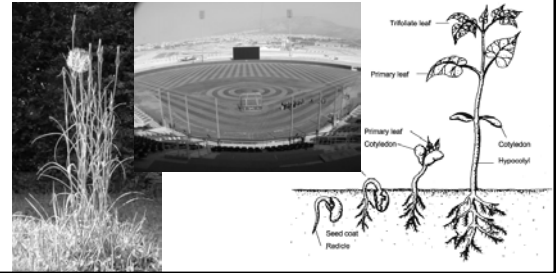


# Chapter 9 Seed Plants



## Section 1 The Characteristics of Seed Plants

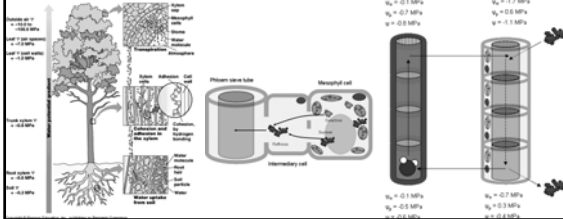
- seed plants outnumber seedless by 10 to 1 – all seed plants have vascular tissue and use seeds to reproduce – have sporophyte and gametophyte stages – the plant we see is the sporophyte – gametophyte stage is microscopic – most seed plants live on land -



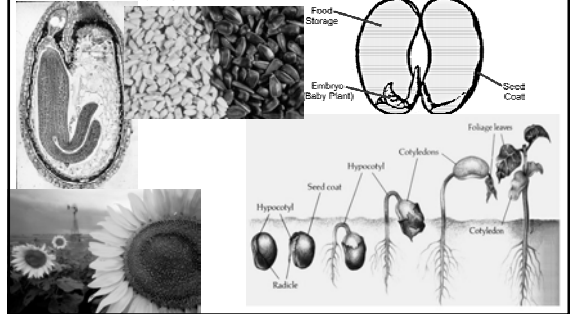
-2 types of vascular tissue for seed plants

-PHLOEM = vascular tissue through which food moves (sugars)  
- food is made in the leaves and travels through the phloem to the stems and roots –

-XYLEM = vascular tissue that water and nutrients travel through  
- ex. Water and nutrients absorbed by the roots and travel to leaves and stems

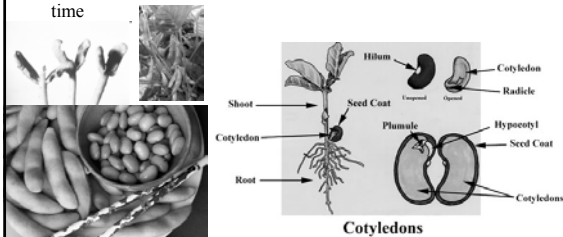


-Seeds = contain a young plant inside a protective covering – seed plants do not need water in the environment to reproduce – seeds develop after the sperm has fertilized the egg – helps keep the embryo from drying out –



There are 3 important parts to a seed

- Embryo = young plant that develops from an zygote
- Stored food = embryo uses this until it can make it's own – COTYLEDONS is a seed leaf that stores food
- Seed Coat = outer coat – thought of as “skins” – keep the embryo from drying out – can allow a seed to remain inactive for a long time



Seed Dispersal = scattering of seeds

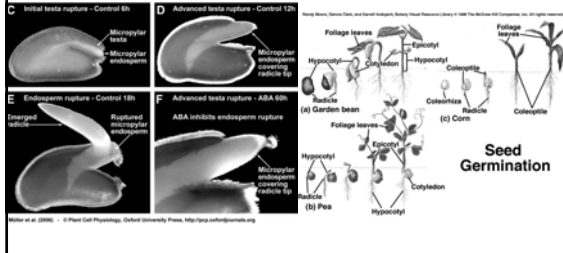
Animal – by being eaten and passed through digestive system – carried by fur or clothing –

Water – ocean currents – rivers – streams

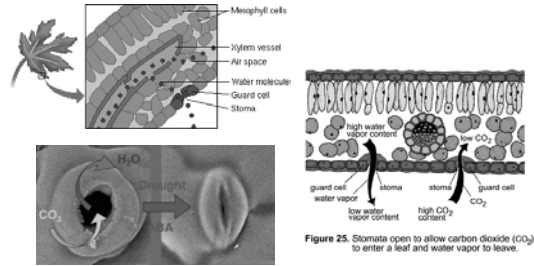
Wind -



Germination – early growth stage of the embryo – seed absorbs water – uses stored energy to begin growing – roots grow downward first then stems and leaves grow upward – seeds that are dispersed farther away from parents have a greater chance of survival = don't have to compete with parent for light, water and nutrients

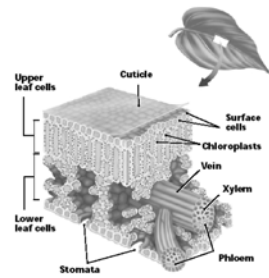


Leaves – capture energy from the sun – carry out food making (photosynthesis) – stomata = underside of the leaf that open and close to allow carbon dioxide in and oxygen and water vapor out – chloroplasts located on the top of the leaf = where the photosynthesis occurs = most direct sunlight



Photosynthesis

- carbon dioxide enters through the stomata
- water absorbed in roots travels to leaf through the xylem
- sugar and oxygen produced from water and carbon dioxide
- oxygen goes out through the stomata
- sugar enters phloem and travels throughout the plant



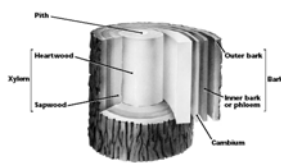
-Process of evaporation from plant leaves to the air = transpiration – plants can retain water by closing off the stomata

-Stems carry substances between the plant leaves and roots – stems provide support to hold up leaves – some plants store energy in stems (asparagus) – different sizes depending on the plant and the environment they have adapted to

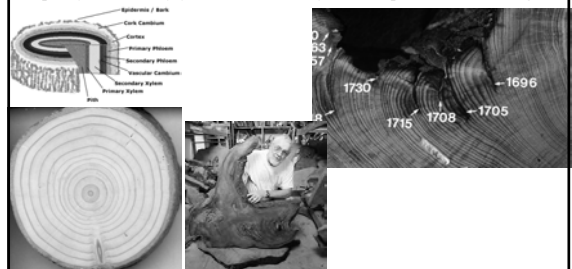


-Stems can be herbaceous (soft) or woody (hard and ridged) – both types have phloem and xylem –

- Woody = have bark to protect the cells inside – have layers of heartwood that give support
- Cambium = these cells divide up to become new phloem and xylem – will increase the stem width
- Heartwood – no longer xylem or phloem but strengthens the stem
- Pith – center – in young trees stores food and water



Annual rings = one ring of growth per year – made by the xylem cells that form in the spring – in spring they grow rapidly and are wide with thin walls – summer grow slowly and are small with thick walls – one pair of light and dark rings = one year – can estimate a tree's age by counting the rings – rings can also give clues about weather conditions of past years = rainy years have more xylem and produce wider rings



Roots – anchor the plant to the ground and absorb water and nutrients  
 – more roots mean more water absorption

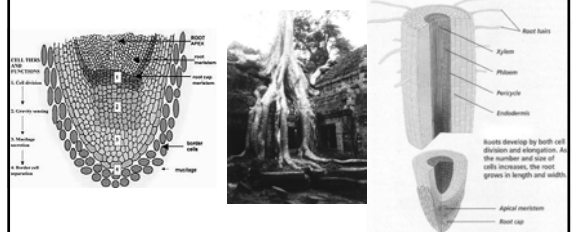
taproot system = long thick main root – ex. Carrots

fibrous system = several main branching roots – ex. grass



### Root structure

- tip = root cap – contains dead cells to protect root from injury – root grows behind the root cap – root hairs increase the root surface area and allow more water absorption – vascular tissue = xylem and phloem – water and minerals travel through the xylem – Phloem transports food from the leaves to the roots – cambium produces new xylem and phloem



### Section 2 Gymnosperms

- a seed plant that produces naked seed (not in protective casing) – many have needlelike leaves or scalelike leaves – have deep growing root systems – most are trees – the oldest seed plant



### 4 types of gymnosperms

cycads – live in tropics – look like palm trees with cones

ginkgo – only one species exists today – grow up to 25 meters – tolerate pollution well

gnetophytes – only found in hot, dry areas of south africa, deserts of western U.S. and tropical rain forests – are shrubs, trees, or vines

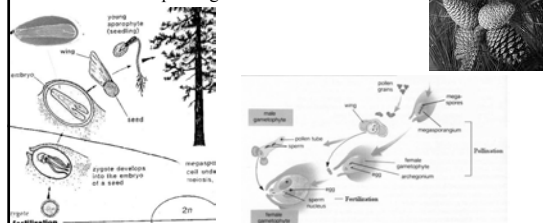
conifers – cone bearing plants – includes the pine trees – many are evergreen - are the tallest and shortest trees on earth – one of the oldest organisms on earth



Cones – most reproduce with them – are covered with scales – gymnosperms produce male and female cones – some produce only male or only female – male cones produce pollen (microscopic cells that will later become sperm) – Female cones contain at least one ovule (structure that contains an egg cell) – after fertilization the ovule becomes a seed

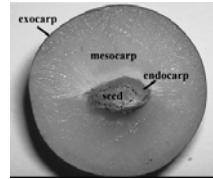
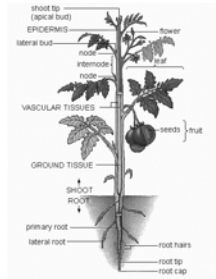


Pollination = transfer of pollen to ovule - pollen carried by wind onto the sticky substance on female cones – female cones close and seal – inside the cone fertilization occurs – seed forms on the scales – female cones stay on the tree until the seeds mature – male cones fall off after the release their pollen – female cones increase in size and start to point downward as seeds mature – when the seeds are mature the scales open and the seeds are carried away – only a few seeds will land in a suitable spot to grow a new tree



**Section 3 Angiosperms**

- produce seeds that are enclosed in a fruit – ovary = where the seeds develop – located in the plants' flower – all angiosperms create flowers and fruit – found all over earth



**Flowers**

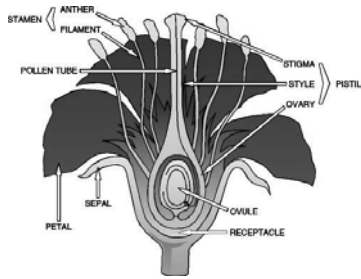
-come in all different sizes, shapes, and colors – all are used for reproduction –

-When flower is a bud it's protected by sepals – after sepals fold back the petals are exposed – petals color, shape, and scent used to attract insects and animals – most flowers have both male and female reproductive parts



Stamens = thin stalks topped with small knobs = male reproductive parts – pollen produced by knob

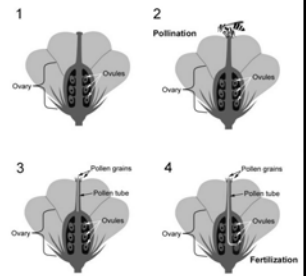
Pistil = usually in the center of the flower – sticky tip called the stigma – slender tube called the style – ovary contains the ovules



**Reproduction**

-pollen gets on the stigma – sperm and egg cells join in the flower's ovule – zygote develops into the embryo part of the seed

-Most use insects, birds, bats, etc. for pollination – nectar is located deep within the flower – when organism goes inside to get the nectar brushes against anthers and gets coated with pollen – some of pollen can drop into stigma



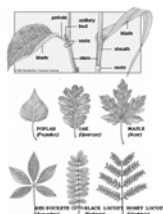
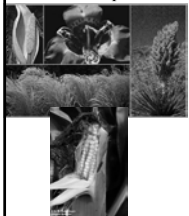
-As seed develops the ovary changes into a fruit – fruit is used to disperse the seeds

-2 major types of angiosperms

-Monocots = have only one seed leaf - grasses

-Dicots = have two seed leafs – apples, beans, oaks, etc

- seed leafs provide food for the embryo



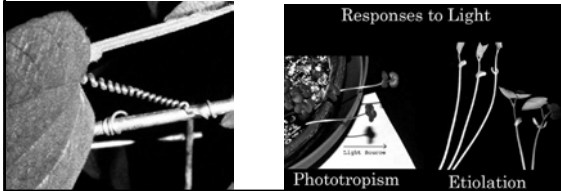
- Angiosperms used for food, livestock feed, clothes, rubber, furniture, medicine, etc.



**Section 4 Plant Responses and Growth**

Tropisms – a plants growth response towards or away from a stimulus  
 – towards a stimulus = positive tropism – away from stimulus = negative tropism - plants can respond to touch, light, and gravity

- touch = ex. Vines coil
- light = ex. Sunflower moves toward sun
- gravity = ex. Roots grow down and stems grow up



**Plant hormones**

-control tropisms, germination, flower formation, shedding of leaves, ripening of fruit, etc.

-Auxin = hormone that speeds up the rate at which a plant's cells grow – when light shines on one side of leaf, it moves it towards the sun -



Annuals = 1 lifecycle per year

Biannuals = 1 lifecycle per 2 years

Perennials = live more than 2 years – may be green all year long or the top part dies off and roots stay alive (potato)



**Feeding The World**

- Earth's population is growing very fast – labs are working to make plants that are resistant to insects, disease, drought, more food per plant, grow in different environmental conditions, etc. – scientists use genetic engineering = alter the organisms genetic material to produce the qualities people find useful – scientists use GPS to fertilize and spread soil to keep proper nutrients in the soil and prevent algal blooms – hydroponics = growing plants in solutions of water and nutrients (no soil) with roots anchoring in gravel or sand – problem is this is not cost effective

