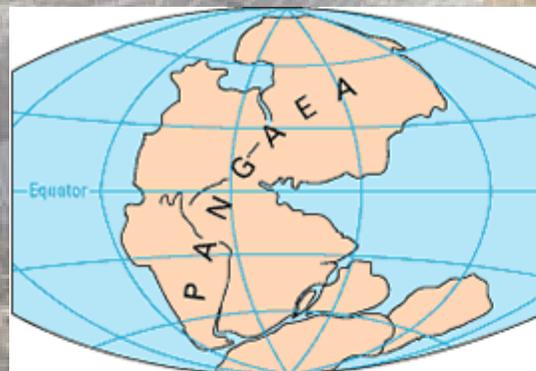


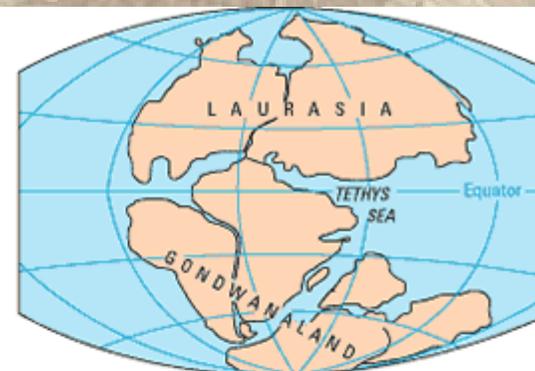
# Making of the Irish Landscape



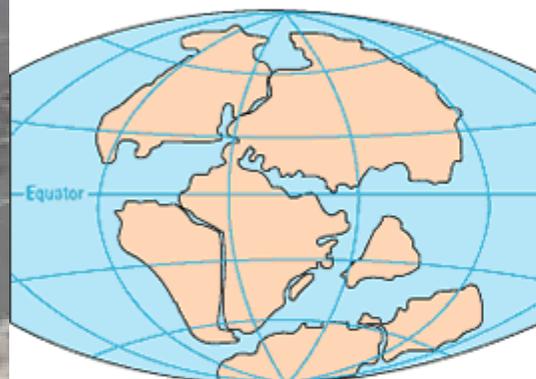
# Pangaea



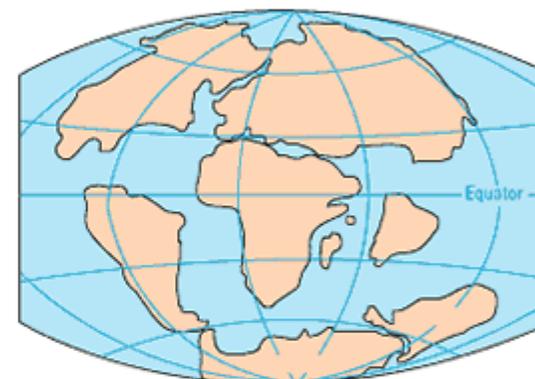
PERMIAN  
225 million years ago



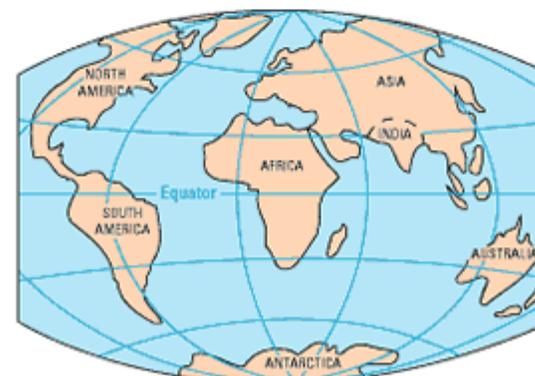
TRIASSIC  
200 million years ago



JURASSIC  
135 million years ago



CRETACEOUS  
65 million years ago

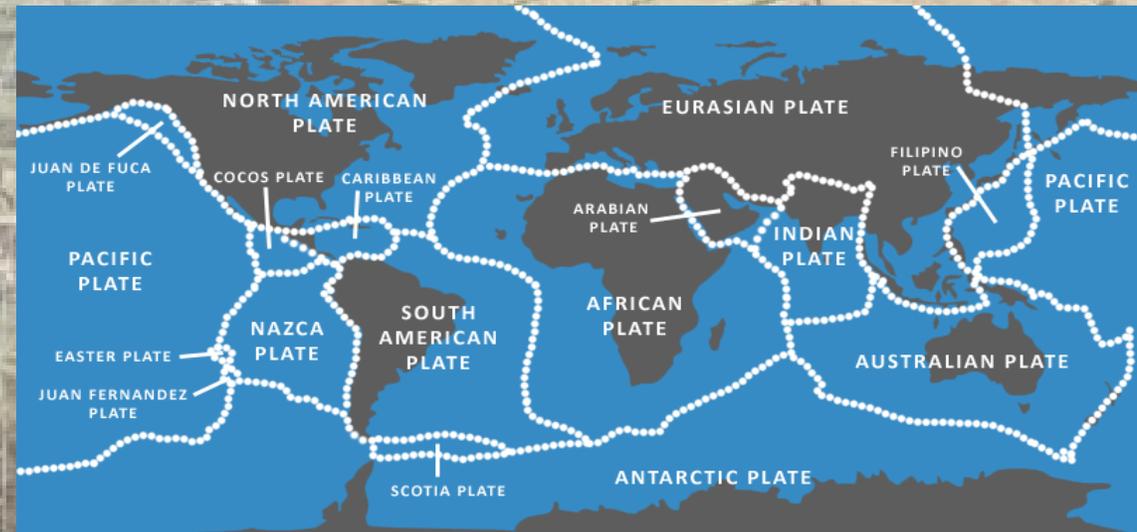


PRESENT DAY

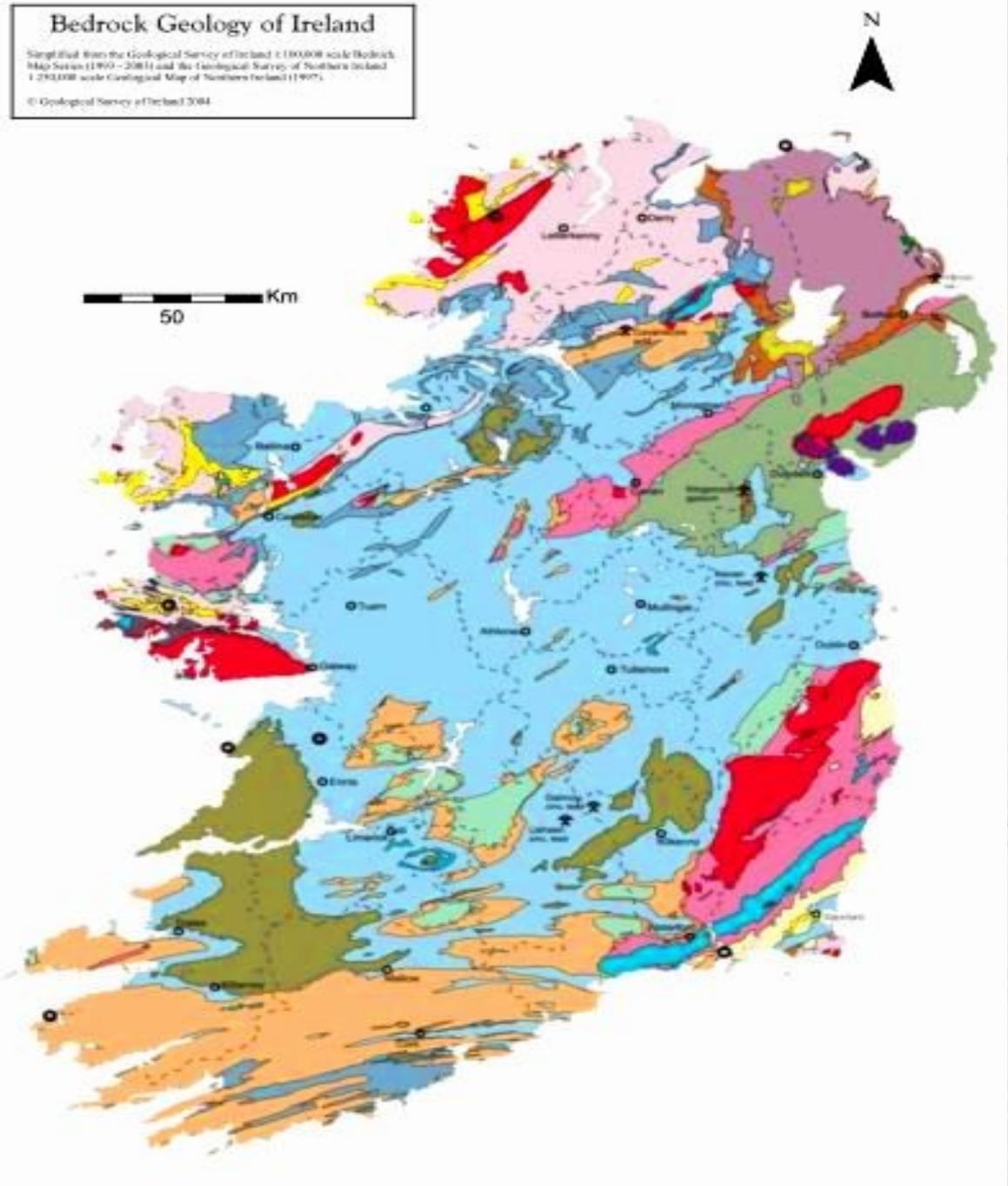
Image by  
USGS.org

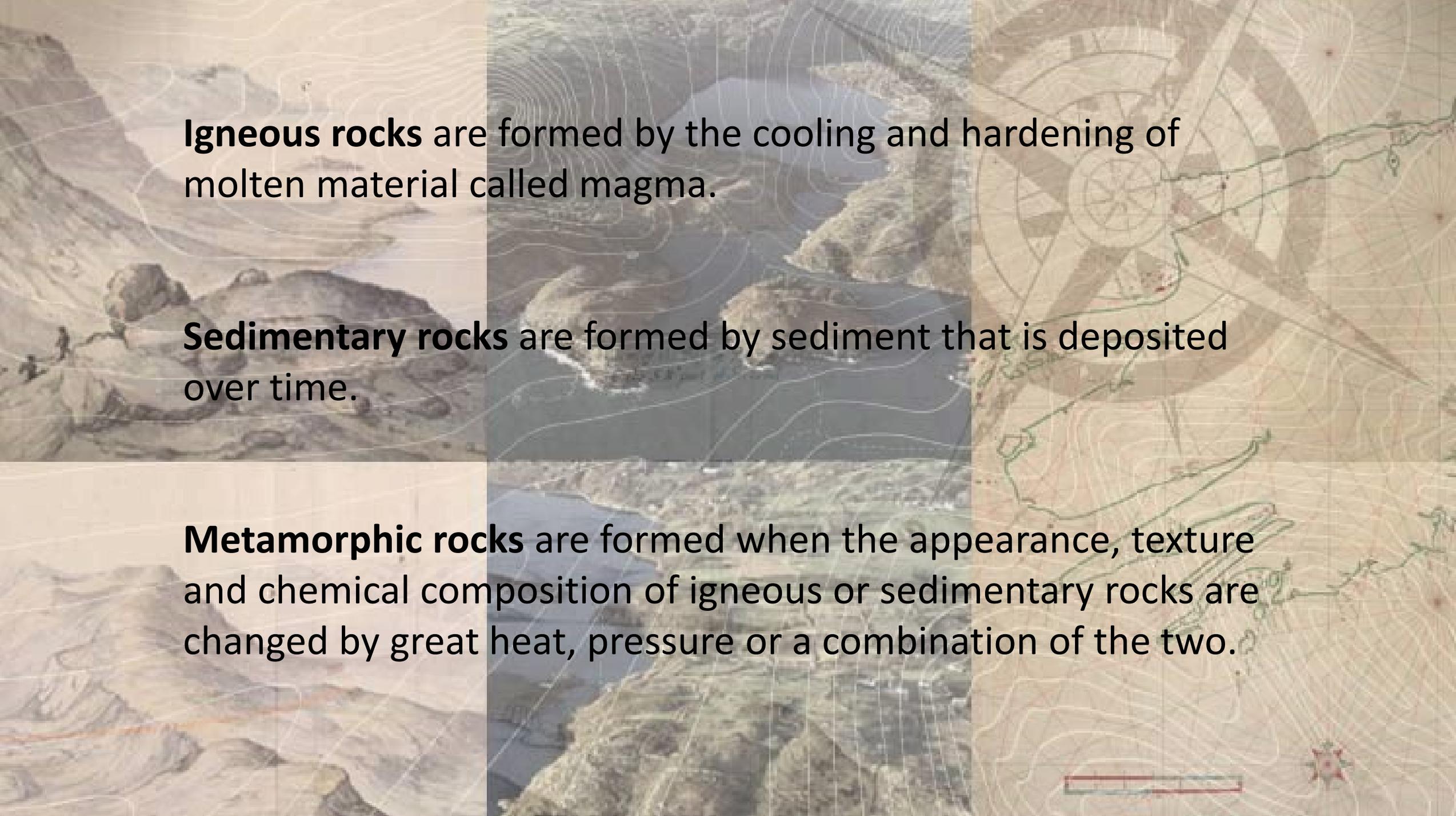
- About 300 million years ago the earth didn't have 7 continents but one SUPERcontinent called Pangaea
- Present-day Ireland was connected to Newfoundland
- Pangaea split apart 200 million years ago
- Ireland is on the Eurasian plate which drifted to its current position

<https://www.youtube.com/watch?v=vohv-kVfFAs>



# Bedrock Geology of Ireland





**Igneous rocks** are formed by the cooling and hardening of molten material called magma.

**Sedimentary rocks** are formed by sediment that is deposited over time.

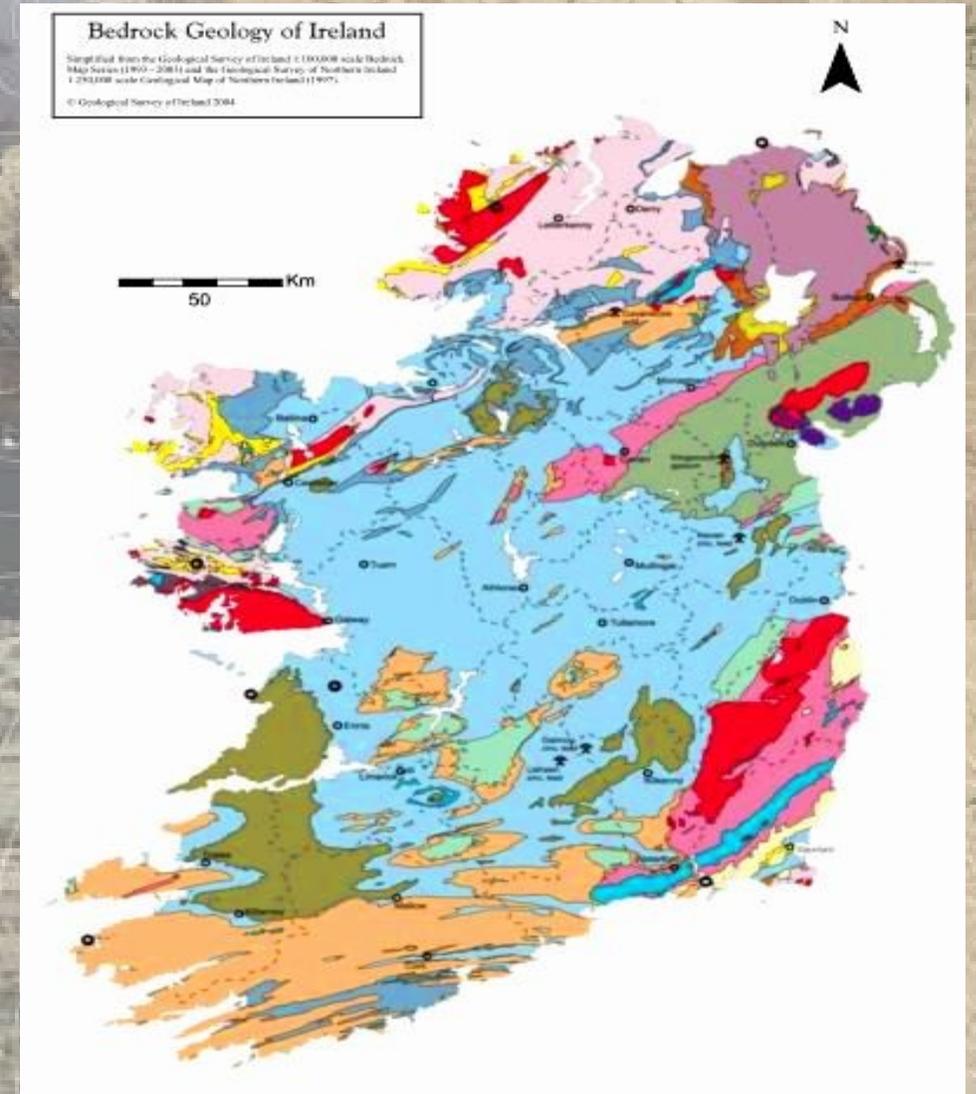
**Metamorphic rocks** are formed when the appearance, texture and chemical composition of igneous or sedimentary rocks are changed by great heat, pressure or a combination of the two.

# Lowlands

Most widely-distributed sedimentary rock is **Carboniferous (365 -325 MYBP)** limestone, the main rock across much of the central lowlands.

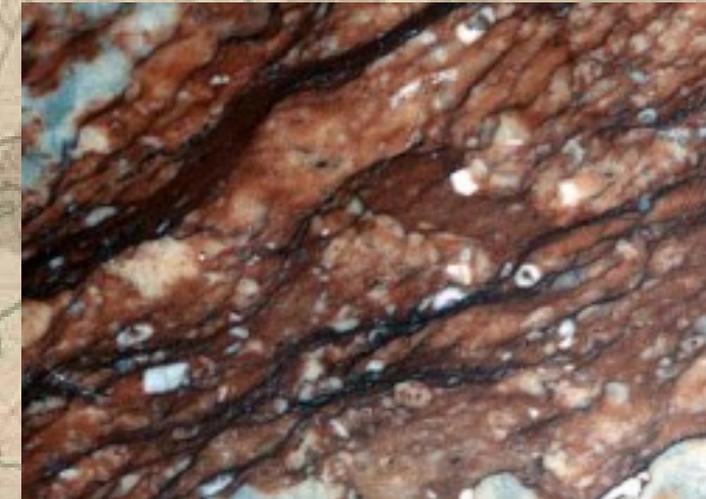
It is generally light-grey in colour, and is hard. It was formed in warm, shallow tropical seas teeming with life. The rock is made up of the shells and hard parts of millions of sea creatures.

Limestone covers over 50% of Ireland



## The Burren

“There isn't a tree to hang a man, water to drown a man nor soil to bury a man”



Ringaskiddy



Fota

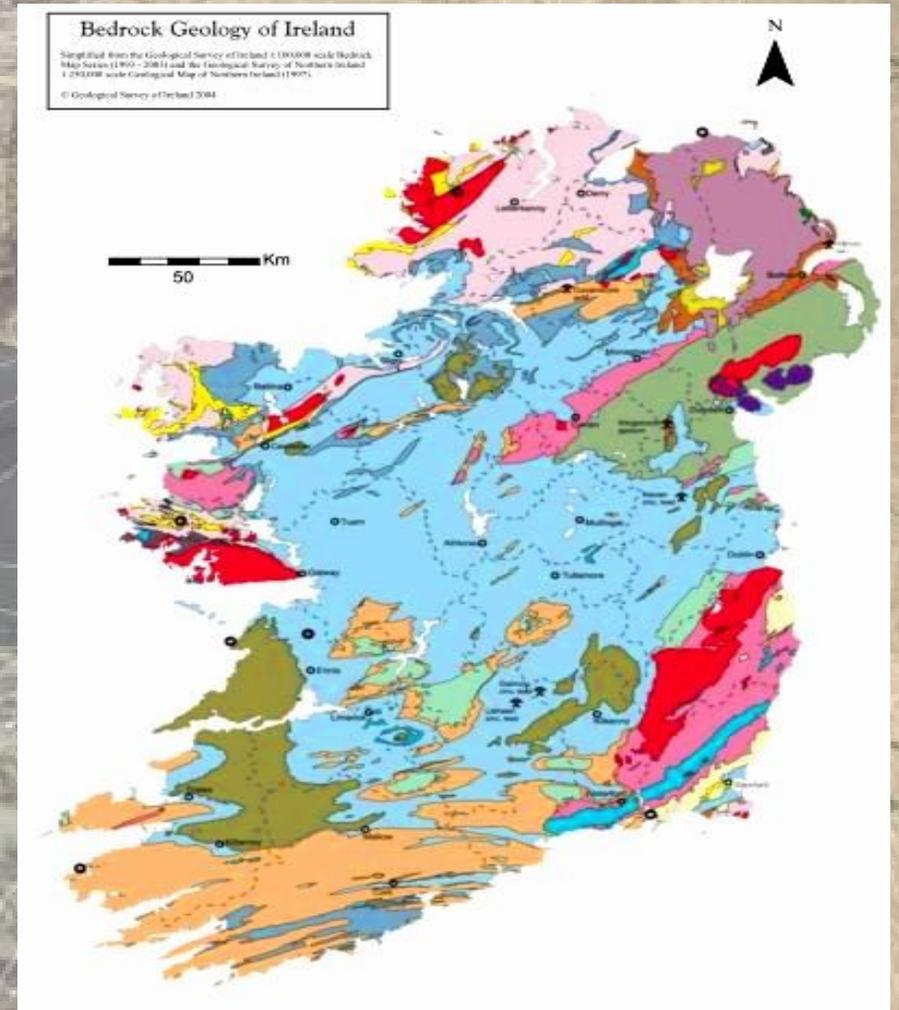
## Cork Red limestone

The red colour comes from iron oxides eroded from the underlying Old Red Sandstone.

# Coastal

The coastal mountains vary greatly in geological structure.

**North and West:** metamorphic rocks and granite.



**Metamorphic:** Marble and quartzite

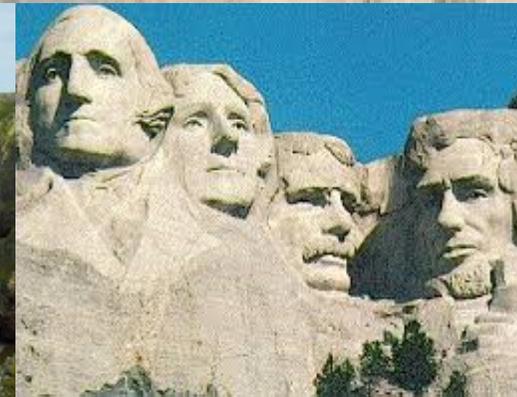
Limestone changes into marble  
e.g. Connemara Marble



Sandstone changes into quartzite  
e.g. Sugarloaf Mountain, Croagh Patrick



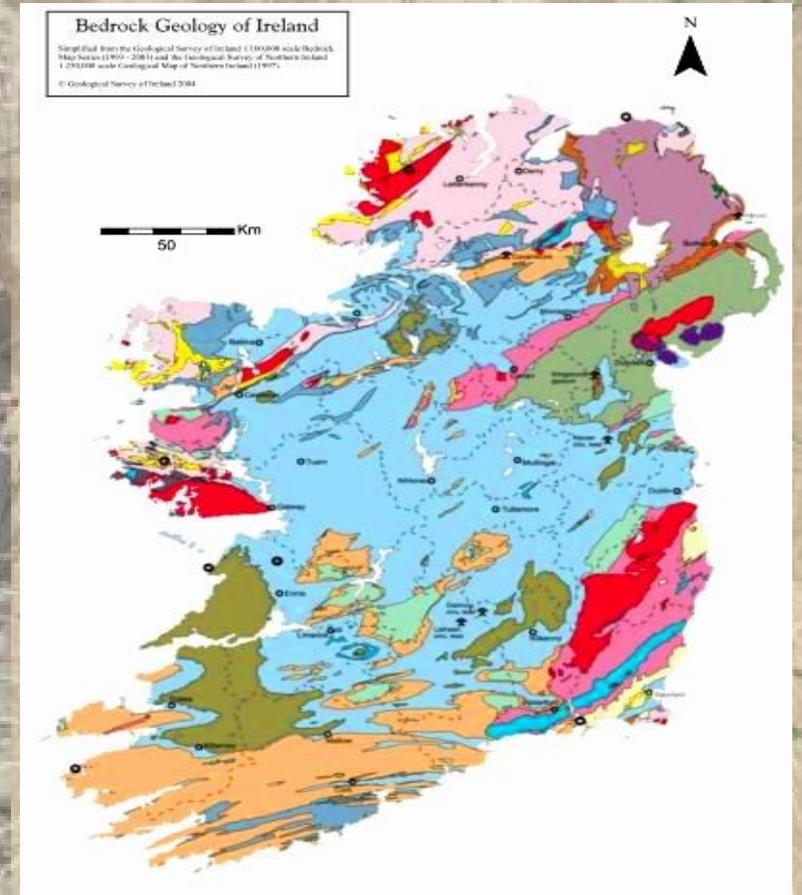
**Igneous:** Granite is formed within the crust of the Earth when magma cools down without reaching the surface e.g. Bloody Foreland & Mt Errigal in Donegal

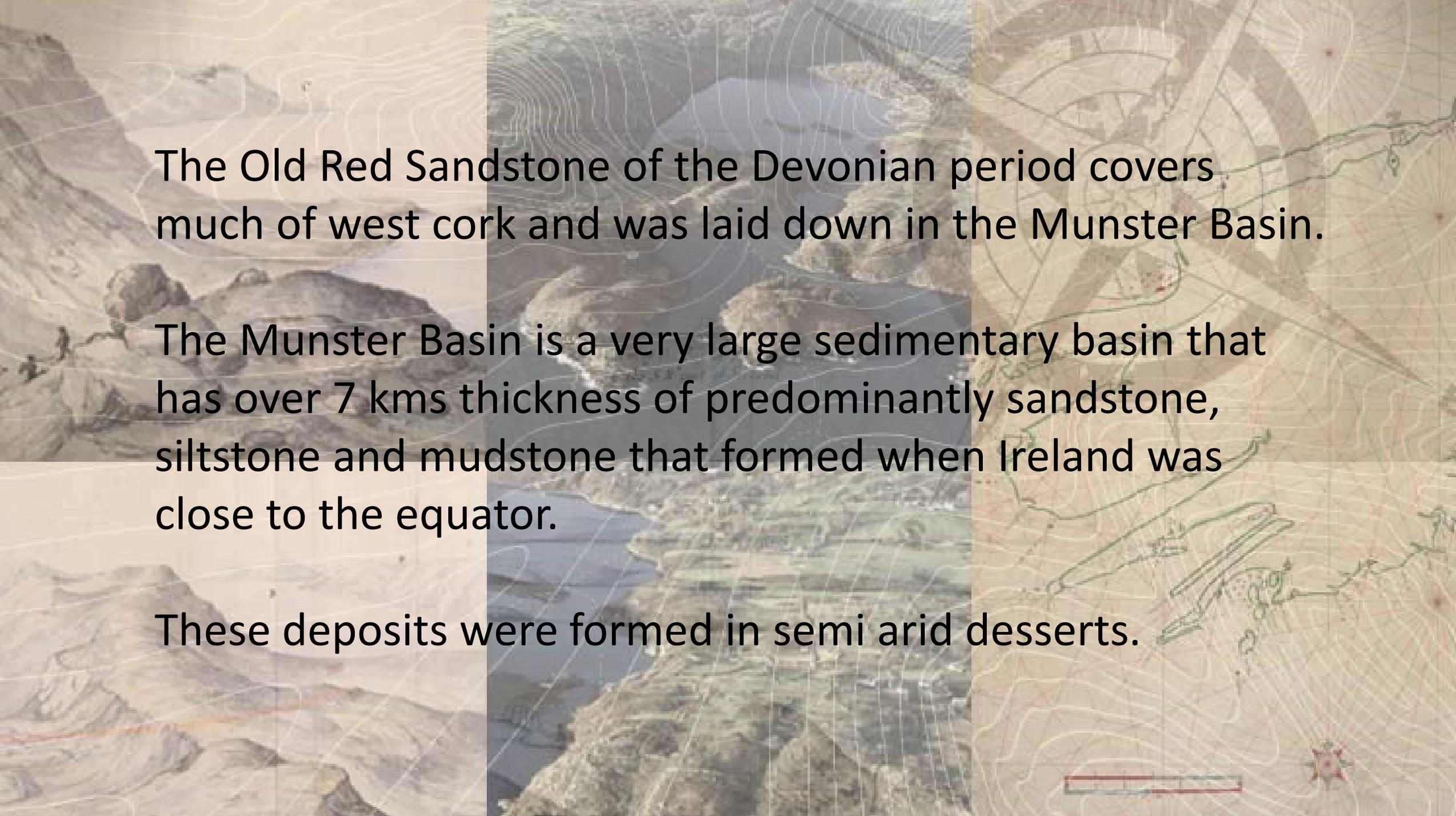


South - West

Composed of Old Red Sandstone with limestone river valleys from the **Devonian (415 MYBP)** period.

Old Red Sandstone is a sedimentary rock.

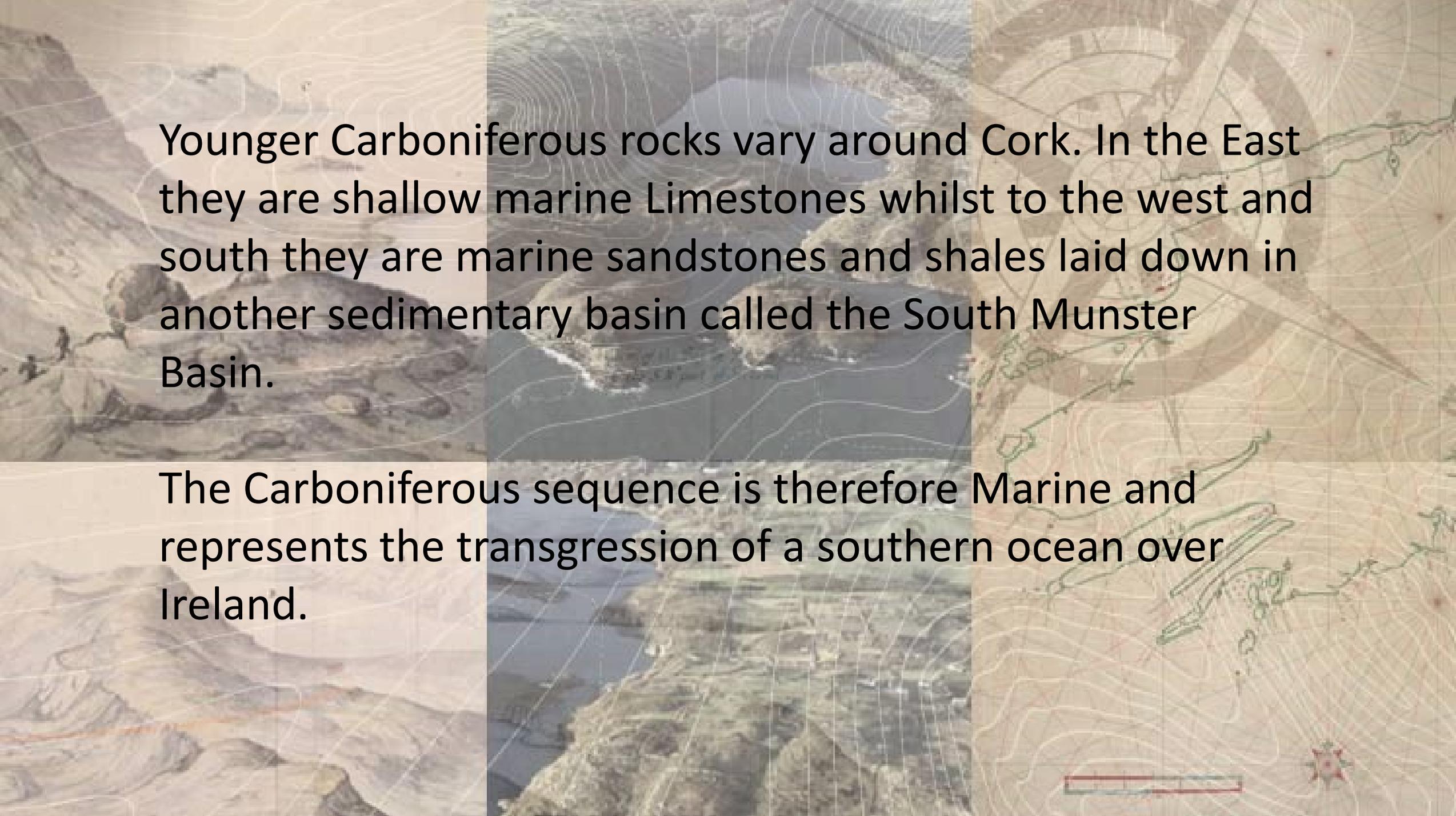




The Old Red Sandstone of the Devonian period covers much of west cork and was laid down in the Munster Basin.

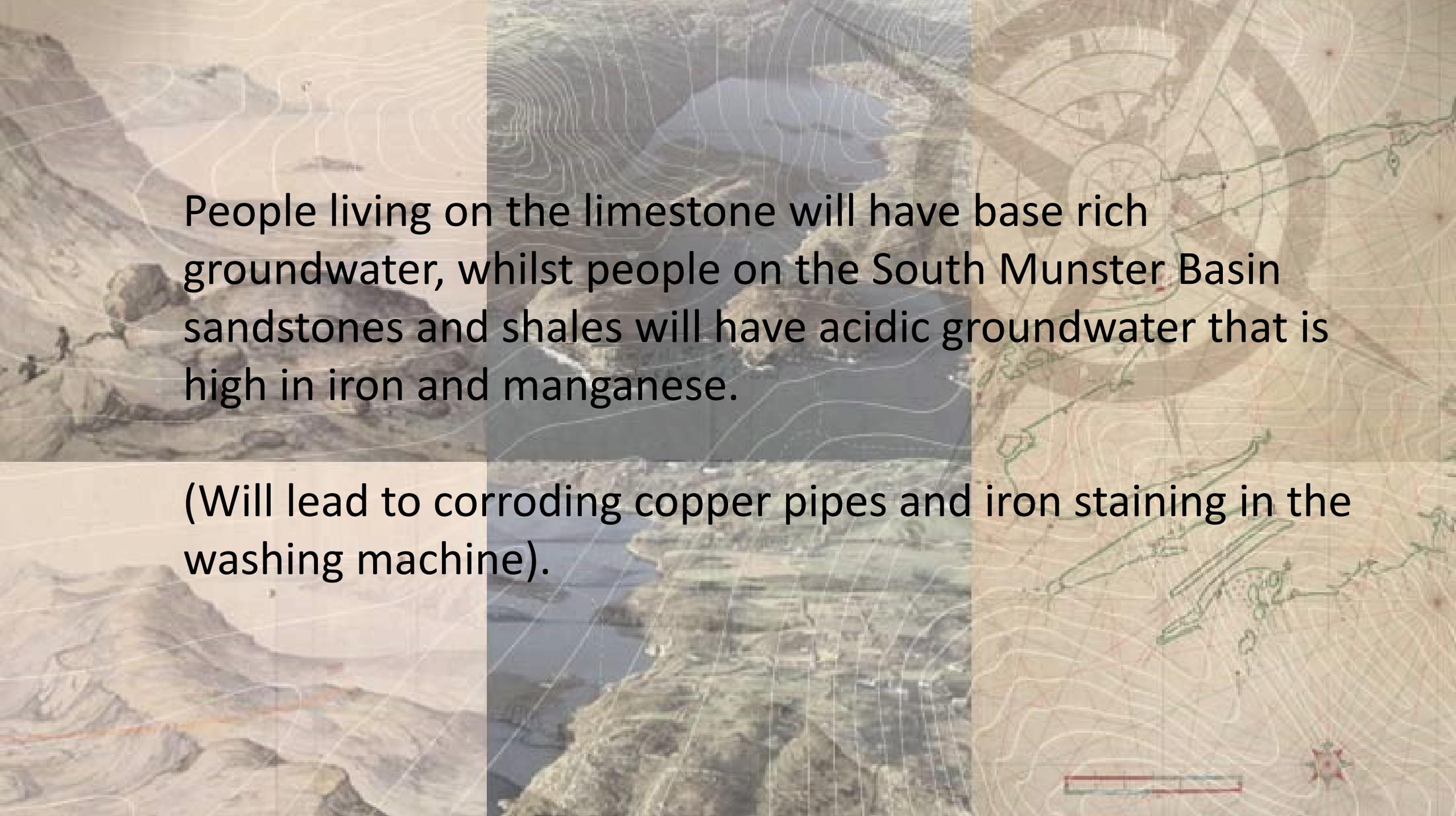
The Munster Basin is a very large sedimentary basin that has over 7 kms thickness of predominantly sandstone, siltstone and mudstone that formed when Ireland was close to the equator.

These deposits were formed in semi arid desserts.



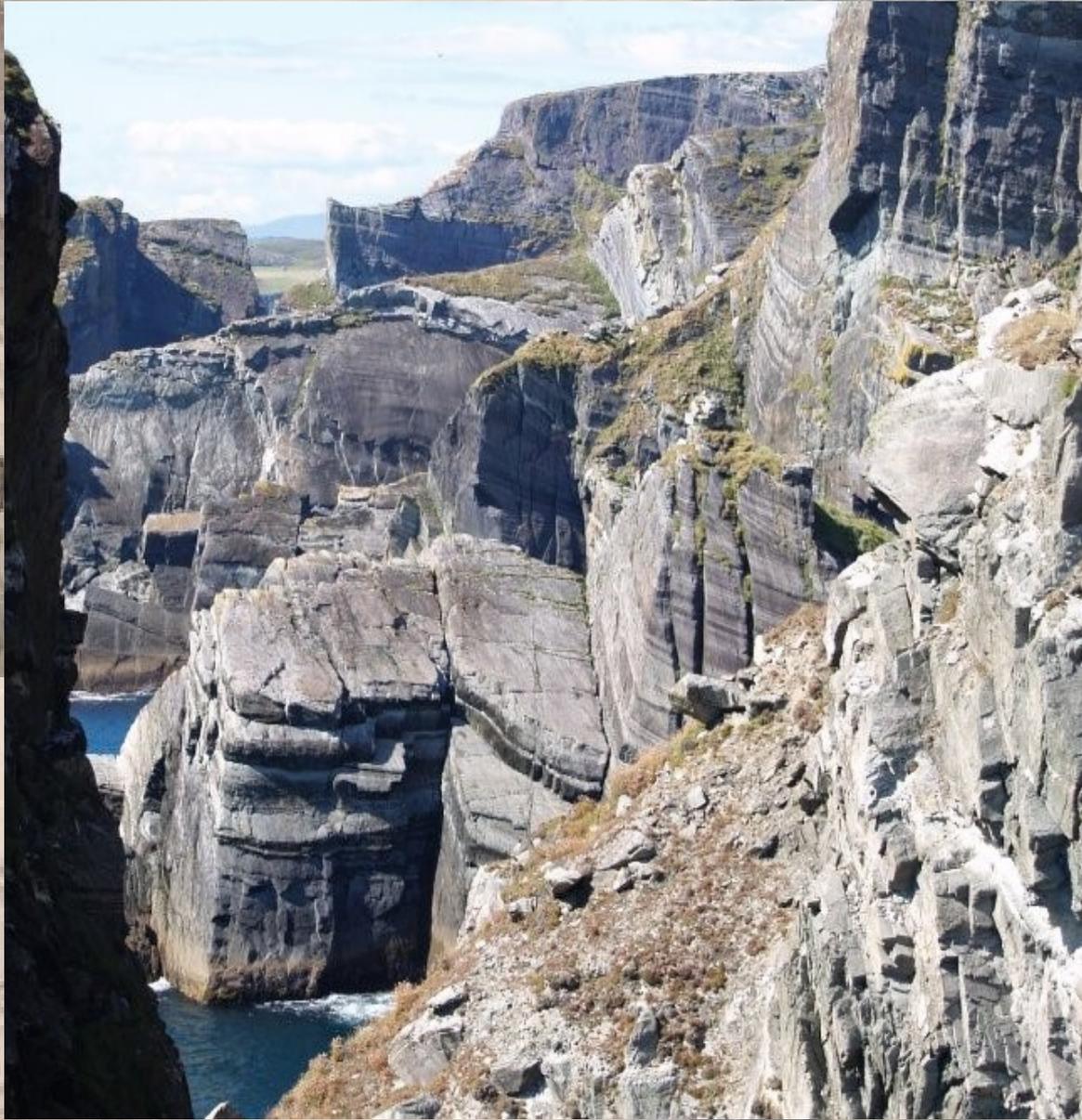
Younger Carboniferous rocks vary around Cork. In the East they are shallow marine Limestones whilst to the west and south they are marine sandstones and shales laid down in another sedimentary basin called the South Munster Basin.

The Carboniferous sequence is therefore Marine and represents the transgression of a southern ocean over Ireland.



People living on the limestone will have base rich groundwater, whilst people on the South Munster Basin sandstones and shales will have acidic groundwater that is high in iron and manganese.

(Will lead to corroding copper pipes and iron staining in the washing machine).



Mizen Head



Watercolour Painting by Georges Victor Du Noyer

# Allihies



John Puxley, 1812 copper mining

*Achaeopteris malicenta* from the Upper Devonian  
Period. Toe Head Sandstone Fmn, West Cork



Old Head of Kinsale  
Devonian- Carboniferous boundary

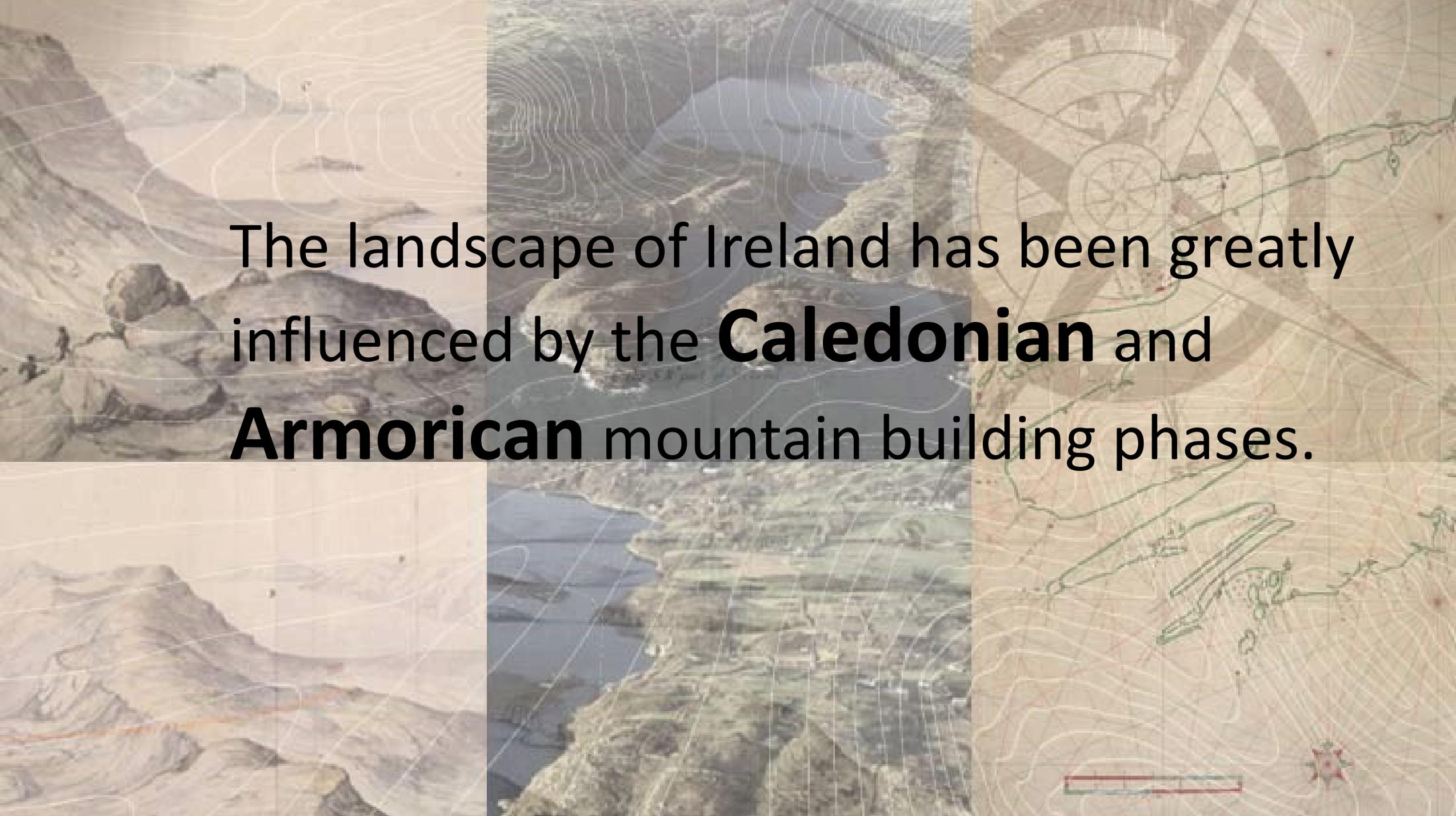


# Experiment



To most geologists, the term "acid test" means placing a drop of dilute (5% to 10%) hydrochloric acid on a rock or mineral and watching for bubbles of carbon dioxide gas to be released. The bubbles signal the presence of carbonate minerals such as calcite or dolomite.

Marble will fizz on contact with dilute hydrochloric acid.  
Granite will not fizz on contact with dilute hydrochloric acid.  
Limestone will fizz on contact with dilute hydrochloric acid.



The landscape of Ireland has been greatly influenced by the **Caledonian** and **Armorican** mountain building phases.

## Caledonian

**Caledonian** mountain building phase occurred 400 million years ago when the Eurasian and North American plates collided.

The discernible north-east to south-west grain in the mountains of the north and west of Ireland and in the Leinster mountains is a legacy of Caledonian folding.



## Armorican

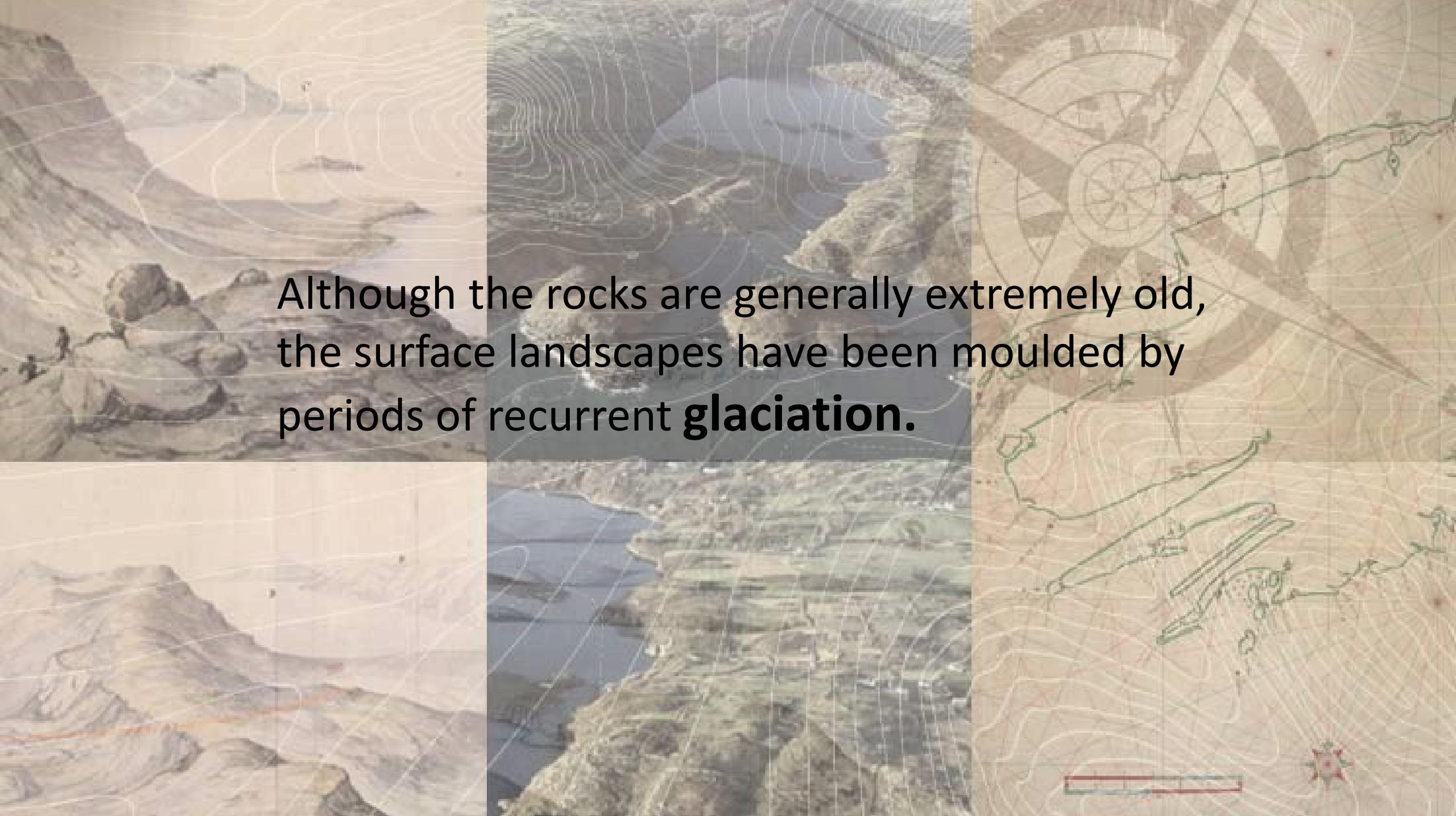
**Armorican** period of folding occurred about 250 million years ago when the Eurasian and African plates collided.

Responsible for the east-west orientation of the parallel ridges and valleys of Munster.



Anticlines and synclines are the up and down folds that usually occur together and are caused by compressional stress.





Although the rocks are generally extremely old, the surface landscapes have been moulded by periods of recurrent **glaciation**.

# The Quaternary Period

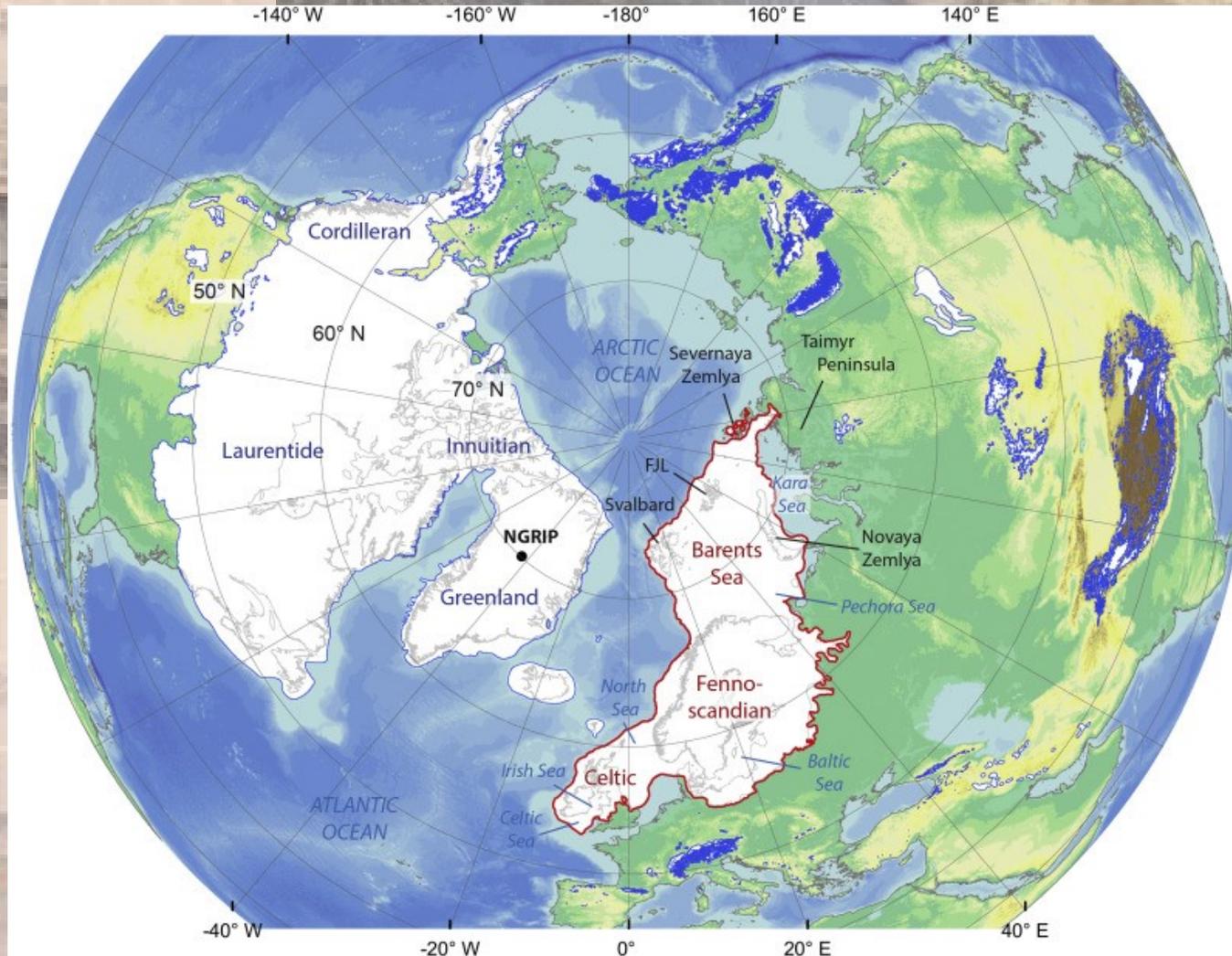
2 Epochs-

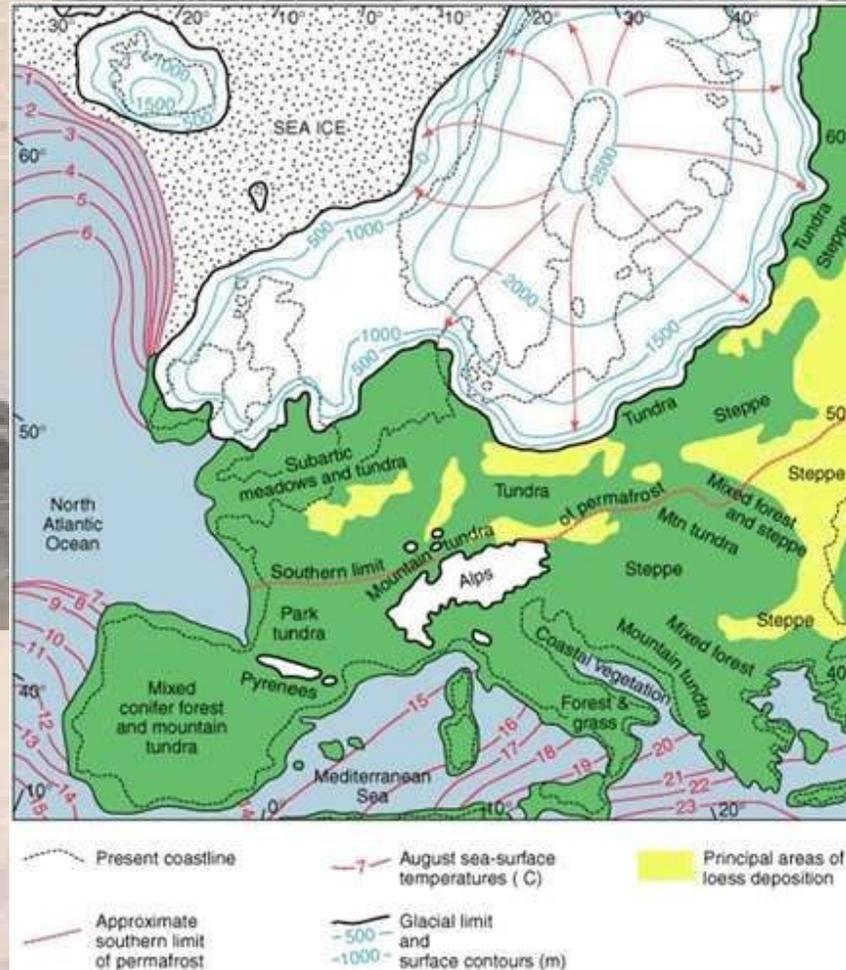
**Pleistocene** (2.6 million years ago until 11,700 YBP)

**Holocene** (from 11,700 years ago until the present day)

- Ice ages or *stadials*
- Intervening warm intervals or *interstadials*
- Last glacial Maximum (LGM) 18 to 20, 000 YBP

# Last Glacial Maximum – Last Ice Age





<http://www.nationalgeographic.com/archaeology-and-history/magazine/2017/01-02/1709-deep-freeze-europe-winter/>



Through processes of deposition or erosion, **glacial features** are formed on the landscape.

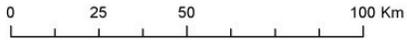
# Drumlin Belt



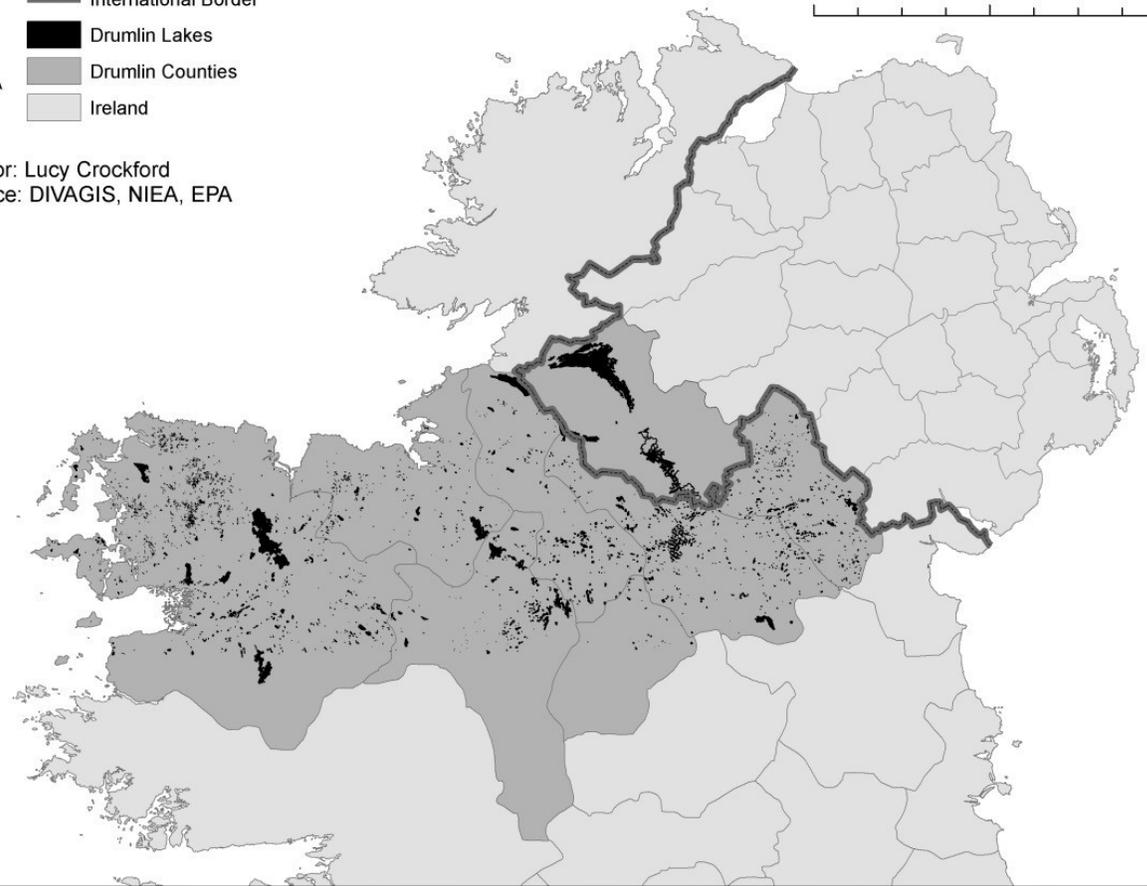
An oval-shaped hill, largely composed of glacial drift, formed beneath a glacier or ice sheet and aligned in the direction of ice flow.



- N
- International Border
  - Drumlin Lakes
  - Drumlin Counties
  - Ireland



Author: Lucy Crockford  
Source: DIVAGIS, NIEA, EPA



# Conor Pass - corrie lakes



E.g. Pedlars Lake which is a corrie lake in the Conor Pass.



# Pass of Keimaneigh

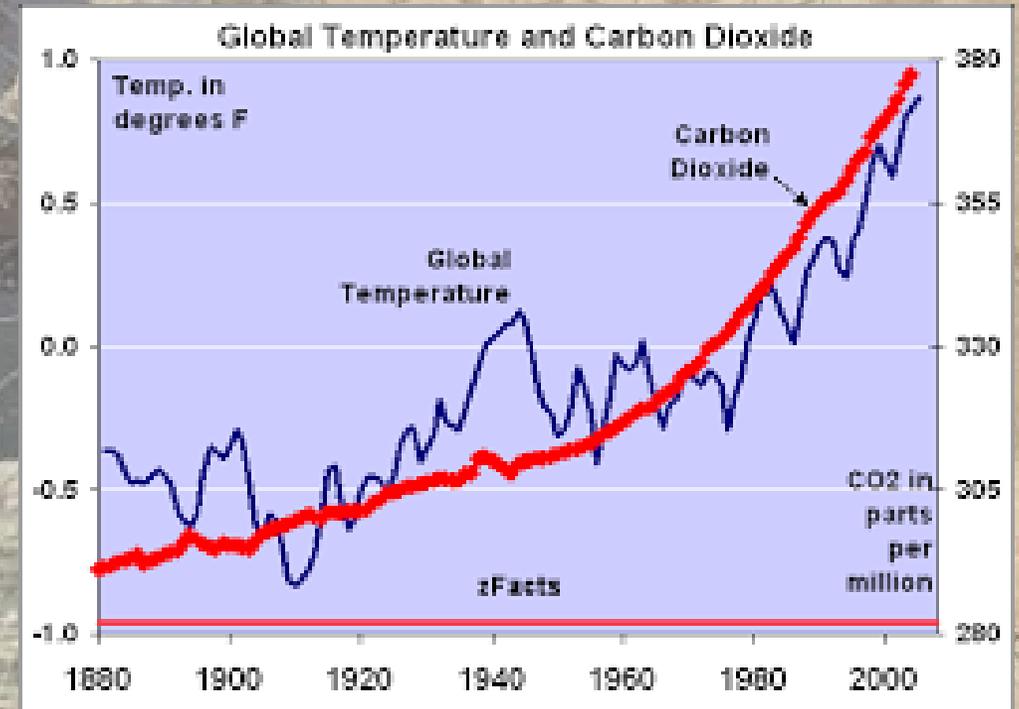
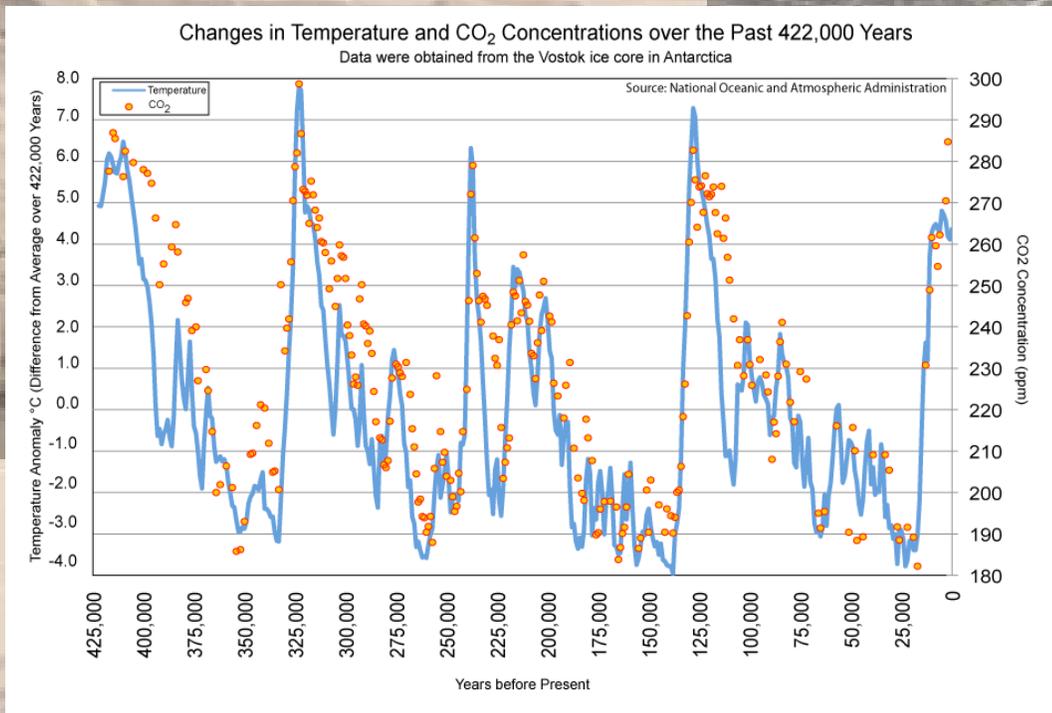


The name translates as 'The Deer's Leap', alluding to a folktale of a deer, pursued by hunters, leaping the pass. Ceim on Fhia

# Lough Hyne

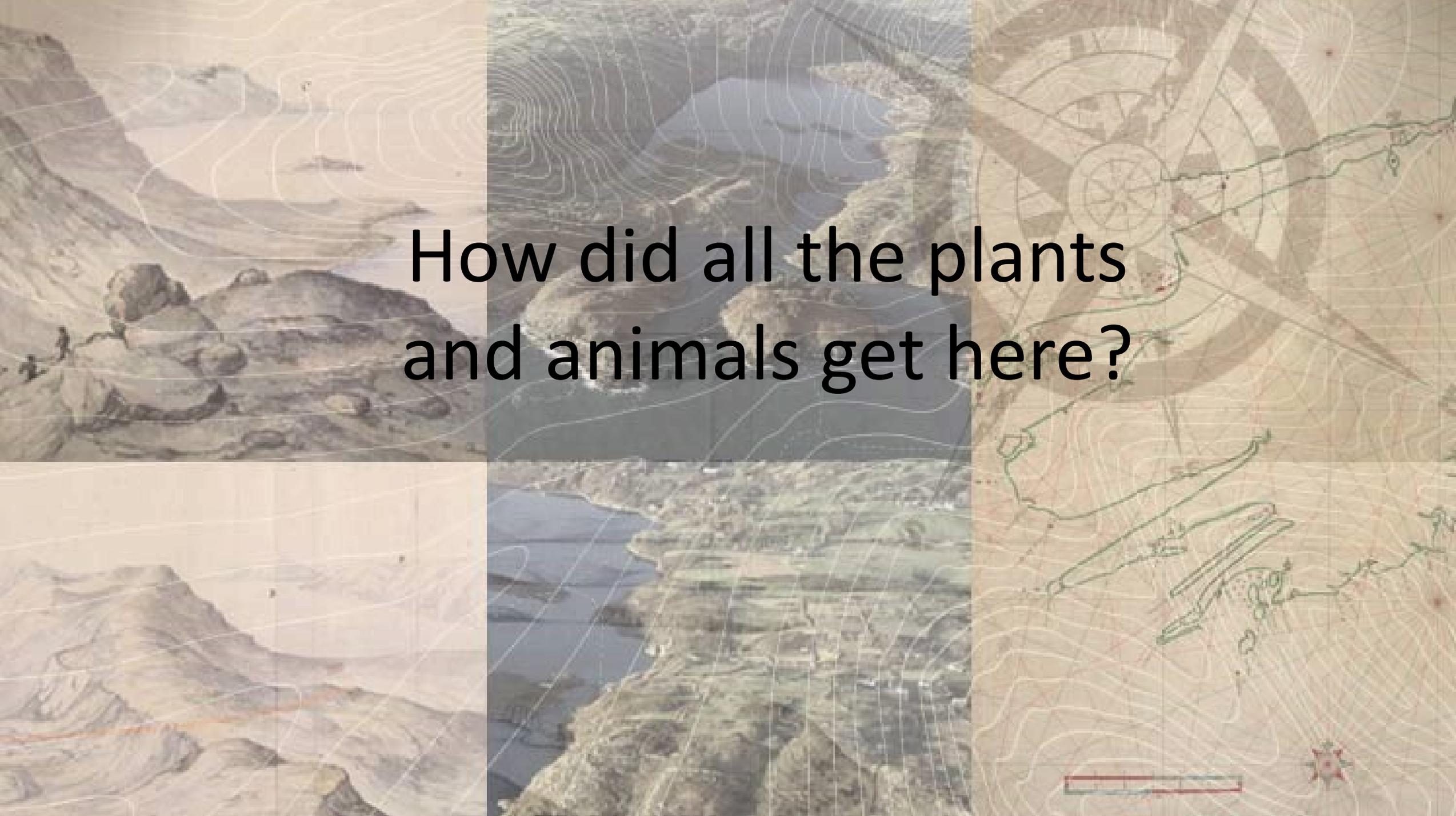


# Natural Cycles of Glaciation

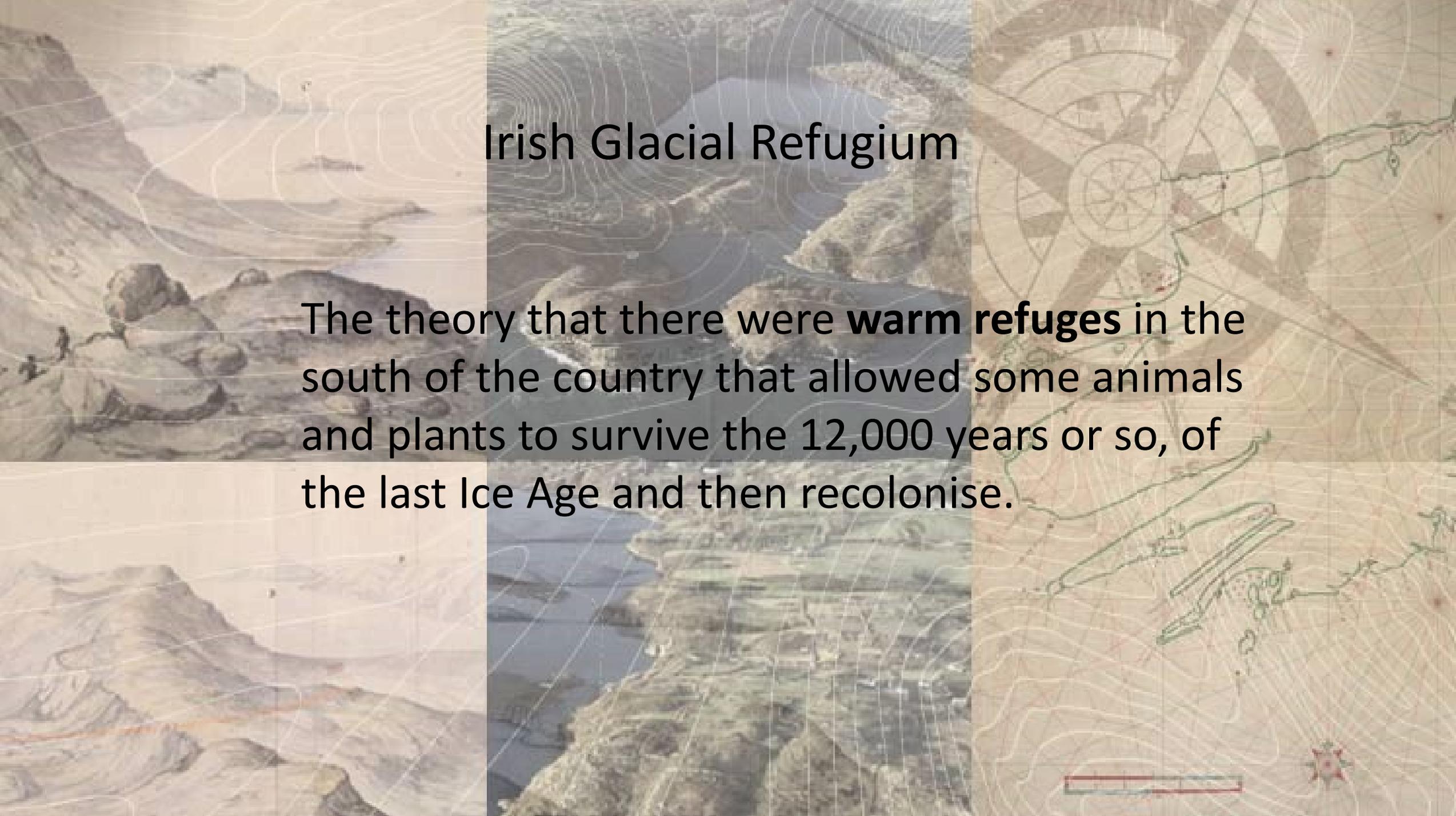


Periods of glaciation and deglaciation are 'normal'

Now we are moving into the era of the Anthropocene



How did all the plants  
and animals get here?



## Irish Glacial Refugium

The theory that there were **warm refuges** in the south of the country that allowed some animals and plants to survive the 12,000 years or so, of the last Ice Age and then recolonise.

A southern ecosystem,  
sheltering animals and plants  
through the last of the Ice Age.



Edward Forbes 'On the Connexion between the Distribution of the existing Fauna and Flora of the British Isles, and the Geological Changes which have affected their areas, especially during the epoch of the Northern Drift'. 1800s

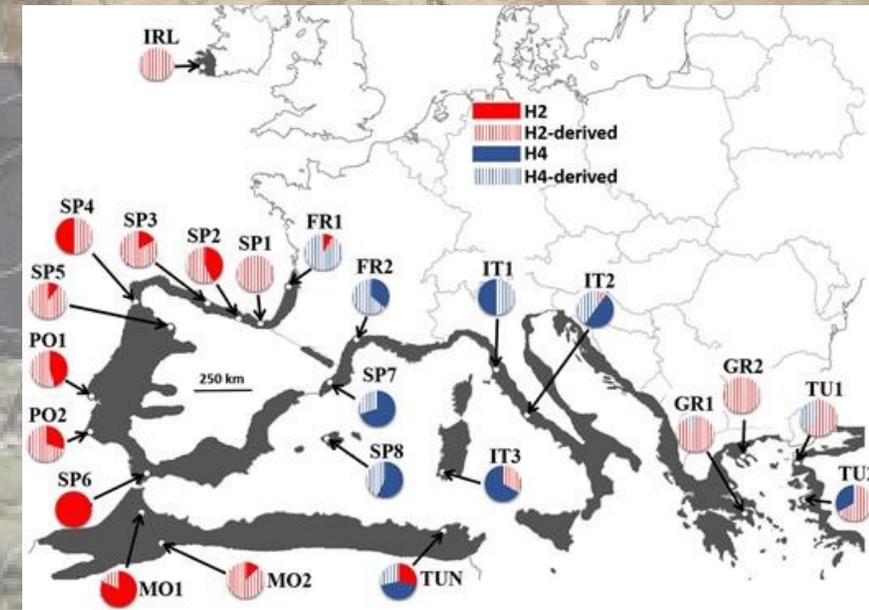
“Native” Irish species, some with ancient and very unusual DNA profiles, the animal list runs as follows: Irish stoat, hare, otter, badger, red squirrel,



Wood mouse,  
Leisler's bat, natterjack toad,  
and the hairy wood ant.



# Strawberry tree (*Arbutus unedo*)



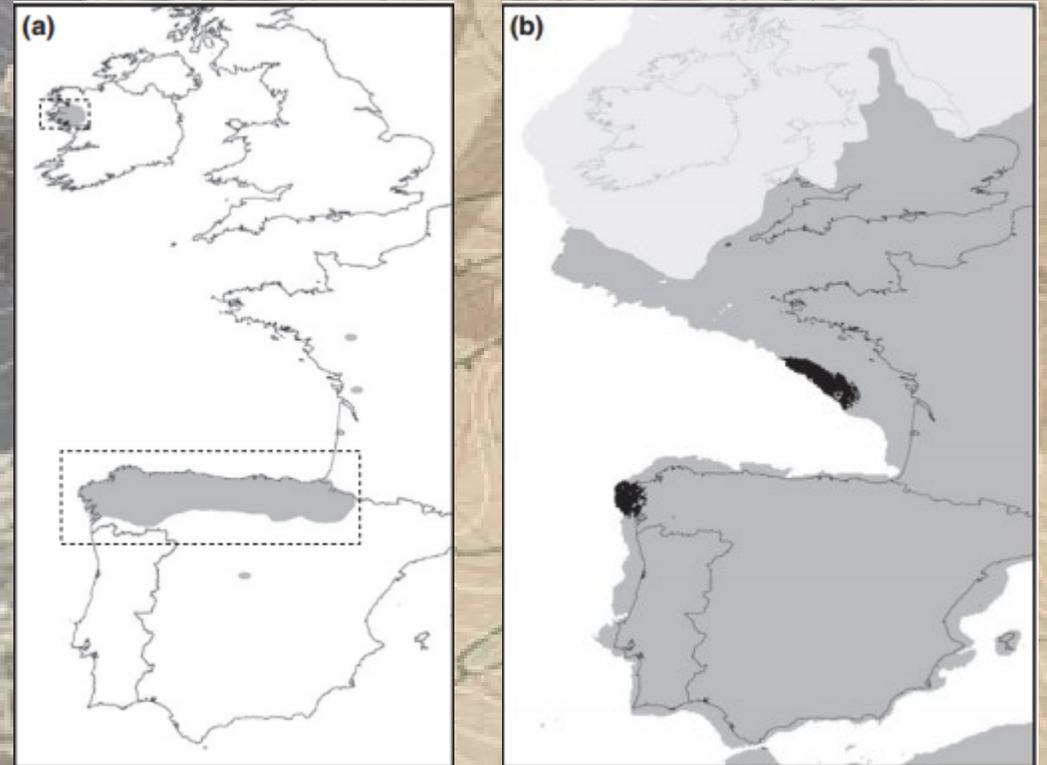
# Kerry slug and Pyrenean glass snail



# St Dabeoc's heath



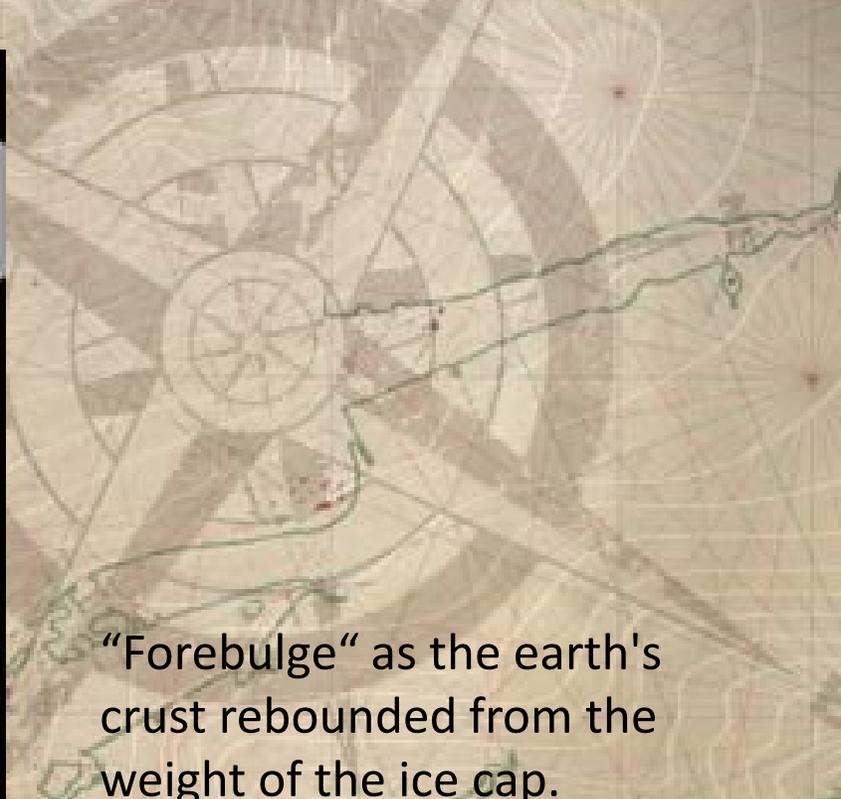
**Figure 1** (a) Present-day distribution of *Daboecia cantabrica* [shaded; based on Webb, 1983, and the Global Biodiversity Information Facility (<http://data.gbif.org/>)] in western Europe. Dashed areas show the regions highlighted in Fig. 3a–c. (b) Palaeodistribution model (black) for *D. cantabrica* at the Last Glacial Maximum (LGM, c. 21 ka). The limits of the British–Irish Ice Sheet at the LGM (after Sejrup *et al.*, 2005) are also indicated in light grey, with areas of dry land at the LGM indicated by dark grey.



# Land bridges

Retreat of the  
Ice





“Forebulge” as the earth's crust rebounded from the weight of the ice cap.

# Succession

Each previous community makes the environment more habitable for subsequent species. At first, only a few species can exist; as time goes by and changes occur in the environment, many more species can occupy the region because the environmental conditions have become favourable for them.



Lichens



Moss



Grasses



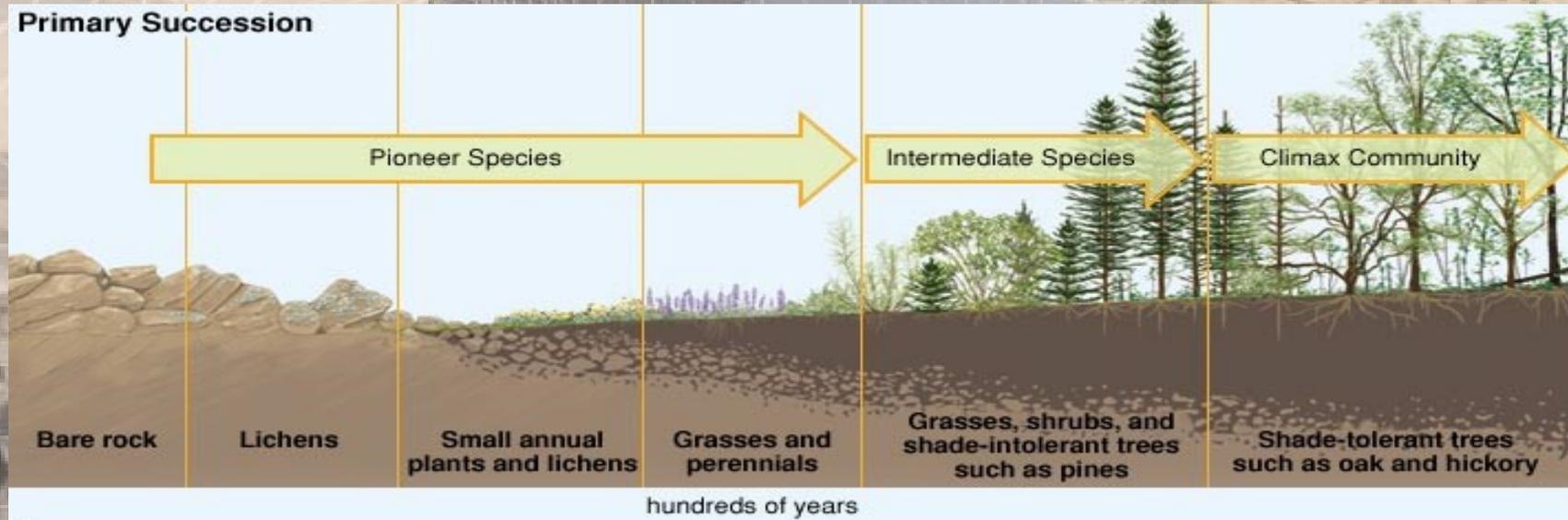
Shrubs



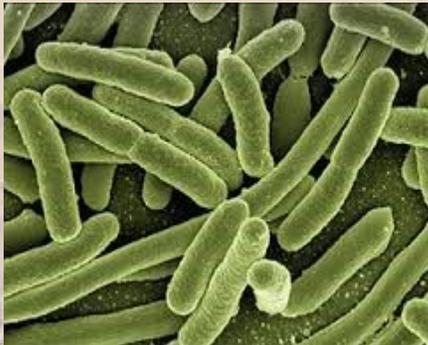
Trees

Ecological succession is the gradual process by which ecosystems change and develop over time.

## Primary Succession



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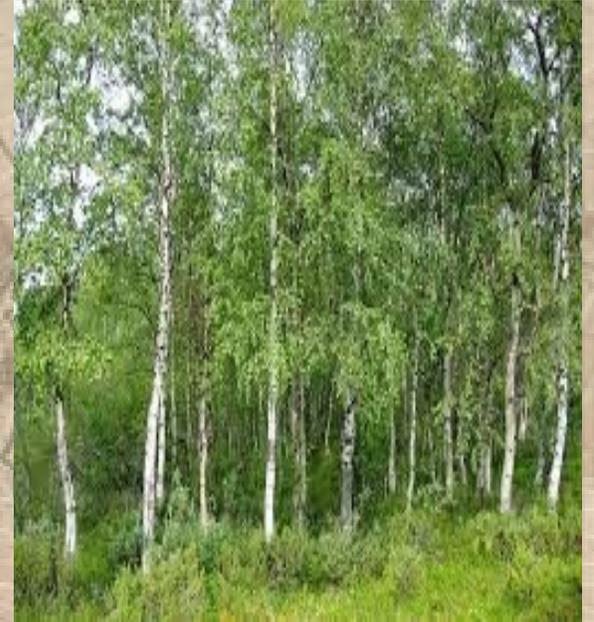




**Scots pine**



**Hazel**



**Birch**

# Ireland an Island

Ireland has been an island for at least 12,000 years

Refugium and land bridges...

How else did flora and fauna get here?



**Man deliberately or accidentally introducing species.**



# Deliberately

Killarney Red deer were introduced into Ireland by humans, probably Neolithic deer farmers, and then went wild?



# Deliberately

Normans



Fallow Deer



Rabbits

# Coney Island near Baltimore

Rabbits - Could this be what Coney Island near Baltimore was used for?



# Deliberately



Sir Walter Raleigh introduced potatoes to Ireland in 1589 on the 40,000 acres of land near Cork...

# Estates

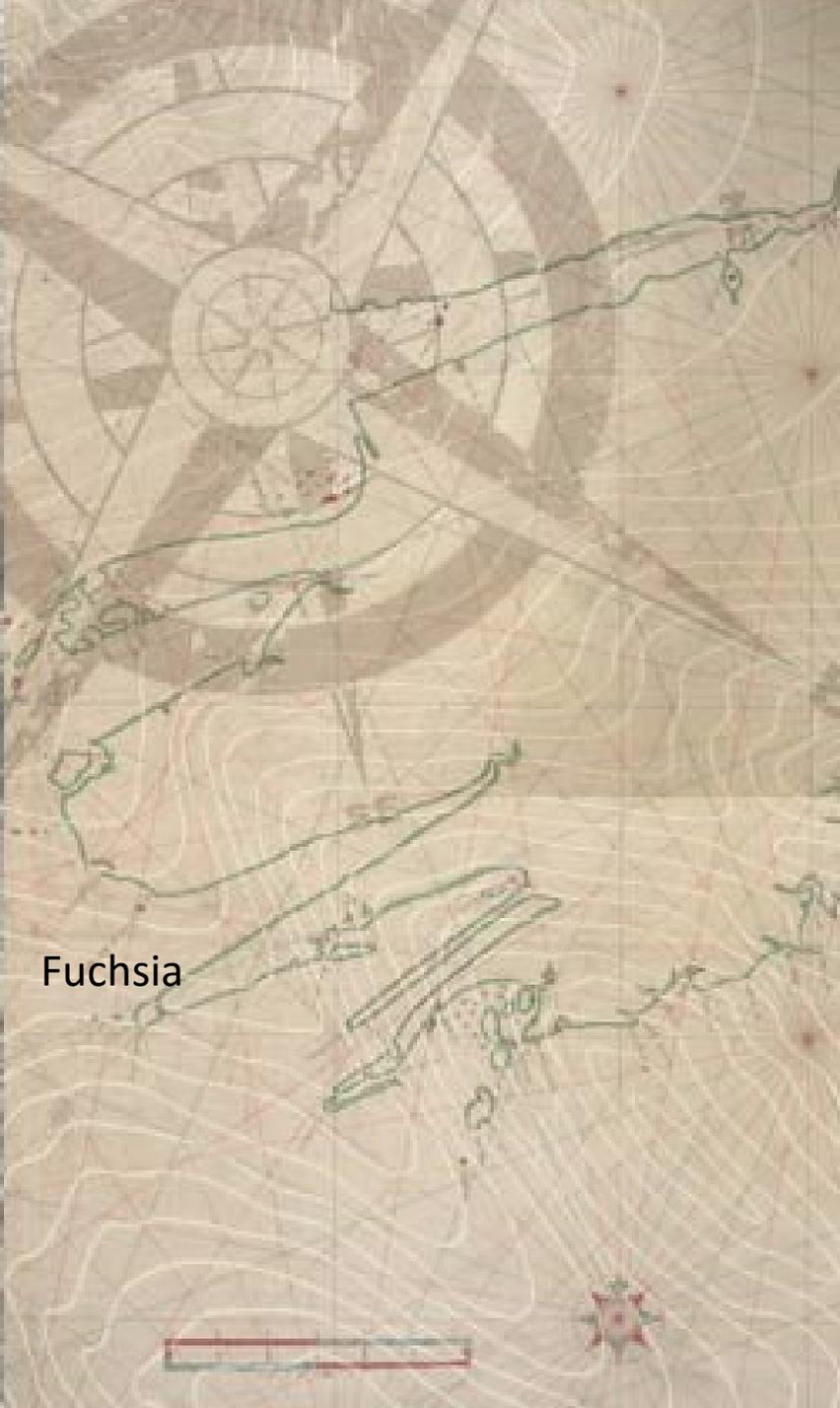


rhododendron



montbretia





Fuchsia

# Accidental



## Giant rhubarb - Gunnera

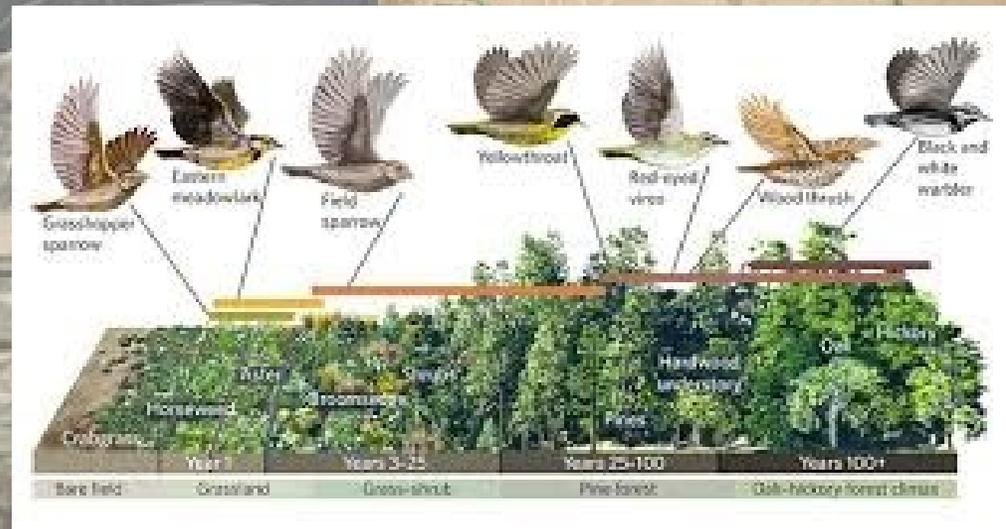
Originally introduced into Ireland as a desirable, architectural, garden plant and then it escaped.



# Birds

Birds don't follow these rules.

Availability of food in the receiving island, would have been essential.





## Native versus Non-native

General rule is: If it got here on its own then it is native.

# Native versus Non-native

## **Native:**

- Evolved in a particular region over a long period of time.
- Adapts to the climate, hydrology and geology of its region.
- Found in “communities”, meaning they have grown together with other plant species providing habitat for wildlife.
- Positive impact on the local environment and ecosystem.

## **Non- Native:**

- Introduced to an environment in which they did not evolve.
- Introduced deliberately or by accident.



Red Deer

VS



Egret

# Native vs Non-Native vs Invasive

	Where is it from?	How does it behave?
Native to Ireland	Ireland - Historically occurred and evolved in Ireland	In balance with other species
Non-native to Ireland	Away - Intentionally or accidentally introduced to Ireland	Does not disrupt natural ecosystem processes
Invasive to Ireland	Away - Intentionally or accidentally introduced to Ireland	Displaces native species, negatively impacts ecology, economy, human health or way of life