September 2023 Plants through geological time – how the underlying geology influenced the flora in Glendale

Speaker: Elizabeth Devon

Some of us already know Elizabeth Devon's passion for Geology from the lectures she gives to the Geology group of the Wooler u3a, but at the GLHS September meeting she surpassed even those with a talk on the evolution of plants and life. Her best analogy is the human arm: if one stretches out one's right arm to demonstrate a timeline of life, the earth was formed 4.6 billion years ago on the 'left side of one's neck'; mankind arrived at the end of one's middle fingernail; and if one cuts that nail it is as if mankind never existed.

Elizabeth made the point that without plant life nothing could live on land, and that this was the state of the world for billions of years. Indeed, all life was in the sea until 'only' 500 million years ago. Photosynthesis involves the chlorophyl in leaves to convert carbon dioxide and water into oxygen and glucose and probably began about 3.4 billion years ago in a primitive form wherein the first photosynthetic bacteria absorbed infra-red light was absorbed and produced sulphate compounds. There is the first rock evidence of oxygen from 2.4 billion years ago. Thus, we must remind ourselves that given the timescales involved, rounding errors involve tens of millions of years, which should make us think of the significance or otherwise of our own lives in the history of the cosmos in general and of earth in particular.

The first cyanobacteria formed about 2.7 billion years ago; they absorbed visible light using a mix of pigments including chlorophyll. Red and brown algae were followed by green algae which do better in the strong light of shallow water. The first land plants, mosses and liverworts descended from the green algae, arrived about 0.475 billion years ago. They lacked a vascular structure (roots and stems) so could not grow very tall. Barely 50m years later, vascular plants such as ferns, grasses, trees and cacti evolved, and grew canopies to catch more light.

Plants and animals divided and there is some debate as to whether fungi divided from animals or plants but the largest living organism on the planet is the honey fungus in Oregon covering 2,600 acres. This was typical of the fun facts that Elizabeth threw into her talk. She explained how a mass extinction 250 million years ago wiped out 95% of species living in the sea and 75% of those living on land.

What passed as the British Isles began near the tropic of Capricorn south of the equator some 500 million years ago and the carboniferous forests which gave us our coal grew as they moved north past the equator some 300 million years ago. Our sandstone was laid when the Islands migrated further north and became desert. So it was eventually, that the British Isles arrived where they are now and the first evidence of habitation is from 850,000 years ago. This explains the resonance of the 'arm' analogy of Elizabeth's talk.

Thus, she explained that the vegetation we now see around us is very recently derived. Although Cheviot was a volcano {about 400 million to 350 million years ago} when the British Isles lay on the edge of a volcanic plate {as is Japan now}, our vegetation has been largely determined by the effects of the ice age. The Millfield plain is the dried sediment of a glacial lake surrounded by sandstone {Doddington, for example} and outcrops of volcanic rock which has been eroded by ice only about 22,000 years ago. Although it seems hard to believe, as there is ice at the poles, we are still in an ice age.

It was such a fascinating talk with so many nuggets of information, it is difficult for a poor scribe to do it justice.

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