

UNIT 3 BIOLOGY 2005
WRITTEN EXAMINATION 1
TRIAL EXAMINATION PAPER

Reading Time: 15 minutes
Writing Time: 1 hour 30 minutes

QUESTION AND ANSWER BOOK

Structure of Book

<i>Section</i>	<i>Number of Questions</i>	<i>Number of Questions to be Answered</i>	<i>Number of Marks</i>	<i>Suggested Times (minutes)</i>
A	25	25	25	30
B	6	6	50	60
			Total 75	Total 90

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MULTIPLE CHOICE QUESTIONS - ANSWER SHEET

Please note that the format and requirements of this answer sheet are different to the answer sheet that will be issued in the VCAA examination. Copies of the actual examination answer sheet may be obtained at: www.vcaa.vic.edu.au

Choose the correct response or the one which best answers the question by shading the square corresponding to your response in the table below.

Question 1	A	B	C	D
Question 2	A	B	C	D
Question 3	A	B	C	D
Question 4	A	B	C	D
Question 5	A	B	C	D
Question 6	A	B	C	D
Question 7	A	B	C	D
Question 8	A	B	C	D
Question 9	A	B	C	D
Question 10	A	B	C	D
Question 11	A	B	C	D
Question 12	A	B	C	D
Question 13	A	B	C	D
Question 14	A	B	C	D
Question 15	A	B	C	D
Question 16	A	B	C	D
Question 17	A	B	C	D
Question 18	A	B	C	D
Question 19	A	B	C	D
Question 20	A	B	C	D
Question 21	A	B	C	D
Question 22	A	B	C	D
Question 23	A	B	C	D
Question 24	A	B	C	D
Question 25	A	B	C	D

SECTION A - MULTIPLE CHOICE QUESTIONS

Instructions for Section A

Section 1 consists of 25 multiple-choice questions, each worth 1 mark. You should attempt all questions.

Choose the correct response or the one which best answers the question by shading the square corresponding to your response on the answer sheet provided.

A correct response is awarded 1 mark. Marks will not be deducted for an incorrect response. No marks will be awarded to any question where more than one answer is selected.

Question 1

A cell component responsible for the degradation of unwanted substances is the

- A lysosome.
- B vacuole.
- C centriole.
- D chloroplast.

Question 2

A frog accidentally hops into a saltwater swimming pool. The frog shrivels as water flows from

- A a hypertonic solution to a hypotonic solution.
- B an isotonic solution to another isotonic solution.
- C a hypotonic solution to a hypertonic solution.
- D a hypertonic solution to an isotonic solution.

Question 3

Antibodies are received by an infant in breast milk. This is an example of

- A active immunity.
- B passive immunity.
- C vaccination.
- D intoxication.

Question 4

Which sequence below most correctly represents the results of a reaction catalysed by an enzyme?

S = Substrate, E = Enzyme, P¹ = Product¹, P² = Product²

- A $E + P^1 \rightarrow S + P^2$
- B $S + P^1 + E \rightarrow E + P^2$
- C $S + E \rightarrow P^1 + P^2 + E$
- D $P^1 + P^2 + E \rightarrow S + E$

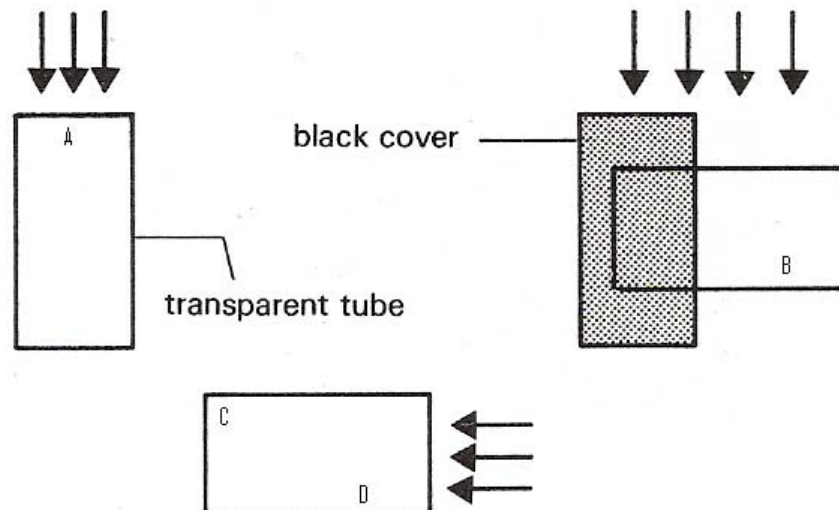
Question 5

The amount of water vapour lost to the atmosphere by a plant is increased if there is a reduction in

- A wind velocity.
- B relative humidity of the air.
- C the intensity of sunlight.
- D availability of soil water.

Fruit flies are positively phototactic and negatively geotactic.

Fruit flies were placed in the three containers below under the conditions shown. The arrows indicate the direction of light.

**Question 6**

Fruit flies would most likely congregate at

- A Region B
- B Region C
- C Region A
- D Region D

Question 7

Which one of the following features of prokaryotic cells does not distinguish them from eukaryotic cells?

- A No membrane bound nucleus.
- B A cell wall.
- C Relatively little internal organisation.
- D Extremely small size (less than 6 microns).

Question 8

If proteins responsible for the clotting of blood are found in a person's urine, it would indicate a disorder of the

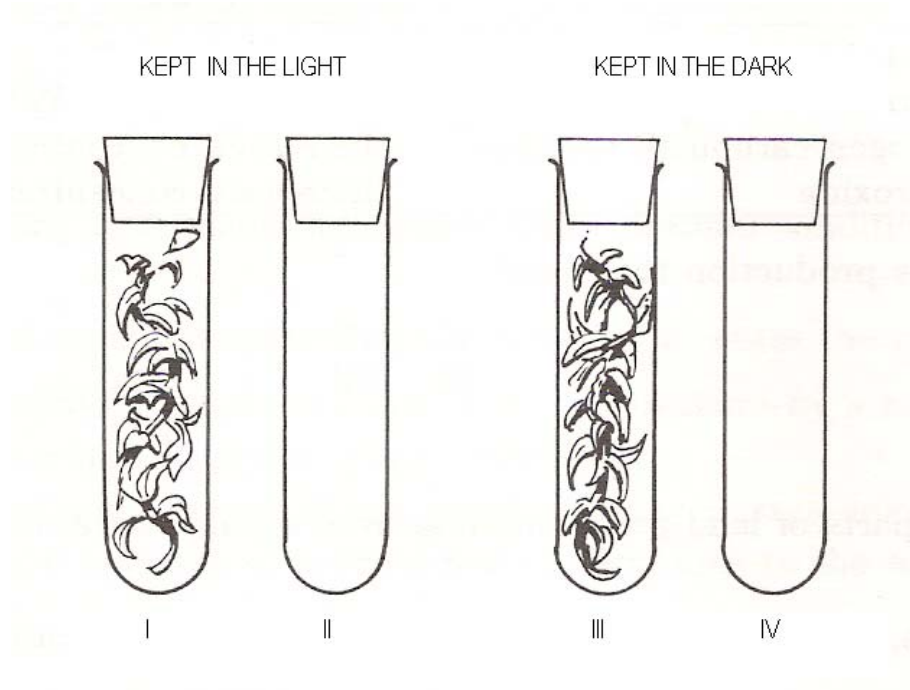
- A Urethra
- B Pituitary Gland
- C Glomeruli
- D Loops of Henle

Question 9

During photosynthesis

- A the light-independent reactions occur on the grana.
- B glucose is a product of the light-independent reactions.
- C water is formed as a result of the light reactions.
- D the light reactions occur in the stroma.

Four test tubes were set up as shown in the diagram below. Each of the tubes was filled with sterile water. Tubes I & III also contained pieces of the water plant, *Elodea*.



Question 10

The four tubes were each kept at the same temperature. At the end of two hours, the oxygen content of each tube was measured.

Which one of the following gives the tubes in the expected order of oxygen concentration from highest to lowest?

- A II & IV equal, III, I
- B I, II & IV equal, III
- C III, I, II & IV equal
- D III, II & IV equal, I

Question 11

The spongy mesophyll layer of a leaf

- A is the main region of photosynthesis.
- B regulates water loss via the action of stomata.
- C is a major site of transpiration due to the large surface area of exposed cells.
- D secretes a cuticle to reduce water loss.

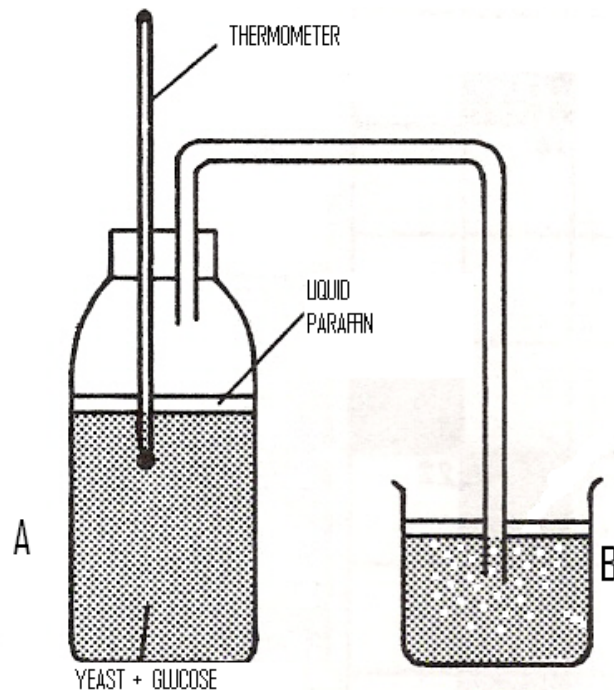
Question 12

Most living cells contain compounds capable of their own destruction. However, these compounds normally do not destroy the cell itself. This can most likely be explained by the fact that they

- A act only on compounds not found in the cell.
- B become chemically active only when the cell is aged or dead.
- C are contained within organelles.
- D perform other functions within the cell.

The information below refers to Questions 13 and 14.

The apparatus shown below was used to investigate anaerobic respiration in yeast.



Question 13

It would be reasonable to expect the temperature of flask A to

- A stay the same.
- B increase.
- C decrease.
- D be cooler than flask B.

Question 14

It would be reasonable to expect the gas bubbling through B to be

- A oxygen.
- B carbon dioxide.
- C nitrogen.
- D hydrogen.

Question 15

Ribosomes

- A are found only in eukaryotic cells.
- B are the site of tissue degradation.
- C are the site of polypeptide synthesis.
- D are the site of synthesis of pyruvate.

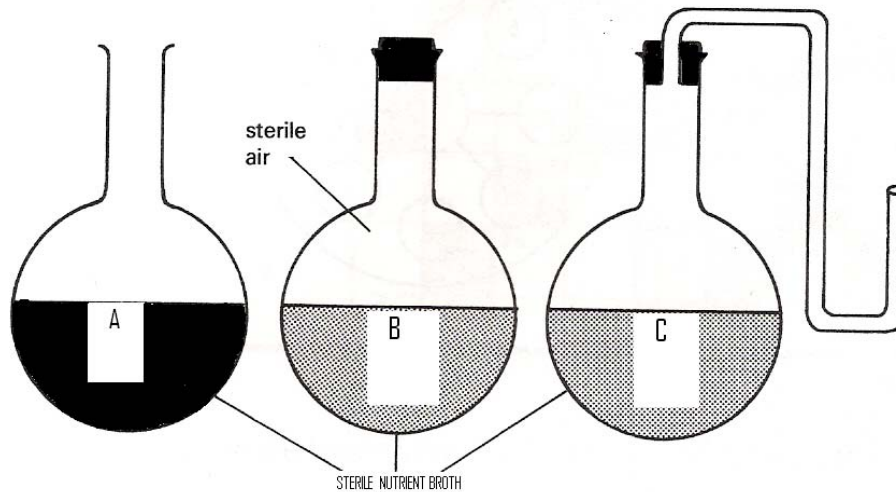
Question 16

The concentration of a particular antibody to a disease was measured over a period of time in an individual. It was noted that the initial level of antibody was high, but no antibodies were detected after a period of months.

It would be reasonable to conclude that

- A the individual was an adult who at the start of the test had just been vaccinated against the disease.
- B the individual was an adult who at the start of the test had just been exposed to the disease for the very first time.
- C the individual was a newborn baby whose mother had been vaccinated against the disease.
- D the individual was a newborn baby whose mother had been injected with antibodies to the disease 12 months prior to the pregnancy.

The following shows one of Louis Pasteur's experiments set up to show microbes as agents of decay.



His results showed only vessel A contained decay.

Question 17

A valid conclusion to his experiment would be that:

- A contamination by micro-organisms is caused, not by exposure to air, but by micro-organisms in the air.
- B contamination by micro-organisms is caused only by exposure to air and not by micro-organisms in the air.
- C contamination by micro-organisms is not caused by exposure to air or by micro-organisms in the air.
- D contamination by micro-organisms is caused not by micro-organisms in the air, but by exposure to sterile air.

Question 18

Receptors are specialised cells which

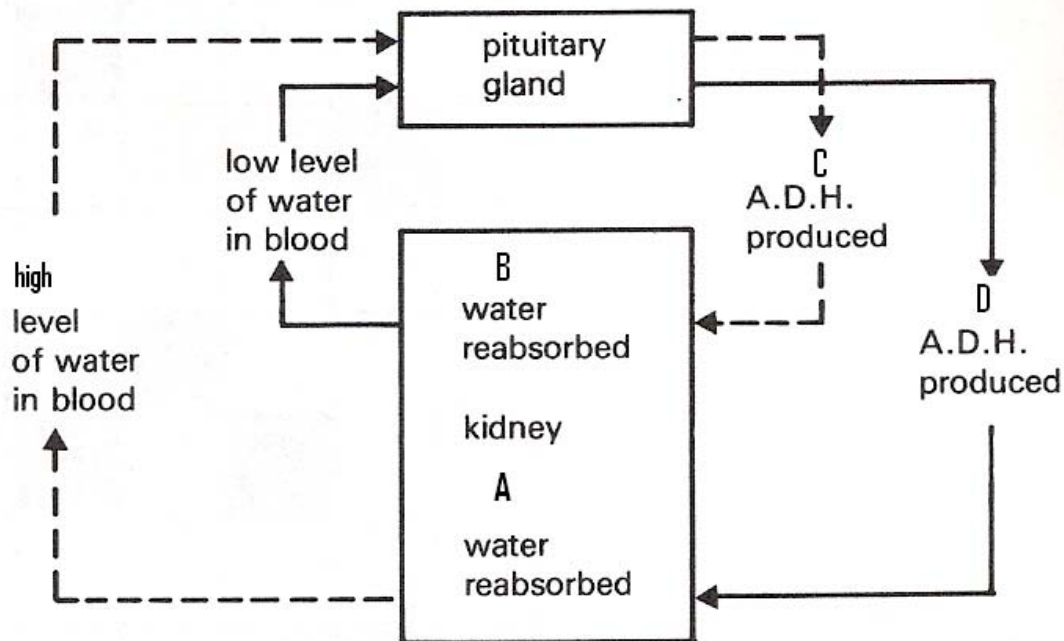
- A only detect external stimuli.
- B only detect chemical changes within the body.
- C are mainly glands or muscles.
- D detect changes to both the internal and external environment.

Question 19

The majority of carbon dioxide is carried in the blood in the form of

- A bicarbonate ions in the plasma.
- B a haemoglobin molecule.
- C dissolved carbon dioxide molecules in the plasma.
- D crassulacean acid in the plasma.

A student prepared the following diagram as a study aid to show how water balance is maintained in mammals. However, at key points, the student left the word 'more' or 'less' out.



Question 20

In order from A to D what is the correct sequence for the missing words?

- A More, more, less, more.
- B More, less, less, more.
- C More, less, more, less.
- D Less, more, more, less.

Question 21

An individual has been inoculated with a particular antigen. Four weeks later, the inoculation is repeated.

It would be reasonably expected that after the second inoculation, antibodies specific to the antigen

- A are produced more slowly and in smaller quantities than after the first.
- B are produced quicker and in smaller quantities than after the first.
- C are produced quicker and in greater quantities than after the first.
- D are not produced at all as the antigen is recognised as non-threatening.

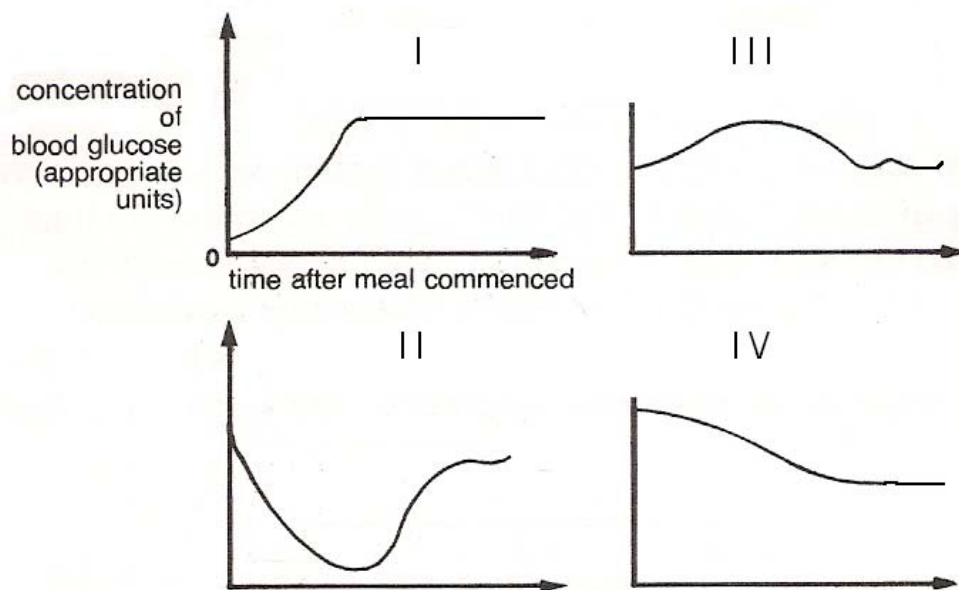
Question 22

In parasitic lifecycles, the primary host is

- A infected by the sexually reproductive form of the parasite.
- B also called the intermediate host.
- C capable of being infected by only one type of parasite.
- D generally smaller than the parasite in question.

Question 23

Of the following graphs, which one most probably describes the concentration of glucose in a person's blood after a large meal rich in carbohydrate?



- A Graph I
- B Graph II
- C Graph III
- D Graph IV

Question 24

The following help form part of the body's defences against the invasion of a pathogen - Macrophage, Lysozyme, B Cells, T Helper Cells.

List them in order of exposure to a pathogen.

- A Lysozyme, Macrophage, B Cells, T Helper Cells.
- B Macrophage, B Cells, Lysozyme, T Helper Cells.
- C Lysozyme, Macrophage, T Helper Cells, B Cells.
- D B Cells, Macrophage, Lysozyme, T Helper Cells.

Question 25

What element is not common to proteins, carbohydrates, nucleic acids and lipids?

- A Carbon (C).
- B Nitrogen (N).
- C Oxygen (O).
- D Hydrogen (H).

SECTION B – SHORT ANSWER QUESTIONS

Instructions for Section B

Answer this section in **pen**.

Answer all questions in the spaces provided.

Question 1

Cassava is a root crop grown extensively in Africa and South-East Asia and is a key source of carbohydrate. It does however have one major problem. The roots and leaves of poorly processed cassava plants contain a substance that when eaten can trigger the production of cyanide. This substance is linamarin, a type of cyanogenic glucoside.

Correct processing methods ensure that the cyanogen content in cassava plants will be within an acceptable range. However, these techniques release the toxin into the atmosphere.

- a. What are two ways a person may suffer the effects of cyanide poisoning associated with cassava?

i. _____

ii. _____

2 marks

Leaves contain more linamarin than do the plant roots, and scientists believe that linamarin is transported from the leaves to the roots early in a plants life

- b. Design an experiment to test the hypothesis that linamarin is transported from the leaves to the roots.

3 marks

Cyanide is very poisonous because it binds to an enzyme – cytochrome oxidase – and stops its action in respiration.

- c. Write a balanced general equation for the process of aerobic respiration.

2 marks







- d. Give a reason as to why plants such as cassava may produce linamarin?

1 mark

Total 8 marks

Question 2

Plant growth and function is under the control of many different groups of hormones. The table below depicts the effect of one group of plant hormones on plant shoots:

	Treatment	Results
 direction of light	 shoot intact	 bending
 direction of light	 tip removed	 no bending

a. What type of tropism is shown above?

_____ 1 mark

b. Name the hormone responsible for this tropism and describe how it can cause the above results.

3 marks

Many plant-related tales and remedies, passed down from generation to generation, are widely believed today. For instance, science now offers a plausible explanation for the old saying “one bad apple will spoil the whole lot.”

c. What plant hormone is the basis of this observation?

_____ 1 mark

d. Explain how this hormone is responsible for this type of event?

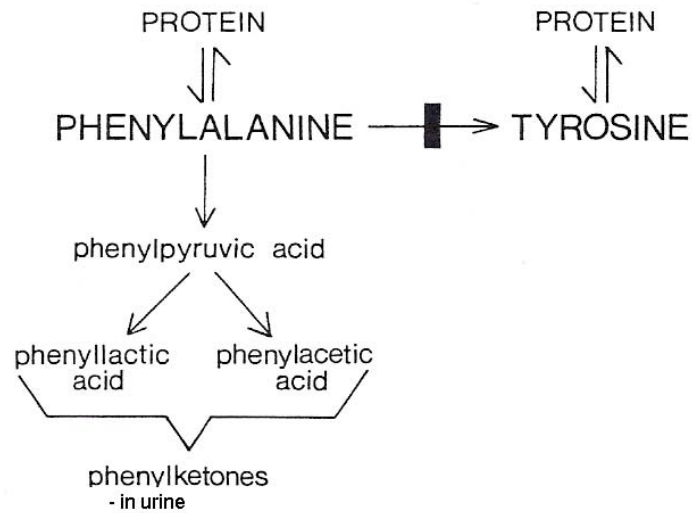
2 marks

Total 7 marks

Question 3

PHENYLKETONURIA

A defect in the enzyme that normally converts the amino acid phenylalanine, to tyrosine, leads to a condition known as phenylketonuria (PKU). As a consequence of this blocked metabolic pathway, part of which is shown below, irreversible mental retardation can occur in the developing child due to toxic accumulations of abnormal metabolites of phenylalanine in the brain.



- a. It has been noted that this disorder only develops in children after birth. Explain.

2 marks

- b. State a possible source of phenylalanine to a child other than that supplied in the diet?

1 mark

- c. How might early detection of PKU be possible in a developing infant?

2 marks

Total 5 marks

Question 4

Complex molecules, located on the surface of cells, enable the body to recognise self from non-self.

The presence or absence of two antigens (A & B) on the surface of red blood cells determines an individual's ABO blood group. Two types of antibodies (anti-A & anti-B) can respond to the presence of these antigens. Depending on an individual's blood type, the antigens may occur on their own, together, or may be completely absent from a red blood cell membrane.

ABO blood groups are determined by using anti-A & anti-B antibodies. A drop of an individual's blood is added to a drop of anti-A and then to a drop of anti-B antibodies. If the blood cells possess antigens which match the antibodies, the cells will stick or clump together. Such a reaction is termed to be positive.

- a. Indicate in the table below the results you would expect from the following combinations of blood types and antibodies:

√ = Positive Result
X = Negative Result

Blood Group	Anti-A added	Anti-B added	Anti-A + Anti-B added
A			
B			
O			
AB			

3 marks

- b. A person of which blood type is often referred to as a universal donor? Explain.

1 + 2 marks

Another blood group category is known as Rhesus Factor (Rh). Individuals are either rhesus positive (Rh+) or rhesus negative (Rh-). This blood group category can present potential problems during pregnancy.

Rh disease of babies is a form of anaemia caused by a mother's antibodies reacting with Rh antigens on the baby's blood cells. Rhesus disease occurs in the Rh positive babies of Rh negative women who have developed Rh antibodies during a previous pregnancy of an Rh positive child. In such cases the mother's antibodies may enter the circulation of the baby and destroy its red blood cells.

- c. Describe how Rh disease could present a problem to a developing foetus.

2 marks

- d. How could the potential risk of Rhesus disease be prevented in later siblings of Rh positive babies to Rh negative mothers?

2 marks

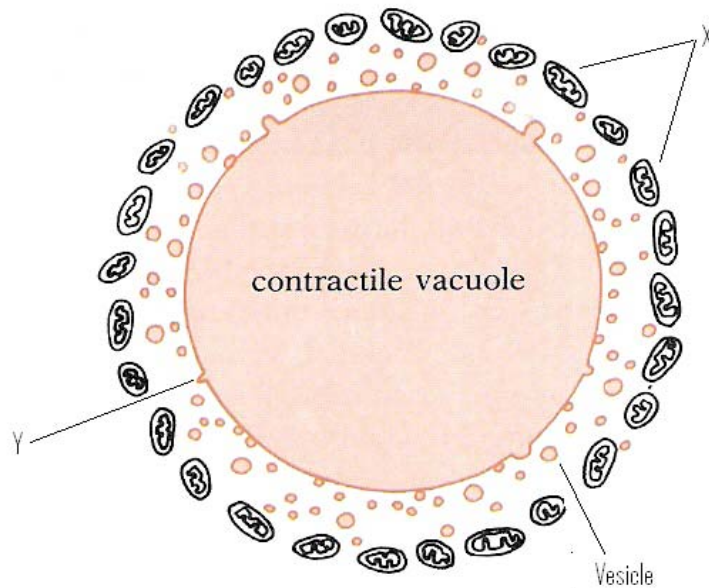
- e. What cells of the mother's immune system allow for the recognition of Rh antigens in subsequent pregnancies of Rh negative mothers with Rh positive babies? Explain their occurrence and function.

1 + 2 marks

Total 13 marks

Question 5

The contractile vacuole is an organelle used by fresh water protists to cope with the continual entry of water into the cell.



- a. Why does an influx of water present a problem to many fresh water protists, but not to plants living in fresh water?

2 marks

Research has shown that the membrane surrounding the contractile vacuole is largely impermeable to water. It is also noted that a layer of tiny vesicles surrounds the vacuole, and that it gains water from the cytosol via these vesicles.

- b. The fluid composition of these vesicles is initially isotonic to the cytosol. What does this mean?

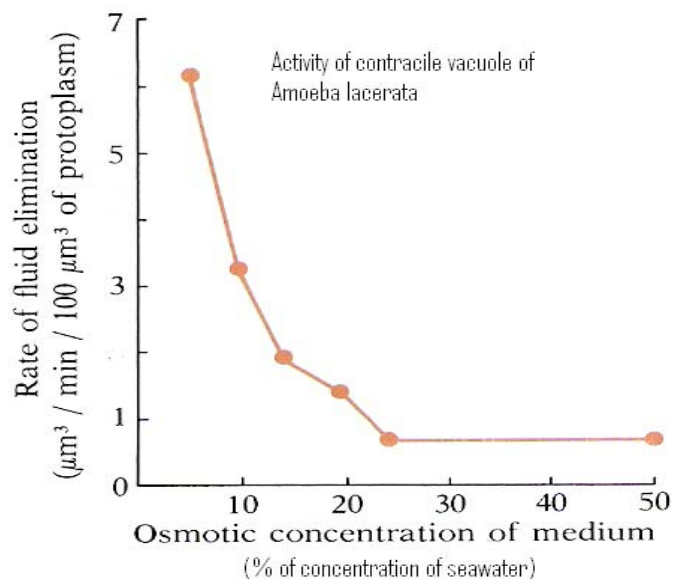
1 mark

It is thought that these vesicles then gradually lose ions to the cytosol, until their osmotic concentration is a third that of the cytosol. The vesicles, now containing more water than fuse (Y in diagram) with the vacuole, which gradually expands.

The vesicles lose ions to the cytosol with the aid of a surrounding layer of organelles (see X).

- c. What is the name of these organelles? How do they aid in the transport of ions out of the vesicles?

2 marks



- d. What does the above graph indicate about the activity of the contractile vacuole? Explain why this is so.

1 + 2 marks

Total 8 marks

Question 6

Sodium is a vital element required for normal body function. It is lost in sweat and urine and is replaced in the diet. The body has the ability to maintain sodium and water balance in a wide range of conditions, thus ensuring our survival. Ultra-endurance events such as marathons challenge this mechanism.

In hot, humid conditions, a large amount of sweat is lost, which can disturb sodium and water balance. Often, lost sweat (salt and water) is replaced only by ingested water (no salt) resulting in Hyponatremia – a low concentration of salt in the blood.

- a. What term describes the maintenance of a constant internal environment?

_____ 1 mark

- b. How does sweating benefit the body? Explain how this is achieved.

_____ 1 + 2 marks

- c. What consequence would high levels of humidity have on the effect discussed in 'b.' above?

_____ 1 mark

Often, the symptoms of hyponatremia are confused with those of dehydration.

- d. State the type of cells (and their location) which detect changes to blood solute concentrations.

_____ 1 mark

- e. Detail a feedback mechanism targeting the kidney of the body in response to lack of water.

2 marks

- f. Is the above an example of a positive or negative feedback mechanism? Explain.

1 mark

Total 9 marks

END OF PAPER

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