

Etege Menen Girls' Boarding Secondary School

Biology Department

Grade 10

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SECOND SEMESTER CONTENTS

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UNIT 4

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UNIT 5

CONSRVATION AND NATURAL RESOURCE

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3.5 HOMEOSTASIS

- **Homeostasis**: is the ability of the body maintains a Constant internal environment.
- Come from two Greek words.

  homoios ; like

  Stasis; states
- Keeping internal environment the same state.
- The body ability to maintain a constant internal environment
- The ability of an organism maintaining a constant internal environment both in tissue fluids and cells.
- Homeostasis makes living organism in **steady state.**
- A **steady state** is the rate of input substance equals the rate of output substance.

Genene. T

Controlling temperature

- **Temperature** is a way of measuring hotness and coldness of something.
- **Living organism continually gained heat by;**
  - **Conduction** the transfer of heat through direct contact
  - **Conviction** the transfer of heat through the current of air and water
  - **Radiation** the diffusion of heat from warmer to colder through the air
  - **Cellular respiration**
- **Living organism continually losing heat by;**
  - Conduction
  - Conviction
  - Radiation
  - Evaporation

With regard to temperature regulation organism can be divided into two major groups

1. Poikiltherms
2. Homoiotherms

1. Poikilotherms

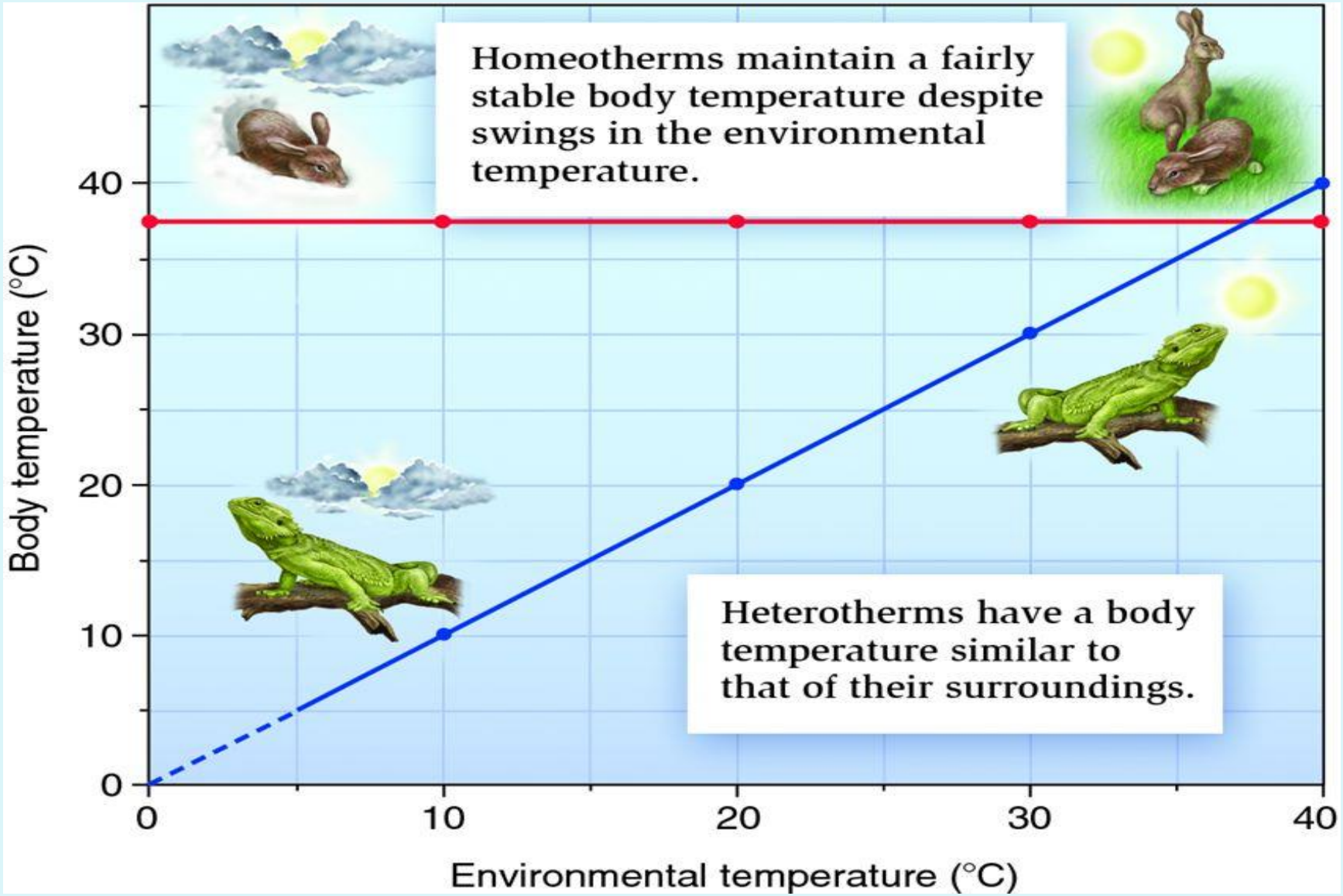
- Body temperature governed by external temperature.
- Body temperature vary over a wide range
- E.g.; **Invertebrates , Fish, amphibians and reptiles**

Organism	Environmental temperature	Body Temp.
Fish	25^0C	25^0C
	30^0C	30^0C
	40^0C	40^0C

2. Homoiotherms

- Constant internal body temperature
- Independent of environmental temperature
- E.g.; Birds and mammals

Organism	Environmental temperature	Body Temp.
Human	25^0C	37^0C
	30^0C	37^0C
	40^0C	37^0C


Homeotherms maintain a fairly stable body temperature despite swings in the environmental temperature.
Heterotherms have a body temperature similar to that of their surroundings.
Body temperature (°C)
0
10
20
30
40
Environmental temperature (°C)

Temperature controls in Poikilotherms

When hot

- Move into water
- Move into shade

when cold

- press their body to warm temperature
- Erect special sails to absorb more heat from the sun
- Bask in the sun

Temperature controls in Homoiotherms

1. Physiological method

- **Heat losing mechanism** in response to **hot condition** in order to **cool** the body

A. Sweating

- As sweat evaporates from the skin surface it has a cooling effect because the evaporating liquid carries away body heat.

B. Vasodilatations

- Is the widening(dilates) of blood vessels
- More blood flows through the capillaries
- More heat is lost through radiation from the surface

Con't

C. Panting and licking

- Man mammals have thick and furry coat so sweat cannot evaporate from the skin surface
- Some animals, such as dog and cats may lick themselves with saliva to coal the body
- They also pant, which allows more heat to evaporate from the moist surface.

Heat gain mechanism

operates in response to **cold condition in order to worm the body**

A. Vasoconstriction

- Narrowing (constricts) of blood vessels
- Reduce the flow of blood through capillaries
- Reduce heat lost through the surface of skin

B. Piloerection → pulling the hair upright

When body temperature fails (drops)

- Hair erector muscle contract and pulling the hair upright, trapping an insulating layer of air to conserve heat.

When body temperature rises

- Hair lie flat, hair erector muscle relaxes and reduce an insulating layer which makes easier to loss heat by conviction.

C. shivering and metabolic response

When body temperature fails (drops ,cools)

- Metabolic rate speeds up
- Produce more heat energy and the body temperature starts to go up.
- The muscle starts shiver and contract rapidly
- Increase the rate of respiration to generate more heat

When body temperature rises(warms up)

- Shivering stops
- Metabolic rate drops and less heat produce.

D. Fat layer under skin →subcutaneous fat

- Serve as an insulator and reduce heat loss from the body in cold climates.
- Animal that lives in cold climate like polar bear and seal have thick layer of fat which aid in heat conservation

2. Behavioral method of temperature regulation

- Clothing
- Bathing
- Seeking shade and shelter
- Taking high calorie food
- **Hibernation;** animal response to cold environment undergo period of dormancy (deep sleep) *e.g.. hedgehog*
- **Aestivation ;** Animals response to hot environments undergo a period of dormancy (deep sleep)

3. Morphological method of temperature regulation

- Surface to volume ratio is the amount of surface area to per unit volume
- As organism get larger both its surface area and volume increase but the volume increase faster than surface area.
- Smaller organism tending to have a greater surface area to volume ratio than larger animals
- Smaller organism tend to loss heat faster than larger organism

To sum up

Smaller organism

- Larger surface area to volume ratio
- Loss heat faster
- Adapted to live hot condition

Larger organism

- Smaller surface area to volume ratio
- Do not loss heat faster
- Adapted to live cold condition\

HYPOTHERMIA

- Occurs when your body losses heat faster than it can produce heat
- Causing a dangerous low body temperature
- Normal human body temperature is **37^0c or 98.6^0F**
- **Hypothermia occurs** as your body temperature **passes below35^0c or 95^0F**

Controlling core body temperature

- Human being have internal control mechanism (homeostasis)
- Loss excess heat if core body temperature rises
- Conserve heat when core temperature starts to fall.
- **Thermoregulatory center** of the brain (hypothalamus) control the core body temperature
- The control of core body temperature is an example of **negative feedback loop**.

Con't

As body temperature rises; heat **lost** from the body using:

- **Dilation of blood vessels** ,blood flow through the capillaries increase and more heat is lost
- **Lot of sweat** produced and **hair lie flat**

As the core body temperature fails; heat gain to the body

- Contraction of blood vessels , blood flow the capillaries decrease, less heat is lost
- No sweat is produce
- Hairs pulled erect to trap insulating the air

3.5.2 Homeostasis in the kidney

- Kidney, lung and skin are the main excretory organ of the body
- Human kidney has vitally **important in two aspect of homeostasis**:

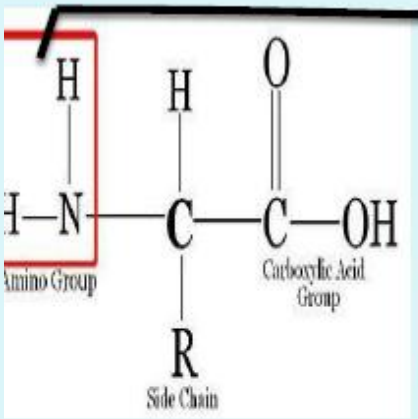
  i**. Excretion** ii . **Osmoregulation**

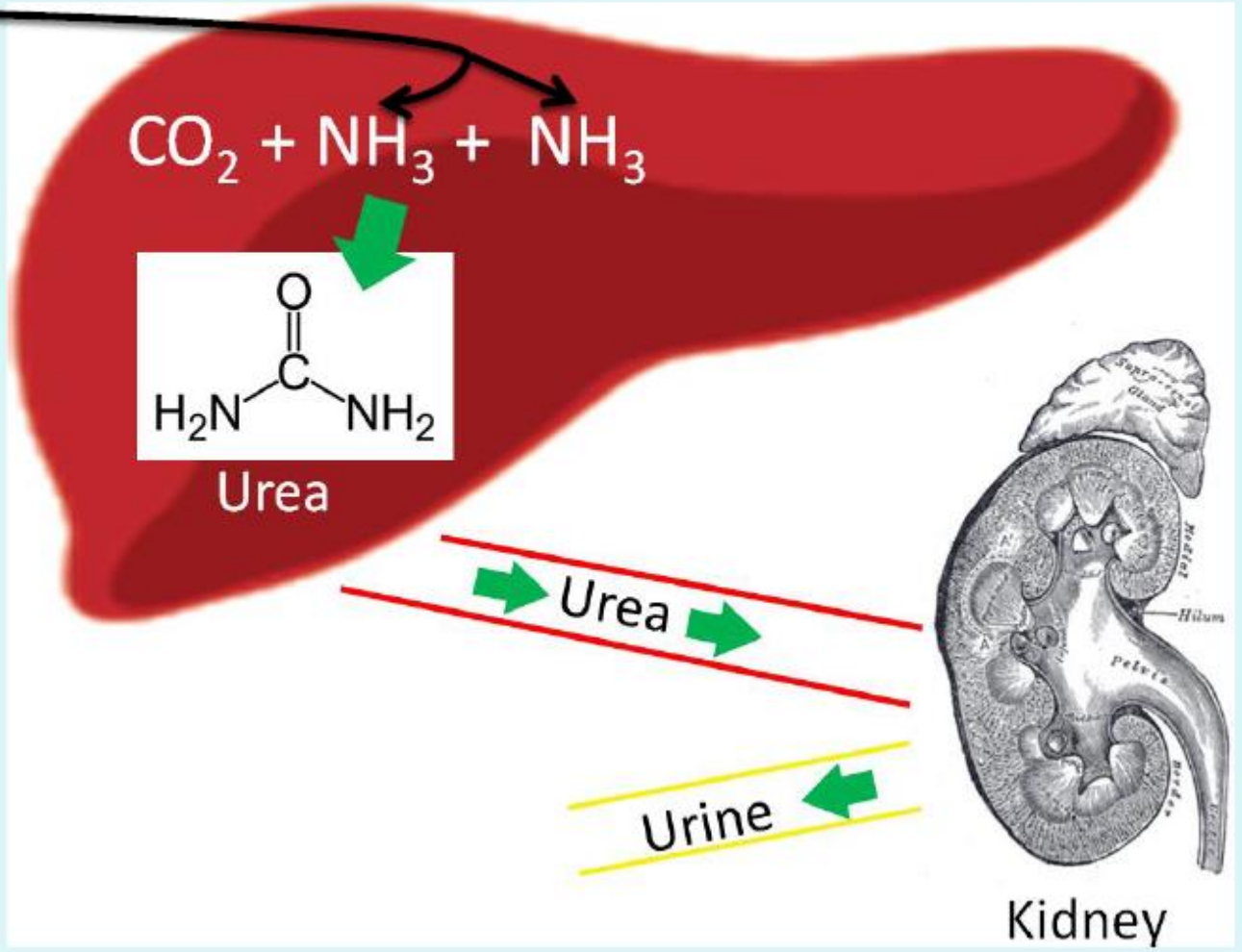
1. Excretion. The removal of metabolic waste from the body

- Kidney removes nitrogenous waste such as urea.
- Urea is produced in the liver.
- Excess amino acid
  - Amino group; convert to ammonia
  - carboxylic acid—converts to carbohydrate
  - Urea→ ammonia + carbon dioxide
  - Urea filtered out of blood by kidney and removed as urine

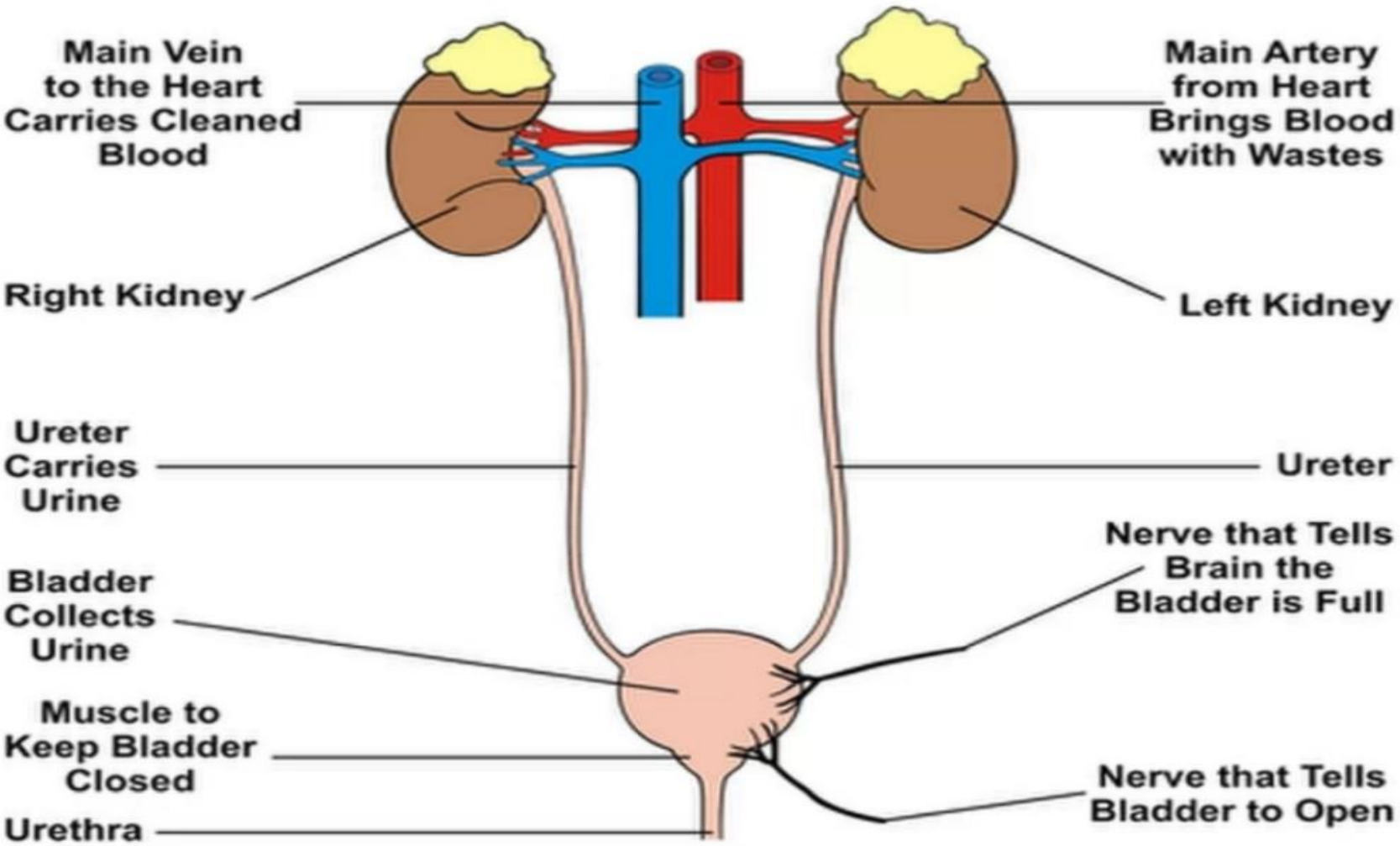
2. Osmoregulation. Control of water and ion balance in the body

Urea production





Kidney Morphology



The kidney

- Blood **filtration and purification organ**
- Each kidney connected to a tube called **ureter** , carries urine to the bladder
- **Bladder;** urine is stored until it is ready to be passed away from the body
- **Sphincter**-a ring of muscle that control the opening of bladder
- **Urethra**-A duct through which urine is discharged
- **Renal arteries;** carries oxygenated blood to the kidney

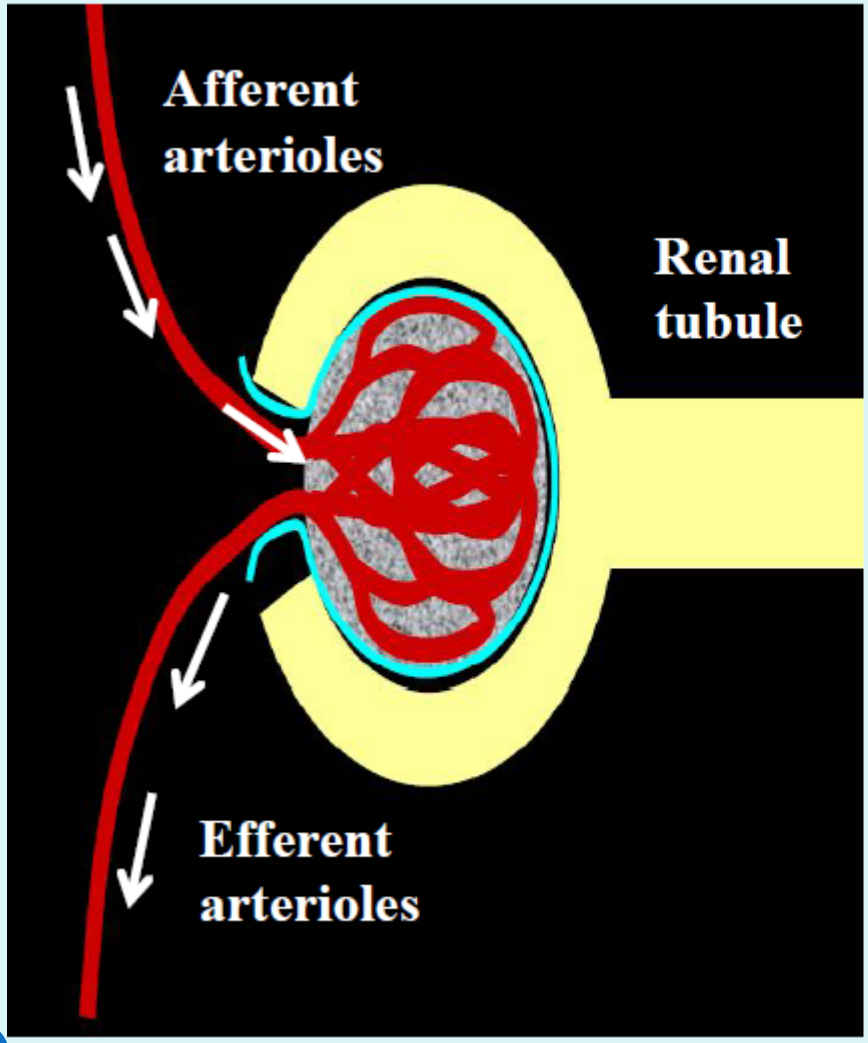
Nephrones

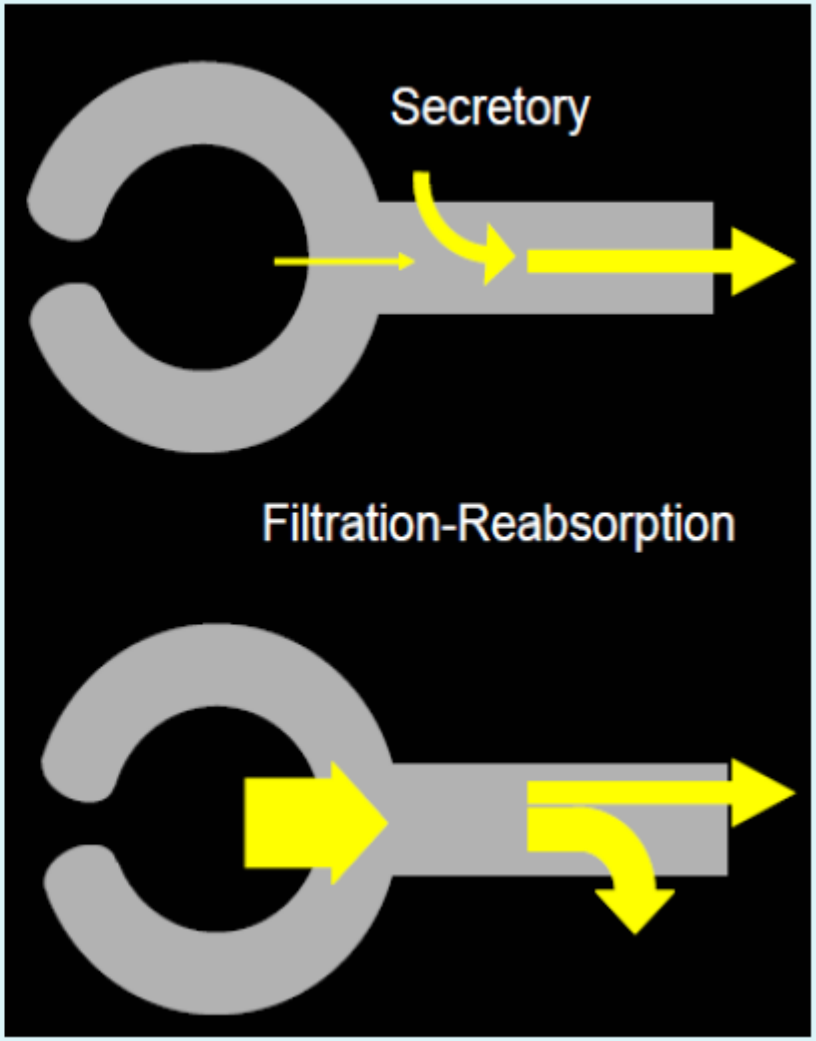
- microscopic structure of the kidney
- functional unit of the kidney where blood is filtered urine is produced
- consists of a cluster capillaries known as glomerulus

Section of nephrones

1. **Bowman's capsules** site of ultra filtration
   - **Ultra filtration** the removal of excess water and other substance from the blood into bowman's capsules.
   - **Glomerulus—**the knot of blood vessels in bowman capsules
     - **Afferent arterioles; a**rterioles that takes blood into the glomerulus
     - **Efferent arterioles;** arterioles that leading blood away from the kidney
   - **Glomerular filtrate—**the liquid resulting from filtration in the bowman capsules contains urea, glucose, water, salt
2. **First coiled (convoluted. proximal) tubules –**
   - Reabsorptions of useful substance
3. **Loop of Henley-** urine is concentrated and more water is conserved.
4. **Second convoluted (Distal) tubules**—the main water balance is done.

Bowman's capsules

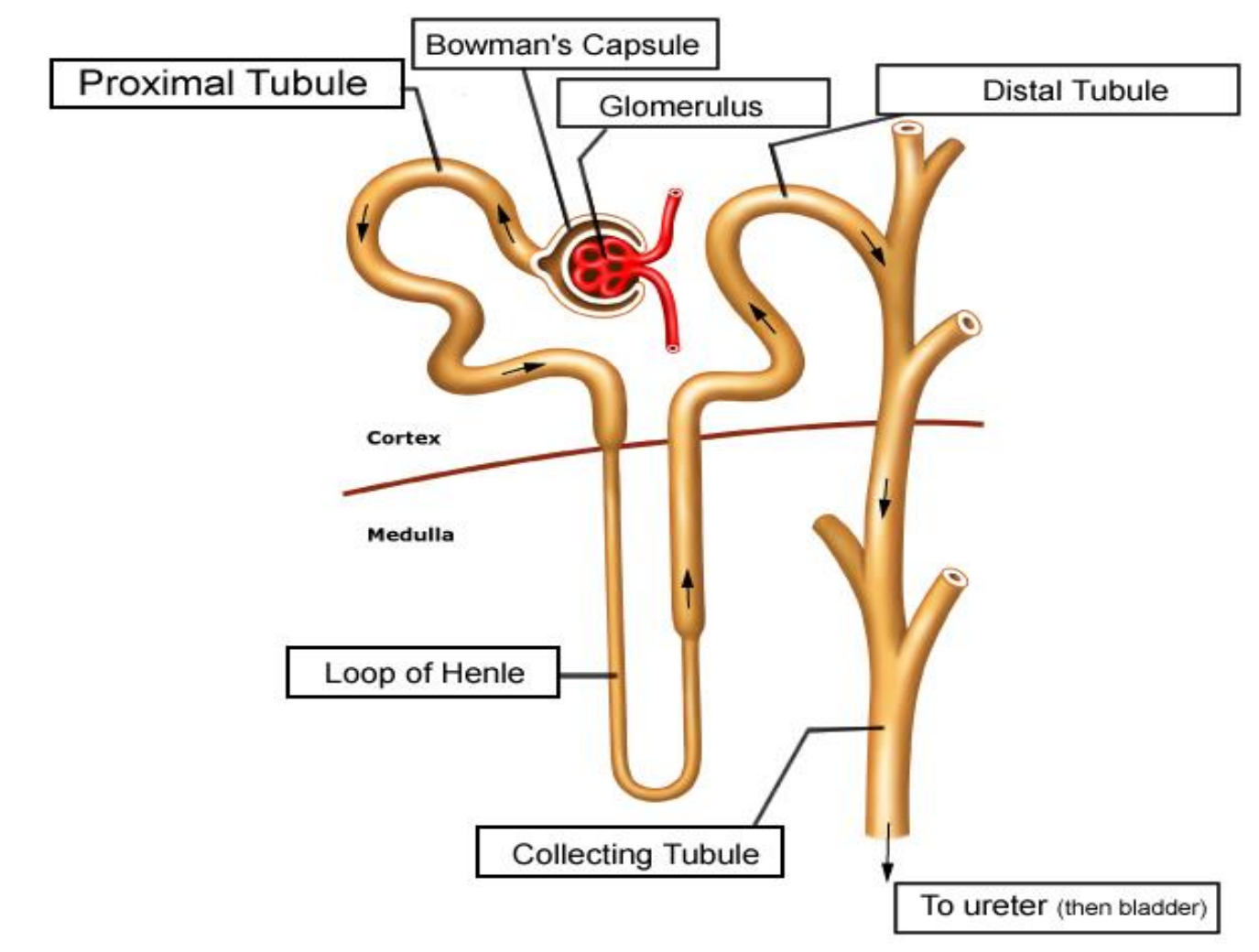




5. Collecting duct

- **Collecting duct**: urine is collected and water reabsorption using ADH.
- It contains about 1% of the original water,
- with no glucose at all.
- The level of salt in the urine
  - depend on the amount of salt in diet
  - the water content of the urine.
- There is also a much higher concentration of urea in the urine than in the blood –

Parts of Nephrones



The role of ADH in second convoluted tube

If the water contents of the blood is too low and salt level is greater

- More ADH is released into the blood
- Increase permeability of renal tubules
- Kidney tubules reabsorb more water
- Little dark colored concentrated urine is produced

If the water content in the blood is too high than salt level

- Less ADH is released into the blood
- Reduce permeability of renal tubules
- Kidney tubules reabsorbs less water
- Much pale colored urine is produced

Con't

- On an average day your kidneys will produce around **180 l** of liquid filtered out of your blood in the glomerulus (**glomerular filtrate**)
- Only about 1.5 l of urine.
- So more than 99% of the liquid filtered out of your blood is eventually returned to the body.

3.5.3 Liver and homeostasis

1. The liver plays a large role in maintaining a constant internal environment.
2. It is the largest individual organ in of the body
3. In fact it makes up around 5% of your body mass.
4. **T**he liver carries out over 500 different functions
5. It is the **body's chemical factory**
6. It performs many different chemical processes.
7. It can regenerates itself if it gets damaged
8. Liver has a special blood supply
    1. **Hepatic artery** carries oxygenated blood to liver
    2. **Hepatic vein**-remove deoxygenated blood from liver
    3. **Hepatic portal vein**-comes from liver directly from gut
9. Brings the product of digestion to the liver

Liver plays the following role:

1) **Regulation of blood glucose level-** because glucose is used;
   - **Source of energy**
   - **Affect blood osmotic potential**
2) Protein metabolism; the process of removing amino group from amino acid is called **deamination**
3) Control toxins, change harmful substance to harmless **Detoxification**
4) The breakdown of worn-out red blood cells, in particular the red pigment hemoglobin. Iron containing heme group, convert into amino acid and iron where as globin convert into bile
5) The formation of bile which is made in the liver and stored in the gall bladder
6) Temperature control
7) Control fat and cholesterol in the blood
8) Production of plasma protein

UNIT 4

Food making and growth in plant

There is four main organ of flowering plant

- **Flower-**reproductive organ
- **Leaves-**Make food by photosynthesis
- **Stem-**transport and support system
- **Roots-**anchoring and absorption

4.1 The leaf; a photosynthetic machine

- **Adaptation of leaf for photosynthesis**
  - Leaf is flat and wide
  - large surface to collect light
  - short distance for gas exchange
- **External structure of the leaf**
  - **Petiole (leaf stalk)** the leaf is attached to the stem
  - **Lamina (leaf blade)** the photosynthetic portion of the leaf
  - **Mid rib and veins;** contain xylem and phloem
  - **Margin;** is the border line of the leaf

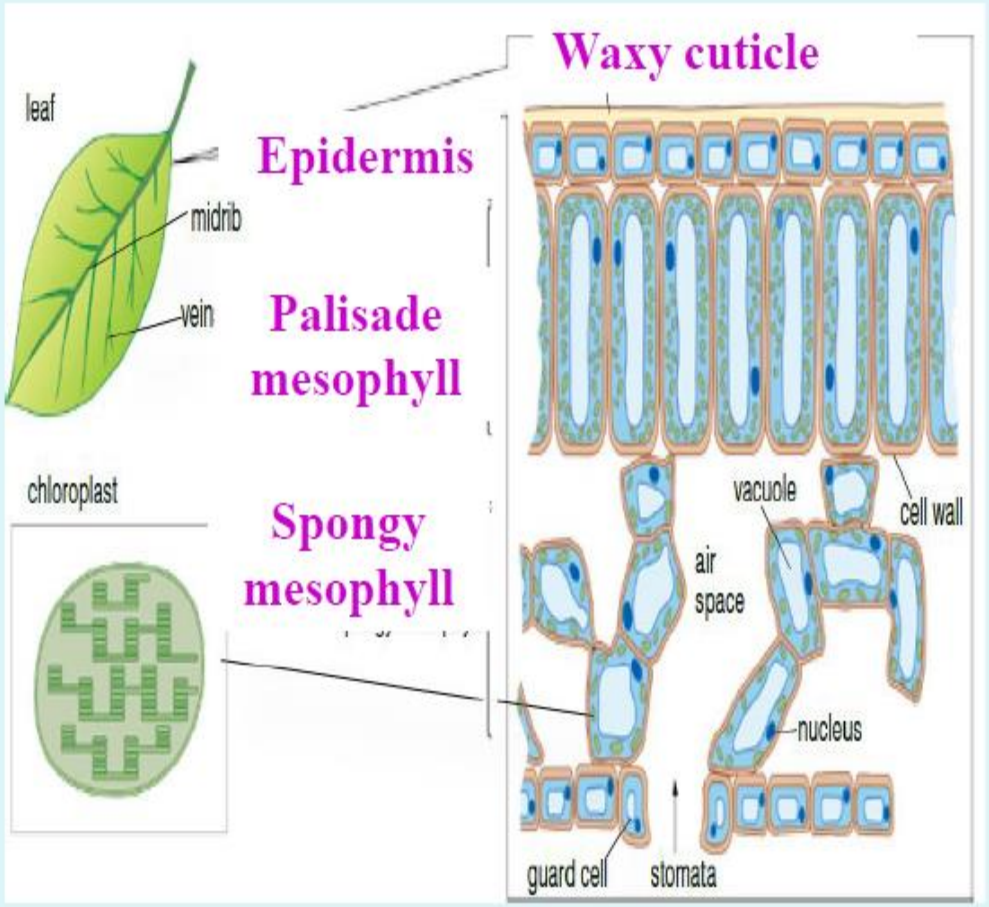
4.1 The leaf: a photosynthetic machine

- **Adaptation of leaf for photosynthesis**
  - **Large surface area** to absorb maximum sun light.
  - **Leaf are thin** hence a short distance for gas exchange.
  - **Have a net work of vein** to transport water, mineral ions and sugar.
  - Presence of an opening called **stomata** to allow CO2 into the leaf and O2 out.
  - Leaves have **large amount of chlorophyll** to absorb sun light and transform into chemical energy.

Internal structure of the leaf

1. Waxy cuticle

- Water proof layer
- Found on the surface of
- many leaves
- Help to prevent water loss



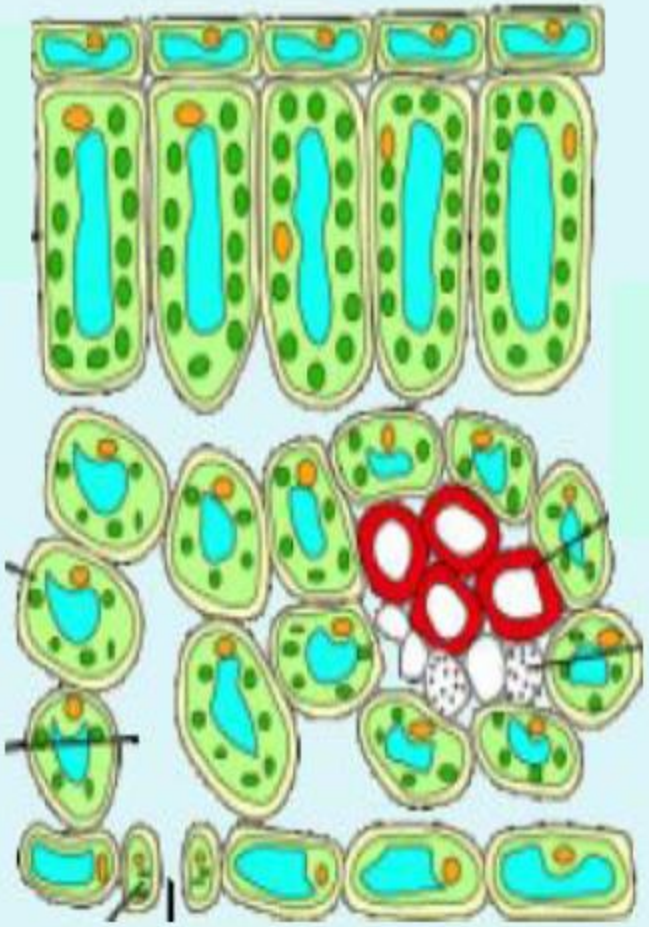
2. Mesophyll

Palisade mesophyll

- Have closely packed cell
- Have many chloroplast
- Has less air space
- The main site of photosynthesis
- Vertically arranged

Spongy mesophyll

- Have loosely arranged cell
- Has few chloroplast
- Has a lot of air space
- Allow exchange of gases
- Irregular arranged.



Con't

3. Lower epidermis

- Has opening known as **stomata**, Stomata used to exchange of gases.
- **Guard cell** control the opening and closing of stomata

4. Vascular bundle

- Contain xylem and phloem
- **Xylem –dead tissue.** Transport water and dissolved mineral from soil to leaves
- **Phloem—Living tissue.** Transport product of photosynthesis away from leaves.

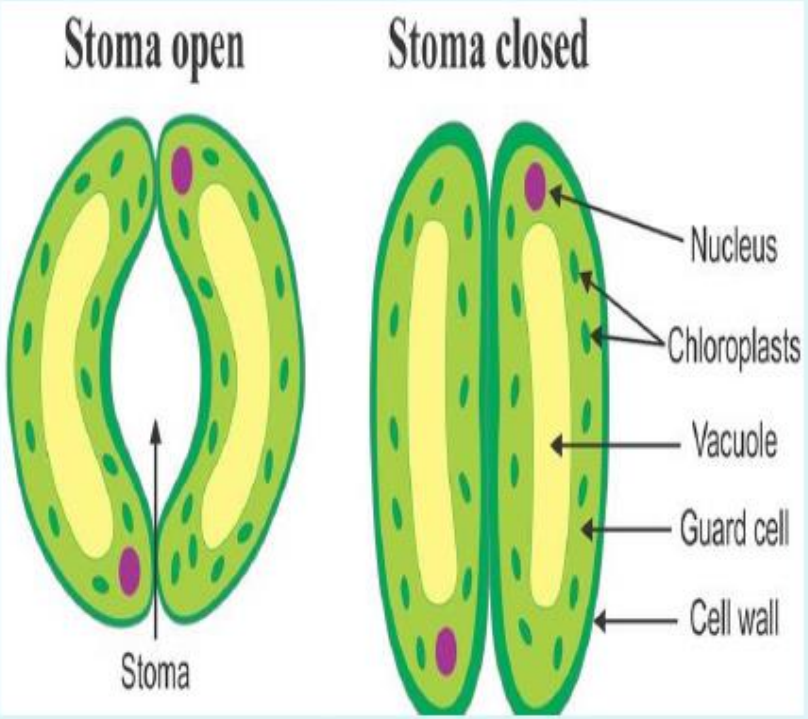
Opening and closing of stomata

❖**During the day**

- Photosynthesis high
- Concentrations of **sugar** in the **guard cell high**
- Water **move into the guard cell** and **swell up**
- **Stomata open**

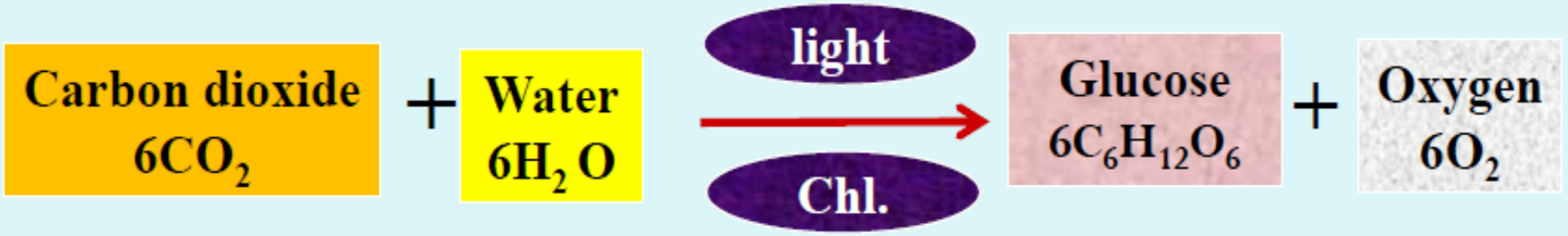
❖**During night**

- Photosynthesis low
- Concentrations of **sugar** in the **guard cell low**
- Water **move out of guard cell** and **shrinks**
- **Stomata closed**



4.2 Photosynthesis

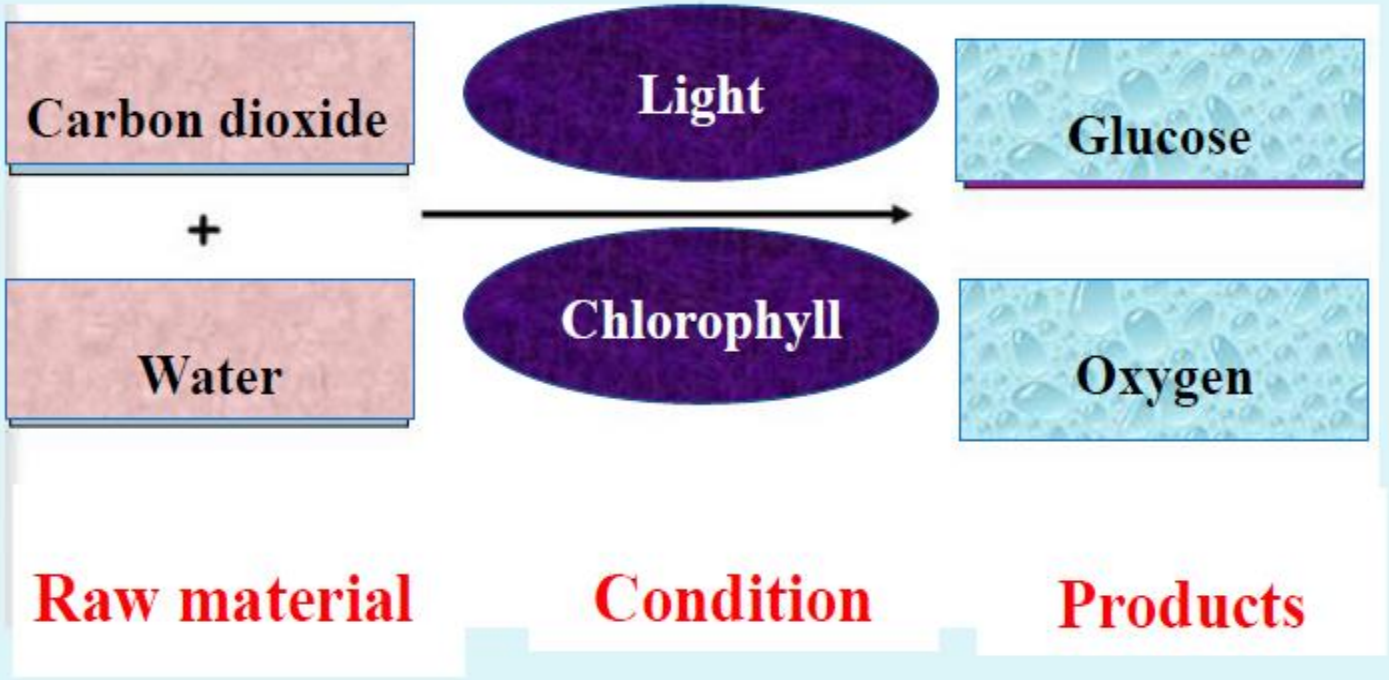
- **Photo** –light
- **synthesis**—making
- **Photosynthesis** process of making food by green plants
  - The process of making food by green plants in the presence light energy and chlorophyll



- Photosynthesis can be summed up in the above equation:

Summery equation for photosynthesis

- **Two row material**-CO_2 and H_2O
- **Two products** -Glucose and oxygen
- **Two condition-**chlorophyll and light energy



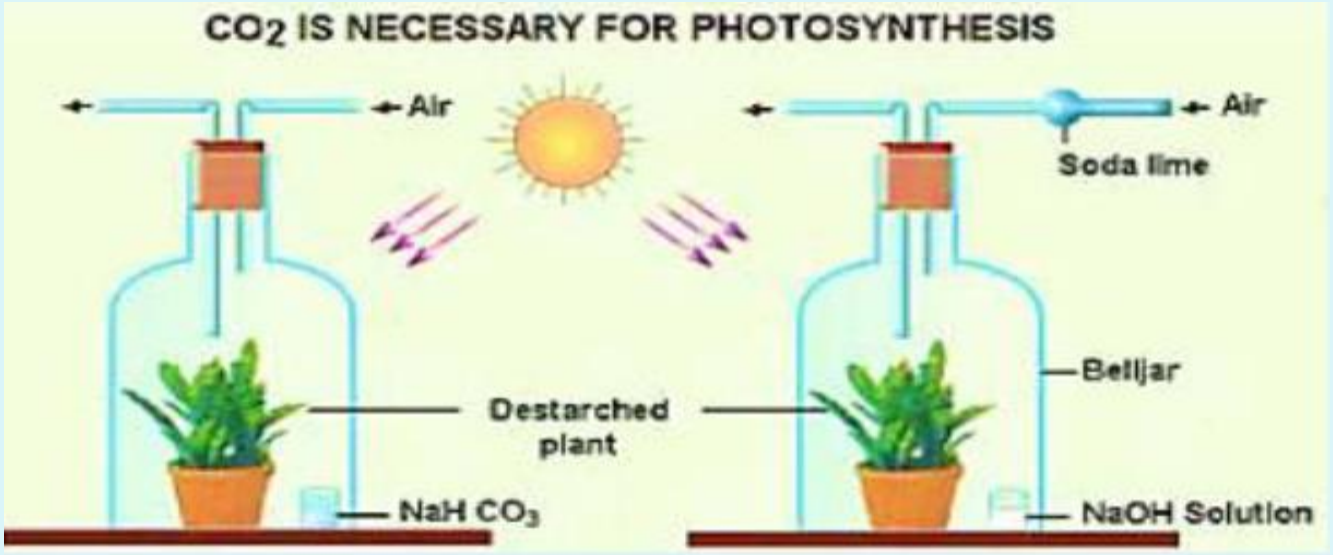
Green plant use the food produced

- Source of energy
- Growth
- Rapier of tissue
- Excess of food is converted to starch for storage

Requirements of photosynthesis

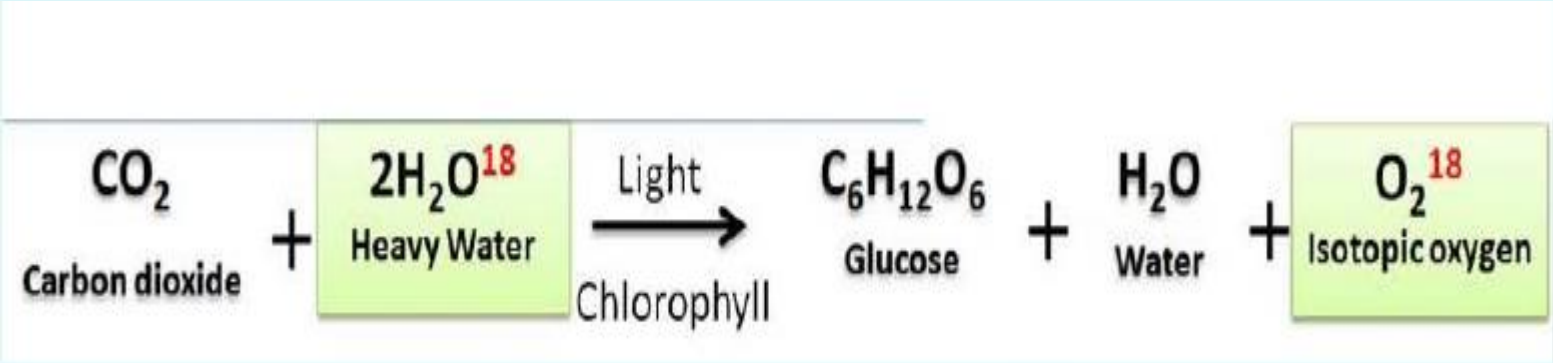
1. Carbon dioxide (CO2)

- The source of carbon to prepare sugar
- Plant get CO_2 from the air To show up CO_2 is used in photosynthesis **KOH (soda lime**) is used
- The more valid is to approach is to change the levels of carbon dioxide in the air surrounding a plant



2. Water (H_2O)

- The source of hydrogen ion to reduce CO_2 to sugar
- Oxygen gas produced from photosynthesis comes from the split of H_2o
- **Radioactive tracers(O^{18})** is used to show the need of water for photosynthesis



Con't

3. Sun light

- Used to break down water into hydrogen ion and oxygen
- De-starching a plant by putting it in complete darkness one or two days is used to demonstrate the need of light for photosynthesis

4. Chlorophyll—is the green pigment chloroplast

- Used to trap light energy
- **Variegated leaves** are used to show the importance of chlorophylls for photosynthesis

Variegated leaves (leaf with different color) are used to show the importance of chlorophylls for photosynthesis, the green part contain chlorophyll which can make starch so in testing the leaf for starch only the green part shows blue black color the positive result for starch



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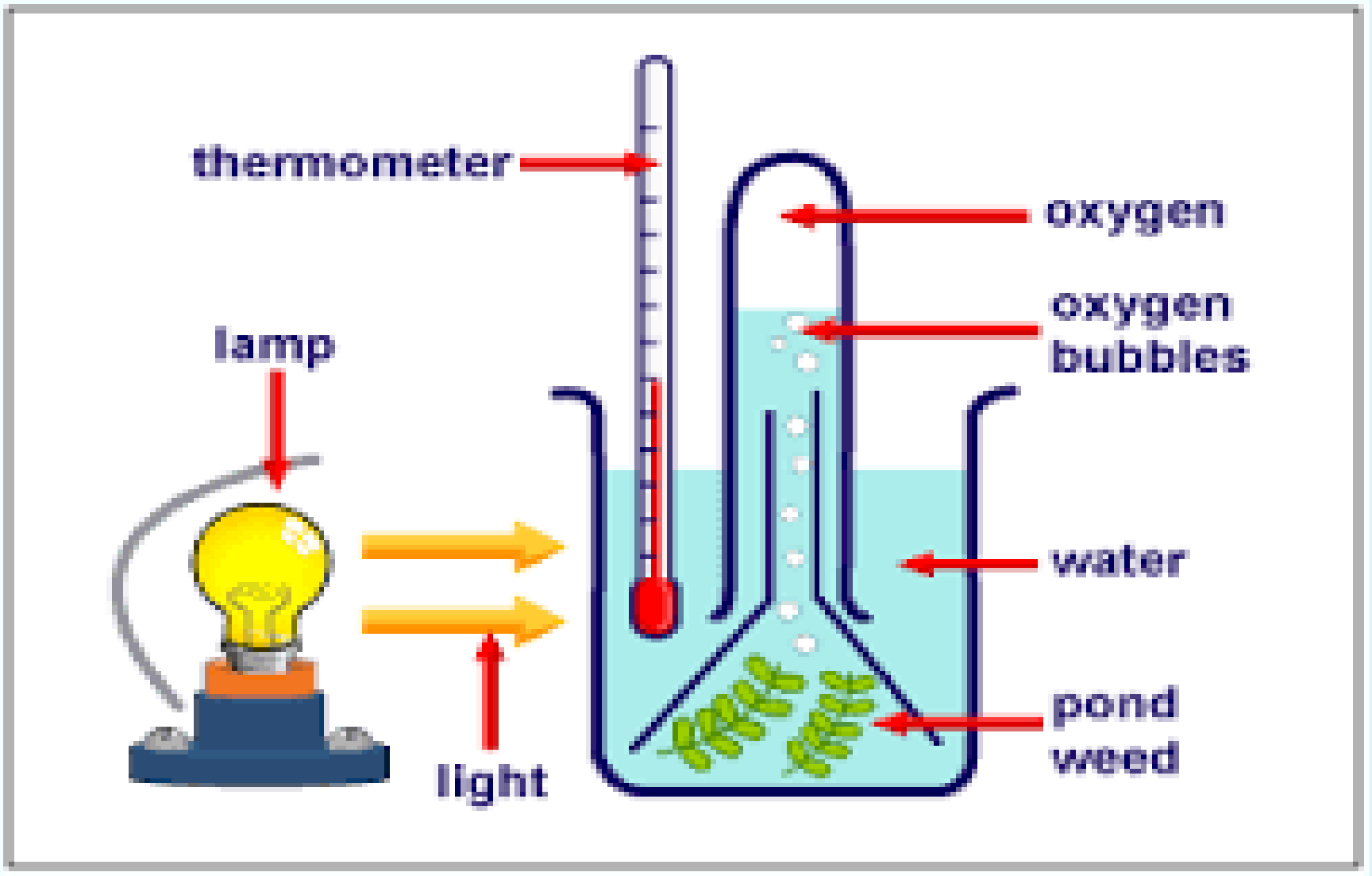
To demonstrate oxygen is produced during photosynthesis

- Place a pond weed in a large baker filled with about 150Cm^3 Pond water
- Add sodium bicarbonate to water to produce more carbon dioxide
- Invert a funnel over a pond weed

Result

- Oxygen gas is collected at the top of inverted test tube
- A glowing splinter introduce into a test tube containing the collected oxygen gas will burst into a flame. By this we confirm oxygen is evolved in photosynthesis
- Pond water is used for this experiment because it is the source of carbon dioxide

Con't


thermometer
oxygen
oxygen bubbles
lamp
water
pond weed
light

Two phases of photosynthesis

1. Light dependent reaction
2. Light independent reaction

1. Light dependent reaction

- First phase of photosynthesis
- Depend on light
- Split water molecule into hydrogen and oxygen
- Produce energy (ATP)
- $12H_2O \xrightarrow[\text{Light energy}]{\text{Chlorophyll}} 24H^+ + 6O_2$

2. Light independent reaction

- Do not require light
- Depend on hydrogen ion and carbon dioxide
- Reduction of CO_2 to gl*ucos*e
- Use energy(ATP) produce in light reaction
- $24H^+ + 6CO_2 \longrightarrow C_6H_{12}O_6 + 6H_2O$

Glucose

- The first product of photosynthesis
- Other compound are also produce after photosynthesis
- Glucose molecule converted to fats , proteins , starch

Testing leaf for starch using iodine solution

- **The leaf is put in boiling water because**
  - To stop all the biochemical process by killing the leaf
  - Making the leaf soft for iodine penetration
- **The leaf put in ethanol because**
  - remove chlorophyll (green pigment) from leaf

4. 3 Transports

The main transport system of plans is

- Osmosis
- Diffusion
- Active transport

Osmosis is important for plants

- Make the plants rigid and firm by the movement of water into the cell
- Plants take up water through **root hair**
- **Root hair** increase surface area for osmosis to take place

- **Active transport in plant;** By using active transport plants absorb mineral ion against concentration gradient

Transport material around the plants

- A double transport system (vascular system)
- Plants have two separate transport system

Phloem and **xylem**

Phloem

- Made up of living tissue
- Transport organic martial made by photosynthesis
- Use energy to move substance (active transport)
- Food substance move both up and down of the plant
- Phloem cell are thin walled and contain liquid reach food
- Phloem found in woody plant in the ring next to bark

Xylem

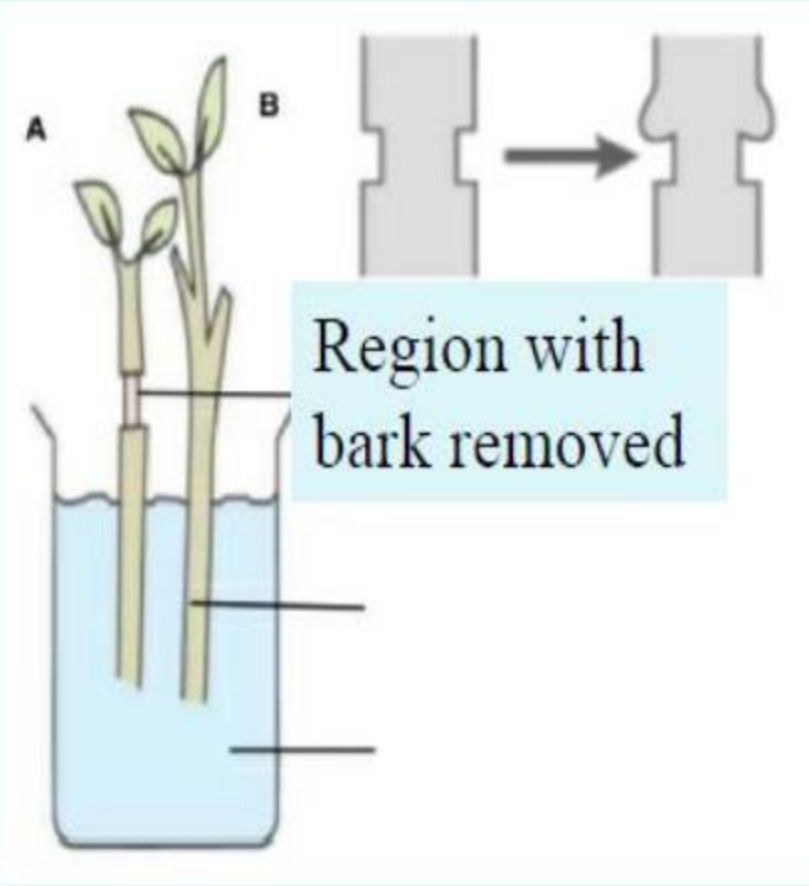
- Made up of dead cell
- Transport water and mineral ion
- Transport from root around the plant
- No active transport take place
- Passive transport no need of energy from the plant
- Movement of water in xylem is due to transpiration
- Water and mineral transport upward of the plant

The ringing experiment

- To find out whether, xylem or phloem tissue involved in transport of food material
- If xylem is involved in the transportation, the root found below the ring is not affected
- But in this experiment, the root suffer temporarily because, they don’t get adequate supply of food material
- This experiment **suggests that phloem tissue involve in transport of food.**

Ringing experiment

- To find out **whether, xylem** or **phloem** tissue are involved in transport of food material
- **Removing a ring from a woody** branch will result in the **removal of the Phloem tissue**
- **The swelling** above the ring where the phloem is removed will be **caused by an accumulation of sugars** in the region above the ring



The need of transport

To transport;

1. Sugar made in leaves around the plant

- Plant store glucose in the form of starch which is osmotically inert
- Plant deposited starch in root tubers , stem and leaves
- Starch is also deposited fruit and leaves

2. The movement of mineral and waters from leaves

- Mineral is needed to make protein and other molecule
- Plant need water is for two reason
  - Maintain turgor pressure
  - Raw material for photosynthesis

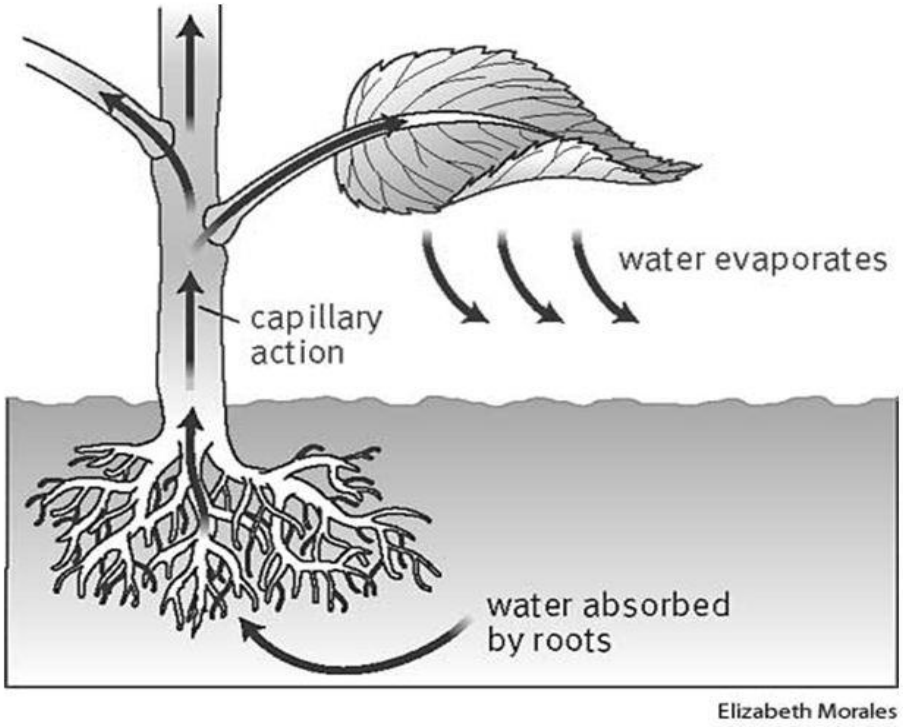
Moving water through xylem tissue

- **Transpiration stream;** a constant moving

of water through xylem from root to leaves

- **Transpiration** –the loss of water through the stomata
- Water enter the root hair of the plant by osmosis to xylem tissue

Transpiration



Transpiration – evaporation of water from the leaves.

Transpiration stream – movement of water through the plant.

Moving water through xylem tissue

The factor which move water up wards

- **Root pleasure** the pleasure pushing water upwards
- **Adhesive force** the force of attraction between water molecule and xylem tube
- **Cohesive force** the strong attraction force between water molecules through xylem tube
- Constant **evaporation** of water from leaves
- **Leaves** the main pull which move water up from root
- **Capillarity of water:** refers to the rise water in a tube

Factor affect in the rate of transpiration

- The main factors which affect the rate of transpiration are
  - **Humidity** rate of transpiration **decrease in humid air**
  - **Light intensity** rate of transpiration very high during day time
  - **Temperature** transpiration faster on warm sunny day then cold and dully day
  - **Wind (air movement)** transpiration faster in windy day then still day
- **To sum up** transpiration is more rapid in **hot, dry** and **windy** than **humid** day

4.4.1 The germination seed

What the basic structure of seed?

- **Endosperm** food storage tissue
- **An embryo**
  - **Plumule** embryonic shoot
  - **Radicle** embryonic root
  - **Cotyledon** embryonic leaves
    - ✓**Monocot** have one cotyledon
    - ✓**Decoct** have two cotyledon
- **Testa (seed coat)** protects the seed.
  - **Micropyle** A thin hole on the seed

Factor need for germination

- **Water** activate enzymes and aids hydrolysis of stored food into soluble materials
- **Temperature** (warmth) for optimum activity
- **Oxygen(Air)** for aerobic respiration that produces energy for germination

Enzymes in seed

- **Diastase** converts starch to simple sugar
- **Lipase** hydrolysis fat into fatty acid and glycerol
- **Proteolytic** hydrolysis protein into amino acid

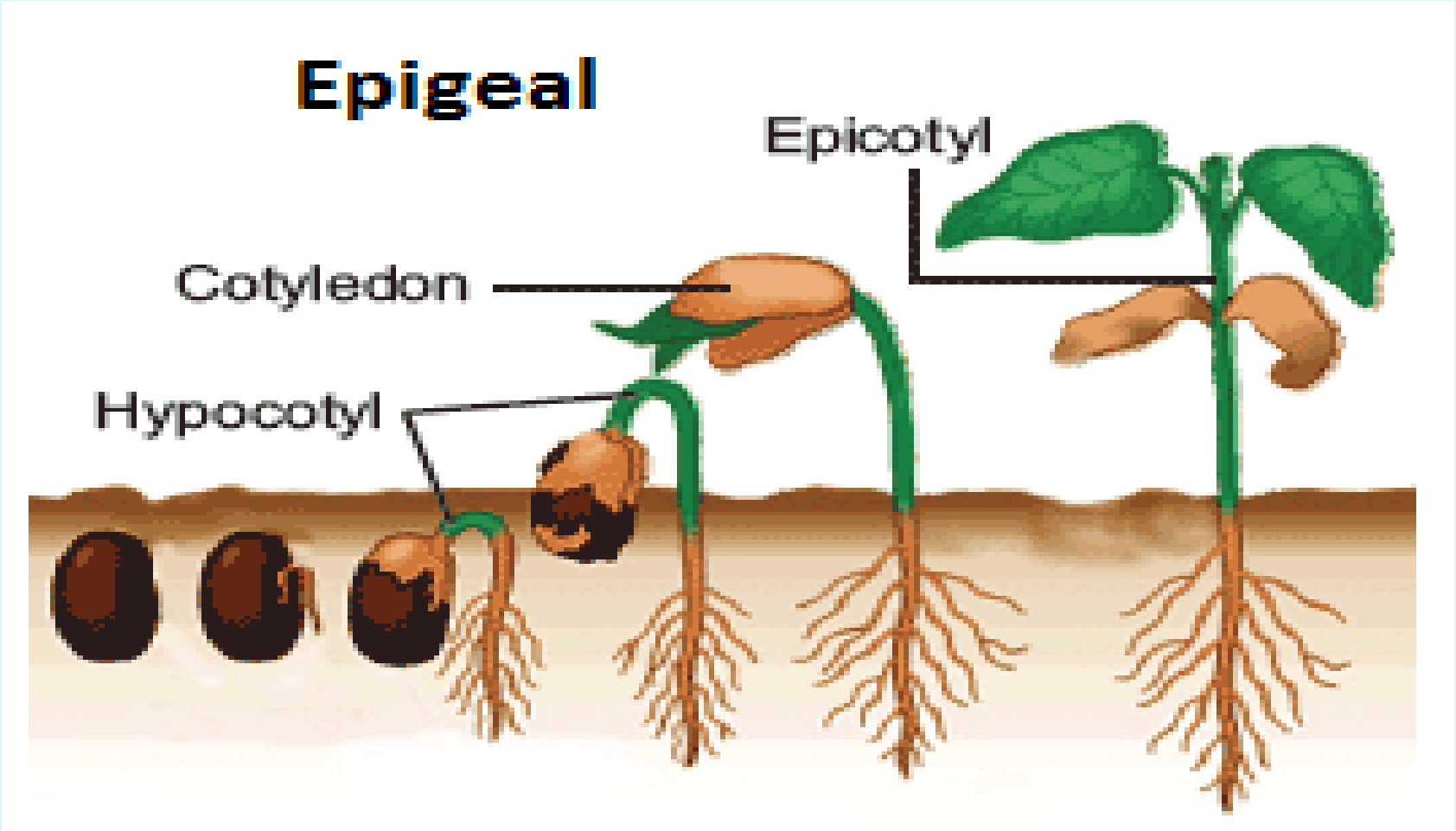
- **Stage of development**
  - **Zygote→ embryo→ Seed lings**
    - **Zygote develop into embryo**
    - **Embryo develops from zygote ,**
    - **Embryo develops into seedlings**

Type of germination

1. Epigeal germination

- Cotyledons are carried above the ground
- The elongation of hypocotyls bring the cotyledon above the ground
- E.g. **Most dicot plant** been ,ground nuts, Cotton and **few monocots** onion , lilies

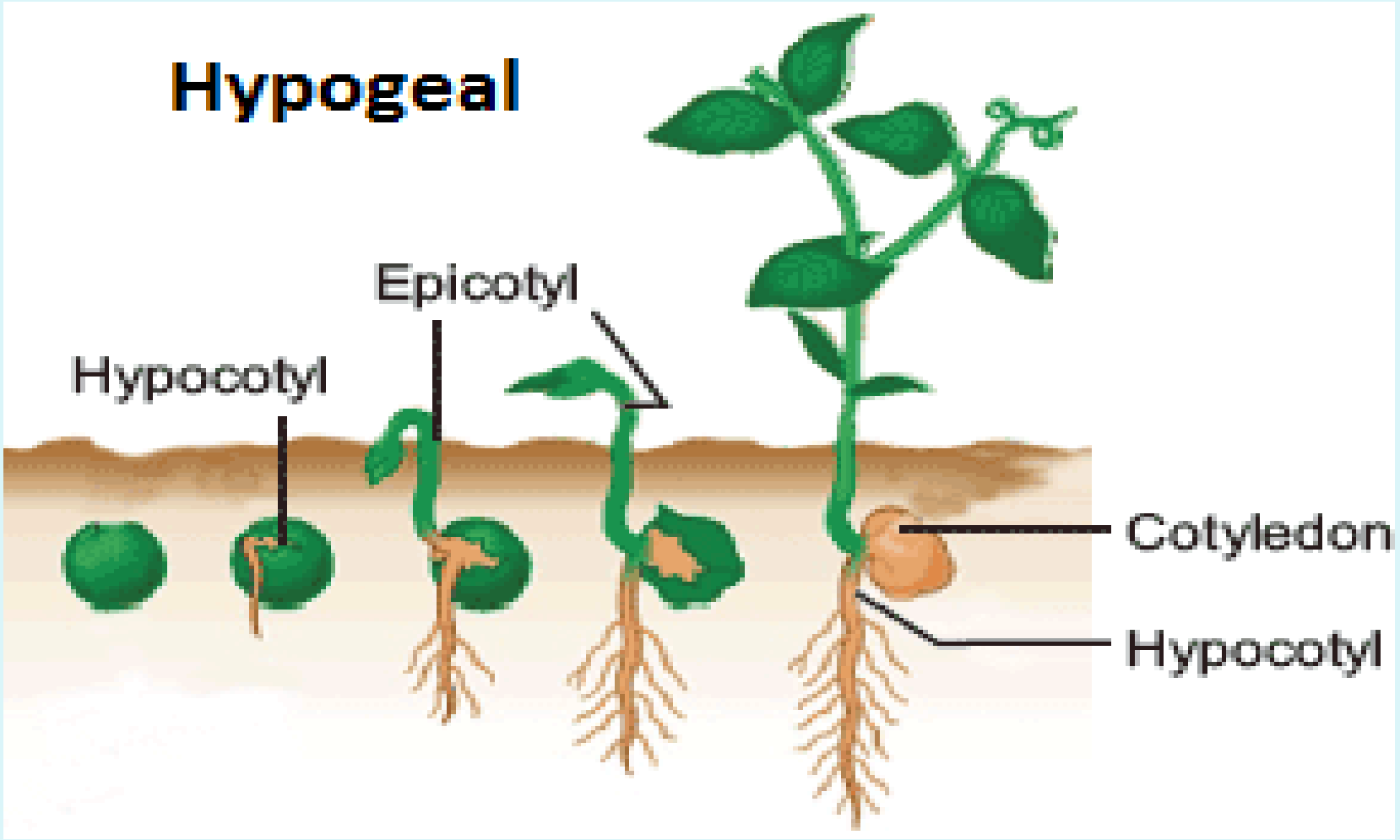
1. Epigeal germination



2. Hypogeal germinations

- Cotyledon below the ground
- The elongation of epicotyls leaving the cotyledon below the ground
- E.g. most monocots maize, wheat, sorghum, millet and few dicot kidney been , broad been
- **Epicotyls** the region above the cotyledons which gives rise to young leaves
- **Hypocotyls** the stem likes area below cotyledon which gives rise to embryonic root
- Radical the first part of embryo that emerges from seed

2. Hypogeal germinations



4.4.2 **Plant hormone and growth**

- The main hormone involve in plant growth
  - **Auxin**
  - **Ethylene**
  - **Gibberellin acid**
  - **Absicisic acid**
  - **Cytokines**

Auxin (IAA)

- Involve in general plant growth
- Promote lateral bud dormancy
- Stimulates the elongation of new plant cell **(apical dominance)**
- Stimulates the **growth of root on cuttings**
- Prevent the falling of fruits before ripening
- Plays a significant **role in tropism**

Con't

- **Gibberellins**
  - Involve the growth of plants stem
  - Helps **seed to break their dormant period start germinations**
  - Stimulates the production of enzymes used to breakdown food stored in seed
  - **Makes dwarf plants grow in normal size**
- **Ethylene**
  - Gas at room temperature
  - Promotions of **root ripening**
  - Causes fruits and leaves to fall from plants

Con't

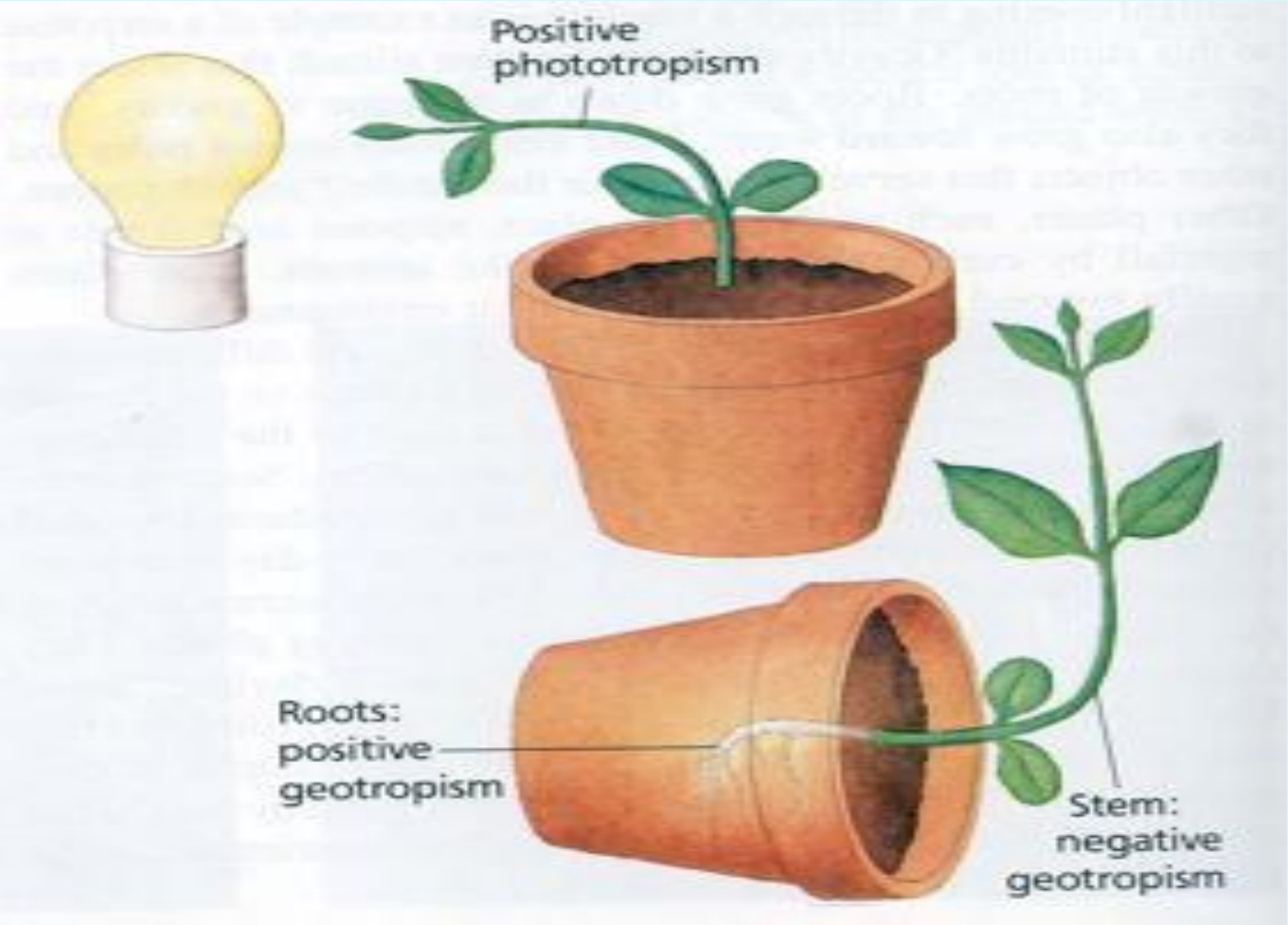
- **Cytokinins**
  - Stimulate cell division in plants
  - The balance between Auxin and cytokinin very important in plant growth
  - Promote lateral bud development
  - Inhibit leaf falling
- **Abscisic acid (ABA)**
  - Inhibit growth
  - **Involve in seed dormancy**
  - Involved in geotropism
  - Play a major role in leaf fall

4.4.3 Tropic response (tropism)

- The directional growth movements to stimuli
  - **Positive tropism** growth toward stimuli
  - **Negative tropism** growth away from the stimuli

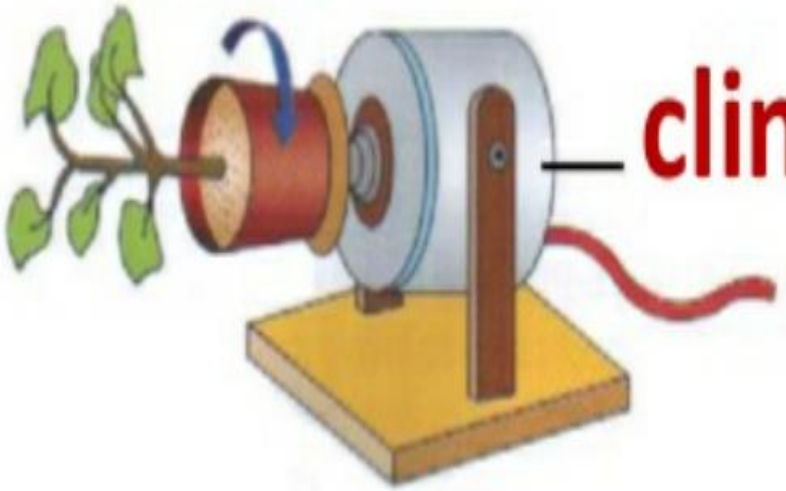
- **Phototropism**
  - The directional growth movements
  - in response to light
  - **Shoot** positive phototropism
  - **Root** negative geotropism

Phototropism



Con't

- **Hydrotropism**
  - Growth response to water stimuli
  - **Root** positive hydrotropism
  - **Shoot** negative hydrotropism
- **Geotropism**
  - Growth response to gravity
  - **Shoot** negative geotropism
  - **Root** positive geotropism
- The response of seedling to gravity can be investigated using **klinostat.** Seedling horizontally fixed to klinostat both shoot and root continue to grow straight because the stimulus is not unilateral, due to the klinostat the movements



clinostat

A motor that rotates slowly – 4 times per hour

Con't

- **Nastic response**
  - Non directional response to stimuli
  - Nastic response differ from tropic response

Nastic response	Tropic response
Non directional response	Directional response
Independent of stimulus position	Depend on the direction of stimulus
E.g. opening and closing of stomata	E.g. phototropism

How tropic response brought about

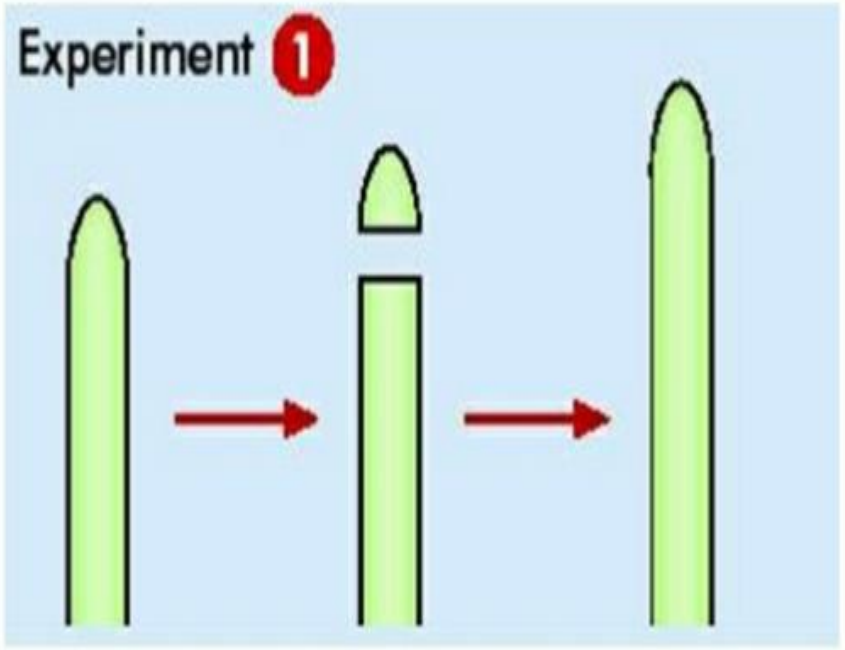
- Plant responds to unilateral stimuli
- Maize grain germinate to produce a straight shoot called **coleoptiles**
- **Coleoptiles** widely used in experiment to investigate the role of hormone in shoot growth

- When the tip of coleoptiles are removed (decapitated)
  - They don't grow since the source of IAA is removed
  - Failure of decapitated seed to grow suggest that Auxin probably produce in the tip
  - Auxin produce in the tip is iodol acetic acid (IAA)
  - IAA involves the response of shoot to light and gravity

Con't

The coleoptile tip was removed

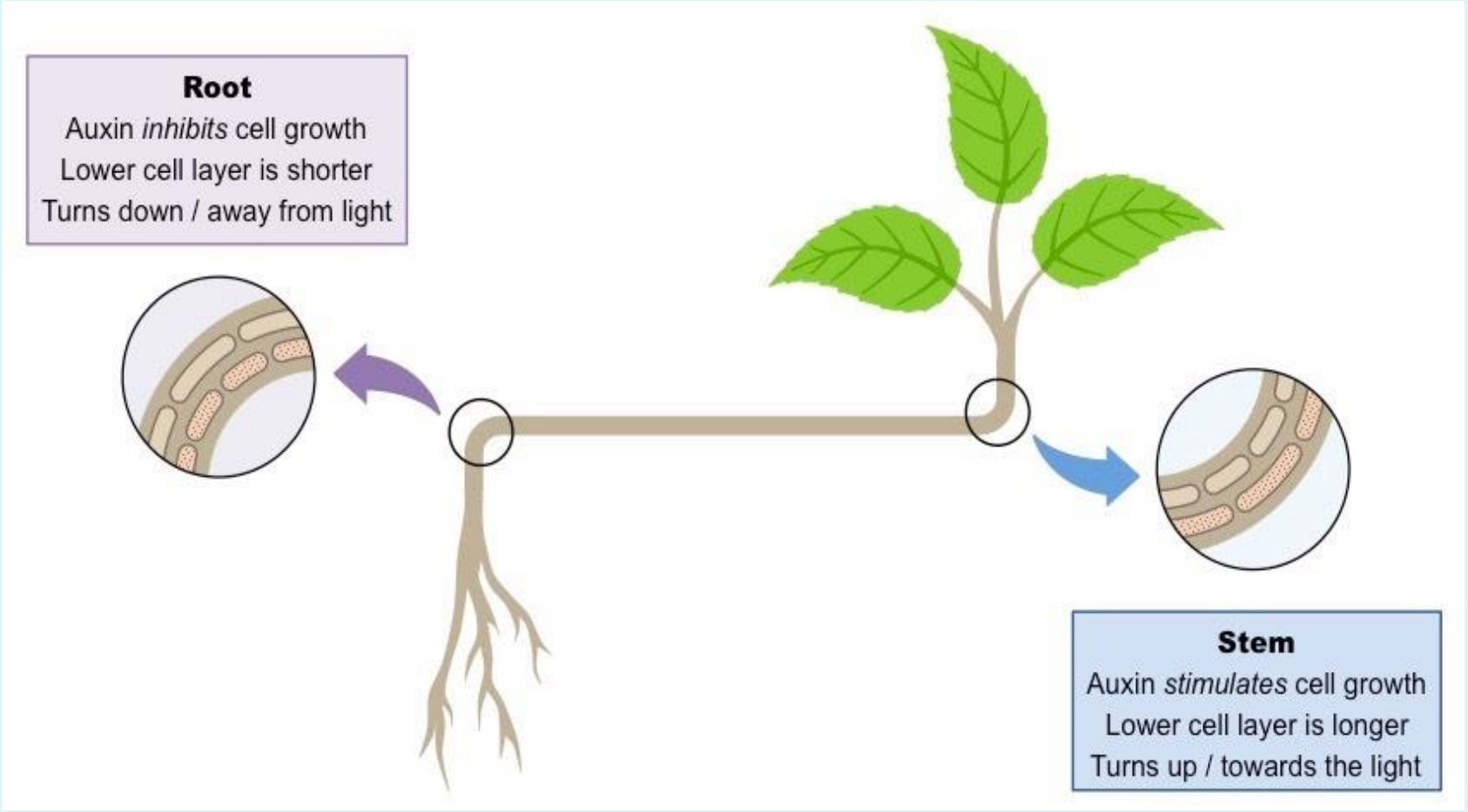
There was no growth until it was replaced



When the plant placed horizontally

- Due to force of gravity auxin accumulate to the lower side
- Auxin promote shoot growth and the shoot growth upward
- Auxin inhibit root growth and the root growth downward

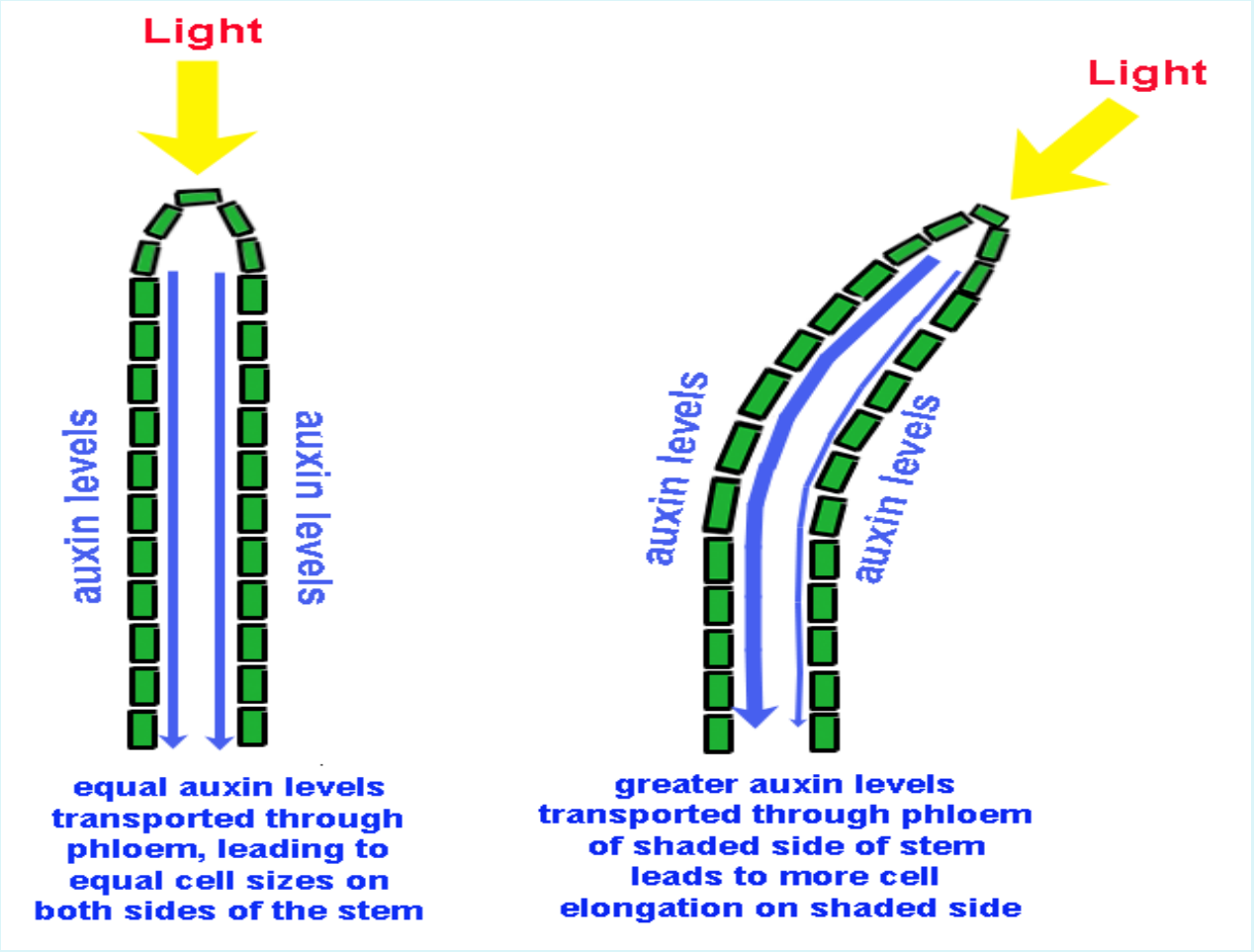
Con't


Root
Auxin *inhibits* cell growth
Lower cell layer is shorter
Turns down / away from light
Stem
Auxin *stimulates* cell growth
Lower cell layer is longer
Turns up / towards the light

When the shoot is lit from one side only

- The shaded side grows faster than illuminated side
- The a shot bend toward light
- Light involved the distribution of IAA in shoot
- IAA diffuse toward the dark side of the shoot
- The dark side grow faster than illuminated
- Growth is directly proportional to IAA

Con't


Light
auxin levels
auxin levels
equal auxin levels transported through phloem, leading to equal cell sizes on both sides of the stem
Light
auxin levels
auxin levels
greater auxin levels transported through phloem of shaded side of stem leads to more cell elongation on shaded side

UNIT 5
CONSRVATION AND NATURAL RESOURCE

5.1 definition of resource

- **Natural recourses** are resource that exist in nature and are useful for human beings resource supplied by nature
- Can be classified into two
  - Renewable
  - Non renewable

Renewable natural resource

- Are resource capable of producing indefinitely
- They are found in unlimited quantity
- They can be reused and replaced easily
- Include mostly living things and their products
- Examples: vegetation, animal, water , air, solar energy, micro organism

Nonrenewable natural resource

- **Nonrenewable natural resource**
  - Are resource that cannot be easily made or produced if they are used once
  - They are found in limited quantity
  - Cannot be reused or replaced
  - Include mostly nonliving things
  - Example ;petroleum, coal, diamond, minerals

5.2 Conservation and biodiversity

- **Conservation**
  - The wise and sustainable use of natural resource
  - involves protection and preservation of natural environment
  - only if the natural resources are properly used and managed can lost forever
  - if natural resource are not wisely used their number declines become extinct
  - **extinct** is the loss of a species everywhere in the world or particular habitat
- **Biodiversity**
  - Is the measure of wealth of species in a given place or habitat
  - Is the different variety species in a given area (species richness)
  - Include all type of animal organisms ranging from small micro-organism to big tree and large animal

Importance of biodiversity

- Maintain the balance in an ecosystem
- Produce genetic variety
- Make place look good with a mixture of different species rather than monoculture
- Help to reduce the spread of diseases
- **Monoculture** is the cultivation of a single croup
- **Monocultures are:**
  - not attractive to look at
  - does not support wide range of plants and animals
  - increase the risk of diseases to spread to quickly

Biodiversity of an area lost by;

- to grow crop for agricultural purpose
- deforestation
- environmental pollution like acid rain
- for growing industrial raw material E.g. sugar

Conserving the biodiversity

- Avoid over exploitation of natural resource
- Improved the habit of planed use of forest resource
- Reduce pollution
- Establish national parks, sanctuaries and zoos

5.3 Vegetation

- **Importance of plant**
  - Source of food
  - To make drink such as tella, tej and coffee
  - Export product for the country
  - For building material
  - For timber production
  - of medicine
  - Source of oxygen to the atmosphere
  - Absorb atmospheric CO_2

Human effect on vegetation

- **Deforestation** for various purposes such as agriculture, fuel consumption, timber production
- **Overgrazing** expose the land for serious wind and soil erosion
- **Burning**

Endemic species

- **Some of endemic species in Ethiopia are**
  - Teff (*Eragrostis teff*
  - Noug *(Guizotia abisinica)*
  - Enset (*Ensete ventricosum*
  - Juniper (tid)
  - Kerero etc

Conservation

Some method of conserving vegetation

1. Afforestation planting young tree
2. Controlled grazing
3. Fire protection
4. Awareness creation

5.4 Wildlife

- Importance of wildlife resource
  - Economic or commercial value from tourism
  - Educational, scientific and recreational value
  - Maintenance of natural balance in an ecosystem
- **Endemic wildlife species in Ethiopia**

Mammals	Birds
Gelada babbon	thick-billed raven (kura)
Walia ibex	white colored pigeon
Menlik's bushbuck	

Human effect on wildlife

- Distraction of forest habitat
- Uncontrolled hunting
- Human settlement

Wildlife conservation

- Establishing park, zoos, sanctuaries
- Preventing the spread of disease
- Controlling human settlement
- Awareness creation

National park

- **National park** is conservation area designed to give maximum protection to wild animal
- **Sanctuaries** are conservation area establish to focus on a particular species, some example of wildlife sanctuary
  - **Harer wild life sanctuaries;** set up to conserve and protect native elephant species, *Laxodonta African oleansieSe*
  - **Kuni-muktar mountain nyala sanctharies;** set up to protect mountain nyala
  - **Senkelle Sewayne' heart beest sanctuaries;** close to rift valley lake national park which is dedicated for protection of heart beest

Con't

National park	Organism found
Abijatia-shall	**Flamingoes, pelicans, Gazelle,**
Awash	**Zebra, wild pig, cheetahs**
Bale mountain	**Gelada babbon, neyala, Wolves, M. bushbucks**
Gambella	**Lion, Elephants, buffalo, Zebra**
Rift valley lake	**Gazella, flamingoes, pelicans**
Mago	**Giraffe. Elephants, lions, buffalo**
Omo	**Giraffe. Elephants, lions, buffalo**
Nechisar (b/n Abaya & chamo)	**200 species of birds**
Simian mountain	World heritage site Walia, wolves, G. babbon
Yangudi--rassa	Variety of vegetation Zebra ,cheetha

5.5 Air

- **Pollution;** the contamination of the natural environment by harmful substances as a result of human activity.
- **Pollutant**; a harmful substance
- **Air pollution** can occurs in different forms, these include
  1. **Global dimming;** is the worldwide blockage or reduction of sunlight from reaching the earth's surface as a result of hydrocarbon released in the atmosphere in the form of smoke. **Black carbon pollution.**
  2. **Global warming;** is the rising of temperature on earth's surface as a result of accumulation of green house gas like **carbon dioxide** and **methane**.

Con't

- **Carbon dioxide CO_2**
  - Increase as a result of human activity such as
  - Combustion Burning of fissile fuel
  - Deforestation
  - Respiration
- **Methane**
  - **It is** increased in the atmosphere as a result of
  - Growth of rice in swampy condition
  - Digestive activity of cattle produce methane

3. Acid rain

- Caused by sulfur and nitrogen oxide
- Formed when rain water react with these oxide
- **Acid rain damages our environment by;**
  - Killing leaves
  - Depletion of soil which destroys roots of tree
  - Pollution of lake, river and stream water
  - Damage on building materials by reacting with carbon dioxide
- **Natural cause of acid rain**
  - Water vapors from clouds
  - Volcanic eruption and lightning
- **human cause of acid rain**
  - -burning of fossil fuels from industries and vehicles

Effect of air pollution on human

- Chronic respiratory problems
- Lung cancer
- Heart disease
- Brain damage
- Nerve, kidney. Liver damage
- **Chlorofluorocarbon (CFC'S)** cause ozone depletion