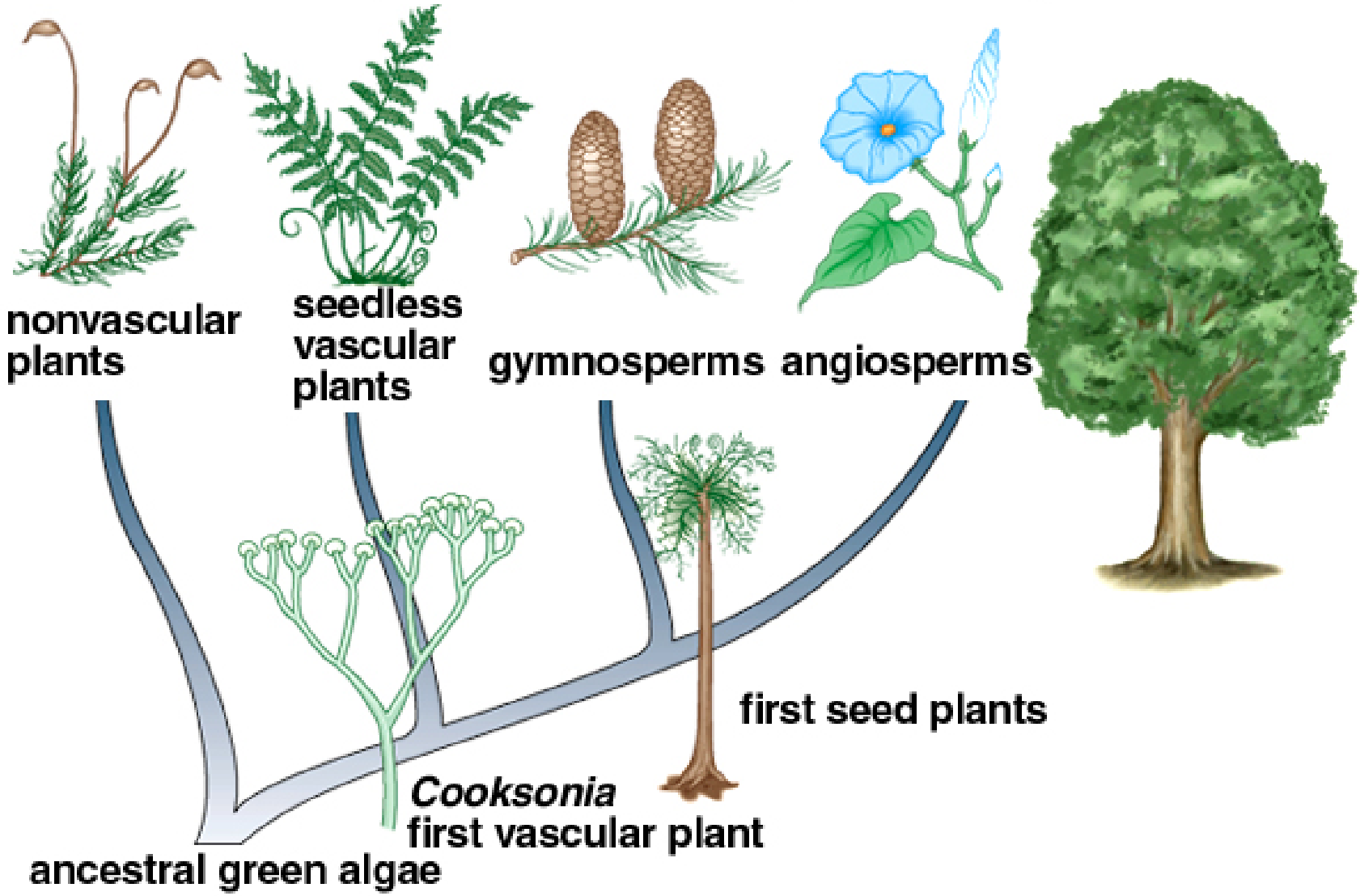
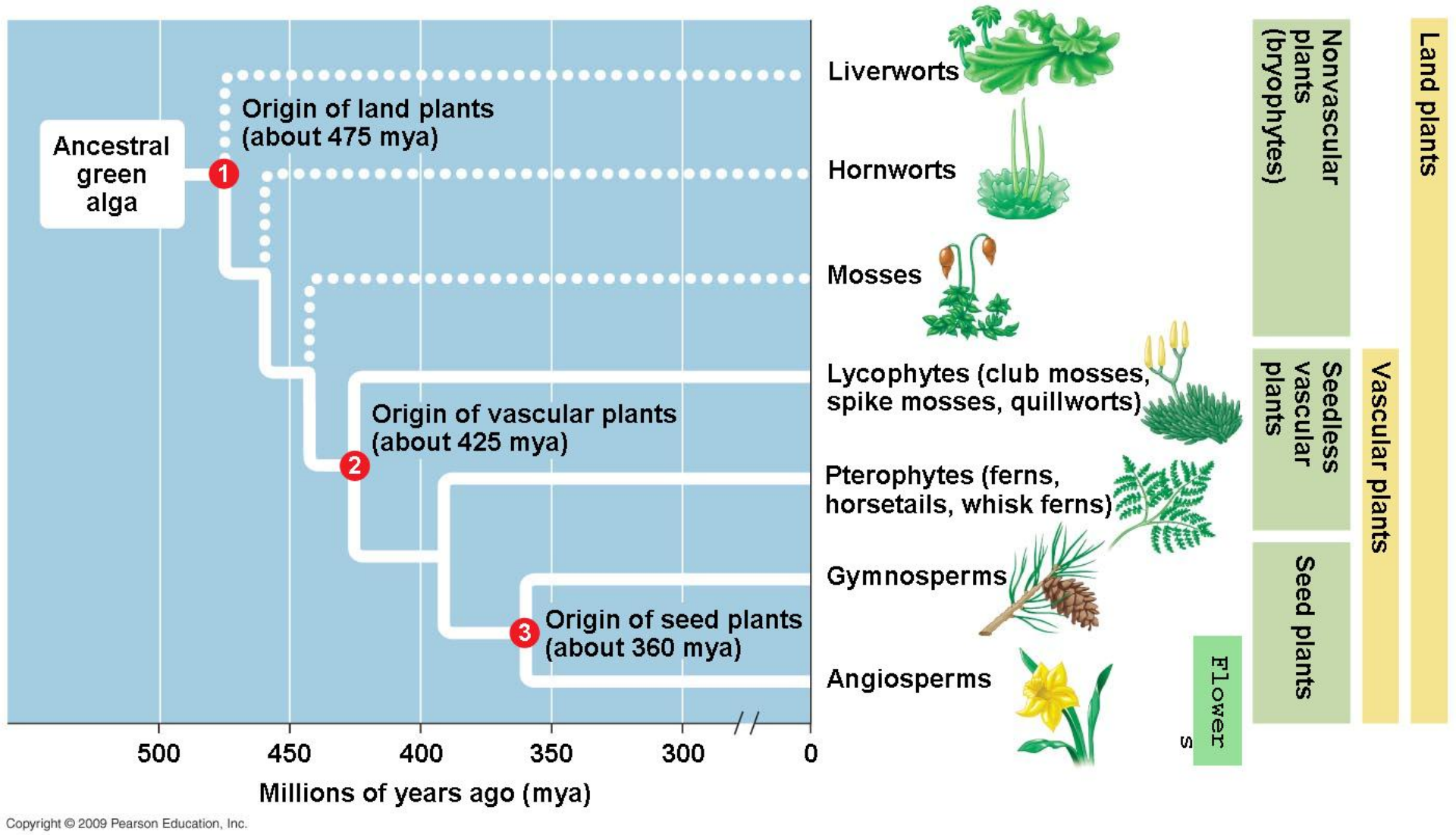
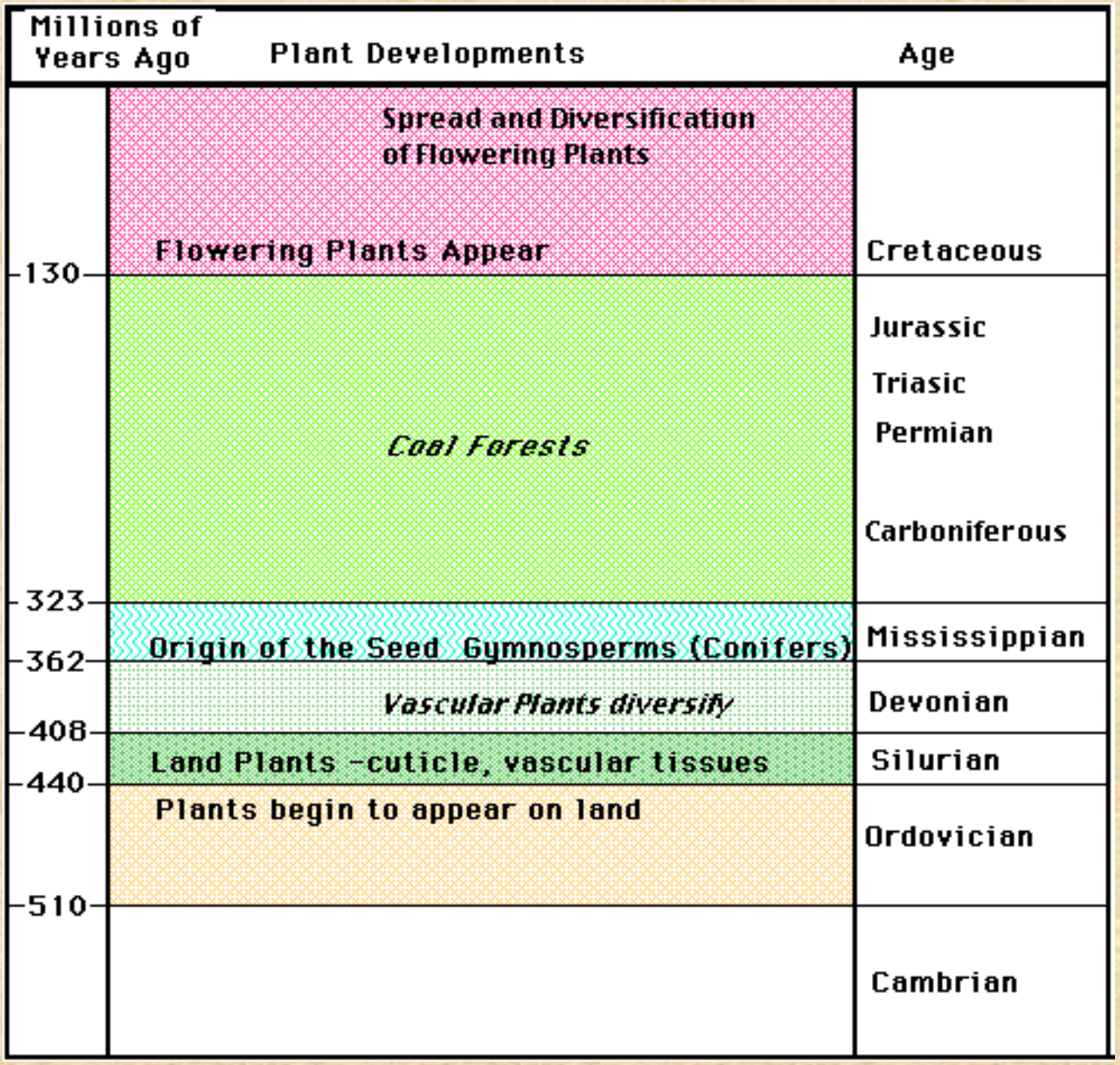
Seed-bearing Plants

Evolution of the major groups of plants (simplified)



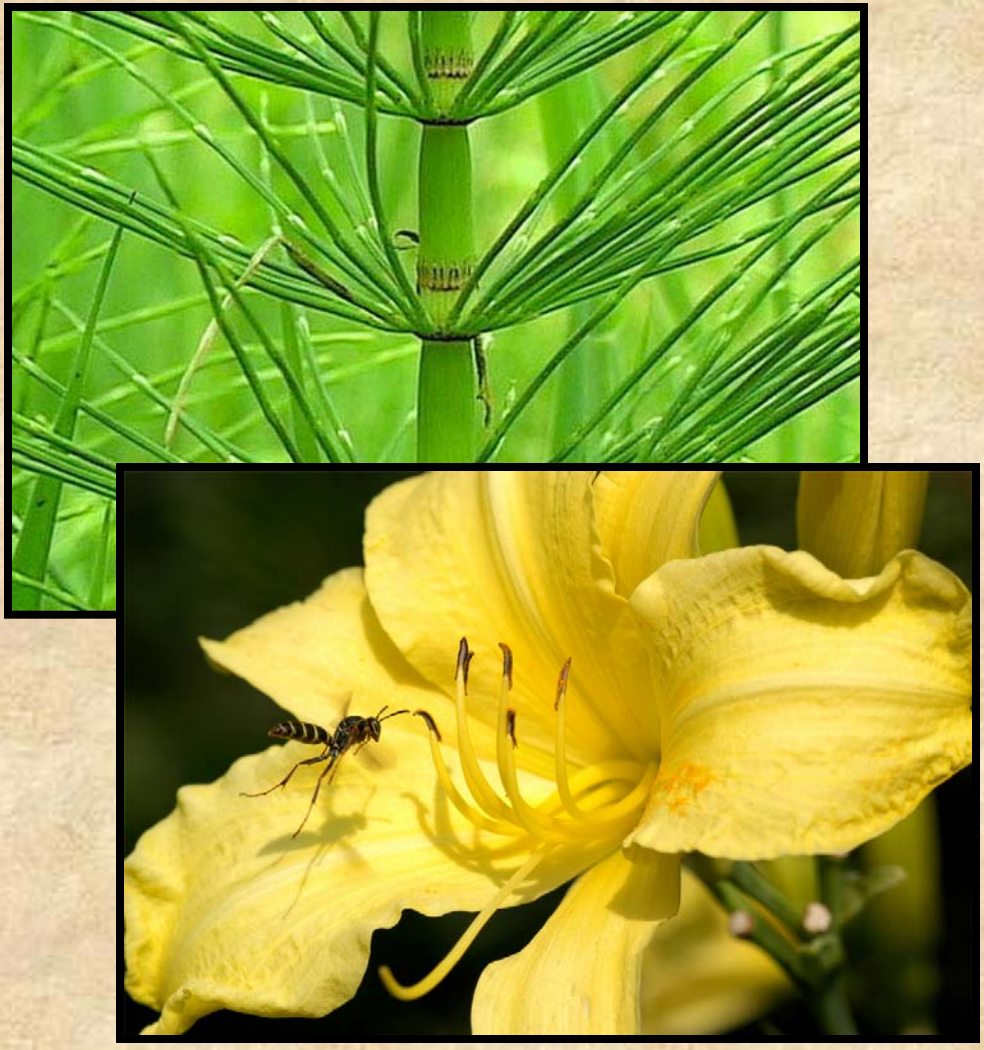



Millions of Years Ago
Plant Developments
Age
Spread and Diversification of Flowering Plants
Flowering Plants Appear
Cretaceous
130
Jurassic
Triasic
Permian
Coal Forests
Carboniferous
323
Origin of the Seed Gymnosperms (Conifers)
Mississippian
362
Vascular Plants diversify
Devonian
408
Land Plants -cuticle, vascular tissues
Silurian
440
Plants begin to appear on land
Ordovician
510
Cambrian

Land Plants fall into two major groups

- Non vascular
- Vascular

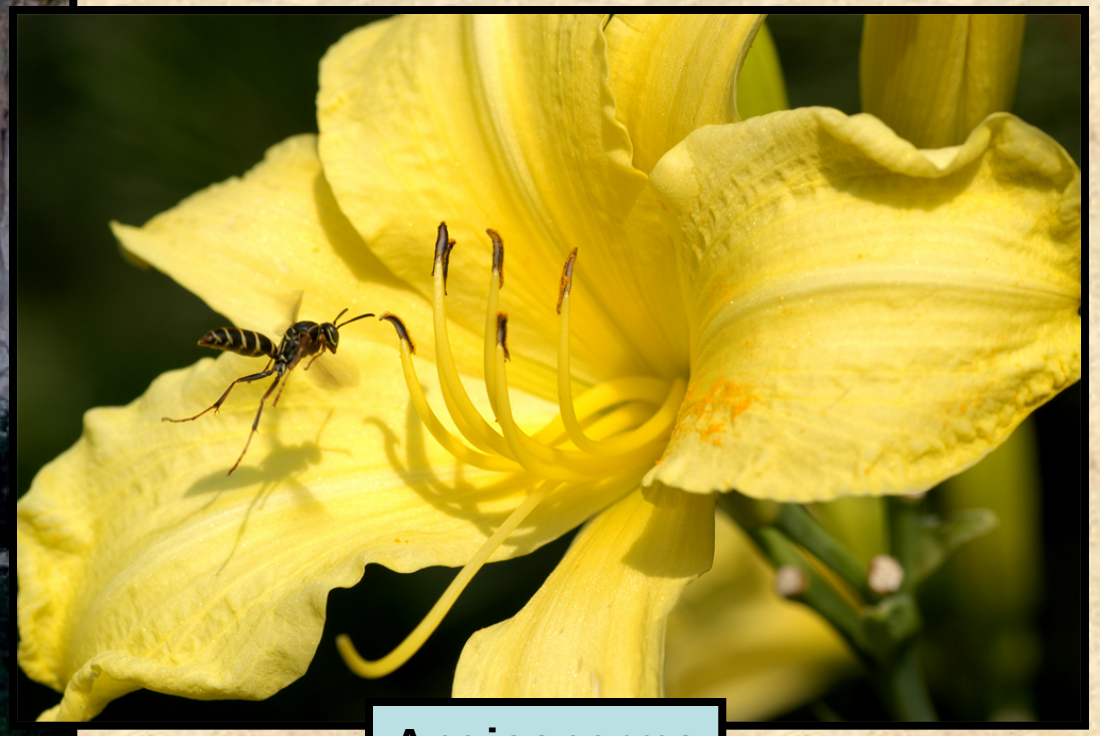
Vascular Plants



- Some are seedless
- Others produce seed

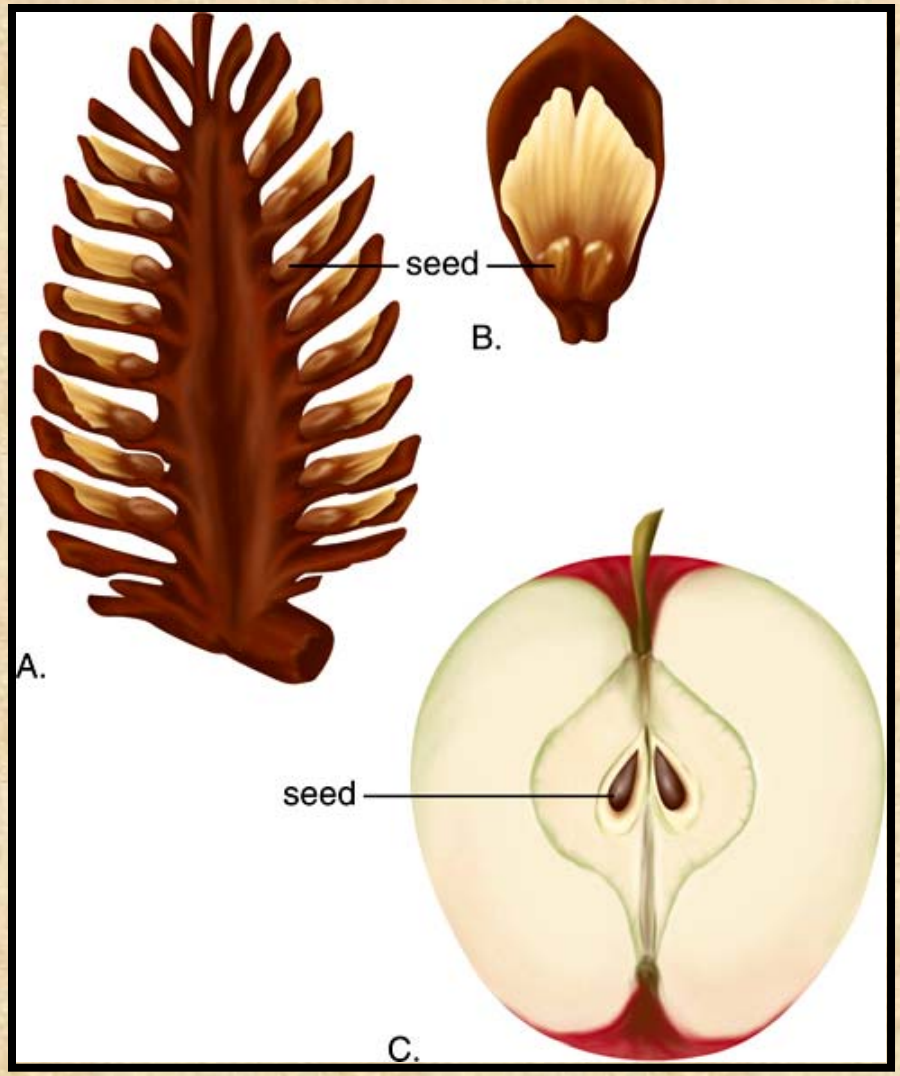
Seed-bearing Vascular Plants fall into two major categories

Gymnosperms



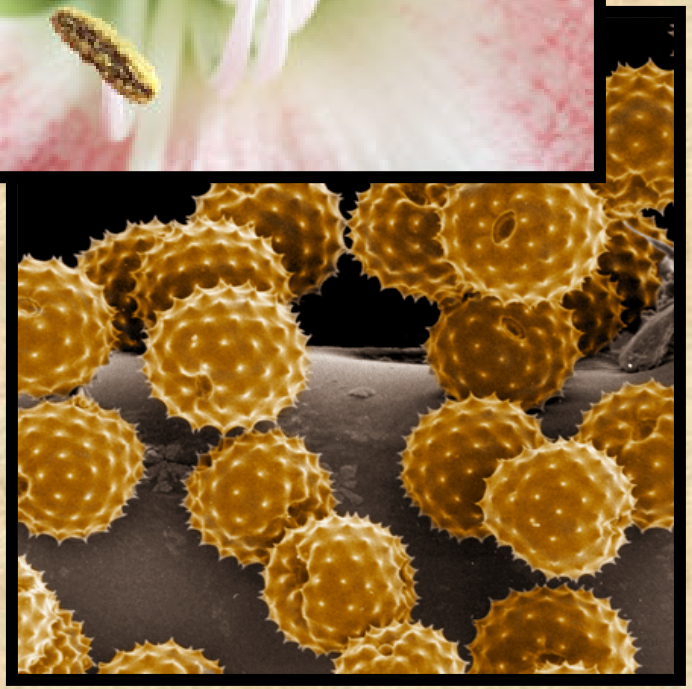
Angiosperms

Seed-bearing Vascular Plants fall into two major categories



- Gymnosperm – seeds naked on surface of sporophyll
- Angiosperm – seeds enclosed in a ripened ovary

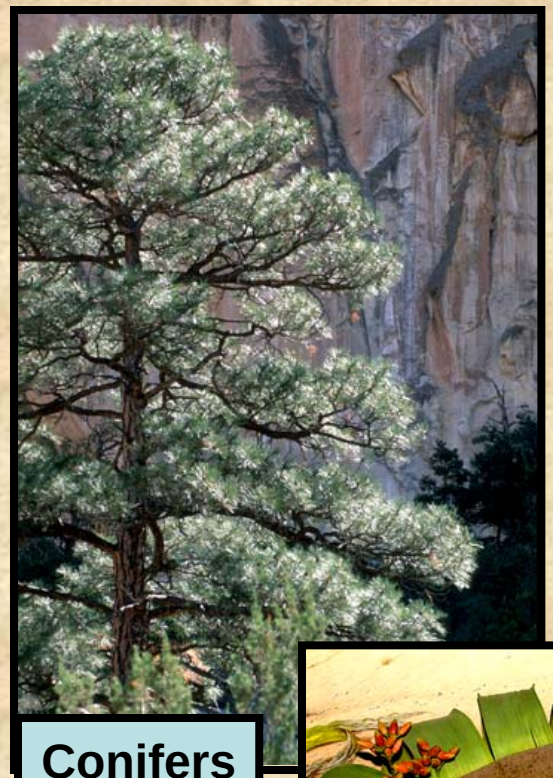
Seed-bearing plants also produce pollen



Living Gymnosperms

Cycads

Ginkgoes



Conifers

Gnetophytes

Conifers – the most conspicuous gymnosperms

Conifers

- **Like the Cycads and Ginkgos, Conifers are well represented in the fossil record**

Sequoia affinis

Conifers are of great ecological importance

- Conifers are the dominant members of the vast Boreal forests (Taiga)

Conifers are of great ecological importance

- Conifers are important members of other ecosystems

Conifers are of great economic importance

- Edible Seeds
- Crates, Boxes, Matchsticks, Furniture
- Telephone Poles
- Turpentine and Rosin (Resin)
- Fuel (Pitch)
- Pulpwood
- Ornamentals
- Pharmaceuticals (Taxol)

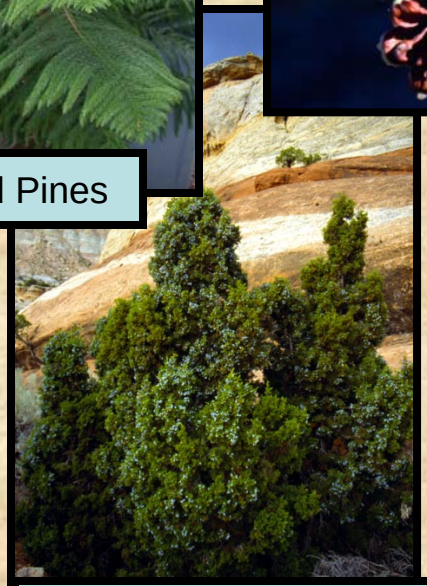
There are seven living families of Conifers

Norfolk Island Pines

Pines, Fir Spruce

Sequoias and Redwoods

Five of the most familiar



Junipers and Cedars

Yew

The Largest and the Oldest Plants are both Conifers

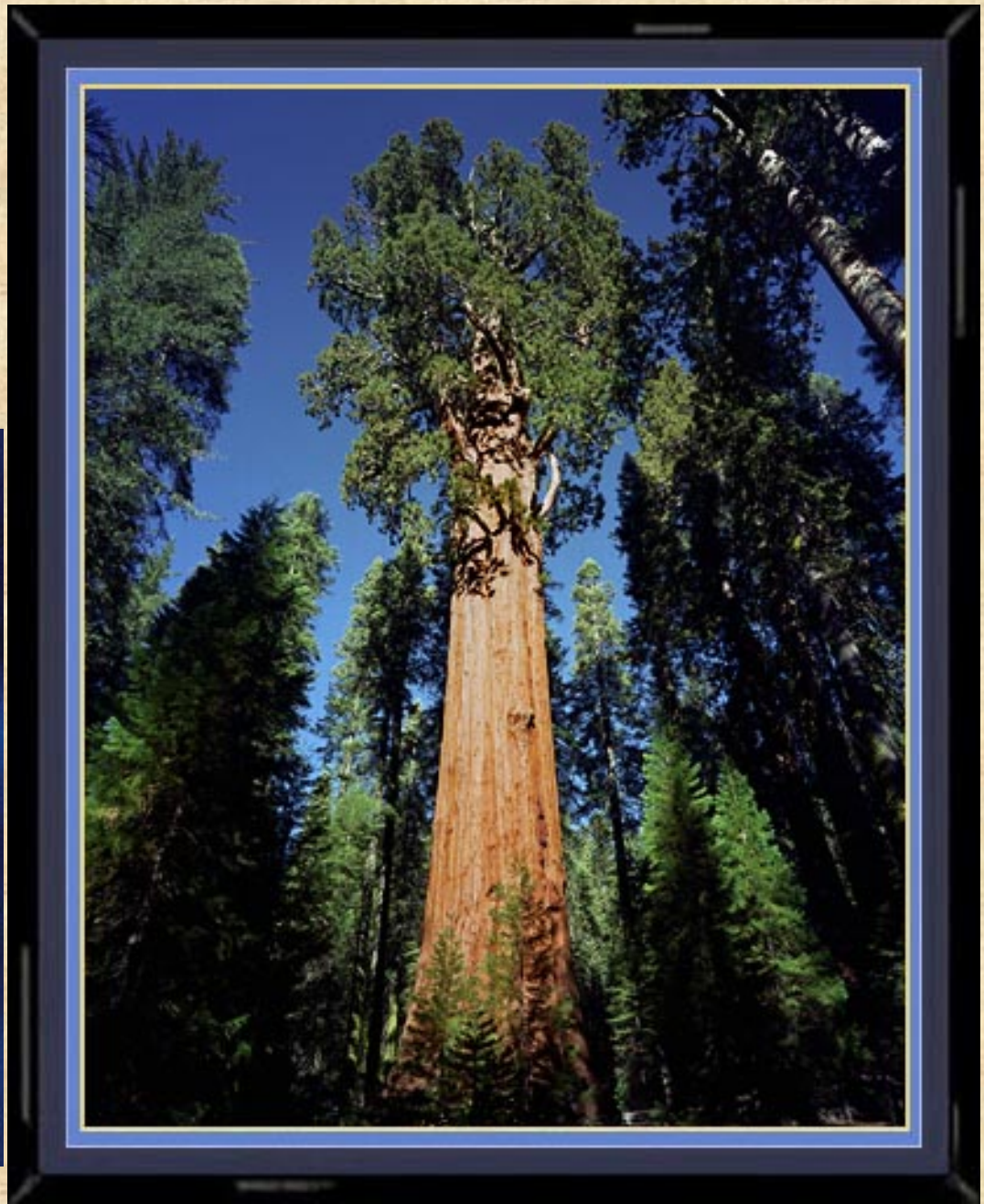
- Giant Sequoias of the California Sierras are the largest
- Bristlecone pines of the California White Mountains are the oldest

"The Largest Living Thing on Earth"
- General Sherman -

Sequoia National Forest, CA
2200 years old , 275 feet tall ,

30 feet in diameter at the base.

119.3 miles of 1X12 planks



Oldest Living Tree Found in Sweden

The visible portion of the 13-foot-tall (4-meter-tall) "Christmas tree" isn't ancient, but its root system has been growing for 9,550 years. Discovered in 2004, the lone Norway Spruce represents the planet's longest-lived identified plant. Researchers found the shrubby mountain survivor at an altitude of 2,985 feet (910 meters) in Dalarna Province. The tree's incredible longevity is largely due to its ability to clone itself. The spruce's stems or trunks have a lifespan of around 600 years, "but as soon as a stem dies, a new one emerges from the same root stock," Kullman explained. "So the tree has a very long life expectancy."

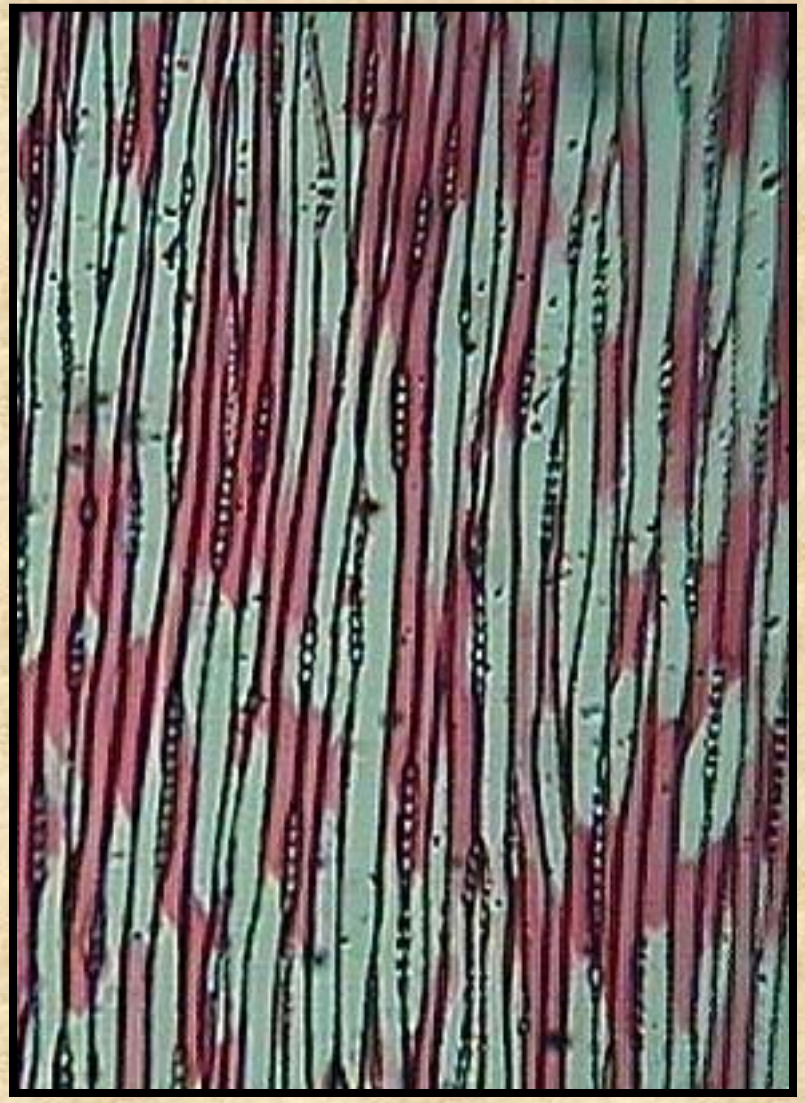
http://news.nationalgeographic.com/news/2008/04/080414-oldest-tree.html

Vegetative Characters of Pine

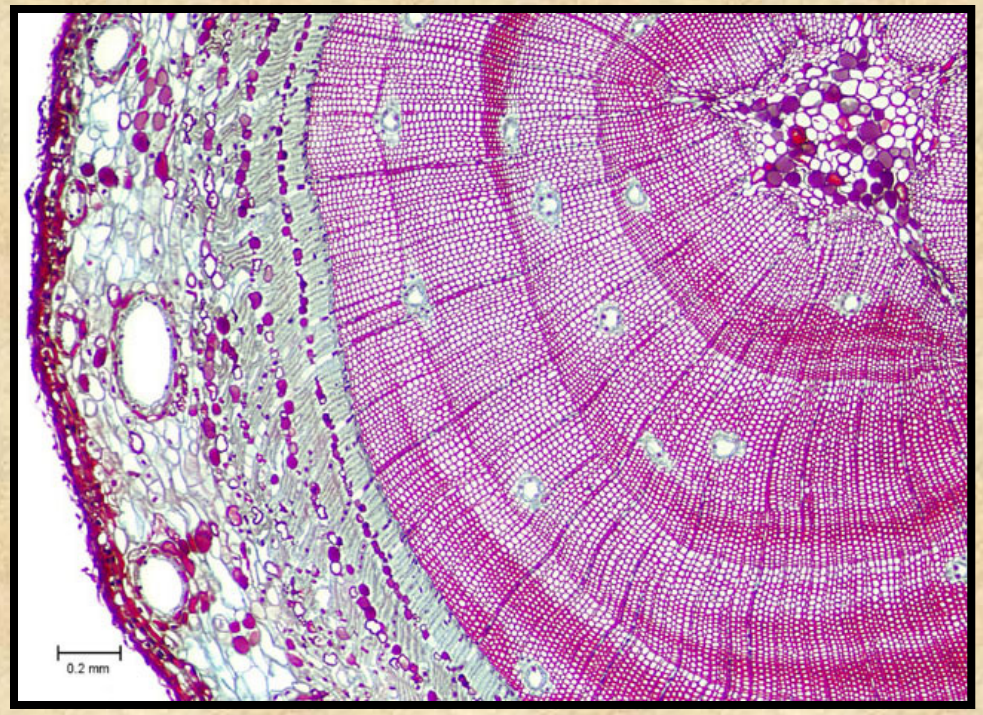
Pine Stems

- Extensive branching
- Christmas tree shape
- Very woody

Pine Stems

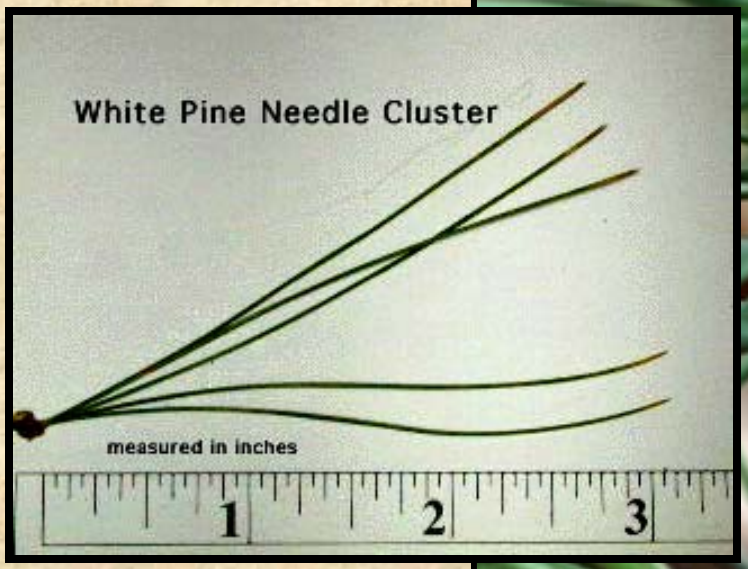


- Wood consist of tracheids only
- No fibers or vessels
- Wood is “soft”

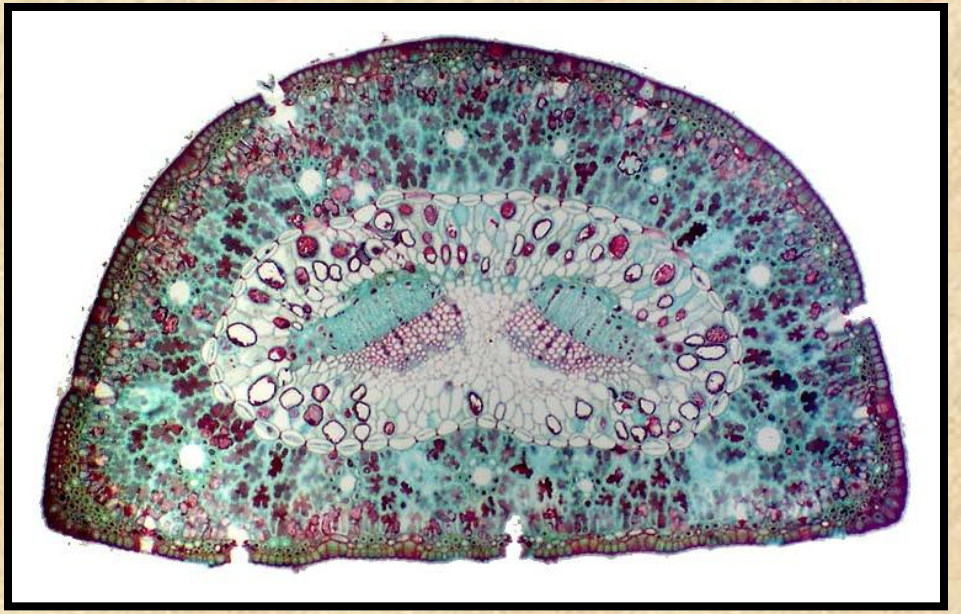


Pine Leaves

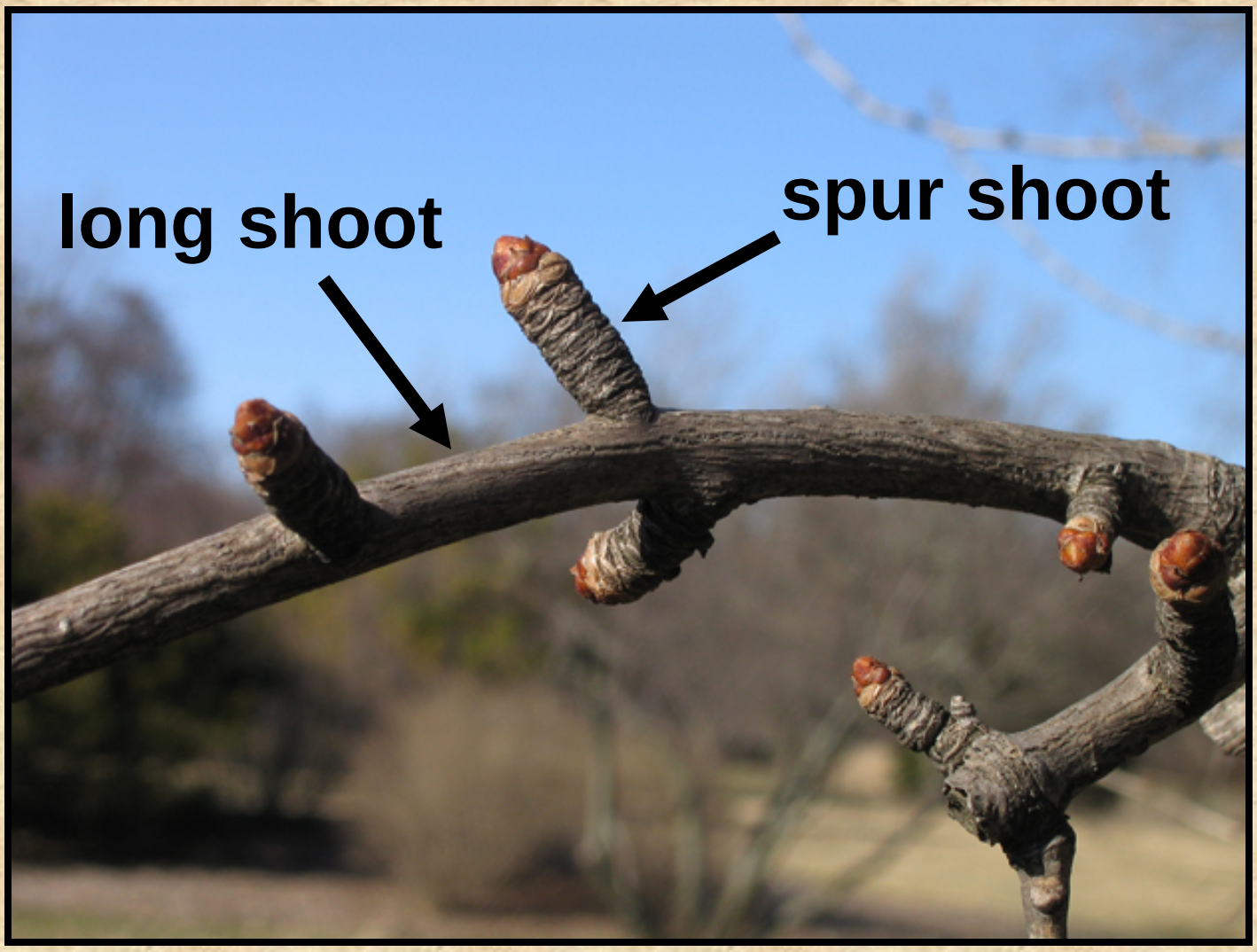
- Needles produced in clusters (fascicles) of 1 to 5



Leaf shape in transverse section depends on number of leaves in the fascicle

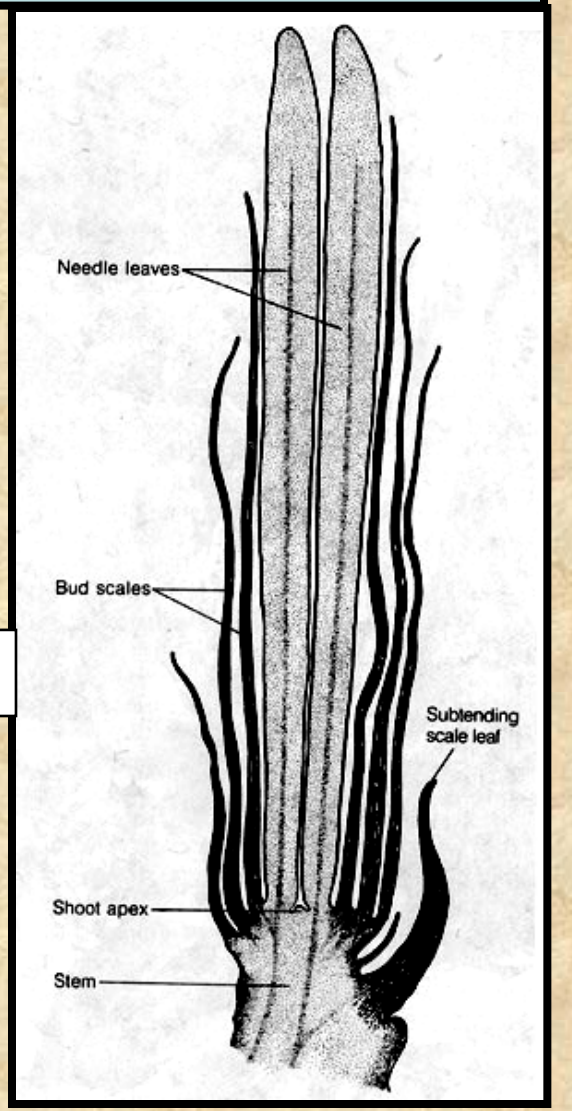


Ginkgo Stems



Pine Leaves

- Each fascicle is an entire spur shoot

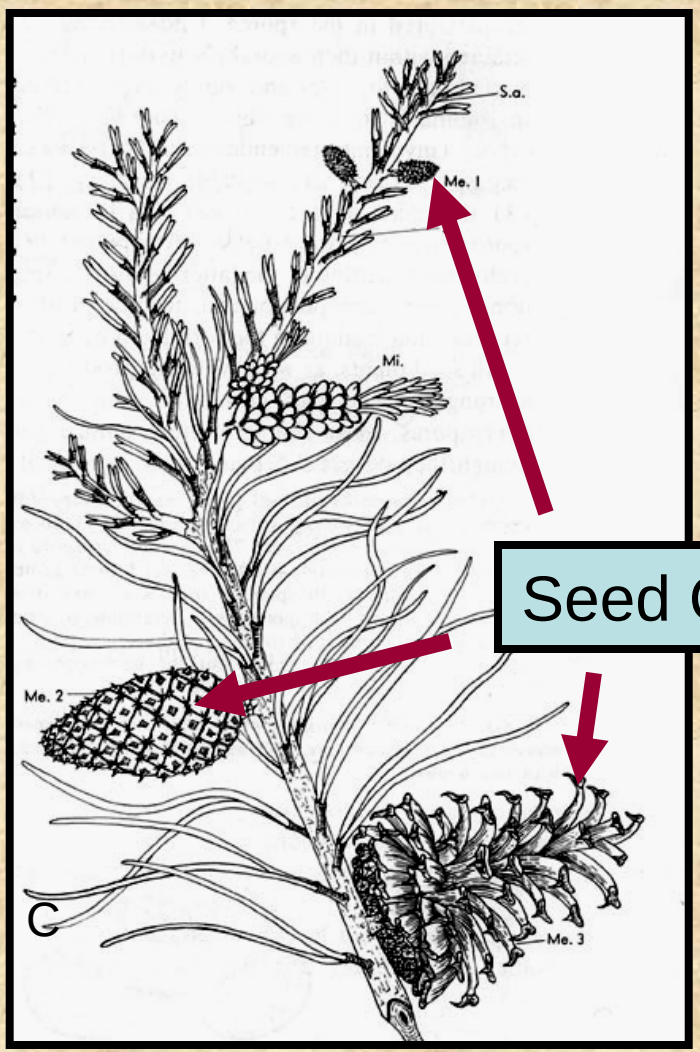


Pine – Reproductive structures

Pines produce pollen and seeds in cones

Pines are Monecious

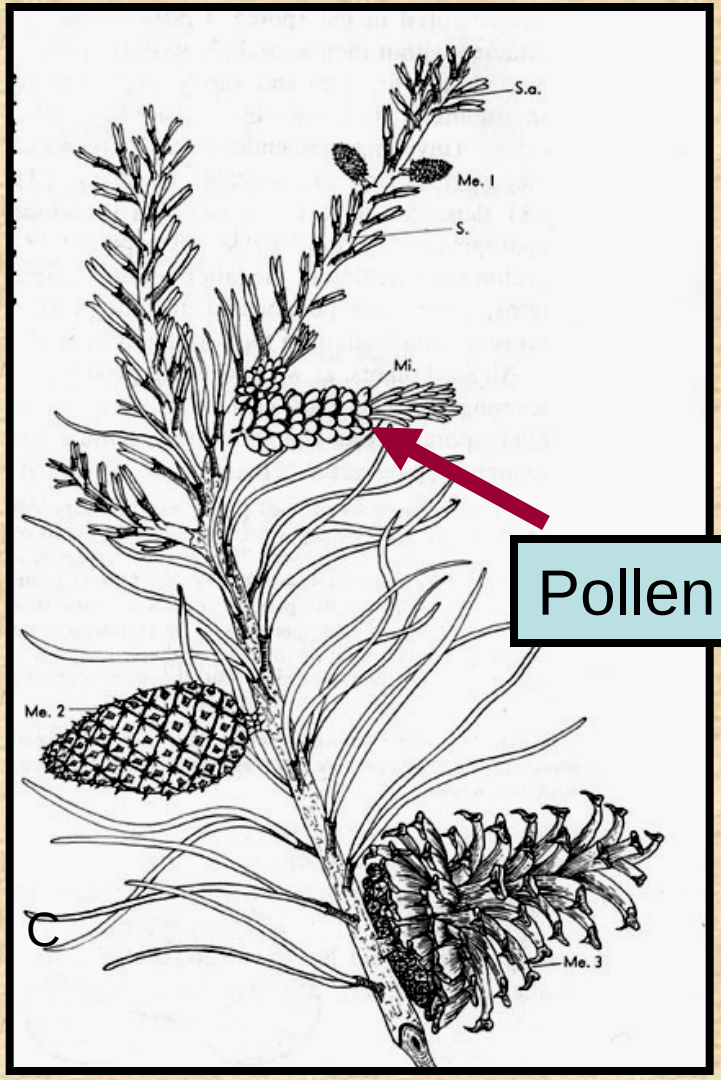
Individual plants produce both pollen cones and seed cones



Seed Cone

Pines are Monecious

Individual plants produce both pollen cones and seed cones



Pollen Cone

Pollen cones produce pollen

C

Seed cones produce seed

Young seed cone

C

Mature seed cone