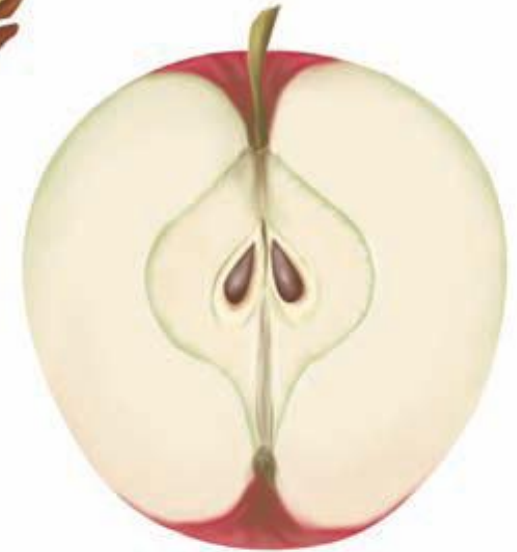


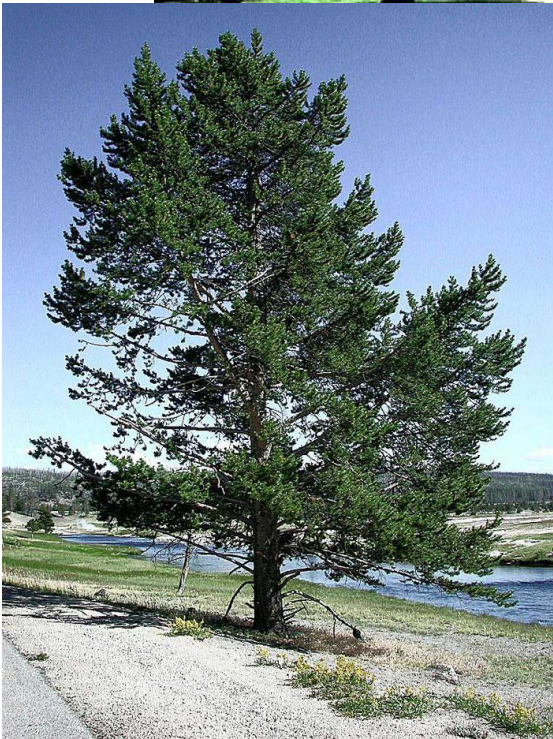
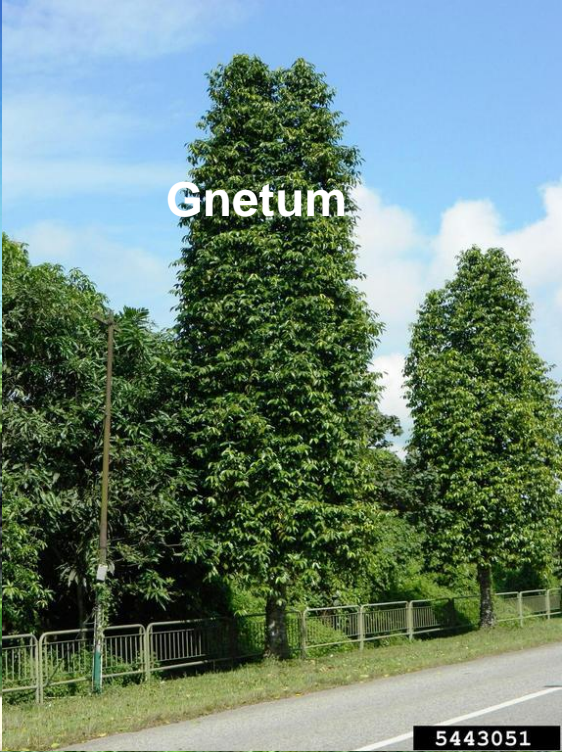
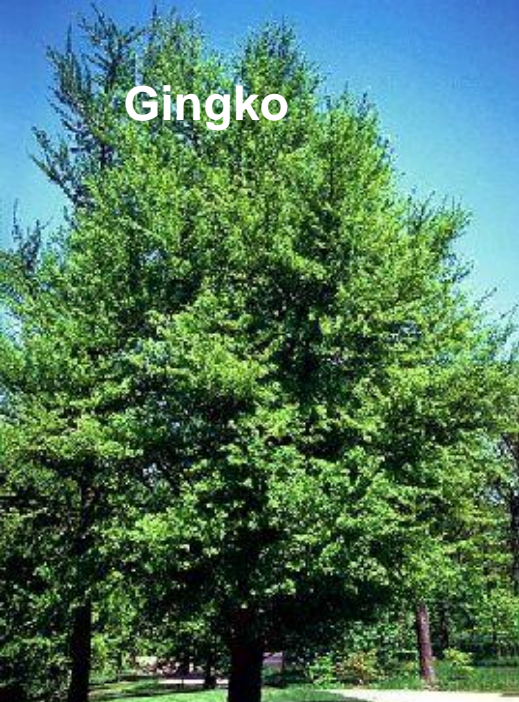
The name **gymnosperm** is derived from two Greek words: **gymnos**, meaning naked, and **sperma**, a seed.

Gymnosperm means “naked seed”: their seeds develop naked, not in an inclosure, or in ovary as in the flowering plants.

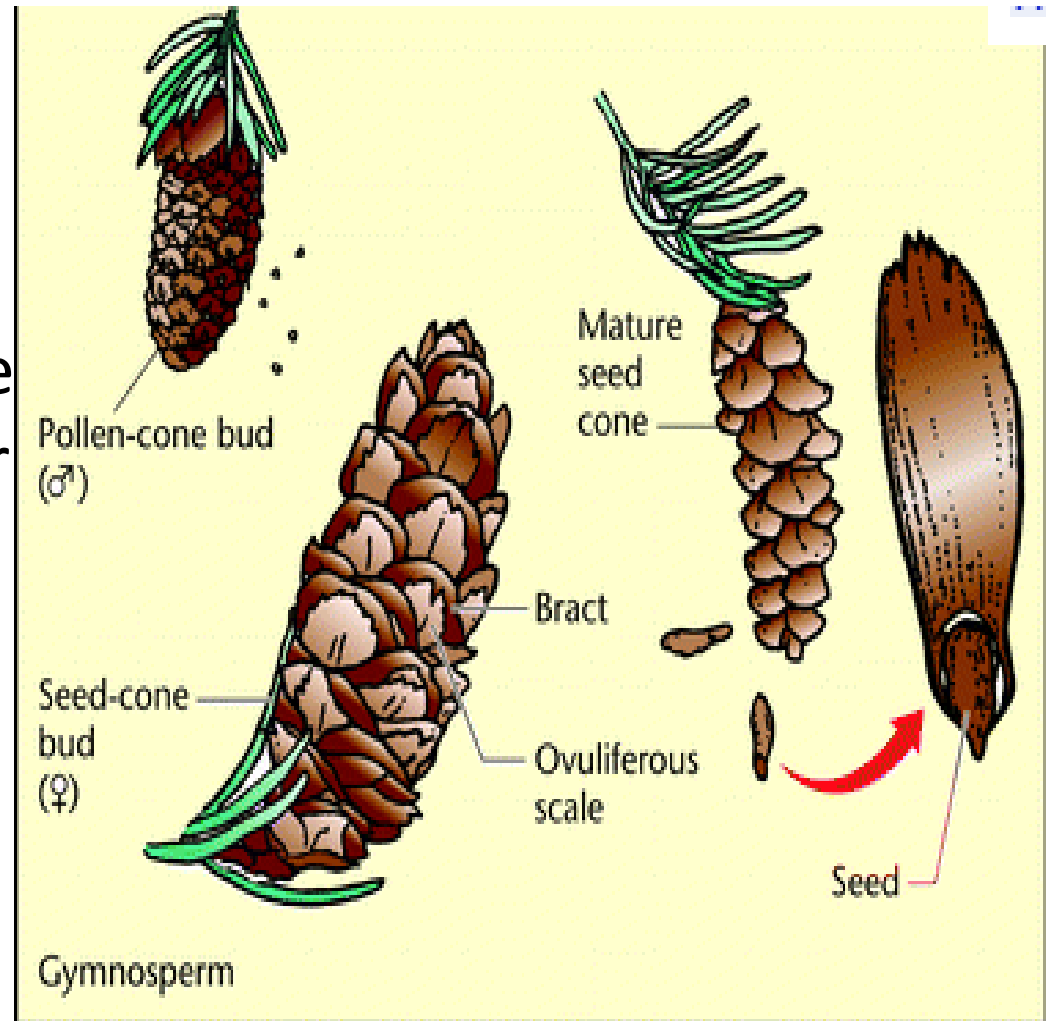


- There are four groups of living gymnosperms: the **conifers**, the **cycads**, **Ginkgo**, and **Gnetum** and its relatives.

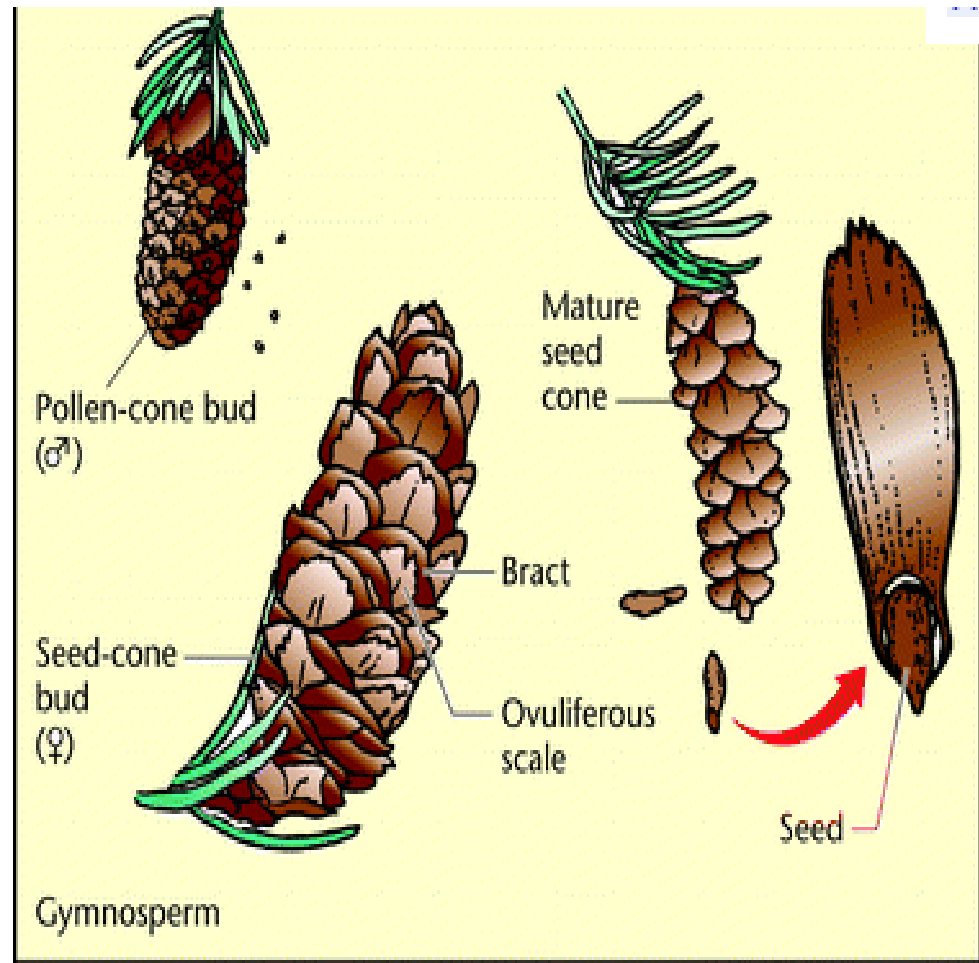
- Ginkgo is represented by a single species: ***Ginkgo biloba***.



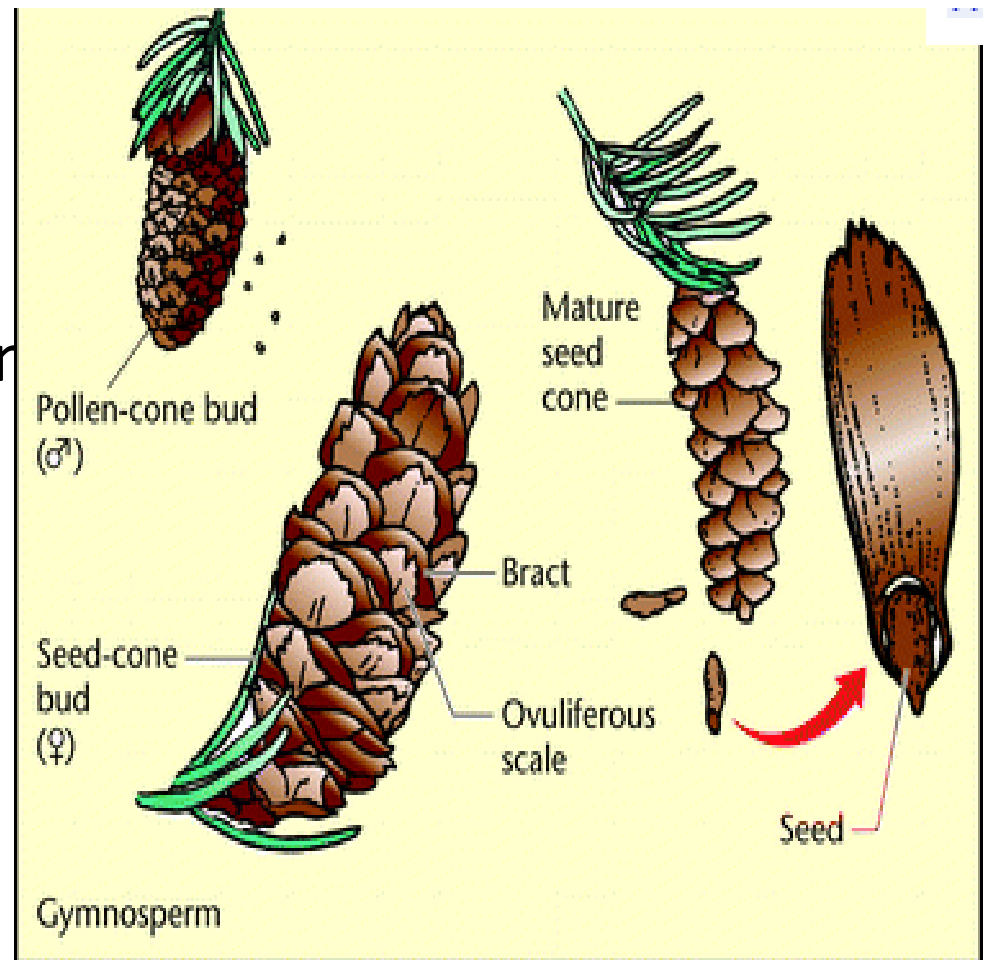
- The name refers to the exposed nature of the seeds, which are produced on the surface of **sporophylls** or similar structures instead of being enclosed within a fruit as they generally are in the flowering plants.



- **Sporophyll** is a modified leaf that bears a sporangium or sporangia.
- The exposed seeds of gymnosperms produced on sporophylls, in a **strobilus**, or cone.

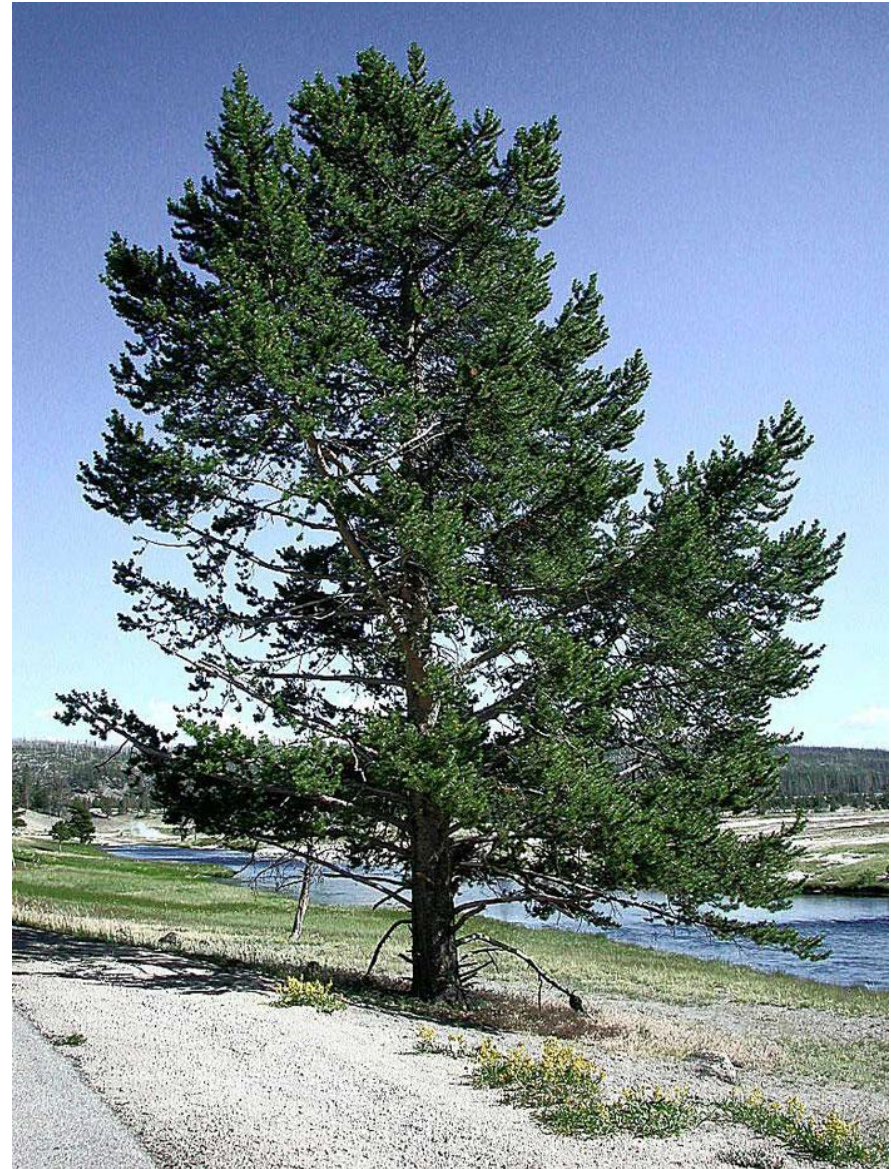


- **Sporangium** (pl. **sporangia**) a structure in which spores are produced; it may be either unicellular or multicellular.
- **Strobilus** (pl. **strobili**) an aggregation of sporophylls on a common axis.
- it usually resembles a cone or is somewhat conelike in appearance.



The conifers

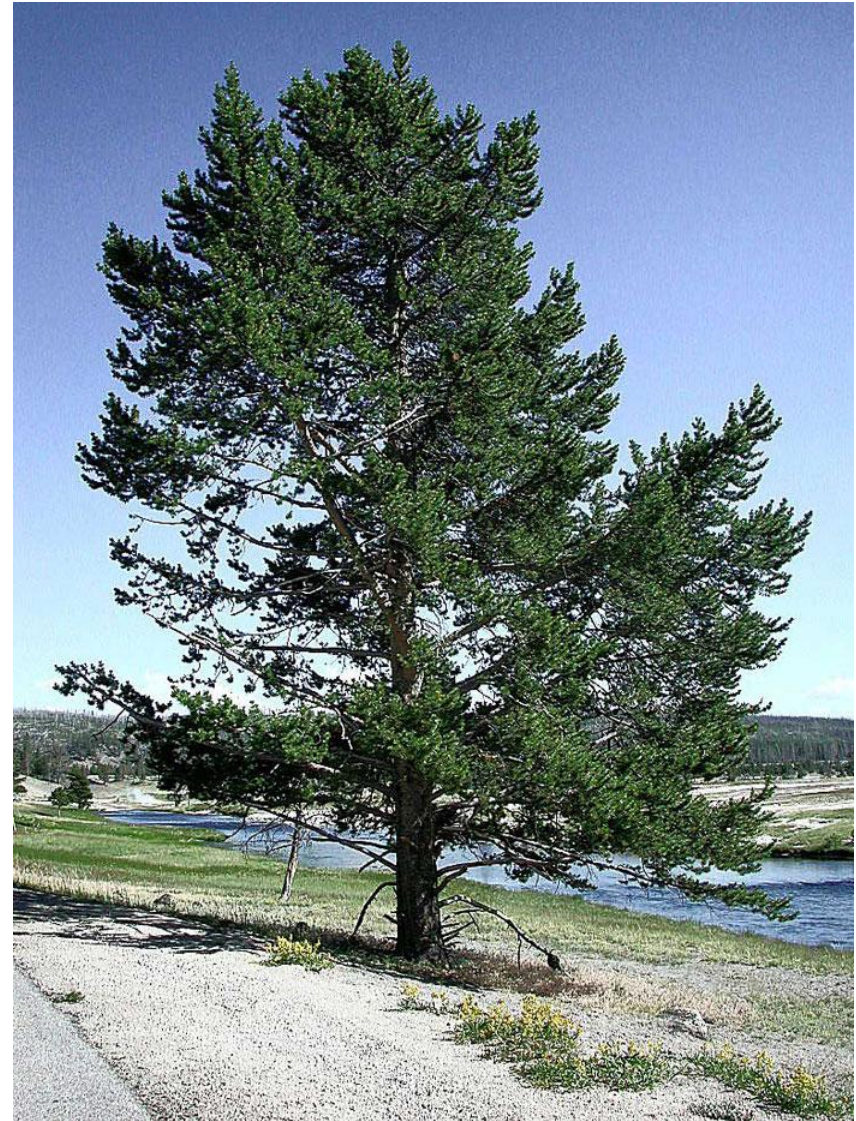
- **Pines** are the largest genus of conifers, *Pinus* (pines) has over 100 living species.
- They are the dominant trees in the vast coniferous forests of the Northern Hemisphere.
- They have also been planted extensively in the Southern Hemisphere.



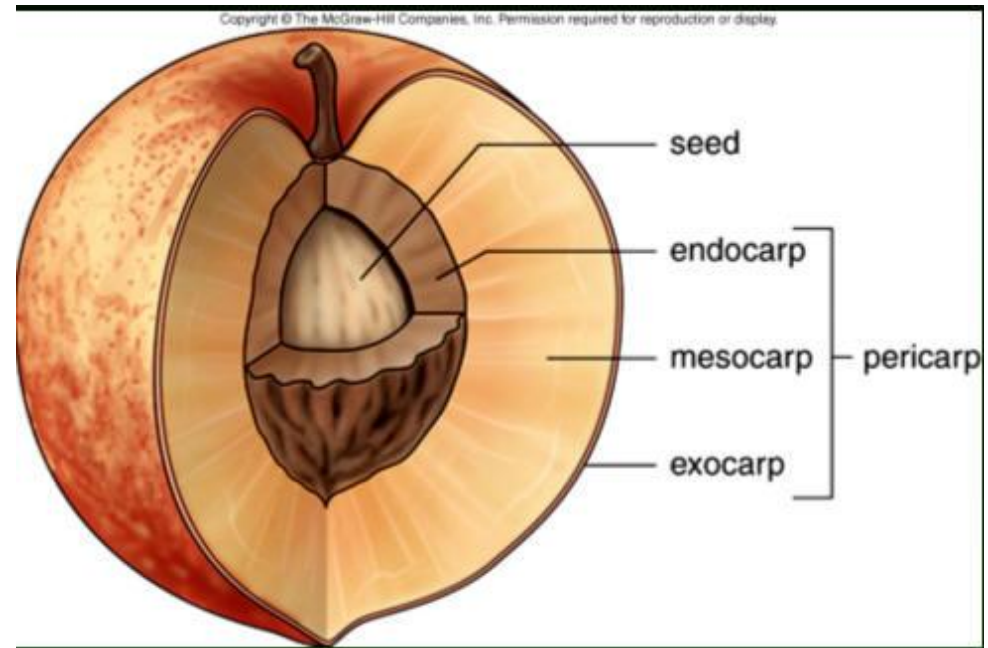
- They include the world's oldest known living organisms like ,the bristlecone pines.
- Some trees still standing are about 4,600 years old, and one that was, cut down in 1964 was found to have been about **4,900** years old.



- Most gymnosperm wood, including that of pines, consists of tracheids and differs from the wood of dicots in having no vessel members or fibers.
- Companion cells are absent from the phloem, but similar **albuminous** cells apparently perform the same function.

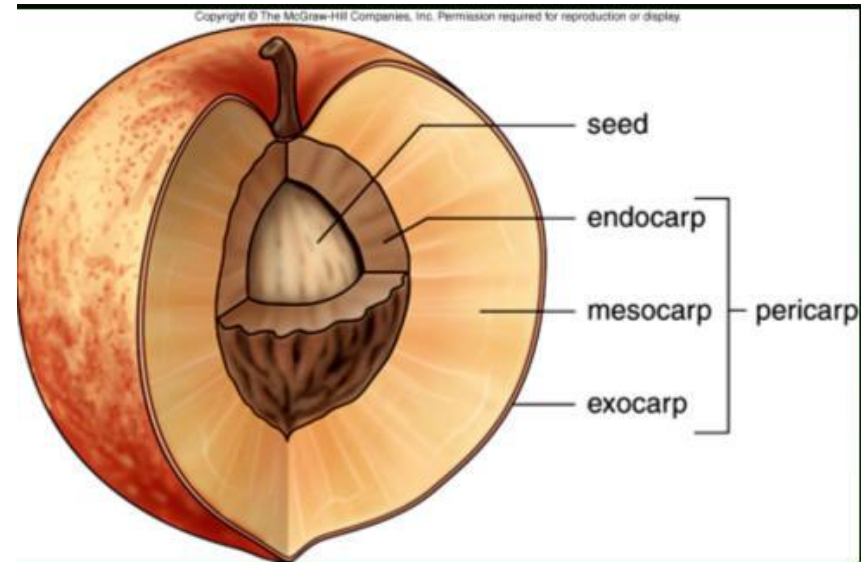


- **Angiosperms**
- The term angiosperm is derived from two Greek words: **angeion**, meaning “vessel,” and **sperma**, meaning “seed.”
- **Angiosperms are flowering plants.** Most of the plants we see are angiosperms, they are dominant plants in the world and make about **88% of Plant Kingdom.**



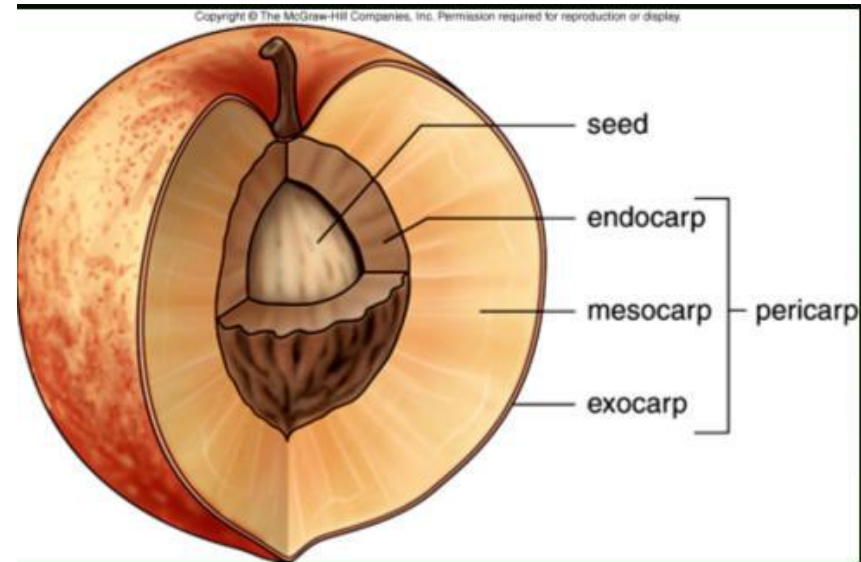
Unlike the other plant groups, angiosperms are often fertilized with the aid of animals: insects, birds, bats, that carry the pollen from one plant to another.

The plants and their pollinators have co-evolved in a symbiotic relationship.

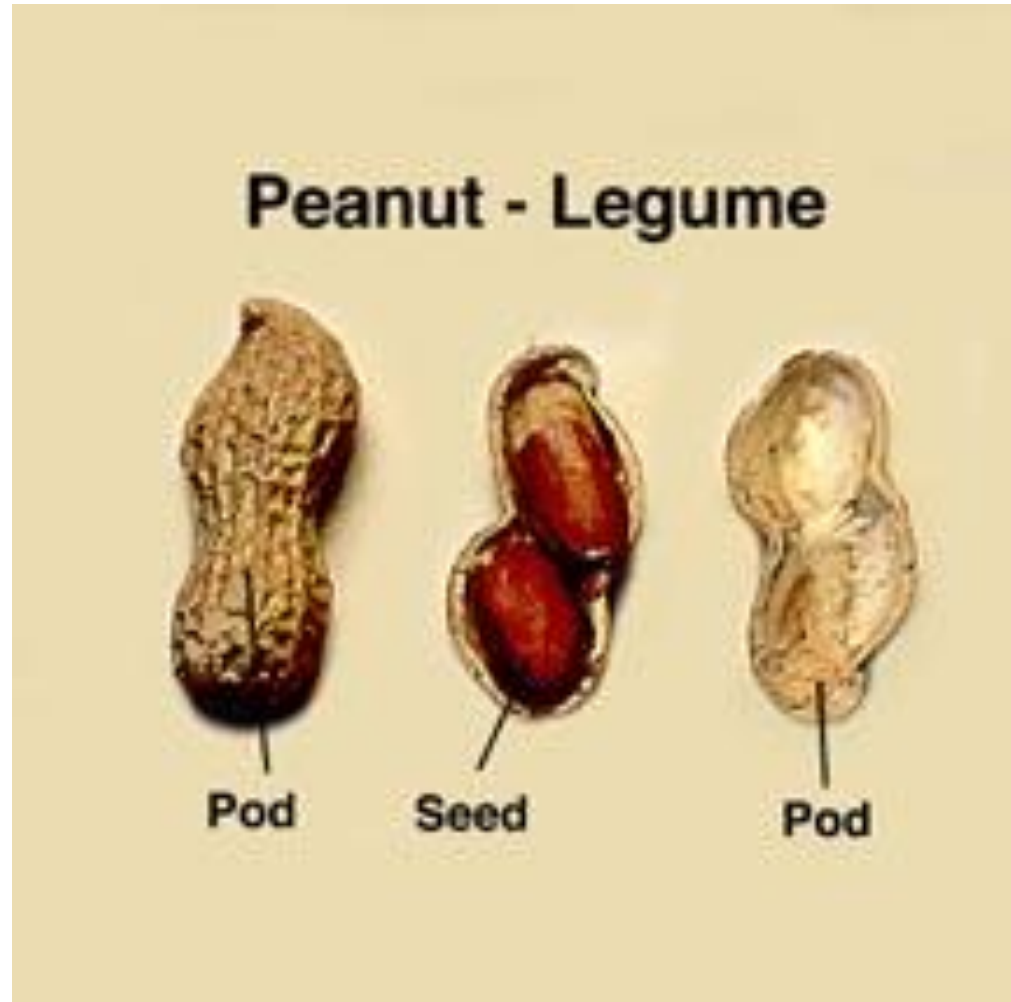


Flowers secrete nectar which is eaten by the pollinators.

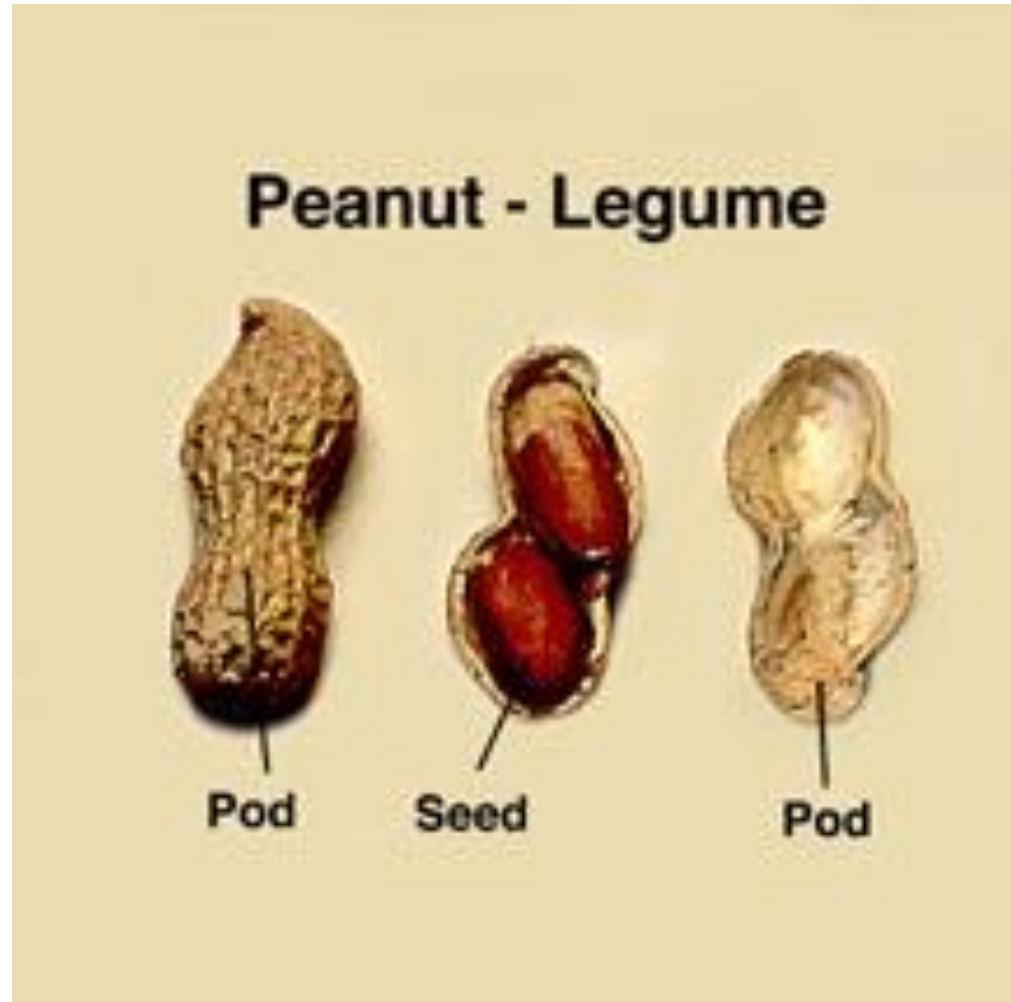
The pollen is carried from flower to flower on the body of the pollinator, as a consequence of its going into the flower in search of nectar.



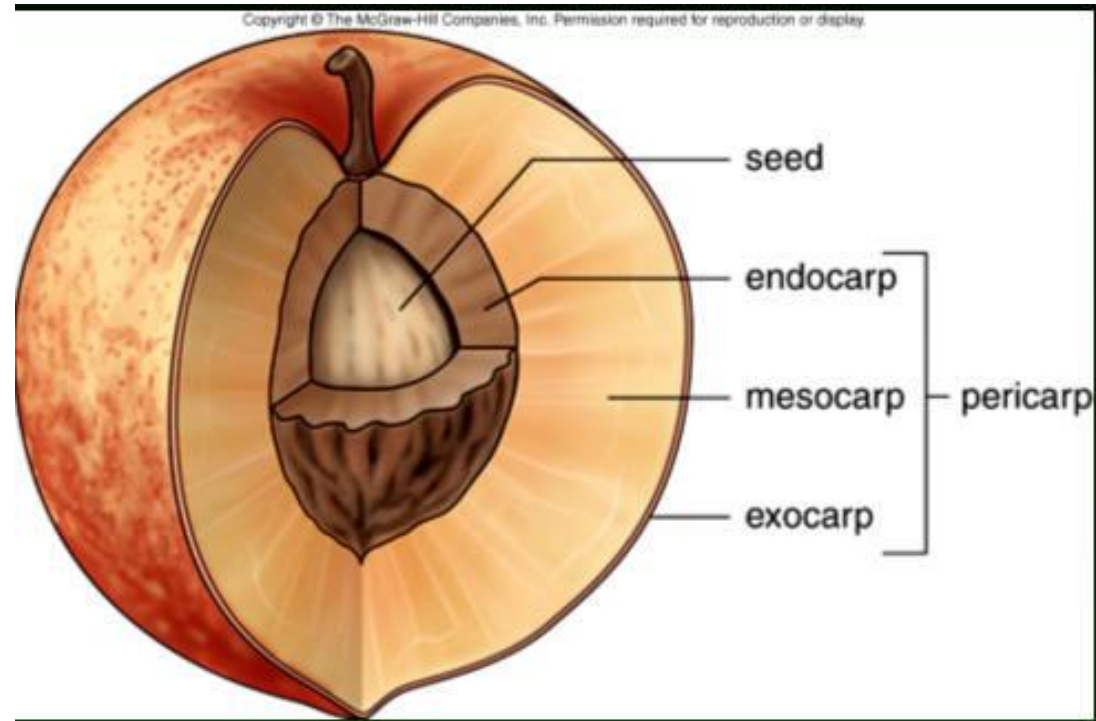
- The “vessel” is the **carpel**, which is like an inrolled leaf with seeds along its margins.
- A green pea pod, for example, is a **carpel** that resembles a leaf that has folded over and fused at the margins, enclosing the attached seeds.



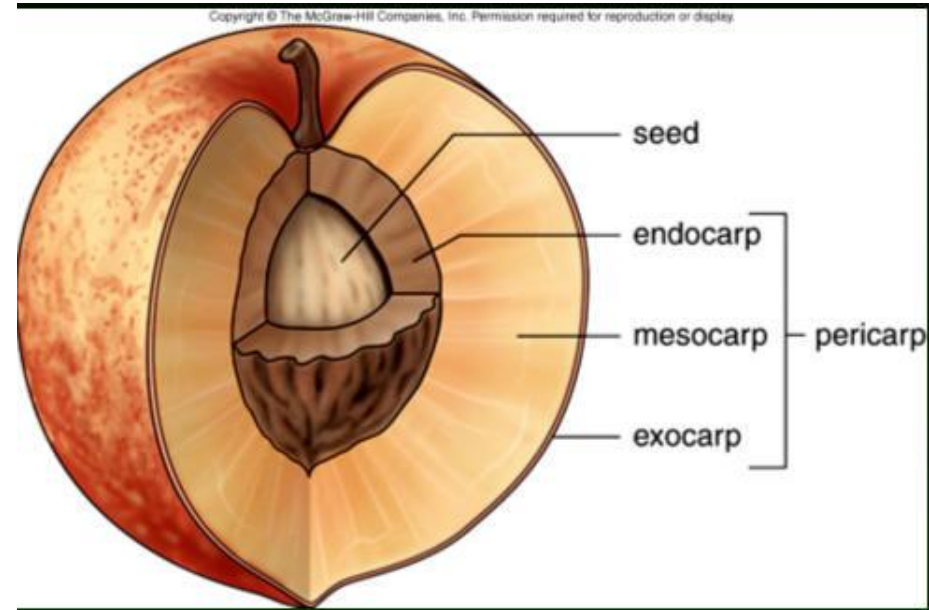
- Many flowers have pistils composed of either a single carpel or two or more united carpels.
- A seed develops from an ovule within a **carpel** and is part of an ovary that becomes a fruit.



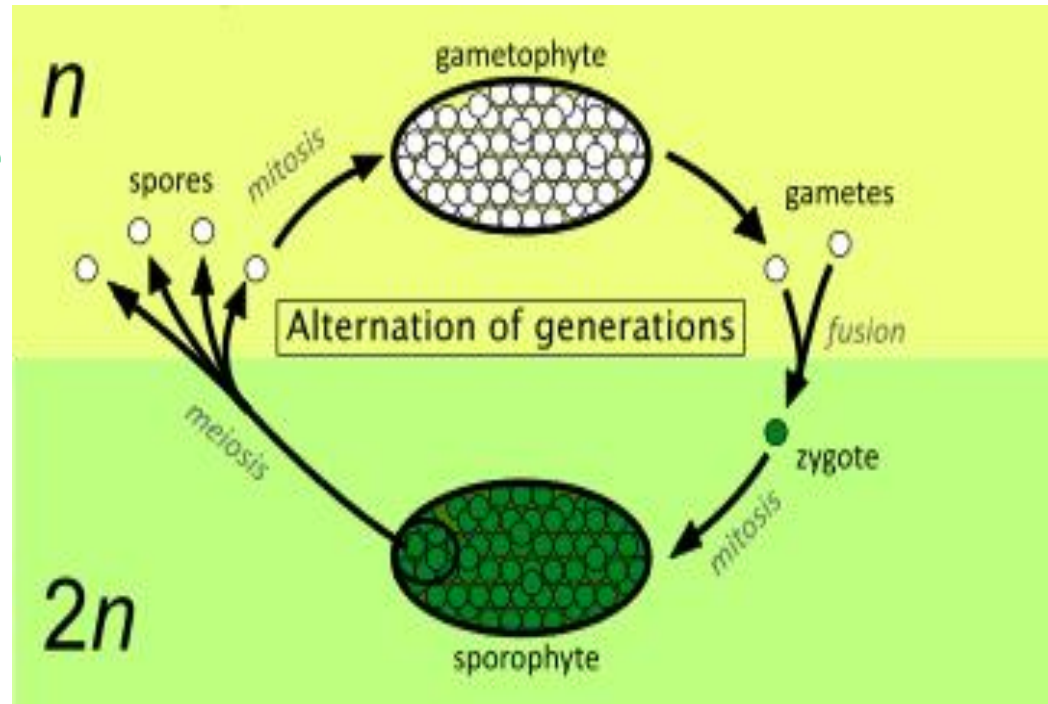
- All angiosperms are presently considered to be in the Phylum **Magnoliophyta**.
- Phylum Magnoliophyta has been divided into two large classes: the **Magnoliopsida** (dicots) and the **Liliopsida** (monocots).



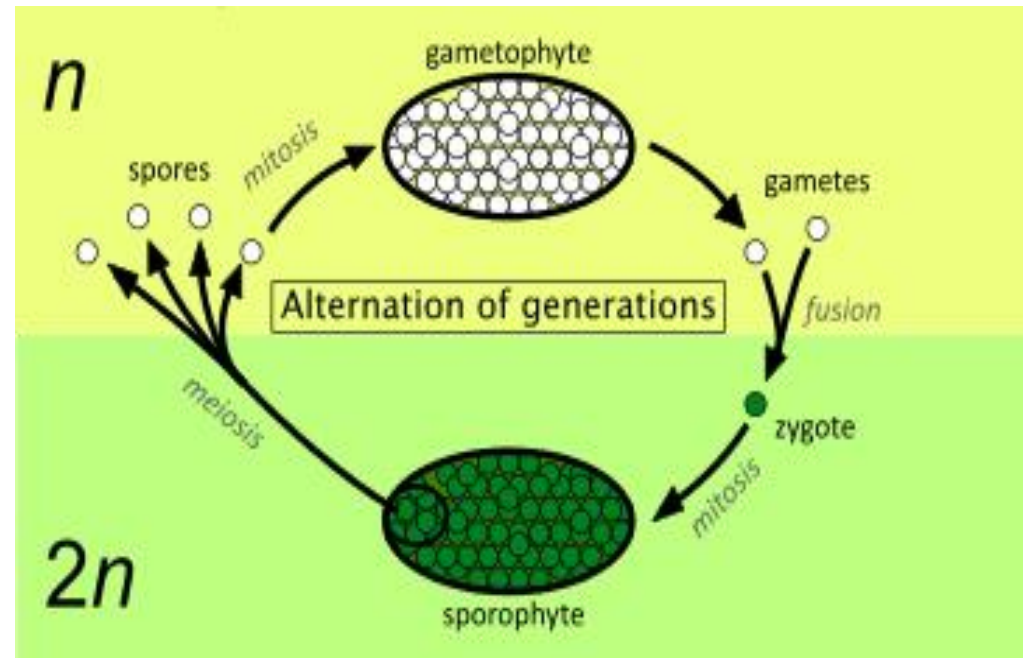
•The **angiosperms** generally have organs and tissues similar to those of the **gymnosperms**, the enclosed ovules and seeds of the angiosperms distinguish them from gymnosperms, which have exposed ovules and seeds.



- **Alternation of Generations**
- Is alternation between a **haploid gametophyte** phase and a **diploid sporophyte** phase in the life cycle of sexually reproducing organisms.
- A **haploid phase**, the **gametophyte**, produces **gametes**, which, after fusion in pairs form, a **zygote**.

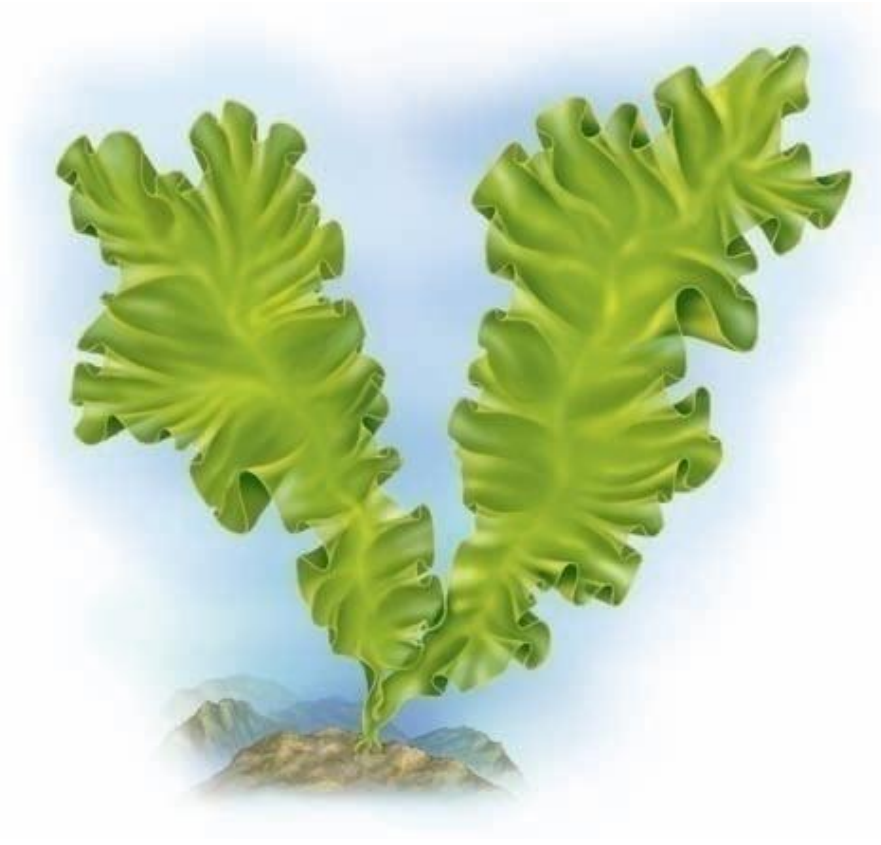


- The zygote germinate, producing a **diploid phase, the sporophyte** .
- **Spores** produced by **meiotic** division from the **sporophyte** give rise to new **gametophytes**, completing the cycle.



Alternation of Generations

- This life cycle is characteristic of plants and many algae.
- Sea lettuce *Ulva* is a multicellular seaweed with flattened green blades that may be up to 1 meter or more long.
- A basal holdfast anchors the **blades**, which may be either **haploid** or **diploid**, to rocks.



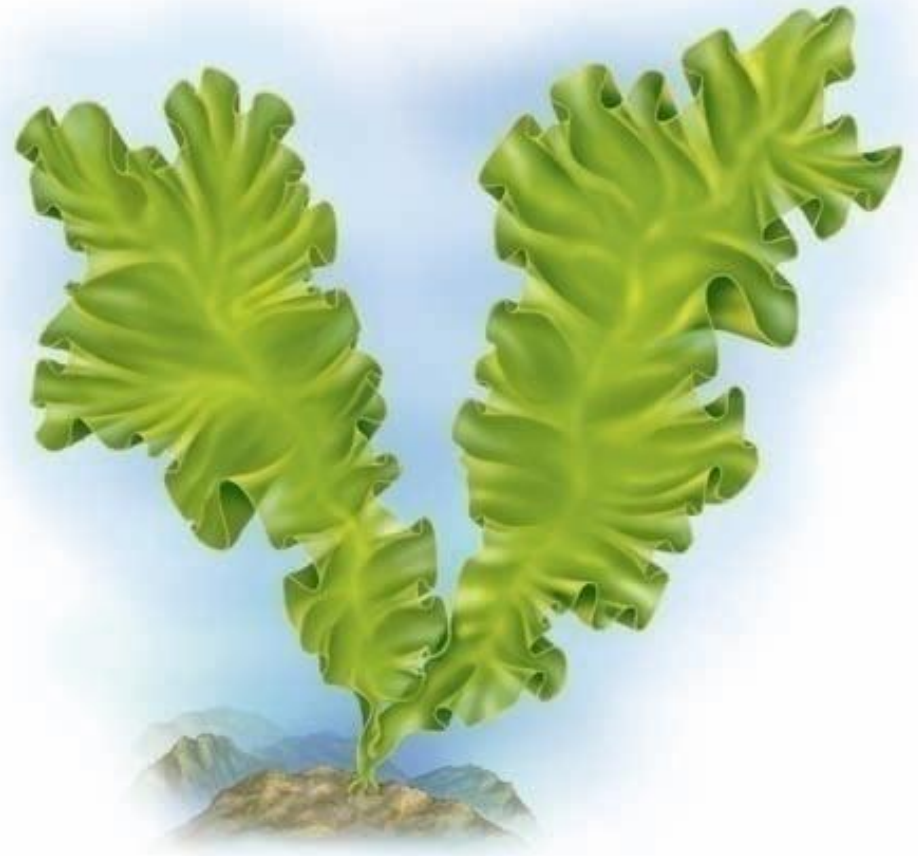
Sea lettuce (*Ulva*)

- Diploid blades produce spores that develop into haploid blades bearing **gametangia** .
- The gametes from the haploid blades fuse in pairs, forming zygotes, that can potentially grow into new diploid blades.



Sea lettuce (*Ulva*)

Except for the reproductive structures, the haploid and diploid blades of sea lettuce are indistinguishable from one another, a feature known as **isomorphism**.



Sea lettuce (*Ulva*)

- **PLANTS AND THE ENVIRONMENT**
- The interactions between organisms and their environment determine whether or not a species, or an individual member of a species, can survive and reproduce in a particular habitat.
- The environment of each habitat is determined by both living and nonliving factors.
- The Living, factors include all of the other organisms in the habitat with which the organism interacts.

- **Ecology** is the biological discipline that is concerned with the relationships of organisms to each other and to their environment.
- A system involving interactions of living organisms with one another and with their nonliving environments.

- Two types of components make up the **biosphere** (Zone of the earth where life is found) and its ecosystems:
- Type one, called **abiotic**, consists of nonliving components such as water, air, nutrients, and solar energy .
- The other type, called **biotic**, consists of biological components—plants, animals, and microbes.

- **Population** is a group of individual organisms of the same species living in a particular area.
- Different species and their **populations** thrive under different physical and chemical conditions.
- Some need bright sunlight; others flourish in shade.
- Some need a hot environment; others prefer a cool or cold one.
- Some do best under wet conditions; others thrive under dry conditions.

- **Community** composed of populations of all species living and interacting in an area at a particular time.
- **Ecosystem** any geographic area that includes all of the organisms and nonliving parts of their physical environment.
- In any **ecosystem**, the **producers** and **consumers** interact, forming food chains or interlocking food webs that determine the flow of energy through the different levels.



Biosphere

Parts of the earth's air, water, and soil where life is found

Ecosystem

A community of different species interacting with one another and with their nonliving environment of matter and energy

Community

Populations of different species living in a particular place, and potentially interacting with each other

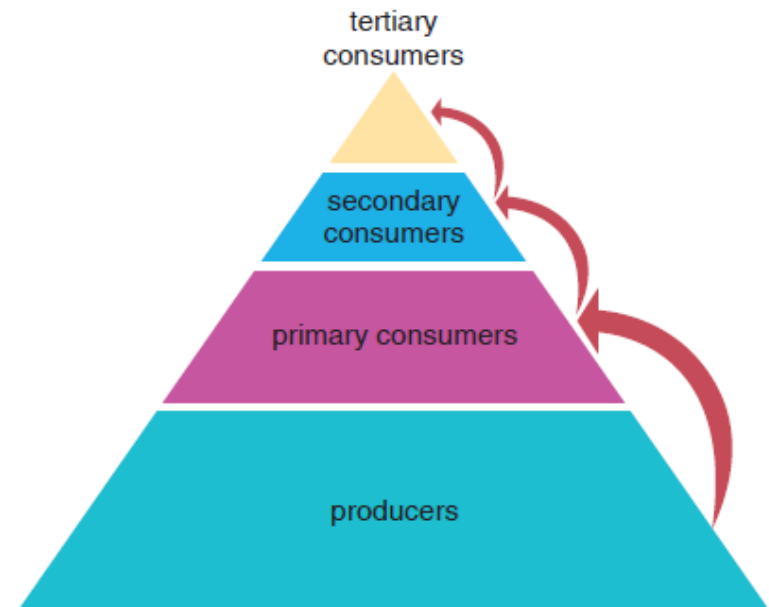
Population

A group of individuals of the same species living in a particular place

Organism

An individual living being

- In such **chains** or **webs**, each link feeds on the level below and is consumed by one at a higher level, with photosynthetic organisms at the bottom and the largest non-herbivorous animals at the top.



- **producers** are organisms capable of carrying on photosynthesis (e.g., plants, algae) and store energy that may be released by other organisms.
- **primary consumers** are animals such as cows, caterpillars, and other organisms that feed directly on producers.
- **Secondary consumers** such as tigers, toads, and tsetse flies, feed on primary consumers.

- **Decomposers**, break down organic materials to forms that can be reassimilated by the producers.
- The foremost **decomposers** in most **ecosystems** are **bacteria** and **fungi**.
- **Scavenger**: is an organism that feeds on dead organisms that were killed by other organisms or died naturally.
- Examples include **vultures**, **flies**, and **crows**.

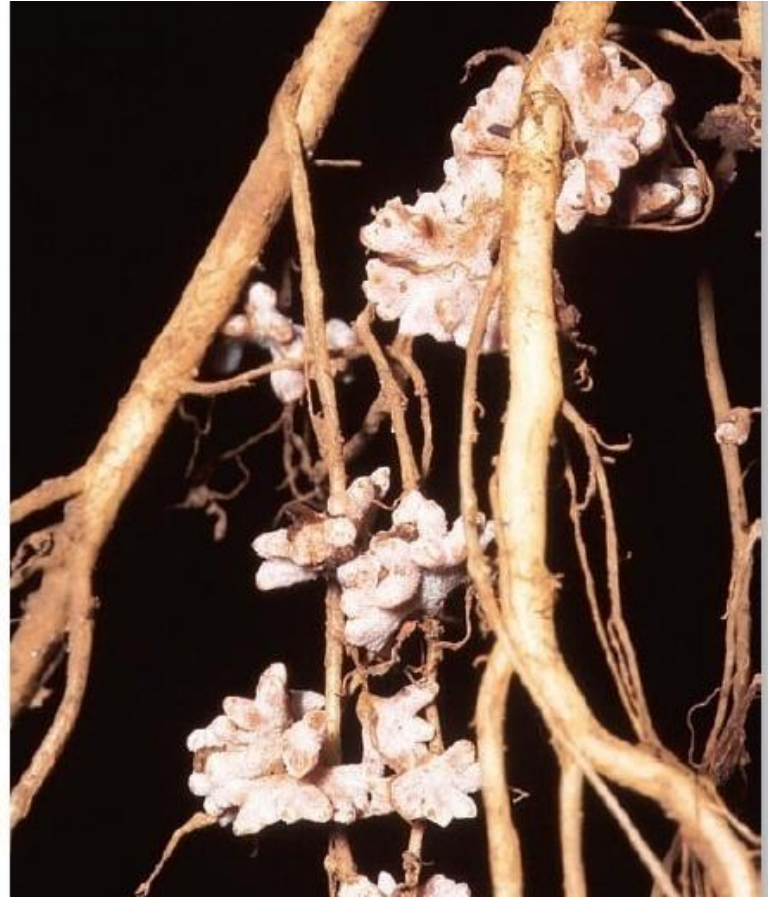
- **Natural cycles**
- Water and elements such as carbon, nitrogen, and phosphorus are constantly cycling throughout nature.
- Such cycling involves transformation between organic and inorganic forms.
- Nutrients constantly cycle and are recycled in the web of life.
- Carbon, nitrogen, water, phosphorus, and other molecules have been passing through cycles for eons.

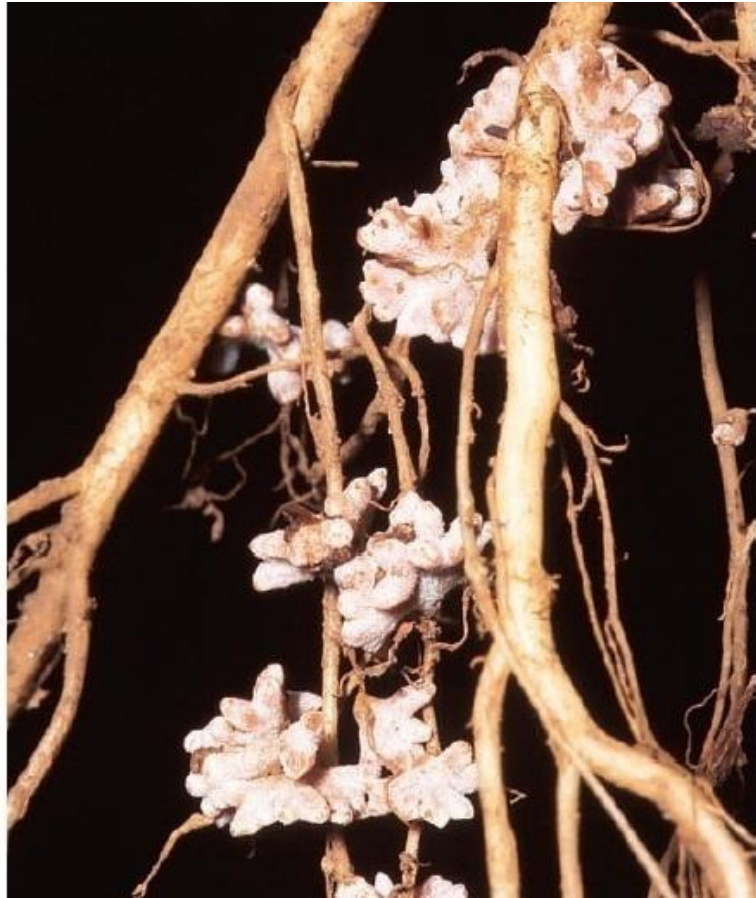
- Water evaporates from bodies of water and is transpired from plants, which make up more than **98%** of the earth's biomass.
- Water also evaporates from the surfaces of animals and damp areas of the earth as the sun shines on them.
- The water vapor rises into the atmosphere, condenses, and falls back to earth in the form of rain, snow, and hail in a constant cycle.

- **The Nitrogen Cycle**
- Most of the nitrogen supply of plants (and indirectly of animals) is derived from the soil in the form of inorganic compounds and ions taken in by the roots.
- These compounds and ions include those that contain nitrogen combined with oxygen or hydrogen.

- Animals, through their digestive processes, and bacteria and fungi **break down the more complex molecules of dead plant and animal tissues to simpler ones.**
- Some nitrogen from the air is also fixed—that is, converted to **ammonia** or other nitrogenous compounds by various **nitrogen-fixing bacteria.**

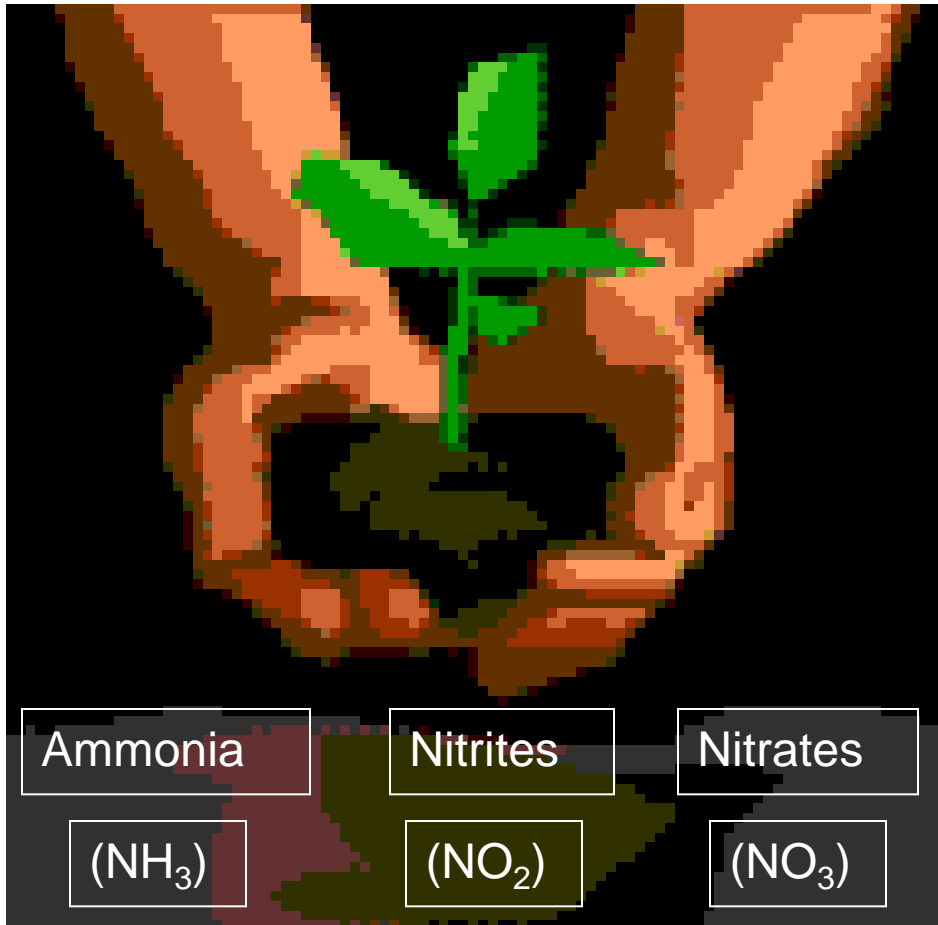
- Some of these organisms gain access to various species, particularly legumes (e.g., peas, beans, clover, alfalfa), through the root hairs, with the plant producing root nodules in which the bacteria multiply.





Root nodules on the roots convert nitrogen from the air into forms that can be used by the plant.

Nitrifying bacteria in the ground first combine **ammonia** with **oxygen** to form **nitrites**. Then another group of nitrifying bacteria convert **nitrites** to **nitrates** which green plants can absorb and use.



Nitrifying bacteria in soil combine ammonia with oxygen



Ammonia changes to nitrites



Nitrifying bacteria in soil convert nitrites to nitrates



Plants absorb nitrates and grow