



Temperate Deciduous Forests

- evolution of “deciduous” habit

Most agree that the “deciduous” habit first arose as an adaptation in response to winter aridity in the subtropical forests - reduce water demand by shedding leaves

Winter brown

Summer green

Subtropical dry forest of Mexico

Temperate Deciduous Forests

- evolution of “deciduous” habit in temperate regions is a response to winter cold - loss of thin deciduous leaves in winter represents a saving of material as compared with the freezing of thick evergreen leaves

Temperate Deciduous Forests

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Map of fall colors around the northern hemisphere

Temperate Deciduous Forests

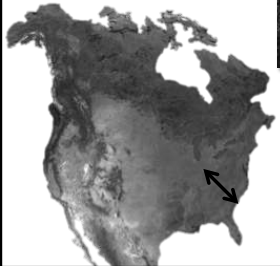


Acer (maples) in southern Indiana



Rhododendron in Roan Mt., Tennessee

- a gradient from “evergreen” to mixed “evergreen-deciduous” to “deciduous” forests from SE USA to upper Midwest

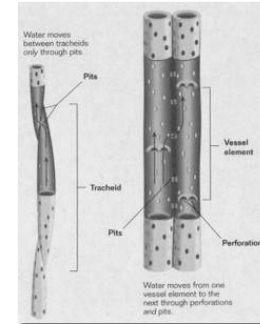


Live oak evergreen forest, South Carolina



Temperate Deciduous Forests

- further north and west, angiosperms with water-efficient but freezing-sensitive vessels elements lose out to less efficient, slower-growing, but more freeze-tolerant gymnosperms with tracheids only



Boreal forest, upper Michigan

Temperate Deciduous Forests

- three main floristic regions in Northern Hemisphere (small size of continents at this latitude in S. Hemisphere precludes effective formation)



- eastern North America: north of temperate (subtropical) evergreen forest and south of boreal forest

- deciduous
- mixed deciduous/boreal

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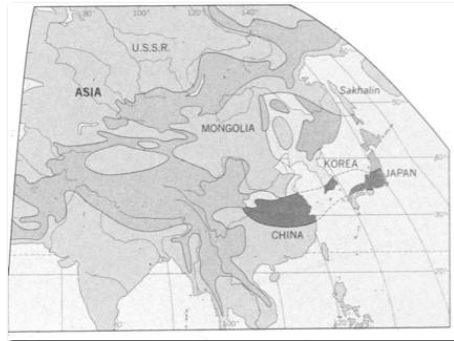


- western and central Europe:

- deciduous
- mixed deciduous/boreal

Temperate Deciduous Forests

- three main floristic regions in Northern Hemisphere (small size of continents at this latitude in S. Hemisphere precludes effective formation)



- eastern Asia: north of temperate (subtropical) evergreen forest

- deciduous
- mixed deciduous/boreal
- evergreen

Temperate Deciduous Forests

- dense shade cast by canopy by mid-summer



- trees with unisexual flowers in aments/catkins before leafing out - wind pollinated
- one-seeded dry fruits - wind or animal dispersed



Temperate Deciduous Forests

- dense shade cast by canopy by mid-summer



- reduces shrub layer diversity



- increases geophyte ("spring ephemeral") diversity with similar adaptations of early flowering, large broad leaves, fleshy fruits

Trillium and *Arisaema* (jack-in-the-pulpit) convergence

Temperate Deciduous Forests

- eastern North America flora - more on floristic relationships among three regions later

Acer - sugar maple: the most dominant of the deciduous forest trees



Temperate Deciduous Forests

- eastern North America flora

Fagus - American beech



Temperate Deciduous Forests

- eastern North America flora

Ulmus - American elm

Aesculus - buckeye



Temperate Deciduous Forests

- eastern North America flora

Carya - shagbark hickory



Quercus - oak



Temperate Deciduous Forests

- eastern North America flora

Tsuga canadensis (American hemlock) -
one of several evergreen gymnosperms



Temperate Deciduous Forests

- eastern North America flora

Pinus strobus (white pine) - one of several evergreen gymnosperms



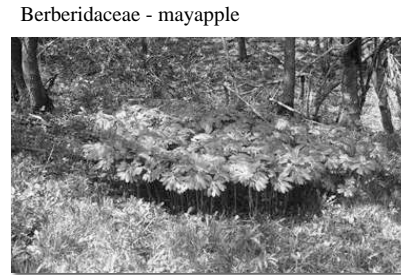
Temperate Deciduous Forests

- eastern North America flora

Papaveraceae - Dutchman's breeches



Ranunculaceae - baneberry



Berberidaceae - mayapple



Temperate Deciduous Forests

- eastern North America flora

"Liliaceae" - trout lily & trillium



Temperate Deciduous Forests

- eastern Asia flora - share genera but more diverse overall



Liriodendron chinense

eastern Asia



Liriodendron tulipifera
Tulip tree, Magnoliaceae

eastern North America

Temperate Deciduous Forests

- eastern Asia flora - share genera but more diverse overall



Podophyllum hexandra

eastern Asia



Podophyllum peltatum
Mayapple, Berberidaceae

eastern North America

Temperate Deciduous Forests

- western Europe flora - share some genera but less diverse overall



Fagus sylvatica - European beech



Aesculus hippocastanum -
horsechestnut (Balkans)