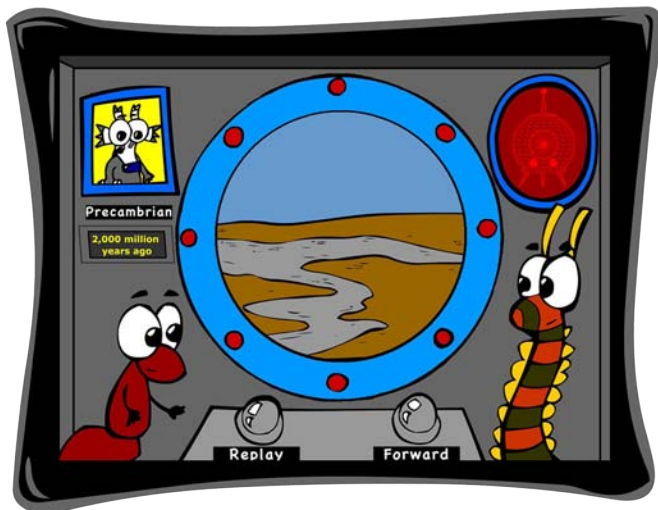




Topic 4: The Beginnings of Soil

Introduction Soil formation has been going on for billions of years but geological times have often been turbulent times so there have been periods of great disruption to this soil formation. Think, for instance, of the great mountain building periods, the huge earthquakes that occur and the movements that have occurred to the earth's crust. Such events will have disrupted soil formation and in many cases soil formation will have needed to begin again. Let us look in on some of these geological periods and trace soil formation back in time.



2,000,000,000 years ago This is called the Pre-Cambrian period and is the earliest geological period. It is, of course, difficult to be sure what was happening so long ago but scientific research suggests soil formation began in this period. Compared to today, soil forming factors were very different so long ago. For example, there was no vegetation and few organisms to help to create the soil. It is thought that these earliest soils formed in an atmosphere with little or no oxygen and consisted of greenish clays.

400,000,000 years ago This is called the Devonian period. By this time land plants were becoming established and these required soils in which to grow. There was more oxygen in the atmosphere in this period and the soils were redder and browner, like some of our soils today. Various organisms developed and for the first time soil organisms began to play a part in soil development.





354,000,000 to 250,000,000

years ago Carboniferous times, which were 354 to 290 millions years ago, were characterised by forests and swamps but there were major changes in the vegetation as the sub-tropical climate developed. The most striking soils from this era were the peat soils which eventually became buried and converted into coal. The Permian period dating from 295 to 250 million years ago also experienced a wide range of climate. Towards the end, conditions became hot and dry and desert soils developed widely.

180,000,000 years ago This was the Jurassic period, now well known for its dinosaurs, living in the subtropical conditions that were a bit like parts of Africa are today. By this time there was quite a wide range of animals, including soil organisms. The soils of this era would have resembled the subtropical soils of today, quite deep and reddish under the warm conditions that prevailed and capable of sustaining luxuriant pines and ferns.



Over this long, long time period from 2000 million years to just 2 million years ago think of the many changes that have taken place including the beginning of animals and plants, but remember also that soils started to form and this allowed the ancestors of the various plants and animals we see today to develop.



The Ice Age, beginning 2 million

years ago Many parts of the world have been affected by at least one major Ice Age, resulting in the landscape being covered by ice. In some parts of the world there have been as many as four periods in the last 2 million years when the temperature has fallen and the land has become covered by an ice sheet. In these conditions pretty well all previous soils are scoured from the landscape and soil formation has to begin again. When the ice melted it left behind large deposits of mixed sediments. It is in this material that many of today's soils have been formed.

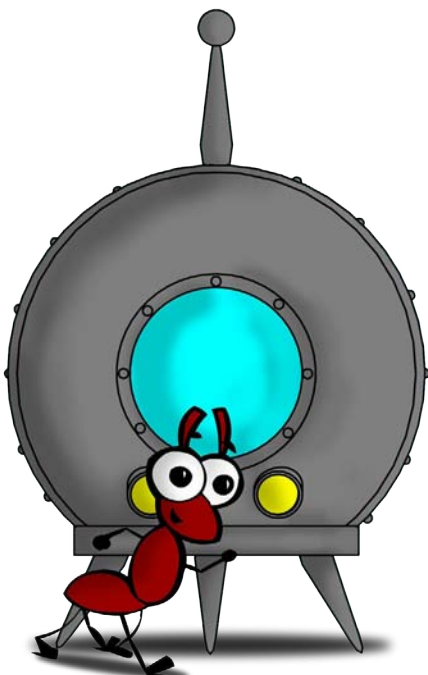




Get your teacher to tell you about the Ice Age. This is a good example of how nature can control and change many situations.

Just as there is a lot of news currently about climate change, and the fact that temperatures are rising, the Ice Age is an example of what happens when the climate cools so much that ice sheets form across the landscape and nothing will grow. This would have had a devastating effect on plants and animals because there was no soil to support them any longer over some very large areas.

Soils of Today Although soil formation began 2000 million years ago, virtually all world soils are less than 1 million years old. The oldest soils are probably those found on some of the old landscapes of Africa. Most world soils are quite young and date back less than 10,000 years when the last ice sheets melted. Soils continue to form every day and even today somewhere there will be a new soil, perhaps on an exposed rock, beginning to form.



Each geological period has been marked by some degree of soil formation which has been able to support a characteristic flora and fauna for that period. Nature has a great deal of resilience.

However, this resilience becomes increasingly tested as the human population increases, and perhaps as the climate begins to change again.

There are some landscapes of the world, particularly the desert landscapes, which are changing even as you read this note. Here the wind is the force which is regularly remoulding the landscape. Think how difficult it is here for the soils to stabilise when the wind is regularly changing the shape of the landscape.



The birth of soils has a long and complicated history but because soils need a long time to form and we need them for this and future generations we must be sure to look after them and protect them.

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