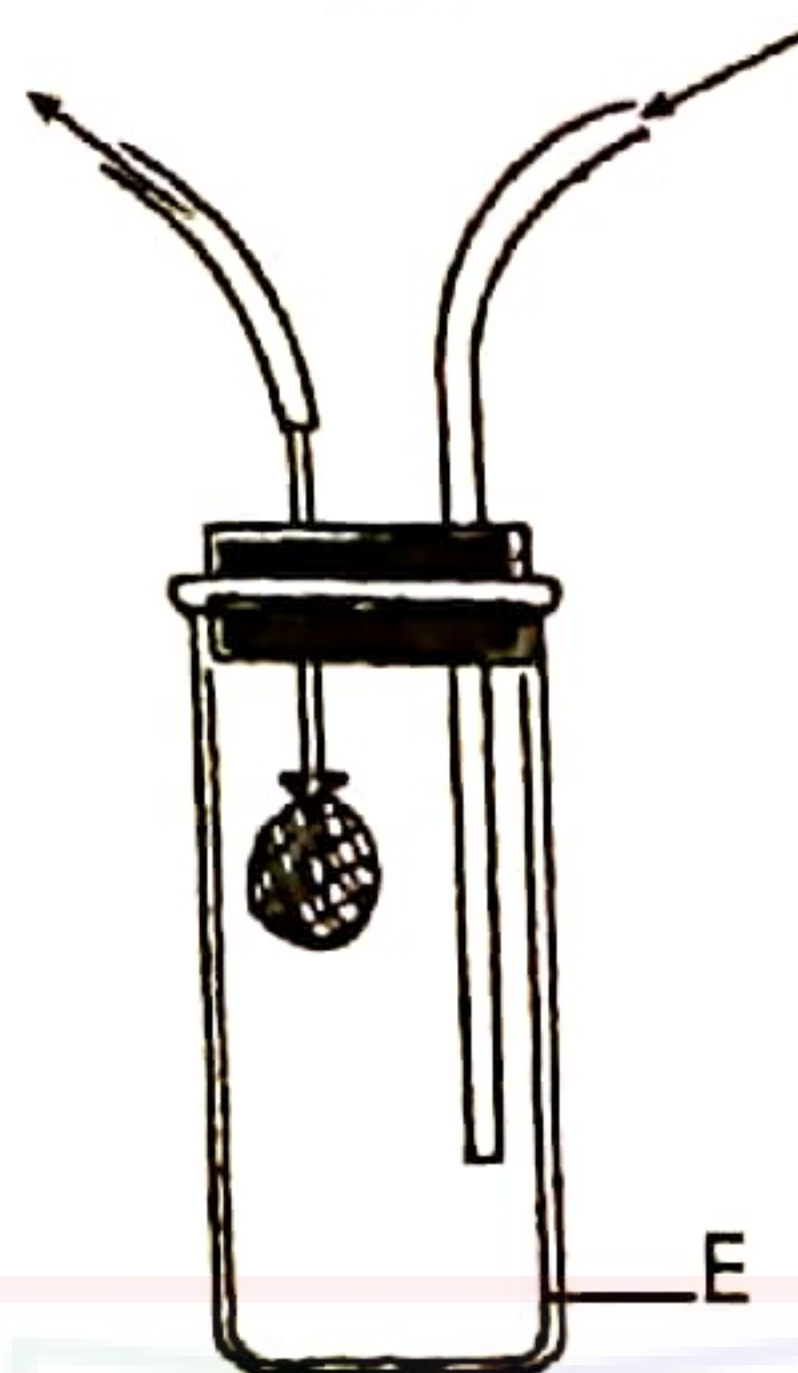


Answer **all** the questions in the spaces provided.

- 1 The following diagram shows an apparatus used in ecological studies.



- (a) Name the apparatus. (1 mark)

Pooter / Aspirator;

- (b) Why is glass preferred in the making of the part labelled E? (1 mark)

Glass is transparent / to (clearly) see / observe / study the observable (1 mark)
Glass is transparent therefore allow light and the specimen / can be seen / viewed (features / characteristics of the collected specimen);

- 2 (a) Name the Kingdom whose members are all microscopic. (1 mark)

Monera

- (b) State two diseases caused by organisms belonging to the Kingdom named in 2(a). (2 marks)

Whooping cough / Pertussis; Cholera; Tuberculosis; Dental caries; Gonorrhoea; Anthrax; E
Typhoid; Syphilis; Tetanus; Meningitis; Pneumonia; Diph

- 3 During a microscopy practical, the following materials were provided:

- a temporary mount of an onion epidermis
- a transparent ruler

- (a) State the aim of the experiment. (1 mark)

To estimate the size/diameter of a cell/cells (visible in the field of view);

(b) Explain how the aim stated in 3(a) can be achieved.

(3 marks)

- Using the ruler determine the size of field of view (in mm);
 - Count the (no. of) cells (that fits) across the field of view;
 - Calculate / work out the diameter / size of one cell (in mm) /
- $\text{Diameter / size of one cell} = \frac{\text{Diameter of field of view (in mm)}}{\text{No. of cells}}$

4 The following diagram represents a specialized animal cell.



(a) Identify the cell.

(1 mark)

Sperm (cell) / spermatozoon;

(b) (i) Name the cell organelle that is likely to be found in abundance in the part labelled F.

(1 mark)

Mitochondrion; Accept Mitochondria

(ii) Explain the answer in 4(b)(i).

(2 marks)

Mitochondria enable the cell to respire hence provide energy; which aid in propulsion (of the cell);

5

Name two components of blood that are absent in the tissue fluid.

(2 marks)

Red blood cell / Erythrocytes;
Some white blood cell / Leucocytes / non-phagocytic leucocytes;
Plasma protein; Platelets / thrombocytes;

6

Name the structures in plants through which the processes of transpiration and guttation occur.

Process

Structures in plants where it occurs

a) Transpiration

Stomata / stomas; cuticle(s); lenticel(s);

(1 mark)

b) Guttation

Hydathodes;

(1 mark)



Name two Classes of the Phylum Arthropoda that have a cephalothorax.

(2 marks)

Crustacea;

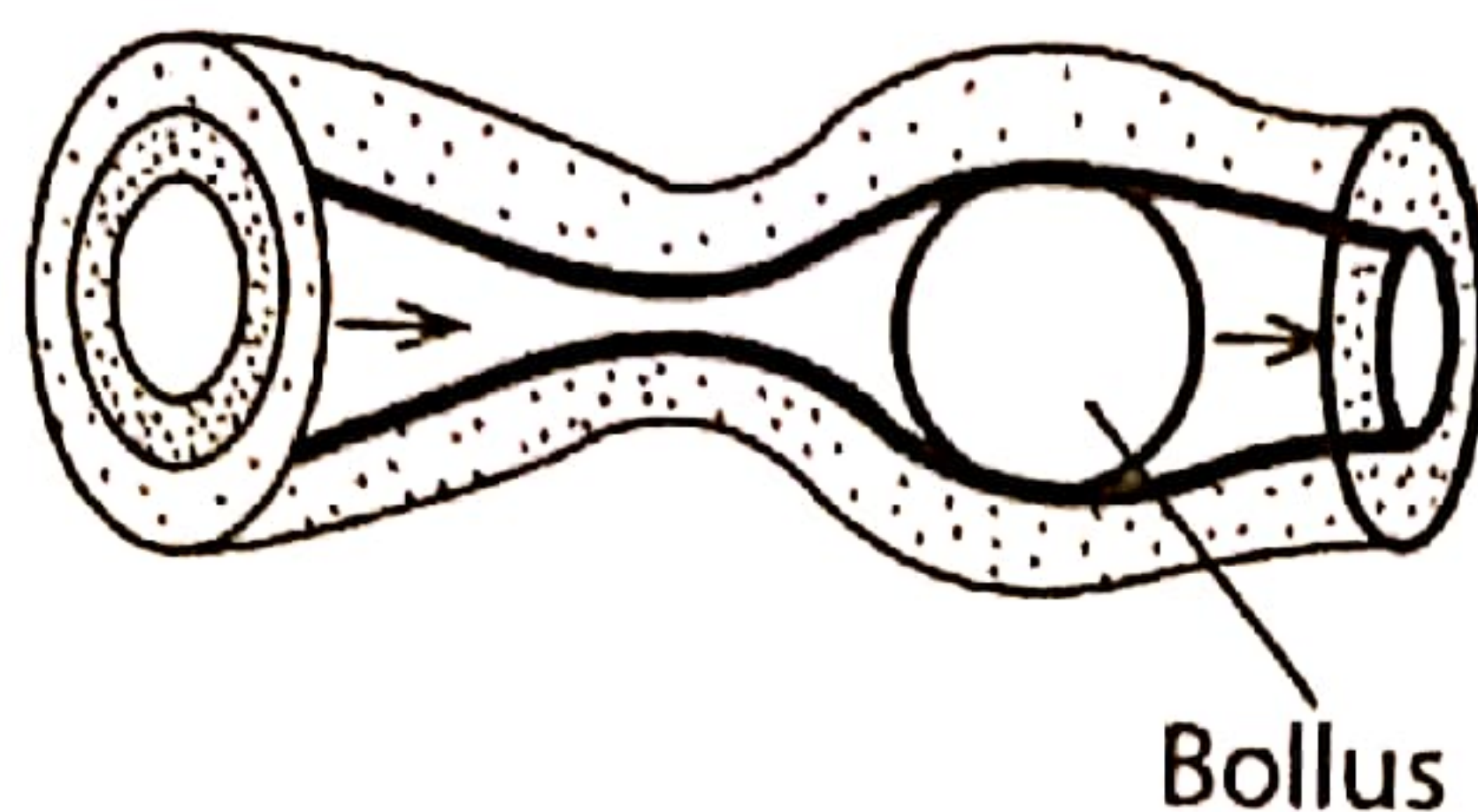
Arachnida;

(a) Name the source of hydrochloric acid in the human alimentary canal.

(1 mark)

Gastric glands / parietal cells / oxyntic cells;

(b) The following diagram shows a process along the mammalian digestive system.



(i) Name the process.

(1 mark)

peristalsis;

(ii) State two roles of the process in digestion.

(2 marks)

• Facilitate move of food (along the digestive tract/system);

• Enables mixing of food (down the alimentary canal);

• Enables large intestine / colon / rectum to absorb water from undigested food;

Name one blood disorder caused by gene mutation.

(1 mark)

✓ Sickle cell anaemia / sickle cell trait; ✓ Haemophilia;

Name the stage in meiosis where each of the following processes occur:

(a) formation of spindle fibres;

(1 mark)

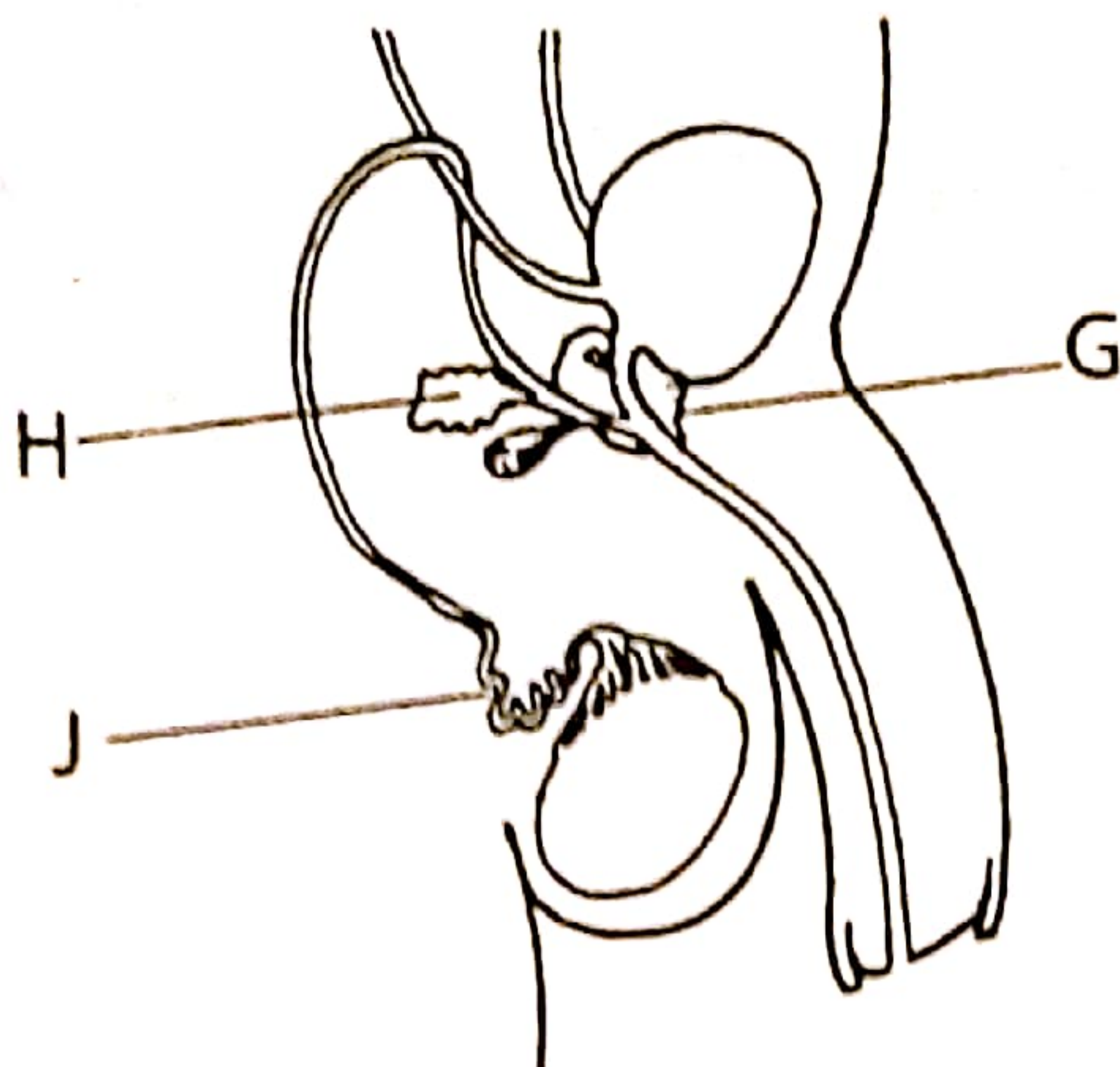
Metaphase I / Metaphase II;

(b) disappearance of nucleolus.

(1 mark)

Prophase I / Prophase II;

- 11 The following diagram represents part of the human male reproductive system.



- (a) Name the part labelled G. (1 mark)

Prostate gland;

- (b) State one function of the structure labelled H. (1 mark)

Provides an alkaline fluid to neutralize the acidic vaginal fluids / Provides nourishment to the spermatozoa / Aid in sperm move;

- (c) How is the structure labelled J adapted to its function? (2 marks)

Highly coiled;

To increase the S.A for the storage of the sperms;

long does not spill but 2nd stores.

- 12 How do the following structural modifications in plants minimize the rate of water loss?

- (a) Leaf folding. (1 mark)

Reduces the S.A exposed (to light / temperature);

- (b) Sunken stomata. (1 mark)

Water vapour is deposited in pits reducing diff / S.A
Water vapour / moisture accumulates / is deposited in the pits / sunken stomata reducing the diff. gradient / saturation deficit (between internal air spaces & the pits / inside and outside the leaf);

- State two reasons for the absence of complex excretory organs in plants. (2 marks)

Wastes form slowly / little wastes accumulate (due to the inactivity of the plants);

Some waste materials are recycled / reutilized;

The wastes are less toxic;

Some are stored in plant parts that are later shed off / stored in dead tissues;

- 14 State the significance of each of the following characteristics in mammalian gaseous exchange structures and surfaces. (1 mark)

(a) Presence of rings of cartilage in the trachea.

(1 mark)

Keep the trachea/wind pipe open / prevent from collapsing (for gaseous exchange);

(1 mark)

(b) Numerous blood capillaries lining the lungs.

Increase the s-a for diffusion of (respiratory) gases / increase diffusion gradient / rapid transport of (respiratory) gases / creates steep concentration gradient;

15

(a) What is the most appropriate method of estimating the population of black ants in a school playing field? (1 mark)

Quadrat / capture-recapture method;

(b) Why are shorter food chains advantageous in an ecosystem? (2 marks)

(2 marks)

- They have fewer/less trophic / feeding levels; therefore,
- (more) energy is conserved / minimize / reduce loss of energy;

16

(a) Using an example, define convergent evolution. (2 marks)

(2 marks)

is the modification of structures of organisms of different ancestral / embryonic origin to perform similar functions; eg wings of insects & birds / wings of bats / insects (modified for flying) / eyes of mammals & cephalopods / flippers of whales & fins of fish;

(b) Explain how natural selection is advantageous to living organisms. (3 marks)

It serves to identify organisms with desirable traits / adaptations that help them survive and reproduce; eliminate organisms with harmful traits (that are less likely to survive and reproduce); pass on beneficial genetic traits / mutations to subsequent generations through

17

(a) (i) Name the blood vessel that carries oxygenated blood from the heart to the rest of the body tissues. (1 mark)

(1 mark)

Aorta;

(ii) State the role of tricuspid valve in the mammalian heart. (1 mark)

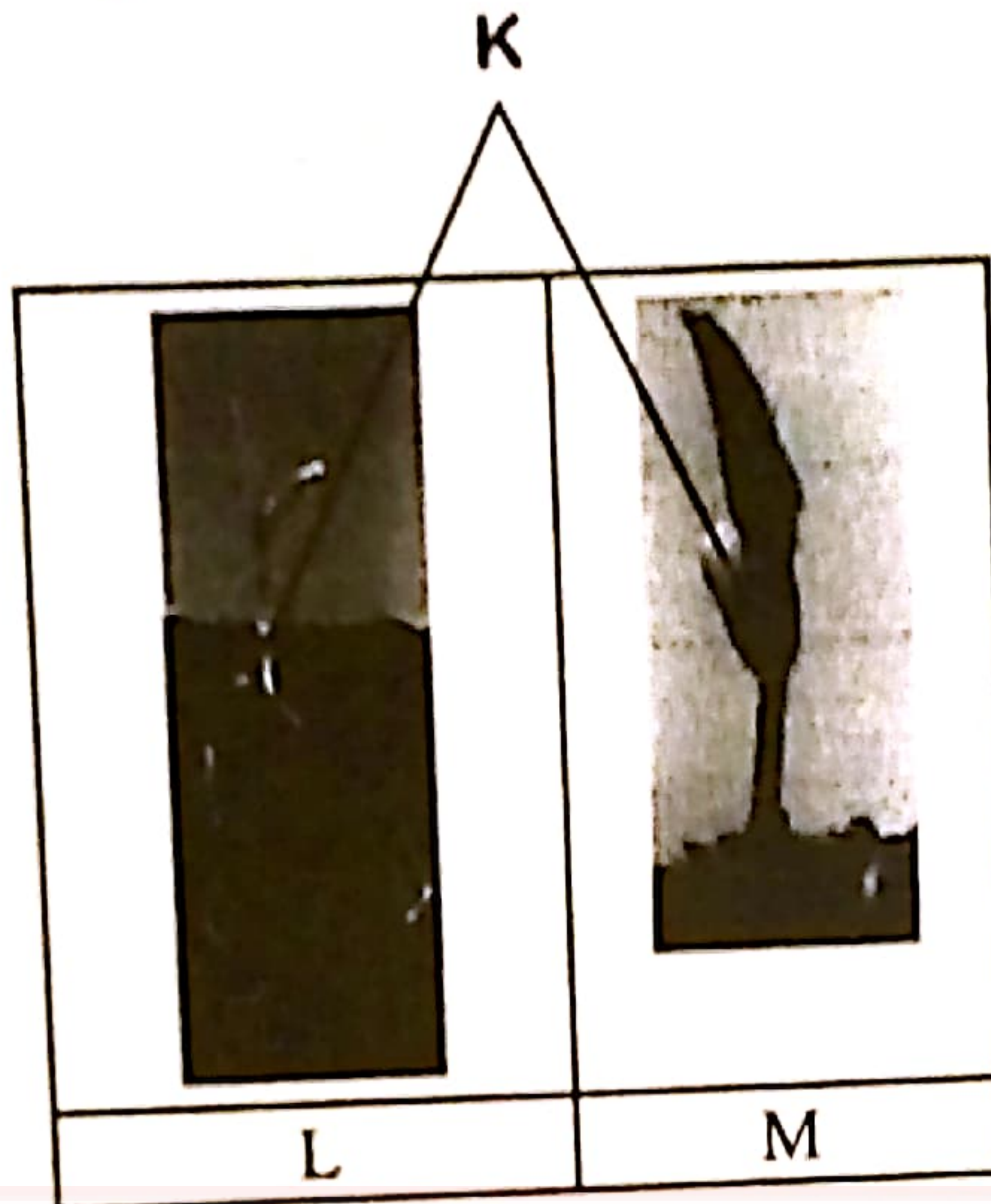
(1 mark)

Prevent back-flow into the right atrium (when ventricle muscles contract) / allow flow of blood from right atrium into the right ventricle;

2 points not tied
Antigens in plasma

- (b) Why are people with blood group O referred to as universal donors? (2 marks)
- Blood group O lack antigens / A B; therefore,
 - No agglutination (with recipient antibodies);

18 The following diagram shows germination in two different seedlings labelled L and M.



- (i) Identify the type of germination shown in seedling L. (1 mark)

Hypogeal;

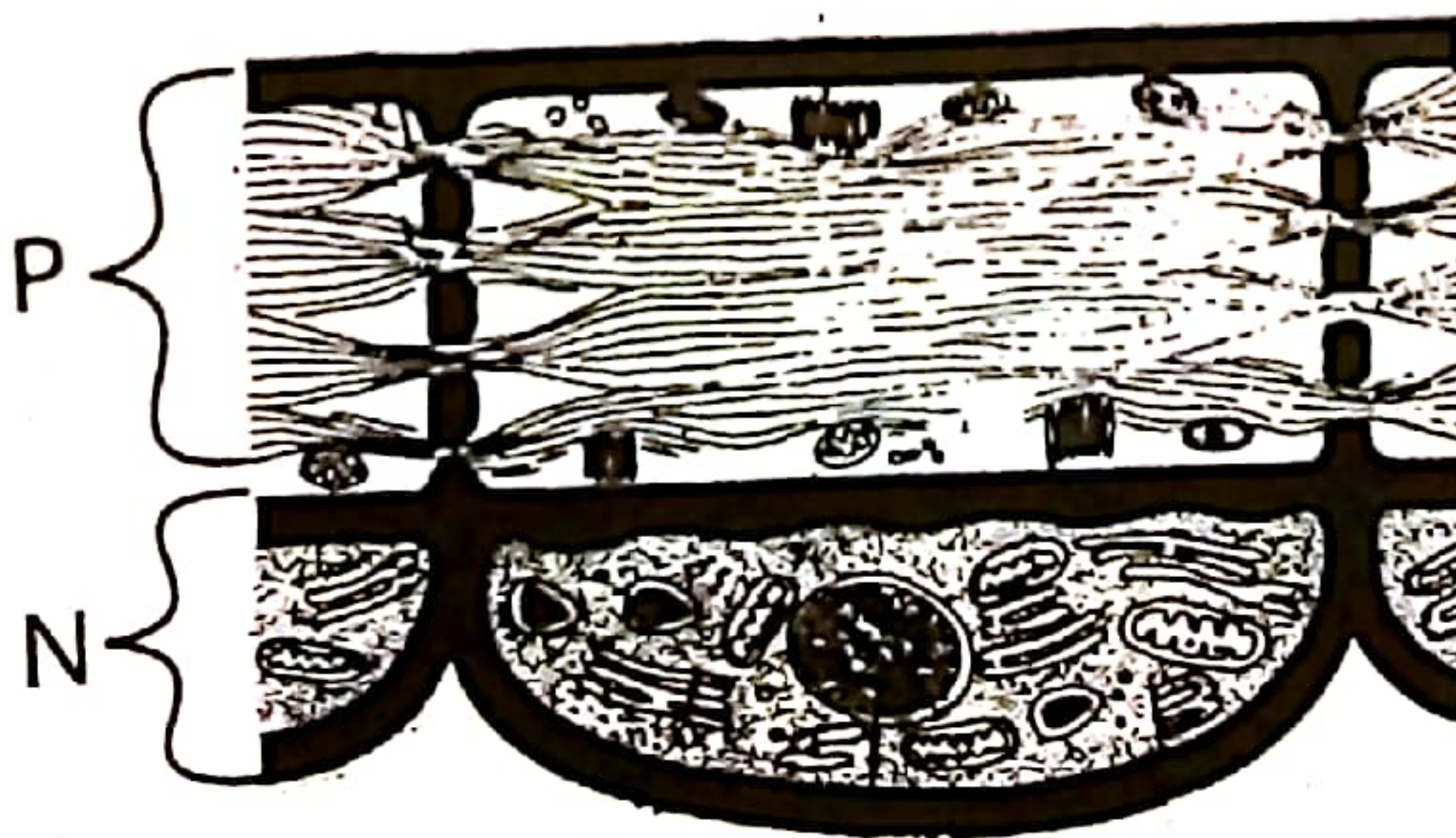
- (ii) Give a reason for the answer in 18(a)(i). (1 mark)

• The cotyledon remains below the soil surface / underground.

- (b) State one common function of the parts labelled K in seedlings L and M. (1 mark)

• storage of food / contain digestive enzymes that breakdown / hydrolyse (stored) food (needed for germination);

19 The following diagram represents a longitudinal section through a phloem tissue.



8

(a) Account for the high concentration of mitochondria in the part labelled N. (3 marks)

- To synthesize the energy;
- Needed for the active transportation / translocation;
- of food substances in / out of the sieve tubes;

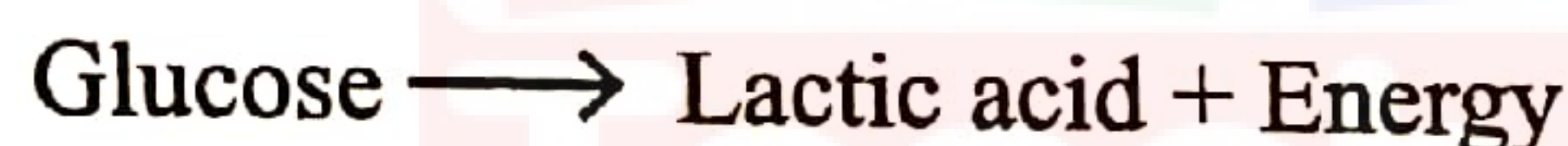
mark the 1st function no more

(b) State one structural adaptation of the part labelled P to its function. (2 marks)

- Close to companion cells; for easy access of energy / nutrients;
- Filled with fine cytoplasmic filaments; for streaming of food from one sieve tube to another;
- Has organelles placed against the wall; increase SA for packaging of filaments;
- Has (sieve plates) sieve pores; to allow continuous flow of materials;

20

The following word equation represents a metabolic reaction taking place in an animal tissue.



(a) State the condition under which the reaction occurs. (1 mark)

In the absence of oxygen / insufficient supply of oxygen / anaerobic condition / Anaerobic respiration / Anaerobiosis;

(b) How does the size of an animal affect the rate of respiration? (3 marks)

Small bodied animals have larger SA:VR; exposed to higher / faster heat loss; hence higher rate of respiration to compensate for the lost heat; (and vice versa);

21

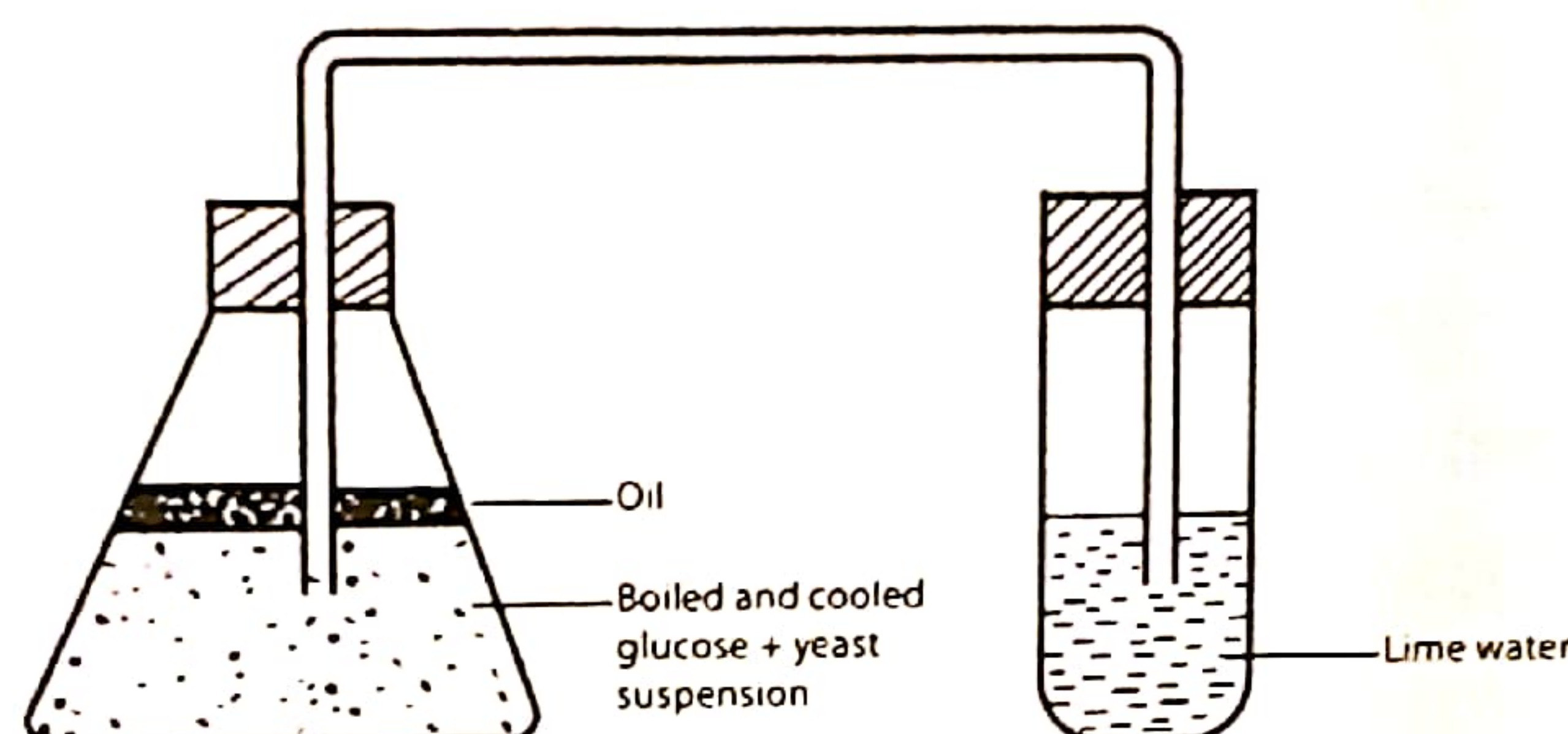
(a) How can sexual reproduction in organisms lead to the evolution of new species? (3 marks)

- Gametes (with different genes/alleles) from different parents;
- Fuse to form a new offspring;
- The varied offspring pass the desirable / advantageous traits to subsequent generations;
- Which may finally result in the establishment of new species over a long period of time; DWTTE

(b) State the role of continental drift in the evolution of organisms. (2 marks)

- Isolation/separation of organisms (with the same genetic composition) from the same origin to different environmental conditions; lead to the development of adaptive traits (for successful survival in the new habitat);

22 The following diagram represents an experimental set-up used to investigate a certain biological process.



(a) (i) Identify the biological process that can be investigated using the set-up. (1 mark)

Anaerobic / Fermentation / Anaerobiosis;

(ii) Give a reason for the answer in 22(a)(i). (1 mark)

Boiling removes / drives out air / oxygen / the layer of oil prevents the entry / supply of oxygen / air;

Write a word equation illustrating the reaction taking place in the experiment.

Glucose $\rightarrow$ Alcohol / ethanol + Carbon(IV) oxide + energy (ATP) (1 mark)

Suggest a modification on the set-up that would increase the rate of reaction in the conical flask. (1 mark)

- Increasing temperature to optimum (to activate the respiratory enzyme);
- Increasing the concentration of yeast / Glucose;

Accept - Warming - introduce heat

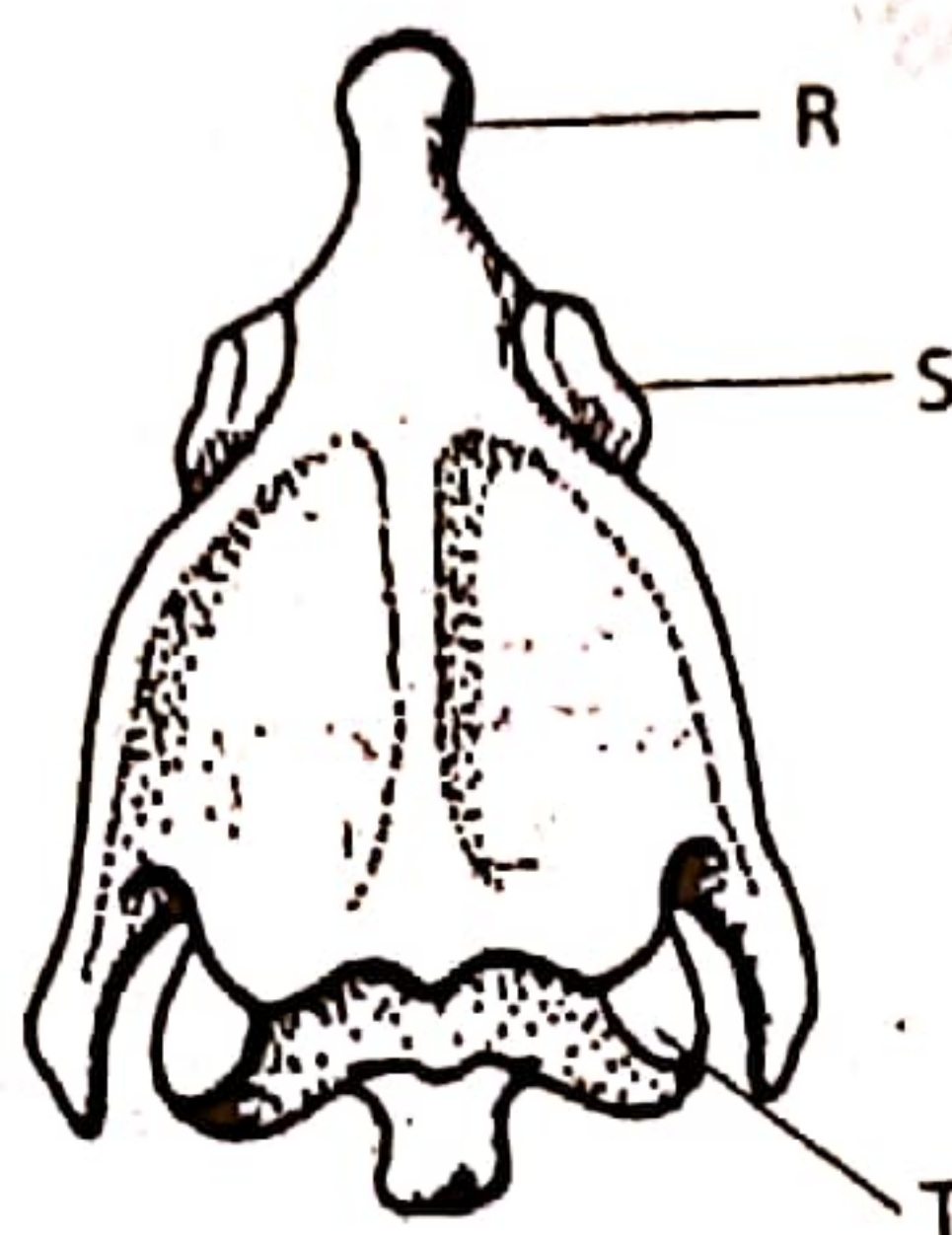
(d) Why is it necessary to cool glucose before adding yeast in the conical flask? (1 mark)

- To avoid killing the yeast cells / denature the enzymes in the yeast / Zymase;



23

The following diagram represents a bone obtained from a mammalian axial skeleton.



(a) Identify the:

(1 mark)

(i) bone;

Axis;

(ii) part labelled R.

(1 mark)

Odontoid process / peg;

(b) Name the bones that articulate at the points labelled S and T.

(1 mark)

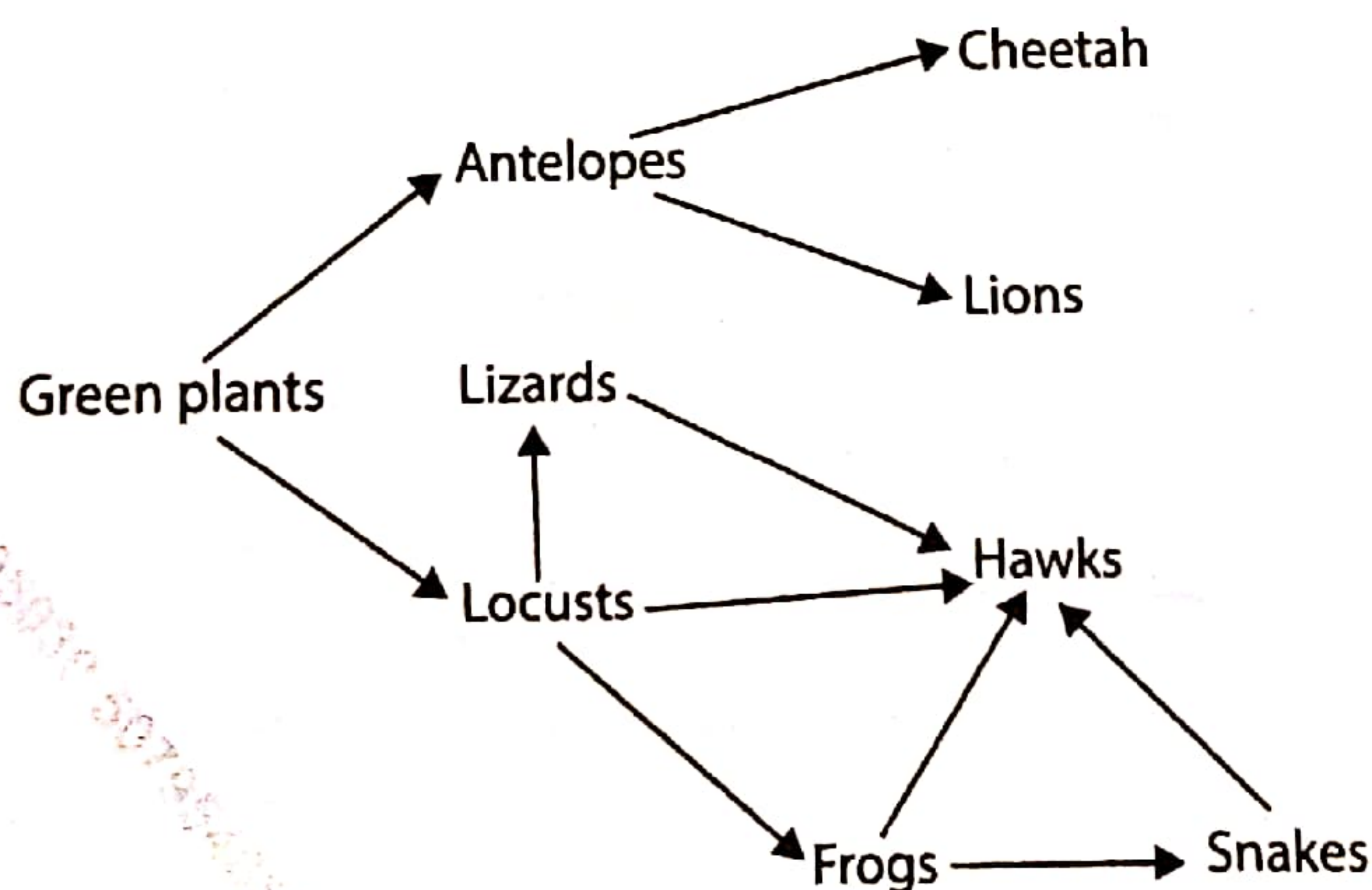
S Atlas

T (other) Cervical vertebra / 3rd cervical vertebra;

(1 mark)

24

The following food web shows a feeding relationship found in a certain ecosystem.



(a) From the food web, identify the:

(i) organism with the lowest biomass;

(1 mark)

Hawks;

(ii) trophic level occupied by lizards.

(1 mark)

..... • Secondary consumer / 3rd trophic level;

(b) Name the type of feeding relationship between the:

(i) lion and the cheetah;

(1 mark)

..... • (Interspecific) Competition; (Interspecific competition)

(ii) cheetah and the antelopes.

(1 mark)

..... • Predation / Predator-prey relationship

(c) Explain the role bacteria would play in this ecosystem.

(2 marks)

..... • Decomposition; for releasing / recycling of (more) nutrients in the ecosystem / cleaning the environment;

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