Arran Geopark

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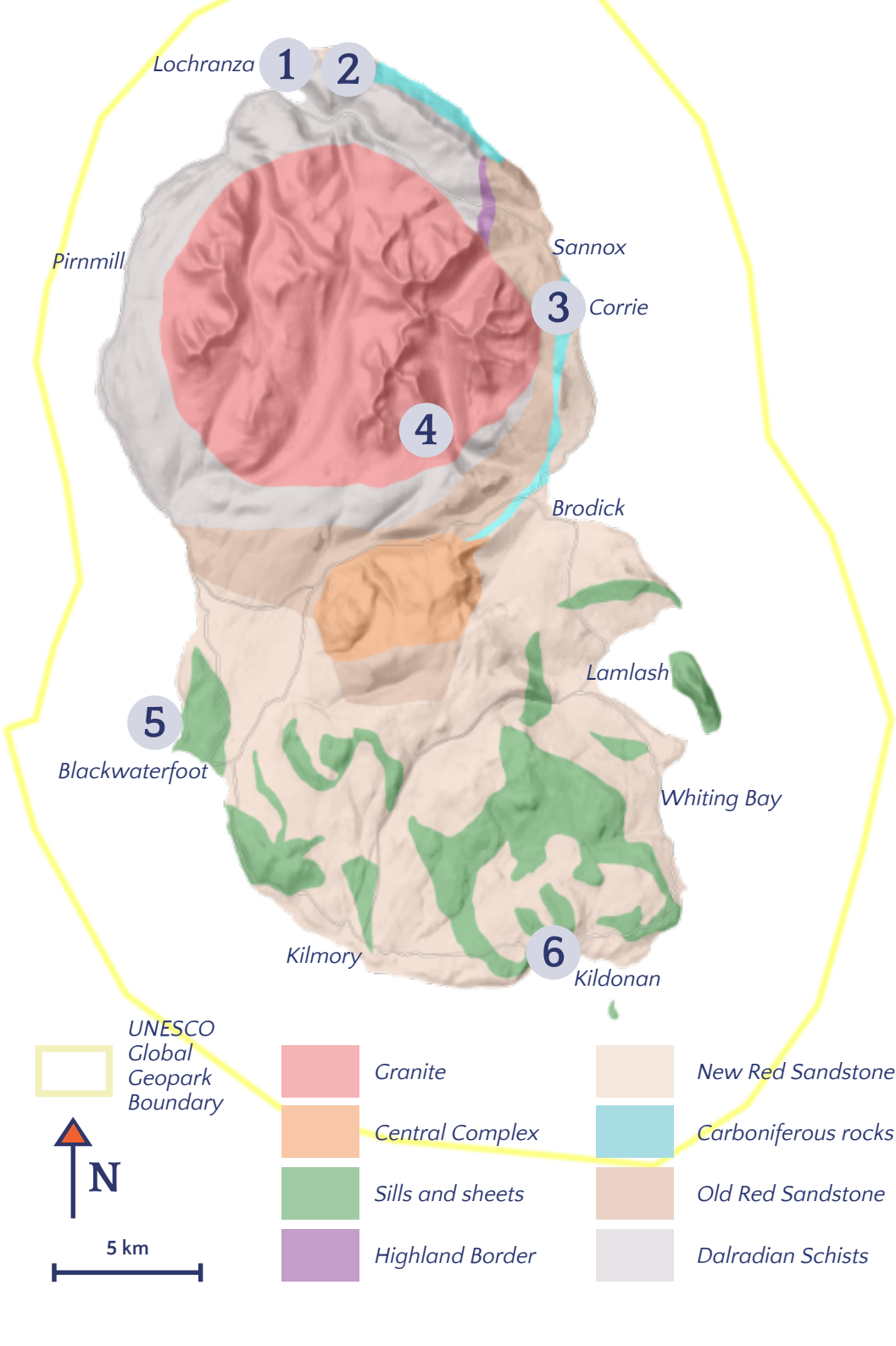
Walking Guide

£3 – suggested donation

Details of how to donate on reverse


Lochranza
1
2
Pirnmill
Sannox
3
Corrie
4
Brodick
Lamlash
5
Blackwaterfoot
Whiting Bay
Kilmory
6
Kildonan
UNESCO Global Geopark Boundary
N
5 km
Granite
Central Complex
Sills and sheets
Highland Border
New Red Sandstone
Carboniferous rocks
Old Red Sandstone
Dalradian Schists

Arran Geopark

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Six self-guided walks exploring Arran's internationally important geoheritage.

1. Hutton's Unconformity
2. North Arran Circuit
3. Corrie Shoreline
4. Glen Rosa
5. King's Cave & Drumadoon
6. Kildonan

Look out for the marker posts!

There are numbered wooden posts at each of the points marked on the walks maps.

Parking and access: please park considerately and follow any local signs - space may be limited. Suggested parking locations are given using What3Words. 🌿 Consider using the local bus service instead.

The essentials of the Scottish Fossil Code

SCOTTISH FOSSIL CODE

Seek permission – You are acting within the law if you obtain permission to extract, collect and retain fossils.

Access responsibly – Some locations, such as Sites of Special Scientific Interest are protected by law; damage to these sites is a criminal offence.

Collect responsibly – Exercise restraint in the amount collected and the equipment used. Be careful not to damage fossils and the fossil resource. Record details of both the location and the rock type.

Seek advice – If you find an exceptional or unusual fossil do not try to extract it, but seek advice from an expert.

Label and look after – Collected specimens should be labelled and taken good care of to prevent deterioration and loss.

Donate – If you are considering donating a fossil - or maybe your entire collection - consider the Arran Heritage Museum in Brodick.

What makes Arran so special?

Known as "Scotland in Miniature", the Isle of Arran perfectly captures the nation's breathtaking variety of landscapes — from rugged mountain peaks and lush farmland to wild coastlines.

This remarkable diversity stems from the island's unique geology. The Highland Boundary Fault divides Arran, separating the older northern rocks, linked to the Grampian Mountains, from the younger formations in the south — mirroring the geological split seen in mainland Scotland.

Arran's rocks tell an incredible half-billion-year story of moving continents, vanished mountain ranges, prehistoric deserts, tropical jungles, volcanoes, and long-extinct creatures.

It's also where James Hutton, the "Father of Modern Geology", developed groundbreaking theories that revolutionized our understanding of Earth's history. Arran is a captivating living record of our planet's past.

What is a UNESCO Global Geopark?

UNESCO Global Geopark status is awarded to special places with internationally important geology and outstanding natural and cultural value - just like Arran!

Geoparks highlight the links between geological heritage and all other aspects of the area's natural and cultural heritage.

Geoparks use this heritage to raise awareness of key issues facing society in the context of the dynamic planet we all live on. In doing so, they encourage respect for the environment and promote local sustainable economic development.

How can I support Arran Geopark?

Get involved! We have regular volunteer work meets from May to September. Check the events page on our website.

Have you thought about donating to Arran Geopark? Details can be found on the back of this guide.

Where can I find out more?

Visit our information centre in Lochranza or the geology room at the Arran Heritage Museum. Join us for one of our guided walks or other events. There's lots more info on our website:
www.arran-geopark.org.uk

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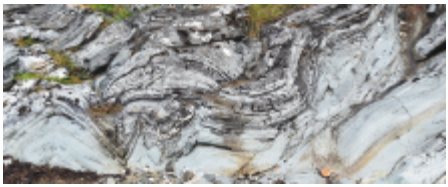
1 Hutton's Unconformity

This 3 km walk takes you to one of the most historically important geological outcrops in the world. The observations that James Hutton made on Arran were crucial to forming a modern understanding of geology and the age of the Earth.

Parking: ///learn.clauses.lordship **Bus**: 324 to Newton Road, Lochranza

1 **Folded Dalradian schists –** The Dalradian schists are the oldest rocks on Arran. They were formed as sediments on the ocean floor over 550 million years ago. These metamorphic rocks were shaped by intense heat and pressure deep within the Earth. On the shore here, you can see how much they have been folded. Imagine the pressures involved in deforming these solid rocks like toffee!



These rocks have been deformed and folded by tectonic processes deep in the Earth

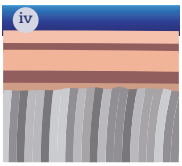
2 **Carboniferous sandstones –** The rocks you have been walking over are grey Dalradian schists. Notice that the layers of rock are dipping steeply – almost vertically. Ahead of you, you can see layers of orange/brown Carboniferous sandstone, these are sloping gently towards the sea.

3 **Hutton's Unconformity –** James Hutton was an eighteenth century Scottish geologist who visited Arran in 1787. At that time it was thought that the Earth was around 6,000 years old. In Lochranza he noticed that the gently-sloping sandstones lay directly on top of the steeply-dipping schists. It is this contact between the two that is the famous 'unconformity'.

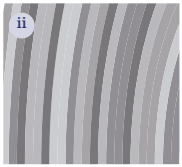
Hutton reasoned that such a structure must have taken millions of years to form. From his observations on Arran, Hutton concluded that the Earth must be unfathomably old; thus introducing the concept of 'deep time' to the scientific community.

Hutton's Unconformity is the junction where Dalradian schist meet Carboniferous sandstone

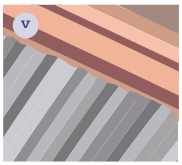
540 million years ago, sediment was deposited in an ocean and compacted to form sedimentary rock.



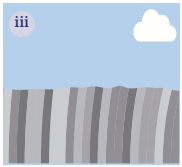
350 million years ago, this landscape was covered by a shallow sea. More layers of sedimentary rock formed on top.



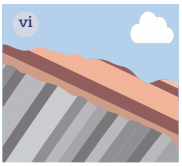
Collision of tectonic plates caused immense heat and pressure, which folded and tilted these rocks.



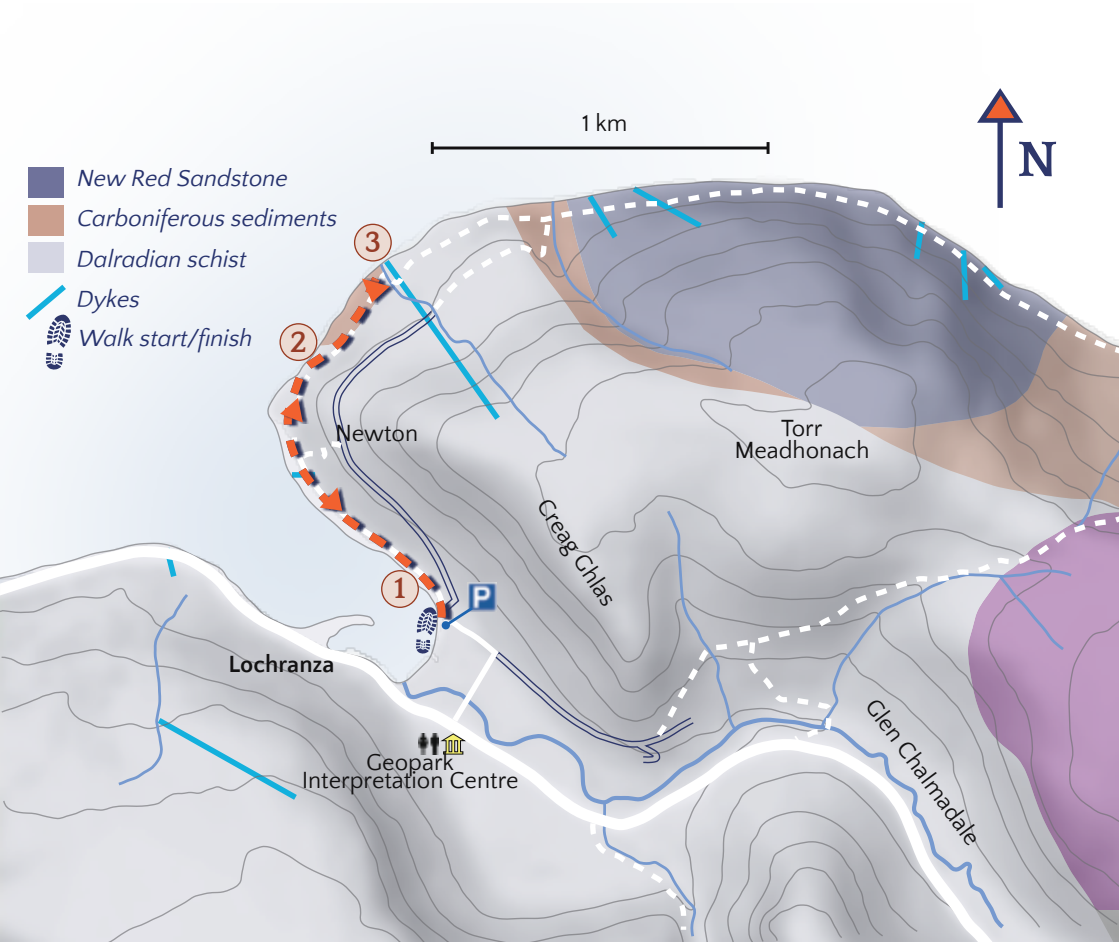
Once again, these rocks were tilted and uplifted to the Earth's surface.



As the landscape eroded away, these rocks were brought to the surface.



Erosion at the surface has shaped the outcrop into what it looks like today!



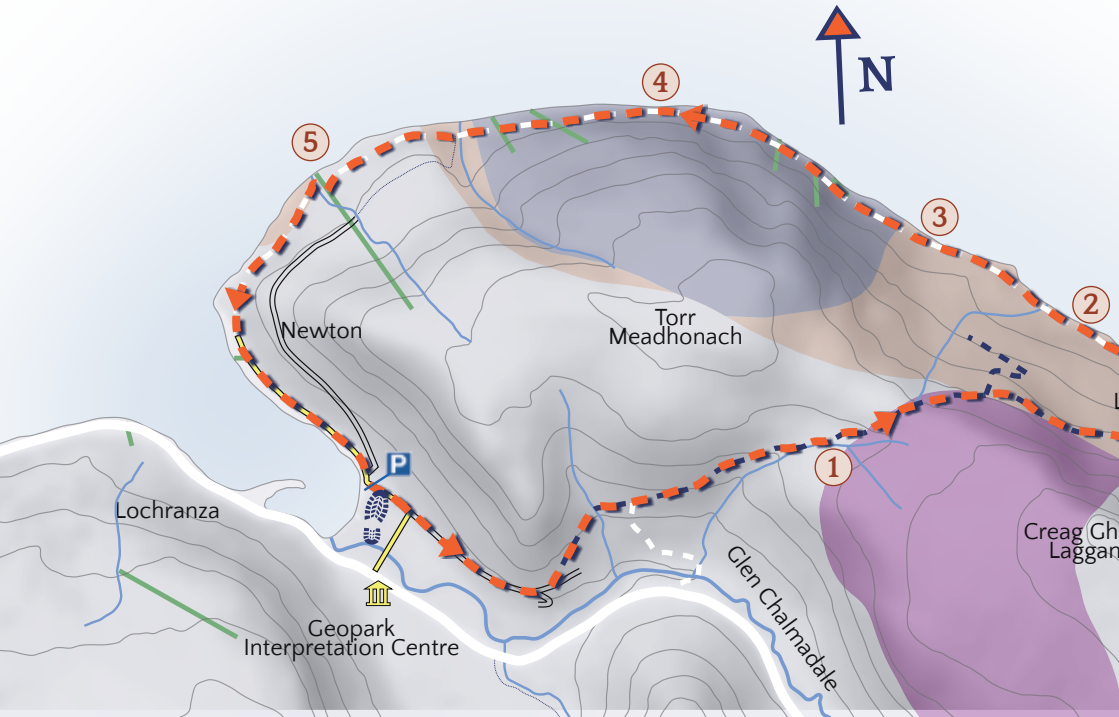
2 North Arran Circuit

This challenging 12 km circular walk through remote coastal terrain visits many important geological and historical locations. Find the footprints of a giant millipede and see the place where James Hutton changed scientific thinking forever.

Parking: ///learn.clauses.lordship **Bus**: 324 to Newton Road, Lochranza

Slates that were not deemed to be of a high enough quality were dumped by the old quarry.

1 **Lochranza slate quarry –** Look up the hill to the right of the path to see the remains of the old slate quarry. These slates are the oldest rocks on Arran at around 540 million years old. They were quarried for a short time for use as roofing slates. Some samples contain crystals of pyrite, also known as 'fool's gold'.

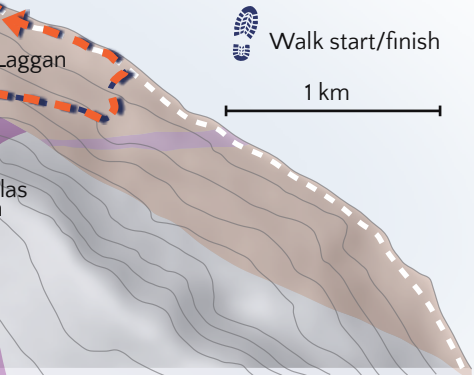


2 Coal mines and Arthropleura trackway – This is the site where Arran's only coal seam was exposed at the surface. You can still see the pits where it was mined. The ruined buildings are the old salt works, where the coal was burned to evaporate seawater.

On a sloping sandstone bed in a small bay next to the salt works, two parallel lines of footprints can be seen. This trackway was left by a giant millipede called *Arthropleura*, which lived around 300 million years ago. Palaeontologists have calculated that the animal that made these tracks was 1.6m long. Meet a replica in the Lochranza Interpretation Centre!

The famous Arthropleura trackway is seen on a sandstone bed near Laggan. Arthropleura, at up to 2m long, was the largest invertebrate that ever lived on land!

The trackways are on this sloping sandstone layer next to one of the ruined buildings.



3 Desert sandstones – The rocks along this section of the coast belong to a geological unit called the New Red Sandstone. They were deposited in a desert during

the Permian around 270 million years ago. Some layers contain fragments of other rocks. These were laid down by flash floods during storms.

Ossian's Cave can be found in the sandstone cliffs on the left of the path. Ossian was the great poet of Celtic mythology. The walls of the cave contain carvings, including one of a three-masted ship, that may date to the 18th century.

Individual sand dunes can still be made out in the Permian sandstones of north Arran.

4 **An Scriodan rockfall** – The path winds between boulders of sandstone and conglomerate that fell from the cliffs above as a huge rockfall in the 18th century. The noise was reportedly heard on the Isle of Bute and on the mainland!

5 **Hutton's Unconformity** – James Hutton is considered the father of modern geology. He came across this outcrop in 1787, and noticed that gently sloping sandstones lay right on top of steeply dipping schists. This junction of rocks is known as an 'unconformity'.

Hutton reasoned that the time taken for geological processes to create this feature must have been immense. At this time, the Earth was thought to be 6,000 years old, but Hutton knew that an unconformity could not possibly form in that time.

He proposed that the Earth was immeasurably ancient, and thus Hutton introduced the concept of 'deep time'.

Hutton's Unconformity is the junction where Dalradian schist meet Carboniferous sandstone

Photo: Jessica Pugsley, University of Aberdeen

3 Corrie Shoreline

This short 2.5 km walk takes you through 100 million years of Arran's geological past! During this time, Scotland was moving north across the equator from the Southern Hemisphere. At Corrie you can follow this journey from the older rocks in the north to the younger rocks in the south.

Parking: ///snacks.punk.brisk **Bus**: 324 to the north end of the village

1 **Old Red Sandstone conglomerates –** These rocks formed around 370 million years ago, as sediment was eroded from the nearby Caledonian Mountain Range. The sands and gravels were washed into valleys during flash flood events. Arran's position around 30° south of the equator meant a hot, arid environment, devoid of plants and animals.

2 **Carboniferous volcaniclastic sediments –** This is the start of a significant period of volcanism in Scotland, around 340 million years ago. These formed at the same time as the Campsie Fells and Arthur's Seat in Edinburgh. They are dark in colour and contains rounded cobbles of black basalt. It probably formed as a volcanic mudflow after an eruption. These are known as 'lahars' and are common during heavy rain after volcanic eruptions.

3 **Basalt lava –** This blocky black rock is a Carboniferous lava flow. If you look closely at fresh surfaces you can see crystals of brown olivine and black pyroxene. Lava flows like this often form hexagonal columns, for example at the Giant's Causeway (Northern Ireland) and Fingal's Cave (Staffa). Can you see any hexagonal patterns in the rocks here?

Hexagonal structures are visible in the Carboniferous lava, these have been eroded by the sea

4 **Limestone –** These cliffs show layers of limestone and mudstone that were deposited in a shallow tropical sea when Arran was near the equator. The Old Corrie Harbour across the road is not a natural feature, it was quarried for limestone. Up the track you can

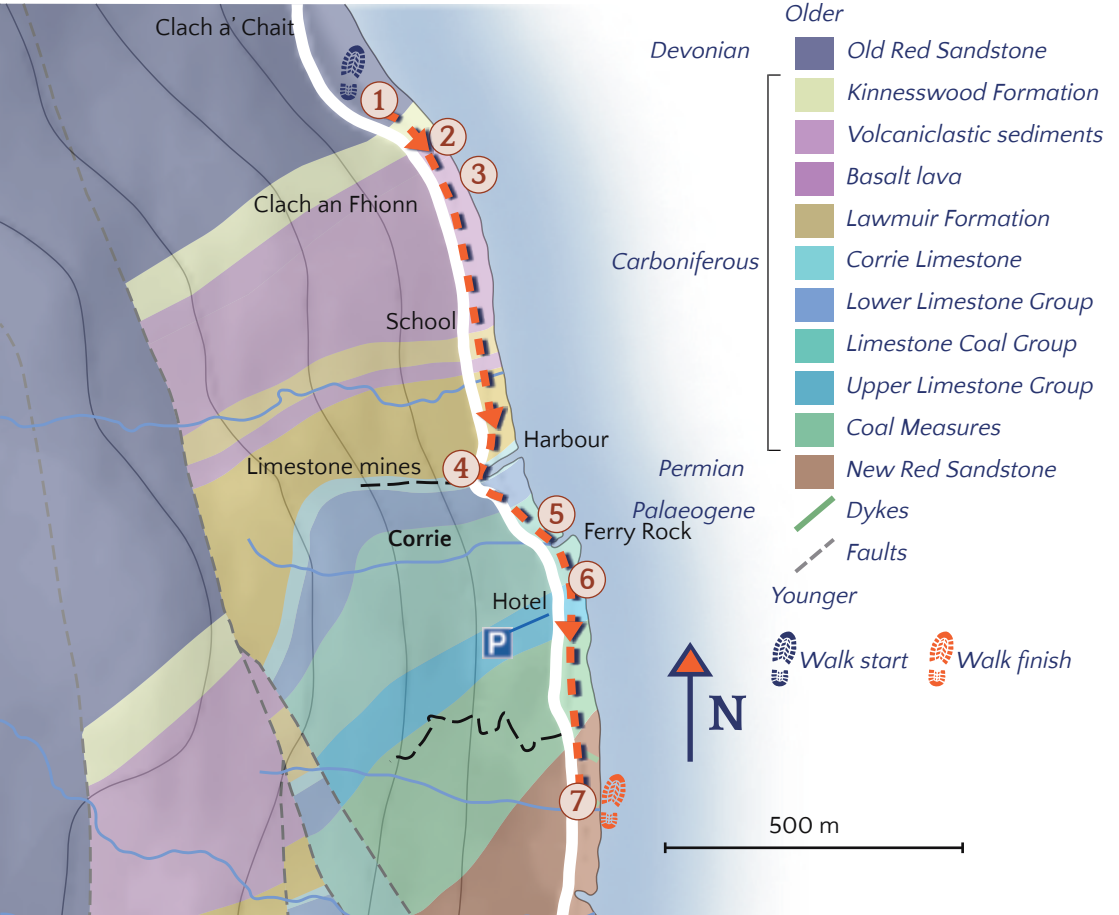
see the remains of a kiln where the limestone was turned into lime for use in farming. Do not enter.

5 Sedimentary cycles – Between the old Corrie Harbour and Ferry Rock you can see repeating layers of sandstone, limestone, and mudstone. These cycles show rising and falling sea levels, as limestone and mudstone are marine sediments and the sandstones are river sediments. The sandstone tends to form ridges crossing the shore – some contain plant fossils!

Do not damage or attempt to remove any fossils. This entire shoreline is a protected Site of Special Scientific Interest (SSSI).

6 Ferry Rock – Ferry Rock is a small promontory made of white sandstone. This rock is very pure, and makes an attractive building stone. You can still see the drill marks on the north side of the rock where it was quarried.

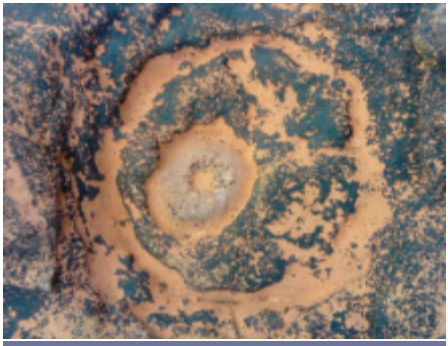
7 New Red Sandstone desert – The sandstones here are a very striking red colour, due to the



presence of iron oxide. They were deposited in a great sandy desert when Arran was 30° north of the equator. You can still see evidence for the individual dunes which formed around 270 million years ago. There are distinctive pockmarked areas of "honeycomb weathering", likely caused by salt erosion and the frequent wetting and drying of the rock.

The deep hollow that has been carved into the rock is known as the Doctor's Bath. It fills up with water at high tide. This was built by the Victorian physician Dr McCredey and his patients would bathe here. Fancy a dip?

Around 70m to the south of the bath is a strange circular marking on the face of the rock. This is a fossilised lightning strike (*fulgurite*) marking where sand dunes were struck by lightning and fused by the heat around 270 million years ago! Can you find it?



270 million years ago, a bolt of lightning struck a desert sand dune

Photo: NTS Arran Ranger Service

4 Glen Rosa

This 4.5 km walk explores Glen Rosa, a spectacular glaciated U-shaped valley, managed by the National Trust for Scotland. At its maximum, around 18,000 years ago, the ice would have been hundreds of metres thick here.

Parking: ///roost.forecast.mystery **Bus**: 322 to Glen Rosa road end

This is what Glen Rosa would have looked like during the last Ice Age!

Glaciers are an incredibly powerful agent of erosion. Rocks from the mountains are ripped away from the landscape and become embedded in the base of the glacier. As they move downhill – like slow rivers of ice – they act like sandpaper scouring out these deep glens.

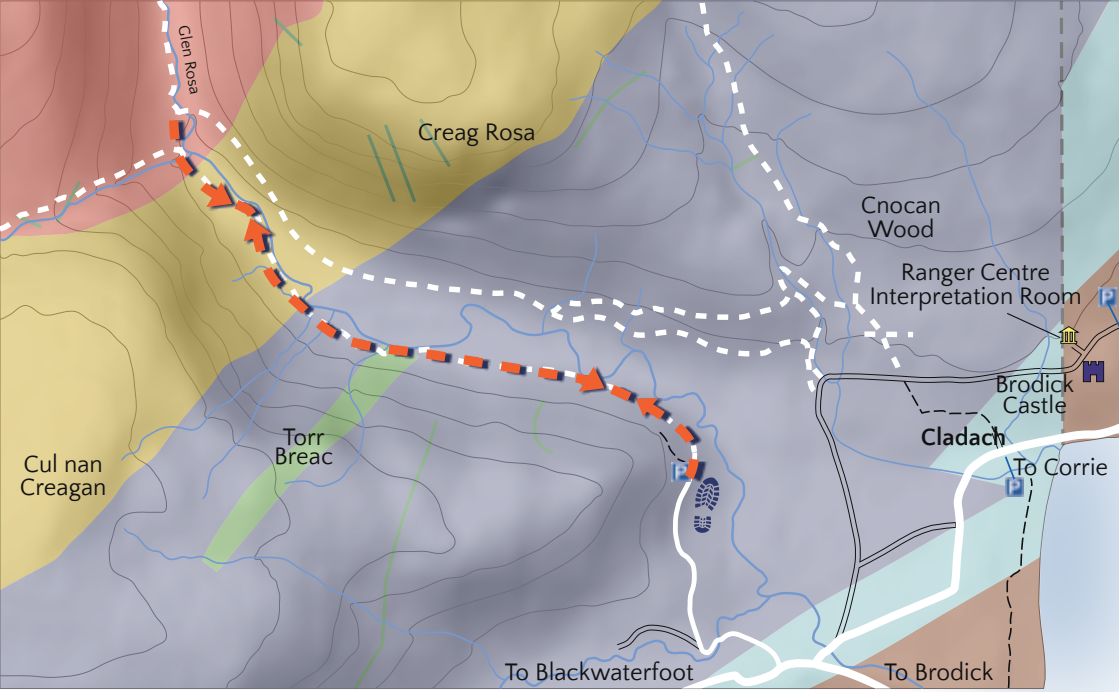
The lower glen – This area is typical of a glaciated valley: the sides of the glen are steep and the floor is flat, with a stream that is too small to have eroded this valley on its own. This 'U-shape' is characteristic of glens that have been carved by ice.

Evidence of glaciers – As you walk further into the glen, you will see large mounds either side of the Rosa Burn. These are called moraines – thick piles of sediment dumped by the glacier that carved out Glen Rosa.

Glaciers are full of eroded rock particles, from microscopic fragments to huge boulders. When the ice melts, these sediments are left behind and provide geologists with evidence of past processes.

Cir Mhor – Just before you reach the Garbh Allt bridge, you will have a fantastic view of Cir Mhor. It is perhaps Arran's most impressive mountain, and is an example of a

Cir Mhor from Glen Rosa



'pyramidal peak' – a mountain formed as several glaciers eroded backwards towards each other. All of the highest mountains surrounding Glen Rosa are made of granite, a hard igneous rock that formed from the cooling and solidifying of magma 60 million years ago.

Most of Glen Rosa is owned and protected by the National Trust for Scotland. Trees were once abundant in the area, but overgrazing has meant that they have mostly disappeared. A major project is under way to revive native woodland in the glen. This will improve the biodiversity of the area which is great news for insects, reptiles, small mammals, and for birds of prey – like Golden Eagles and Hen Harriers.

North Arran Granite
Dalradian Schist
Devonian intrusion
Old Red Sandstone
Carboniferous sediments
New Red Sandstone

Dykes
Faults

N

Walk start/finish

1 km

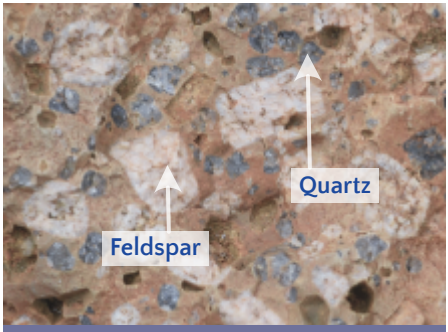
These lumps either side of the river are thick layers of sand and gravel deposited by a glacier.

5 King's Cave and Drumadoon

This 8 km walk takes you through the spectacular and varied geology of the King's Cave coastline. See igneous intrusions, evidence for sea-level change, historic rock carvings, and find the footprints of the mysterious 'hand beast'.

Parking: ///trickled.dragons.posts **Bus**: 322/324 to King's Cave car park

1 An Cumhann dyke - The rock you're now standing on is one of 'Judd's dykes' – a series of magmatic intrusions described by JW Judd in 1893. It is an igneous rock known as a 'porphyry', meaning it contains large crystals in a fine-grained matrix. This intrusion is connected to the main Drumadoon sill.



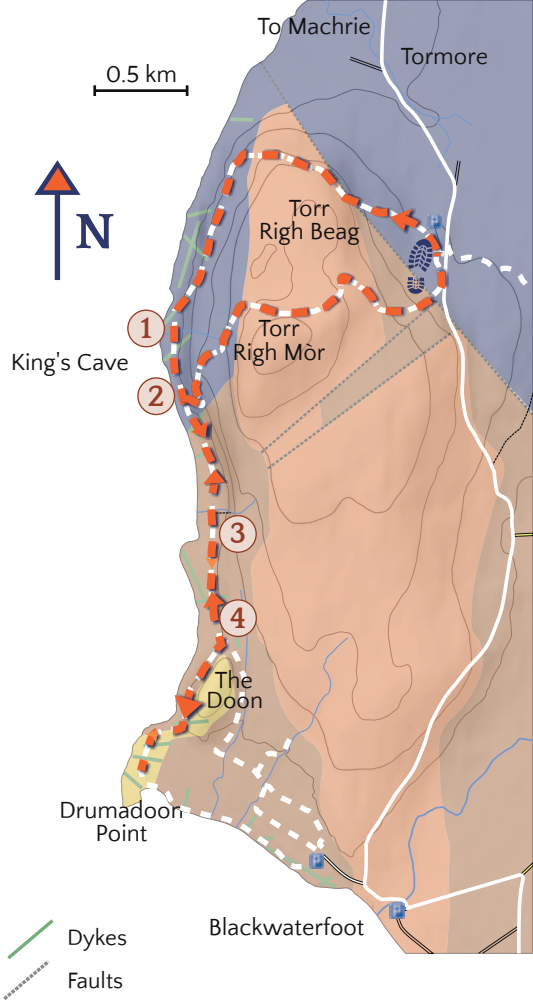
This porphyry contains crystals of quartz and feldspar. Quartz is grey and transparent. The larger white crystals are feldspar.

2 King's Cave is one of several large caves eroded into the New Red Sandstone along this coast. They were worn away by the sea at a time when ice covered much of Scotland. After the glaciers melted and the weight of the ice was lifted, Arran began to rise relative to the sea, leaving a feature known as a 'raised beach'. There are important carvings on the walls of the cave from the Iron Age and early Christian times. Look for crosses, deer, and a group of snakes.

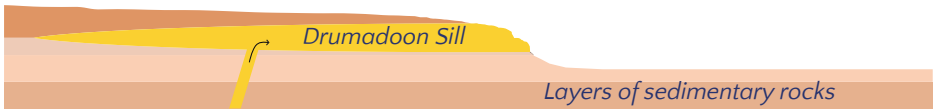
3 Chirotherium footprint - At the end of this path you will find a small vertical rock face with several footprints. These belong to a large reptile that lived at the time of the earliest dinosaurs. The name Chirotherium means 'hand beast', because the prints look like giant

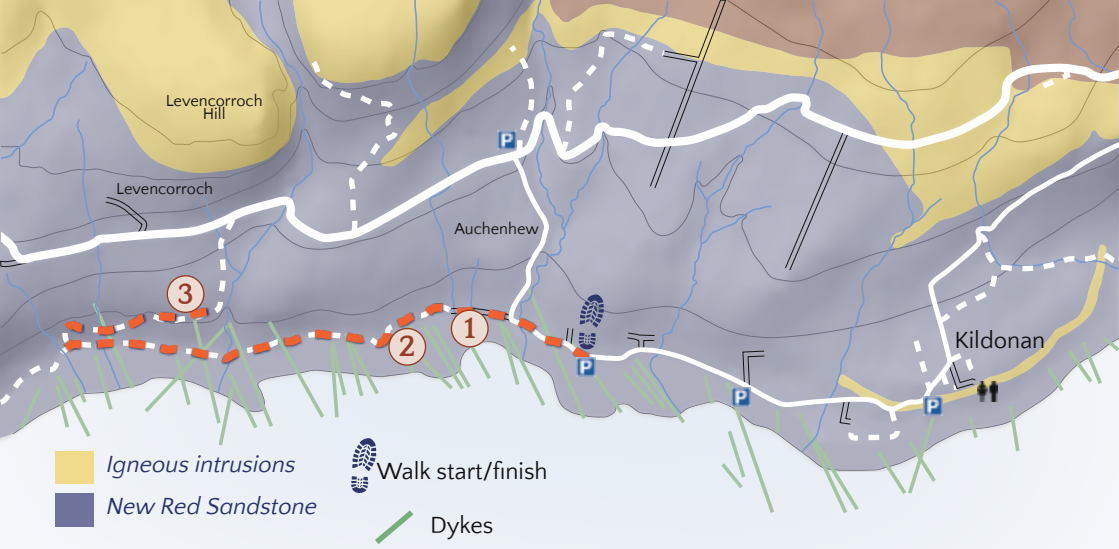
hands – although the digit that points to the side is not its thumb but its outside toe.

4 Drumadoon Sill – The spectacular cliffs are made up of igneous rock like you saw at An Cumhann. The magma was intruded as a sill, meaning that it squeezed its way horizontally between layers of sedimentary rocks. As you walk along the shore below the sill, you get a closer view of the large blocks that have fallen from the cliffs. You should be able to identify quartz and feldspar again. Look for blobs of orange material in the rock, this is a different magma that mixed with the porphyry while both were still molten.



Drumadoon Sill
Other igneous intrusions
New Red Sandstone (Triassic)
New Red Sandstone (Permian)





6 Kildonan shore

The 4 km walk along Arran's southern coast exposes one of the best examples of a 'dyke swarm' in the world! These walls of igneous rock were formed when magma was squeezed up through cracks in the Earth's crust 60 million years ago.

Parking: ///drags.wasp.debut **Bus**: 323 to Kildonan Village Hall

⚠ **Park at the Village Hall, do not drive along the private track to the houses on the shore**

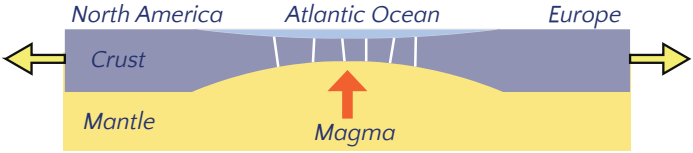
This footprint was left by a 4 metre long reptile that is related to early crocodiles. It lived at the same time as the first dinosaurs.

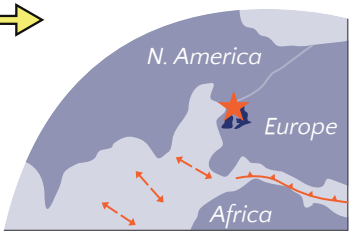
At the end of the track, on the rock platform 50m south of the last houses, there are large footprints **only visible at low tide**. These were left by a large reptile (*Pseudosuchus*) that roamed Arran around 240 million years ago. The fossilised prints are named *Chirotherium,* meaning 'hand-

beast', because they look like giant hand prints.

2 The coastline all along this walk is dominated by dykes that extend out into the sea. They were formed as magma was squeezed through cracks in the Earth cooled and solidified. Have a close look at the rock forming the dykes. You might be able to see crystals that were carried by the magma as it flowed. Also look for small holes, particularly in the middle of each dyke. These were gas bubbles that that were preserved as the magma solidified.

3 From the top of the track you get a good overview of the dyke swarm, as well as views south to the islands of Pladda and Ailsa Craig. These are also made of igneous rocks from around 60 million years ago – Pladda is made up of a basalt, like the dykes, and Ailsa Craig is made of microgranite, used in the manufacture of curling stones. Each one of the dykes represents a crack formed as the crust was stretched. The total thickness of all the dykes at Kildonan shows exactly how much the crust was stretched during continental rifting.





60 million years ago, the North American and European plates were joined, but began to drift apart. The Earth's crust thinned, split, and cracks formed allowing huge amounts of magma to rise up to the surface – in some areas volcanoes erupted.

The island of Pladda is made of the same rock as the dykes. It was formed when magma pushed its way through a horizontal layer in the Earth's crust.

The magma that was squeezed between the cracks may have reached the surface and created 'fissure eruptions' like this recent one in Iceland.

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