Identifying Oregon Driftwood

Oregon State University Extension Service
Sea Grant Marine Advisory Program
Extension Manual 2 / September 1976

Safety on the beach

is just as important

when you hunt driftwood

as any other time!

Remember these important safety rules, whenever you gather driftwood on the beach:

1. *Never turn your back on the sea.*

2. **Waves are unpredictable. Forget anything you have ever heard about "that 7th or 11th wave" that is supposed to be the bad one. The larger, more dangerous waves *cannot be predicted by any system.* There is no substitute for constant watchfulness on your part.**

3. **Even a "small" wave (say, a 3-footer) can knock down an adult.**

4. **"Sneaker waves" are just that – completely unpredictable, even on outgoing tides.**

5. **Check the tide table before you set out for the beach. Incoming tides can be the most dangerous for unwary explorers, but watch outgoing tides, too – they can tumble huge logs along with them.**

6. **Never, never stand on – or even get near – a log that is *in the surf or on the wet portion of the beach.* Unpredictable waves can toss or roll it – and injure you seriously if you happen to be in the way.**

7. **Avoid beachcombing and driftwood hunting alone. If you must go alone, be sure to leave word with someone back at the car, the house, or the motel – about where on the beach you plan to visit and how long you expect to be there.**

8. **Water-soaked wood is very heavy. If you carry it any distance, overexertion is a possibility. Be realistic about how many pieces you can comfortably carry over the distance you must walk or climb.**

Identifying Oregon Driftwood

by

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Acknowledgments

This manual began with a manuscript prepared for the Oregon State University Extension Service by Dr. Alexis J. Panshin, Professor and Chairman Emeritus of Forest Products, Michigan State University, in 1972. His introduction has been expanded, and his key and list of trees have been modified, to increase the manual's usefulness in Oregon. The general approach and almost all of the descriptions of individual woods remain Dr. Panshin's.

Picture credits: 16, 31, 34-35, 39-40, 42-44, State University of New York, College of Environmental Science and Forestry, Syracuse; 11-15, 17-30, 32-33, 36-38, 41, Antone C. Van Vliet; 2, Charles B. Jackson; front cover, Donald E. Giles.

A Note to the Reader

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Contents

Introduction

For about as long as men and women have walked ocean beaches, driftwood has been a subject of unending fascination. Countless times it has simply provided fuel for a fire, but usually it carries a suggestion of something more. . . . The many kinds of wood, the striking forms that pieces can take, the faraway origins they may suggest – through the centuries these factors have made driftwood a treasure to seek, display, and talk about.

Oregon's combination of winds, currents, rather straight coastline, and active logging industry – often based near rivers – makes the state's shoreline one of the best in the union for driftwood hunters. For a growing number of these persons, a general interest has led almost naturally to questions like, "Just what kind of wood is this?"

This manual is an answer to that question. For years, Oregon State University forestry specialists and Extension agents have helped inquirers to identify particular driftwood samples; for 34 selected woods, this manual condenses their experience and knowledge, in a form that should help you find the satisfaction of working out most identifications for yourself.* But first, a few general pointers.

Where driftwood comes from

Large reserves of driftwood are always out at sea; what brings them to shore is the right velocity and direction of wind. Some pieces are timber lost from passing barges and freighters, sometimes exotic woods like mahogany and other Asian hardwoods.

Much of our driftwood is the result of storms, floods, snow, rockslides, and erosion – along the shore and along inland streams and rivers. These forces uproot many inland trees and send them downriver; sooner or later, most of them reach the sea.

Oregon's logging industry accounts for many pieces

*Some common commercial woods are included because similar species or foreign counterparts sometimes wash up on our shores. For instance, it is doubtful that you will find American elm (see page 13) on the beach, but you might find Japanese elm – and be able to recognize it as having the same characteristics as its relative.

on our beaches. Logs escape from rafts and storage areas along rivers and in estuaries. Logging near stream banks leaves behind branches and other debris that slowly work their way down hill; flooding may then carry them downstream to the sea.

Longshore currents (paralleling the shore) transport driftwood from north to south, and even south to north. For example, redwood is often found on Coos County beaches, although the species grows only in northern California and the southwest corner of Oregon.

Some coves and beaches act as driftwood reservoirs; they collect it after particularly strong winter storms.

On some beaches, driftwood comes and goes

Wave action and seasonal changes cause this fluctuation. At any time, some waves may have enough power to push driftwood specimens relatively high on the shore. (*This movement can be very dangerous; do not ignore the beach safety tips on the inside front cover.*

Strong winter waves alternately thrust whole logs and smaller pieces higher up on the beach and drag them back down into the sea again. Gentler summer waves return much of the wood that winter action drives out to sea.

Some tools you will need

Indispensable investments for identifying woods are a good 10X (ten-power) *hand lens* and a quality *pocket knife.*

You can identify some woods by features visible to the naked eye (gross features), but for most woods,

These are actually in use, because they fit the task: a 10X hand lens and a good pocket knife.

accurate identification requires a hand lens for studying cell structure (anatomical features). The cross section (see page 7) is the best plane of study for hand-lens use.

Success in identification depends *on a sharp knife cut.* The pocket knife must be kept very sharp (minimum blade: 3 inches long and ½ inch wide). Avoid using a large hunting knife; single-edged razor blades can be effective – and dangerous.

Sporting goods and hardware stores are usually good sources of pocket knives; many of the good bookstores sell 10X lenses.

The photos that accompany descriptions of woods in this manual show the wood and its key anatomical features *approximately as they appear through a 10X hand lens.*

After leaving the beach

If you load wet driftwood into your car, remember that salt water causes rust. Mop up any puddles.

If there are barnacles on the driftwood you collect, treat these animals with a 70 percent alcohol solution (rubbing alcohol is good) to prevent them from rotting and smelling offensive.

If you plan to carve, cut, turn, or otherwise work with driftwood pieces in your home shop, be sure to remove sand and salt grains, nails, spikes, bits of mollusk shells, and other foreign matter – *to minimize damage to sawteeth and other tool edges.*

How to use this manual

Flip through the pages in the manual. Notice that most pages cover a single wood each, with a picture (at 10X magnification), a brief description, and a condensed version of the *key* that lists only those key lines necessary to move from line 1 to that specific wood.

The *complete key* begins on page 45; it groups all the hardwoods and softwoods described in this manual into a single related sequence of paired choices, from 1 to 33. It arranges a variety of wood features – some that you can see with the naked eye (color, texture), others that you can feel or smell (weight, hardness, and sometimes odor), still others that you can see only through a hand lens – all to show the relationships between the trees the woods come from.

This complete key also lists the pages on which specific woods in the key are described and pictured.

You may be wondering why all the emphasis on the key. The answer is that the key is a useful and efficient tool for the identification process. It does require some effort on your part, though! Note in the complete key that you must choose, at each numbered step, *one of two* alternatives in order to proceed.

Cross-referencing of key information, from single-wood pages to the end section, and vice versa, makes it possible to use this manual in either "direction":

Reading about redgum, for example, on page 25, you may be puzzled by the reference to key line 16 – why did the key jump from line 11 to line 16? By turning to the complete key (hardwoods, page 47), you can work your way from the correct 11 to the correct 16.

Or reverse the situation. You may be studying the softwoods part of the complete key, page 48, and become interested in one of the cedars. You will find a page reference for the cedar you want; when you turn to that page, there is an "instant" key that shows (if you are interested) how the key got from line 1 to that wood.

On the beach, use the key in the same way. You find some driftwood that you are sure is black walnut; page 21 presents all the needed key lines, tells something about that wood, and shows a picture of it. Sometimes, of course, you feel sure it is black walnut, say; but the picture, key, or description will convince you it is not. Then go back to the complete key!

There are, of course, too many woods to include in a booklet; however, practice with the 34 in this key will lead to increased awareness of the distinctive gross and anatomical features and should help you to track down the identifications of woods from other sources.

However you use the manual, you will find that spending time to understand the key, *and to use it*, will make driftwood identification a rational – and, we hope, enjoyable – activity.

The Identifying Process

The correct identification of wood is not simple; there are more than 80 types of trees logged commercially in the United States, and at least 25 of these may be found on the West Coast as driftwood. To this number must be added woods of foreign origin that are discarded or that break loose from ships sailing the Pacific; foreign woods are usually in the form of lumber or round stakes a few inches in diameter.

Further difficulty in the identification of wood may arise: on the one hand, a number of native woods look quite similar at a first glance; on the other hand, different samples of the same wood may vary considerably in appearance and in working characteristics. Finally, the appearance and physical characteristics of wood that has been exposed to water, whether salt or fresh, may be significantly and quite unpredictably altered.

Lumbermen and woodworkers are frequently able to recognize, by their general appearance, a few woods with which they deal constantly. But their method of identification, based on long experience, cannot be easily described and is of no use to less experienced people. Moreover, the larger the number of different kinds of wood involved, the less successful such an unsystematic approach to wood identification becomes.

In some instances, positive identification of a wood is not possible without resorting to a microscope. Fortunately, however, many common native woods can be identified, with a considerable degree of accuracy, by their anatomical characteristics (visible with a 10X hand lens) and their general (gross) characteristics – color, texture, weight, hardness, and sometimes odor.

How wood is formed

Wood consists of a great number of very small units called cells. These cells are so small that in most cases they cannot be seen without some magnification, hence the need for a hand lens. Every kind of wood has several different types of cells that are characteristic of it and by which you can identify it. Unfortunately, because of

the extremely small size of the cells, recognizing them requires considerable experience.

With a little effort, it is possible to become acquainted with the terms commonly used by scientists engaged in wood identification. Here are selected essential ones:

All native trees can be classified as either *softwoods* (also called "conifers" and "evergreens") or *hardwoods* (also known as "deciduous" trees). These terms are somewhat misleading; some softwoods (Douglas-fir or western larch) are quite hard, while wood of some hardwoods (cottonwood or willow) is rather soft.

Gross wood features (those not requiring a hand lens)

Heartwood and sapwood. When looking at the end section of a log or a large piece of wood, you can often distinguish a darker-colored area surrounded by, or sharply differentiated from, the lighter-colored zone. The darker wood is called *heartwood;* the lighter (and newer) wood is known as *sapwood.* In some kinds of wood (for instance, true firs or red alder) there is little or no color difference between the two.

Growth rings (annual rings). Trees of the temperate climate zone grow (and thus form new wood) during the warm months of spring, summer and fall. No wood is formed in the cold months when trees are dormant. When new growth starts again in the spring, the wood formed first differs in structure and appearance from that formed later in the season. This results in a distinct division between the growth of one year and that of the next, and in the formation of circular bands (as seen in the end of a log) or curved bands (as seen on the end of a board).

These bands of wood are called *growth rings* or *annual rings.* That portion of a growth ring that forms when growth starts in the spring is called *springwood* or *early wood;* that formed later in the season is termed *summerwood* or *late wood.* Springwood is usually lighter in color and coarser in texture; summerwood is darker and denser (figures 1 and 2).

Three principal surfaces. Because of the way trees grow and the arrangement of wood cells in the stem, three principal planes or surfaces in which wood is usually examined are recognized:

- *Cross section,* exposed when wood is cut or sawed at a right angle to length of the stem, as across the end of a log or a board.

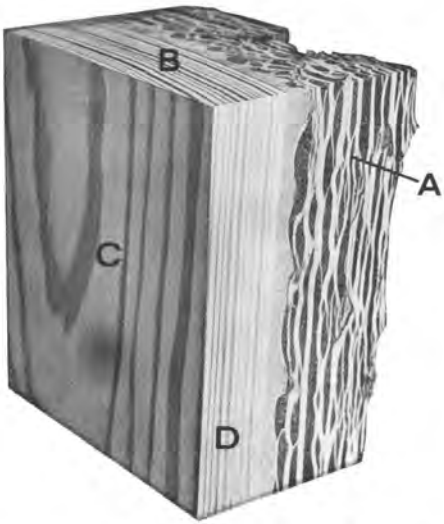


Figure 1. – A block of Douglas-fir. *A* bark; *B* wood, cross section; *C* wood, tangential section; *D* wood, radial section. Note *growth rings* consisting of lighter-colored springwood bands and darker summerwood bands. From Panshin, A.J., and Carl de Zeeuw, *Textbook of Wood Technology,* 3rd ed., vol. 1 (New York: McGraw-Hill, 1970).

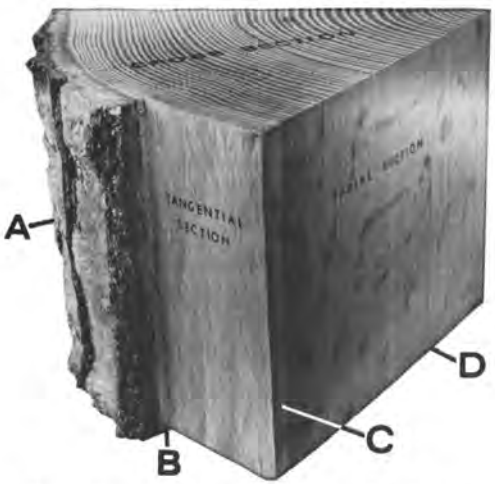


Figure 2. – A wedge-shaped block of red oak. *A* outer dead bark; *B* inner bark; *C* sapwood; *D* heartwood. Note ray flecks on the radial surface. From Panshin, A.J., and Carl de Zeeuw, *Textbook of Wood Technology,* 3rd ed., vol. 1 (New York: McGraw-Hill, 1970).

- *Radial surface,* exposed when the cut is made across the growth rings from the bark toward the pith (i.e., toward the center of the tree).
- *Tangential surface,* exposed when the bark is peeled from a tree.

In sawn wood, lumber cut principally along the radial surface is called *quarter-sawn* or *vertical-grain*, while that cut so that the wide face of the board is tangential to the growth rings is said to be *flat-grain* or *plain-sawn* (figures 1 and 2).

Grain and texture. The term **grain** is applied to the pattern, or figure, of wood produced on the radial and tangential surfaces by the growth rings, the alignment of cells, or different colorations; such descriptive terms as *flat, vertical, straight, even* or *uneven, spiral* or *interlocked* are commonly used.

The term **texture** should be used to describe the size and proportional amounts of given types of cells in a piece of wood; such qualifying terms as *fine-textured* or *coarse-textured* are appropriate.

Weight may help you identify wood. However, as weight is greatly affected by the amount of moisture wood holds, its use in separating driftwood is not always practical. You can compare weights when the wood is dried.

Hardness. Relative hardness is a useful physical characteristic; however, there is no simple, precise method of ascertaining the hardness of wood. Accurate evaluation of hardness requires laboratory equipment, but you can gain an approximate idea by testing a specimen with a knife or your thumbnail.

Color. When color is used to identify wood, the term is generally understood to refer to *heartwood*, unless otherwise indicated. The color of sapwood is seldom distinctive enough to be of much help. Some heartwoods (as in redwood, walnut, and Oregon-myrtle) have distinctive enough color that positive identification is often possible.

However, most heartwoods are shades of grayish brown or reddish brown in color, which rules out using color for precise descriptions. In the case of driftwood, color is very often modified by the exposure to salt water; before deciding on the color of wood, therefore, shave down an outer portion until you can see heartwood that has not been seriously discolored by soaking.

Odor. The *heartwood* of a few woods does have a distinctive odor (for instance, cedar, Oregon-myrtle, and Douglas-fir). However, after soaking in seawater, driftwood has often lost whatever odor it originally had. To find out if the heartwood has an odor, expose fresh heartwood by cutting, shaving, or scraping. Sometimes moistening and warming the newly exposed surface will accentuate the odor. It is easy to confuse the natural odor of heartwood with the generally unpleasant odor (in both sapwood and heartwood) that may be produced by the action of fungi, bacteria, or molds.

Wood features requiring a hand lens

In most cases, you cannot absolutely identify wood by its gross characteristics; you must use a hand lens to study cell structure. Most of these minute structures *are identifiable in the cross section.* To do this, it is necessary to make a smooth cut with *a very sharp knife.* It cannot be stressed too much that your success as an observer depends on your ability to make a cut smooth enough to clearly reveal the cell structure; a fuzzy surface shows no structural detail. The photographs with the descriptions of woods in this manual show wood structure as it should appear in cross section under a 10X hand lens.

Softwoods and hardwoods. Compare the photographs and note the considerable difference in the structures of softwoods and hardwoods. Softwoods are rather uniform in structure and vary little from one kind to another; in contrast, hardwoods present very varied appearances.

Wood rays. *All woods* have structures called *wood rays.* These are ribbonlike aggregations of cells, extending in the radial direction (from the bark toward the center of the tree). Rays, when examined in cross section, look like lines of varying width running more or less at right angles to the growth rings.

The lines formed by rays are often quite narrow and mostly invisible unless you use a hand lens, especially in the softwoods.

Wood rays are more distinct in most hardwoods than in softwoods. In a few hardwoods (oaks, for instance) they are prominent enough for you to see with the unaided eye. On the radial surface, rays appear as flecks;

on the tangential surface (if visible), as short, staggered lines.

Tracheids and resin canals. *Softwoods* have cells called *tracheids*, arranged in regular radial rows that follow across a number of growth rings. In some softwoods (pines, spruce, western larch, and Douglas-fir) the large, rounded openings scattered among the tracheids are *resin canals*. With a hand lens, you can readily see resin canals (cross section) in pines, but they appear mostly as occasional white specks in other woods.

Porous and nonporous woods. *The main difference* between softwoods and hardwoods is the presence *in hardwoods* of numerous cell structures, called *pores* or *vessels*, scattered throughout the growth rings. *Pores are absent in the softwoods*. For this reason, hardwoods are sometimes called *porous woods* and softwoods, *nonporous*.

Pores can be quite uniform in size throughout the growth ring; such hardwoods are called *diffuse porous*. In other hardwoods, the pores are quite a bit larger and differently arranged in the springwood portion of the growth rings; these are *ring porous*. Woods that fall between these definitions are called *semi-ring* or *semi-diffuse porous*.

Learning to use the key

Reread "How to use this manual," page 3, which explains how the key helps you to identify driftwood. Practice using the key before your next trip to the beach – on driftwood already in your home, if you have any. Remember that there is no substitute for a sharp knife to help you make fresh, smooth cuts to identify what you find.

Suggestions for further reading

Enjoy the Beaches – in Safety, Oregon State University Extension Service, Extension Circular 721 (Corvallis, reprinted 1966).

Panshin, A. J., and Carl de Zeeuw, *Textbook of Wood Technology* (New York: McGraw-Hill, 1970), vol. 1, *Structure, Identification, Uses, and Properties of Commercial Woods of the United States and Canada*.

Ross, Charles, R., *Trees to Know in Oregon*, Oregon State University Extension Service and State Department of Forestry, Extension Bulletin 697 (Corvallis, revised 1975). Order from: Extension Business Office, Oregon State University, Corvallis 97331 (50 cents a copy).

Oregon White Oak
Quercus garryana

1. *Start here:* wood with pores . . . . . *go to* 2
2. Wood is ring porous 3
3. Wood rays broad and conspicuous to unaided eye . . 4
4. Small summerwood pores are numerous, formed into a wavy radial band (fan-shaped), and hard to see, even under hand lens **Oregon white oak**

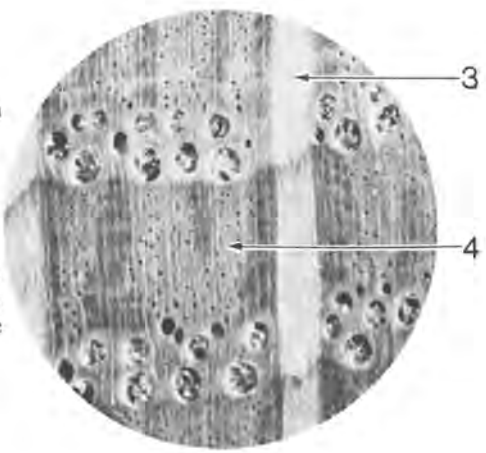
Characteristics. *Sapwood* gray white to light brown. *Heartwood* light to dark brown. Growth rings very distinct. *Ring porous.* Springwood pores large, readily visible to naked eye (cross section), *usually filled with glossy material (tyloses);* summerwood pores small, numerous, aligned in flame-shaped tracks, indistinct without hand lens. *Rays* of two kinds, as seen in cross section: (a) light-colored lines, visible to naked eye; (b) numerous fine rays, between broad (light-colored) rays, invisible without hand lens. Broad rays appear as handsome flecks on radial section and as staggered lines (up to 1 inch high) on tangential surface.

(See California black oak, page 12, for clues on distinguishing it readily from Oregon white oak.)

Wood heavy and hard; machines well with power tools but hard to work with hand tools; can be carved and turned to smooth surface but requires especially sharp tools; has coarse but distinctive figure; difficult to dry without checking and splitting.

Principal uses. See California black oak, page 12.

The arrows in this and subsequent photographs point to features referred to in key lines that bear the same numbers.



California Black Oak
Quercus kelloggii

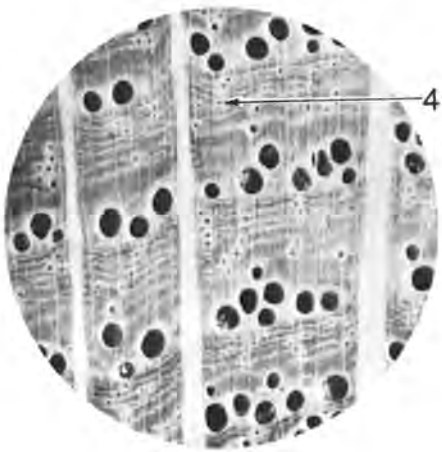
1. *Start here:* wood with pores . . . . . *go to* **2**
2. Wood is ring porous **3**
3. Wood rays broad and conspicuous to unaided eye . . **4**
4. Small summerwood pores are less numerous but distinct under hand lens; individual pores often visible
California black oak

Characteristics. *Sapwood* grayish white to pale reddish brown. *Heartwood* pinkish to light reddish brown. *Ring porous.* Springwood pores large, distinct to naked eye (cross section), *generally open;* summerwood pores indistinct without hand lens, round, less numerous, and not crowded as in Oregon white oak. *Rays* as in Oregon white oak.

Note: California black oak can be readily distinguished from Oregon white oak (page 11): *California black oak* – heartwood pinkish or reddish brown; springwood pores usually open; summerwood pores not crowded, round, quite distinct with hand lens. *Oregon white oak* – heartwood brown; springwood pores generally filled with tyloses; summerwood pores numerous, angular, crowded.

Wood heavy and hard; machines well with power tools but hard to work with hand tools; can be carved and turned to smooth surface but requires especially sharp tools; has coarse but distinctive figure; difficult to dry without checking and splitting.

Principal uses. West Coast oaks are little used commercially, but either Oregon white oak or California black oak is suitable for many uses: veneer, furniture, flooring, paneling, boat building, barrels and kegs, handles, railroad ties, and many others where hardness and strength are assets.



American Elm

Ulmus americana

1. *Start here:* wood with pores . . . . . *go to* **2**
2. Wood is ring porous **3**
3. Wood rays narrow, usually narrower than early wood pores **5**
5. Summerwood pores form visible wavy pattern

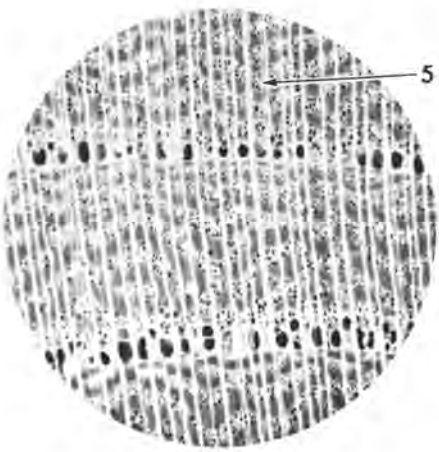
American elm

Of the six species of elm that grow in the U.S., American elm is the best known because of its stately beauty. This species also produces by far the greatest amount of elm lumber and veneer. (Learning about this wood may help in identifying Japanese elm.)

Characteristics. *Heartwood* with reddish tinge. *Ring porous.* Early wood pores distinctly visible to naked eye, arranged in one continuous row; late wood pores small, numerous, arranged in more or less continuous, wavy, concentric bands. *Rays* indistinct to naked eye, readily visible under hand lens. Frequently has sour, unpleasant odor, especially sapwood.

Wood moderately hard; bends well; high shock absorption, tough.

Principal uses. Staves and hoops for barrels, kegs, etc. (dry contents); boxes and crates, furniture (lumber and veneer), plywood paneling.



The Hickories

Carya spp.

1. *Start here:* wood with pores . . . . . *go to* 2
2. Wood is ring porous 3
3. Wood rays narrow, usually narrower than early wood pores 5
5. Summerwood pores do not form wavy pattern . . . 6
6. Fine lines of light-colored cells run in tangential bands

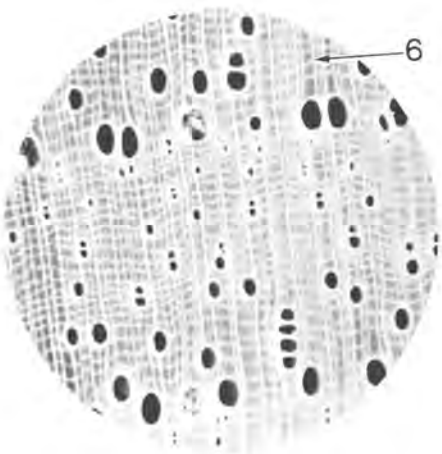
The hickories

East Asian hickories sometimes wash up on Oregon beaches.

Characteristics. *Sapwood* grayish white. *Heartwood* pale brown to brown. *Ring porous or semi-ring porous:* true hickory is ring porous; pecan hickory, semiring. Summerwood pores small, visible under hand lens, solitary and in multiples of 2 to 3; fine, tangential bands of light-colored food-storage cells ("metatracheal parenchyma" to professionals), arranged irrespective of pores, conspicuous with hand lens.

Wood very hard, strong, very high shock absorption, but not durable; machines satisfactorily, finishes well, below average in gluing properties, splits readily when nailed, shrinks appreciably, warps if not seasoned properly.

Principal uses. "Impact" tool handles (hammers, axes, picks, etc.), ladders, furniture, sporting goods (skis, gymnastic bars, etc.), flooring (only pecan hickory), woodenware and novelties.



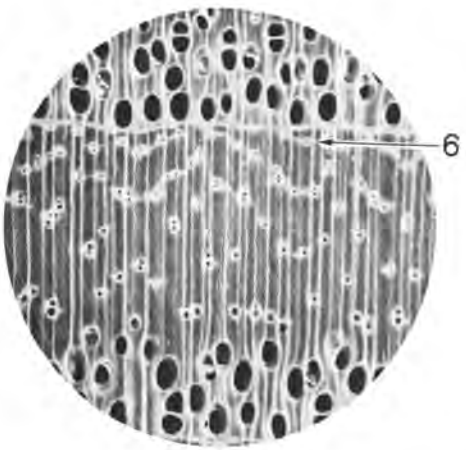
Oregon Ash
Fraxinus latifolia

1. *Start here:* wood with pores . . . . . *go to* 2
2. Wood is ring porous 3
3. Wood rays narrow, usually narrower than early wood pores 5
5. Summerwood pores do not form wavy pattern . . . 6
6. Light-colored cells project as winglike extensions from late wood pores (usually in multiples of 2 or 3) **Oregon ash**

Characteristics. *Sapwood* white, wide. *Heartwood* pale cream-streaked brown, or grayish brown to light brown. Wood lustrous. Growth rings distinct. *Ring porous.* Springwood pores large, distinctly visible in cross section to naked eye; summerwood pores small, sparse, indistinct to unaided eye.

Wood hard and heavy, very strong; machines well to smooth surface; has excellent turning characteristics; dries slowly but can be dried without excessive checking; holds shape well.

Principal uses. Preferred for baseball bats, oars, tennis racket frames, snowshoes, skis, polo and hockey sticks; other uses include paneling, furniture, toys, woodenware, and baskets.



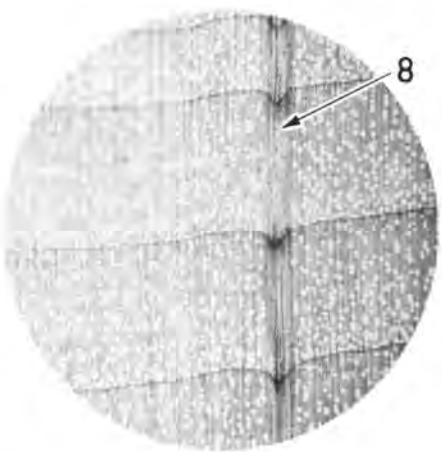
Red Alder
Alnus rubra

1. *Start here:* wood with pores . . . . . *go to* **2**
2. Wood is not ring porous, but diffuse porous **7**
7. Wood rays equal to, or wider across than, largest pores **8**
8. Wood rays numerous, but a few large rays random in spacing, often 1 inch high on vertical tangential surface (along grain) **Red alder**

Characteristics. *Heartwood* indistinct from *sapwood:* creamy white when freshly cut but ages to light brown with reddish tinge, frequently with bluish or grayish stain. Growth rings distinct. *Diffuse porous.* Pores small, indistinct to unaided eye; little variation in size throughout growth ring. *Rays* of two sizes; very narrow, poorly visible, even under hand lens; *occasional* wide rays visible to naked eye (cross section).

Wood moderately light and soft; works easily with tools and finishes to smooth surface; easy to carve and turn but lacks attractive figure; dries easily, usually without excessive checking or warping.

Principal uses. Furniture, paneling, woodenware, novelties and toys, handles, core stock for plywood; pulpwood.



Beech
Fagus grandifolia

1. *Start here:* wood with pores . . . . . *go to* 2
2. Wood is not ring porous, but diffuse porous 7
7. Wood rays equal to, or wider across than, largest pores 8
8. Wood rays numerous and regular in their spacing . . 9
9. Wide rays (up to 1/8 inch high) on the vertical tangential surface, visible to unaided eye **Beech**

Characteristics. *Heartwood* with reddish tinge to reddish brown. Growth rings distinct, marked by dark band of denser summerwood. *Diffuse porous.* Pores small and indistinct without hand lens. *Rays* broad and plainly visible to unaided eye, separated by several narrow rays, appearing on tangential surface as short, rather widely spaced, staggered lines that are easily seen. (A similar beech from Chile may find its way to Oregon.)

Wood is hard, strongly resistant to bending; difficult to work with hand tools but machines satisfactorily; difficult to season because of high amount of shrinkage.

Principal uses. Hardwood veneer, boxes and crates, novelties.

Black Cherry
Prunus serotina

1. *Start here:* wood with pores . . . . . *go to* 2
2. Wood is not ring porous, but diffuse porous 7
7. Wood rays equal to, or wider across than, largest pores 8
8. Wood rays numerous and regular in their spacing . . 9
9. Wide rays usually less than 1/8 inch high on vertical tangential surface 10
10. Pores numerous in springwood; early wood pores are slightly larger as wood tends toward semi-diffuse porous in appearance; wood rich reddish brown

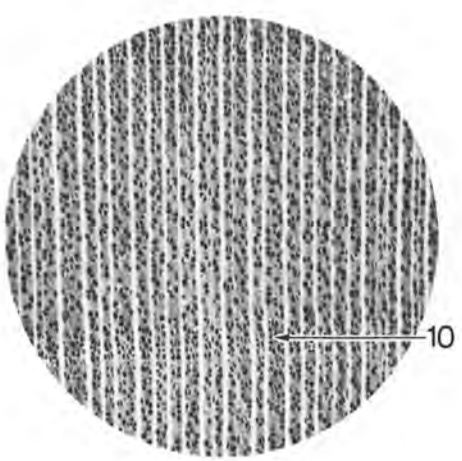
Black cherry

There are several kinds of cherry in the Oregon forests; most are wild shrubs or small trees. Cherry is one of our most beautiful domestic woods.

Characteristics. *Sapwood* whitish to reddish brown, narrow. *Heartwood* light reddish brown. Growth rings distinct. *Diffuse porous.* Pores small, indistinct to unaided eye (cross section), numerous, evenly distributed throughout growth ring, except for one continuous row of somewhat larger pores at beginning of each growth ring. *Rays* fine but visible to naked eye; plainly visible under hand lens on smoothly cut cross section.

Wood moderately hard and heavy; works well with hand tools. Because of small size, suitable only for small articles. Has pleasing reddish color.

Principal uses. Highly desired for furniture and specialty veneers.



Oregon Maple (Bigleaf Maple)
Acer macrophyllum

1. *Start here:* wood with pores . . . . . *go to* **2**
2. Wood is not ring porous, but diffuse porous **7**
7. Wood rays equal to, or wider across than, largest pores **8**
8. Wood rays numerous and regular in their spacing . . **9**
9. Wide rays usually less than 1/8 inch high on vertical tangential surface **10**
10. Pores not crowded, diffused uniformly through annual ring; pores sometimes in multiples of 2 to 4; rays not easily seen; annual rings sometimes distinguishable as brown lines

Oregon maple (bigleaf maple)

Characteristics. *Sapwood* reddish white, sometimes with grayish cast. *Heartwood* pinkish brown. Growth rings not very distinct (cross section). *Diffuse porous.* Pores indistinct without hand lens, evenly distributed throughout growth ring (sometimes more numerous in springwood) but with little difference in size. *Rays* barely visible to naked eye as light-colored lines in cross section and as short, crowded lines (about 1/8 inch high) on tangential surface.

Wood rather heavy, moderately hard; works well with tools; good for carving and turning; finishes smoothly, has pleasing but not distinguished figure, unless piece shows quilted figure (striking effect like depressed or elevated areas of varying size and contour) or bird's-eye figure (small, irregularly spaced indentations); dries well but may develop surface checks if dried too fast; burls prized for veneer and novelties.

Principal uses. Furniture, cabinet work, paneling, woodenware and novelties, handles, toys, plywood veneers.

Black Cottonwood
Populus tricocarpa

1. *Start here:* wood with pores . . . . . *go to* 2
2. Wood is not ring porous, but diffuse porous 7
7. Wood rays narrower across than largest pores 11
11. Pores plainly visible under hand lens 12
12. Pores numerous, crowded; rays distinct only under hand lens; wood grayish white to cream brown

Black cottonwood

Characteristics. *Sapwood* white, merging into grayish white *heartwood*. Growth rings inconspicuous, frequently quite wide. *Diffuse porous.* Pores numerous, frequently crowded in springwood, decreasing gradually in size toward summerwood. *Rays* very fine, barely visible even under hand lens. Wood odorless or with disagreeable odor when wet.

Wood light and soft; surface tends to fuzz when machined; could be easily carved and turned but does not produce smooth surface; lacks distinctive color or figure.

Principal uses. Pulp, veneer for plywood core stock and crossbands (and also for berry boxes); lumber for concealed parts in furniture, but mainly for boxes, crates and pallets, paneling.

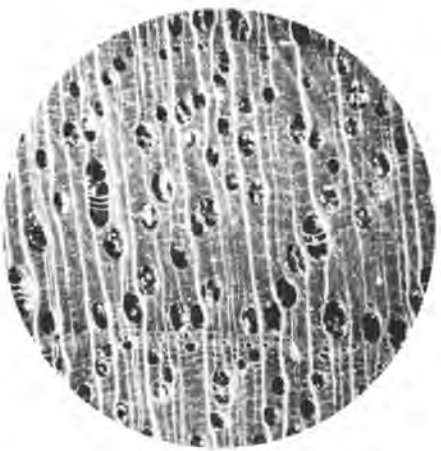
Black Walnut
Juglans nigra

1.	*Start here:* wood with pores	*go to* **2**
2.	Wood is not ring porous, but diffuse porous	**7**
7.	Wood rays narrower across than largest pores	**11**
11.	Pores plainly visible under hand lens	**12**
12.	Pores not crowded; rays very distinct under hand lens	**13**
13.	Annual layers distinctly defined	**14**
14.	Wood rich chocolate or purplish brown; pores tend toward semi-diffuse appearance; defined annual rings	**Black walnut**

Characteristics. *Sapwood* whitish yellow or gray brown; commercially, sapwood is commonly darkened by steaming or staining to match *heartwood*, which is readily recognized by rich chocolate or purplish brown (often variegated) color. Growth rings distinct. *Semi-diffuse porous (can be classed as either semi-ring or semi-diffuse porous).* Pores (cross section) large enough to be visible to naked eye, grading in size from spring- to summerwood. *Rays* fine, indistinct to unaided eye.

Wood hard and heavy. Superior machining qualities, handsome color, and attractive figure place it on par with mahogany as one of several most valuable hardwoods in world. Mild, characteristic sweet odor when worked with tools.

Principal uses. Furniture, cabinets, interior finish, paneling, gunstocks, interior plywood; all kinds of woodenware and novelties, for which walnut burls and stumpwood (from bell-shaped base of tree just above roots) are especially prized.



American (West Indies) Mahogany
Swietenia mahagoni

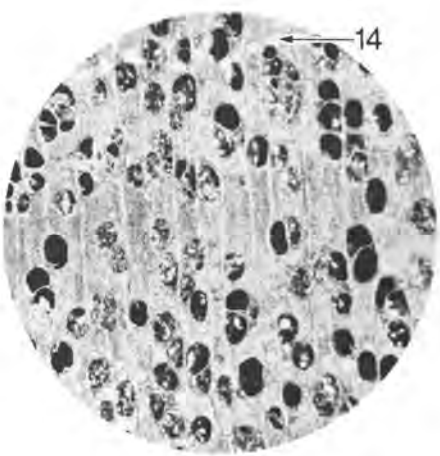
1.	*Start here:* wood with pores	*go to* **2**
2.	Wood is not ring porous, but diffuse porous	**7**
7.	Wood rays narrower across than largest pores	**11**
11.	Pores plainly visible under hand lens	**12**
12.	Pores not crowded; rays very distinct under hand lens	**13**
13.	Annual layers distinctly defined	**14**
14.	Wood pale brown to reddish brown; gum deposits occasionally visible as white dots; not to be confused with narrow band of cells that often defines growth ring	**American (West Indies) mahogany**

Though rare in U.S. (growing only in tropical keys of southern Florida), American mahogany – often called "genuine mahogany" – is found throughout Central America, South America, and West Indies. Mahogany is world's foremost cabinetwood and one of tropical America's most valuable timber trees. Central American specimens may reach the Oregon coast, in winter months, on the nearshore Davidson Current.

Characteristics. *Sapwood* very thin, light-colored. *Heartwood* pale brown to reddish brown. Growth rings usually distinct because of light line of white tissue at end of each annual ring. *Diffuse porous.* Pores large enough to see without using hand lens; can be multiple.

Medium-textured, lustrous wood; works well with tools.

Principal uses. Furniture, musical and scientific instruments, as veneer and solid wood.



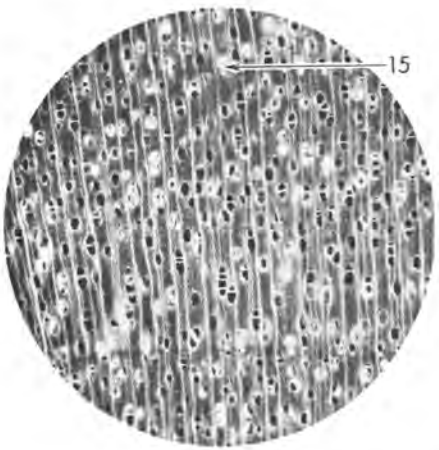
Birch
Betula spp.

1.	*Start here:* wood with pores	*go to* **2**
2.	Wood is not ring porous, but diffuse porous	**7**
7.	Wood rays narrower across than largest pores	**11**
11.	Pores plainly visible under hand lens	**12**
12.	Pores not crowded; rays very distinct under hand lens	**13**
13.	Annual layers not distinctly defined	**15**
15.	Scattered pores often appear as white dots; wood reddish brown and hard	**Birch**

Characteristics. *Sapwood* creamy white to pale yellow. *Heartwood* reddish brown. Growth rings not very distinct, marked by fine line of dense, fibrous tissue. *Diffuse porous.* Pores frequently appear as white dots to naked eye; largest pores are obviously wider than widest rays. *Rays* fine, generally not distinct to naked eye.

Wood moderately hard to hard, moderately strong, high shock absorption, turns well, finishes smoothly.

Principal uses. Veneer, lumber, furniture, boxes and crates, novelties; hardwood distillation, yielding chemical byproducts.



Lauans (Philippine Mahogany)
Shorea spp.

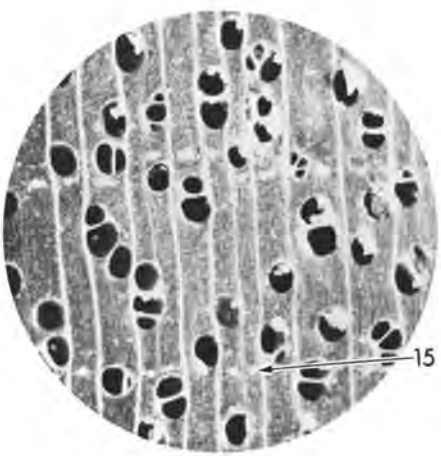
1. *Start here:* wood with pores . . . . . *go to* **2**
2. Wood is not ring porous, but diffuse porous . . . **7**
7. Wood rays narrower across than largest pores . . . **11**
11. Pores plainly visible under hand lens **12**
12. Pores not crowded; rays very distinct under hand lens **13**
13. Annual layers not distinctly defined **15**
15. Gum ducts often appear as white dots and often form tangential bands (these are not annual rings); wood dull grayish brown to dull red

Lauans (Philippine mahogany)

Considerable quantities of these woods, belonging to numerous tropical species, wash ashore on Pacific coast, usually as veneer or dunnage washed off ships from Philippines, Indochina, and Japan.

Characteristics. Most of this wood can be identified by: (a) *color* – dull grayish brown to dull red, and (b) *pores* – evenly distributed, usually round, visible to naked eye, generally imbedded in lighter masses of parenchyma (food-storage cells), often accompanied by white lines of parenchyma extending at right angles to rays. *Diffuse porous. Rays* mostly pinkish, distinct under hand lens. Growth rings hard to distinguish.

Wood soft to medium hard, light to medium heavy. **Principal uses.** Low-cost, decorative plywood paneling and furniture.



Redgum (Sweetgum)
Liquidambar styraciflua

1.	*Start here:* wood with pores	*go to* **2**
2.	Wood is not ring porous, but diffuse porous	**7**
7.	Wood rays narrower across than largest pores	**11**
11.	Pores difficult to see under hand lens	**16**
16.	Pores uniformly crowded between very fine rays; pores and rays not distinguishable without using hand lens; heartwood usually reddish brown	**Redgum (sweetgum)**

Redgum (sweetgum) grows principally in southeastern U.S. At one time it was considered a weed species and was little used, because of its tendency to warp. Introduction of improved drying methods raised redgum from comparatively obscure species to prominent commercial hardwood.

Characteristics. *Heartwood* gray to various shades of reddish brown, occasionally with dark streaks of brown. Growth rings inconspicuous. *Diffuse porous.* Pores not visible to naked eye. *Rays* not distinct to naked eye, very close together when viewed under hand lens. No odor or taste.

Wood moderately heavy; works moderately well; frequently has interlocked grain; requires care in seasoning because of high shrinkage and warping.

Principal uses. Veneer, extensively for furniture, panels, boxes, etc.; lumber for millwork, furniture, cabinetry, containers; barrels, kegs, etc. (dry contents); turned articles, mine props; railroad ties.

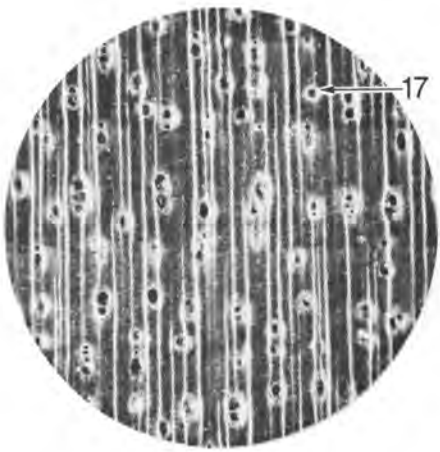
Oregon-Myrtle (California-Laurel)
Umbellularia californica

1.	*Start here:* wood with pores	*go to* **2**
2.	Wood is not ring porous, but diffuse porous	**7**
7.	Wood rays narrower across than largest pores	**11**
11.	Pores difficult to see under hand lens	**16**
16.	Pores not crowded between very fine rays	**17**
17.	Pores uniformly distributed, with whitish sheath around them; rays visible to unaided eye; annual rings often visible (dark tissue separates them); heartwood has wide range of colors and distinct spicy odor	**Oregon-myrtle (California-laurel)**

Characteristics. *Sapwood* creamy white to light brown. *Heartwood* grayish brown, frequently with darker streaks; darkens appreciably when exposed to water. Growth rings distinct. *Diffuse porous.* Pores about same size throughout growth ring (cross section), barely visible even under hand lens. *Rays* plainly visible under hand lens. Freshly cut surface has characteristic spicy odor.

Wood moderately hard, heavy; machines well; one of best woods for carving and turning; polishes to smooth, marblelike surface; exhibits varied and most attractive grayish brown color and fine figure.

Principal uses. Prized for carved and turned articles, especially bowls and trays; other important uses include furniture, cabinet work, interior finish, paneling (often as veneer), and gunstocks.



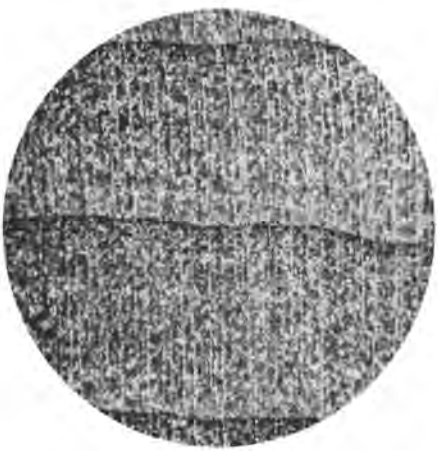
Pacific Madrone
Arbutus menziesii

1. *Start here:* wood with pores . . . . . *go to* 2
2. Wood is not ring porous, but diffuse porous 7
7. Wood rays narrower across than largest pores . . . 11
11. Pores difficult to see under hand lens 16
16. Pores not crowded between very fine rays 17
17. Pores numerous, uniform in size except for one row of slightly larger pores at start of each growth ring; rays barely visible under hand lens; bands of dense fibrous tissue alternate with zones of pores; wood reddish brown **Pacific madrone**

Characteristics. *Sapwood* white to cream-colored, often with pinkish cast. *Heartwood* light reddish brown (cherry-wood-colored). Growth rings distinct. *Diffuse porous.* Pores exceedingly small, indistinct without hand lens, numerous, uniform in size except for one row of slightly larger pores at start of each growth ring. *Rays* barely visible under hand lens.

Wood hard and heavy; machines well; exhibits fine color and attractive figure; excellent for carving and turning.

Principal uses. Furniture, shuttles; rollers 6 to 8 inches in diameter used in shifting heavy cargoes aboard ships; plywood veneer; usable for novelties, toys, woodenware, and other turned items.



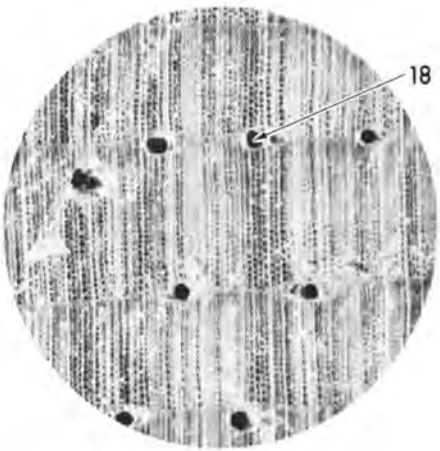
Sugar Pine
Pinus lambertiana

1.	*Start here:* wood without pores	*go to* **18**
18.	Wood with resin canals	**19**
19.	Resin canals numerous	**20**
20.	Cell size changes gradually across annual ring . . .	**21**
21.	Cell size large but even-textured; resin canals large; both visible to unaided eye	**Sugar pine**

Characteristics. *Sapwood* off-white to pale yellow, narrow to medium wide, frequently discolored with blue stain. *Heartwood* cream-colored to light brown or reddish brown, sometimes discolored with brown stain. Growth rings distinct: quite uniform texture, no distinct transition between spring- and summerwood. *Resin canals* visible to naked eye on smoothly cut cross section. Slight resinous odor.

Wood light to moderately light, quite soft; texture uniform; machines well, excellent for carving; dries easily without checking or warping, holds shape well; finishes well.

Principal uses. Excellent for millwork, interior finish, paneling (especially "knotty" pine); patterns for foundry molds; signs, general construction; extensively used for specialty items (matchsticks, piano keys, organ pipes, picture frames, novelties); plywood.



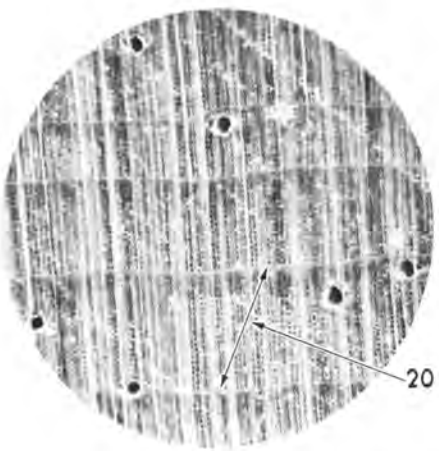
Western White Pine
Pinus monticola

1.	*Start here:* wood without pores	*go to* **18**
18.	Wood with resin canals	**19**
19.	Resin canals numerous	**20**
20.	Cell size changes gradually across annual ring	**21**
21.	Cell size and resin canals smaller, usually visible without using hand lens	**Western white pine**

Characteristics. *Sapwood* off-white to pale yellow, narrow to medium wide, frequently discolored with blue stain. *Heartwood* cream-colored to light brown or reddish brown, sometimes discolored with brown stain. Growth rings distinct: quite uniform texture, no distinct transition between spring- and summerwood. *Resin canals* scarcely visible without using hand lens. Slight resinous odor.

Wood light to moderately light, quite soft; texture uniform; machines well, excellent for carving; dries easily without checking or warping, holds shape well; finishes well.

Principal uses. See sugar pine, page 28.



Southern Pines

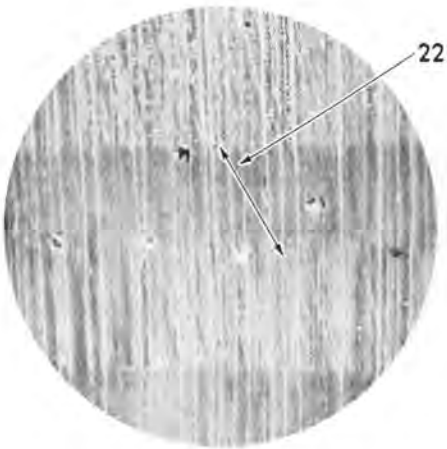
Pinus palustris, P. taeda,
P. echinata, P. elliotti

1.	*Start here:* wood without pores	*go to* **18**
18.	Wood with resin canals	**19**
19.	Resin canals numerous	**20**
20.	Cell size changes abruptly across annual ring; late wood distinct	**22**
22.	Late wood wide, generally more than 20 percent of annual ring; growth rate often erratic; resin canals large	**Southern pines**

Characteristics. *Sapwood* off-white to yellow. *Heartwood* distinct, ranging through shades of yellow and orange to reddish brown. Growth rings distinct, marked by pronounced band of darker late wood. Abrupt transition from early to late wood, with late wood often ranging from broad to narrow bands in erratic growth pattern. *Resin canals* present, conspicuous to naked eye (plainly distinct under hand lens), confined largely to central and outer portions of annual ring. Characteristic resinous odor.

Note: Southern pines are often confused with Douglas-fir (pages 33-34), the other common structural timber. Distinguishable from Douglas-fir by excessive amount of late wood in each annual ring (usually more than 20 percent of ring), by texture that is very hard to cut (heavy resin content), and by numerous resin canals.

Principal uses. See young-growth Douglas-fir, page 33.



Ponderosa Pine and Lodgepole Pine
Pinus ponderosa, Pinus contorta

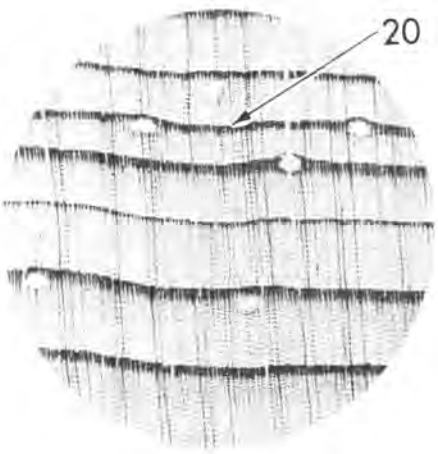
1. *Start here:* wood without pores . . . . . *go to* **18**
18. Wood with resin canals **19**
19. Resin canals numerous **20**
20. Cell size changes abruptly across annual ring; late wood distinct **22**
22. Late wood generally narrow, usually less than 20 percent of annual ring; resin canals visible, usually located in outer portion of annual ring

Ponderosa pine, Lodgepole pine

Characteristics. *Sapwood* off-white to pale yellow, quite narrow in lodgepole, wide in ponderosa. *Heartwood* light yellow brown to light reddish brown (in lodgepole, sometimes scarcely distinct from sapwood). Tangential surface frequently dimpled when split, especially lodgepole. Growth rings distinct: abrupt transition from spring- to summerwood; summerwood bands darker, usually very narrow. *Resin canals* appear as small openings (cross section), generally visible to naked eye on smoothly cut surface. Distinct resinous odor.

Wood moderately heavy to moderately soft (especially ponderosa); machines easily; softer and more uniform-textured pieces easily carve, turn, and finish to smooth, even surface; dries easily without excessive checking or warping.

Principal uses. Millwork, interior finish, paneling, construction lumber; turned work (porch columns, posts, stair rails and supports); furniture, patterns for foundry molds; poles, posts, mine timbers; pulpwood.

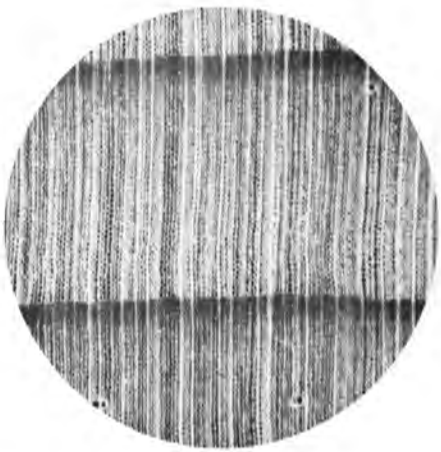


Sitka Spruce
Picea sitchensis

1.	*Start here:* wood without pores	*go to* **18**
18.	Wood with resin canals	**19**
19.	Resin canals sparse	**23**
23.	Cell size changes gradually across annual ring	**24**
24.	Resin canals difficult to see without using hand lens; wood pinkish yellow to pale brown; possesses luster and reflective quality	**Sitka spruce**

Characteristics. *Sapwood* creamy white to light yellow, grading into light pinkish yellow to pale brown with purplish cast. *Heartwood* pinkish yellow to pale brown, darkening on exposure to silvery brown with tinge of red. Tangential surface often dimpled. Growth rings distinct but texture quite uniform within each ring. Gradual transition from spring- to summerwood. *Resin canals* sparse, appearing as white specks to naked eye (smoothly cut cross section). No distinct odor.

Principal uses. Building materials, laminated beams, planing mill products (especially flooring, interior finish, boxes and crates).



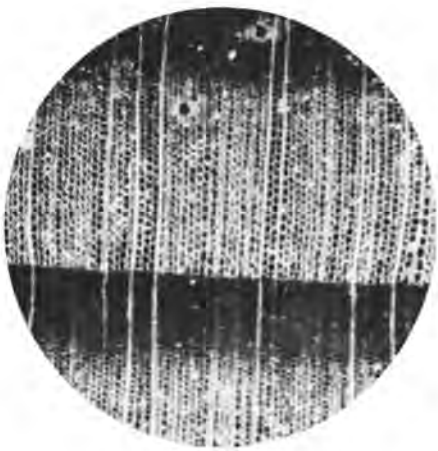
Douglas-Fir (Young Growth)
Pseudotsuga menziesii

1.	*Start here:* wood without pores	*go to* **18**
18.	Wood with resin canals	**19**
19.	Resin canals sparse	**23**
23.	Cell size changes gradually across annual ring	**24**
24.	Resin canals often in pairs; wood pale red to orange red; distinct odor; hard to cut	**Douglas-fir (young growth)**

See also old-growth Douglas-fir, page 34.

Characteristics. *Sapwood* off-white to pale yellow. *Heartwood* pale red to orange red. Growth rings distinct; each ring has narrower, conspicuously darker band of summerwood; transition from springwood to summerwood tends to be gradual in wide rings. *Resin canals* sparse, appearing as small flecks or openings in cross section, visible only under hand lens. Distinct, characteristic resinous odor.

Principal uses. Construction (lumber, timbers, laminated beams and arches); furniture and millwork; principal wood for veneer converted into structural plywood; extensively used for kraft pulp, and particle and fiberboard; poles, piling, mine timbers, railroad ties. (*Note:* some young growth is limited for some structural uses; old growth usually has no such limitations.)



Douglas-Fir (Old Growth)
Pseudotsuga menziesii

1. *Start here:* wood without pores . . . . . *go to* **18**
18. Wood with resin canals **19**
19. Resin canals sparse **23**
23. Cell size changes abruptly across annual ring **25**
25. Resin canals often in pairs; annual rings may have wavy appearance in slow-grown trees; narrow growth rings; wood yellowish to pale reddish brown; summerwood shiny when cut; distinct odor

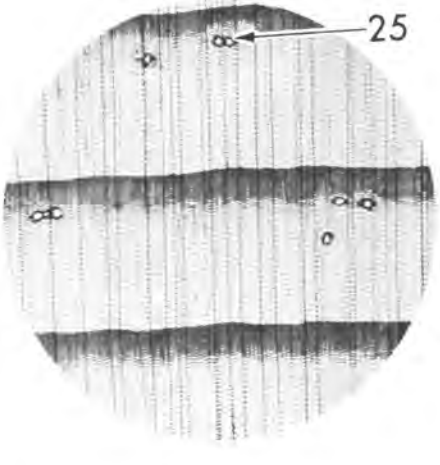
Douglas-fir (old growth)

See also young-growth Douglas-fir, page 33.

Characteristics. *Sapwood* off-white to pale yellow. *Heartwood* yellowish to pale reddish brown. Growth rings distinct, frequently wavy; each ring has narrower, conspicuously darker band of summerwood; transition from springwood to summerwood is usually quite abrupt. *Resin canals* sparse, appearing as small flecks or openings in cross section, visible only under hand lens. Distinct, characteristic resinous odor.

Note: Old-growth Douglas-fir resembles western larch (page 35) in some characteristics; positive identification is quite difficult without using microscope.

Principal uses. See young-growth Douglas-fir, page 33.



Western Larch
Larix occidentalis

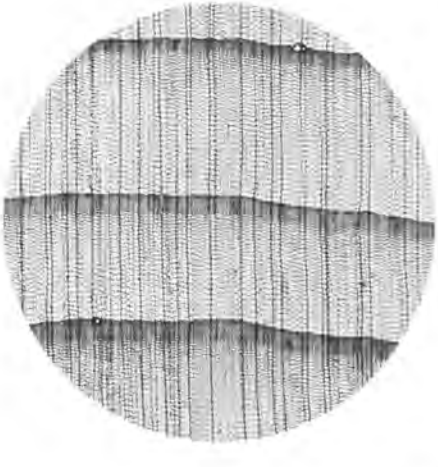
1. *Start here:* wood without pores . . . . . *go to* **18**
18. Wood with resin canals **19**
19. Resin canals sparse **23**
23. Cell size changes abruptly across annual ring **25**
25. Resin canals not usually in pairs, difficult to see without using hand lens; wood russet to reddish brown; slightly oily; no distinct odor **Western larch**

Characteristics. *Sapwood* buff to light brown, rarely more than 1 inch thick. *Heartwood* russet to reddish brown. Growth rings distinct (cross section): light-colored springwood and much darker summerwood, with abrupt transition between the two. *Resin canals* quite sparse, difficult to find even under hand lens, appearing as small white flecks in cross section.

Note: Western larch resembles old-growth Douglas-fir (page 34) in some characteristics; positive identification is quite difficult without using microscope.

Wood hard and heavy; machines satisfactorily with power tools but difficult to carve and turn because of hardness and nonuniform texture; when finished smooth, pleasing figure formed by coloration and contrast between lighter springwood and darker summerwood; difficult to dry without checking; shrinks considerably.

Principal uses. Building materials, laminated beams, planing mill products (flooring, interior finish, boxes and crates).



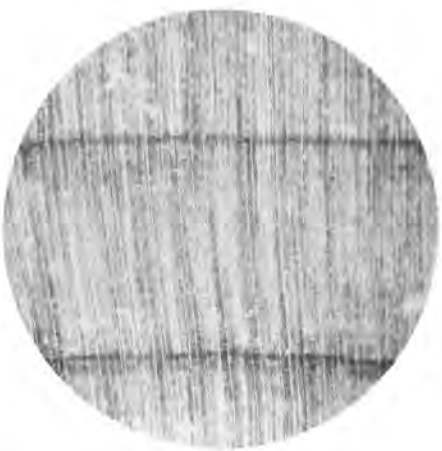
Western Juniper
Juniperus occidentalis

1. *Start here:* wood without pores . . . . . *go to* **18**
18. Wood without resin canals **26**
26. Heartwood has fragrant or pungent odor **27**
27. Heartwood with reddish cast (including pink, rose red, red brown, brown, and red purple) **28**
28. Wood fine-textured (cells difficult to see even under hand lens); heartwood light reddish brown with zones of light wood **Western juniper**

Characteristics. *Sapwood* usually whitish yellow and very thin. *Heartwood* yellowish brown to light reddish brown. Growth rings distinct, marked by band of darker late wood that is usually fairly narrow. Light-colored zones of what appears to be sapwood often included in heartwood zone. *Resin canals* absent. Distinct, delicate, pungent odor, similar to that of cedar chests.

Wood has excellent working qualities and fragrance; reputedly repels moths.

Principal uses. Western variety, because of sparseness and scraggly shape, confined mostly to novelties and fence posts. Where large numbers of trees are available in sufficient size, can be cut into fine lumber for chests, wardrobes and closet linings.



Incense-Cedar
Librocedrus decurrens

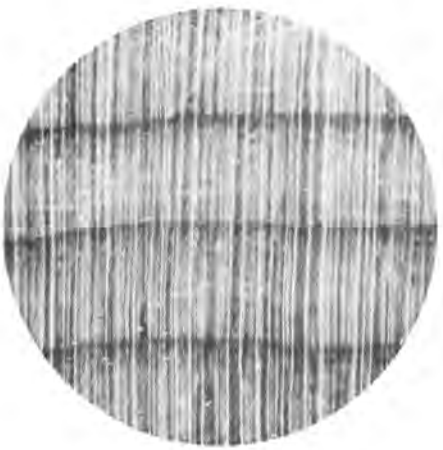
1. *Start here:* wood without pores . . . . . *go to* **18**
18. Wood without resin canals **26**
26. Heartwood has fragrant or pungent odor **27**
27. Heartwood with reddish cast (including pink, rose red, red brown, brown, and red purple) **28**
28. Wood is not fine-textured (cells can be seen under hand lens) **29**
29. Wood medium-textured; cuts evenly; heartwood pinkish brown with slight purplish cast; odor like pencil shavings **Incense-cedar**

Characteristics. *Sapwood* off-white. *Heartwood* pinkish brown with slight purplish cast; has spicy, acrid taste (test by placing freshly cut shaving on tip of tongue). Growth rings distinct. Gradual transition from spring- to summerwood. *Resin canals* absent. Characteristic "cedar" odor, like pencil shavings.

Note: Incense-cedar and western redcedar (page 38) difficult to distinguish. And *both* easily confused with redwood (page 41) – but redwood lacks "cedar" odor.

Wood light, soft; works easily with tools; easy to carve; has attractive color but lacks distinctive figure.

Principal uses. Incense-cedar and western redcedar used in pencils (especially incense-cedar), shingles, woodenware, and novelties; as lumber, used extensively for interior finish, paneling, and wherever exceptional durability and ease of working are priorities (tanks, vats, porch columns, greenhouse flats, "moth-proof" chests and closets, and outdoor furniture). Western redcedar is prime western siding and shake species.



Western Redcedar
Thuja plicata

1. *Start here:* wood without pores . . . . . *go to* **18**
18. Wood without resin canals **26**
26. Heartwood has fragrant or pungent odor **27**
27. Heartwood with reddish cast (including pink, rose red, red brown, brown, and red purple) **28**
28. Wood is not fine-textured (cells can be seen under hand lens) **29**
29. Wood medium- to coarse-textured; early wood cuts often spongy; pungent or "shingle" odor

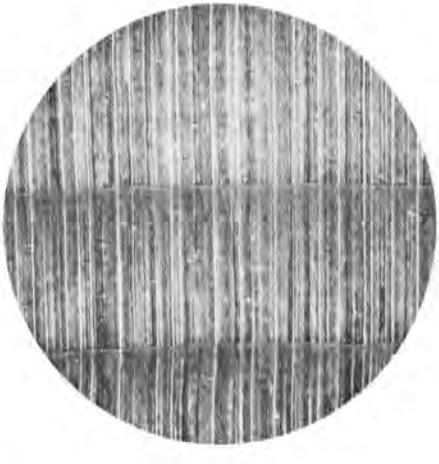
Western redcedar

Characteristics. *Sapwood* brownish white. *Heartwood* reddish brown to brown. Growth rings distinct. Gradual transition from spring- to summerwood. *Resin canals* absent. Characteristic "cedar" odor.

Note: Western redcedar and incense-cedar (page 37) difficult to distinguish. And *both* easily confused with redwood (page 41) – but redwood lacks "cedar" odor.

Wood light, soft; works easily with tools; easy to carve; has attractive color but lacks distinctive figure.

Principal uses. See incense-cedar, page 37.



Alaska-Cedar (Alaska Yellow-Cedar)

Chamaecyparis nootkatensis

1. *Start here:* wood without pores . . . . . *go to* **18**
18 Wood without resin canals **26**
26. Heartwood has fragrant or pungent odor **27**
27. Heartwood not with reddish cast but toward yellowish white or light brown (may be stained or darkened by salt water) **30**
30. Wood fine- to medium-textured; heartwood yellow with distinct raw-potato odor

Alaska-cedar (Alaska yellow-cedar)

Characteristics. *Sapwood* off-white to yellowish white. *Heartwood* bright, clear yellow, darkening on exposure to yellow brown. Growth rings barely visible. Gradual transition from spring- to summerwood. *Resin canals* absent. Characteristic raw-potato odor when freshly cut.

Wood rather heavy, moderately hard; works well with tools; very suitable for carving and turning.

Principal uses. Both Alaska-cedar and Port-Orford-cedar (page 40) excellent for paddles, small boats, and racing shells; other uses include greenhouse construction, tanks for chemicals, sounding boards of musical instruments (usually Alaska-cedar), lining for "mothproof" cabinets and closets, interior finish, furniture and cabinet work; excellent for novelties and woodenware.

Port-Orford-Cedar

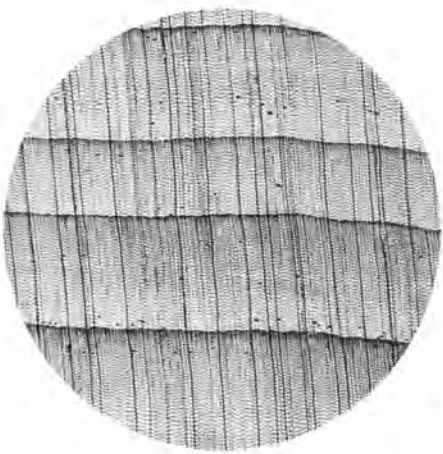
Chamaecyparis lawsoniana

1.	*Start here:* wood without pores	*go to* **18**
18.	Wood without resin canals	**26**
26.	Heartwood has fragrant or pungent odor	**27**
27.	Heartwood not with reddish cast but toward yellowish or light brown (may be stained or darkened by salt water)	**30**
30.	Wood medium-textured; heartwood yellowish white to pale yellowish brown; distinct, pungent, spicy odor; oil spots often visible	**Port-Orford-cedar**

Characteristics. *Sapwood* white to pale yellow, not clearly distinguishable from *heartwood*, which is yellowish white to pale yellowish brown. Growth rings not conspicuous. Gradual transition from spring- to summerwood. *Resin canals* absent. Characteristic pungent, gingerlike odor when freshly cut.

Wood rather heavy, moderately hard; works well with tools; quite suitable for carving and turning.

Principal uses. See Alaska-cedar, page 39.



Redwood

Sequoia sempervirens

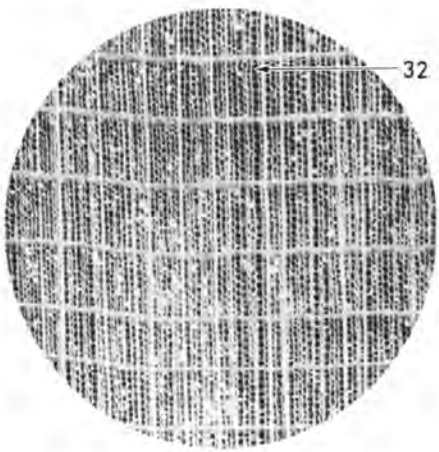
1.	*Start here:* wood without pores	*go to* **18**
18.	Wood without resin canals	**26**
26.	Heartwood without fragrant or pungent odor; sometimes with unpleasant odor	**31**
31.	Heartwood distinct reddish brown	**32**
32.	Wood very coarse-textured; cell size changes abruptly from early to late wood; light in weight, soft to cut	**Redwood**

Characteristics. *Sapwood* nearly white, narrow. *Heartwood* light red to reddish brown. Growth rings distinct, usually narrow in old trees, can be quite wide in young stock; abrupt transition from spring- to summerwood; darker summerwood bands generally quite narrow. Coarse but uniform texture: early wood cells quite large, distinct under hand lens on smoothly cut cross section. *Resin canals* absent. No characteristic odor.

Note: Easily confused with incense-cedar (page 37) and western redcedar (page 38), but redwood lacks "cedar" odor characteristic of those woods.

Wood light, soft to moderately hard; machines well; no particularly distinctive figure, except for burls; dries easily without checking but can develop honeycomb if dried too fast; very durable.

Principal uses. General construction, planing mill products, millwork; shingles and shakes, caskets and coffins, tanks, vats, garden furniture, fences, signs, stadium seats, greenhouses, woodenware and novelties; wood from burls is sought for turned and carved objects; plywood.



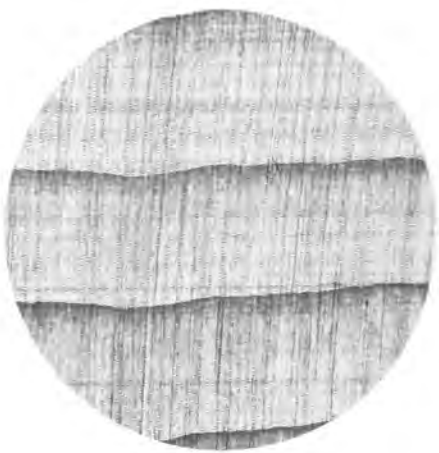
Pacific Yew
Taxus brevifolia

1. *Start here:* wood without pores . . . . . *go to* **18**
18. Wood without resin canals **26**
26. Heartwood without fragrant or pungent odor; sometimes with unpleasant odor **31**
31. Heartwood distinct reddish brown **32**
32. Wood very fine-textured; cells cannot be seen easily, even under hand lens; heavy; heartwood bright orange brown to russet brown **Pacific yew**

Characteristics. *Sapwood* light yellow, thin. *Heartwood* bright orange brown to russet brown. Growth rings distinct. Gradual transition from spring- to summerwood. *Resin canals* absent. No distinct odor.

Wood heavy, very hard, finishes extremely smooth, has very pleasing appearance.

Principal uses. Excellent for bows and small carved and turned articles.



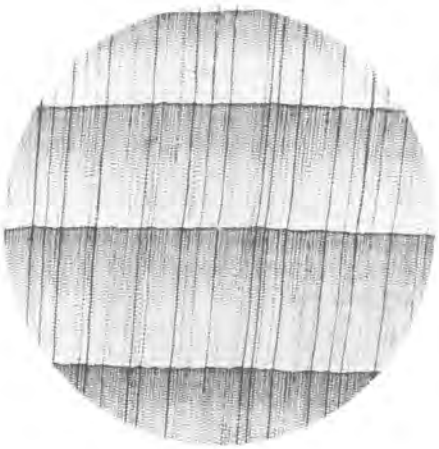
Western Hemlock
Tsuga heterophylla

1. *Start here:* wood without pores . . . . . *go to* **18**
18. Wood without resin canals **26**
26. Heartwood without fragrant or pungent odor; sometimes with unpleasant odor **31**
31. Heartwood not reddish brown **33**
33. Heartwood buff to light brown with lavender cast; medium-textured; growth rate sometimes erratic
Western hemlock

Characteristics. *Heartwood* not easily distinguishable from *sapwood:* buff to light brown with lavender cast. Growth rings distinct: gradual transition from spring- to summerwood (cross section); summerwood portion darker, with reddish brown to purplish tinge. *Resin canals* absent. Odorless or unpleasant "sour" smell.

Wood moderately heavy, moderately hard; machines adequately with power tools, but not recommended for turning (because of nonuniform texture and lack of distinctive figure); dries reasonably well without checking; tends to split in nailing.

Principal uses. Lumber for general construction, planing mill products, paneling, boxes and crates; barrels, kegs, etc. (dry contents); railroad construction, ladders; important source of pulpwood.



True Firs
Abies spp.

1.	*Start here:* wood without pores	*go to* **18**
18.	Wood without resin canals	**26**
26.	Heartwood without fragrant or pungent odor; sometimes with unpleasant odor	**31**
31.	Heartwood not reddish brown	**33**
33.	Heartwood white to light brown; medium-textured; growth rate fairly even; sometimes has translucent appearance	**True firs**

Characteristics. *Heartwood* not distinct from *sapwood:* white to light brown. Growth rings usually distinct: summerwood portion with reddish brown to lavender tinge; gradual transition from lighter-colored springwood to darker summerwood. *Resin canals* absent. No distinct odor; can acquire disagreeable odor, especially when soaked in water.

Wood light, moderately soft, uniform in texture; machines easily but not good for carving or turning (because of fuzzy grain and absence of attractive pattern); dries easily without excessive checking.

Principal uses. Lumber for general construction, boxes and crates, planing mill products; important source of pulpwood.

The Complete Key for the 34 Woods (as seen in cross section, 10X)

Hardwoods

1. *Start here:* wood with pores. . . . . *go to* 2
   or
1. *Start here:* wood without pores. . . . . *go to* 18
   2. Wood is ring porous. 3
   2. Wood is not ring porous, but diffuse porous. 7
3. Wood rays broad and conspicuous to unaided eye. 4
3. Wood rays narrow, usually narrower than early wood pores. 5
   4. Small summerwood pores are numerous, formed into wavy radial band (fan-shaped), and hard to see, even under hand lens.
      Oregon white oak, page 11
   4. Small summerwood pores are less numerous but distinct under hand lens; individual pores often visible.
      California black oak, page 12
5. Summerwood pores form visible wavy pattern.
   American elm, page 13
5. Summerwood pores do not form wavy pattern. 6
   6. Fine lines of light-colored cells run in tangential bands
      The hickories, page 14
   6. Light-colored cells project as winglike extensions from late wood pores (usually in multiples of 2 or 3).
      Oregon ash, page 15
7. Wood rays equal to, or wider across than, largest pores. 8
7. Wood rays narrower across than largest pores. . 11
   8. Wood rays numerous, but a few large rays random in spacing, often 1 inch high on vertical tangential surface (along grain).
      Red alder, page 16
   8. Wood rays numerous and regular in their spacing. 9

9. Wide rays (up to 1/8 inch high) on vertical tangential surface, visible to unaided eye.
Beech, page 17

9. Wide rays usually less than 1/8 inch high on vertical tangential surface. 10

10. Pores numerous in springwood; early wood pores are slightly larger as wood tends toward semi-diffuse porous in appearance; wood rich reddish brown.
Black cherry, page 18

10. Pores not crowded, diffused uniformly through annual ring; pores sometimes in multiples of 2 to 4; rays not easily seen; annual rings sometimes distinguishable as brown lines.
Oregon maple (bigleaf maple), page 19

11. Pores plainly visible under hand lens. 12

11. Pores difficult to see under hand lens. . . .16

12. Pores numerous, crowded; rays distinct only under hand lens; wood grayish white to cream brown.
Black cottonwood, page 20

12. Pores not crowded; rays very distinct under hand lens. 13

13. Annual layers distinctly defined. 14

13. Annual layers not distinctly defined. 15

14. Wood rich chocolate or purplish brown; pores tend toward semi-diffuse appearance; defined annual rings.
Black walnut, page 21

14. Wood pale brown to reddish brown; gum deposits occasionally visible as white dots; not to be confused with narrow band of cells that often defines growth ring.
American (West Indies) mahogany, page 22

15. Scattered pores often appear as white dots; wood reddish brown and hard.
Birch, page 23

15. Gum ducts often appear as white dots and often form tangential bands (these are not annual rings); wood dull grayish brown to dull red.
Lauans (Philippine mahogany), page 24

16. Pores uniformly crowded between very fine rays; pores and rays not distinguishable without using hand lens; heartwood usually reddish brown.
Redgum (sweetgum), page 25

16. Pores not crowded between very fine rays. 17

17. Pores uniformly distributed, with whitish sheaths around them; rays visible to unaided eye; annual rings often visible (dark tissue separates them); heartwood has wide range of colors and distinct spicy odor.
Oregon-myrtle (California-laurel), page 26

17. Pores numerous, uniform in size except for one row of slightly larger pores at start of each growth ring; rays barely visible under hand lens; bands of dense fibrous tissue alternate with zones of pores; wood reddish brown.
Pacific madrone, page 27

Softwoods

18. Wood with resin canals. . . . . *go to* 19

18. Wood without resin canals. 26

19. Resin canals numerous. 20

19. Resin canals sparse. 23

20. Cell size changes gradually across annual ring. 21

20. Cell size changes abruptly across annual ring; late wood distinct. 22

21. Cell size large but even-textured; resin canals large; both visible to unaided eye.
Sugar pine, page 28

21. Cell size and resin canals smaller, usually visible without using hand lens.
Western white pine, page 29

22. Late wood wide, generally more than 20 percent of annual ring; growth rate often erratic; resin canals large.
Southern pines, page 30

22. Late wood generally narrow, usually less than 20 percent of annual ring; resin canals visible, usually located in outer portion of annual ring.
Ponderosa pine, Lodgepole pine, page 31

23. Cell size changes gradually across annual ring. 24
23. Cell size changes abruptly across annual ring. 25
24. Resin canals difficult to see without using hand lens; wood pinkish yellow to pale brown; possesses luster and reflective quality.
Sitka spruce, page 32
24. Resin canals often in pairs; wood pale red to orange red; distinct odor; hard to cut.
Douglas-fir (young growth), page 33
25. Resin canals often in pairs; annual rings may have wavy appearance in slow-grown trees; narrow growth rings; wood yellowish to pale reddish brown; summerwood shiny when cut; distinct odor.
Douglas-fir (old growth), page 34
25. Resin canals not usually in pairs, difficult to see without using hand lens; wood russet to reddish brown; slightly oily; no distinct odor.
Western larch, page 35
26. Heartwood has fragrant or pungent odor. . . . 27
26. Heartwood without fragrant or pungent odor; sometimes with unpleasant odor. . . . 31
27. Heartwood with reddish cast (including pink, rose red, red brown, brown, and red purple). 28
27. Heartwood not with reddish cast but toward yellowish white or light brown (may be stained or darkened by salt water). 30
28. Wood fine-textured (cells difficult to see even under hand lens); heartwood light reddish brown with zones of light wood.
Western juniper, page 36
28. Wood is not fine-textured (cells can be seen under hand lens). 29
29. Wood medium-textured; cuts evenly; heartwood pinkish brown with slight purplish cast; odor like pencil shavings.
Incense-cedar, page 37
29. Wood medium- to coarse-textured; early wood cuts often spongy; pungent or "shingle" odor.
Western redcedar, page 38

30. Wood fine- to medium-textured; heartwood yellow with distinct raw-potato odor.
Alaska-cedar (Alaska yellow-cedar), page 39

30. Wood medium-textured; heartwood yellowish white to pale yellowish brown; distinct, pungent, spicy odor; oil spots often visible.
Port-Orford-cedar, page 40

31. Heartwood distinct reddish brown. 32

31. Heartwood not reddish brown. 33

32. Wood very coarse-textured; cell size changes abruptly from early to late wood; light in weight; soft to cut.
Redwood, page 41

32. Wood very fine-textured; cells cannot be seen easily, even under hand lens; heartwood bright orange brown to russet brown.
Pacific yew, page 42

33. Heartwood buff to light brown with lavender cast; medium-textured; growth rate sometimes erratic.
Western hemlock, page 43

33. Heartwood white to light brown; medium-textured; growth rate fairly even; sometimes has translucent appearance.
True firs, page 44

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