

CLASSIFICATION OF PLANTS

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Medicinal plants sold in Asuncion, Paraguay, in a plant market.
Photo by Steven R. King, 1996.

INTRODUCTION: WHAT'S IN A NAME?

"A rose is a rose," it has been said. And most of us know a rose when we see one, as we know the African marigolds we plant beside the [potatoes](#) and beans in our gardens, and the maples, elms, cedars, and pines that shade our backyards and line our streets. We usually call these plants by their common names. But if we wanted to know more about the cedar tree in our front yard, we would find that "cedar" may refer to an eastern red cedar, an incense cedar, a western red cedar, an Atlantic white cedar, a Spanish cedar, a banak cedar, or the biblical cedar of Lebanon. In fact, we would find that cedars are found in three separate plant families.

Later, after discovering that our "African" marigolds are in fact from Mexico and our "Spanish" cedar originated in the West Indies, we would realize how misleading the common names of plants can be. The same plant can have many different common names. The European white lily has at least 245, while the marsh marigold has at least 280. Clearly, if we use only the common name of a plant, we cannot be sure of understanding very much about that plant.

It is for this reason that the scientific community prefers to use a more precise way of naming, or classification. Scientific classification, however, is more than just naming: it is a key to understanding. Botanists name a plant to give it a unique place in the biological world, as well as to clarify its relationships within that world. Classification is sometimes difficult. As modern botany has advanced, producing an increasing understanding of complex biochemical mechanisms, the criteria for the way plants are classified has undergone transformation. Even further, Nature is not fixed and plants, like us, are capable of change. Plants can vary for reasons we don't entirely understand. To be sure, plant classification is not the dull field that some might

assume!

HOW ARE PLANTS CLASSIFIED?

Science classifies living things in an orderly system through which they can be readily identified. Living things are grouped into categories of increasing size, based upon relationships within those categories. For example, all plants can be put in order from the more primitive to the more advanced. Such a ranking would look like this:

Plant Kingdom

Bryophytes: Small with leaflike, stemlike, and rootlike structures.

Disseminated by spores: mosses, liverworts, hornworts.

Vascular Plants: Larger with true leaves, stems, and roots.

1. Seedless: Ferns, horsetails, club mosses.

2. Seed Plants:

a. Gymnosperms: Usually have cones, no flowers, seeds not enclosed in fruit: pines, spruces, firs, hemlocks, cycads, ginkgo.

b. Angiosperms: Have flowers, seeds enclosed in fruit

i. Monocotyledons: Leaves have parallel veins, one seed leaf: grasses, orchids, lilies, palms.

ii. Dicotyledons: Leaves have netted veins, two seed leaves: cherry trees, maples, coffee, daisies, etc.

This informal way of describing plant classification gives an overview of how plants are classified. Botanists use a more complex system. A botanist divides the plant kingdom into Divisions, similar to the Phyla used to divide the animal kingdom. There are twelve divisions. Referring to the above ranking, three of these divisions are Bryophytes, four are seedless plants, four are Gymnosperms, and one is Angiosperms. Each Division is further divided into Classes, which are divided into Orders, which are divided into Families, which are divided into Genera (singular, Genus), which are divided into species, which is the "basic unit" of classification. Put somewhat simply, individuals in a species are able to breed with each other, while in broader categories individuals do not interbreed.

THE BINOMIAL SYSTEM OF CLASSIFICATION

The [scientific or botanical name](#) of a plant is the means by which we give it its unique place in the scientific and biological world. Begun by Carolus Linneaus, a Swedish botanist, in the eighteenth

century, this name is binomial (has two parts), consisting of genus and species, both of which are expressed in Latin. The genus or generic name is a noun which usually names some aspect of a plant, such as *Coffea*, the Latinized form of the Arabic word for beverage, kahwah. The species or specific name is usually an adjective that describes the genus. In the case of coffee, the species is *arabica*, indicating that the plant was thought to originate in Arabia. The coffee plant botanical name, *Coffea arabica*, refers to only one plant and cannot be confused with any other. Its botanical name is unique to that particular plant the world over.



The botanical name is often followed by a letter or letters which stand for the botanist who named that plant. The coffee plant's complete botanical name is *Coffea arabica* L., the L. standing for Linnaeus. If the original botanical name of a plant is later changed, the original classifier is still noted in parentheses. Other often used abbreviations are Sarg. for Charles Sprague Sargent, founder of Harvard University's Arnold Arboretum; Lam. for Jean Baptiste Lamarck, French evolutionist and botanist; and Audub. for John James Audubon, ornithologist, naturalist, and painter. (Interestingly, this convention of naming the discoverer is not found in the naming of animals.) Sometimes the Family name is included, which groups the genera. It can usually be distinguished by its ending--"ae."

The foxglove plant is the source of digitalis.
Photo by Steven R. King, 1996.

Linnaeus's book *Species Plantarum* (The Species of Plants), published in 1753, continues to influence the naming of plants today. It is the starting point for checking whether a name has been used previously to insure that each plant is given a unique name. The earliest name for a plant is usually the official name should a dispute arise.

WHAT THE NAMES MEAN



Coca leaves and scale for sale in Bolivian market to local coca chewers. Photo by Steven R. King, 1996.

The [genus and species](#) names often tell something about the plant. They can describe the appearance of the plant, reflect the common name of the plant, indicate a chemical present in the plant, tell how the plant tastes or smells, or describe how the plant grows. The genus or species name can honor someone, a botanist, a person in power, someone historically prominent. The name can reflect the country or origin of a plant.

For example, [Erythroxylum coca](#), the plant from which we derive cocaine, is named after erythro meaning red and xylo meaning wood, literally "red stem." (Coca, the species name, is the common name of the plant.) The jaborandi tree [Pilocarpus jaborandi](#) has a genus name which indicates that the alkaloid pilocarpine can be extracted from the plant. The species name jaborandi means "one who makes saliva or one who spits," referring

to the use of the plant as an expectorant.

Plant classification can be painstakingly difficult. Plant species can resemble one another quite closely; plants can sometimes interbreed within species or across species, producing hybrids and varieties that complicate classification. A case in point is the [cinchona tree](#), a plant instrumental in world history as a result of its alkaloid derivative, quinine, which helped to reduce the incidence of the terrible disease malaria. The cinchona tree, with its many species and hybrids and varieties within species, has resisted absolute classification. It's ambivalent ways have left botanists puzzled as to the exact number of species which exist. In fact, one species grouping of cinchona has been labeled '*Cinchona officinalis*.' *Officinalis* (meaning 'of the workshop') is a common species name used for many medicinal plants, particularly, it seems, under the trying circumstances of difficult taxonomy.

PLANT CLASSIFICATION IN OUR MODERN WORLD

Despite the great advances made in botany, there are many, many plants yet to be discovered, classified, and utilized; unknown plants are treasures waiting to be found. Today's ethnobotanists are combing regions of the world, looking for tomorrow's medicines and food crops. They are exploring the functional properties and relationships of plants within ecosystems to help us to understand the need for diversity in the way we manage our plant resources.

The plant world, our world, is in constant flux. Due to human and other factors, we are seeing the possibility of extinction for many plants and animals. Plant classification aids in keeping track of our planet's endangered inhabitants. Just as importantly, we are realizing the need to understand ecological systems which preserve biodiversity. Today's scientists are exploring how genetic diversity and ecological sensitivity are necessary in solving such problems as feeding the population and fighting disease. Plant classification is vital to these endeavors. As is plain to see, a name is not just a name.



Drawing of herbarium specimen of *Cinchona officinalis*, the source of quinine. Photo by Steven R. King, 1996.

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