**What do cells need?**

**Animal cells**

The table shows some things that animals need to stay alive.

**To talk about in your group**

Where would you put the cards to complete the table?

|  |  |  |
| --- | --- | --- |
| **What animals need** | **Why animals need it** | **What animal cells do with it** |
| Air |  |  |
| Water |  |  |
| Food |  |  |

**What do cells need?**

**Plant cells**

The table shows some things that plants need to stay alive.

**To talk about in your group**

Where would you put the cards to complete the table?

|  |  |  |
| --- | --- | --- |
| **What plants need** | **Why plants need it** | **What plant cells do with it** |
| Air |  |  |
|  |  |
| Water |  |  |
|  |  |
| Light |  |  |
| Nutrients from soil |  |  |

*Biology> Big idea BCL: The cellular basis of life > Topic BCL2: From cells to organ systems > Key concept BCL2.1: Working together – cells, tissues and organ systems*

|  |
| --- |
| **Response activity** |
| **What do cells need?** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | The cells of multicellular organisms are organised into tissues, organs and organ systems that work together to keep the cells alive. |
| Observable learning outcome: | Explain what cells must be supplied with in order to stay alive. |
| Activity type: | Discussion |
| Key words: | cell, requirements, life, living, respiration, nutrition, growth |

This activity can help develop students’ understanding by addressing the sticking-points revealed by the following diagnostic question:

* Diagnostic question: Cell needs

**What does the research say?**

At age 5-11 children are likely to learn that living things depend on their environment to survive; that animals need a plentiful supply of air, water, and nutrients from food to keep them alive; and that plants need air, water and light (to make their own food), plus nutrients from soil (Department for Education, 2013).

Children’s understanding of the concept of what is alive is linked to their growing understanding of biological processes (Carey, 1985).

It is still common for science teaching up to around age 11 to define life using a set of characteristic processes of living organisms: movement, growth, nutrition, excretion, respiration, reproduction, sensitivity and sometimes also control (maintaining a constant internal environment). Rote learning and recall of these can lead to superficial learning without understanding (Brumby, 1982). From the age of 11 this model of life (which comprises criteria based only on processes) can be supplemented with the idea that organisms are made of cells, as a further criterion (and in this case a structural one) for deciding what is or once was alive (Skinner, 2011).

**Ways to use this activity**

This card-sort activity helps to develop students’ ability to link their knowledge of the requirements of living organisms to the characteristic processes of life and to the idea that organisms are made up of cells.

Students should be provided with cards printed and cut out from the final page of these teacher notes. The animal card sort and the plant card sort should be completed separately. The cards should be provided in small boxes or tubs, one containing the cards for the “Why animals/plants need it” column, and the other containing the cards for the “What animal/plant cells do with it” column.

Students should complete this activity in pairs or small groups. The focus of the activity should be on group discussion to reach a consensus on where to place the cards. It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each group will often give you insights into how your students are thinking.

The quality of the discussions can be improved with a careful selection of groups; or by allocating specific roles to students in the each group. For example, you may choose to select a student with strong prior knowledge as a scribe, and forbid them from contributing any of their own answers. They may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

After their discussions, each group should be prepared to report the key points of their discussion to another group, or to the class.

*Differentiation*

To ease the demand for some students, some parts of the table could be completed for them by pasting in the answers before printing the worksheets or showing the presentation.

**Equipment**

For each group:

* cards (printed and cut out from the end of this document)
* small boxes/tubs into which cards have been sorted according to which column of the table they fit into (optional)

**Expected answers**

*Animals*

|  |  |  |
| --- | --- | --- |
| **What animals need** | **Why animals need it** | **What animal cells do with it** |
| Air | As a source of  oxygen. | Animal cells use oxygen for respiration to provide energy for life processes. |
| Water | To store and transport dissolved substances. | Animal cells are filled up with it. |
| Food | For nutrition and respiration. | Animal cells use it to get energy, and to make new cells and materials. |

*Plants*

|  |  |  |
| --- | --- | --- |
| **What plants need** | **Why plants need it** | **What plant cells do with it** |
| Air | As a source of  carbon dioxide. | Plant cells use it in a chemical reaction to make food. |
| As a source of  oxygen. | Plant cells use it for respiration to provide energy for life processes. |
| Water | To store and transport dissolved substances. | Plant cells are filled up with it. |
| For nutrition. | Plant cells use it in a chemical reaction to make food. |
| Light | Plants need to absorb energy. | The energy is used for a chemical reaction in cells that makes food. |
| Nutrients from soil | For nutrition and growth. | Plant cells use nutrients to make new cells and materials for growth. |

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

**References**

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Skinner, N. (2011). Cells and life processes. In Reiss, M. (ed.) *ASE Science Practice: Teaching Secondary Biology.* London, UK: Hodder Education.

**Print and cut out cards for card-sort activity**

*Cards for “Why animals need it” column:*

✁

|  |  |  |
| --- | --- | --- |
| As a source of  oxygen. | To store and transport dissolved substances. | For nutrition and respiration. |

*Cards for “What animal cells do with it” column:*

✁

|  |  |  |
| --- | --- | --- |
| Animal cells use oxygen for respiration to provide energy for life processes. | Animal cells are filled up with it. | Animal cells use it to get energy, and to make new cells and materials. |

*Cards for “Why plants need it” column:*

✁

|  |  |  |
| --- | --- | --- |
| As a source of  carbon dioxide. | As a source of  oxygen. | To store and transport dissolved substances. |
| For nutrition. | Plants need to absorb energy. | For nutrition and growth. |

*Cards for “What plant cells do with it” column:*

✁

|  |  |  |
| --- | --- | --- |
| Plant cells use it in a chemical reaction to make food. | Plant cells use it for respiration to provide energy for life processes. | Plant cells are filled up with it. |
| Plant cells use it in a chemical reaction to make food. | The energy is used for a chemical reaction in cells that makes food. | Plant cells use nutrients to make new cells and materials for growth. |