Pinophyta - Gymnosperms

Seed bearing plants without flowers and pistils - "naked seeds"

- 4 major groups recognized; sometimes as separate phyla
- 3 families of conifers only in Great Lakes region with 8 genera and 13 species
- Cupressaceae - junipers
- Pinaceae - pines, spruces
- Taxaceae - yews

General characteristics:
- Less diverse than ferns: 12 families, 80 genera, 820 species
- Woody: trees, shrubs, lianas, few epiphytes
- Worldwide, but more dominant in colder and arctic regions

Gymn-assium = "naked house"
Pinophyta - Gymnosperms

General characteristics:

• Seeds!
• = mature ovule
• "naked seed" in cone
• No water required for sperm movement - pollen
• = male gametophyte (heterosporous!)
• pollinated by wind (mostly)

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Cupressaceae: cypress family

Leaves needle or scale-like
Opposite or whorled, persistent
Important rot resistant trees (redwood, cedar)

Thuja occidentalis
Arbor vitae, White cedar
Leaves opposite in 4 ranks and heteromorphous
Branches flattened
Small woody cones

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Good books!

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Cupressaceae: cypress family

Juniperus
Junipers, Red cedar
Leaves closely appressed: can be scale-like or awl-like
Branches not flattened
Blue "berry" cones
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Cupressaceae: cypress family
Juniperus virginiana
Red cedar

Juniperus communis
Common juniper

Juniperus horizontalis
Creeping juniper

Taxaceae: yew family

Leaves needle-like, spreading in one plane - 2 ranked
No cones, single seed in fleshy aril, but seeds naked
1 genus Taxus; taxol drug from western T. brevifolia

Taxus canadensis
American yew
Ground hemlock

Apostle Islands stand with no deer

Taxus cuspidata
Japanese yew

Foliage leaves needle-like, alternate or fascicled
Many seeds enclosed in fleshy to woody cone, with conspicuous cone scales

Pinaceae: pine family

6 genera, 200 species of Northern Hemisphere
Foliage leaves needle-like, alternate or fascicled
Many seeds enclosed in fleshy to woody cone, with conspicuous cone scales

Pinus strobus
White pine

Alleghenian element
**Pinophyta - Gymnosperms**

**Pinaceae: pine family**

*Pinus resinosa* - Red pine
- more xeric than white pine

**Pinophyta - Gymnosperms**

**Pinaceae: pine family**

*Pinus banksiana* - Jack pine
- most xeric of the pines
- showing serotinous cones

**Pinophyta - Gymnosperms**

**Pinaceae: pine family**

*Pinus banksiana* - Jack pine
- Keystone species involving glacial geology, jack pine bud worm, defoliation, fire, serotinous cones, endangered Kirtland’s warbler, and parasitic cowbird

**Pinophyta - Gymnosperms**

**Pinaceae: pine family**

7 year old jack pine site – Crawford Co. MI
- “sand counties” due to glacial melt off
Endangered Kirtland’s Warbler basically restricted to these sand counties in MI and to young stands of jack pine.

Jack pine bud worm infestations allow fire and cyclical formation of new stands of jack pine.

Parasitic cowbird (and suppression of fire) almost caused the Kirtland’s warbler go extinct.

Abies balsamea
Balsam fir

Larix laricina
Larch, tamarack

Picea mariana
Black spruce

Picea glauca
White spruce

Tsuga canadensis
Eastern hemlock

Picea glauca
White spruce