

Rocks to eat? How we get the elements we need to stay healthy

We are alive and like other living things, we need many chemical elements in order to be healthy. These elements come from minerals in the soil. How might these elements reach us and other living things?

The activity begins with a discussion about food. The pupils know that they have to eat to stay alive.

- Explain that food gives both the energy and the elements they need to stay healthy,
- if they eat meat, then the elements come from animals, which in turn, eat plants,
- plants get the elements from minerals in the soil,
- soil gets the minerals from the rocks beneath,
- so the elements in minerals in rocks go into the soil, are taken up by plants, are eaten by animals and are then eaten by us in either the plants or the meat we eat.

The activity:

- put some pieces of any sort of rock into a plastic container with a lid,
- shake the container hard for 30 seconds,
- take the lid off the container carefully as there may be some dust,
- add about 100ml water to the container and put the lid on,
- cut off the top of a plastic bottle and turn it upside down to use as a funnel,
- put filter paper, or some fine-mesh paper or material, in the funnel; ask one pupil to hold this over a small container (a saucer or equivalent),
- ask another pupil to shake the container hard for a few seconds and then to pour some (but not all) of

the dusty, cloudy water into the funnel.

- when the water has stopped dripping through the funnel, heat the saucer until nearly all the water has evaporated. If there is no heat source, the saucer could be left until evaporation has occurred,
- what can be seen on the saucer?
- meanwhile, add a few drops of ink or food colouring to the cloudy water in the container and put a plant stem into it. It is best to use a plant like celery, but any plant which will take up the colour can be used,
- remove the plant stem from the water after about 20 minutes, dry it and cut it in half,
- what can be seen in the stem of the plant?



Rocks to eat? Photo by Elizabeth Devon

The back up

Title: Rocks to eat?

Subtitle: How we get the elements we need to stay healthy.

Topic: Nutrition - why we need to eat a range of foods to stay healthy

Age range of pupils: 12 - 18 years

Time needed to complete activity: 30 minutes to do the activities but longer to allow evaporation to take place and to allow the plant stem to take up the coloured water.

Pupil learning outcomes: Pupils can:

- explain that they need elements in their food to keep them healthy;
- understand that these elements come from the meat and plants (vegetables and fruit), that they eat;
- appreciate that the animals eat plants and the plants get the elements from the soil;
- explain that the soil gets the elements from minerals in the rock;
- understand that the rock minerals contain all the essential elements that are needed for good health;
- understand that all living things on land obtain the elements they need in this way.

Context: A series of activities showing how living things get many of the elements they need from the soil and, ultimately, from the rocks beneath. This is part of a cycle as seen in the follow-up below.

What can be seen on the saucer after most of the water has evaporated? *A small amount of residue can be seen. This is composed of the elements which were dissolved in the water.*

What can be seen in the stem of the plant? *The coloured water can be seen in the xylem, or transport tissue, of the plant. As we have seen from the residue on the saucer, the water contains dissolved elements essential to the life and health of the plant. When animals or people eat the plant, these elements pass into them.*

Following up the activity:

Consider what happens to the elements after we have consumed them. They either become part of our bodies or are excreted and eventually find their way back to the Earth in different ways. Even those that become part of our bodies eventually return to Earth when we die.

Different rocks could be compared, to see if they produce more or less residue from the dissolved elements in them.

Underlying principles:

- all living organisms are dependent on the chemical elements contained within the minerals in rocks.
- the elements we need are mostly carried in solution not as solid particles.

Thinking skill development:

- A pattern is established that the elements in minerals in soil relate to the elements in living organisms.
- Understanding that there are dissolved elements in the filtered water even though they cannot be seen is a cognitive conflict.
- Reasoning that, in the coloured water, these dissolved minerals must be taken into the plant

involves metacognition.

- Applying these experiments to everyday life involves bridging.

Resource list:

- several types of rock in small pieces (e.g. red sandstone or a mudstone)
- plastic container with a lid
- 100 cm³ water (i.e. about half a cupful)
- filter funnel or the top from a plastic bottle
- filter paper or fine mesh paper or material
- colouring e.g. ink or food dye
- evaporating dish or saucer (heat-proof if there is a heat source)
- heat source, if available
- leafy plant stem e.g. celery
- knife (for cutting plant stem).

Useful links:

<http://www.fns.usda.gov/eatsmartplayhard/>

Source: Developed as part of an Earth Science Education Unit 'Life on earth' Teaching KS3 Biology. www.earthscienceeducation.com

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