

The ups and downs of ammonites

How did ammonites adjust their position in the sea?

Modern relatives of the extinct ammonites, called nautilus, live in the sea. They can adjust the depth of water in which they swim, in search of food or for protection. Ammonites could almost certainly do the same. How did they do it?

Make pupils aware of the ups and downs of ammonite life by gently bouncing a replica fossil on the end of a long weak spring (Photo 1).



Photo 1: A replica ammonite on a long weak spring

Explain that ammonites had a coiled shell, but that the soft body only lived in part of the outermost coil. Inside the rest of the shell, the space was filled with gas, which made the animal buoyant. Demonstrate this, using a boiling tube full of air with a bung to represent the shell of the ammonite. The air-filled tube represents the gas-filled inner coils of the ammonite. The bung represents the living parts of the animal, which can move towards the neck of the tube or retract back into it. (The bung has a piece of wood,

jammed into it, so that it can be slid up and down the tube). Before carrying out the demonstration in front of your pupils, practise getting the boiling tube to float upright in a deep container of water, such as the 2 litre plastic bottle shown.



Photo 2: The model "ammonite" ready to place into the bottle of water
(Photos: Peter Kennett)

Now, show the pupils the "ammonite" floating in the water, and ask them what they think will happen if the "ammonite" withdraws its "soft parts" into its "shell", perhaps to escape a predator. Ask them to explain their observations. (*Slide the bung a centimetre or so further down into the boiling tube, and the tube will sink. This is because the neck of the tube is open to the surrounding water, which floods in. Water is denser than the air which is displaced: the tube become heavier and therefore sinks.*)

The back up

Title: The ups and downs of ammonites

Subtitle: How did ammonites adjust their position in the sea?

Topic: A demonstration of how an ammonite might have controlled its buoyancy.

Age range of pupils: 11 -16 years

Time needed to complete activity: 5 minutes

Pupil learning outcomes: Pupils can:

- describe how ammonites could change the depth at which they swam in the sea;
- explain that air is of lower density than water;
- predict what will happen if the relative amount of air and water in the boiling tube is changed;
- explain why the boiling tube sinks when the bung is pushed further into the tube.

Context: The demonstration shows how some animals which are buoyant in water can change their depth in the sea.

Following up the activity: Use the Earthlearningidea activity *What was it like to be there? – bringing a fossil to life*, to encourage pupils to think about other ways of life of animals which now occur as fossils.

Underlying principles:

- Many marine animals need to control the depths at which they swim, in the search for food, or to escape predators.
- Ammonites are extinct, but we can infer a similar mode of life to modern nautiloids, to which ammonites are related.
- The buoyancy of a hollow object in water depends on the ratio of gas-filled space to water-filled space.

Thinking skill development: Pupils use their experience of other floating objects to construct their predictions of floating or sinking. Relating the model in the bottle to the real world involves bridging skills.

Resource list:

- a deep container of tap water, such as a 2 litre plastic bottle with the neck cut off
- a boiling tube with a close-fitting rubber bung
- a small weight in the bottom of the boiling tube to ensure that it floats upright
- a short piece of wooden dowel or stiff wire or a thin bolt fitted securely into the top of the bung, so that it can be pushed down or pulled up
- a piece of string to attach to the dowel to enable the model to be recovered without getting too wet.
- Vaseline™ to grease the sides of the bung
- a replica ammonite, e.g. made by pasting a copy of Photo 1 onto plastic or plywood
- a long weak spring

Useful links:

<https://www.youtube.com/watch?v=vR6G-ANma1w> shows a nautilus eating krill.

Source: Adapted by the Earthlearningidea team from an activity devised by Mike Tuke and published by him on <http://www.earth-science-activities.co.uk/> We are grateful for Mike Tuke's comments on this activity when in draft form.

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