



Plant Identification

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Today's Agenda

- History of Plant Taxonomy
- Plant Classification
- Scientific Names
- Leaf and Flower Characteristics
- Dichotomous Keys



What do you gain from identifying plants? Why is it important?

- Common disease and insect problems
- Cultural requirements
- Plant habit
- Propagation methods
- Use for food and medicine



Looking at plants more closely

- How do plants relate to each other? How are they grouped?



Plant Classification

Group each plant into a specific category

Maple	Spiraea
Viburnum	Crabapple
Apple tree	Ash
Daylily	Geranium
Tomato	Poinsettia
Oak	Pepper
Weeping willow	Mint
Petunia	Euonymus

Plant Classification

Group each plant into a specific category

Maple	Spiraea	TREES
Viburnum	Crabapple	
Apple tree	Ash	
Daylily	Geranium	
Tomato	Poinsettia	
Oak	Pepper	
Weeping willow	Mint	
Petunia	Euonymus	

Plant Classification

Group each plant into a specific category

- | | | |
|----------------|------------|--|
| Maple | Spiraea | Ornamental
Flowering
Plants |
| Viburnum | Crabapple | |
| Apple tree | Ash | |
| Daylily | Geranium | |
| Tomato | Poinsettia | |
| Oak | Pepper | |
| Weeping willow | Mint | |
| Petunia | Euonymus | |

Plant Classification

Group each plant into a specific category

- | | | |
|----------------|------------|-------------------------|
| Maple | Spiraea | Edible
Crops |
| Viburnum | Crabapple | |
| Apple tree | Ash | |
| Daylily | Geranium | |
| Tomato | Poinsettia | |
| Oak | Pepper | |
| Weeping willow | Mint | |
| Petunia | Euonymus | |

Plant Taxonomy

- Identifying, classifying and assigning scientific names to plants
- Historical botanists trace the start of taxonomy to one of Aristotle's students, Theophrastus (372-287 B.C.), but he didn't create a scientific system
- He relied on the common groupings of folklore combined with growth: tree, shrub, undershrub or herb
- Detected the process of germination and realized the importance of climate and soil to plants
- Then, along came Linnaeus...



Carolus Linnaeus

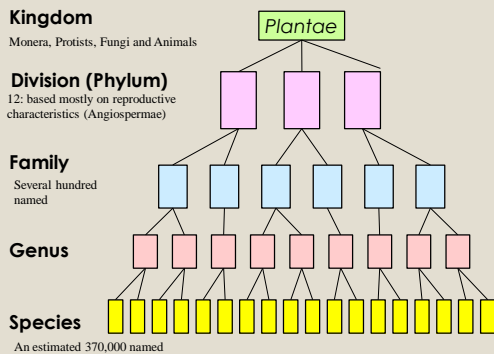
The Father of Taxonomy

- Swedish botanist
- Developed binomial nomenclature
- Cataloged plants based on natural relationships—primarily flower structures (male and female sexual organs)
- Published Species Naturae in 1735 and Species Plantarum in 1753



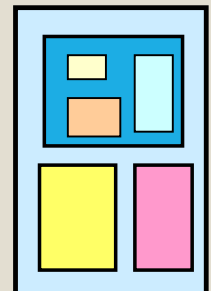
Photo: University of California at Berkeley

Plant Classification Pyramid



Generally Accepted Classification Units for horticulturists and gardeners

- Family
- Genus
- Species

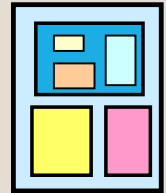


Family

- Group of closely related genera
 - Similar structure and appearance
 - Seed pod/fruit
 - Flower parts
 - Leaf arrangement
- Plants are classified based mainly on these characters
- Cultural practices (i.e., the care of the plant) generally follows family lines

Family names end in “aceae”

- **Caprifoliaceae** – Honeysuckle family including Honeysuckle, Snowberry, Weigela
- **Fabaceae** – Pea family including clover, Locust, mimosa, lupine and vetch
- **Oleaceae** – Olive family including Ash, Forsythia, and Privet



Remember our friend, Carl?

- Linnaeus simplified scientific names by designating one Latin name to indicate the genus, and one as a "shorthand" name for the specific epithet

Binomial nomenclature!

What's with the Latin?

When Linnaeus published his first books

- Latin was the language of science in Western Europe
- He followed this trend using Latin and Greek names

● Spelling is universal, worldwide

- Pronunciation depends on local language and dialect



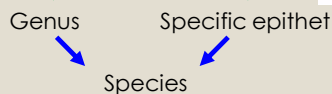
Scientific Names: Binomial Nomenclature

- The names are composed of two parts

1. Genus
2. Specific epithet

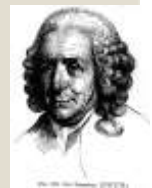
Family: Bignoniaceae

Catalpa speciosa
Western Catalpa



Scientific Names: Binomial Nomenclature

- Species: the basis of the binomial system of nomenclature
- a difficult word to define, a population of individuals within a genus that are capable of interbreeding freely with one another



Genus and Species



Equus ferus caballus – 64 chromosomes



Equus africanus asinus – 62 chromosomes

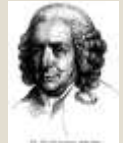


Mules *Equus asinus* x *Equus caballus* – 63 chromosomes – sterile

The specific epithet can give us hints plant about the plant:

- Specific epithet: the second word in a scientific plant name, not capitalized and usually an adjective used to describe size, color, leaf shape, growth habit, origin of the plant or to commemorate a person.

- *Cotoneaster horizontalis*
- *Coreopsis gigantea*
- *Clerodendrum thomsoniae*
- *Godetia grandiflora*
- *Cistus x purpureus*
- *Chionanthus virginicus*



Scientific Names: Binomial Nomenclature

- **Correct spelling**
 - Genus and specific epithet names are always underlined or in *italics*.
 - Genus is capitalized
 - Specific epithet is not capitalized

Fraxinus americana



Participation question

Which name is written correctly?

Red maple:

1. *Acer rubrum*
2. *Acer Rubrum*
3. acer rubrum
4. Acer rubrum



Participation question

Which name is written correctly?

Red maple:

1. *Acer rubrum*



Scientific Names: Binomial Nomenclature

'sp.' = species (singular) > Do not italicize or underline.
'spp.' = species (plural)

For example

- ***Prunus sp.*** – Refers to a definite plant in the *Prunus* genera of unidentified species.
- ***Prunus spp.*** – Refers to all of the species in the *Prunus* genus.

Plant species can be divided more specifically into:

- cultivar
- variety
- Hybrid



Subspecies Taxa

Cultivar

- "Cultivated variety" or horticultural variety
- plants within a species that have been selected especially for a particular characteristic and are propagated, usually asexually to continue this trait (growth habit, flower, fruitless)

Variety

botanical or wild variety, a group of plants intermediate between species and forma and usually associated with inheritable differences. They are recognized as distinct populations breeding true to type

Hybrid

- two closely related but distinct species will interbreed to form a hybrid. Are often sterile and produce no seed or fruit

Subspecies taxa

Cultivar – plant group from a cultivated variety. Written in plain text, capitalized and set off by single quotes, e.g.

- *Viburnum opulus* 'Roseum' or *Viburnum opulus* cv. Roseum

Variety – plant group found in nature

- *Buxus microphylla* var. *japonica*
- Japanese Boxwood

Hybrid – Cross between *A. rubrum* and *A. saccharinum*

- *Acer x freemanii* 'Jeffersred'
- The "X" also denotes it is a hybrid (a cross between different species)
- Often sterile and not producing fruit

Sometimes the cultivar (in single quotes) is not what the registered trade name is

- *Acer x freemanii* 'Jeffersred' is also the Autumn Blaze® maple
- *Pyrus calleryana* 'Glen's Form' is Chanticleer® Callery pear



Participation question

Which name is written correctly?

Furman' s Red Sage

- Salvia greggii*
'Furman' s Red'
- Salvia greggii*
'Furman' s Red'
- Salvia Greggii
Furman' s Red



Participation question

Which name is written correctly?

Furman' s Red Sage

- Salvia greggii*
'Furman' s Red'
- Salvia greggii*
'Furman' s Red'
- Salvia Greggii
Furman' s Red



Scientific Names: Binomial Nomenclature

- **Authority** – person who first identified the species
 - *Acer palmatum* Thunberg
 - *Acer palmatum* T.
 - Japanese Maple
 - *Solanum tuberosum* Linnaeus
 - *Solanum tuberosum* L.
 - Irish potato



What's wrong with Common Names? They don't always identify the plant



Liriodendron tulipifera

- Tuliptree in the north
- Yellow Poplar in the south

Carpinus caroliniana

- American Hornbeam
- Blue Beach
- Musclemwood
- Water Beech
- Ironwood

Nymphaea alba

- European White Waterlily
- 15 common English names
- 44 common French names
- 105 common German names
- 81 common Dutch names

Also Consider.....

- Common names not universal
- Many different plants are given same common name
- Many species do not have common names

Common Names: Rules for Writing

- While a constant source of confusion, they are often used
- For writing, all common names are usually in lower case letters
 - sugar maple
 - barberry
 - dogwood
 - ginkgo
- Unless there is a proper name in the common name or you're naming a specific cultivar...
 - Japanese maple
 - Russian olive
 - 'Autumn Purple' white ash
 - Chanticleer® pear

Many Latin names are now “generic” common names.

- **Anemone**
- **Rhododendron**
- **Crocus**
- **Viburnum**



Plant Name Changes



- Happens occasionally because:
 - Can be changes in International Code of Botanical Nomenclature
 - Book which has rules and guidelines for naming plants – ex. The nomenclature of taxonomic groups is based on the priority of publication
 - Advances in technology have changed our knowledge of plant relationships, ex. Using molecular techniques
 - Botanists disagree on placement of plants
 - Ex. lumpers vs. splitters

Plant Name Changes

- The Genus *Aster* used to contain hundreds of species in North America and Eurasia
- Morphologic and molecular research determined the species should be split
- Now there are 180 species in the genus, all except one are all in Eurasia
 - *Almutaster*
 - *Ampelaster*
 - *Canadanthus*
 - *Doellingeria*
 - *Eucephalus*
 - *eurbia*

Ionactis
Ocelmena
Oreostemma
Seriocarpus
Symphotrichum

Quick Review....

- Let's review some plant ID concepts
 - Leaf Arrangement
 - Leaf Shape
 - Simple vs. compound
 - Flower parts
 - Flower characteristics
 - Fruit types

Leaf arrangement, a tool for plant ID

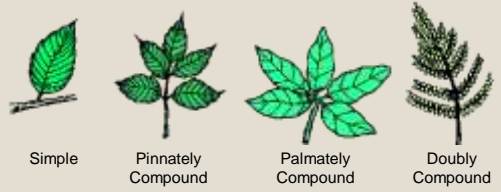
On stem



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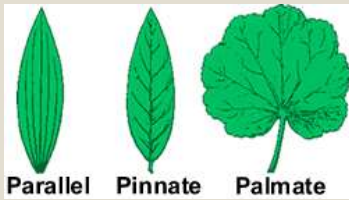
Leaf arrangement, a tool for plant ID

Leaflets



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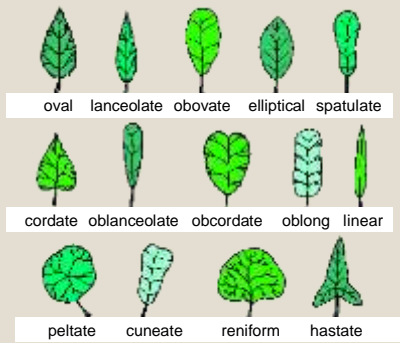
Leaf venation, a tool for plant ID



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Leaf shape, a tool for plant ID

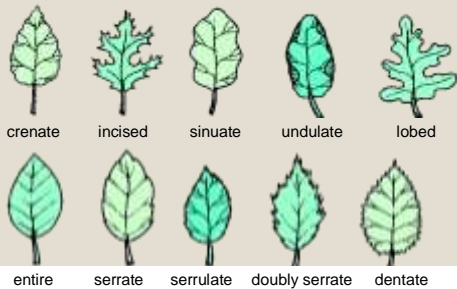
Overall shape



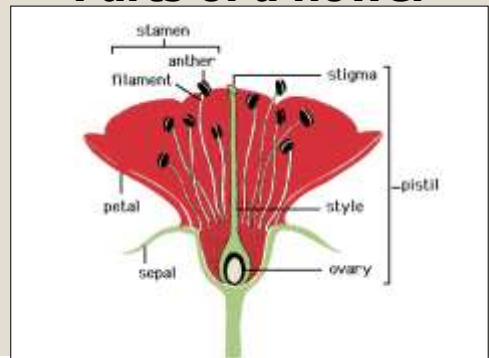
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Leaf shape, a tool for plant ID

Margin shape



Parts of a flower



Imperfect flowers



Hazelnut

Monoecious = "one house":
male and female flowers
on the same plant

Willow



male



female

Dioecious = "two
houses": male and
female flowers on
different plants

Numerical plan



Flowers 3-merous
(monocots)



Flowers 4- or 5-merous
(eudicots)

Floral symmetry



Radial (actinomorphic)



Bilateral (zygomorphic)

Corolla



Petals separate



Petals fused:
corolla is **sympetalous**
(if the sepals are fused, the calyx
is **synsepalous**)

Stamens



Monadelphous:
filaments united

Epipetalous:
upon the petals

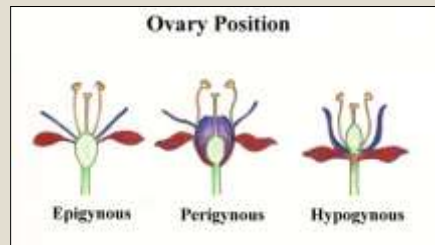


Tetradynamous 4+2



Didynamous: 2+2

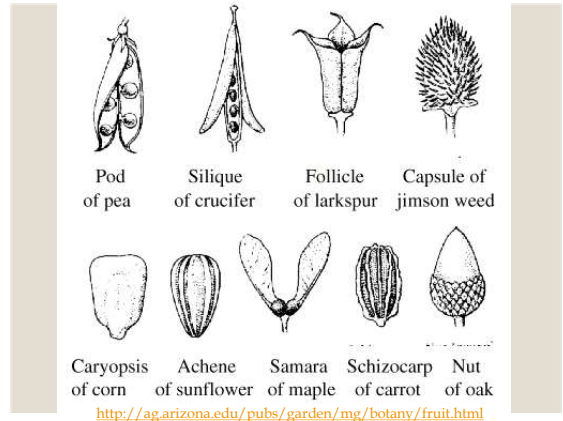
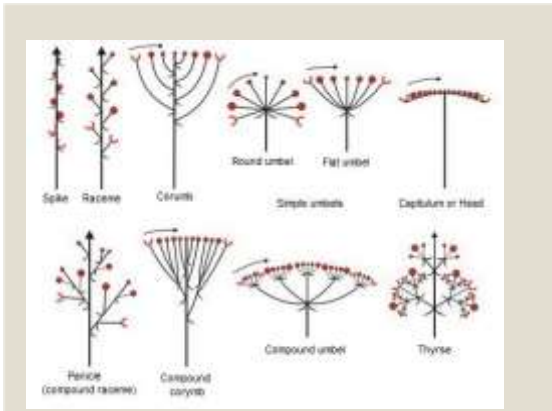
Ovary Position



Inferior ovary

Superior ovary

http://www.puc.edu/Faculty/Gilbert_Muth/art0021.jpg



Monocots

- About 20% of all flowering plants
- Most are orchids, grasses, sedges and palms

Eudicots

- 70% of angiosperms

Identify monocot or eudicot

Vascular bundle Leaf venation Flower parts Cotyledons

Monocot

- random
- parallel
- 3's
- 1

Eudicots

- outer circle
- palmate, pinnate
- 5's
- 2

woody non-woody

Examples of Woody Eudicot Families

- Aceraceae- maple family – includes maples and boxelder
 - Opposite leaves
 - Fruit a double samara
- Ericaceae- heath family- includes rhododendron, pieris, salal
 - Evergreen trees and shrubs
 - Flowers bell or urn-shaped
- Roseaceae- rose family – includes cotoneaster, rose and ~250 landscape plants
 - Many stamens
 - Leaves often stipulate
 - Stems often with thorns or prickles

Examples of Herbaceous Monocot and Eudicot Families

- Liliaceae- Lily family – includes asparagus, hosta, tulips
 - Ovary superior
 - Flowers 3-merous
 - Sepals petaloid
- Lamiaceae- Mint family- includes many herbs, bee balm
 - Square stems
 - Leaves opposite
 - Bilateral symmetry for flowers
- Asteraceae- aster family – includes daisies, sunflower, dandelion
 - Inflorescence a head
 - Ovary inferior
 - Fruit an achene



Plant Keys

Dichotomous

- 1a ---- (2)
 1b ---- (4)
 2a ---- (answer)
 2b ---- (3)
 3a ---- (answer)
 3b ---- (answer)
 4a ---- (answer)
 4b ---- (5)

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Using a dichotomous key

- A key is **dichotomous** if you must make a choice between two mutually exclusive statements (**leads**).
- Each set of leads is a **couplet**.
- Each statement in a couplet **leads** to another couplet and, eventually, to a **taxon** (e.g. family, genus, species)

- 1a ---- (2)
 1b ---- (4)
 2a ---- (answer)
 2b ---- (3)
 3a ---- (answer)
 3b ---- (answer)
 4a ---- (answer)
 4b ---- (5)

Example: a dichotomous key to five taxa (A-E)

- 1a. Flowers red A
 2a. Ovary superior B
 2b. Ovary inferior
 1b. Flowers white or yellow
 3a. Leaves simple C
 4a. Petals distinct D
 4b. Petals fused E
 3b. Leaves compound



Key to Conifers

- 1 a) Leaves needle-like (3)
 1 b) Leaves flattened and scale-like (2)



Key to Conifers

- 1 a) Leaves needle-like (3)
 1 b) Leaves flattened and scale-like (2)



Key to Conifers

- 3 a) Needles Clustered (4)
- 3 b) Needles not clustered (5)



Key to Conifers

- 3 a) Needles Clustered (4)
- 3 b) Needles not clustered (5)



Key to Conifers

- 4 a) Clusters of 2-5 needles...Pine
- 4 b) Clusters greater than 10 (6)



Key to Conifers

- 4 a) Clusters of 2-5 needles...Pine
- 4 b) Clusters greater than 10 (6)



Discussion...

What kind of information do you need for plant identification?

Why is plant ID so important for the diagnostic process?



Before you start the ID process

◦ **Collect information by observation or questions**

- Does client know what it is?
 - May need to confirm
- ✓ Deciduous vs. Evergreen
- ✓ Growth habit
- ✓ Shape and height
- ✓ Any other distinctive characteristics
 - ✓ Flower color, time of year
 - ✓ Leaf shape, size, color
 - ✓ Bark characteristics

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Bring in branch sample or send photos



Not over the phone

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Tools used for plant identification

- Senses
- Plant samples
- Hand lens
- Ruler
- Sharp blade
- Dissecting scope
- Reference materials and keys



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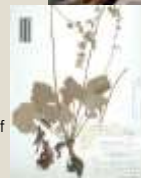
Integrated Approach to Plant Identification

- Visual inspection of plant characteristics
- Photographic references
- Plant classification keys
- Expert advice



Herbaria

- Collection of plant specimens
- Pressed plants mounted on paper with collection info
- Used for cataloging and identifying plants in an area
- Historical record of plants in an area
- Essential for the study of plant taxonomy
- Samples often used as a source of DNA for molecular studies



An Amazing Resource



◦ <https://landscapeplants.oregonstate.edu>

An Amazing Resource



◦ <https://landscapeplants.oregonstate.edu>

If All Else Fails....



Technical terminology

- **Look up meaning, as needed**
- Don't memorize terms

Reference

- **Plant Identification Terminology: An Illustrated Glossary** by James Harris



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Resources

- Manual of Woody Landscape Plants – Michael Dirr
- Dirr's Hardy Trees and Shrubs – Michael Dirr
- Manual of Herbaceous Ornamental Plants – Steven Still
- Trees to Know in Oregon – Edward C. Jensen, EC 1450
- Shrubs to Know in Pacific Northwest Forests – Edward C. Jensen, EC 1640
- Botany in A Day – Thomas J. Elpel



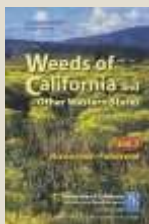
Resources

- The Shrub Identification Book – George Symonds
- The Tree Identification Book – George Symonds
- Trees of North America and Europe – Roger Phillips
- A-Z Encyclopedia of Garden Plants – Christopher Brickell
- Sunset Western Garden Book



Weed Identification

- Weeds of the West – T. Whitson
- Weeds of California – UC Publication



Resources

- Oregon Flora Project



What questions
do you have about
scientific names,
plant classification
or identifying
plants?



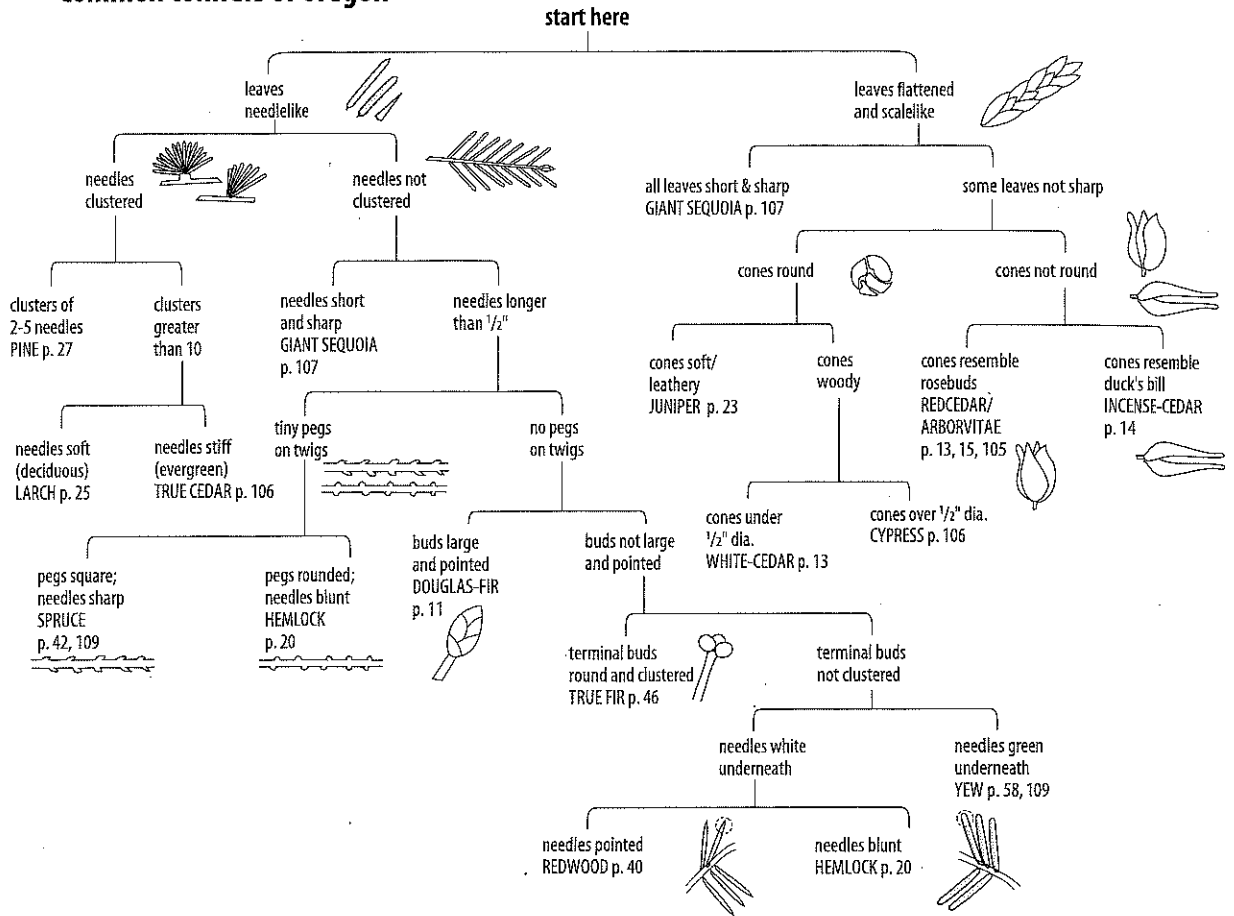
Plant Identification Activity



To Use This Key

1. Start at the top of the key. Then read each of the two statements directly below the starting point.
2. Decide which of the two statements better describes the plant you're trying to identify. Then read the two statements directly under that box.
3. Continue this process until you've identified a single group of trees (called a genus). Then turn to the page indicated and read the descriptions of individual species contained within that genus (there may be only one, or there may be several).
4. If the species description matches the plant you're trying to identify—GREAT! If it doesn't match, go back to the beginning of the key and try again.

Common conifers of Oregon



From: Trees to Know in Oregon
OSU Extension Service