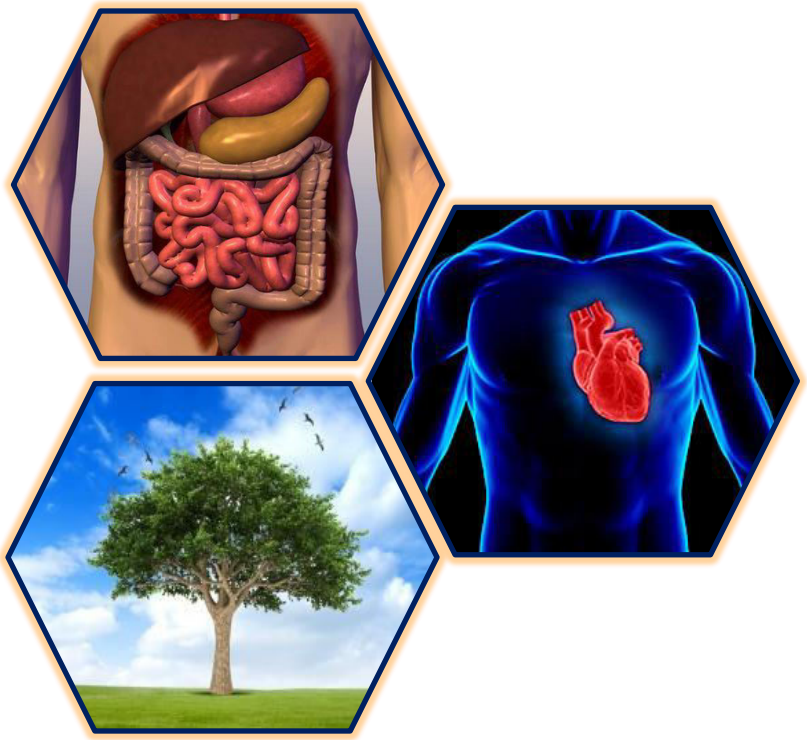
Module 1

6. LIFE PROCESSES



The world is made up of living and non-living things

Let us see what are these characteristics

Living

Non-living

How can you differentiate between living and non-living ?

Characteristics of living things

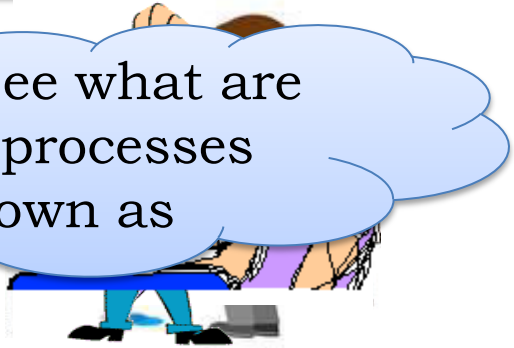
Ability To Move

Produce Offsprings

Turn Food Into Energy

Respond And React

Let us see what are these processes known as



Give birth to new

Respond to external change

Processes like :

Nutrition
Respiration
Excretion
Transportation
Reproduction
Sensitivity
Growth

Are known as → **Life processes**

Help → **Sustain**

Maintain life

So we will learn about these processes in detail in this chapter called

6. LIFE PROCESSES

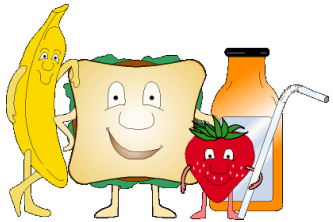
Nutrition :

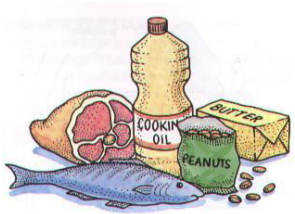
Living organisms —need→ **Energy for growth and maintenance** —obtained→ **Food** —contains→ **Nutrients**

Nutrients :

Substances which an organism obtains from its surroundings and uses as a source of energy

Eg. : Carbohydrates, proteins, fats.





The process of intake of nutrients

and its utilization

by an organism

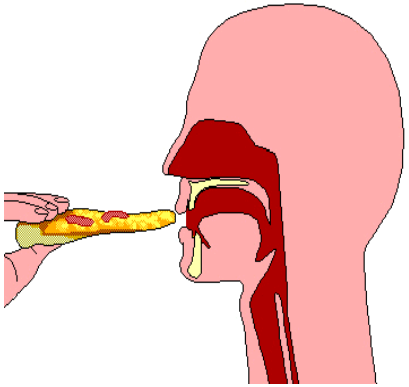
is called as

Nutrition

Provides

Use for various functions

...erial to sustain life



WAYS OF OBTAINING FOOD

is known as

MODES OF NUTRITION

(Two types)

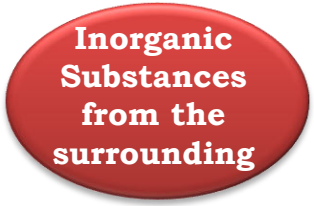
AUTOTROPHIC **HETEROTROPHIC**

Thank You

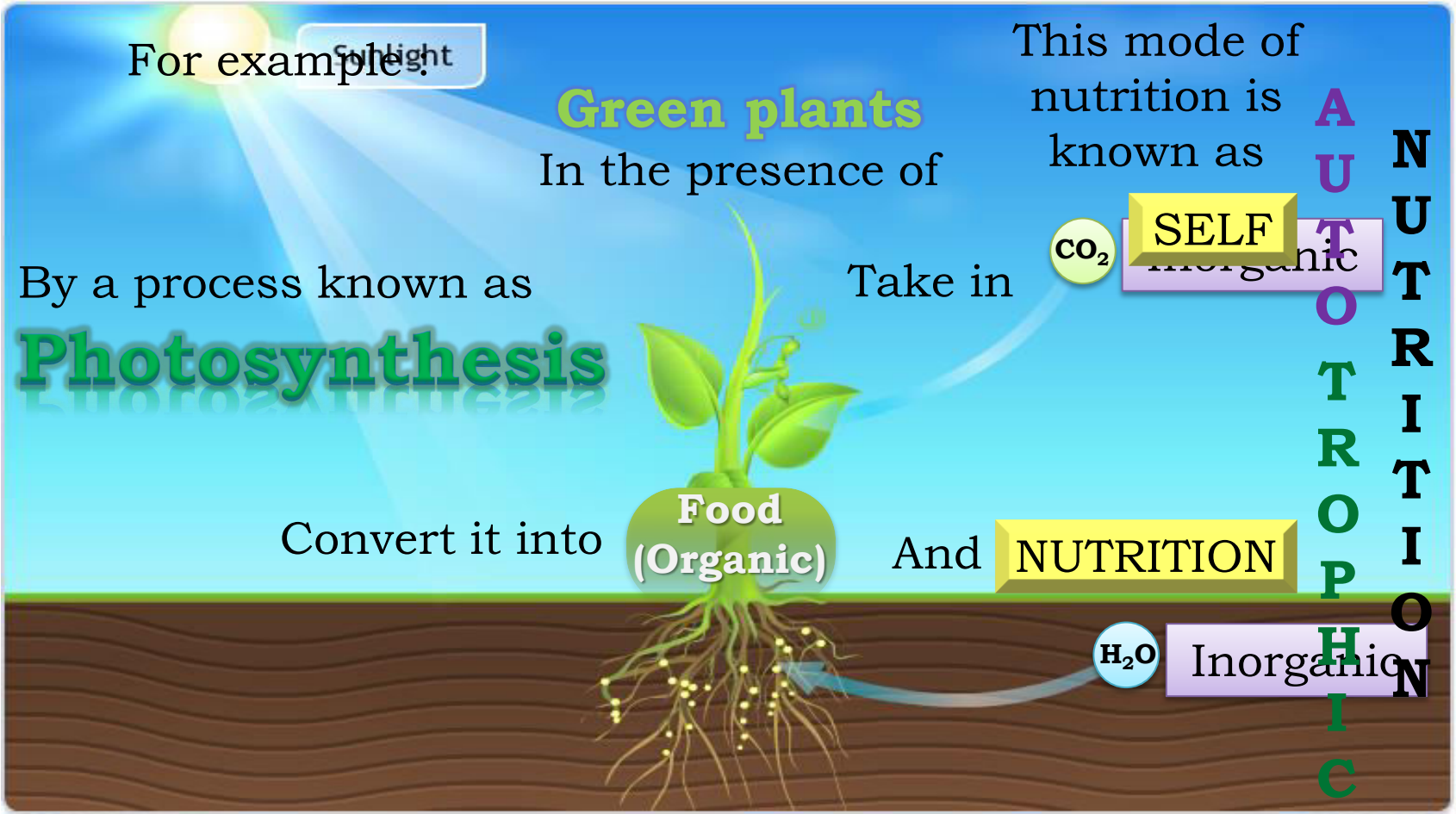
Module 2

In autotrophic nutrition

Takes in



And converts it into


For example:
Sunlight
Green plants
In the presence of
This mode of nutrition is known as
AUTOTROPHIC NUTRITION
By a process known as
Photosynthesis
Take in
CO_2
SELF
Inorganic
Food (Organic)
Convert it into
And
NUTRITION
H_2O
Inorganic

Autotrophic nutrition is a mode of nutrition in which organisms synthesize their own organic food.

So how do we define autotrophic nutrition ?

Such organisms are called as

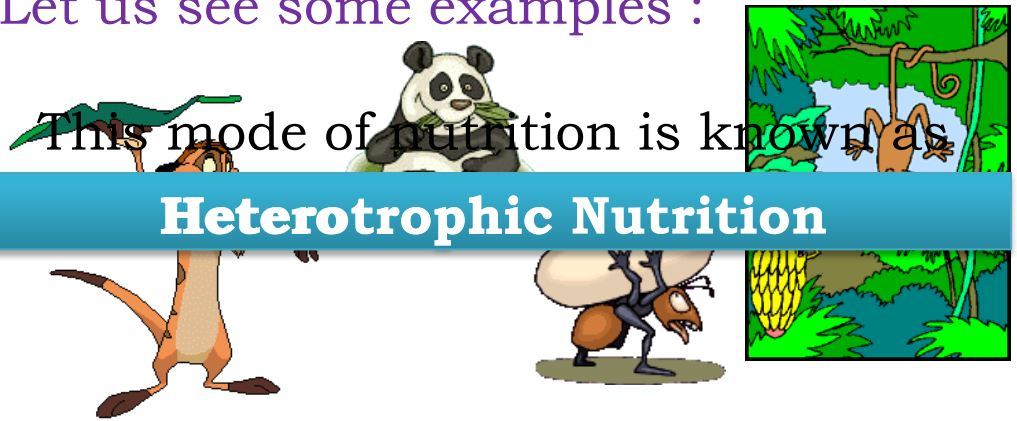
AUTOTROPHS

e.g. PLANTS and some bacteria

Only green plants

However there are some organisms which can not prepare their own food.
They depend on other organisms for their food.

Let us see some examples :



This mode of nutrition is known as

Heterotrophic Nutrition

Depending on others

Nutrition

Eg. All Animals and Fungi

In heterotrophic Nutrition :

Methods

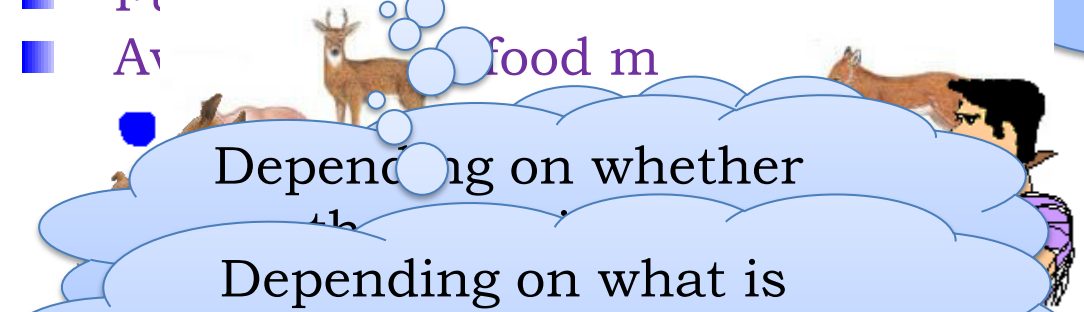
Different organisms use different strategies to obtain food depending upon :

- Body design
- Organization
- Functioning
- Availability of food m

Eg. Herbivores need different food compared to carnivores based on their digestive system

For e Herbivores have Carnivores have

Therefore



Depending on whether

Depending on what is the type of food available around the organism

different mode intestine

Thank You

Module 3

Some organisms → **Breakdown food into simple substances outside the body** → **Then absorb it inside**

E.g. Fungi like yeast and mushroom & some carnivorous plants.

Mushroom

Releases enzymes

Digests food outside the body

Absorbs the simple substances

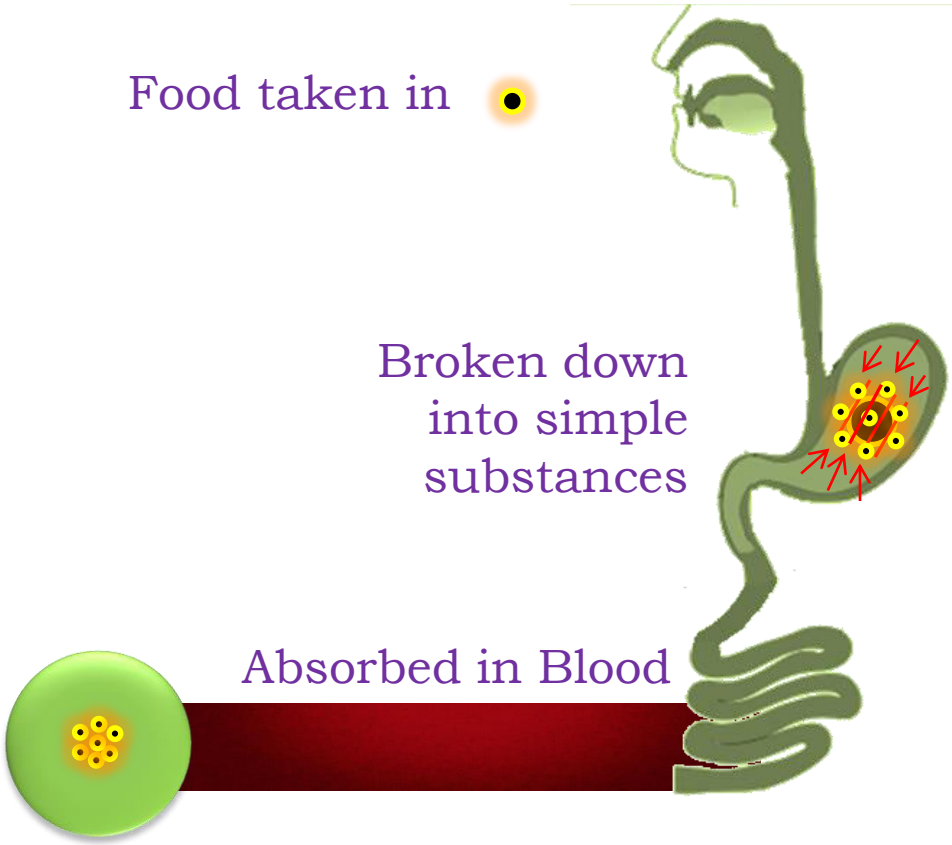
Some organisms → **Breakdown food inside the body** → **Then Absorb it**

E.g. Human beings, cat & cow

Food taken in

Broken down into simple substances

Absorbed in Blood



- Some animals and plants derive nutrition from other plants or animals without killing them.
- But during the process they harm the host plant or animals.

E.g. cuscuta, ticks, lice, leeches, tapeworms, etc.

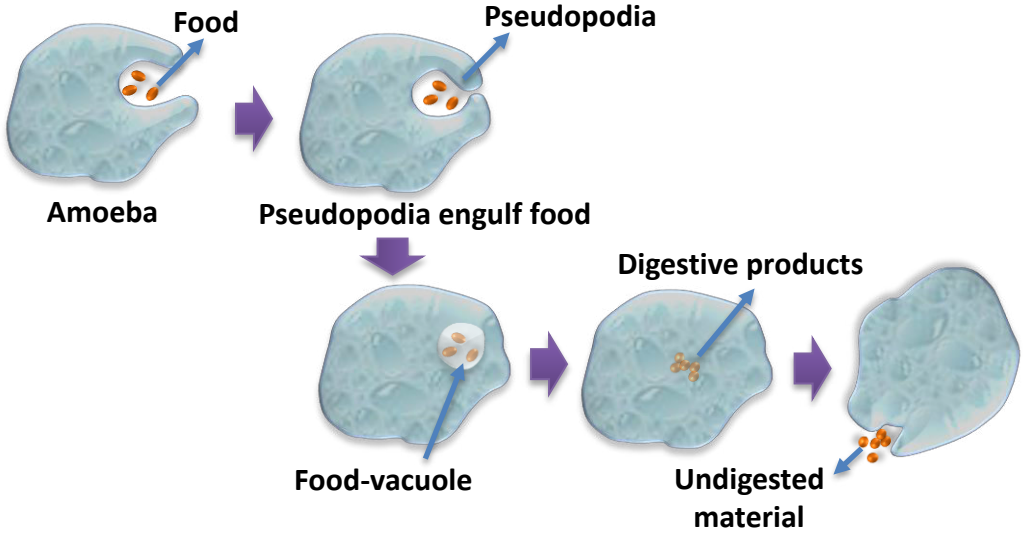
Worms found in the intestine of man and derives nutrition from there.


How do organisms obtain their nutrition?

- Since the food and the way it is obtained differ, the digestive system is different in various organisms.
- In single – celled organisms, the food may be taken in by the entire surface.
- But as the complexity of the organism increases, different parts become specialised to perform different functions.

- For e.g. amoeba takes in food using temporary finger-like extensions of the cell surface which fuse over the food particle forming food-vacuole.
- Inside the food vacuole, complex substances are broken down into simpler ones that diffuse into the cytoplasm.
- The remaining undigested material is moved to the surface of the cell and thrown out.

Pseudopodia



Thank You

Module 4

Nutrition in human beings :

Takes place in a special syste

Digestive system

It is

Alimentary canal

It is a long an
muscular
of varyin
diam

Ext m
the
anu

tive
s

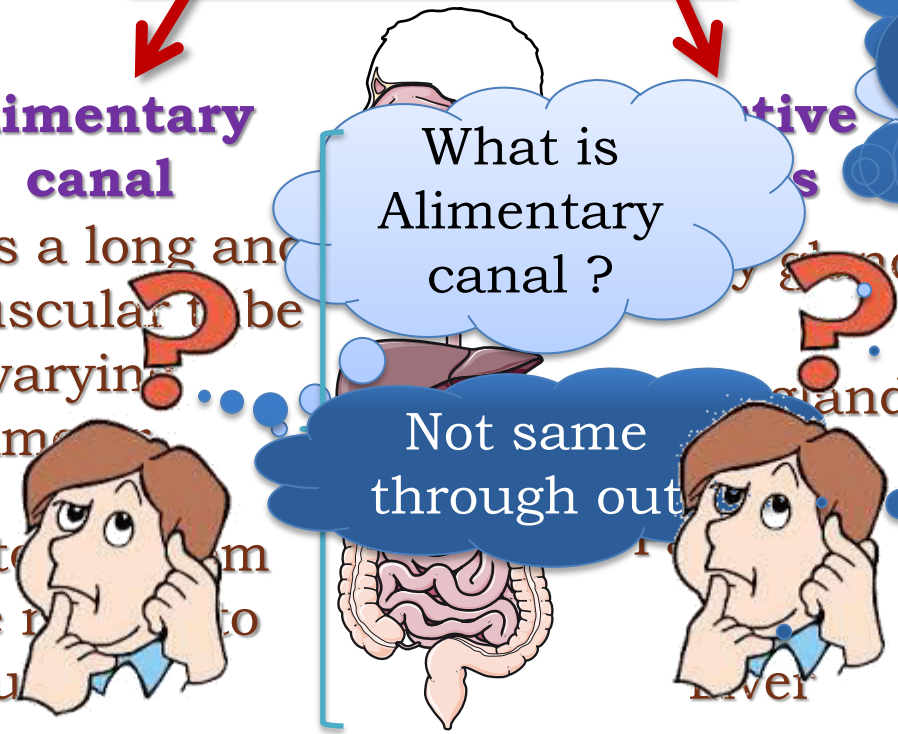
glands

glands

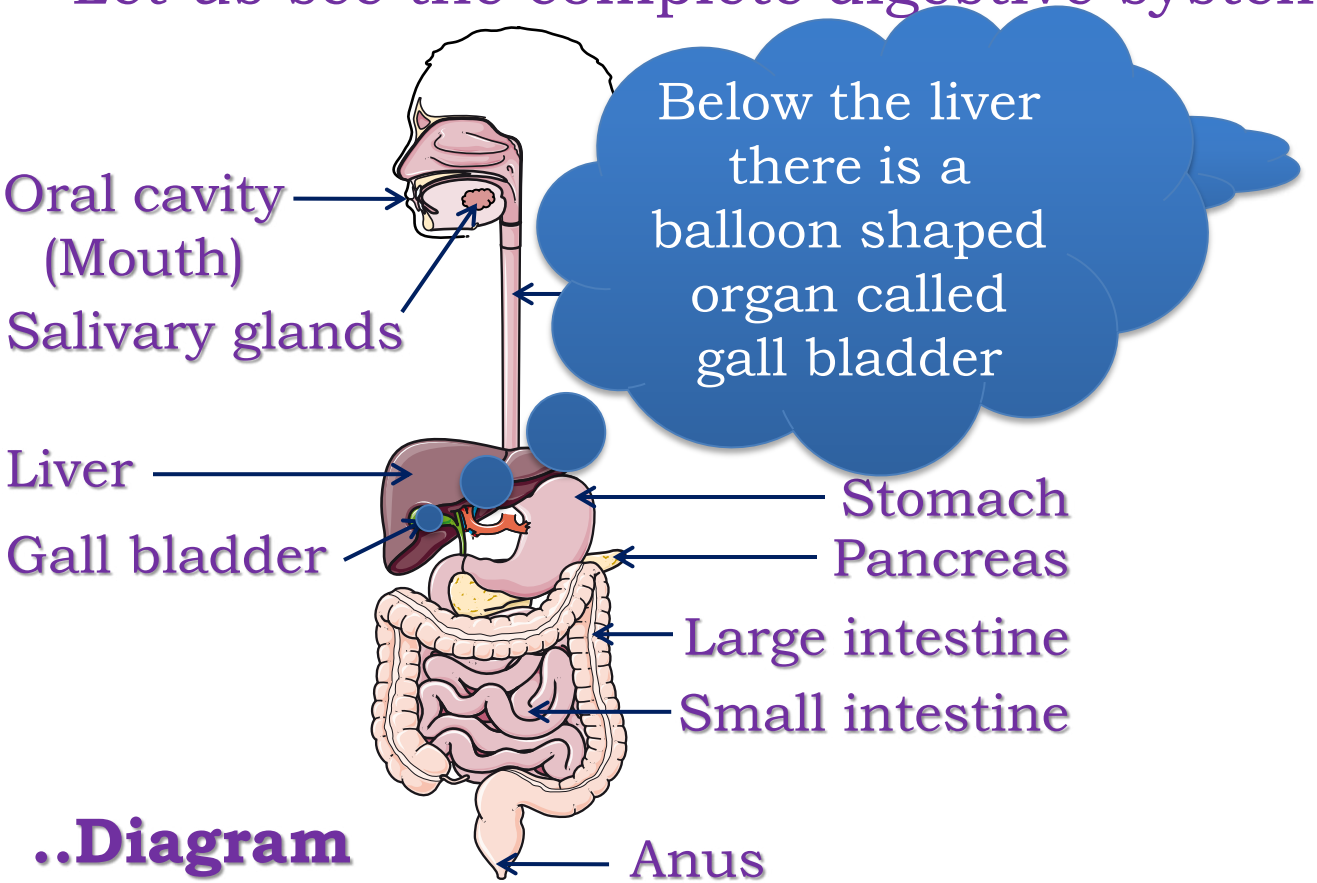
What is Alimentary canal ?

Not same through out

Enzymes are chemicals which break down complex food into simpler ones. So they are also called as biological catalysts.

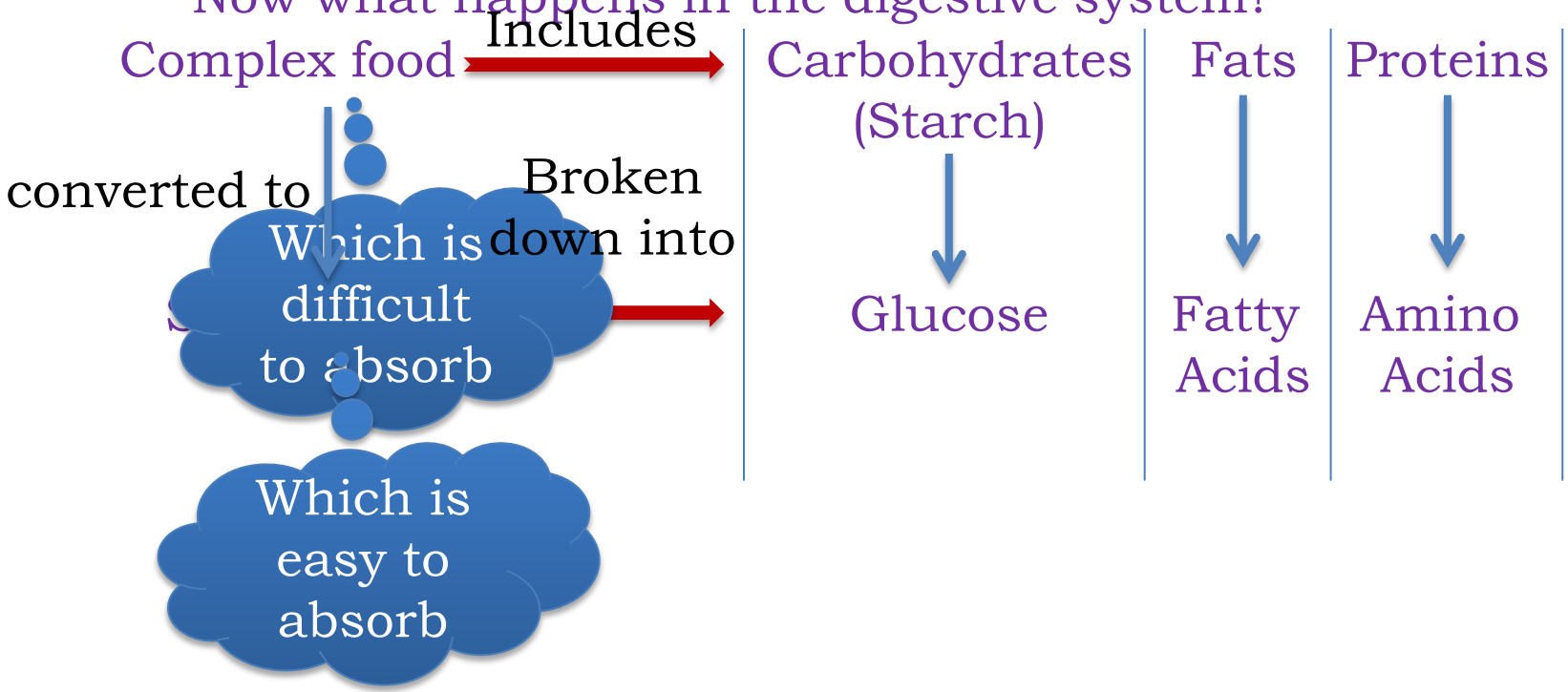


Let us see the complete digestive system together



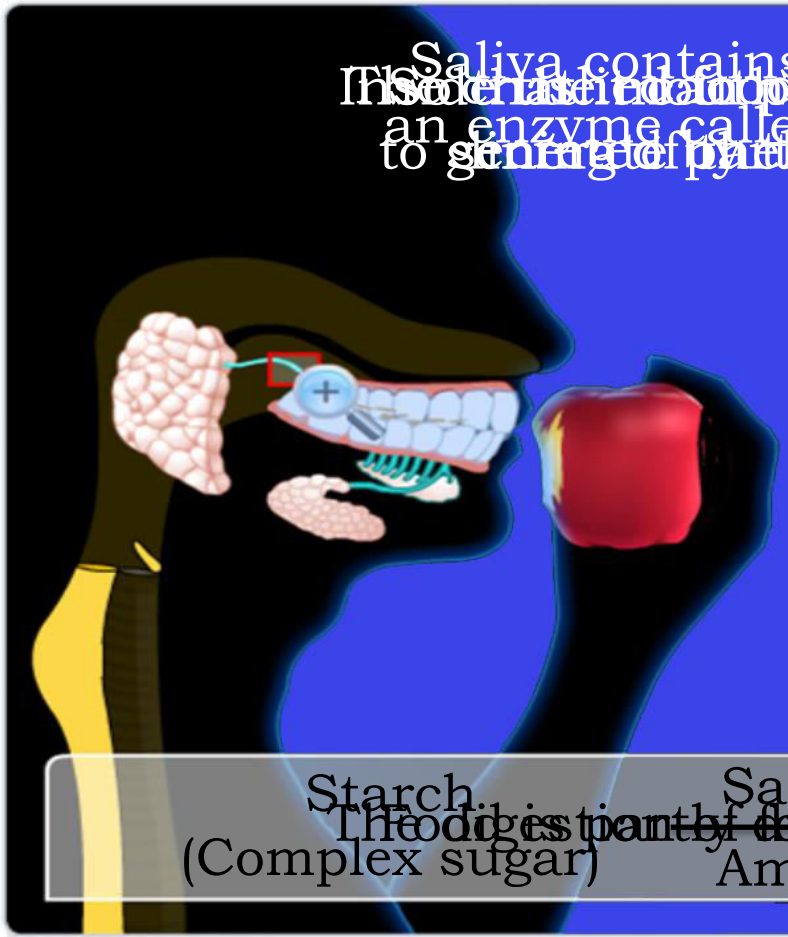
..Diagram

Now what happens in the digestive system?



Thank You

Module 5



Saliva contains
an enzyme called

Chewed

Salivary amylase

Breaks it into

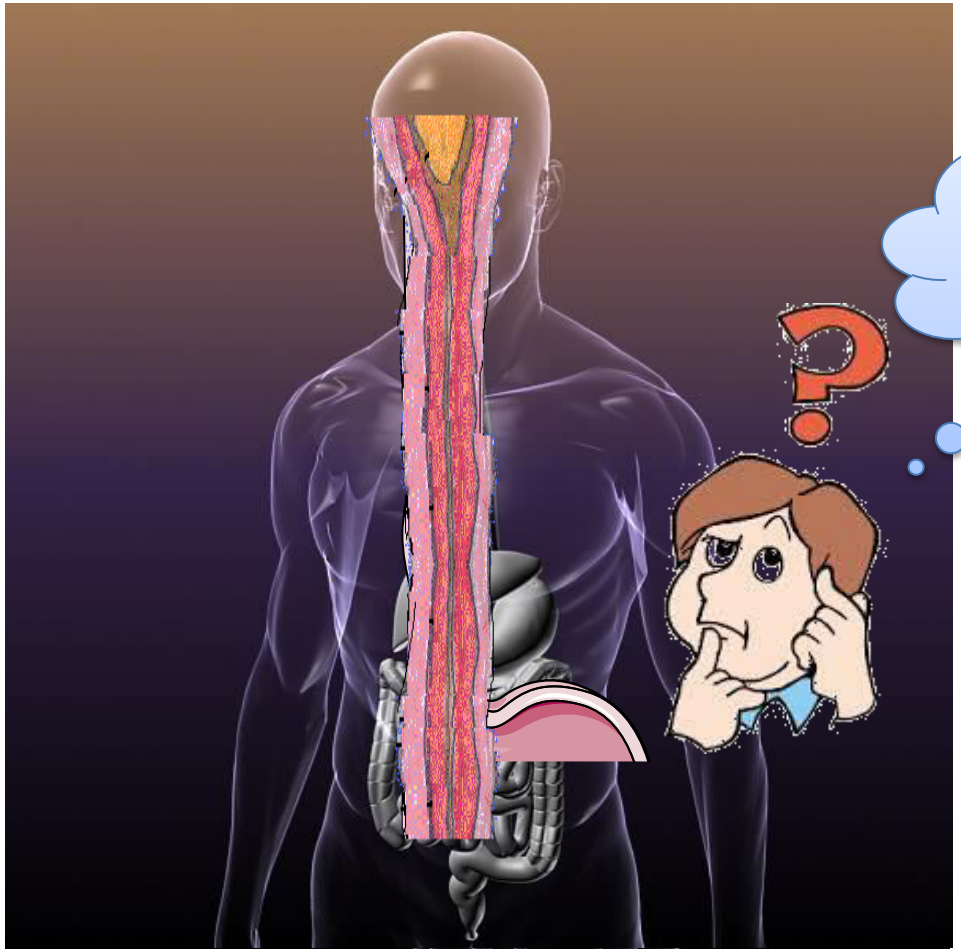
Sugar

Acts on

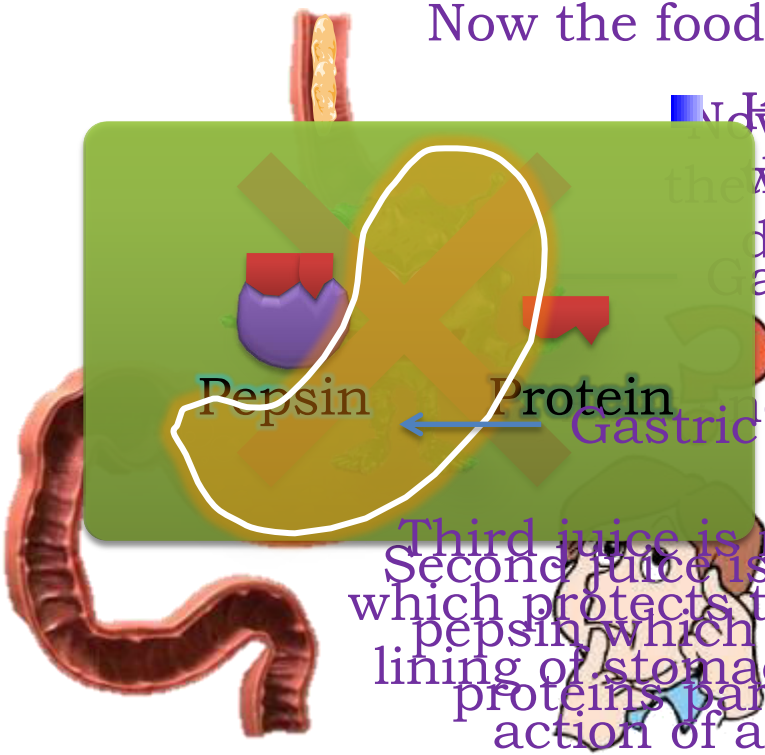
The food is taken in through the mouth

Starch
(Complex sugar)

Salivary Amylase


How does this happen
Due to the rhythmic contraction and relaxation of the muscles of the oesophagus
This is called peristaltic movement
digested through oesophagus

Now the food enters into a J shaped stomach



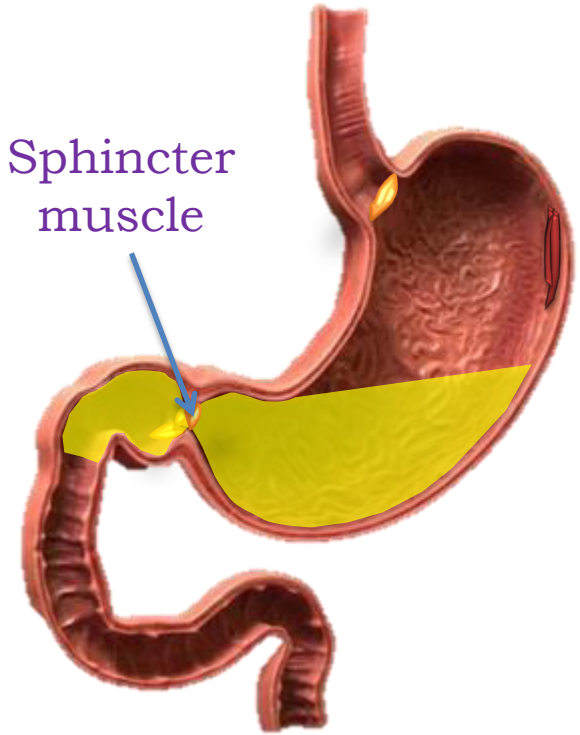
What is the function of HCl ?

Gastric juices

Third juice is mucus

Second juice is enzyme pepsin which digests proteins partially.

which protects the inner lining of stomach from action of acid

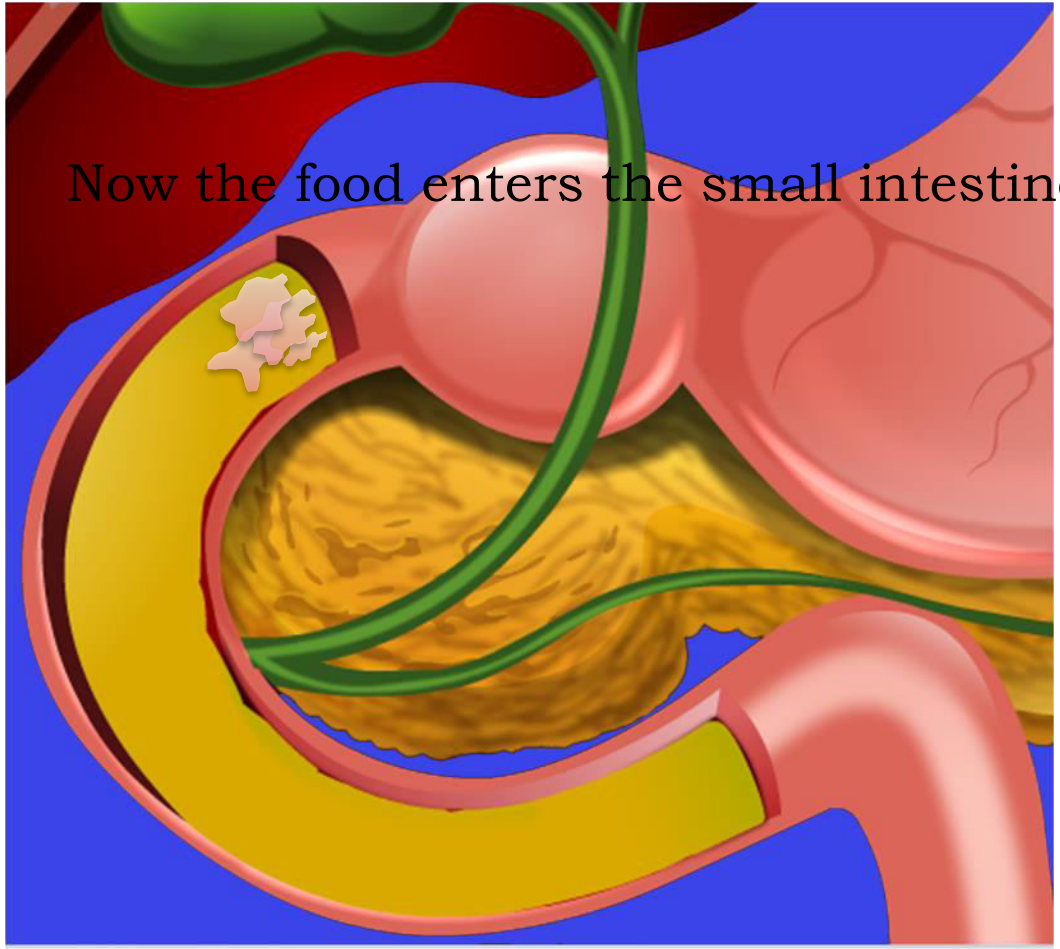


The partially digested food leaves the stomach

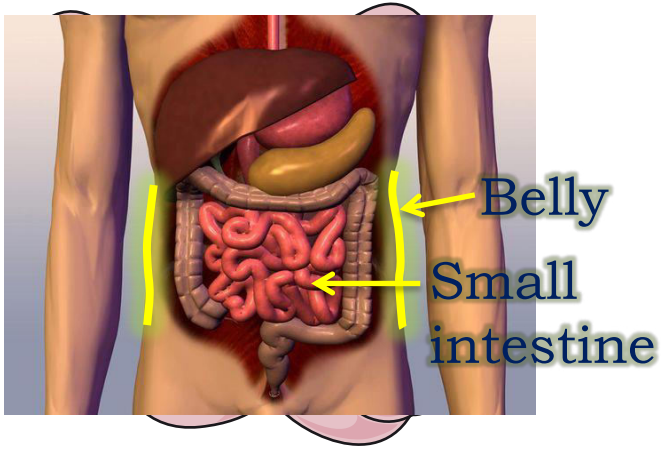
The exit of the food from the stomach is regulated by a muscle called Sphincter muscle

Thank You

Module 6


Now the food enters the small intestine.

- SMALL INTESTINE is the longest part of the alimentary canal
- Fitted into a compact space in the belly by extensive coiling
- Long[illegible] intestine
- Beca[illegible] it has
- Ca[illegible]ydrates, [illegible]ns are fu[illegible]gested in the small intestine

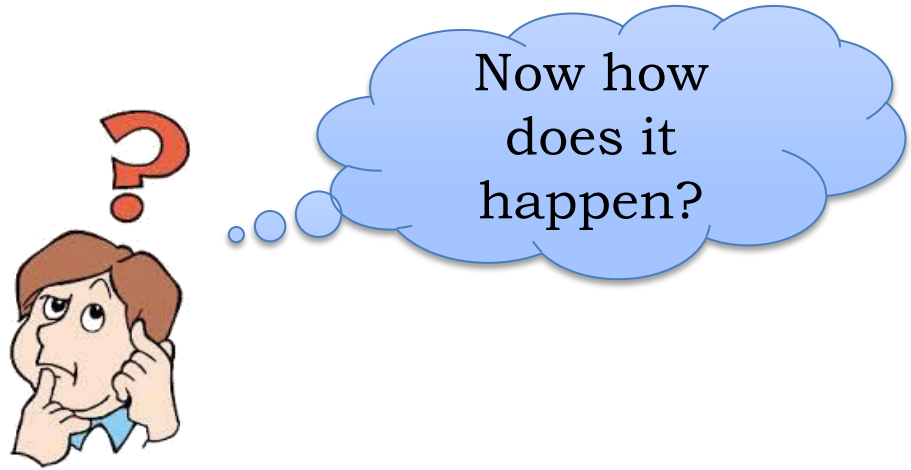


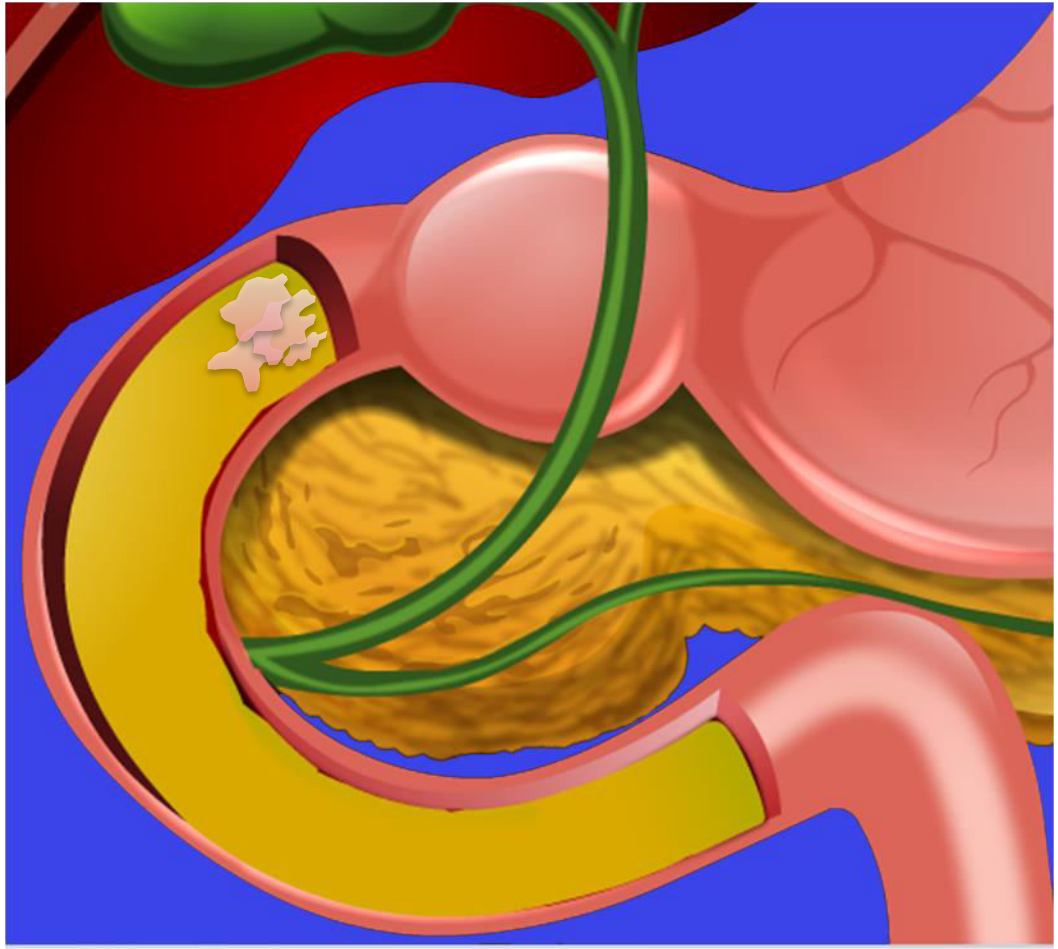
Abdomen

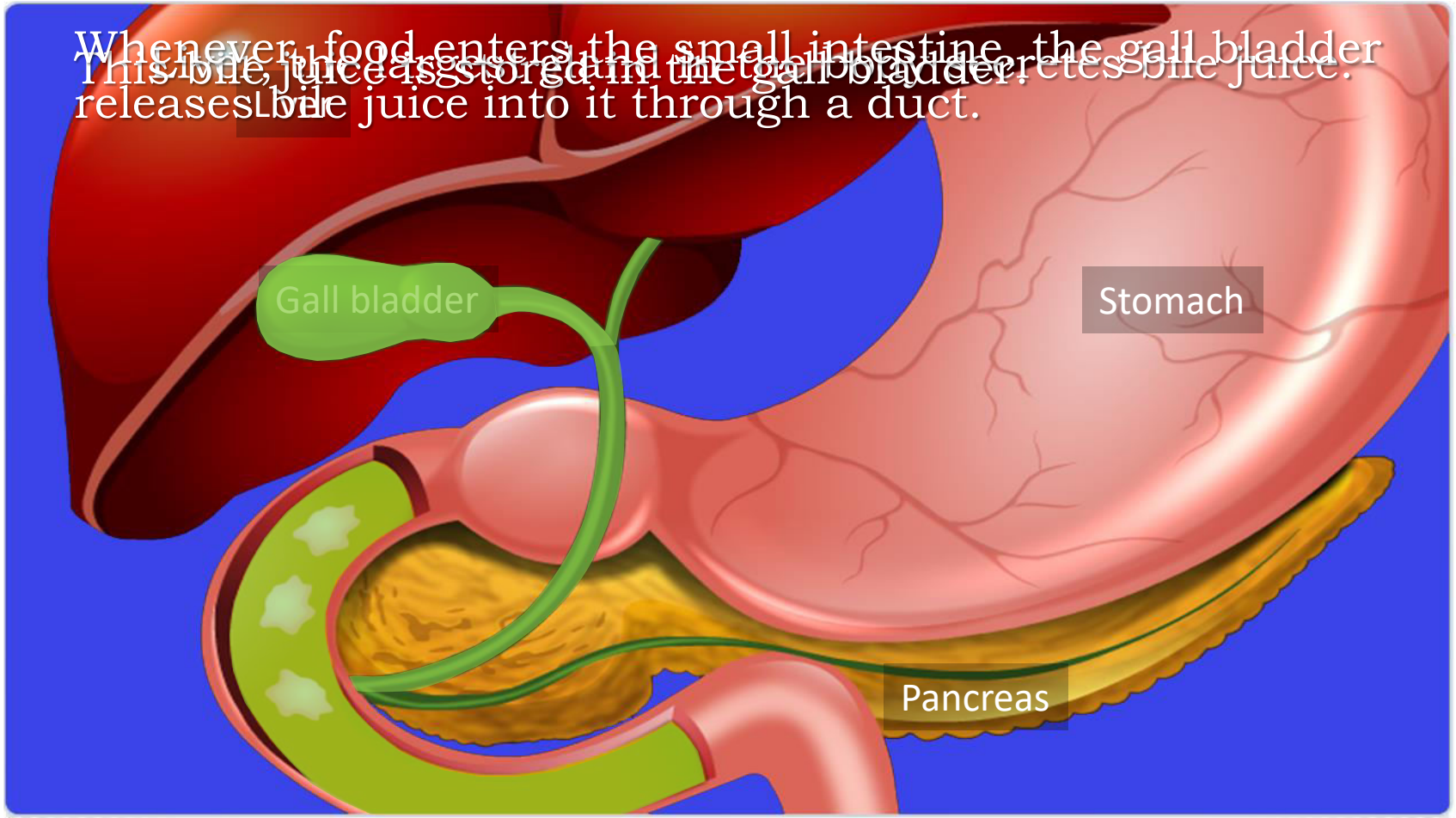
Twists and

Why is it called **small** intestine ?

- Digestion of food in the small intestine requires alkaline medium
- So the food received from the stomach has to be first made alkaline.







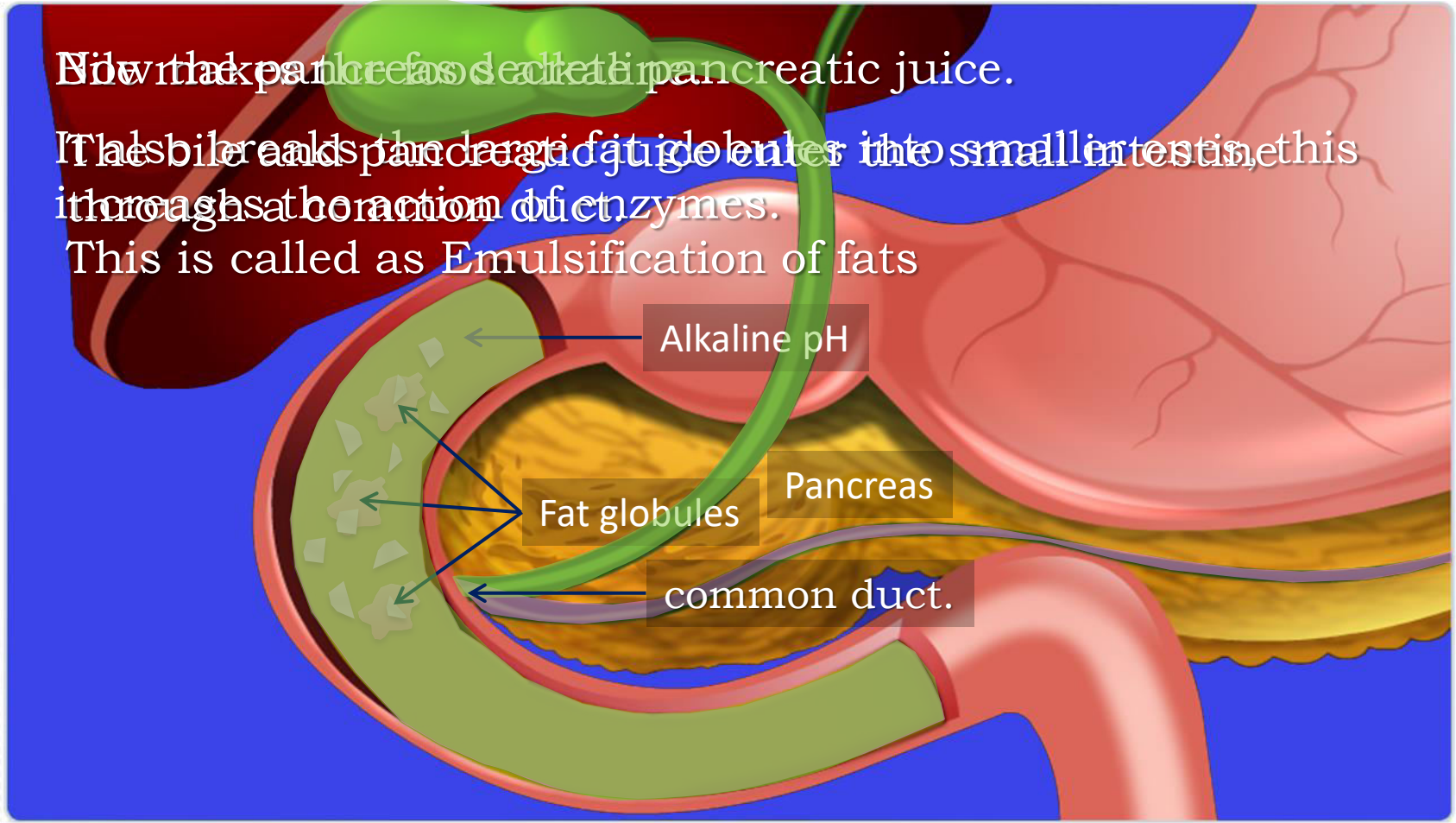
Whenever food enters the small intestine, the gall bladder releases bile juice into it through a duct.

This bile juice is stored in the gall bladder.

Now the pancreas secrete pancreatic juice.

The bile and pancreatic juice enter the small intestine through a common duct.

It breaks the large fat globules into smaller ones, this is called as Emulsification of fats



The pancreatic juice has 3 digestive enzymes :

The first one is Trypsin :

Amino acids

Proteins

Fatty acids

Pancreatic amylase
Digests carbohydrates into glucose

The Third one is Pancreatic amylase

The second one is Lipase :

Glucose

digests

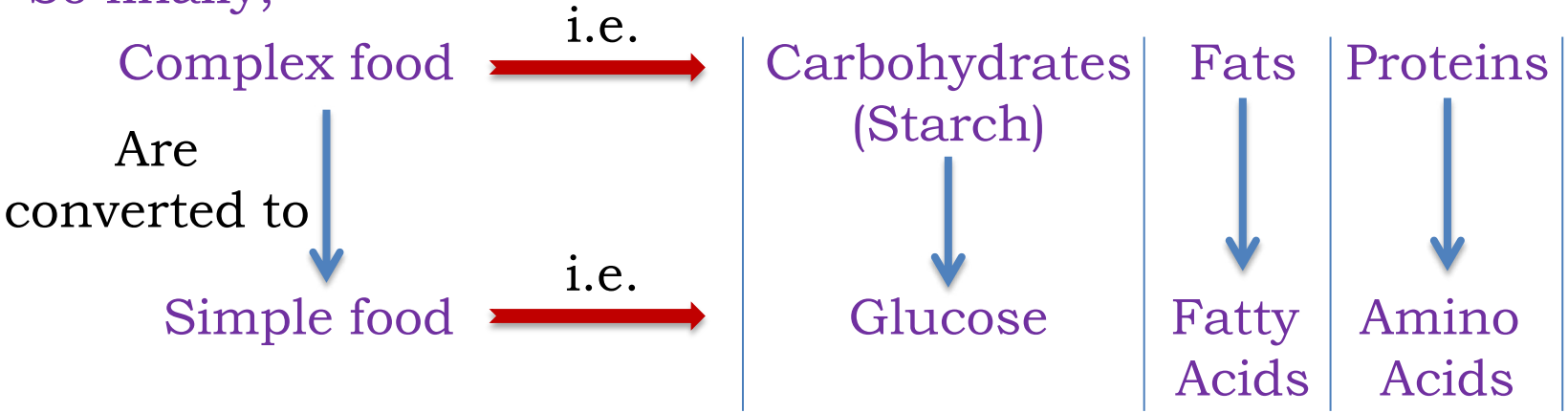
to fatty

cid

Pancreatic amylase

Carbohydrates

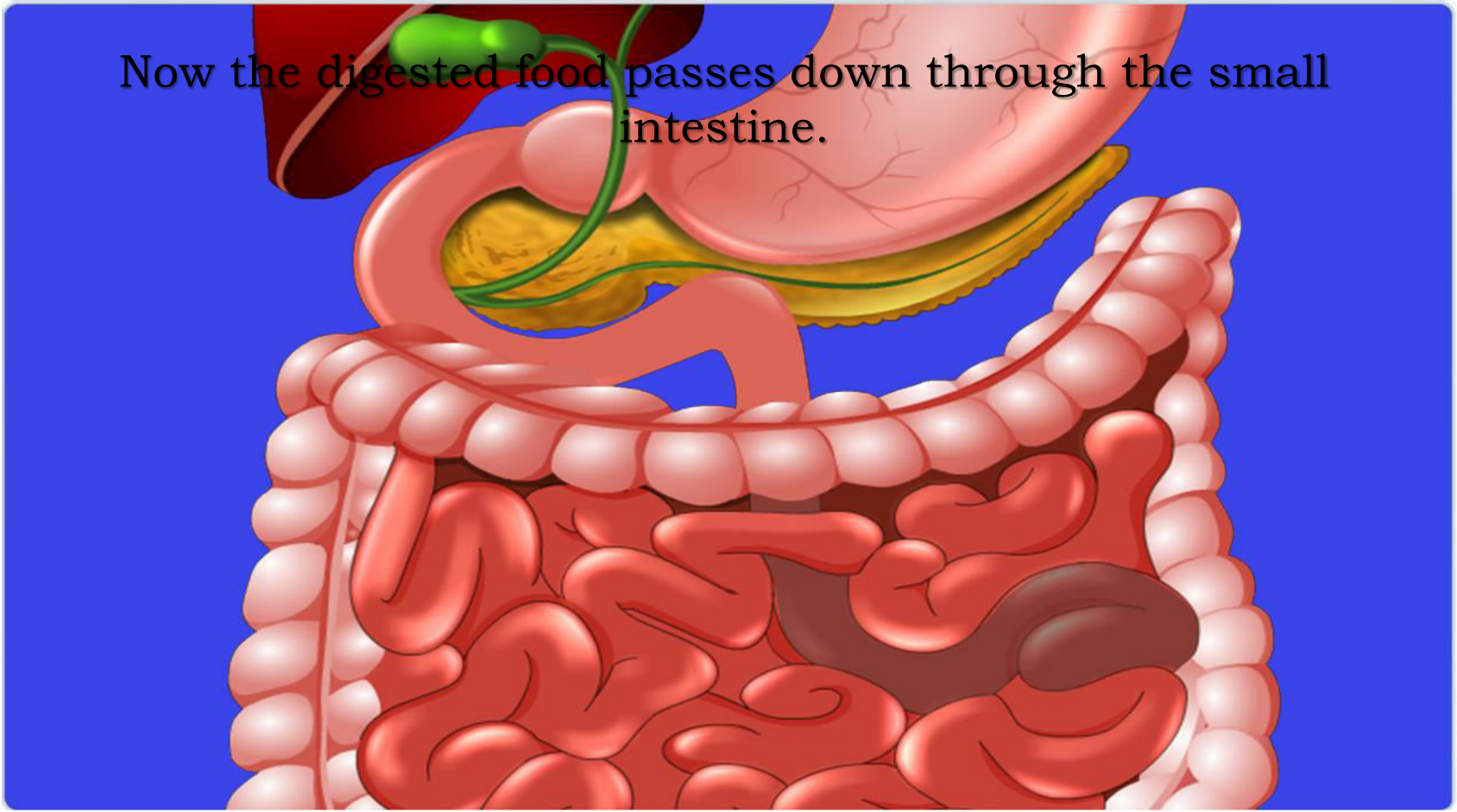
So finally,



Thus the food is completely digested in the small intestine.

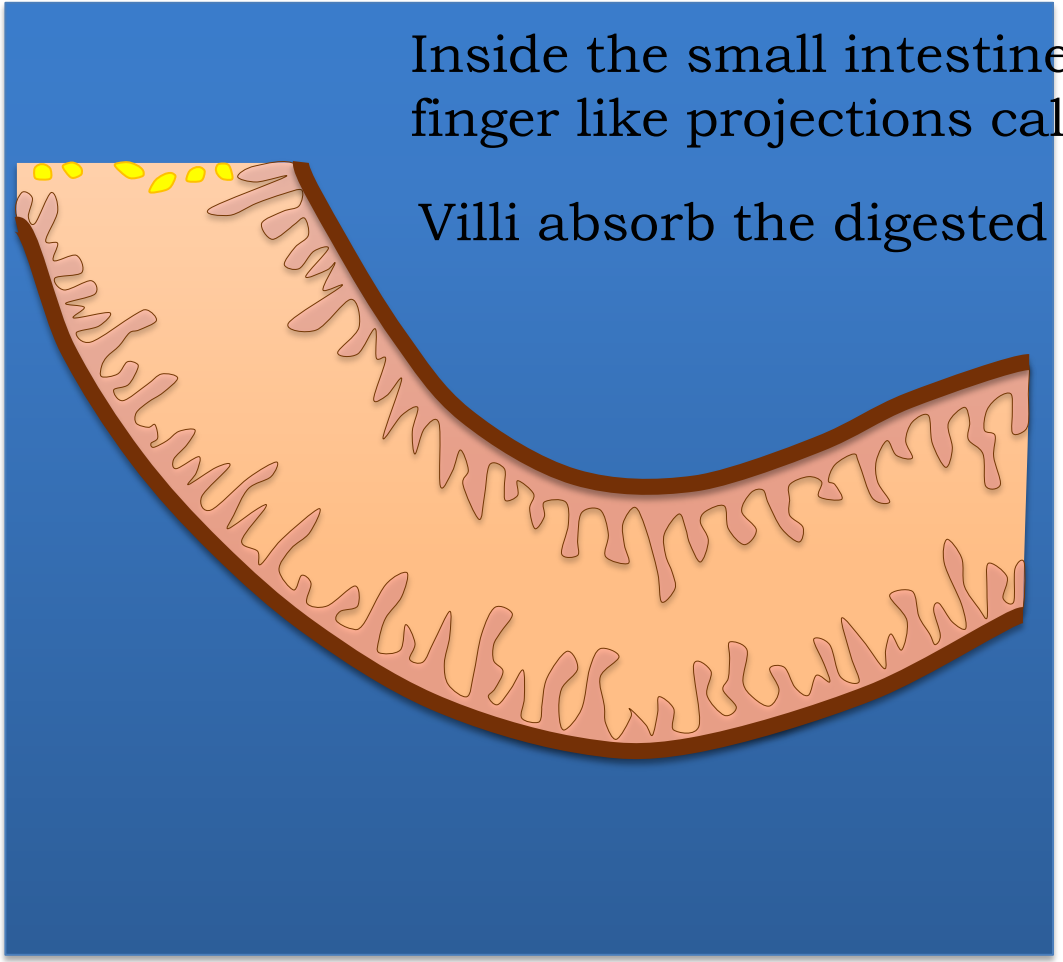
Thank You

Module 7


Now the digested food passes down through the small intestine.

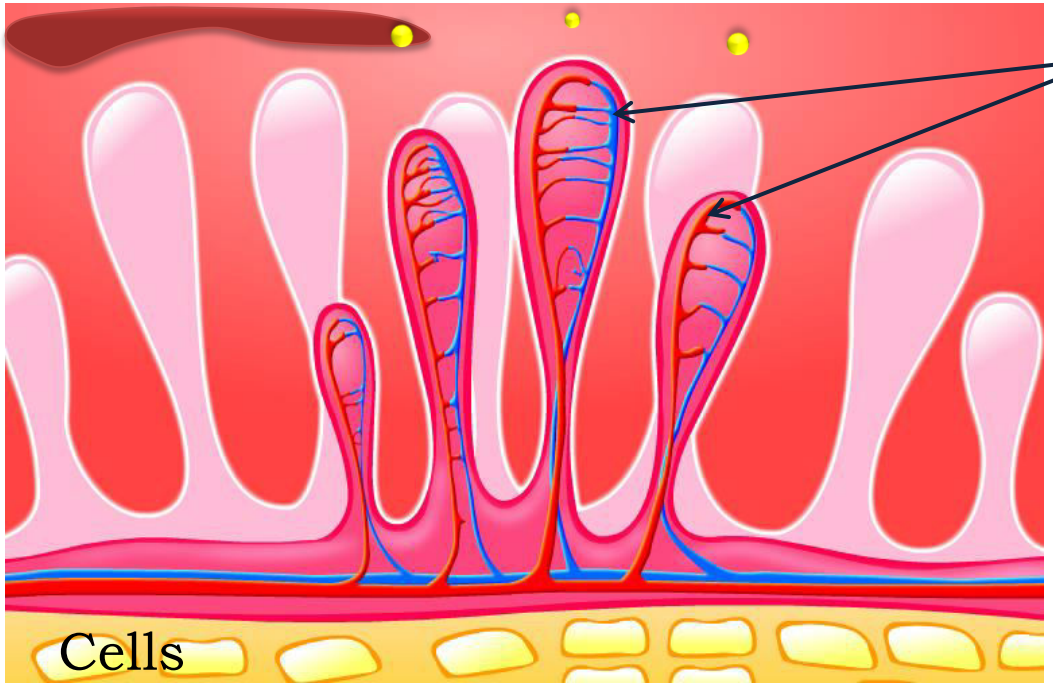
Inside the small intestine there are numerous finger like projections called **villi.**

Villi absorb the digested food.

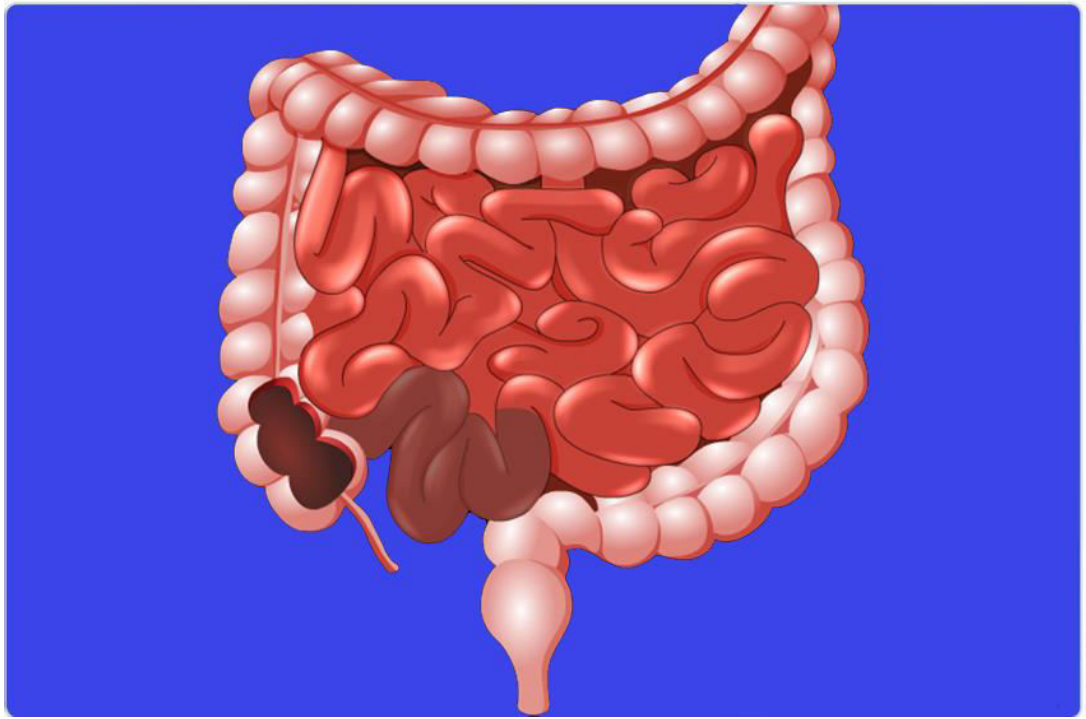


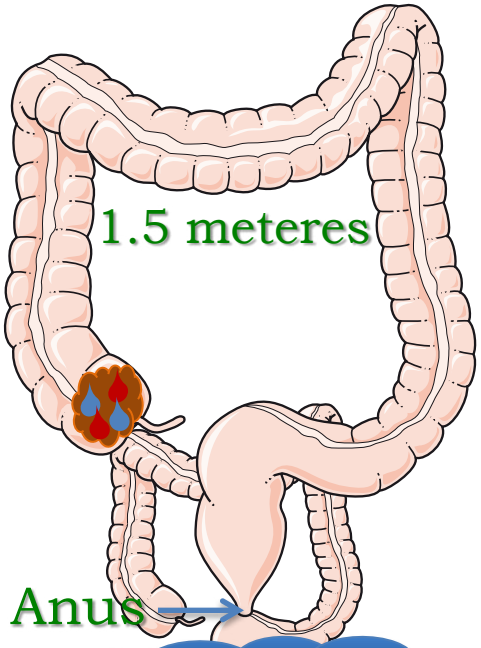
The villi are richly supplied with blood vessels.

The absorbed food is taken to each and every cell of the body where it is utilized for obtaining energy.



Now the unabsorbed food passes into the large intestine.





A types of muscle

Large intestine does not have any digestive functions

Finger like projections

It has VILLI that absorb water & salts

Rest of the material is removed out through the ANUS

The exit is regulated by the muscle called Anal sphincter.

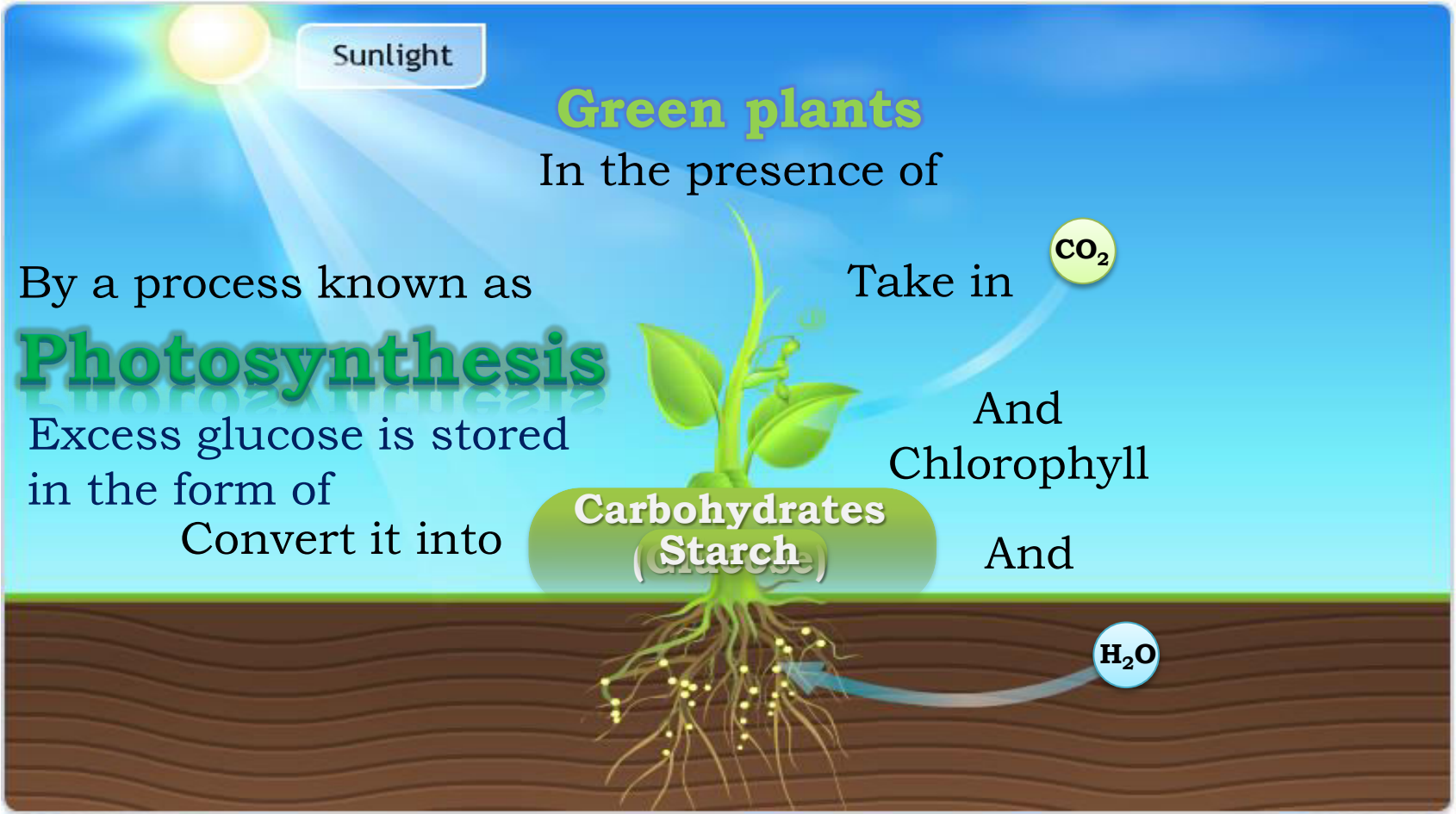
Thank You

Module 8

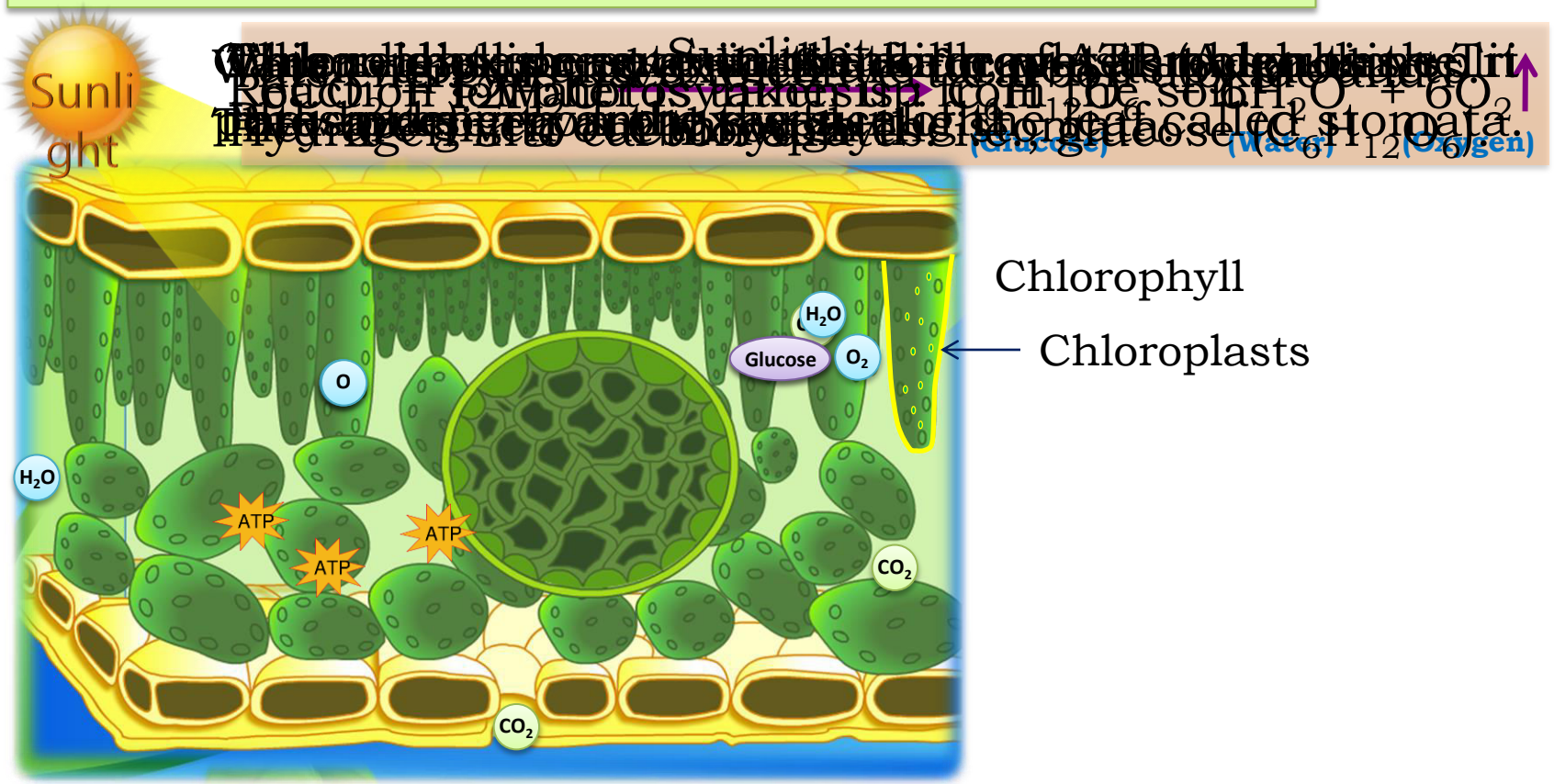
Nutrition in plants

Like animals, plants also need food for growth and energy.

Green plants synthesize their food by the process of photosynthesis.


Sunlight
Green plants
In the presence of
By a process known as
Photosynthesis
Take in
CO_2
And
Chlorophyll
Excess glucose is stored
in the form of
Convert it into
Carbohydrates
Starch
(Glucose)
And
H_2O

Process of photosynthesis

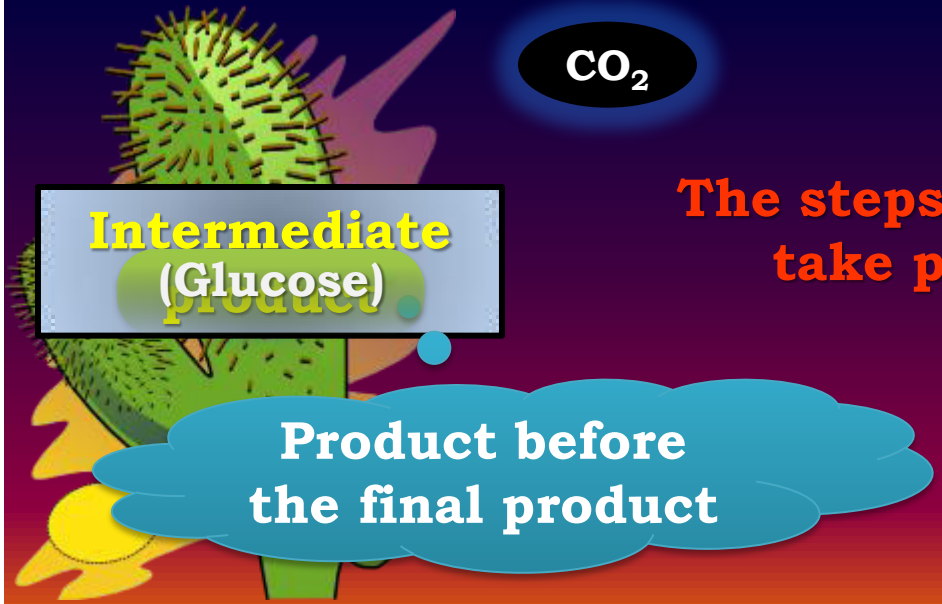


Take in CO_2 at night

And convert it into

Then during day time the intermediate product is acted upon by energy absorbed by chlorophyll and converted into

CO_2

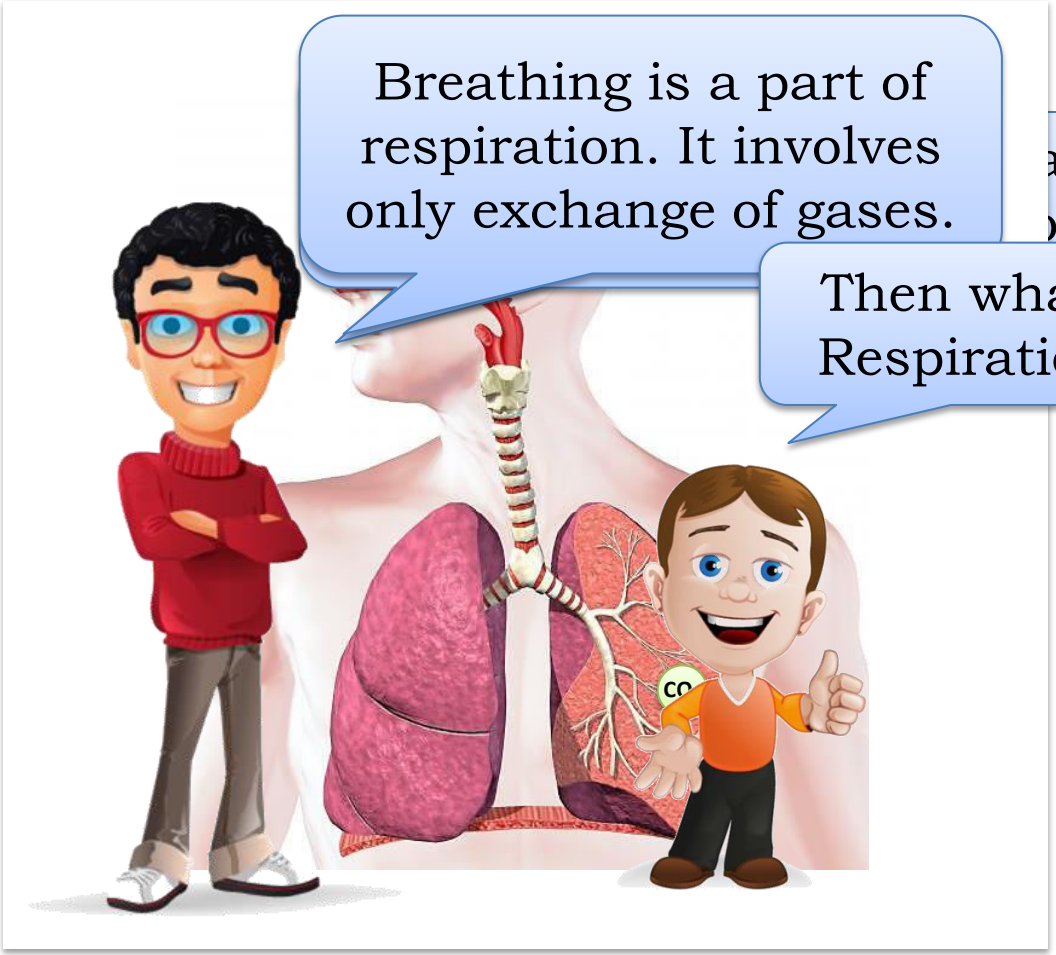


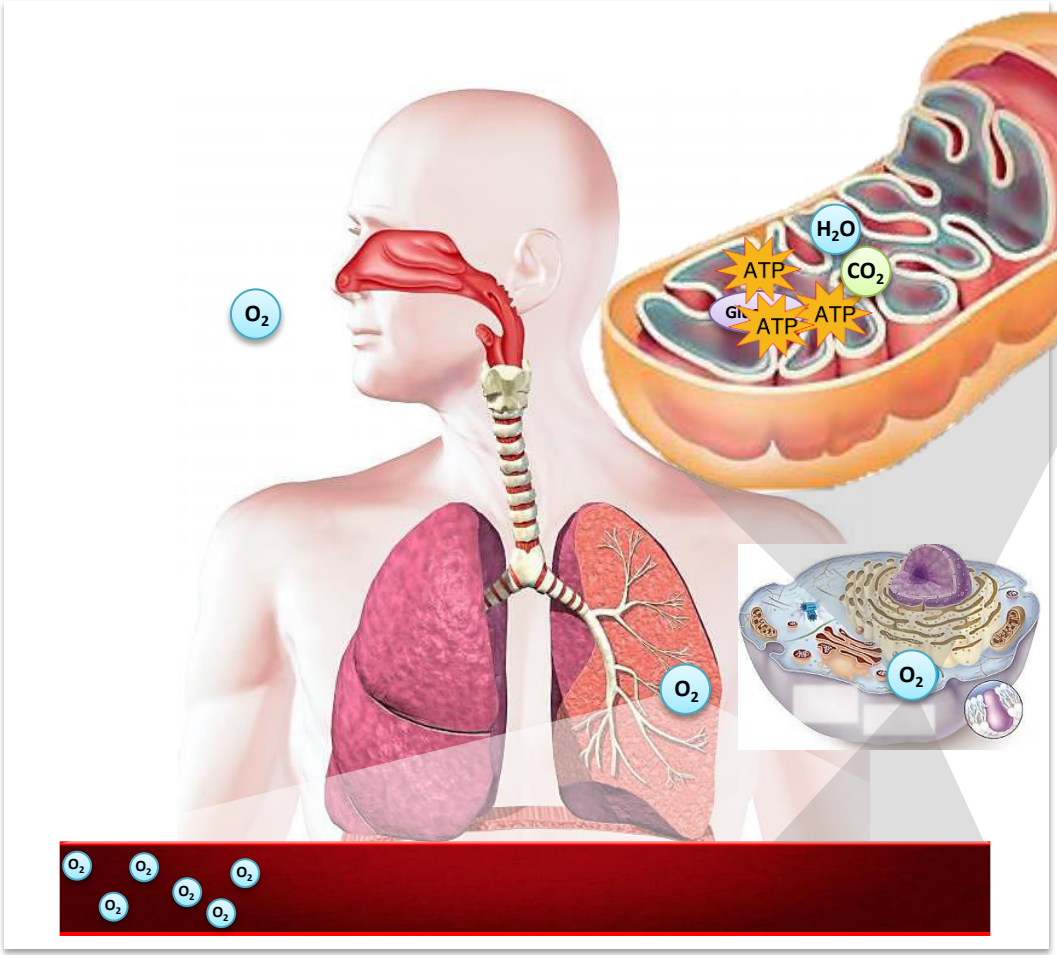
The steps of photosynthesis do not take place one after another immediately

Desert plants

Thank You

Module 9


Breathing is a part of respiration. It involves only exchange of gases.
Then what is Respiration ?
ation is a
f taking in
ing
xide.
CO



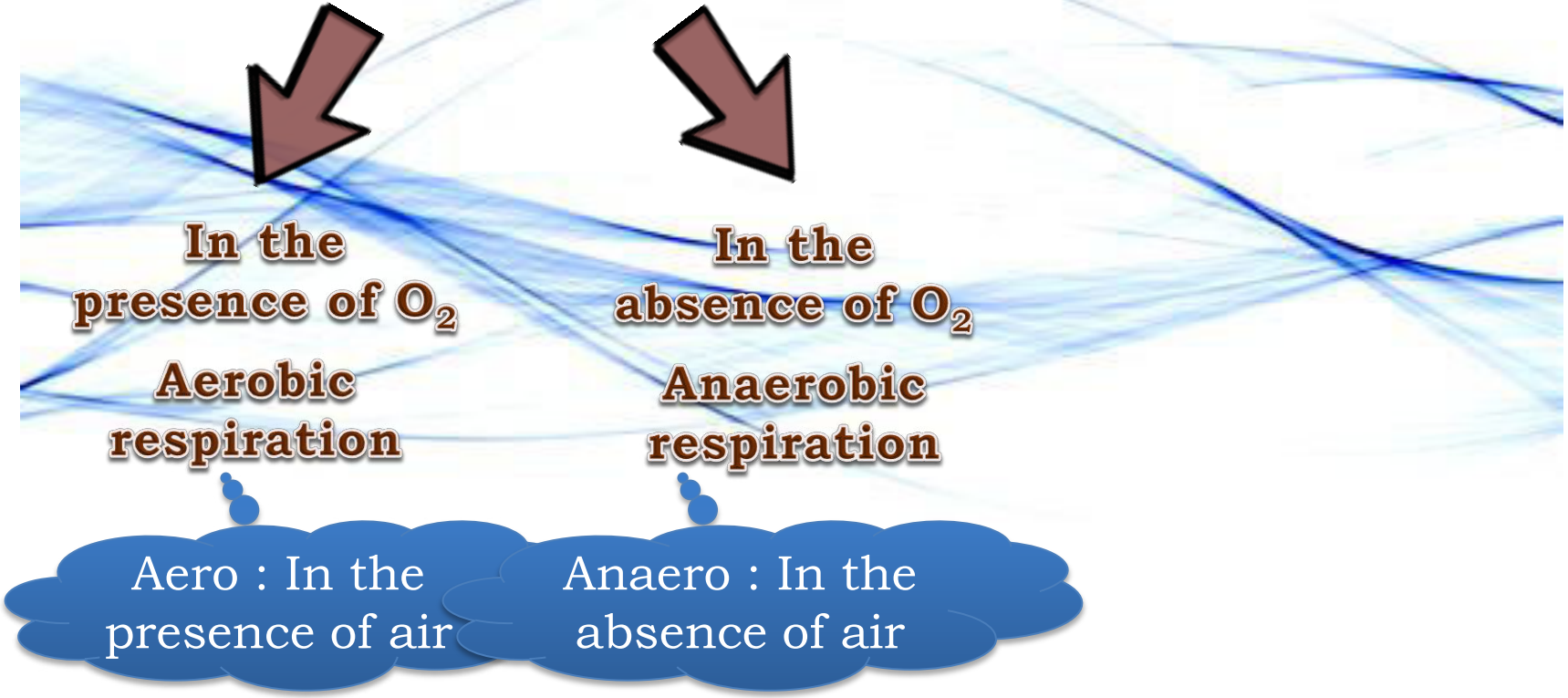
In the mitochondria,

From the lungs oxygen

form of ATP.

Depending upon the presence or absence of oxygen

RESPIRATION is of two types



Phases of Respiration

- We saw that breathing is a part of respiration. It involves only exchange of gases.

- Actual respiration involves release of energy inside the cell. So we can also called it as Cellular respiration.

- Therefore we can say that

RESPIRATION

Has two phases

Phases

Breathing

Also called as

External Respiration

Here there is

Exchange of gases in a particular pathway

It takes place in

RESPIRATORY SYSTEM

Cellular Respiration

Also called as

Internal Respiration

Here there is

Release of energy in the form of ATP

It takes place in

MITOCHONDRIA

Thank You

Module 10

EXCHANGE OF GASES IN ANIMALS

Different animals have different organs for respiration. Eg.

First we will study exchange of gases in animals:

Aquatic animals respire through GILLS

Terrestrial animals respire through LUNGS

Amphibian animals respire through SKIN

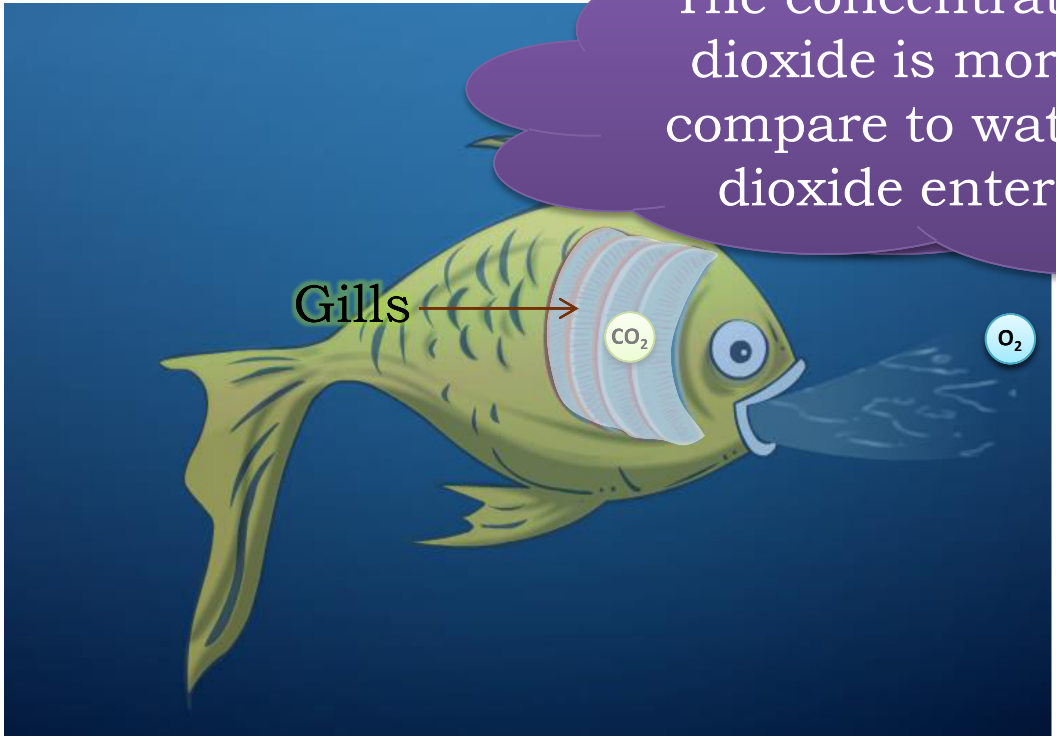
Speed of breathing.

Through the gills oxygen from the water enters the blood and carbon dioxide from the blood enters the water.

Fish take in oxygen rich water through the mouth and move it over the gills.

This process takes place through diffusion.

Thus water containing carbon dioxide leaves out from the gills.



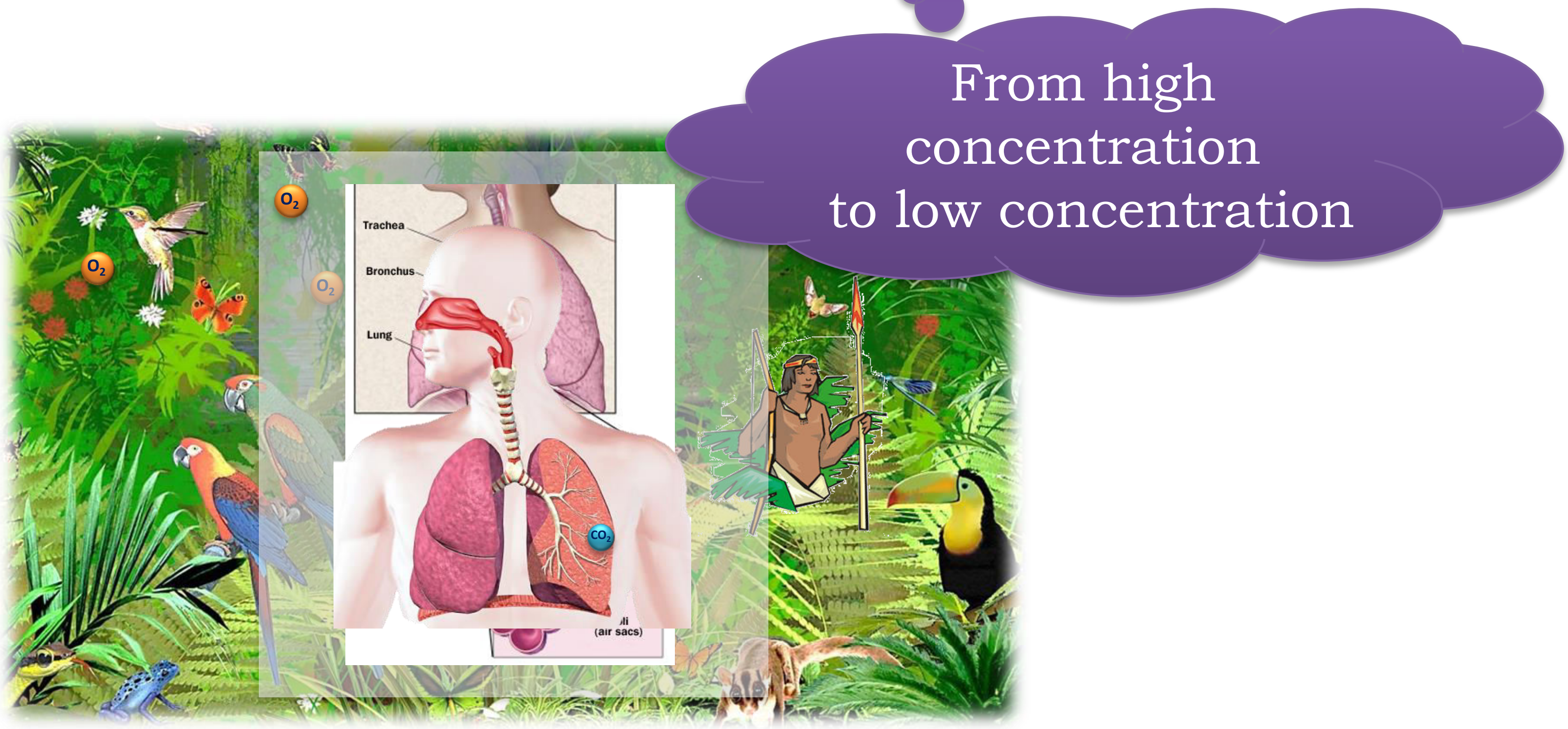
The concentration of carbon dioxide is more in blood as compare to water. So carbon dioxide enters the water.

These organs have special structure that increase the surface area for exchange of gases takes place.

But these structures are delicate, so they are placed within the body.

Respiratory organs in different animals are different. But the process of diffusion is common.

Terrestrial organisms take up oxygen from "Terrestrial animals"

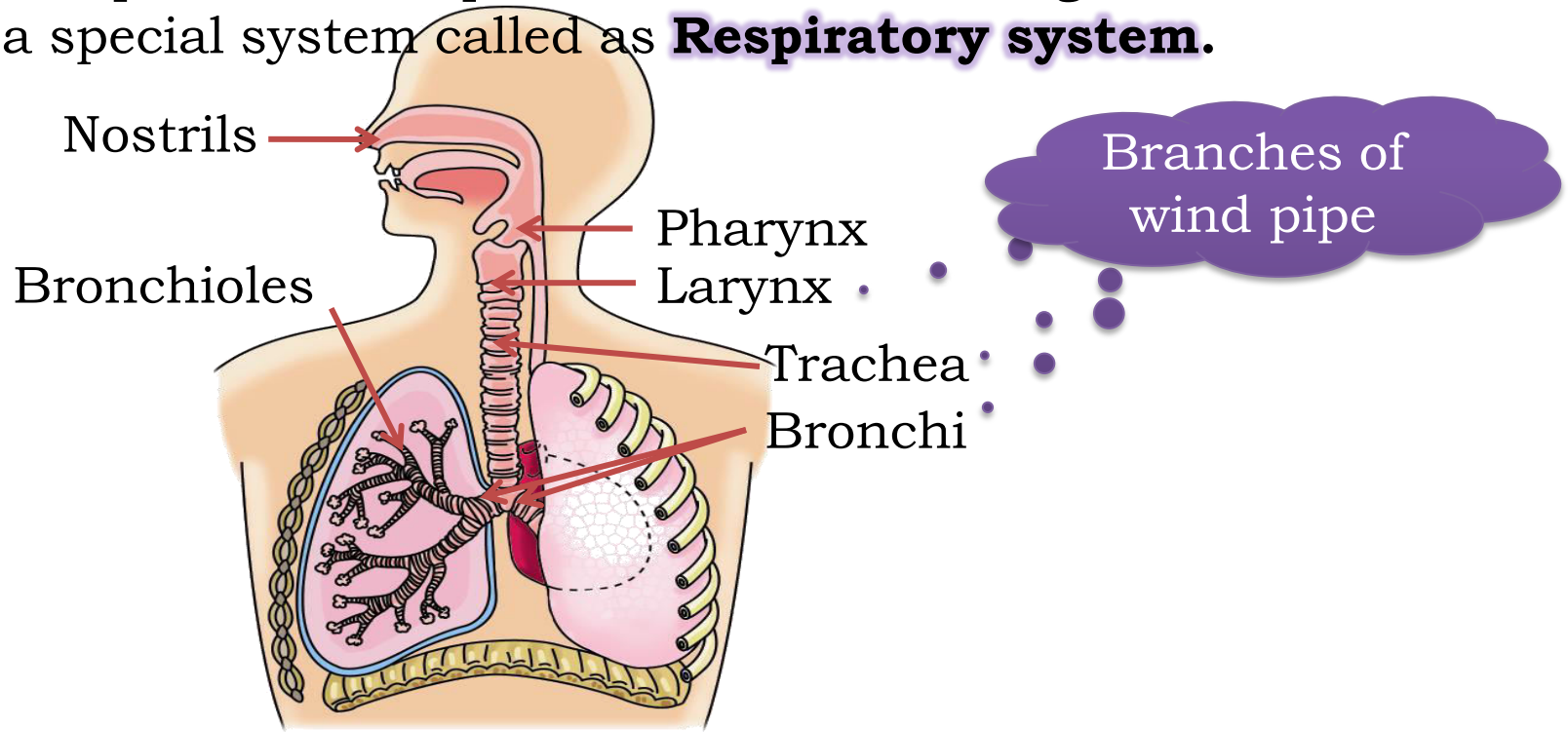


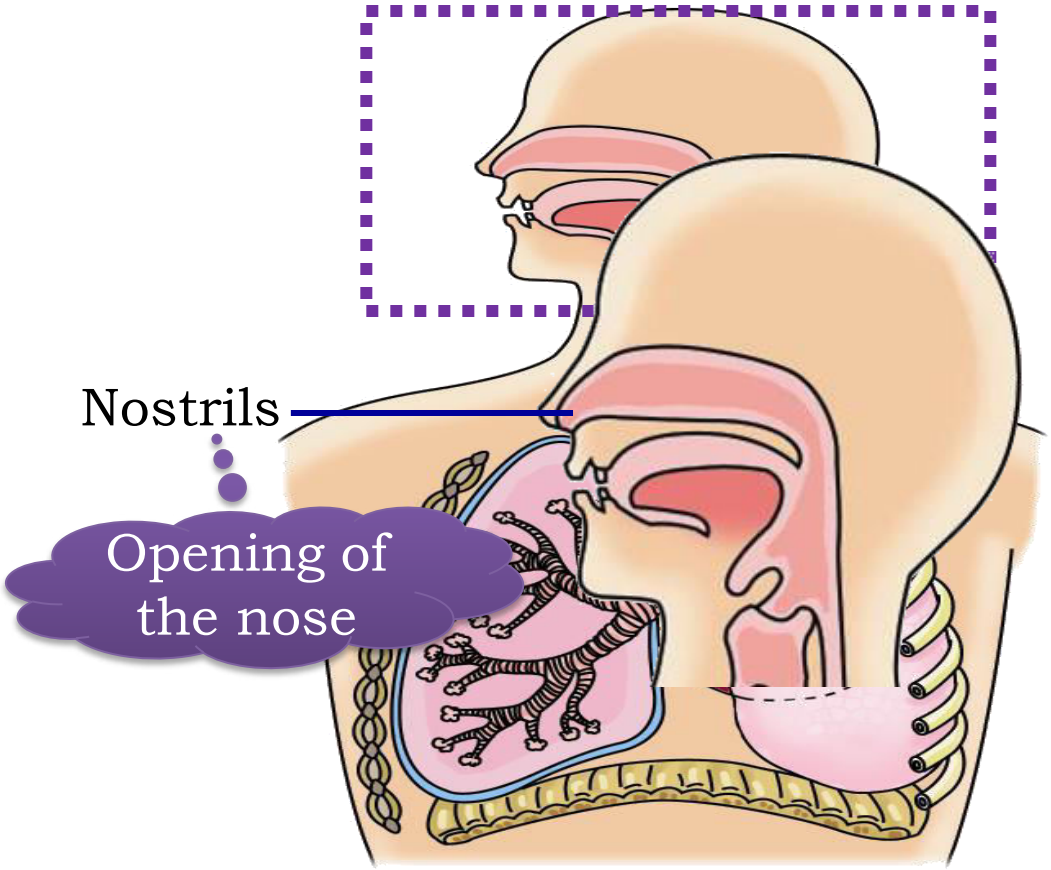
Thank You

Module 11

Human Respiratory system consists of

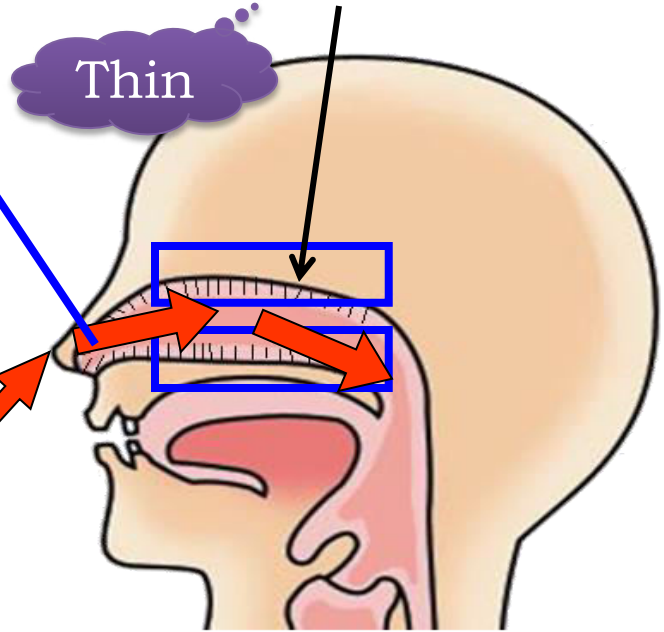
The process of respiration in human beings occurs in a special system called as **Respiratory system.**




Nostrils
Opening of the nose

Air passes through the nostrils

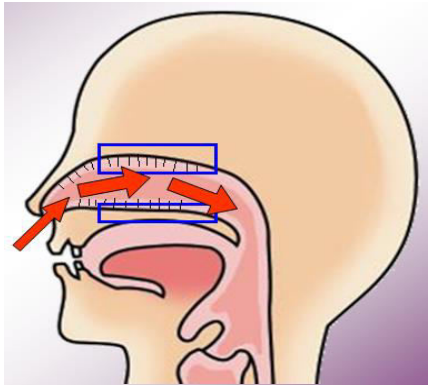
Inside the passage there are FINE HAIR

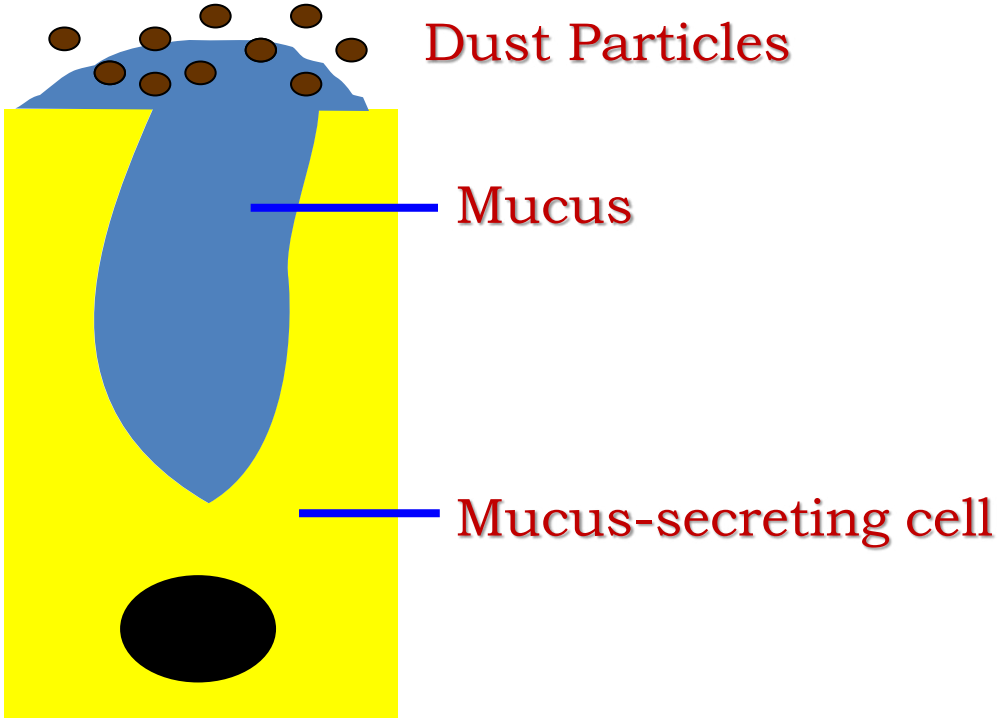


Air gets filtered by the fine hair

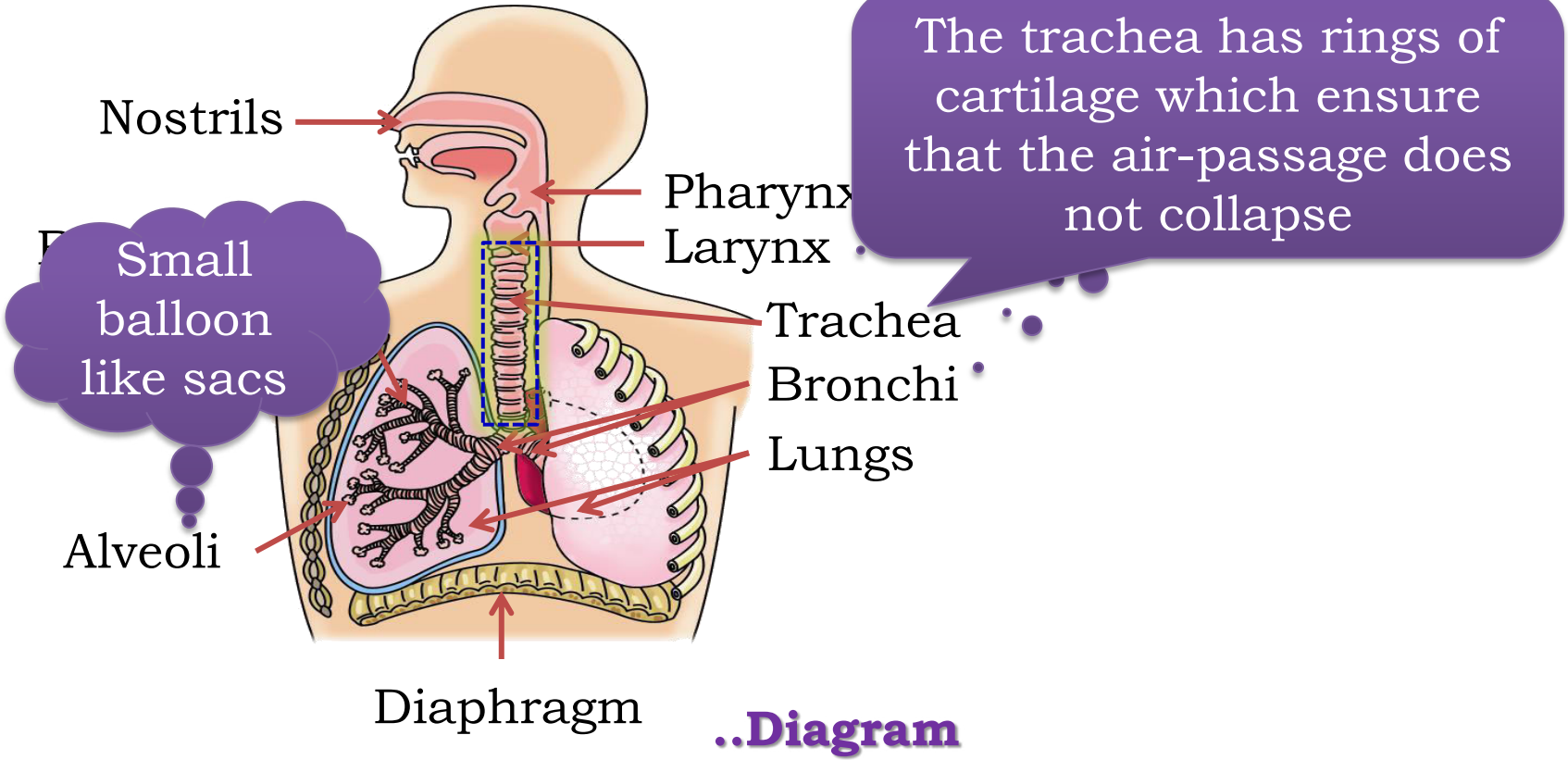
Air becomes moist and warm

Inside the nose there are special mucus secreting cells.
They secrete mucus which traps the dust particles.



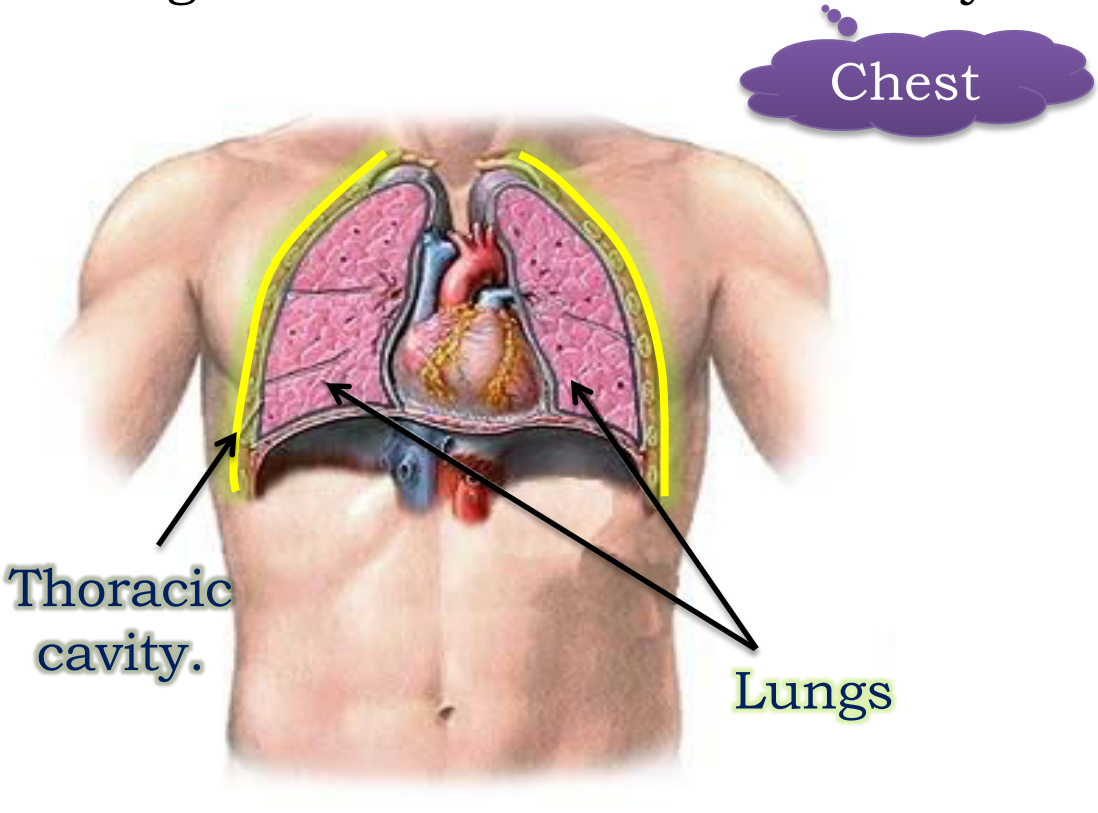


Respiratory organs includes



..Diagram

The lungs are located in thoracic cavity.

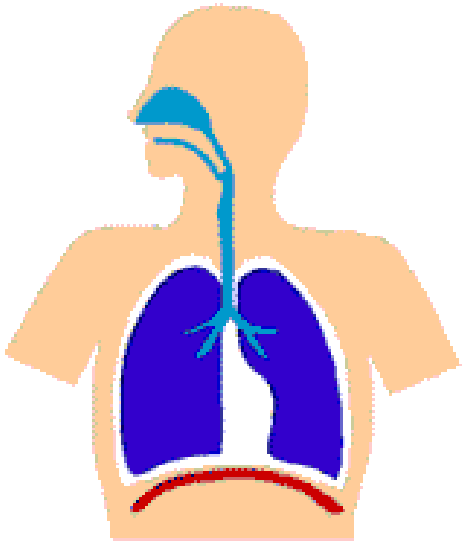


Thank You

Module 12

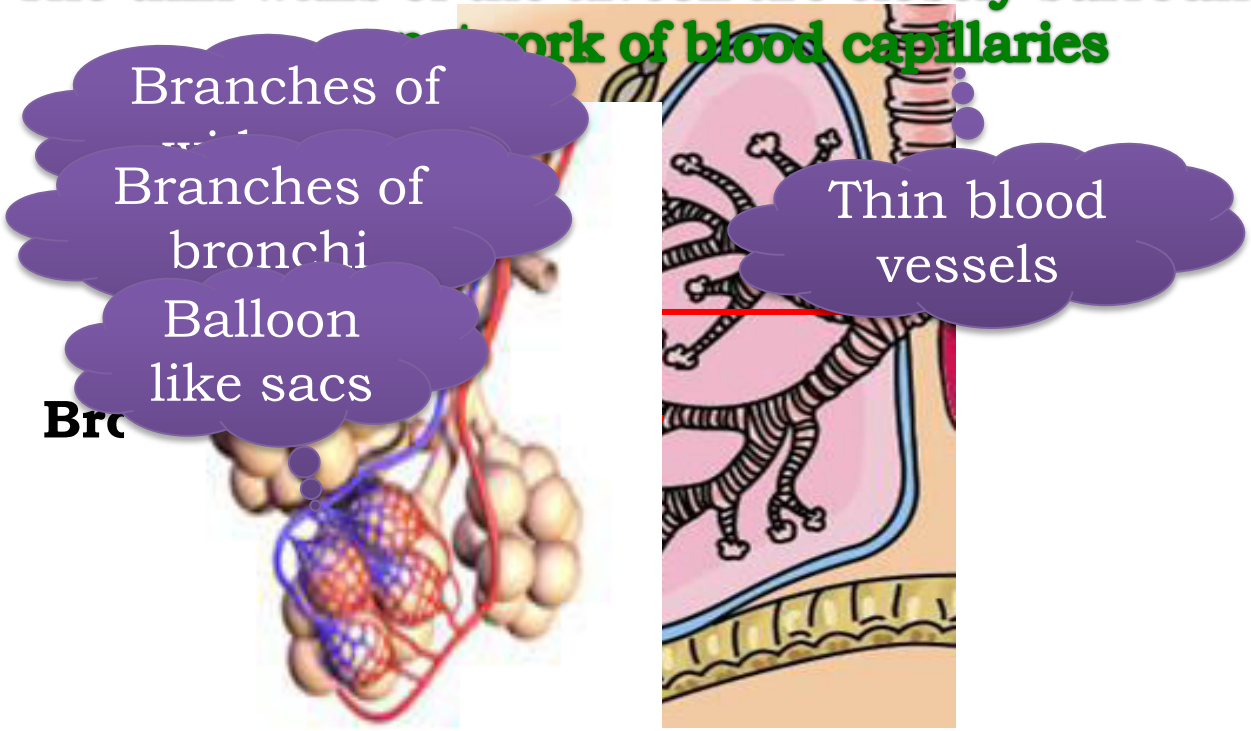
When we breath in, we lift our ribs and flatten our diaphragm, and as a result chest cavity becomes larger.

Because of this air is sucked into the lungs and fills the expanded alveoli.



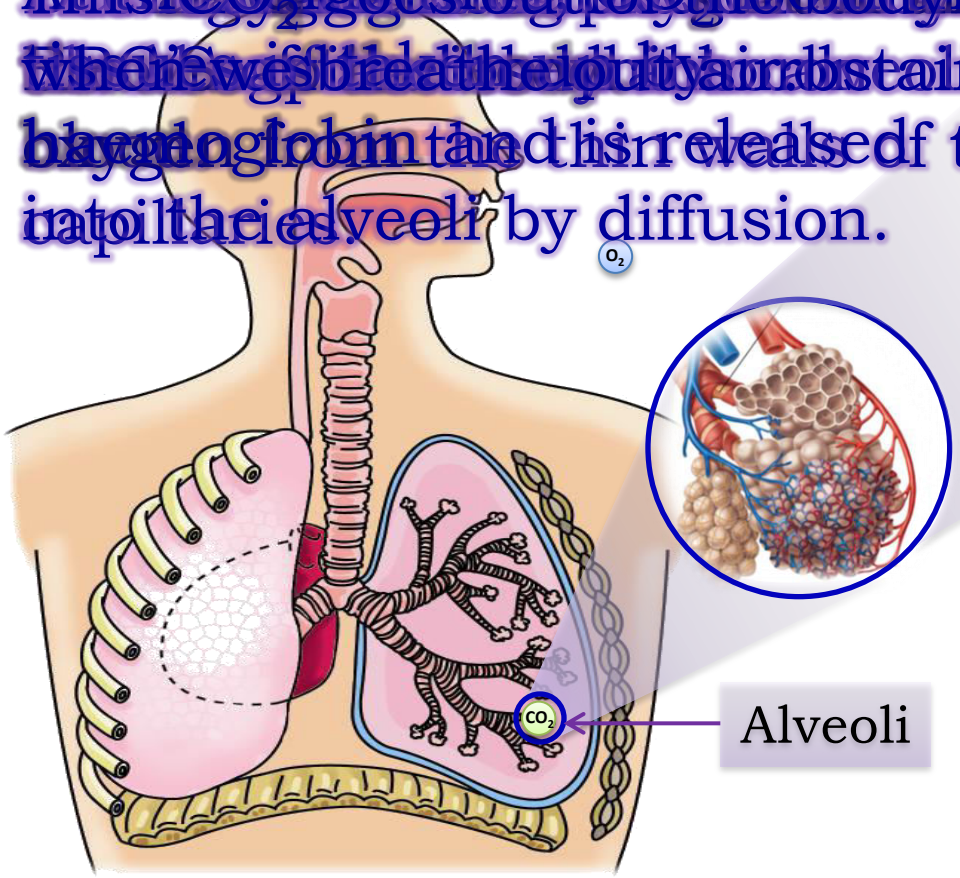
ALVEOLI

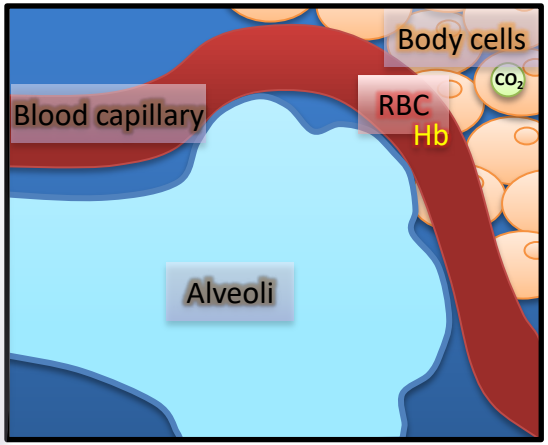
The thin walls of the alveoli are closely surrounded by a network of blood capillaries



Let us see how exchange of gas takes place in the body.

When we breathe in, oxygen from the air enters into the alveoli by diffusion.





Haemoglobin helps in exchange of gases between the alveoli and the surrounding tissues.

So haemoglobin is also called as respiratory pigment.

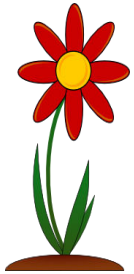
During the breathing cycle, when air is taken in and let out, the lungs always contain a residual volume of air so that there is sufficient time for oxygen to be absorbed and for carbon dioxide to be released.

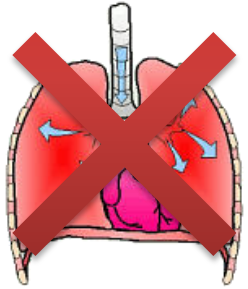
Exchange of gases in Plants

- Plants do not have respiratory organs.
- Plants are stationary.
- So their energy requ… …ss.
- So the process of … slower as compared to animals.
- So … gas…
- The gases are exchanged by the process of **DIFFUSION.**

Fixed at one place

Higher concentration to lower concentration



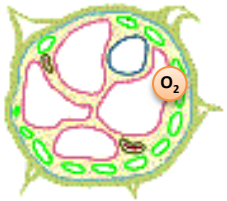


During day time :

Due to open stomata respiration and photosynthesis is simultaneous.

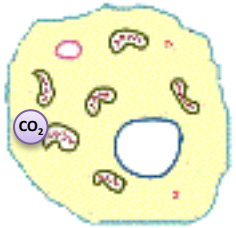
CO_2 is used for photosynthesis.

During



Photosynthesis

O_2 is released.



Respiration

CO_2 is given out

O_2 is utilized for respiration

During night time :

Photosynthesis

No Photosynthesis

No O_2 is released.

During respiration

Respiration

More CO_2 is eliminated

Thank You

Module 13

RESPIRATION

phases

Breathing or External respiration

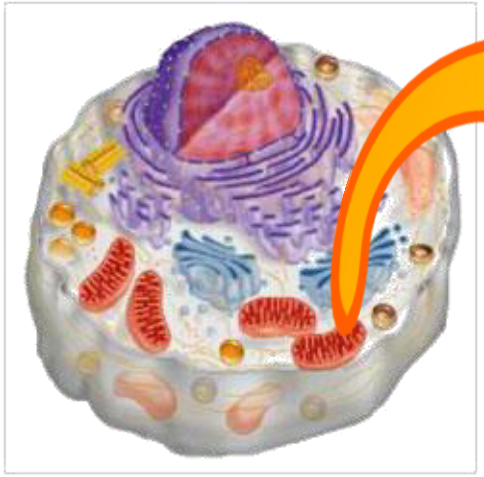
Cellular respiration

Internal respiration

Also called as

Now let us see

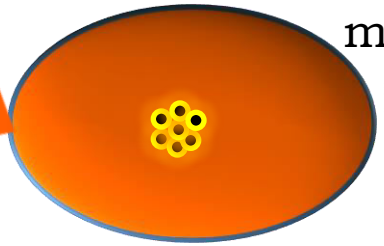
Cellular respiration



Cell

Inside the cell there is a organelle called as

Chemical process inside living cells



Mitochondria

Inside the mitochondria

Glucose is oxidised

To produce

Energy

ATP

Broken down by oxygen

Adenosine Tri Phosphate

It is a biochemical pr

Let us see the steps of cellular respiration

Inside the cell

Glucose (which is a 6 carbon compound)

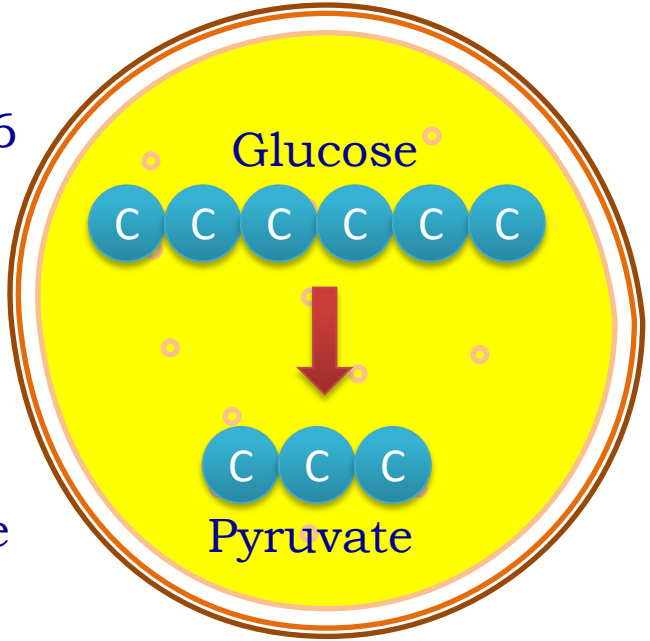
Is broken down into

Pyruvate (which is a 3 carbon compound)

This step takes place in the cytoplasm

This process is anaerobic.

It is called as glycolysis.

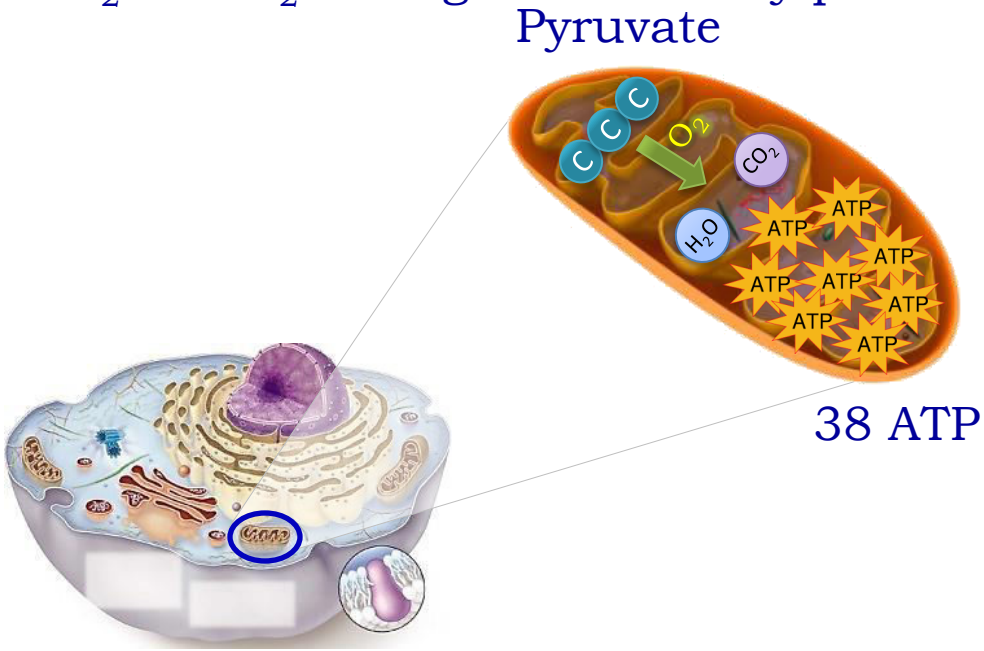


Absence of O_2

Now pyruvate enters the mitochondria

Here pyruvate is broken down in the presence of oxygen to release energy in the form of ATP.

CO_2 and H_2O are given out as by products.



However during heavy exercise, the human muscle cells respire in the lack of oxygen.

So in the muscle cells pyruvate is broken down in the lack of oxygen to release energy (2 ATP).

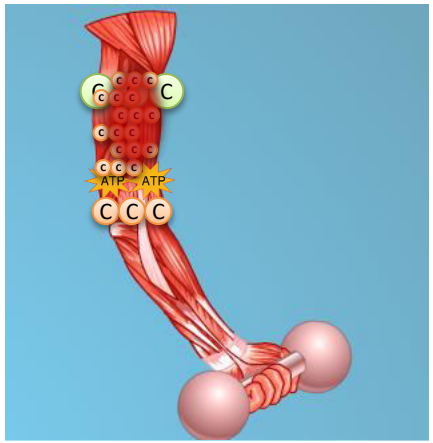
Here lactic acid is formed as a byproduct.

This lactic acid gets accumulated in the muscle cells.

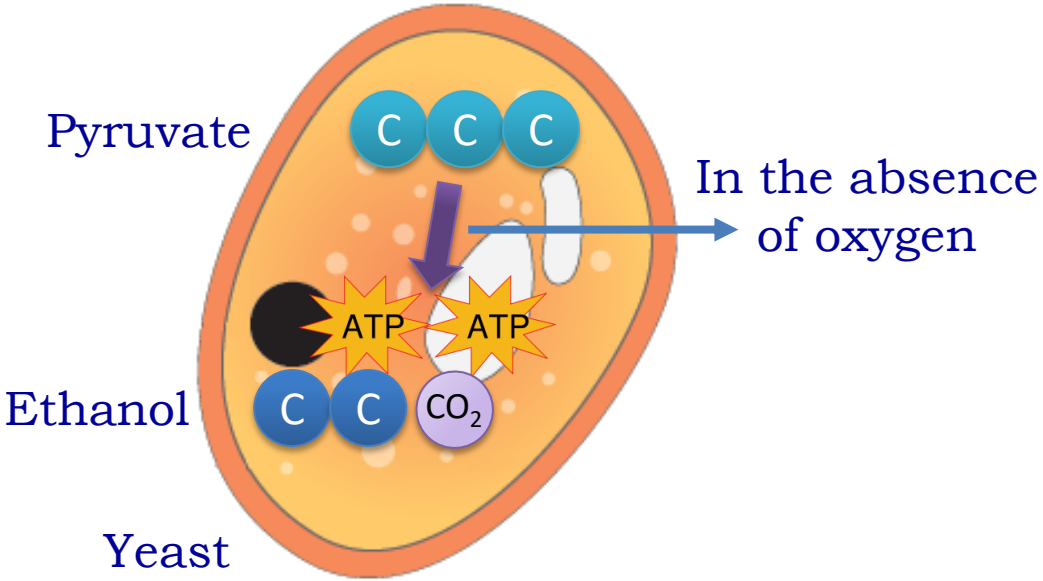
Due to this, the muscles feels fatigued during exercise.

Pyruvate

Lactic acid



Organisms like yeast respire in the complete absence of oxygen.
So in case of yeast pyruvate is broken down in the absence of oxygen to release energy (2ATP).
Here, ethanol and carbon dioxide are formed as byproducts.
This process is called as fermentation.



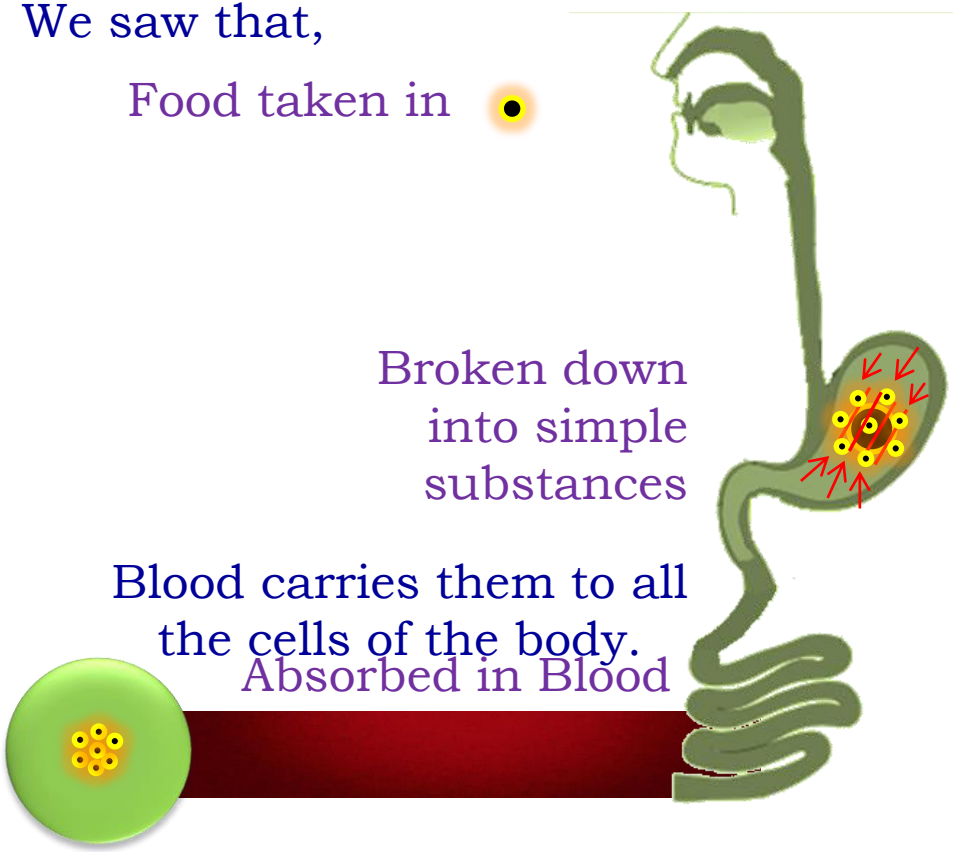
Thank You

Module 14

TRANSPORTATION

We saw that,

Food taken in

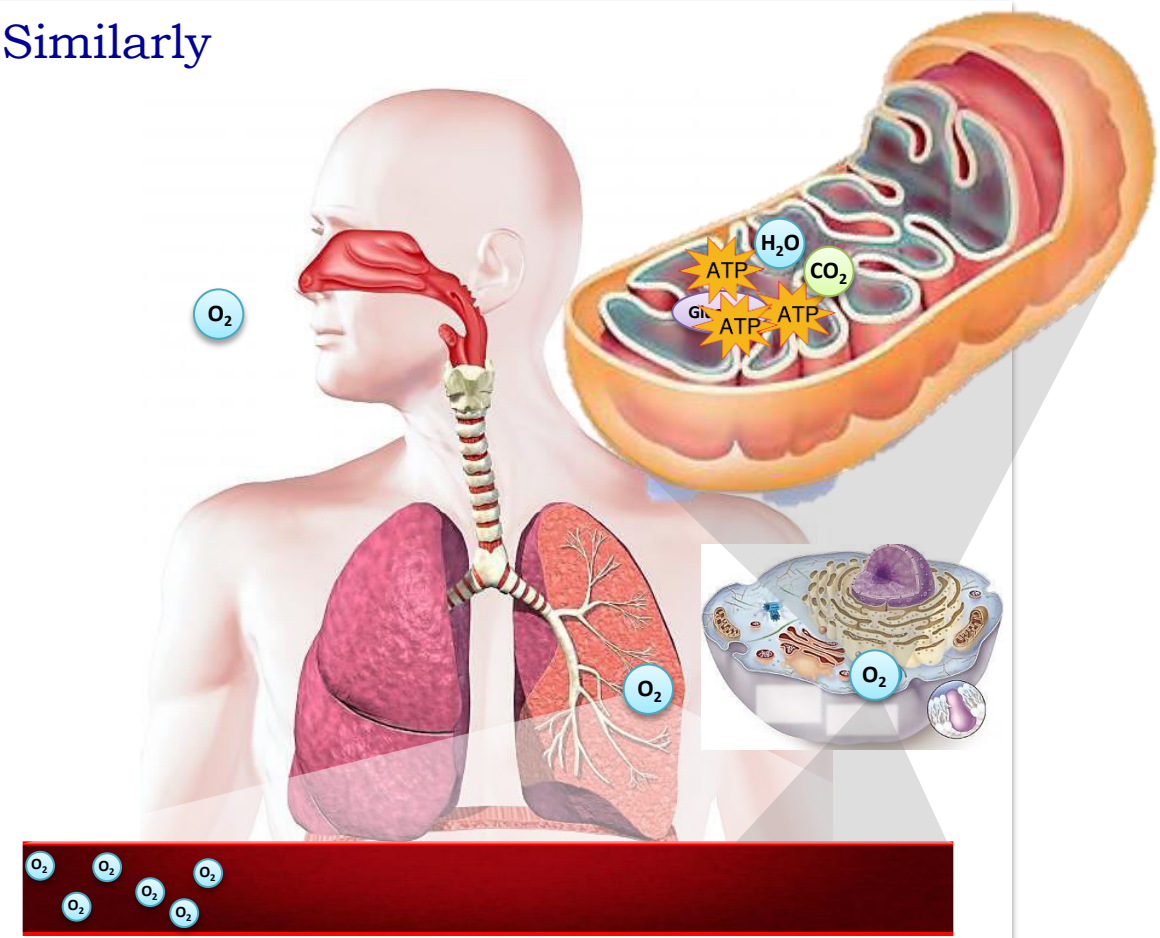


Broken down into simple substances

Blood carries them to all the cells of the body.

Absorbed in Blood

Similarly

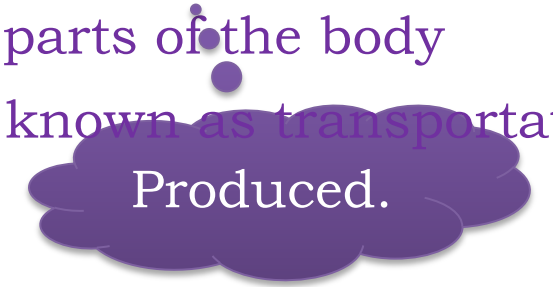


Oxygen that enters the lungs is carried to the cells by blood.

So we can say that,

A substance synthesized or absorbed in one part of the body moves to other parts of the body

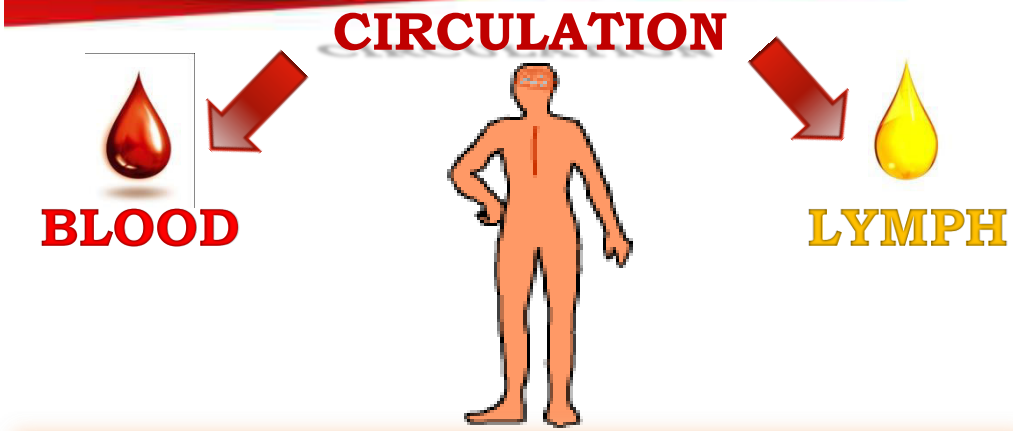
This process is known as transportation.



This transport in human beings is called as circulation.

The process of circulation requires some medium.

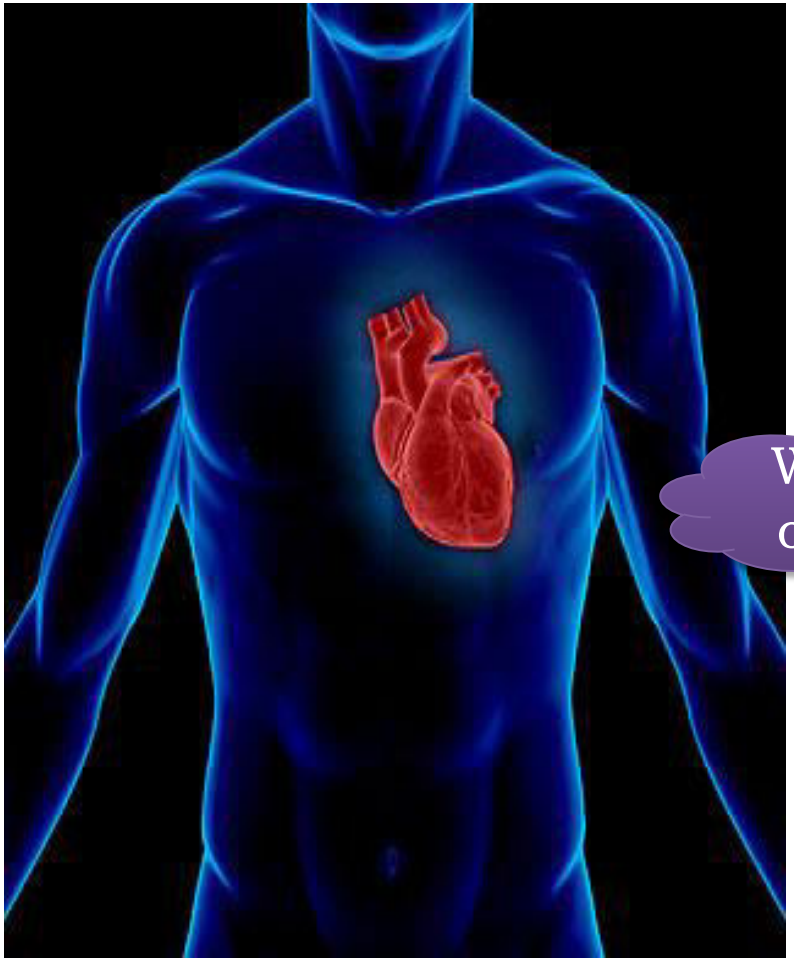
In human beings there are two such media.



A pumping organ is needed to
A system to repair the damage from time to time if it is damaged
to reach all the tissues

Thank You

Module 15



A pumping organ is needed to push the blood around the body

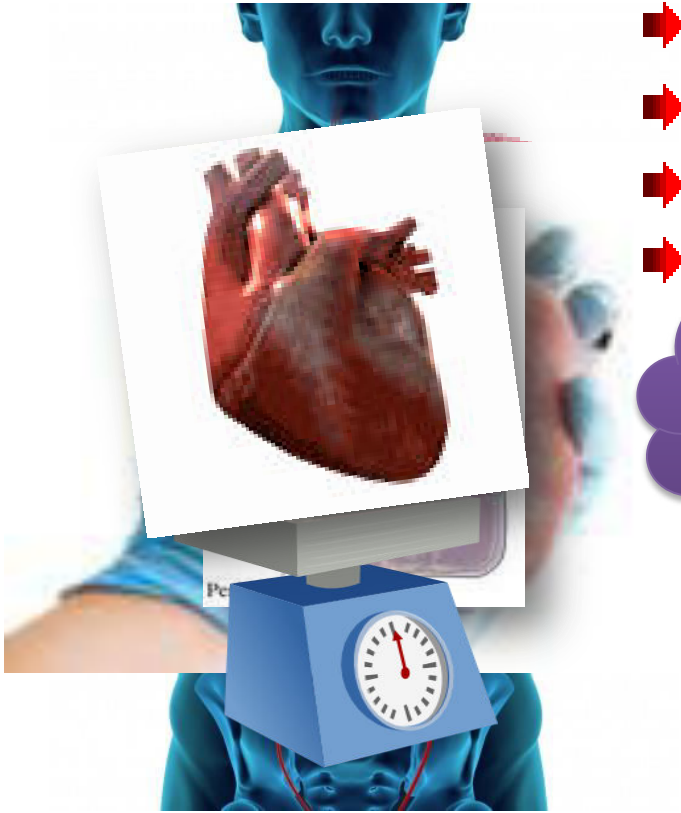
This pumping organ is

HEART

The involuntary pump

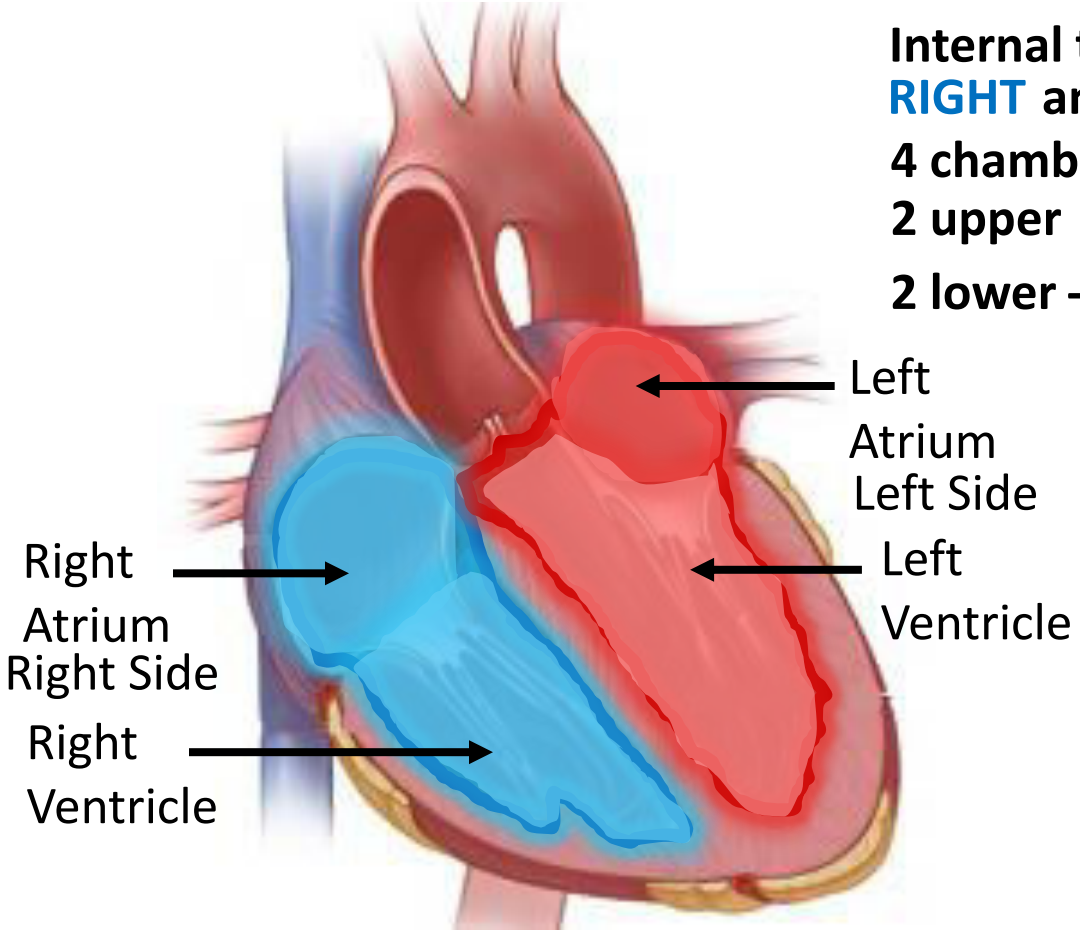
Without our will

HUMAN HEART



- Muscular organ
- Size of the human fist
- Covered by pericardial membrane
- Weight of the heart is about 360 gm.

Outer covering of heart



Internal the heart is divided into RIGHT and LEFT sides

4 chambers

2 upper - Atria (Atrium)

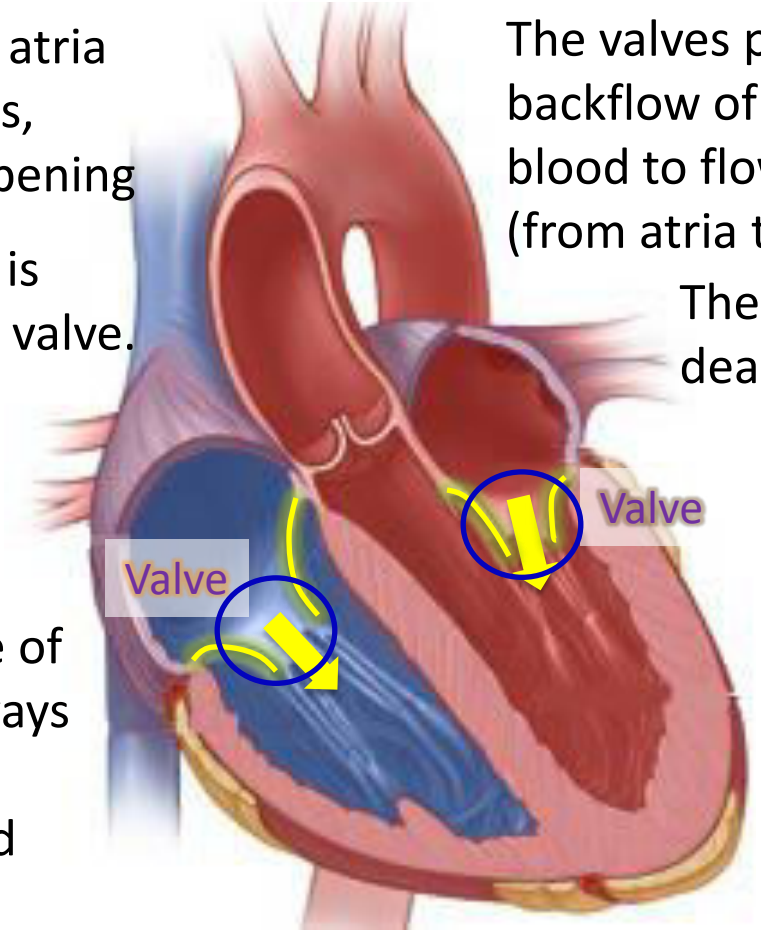
2 lower - Ventricles (Ventricle)

Between the atria and ventricles, there is an opening

This opening is guarded by a valve.

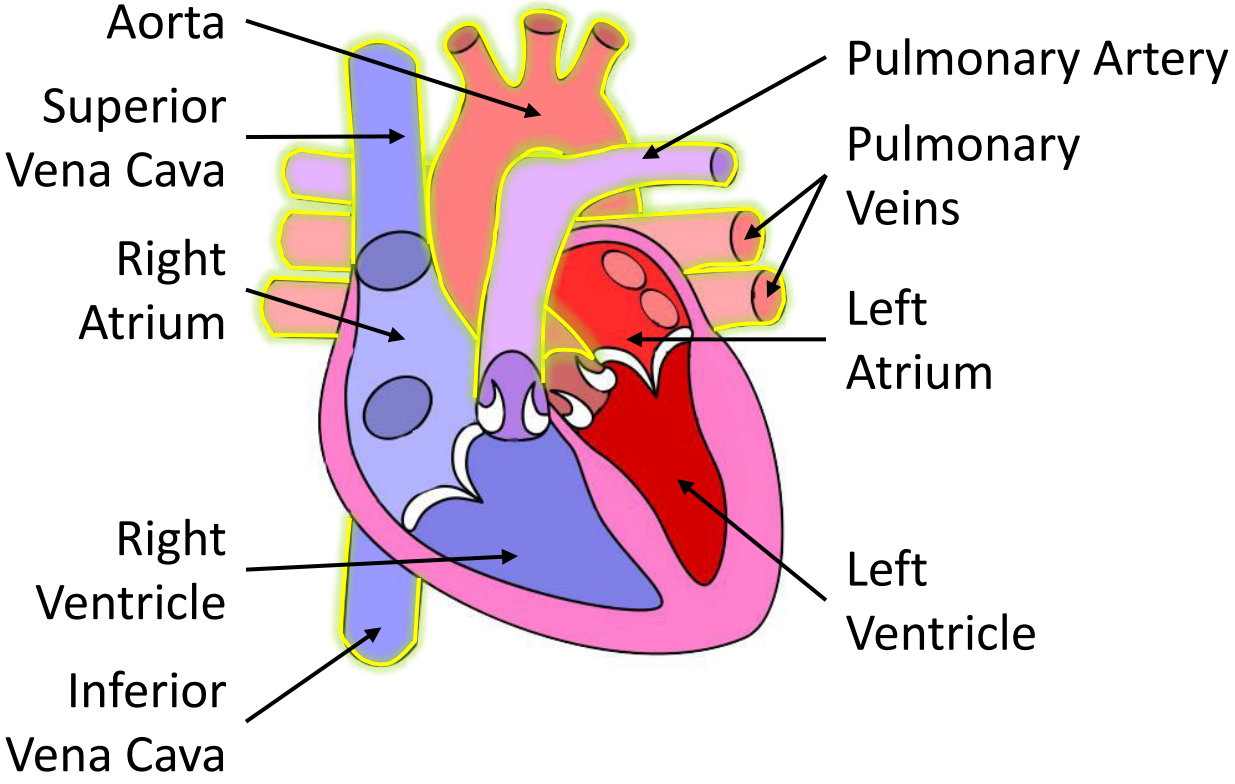
The valves prevent the backflow of blood. i.e., they allow the blood to flow only in one direction. (from atria to the ventricles.

The left side of the heart always deals with oxygenated blood.



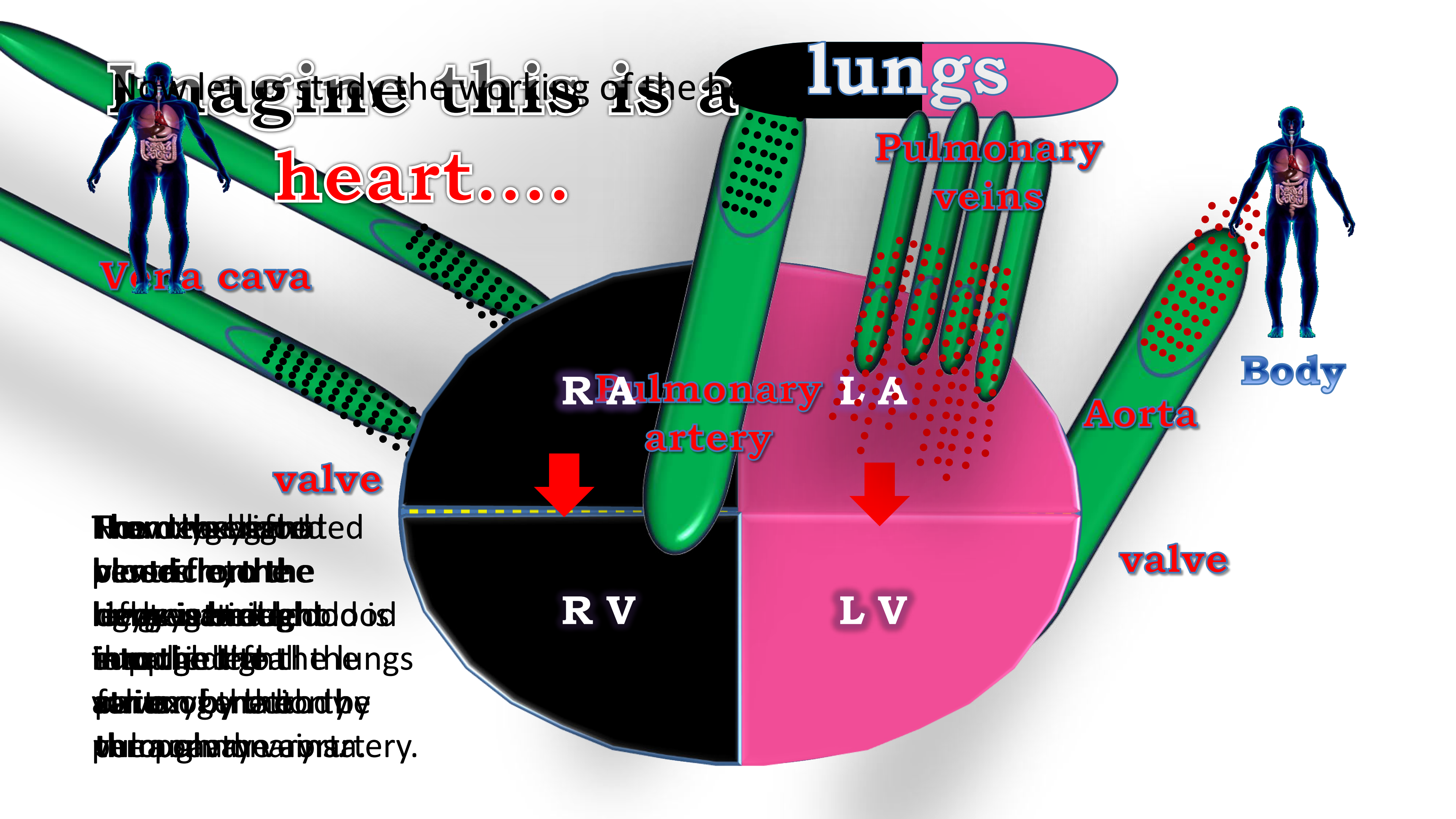
The right side of the heart always deals with deoxygenated blood.

An artery leaves the left ventricle and divides into two branches.
Four veins enter the left atrium. Two from the right lung and two from the left lung.
The largest artery in the body leaves the heart and takes blood to the rest of the body.
One branch enters the right lung and the other branch enters the left lung.

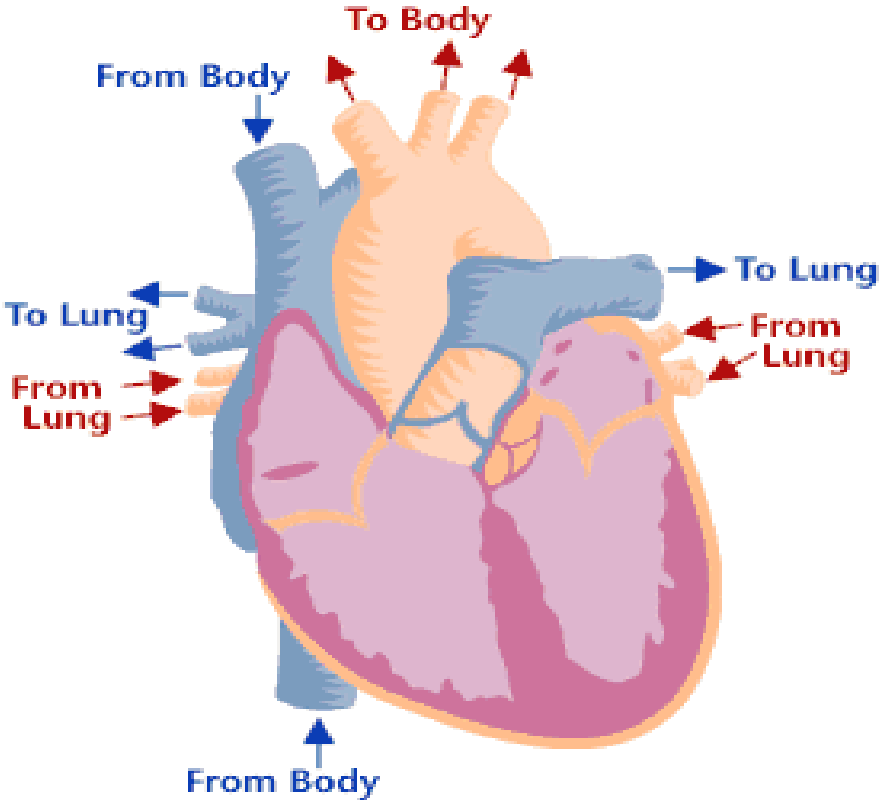


Thank You

Module 16

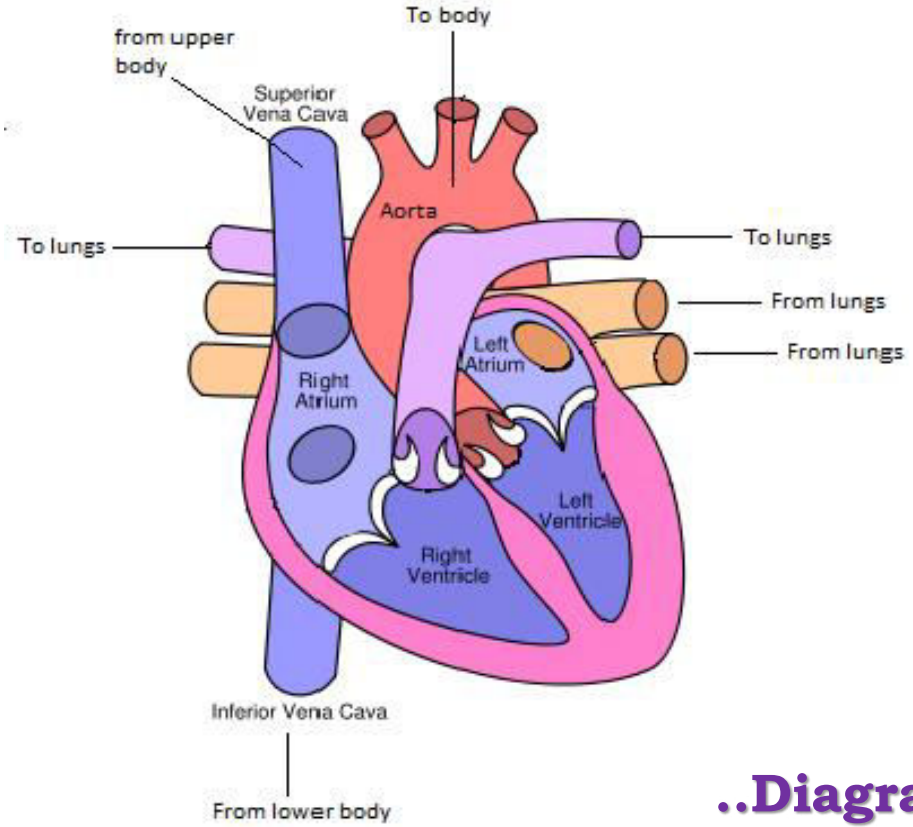

heart....
lungs
Pulmonary
veins
Pulmonary
artery
L A
R V
L V
valve
valve
Aorta
Body

Therefore, the blood passes through the heart twice



Double Circulation

Vertical section of human heart

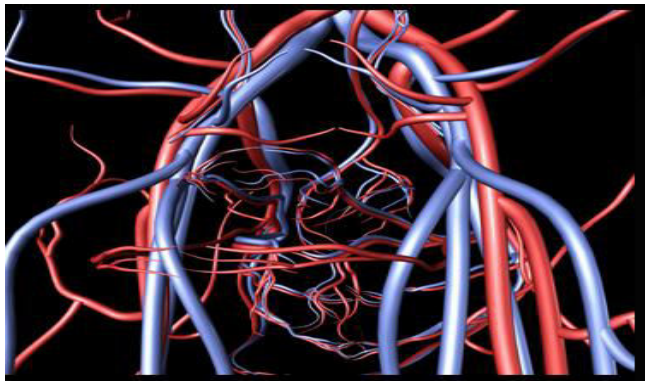


..Diagram

Thank You

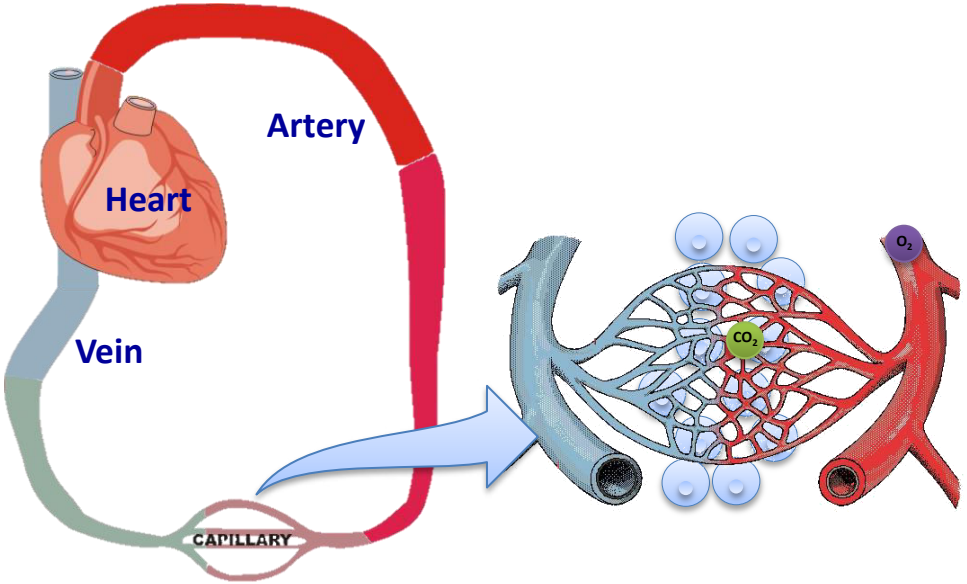
Module 17

A pumping organ is needed to push the blood around the body along with a network of tubes to reach all the tissues



Network of tubes

The Blood vessels



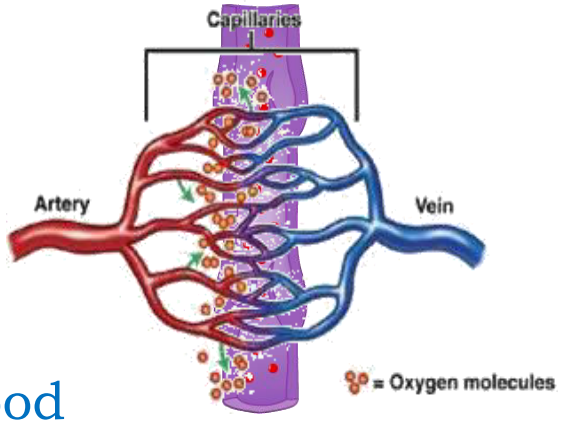
The aorta divides to form arteries.

On reaching the tissues, the arteries divide and redivide into smaller vessels called capillaries.

Exchange of materials takes place between the blood and the surrounding cells across the thin walls of the capillaries.

The capillaries join together to form veins which take the blood away from the organ towards the heart.

The Blood vessels



Arteries

Carries blood away from heart.

Have to tolerate high pressure.

Thick and elastic walls.

Veins

Brings back blood to the heart.

Do not tolerate high pressure.

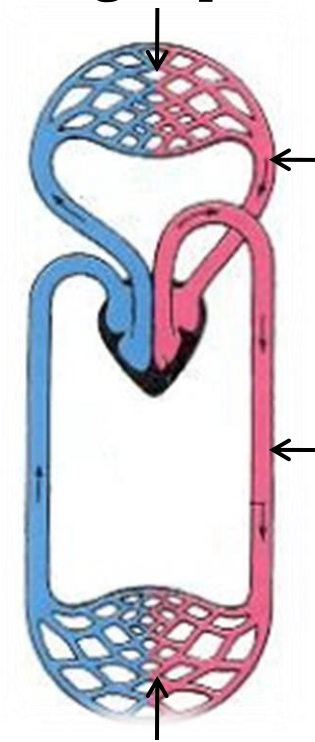
Not thick walled, have valves to prevent back flow of blood.

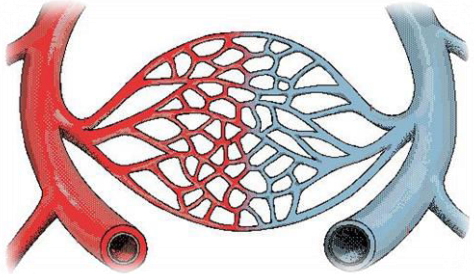
ARTERIES	VEINS
Blood – from heart to different parts	Blood – from different parts to heart
Blood is under high pressure	Blood is not under high pressure
Thick and elastic walls	Thin wall and less elastic
Valv ent	Val nt to pr flow
Carry oxygenated blood except pulmonary artery	Carry deoxygenated blood except pulmonary veins

Pure (O_2)

Impure (CO_2)

Double Circulation





Network of capillaries

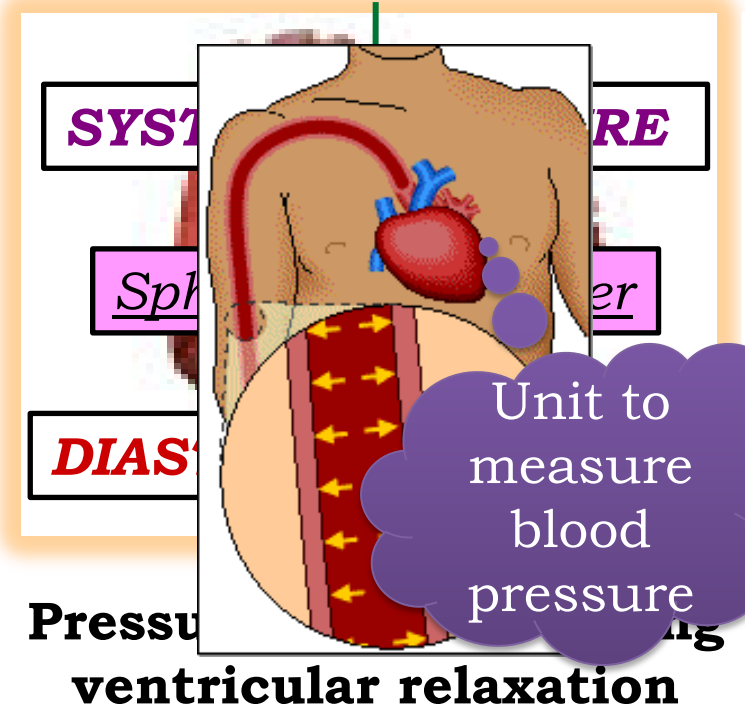
..Diagrams

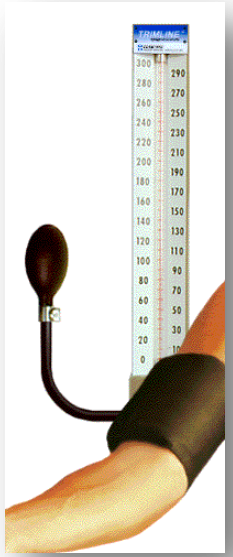
Thank You

Module 18

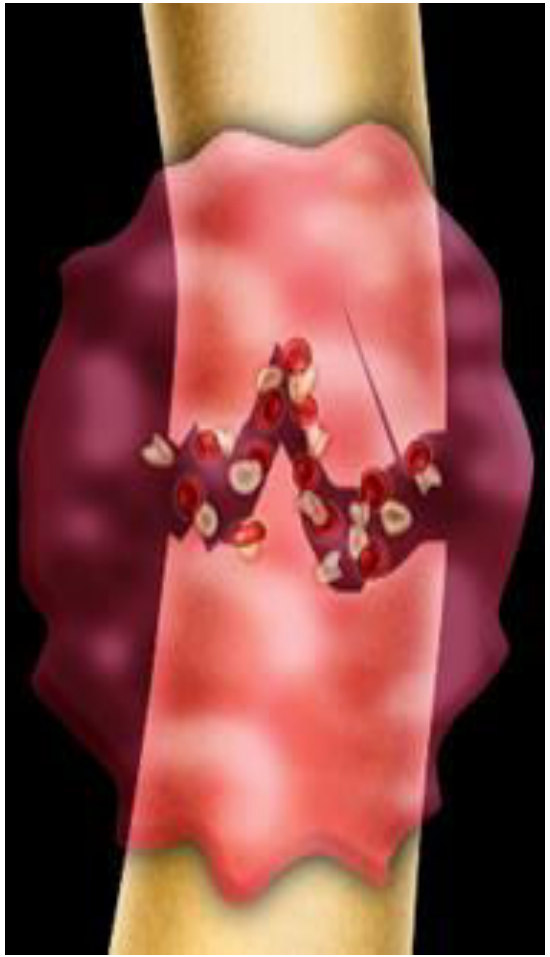
HEART - PUMPING ORGAN

Pressure is exerted by flowing blood during ventricular contraction exerts force on the wall of the blood vessels.





Blood pressure is measured by an instrument called as



A system to repair the damage from time to time if it is damaged

Repair of the damaged network

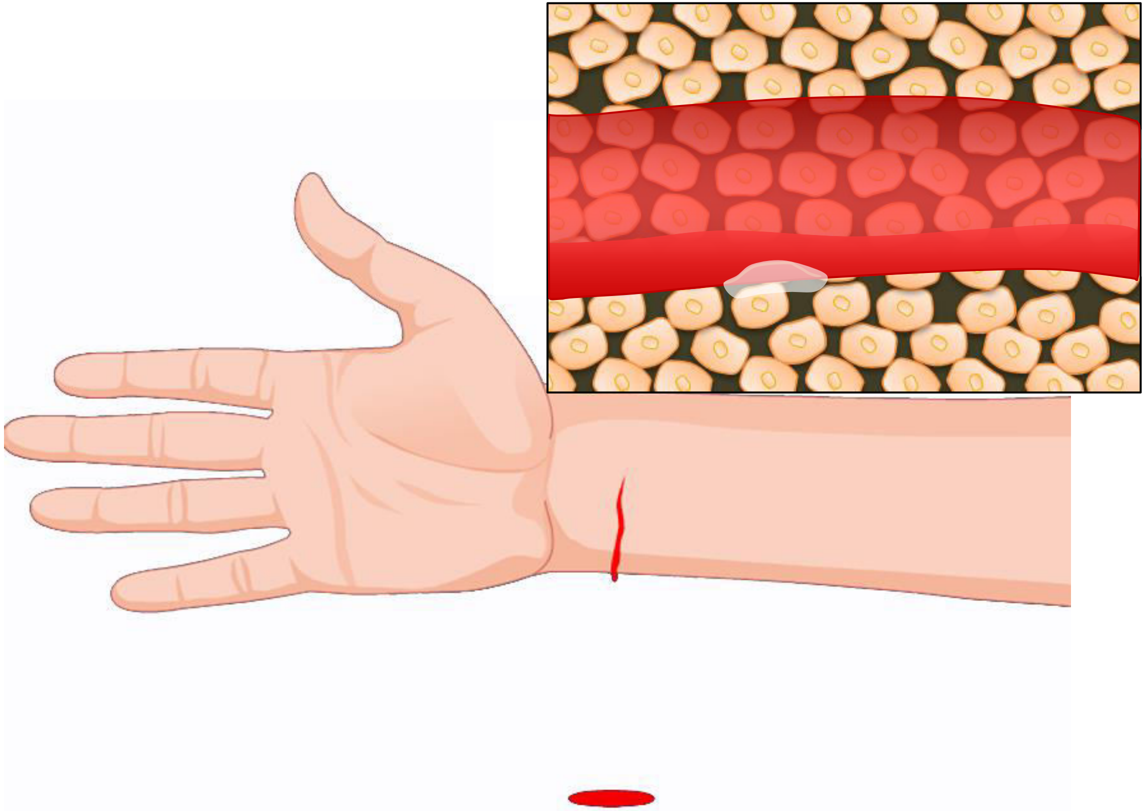
The Platelets

A type of blood cell

[illegible]

leakage in a closed system.

by clotting the blood at the point of injury.

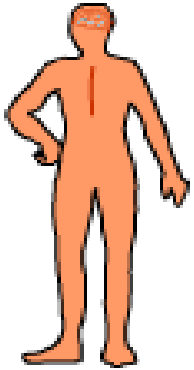


Thank You

Module 19

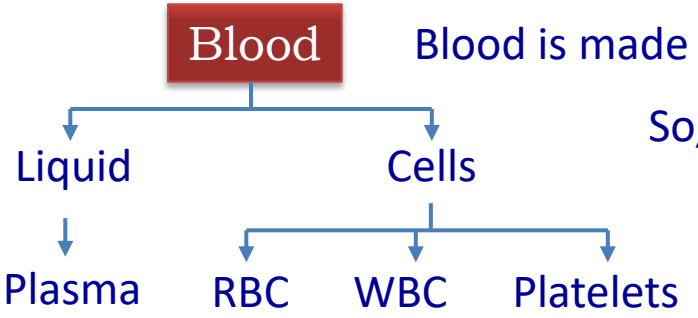
CIRCULATION

BLOOD



LYMPH

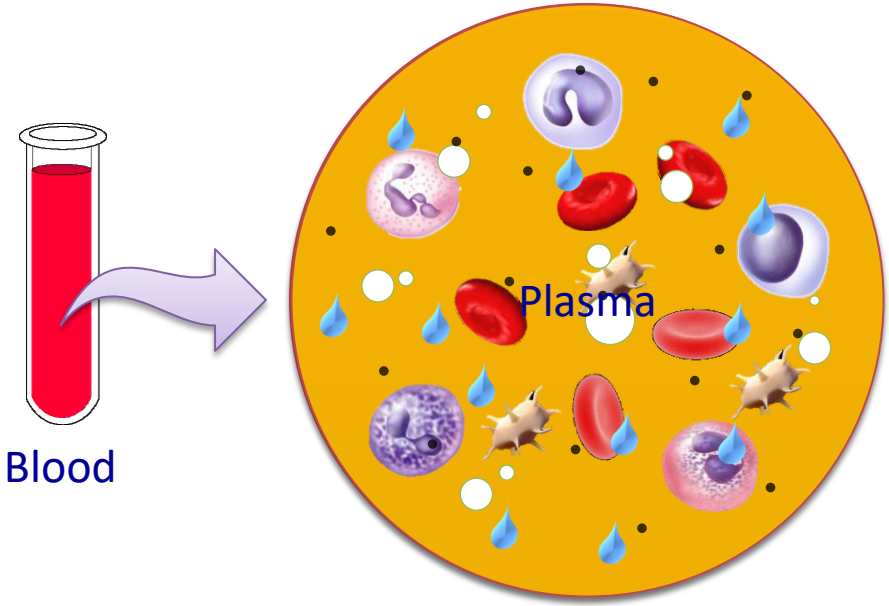
Now let us learn about lymph



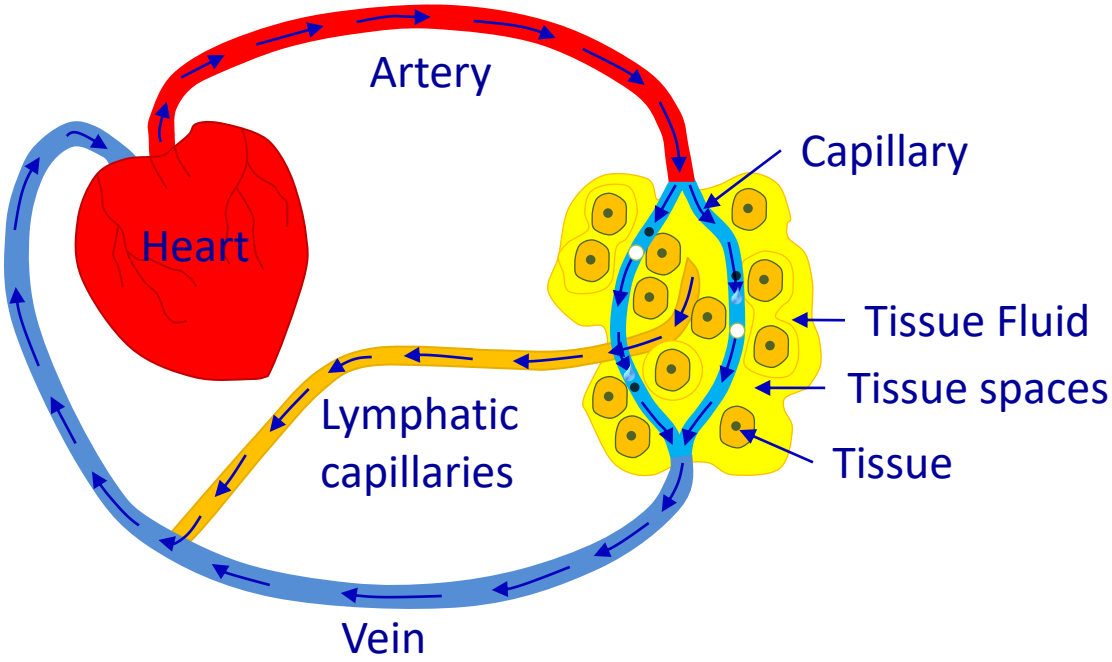
Blood is made up of two components

So, if we remove the cells from the blood what remains is plasma.

Plasma is made up of water, proteins and dissolved solutes.

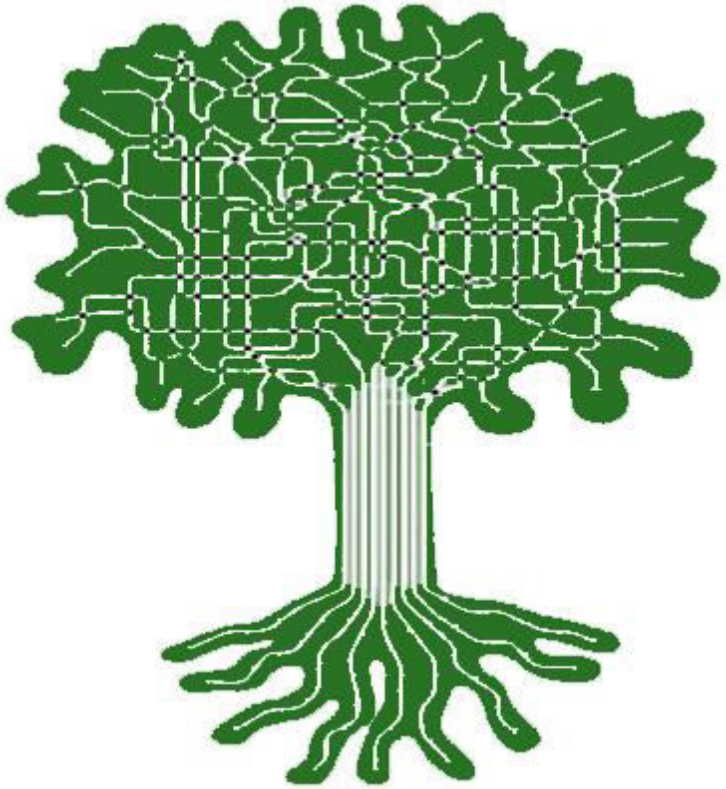


It is similar to blood plasma except that it has very less amount of proteins in it.

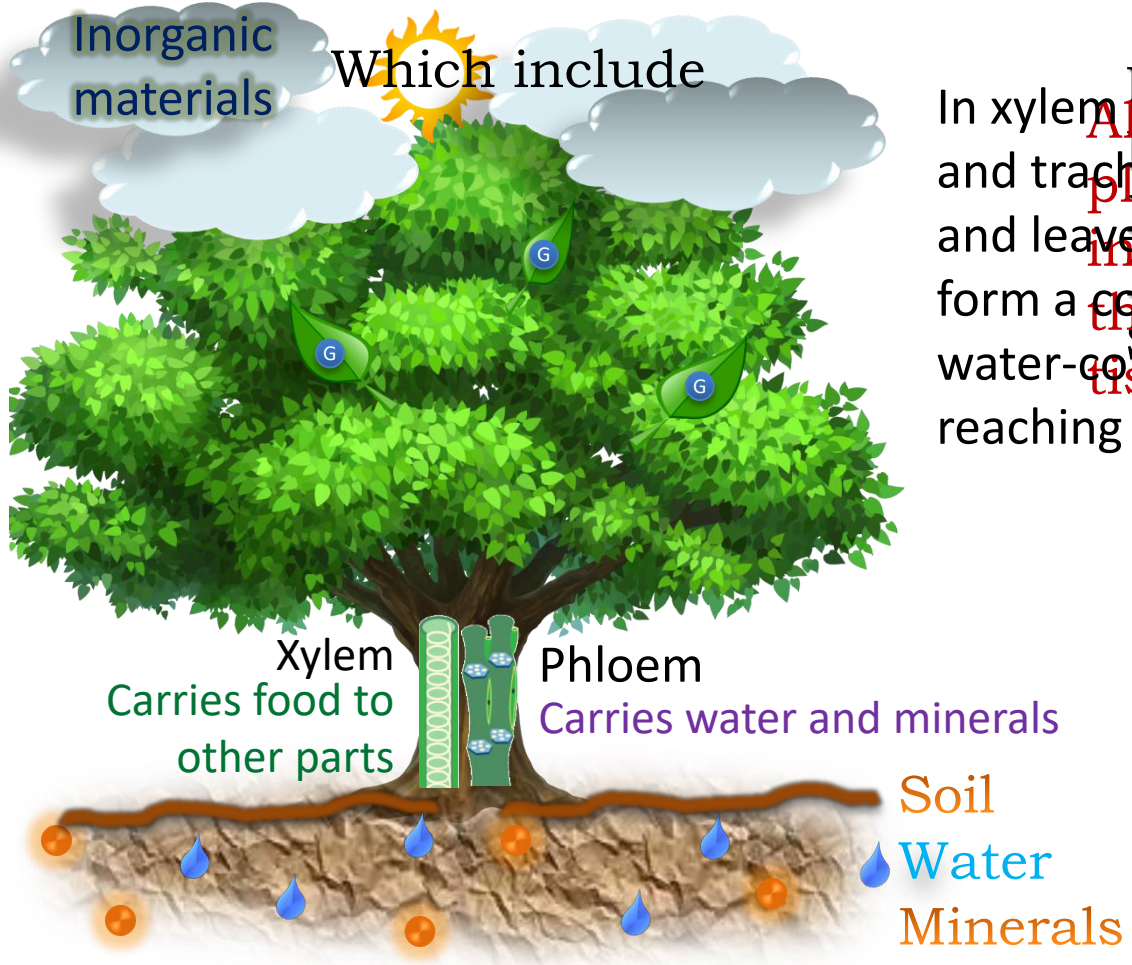


Thank You

Module 20



PLANT'S TRANSPORT SYSTEM



In xylem tissues cells like vessels and tracheids of the roots, stems and leaves are interconnected to form a continuous system of water-conducting channels reaching all parts of the plants.

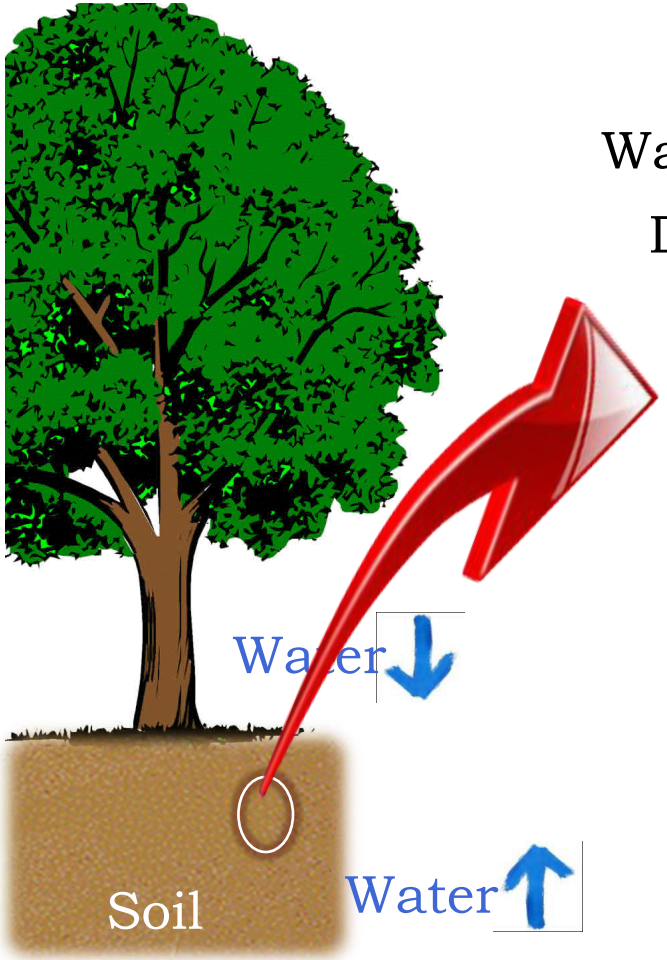
All the parts of the plant are interconnected with these conducting tissues.

TRANSPORT OF WATER IN PLANTS

Takes place by two ways

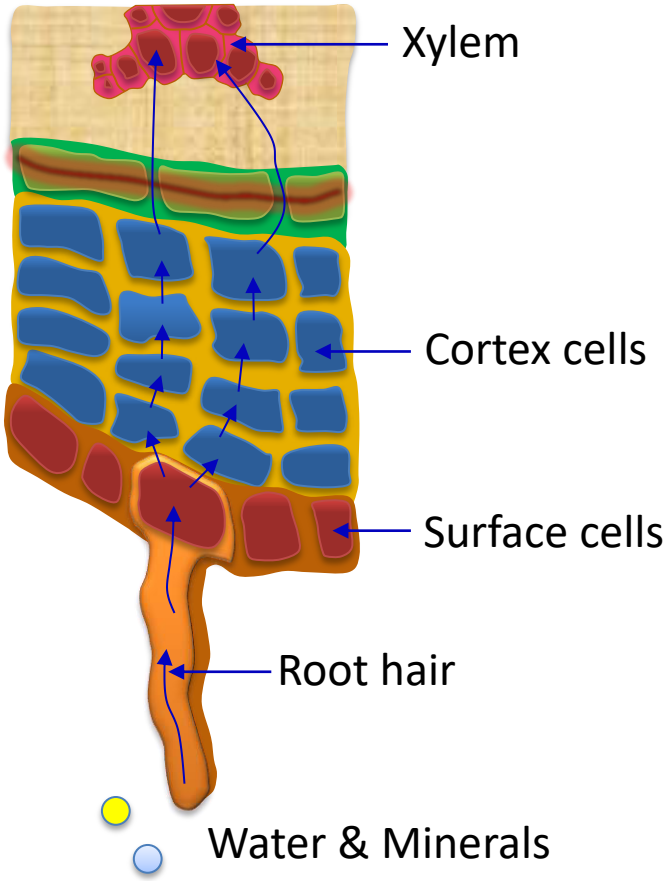
- Root pressure
- Transpiration pull

Now first let us see root pressure



Water molecules enter from the roots

Due to difference in concentration



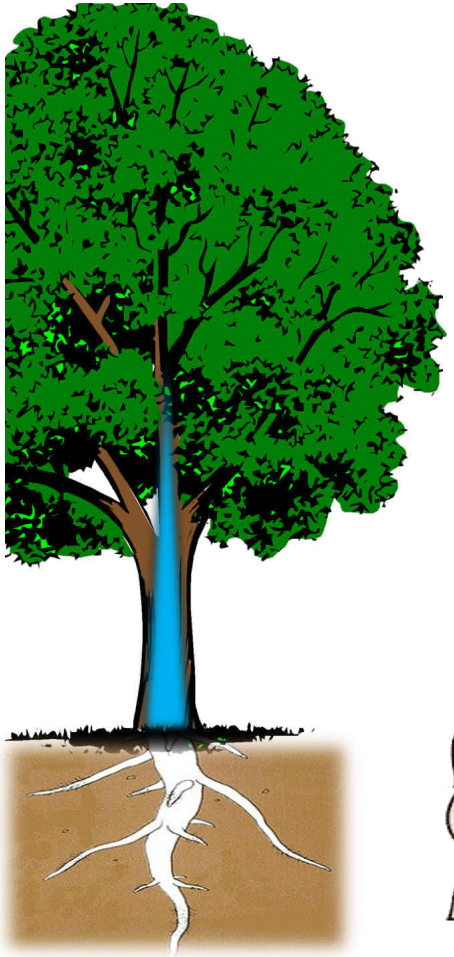
This pressure carries water from the xylem and it pushed further and further.

This steadily builds up a column of water that is steadily pushed upwards.

This pressure is called root pressure

Thank You

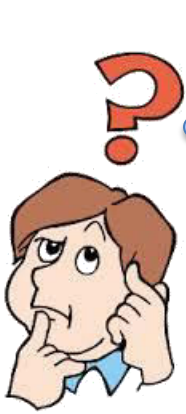
Module 21



Root pressure is adequate to move water only in small plants like herbs and shrubs or small

H ve the water in

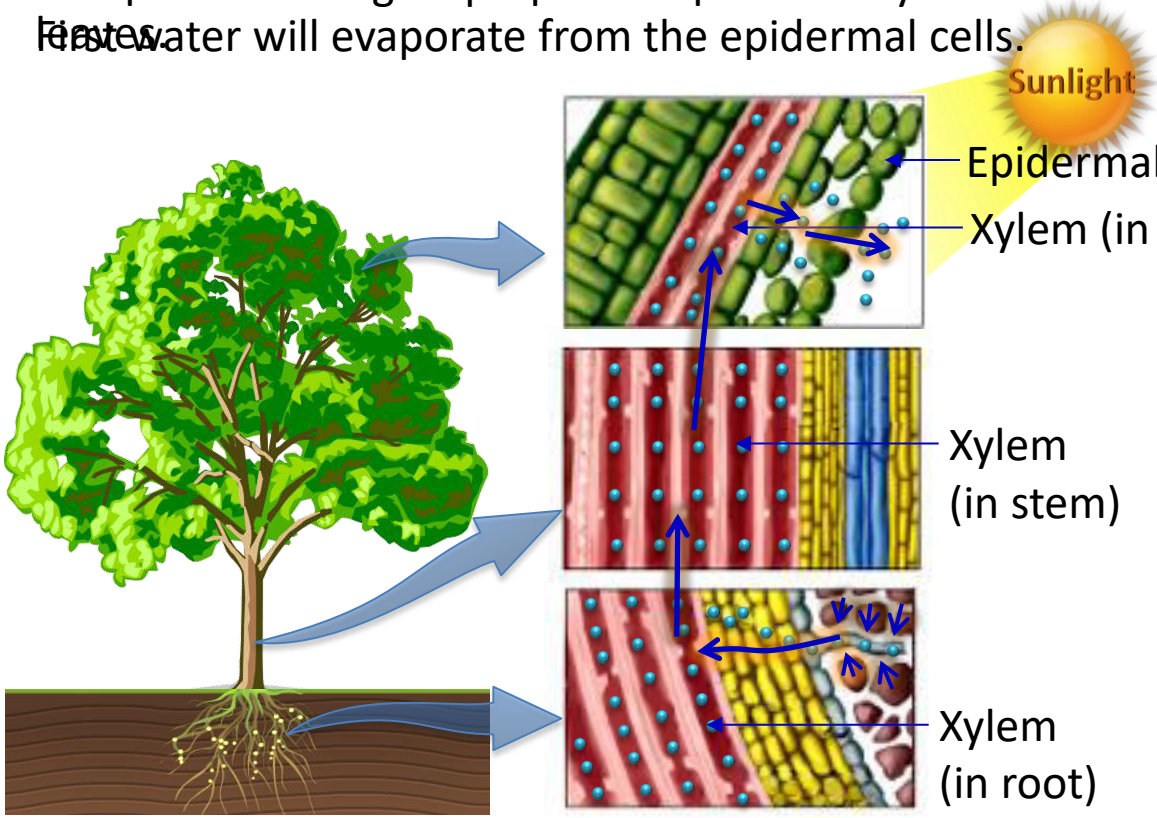
Then how is water transported in tall trees???



TRANSPIRATION PULL

This loss of water from the aerial parts of plants creates a suction force which pulls water from the xylem of stem and then roots. This is called transpiration pull.

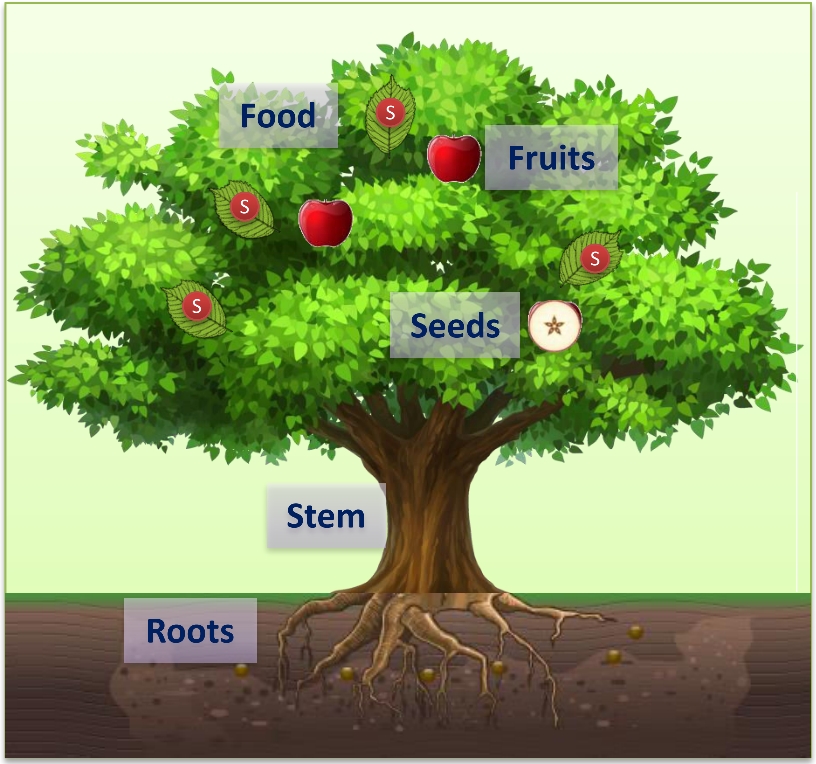
It helps in transport of water and minerals in tall plants during day when the stomata are open.

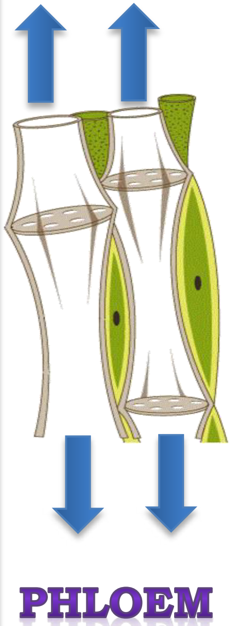


This process is known as **TRANSLOCATION**

Food manufactured in the leaves is transported to each cell of the plant.

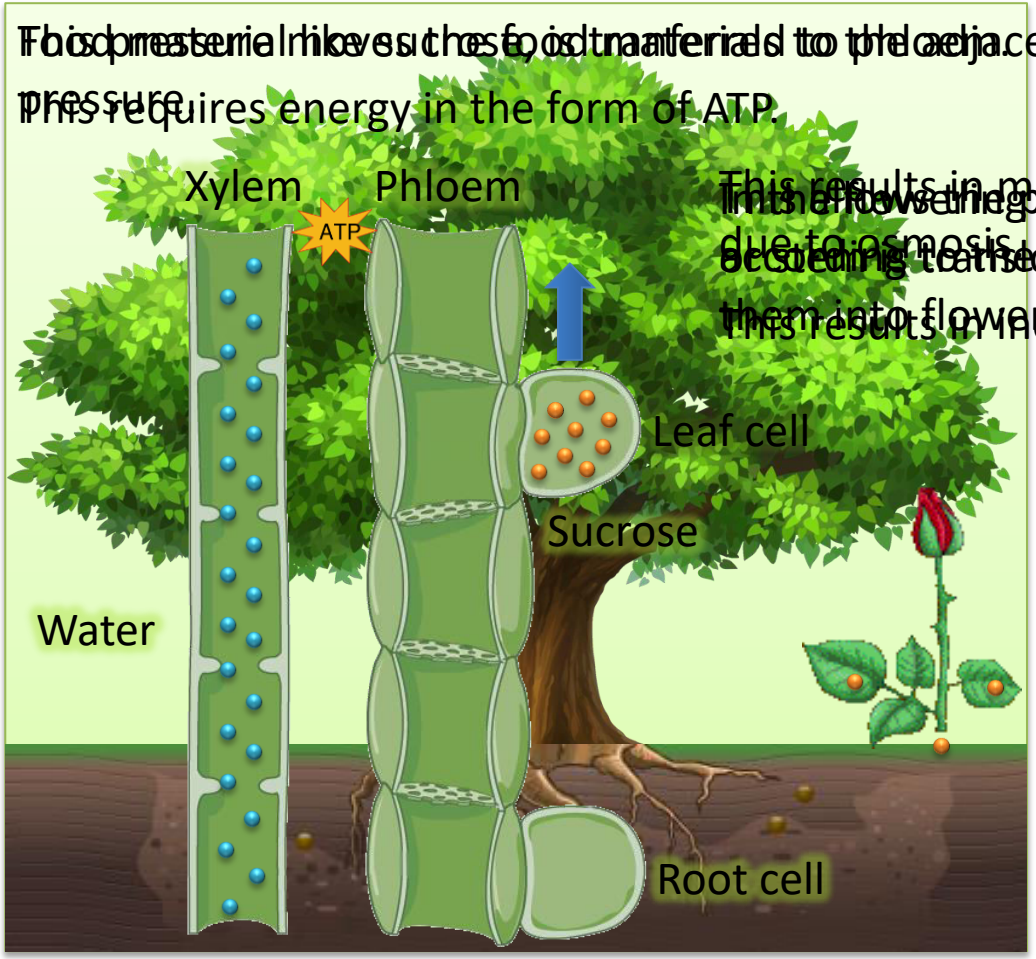
This is done by phloem in both upward and downward direction.





Food material like sucrose is transferred to the adjacent cells with low pressure.

This requires energy in the form of ATP.



This results in movement of water into the cells due to osmosis.

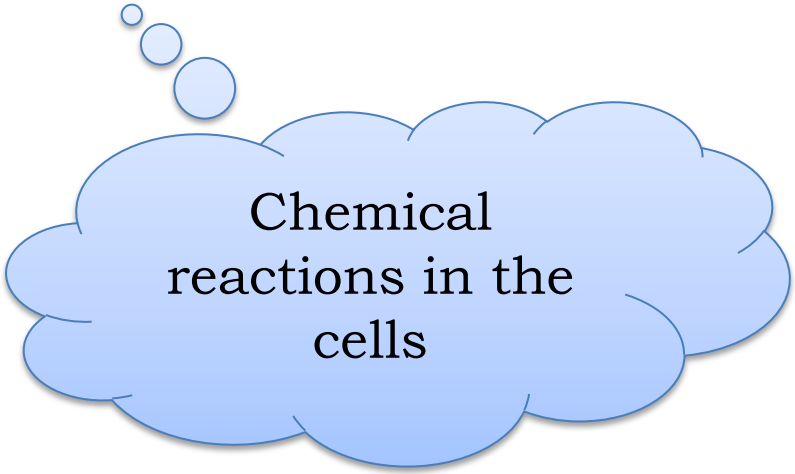
This results in increase in pressure in the cells.

Thank You

Module 22

EXCRETION

Biochemical reactions constantly occur in the cells of a living organism.



After digestion the food is carried to the cells by the blood

Kidneys

Urine

Food

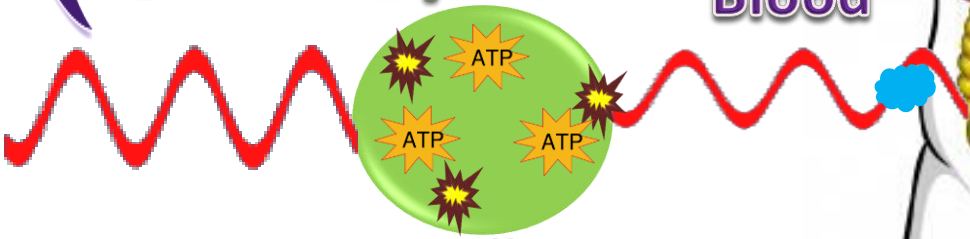
The kidneys filter the blood and remove the waste products in the form of urine.

So, the body needs to get rid of these harmful products

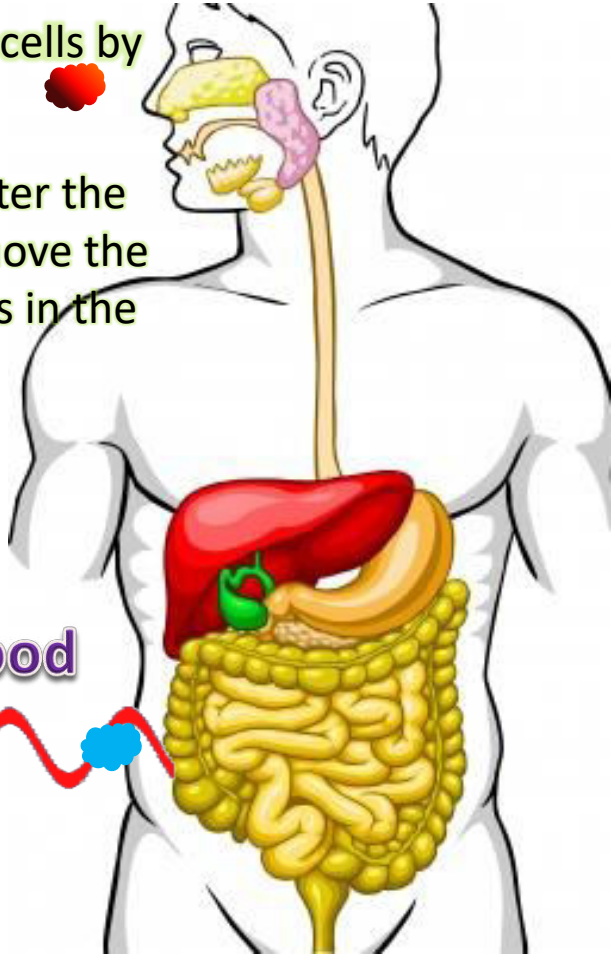
But along with the required substances, it also produces harmful substances like Urea, uric acid and ammonia.

If the kidneys fail to remove these harmful substances from the body, it may cause serious damage, sometimes leading to death.

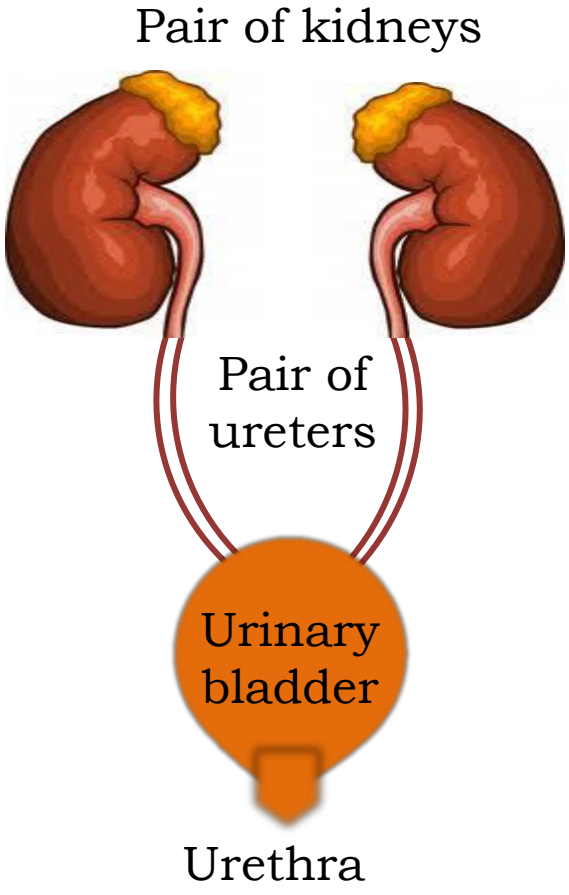
Blood



cell



The excretory System in human beings includes .....

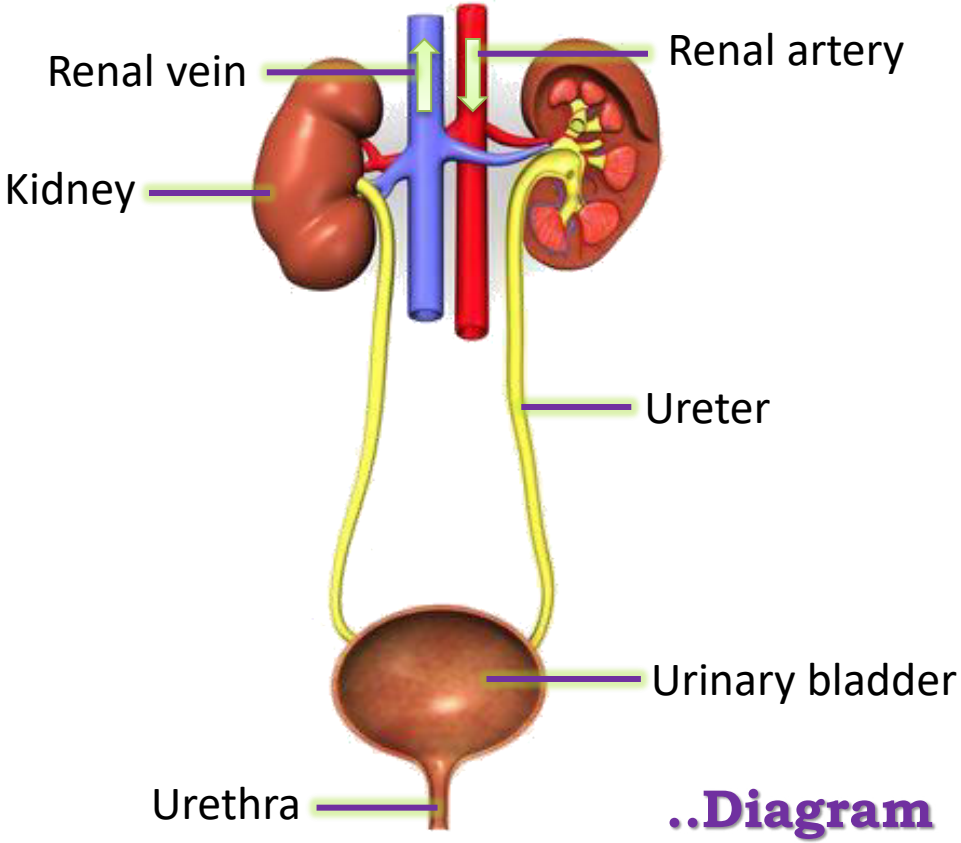


From the kidneys two thin tubes come out called as ureters

Both the ureters open in a bag like organ called urinary bladder

The urinary bladder opens into a small tube like structure called urethra.

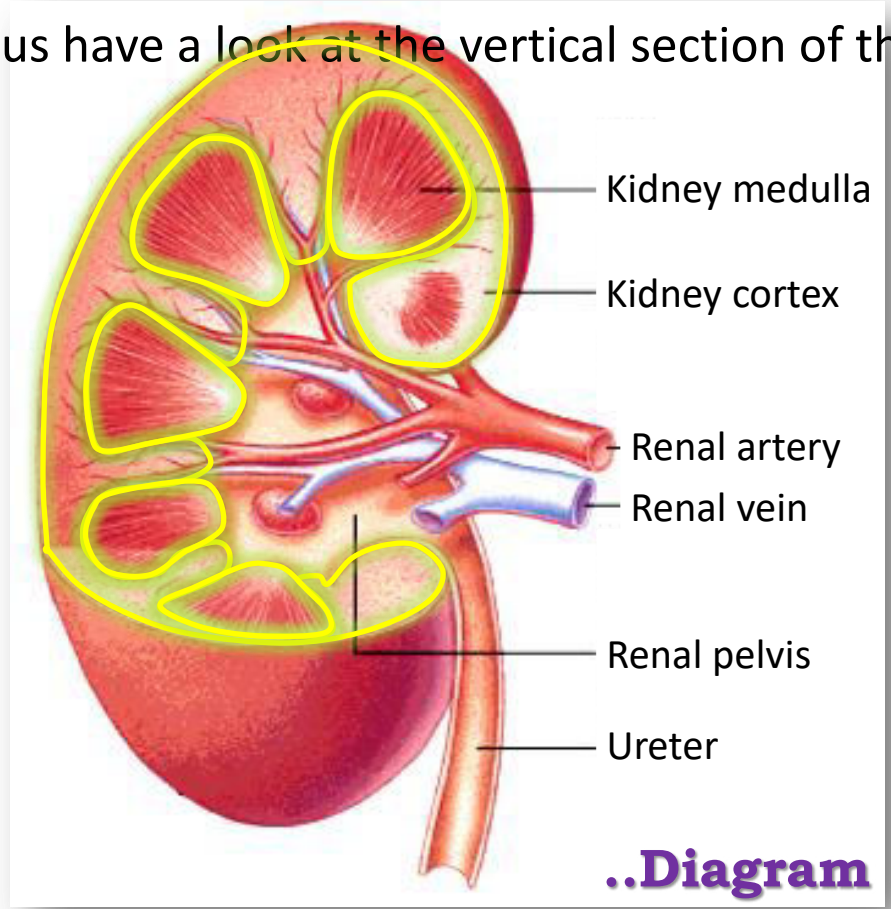
THE HUMAN EXCRETORY SYSTEM



..Diagram

- The artery that carries blood to the kidneys is called as renal artery.
- The vein that carries blood from the kidneys is called as renal vein.

Let us have a look at the vertical section of the kidney.

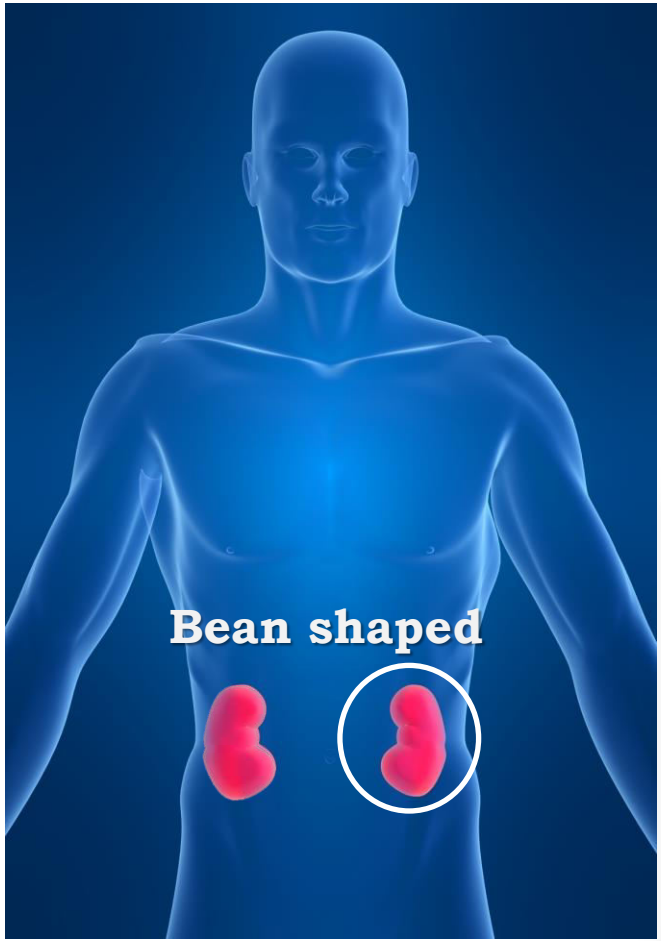


..Diagram

- The triangular region is called as
- The region out side the medulla is called as
- The region where the ureter begins is called as

Thank You

Module 23



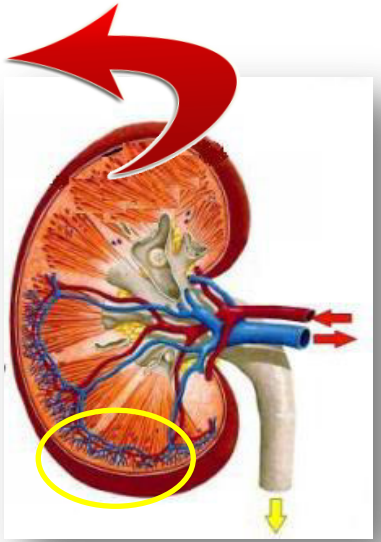
Kidneys are bean shaped organs.

Situated at the back side of the abdomen, one on either side of the vertebral column

Basic filtration unit in the kidney is

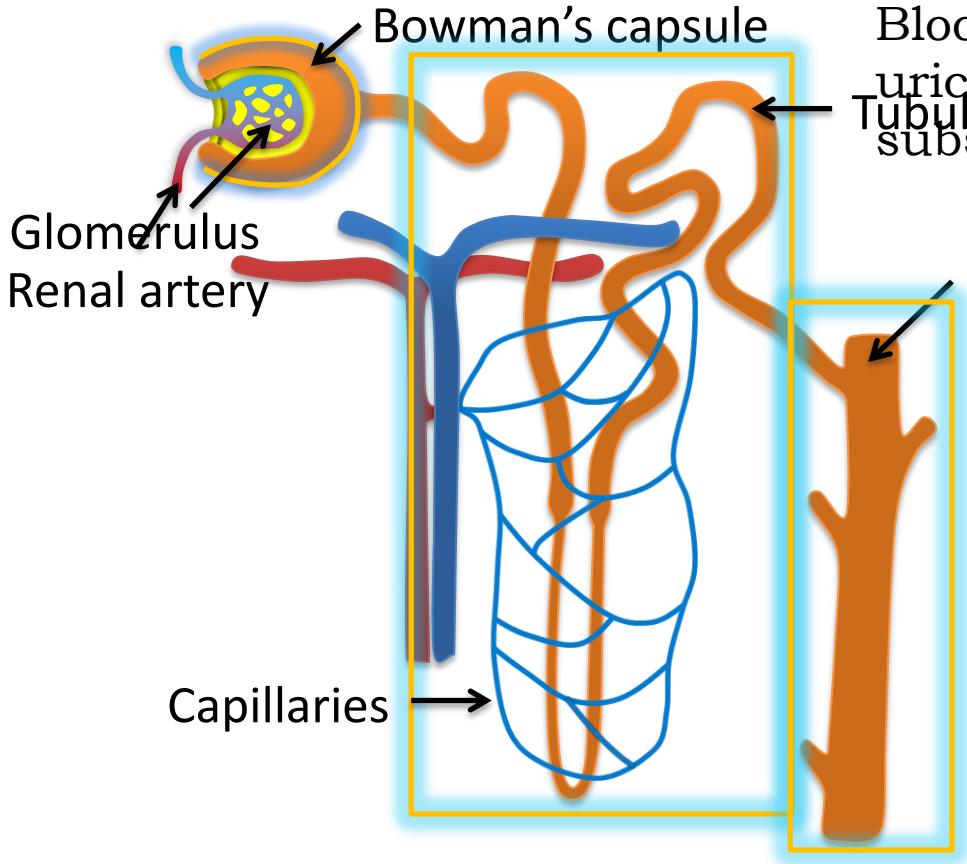
A cluster of thin walled capillaries

Called as



Let us see the process of urine formation

STRUCTURE OF NEPHRON

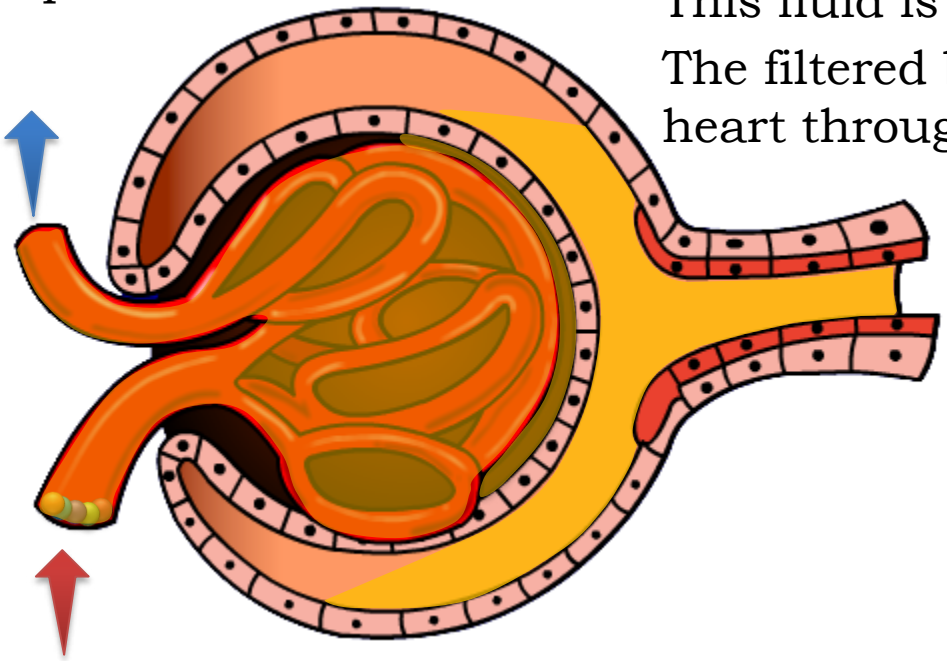


Blood contains urea, ammonia, uric acid, water and other useful substances.

The [illegible] network of capillaries called as

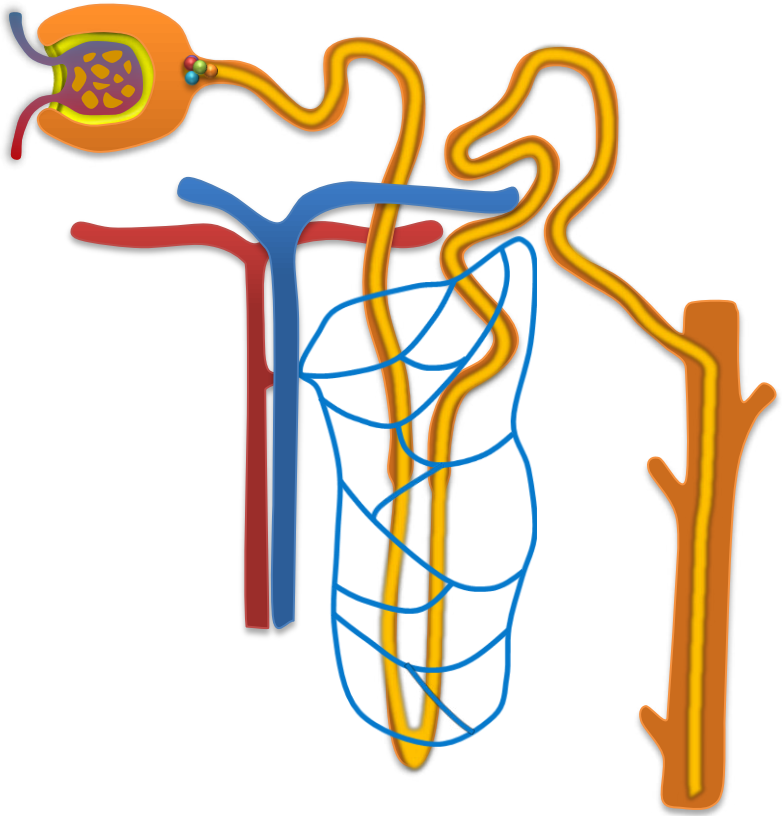
When blood passes through the glomerulus, it gets filtered.

Urea, uric acid, ammonia, water and other useful substances get filtered out from the blood and this fluid collects in the bowman's capsule.



This fluid is called as glomerular filtrate.

The filtered blood is sent back to the heart through the renal vain.



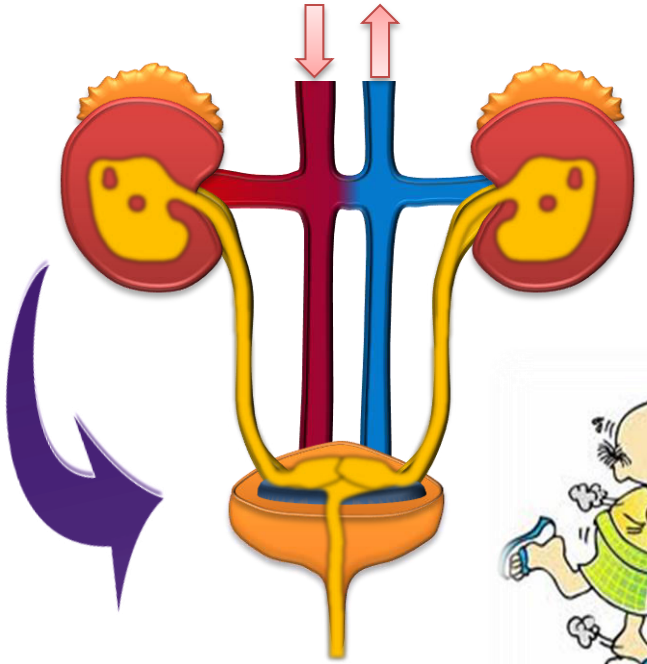
The glomerular filtrate passes through the tubule

In the tubule reabsorption of water and useful molecules takes place.

The remaining fluid containing the waste forms the urine which passes through the ureter to the bladder

Eventually the urine enters the ureters and is carried to the urinary bladder.

It is stored in the urinary bladder and from there it is thrown out through the urethra.



Thank You

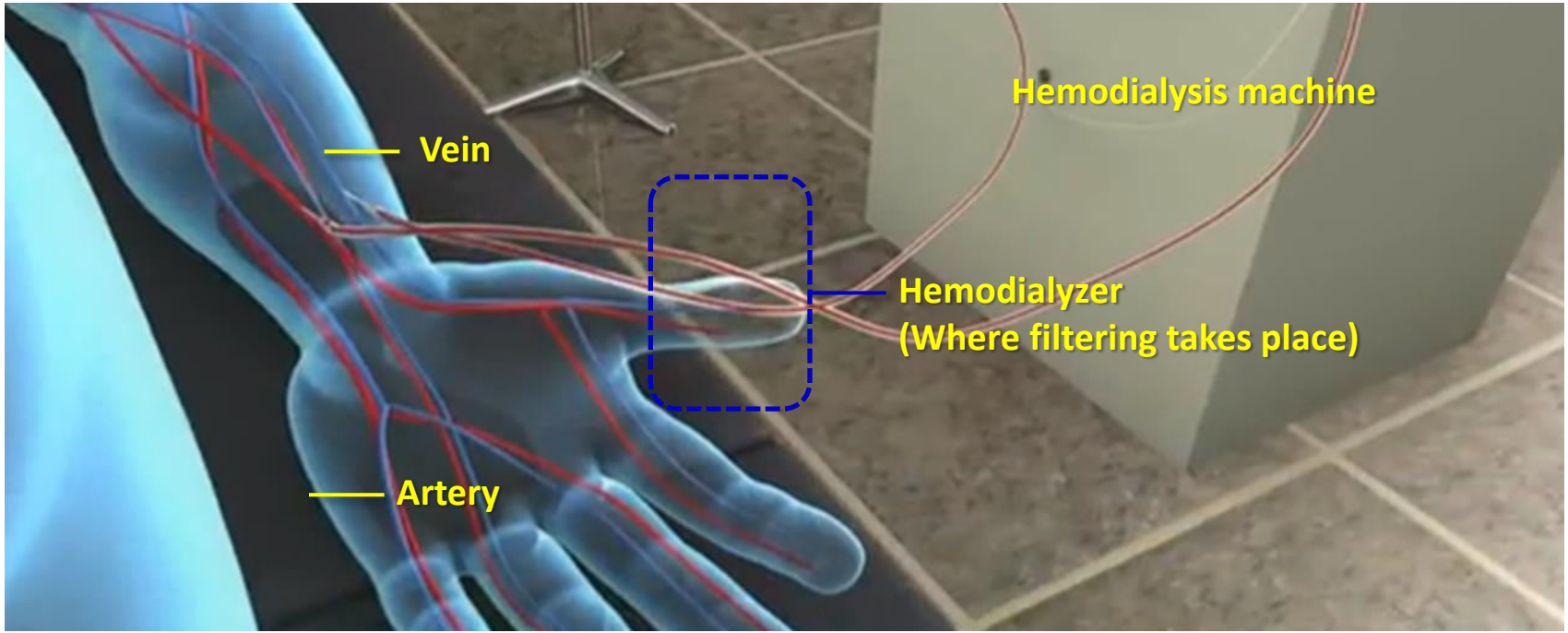
Module 24

HAEMODIALYSIS

- In this case kidney failure, an artificial machine is used to remove the nitrogenous waste products from the blood.
- This is called as kidney failure.

HAEMODIALYSIS

- This is called as hemodialysis.
- In this artificial kidney machine is used to remove the nitrogenous waste products from the blood.
- At one time 300 ml of blood is passed through the dialyzing machine.
- This process is called as dialysis.



Do plants excrete???

YES !

In plants excretion is very simple

No definite excretory system or organ

Gases are eliminated by diffusion

Waste stored in vacuoles of leaves, flower, fruit, bark.

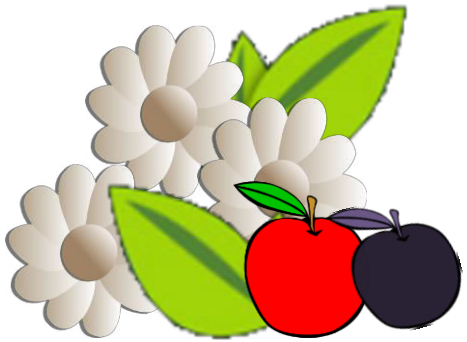
Other waste products are stored as resins and gum in old xylem

Plants e

into the soil

Empty spaces in cells

Chemicals



Thank You