GCSE Biology A (Gateway)

J247/02 B4-B6 and B7 Foundation (Foundation Tier)

Question Set 9

1 Some students are investigating lichens.
Lichens are often studied because they are sensitive to pollution.

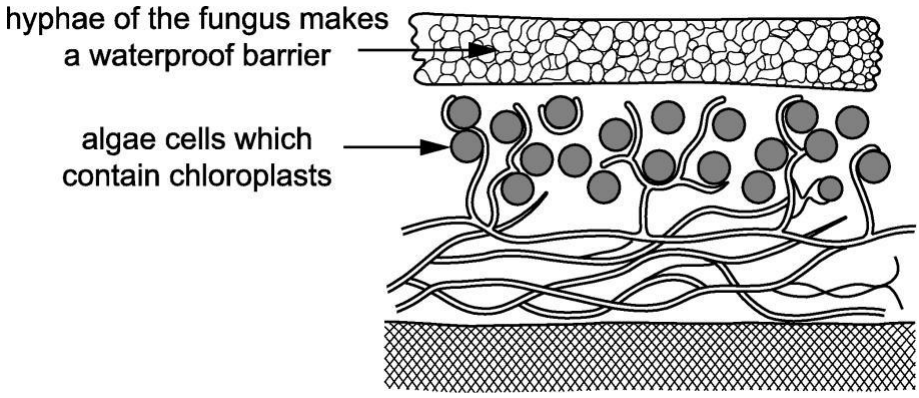
(a) Lichens are made up of two different organisms: fungus and algae.

Fungi and algae gain from living together.

What biological name is given to a relationship where both organisms gain? **[1]**

Mutualism

(b) The students find a diagram of a lichen.



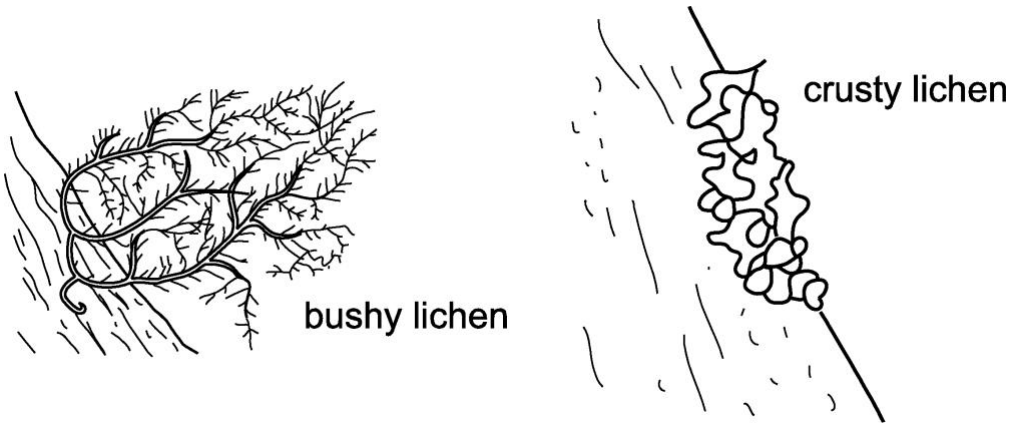
Using the diagram, suggest what the algae and fungus each gain from their relationship.

Algae ..... Algae gain protection .....

Fungus ..... Fungi gain sugars .....

[2]

(c) Lichens are sensitive to pollution because they take up chemicals from the air. The diagram shows a 'bushy' species of lichen and a 'crusty' species of lichen.



Bushy lichens are usually more sensitive to pollution than crusty lichens. Use the diagrams to suggest why. **[1]**

They have a larger surface area so take up more pollutants.

(d) The students decide to use lichens to try and work out how polluted their school grounds are.

They read about a scale called the Lichen Diversity Value (LDV). LDV is worked out in this way.

Step 1 Choose four trees in the area.

Step 2 Hold a quadrat on the north side of the trunk of one tree.

Step 3 Count the total number of all the lichens in the quadrat.

Step 4 Repeat **steps 1–3** on the east, south and west side of the tree.

Step 5 repeat **steps 1–4** for each tree. **[1]**

(i) Suggest how the students could choose the four trees in **step 1**.

Use of random numbers.

(ii) The students record their results in a table.

	Total number of lichens found in each quadrat			
Tree number	**North**	**East**	**South**	**West**
1	3	11	18	7
2	4	12	17	8
3	5	10	15	12
4	4	15	12	9
mean	4.0	12.0	15.5	.....

The LDV is found by adding together the four mean values.

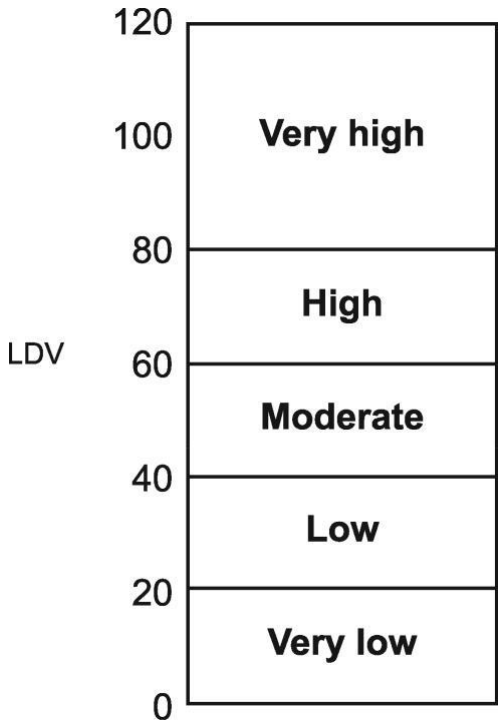
The students calculate the mean number of lichens on the north, east and south sides of the trees.

- Calculate the mean value for the west side and add it to the table.
- Calculate the LDV.

$\frac{7+8+12+9}{4} = 9$

$9 + 4 + 12 + 15.5 = 40.5$ LDV = 40.5 **[2]**

(iii) This scale shows the type of diversity shown by the LDV.



What does the LDV show about the amount of diversity in the school grounds?

There is moderate pollution which is just above low. **[2]**

(iv) LDV is calculated by counting all the lichens present.

The students want to make a better assessment of pollution.

What else about the lichens could the students look for?

They should identify the species of lichens present in their sample and find out how sensitive to pollution these lichens are. If the lichens are mostly pollution sensitive species we know that means pollution levels are low. **[3]**

Total Marks for Question Set 9: 12

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