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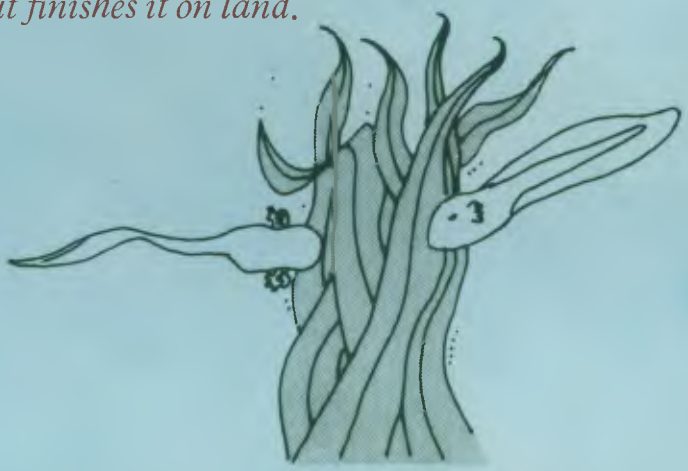
Book 2

Beginning Scientific English

Thus *a change happens to the frog* during its development; i.e. it is an *animal which begins life in water but finishes it on land.*



Thus (22) the frog undergoes a metamorphosis during its development.

Contents

Unit 40 Osmosis

A

If a semi-permeable membrane has a *weak* solution of sugar on one side and a *strong* solution of sugar on the other, then *more* water molecules will diffuse through the membrane from the weak solution to the strong one than the *opposite way*. *The result is that* water diffuses from the weak solution, through the semi-permeable membrane, into the strong solution.

This process is known as osmosis. When both solutions on either side of the membrane are of *the same strength*, osmosis *stops happening*.

The *taking up* of water from the soil by the roots of plants is a good *example to show* osmosis. Water molecules diffuse from the weak solution in the soil to a stronger solution inside the *cells of the roots*. From here, they pass up the stem to the leaves.

All *plant and animal bodies* depend on osmosis to *carry/food materials* and waste materials through the cell walls. Osmosis is one of the most important *things that happen in nature*, and many life processes depend upon it.

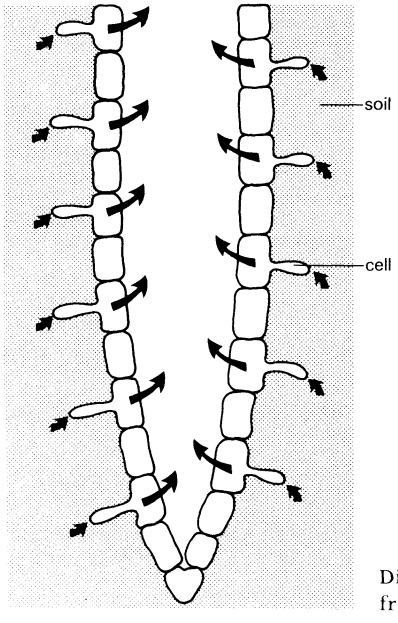


Diagram of root-hair (enlarged) absorbing water from the soil

B

If a semi-permeable membrane has a (1)dilute solution of sugar on one side and a (2)concentrated solution of sugar on the other, then (3)a greater number of water molecules will diffuse through the membrane from the (1)dilute solution to the (2)concentrated one than the (4)reverse. (5)In effect, water diffuses from the (1)dilute solution, through the semi-permeable membrane, into the (2)concentrated solution.

This process is known as osmosis. When both solutions on either side of the membrane are of (6)equal concentration, osmosis (7)ceases.

The (8)absorption of water from the soil by the roots of plants is a good (9)illustration of osmosis. Water molecules diffuse from the (1)dilute solution in the soil to a more (2)concentrated solution inside the (10) root cells. From here, they pass up the stem to the leaves.

All (11)living organisms depend on osmosis to (12)transport (13)nutrients and waste materials through the cell walls. Osmosis is one of the most important (14)phenomena, and many life processes depend upon it.

Exercise 1 Find the way in which the words and phrases italicised in Text A are expressed in Text B:

1 weak
2 strong
3 more
4 opposite way
5 The result is that
6 the same strength
7 stops happening
8 taking up
9 example to show
10 cells of the roots
11 plant and animal bodies
12 carry
13 food materials
14 things that happen in nature

Exercise 2 Rewrite these phrases as compound nouns, as in example (b):

(a) *walls of cells*	(b) *cell walls*
1 cells of roots	10 a layer of plastic
2 a solution of sugar	11 a coat of cloth
3 roots of plants	12 bodies of animals
4 a process of life	13 cells of leaves
5 organisms of plants	14 transport of nutrients
6 absorption of heat	15 molecules of water
7 impulses of nerves	16 rays of light
8 transmission of energy	17 nutrition of plants
9 cells of animals	18 an atom of hydrogen

Exercise 3 Compare these ways of expressing the same ideas:

In everyday speech or writing:	In Science:
(1a) to be different	(1b) *to differ*
(2a) to change	(2b) *to vary*
(3a) depending on	(3b) *according to*

(4a) The velocity of sound *changes depending on* the medium.
(4b) The velocity of sound *varies according to* the medium.

Rewrite these sentences as in examples (b):

1 The boiling point of different liquids is different.
2 The freezing point of different liquids is different.
3 The boiling point of a liquid changes depending on the pressure of the surrounding atmosphere.
4 The rate of expansion of gases, liquids and solids is different.
5 Water is different from most other liquids because it expands on solidifying.
6 The state of a substance changes depending on its temperature.
7 The temperature of the air will be different at different times of the day.
8 The climate in most places is different depending on the season.
9 The amount of rainfall on an area is different depending on the season.
10 The rate of heat transfer by conduction is different in different solids.
11 The method of heat transfer in solids and fluids is different.
12 The rate of development of plants will be different depending on their environment.
13 Methods of seed dispersal are different for different varieties of plant.
14 The focal length of a convex lens changes depending on its thickness.
15 The length of light waves changes depending on their frequency.

16 The frequencies of waves of light and sound are different.
17 The velocity of sound changes depending on the medium through which it travels.
18 The velocity of light and that of sound are different.
19 A colloid and a suspension are different depending on the size of the suspended particles.
20 The atom of one element is different from that of any other.

Exercise 4 Rewrite this passage, using passive forms. You will then have summarised the Texts. (The subjects of the passive sentences are italicised):

The semi-permeable membrane allows *water molecules* to pass through but will not allow *the sugar molecules* to do so. In osmosis, the semi-permeable membrane allows *the water molecules* to diffuse from the dilute to the concentrated solution. Roots of plants absorb *water and its solutes* from the soil in this way. They absorb *water from the dilute solution in the soil* into the concentrated solution inside the root cells. Living organisms depend upon *osmosis* for many of their life processes.

Exercise 5 Read and rewrite this passage, using a single word in place of each phrase italicised. (One small *change in word order only is necessary):

If a material allows water to *pass through*, it is said to be permeable to water. A material which does not, is said to be impermeable to water. All *plant and animal bodies *that live/are made* of cells, *which are like* tiny boxes *and their* walls are known as membranes. These are permeable to water but not always to every *substance dissolved in it. This kind of* membrane is said to be semi-permeable.

If a semi-permeable membrane lies between a *very weak* and a *very strong liquid with a substance dissolved in it*, more water molecules diffuse from the *very weak* to the *very strong* than the *opposite way*. This process is known as osmosis, and it does not *stop happening* until the concentrations of molecules on both sides of the membrane are *the same*.

A good *way of showing (with an example of)* osmosis is the *taking up* of water from the soil by the *roots of plants*, which *have in them* a more concentrated solution than that in the soil. It is also by osmosis that *food materials* are transported in plant and animal cells, and this is one of the most important *things that happen in nature* on which life processes depend.

-ABILITY/-IBILITY

Adjectives ending in -ABLE/-IBLE may form a noun ending with -ABILITY/-IBILITY:

permeable	permeability
visible	visibility

They also form their negatives by putting IN-/IM-/UN- in front:

impermeable	impermeability
invisible	invisibility

Exercise 6 Complete the table below as shown in the examples above:

ADJECTIVE	NOUN	NEGATIVE ADJ.	NEGATIVE NOUN
permeable	permeability	impermeable	impermeability
visible	visibility	invisible	invisibility
variable			
penetrable			
soluble			
combustible			
diffusible			
able			
digestible			
assimilable			
movable			
available			
absorbable			

Adjectives ending with -IC

Some adjectives are formed by adding -IC to the noun:

volcano	volcanic

Notice the difference in pronunciation, thus: The stress moves forwards to the syllable just before the -IC ending, e.g. MAG-net – mag-NET-ic.

Exercise 7 Read and write the adjectives formed from these nouns, as in the above examples:

1	ion	8	atmosphere	15	metal
2	atom	9	dynamo	16	microscope
3	magnet	10	organ	17	carbon
4	state	11	sulphur	18	protoplasm
5	volcano	12	acid	19	alcohol
6	electron	13	base		
7	mercury	14	metre		

Nouns ending with -SIS, -SE, change to -TIC in the adjective, e.g. ellipse – elliptic.
Read and write the adjectives formed from these nouns:
osmosis – osmotic
synthesis – synthetic

Exercise 8 Answer these questions without referring to the Texts:

1 What is the difference between the two sugar solutions on either side of the membrane?
2 Which way will the greater number of water molecules diffuse?
3 What is this process of diffusion called?
4 When does it cease?
5 Give a good illustration of osmosis.
6 Which solution is more concentrated, that in the root cells or that in the water in the soil?
7 Where does the absorbed water travel from the root cells?
8 What do living organisms depend on osmosis to do?

Exercise 9 Questions for further discussion:

1 Why can't salt-water fish live in fresh water, or fresh-water fish live in salt water?
2 Why is it unwise for a ship-wrecked sailor to drink sea-water when he can't find fresh water?
3 Why should fertilisers be used only in very dilute solutions?

Vocabulary
fresh water ship-wrecked

Exercise 10 Suggestions for further activities:

1 Water a healthy (but unwanted) plant with salt solution for a few days. The plant will die. Why?
2 Water a healthy (but unwanted) plant with a concentrated sugar solution for a few days. The plant will die. Why?