

School

Candidate's Name (PLEASE PRINT)



WINCHESTER
COLLEGE

Election

Tuesday 25 April 2017

Science

BIOLOGY

THEORY SECTION

Recommended time: 20 minutes

Write all your answers in the spaces on this question paper

- 1 Figure 1.1 shows the fruiting bodies of the Fly agaric fungus (*Amanita muscaria*). This fungus is well known for its bright colours and toxicity.



Figure 1.1 Fruiting bodies of Fly agaric¹

- (a) Fungi such as the Fly agaric gain nutrients, such as carbohydrates, by releasing digestive enzymes into surrounding organic matter and then absorbing the products. Explain how this is different from the way in which a plant obtains carbohydrates.

.....

.....

.....

(b) Fungi, like humans, require carbohydrates, fats and proteins. List one use of each nutrient in your body.

(i) Carbohydrates

..... [1]

(ii) Fats

..... [1]

(iii) Proteins

..... [1]

(c) Suggest how the nucleus of a Fly agaric cell could be responsible for the red colour of the fungus.

.....
.....
.....
.....
.....
.....

[3]

(d) Some fungi grow in close association with the roots of plants. An experiment was carried out to determine the effect of root fungi on tree growth. Figure 1.2 shows the results of the experiment.

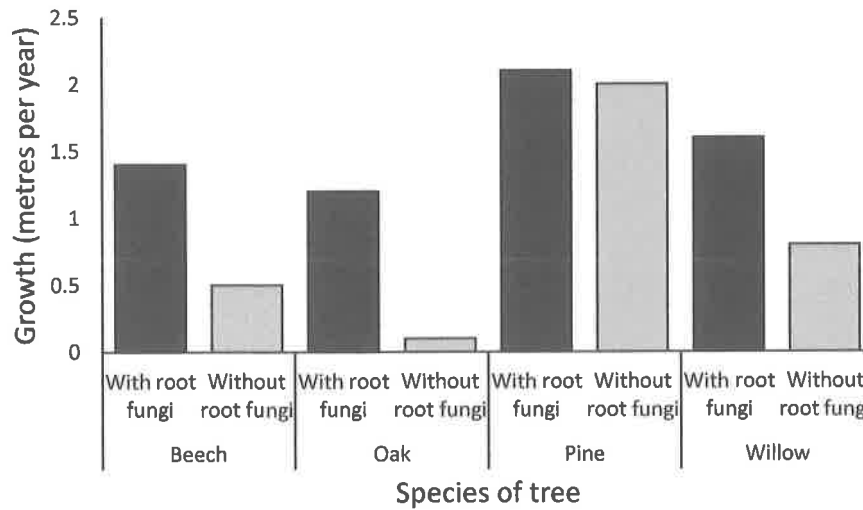


Figure 1.2 The effect of root fungi on tree growth²

Describe the conclusions you draw from this graph and provide biological explanations as to why these trends are observed.

.....

.....

.....

.....

.....

.....

(e) The Fly agaric is known for its toxicity, which gives it protection from animals that would otherwise eat it. Apart from the action of predators, discuss what other factors might limit the population of the Fly agaric.

.....

.....

.....

.....

.....

[2]

- 2 Figure 2 shows the caterpillar of the Buff-tip moth (*Phalera bucephala*), which is known for its close resemblance to a broken twig.



Figure 2 Caterpillar of the Buff-tip moth³

- (a) State the group of animals to which moths and butterflies belong.

..... [1]

- (b) The camouflage of the Buff-tip is an example of an adaptation. Explain what you understand by the term adaptation.

.....
.....
..... [1]

(c) Fully explain the process by which the caterpillar of the Buff-tip came to resemble a twig.

.....

.....

.....

.....

.....

[4]

(d) The adults of many moths feed on the nectar produced by flowering plants. In doing so they help to pollinate the plants. Explain the process of pollination.

.....

.....

.....

.....

[2]

(e) (i) When an adult moth flies, its muscles need a constant supply of energy. Name the organelles within a muscle cell that are responsible for supplying this energy.

.....

[1]

(ii) In living cells, energy is released through the process of respiration. Write a balanced symbol equation for aerobic respiration.

..... [1]

(f) Moths do not have lungs. Instead they have a tracheal system, which consists of a series of tubes connecting internal tissues to atmospheric air via holes in the body wall known as spiracles. Suggest what features this system might have to enable efficient gaseous exchange.

.....
.....
.....
..... [2]

End of this Section

Images

1. Fruiting bodies of Fly agaric. Image taken by E. Donovan, Winchester College.
2. The effect of root fungi on tree growth. Image produced by E. Donovan, Winchester College.
3. Caterpillar of the Buff-tip moth. Image taken by E. Donovan, Winchester College.