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

- 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
Subtropical dry forest of Mexico
Summer green

Map of fall colors around the northern hemisphere
Temperate Deciduous Forests

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

- live oak evergreen forest, South Carolina

- Acer (maples) in southern Indiana

- Rhododendron in Roan Mt., Tennessee

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

Temperate Deciduous Forests

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

- 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

- one-seeded dry fruits - wind or animal dispersed

- trees with unisexual flowers in aments/catkins before leafing out - wind pollinated

- dense shade cast by canopy by mid-summer

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

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

  *Trillium* and *Arisaema* (jack-in-the-pulpit) convergence
Temperate Deciduous Forests
- eastern North America flora

*Fagus* - American beech

*Ulmus* - American elm
*Aesculus* - buckeye

*Tsuga canadensis* (American hemlock) - one of several evergreen gymnosperms
Pinus strobus (white pine) - one of several evergreen gymnosperms

Temperate Deciduous Forests

- eastern North America flora

Berberidaceae - mayapple
Papaveraceae - Dutchman’s breeches
Ranunculaceae - baneberry

“Liliaceae” - trout lily & trillium

Temperate Deciduous Forests

- eastern North America flora

"Liliaceae" - trout lily & trillium

Liriodendron chinense
Tulip tree, Magnoliaceae
eastern Asia

Liriodendron tulipfera
Tulip tree, Magnoliaceae
eastern North America

Temperate Deciduous Forests

- eastern Asia flora - share genera but more diverse overall

Temperate Deciduous Forests

- eastern North America flora
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* - horse chestnut (Balkans)