CLASS X/ BIOLOGY
LIFE PROCESS

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RESPIRATION

The entire process of respiration involves following 5 steps:

i) Breathing in oxygen
ii) Reaction with oxygen with food molecules
iii) Oxidation of food molecules
iv) Release of energy and its storage in the form of ATP molecules in the cell.
v) Elimination of waste products like carbon dioxide and water.

Food + Oxygen → Carbon Dioxide + Water + Energy

Glycolysis – It is an anaerobic process in which a molecule of glucose is converted into two molecules of pyruvic acid. It takes place in the cytoplasm

Krebs Cycle – It is an aerobic process that takes place in the mitochondria that involves the oxidation of pyruvic acid into water and carbon dioxide.

GLYCOLYSIS

i) Glucose ($C_6H_{12}O_6$) contain six carbon atoms. It is oxidised in the cells of organism during respiration.

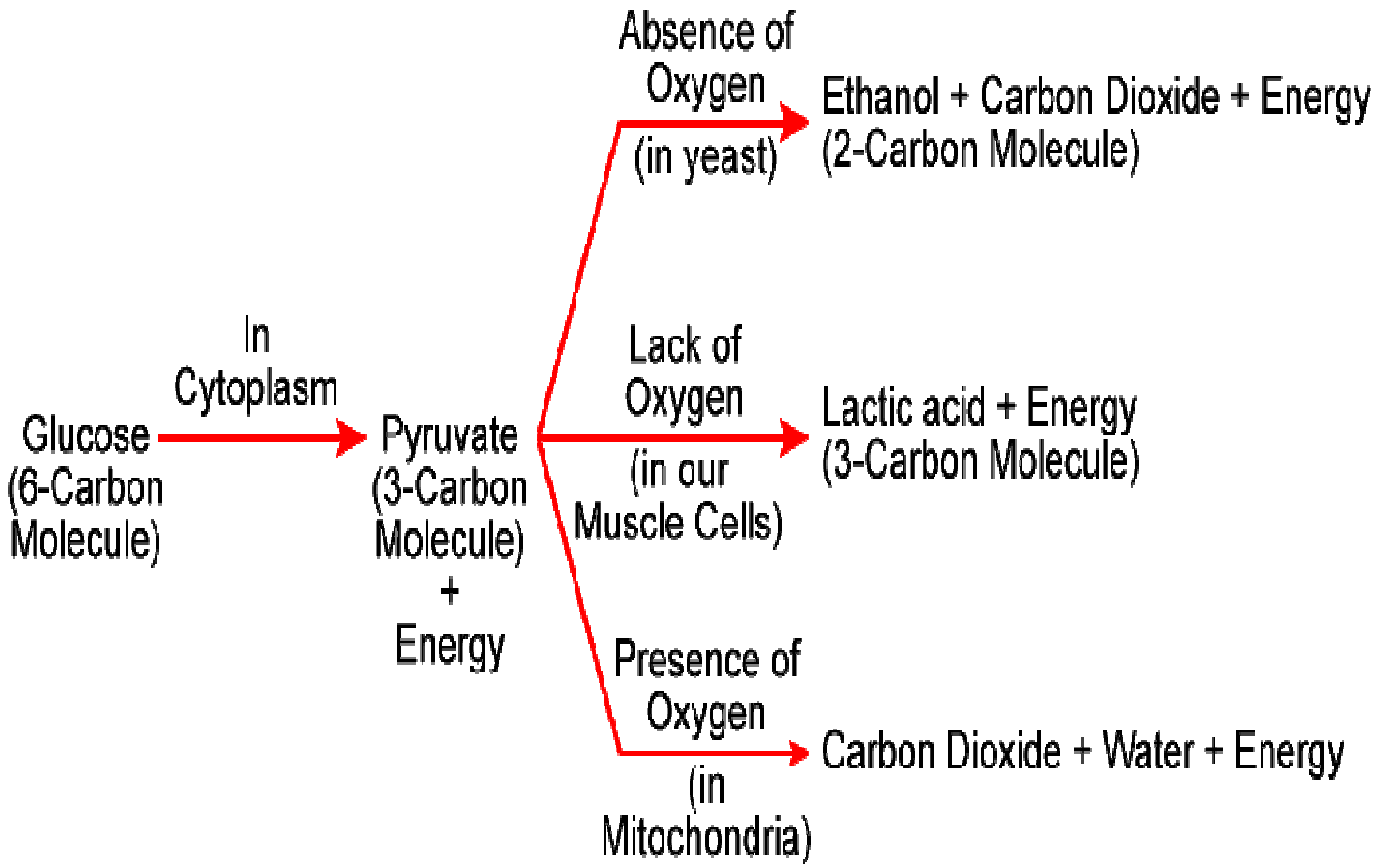
ii) Oxidation of glucose takes place in the cytoplasm and results in the production of pyruvic acid. The oxidation of glucose to pyruvic acid is called glycolysis.

iii) In the process of glycolysis, one molecule of glucose breaks down to produce two molecules of pyruvic acid (pyruvate). This pathway does not require oxygen.

iv) When oxygen present in the cells the pyruvic acid is completely oxidised to carbon dioxide and water and lot of energy is produced

v) When oxygen is not available in the cells the pyruvic acid is converted to ethanol and carbon dioxide in case of plants.

vi) When oxygen in not available in the cells pyruvic acid is converted to lactic acid in case of animals.

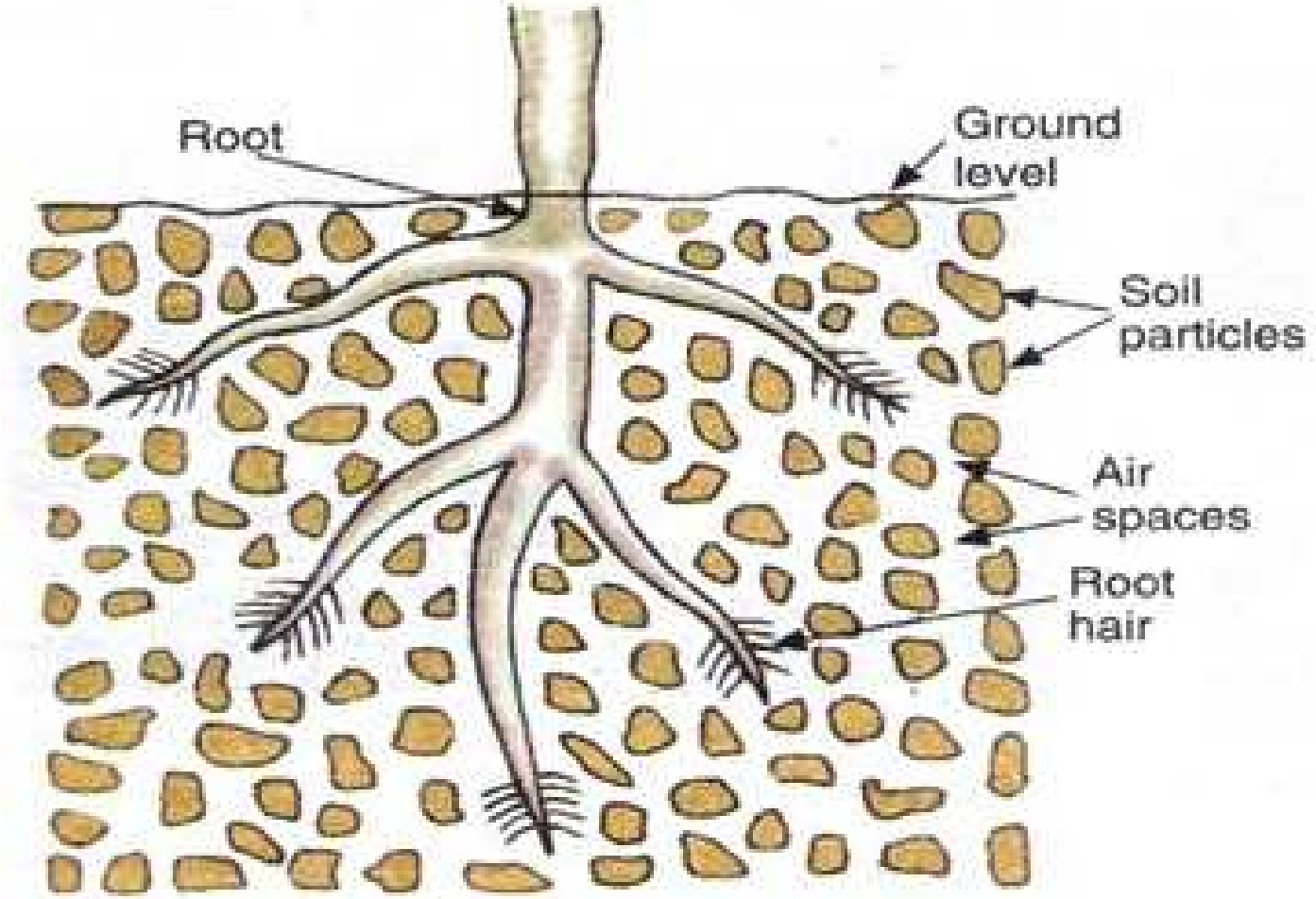

Glucose
(6-Carbon
Molecule)
In
Cytoplasm
Pyruvate
(3-Carbon
Molecule)
+
Energy
Absence of
Oxygen
(in yeast)
Ethanol + Carbon Dioxide + Energy
(2-Carbon Molecule)
Lack of
Oxygen
(in our
Muscle Cells)
Lactic acid + Energy
(3-Carbon Molecule)
Presence of
Oxygen
(in
Mitochondria)
Carbon Dioxide + Water + Energy

RESPIRATION IN PLANTS

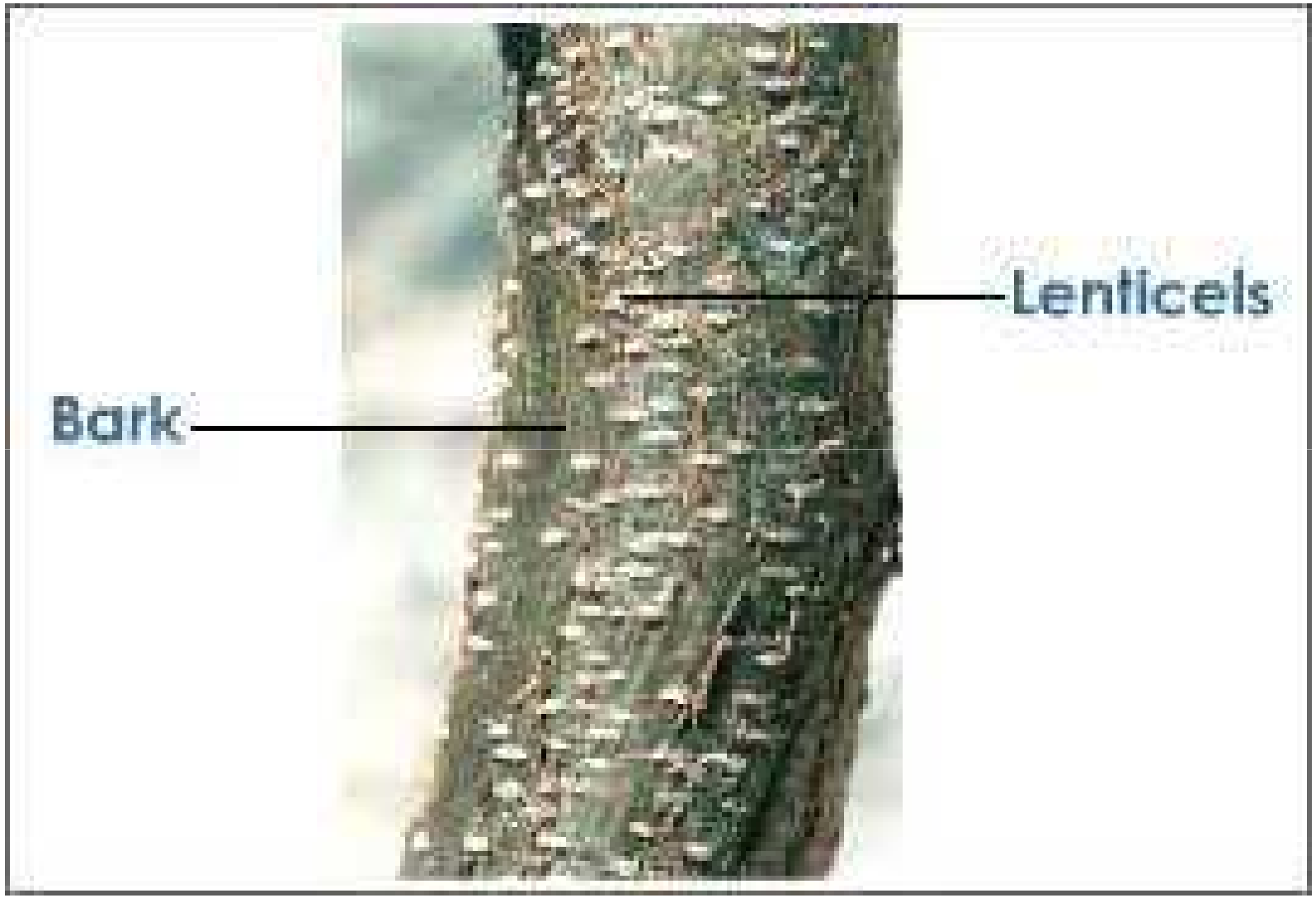
- All parts of the plant (root, stem, leaf) perform respiration individually.
- In plants transport of gases to one part to another is not required.
- In plants respiration occurs in a slower rate.

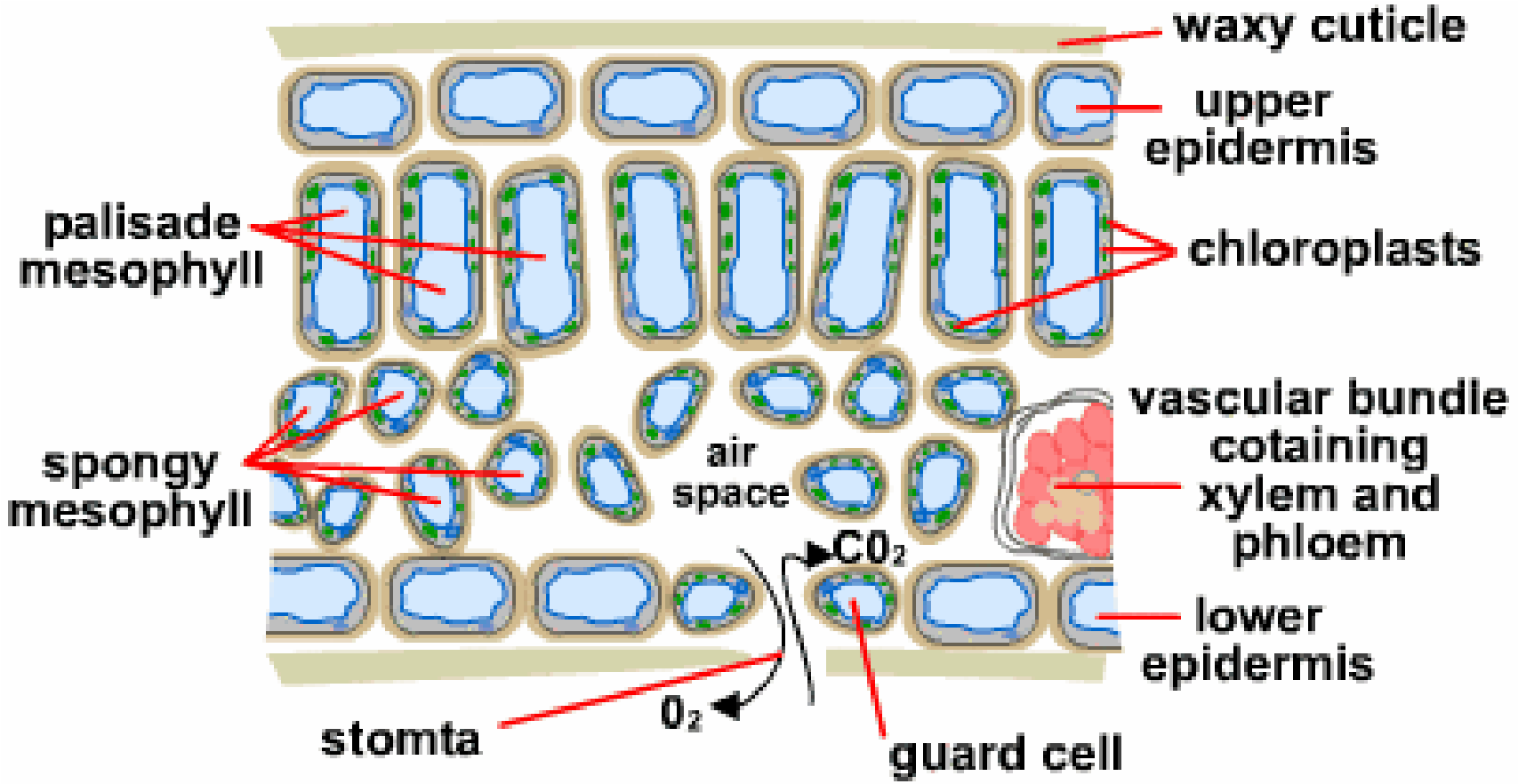
EXCHANGE OF GASES IN ROOT AND STEM

- Roots take up oxygen present in between the soil particles by the process of diffusion
- In plants, oxygen and carbon dioxide diffuse through the stomata and the intercellular spaces of the leaves, and the lenticels of the bark.
- Lenticels are small openings in the pits of the bark. The exchange of gases takes place through the lenticels also, apart from the exchange through the tiny openings in the leaves called stomata which are present on the inner surface of the leaves.



Roots absorb oxygen from air present in-between the soil particles through the root hair.


Lenticels
Bark


waxy cuticle
upper epidermis
palisade mesophyll
chloroplasts
vascular bundle cotaining xylem and phloem
spongy mesophyll
air space
$C0_2$
lower epidermis
0_2
stomta
guard cell

RESPIRATION IN ANIMALS

Different animals have different mode of respiration.

i) **Body Surface:** In unicellular organism respiratory gases diffuse between the surrounding medium and cell across the plasma membrane.

ii) **Skin:** Respiration through skin is known as cutaneous respiration and takes place in annelids, crustaceans and amphibians

iii) **Buccopharyngeal Lining**: It is seen in frog and toads.

iv) **Gills:** Bronchial respiration occurs through gills and is found in many annelids, crustaceans, molluscs, insect larvae, fishes and some amphibians.

v) **Lungs:** Respiration through lungs is called pulmonary respiration and is found in snail, amphibians, reptiles, birds and mammals.

vi) **Trachea:** In insects like grasshopper, cockroach, housefly and mosquito, the tiny holes called spiracles on their body and the air tube called trachea are the respiratory organs.

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