

# A guide to the Geological Garden in Bunmahon



## **The Copper Coast Geological Garden**

The Geological Garden allows you to take a walk through 4.6 billion years of earth history along a path laid approximately in proportion to time.

Key physical and biological evolutionary events are marked with carved slabs in the ground and provide a memorable journey through a very, very long time or what is known as deep time.

Deep time is the idea of geologic time and was developed in the 18<sup>th</sup> century by Scottish geologist James Hutton, not too long before copper was mined commercially in this area.

There were several mass extinctions in geological time, the best known being that related to the disappearance of the Dinosaurs. One event killed out nearly all life on earth.

Contrary to popular belief, the dinosaurs were arguably the most successful of all forms of animal life to have existed on Earth, which they dominated for nearly 160 million years until 65 million years ago.

You can visit the Copper Coast Geological in person but if that is not possible you can also visit online via Google Street View.

**The Geogarden can be visited online** Here [is a link](#) to a Google street view tour of the Copper Coast Geological Garden.

The next few pages feature a short quiz that you can do after visiting as well as a more detailed explanation of each of the rocks in the geological garden.

## Copper Coast Geological Garden Quiz

1. What are the symbols that you can see on the Ogham stones for?
2. What caused the extinction of the dinosaurs and when did it occur?
3. The creature on the path stone relating to the Cambrian period 540-500 million years ago, is the ancient ancestor to which modern creepy crawly?
- 4.. How old is the planet Earth? (a) Four Thousand (4000) years old (b) Four hundred Thousand (400'000) years old (c) 460 million years old (d) 4.6 billion years old
- 5.. Why do the sandstones and conglomerates have a red colour?
6. What was the name of metal mined in Bunmahon in the 19th Century?  
(a) Gold (b) Silver (c) Copper (d) Iron

7. Waterford was once covered by Ice and Snow?

(a) True (b) False

8. The rocks of Geological Garden show that Waterford was has been in many different environments:

(a) True (b) False

9. What is the name of the rock formed by explosive volcanoes

(a) Andesite (b) Rhyolite (c) Sandstone (d) Limestone

10. Within veins of which rock was metal ore found within the Copper Coast

(a) Quartz) (b) Limestone (c)Rhyolite (d)Sandstone

## **Copper Coast Rocks**

The Copper Coast Geopark geological garden contains very ancient rocks form the foundation of the landscape stretching from Kilfarrasy to Stradbally.

They were formed in a variety of environments – on the floor of a deep ocean near the South Pole about 450 million years ago (SLATE), in a volcano on the floor of that ocean (ANDESITE and RHYOLITE) and in a desert near the Equator about 360 million years ago (SANDSTONE). The desert landscape was created out of the ocean floor by the collision of two continents about 400 million years ago.

Below is a short guide to each of the rock types found within the garden and around the coast itself.

### **SLATE (*MUDSTONE*)**

This rock originated as mud deposited about 450 million years ago on the floor of a deep ocean, close to the South Pole.

Pale grey bands, about 2cm wide, are visible in some of the otherwise grey coloured slate boulders. The bands reflect the layering created as the sediments were deposited.

All the boulders contain another type of layering – very fine sheeting, along which rocks similar to these may be split to form slate. This sheeting was created by extreme pressure during the collision of two continents 400 million years ago.

Slates are well exposed in Stradbally cove and the cliffs towards in Ballyvooney

## **ANDESITE**

Andesite is a green coloured, volcanic rock similar in composition to its better known cousin, basalt.

It forms a very “runny” type of lava at about 800°C and normally occurs in the earliest stages of the formation of a volcano.

The rock is rich in iron and magnesium minerals, which give it its green colour. It also contains distinct blobs and veins of a pale yellowish green, calcium and iron rich mineral, epidote, and white to greyish white glassy quartz.

## **RHYOLITE (1)**

Rhyolite is treacly lava, produced during the “old age” phase of volcanic activity. It solidifies quickly from lava at about 600°C, and it is prone to explosive disruption creating vast clouds of ash and fragments – like Vesuvius or Mt. St Helens.

Many of these boulders are composed of fragments and fine ash, finely layered in one case. Another contains a band of spheres, resembling to frog spawn, which formed as the rock cooled.

Rhyolite dominates the cliffs east of Bunmahon to Kilfarrasy, including the spectacular “Pipes of Baidhb” along Knockmahon Strand.

## **RHYOLITE (2)**

The multi-coloured standing stone is composed of rhyolite, just like the boulders around it. Its prominent colour, ranging from raspberry red to orange, yellow and white, reflects the alteration caused by very hot fluids moving through the rock. The alteration process can change mineral compositions, as well as colours.

Alteration is also commonly associated with mineral rich veins and was eagerly sought by old time prospectors and miners as a guide to mineralisation.

## **QUARTZ**

Very prominent veins of white to grey coloured glassy quartz veins cut through these boulders of slate. Some veins contain dark brown, iron carbonate crystals.

Quartz is composed mainly of the element silicon and it is the primary source of silicon for computer chips and ordinary glass.

The veins were probably formed about 400 million years ago during the collision of two continents.

The copper “lodes” mined here, and at Tankardstown, were formed mainly of quartz as cement containing the copper minerals.

## **THE OGHAM ALPHABET**

The Celts who lived in Ireland had a type of writing called ogham.

This writing was done on stones, called ogham stones. Many of these stones were erected in memory of a brave warrior, or some other important person.

There were twenty letters in the ogham alphabet and the writing was read from the ground upwards.

## **RED SANDSTONE AND CONGLOMERATE**

Sandstone is formed of sand sized particles.

Conglomerate is essentially made of pebbles or rounded blocks.

Both formed here when the Copper Coast was a desert / when the Copper Coast was exposed to desert conditions.

The red sandstone and conglomerate correspond to river deposits when storms were affecting the area; the river was carrying loads of reddish-brown muddy water with sand, gravel and boulders.

## **LIMESTONE**

Limestone forms in the sea from the accumulation of broken and/or pulverised shells, slowly building layers upon layers of lime rich mud





## **Copper Coast Geological Garden Quiz Answers**

1. writing
2. Asteroid impact 66 million years ago
3. Woodlice
4. (d)
5. Because they were formed in oxygen rich, warm and dry environment
6. (c)
7. (a)
8. (a)
9. (b)
- 10.(a)