with pointed tips. The dark red black fruit hang in characteristic racemiform (elongated) clusters. All cherry trees can be identified by the distinctive lenticels or pores circularly arranged around their trunks. Native cultures have widely used chokecherry for food. The pounded fruit is a major ingredient of pemmican to which dried meat is added. There is little historical mention of using bitter cherry for food. However, the lustrous dark bark of the bitter cherry is still an important material for the appealing designs of imbricated basketry.

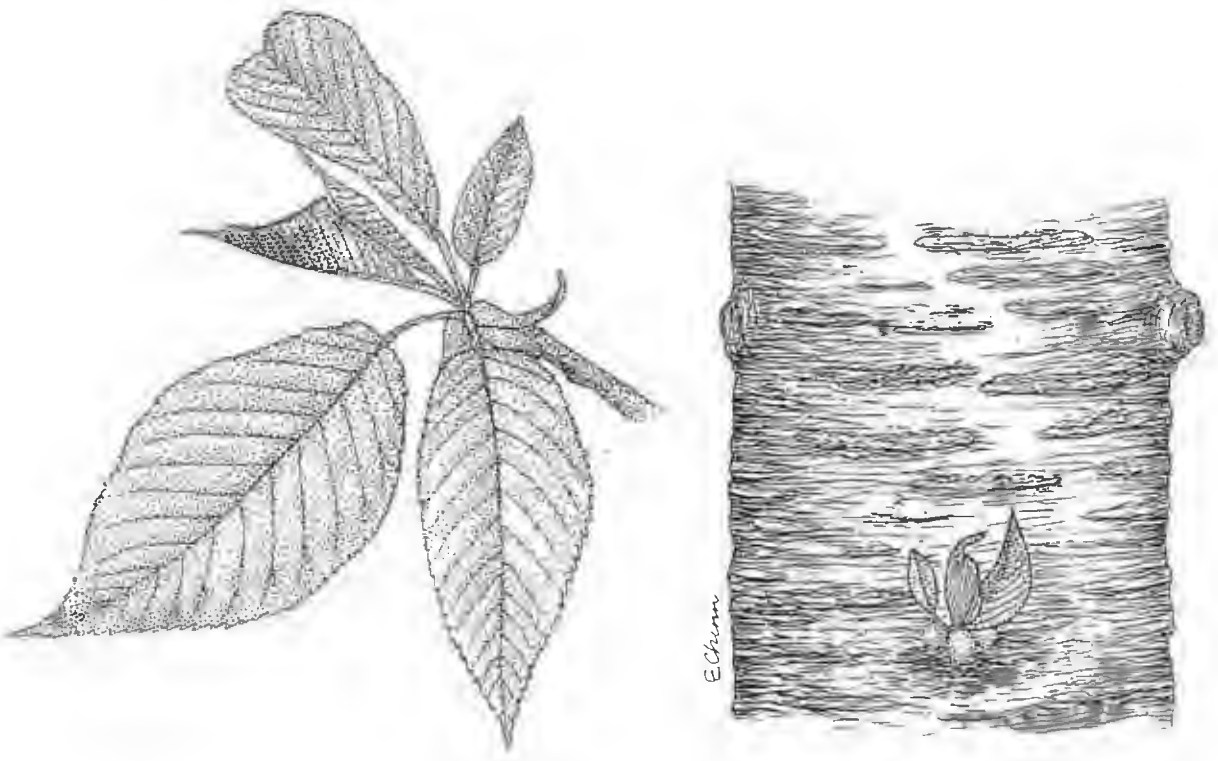


Fig. 5.13. Sweet Cherry. Note lenticels on bark.

Chicory (*Cichorum intybus*)

Compositae - daisy family. Chicory is an immigrant from Europe where it has long been cultivated for its root (an additive or substitute for coffee) and blanched tops for salads. The utility of chicory was known in ancient times, and its common name may derive from the Egyptian term "kehser." The Arabic word "hendibeh" is said to be the origin for the Latinized specific name "intybus." "Hendibeh" is also said to be the origin for "endive," a closely related salad plant.

Immigrant weeds may put on their finest show when spikes of cerulean blue chickory are seen swaying in the breeze against the delicate white background of Queen Anne's lace. However both weeds are better appreciated cheering up country roadsides and abandoned fields rather than one's own garden plot. Chicory and wild carrot, like another immigrant the dandelion, have prodigious tap roots and seeding capability, as many gardeners know.

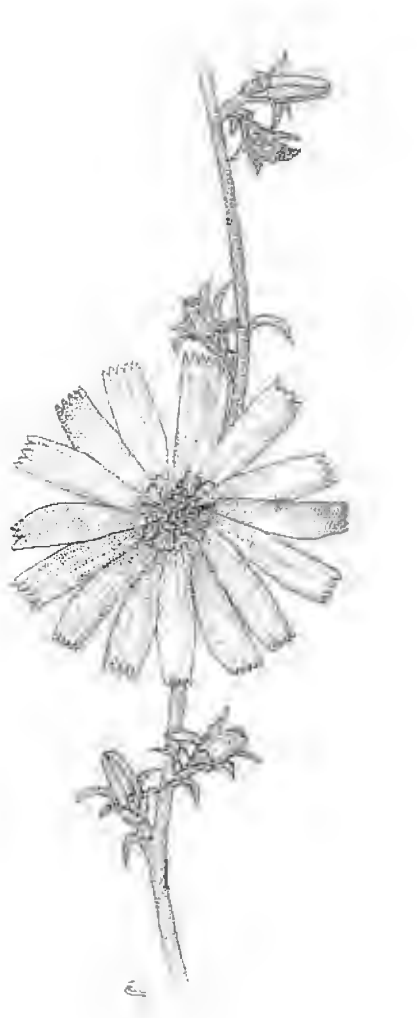


Fig. 5.14. Chicory. The blossoms are a cerulean blue.

Cleavers or Bedstraw (*Galium aparine*)

Rubiaceae - coffee family. The leaves, seeds, and squarish stems of this thin, clambering weed have small bristles or barbules to catch passing fur or clothing as a means of seed dispersal. This loathsome characteristic explains the common name "cleavers" (from Old English "clifian," to adhere), and the specific name "aparine" (from Greek "apara," to seize). Galium *species, some pleasantly fragrant, have been used as bedstraw (giving rise to an alternative common name), and according to legend, a species was used in the manger at Bethlehem. The ability of many members of this family to curdle milk ("gala," Greek for milk) in the process of cheese-making explains the generic name* Galium.

Cleavers has cosmopolitan (worldwide) distribution. In England, the names of "catchweed" and "grip-grass" are also used. Six to eight leaves are distinctively arranged in a whorl around the squarish stem. The flowers and paired seeds arise from slender axillary stalks. Dried and roasted seeds of various *Galium* species have been used as a substitute for coffee, not surprisingly since both cleavers and coffee are members of the same family. There are several other native bedstraws, all relatively uncommon in populated areas compared to cleavers, and all with decidedly better manners. The sweet-scented ground cover of a related genus with similar appearance is the sweet woodruff of European origin.

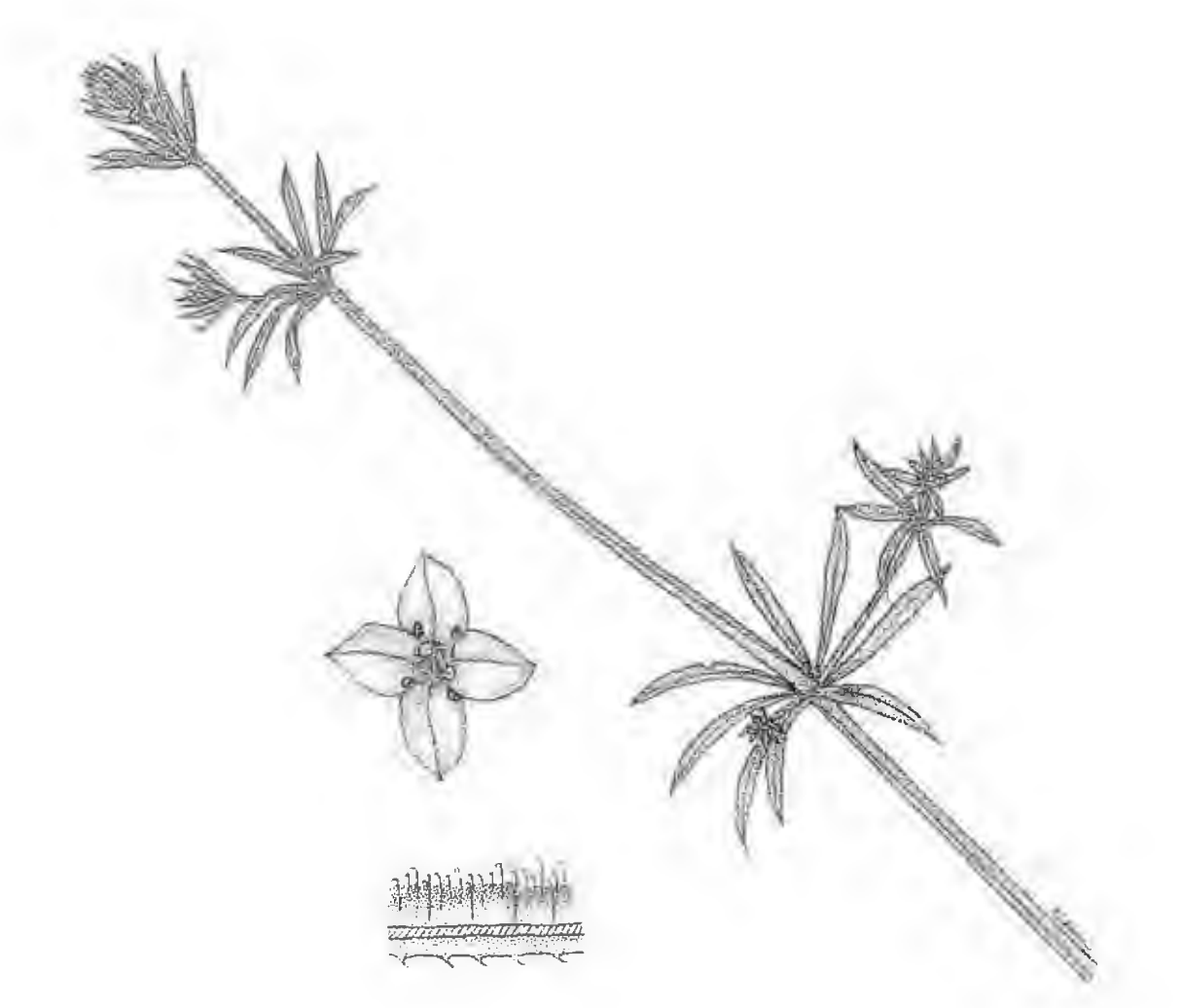


Fig. 5.15. Cleavers or Bedstraw, a common but intriguing garden pest. Closeup of flower (left upper). Greatly magnified section of a leaf (left lower) cut longitudinally along the midrib showing hooked hairs on upper leaf surface and barbules along the midrib below. Stems have similar barbules along the edges.

Clematis, Western. Also Virgin's Bower (*Clematis ligusticifolia*)

Ranunculaceae - buttercup family. The Greek word "klema" referring to a tendril or vine-branch, is the origin of the generic name for this vine. The specific name was acquired when the 19th century botanist Nuttall thought the leaves resembled those of Ligusticum *in the parsley family. The vines often drape heavily over trees, and in the summer and fall are covered with masses of fluffy white seed clusters. No doubt a forest trail shaded by this canopy of white fluff inspired the more fanciful name of "Virgin's Bower."*

This relatively common vine has opposite leaves subdivided into five to seven leaflets. The leaflets contain variable numbers of toothed lobes. The cluster of flowers arise from leaf axils. The petals are dimunitive, but the sepals are white and petal-like. The vines are are dioecious, bearing either male or female flowers, the latter producing the abundant, plumed seed by fall. The seeds are dispersed widely by wind. There are many cultivars of related *Clematis* species grown for floral displays and fragrance. Non-native garden escapees, e.g., *Clematis vitalba* (Travelers-joy), can sometimes be found in the wild.

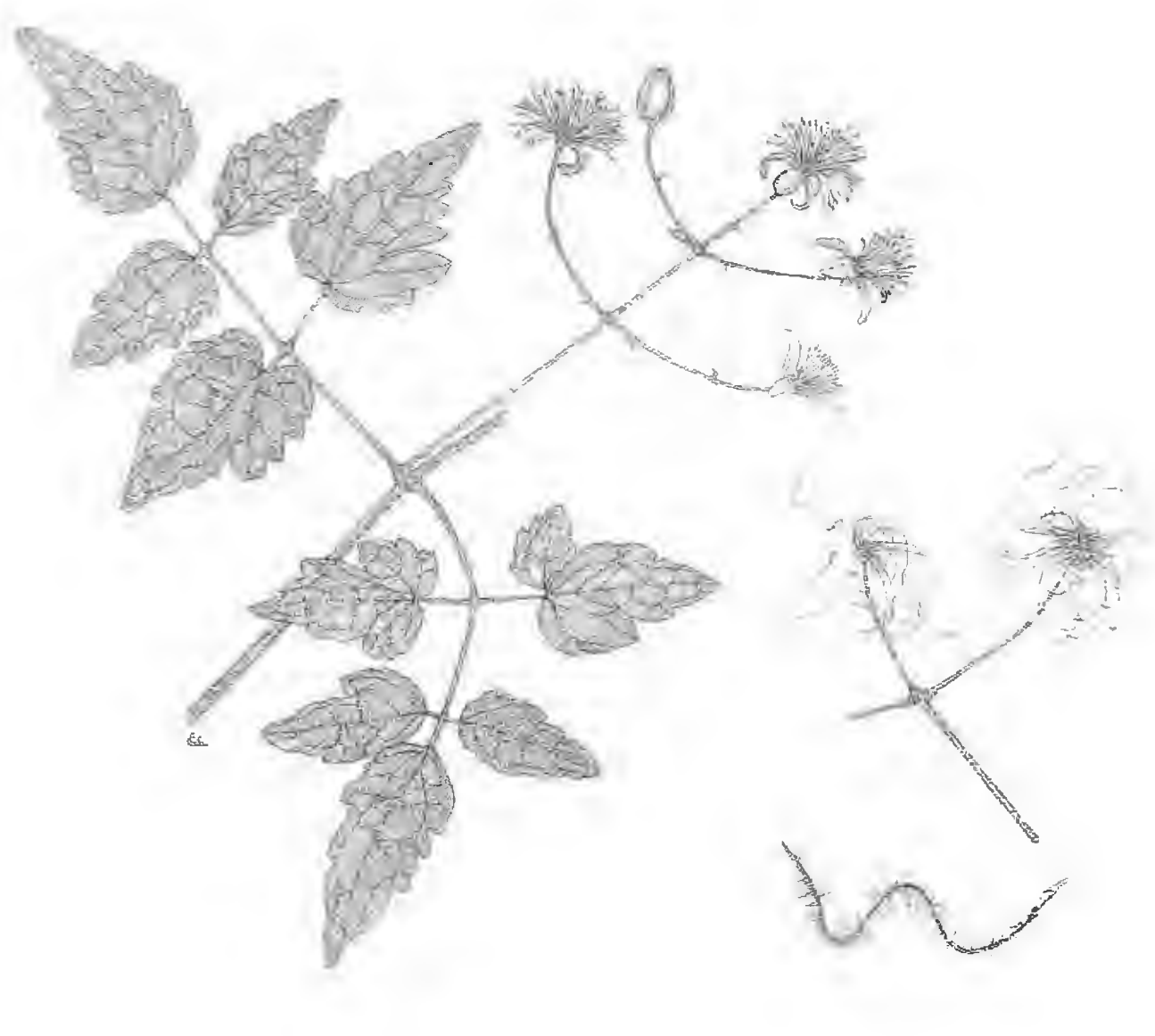


Fig. 5.16. Western Clematis or Virgin's Bower. A seed is enlarged (below right).

Cottonwood, Black (*Populus trichocarpa*)

*Salicaceae - willow family. It is the seed ("carpa" meaning "fruit") that is cotton-like ("tricho" meaning "hairy"), not the wood, that is the basis for the common and specific names. The generic name is Latin meaning "people" for poplars (*Populus spp.*) were commonly planted in Roman cities.*

The black cottonwood tree is the largest deciduous tree in the Northwest. This member of the willow family is common along riverbanks and other wet areas where abundant moisture enables it to be one of the fastest growing trees. The largest cottonwood in the Willamette Valley has been measured at 147 feet in height and 9.5 feet in thickness. Young bark is light gray and smooth contrasting sharply with the darkened fissures of older bark. The leaf buds are large, pointed and exude a sticky sweet-scented resin. The leaves are triangular, dark glossy green above and whitish beneath. Remember the cottonwood when warm summer breezes are filled with cottony fluff carrying tiny seeds produced by the female trees. Native groups used the wood for posts, the bark for roofing, and young shoots for lashing and tying. The infusion of bark found use as a gargle for sore throat, the bruised leaves as an antiseptic for cuts, the buds to prepare an eyewash, and the resin for direct application on cuts and wounds. The Native medicinal uses parallel European uses of black poplar (*Populus nigra*), and are very likely based on the anti-inflamatory and antiseptic properties of tannins, resins, essential oils, and the glycosides salicin and populin.

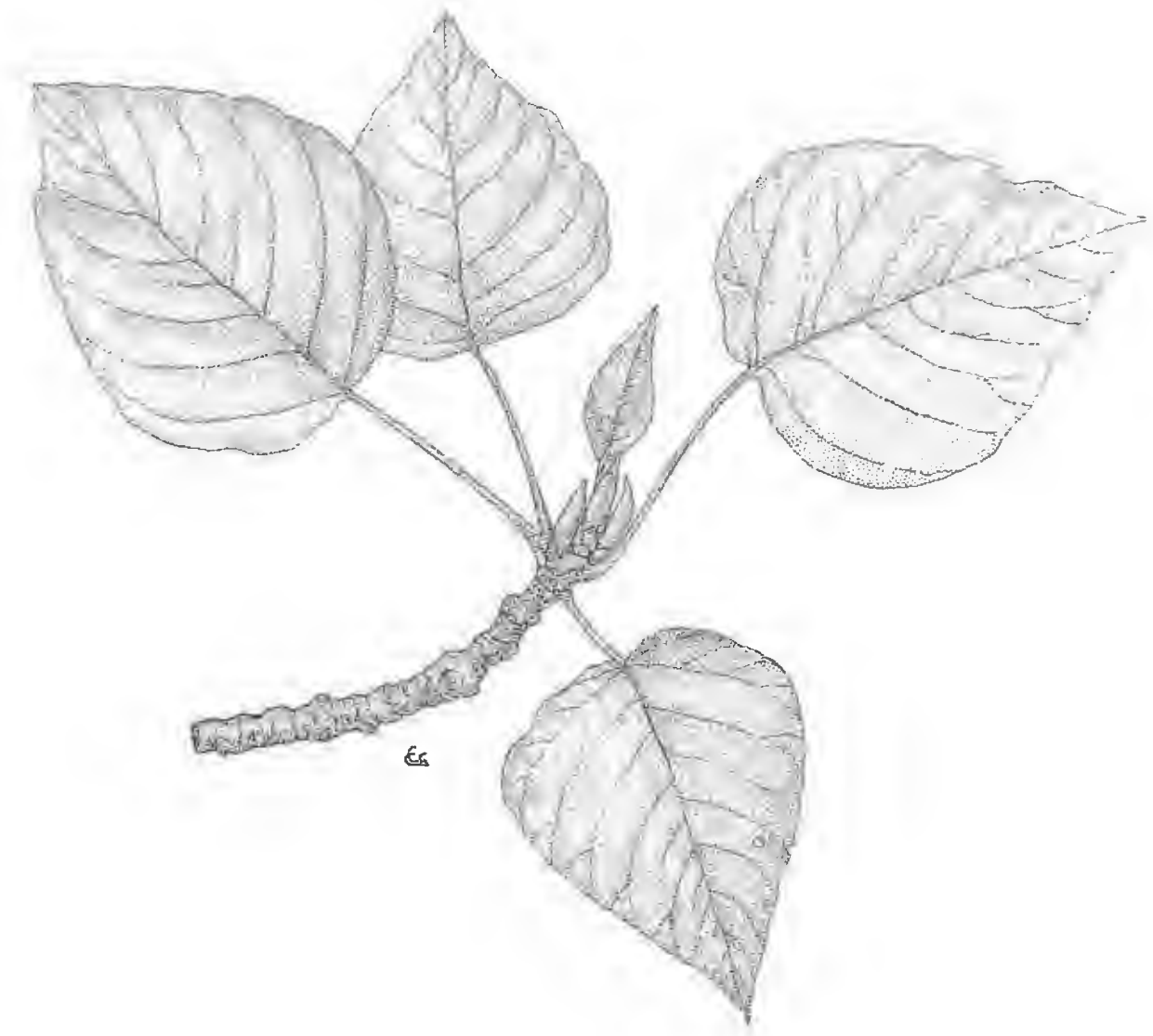


Fig. 5.17. Black Cottonwood, one of the largest and fastest growing deciduous trees in the Northwest.

Currant, Red-flowering (*Ribes sanguineum*)

Grossulariaceae - currant and gooseberry family. The genus takes its name from the Arabic name "ribas" for a rhubarb-like plant Rheum ribes. *The racemes of red flowering currant may be blood red ("sanguineum"), but are usually of a more subdued shade. Currants and gooseberries are in the same genus, and are distinguished by the presence of thorns on gooseberries but not currants.*

The thought of currants and gooseberries evokes images of a well-tended English garden with Peter Rabbit up to some mischievousness between tidy hedgerows. Yet *Ribes* is primarily of North American and Andean distribution. Our native red-flowering currant became a garden favorite in Europe upon its introduction by David Douglas in 1826. More than a century and a half later this beautiful and tame shrub, described by eminent botanist Lewis Clark as "one of the finest of all ornamental shrubs," is still underappreciated here, its place of origin. Prior efforts to control the white pine blister rust, an introduced fungus with alternate life cycles between *Ribes* and commercial pines, led to the attempted eradication and perhaps undeservedly tarnished reputation of *Ribes*. Red-flowering currant has many upright stems three to ten feet high, with thin brown bark and alternate, deciduous leaves of three to five lobes. The flowers are borne in showy, pendulous racemes in spring, and develop into bluish-black berries that are palatable for birds but are not very palatable for humans.

Fig. 5.18. Red-flowering Currant, a beautiful and underappreciated native shrub.

Currant, Wild *(Ribes sp.)*

Grossulariaceae - currant and gooseberry family. See preceeding for derivation of nomenclature.

This wild currant has small yellow-green flowers and jewel-like, red semi-translucent fruit. Both flower and fruit are about 4 to 5 mm. across. The not unattractive 3 to 4 foot tall shrub has tan-brown stems, and leaves that are shiny and medium-dark green above. This wild currant may outnumber the native red-flowering currant near populated areas, and probably is an escaped form of the cultivated **red currant** *(Ribes sativum)*.

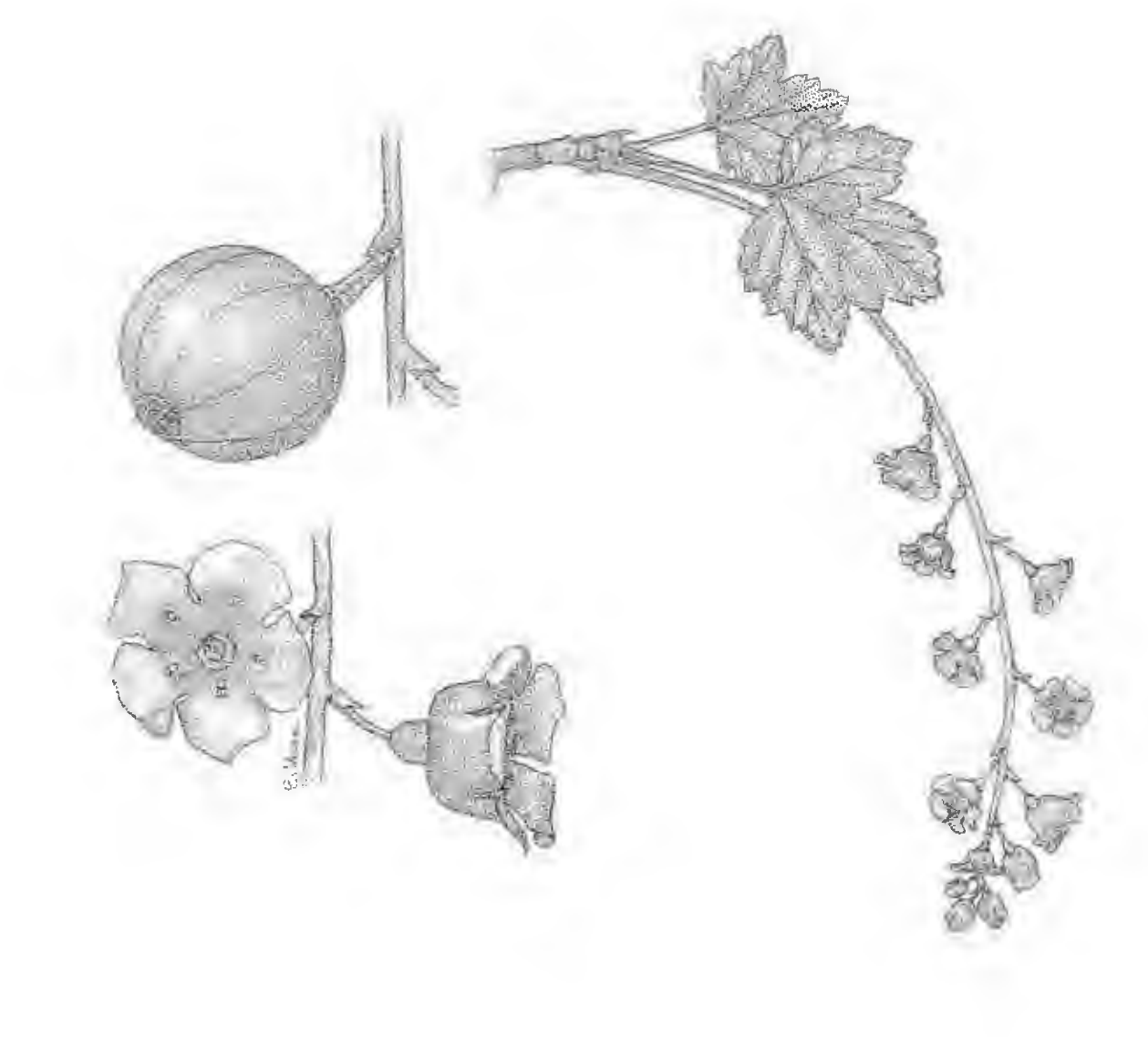


Fig. 5.19. Wild Currant, probably an escaped form of cultivated Red Currant.

Dogwood, Creek or Red-Osier (*Cornus stolonifera*)

Cornaceae - dogwood family. The interesting origins of the generic name "Cornus" and the common name "dogwood" are explained in the section on Pacific dogwood. The adjectives "creek" and "red osier" of the common name accurately describe the wet or damp soil conditions preferred by this dogwood, and the willow-like ("osier" of French origin) stems that turn bright red in winter. The tendency for prostrate stems (stolons) to sprout roots enables the creek dogwood to have a spreading, sometimes thicket-like habit of growth, and is the origin of the specific name "stolonifera."

The creek dogwood has opposite, ovate leaves, and clusters of tiny four-petalled flowers like its cousin the Pacific dogwood. However, the creek dogwood lacks the large, showy, petal-like bracts of the Pacific dogwood. The landscaping virtues of this native dogwood are most striking in late fall and winter, when clusters of white berries contrast aesthetically with smooth and naked stems of red. A vintage winter scene will have fresh-fallen snow as the backdrop of white for the red-osier stems. In wet areas, creek dogwood is a rapid grower reaching 6 to 12 feet within a few years. Birds find the fruit attractive, and seem quite successful in dispersing the seeds around neighborhoods and wet areas. Although bitter, the berries were used as food by certain Native groups. The flexible stems were used to make racks, bows, and baskets. Bark fibers were processed into cordage for tying.

Fig. 5.20. Creek Dogwood or Red-Osier. Enlarged fruit (upper left) and flower (lower left).

Dogwood, Pacific Flowering (*Cornus nuttallii*)

Cornaceae - dogwood family. There is universal agreement that "cornus" is the Latin word for horn, but there is no agreement as to which attribute of the dogwood engendered this generic name. Botanist Lewis Clark suggests that the generic name is derived from the resemblance of the immature flower heads to the knobbed ends, or cornu, of scrolls, whereas Arthur Kruckeberg suggests that "cornus" refers to the hard, resilient wood. The specific name is without controversy, and honors Thomas Nuttall (1786-1839), one of the earliest botanical explorers of western North America. The common name "dogwood" has nothing to do with man's best friend, but is a corruption of "dagwood," referring to the Old English "dagge" ("dagger" or "skewer") made from the hard wood of a European Cornus *species.*

In April and May, and infrequently in September, this beautiful 20 to 50 foot tree shows off its large white blossoms borne on bare branches reminiscent of the pink eastern dogwood. In fall, the Pacific dogwood like its eastern cousin, is again showy, with yellow to red leaves and bright red-orange clusters of fruit that birds find attractive as food. The large showy "petals" are really four to six large petal-like leaves called "bracts." The true flowers are tiny and clustered centrally in a compact head (cyme). Many attributes of dogwood come in pairs or quadruplets, such as the four true petals and stamens, and paired and opposite leaves and branches. The hard and resilient quality of the wood was well known to Native people who honed the wood into harpoons or bows. The boiled bark was used as a laxative, and in the 1800's to treat malaria in place of quinine.

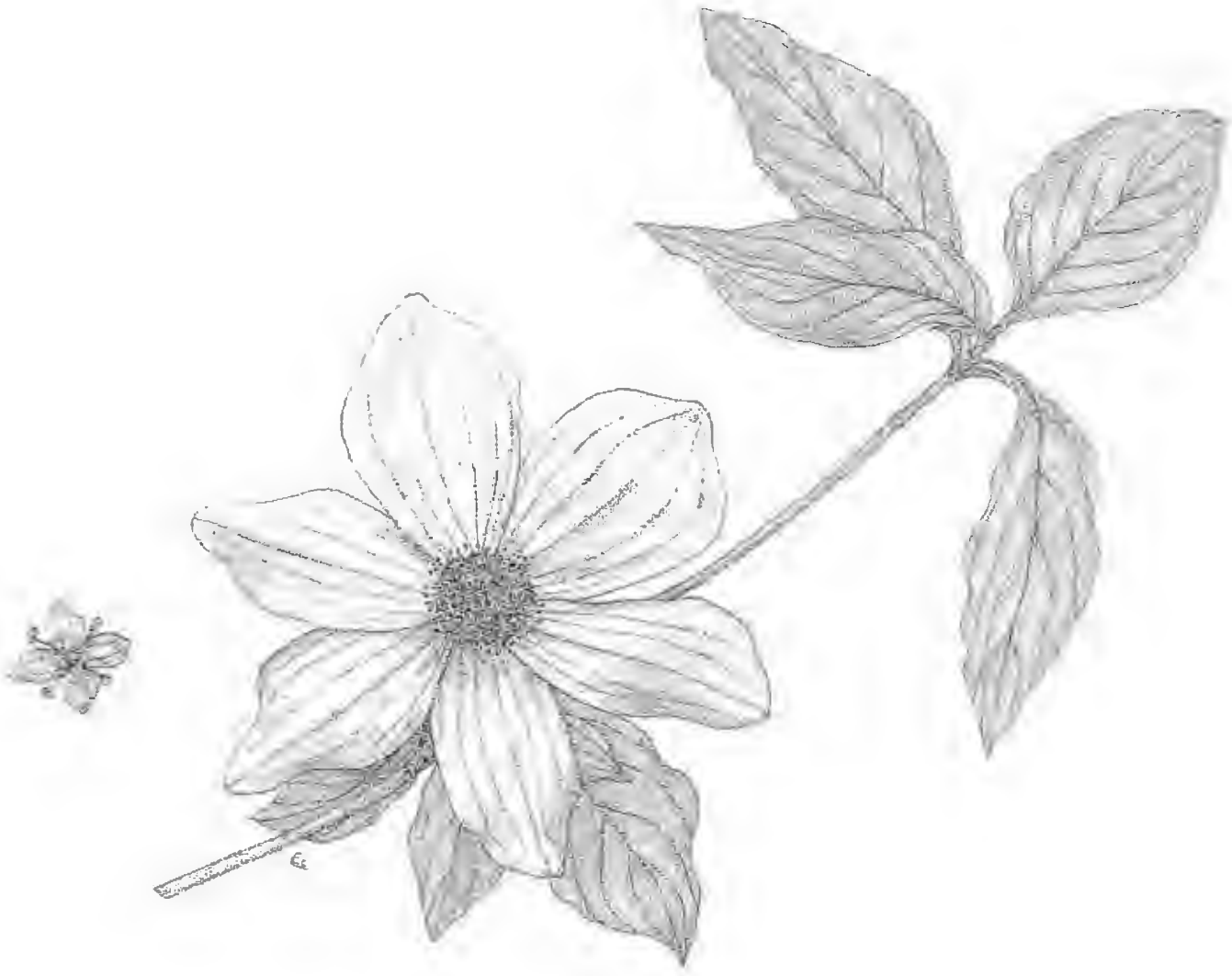


Fig. 5.21. Pacific Flowering Dogwood, a beautiful native tree. Enlarged true flower at left.

Douglas-fir (*Pseudotsuga menziesii*)

Pinaceae - pine, fir family. "Pseudotsuga" is derived from "pseudo" (false) and "tsuga" (the Japanese name for hemlock). "Menziesii" is derived from the name of the naval surgeon and naturalist with the expedition of Captain George Vancouver, Archibald Menzies (1754-1842). The common name honors the famous Scottish botanist and explorer David Douglas (1799-1834). Despite the common name, the tree is not a true fir of the genus Abies.

Old growth Douglas fir giants may live for over a thousand years and may top 300 feet. The lofty boughs of Douglas-fir are frequently too high for identification, but the thick, fissured, and corky bark is immediately recognizable. If there is still any doubt, the triple pointed bracts of the fallen cones look like so many mice diving for cover! Douglas-fir bark and wood were important sources of firewood for the Northwestern Native peoples. Pitch-saturated boughs were used for torches. Harpoon shafts, spears, net handles, and other implements were crafted from the wood. Some tribes used pitch as medicine by applying it to sores. (Turpentine, derived from the pitch of various conifers, has been historically used as a disinfectant and medicinal in Western medicine.) The pitch, needles, or bark of young roots were sometimes boiled and the infusion drunk as a cold tonic. Bud tips, perhaps like lozenges, were chewed for sore throat. The small winged seeds are food for Douglas squirrel, chipmunks, mice, and many birds. The young shoots are a source of sustenance for black-tailed deer during winter. Black bears are well-known to strip bark off young trees in order to dine on the soft and nutritious cambium layer.

Fig. 5.22. Douglas-Fir is not a true fir. The cones have bracts that resemble the hind end of mice.

Elderberry, Blue (*Sambucus cerulea*)

Caprifoliaceae - honeysuckle family. The Latin name for elderberry is "sambucus." The clusters of glossy, bluish (cerulean) berries contrast with the red berries of red elderberry (Sambucus racemosa).

This member of the honeysuckle family grows as a tall shrub or attractive small tree in areas dryer and sunnier than that preferred by the red elderberry. The long (5 to 12 inches) pinnately compound leaves have 5 to 11 finely toothed leaflets. The small creamy flowers are born in a flat-topped cluster, known as a compound cyme. The fruits are round and powder blue, about 5 mm. in diameter. The elderberries (red more so than blue) are considered mildly toxic when eaten in large quantity, but cooking seems to improve palatability. Many Northwest Native groups consumed blue elderberries, occasionally fresh, but frequently steamed using hot rocks. Traditional medicinal uses included applying the pounded leaves to relieve abcess or joint swelling, and using a tea made from bark as an emetic or cure for diarrhea.

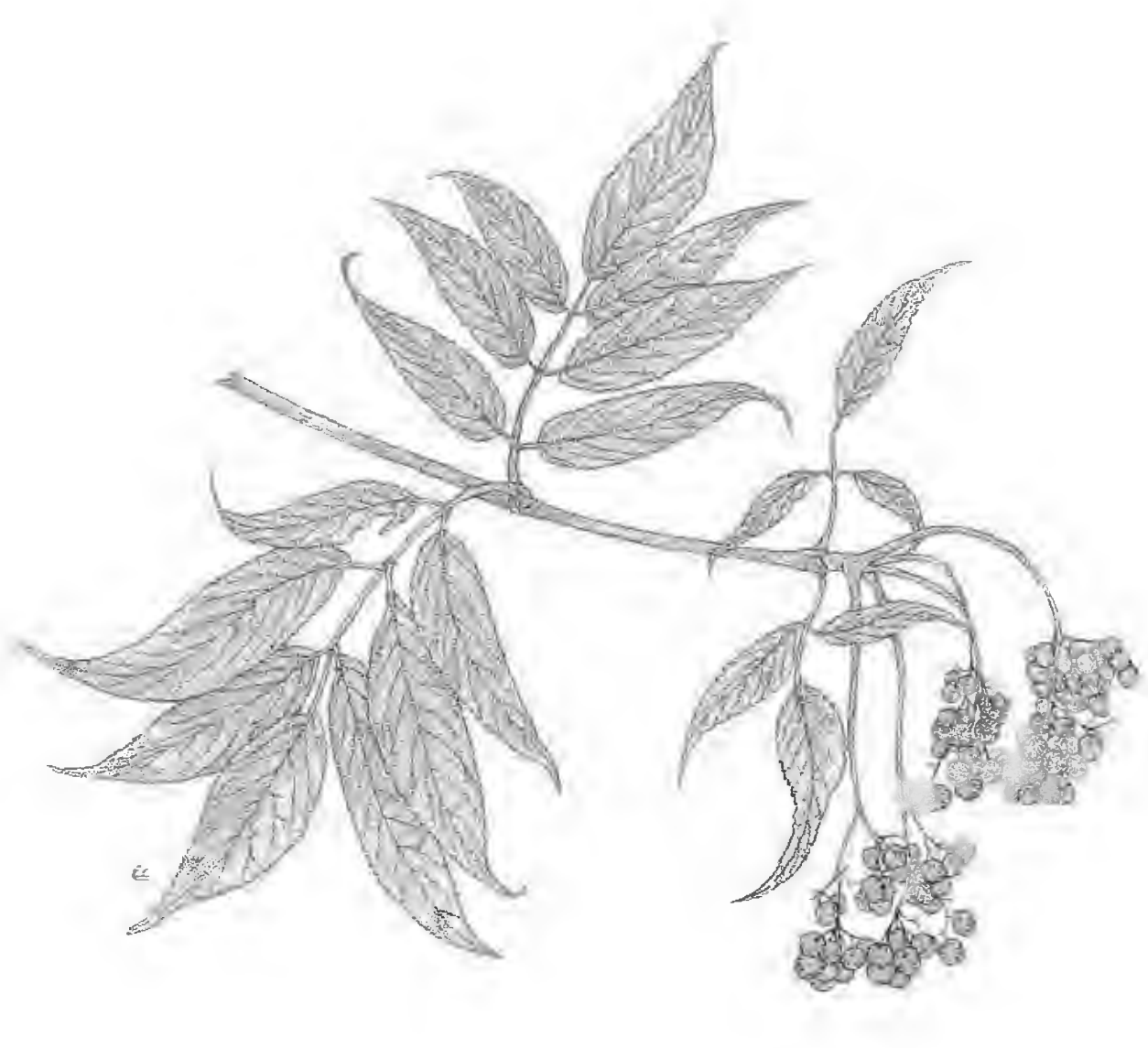


Fig. 5.23. Blue Elderberry is an attractive shrub, and grows in areas usually too dry for red elderberry.

Elderberry, Red (*Sambucus racemosa*)

Caprifoliaceae - honeysuckle family. The generic name is Latin for "elderberry." The specific name refers to the raceme-like (actually a compound cyme) clusters of small, cream-colored flowers.

Like the blue elderberry, the red species is also a tall shrub or small tree. The two species are uniquely adapted to different types of habitats, are are rarely found adjacent to one another. Red elderberry is better adapted to shaded and moist sites, whereas blue elderberry is better adapted to drier and sunnier sites. Both species have compound pinnate leaves but the red elderberry tends to have fewer leaflets (five) that are generally broader and larger than those of the blue elderberry. Of course the most striking difference is in the color of the fruit, bright red versus powder blue. Red and blue elderberry were used in similar ways by Native people for food and medicinal purposes (see Elderberry, Blue).

Fig. 5.24. Red Elderberry usually has fewer leaflets than blue elderberry, and is found in wetter sites.

Fairy-bell (*Disporum hookeri*)

Liliaceae - lily family. The generic name means "two seeds" in Greek, and does not refer to the usually paired flowers and berries, but instead refers to the presence of two seeds in each division of the ovary. The more common fairy-bell in our area has the specific name honoring botanist Joseph Hooker (1817-1911). The delicate white flowers are bell-shaped and dangle at the ends of pendent branchtips awaiting mythical wood fairies. The less common species in our area is Disporum smithii, *distinguished by the larger flowers (1/2 to 1 inch in length compared to 1/4 to 1/2 inch for* D. hookeri*), and may also be fancifully referred to as "fairy lanterns."*

Fairy-bell is found in shaded moist woods, and like the trillium, has leaves with drip tips to dispense excess water. The leaves are 2 to 5 inches long, glossy and green, with parallel veins characteristic of the lily family. The 2 to 3 foot high plant has a gracefully branching habit adorned by bell-shaped flowers in spring and round red berries in summer. The fleshy berries have 4 to 6 seeds, and were apparently not utilized much as food by Native cultures. Two other genera of the lily family in our area resemble fairy-bell. **Twisted stalks** (*Streptopus amplexifolius* and *S. roseus*) bear flowers from leaf axils, and **false-Solomon's-seals** (*Smilacina racemosa* and *S. stellata*) bear flowers in terminal clusters. Two other interesting members of the lily family, not common in Springbrook Park, are tiger lily and corn lily. The **tiger lily** *(Lilium columbianum*) resembles the Easter lily except that the flowers are orange with dark spots. (Perhaps a better name is "leopard lily.") Tiger lilies require more sun than trilliums and are usually found in forest openings. The **corn lily** or **white false hellebore** (*Veratrum californicum*) prefers open, wet places. The poisonous plants resemble stalks of corn with shiny oval leaves up to 12 inches long, topped by a panicle of whitish flowers in a manner resembling a corn tassel.

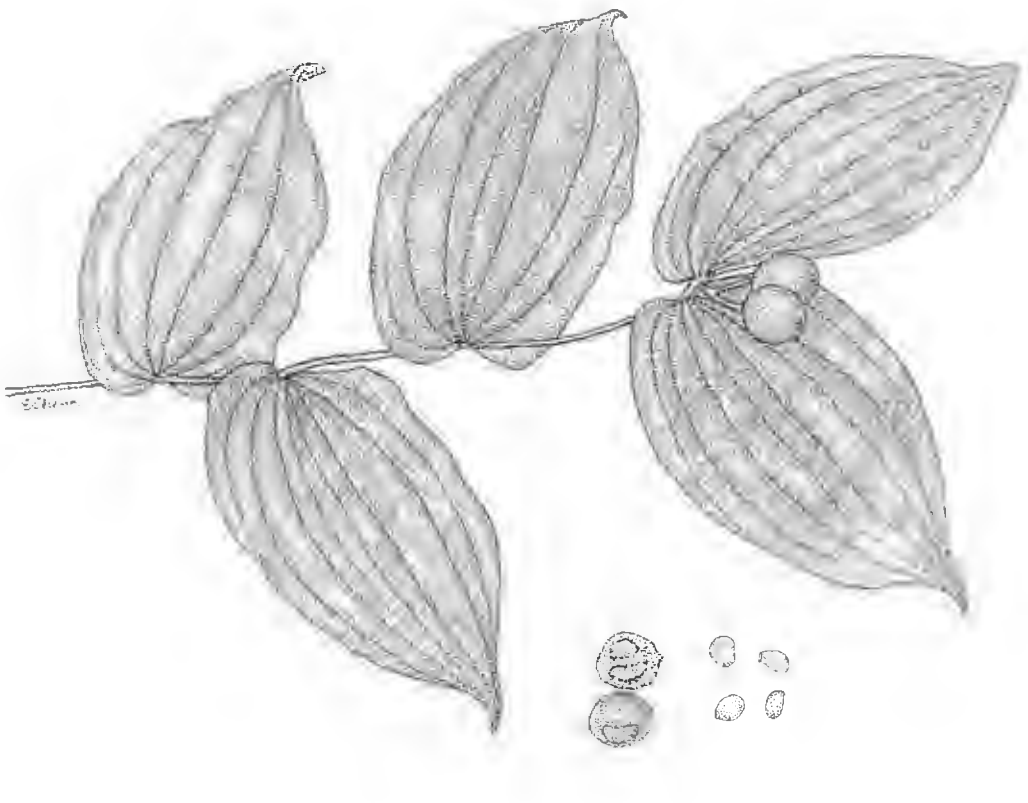


Fig. 5.25. Fairy-bell. The bright red fruit are more frequently beneath the leaves.

Fern, Bracken (*Pteridium aquilinum*)

Polypodiaceae - fern family. The broad leaves resemble great "wings" ("pteron" in Greek) giving rise to the generic name. On closer inspection, these leaves are three times pinnate, a pattern suggesting an eagle's claw ("aqui") thereby giving rise to the specific name.

The large, feathery fronds of the the bracken (brake) fern usually rise several feet above the forest floor from thick underground stems (rhizomes). In the Northwest, this is the tallest and fastest growing of the ferns, reaching heights up to 16 feet in very favorable conditons. Its refreshing tropical-like greenery of the spring and summer are lost in the fall as these fronds turn yellow and then a shriveled brown by winter. After being roasted and peeled, the thick starchy rhizomes were widely used for food by Northwest Natives. The tender "fiddleheads" of unfurled leaves were also consumed. However bracken fern contains several chemical compounds, that when ingested in great quantity as cattle are prone to do, can prove toxic. It follows that cattle ranchers generally regard this fern as a weed.

Fig. 5.26. Bracken Fern.

Fern, Lady (*Athyrium filix-femina*)

Polypodiaceae - fern family. "Athyrium" means "without a shield," referring to the covering, or more precisely the lack thereof, of the spore clusters. The delicate fronds ("filix" perhaps derived from the Latin term for "thread") may be considered dainty or lady-like ("femina"), giving rise to the hyphenated specific name.

With its relatively soft, fragile fronds, the lady fern is more demanding of moisture than the sword fern. The lady fern is found in favorably moist forest soil or along stream banks. In the spring, lady fern sends out a refreshing flush of delicate light green fronds several feet in length. The fronds taper at each end, a distinguishing feature when compared to fronds of other ferns. The fronds are deciduous, sometimes withering away by summer's drought. The stem rests through the winter to begin the cycle anew in spring. Erna Gunther relates that several Northwest Native groups used the peeled and roasted stems for food. The soft fronds were used to cover camas during baking, a tea made from boiled stems was drunk to "ease body pains," and pounded and boiled stems were used to ease the pain of childbirth.

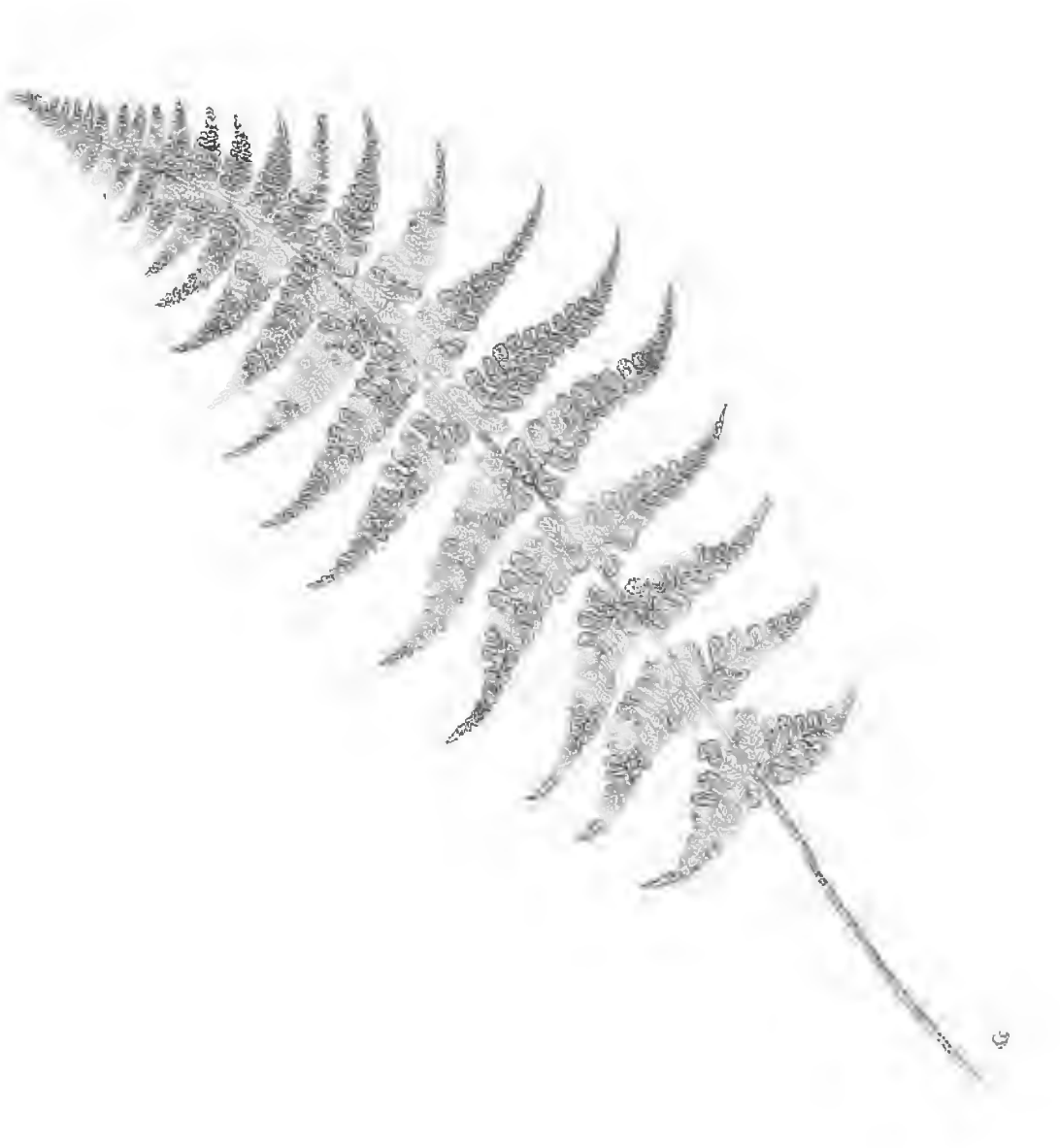


Fig. 5.27. Lady Fern. The light green, delicate fronds taper at both ends.

Fern, Licorice (*Polypodium glycyrrhiza*)

Polypodiaceae - fern family. The branched stem or rhizome of the licorice fern look like so many ("poly") feet ("podium"), thus explaining the generic name. The specific name referes to the sweet ("glycyr") licorice smell of the rhizome ("rhiza").

Moss-covered branches and trunks, particularly of big leaf maple, provide habitat suitable for licorice fern to thrive in Northwest woods. The medium green, pinnate leaves are up to a foot in length, and persist throughout winter. The licorice fern has adapted well to the warm and dry Northwest summers, and wet and cool winters. Its leaves wilt and shrivel to a pale green in the heat of summer when water is sparse, but turn lush with the cool rains of fall. This survival strategy takes advantage of both increased water, and sometimes increased sunlight, during the colder months - a time when the heavy forest canopy of summer has considerably thinned with the fall of deciduous leaves. Other plants have also adopted this strategy of dry season dormancy to our Northwest climate, including the water absorbant carpet of moss that is most often associated with the licorice fern. The rhizome of licorice fern was used sparingly for food and flavoring by Native peoples, for eaten in quantity, it reportedly has a laxative effect. The rhizome was also used as a remedy for cough.

Fig. 5.28. Licorice Fern is frequently found on the mossy trunks of big leaf maple.

Fern, Sword (*Polystichum munitum*)

Polypodiaceae - fern family. The many ("poly") rows ("stichum") of spore clusters give the genus its name. The specific name is derived from the swordlike (linear-lanceolate) leaves that are divided into rows of tooth-like leaflets (pinnae) suggesting an armament ("munitum") of teeth.

In the forest, sword ferns form lush evergreen clumps of arching, two to four foot fronds. A luxuriant quality is imparted by the bright green of unfurling younger fronds contrasted against the deep green of mature fronds. Sword fern spores germinate readily on damp, mossy soil. Thus sword ferns root in forest soil in contrast to licorice ferns that frequently perch on moss-covered big leaf maple trunks, or wood ferns that usually root on well-rotted logs and stumps. Various Northwest Native groups peeled, and baked or boiled the stems for food. They also used the leaves to line pits for baking or steaming of camas bulbs, wapato, and other vegetables. The fronds were used as a non-sticking surface for drying, and when bundled, they served as mattresses. Despite their lush appearance, sword ferns are relatively tolerant of drought and can be mixed with salal in partially shaded areas to form a perfectly natural garden.

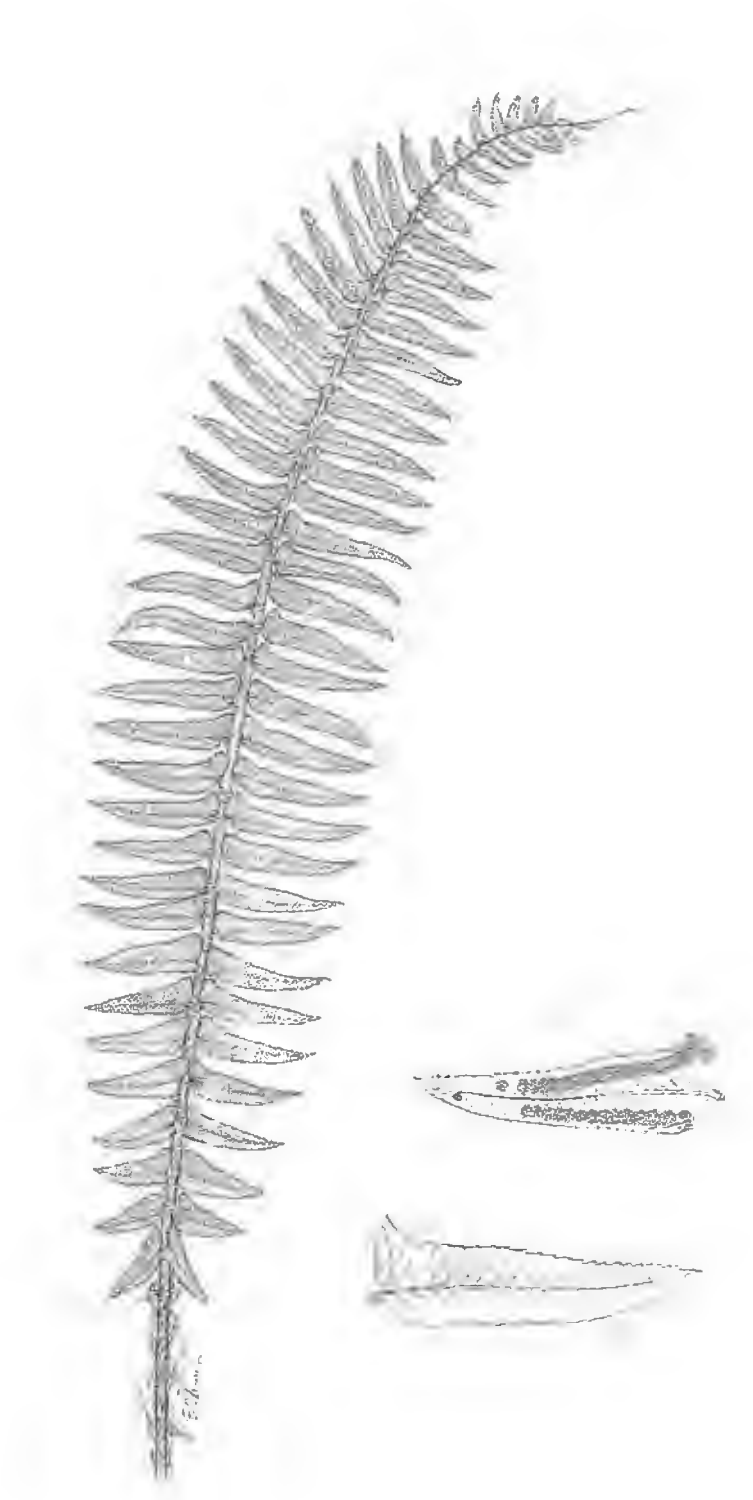


Fig. 5.29. Sword Fern. The spore clusters (sori) are on the underside of the leaflets (above, right).

Fern, Wood. Also Shield Fern (*Dryopteris austriaca*)

Polypodiaceae - fern family. Wood fern is nearly always found growing on old, rotten stumps and large logs in shaded and moist parts of the woods. The wood fern's habitat preference is reflected in both the common name and in the generic name ("drys" Greek for "tree," and "pteris" Greek for "fern"). The specific name refers to Austria, reflecting the wood fern's circumboreal distribution.

Perched on an old stump or log, the wood fern is one of the more graceful of native ferns. The medium to dark green leaves are about 1 to 2 feet long, and well-proportioned to catch the limited light of the shaded forest. The leaves are three times pinnate, possessing a filigree pattern of superior quality. Most leaves are deciduous in late fall, but the rhizome persists through winter to unfurl new shield-like fronds by spring. Some Native groups used the rhizomes for food, baking them overnight in pits.

Fig. 5.30. Wood Fern is most frequently found on well-rotted stumps or logs.

Fringecup (*Tellima grandiflora*)

Saxifragaceae - saxifrage family. "Tellima" is an anagram (rearrangement) of "Mitella" (Bishop's cap), a related genus. "Grandiflora," meaning "large flowered" is perhaps a misnomer, for the flowers are not large but about 6 to 8 mm. across. Perhaps it is the imaginative design of the flowers that is grand. The sepals are fused into a cupped calyx with a fringe of five lacy petals perfectly reflecting the common name of "fringecup."

The fringecup has a rosette of basal leaves around a short central stem from which tall flower spikes unfurl in spring. This characteristic growth habit is also common to fringecup's related woodland neighbors - the **pig-a-back plant**, the **foamflower** or **coolwort**, and **alumroot** or **heuchera**. Precise identification is made much easier if the flowers are present., for these are quite distinctive. The perennial fringe cup thrives in moist woods in areas not quite as wet as preferred by pig-a-back plant. The vertical flower spike unfurls in spring and summer, with the greenish-white flowers taking on a pinkish glow as they mature. Flowers turn into seed-filled capsules shaped like a miter (Bishop's cap). By summer and fall, the dried seed capsules have waved to and fro with the wind, dutifully spilling the tiny seeds for another generation of fringecups. Erna Gunther reports that the Skagit pounded and boiled the plant, then drank the tea as a cure for various illnesses, and to restore appetite.

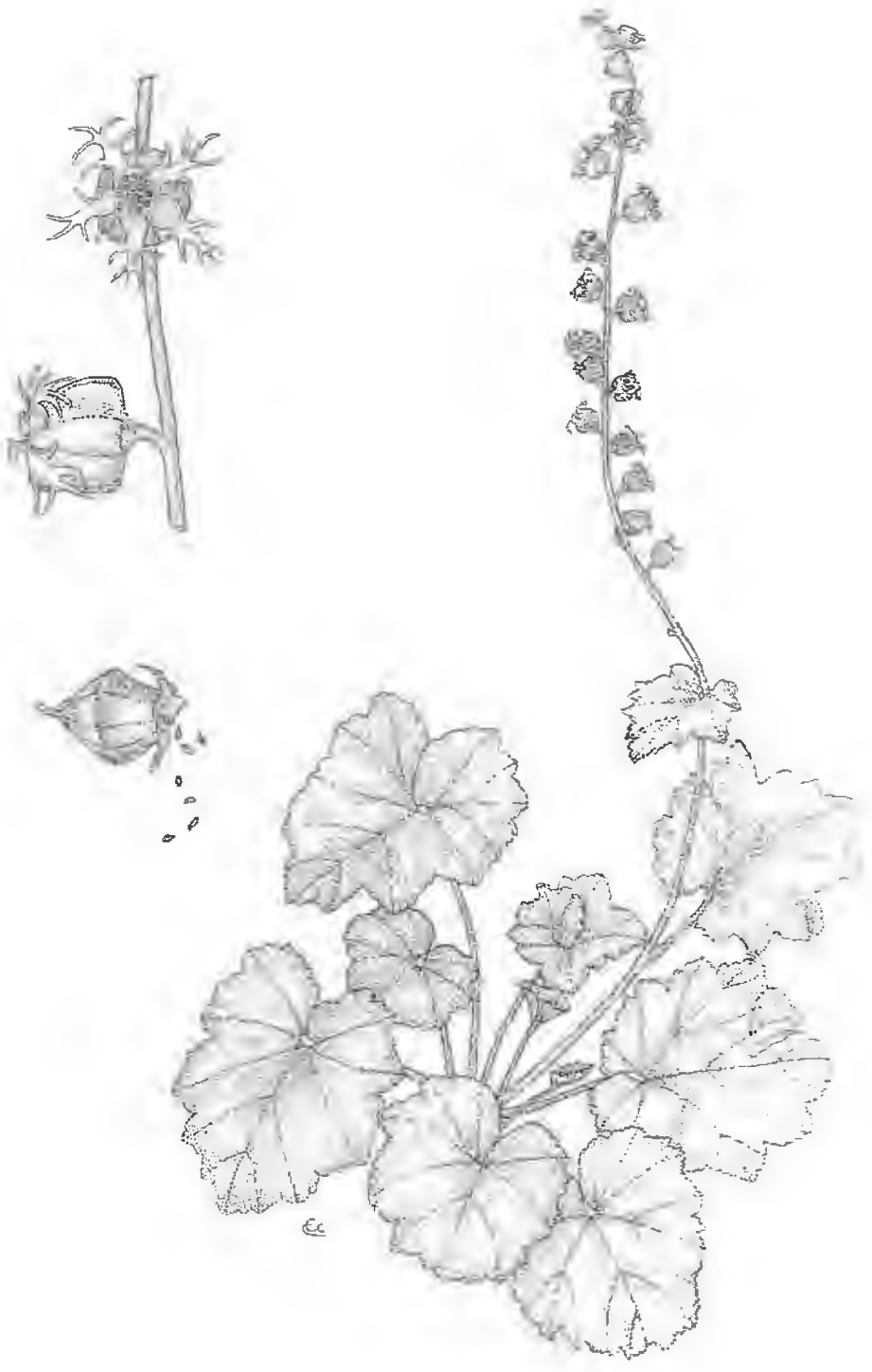


Fig. 5.31. Fringecup. Close-up of flowers (upper left) and seed capsule (lower left).

Geranium, Wild. Also Herb Robert (*Geranium robertianum*)

Geraniaceae - geranium family. The pointed seed pod of true geraniums resemble the bill of a crane ("geranos," Greek for crane), thereby giving rise to the common and generic names. There are more than several "wild geraniums," introduced and native, but Herb Robert of recent introduction from Europe, has become discomfortingly common in some native woodland settings. "Robert" may refer to the reddish ("ruber" in Latin) to violet flowers, or to Robert, Duke of Normandy.

The attractive foliage and flowers of herb Robert are perhaps the reason the plant found its way to Oregon only several decades ago. Unfortunately for some native species, this geranium of about 12 inches in height, grows rapidly and spreads readily by seeds. Herb Robert, as the name implies, has been used by herbalists for its reputed astringent and diuretic properties. Several other introduced and weedy geraniums are Carolina geranium (*G. carolinianum*), dovefoot geranium (*G. molle*), and cut-leaf geranium *(G. dissectum*). Like Herb Robert, they can be readily identified as true geraniums by the crane's bill shape of the seed pods.

Fig. 5.32. Herb Robert, an escaped geranium from Europe.

Grand Fir *(Abies grandis)*

Pinaceae - pine family. "Abies" is the Latin name for fir. The common and specific names mean "big."

Grand fir is the only true true native fir of the genus *Abies* likely to be encountered west of the Cascades below 2000 feet. Grand fir is more shade-tolerant than Douglas-fir, and can become the dominant conifer where conditions are too dry for western hemlock and western red cedar. (The latter in turn are both more shade tolerant than grand fir.) Like all true firs, the female cones stand erect on high branches near tree top. Intact barrel-shaped cones can sometimes be found at ground level after a squirrel has knawed them off branches to collect the seeds, for normally cones gradually shed scales and seeds to the wind from way up high. The foliage is distinctive, with a flat row of needles on either side of the twig, dark glossy green above and whitish below. Only the yew tree in this area has a similar flat arrangement of needles, but the latter are characteristically pointed (see Yew illustration). Old growth grand fir can attain a height of 200 feet and live for 250 to 300 years. Native cultures had various uses for grand fir including wood for fuel, boughs for bedding and floor coverings, the tea from boiled needles for a cold remedy, and the pitch as a sealant for paddles and other wood implements.

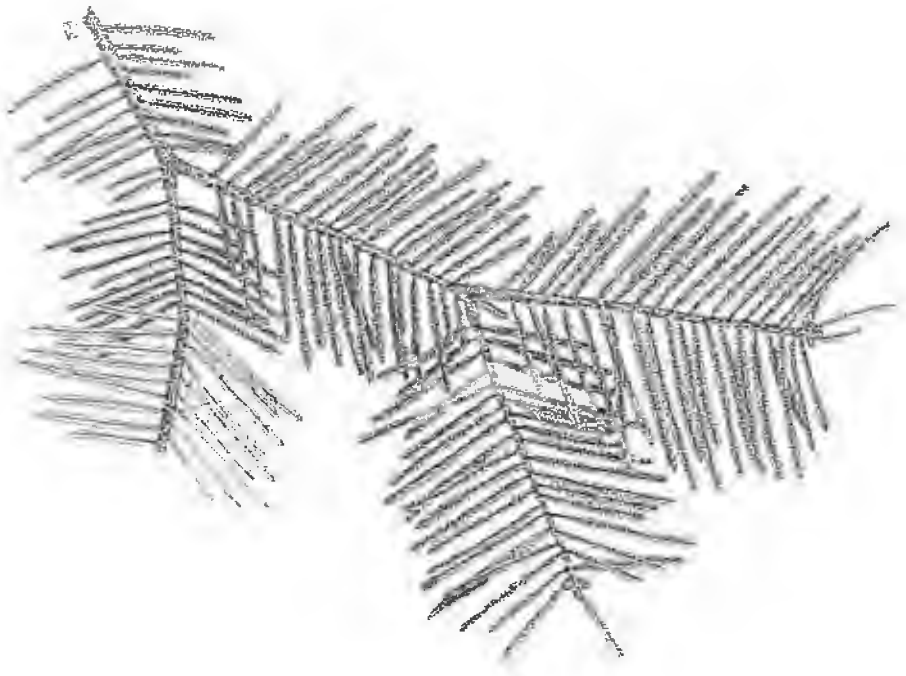


Fig. 5.33. Grand fir needles are in a flat plane, and are glossy green above and whitish below.

Hawthorn, English or Red (*Crateagus species*)

Rosaceae - rose family. "Hawthorn" derives from the Middle English "hawe" and the Old English "haga" meaning hedge. The thorn-bearing hawthorn was ideal for hedgerows that served as living fences and are so closely associated with old English countrysides. The hardness of the wood explains the generic name "Crateagus," a name derived from Greek "kratos" meaning "strong." If the small, red apple-like fruit has a single seed, it is likely of the species C. monogyna. *Multi-seeded fruit indicate the species* C. oxycantha.

Oregon settlers must have also found hawthorn useful since remnants of hedgerows are frequent in old farm fields. Birds continually disperse seeds widely over woodlands, fields, and neighborhoods making volunteer seedlings of English hawthorn a common sight. English hawthorn grows into a small thorny tree in the wild. Two native species are comparatively uncommon in populated areas, *C. douglasii* (the black hawthorne) and *C. Columbiana*, the latter occurring east of the Cascades.

Fig. 5.34. English Hawthorn. The number of seeds in a fruit indicates the species.

Hazelnut, Filbert (*Corylus cornuta*)

Betulaceae - birch and alder family. "Corylus" is derived from "korys," Greek for helmet; "cornuta" means "horned." Together the generic and specific names aptly describe the helmet-like calyx surrounding the edible nut.

This tall deciduous shrub or small tree has long main stems, and velvety ovoid leaves with pointed tips and double-toothed margins. The European filbert of Willamette Valley orchards is a close, and nearly identical, relative to our native hazelnut. Hazelnuts and filberts are festooned with yellow male catkins in February, heralding the allergy season for many pollen sufferers. The inconspicuous female flowers look like small green buds with several bright red pistals. The hazelnut has co-evolved with the squirrels, jays, and other creatures that energetically compete for the rich nuts. Hazelnut seedlings are dispersed through forest, fields, and backyards, by jays who lose their grip on the smooth shell, and Douglas squirrels who forget where they have buried their booty. Native inhabitants of the Northwest ate the nuts fresh or stored them for winter use. The long twigs were used as ties or twisted into rope by some tribes.

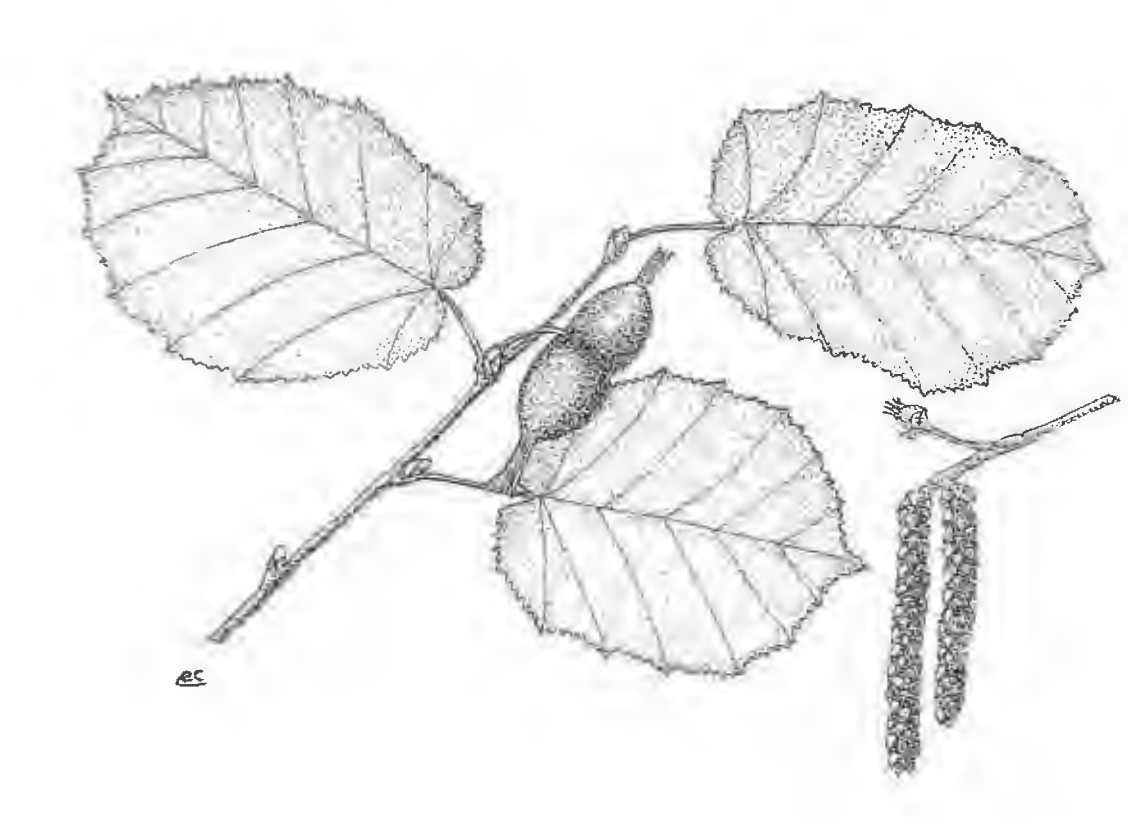


Fig. 5.35. Hazelnut or Filbert. Male catkins and inconspicuous female flower are at right.

Holly, English *(Ilex aquifolium)*

Aquifoliaceae - holly family. The holly leaves ("folium") are pointed sharply like the talon of an eagle ("aquila") and serve as the basis for both the family and specific names. The generic name is derived from the Latin name for the Mediterranean holly oak, Quercus ilex.

English holly is widely cultivated for its landscaping virtues. Since only female trees produce the bright red berries that make holly wreaths so attractive, male holly is often grafted onto a female plant to assure fertile berries. These berries are poisonous to humans, but not for birds who are responsible for seeding the holly widely in woods and neighborhoods. Left unattended in the woods, hollies become gradually enlarging inpenetrable thickets as the pendulous lower branches spread along the ground and take root.

Fig. 5.36. English Holly. Only the female plants produce berries, which are poisonous.

Honeysuckle, Orange (*Lonicera ciliosa*)

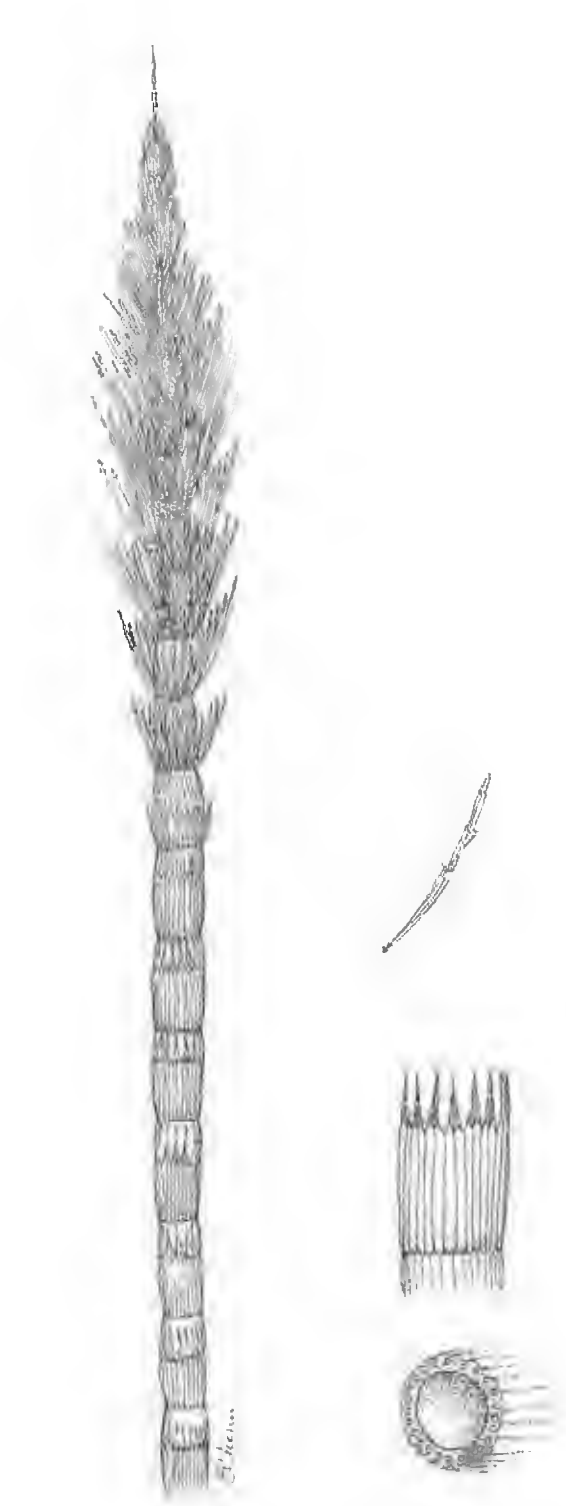
Caprifoliaceae - honeysuckle family. The generic name honors an early German botanist, Adam Lonitzer (1528-1586). The specific name refers to the minute hairs, like cilia, at the leaf margins. Our native honeysuckle has evolved a bright orange coloration to attract daytime pollinators, of which the hummingbird is best known.

In spring, vivid orange clusters of trumpet-shaped flowers hang from our native honeysuckle vines, beckoning hummingbirds along forest edges. The flowers are formed by a five-lobed corolla of fused petals with a chamber of sweet nectar at the base. The native orange honeysuckle has evolved a brilliant coloration to attract daytime pollinators like the hummingbird, and lacks the perfumed fragrance and white color of English honeysuckle which has evolved to attract night time moth pollinators. Beneath each flower cluster is a distinctive saucer-shaped fusion of two opposite leaves. The fruit is a berry that turns red in the summer. Erna Gunther reports that various Native groups used the leaves, and sometimes the bark, variably as a contraceptive, to stimulate lacteal flow, and as a cold remedy or tonic.

Fig. 5.37. Orange Honeysuckle. The bright orange flowers and sweet nectar attract hummingbirds.

Horsetail *(Equisetum species)*

Equisetaceae - horsetail family. The whorls of long needle-like branches around the hollow stems resemble a horsetail ("equus" Latin for "horse," and "seta" Latin for "bristle") giving rise to the common and generic names.



Horsetails are primitive, non-flowering plants that, like ferns, reproduce by spores. Horsetails grew as trees in the carboniferous age approximately 300 million years ago. Prehistoric forests of horsetails and other fern allies have become some of the richest coal deposits. The **common or field horsetail** is *Equisetum arvense* with legendary power to burst through asphalt pavement. Many other horsetails prefer wet or marshy environments. Horsetail stems have longitudinal grooves and are hollow. Whorls of thin branches resemble needle-like leaves, but the true leaves are reduced to toothed sheaths arising from stem nodes. The mature stems are rich in silica, making them coarse to the touch and useful as a substitute for sandpaper. An alternative name for horsetail is thus "scouring rush." The number of longitudinal ridges aids species identification - *E. arvense* (**field horsetail**) has 10 to 12, *E. palustre* (**marsh horsetail**) has 5 to 10, and *E. telmateia* (**giant horsetail**) has 20 to 40 ridges. The wetland horsetail below, growing with skunk cabbage and water parsley, has 24 ridges indicating *E. telmateia.* Many Native groups used the young shoots of reproductive stems as early spring food. The silica-laden stems were used like sandpaper for polishing arrowshafts.

Fig. 5.38. Horsetail. Early spring shoot with close up of needle-like branch, leaf sheaths, cross-section of stem.

Huckleberry, Red (*Vaccinium parvifolium*)

Ericaceae - rhododendron and blueberry family. Vaccinium *is the Latin name said to originate from a berried plant browsed by cows ("vacca" meaning "cow"). "Parvi" implies that the light green, oval leaves ("folium") are small, 1/4 to 1 inch.. The origin of "huckleberry" is somewhat obscure, but seems to be a derivative of "hurtleberry," in turn a derivative of Old English "hortanberry," the latter having undergone etymological evolution to "whortleberry" in Europe. The "red" portion of the common name is straight-forward as this is the color of the berry which unlike berries of most species of* Vaccinium *is not bluish or black.*

The red huckleberry is perhaps the most aesthetically pleasing of the forest shrubs. It usually perches prettily on a large stump or log, its thin, graceful branches supporting light green, airy foliage and semitranslucent red berries. Young twigs are distinctively square in cross section. The yellow-green flowers resemble urn-shaped lanterns similar in shape to those of salal. Red huckleberry grows to a height of several feet in the shade, but if given the opportunity, will become a small multistemmed tree. Northwest Native people universally appreciated the edibility of the mildy tart berries. They could be brushed off of twigs into a basket, to be eaten fresh or after drying. A tea was also made from boiled bark and used for colds. Birds also enjoy the berries, thereby effectively dispersing the seeds.

Fig. 5.39. Red Huckleberry is usually perched upon a stump or log. Bud and flowers (lower).

Indian Plum or Osoberry (*Oemleria or Osmaronia cerasiformis*)

Rosaceae - rose family. The newer generic name Oemleria *derives from August Oemler, a European botanist. The white flower clusters are fragrant ("osme," Greek for" fragrance"), and are similar to those of the genus* Aronia *of the same family, thereby accounting for the earlier generic name* Osmaronia. *The bright orange to peach colored fruit resembles a cherry ("cerasiformis") in having a fleshy outer pulp and a stony seed (drupe). "Oso" is not a Native term, but Spanish for "bear."*

Indian plum is one of the first shrubs to break the bonds of winter dormancy. The bright green of unfolding foliage and clusters of fragrant white blossoms herald the coming of spring in February or March. Flowers are about a centimeter across, and female flowers develop into cherry-like drupes. The fruits display a range of colors - green, yellow, orange-red, and blue-black - as they reach maturity in summer. Birds are so fond of the fruit that the dark blue coloration is uncommonly observed in the wild. Indian plum is a graceful 5 to 15 foot shrub or small tree with multiple arching stems in semi-shaded woods. The two to four inch long oblong leaves turn yellow in autumn. As the common name implies, the fresh or dried fruits were consumed by many Native groups.

Fig. 5.40. Indian Plum, appreciated for early spring flowers and foliage, and fruit in the summer.

Inside-out Flower, Duckfoot (*Vancouveria hexandra*)

Berberidaceae - Oregon grape family. "Vancouveria" is derived from the name of the 18th century Pacific Northwest explorer Capt. George Vancouver (1758-1798). The flowers are six ("hex") parted, with swept-back sepals and petals exposing the stamens, earning the name "inside-out flower." The leaflets are as fanciful as the flowers and resemble ducks' feet.

The inside-out flower has underground stems (rhizomes) that send up compound leaves divided into leaflets of three. The leaflets fancifully resemble ducks' feet. Despite the fragile appearance of the thin leaflets and petioles, the inside-out flower is a common herb carpeting the forest floor, along with relatives **Oregon grape** (*Berberis nervosa*) and **vanilla leaf** (*Achlys triphylla*, also known as **"deerfoot,"** rare in Springbrook Park). This plant is best appreciated up close. In spring, panicles of yellow or white flowers bob in the forest breeze. The six swept-back sepals and petals expose the six stamens and central pistil, thus resembling a shooting star (or inside out flower). Although Native people apparently had little practical use for this deciduous herb, inside-out flower today serves as a curious and delightful ground cover in the shaded reaches of a natural garden.

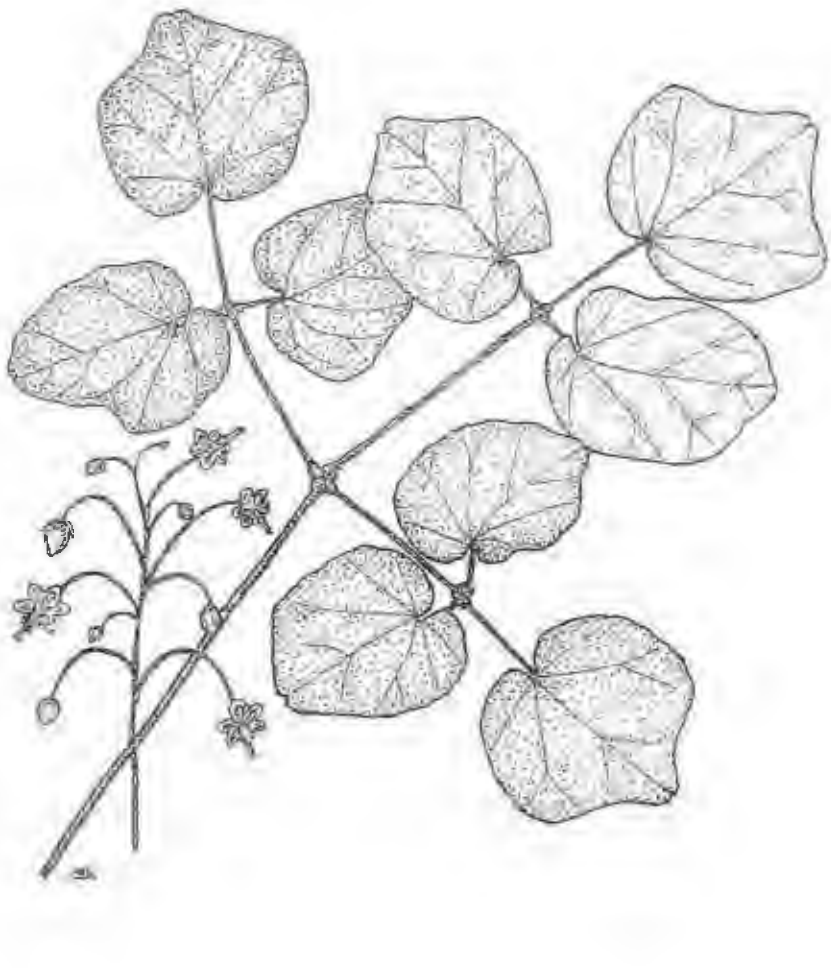


Fig. 5.41. Inside-out Flower or Duckfoot, a curious and delightful woodland groundcover.

Ivy, English (*Hedera helix*)

Araliaceae - Ginseng family. The generic name is derived from the Latin term for ivy. "Helix" is Greek for "spiral" describing the growth habit of the vine.

The appealing nature of ivy has resulted in many cultivars widely used as groundcovers and ornamental vines. However, in the woodland environment ivy has a dark side as the vine progressively smothers acre upon acre of native flowers and shrubs including salal, duckfoot, and trillium. Even plants perched up on stumps are in mortal danger as the vines readily creep up trees and stumps, rooting along the stem to strangle red huckleberry, wood fern, and other native dwellers. When stems climb off the ground, they flower and produce clusters of shiny black berries. The berries are poisonous to humans, but birds find them quite edible. Thus ivy is widely dispersed in suburban woods and neighborhoods by birds.

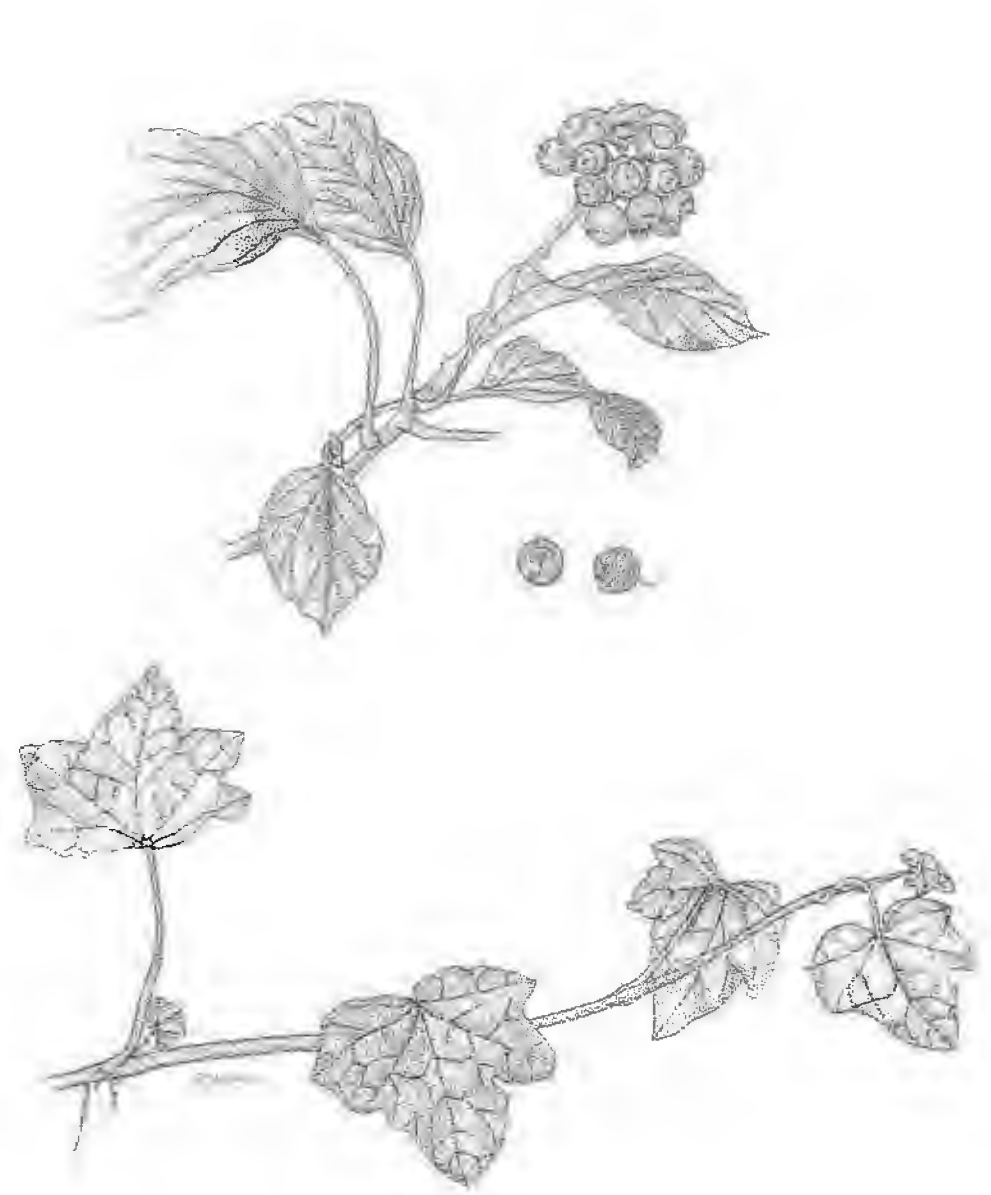


Fig. 5.42. Ivy, rooting vine (below) and berries (above).

Madrone. Also Madrona, Pacific Madrone (*Arbutus menziesii*)

Ericaceae rhododendron, huckleberry family. Ranging from British Columbia to Baja California, early Spanish noticed the resemblance of Pacific madrone to the Mediterranean "madro" or strawberry tree (Arbutus unedo). *Thus the Spanish name* madrono *("big madro") was bequeathed to our Pacific Coast species. The generic name* Arbutus *is the Latin term for strawberry tree. The specific name honors surgeon and naturalist Archibald Menzies (1754 - 1842) a member of the expedition of Captain George Vancouver.*

The Pacific madrone is in many ways one of the most facinating of our native trees. It is our *largest broadleaf evergreen tree*, ranging up to 50-80 feet in height. The madrone thrives on soils too thin, rocky, or dry to support dense stands of conifers that would otherwise crowd out the madrone. Madrone is relatively abundant on southern slopes of the San Juan Islands and in the western Siskiyou Mountains of southwest Oregon. Madrone trees are scattered in the warmer and drier oak woodland communities of the interior Willamette Valley. Madrone occurs occasionally in lower and drier sites within the Western Hemlock Forest Zone, and in remnants of pioneer stands preceding climax conifer stands.

Unique concentrations of madrone trees and Oregon oak are found in the rocky scablands left by the great ice age Bretz floods (see Chapter 2). A large concentration is found in the Tonquin Geologic Area of Sherwood and Tualatin, Oregon. Madrones are also relatively common in the scablands of the Summit-Twin Points area of Oswego Lake, and on the upper slopes of Iron Mountain. Occasional madrone trees can be found in suburban areas of Lake Oswego, including the Lake Grove district where the street named *Madrona* gives deserved recognition to these native trees.

The madrone has interesting physical features. The thin red-brown outer bark peels away in brittle flakes leaving the sinuous stems and trunkst with a smooth surface. The dark green leaves are leathery and shiny with smooth edges, except for young trees whose leaves may be finely serrated. The leaf characteristics along with the extensive fibrous root system allow the madrone to tolerate drier and sunnier conditions. In April and May, the madrone blossoms with thousands of white bell-shaped flowers in compound racemes. The fragrant nectar is welcomed by bees. Over summer the blossoms mature into orange-red berries that attract flocks of birds in the fall. According to Gunther, an infusion of madrone leaves was used by Native groups for colds, sore throat, and stomach ulcers. As related by Arno and by Whittlesey, the berries were used as food and the sinuous wood was fashioned into spoons and small dippers. Today in our neighborhoods the Pacific Madrone can be found as a medium-sized, drought-resistent, evergreen shade tree valuable for landscaping and wildlife.

Fig 5 43 Pacific Madrone, or Madrona, has red-brown bark that peels away in flakes. Racemes of fragrant white blossoms appear in the spring, and mature into clusters of red-orange berries by fall.

Maple, Big Leaf (*Acer macrophyllum*)

Aceraceae - maple family. "Acer" is the classical Latin name for maple. "Macrophyllum" aptly describes the big ("macro") leaves ("phyllum") of this native maple.

The leaves have five deeply cut lobes and may be 8 to 12 inches in width, larger than leaves of any other native or introduced maple. The fragrant yellow blossoms of April and May develop into double-winged fruits by fall. The winged seeds (samaras) are paired but gradually become separated upon maturity. In fall, wind gusts transform the samaras into whirling, spiraling airfoils to the delight of children and squirrels, the latter collecting and opening the samaras for seeds. In the forest, the stout main trunk and vertical side branches stretch upwards to a height of about 100 feet. The base of the trunk is often cloaked by a thick layer of moss, forming a unique niche for licorice ferns. Though the trunk and leaves are of great magnitude, close inspection of the leaves and samaras reveals a very fine venous pattern displaying an unexpected and delicate beauty. Native inhabitants found big leaf maple wood exceptional for carving bowls, dishes, platters, spoons, canoe paddles, and cradle boards. Some used the bark for making rope, and the leaves for lining cooking pits. Big leaf maple trees today serve as large shade trees for parks and big yards. They provide food and shelter for birds and squirrels, and even produce syrup that is reportedly close in quality to that of sugar maple.

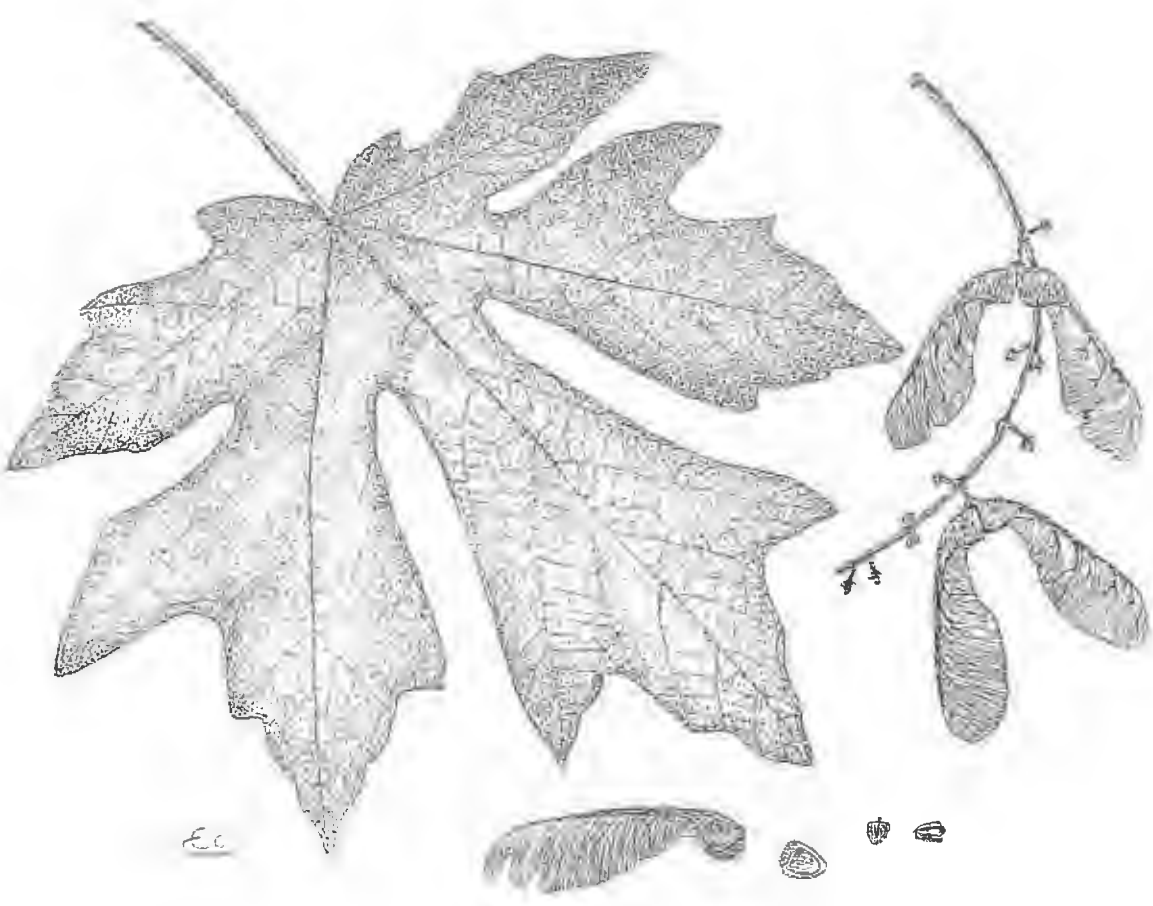


Fig. 5.44. Big Leaf Maple. The seed is carried great distances by the wings of the samara.

Maple, Vine (*Acer circinatum*)

Aceraceae - maple family. The Latin name for maple is "acer." The seven to nine lobed leaves are relatively circular (circinatum). The common name is descriptive, for in the shaded forest, the greenish branches of vine maple are frequently prostrate, vine-like on the forest floor.

In sunnier locales, the vine maple grows upright as a graceful small to medium, multi-stemmed tree with light green and attractive foliage. In autumn, the leaves often turn to the celebrated orange and red hues of fall color. The vine maple seeds are winged and paired like big leaf maple seeds, but form a more open angle, unlike the U-shape of paired big leaf maple seeds. Vine maple is also distinguished by its ability to root from the stems, an adaptation to the prostrate habit of its branches on the shaded forest floor. The long, flexible stems were used for weaving openwork baskets, thus earning the name of "basket tree" by the Quinault people. The resilient stems were also used for fish traps, bows, arrows, and implement handles by various Native groups.

Fig. 5.45. Vine Maple has prostrate stems in the shade but grows upright in the sun.

Mockorange or Syringa. (*Philadelphus lewisii*)

Hydrangeaceae - hydrangea family. Members of the genus Philadelphus, *named after Egyptian pharaoh Ptolemy Philadelphus, bear blossoms that are similar to true orange blossoms in being fragrant and whitish. The specific name of our Northwest species was bestowed by Frederick Pursh (1774-1820), an American botanist, in honor of Meriwether Lewis (1774-1809) of the Lewis and Clark Expedition. Mockorange, like lilac, is a multistemmed shrub bearing fragrant blossoms. This similarity is the probable origin for the somewhat inaccurate alternate common name of* Syringa, *the generic name of the lilac species.*

The native mockorange has been a highly-prized ornamental in Europe since its introduction in 1825 by David Douglas. Despite being a rage overseas, mockorange is an infrequent denizen of Northwest gardens. This is why Kruckeberg laments, "so fine a plant, then, should be known more to gardeners in its native land." Mockorange is found from British Columbia to northern California, on both sides of the Cascades, and east to Montana. It is the official state flower of Idaho. The 5 to 10 foot deciduous shrub has long stems with opposite branchlets bearing opposite leaves with variably toothed edges. West of the Cascades, mockorange is found in more open and drier woods. Mockorange is rare in Springbrook Park due to the deep forest shade. However it is more common and floriferous in the open and rocky areas of nearby Iron Mountain Park. Flowers are borne on showy elongated clusters. The four strap-like petals are delicate, fragrant, and one to two cm in length. By fall, the flowers transform into woody capsules that disperse tiny elongated seeds to the wind. The straight stems of mockorange were apparently well-utilized by Northwest native groups, as reported by Erna Gunther, for combs, arrowshafts, netting shuttles, and "many other things." The leaves and flowers were used by the Snohomish to make a soapy lather for use on sores, or for cosmetic purposes.

Fig. 5.46. Mockorange is a multistemmed shrub bearing fragrant white blossoms of four petals. The sun-loving, fast-growing, and drought-tolerant mockorange deserves a more celebrated status in its native Northwest

Ninebark *(Physocarpus capitatus)*

Rosaceae - rose family. "Physocarpus" is derived from the Greek words for bladder ("physa") and fruit ("karpon") referring to the dry, bladder-like capsule of generally three seeds. "Capitatus" refers to the capitate or head-like clusters of rounded five-petaled white flowers each containing 20 or more brilliant pink stamens. The mature bark of this 6 to 12 foot shrub or small tree peels into many layers giving rise to the common name of "ninebark."

Ninebark is a graceful shrub or small tree with upright but arching dark brown stems. The medium to light green leaves are multilobed, serrated, and like those of the maple, are aesthetic in form. Ninebark spreads primarily by seeds, and also by rooting stems. The peeled young shoots were used as an emetic by some Native groups who apparently had little other use for ninebark. Today, the white flower heads, handsome leaves, and graceful habit of this small tree are reasons enough to find Ninebark a niche in the natural garden.

Fig. 5.47. Ninebark is a shrub or small tree that resembles a maple but is in the rose family.

Oak, Oregon White or Garry Oak (*Quercus garryana*)

Fagaceae - Beech family. Oregon white oak is generally found in drier areas west of the Cascades from Vancouver Island to California, but it is most abundant in Oregon. The generic name is Latin for oak. The famous botanist, David Douglas, upon encountering Oregon white oak in the 1820's, honored Nicholas Garry of the Hudson Bay Company with the specific name.

Native peoples of the Willamette Valley maintained and promoted large areas of open oak savannahs (savannahs are grasslands with scattered shrubs and trees) by periodic burning. This practice increased forage for deer, elk, and other game animals. Burning also aided the harvest of oil-rich tarweed (*Madia*) seeds. By controlling the growth of competing trees and shrubs, periodic burning also increased production of hazelnuts, and acorns from fire resistent oak trees. The relatively even-aged stands of oak trees in the Kruse Oaks area of west Lake Oswego may have resulted from cessation of periodic burning about 170 years ago. Siddall and Potter, using tree ring data, suggest that these trees may have arisen from the sprouts of fire resistant oak stumps (Lake Oswego Physical Resources Inventory, pp. 11 and 41, 1976). Elsewhere in the Willamette Valley, giant oak trees 300 and more years old with large open crowns, are living evidence of the historic oak savannahs. These venerable giants contrast sharply to the smaller and crowded habit of oak trees in stands that have developed since fire suppression.

Oregon oak is adapted to drier conditions. It particularly thrives in the inland Willamette Valley but is also found east of the Cascades in the Columbia River Gorge region. The multilobed (approximately 7 rounded lobes) leaves are leathery and the undersides are covered with fine hairs to conserve moisture. Oregon oak and Pacific madrone may occur together in drier sites. Both have extensive fibrous root systems to extract moisture from the soil. Interestingly, some Oregon oak trees tolerate seasonal flooding, and form a unique association with Oregon ash. In Lake Oswego, this occurs in Kruse Woods and West Waluga Park.

Oregon oak flowers in spring. The acorns mature in a single season unlike some other species of oak that require two seasons to mature. The acorns were an important source of traditional Native food. When eaten in large quantity, acorns first had to be soaked in water or buried in mud for an extended time to leach out tannic acid. Smaller quantities could be eaten plain or roasted. The tough wood was used for digging sticks, combs, and fuel by Cowlitz of western Washington.

In some oak woods, spherical and speckled leaf galls are more apt to be sighted than acorns, the latter being highly coveted by squirrels, jays, and other wildlife. The galls are overgrowths of plant tissue induced by a tiny wasp larva that lives in a small central chamber. Oak galls are also known as *oak apples*, *oak cherries*, and *pop balls*, the latter derived from the sound emanating from a gall underfoot. The galls have a high content of tannic acid, which is as bitter as gall (bile). Thus it is the bitter tannic acid that accounts for the naming of these fascinating insect dwellings. Galls are also found on stems, and occur on many other types of plants.

Fig. 5.48. Oregon Oak, Garry Oak. Acorns contain a nut (upper right) that was an important food for Willamette Valley tribes. The nuts are so coveted by wildlife that it may be easier to find speckled leaf galls (lower right) than acorns. Leaf galls, and stem galls (middle right), are the protective living quarters of wasp larvae.

Ocean-Spray or Creambush (*Holodiscus discolor*)

Rosaceae - rose family. "Holodiscus" refers to the whole (non-lobed) floral disc, the latter being an enlargement of the stem around the base of the female flower part (pistil). The specific name may to refer to the off-white creamy color of fresh blooms, or the bedraggled brown of spent blooms. The common names are picturesque descriptions of the plant in full bloom.

Ocean-spray prefers sunnier and drier woodland settings where it forms a cluster of stems up to 10 feet high. The somewhat triangular alternate leaves are light green with prominently lobulated margins. By midsummer, the long stems are gracefully pendent with plumes of creamy flowers. Ocean-spray, once established, can thrive in sunny areas prone to summer drought. Native peoples knew the value of the wood for tools and utensils including spears, digging sticks, and arrowshafts. ("Arrowwood" and "ironwood" are colloquial names.) Reported medicinal uses include using bark for a tonic, flowers for diarrhea cure, leaves for soothing sore lips or feet, and boiled seed clusters to treat various contagious diseases. A related plant with creamy plumes of flowers is **goatsbeard** (*Aruncus sylvester*), distinguished from ocean-spray by lack of woody stems, leaves that are divided into sharply toothed leaflets like those of baneberry, and preference for a more moist and shaded environment.

Fig. 5.49. Ocean-Spray. Close-up of flowers.

Oregon Grape, Low (*Berberis* or *Mahonia nervosa*)

Berberidaceae - barberry family. "Berberis" is derived from the Arabic name for one or more species in the Mediterranean area. The alternate generic name, "Mahonia," honors Bernard McMahon, a nineteenth century American horticulturalist. The elongated compound leaves of low Oregon Grape have 9 to 19 leaflets, with prominent veins. "Nervosa" probably refers to this prominent pattern of venation.

The Oregon state flower is the tall Oregon grape, *Berberis aquifolium*, with holly-like leaves (Latin for "holly" is "aquifolium"). Its tolerance for sun and heat make it a useful denizen in parking lot landscapes and other open areas. In contrast, the low (also cascade or mountain) Oregon grape, forms an evergreen groundcover, of several inches to two feet in height, in the moderate to deep shade of a woodland. The leaves are dark green, glossy, and have small sharp spines along the margins. Older plants grow like palm trees, with foliage arising from the top of a vertical stem marked by leaf scars. The yellow flowers are borne on long stalks, maturing into resolutely sour, blue fruits by fall. Not surprisingly, Erna Gunther notes that many Native groups regard the berries as too dry and sour to be good. However the bright yellow roots, when boiled, still have wide use a source of yellow dye for basketry and mats. A tea made from boiled root was used as a general tonic, or to cure coughs, by some Native groups.

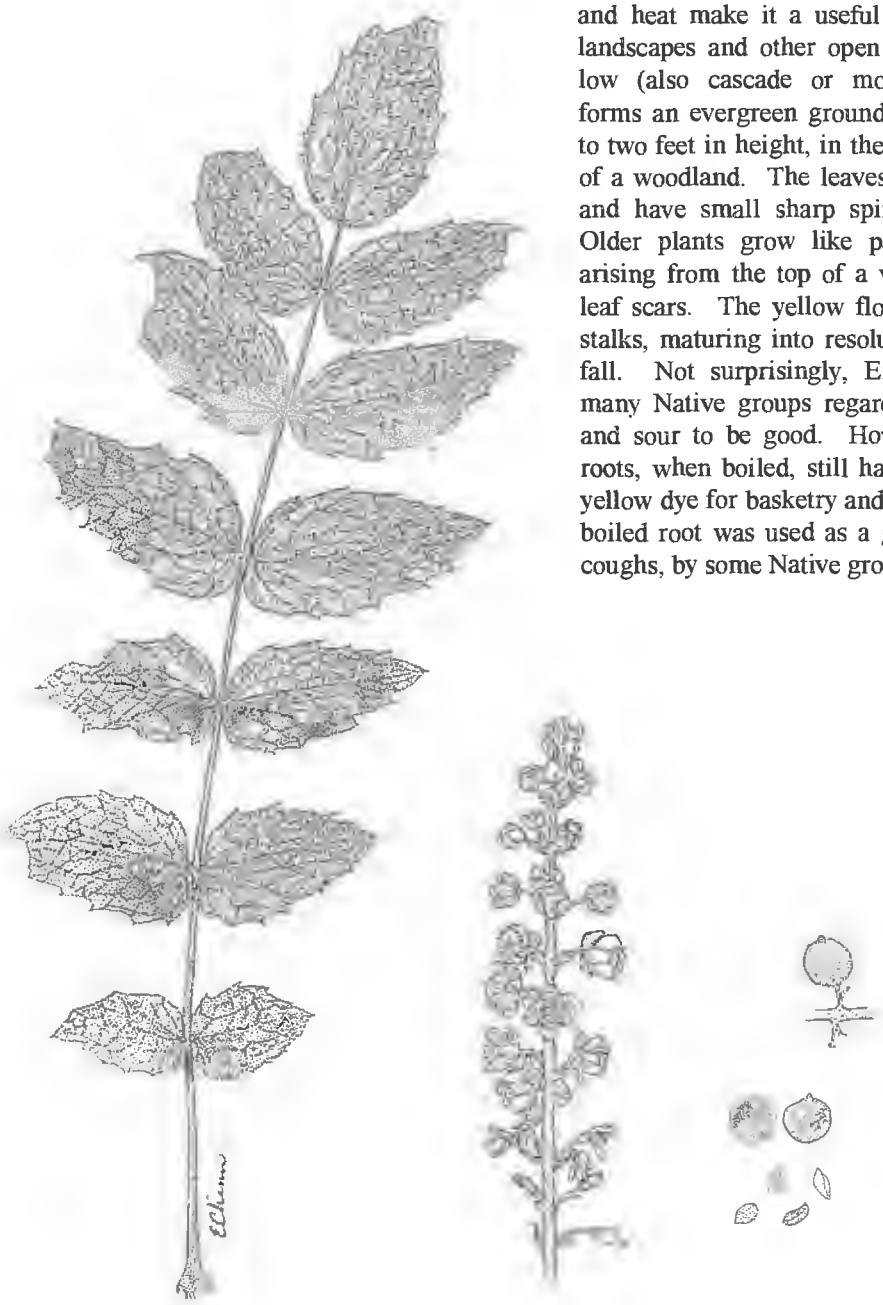


Fig. 5.50. Low Oregon Grape. The flower spike is bright yellow (center) and fruits are deep blue (right).

Phantom Orchid (*Eburophyton austiniae*)

Orchidaceae - Orchid family. The flower stalk is ivory-white, giving rise to the common and Latinized generic name ("eburon" means "ivory" and "phyton" means "plant"). The specific name honors R. M. Austin (1823-1919), an American botanist.

The phantom orchid is a saprophyte, taking its nutrients from the rotting organic matter of the forest floor. It lives most of its life beneath the soil surface, and only sporadically sends up an ivory white flower stalk about one foot in height. Intervals between flowering may be lengthy, up to a decade or more. The phantom orchid is one of many saprophytes and partial saprophytes that have adapted to the particular forest floor habitat of the Northwest coniferous forest. The habitat is a thick layer of damp organic matter in the deep shade of the dense forest canopy. In this dark environment, green plants that derive all their energy from sunlight are at a disadvantage. However plants that do not depend on sunlight but instead utilize energy and nutrients stored in the humus, can thrive. The pure saprophytes are usually pale white because they lack chlorophyll. **Indian pipe** (*Monotropa uniflora*) and **pinedrops** (*Pterospora andromedea*) are two saprophytic examples of the heath family. Many other plants that grow in limited light are partial saprophytes, retaining chlorophyll for photosynthesis, but maintaining a complex saprophytic relationship with fungi to exploit the thick layer of rotting organic matter.

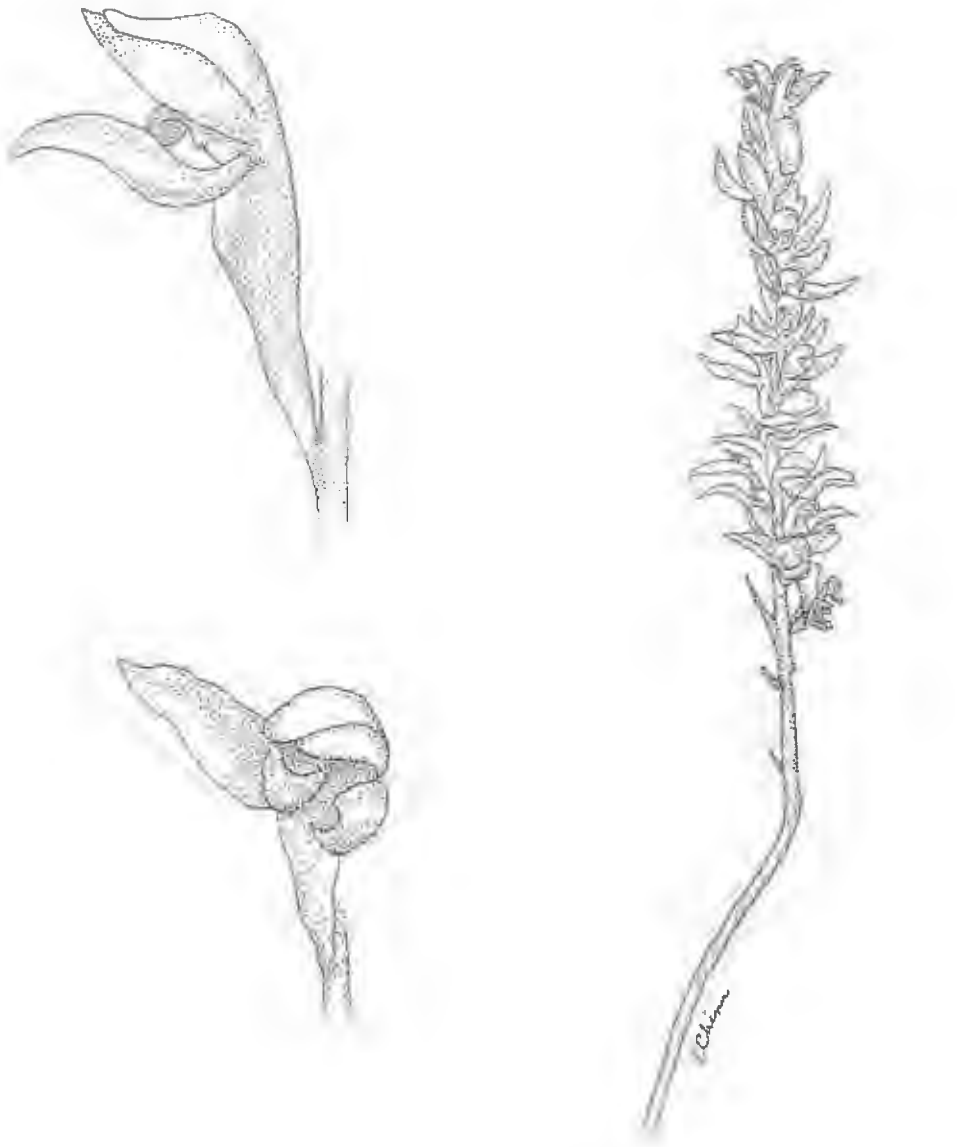


Fig. 5.51. Phantom Orchid, a saprophytic plant with an ivory-white flower stalk.

Pig-a-back Plant, Youth-on-Age (*Tolmiea menziesii*)

Saxifragaceae - saxifrage family. Both common names refer to the presence of a miniature plant that arises at the base of the leaf blades. William Tolmie (1812-1886), a surgeon for the Hudson's Bay Company at Fort Vancouver, lends his name to the genus. The specific name honors Dr. Archibald Menzies (1754-1842), a naval surgeon and naturalist with the expedition of Captain George Vancouver.

This member of the Saxifrage family is so unusual it is the only member of the genus *Tolmiea*. Pig-a-back (also piggy-back) plant has the ability to spread vegetatively by forming little plants at the base of the leaf blades. Roots sprout as the leaves touch the ground, producing a ring of little plants around the mother plant by the following spring. The 5 to 7 lobed leaves have long petioles to assist in this feat. The brownish-purple flowers are also unusual. Sepals are fused into an expanded tube with thread-like petals above and to the sides. One Native group ate fresh sprouts in early spring, and another used the leaves to apply to boils. Pig-a-back is found in moist woodland sites such as along streambanks, and makes a good and curious houseplant.

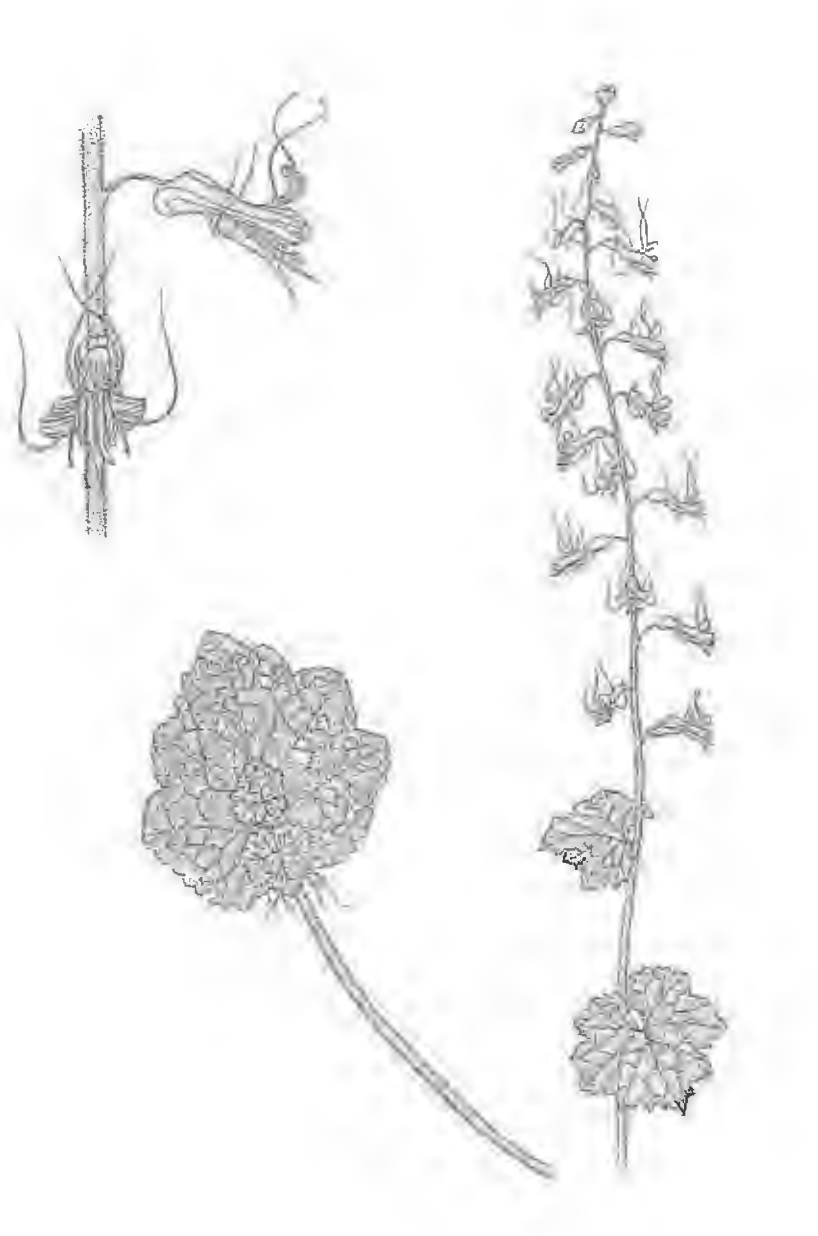


Fig. 5.52. Pig-a-back Plant. Close-up of flowers (upper left), and miniature plant on leaf blade (lower left)

Poison Oak, Poison Ivy (*Rhus diversiloba, Rhus radicans*)

*Anacardiaceae sumac family. "Rhus" is the ancient Gtreek name, perhaps deriving from "rhous" meaning "reddish." The reddish description may have originally referred to sumac (*Rhus glabra *and related species) with their renowned brilliant red fall foliage and clusters of red berries. However the leaves of poison oak and poison ivy are also reddish in spring and a deceptively attractive yellow to red in fall. "Diversiloba" refers to the diverse lobulations of poison oak leaflets and "radicans" means "rooting" reflecting the ability of the poison ivy stems to root.* R. diversiloba *is commonly called "poison oak"* **or** *"poison ivy," but* R. radicans *is commonly called just "poison ivy," for reasons stated below.*

"Leaflets of three, let it be" is an old warning to avoid contact with these closely related species. *Rhus diversiloba* is the species occurring on the west side of the Cascades. In sunny, drier areas it grows as a shrub frequently with Oregon oak (*Quercus garryana*). As a shrub it is commonly called "poison oak." The same species can also be vine-like in less open surroundings, and may then be referred to as "poison ivy." In contrast, *Rhus radicans* is mostly found east of the Cascades, has more narrowly pointed leaflets, and is more commonly called just "poison ivy." Both contain urushiol, a compound (allergen) that activates the immune system of many, but not all, people. (Wash yourself quickly if you think you have had a close encounter, to minimize the exposure to the allergen.) This type of allergic reaction is a *delayed* (a half day to several days) *hypersensitivity, cell-mediated* immune reaction, and often results in a severe dermatitis for sensitive people. Destroying these plants by **burning may prove fatal to highly sensitive individuals** who unwittingly breathe in the volatile oils. Clusters of white berries are present by summer, and birds are an effective means of seed dispersal. "Leaflets of three, let it be."

Fig. 5.53. Poison Oak.

Queen Anne's Lace, Wild Carrot (*Daucus carota*)

Umbelliferaceae - carrot and parsley family. Wild carrot is the ancestral form of the cultivated carrot. The namesake of the carrot family is the characteristic umbel or umbrella-like flower head. The umbel of small white flowers has a lacy appearance to explain the common name "Queen Anne's lace." Often in the center of the white umbel is a dark purplish flower, a memento of Queen Anne's pricked finger. "Carrot" and "carota" are derivatives of "karotin," the Greek word for wild carrot. Greek "daukos" is the origin of the generic name for another member of the umbel family.

Wild carrot is a weedy, but at times pretty, inhabitant of sunny and disturbed sites. The finely divided, lacy leaves of this European immigrant are reminiscent of parsley. The biennial wild carrot produces a tough, whitish root. Remembering that wet leaves of wild carrot may cause dermatitis in some, is also a reminder that members of this large family (particularly poison hemlock, another immigrant) can be fatal if ingested. **It is wise for the casual observer to regard wild carrot as inedible, despite its name.**

Fig. 5.54. Queen Anne's Lace. Clockwise from left: leaf, umbel, close-up of seed, and root.

Reed Canarygrass (*Phalaris arundinacea*)

Gramineae - grass *family. The etymology of the common name is long but interesting. Reed canarygrass borrows most of its name from a close relative, the canarygrass,* Phalaris canariensis. *(Canarygrass, cultivated for birdseed, is frequently escaping and becoming established throughout our area, according to Hitchcock and Cronquist.) Canarygrass, and the small yellow finch known as the canary, are both native to the Canary Islands. The Canary Islands are named "Islas Canarius" in Spanish meaning "Dog Island" because legend tells of large and fierce dogs (canis in Latin) that long ago inhabited these islands off the North African coast!*

Since reed canarygrass is apt to found in a wetland environment, "reed" is an appropriate name that by definition means the tall hollow stems of certain grasses growing in wet places. The generic name Phalaris *is Greek for a type of grass. The specific name* arundinacea *is derived from "arundo," Latin for "reed."*

Reed canarygrass, of Eurasian origin, is relatively common in wet areas across Canada and most of the Unitied States. It grows between 3 and 5.5 feet high. The leaves are about 5 to 15 mm wide. The flower clusters (panicles) are clearly branched or lobed. Reed canarygrass can become a rampant pest in wetlands, choking out native vegetation. It is currently a very common species in the marshy areas of West Waluga Park, Lake Oswego. The common reed (*Phragmites communis*), a wetland grass native here and elsewhere in the world, differs from reed canarygrass by taller height (six to eight feet), broader leaves (about 10 to 40 mm wide), and plume-like panicles. Grasses and rushes both have round stems, but those of grasses are hollow while those of rushes are filled with spongy pith.

Fig. 5.55. Reed canarygrass. This introduced Eurasian species may become rampant in wetland communities, choking out native wetland plants.

Rose, Bald Hip and Other Wild Roses (*Rosa gymnocarpa, and other species*)

*Rosaceae – rose family. "*Rosa*" is the classical Latin name for the flower. The rose hips ("karpos" is Greek for "fruit") are bright red and bare ("gymnos" is Greek for "naked") of sepals. Thus, fitting is the common name "bald hip" which is a loose translation of "gymnocarpa." An alternative common name "**little wild rose**" is also descriptive because this species is the smallest and most dainty of the native woodland roses.*

Bald hip rose is most distinctive in the summer and fall when its bright red, bare rose hips seem to glow red in the shade of forest greenery. The springtime flowers of five petals are light pink and about one inch across. Whether in flower or fruit, the stems are well-protected by a characteristic armament of thin, straight prickles. Despite the prickles, little wild rose has many more charming features - the pink flowers and red hips, slender stems and airy growth habit, medium to light green leaves, and limited height rarely over four feet. Two other native roses than may be encountered are the clustered wild rose (*Rosa pisocarpa*) and Nootka rose (*Rosa nutkana*). **Clustered wild rose** produces *clusters* of five-petalled flowers and bright red hips that may or may not be pea-like ("pisos" is Greek for "pea"). **Nootka rose** was described from a specimen collected at Nootka Sound, Vancouver Island. Nootka rose usually has *solitary* (not bunched), but larger and showier five-petalled flowers 2 to 3.5 inches across. Two European roses that have escaped cultivation are **sweetbriar rose** *(Rosa eglanteria*) and dog rose (*Rosa canina*). Both of these introduced species can be differentiated from our native roses by the generally *stout and curved thorns* which differ from the straighter thorns of the native roses. These escaped roses, beautiful in their own way, tend to have bare hips like the native baldhip rose, but not like the native Nootka and clustered wild roses. Rose hips were eaten by Native people, as they still are throughout the world, for the hips are very rich in vitamin C.

Fig. 5.56. Bald Hip Rose or Little Wild Rose. Opened hip at lower left.

Rush, Common or Soft Rush (*Juncus effusus*)

Juncaceae - Rush family. Common rush, first described by Linnaeus (1703-1778) has a widespread (i.e., common) range from coastal tideflats to mountain meadows in Europe and across North America. The alternate name "soft rush" probably refers to the flexible stems. The specific name effusus *is derived from Latin and means "to pour out," likely referring to the spreading, arching habit of the stems. In olden times rushes were used for banding and roping. Thus as explained by Spencer, the generic name* Juncus *derives from the Latin "junctio" and "jungere" meaning "to join."*

In our area, common rush occurs where the soil is wet for much of the year. In wetland areas of West Waluga Park, Lake Oswego, common rush grows up to 3 feet high, in proximity to Douglas' spirea, reed canarygrass, sedge, and cat-tail. Common rush does not require standing water to thrive. Indeed wild seedlings often thrive in backyard areas waterlogged only during winter and spring. In the proper location, the arching gray-green stems of common rush become a graceful landscape accent through the seasons.

Distinguishing rushes, sedges, and grasses is made easier by remembering that stems of *rushes are round* whereas stems of *sedges have edges*. Grass stems are also round, but they are hollow whereas rush stems contain spongy pith. Leaf blades of many rushes are much reduced. In common rush, leaf blades are inconspicuous brown sheaths near the stem bases. Seed capsules are three-parted and become gelatinous and sticky when wet, promoting seed dispersion by passing animals. Soft rush was used by traditional cultures in the Northwest for weaving tumplines and string. ("Tumpline" is a strap passing in front of the forehead to support a basket on the back.) The Snuqualmi in Washington used the stems for tying, and sometimes used the early sprouts for food.

Fig. 5.57. Common or Soft Rush stems are round and filled with spongy pith. Seed capsules are sticky when wet, resulting in widespread seed dispersal by passing animals.

Salal (*Gaultheria shallon*)

Ericaceae - rhododendron and blueberry family. "Gaultheria" is derived from the name of the Quebec physican and naturalist Jean Gaultier (1708-1756). "Shallon" is the Latinized form of the Native "salal" or "shalal."

This robust evergreen shrub has young growth of light green foliage and pinkish stems set upon a background of lustrous dark green foliage. The ovoid leaves are leathery and shiny with a pointed tip and fine serrations. The flowers are urn-shaped lanterns that transform into juicy black-purple berries up to one centimeter in diameter during summer and fall. The berries were eaten fresh, or dried, mashed, and compressed into loaves weighing up to 10-15 pounds for winter use by the lower Chinookan people. Large leaves were used to line cooking pits. Chewed leaves were used on burns and sores, making use of the astringent property of tannic acid. Other Native groups used the leaves either chewed or as a tea for relief of heartburn, colic, or diarrhea. The Makah smoked a dried and pulverized mixture of salal and kinnikinnick (*Arctostaphylos uva-ursi*) leaves. Explorer and botanist David Douglas was so impressed with salal in 1825 that he sent seeds to England for cultivation. Although salal created a sensation it never became the premier berry plant that Douglas had envisioned for Europe. In the Pacific Northwest however, salal is an very valuable landscaping shrub for its lustrous and evergreen texture. It is drought resistant when established and provides excellent habitat and food for wildlife.

Fig. 5.58. Salal.

Salmonberry (*Rubus spectabilis*)

Rosaceae - rose family. There are at least two explanations for the common name and both appear to have merit. The tender green shoots of salmonberry were cooked by Native people and eaten with salmon. The ripe berries are variable in color, often bright orange-yellow but also red to salmon in color. The generic name means "red," as explained earlier (See Blackberry). The five bright red-pink petals of salmonberry blossoms are an early spring-time spectacle ("spectabilis") against the background of burgeoning green foliage.

Salmonberry prefers wetter areas such as along streambanks, near seeps, and in the mist of waterfalls. In winter, the leafless tan stems stand forlornly, the older stems bare and younger stems thorned. But when spring arrives, the stems burst forth with a flourish of leaves and blossoms. Each leaf is divided into three leaflets that in turn are lobed with toothed margins. Through spring and summer the showy pink-red blossoms transform into succulent orange-yellow berries. The berries were eaten fresh by Native people, but were considered too soft for drying. Salmonberry spreads in a raspberry-like manner by underground stems.

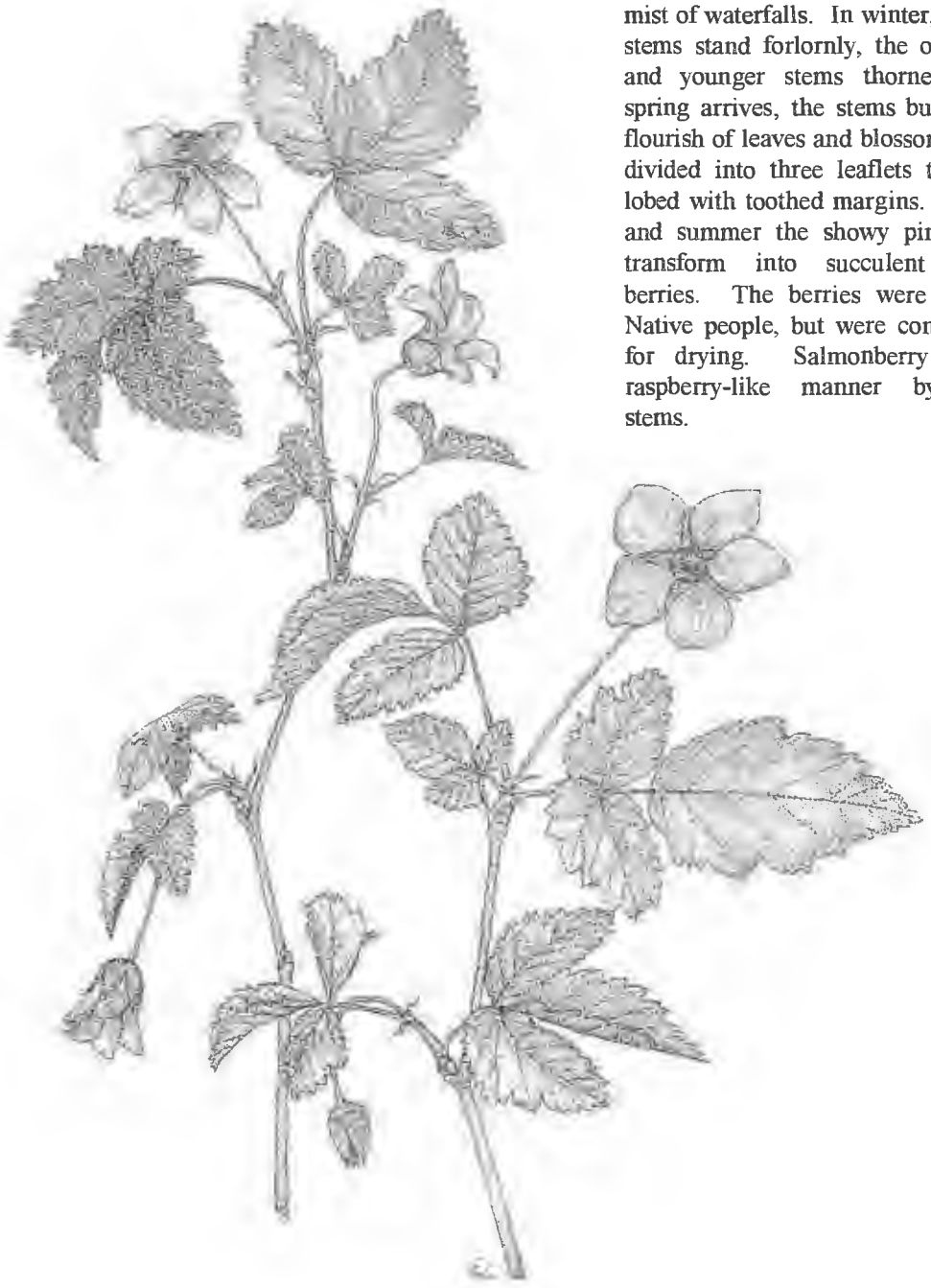


Fig. 5.59. Salmonberry. Flowers and foliage put on an energetic springtime display.

Sedge (*Carex species*)

Cyperaceae - sedge, bulrush family. The common name is derived from Old English,, "seeg." Carex *is the Latin name for the genus.* Scirpus *is a related genus that includes bulrush and tule.*

Sedges are grass-like herbs with mostly triangular, but sometimes rounded, solid stems. Like rushes and some grasses, many sedges grow in wet environments. To simplify identification, remember that stems of sedges usually have three edges, those of rushes are round, and those of grasses are hollow. Flowers of sedges are borne in elongated clusters called spikes. A leafy bract frequently arises beneath the spike. The two foot high sedge illustrated, *Carex aquatilis*, grows in seasonally saturated soil adjacent to reed canarygrass, soft rush, and cat-tail in marsh communities of West Waluga Park, Lake Oswego.

Identification of the innumerable species of sedge is difficult, and often depends on small differences of the special bract (perigynium) that encloses the dry fruit (achene). Two sedges common in our area are water sedge (*Carex aquatilis*), and slough sedge (*Carex obnupta*). The spikes of *Carex aquatilus* are about 5 cm and erect, while the spikes of *Carex obnupta* are about 10 cm long and droop.

The inner leaves of *Carex obnupta* were split, flattened, and dried before being woven into fine baskets by the Makah and other Northwest tribes. Baskets were decorated with intricate designs using interwoven strands of colored bark and dyed grasses.

Fig. 5.60. Water sedge. The stems of sedges have three edges, while those of rushes and grasses are round.

Self-Heal, Heal-All (*Prunella vulgaris*)

Labiatae – mint family. "Prunella" is believed to be a corruption of "Brunella," in turn being derived from the German "di Braune" meaning "the quinsy" (sore throat). Self-heal was regarded in Europe as a cure for quincy and as a wound healer, but modern analysis has not yet confirmed this belief. "Vulgaris" means "common," for self-heal is found throughout Europe.

The European variant of self-heal is a tough, low-growing plant that produces tenacious roots along its creeping stem. The native form is more gracefully erect with tapering leaves. It is more apt to be located in a woodland setting, unlike the lawn-inhabiting tendency of its European twin. Members of the mint family (Labiatae), including self-heal, have characteristic square stems, and flowers with prominent lower lips ("labia" is Latin for "lip"). The five, partially fused petals are highly specialized to attract pollinating insects. Insects such as bees typically alight on the large lower lip and are guided by an overhanging hooded lobe towards the base of the flowertube and nectar reward. A few Native groups used self-heal to treat boils, perhaps supporting its early European reputation for astringent, hemostatic, and antiseptic medicinal properties.

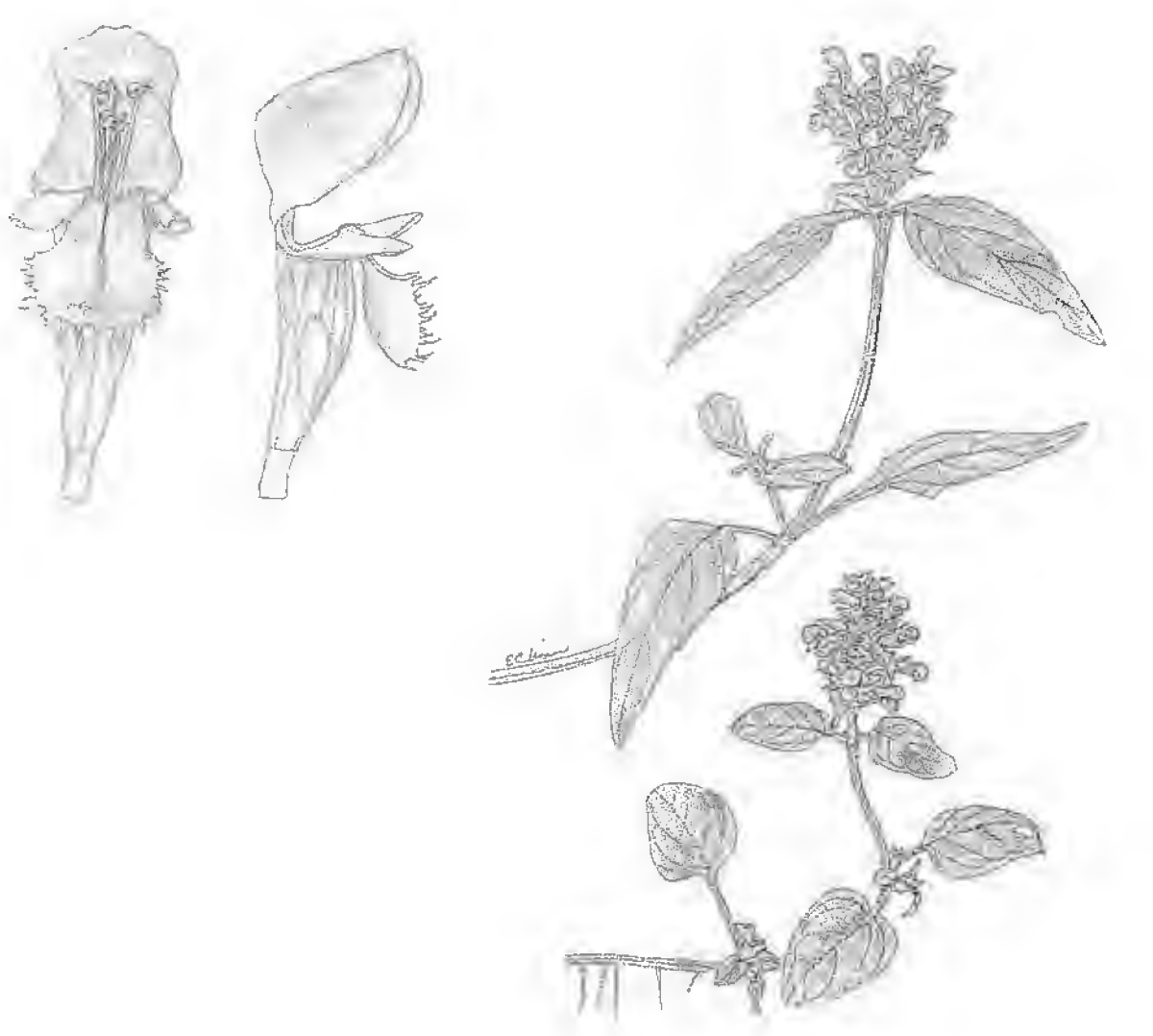


Fig. 5.61. Self-Heal. Close-up of flower at left. Native form (upper right), European form (lower right).

Serviceberry or Saskatoon Berry (*Amelanchier alnifolia*)

Rosaceae - rose family. The origin of the generic name is French for a cultivated hawthorn. The leaves, to a limited degree, resemble those of alder ("alnifolia"), thereby accounting for the specific name. Serviceberry was once grouped with mountain ash (Sorbus), the latter name becoming corrupted to "sarvis" and then to "service." Serviceberry was a winter staple for tribes of the Great Plains. Lewis J. Clark relates how settlers shortened the Native name for the berry from "mis-ask-wu-toomina" to "saskatoon," thereby providing yet another colorful etymological tale.

Serviceberry is another Northwest native that gained popularity in the gardens of England but remains underappreciated in its place of origin. Arthur Kruckeberg sums up the virtues of the serviceberry: "With superior foliage, flower, and fruit, our native serviceberry merits wider use in the garden." In addition to all of this, serviceberry once fully established, withstands full sun and summer drought. Serviceberry is a multibranched shrub or small tree, from five to 30 feet high, with light to medium green leaves, lighter on the underside. The flowers have fragile, strap-like petals, that are pure white and born in bouquet-like clusters in spring. The half inch purple fruit resemble miniature apples. Native people know serviceberries well, eating them fresh or dried, using them in soups, or mixing them with meats to make pemmican.

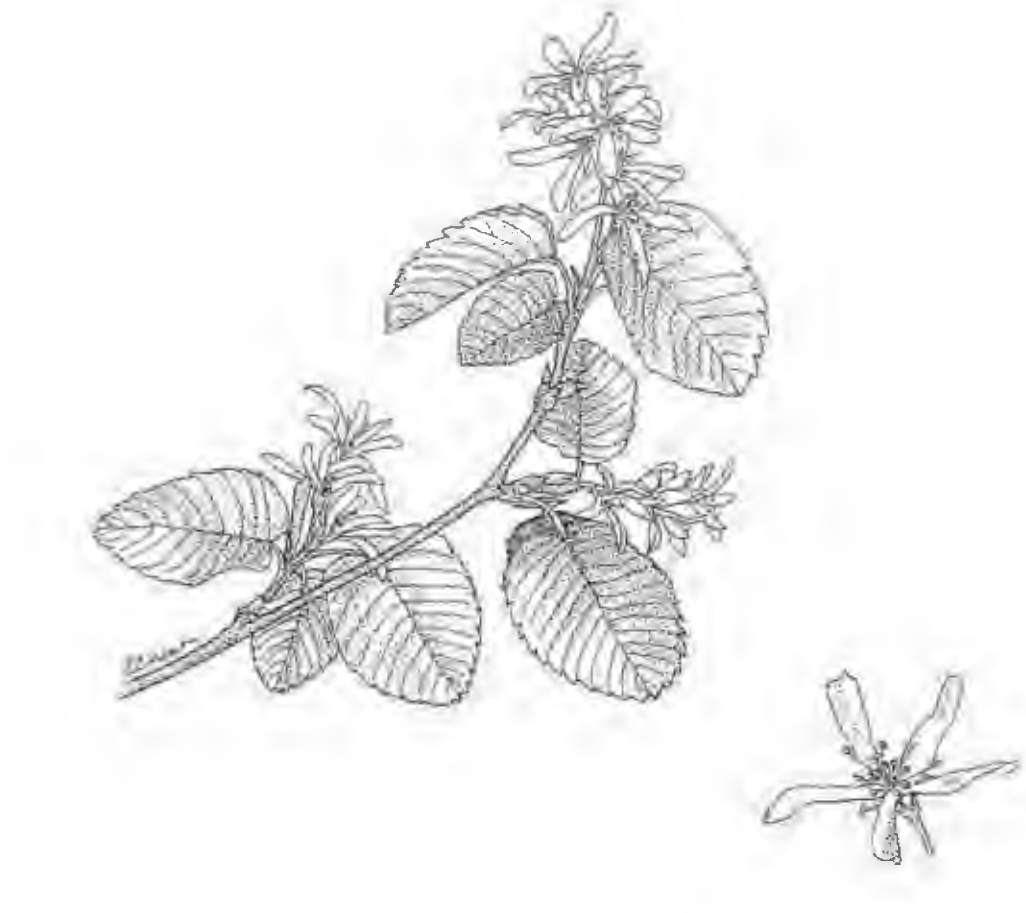


Fig. 5.62. Serviceberry, underappreciated in its place of origin.

Skunk Cabbage *(Lysichitum americanum)*

Araceae - taro family. The skunk cabbage seems strangely out of place in the temperate climate of the Northwest. It's mildly malodorous scent, some say skunk-like, seems better suited to a southern swampland. The compact flower stalk is partly enclosed by a bright yellow spathe (modified leaf), as relected by the generic name meaning loose ("lysis") tunic ("chiton").

The bright yellow spathe and stalk of small greenish flowers emerge in early spring in wetland areas. Its distinctive scent has presumably evolved to entice those peculiar pollinators normally attracted to rotting material. The smooth, shiny leaves that follow the flower stalk are often of huge propotions, with one gargantuan leaf in the Northwest measuring nearly 2.5 x 5 feet. A relative of the skunk cabbage is the taro of subtropical Hawaii. Like the Hawaiians did with the nutritious taro root, Native people steamed, baked, or boiled the roots, flowers, and leaves before eating to destroy intensely irritating calcium oxalate crystals. The large leaves were useful for wrapping and drying berries, and for folding into drinking cups or berry containers.

Fig. 5.63. Skunk Cabbage.

Snowberry (*Symphoricarpos albus*)

Caprifoliaceae - honeysuckle, elderberry family. The scientific name for snowberry is apt the white (albus) fruit (carpos) are distinctively clustered together (sympho).

This three to six foot shrub is perhaps most attractive when the leaves drop in fall to expose ornamental clusters of white berries pendent on twigs. The one to two inch leaves are thin, opposite, and may be quite variable in shape. Leaves may be ovoid or lobed. The small pink flowers have five petals that unite to form a tube in typical honeysuckle fashion. Although largely avoided as a food source, some Northwest Native peoples used the berries as a soap for washing hair, or as an emetic. The leaves were sometimes used as a poultice for cuts or boiled as a cure for colds. During the winter, the clusters of berries become food for birds and dainty ornaments in the natural garden.

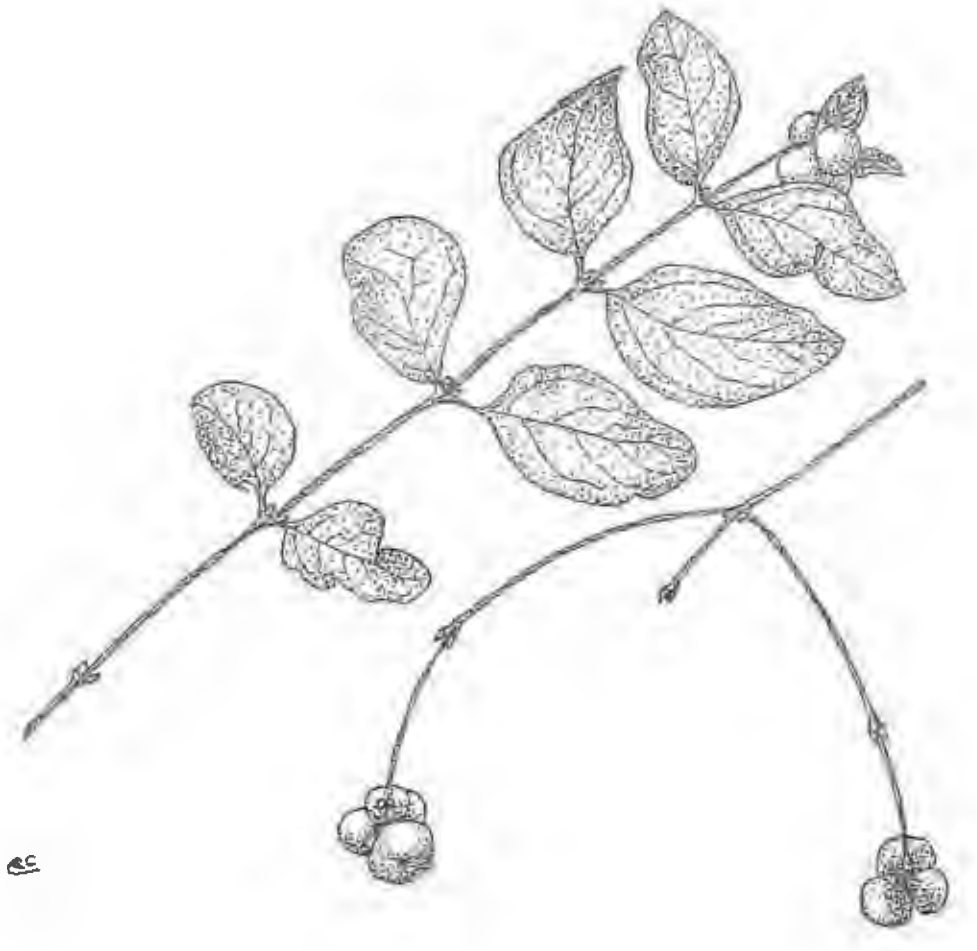


Fig. 5.64. Snowberry. Winter twig and berries at right.

Spirea, Douglas' or Hardhack (*Spiraea douglasii*)

Rosaceae- rose family. 'Spirea' is derived from the Greek word "speira" meaning coil or wreath. Douglas' spirea *can form nearly impenetrable thickets in open swampy areas. Early explorers had a difficult time hacking through these thickets, hence the name of "hardhack." The British botanist Hooker honored fellow botanist and explorer David Douglas with the specific name, perhaps because the intrepid Douglas was apparently undaunted by hardhack..*

Douglas' spirea or hardhack grows as a multistemmed shrub 6 to 12 feet high. The alternate leaves are 1 to 2 inches long, and notched along the upper edges. Fine whitish hairs coat the undersides of the leaves. Tiny five-petalled flowers are massed into attractive purple-pink spires in summer. Like its cousin ocean-spray in the rose family, the spent flowers acquire a tired brown color while maturing into seedheads. Douglas' spirea can be found at West Waluga park, George Rogers park, and other wet and sunny areas in Lake Oswego. It may be tamed for the garden by planting in a spot too dry to encourage a thicket. Stems of spirea were used like ocean-spray stems by the Lummi principally for spreading and smoking salmon. The tiny seeds were used for a tea to treat diarrhea.

Fig. 5.65. Douglas' Spirea or hardhack prefers streambanks and swampy areas. It is an attractive shrub when topped by spires of pink-purple blossoms.

Starflower (*Trientalis latifolia*)

Primulaceae - primrose family. The light pink flowers of six petals rise star-like above the whorl of broad ("lati") leaves ("folia"). Starflower may grow over a foot high to compete for sunlight among neighboring woodland plants, but the Latin "triens," meaning "one-third" in the generic name, suggests a more common height of about four inches (one-third of a foot).

The tuber is a storehouse of food that, spring after spring, the starflower plant uses to send forth its whorl of medium green leaves and delicate, gem-like flowers. Starflower may spread by seeds or runners. The colloquial name "Indian potato" indicates the small potato-like tubers were a source of starch and nutrition for Native people in the Northwest. The juice of the starflower was used as an eyewash by one Native group.

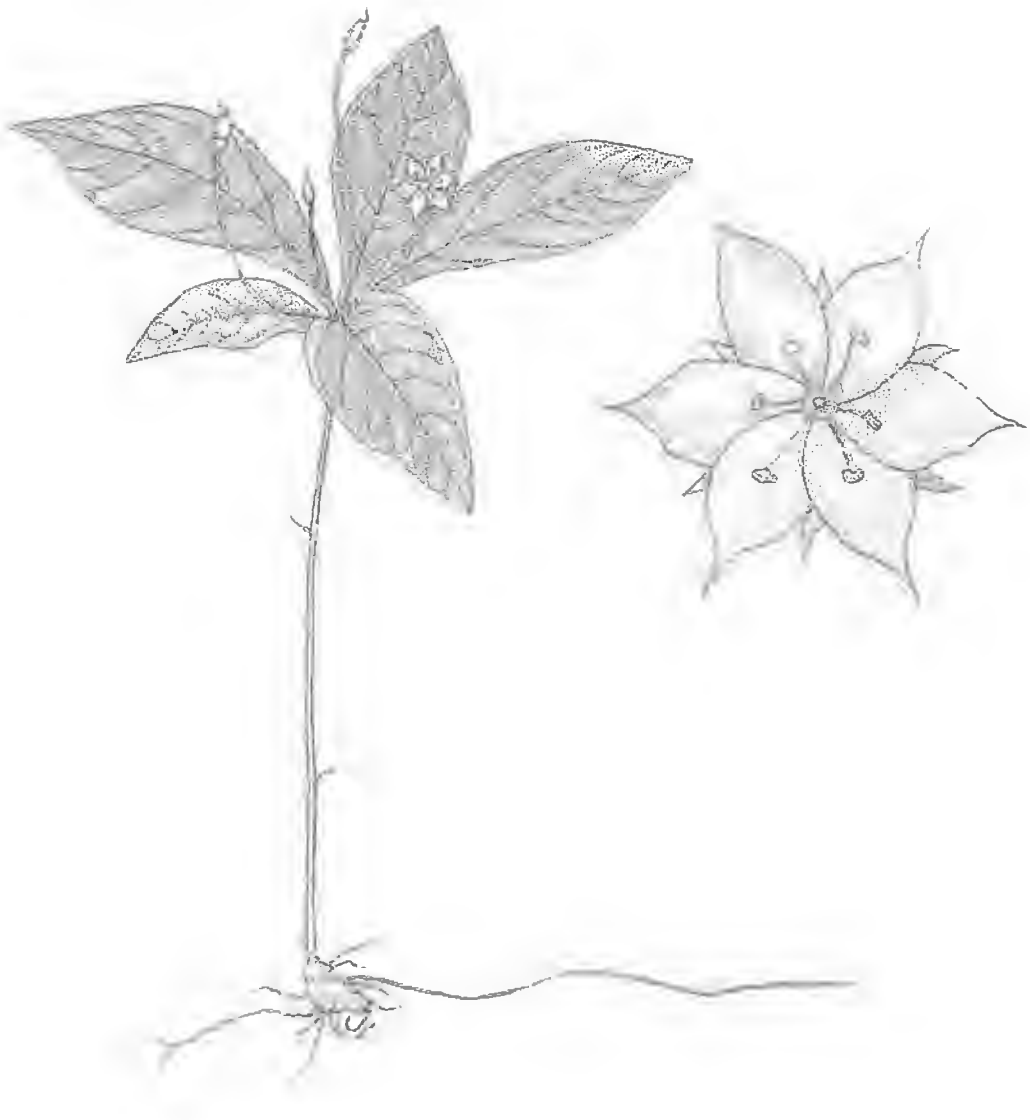


Fig. 5.66. Starflower, colloquially known as Indian Potato.

Stinging Nettle (*Urtica dioica*)

Urticariaceae - nettle family. This perennial is covered with specialized spring-loaded stinging hairs, giving rise to the generic name ("urticare" in Latin means "to sting"). The specific name "dioica" refers to the many species of the genus that bear male and female flowers on separate (dioecious) plants. Interestingly, our variety is monoecious, bearing unisexual (male and female) flowers on the same plant.

Despite being nettlesome, the stinging hairs are of ingenious design. Like the stinging nematocysts on jellyfish tentacles, the hollow hairs of the nettle are sprung under tension and release abruptly when triggered. The injection of formic acid has an effect similar to a small bee sting. Stinging nettle is found in shady, damp places. The creeping underground rhizomes can form dense colonies several feet high that are formidable in summer, but die back during winter. The stems have widely spaced pairs of opposite, long-petioled leaves that are broadest at the base and taper at the tip (ovate). The small, greenish flowers are borne on drooping spikes arising from leaf axils. (A close look-alike to stinging nettle is the **hedge-nettle** (*Stachys cooleyae*), a member of the mint family. The hedge-nettle, like other members of the mint family, has square stems and flowers with prominent "lips," characteristics lacking in true nettles. See Self-Heal, *Prunella.)* It is said that the young shoots of stinging nettle are a good substitute for spinach when boiled, and Erna Gunther also mentions this use for Native peoples. The bark remains an important source of natural fiber after being peeled, dried and rolled into a string for making nets. Medicinally, some Native groups applied fresh nettle for relief of rheumatism, paralysis, and colds, perhaps partly as a counter-irritant. Bathing in, or drinking, an infusion of nettle also served as a general tonic, a cold relief, and treatment for rheumatism, soreness, or stiffness.

Fig. 5.67. Stinging Nettle. Clusters of seeds, with close-up (below). Leaf shape is variable.

Strawberry, Woods (*Fragaria vesca*)

Rosaceae - rose family. A strawberry plant, left to itself, will in time be surrounded by little strawberry plants set forth by runners. Thus "streowberie" is the name Anglo-Saxons gave to strawberry that"strews" the ground with plants and fruits. A freshly cut strawberry emits a delicious fragrance ("fraga" in Latin) engendering the generic name. The woods strawberry has thin ("vesca") leaves relative to the thicker-leaved native strawberries F. virginiana *that is more common in the eastern Cascades, and* F. chiloensis *of coastal regions.*

The plants of woods strawberry closely resemble those of the garden strawberry. But the appearance of relatively tall flower stems, later displaying the small sweet berries *above* the leaves, is a distinguishing feature. Woods strawberry, unlike the sun-loving garden strawberry, is adapted to the damper and shadier woodland. It holds its small precious fruit above the threat of ever-present slugs and sow bugs. Native groups relished wild strawberries of all types fresh or dried, and today many people consider wild strawberries of superior flavor to the cultivated hybrids.

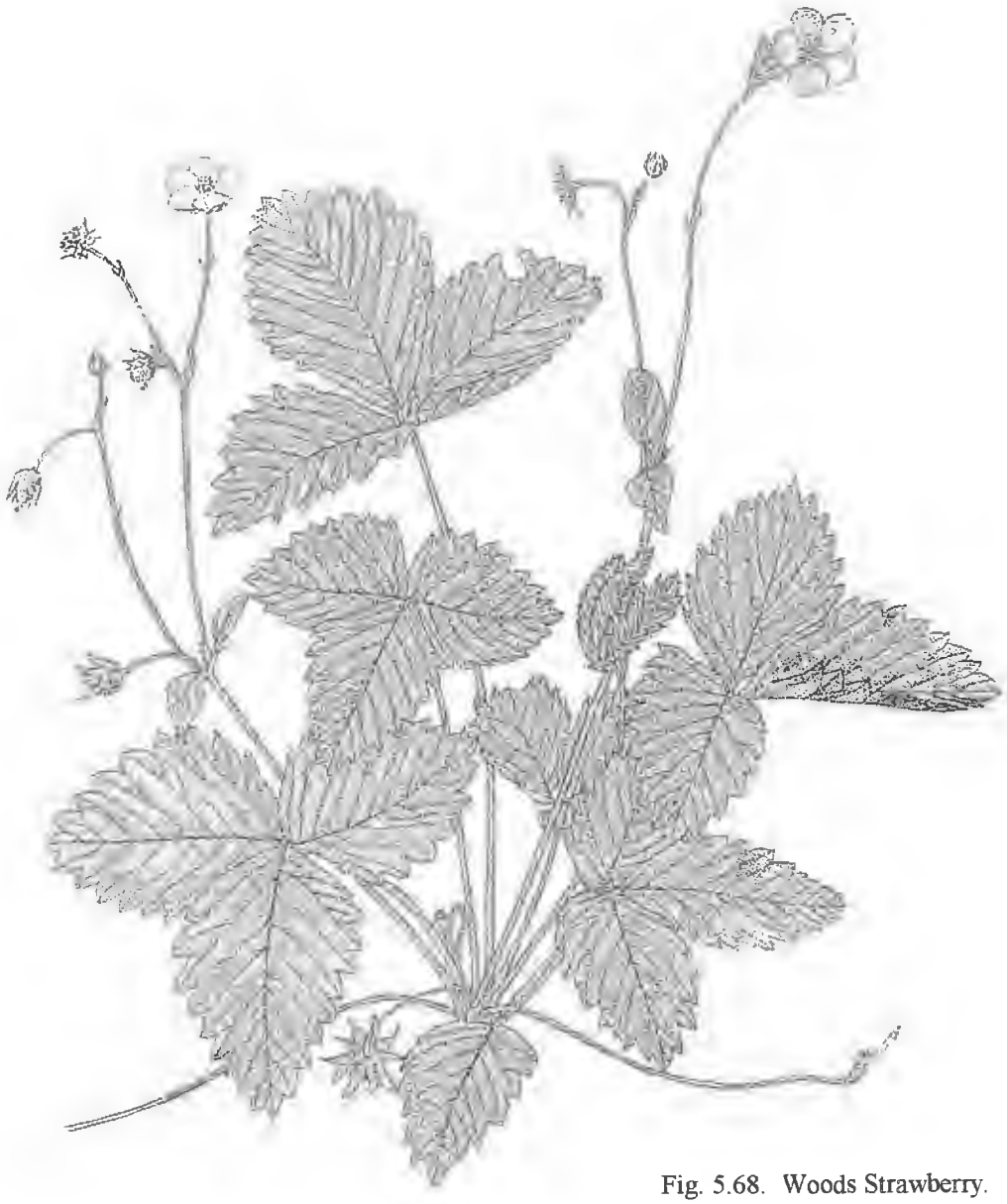


Fig. 5.68. Woods Strawberry.

Thimbleberry (*Rubus parviflorus*)

Rosaceae - rose family. "Rubus" is the Latin name for blackberry and is likely derived from the red ("rubus") color of both immature fruit (blackberries are red before they turn black) and mature fruit (such as the bright red of ripe thimbleberry and raspberry) of this genus. The flowers occur in loose clusters of four to eight and have five white petals around the central stamens and pistils. Compared to the denser flower clusters of related species, those of thimbleberry may seem relatively sparse ("parvi") of flowers ("florus"), thereby explaining the specific name. The fruit, like those of other raspberries, pulls free from its core when picked to resemble a thimble.

Thimbleberry stands erect to a height of three to seven feet in sunnier locations of the forest, proudly displaying its broad, light green palmate leaves. The soft leaves are covered with velvety hair, and could be used as a handkerchief. Thimbleberry plants like other raspberries spread by underground stems, and may form a small thicket in favorable conditions. The lack of thorns and sweet red berries encouraged widespread harvesting among Northwest Native groups. The berries could be eaten fresh, or dried and stored. In early spring, the young sprouts were consumed as vegetable greens. The broad leaves were used as a wrap for cooked berries. Thimbleberry had other diverse uses, such as using boiled bark for soap, powdered dry leaves to prevent burns from forming scars, and leaves for a tea to treat anemia.

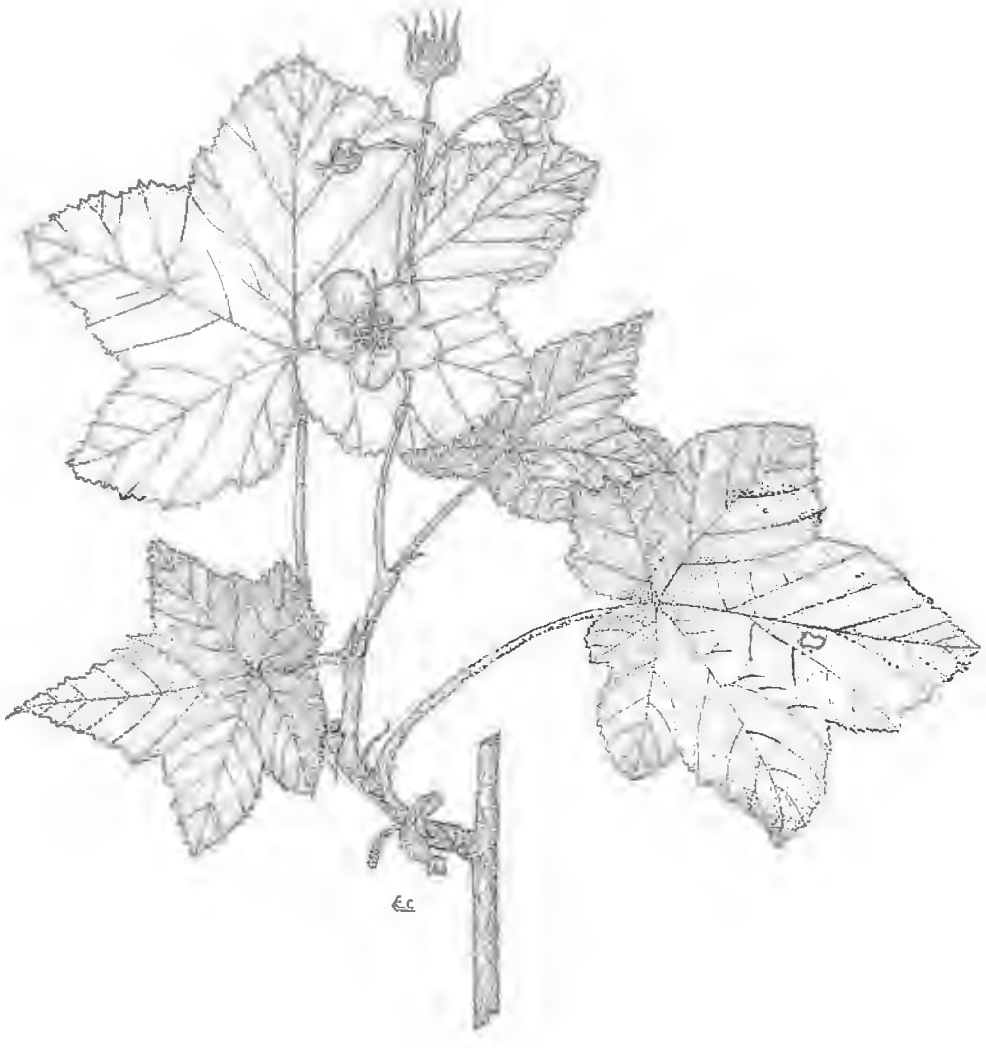


Fig. 5.69. Thimbleberry.

Trillium (*Trillium ovatum*)

Liliaceae - lily family. The leaves and petals are arranged as triplets ("tri" meaning three) in this genus. A single stalk supports the trio of ovoid ("ovatum") leaves that taper to a drip point to shed excess water .

Above the triplet of leaves rises the prominent white, three petaled flower with six yellow stamens. The long lasting flowers gradually turn pink and then red-purple. When the petals at last are shrivelled, the three-parted ovary has matured into a plump, ridged seed capsule that splits open upon maturity. Attached to each brown seed is a morsel of food for ants, enticing them to carry the seeds to their burrows. This ingenious method of plant dispersal is an example of mutually beneficial partnerships between the plants and animals in nature. The broad leaves persist through summer, using the dim filtered light of the forest floor to store food in the underground bulb for next season's bloom. Though trillium picking brings momentary delight, the trillium is robbed of its food production for the year, and several seasons must pass before there is again sufficient energy for flower production. Perhaps because the sight of early spring trillum blossoms is enchanting, at least one Native group uses the pounded bulb as a "love medicine." In another Native group, a woman who wishes a man for a lover drops a cooked trillium bulb into his food. Far less romantically, several other Native groups use the juice of the bulb as an eye medication, and the scrapings of the bulb to bring a boil to a head.

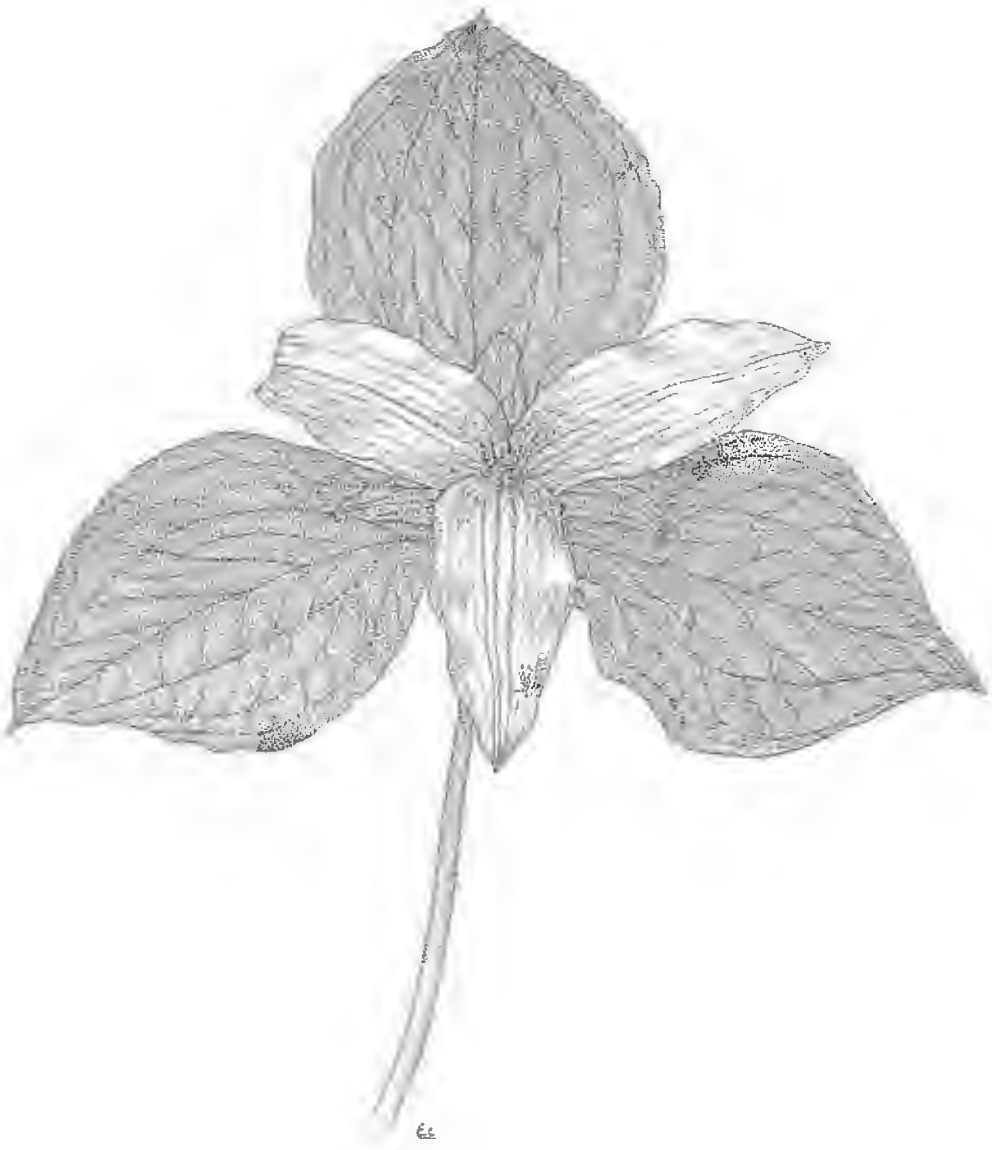


Fig. 5.70. Trillium.

Violet, Yellow Wood (*Viola glabella*)

Violaceae - violet family. "Viola" is the Latin name for the genus and "glabella" describes the smooth (glabrous) parts of the yellow wood violet.

From the fleshy stems that have lain dormant over winter arise cheerful clusters of bright yellow wood violets proclaiming the onset of spring. The three lower petals have several fine purple lines, probably a guidance system for pollinating insects. The appearance of the yellow blossoms is enhanced by the heart-shaped leaves of medium green. The yellow wood violet is a prolific bloomer until it recedes into dormancy with summer's drought. The little violet's seed capsules are an engineering marvel, for they become spring-loaded when dry and explode at least provocation in a shower of seeds. This is followed next spring by a secondary explosion of wood violet seedlings from one to five feet away.

Fig. 5.71. Yellow Wood Violet. Close-up of seed capsules (below left).

Water-Parsley (*Oenanthe sarmentosa*)

Umbelliferaceae – carrot and parsley family. As the common name implies, water parsley can be found in seeps, marshes, bogs, and other wet places. The divided leaves are parsley-like, but larger. "Oenanth" suggests that the flowers ("anthos") of a species were added to wine ("oinos," Greek). The spreading growth is aided by rooting of the prostrate stems, explaining the specific name "sarmentosa" ("bearing runners").

The presence of water parsley indicates wetland habitat. The spreading prostrate growth and hollow leaf stalks are adaptations to keep the plant from sinking into the wetland habitat shared by skunk cabbage and scouring rush. Like other members of the umbel family, the small greenish-white flowers occur in an umbel (see Queen Anne's Lace); the umbels of water-parsley in turn are compound (umbels of umbels). Native groups used the young, tender stems for food, the older stalks for childrens' whistles, and the pounded root as a laxative. **Confusion of poison hemlock and water hemlock with water-parsley makes these uses potentially deadly for the inexperienced.**

Fig. 5.72. Water-Parsley.

Waterleaf, Pacific (*Hydrophyllum tenuipes*)

Hydrophyllaceae - waterleaf family. The generic name is the Latin version of "water" ("hydro") and "leaf" ("phyllum"), and may refer to the moist conditions required by some species or to the wetness of the stems when broken. The specific name in Latin means "thin" ("tenuis") and "foot" ("pes"), perhaps referring to the tall and erect growth of Pacific waterleaf compared to other species in this genus.

The sharply divided palmate leaves arise from rhizomes in spring. In favorably moist woodland areas, waterleaf can grow up to three feet high and may blanket the forest floor. The stems, foliage, and sepals have thin, protective bristles. The flowers occur in clusters and have whitish petals. The stamens of this genus extend noticeably beyond the petals and give the flower heads a bristly appearance. By summer's drought, the light green luxuriant blanket of waterleaf foliage has whithered away, only to reappear the following spring. At least one Native group used the root for food. **Woods nemophila** (*Nemophila parviflora*) is a dimunitive member of the waterleaf family, an annual herb with small whitish flowers and creeping stems, inconspicuous on the forest floor.

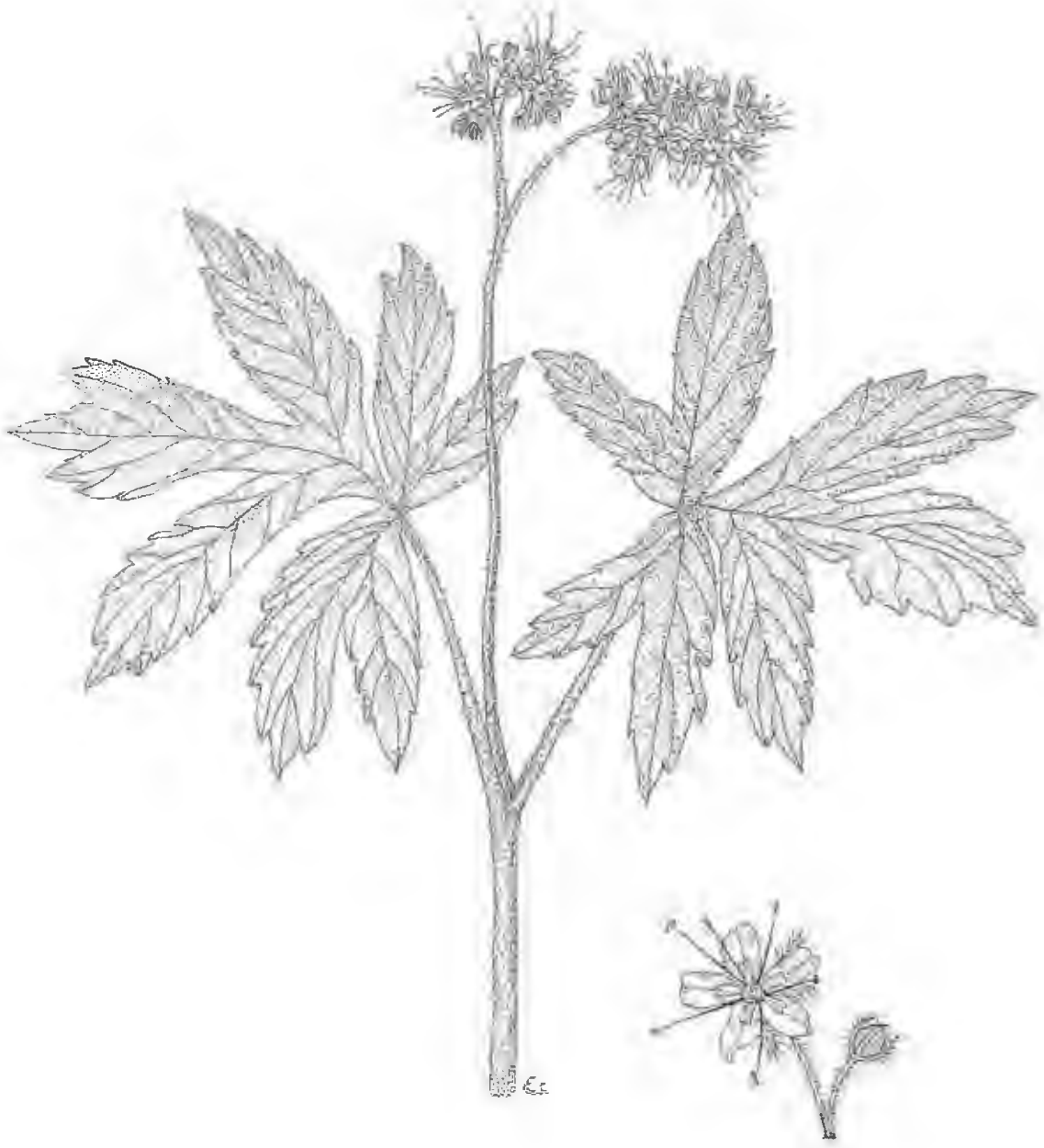


Fig. 5.73. Pacific Waterleaf, with close-up of flower.

Western Hemlock (*Tsuga heterophylla*)

Pinaceae - fir, pine family. "Tsuga" is derived from the Japanese name for hemlock. The leaves (needles, or "phylla") of varying ("hetero") lengths tend to be longer when horizontally positioned on a branchlet, and shorter when positioned vertically.

A high tolerance for shade and the virtue of perseverance enable western hemlock over many hundreds of years to dominate over taller and faster growing trees like Douglas-fir in an old growth forest. The difference in shade tolerance among species explains why hemlock seedlings are more frequent on nurse logs in the deeper shade of an old growth forest, while Douglas fir seedlings are more frequent in openings created by fire, wind, or logging. The blunted needles are 1/4 to 3/4 inches long and whitened beneath. The small and papery cones are usually borne at the end of twigs and branchlets. The western hemlock has an elegant appearance with its fine needles, gracefully drooping top shoot, and gently lowering branches. The bark of the western hemlock when made into a medicinal tea by various Northwest Native groups was used as a laxative, a wash for sore eyes or for skin sores, a remedy for sore throat, and to control hemorrhage. The pitch was used as a chest rub for childrens' colds, to prevent chapping and sunburn, and as face paint when mixed with ground bark. The inner bark when boiled and pounded made a reddish paint for use on baskets, spears, and paddles. The dye also made nets invisible to fish. The wood was a good source of firewood. The very versatile western hemlock also provided multibranched boughs for fish traps and weirs.

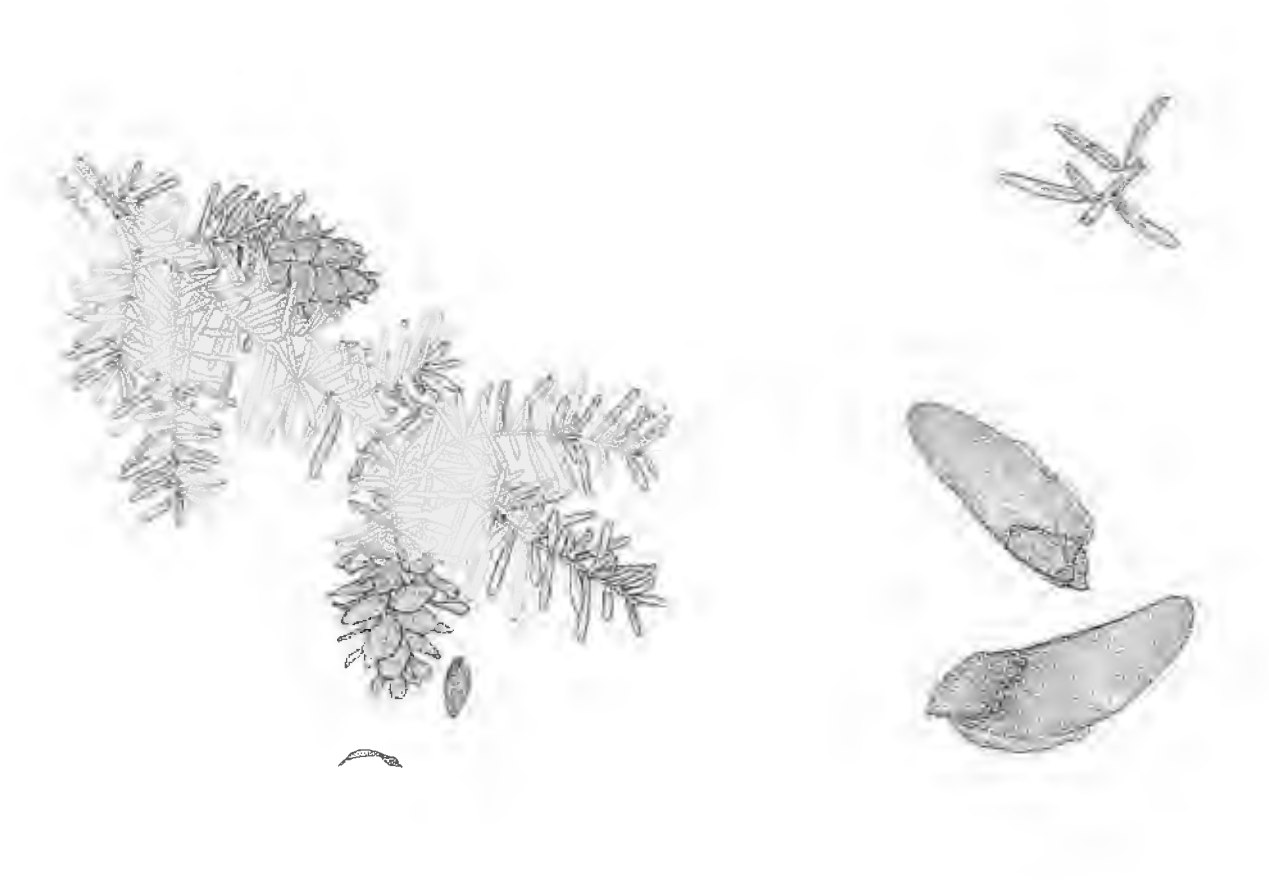


Fig. 5.74. Western Hemlock. Close-up of twig (upper right) and winged seeds (lower right).

Western Red Cedar (*Thuja plicata*)

Cupressaceae - Juniper family. The Greek name for juniper is "thuja." "Plicata" indicates the plaited appearance of the shoots. Despite its name, this tree is not a true cedar of the Old World genus Cedrus.

Western red cedar thrives in soggy ground that would suffocate the roots of Douglas fir and hemlock. Stately red cedar trees are more commonly found along river banks, in moist bottom lands, and near seeps. Old growth trees can top 200 feet and be over 10 feet thick at the base during their 1000 year life span. The distinctive trunk is broad for support at the base, but tapers gracefully upwards, accentuated by long strips of red-brown bark. The drooping, flattened branchlets are covered with scale-like leaves. The leaves have a sweet aromatic smell when crushed. Small ovoid cones contain about six pairs of scales each bearing two to three light winged seeds.

Western red cedar was the tree of greatest utility to Native peoples of the Northwest. The wood splits cleanly into planks used for fishing platforms, walls, roofs, and partitions of plank houses. Perhaps the most impressive canoes in the world are those honed from western red cedar logs. Bark fibers were tightly woven into platters, baskets, mats, and rain hats. The soft, finely shredded bark fibers were used as towels or to line cradles. Longer fibres were woven into fish nets and sewn to make skirts and capes. The red cedar buds or leaf tips were used by some Native groups for toothache when chewed, as a gargle, or as a cough remedy when boiled.

Fig. 5.75. Western Red Cedar, a tree of great utility for Native cultures.

Western Wahoo (*Euonymus occidentalis*)

Celastraceae - burning bush family. Few would consider "Euonymus" a good name, but the precise meaning in Greek is "good" (eu) "name" (onoma)! The specific name means "western," for this plant has a distribution restricted to the western Cascades from Lewis County, WA., south to central California. "Wahoo" is said to be the Sioux and Creek name for an eastern form of the plant.

This 6 to 10 foot shrub or small tree is a relative of the familiar burning bush, a native of northeastern Asia, whose leaves turn a spectacular brilliant red in the fall. The spindly branches of western wahoo bear pairs of opposite, ovate leaves with faintly toothed edges. The quite pretty five-petalled flowers are a mixture of maroon and green about 1 cm. across. A cluster of up to four flowers is suspended by a thin stalk arising from the leaf axils. In fall the three-lobed fruit cracks open to reveal brilliant orange-red seeds.

Fig. 5.76. Western Wahoo. Close-up of flower (below left), and fruit (below right).

Wild Ginger (*Asarum caudatum*)

*Aristolochiaceae - birthwort family. This peculiar plant is in a separate family from true ginger (*Zingiber officianale*), but like its tropical namesake, wild ginger possesses the fresh, spicy taste and fragrance. The generic name is of Greek origin for an Old World species. The distinctively long, tail-like ("cauda") sepals engenders the specific name.*

Wild ginger is found in moist and shaded parts of the woodland. The broad, thickly textured leaves are heart-shaped and suited to collect the limited amount of filtered sunlight reaching the forest floor. The dark green leaves are raised a few inches above the ground, sheltering the branching, prostrate stem and exotically formed flowers. The flower has no petals to speak of, but instead has long, partially fused sepals of brown-purple coloration. The unusual flowers have probably evolved to attract denizens of the humus layer that play the role of pollinators. Erna Gunther reported that one Native group made use of dried leaves to treat tuberculosis, while eating the leaves improved appetite, and boiling the plant produced a tonic.

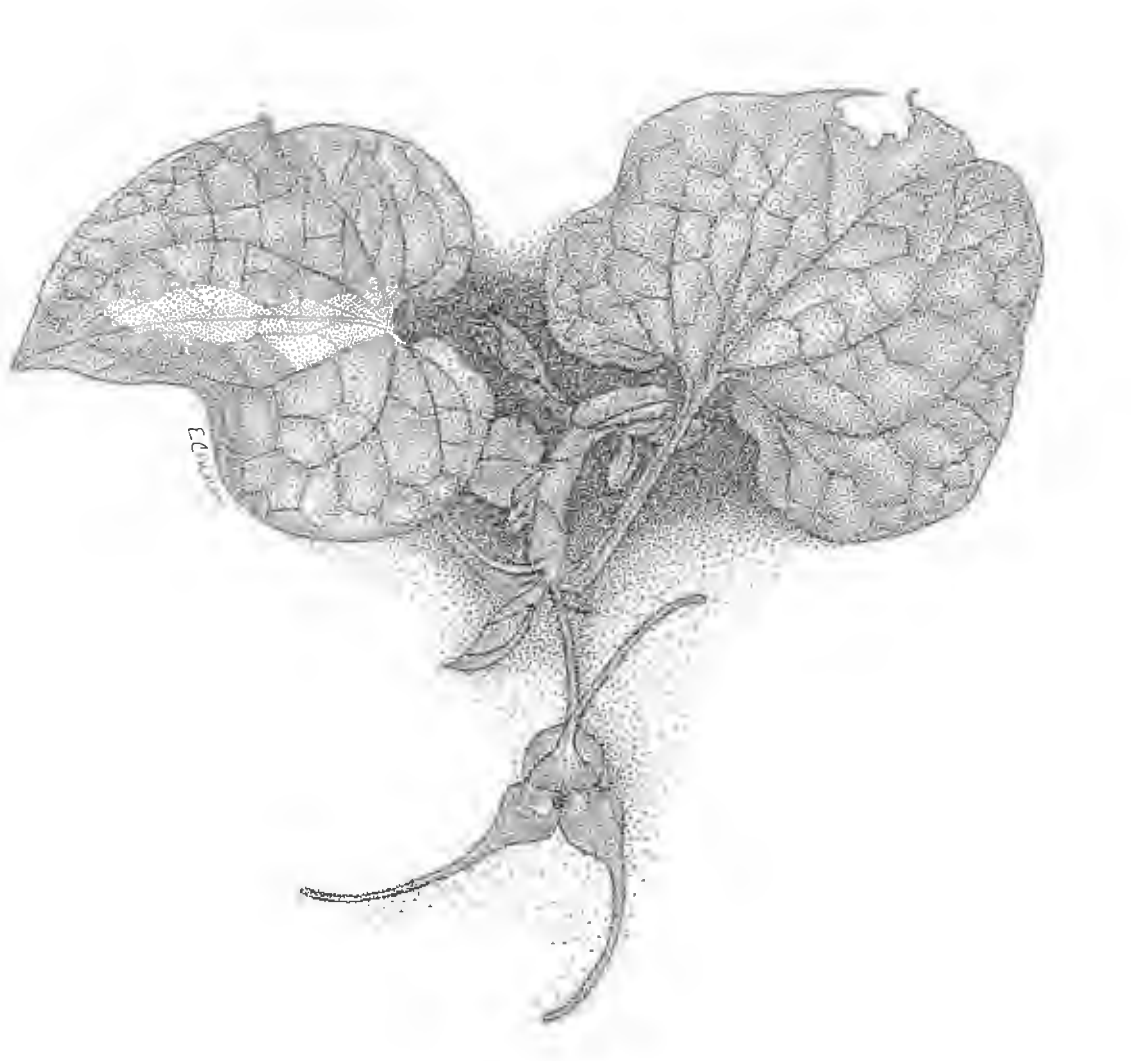


Fig. 5.77. Wild Ginger.

Willow (*Salix species*)

Salicaceae - willow family. The Old English name "welig" is the basis for the common name. "Salix" is the Latin name for willow. Most willows are a challenge to identify, a problem compounded by hybridization.

The two most common tree willows in our area are Scouler willow and Pacific willow. **Scouler willow** *(Salix scouleriana*) unlike other tree willows, commonly grows away from water. Seedlings of this willow are frequent following fire, hence the alternative name of "fire willow." Scouler willow is very widespread in the Northwest. It may reach a height of 40 feet. The leaves are 2 to 4 inches long and distinctively wider above the middle. Like all willows, the flowers are in "catkins," this term meaning "little cats," the "pussy" in "pussy willow." All willows have alternate leaves, with small leaf-like appendages at the leaf base called "stipules." The common and specific names honor John Scouler (a Scottish schoolmate of David Douglas) who spent 7 months exploring the flora of the Pacific Northwest before returning to Scotland to become a physician. **Pacific willow** (*Salix lasiandra*) grows near water along with black cottonwood and red alder. The long and narrow leaves are a shiny dark green. Pacific willow may attain a height of 40 to 60 feet. Other common willows in the Portland, OR. area are **Piper's willow** (*Salix piperi*), and **Sitka willow** (*Salix sitchensis*). The bitter bark of willow contains salicylic compounds, that like aspirin (acetosalicylic acid) have analgesic and anti-inflamatory properties. An infusion of bark was used as a remedy for sore throat by various Native cultures. The fibrous bark was also important for basketry and cordage.

Fig. 5.78. Scouler Willow. Stipules are at the base of the petioles (leaf stalks).

Yew, Pacific or Western (*Taxus brevifolia*)

Taxaceae - yew family. "Yew" is derived from Old English, and referred both to the yew tree as well as the bows made of yew wood. The tough, resilient property of yew wood was also recognized by the ancient Greeks whose term for a bow of yew wood was "taxon" giving rise to the Latinized generic name. Compared to the longer pine needles, the needles or leaves ("folia") of the yew are relatively short ("brevi"), about 2 cm., thereby giving rise to the specific name.

The Pacific yew is never abundant but is widely scattered in the shade of taller conifers. The yew tree is rarely majestic, usually attaining a height of 25 to 40 feet, with a contorted trunk, loosely branching form, and thin reddish bark. The needles are dark green above, yellow-green below, and lie in flat opposite rows. The female yew tree produces a cupped, bright red, fleshy fruit (aril), an unusual departure from the seed cones of other conifers. The fruits are eaten, and the seeds dispersed, by birds, but they are **poisonous** to humans. The related **English yew** (*Taxus baccata*) also grows to a medium-sized tree bearing poisonous arils, but is more frequently encountered as part of a neatly trimmed hedge rather than as a tree. English yew may be dispersing to the woodlands by means of seeds. Native groups valued yew wood in much the same way as the English and Greeks. Bows, arrows, harpoon shafts, hoops of dip nets, clubs, wedges for splitting logs, digging sticks, spoons, and dishes made use of the resilient strength of yew wood. English yew and Pacific yew both contain taxol, a compound that is being successfully used to treat certain types of cancer. Native groups apparently had limited medicinal use for yew. The peeled and boiled bark was used by one group as a "lung medicine."

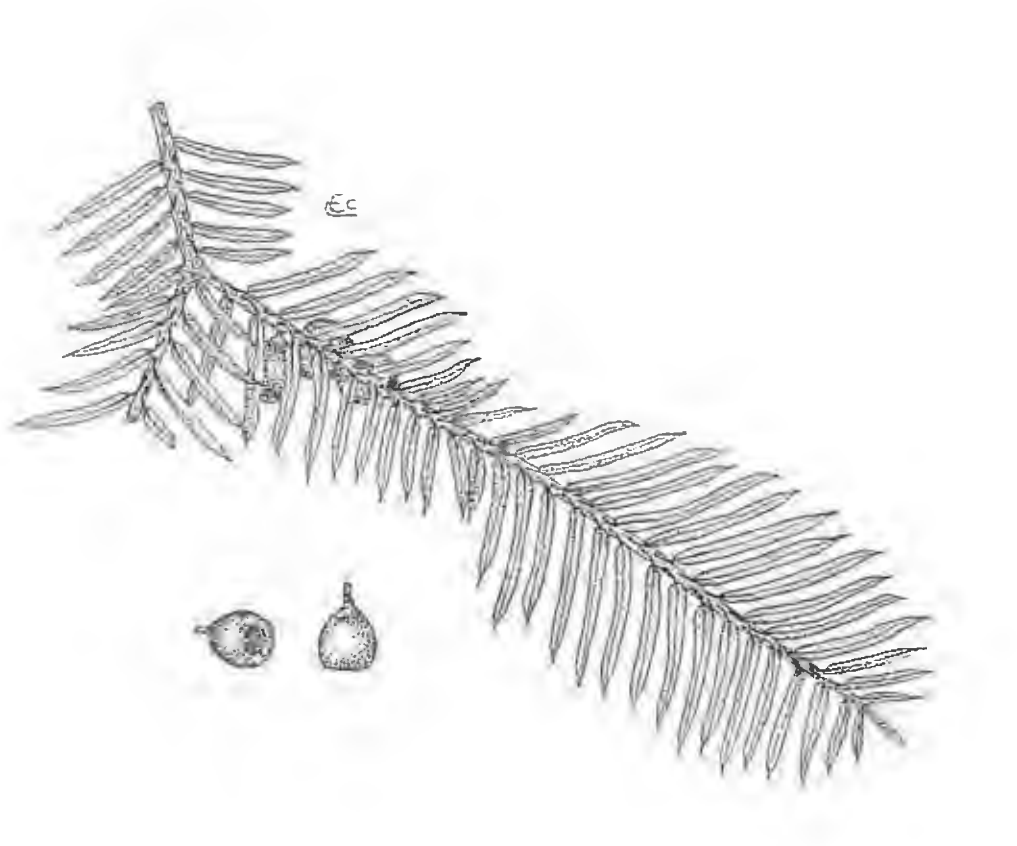


Fig. 5.79. Pacific or Western Yew. Fleshy red arils hang below the twigs.

References

Arno SF, Hammerly R. *Northwest Trees.* The Mountaineers, Seattle, WA. 1977.

Coombes AJ. *Dictionary of Plant Names.* Timber Press, Portland, OR. 1985.

Clark LJ. *Wild Flowers of the Pacific Northwest.* Evergreen Press, Vancouver, B.C. 1976.

Gilkey HM, Dennis LJ. *Handbook of Northwestern Plants.* Oregon State University Bookstores, Corvallis. 1973.

Gunther E. Ethnobotany of Western Washington. University of Washington Press, Seattle. 1945

Hitchcock CL, and Cronquist A. *Flora of the Pacific Northwest.* University of Washington Press, Seattle. 1973.

Jolley R. *Wildflowers of the Columbia Gorge.* Oregon Historical Society, Portland. 1988.

Kruckeberg AR. *Gardening with Native Plants of the Pacific Northwest.* University of Washington Press, Seattle. 1982.

Mathews D. *Cascade-Olympic Natural History.* Raven Editions. 1988.

Mish FC, ed. in chief. *Webster's Ninth New Collegiate Dictionary.* Merriam-Webster, Springfield, MA. 1984.

Pojar J, Mackinnon A, eds. *Plants of the Pacific Northwest Coast.* Lone Pine Publishing, Vancouver, B.C. 1994.

Spencer ER. *All About Weeds.* Dover, New York. 1968.

Volak J, Stodola J. *Illustrated Encyclopedia of Herbs,* Bunney S, ed. Dorset Press, New York. 1984.

Whittlesey R. *Familiar Friends: Northwest Plants.* Rose Press, Portland, OR. 1985.

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