

# DENDROLOGY

FGR-111

# Introduction

- Meaning: *The Study of Trees*
- Common significance: *the Taxanomy of Woody plants* including trees , shrubs.

Besides the taxanomy of woody plants, dendrology as here defined includes tree habits and ranges, since these seems to be most easily learned when first contact is made with the various species covered.

To most of us a tree may be a rather definite thing; yet the line of demarcation between trees and shrubs is by no means clear-cut.

A given species may be shrubby near the extremities of its range, or at or near timberline, and still attain large proportions elsewhere.

For eg. *Alaska Cedar* is ordinarily a moderately large tree, but in exposed situations at timberline it's often reduced to a dwarfed or even healthlike shrub.

- For the sake of convenience a tree may be defined as a woody plant which at maturity is 20 ft or more in height. (with a single trunk unbraced for at least several feet above the ground, and having a more or less definite crown.)
- *Shrubs*, in contrast are smaller and usually exhibit several erect, spreading or prostrate stems and a general bushy appearance.

# Classification (History)

- This dates back to ancient Greek Civilization when Theophrastus (372-287 bc); a student of Aristotle's ( and by many consideration as the father of botanical science, described and classified about 480 kinds of plants.)
- *Caesalpino* (1519-1603) during 16<sup>th</sup> century published a classification of a large no. of plants based upon the nature and structure of their seeds.
- *Carolus Linnaeus* or *Carl Von Linne* (1707-1778), the great Swedish botanist has been called *The founder of modern plant classification* through his extensive works "*Genera Plantarum*" and "*Species Plantum*".

# Classification

- The modern age in Biology began when in 1859 Charles Darwin published this "*Origin of Species*" –Revolutionizing scientific thinking and provoking almost unending controversy.
- At last scientist began to look upon all of life from an entirely new viewpoint.
- Instead of grouping plants merely for Convenience, that is artificially, the aim was to construct natural or phylogenetic arrangements of related groups with the most primitive or oldest coming first, followed in order by the others, and terminating with the most recent ones resulting from the processes of evolution.

- It's one thing to put all plants with 5 stamens in a single group (artificial) and quite another to decide whether the presence of 5 stamens means that the plants are millions of years older, or younger than the others.
- To the fossil record and the classic features of flower, fruit, seeds, leaves and other plant parts there can now be added such things as wood anatomy, cytology, genetics, pollen morphology and biochemistry.
- Plants with flower of simple structure are usually regarded as primitive or of great antiquity while those with structurally complex flowers are ordinarily conceded to be of much more recent origin.

- If this were invariably true ,the taxonomist should experience little difficulty in arranging trees and other seed bearing plants in the order of their apparent descent, listing those of greatest age first and those of most recent origin last. However the phylogenetic positions of several plant species have never been accurately determined because of conflicting evidence.
- It is often difficult to explain whether a certain plant or a group of plants is inherently simple structurally or whether it is simple through extensive evolutionary modification. Plants of the later sort are said to be reduced or simplified due to reduction.



- Such plants are subject to discussion. One group may assert that a given family is inherently primitive and another may assert that it is a reduced type and subsequently assign it to an advanced position in their own classification.

- The monumental “Genera Plantarum”(1862-1883) developed by George Bentham and Sir Joseph Dalton Hooker at the Royal Botanical Gardens, Kew, England , using their extensive collections, has been called the greatest taxonomic work ever produced in Great Britain.

# DEFINITION OF A SPECIES

- Since a species is but a biological concept, it's limits are largely a matter of individual interpretation. The French taxonomist de Jussieu defined a species as “the perennial succession of similar individuals perpetuated by generation”.
- In simple words “species is a collection of individuals so simple that they suggest common parentage and produce like offspring.
- A proper concept of a classificatory group, no matter what its rank or extent, is always reached by a process of synthesis rather than analysis. Our ideas of a species, so far as we develop them from personal experience, are derived entirely from the specimens which we see.
- Even though a species is thought of as a group or population of individuals, it is commonly founded upon a single specimen, the type of which was first described, named and published by its author.

- Briggs and Walters define a species as follows:
- *“A group of individuals of a taxon which are believed to interbreed with a high level of freedom under a specified set of conditions”.*
- *Benson states “A living natural species is a reproducing population or system of populations of genetically closely related individuals”.*
- Minor differences such as those of length of needle or colour of foliage, may give to certain individuals of a given species the status of a variety (*varietas*).

- A hybrid is a plant produced by crossing two species or geographical races within a species. Hybrids may be either natural or artificial. The symbol x is placed before the species name of hybrid plants.
- The population developed vegetatively from a single tree, the ortet is called clone.
- Cuttings root sprouts or scions are ramets.
- To bring order out of the chaos of the varietal names, there was published in 1958 the “International Code of Nomenclature for Cultivated Plants.”

# Nomenclature

- How trees acquire names is an interesting chapter not only in dendrology but also in social development of a people .
- The chief characteristics of trees usually influence the selection of their common names. For eg.:
- *Habitat*: Swamp white oak, sandbar willow, alpine fir, river birch, mountain hemlock.
- *Some distinctive feature*: Weeping willow, bigleaf maple, whitebark pine, bitternut hickory, cutleaf birch, quaking aspen, overcup oak.
- *Locality or region*: Pacific yew, Idaho white pine, southern red oak, Ohio buckeye.

- *Use:* Canoe birch, sugar maple, tanoak, paper-mulberry..
- *In Commemoration:* Nuttall oak, Engelmann spruce, Sargent cypress douglas fir .
- *Adaptation of names: (from other languages)* Chinkapin, hickory, arborvitae and frijolito.

- Note:

One may encounter two or more totally unrelated species with identical common names, as illustrated by the use of term larch.

Botanically the larches are a group of deciduous conifers belonging to the genus *Larix*. However lumbermen along the lower Columbia river apply the term larch to noble fir and in some instances even to pacific silver fir. Furthermore the lodgepole pine of the west may be called "*tamarack*" or "*larch*".



- Another example is the lumberman's use of the name "pine" .
- The only True pines belong to the genus *Pinus*.
- Finally common names are restricted in use to people of one language. For eg.: the *maple* in Spain is known as *acre*,  
in German : *Ahorn*  
in French : *erable*.

# Scientific Names

- It's necessary to have a universal system that can be used not only within the boundaries of a single country but throughout the world.
- This has been made possible by the use of Roman names many of which were first applied when this language was used by scientists of all countries. This practice has been continued; and even now not only technical names are written like that but also the initial descriptions of new Species. These are then followed by translations into whatever language is used by the journal in which the description appears.
- Scientific names have been in common use since the middle of the 18<sup>th</sup> century when Linnaeus published his monumental "*Species Plantarum*"(1753).

- In this book , *Linnaeus* gave the generic, or group name; the species designation, that usually consists of a short descriptive phrase; and finally in the otherwise blank margin of the page a single name set in *italic*.
- He called this the trivial name and used it as an indexing device.
- This practice is found to be very convenient and it gives a generic name followed by a species name for each plant, the combination constituting binomial nomenclature.
- The complete description for a tree/plant consists of three parts viz. a generic name, a specific name, full/abbreviated name of the person or persons responsible for the original published plant description.

- For eg: “*Quercus imbricaria* Michaux”

- *Quercus* : Generic/ Group Name
- *Imbricaria*: is the specific or species name
- Michaux : The person who named and described the tree.

Generic names always appear first and are always capitalized ;  
while specific names begin with small letters.

In common practice, the authors name is omitted except in scientific writing, where it's used at least once when a species is first mentioned, to dispel any doubts as to its identity.

- The use of scientific names and the coinage of new ones are governed by a botanical code of nomenclature.
- The first code of this sort was outlined at the Paris International Botanical Congress in 1867 and provided:
  - That a plant could have but 1 valid scientific name
  - That the name should be the oldest usable one beginning with Linnaeus "Species Plantarum" (1753).
  - That 2 different species or two different genera could not bear the same name
  - That the generic and specific combinations should be succeeded by the name/names of their authors.

- 40 years later in 1905, the 3rd International Botanical Congress was held in Vienna, Austria.
- It was generally agreed that the Paris Code had been satisfactory, and with a few minor changes it was readopted for permanent use.
- At this congress a group of American taxonomists submitted a code that was rejected by the general assembly in favor of revised Paris Code now commonly known as Vienna code.
- Both the Vienna and American codes were used in the USA for a number of years.
- Students should consult the latest copy of the International Code of Botanical Nomenclature .

- “This code aims at the provision of a stable method of naming taxonomic groups, avoiding and rejecting the use of names that may cause error or ambiguity or throw science into confusion”.
- In view of the above quotation and “the rule of priority” that the oldest “usable” name must be applied, it would seem that scientific names should be unchanging, and for the most part they are.

# Identification

- **Leaves:**

General Features: Leaves are temporary organs which are concerned chiefly with the manufacture of plant food, respiration and transpiration. Since they display certain characteristic patterns, they are of considerable value in taxonomy.

The expanded portion of the leaf is the lamina, or blade and the stem or supporting stalk is the petiole.

The petioles of certain leaves are swollen at the base and encloses the next season's bud. In some cases the petiole is missing and the blade is attached directly to the twig; such leaves are said to be sessile.



- **Leaf arrangement (phyllotaxy) :**

Upon careful observation of normal twigs, it was noted that leaves are usually arranged in 1 of 3 definite ways:

(i ) If they are paired at the same height , one on each side of the twig, they are opposite.

(ii ) when more than 2 are found at the same node, they are whorled or verticillate

(iii) when only 1 leaf is attached to each node , close inspection will show that the leaves are attached in spirals about the twig and are in this case alternate.