FOR-136

University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

PART 7

IDENTIFYING WOOD—*A Primer for Everyone*

Further Distinguishing Softwood Species

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Recognizing that an unidentified sample is a resinous or non-resinous softwood, with either an abrupt or a gradual transition, is a good start toward identifying an unknown specimen. The problem is that this information is rarely enough! Other characteristics need to be combined with that data. Some of the things to look out for include characteristic odors, the diameter of the tracheids, and the presence of storage cells. Sometimes the context or original location of the material can be helpful.

Odors

The presence of a distinctive odor can help identify many species, and this applies to both softwoods and hardwoods. Many softwoods have an odor from resins, oils, and other substances, but it's important to be able to recognize the difference between an odor that is distinctive and an odor that is more common. The pines are a good example of species with noticeable odors, but all the pines pretty much smell alike and can't be distinguished from one another by fragrance. (Pines have a resinous smell, particularly on fresh-cut surfaces. I think of pine as having a sort of resiny-floral scent.) Other species, such as the cedars and Douglas-fir, have distinctive odors that set them apart from other species. In most cases, the odor is much stronger in the heartwood than in the sapwood; the sapwood odor may be too faint to be useful as a diagnostic tool.

When you smell the odor on a piece of wood, it might help to think like a perfumer: do you smell top notes (very volatile, sharp-smelling compounds) or do you smell bottom notes (more musky or earthy)? Think of a description that's meaningful to you, because everyone's ability to notice scents is a little different. The woods we call "cedars" smell quite different from each other, and their odors are very helpful in identifying those species. Most species that we casually refer to as "cedars" are not true cedars (*Cedrela spp.*) and are actually in different genera. Here are a few examples of softwood species that I think have fragrances of diagnostic value:

- **Douglas-fir** (*Pseudotsuga menziesii*) has an odor that combines a resinous smell with a mixture of earthy and spicy smells. It's a very distinctive odor.
- **Eastern redcedar** (*Juniperus virginiana*), of the cedars, is probably the most familiar because of how the wood is used. You'll probably recognize the smell from cedar boxes, closet lining, or hamster cage litter. This was the preferred wood for pencils up to the early 20th century. As supplies became scarce, incense cedar was substituted.
- **Incense cedar** (*Calocedrus decurrens*) is the species often used for pencils. It has a characteristic odor (and flavor, for that matter, if you are the type of person who often chews the ends of your pencil). Pencils currently made outside North America frequently use species from southeastern Asia. Incense cedar was formerly known as *Libocedrus decurrens*.
- **Alaska yellow-cedar** (*Callitropsis nootkatensis,* formerly *Chamaecyparis nootkatensis*), has an odor that I think closely resembles raw white potatoes.
- **Western redcedar** (*Thuja plicata*) has an odor that seems to vary slightly from piece to piece, but it always smells kind of sweet. The odor reminds me of either bananas or chocolate, or sometimes the two combined. The odor isn't always strong, particularly in the sapwood, and it's stronger when the wood is slightly damp.
- **Northern white cedar** (*Thuja occidentalis*) is a species that is native to the northeastern United States and southeastern Canada. It's sometimes known as arborvitae when it is used for an ornamental planting. Some people think the wood has an odor that resembles the smell of rubber balloons.
- **Port Orford-cedar** (*Chamaecyparis lawsoniana*) (also known as Lawson's cypress) is a species found in southern Oregon and northern California. The wood has an odor that is described as spicy or gingery. You might think the smell resembles Lysol® cleaner.

How to Smell "Cedars" and Other Fragrant Species

By the time a wood sample is available for inspection, the surface may have lost much of its characteristic odor, usually because the odor-causing chemicals have either evaporated or oxidized into less-volatile substances. Similarly, samples can acquire a surface odor from close, prolonged contact with other woods or materials. To avoid confusion and to make the odor more obvious (if it's actually present), I've found that if I cut a thin shaving from the side-grain and *barely* streak the fresh surface with water from the tip of my finger, any naturally occurring odor seems to revive. Too much water will suffocate any odors present, so be careful not to over-apply it.

Texture

Texture has nothing to do with the way the wood feels; it's the term wood anatomists use when they describe the diameter of softwood tracheids. The tracheid diameters of some species are noticeably larger than others, and this difference can sometimes help with species identification. Tracheid diameters are most easily seen on the cross-section.

Softwood species are described as having either a coarse, medium, or fine texture, depending on whether the

Figure 7-1. Baldcypress (*Taxodium distichum*), a coarse-textured species. It's easy to spot individual tracheids with a 10X lens, and you can almost believe that you can trace the outlines of individual cells.

Figure 7-2. Eastern white pine (*Pinus strobus)*, a medium-textured species. With a 10X lens, you can see that the surface is covered with tracheids, but it's practically impossible to distinguish any individual cell.

tracheid diameters are large, medium, or very small, respectively. With a good-quality 10X hand lens, you might try to categorize the wood this way: if you can easily see the tracheids on the cross-section, and if they *almost* look large enough for you to trace the circumference of one with your eye, then you are looking at a piece of wood with a ***coarse*** texture (ex., redwood or baldcypress). If you can easily see tracheids on the end grain but you can't distinguish one tracheid from another, then you are looking at a sample with ***medium*** texture (ex., eastern white pine). ***Fine***-textured woods have even smaller tracheid diameters; a dry cut might actually appear a bit shiny to the naked eye (ex., eastern redcedar); using a 10X hand lens as before, you would be unlikely to be able to distinguish cellular structure of any kind were it not for a bit of torn grain or a bit of knife chatter here and there.

Here are some cross-section micrographs to illustrate the differences in tracheid dimensions (identical magnifications). These micrographs (Figure 7-1 through 7-3) are significantly enlarged for comparisons, but they are all reproduced at the same magnification. Note that the tracheids are much easier to see in the coarse-textured baldcypress compared to the eastern white pine, and the tracheids aren't visible at all in the eastern redcedar.

Texture can be helpful in wood identification; just by looking at the texture with a hand lens, for example, an analyst can distinguish between anatomically similar species such as the coarse-textured sugar pine (*P. lambertiana*) and a medium-textured pine such as eastern white pine (*P. strobus*) or western white pine (*P. monticola*). Other common species with fairly coarse tracheids include hemlock, Douglas-fir, and the southern pines.

Figure 7-3. Eastern redcedar (*Juniperus virginiana)*, a fine-textured species. Even with a 10X lens, it's impossible to distinguish any individual tracheids on this cross-section, and in fact you may not be able to distinguish any cells at all.

Parenchyma

Parenchyma cells (pronounced par-EN-ki-muh) are thin-walled cells that are used for storage. Most parenchyma run longitudinally in the wood (parallel with the tracheids), though some parenchyma are oriented perpendicular to the tracheid axis and form much of the ray tissue ("ray parenchyma," of which more will be said later). Longitudinal parenchyma are often filled with food (starch) or other waste products, and these are often colored. Colored parenchyma are easy to see on the cross-section, and they can provide another clue to the identification of an unknown sample.

If the surrounding wood is light-colored, softwood parenchyma might be visible as individual colored dots or band-like groups. You will need to examine a cleanly cut cross-section to have any chance of finding parenchyma with a hand lens, but they may not be visible unless a thin shaving is backlit for viewing. (Looking for parenchyma with a microscope may be easier than searching for them with a hand lens in many cases.) Figure 7-4 shows a photograph of eastern redcedar to illustrate dark-colored parenchyma cells. You sometimes have to look carefully to figure out if you are looking at growth rings or parenchyma.

In Figure 7-4 the parenchyma form tangential bands, but individual parenchyma cells might also be scattered throughout the growth ring. Other common examples of softwoods with colored parenchyma cells include baldcypress, redwood, and some of the other so-called cedars.

The photograph of a baldcypress veneer (Figure 7-5, below) shows numerous bands of colored parenchyma that can be seen fairly easily even with the naked eye. These bands are different from false growth rings (which are also found in this species). In this sample I distinguished the parenchyma from false growth rings by looking at it under a stereoscope with backlighting; the parenchyma were filled with dark material and visibly discontinuous in the tangential direction. False latewood tracheids don't have colored contents, and they are continuous tangentially (also refer to the micrograph of baldcypress in Figure 7-1).

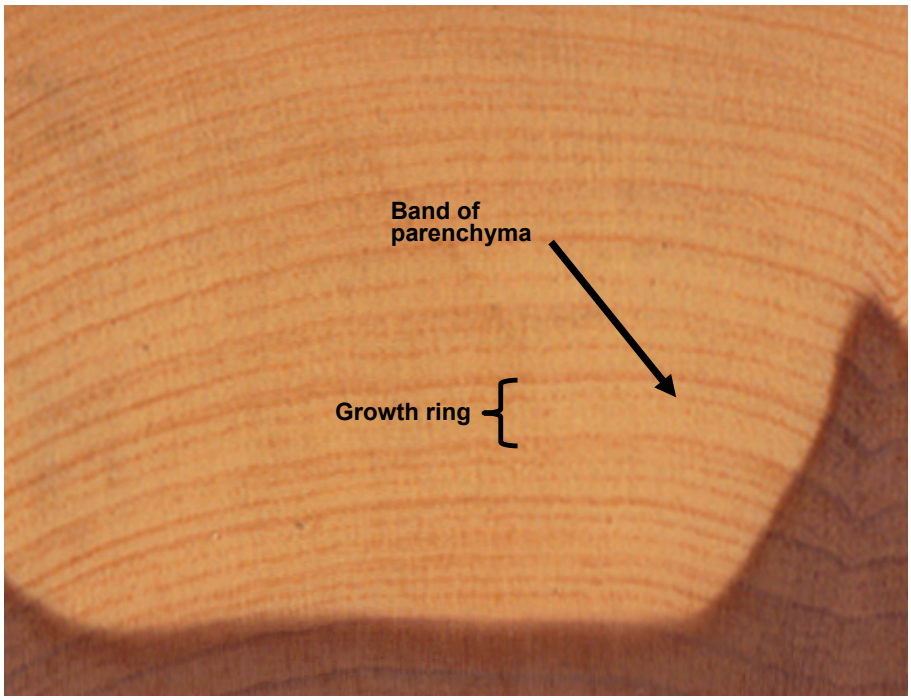

Figure 7-4. A photograph of eastern redcedar (*Juniperus virginiana*) I made from a Hough veneer. I lit the veneer from the backside to show the parenchyma cells more clearly. Notice the thin bands of parenchyma and how they blend into the latewood. In the marked growth ring example, the parenchyma bands look discontinuous. The dark reddish-brown coloration indicates the irregularly shaped heartwood in this sample.

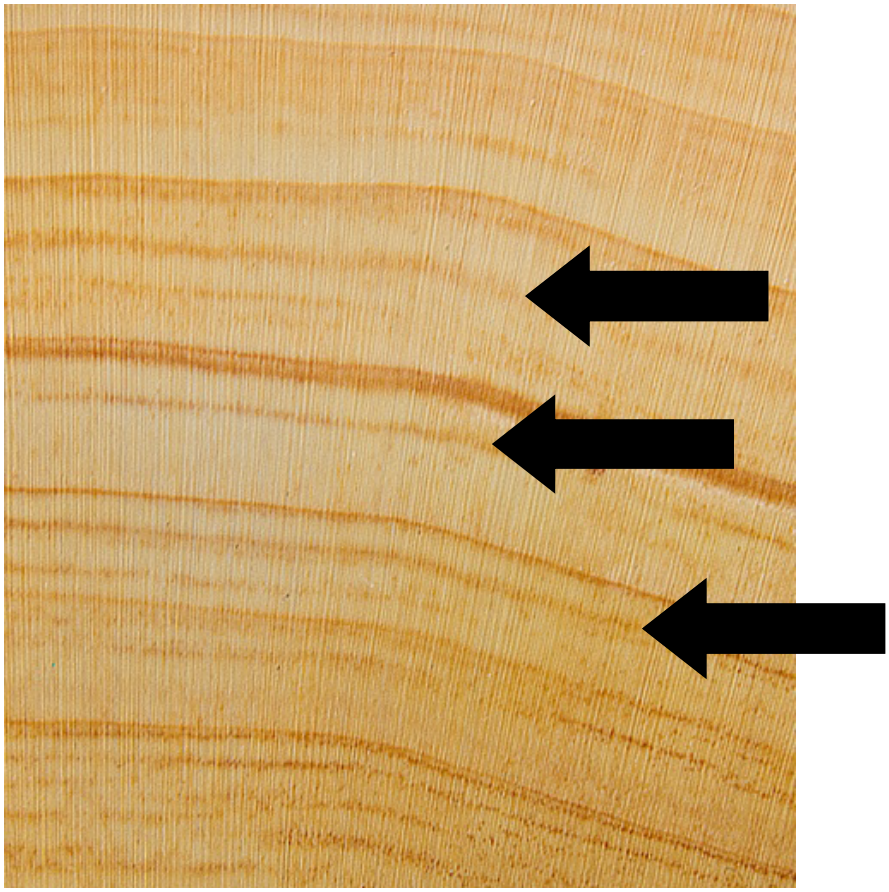

Figure 7-5. Photograph of baldcypress cross-section with numerous parenchyma cells, most of which are banded in this example. Arrows point to several (but not all) of the groups of parenchyma.

Summary

Softwoods can be either resinous or non-resinous, and the growth ring transitions can be either gradual or abrupt; in most cases, more information is needed to identify an unknown sample, however. Odor can be very helpful for some species. Texture (a term used in reference to tracheid diameter) can be distinguished with a 10X lens, and it can also be helpful in separating wood species. Longitudinal parenchyma, thin-walled storage cells, run parallel with the tracheids and frequently have colored contents that make them easy to see on a magnified cross-section. The presence of parenchyma is notable in some species and can assist in determining the identification of an unknown sample. Parenchyma are also located in rays.

Vocabulary

If you don't remember any of the following words, please review this section. Vocabulary is very important!

1. Texture: coarse, medium, fine
2. Parenchyma: ray parenchyma and longitudinal parenchyma
3. *Pinus strobus* (eastern white pine)
4. *Pinus monticola* (western white pine)
5. *Pinus lambertiana* (sugar pine)
6. *Picea* (the genus name for the spruces)
7. *Pseudotsuga menziesii* (Douglas-fir)
8. *Juniperus virginiana* (eastern red-cedar)
9. *Thuja plicata* (western redcedar)
10. *Thuja occidentalis* (northern white cedar)
11. *Callitropsis nootkatensis,* formerly *Chamaecyparis nootkatensis* (Alaska yellow-cedar)
12. *Taxodium distichum* (baldcypress)
13. *Chamaecyparis lawsoniana* (Port Orford-cedar)
14. *Calocedrus decurrens* formerly known as *Libocedrus decurrens*

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