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SCIENTIFIC CLASSIFICATION OF TREES:
An Introduction for Wood Workers

James E. Reeb, Extension Specialist, Department of Forestry

Introduction

Those who work with wood should be able to distinguish between different woods and be familiar with features that make different kinds of wood react differently to cutting, surfacing, finishing, etc. An obvious first step in accomplishing these tasks is to be able to properly identify and name an unknown wood. It is helpful in identifying wood to know that trees, as well as other living organisms, are assigned to groups based on similar physical characteristics.

This publication will introduce the reader to the science of taxonomy, that is, the practice of classifying and assigning living things to groups based on their similarities in anatomical structures. Scientists use scientific names to signify into what groups living things belong.

The users of wood should be familiar with the fact that common names can often be misleading and that the wood of some trees with similar common names may actually be quite different in their structures and properties. Scientific names eliminate the confusion that can occur when using common names.

Common Names Often Misleading

Most probably, each kind of tree in the United States has more than one common name. When G. B. Sudworth, a United States Forest Service employee, published a checklist of trees in 1927, he included about 1,000 trees; however, the list also included almost 9,000 common names as local describers of these trees.

For most practical purposes, common names can be used with no problem. However, in some cases, common names can be confusing or misleading. One kind of tree may be referred to by several different common names throughout its natural growing range. A single name may refer to more than one kind of tree. For example, the term "scrub oak" is often used when speaking about post oak, blackjack oak, and other "scrubby looking" oaks found in the southwestern United States. The tree we commonly call the yellow poplar is not a true poplar, such as cottonwood and aspen, but is instead a member of the magnolia family, *Magnoliaceae.* Eastern redcedar is actually a juniper and not a true cedar.

Common names may describe where the tree grows, such as swamp white oak and river birch, or how the tree looks, such as weeping willow and quaking aspen.

Other common names describe the use of the tree, such as sugar maple and canoe birch. Another way to assign a common name to trees is to incorporate the discoverer's name in the tree name, such as Nuttal oak and Douglas-fir.

Classification and Naming of Trees

Organisms are assigned scientific names because of the confusion of using common names and because of the many different languages spoken throughout the world. Scientists have settled primarily on Latin for scientific names, although they sometimes use Greek or other languages. The important thing is that, regardless of the language the scientist uses for communication, the scientific names chosen for all classified living organisms are the same worldwide. Classifying and assigning scientific names also include those organisms that once lived, such as the dinosaurs.

You may wish to refer to Figure 1 for the following explanation of the classification of trees. The highest taxonomic division of living things is the **kingdom.** All living organisms are placed in either the plant kingdom or the animal kingdom. Since this publication is about the classification of trees, only the taxonomy of the plant kingdom, and specifically trees, will be discussed. However, the taxonomic classification of other plants, and that of animals, is very similar.

The plant kingdom is further classified into **divisions.** Trees are included in the division *Spermatophyta.* Spermatophytes include all plants that have seeds. Divisions are further broken down into **subdivisions**. Spermatophytes are divided into two subdivisions, *Angiospermae* (encased seeds) and *Gymnospermae* (naked seeds). Trees are included in both of these subdivisions.

Trees often referred to as broad-leaved hardwood trees are included in the subdivision *Angiospermae.* Angiosperms have a specialized organ of reproduction, the

flower. The term angiosperm refers to the presence of an ovary that encloses the ovules or seeds. The ovary is the fruit found on the tree. Examples of fruit found on hardwood trees are the samara (wings) of the maples and ashes, the acorn of the oaks, the nut of the hickories, the pome of the apples, the drupe of the cherries, and the berry of the persimmon tree.

Angiosperms are further divided into two **classes,** *Monocotyledoneae* and *Dicotyledoneae.* Monocots have one initial seed leaf and dicots have two. There are no commercially important monocot trees in the United States. Three groups of monocots that attain large size and produce woody stems are bamboo, palm, and rattan. Furniture, fishing rods, and other small items made from these woods are often imported into the United States. Although they produce woody stems, the anatomy of monocots is quite different from that of dicots.

Trees that produce hardwood lumber belong in the class *Dicotyledoneae.* Dicot trees in the United States are divided into twenty-five **families.** All the important hardwood species found in the United States are represented within these families. Examples are *Salicaceae*, the willows and poplars, and *Fagaceae,* the beech family that includes the oaks, American chestnut, chinkapin, and others. In Figure 1, black walnut is shown to be included in the family *Juglandaceae.*

The subdivision *Gymnospermae* includes all the trees that we commonly call softwoods. Softwoods fall within four families of the **order** *Coniferales*, the conifers. The four families are *Cupressaceae*, cedars, junipers, and cypress; *Taxaceae*, yews; *Taxodiaceae*, redwood and baldcypress; and *Pinaceae*, pines, firs, hemlocks, spruces, and larches. The term conifer refers to the fruit that in some (but not all) conifers is a cone.

Genus and Species

Genus is a subgroup of organisms that have many common characteristics. Genus can be thought of as a generic name, such as oaks, willows, or pines. A tree **species** (both singular and plural) can be thought of as a specific kind of tree. A more technical definition of a species is organisms that are similar in anatomical form and structure that can interbreed to produce fertile offspring of the species. There are many different species of oaks, willows, and pines.

What is the Best Name?

A preferred common name for a tree, and its wood, would be one that included some reference to both its genus and its species. Examples are *Quercus alba* and *Acer saccharum. Quercus* is the genus for oaks, and *alba* is the Latin word for white. The common name, white oak, describes the scientific name *Quercus alba. Acer* is the genus for maples, and *saccharum* is the Latin word for

sweet or sugar. The common name, sugar maple, describes the scientific name *Acer saccharum.* However, white oak also describes a grouping of several species of oaks that can be separated by both tree and wood characteristics from another grouping of several species of oaks referred to as red or black oaks.

Because *nigra* is Latin for dark or black, one would suspect *Quercus nigra* to be black oak, but that tree's most used common name is water oak. Black oak's scientific name is *Quercus velutina.* The Latin word *velutum* means velvety. Black oak leaves are exceedingly lustrous, dark green, and velvety. A better common name for this species might have been velvet-leaved oak or velvet oak. Again, black oaks or red oaks may also refer to a group of oaks that can be separated from the white oak group.

This type of confusion is the reason scientists and others use scientific names when referring to different species of organisms. Figure 1 illustrates how black walnut (*Juglans nigra*), a commercially important hardwood, is classified. Other trees in the world may have the common name black walnut, but only this tree is recognized with the scientific classification illustrated in Figure 1. For most practical purposes, common names, especially when used within one area or region, are sufficient to identify tree or wood species. But remember, there can be confusion when using common names to describe a tree or its wood.

How Many Kinds of Trees?

There are close to 10,000 identified species of trees on the earth. Of these, only about 500 are softwoods. It is estimated that hardwoods make up about twice the volume of softwoods in the world. There are more than 1,000 different species of trees in the United States. Of these, about 80 species are recognized as being commercially important for their wood. These are made up of about 30 softwoods and about 50 hardwoods. Although not commercially important for their wood, some trees have value as yard trees or ornamentals, for nut and other fruit production, or for the chemicals they produce. For example, the bark of the Pacific yew (*Taxus brevifolia*), a gymnosperm or softwood, has recently gained importance as a source for taxol, an anti-cancer chemical. An example of a popular ornamental yard tree is the ginkgo (*Ginkgo biloba*), another gymnosperm. This tree is used extensively in the United States as an ornamental and has proven to be very resistant to insects, disease, pollution, and drought.

For more information on classifying or identifying trees or woods, contact your county Cooperative Extension Agent, a Kentucky Division of Forestry forester or a specialist at the Department of Forestry at the University of Kentucky.
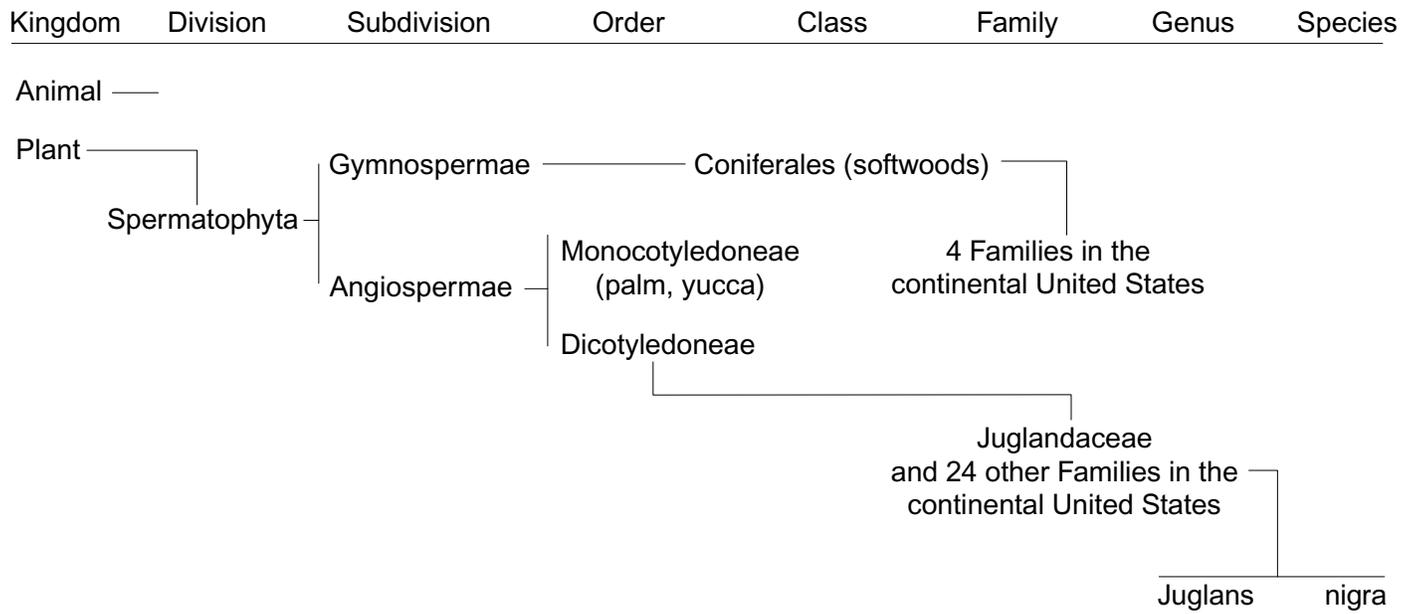
Kingdom	Division	Subdivision	Order	Class	Family	Genus	Species

Animal —

Plant — Spermatophyta — Gymnospermae — Coniferales (softwoods) — 4 Families in the continental United States

Angiospermae — Monocotyledoneae (palm, yucca)

Dicotyledoneae — Juglandaceae and 24 other Families in the continental United States — Juglans — nigra

Figure 1. Classification of trees. Example of eastern black walnut