

forestry & natural resources

ENVIRONMENTAL FORESTRY

How to Identify Some Common Indiana Woods

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Woods differ in strength, hardness, color, odor, weight and other properties, as well as their structure. These differences can be used in their identification.

To identify an unknown wood, cut a smooth surface on the end or cross section of the sample with a sharp knife. Here you will see the annual rings just as they appear on a stump in the woods. Using a hand lens, check to see if openings, called **pores** can be seen within the annual rings. The pores, easily seen in oaks, ash, and hickory, are tubes which carry water and nutrients from the tree roots to the leaves.

In some hardwood (broadleaf) trees, the pores may be larger on one side of the annual ring. The area containing the larger pores, which is always on the side of the annual ring toward the center of the tree, is called **springwood** and grew during the early spring season. The area of smaller pores, along the outside of the annual ring, grew during the summer and so is called **summerwood**. Thus, an annual ring is actually made up of a band of springwood and a band of summerwood.

Woods having large pores in the springwood and small pores in the summerwood are called **ring-porous** woods. These include the oaks, elm, ash, and others.

Woods having springwood and summerwood pores about the same size are called **diffuse-porous**. Among others, these include sycamore, tuliptree, beech and the maples. A few other woods, such as walnut and cherry, have a gradual change from larger springwood pores to smaller summerwood pores. These are often called **semi-ring-porous** woods. The first step, then, in wood identification of the hardwoods is to separate the woods into one of these groups.

In a few species the large springwood pores may appear under the hand lens to be closed, or filled. White oak is a member of this group

In some species, groups of cells will be found in the summerwood arranged in various patterns. These may be roughly triangular (as in white oak), in short lines (as in red oak), wavy horizontal bars (as in red elm), in small isolated clusters, or may appear as more or less continuous fine lines (as in hickory). These serve as additional aids to identification of many species.

Wood Rays

Look again at the cross section of white or red oak. You will see ribbon-like streaks or lines running across the annual rings from the center of the tree to the outside. These are rows of cells which give oak some of its figure and are known as **wood rays**. Rays serve to transport substance laterally within the tree, for food storage and vary in size among species. In cottonwood, for example, they are not usually visible to the naked eye. Rays also appear more numerous in some kinds of wood than in others. Therefore, both the size and number of rays are used in wood identification. Rays are large and easily seen in oak, beech and sycamore. Rays in tuliptree, sweetgum and basswood appear much less distinct to the naked eye. The rays may also vary in size in any one species. White oak, for example, has some wide and very conspicuous rays and others, in between, that are narrow and indistinct. In black walnut the rays are quite uniform in width and indistinct without a hand lens.

Color, Hardness, and Figure

Color, degree of hardness, and figure are also used to assist in identification of woods. **Sapwood**, the outer living portion of the stem, is usually lighter in color than the **Heartwood**, the dead inner wood near the center of a tree. Hardness may be tested by a finger nail. Soft woods, such as basswood and cottonwood, are easily indented. Hard woods, such

as sugar maple, beech and the oaks, cannot be indented in this way. Sometimes the taste or odor, as in sassafras may be noted.

Figure in a wood generally refers to the distinct markings on the face of a wood sample. It is due to differences between the springwood and summerwood (pore size), the presence of wood rays, and the structure of the wood. Some woods, such as basswood and cottonwood, have little or no figure. Others, such as oak, walnut and maple, are well known for their pleasing figure.

Parenchyma

Characteristic white markings may also be seen on the cross section. These are **parenchyma** cells which serve to store food. The parenchyma cells may surround or connect the pores, or be completely independent of any pores. In woods like hickory, the parenchyma appears as fine concentric bands and is not associated with the pores. In summerwood of elm, the parenchyma connects the pores in wavy concentric bands. In ash, the parenchyma forms a narrow sheath about the pores and sometimes unites them laterally toward the outer margin of the ring.

A Key to Sixteen Common Indiana Hardwoods

All of the wood structures and properties of woods described above are used in the **Identification Key** in this leaflet. The sketches and photographs which follow will help you to find the various

parts of the wood samples. You will need to refer to them until the terms become familiar.

To use the Key, look at the cross section of the wood samples. Make a smooth cut with a sharp knife so that the features used for identification can be clearly seen. A hand lens or magnifying glass will be helpful.

The Key is constructed so that a series of alternative choices must be made from pairs of descriptions. By selecting the choice describing the wood to be identified, the point is ultimately reached where the name of the wood is given. Check your identification by comparing the sample with the illustrations.

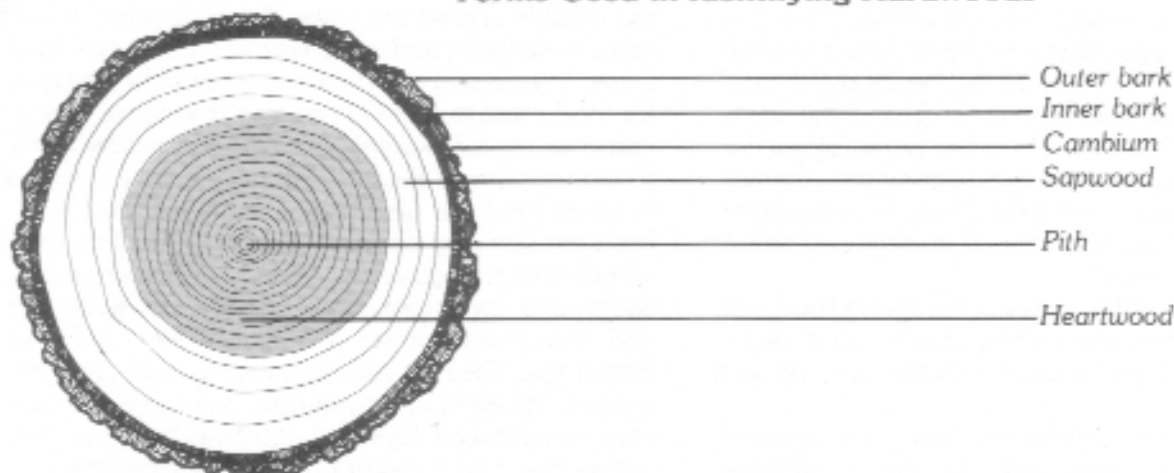
References

Panshin, A.J. and de Zeeuw, C., 1970. *Textbook of Wood Technology*, Vol. 1., 3rd Edition. New York: McGraw-Hill.

U.S. Forest Products Laboratory. *Wood Handbook: Wood As An Engineering Material*. USDA Agr. Handbook 72, rev. 1974. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price \$7.85. Give stock No 0100-03200 when ordering.

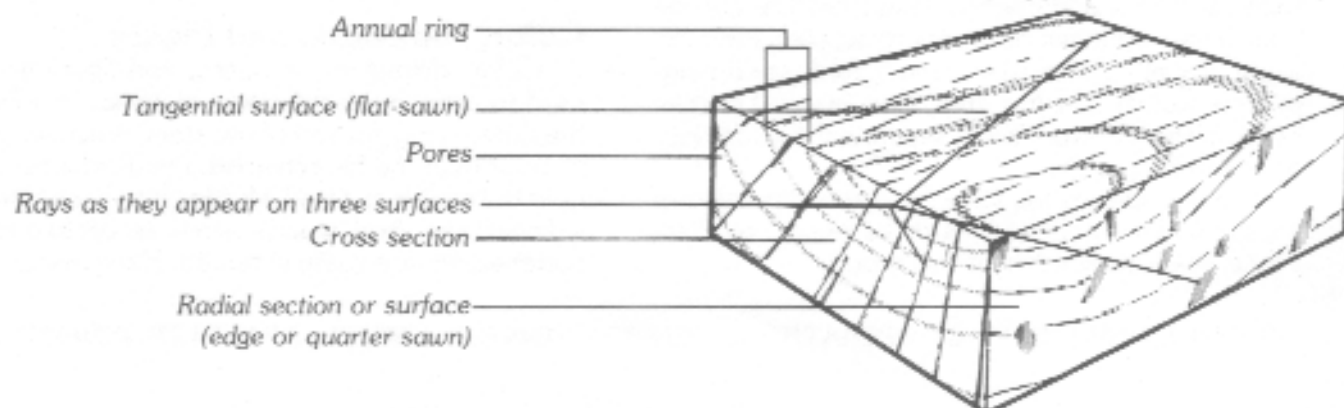
Wood...Colors and Kinds. USDA Agr. Handbook No. 101., 1956. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price 50¢.

Terms Used in Identifying Hardwoods

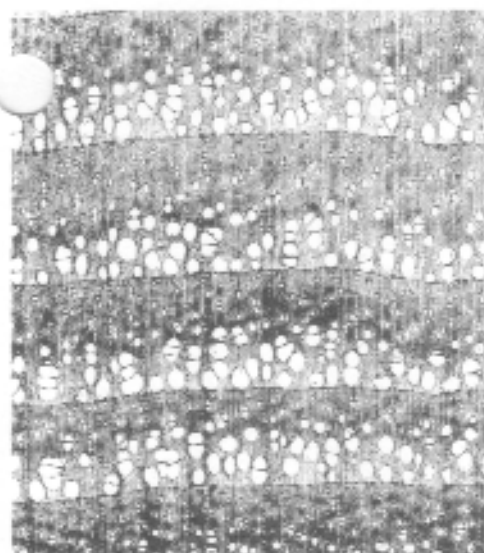


Cross section of a tree trunk or log

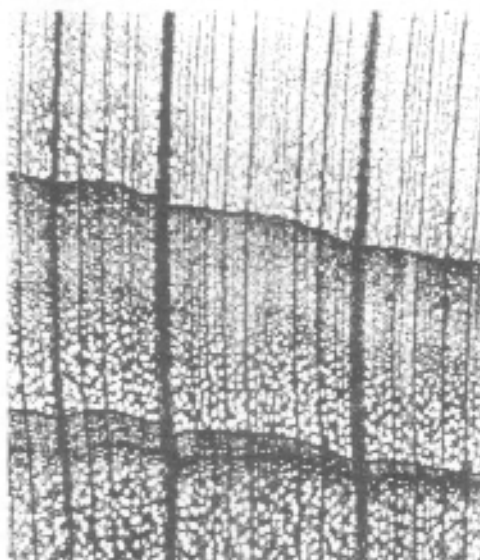
Sketch of an oak board showing three surfaces with characteristics as they appear to the unaided eye.



Selected Cross Sections of Indiana Woods



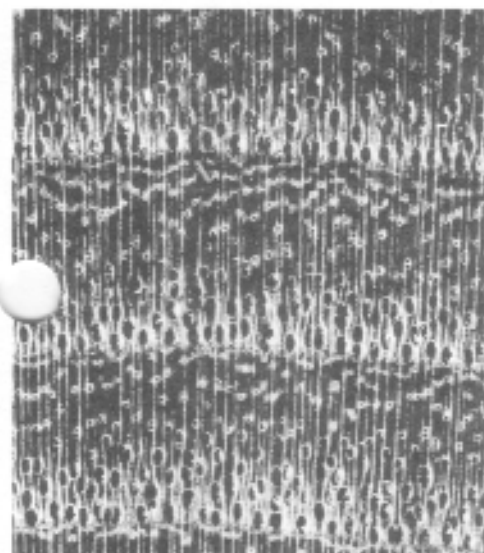
Sassafras



Beech



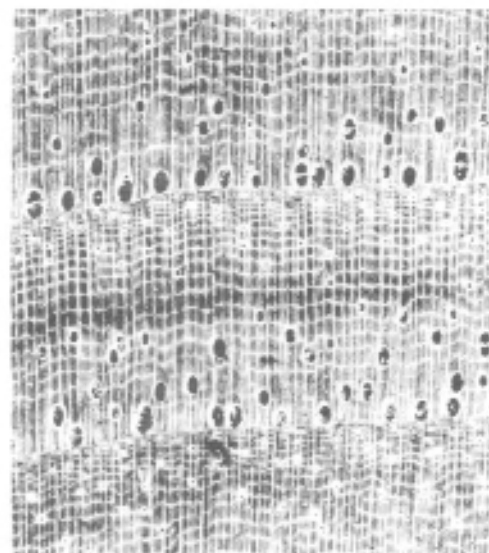
Basswood



Ash



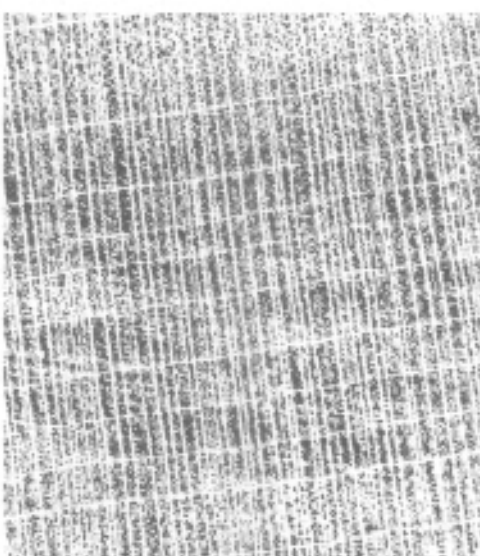
Cottonwood



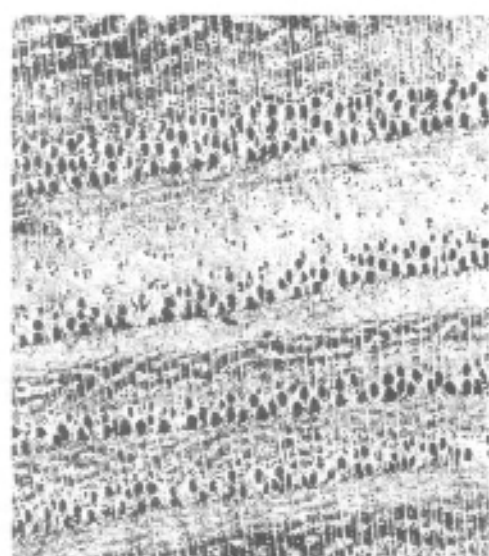
Hickory



Sugar Maple

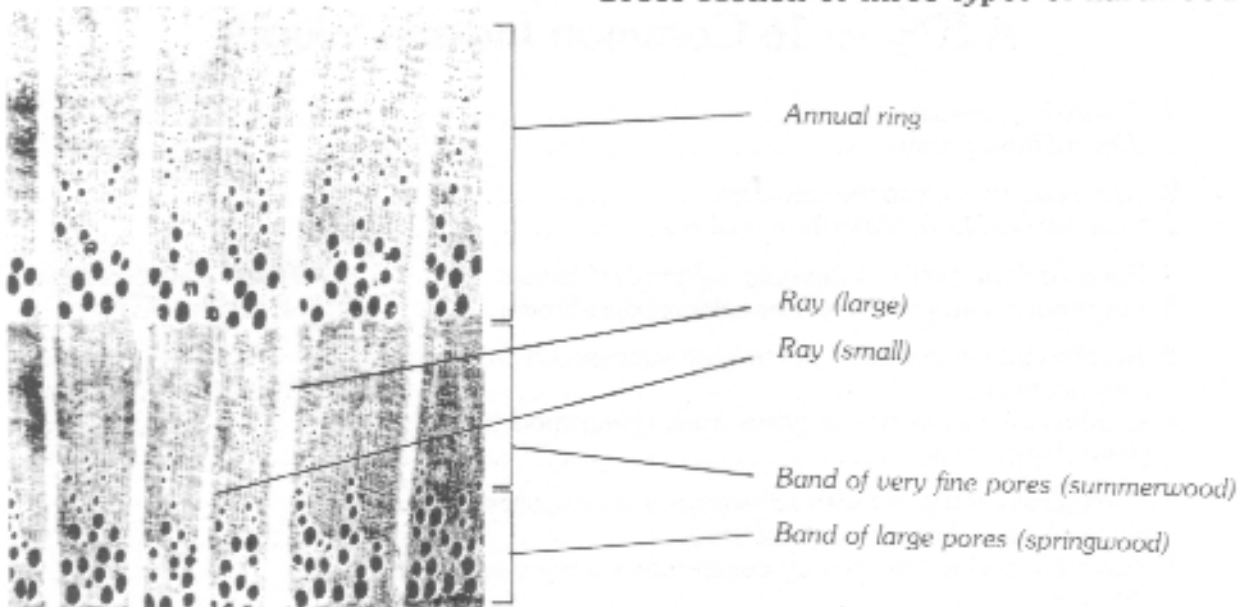


Yellow Poplar
(Tuliptree)

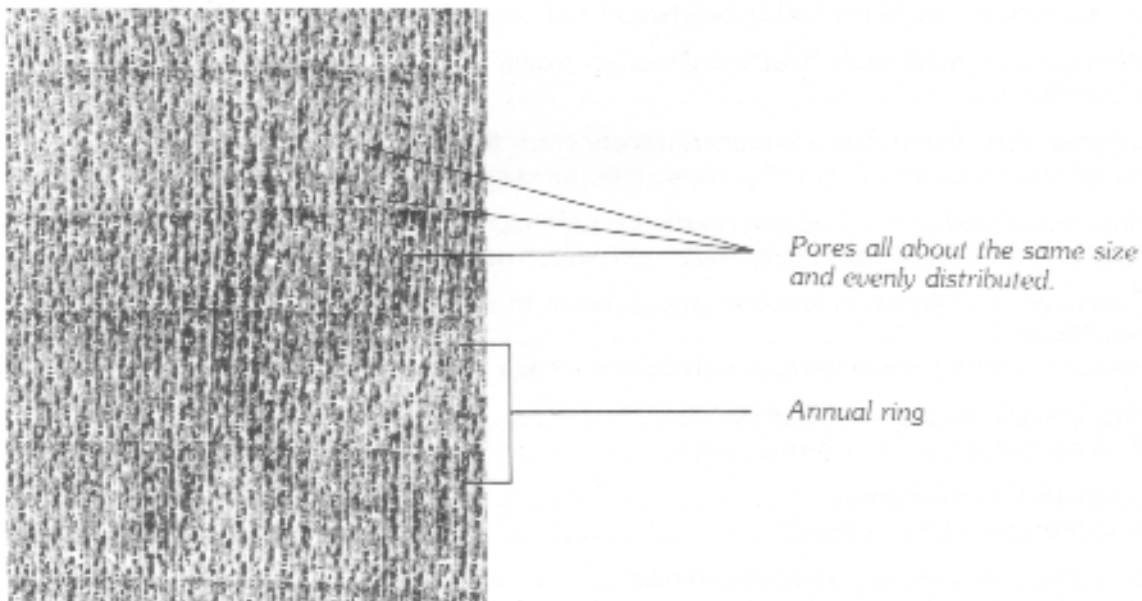


Red Elm
(Slippery Elm)

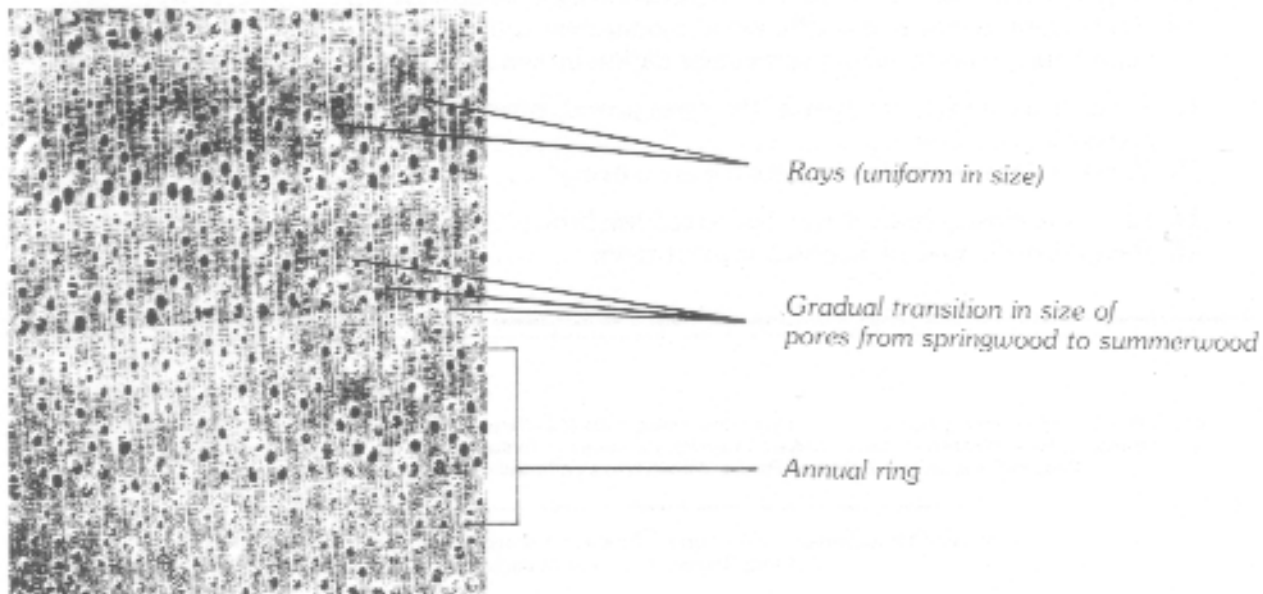
Cross section of three types of hardwoods



A ring-porous wood (Red Oak)



A diffuse-porous wood (Birch)



A semi-ring porous wood (Black Walnut)

A Key to 16 Common Indiana Woods

1 Wood ring porous	2
1 Wood diffuse porous	11
2 Rays readily visible to the naked eye	3
2 Rays not readily visible to the naked eye	4
3 Pores occluded with tyloses color light to dark brown	White Oak Group
3 Pores not occluded with tyloses color reddish-brown	Red Oak Group
4 Abrupt change in size of pores from springwood to summerwood (ring-porous)	5
4 Gradual change in size of pores from springwood to summerwood (semi-ring porous)	9
5 Summerwood figured with conspicuous wavy concentric bands of pores which are mostly continuous	6
5 Summerwood not figured by conspicuous wavy concentric bands of pores	7
6 Springwood pores mostly one row wide, heartwood greyish brown	American Elm
6 Springwood pores 2-4 rows wide, heartwood dark brown	Slippery Elm
7 Wood with aromatic odor, heartwood reddish brown	Sassafras
7 Wood odorless	8
8 Summerwood parenchyma as numerous concentric fine lines	Hickory
8 Summerwood parenchyma not conspicuous, pores in clusters of 2-3	Ash
9 Rays readily visible to naked eye, heartwood red to reddish brown	Black Cherry
9 Rays indistinct to the naked eye, heartwood whitish or chocolate brown	10
10 Pores very numerous, heartwood greyish white to light brown, wood light weight	Cottonwood
10 Pores scattered, heartwood chocolate brown in color	Black Walnut
11 Rays conspicuous to the naked eye	12
11 Rays not conspicuous to the naked eye	15
12 Rays wider than the pores	13
12 Rays narrower than the pores	14
13 Broad rays separated by several small rays	Beech
13 Rays of nearly uniform width closely spaced	Sycamore
14 Rays variable in width, wood hard, heartwood light reddish brown	Sugar Maple
14 Rays nearly uniform in width, wood moderately soft, heartwood greenish yellow, sometimes darker brown upon exposure	Tuliptree
15 Pores usually slightly larger in the springwood, heartwood greyish to pale brown	Cottonwood
15 Pores uniform in size throughout the annual ring	16
16 Rays very closely spaced, heartwood reddish brown	Sweetgum
16 Rays normally spaced, heartwood pale brown	Basswood

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