Fossil Clues - Teacher's Notes

Fossil Clues

Fossils are the remains of living things which have been changed into rock. The father of modern geology, James Hutton, said that we can interpret the nature of creatures from the past and the environment they live in by comparing their fossils with modern day things which look similar.

These fossil crinoids are about 350 to 250 million years old and were found near Gascoyne Junction, inland from Geraldton in Western Australia. The present landscape is of low-lying very dry and dusty plains with a few acacia trees and salt tolerant scrub which can survive very low rainfall.

Present day crinoids are from the same family as sea urchins and starfish. They are only found in oceans that are between 350 and 250 metres deep. They wave their long arms to trap plankton for food.

What is the present landscape? Arid plains/desert

What was the landscape at the time of the crinoids? Seas between 350 and 250 metres deep.

Do we have data (information) which suggests the ancient landscape was very different from the present one? Yes

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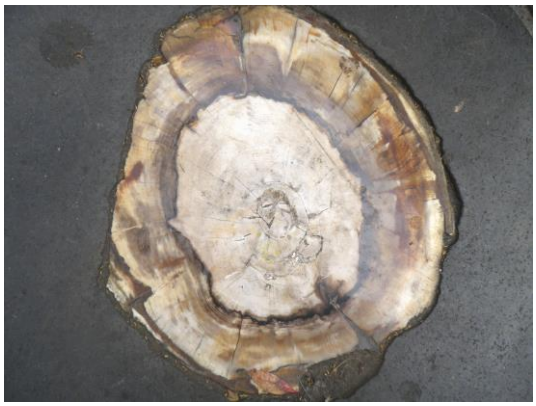
Both these trees can be found at present. One of them has a good shape for survival in a very cold climate where heavy snow has to be shed from its branches or they will break and the tree will die. The other suits a hot desert climate where any rain that falls has to be channeled down to the long thin tap root below the trunk.

Which tree do you think suits the hot dry climate? The tree on the right. The branches channel any rain towards the trunk and down into the ground near the tap root.



This fossil tree trunk was found sticking out of the seabed in southern Victoria. It is only exposed when the tide is very low. Others lie deeper under the ocean. The trunks have a similar structure to the tree on the left above and yet they are almost 120 million years old.
From the fossil evidence, what two things have changed in this landscape over time?

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The forest that grew on land in the past is now under the sea. Sea level has changed and the climate has warmed.
Actually, the Australian continental plate was located much closer to the South Pole at this time. Our continent is still drifting northwards at the same rate as your fingernails grow.

The fossil trunk in the previous photograph measures 35cm across. How could you use this information to estimate the height of trees in this ancient forest? You could find similar modern trees with trunks of the same width. Their height will indicate how high these trees might have grown.

Fossilised leaves of glossopteris

Fossil leaves and trunks of a long extinct tree called Glossopteris can be found in Western Australia, India, South Africa, South America and Antarctica. These trees grew in coastal tropical swamps between 300 and 200 million years ago. They are the source of many of Australia's coal deposits.
How could a land tree be in so many different places separated by thousands of kilometers of ocean? Trees cannot swim and their seeds could not survive soaking in salt water? All of these places, Australia, South

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Africa, India and South America must have been joined together as one land mass or supercontinent. Our continents very slowly move around on the surface of the Earth. Long ago all these continents came together to form the supercontinent Gondwanaland. They later separated roughly 67 million years ago. Australia is presently heading northwards at the same rate as your fingernails grow. This has been confirmed by modern GPS satellite measurement.

Why are no Glossopteris fossils found in Europe? The tree did not grow there and Europe was part of a different supercontinent.

Fossilised Earth Processes

Weathering, erosion and sedimentary processes have been much the same during the 4.5 billion years since our planet formed.

What do you think created the surface pattern on the surface of this 1.8 billion year old rock? Can you recognise the pattern in modern sediment. It was found near the iron ore town Newman, in the northern centre of Western Australia.

The pattern is formed by water ripples at the edge of the sea. At that time the centre of Western Australia must have been the edge of a shallow sea.

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This rock was found close to the previous rock. What natural process 1.6 billion years ago made this pattern in the mudstone? The mud dried up and made these cracks which were filled in by wind blown sand.

What had the landscape of a shallow sea changed into? The sea had dried up and mud cracks formed. It was now land. The landscape had changed.

Why do you think my hammer was deliberately put in both photographs? To give an impression of scale.

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