

What would it feel like to wriggle your toes on an ancient bedding plane as the sediment was being deposited?

Clues from the present day about the origin of sedimentary rocks

When you are looking at a sequence of sedimentary rocks, you can usually pick out the bedding planes (layers). When the rock was being deposited as a loose sediment, each bedding plane would have been the surface onto which the loose sediment was settling. In most cases this would have been approximately horizontal.

You have either visited or seen pictures of lakes, rivers, the seaside and sand dunes.

Now, imagine that you were there at the time when the sediment was being deposited, and imagine what it would have felt like if you could wriggle your toes on the bedding plane while the sediment was settling out. It would have a different feeling depending on the type of sediment and the flow of water or the strength of the wind. Say what it would feel like if you were paddling in the water, and wriggling your toes, as the sediments were being deposited in the first four of the following; or standing on the sand dunes in the fifth photo.

A mud, eventually becoming a mudstone



Mudflats, Tyne Estuary, England.

A 'sandstone' with symmetrical ripple marks



Sandflats, Conway, North Wales.

A 'sandstone' with asymmetrical ripple marks



Sandflats, Conway, North Wales.

A pebble bed ('conglomerate')



Pebble beach, Langstone, Hampshire, England.

A 'sandstone' deposited in a coastal sand dune or desert environment



Sand dunes, Suffolk coast, England.

Where could you go to find all of these in one area?

The back up

Title: What would it feel like to wriggle your toes on an ancient bedding plane as the sediment was being deposited?

Subtitle: Clues from the present day about the origin of sedimentary rocks

Topic: Enhancing an understanding of the energy levels involved in the deposition of sediment, from a series of photographs, which in many cases will prompt pupils to reflect on their own experience.

Age range of pupils: 7 years upwards

Time needed to complete activity: 15 minutes

Pupil learning outcomes: Pupils can:

- use their imagination to visualise sedimentary processes;
- share with their class any experiences of similar situations which they have had;
- acquire a basic understanding of different energy levels of deposition.

Context: The activity can be used to reinforce learning of sedimentary environments and their products. Pupils' responses might include:

- **Mud:** Wriggling your toes would stir up the mud, which would be carried slowly away. If there were shells in the mud then you might feel the sharp edges on your bare feet. If the mud is thick and sticky, you might sink in and become fossilised!
- **Sand with symmetrical ripple marks:** The tops of the ripples are sometimes sharp enough to hurt your feet. Wriggling your toes under water would stir up sand which might be carried backwards and forwards by the waves which formed the ripple marks.
- **Sand with asymmetrical ripple marks:** If the current is strong, then the sand might be washed out from around your feet down the current, and they might sink in.
- **Pebbles:** Wriggling your toes would have little effect, but standing might be uncomfortable on the pebbles. You might get washed off your feet by the current.
- **Sand in a coastal sand dune or a desert:** Wriggling your toes would have little effect, but your feet might sink into the sand and, if the wind was blowing strongly, you would feel sand grains hitting your lower bare legs.
- **Where could you go** to find all of these in one area? The photograph shows a sloping beach at the seaside. If you paddled at high tide, you would be on the pebbles: at mid tide you would be on sand with ripple marks – symmetrical ones where the waves had sloped backwards and forwards, but asymmetrical ones if the tide had fallen quickly, with a current flowing out to sea: at low tide, you would be paddling in black mud, which would stick to your feet and ankles when you came out. There are no sand dunes in this picture but they do occur further along the coast.

Sources of images:

Symmetrical and asymmetrical ripple marks: Peter Kennett
Mudflats:

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Pebble beach:

https://commons.wikimedia.org/wiki/File:Pebble_beach_at_Langstone_foreshore_-_geograph.org.uk_-_1222598.jpg

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Bexhill-on-Sea, Sussex, England – where all these environments occur in a small area.

Following up the activity:

- Try some of the activities listed in Useful Links below.
- Suggest that pupils who visit coastal areas should try out toe wriggling when they are paddling, ensuring adequate supervision from an adult.

Underlying principles:

- Many sedimentary rocks are formed of sediments like gravels, sand and mud which have been weathered and eroded from other rocks.
- These sediments were mostly laid down by rivers and the sea in the geological past.
- These sedimentary rocks contain clues, such as sedimentary structures like ripple marks, about how they were formed.

Thinking skill development:

Investigating the photographic evidence for deposition is a constructive activity. Applying the principles to a real landscape where active deposition is taking place involves bridging.

Resource list:

Paper copies of these sheets, or the facility to project the photographs.

Useful links:

https://www.earthlearningidea.com/PDF/235_Sedimentary_structures.pdf

https://www.earthlearningidea.com/PDF/Symmetrical_Ripple_Marks.pdf

https://www.earthlearningidea.com/PDF/Asymmetrical_Ripple_Marks.pdf

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