3055 BA SANGAM COLLEGE

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WORKSHEET 9

School: Ba Sangam College **Year:** 12
Subject: Biology **Name:**

Strand	**1 – Structure and Life Processes**
Sub strand	**1.4 – Comparative Form and Function in Plants and Animals**
Content Learning Outcome	**Examine the method of gas exchange and the associated problems with exchange of gases in organisms in aquatic and terrestrial habitats.**

Gas Exchange

- Organisms release energy through respiration (burning the food with oxygen).
- Organisms take in oxygen and remove carbon dioxide.
- Gas exchange system is adapted to its environment and way of life.
- Active organisms- require large energy-efficient gas exchange system.
- Sessile organisms- do not require much energy-inefficient gas exchange system.

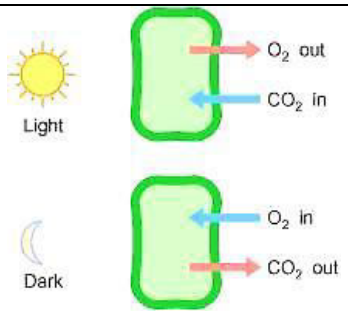
Gas Exchange In Plants – direct diffusion

- Plants-----carbon dioxide------- photosynthesis, oxygen------respiration.
- Plants are sessile----don't need rapid gas exchange.

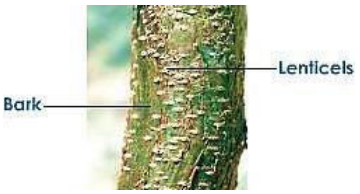
Efficient gas exchange systems must	❖ have a large surface area to volume ratio ❖ be thin ❖ have mechanisms for maintaining high concentration gradients ❖ be permeable to gases.
Factors affecting rate of gas exchange in plants	❖ The area available for diffusion. ❖ The distance over which diffusion occurs. ❖ The concentration gradient across the gas exchange surface. ❖ The speed with which molecules diffuse through membranes.

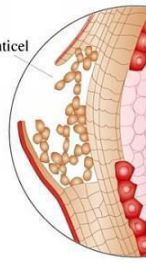
Flowering Plants – exchange gases – stomata

- In light-----carbon dioxide ---- photosynthesis and output-----oxygen from respiration.
- In dark intake of oxygen----respiration and output of carbon dioxide.



- Terrestrial plants----stomata on the bottom of their leaves----have plenty of air.
- Aquatic plants----stomata on top, where they have access to air.
- Plants live under water-----gather CO_2 from the water, they release O_2---bubbles gathering around them.
- *Woody plants* use **lenticels** for exchanging gases----aerobic respiration.

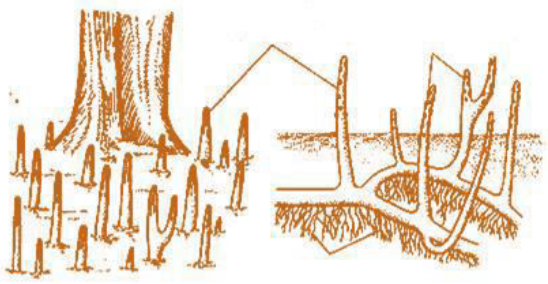




- Live non-photosynthetic cells (lenticels)----need oxygen gas and get rid of carbon dioxide waste gas.
- Plants open their stomata to get gases by direct diffusion-----face water loss----at night and during water shortages plants conserve water by closing their stomata.

Gas exchange in Pneumatophores

Pneumatophores are erect roots with specialized structures that allow for respiration. Eg. mangroves root.



Adaptation for Gas Exchange in Plants;

- **Stomata-**small openings in the underside of most leaves, which allow gases to diffuse in and out.
- **Air spaces**-in the spongy layer of a leaf to allow carbon dioxide to diffuse more quickly to the photosynthesising palisade layer.
- **Thin leaves with broad surfaces**-to maximise surface area to volume ratio for faster diffusion to cells.
- **Lenticels-** (small holes in the bark) in woody plant stems and small gaps in the stem surfaces of herbaceous plants that allow plants to respire.

Gas Exchange in Animals

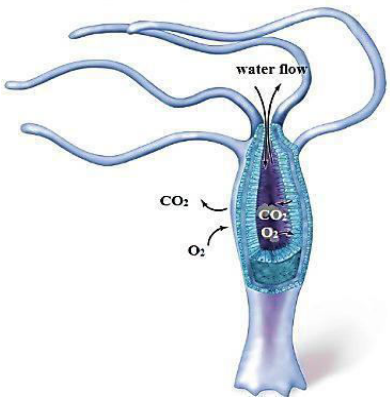
- Small and sessile organisms-----get enough oxygen -----diffusion.
- Larger and motile organisms----gas exchange (O_2----in, CO_2----out) ------ specialised organ system.

Respiratory Surfaces (lungs, skin and gills) adaptations

- **Moist respiratory surfaces**------to dissolve O_2 and CO_2
- **Large SA**----- for gas exchange
- **Extremely thin**----- for gases to pass through quickly

Gas Exchange In Invertebrates

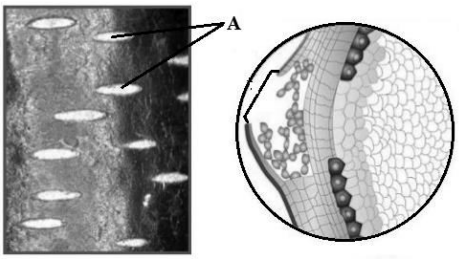
Gas Exchange in Cnidarians- direct diffusion



- Are aquatic (simple diffusion ---to exchange O_2 and CO_2 between cells and surrounding water) and sessile (do not need much O_2)

Exercise

1. List **four** important adaptations to assist diffusion:
   a. Plants **(2 mks)**
   _____
   _____
   _____
   _____
   _____
   b. Animals **(2 mks)**
   _____
   _____
   _____
   _____
   _____
2. Why do organisms need oxygen? **(1 mk)**
   _____
   _____
3. Why the stomata of water lily on the upper leaf surface? **(2 mks)**
   _____
   _____
   _____
   _____
4. How would stomata arrangements be a problem for land plants? **(2 mks)**
   _____
   _____
   _____
   _____
5. The diagram given below shows a section of a tree stem.



   (i) Name the part labelled **A**.
   _____ **(1 mk)**
   (ii) Explain the importance of the role of part **A**. **(2 mks)**
   _____
   _____
   _____
   _____