1. Nov/2019/Paper_41/No.7

The Venus fly trap, *Dionaea muscipula*, is a carnivorous plant, native to wetlands of the East Coast of the USA. Mineral ions from decayed organisms are often washed away in these wetlands.

Fig. 7.1 shows a Venus fly trap leaf.

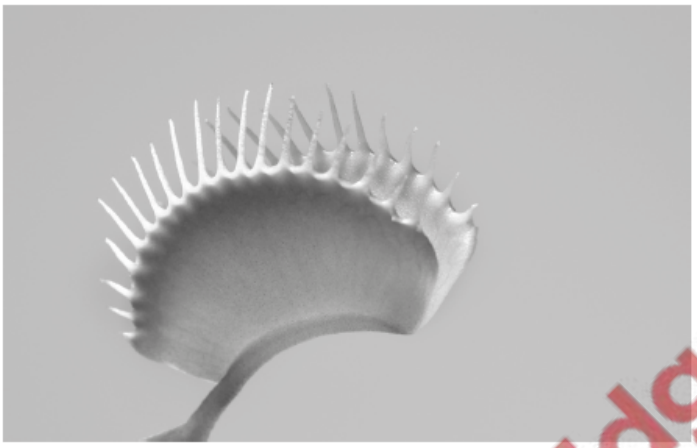

Fig. 7.1

(a) Suggest why a Venus fly trap benefits from catching insects in these wetlands.

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..... [2]

(b) **(i)** The leaves of the Venus fly trap will close if stimulated by an insect.

State which part of the leaf detects the stimulus.

..... [1]

(ii) Explain how the plant does not waste energy by closing when it does not need to, such as when a large drop of rain touches the receptor.

.....

..... [1]

(c) Fig. 7.2 is a graph of an action potential in a human neurone.

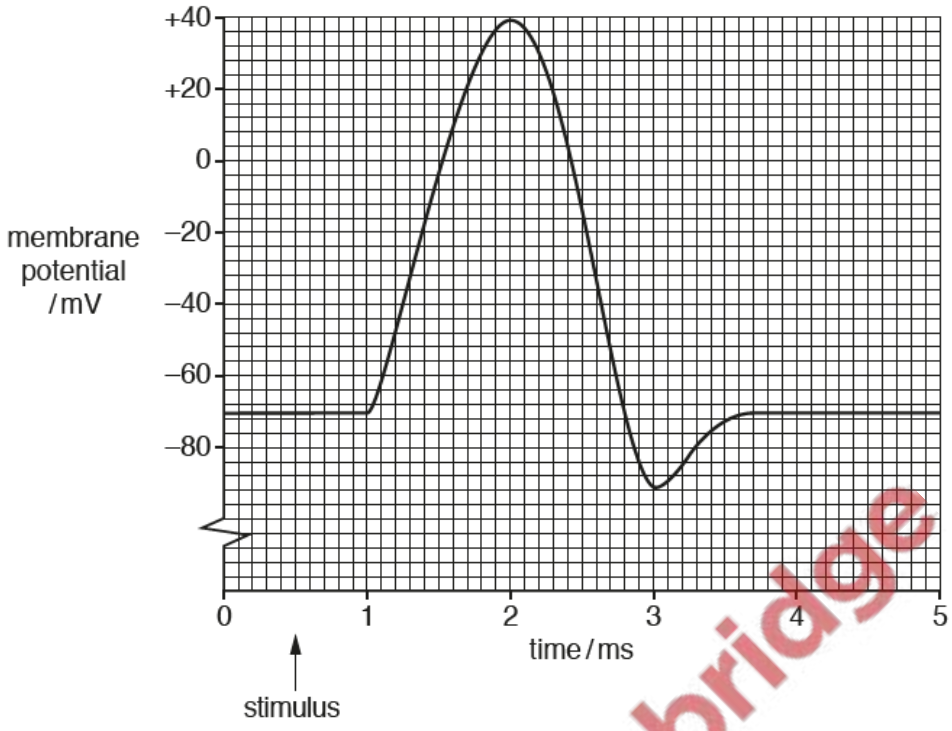

Fig. 7.2

Fig. 7.3 is a graph of an action potential in leaf cells of a Venus fly trap.

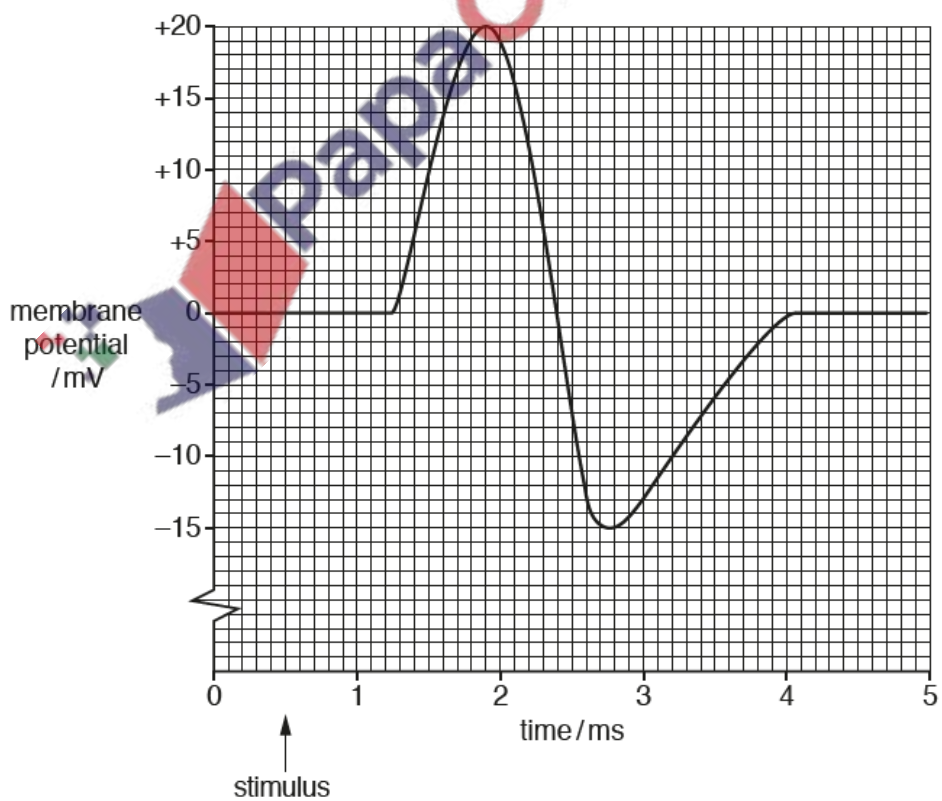

Fig. 7.3

With reference to Fig. 7.2 and Fig. 7.3, describe how the action potential of the Venus fly trap differs from that of a human.

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..... [3]

(d) Describe how the production of action potentials in the leaf cells of the Venus fly trap can result in the leaves closing and trapping an insect.

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..... [5]

[Total: 12]

2. Nov/2019/Paper_42/No.7

The Venus fly trap, *Dionaea muscipula*, is a carnivorous plant, native to wetlands of the East Coast of the USA. Mineral ions from decayed organisms are often washed away in these wetlands.

Fig. 7.1 shows a Venus fly trap leaf.

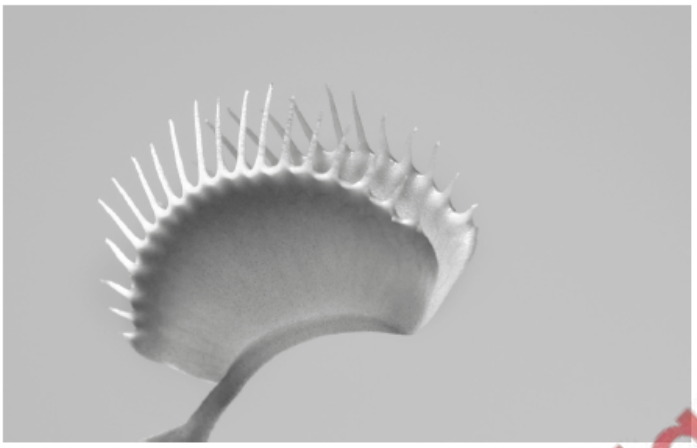

Fig. 7.1

(a) Suggest why a Venus fly trap benefits from catching insects in these wetlands.

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.....

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..... [2]

(b) **(i)** The leaves of the Venus fly trap will close if stimulated by an insect.

State which part of the leaf detects the stimulus.

..... [1]

(ii) Explain how the plant does not waste energy by closing when it does not need to, such as when a large drop of rain touches the receptor.

.....

..... [1]

(c) Fig. 7.2 is a graph of an action potential in a human neurone.

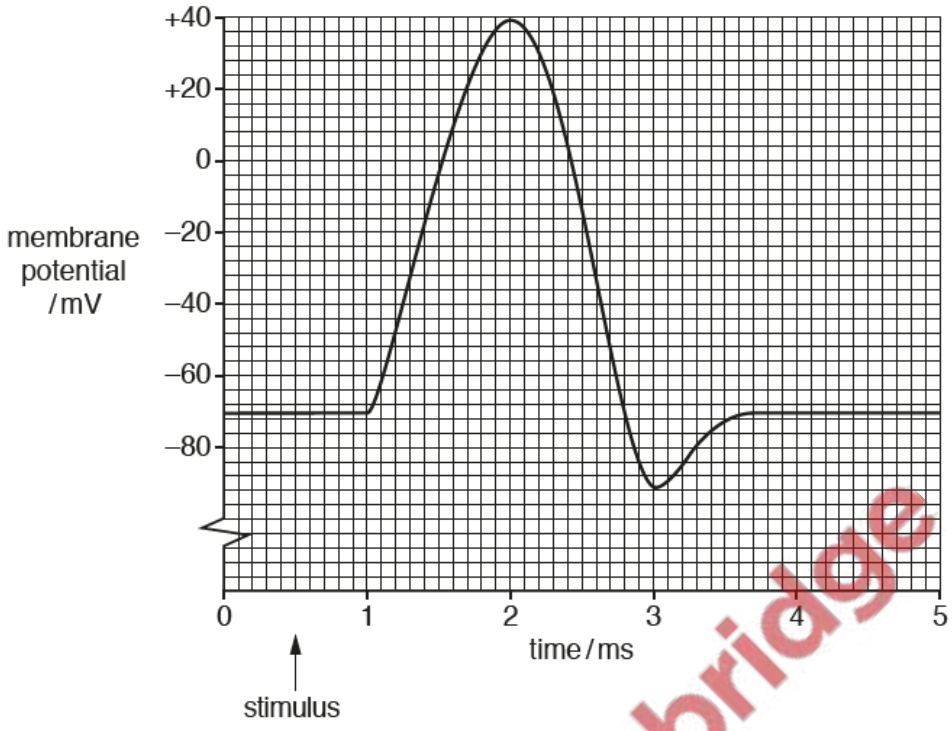

Fig. 7.2

Fig. 7.3 is a graph of an action potential in leaf cells of a Venus fly trap.

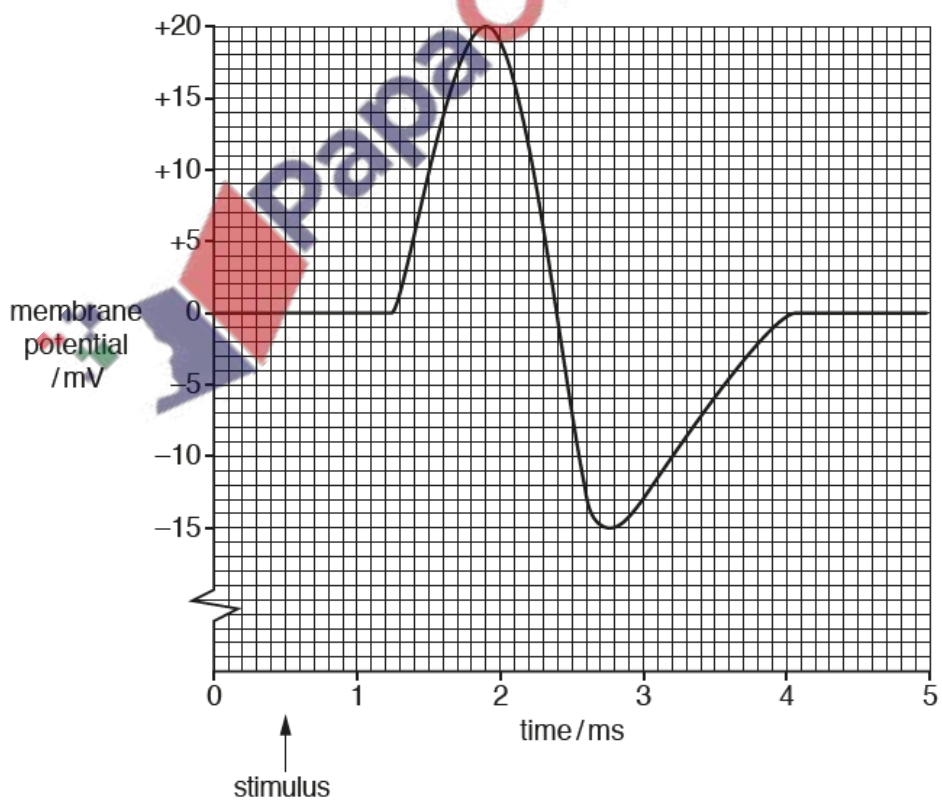

Fig. 7.3

With reference to Fig. 7.2 and Fig. 7.3, describe how the action potential of the Venus fly trap differs from that of a human.

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..... [3]

(d) Describe how the production of action potentials in the leaf cells of the Venus fly trap can result in the leaves closing and trapping an insect.

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..... [5]

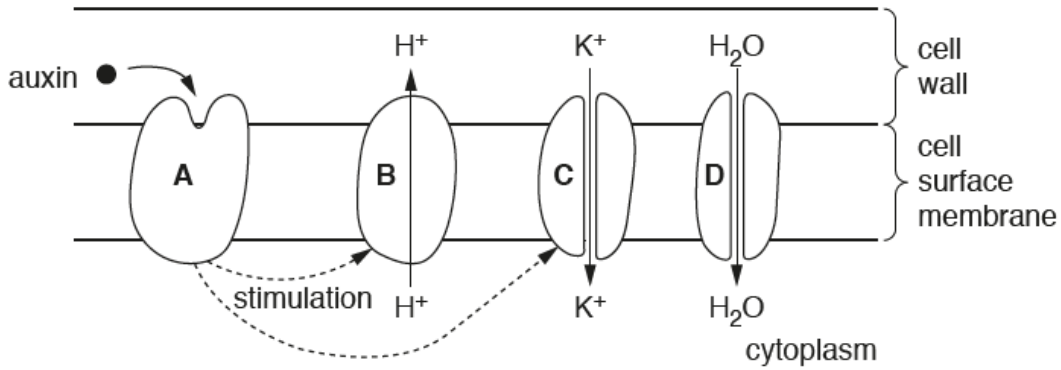
[Total: 12]

3. Nov/2019/Paper_43/No.10(a)

(a) Describe the roles of the neuromuscular junction, transverse system tubules (T-tubules) and the sarcoplasmic reticulum in stimulating contraction in striated muscle. [7]

4. June/2019/Paper_41/No.1

(a) Fig. 1.1 shows part of a cell in a growing region of a plant.



not to scale

Fig. 1.1

(i) State the **type** of protein represented by **A**.

..... [1]

(ii) Proteins **B**, **C** and **D** are transport proteins.

Identify proteins **B**, **C** and **D**.

B .....

C .....

D .....

[3]

(b) Describe the effects on the cell wall of many hydrogen ions moving into the cell wall.

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..... [3]

(c) Explain the consequences of an influx of potassium ions into the cell.

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..... [2]

[Total: 9]

5. June/2019/Paper_41/No.10(a)

(a) Explain how a cholinergic synapse functions. [7]

6. June/2019/Paper_42/No.1

(a) Fig. 1.1 is an electron micrograph showing a cross-section of a myelinated neurone.

Fig. 1.1

Name **A** and **B**.

A .....

B .....

[2]

(b) Explain what is meant by saltatory conduction **and** describe its effect on the transmission of a nerve impulse.

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..... [3]

(c) A type of sea snail, *Conus purpurascens*, produces a toxin that blocks calcium ion channels in the presynaptic knob of a cholinergic synapse. The presence of this toxin results in no action potentials in the postsynaptic neurone.

Explain why the presence of this toxin results in **no** action potentials in the postsynaptic neurone.

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..... [5]

[Total: 10]

7. June/2019/Paper_42/No.10(a)

(a) Outline the biological basis of contraceptive pills containing oestrogen and progesterone. [8]

8. June/2019/Paper_43/No.1

(a) Fig. 1.1 shows a cholinergic synapse.

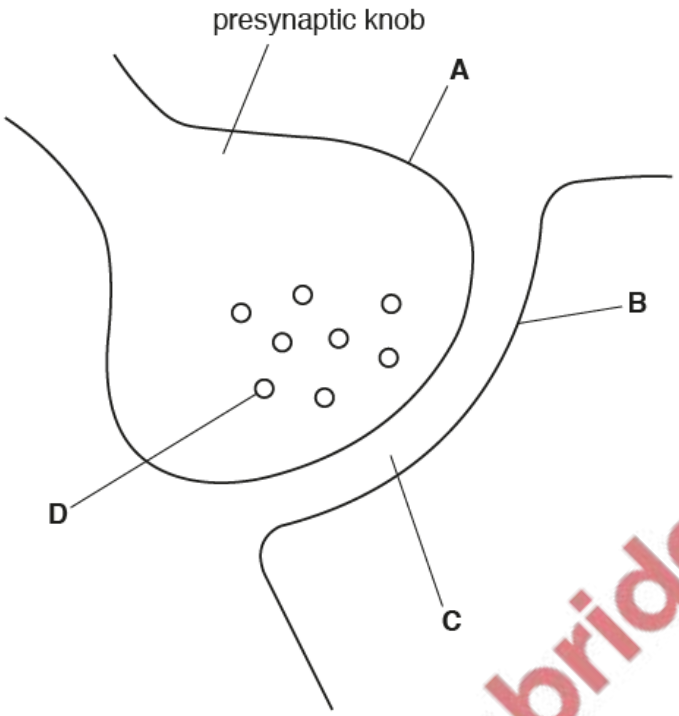

Fig. 1.1

Complete Table 1.1, using the letters **A**, **B**, **C** or **D** from Fig. 1.1, to show the location of compounds and structures associated with a cholinergic synapse.

You may use **A**, **B**, **C** and **D** once, more than once, or not at all.

Table 1.1

compound or structure	location
acetylcholine	.....
voltage-gated channel	.....
receptor protein	.....
acetylcholinesterase	.....

[4]

(b) Explain what is meant by a voltage-gated channel.

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..... [2]

(c) Explain the role of acetylcholinesterase in a synapse.

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..... [3]

(d) Outline the roles of synapses in the nervous system.

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..... [2]

[Total: 11]

9. Feb/2019/Paper_42/No.7

(a) Isolated mitochondria were used to investigate respiration.

- Mitochondria were extracted from respiring mammalian cells and incubated in a buffer solution.
- Pyruvate and inorganic phosphate (Pi) were added at time zero.
- ADP was added one minute later.
- The oxygen concentration of the buffer solution containing mitochondria was monitored throughout the investigation.

The results of the investigation are shown in Fig. 7.1.

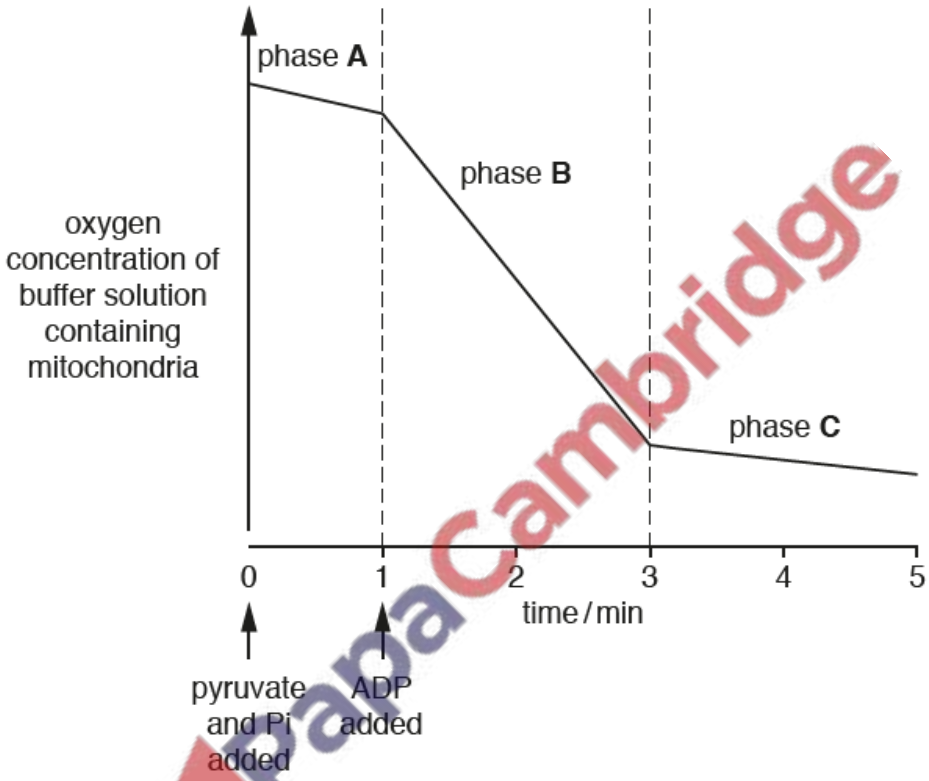

Fig. 7.1

(i) Suggest why the line of the graph in Fig. 7.1 is steeper during phase **B** than during phase **A**.

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..... [3]

(ii) Suggest why the line of the graph starts to level out in phase **C**.

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..... [1]

(b) Some plants, such as rice, grow with their roots submerged in water.

Fig. 7.2 shows a group of rice plants.

Fig. 7.2

Explain how rice is adapted to grow with its roots submerged in water.

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..... [5]

10. Feb/2019/Paper_42/No.9(a, b)

(a) Describe the sliding filament model of muscular contraction. [7]

(b) Explain the roles of the hormones FSH, LH, oestrogen and progesterone in the human menstrual cycle. [8]

[Total: 15]