Plant Unit

Plant Menu

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- Classification of Organisms
- Vascular Plants
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- Plant Defense Mechanisms
- Structures for Survival
- Structures for Reproduction
- Life Cycle
- Reproduction
- Photosynthesis
- Respiration
- Transpiration
- Response to Environment
- Fungi

Plant Characteristics

OBTAIN & USE RESOURCES FOR ENERGY

- need food, oxygen, and water, which provide required energy to perform the basic processes of life, such as growing and developing, or repairing injured parts.
- *Autotrophs* (ex: plants) provide their own food for energy through the process of *photosynthesis*
- *Heterotrophs* (ex: animals) must find an external source for food.
- Energy is released from food in most organisms through the process of *respiration*.

BACK

Plant Characteristics

RESPONSE TO STIMULI

- A *stimulus* is any change in an organism's surroundings that will cause the organism to react.
- Examples- changes in: light, temperature, sound, amount of water, space, amounts or types of food, or other organisms present.
- The reaction to the stimulus is called a *response*. It can be an action or behavior performed by the organism.

BACK

The Bloom of Plants Video 6:01

Plant Characteristics

ABILITY TO REPRODUCE

•Organisms have the ability to produce offspring that have similar characteristics as the parents. There are two basic types of reproduction:

•***Asexual reproduction*:** involves only one parent and produces offspring that is identical to the parent.

•***Sexual reproduction*:** involves two parents. The egg (female reproductive cell) and sperm (male reproductive cell) from these two parents combine to make an offspring that is different from both parents.

Reproduction Video 12:56

BACK

Plant Characteristics

GROWTH & DEVELOPMENT

- ***Growth*** is the process whereby the organism becomes larger.
- ***Development*** is the process that occurs in the life of the organism that results in the organism becoming more complex structurally.
- Organisms require energy to grow and develop.

Characteristics of Organisms Video 21:18

BACK

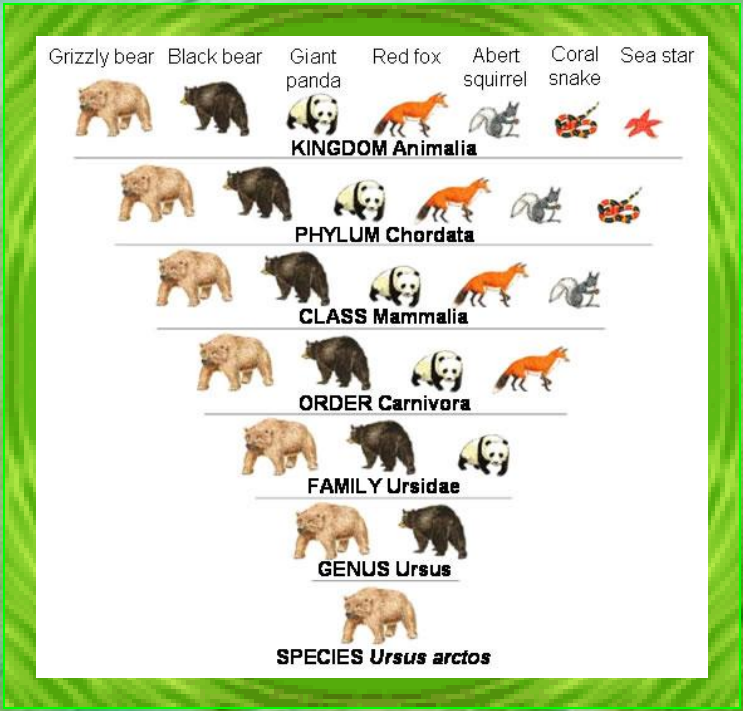
Classification of Organisms

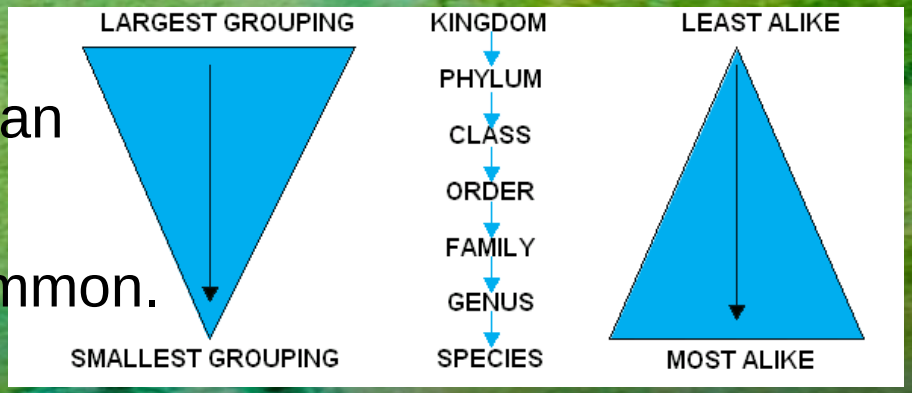
The study of classifying organisms is known as ***taxonomy***.

•An organism is placed into a broad group and is then placed into more specific groups based on its structures.

•The levels of classification, from broadest to most specific, include: kingdom, phylum, class, order, family, genus, and species.

•The more classification levels an organisms share, the more characteristics they have in common.





BACK

Kingdoms Website

Classification of Organisms

KINGDOM

- While scientists currently disagree as to how many kingdoms there are, most support five. (Plants, Animals, Fungi, Protists, Monerans)
- Organisms are placed into kingdoms based on their ability to make food and the number of cells in their body.

Kingdom of Plants Video 16:49

BACK

Classification of Organisms

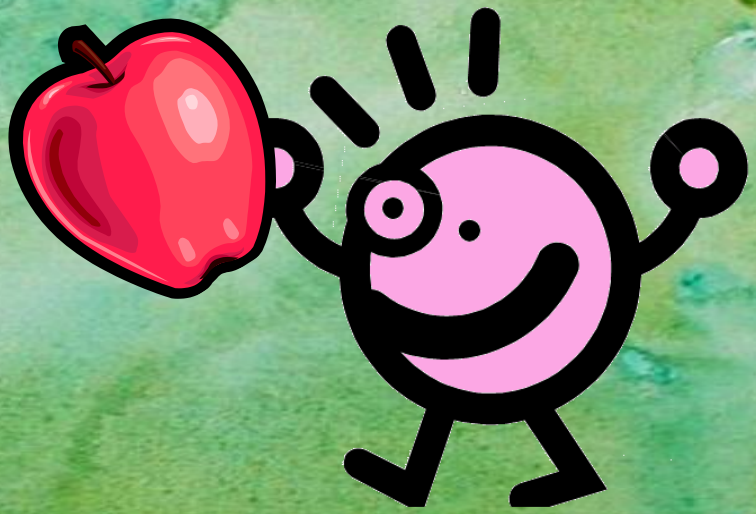
Taxonomists- scientists who group organisms.

King Phillip Came Over For Great...

KINGDOM
PHYLUM
CLASS
ORDER
FAMILY
GENUS
SPECIES

Classification of Organisms

My Pink Friend Prefers Apples



Monera

Animalia

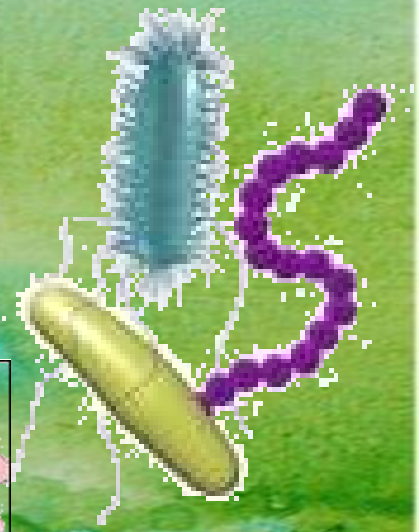
Fungi

Plantae

Protista

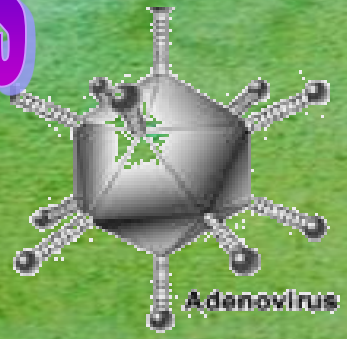
Classification of Organisms

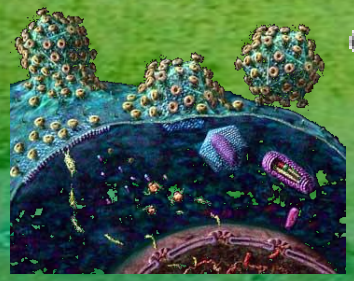
MONERA- made up of the smallest and most primitive forms of life.

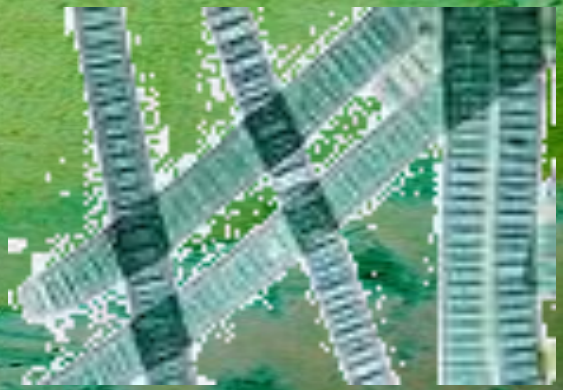


viruses

bacteria







back

Classification of Organisms

PROTISTA- made of organisms having nuclei and cell parts

amoeba

Recent excitement in the microbiology lab ended abruptly when Dr. Roscoe's "giant amoeba" turned out to be a fried egg.

paramecia

algae

back

KINGDOMS	CHARACTERISTICS	EXAMPLES
MONERA	One-celled, no nucleus or cell parts, may use photosynthesis	Bacteria, viruses, blue-green algae
PROTISTA	One-celled, have nucleus and cell parts, found in water	Amoeba, euglena, paramecium
FUNGI	Absorb nutrients, one-celled or many-celled, reproduce by budding or spores	Yeast, ringworm, mushrooms
PLANTAE	Convert sunlight to energy, absorb carbon dioxide, release oxygen, internal system moves water & nutrients through	Mosses, ferns, conifers, grasses, flowering plants
ANIMALIA	Must ingest nutrients, some have backbone, sexual reproduction, contains wide variety of life forms	Worms, fish, frogs, birds, snakes, spiders

Classification of Organisms

PHYLUM (pl. PHYLA)

•In the Plant Kingdom, phyla are sometimes referred to as *divisions*.

•Plants are normally divided into two groups: **vascular** and **nonvascular**.

•In the Animal Kingdom, there are 35 different phyla. These phyla can be divided into two groups: vertebrates and invertebrates.

BACK

Classification of Organisms

CLASS, ORDER, FAMILY

•levels more specific, include fewer organisms

GENUS (pl. GENERA)

•Contains closely related organisms.

•The genus is used as the first word in an organism's scientific name.

SPECIES

•All the organisms of the same type which are able to breed and produce young of the same kind.

•The species is used as the second word in an organism's scientific name.

Classification Video 26:53

BACK

Classification of Organisms

SCIENTIFIC NAME

•The scientific name of an organism is made up of its genus and species.

•It is written in italics (*Genus species*) with the genus capitalized.

•For example, *Canis lupus* is the scientific name for the wolf and *Pinus taeda* is the scientific name for a loblolly pine.

-example: *felix catus*

BACK

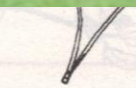
Classification of Organisms

white pine

White cedar

Sugar maple

1. a. The tree has needles ..... go to 2
   b. The tree has leaves ..... go to 5
2. a. The needles are in bundles ..... go to 3
   b. The needles are scale-like ..... white cedar
3. a. There are 5 needles ..... white pine
   b. There are 2 needles ..... go to 4
4. a. The needles are thick and spread away from each other ..... jack pine
   b. The needles are long and thin ..... red pine
5. a. The leaves are simple ..... go to 8
   b. The leaves are compound ..... go to 6
6. a. The leaflets radiate from one point ..... go to 7
   b. The leaflets do not radiate from one point .. white ash
7. a. There are 5 leaflets ..... buckeye
   b. There are 7 leaflets ..... horse chestnut
8. a. The leaf has notches ..... go to 9
   b. The leaf does not have notches ..... go to 10
9. a. The notches are pointed ..... silver maple
   b. The notches are rounded ..... sugar maple
10. a. The leaf is tapered at both ends ..... dogwood
    b. The leaf is heart-shaped ..... catalpa



Jack pine

Red pine

dogwood

buckeye

Silver maple

Horse chestnut

White ash

catalpa

Classification of Organisms

GROUPS OF PLANTS

All plants are included in this kingdom, which is then broken down into smaller divisions based on several characteristics, for example:

- How they absorb and circulate fluids – vascular or nonvascular
- How they reproduce – spores or seeds;
- Method of seed production – cones or flowers;
- Type of seed leaf – monocot or dicot.

BACK

VASCULAR PLANTS

- largest group
- well-developed system for transporting water and food; they have true roots, stems, and leaves.
- help circulate water and food throughout the plant.
- ***Xylem*** transport water and minerals from the roots up to the rest of the plant.
- ***Phloem*** transport food from the leaves down to the rest of the plant.
- **Examples**:

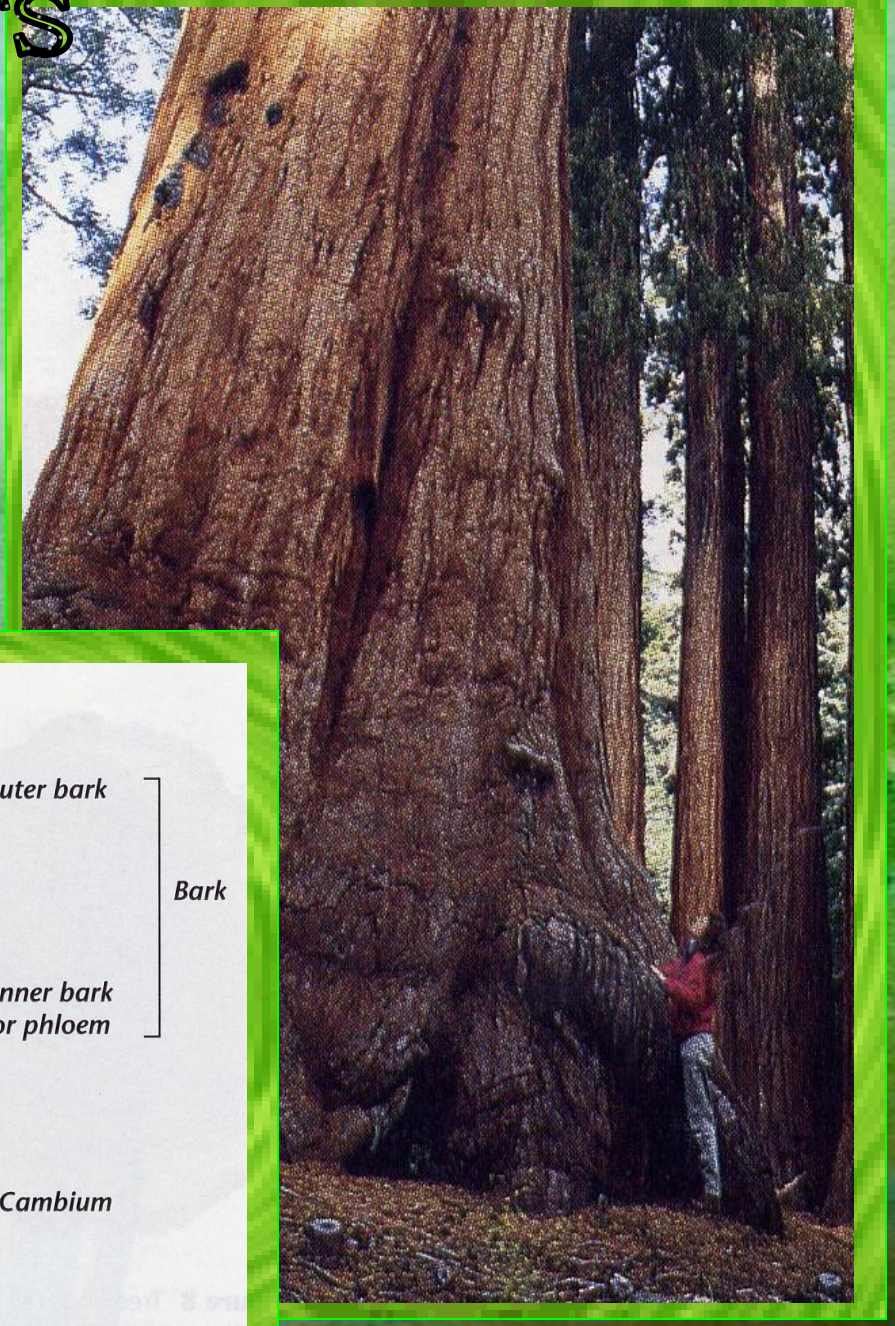
  woody stems- trees & bushes

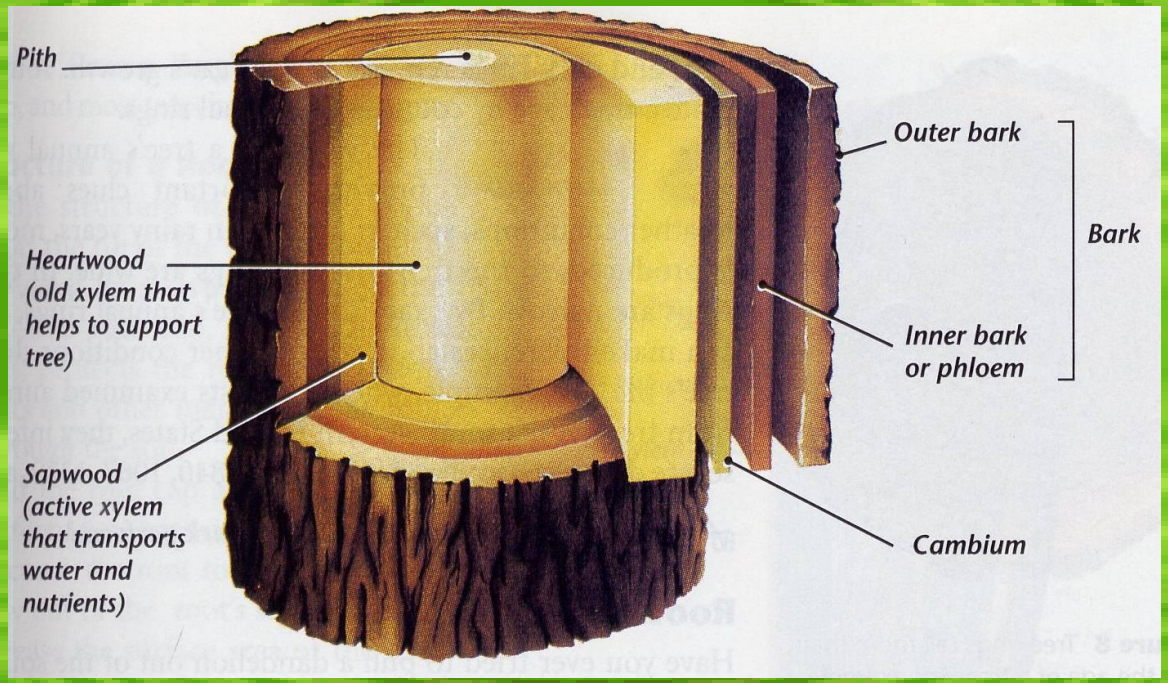
  herbaceous stems- grasses

BACK

Back to Phylum

VASCULAR PLANTS





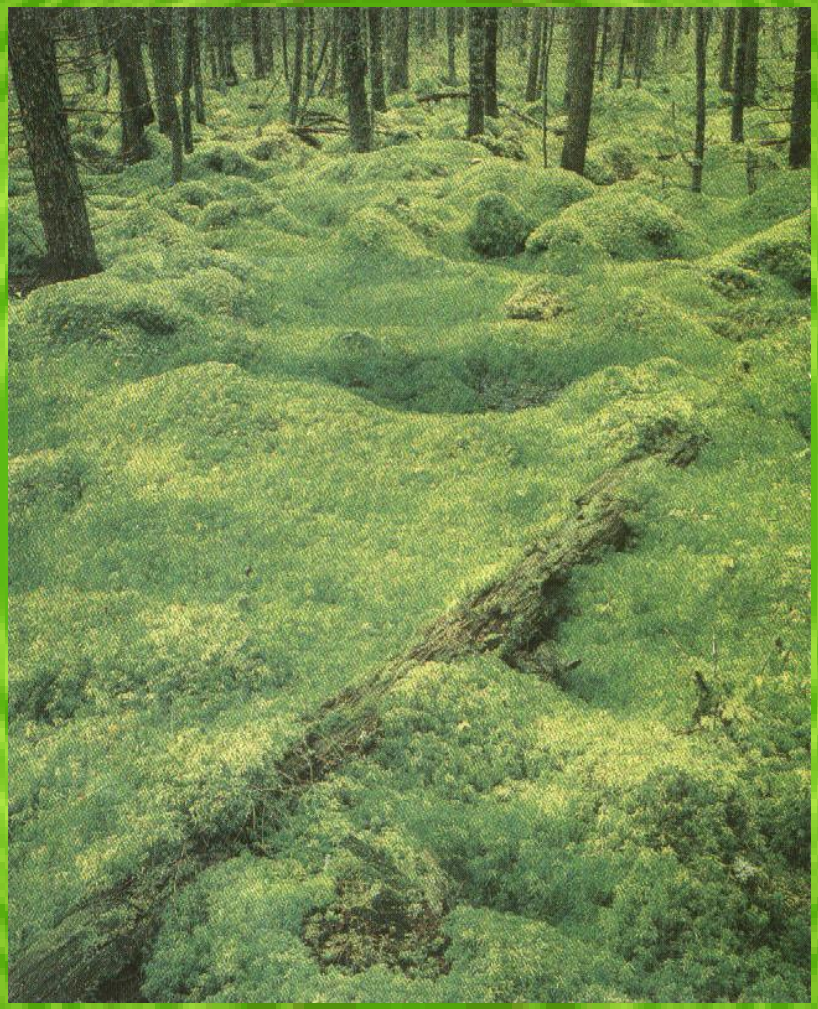
NON-VASCULAR PLANTS

- Plants do not have a well-developed system for transporting water and food; do not have true roots, stems, or leaves.
- They must obtain nutrients directly from the environment and distribute it from cell to cell throughout the plant. This usually results in these plants being very small in size.
- Examples: mosses, liverworts, and hornworts.

BACK

Back to Phylum

NON-VASCULAR PLANTS



Mosses

Moss Video

Back to Phylum

NON-VASCULAR PLANTS

Liverworts

Liverworts Video

Back to Phylum

NON-VASCULAR PLANTS

Hornworts

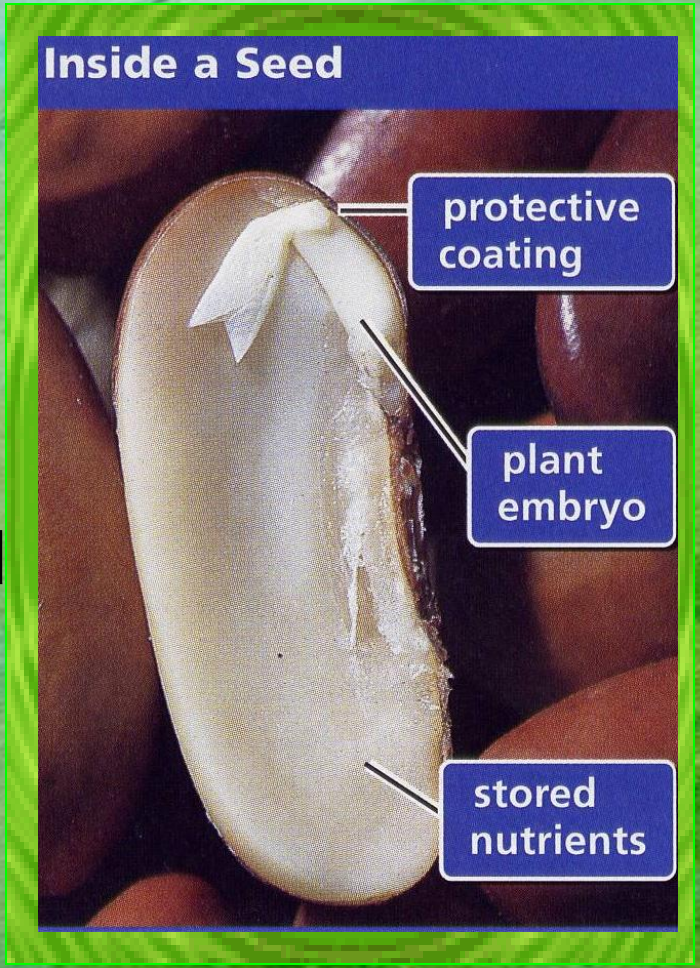
Hornwort Video

Back to Phylum

SEED PRODUCING PLANTS

•Seeds contain the plant ***embryo*** (the beginnings of roots, stems, and leaves) and stored food (***cotyledons***) and are surrounded by a seed coat. From those seeds, new plants grow.

•There are two major groups of seed-producing plants: cone-bearing plants and flowering plants.



Monocots & Dicots

BACK

Types of Seeds

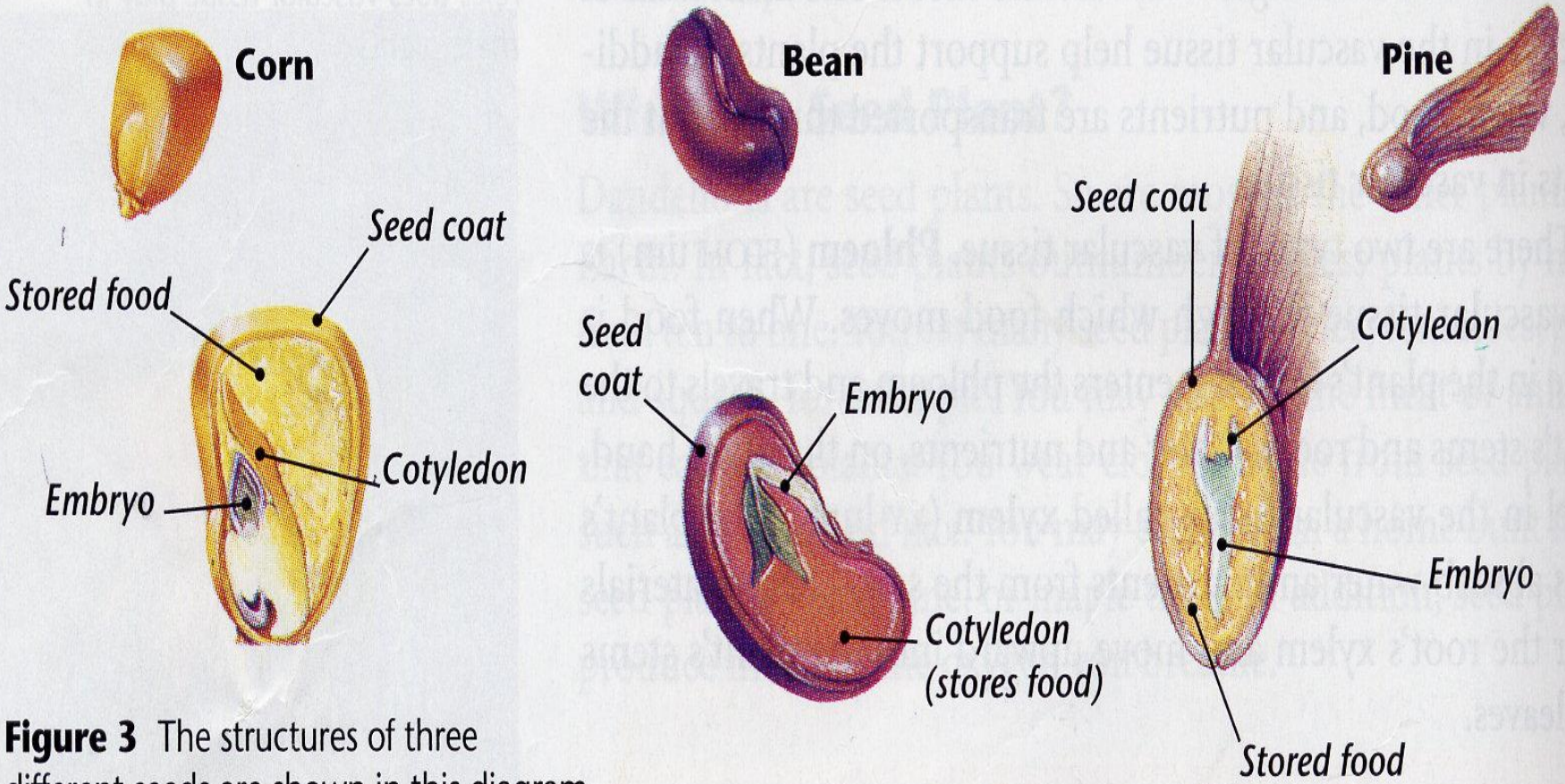


Figure 3 The structures of three different seeds are shown in this diagram.

Inferring *Why do seeds contain stored food?*

SPORE PRODUCING PLANTS

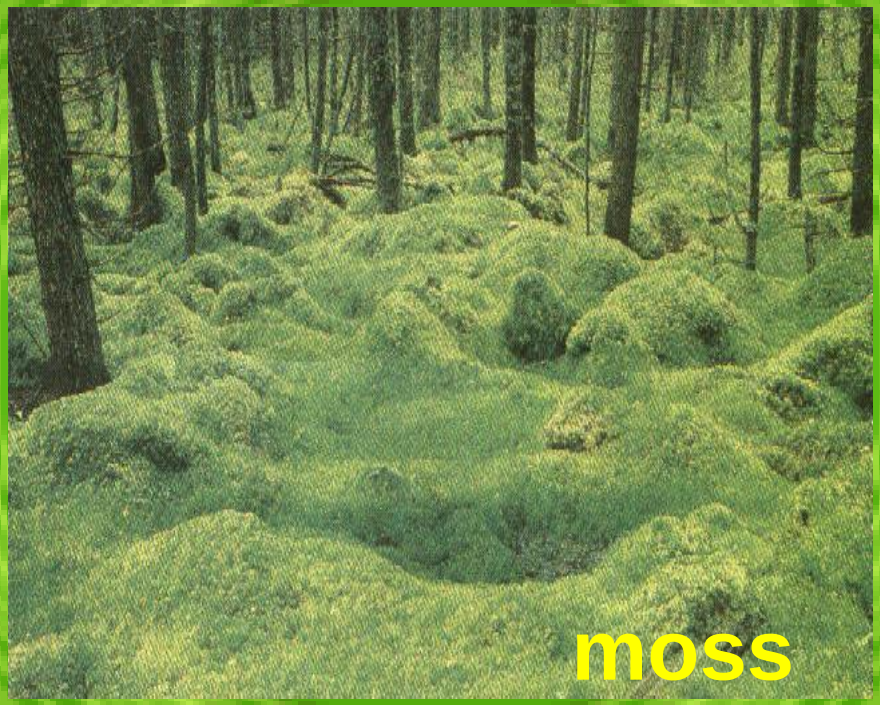
- Spores are much smaller than seeds.
- Almost all flowerless plants produce spores.
- Examples- mosses and ferns

Flowering Plants

- Flowering plants differ from conifers because they grow their seeds inside an ovary, which is embedded in a flower.
- The flower then becomes a fruit containing the seeds.
- Examples include most trees, shrubs, vines, flowers, fruits, vegetables, and legumes.

BACK

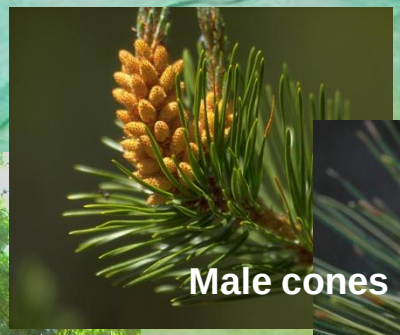
SPORE PRODUCING PLANTS



CONE BEARING PLANTS

- Most cone-bearing plants are evergreen with needle-like leaves.
- Conifers never have flowers but produce seeds in cones.
- Examples- pine, spruce, juniper, redwood, and cedar trees.


Red wood


Male cones


Female cones


Spruce


Juniper

Angiosperm & Gymnosperm Video 1:59

BACK

MONOCOTS

- A seed with one food storage area is called a ***monocotyledon***, or ***monocot***.
- Flowers of monocots have either three petals or multiples of three.
- The leaves of monocots are long and slender with veins that are parallel to each other.
- The vascular tube structures are usually scattered randomly throughout the stem.
- Examples-include grass, corn, rice, lilies, and tulips.

BACK

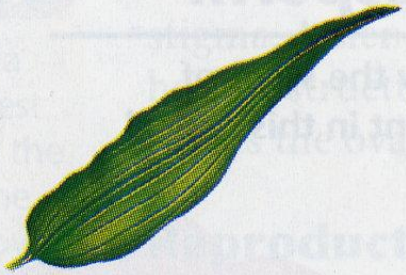
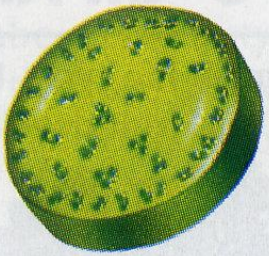
DICOTS

- A seed with two food storage areas is called a ***dicotyledon***, or ***dicot***.
- Flowers of dicots have either four or five petals or multiples of these numbers.
- The leaves are usually wide with branching veins.
- The vascular tube structures are arranged in circular bundles.
- Examples- roses, dandelions, maple, and oak trees.

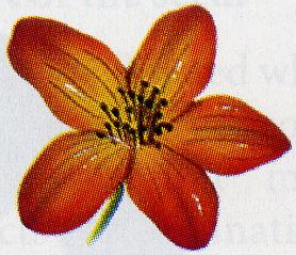
BACK

Monocots vs. Dicots

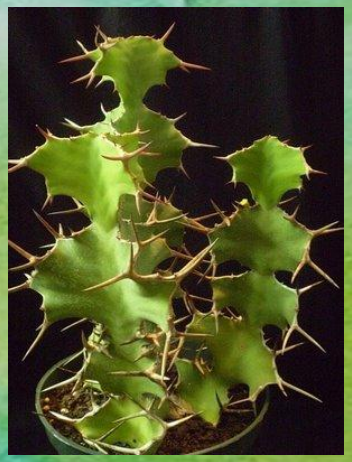
Monocots

Seed	Leaf	Stem	Flower
			
One cotyledon	*Parallel veins*	*Scattered bundles of vascular tissue*	*Flower parts in threes*

Dicots

			
Two cotyledons	*Branching veins*	*Circle of vascular tissue*	*Flower parts in fours or fives*

PLANT DEFENSE MECHANISMS



STRUCTURES FOR DEFENSE

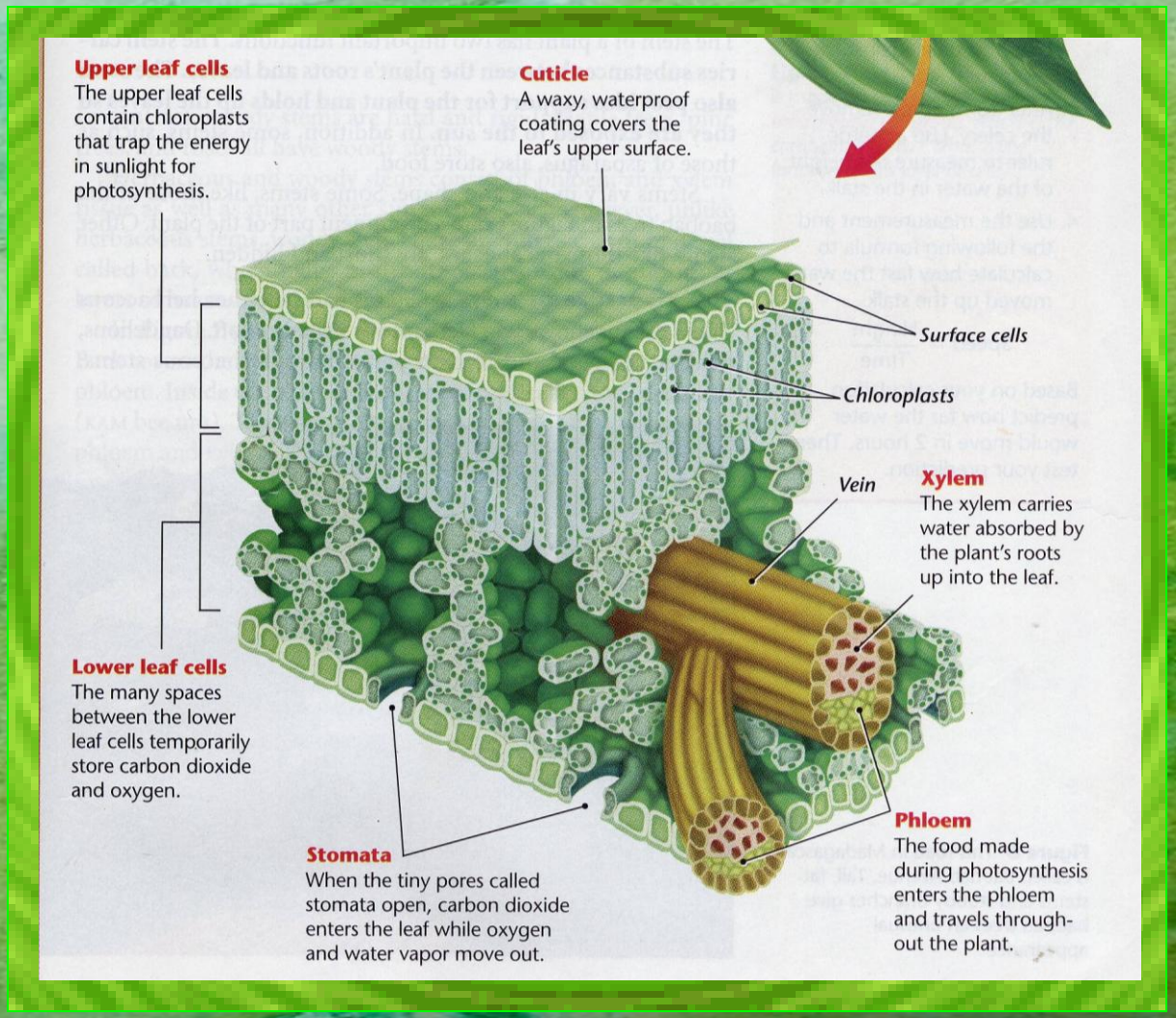
- thorns that can defend the plant from being eaten by some animals
- fruits and leaves with poisons so that they are not eaten by animals
- the ability to close its leaves when touched (***thigmotropism***)

Rosary Pea Plant and Other Deadly Plants
More on tropisms

BACK

Structures for Survival

- Parts of flowering plants that function for survival may be:
- Leaves function as the site of **photosynthesis**, **respiration**, and **transpiration** in plants.



Transpiration Webpage

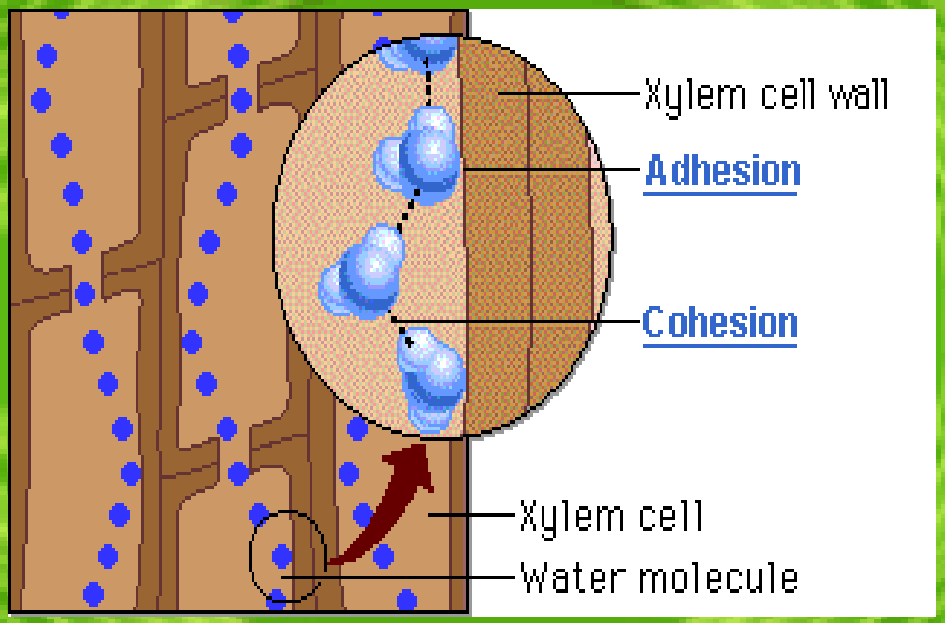
BACK

Structures for Survival

STEMS

•Stems support the plant and hold the leaves up to the light. Stems also function as food storage sites.

• The ***xylem*** in the stems transports water from the roots to the leaves and other plant parts.



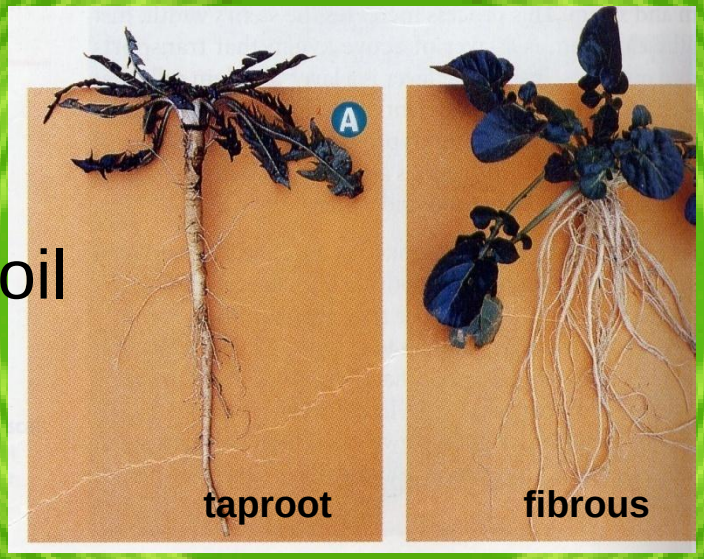
• The ***phloem*** in the stems transport food made in the leaves to growing parts of the plant.

Xylem & Phloem Webpage

BACK

Structures for Survival

ROOTS



- anchor the plant
- absorb water and nutrients from soil
- store extra food for the plants.
- increase surface area to absorb more water and nutrients

Root hairs help to increase this surface area.

- There are two types of roots:

1. ***Fibrous roots*** consist of several main roots that branch off to form a mass of roots.
Examples- grass, corn, and some trees.

2. ***Taproots*** consist of one large, main root with smaller roots branching off. Examples-carrots, dandelions, or cacti.

BACK

Structures for Reproduction

Parts of the flowering plant that function in reproduction include:

FLOWERS

•Flowers produce seeds

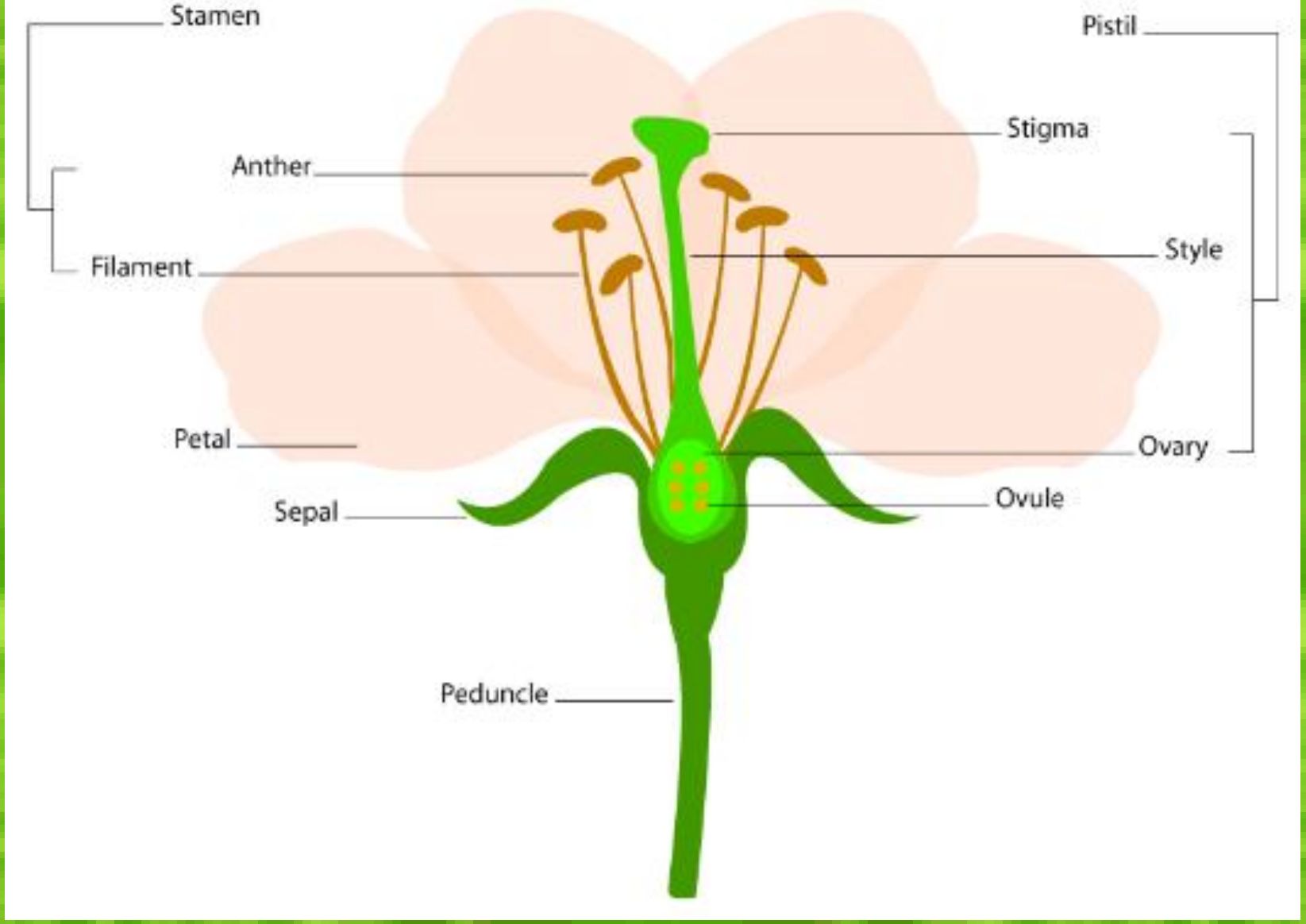
•Many flowers contain both male and female parts needed to produce new flowers.

•Flower petals are often colorful or have a scent to attract insects and other animals.

Plant Parts Webpage
Angiosperm Parts

BACK

Structures for Survival



Structures for Survival

Stamen- male part of a flower has an ***anther*** on a stalk (***filament***).

•The anther produces pollen that contains the sperm cells.

Pistil- _female part of the flower, contains:

•***Ovary***- contains **ovules** where the egg cells are produced

•***Stigma***- the sticky top where pollen grains land

•***Style***- stalk down which the pollen tube grows after pollination has taken place

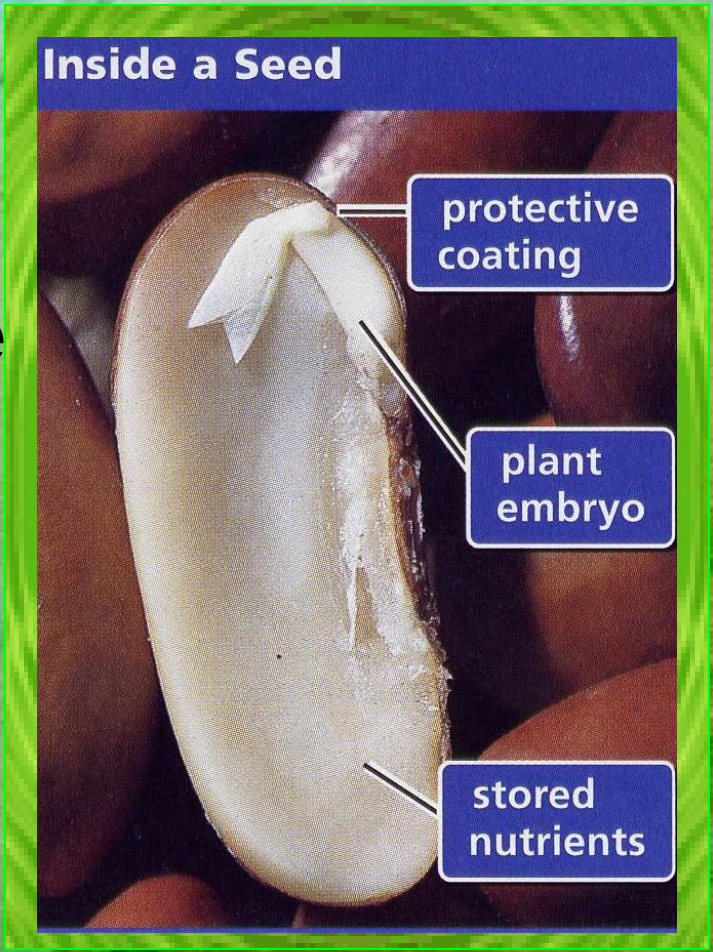
Water Lilly Blooming
Corpse Flower

BACK

Structures for Survival

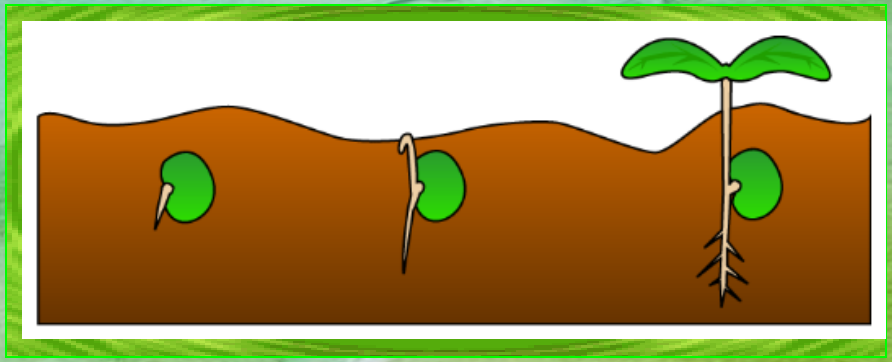
SEED

- The ovule contains a fertilized egg (embryo) from which new plants are formed.
- A fruit is formed from the ovary often protects them.
- Seeds have special structures that allow them to be dispersed by wind, water, or animals.
- The seeds coat protect the embryo from injury and drying out.



BACK

Life Cycle

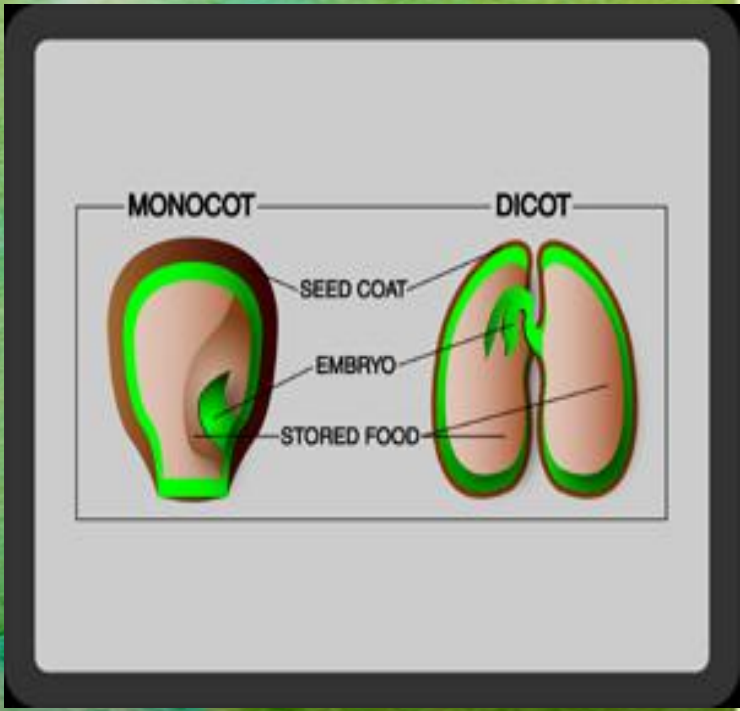


Germination

•When seeds are dispersed from the parent plant, they can either lay dormant or they can begin to grow immediately given the right conditions.

•This early stage of seed growth is called ***germination***.

•The roots begin to grow down, while the stem and leaves grow up.



BACK

Germination & Growth Video 1:11

Life Cycle

PLANT DEVELOPMENT

•Over time the seed grows into a mature plant with the structures necessary to produce more plants.

FERTILIZATION

•When pollen, which is produced in the stamen of a flower, transfers from stamen to pistil (***pollination***) and then enters the ovule, which is located in the ovary of a flower, ***fertilization*** occurs.

Pollination & Fertilization Video 1:50
World of Plants: Our Flowering World 13:33

Pollination Video ~1:50
Fertilization Video ~1:50

BACK

Life Cycle

SEED PRODUCTION

- Once the ovule is fertilized it develops into a seed.
- A fruit (fleshy, pod, or shell) then develops to protect the seed.
- Seeds are structures that contain the young plant surrounded by a protective covering.

Interactive Fruit Webpage
Fruit Formation Video

BACK

Reproduction

SEXUAL REPRODUCTION

•A process of reproduction that requires a sperm cell (in **pollen**) and an egg cell (in the **ovule**) to combine to produce a new organism.

•All flowering plants undergo sexual reproduction.

Reproduction Video 1:21

BACK

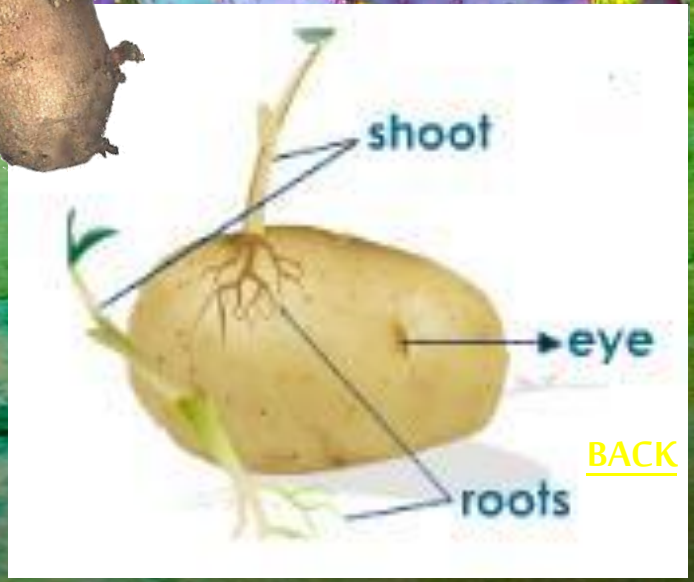
Reproduction

ASEXUAL REPRODUCTION

•A process of reproduction that involves only one parent plant or plant part and produces offspring identical to the parent plant.

•Many plants can grow new plants asexually from their plant parts.

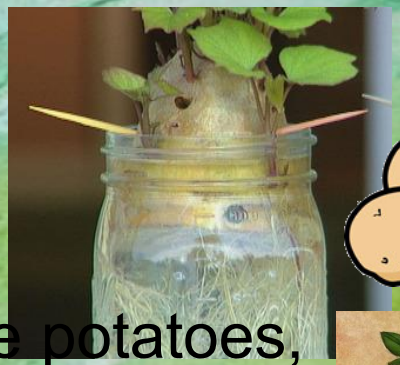
•If a plant is cut or damaged, it can sprout new growth from the stems, roots, or leaves.



Asexual Reproduction Video 2:56

BACK

Reproduction



1. TUBERS

•underground stems

•The “eyes” or buds of tubers, for example potatoes, grow into roots and shoots to produce a new plant.

2.BULBS

Bulbs, for example onions, are big buds made of a stem and special types of leaves.

3. RUNNERS

•stems that run along the ground.

•New strawberries or some ivy grow from the tips of runners.

•Many lawn grasses grow from runners.

Strawberry Runners

BACK

Reproduction

4. STEM CUTTINGS

•When a piece of cut stem is planted, roots may form from the cutting, and then a full plant develops.

•Examples: Sugar cane and pineapple

5. ROOTS

•Some fruit trees and bushes send up "suckers" or new shoots from the roots.

•Some roots that can produce new plants from root pieces, such as a sweet potato.

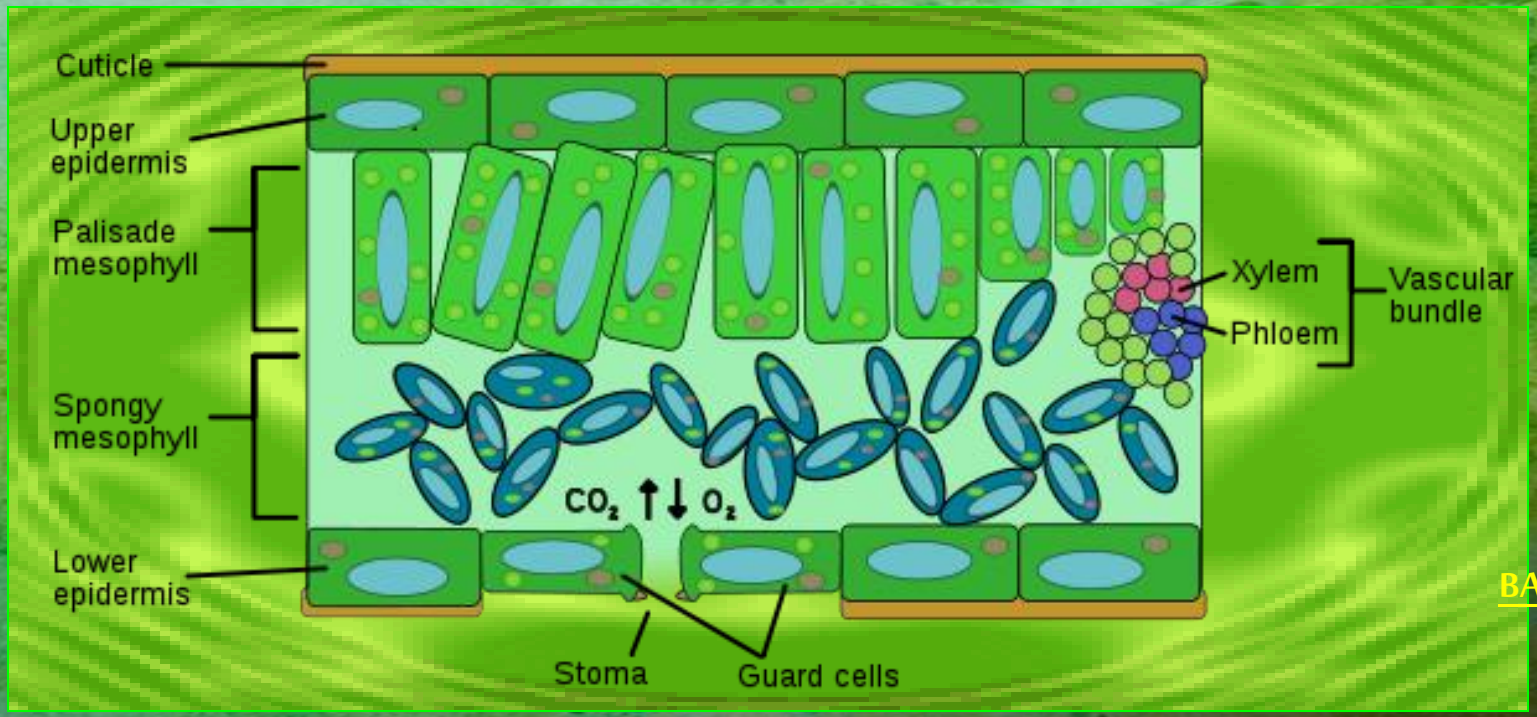
BACK

Stem Cuttings Video

Reproduction

LEAVES

- Some houseplants produce little plants right on their leaves.
- For example, African violets can produce plants from leaves placed on top of soil.



BACK

Photosynthesis

•process to make sugar

• ***Chloroplasts-*** found in the cells of the leaf, contain ***chlorophyll***, a green pigment that absorbs light energy.

•During this process, plants use carbon dioxide gas from the air (taken in through openings in the leaf called ***stomata***) and water (taken in through the roots) to make sugar (food) in the leaves.

•During the process of photosynthesis, oxygen is also produced. The oxygen is released into the air through the stomata.

BACK

Photosynthesis Video 2:20

Structures for Survival

Respiration

- To obtain the energy from the food it produces, plants must break down the sugar in the cells throughout the plant in a process called *respiration*.
- In this process, oxygen from the air (taken in through the stomata) combines with the sugar, which is then broken down into carbon dioxide and water.
- During this process, energy is released. This energy can now be used by the plant to perform life functions.
- The carbon dioxide and water that are formed are then given off through the stomata in the leaves.

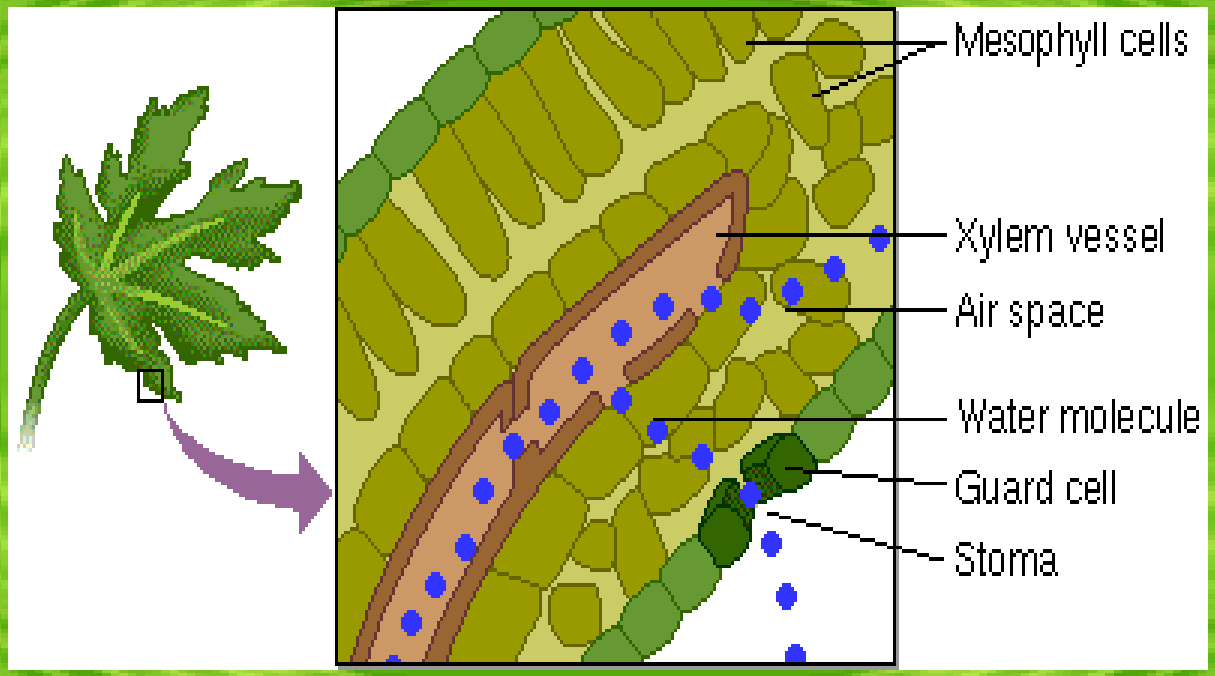
BACK

Structures for Survival

Transpiration

· Some of the water taken in through the roots of plants is used in photosynthesis.

· However, plants lose most of the water through the leaves. This process is called ***transpiration***.



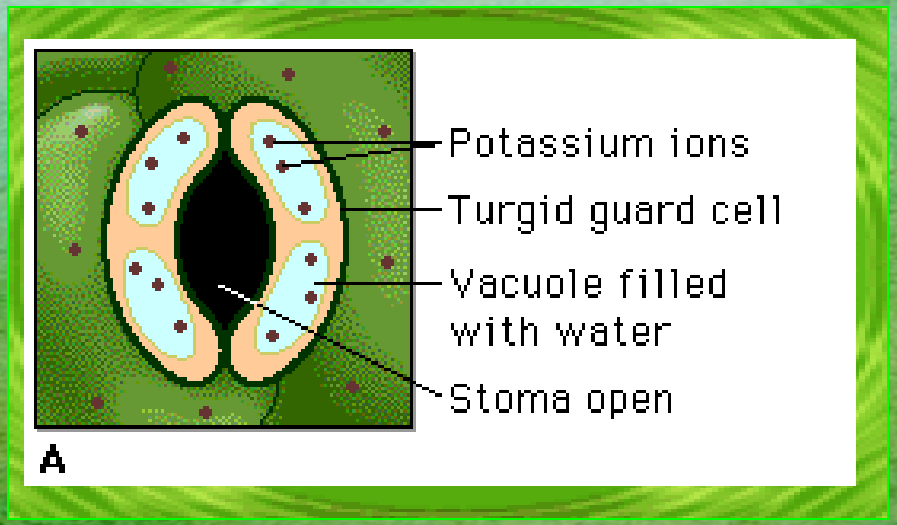
•Plants are able to control the rate of transpiration.

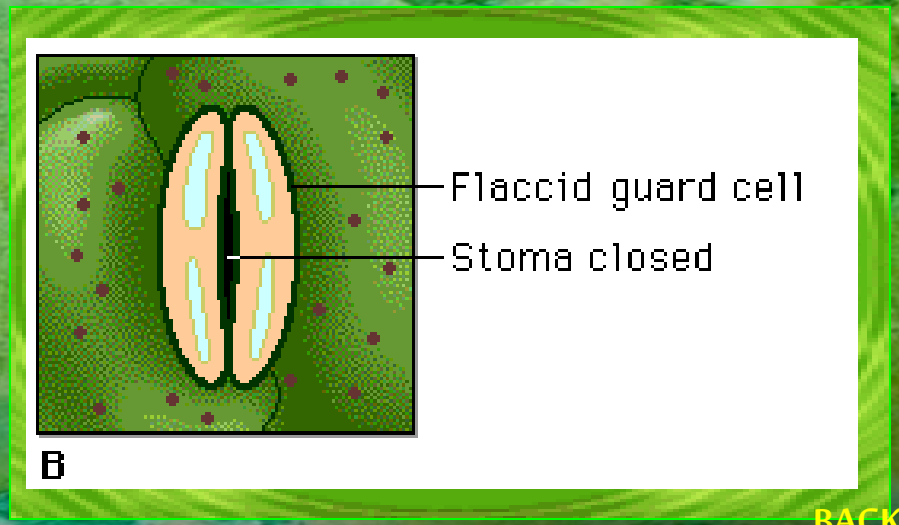
BACK

Structures for Survival

Transpiration

- ***Guard cells***, mostly on the underside of the leaf, open and close the stomata.
- When the stomata are closed, water cannot escape from the leaf.





BACK

Structures for Survival

Response to the Environment

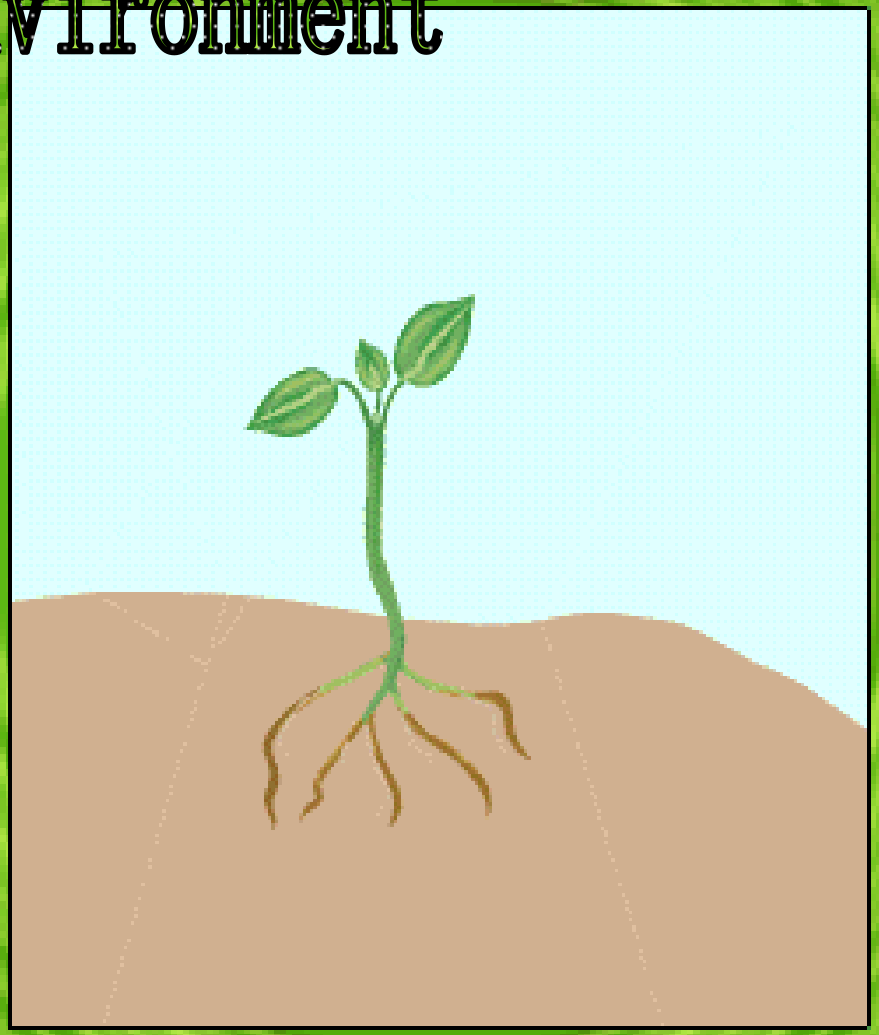
- ***Dormancy-*** time when the growth or activity of a plant or seed stops due to changes in temperature or amount of water.
- allows various species to survive in environments
- ensures that seeds will germinate when conditions are favorable for survival of the small seedlings.
- For example, leaves fall from trees prior to the conditions of winter and the leaf buds do not open again until conditions are favorable in the spring.

BACK

Response to the Environment

Tropism- growing or moving their stems, roots, or leaves toward or away from the stimulus.

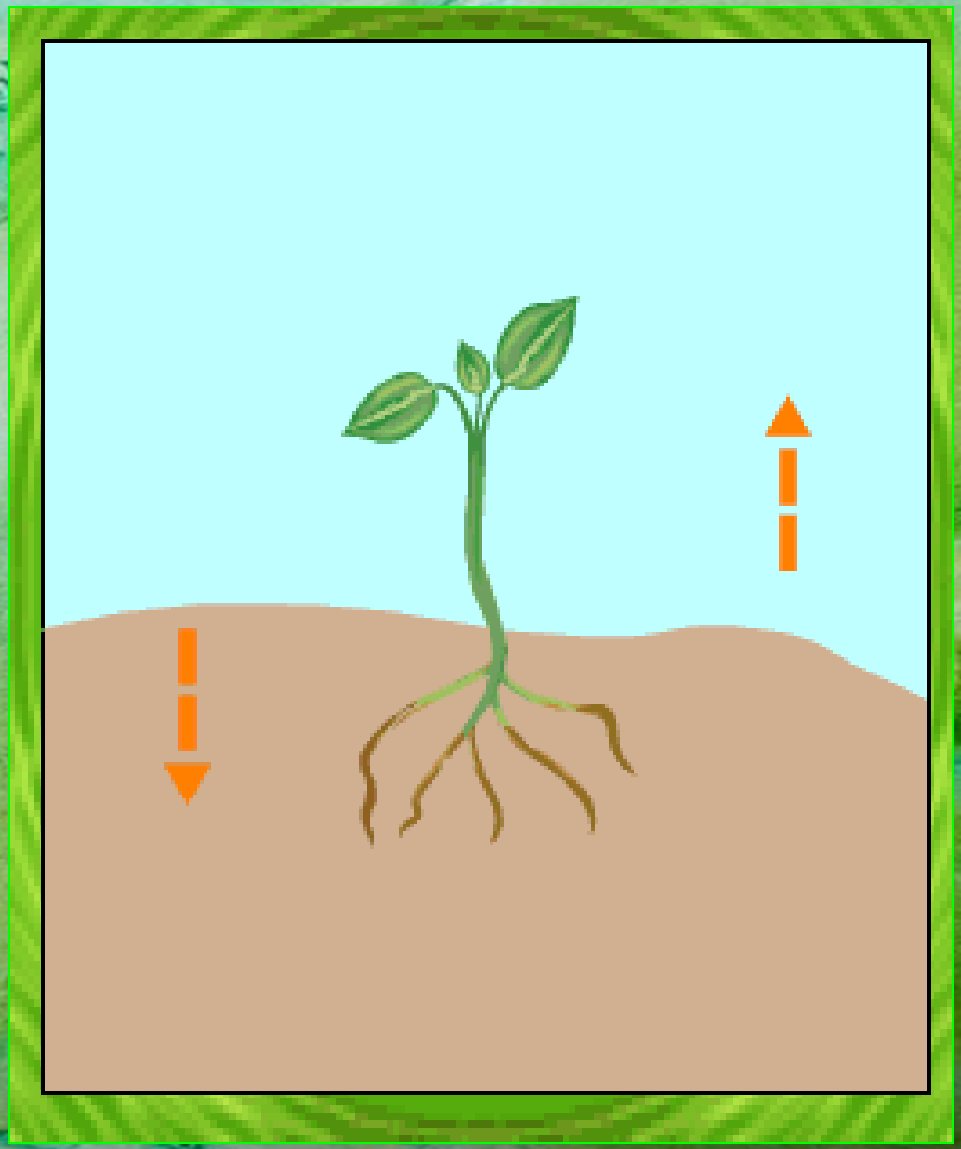
Phototropism- plant grows or moves in response to light



BACK

Response to the Environment

Gravitropism- plant grows or moves in response to gravity; also called ***geotropism.***

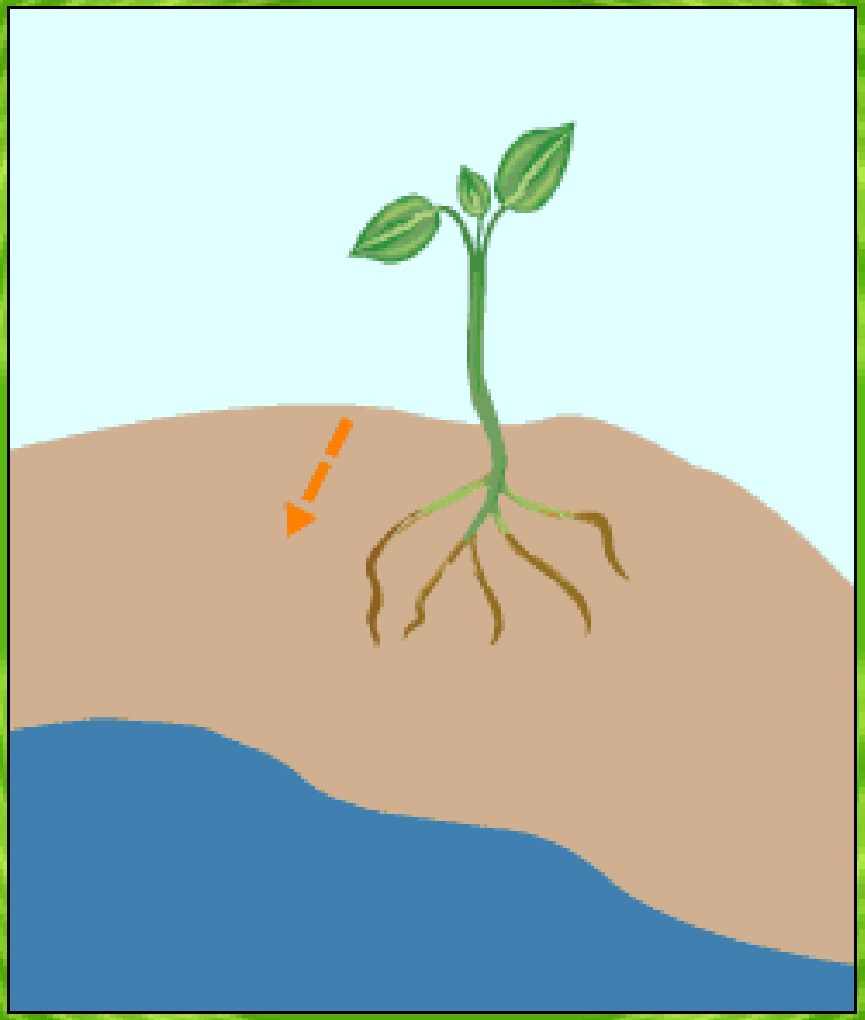


BACK

Response to the Environment

Hydrotropism-

plant grows or moves in response to water.



BACK

Response to the Environment

Thigmotropism-

plant grows or moves in response to touch.

Awesome BBC video on Venus Flytraps

Tropism Videos on the web

BACK

Fungi

- kingdom of organisms that do not make their own food.
- must grow in or on other organisms, such as plants.
- example- grain mold, corn smut, and wheat rust, cause diseases in those plants that result in crop losses.
- Diseases caused by fungi may also affect other important crops, such as rice, cotton, rye, and soybeans.
- If a fungus infects a tree, fruit, or grass, it can eventually kill the plant.

BACK

Fungi

World of Fungus Video 20min

Fungi

Shelf Brackets

Tomato Fungus

Mold

Fungi

White truffles from Alba, Italy, sell at DeLaurenti Specialty Food in Pike Place Market for $4,000 a pound. A medium-size truffle costs approximately $50.

BACK

Corn Diseases Website

Fungi

- most mushroom poisonings in the world
- looks a lot like other mushrooms which people eat
- cap up to six inches wide, and a stalk up to five inches tall
- seen from September to November underneath pines, oaks, dogwoods, and other trees

Death Caps (non-edible)

Honey Mushrooms (edible)