Pine Trees (The Genus *Pinus*)

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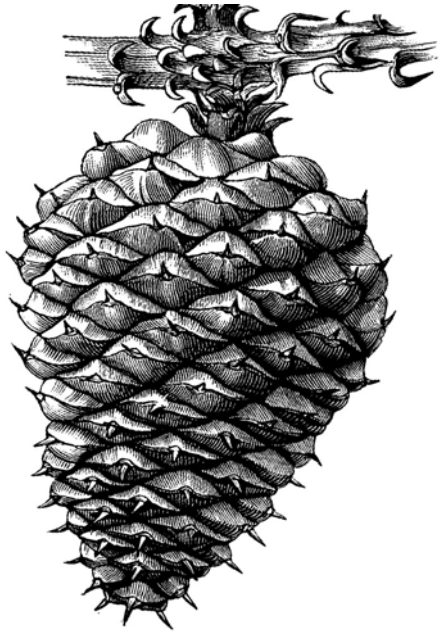


- ~100 species (all but 1 restricted to Northern Hemisphere)
- 42 native to the United States
- 18 native to California
- ~8 species widely cultivated in California

Economic Importance of Pines

- The most economically significant tree genus in the world
- Widely used as lumber, paper pulp, resins, turpentine, and pharmaceuticals, landscaping
- Several pines have become invasive weeds, especially Monterey Pine (*Pinus radiata*)
- Pine "nuts" are important food sources for wildlife and are sold commercial (mostly *Pinus pinea*)

PINACEAE PINE FAMILY

J. Robert Haller & Nancy J. Vivrette

Shrub, tree, evergreen; monoecious. **ST**: young crown conic; twig not grooved, resinous, gen persistent. **LF**: simple, gen alternate, sometimes in bundles or appearing ± 2-ranked, linear or awl-like; base decurrent, woody or not, persistent several yrs. **POLLEN CONE**: gen < 6 cm, not woody, deciduous. **SEED CONE**: gen woody; bracts, scales gen persistent; scale not peltate, fused to or free from subtending bract. **SEED**: 2, on scale base adaxially. 10 genera, 193 spp.: gen n hemisphere; many of great commercial value, supplying > 1/2 of world's timber. Scientific Editors: Thomas J. Rosatti, Bruce G. Baldwin.

1 Lvs in bundles of (1)2–5 (gen 1 in *Pinus monophylla*, but then ± round in section, vs lvs ± flat under 1'), gen 2.5–35 cm, base in scaly sheath; seed cone bract fused to scale at least basally, incl, inconspicuous . . . . . **PINUS**

1′ Lvs not in bundles, 0.5–9 cm, base not in scaly sheath; seed cone bract gen ± free from scale (± fused in *Abies*), exserted or incl, conspicuous

2. Twig without persistent, peg-like lf bases; seed cone erect, scales, bracts deciduous, axis persistent on st, ultimately falling . . . . . **ABIES**

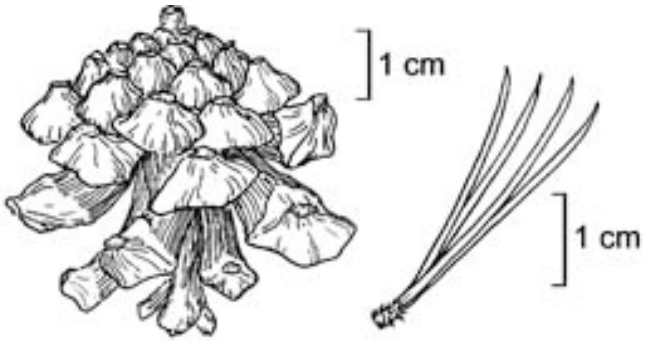
2′ Twig with or without persistent, peg-like lf bases; seed cone pendent, scales, bracts, axis persistent on st, ultimately falling as unit

3. Twig without persistent, peg-like lf bases; seed cone 4–20 cm, bracts exserted, 3-toothed or -lobed . . . . . **PSEUDOTSUGA**

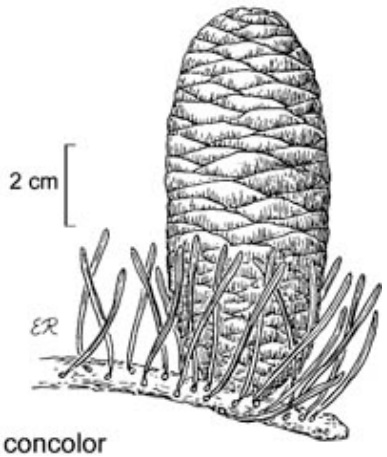
3′ Twig with persistent, peg-like lf bases; seed cone 1.2–12 cm, bracts incl, entire or fringed

4. Lf tip blunt to acute, persistent base spreading, peg-like; seed cone 5–12 cm . . . . . **PICEA**

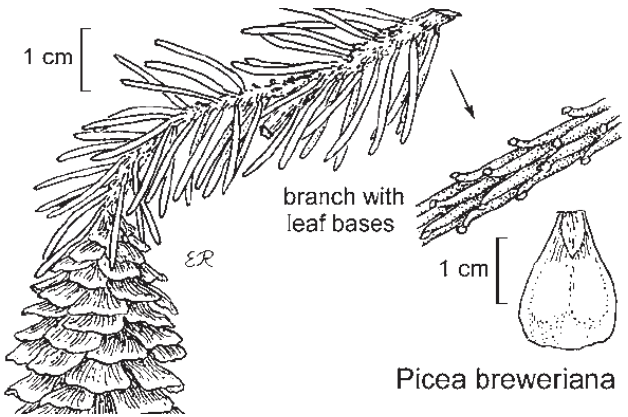
4′ Lf tip gen blunt, persistent base ascending, wedge or scale-like; seed cone 1.2–7.5 cm . . . . . **TSUGA**



Pinus quadrifolia



Abies concolor



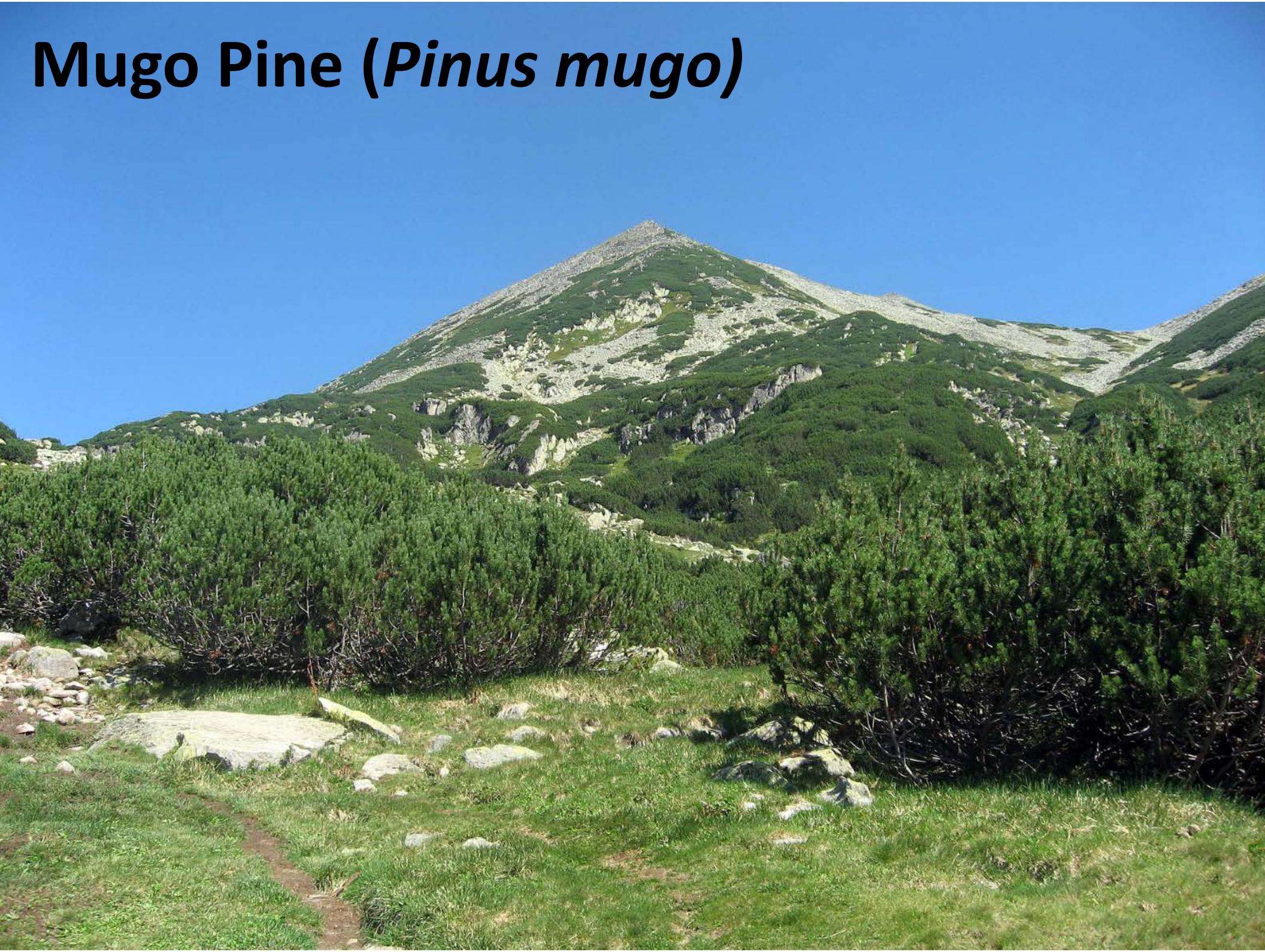
Picea breweriana

Pine Growth Form

- Very large trees to large shrubs

Sugar Pine (*Pinus lambertiana*)

Mugo Pine (*Pinus mugo)*

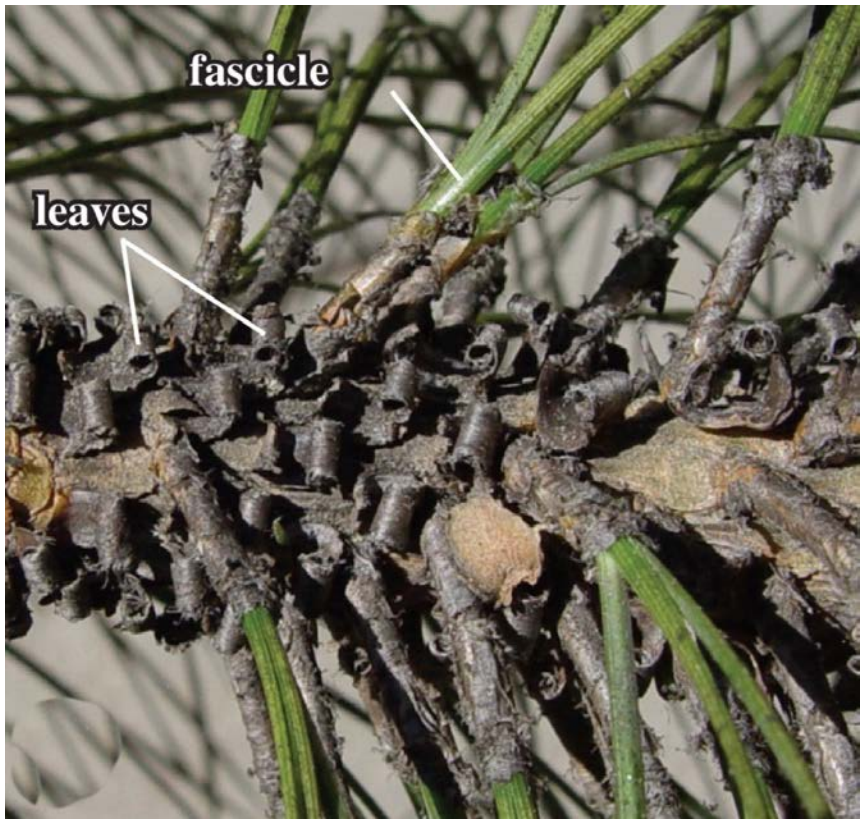


Pine Leaves

- Leaves of two kinds: primary scales and secondary needles
- Primary leaves of pines are membranous scales
- Needle leaves are produced by determinate short shoots (fascicles)
- Each bundle (fascicle) of needles is surrounded by membranous bud scales

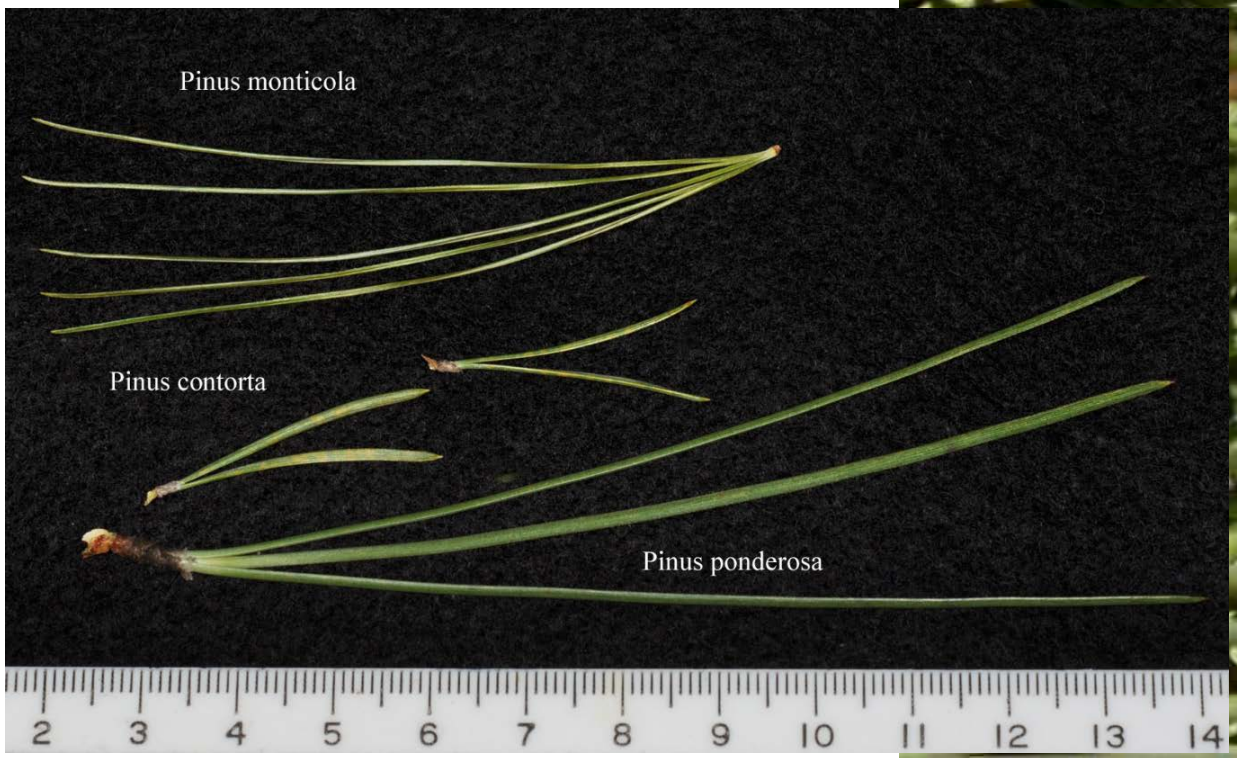
Pine Morphology

- In some pines the membranous bud scales are deciduous (white pines Subgenus: *Strobilus*) in others they are persistent (yellow pines, Subgenus: *Pinus*)
- Lines of stomata



Pine Morphology

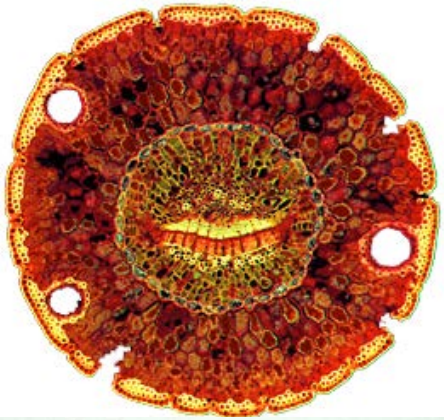
- Needles are in bundles of 1 to 5 depending on species
  - Persist for several years (sometimes decades)

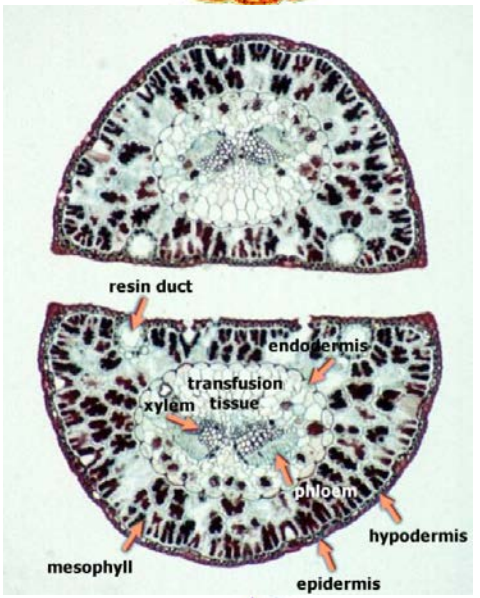


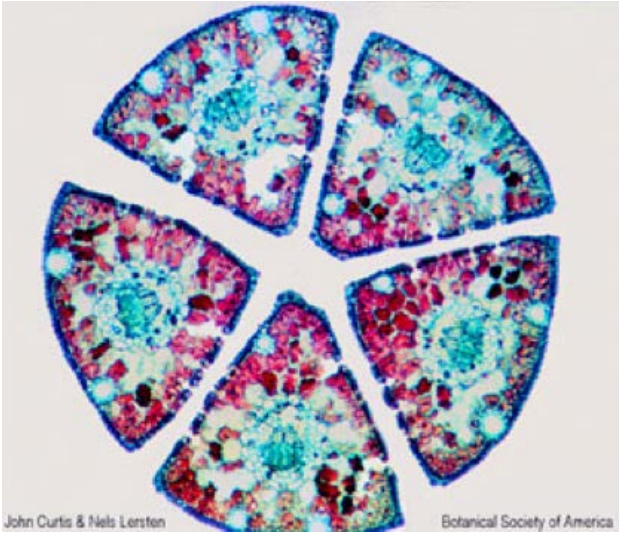
Pinus monophylla **(pinyon pine)**

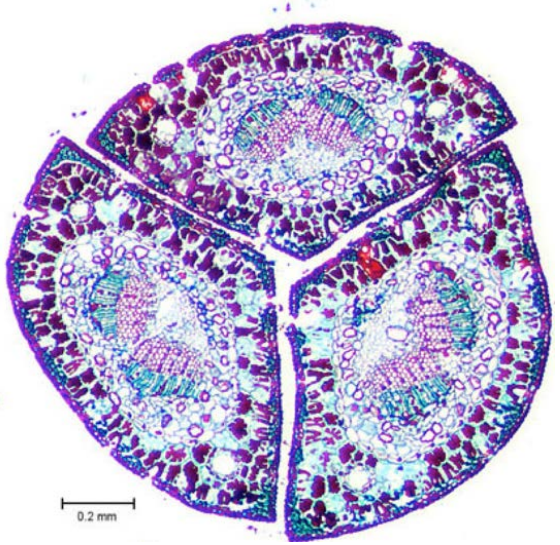
Pine Needles

- The bundle (fascicle) is round in cross-section
  - One-needle pinyon pine has cylindrical leaves
  - Lodgepole pine 2-needled fascicles with each needle a semicircle in cross section.
  - Ponderosa pine (3 needles per fascicle) are broadly wedge-shaped and the five needles of sugar pine are more narrowly wedge-shaped.

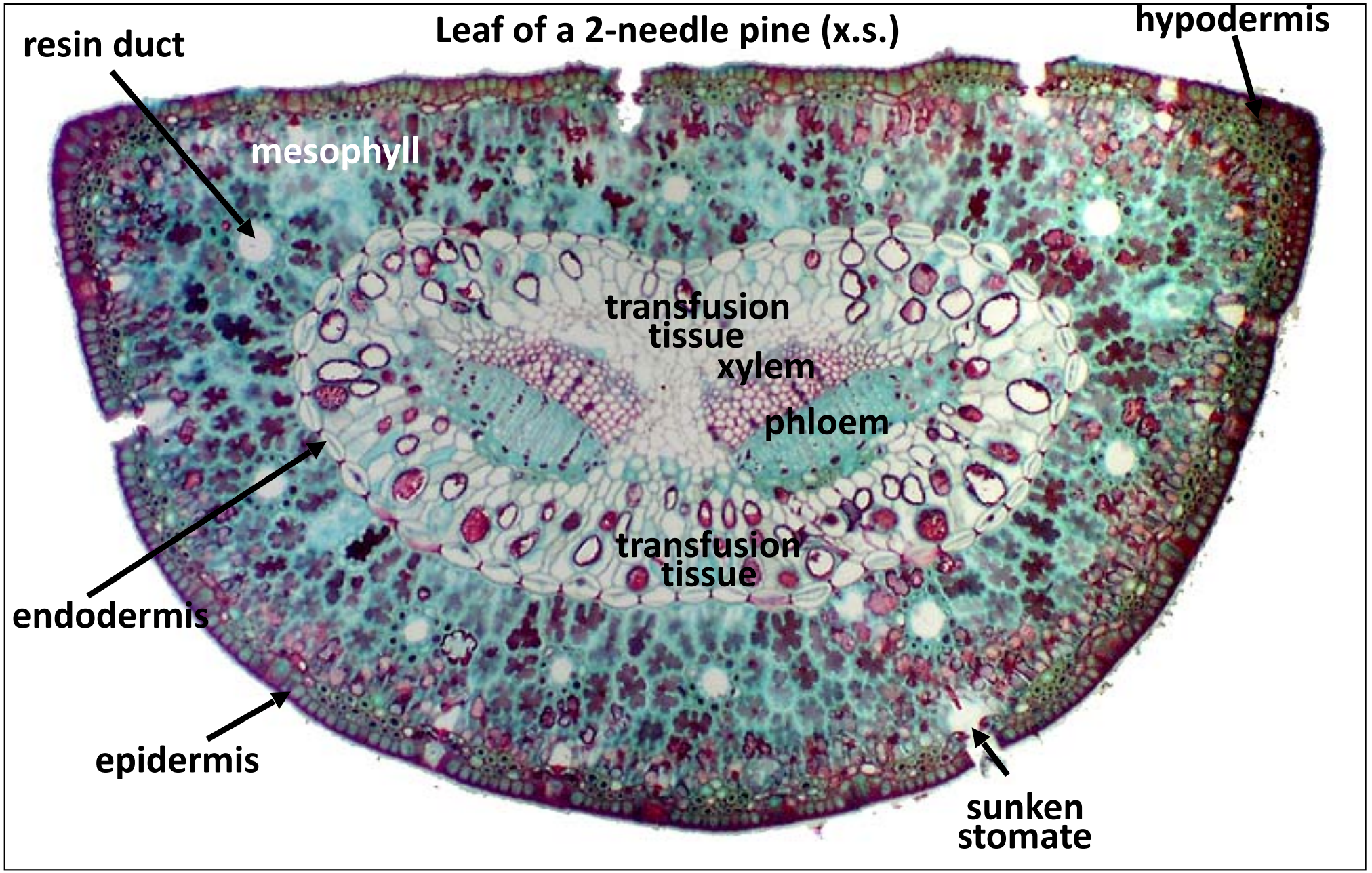








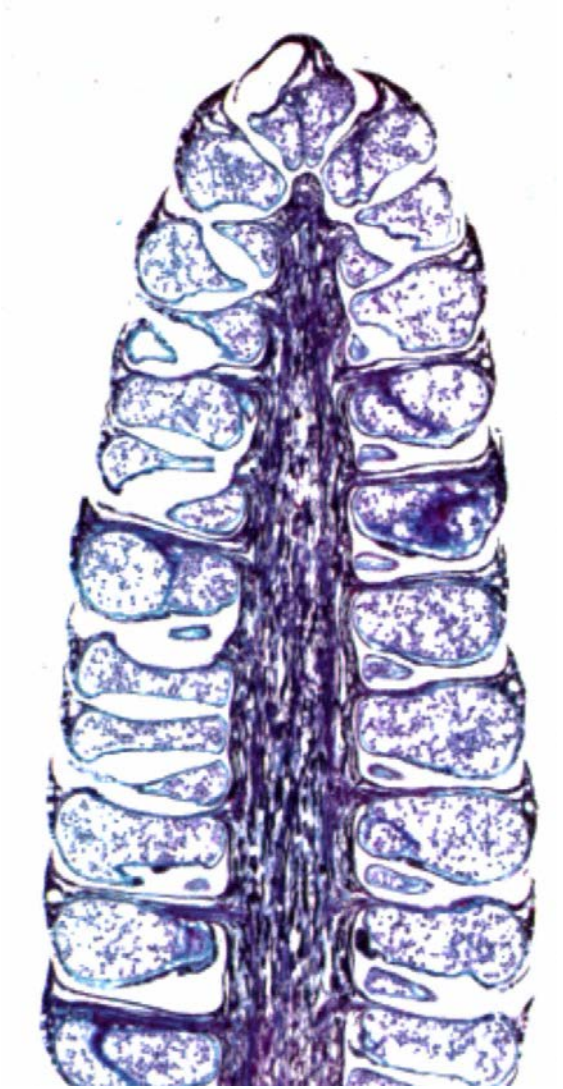
Pine Needle Anatomy

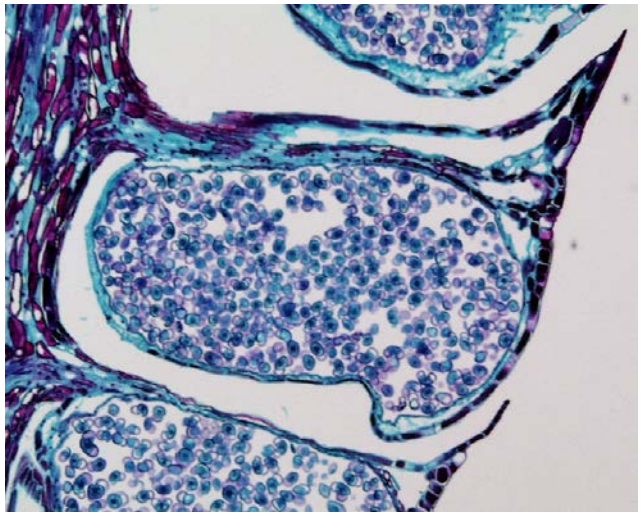


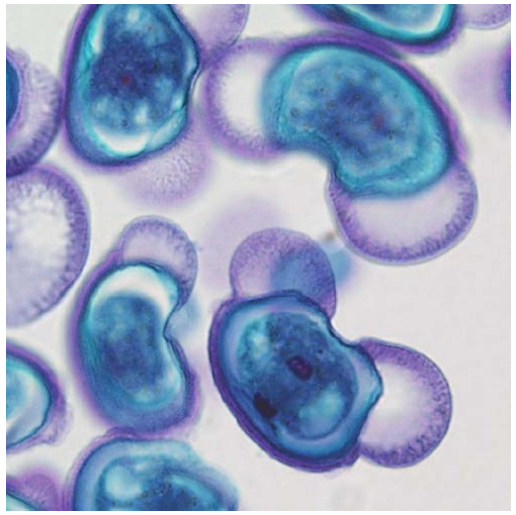
Pine Reproduction

- Monoecious— individual trees produce both male and female cones
- Pollen is produced by small, ephemeral male cones (wind dispersed)
- Seeds are produced in larger female cones (often winged)

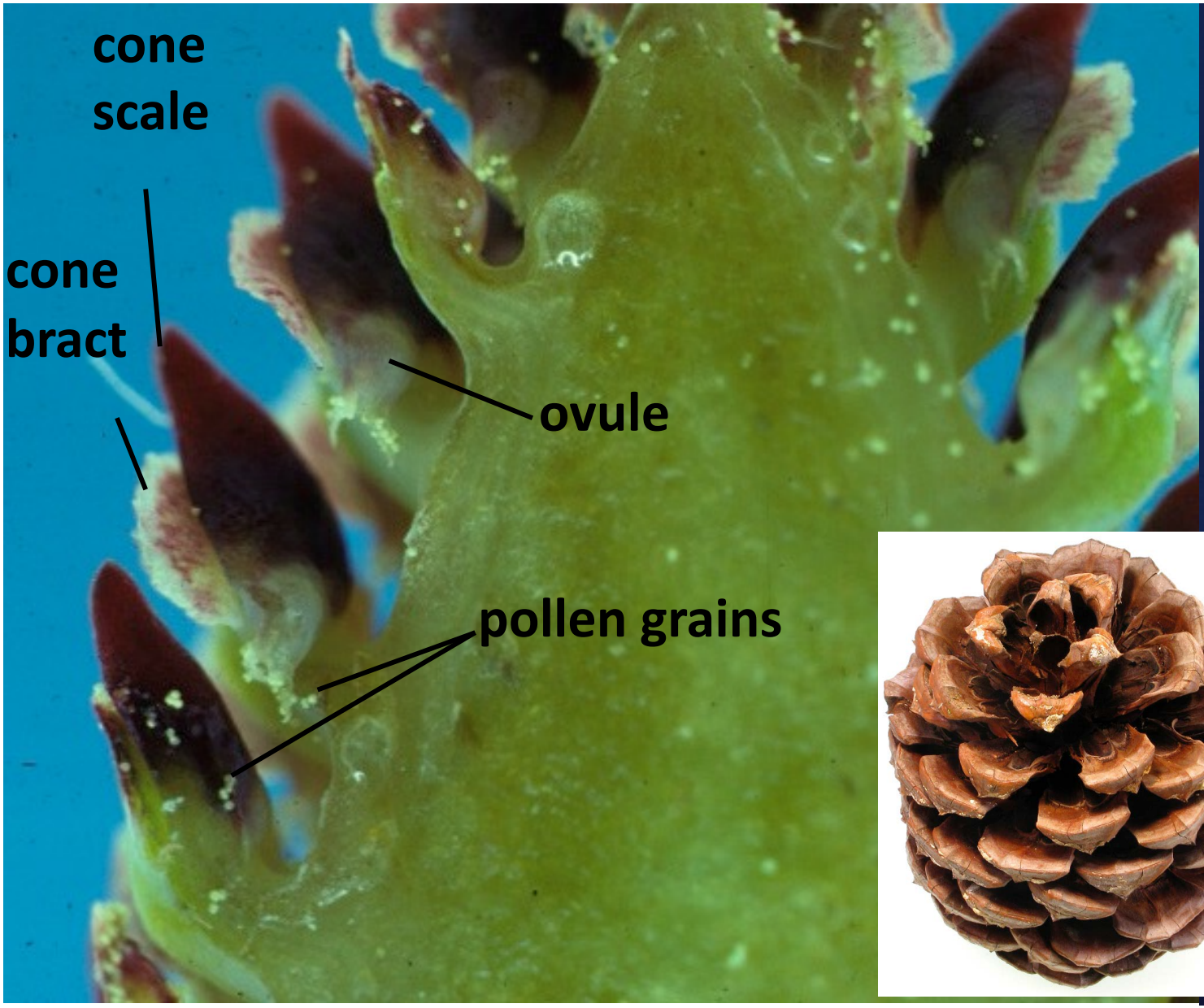

Pollen Cones







Female cones at time of pollination

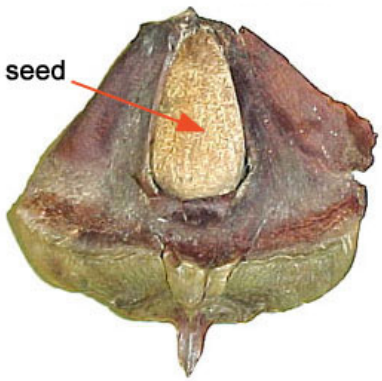


Female Pine Cones

- Female cones mature in two years
- Cone scales - persistent, woody, may have a prickle (umbo)

Pine Seeds

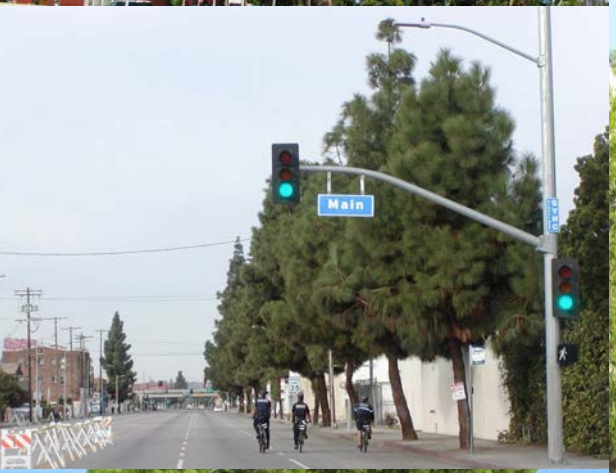
- Two seeds are on each cone scale
- Seeds have a membranous wing usually several times longer than the seed



Araucaria bidwillii
(Bunya-Bunya)

Pinus coulteri
(Coulter Pine)

Commonly Cultivated Pines



Torrey Pine (*Pinus torreyana*)

- 5 needles

Torrey Pine (*Pinus torreyana*)

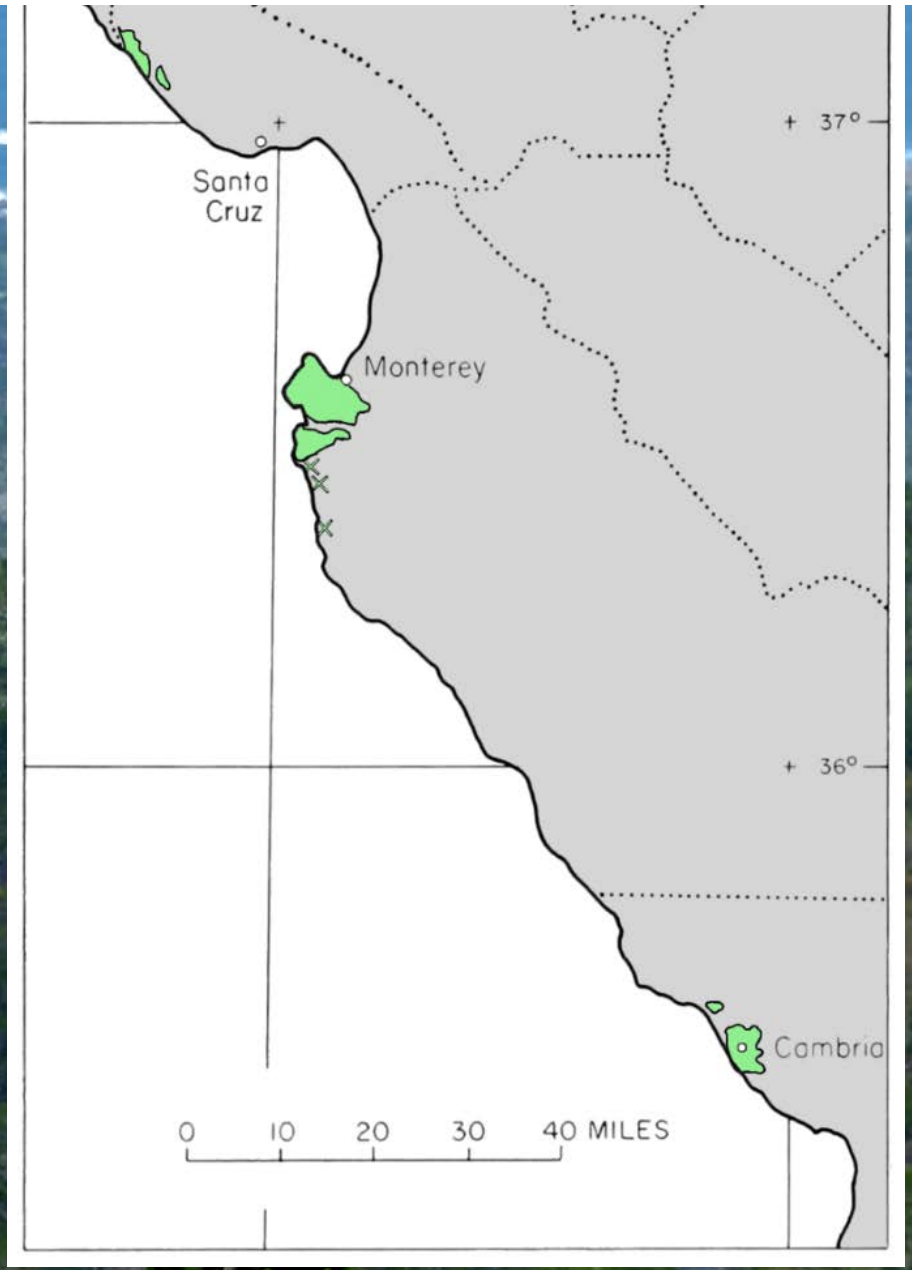
Canary Island Pine (*Pinus canariensis)*

- 3 needle

Monterey Pine (*Pinus radiata)*

- 3 needles

Monterey Pine (*Pinus radiata*)



Italian Stone Pine (*Pinus pinea)*

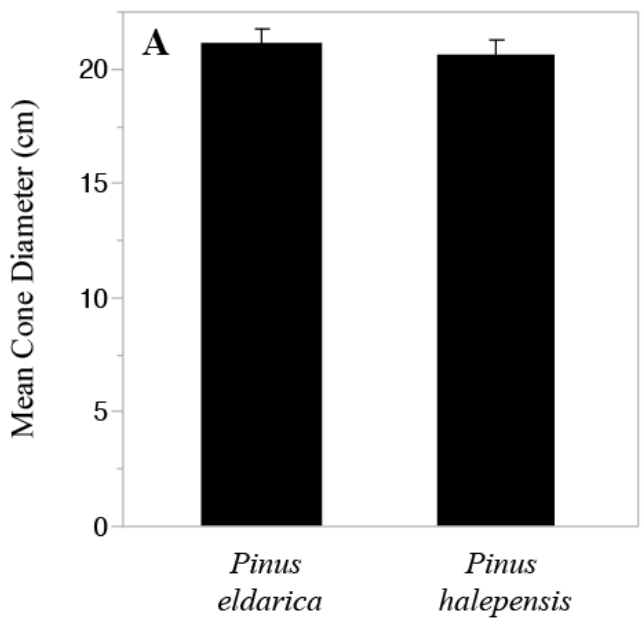
- 2 needles

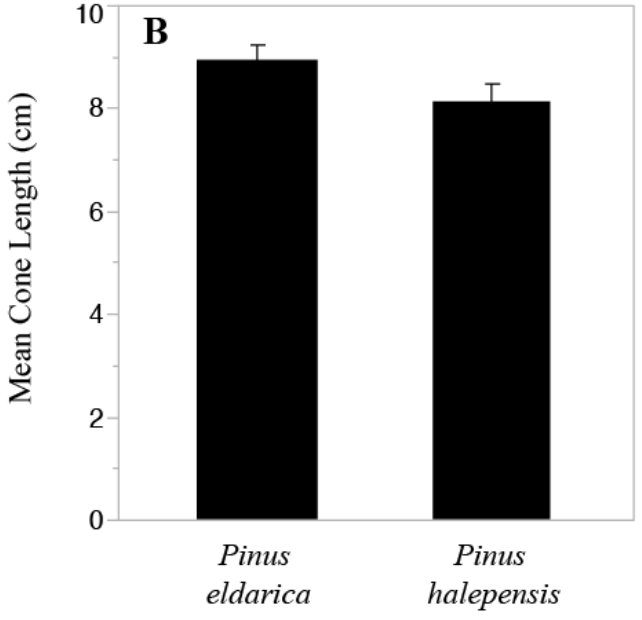

Pinus halepensis - Pinus brutia - Pinus eldarica
Aleppo Pine, Mondell Pine, Afghan Pine

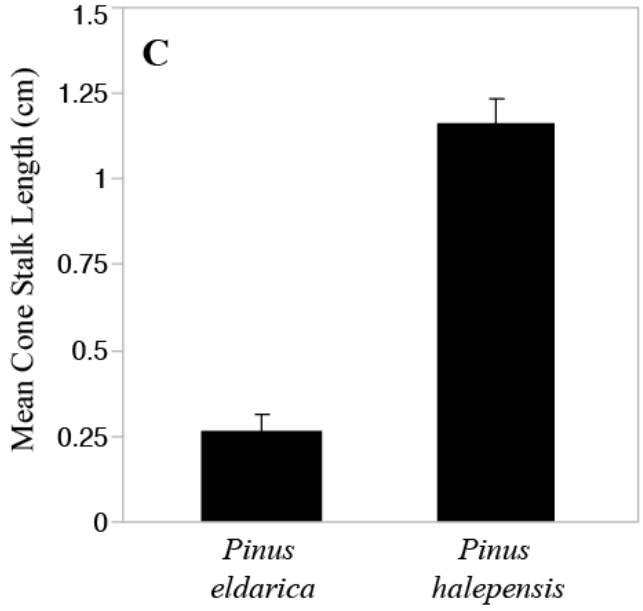
Characters Measured

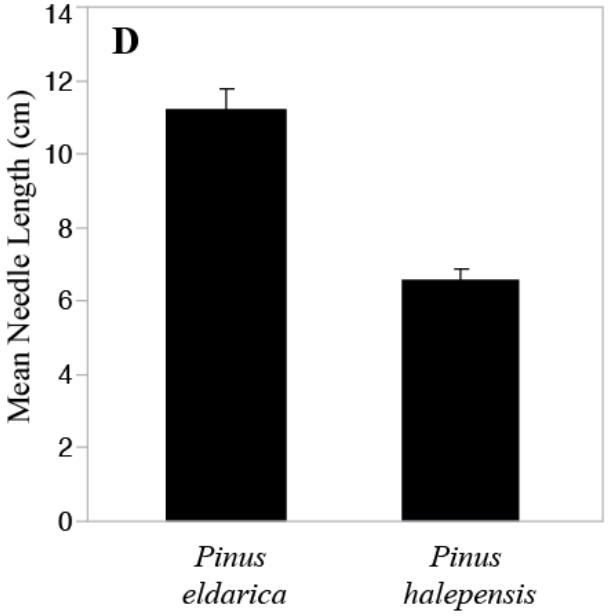
- Needle Length
- Cone diameter
- Cone length
- Cone stalk length
- Cone Angle

Pinus halepensis vs. *Pinus eldarica*

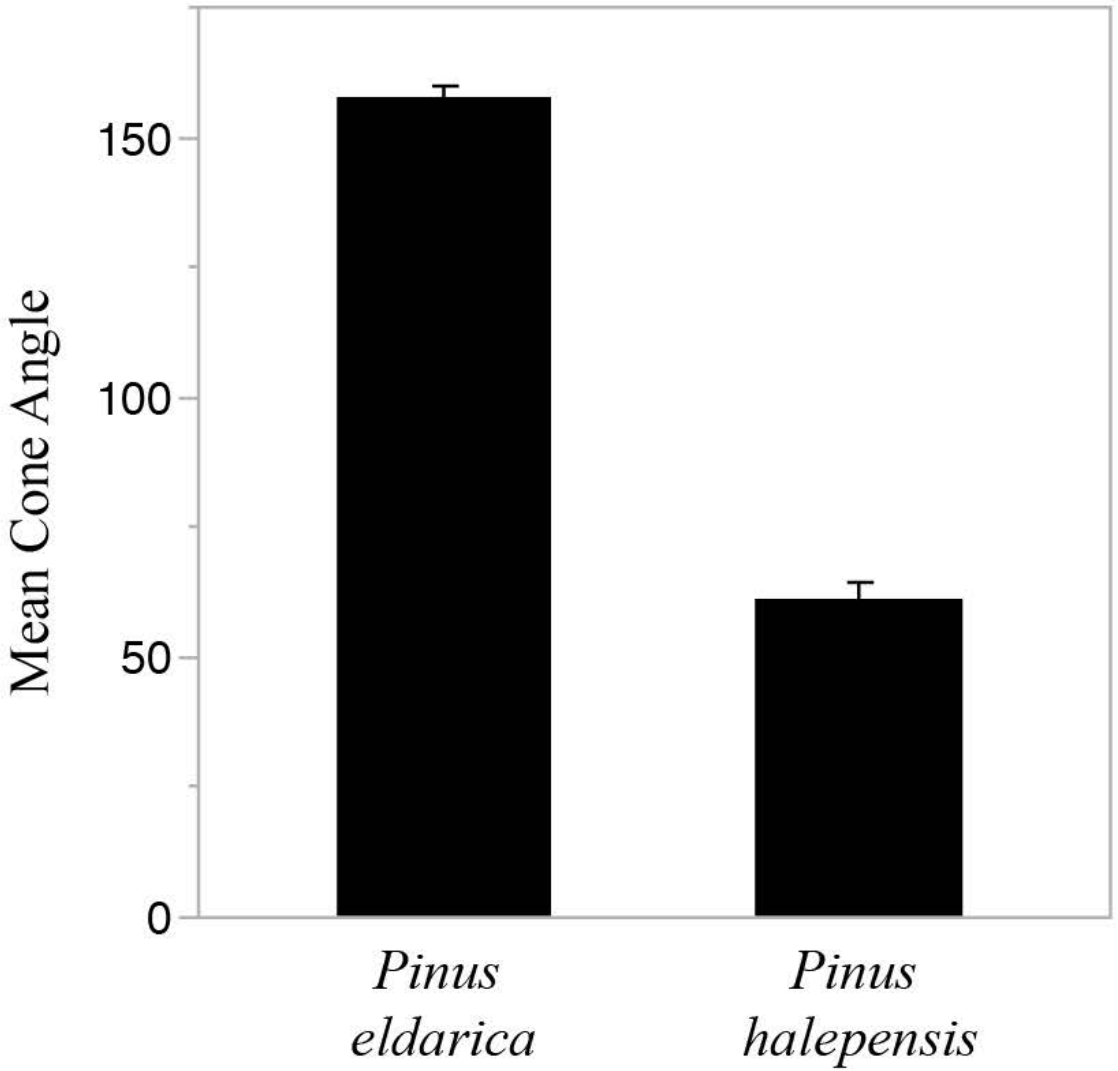


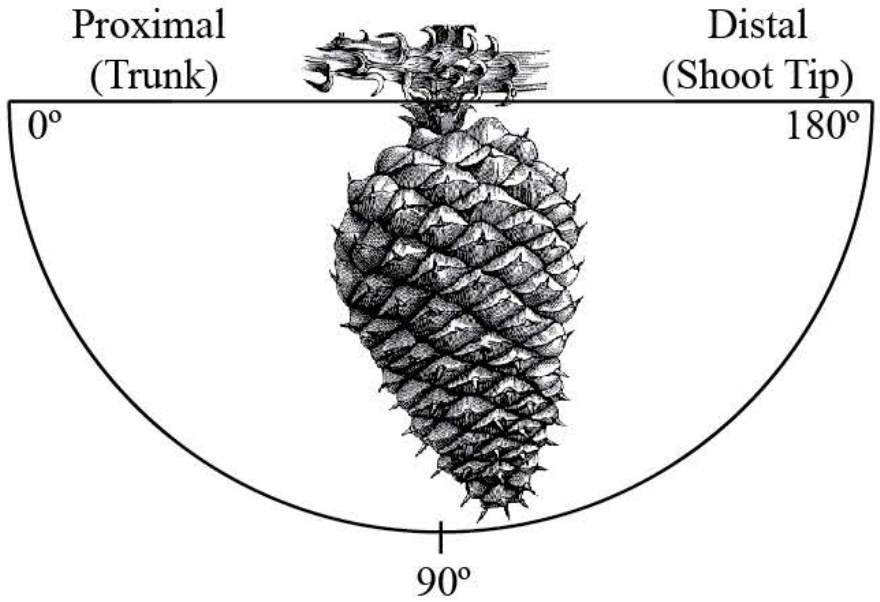






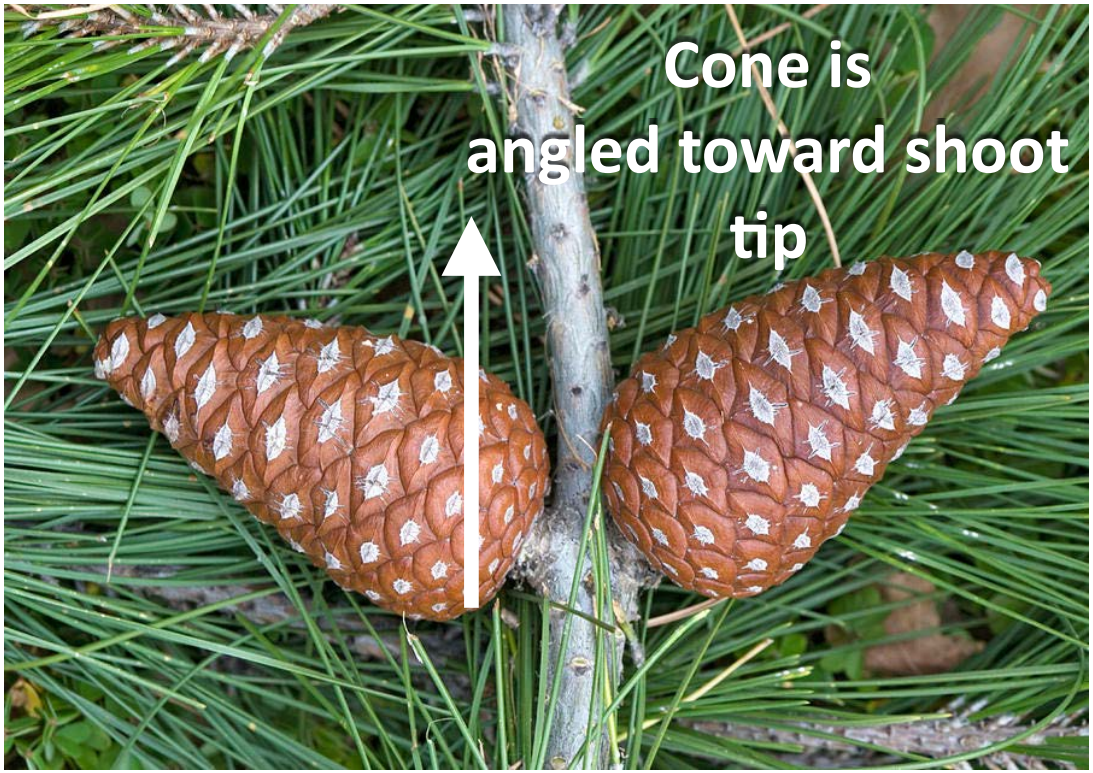
Pinus halepensis vs. *Pinus eldarica*

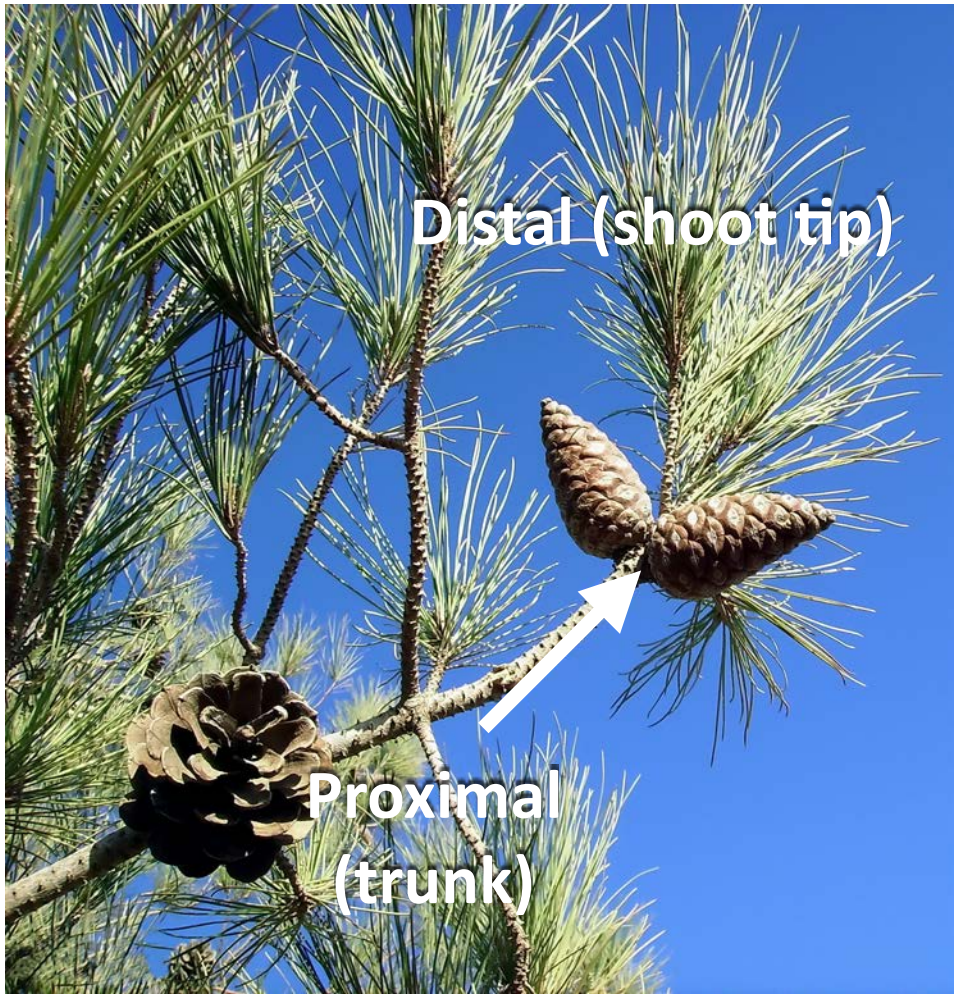




Pinus halepensis Cone Angle

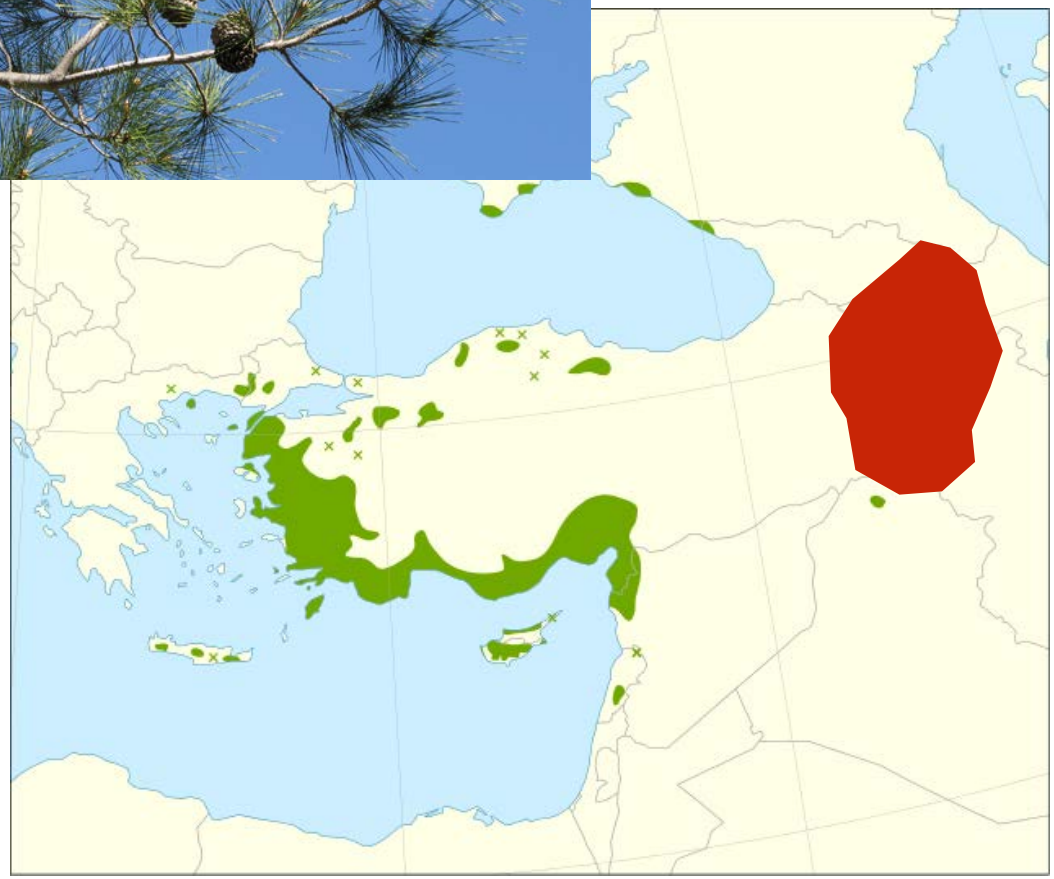
Pinus eldarica Cone Angle





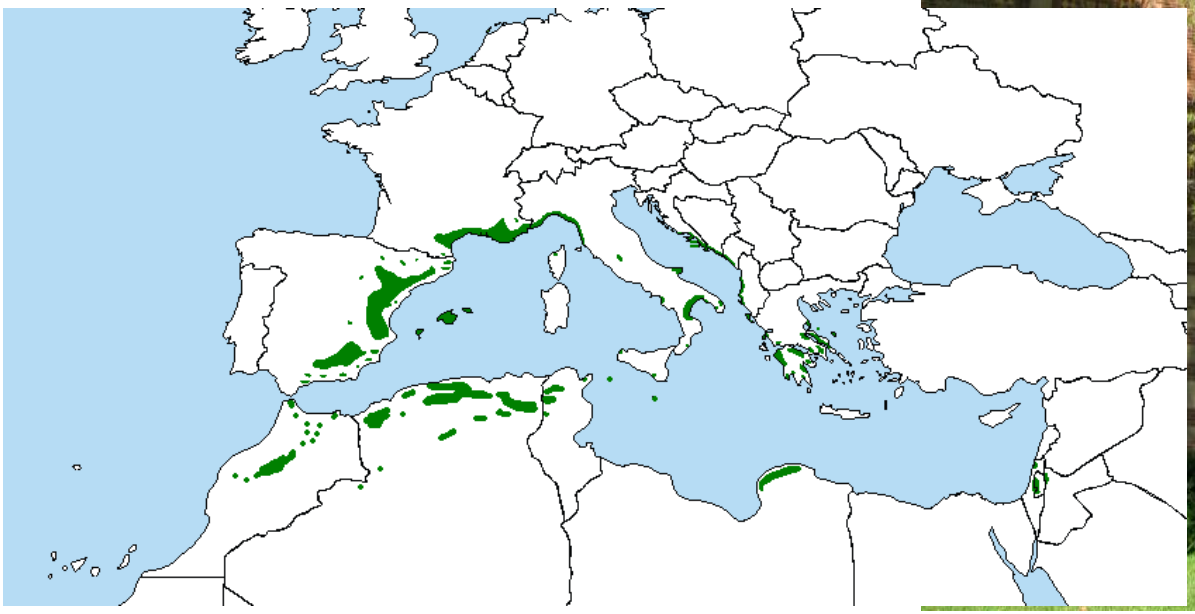
Mondell or Afghan Pine (*Pinus eldarica*)

Synonyms: P. brutia var. *eldarica*



Mondell Pine (*Pinus eldarica*)

Aleppo Pine (*Pinus halepensis)*




Pinus eldarica
Pinus halepensis


Pinus halepensis
Pinus eldarica

Pinus halepensis vs. *Pinus eldarica*

Afghan Pine (*Pinus eldarica*)

- Cones point away (distally) from center of tree on branches
- Most needles greater than 3 inches long
- Cone stalk less than 1 cm long

Aleppo Pine (*Pinus halepensis*)

- Cones pointing toward (proximally) center of tree on branches
- Most needles less than 3 inches long
- Cone stalk 1 cm long or longer