

Travelogue of Scotland: Venerable Outcrops and the Visionary Geologists Who Studied Them



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Main Points

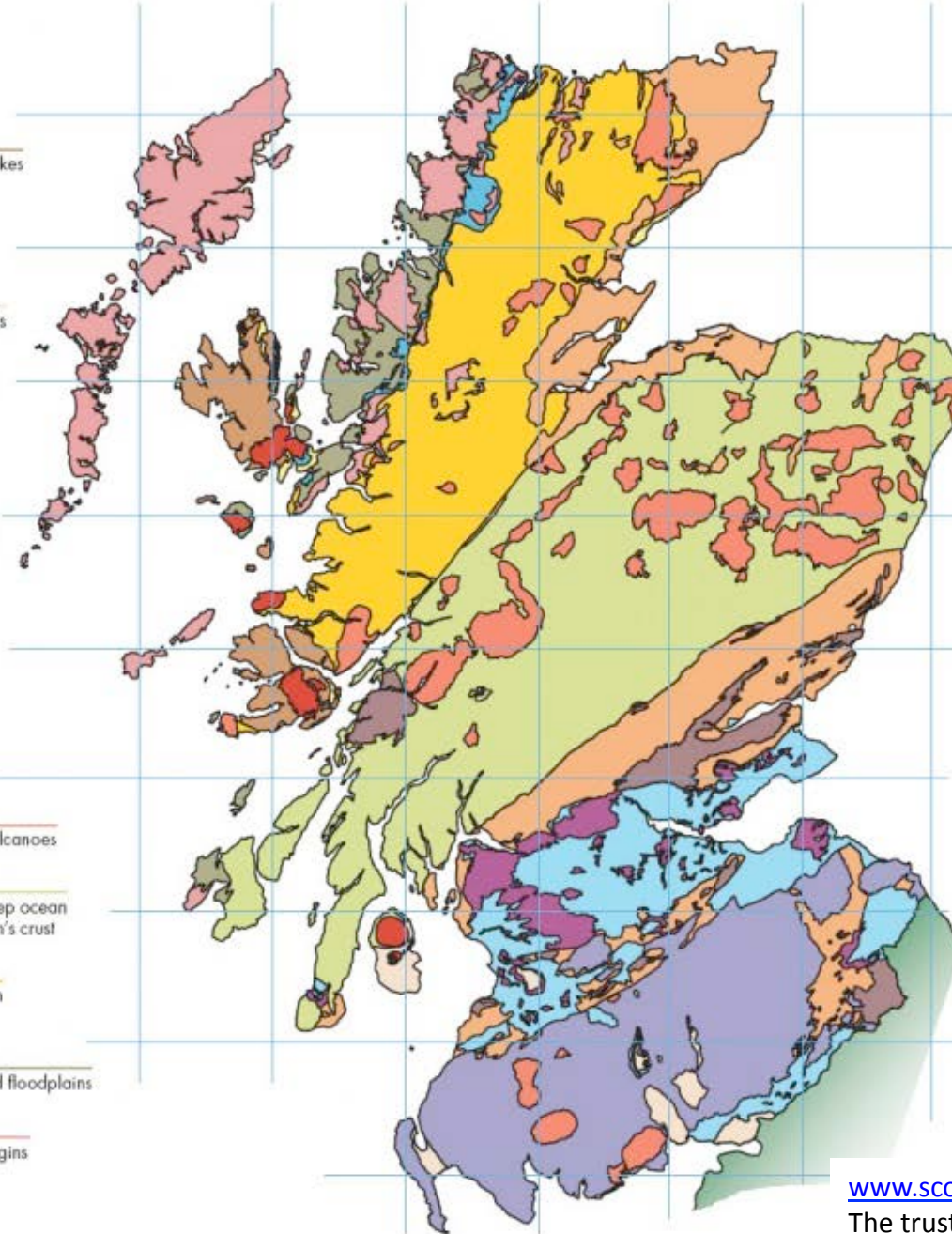
Scotland birthplace of geology
Shedding old ideas/developing new ones
So many places, so many geologists

All geologists have Scottish heritage!

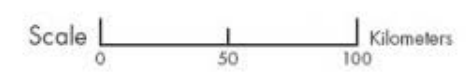
Glen Coe, Scotland

Geologic Map of Scotland

Geological Period	Geological Origins
Palaeogene	Eroded volcanoes Igneous
Palaeogene	Mainly lava flows, minor lakes and rivers Mainly igneous
Jurassic	Shallow seabed Sedimentary
Permian & Triassic	Desert dune and river sands Sedimentary
Carboniferous	Volcanoes and lava flows Igneous
Carboniferous	Tropical forest floors and shallow seabed Sedimentary
Devonian	Volcanoes and lava flows Igneous
Devonian	Desert, lakes, river beds and flood plains Sedimentary
Ordovician & Silurian	Ocean floor Sedimentary
Cambrian & Ordovician	Shallow seabed Sedimentary
Cambrian to Devonian	Intrusions deep beneath volcanoes Igneous
Precambrian (Dalradian)	Originally shallow and deep ocean floor then deep in the Earth's crust Metamorphic
Precambrian (Moine)	Originally ocean floor then deep in the Earth's crust Metamorphic
Precambrian (Torridonian)	Shallow seabed, rivers and floodplains Sedimentary
Precambrian (Lewisian)	Ancient crust of various origins Metamorphic



A simplified geological map of Scotland illustrating the nature, age, origins and distribution of the rocks that comprise Scotland. Fossiliferous rocks are almost entirely sedimentary in origin.



Scotland Geology Resources

<http://www.scottishgeology.com/>

http://en.wikipedia.org/wiki/Geology_of_Scotland

<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

iGeology iPhone app

<http://www.walkhighlands.co.uk/maps/>

The Man Who Found Time — Jack Repcheck (2003), Perseus Pub.

<http://www.archive.org>

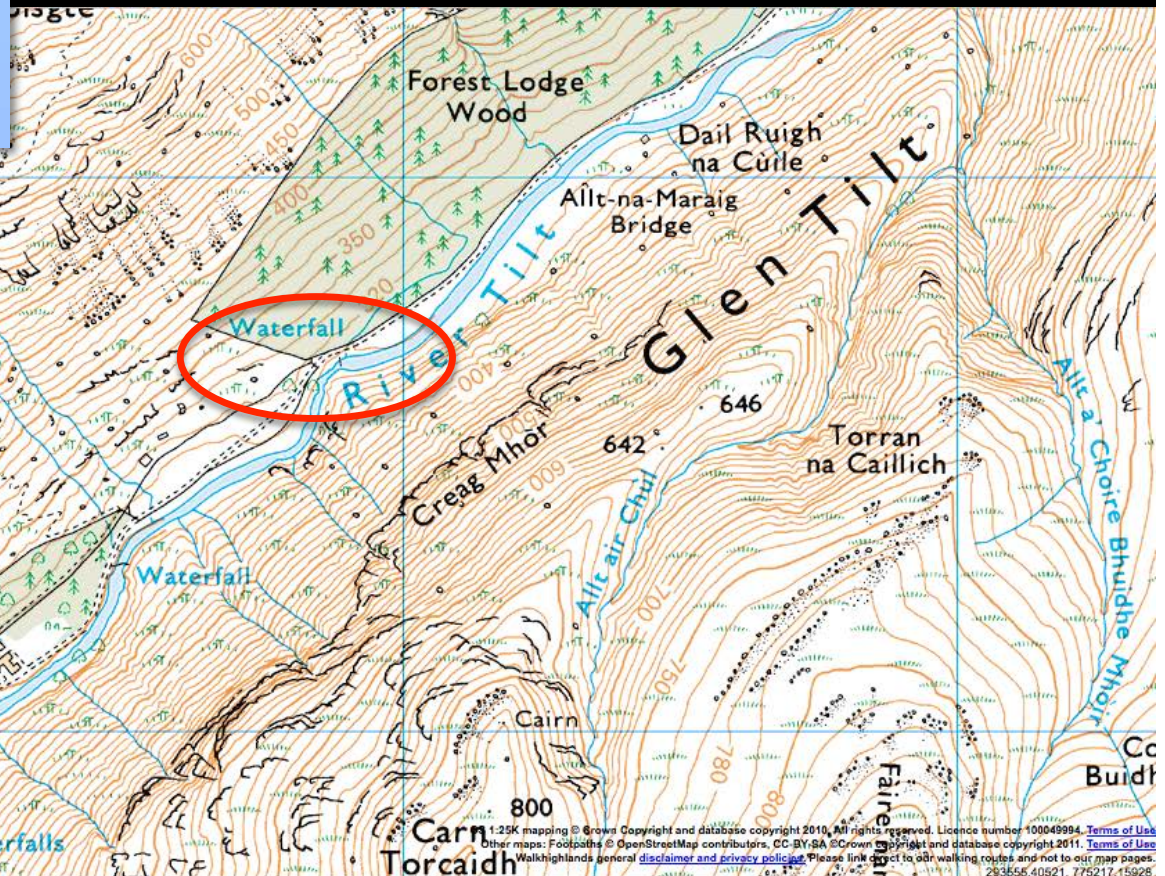
The Old Red Sandstone — Hugh Miller (1841)

The geological structure of the north-west Highlands of Scotland —
Archibald Geikie, ed. (1907)

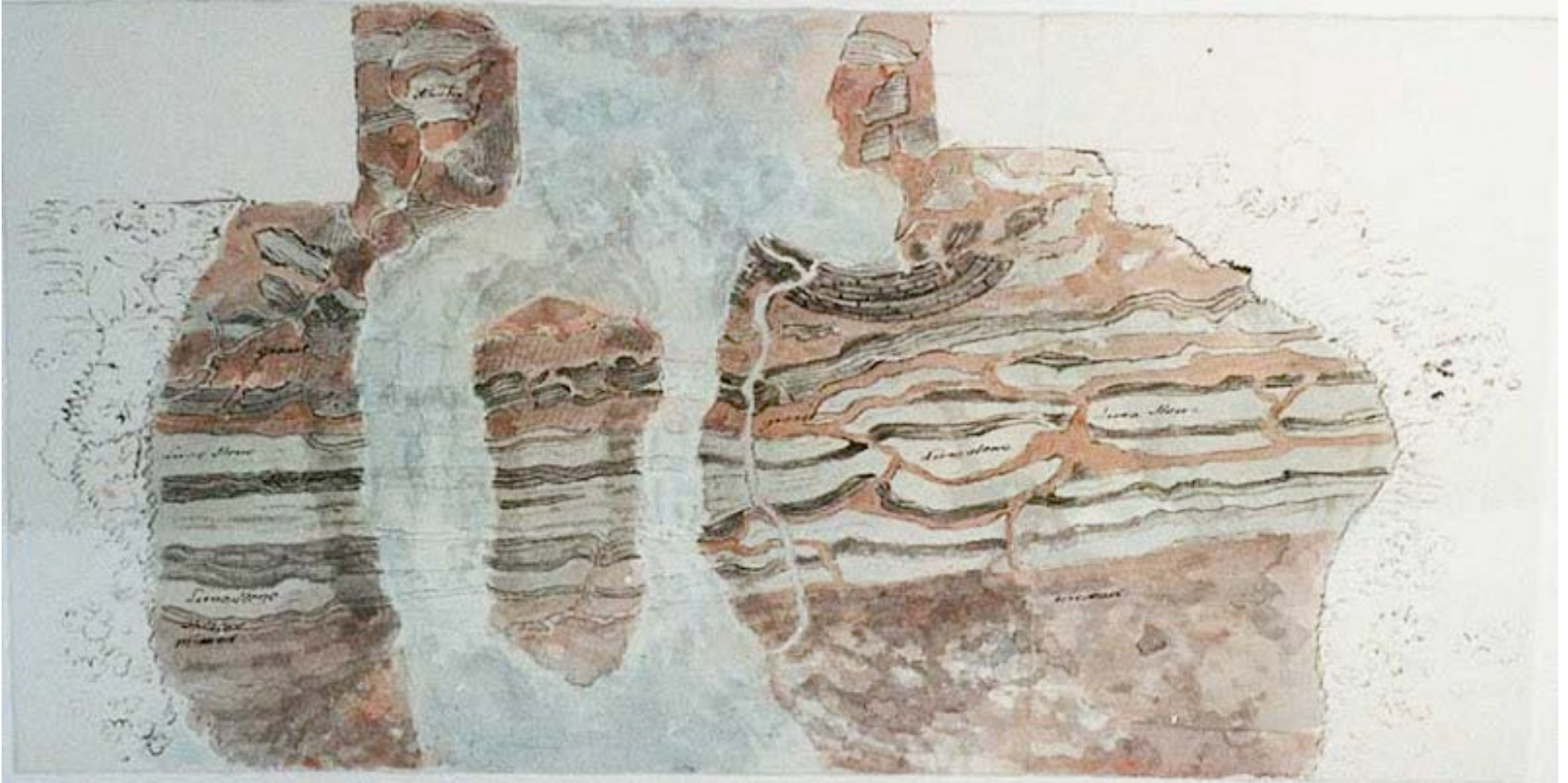


Glen Tilt

Silurian-Devonian granite and diorite cuts the Precambrian Appin Group Metasediments.

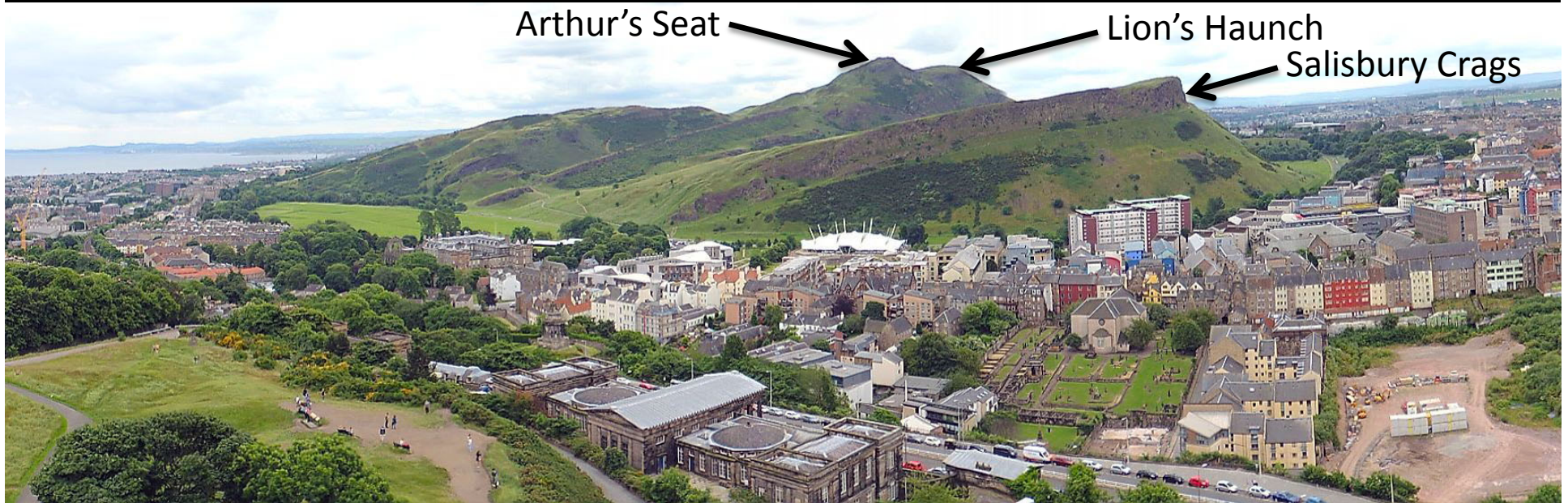


Hutton's Map (watercolor) of Glen Tilt intrusions



Map, Glen Tilt, Tayside

Arthur's Seat volcanic formation — Columnar-jointed basalt.
Lion's Haunch vent — Volcanic agglomerate and microgabbro.
Salisbury Crags sill — microgabbro and diabase.
Ballagan Formation — Carboniferous sandstone country rock.



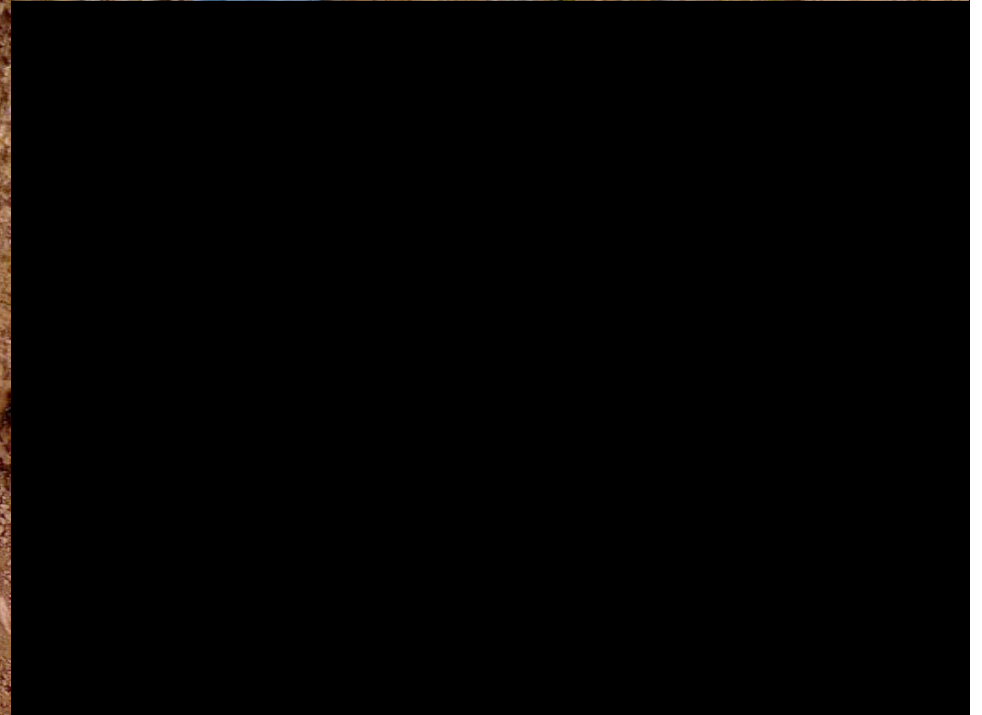
Arthur's Seat Volcanics



Columnar basalt in summit saddle

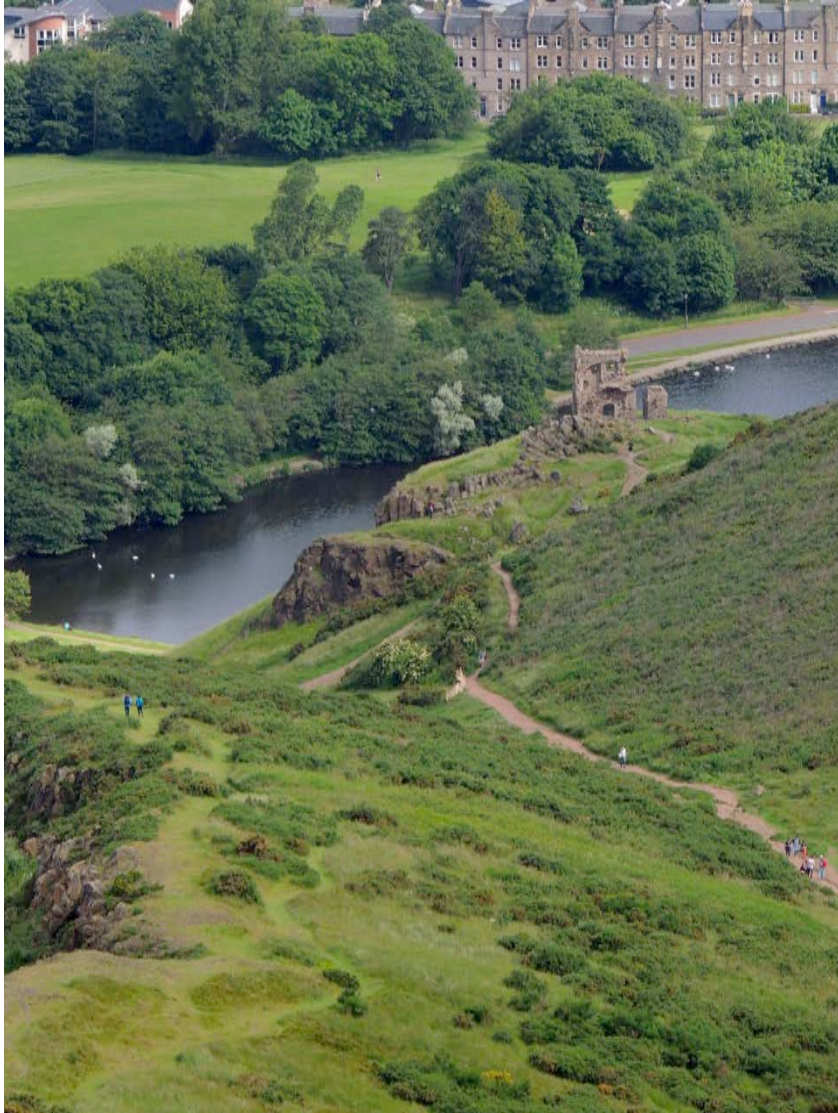


Lion's Head agglomerate



Columnar Jointing

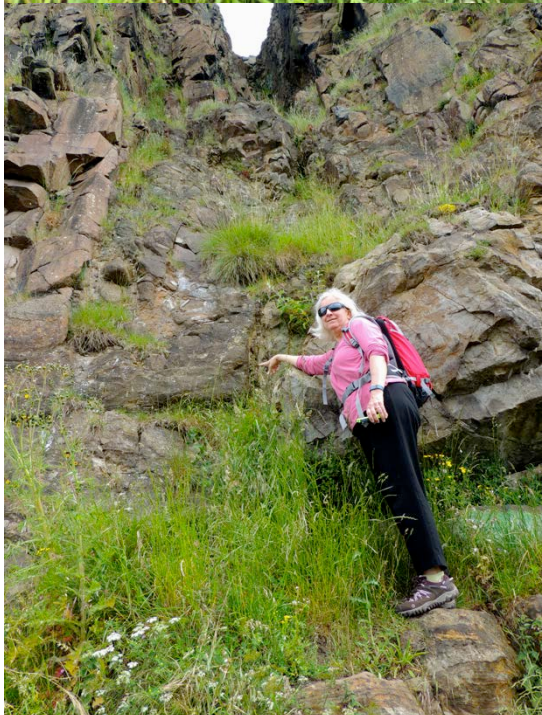
St. Anthony's Chapel



Salisbury Crags sill



Diabase cuts sandstone



Tholeiitic dike
cuts diabase

Siccar Point

Angular unconformity between
greywacke of Gala Group (Silurian)
and conglomerate and sandstone of
the Stratheden Group (Devonian)





JAMES HUTTON and Siccar Point



Proceed from here, through the kissing-gate, past the ruin of St Helen's chapel and along the top of the steep sea-braes to Siccar Point, arguably the most important geological site in the world. In 1788 it gave James Hutton final proof of his revolutionary claim that the Earth is aeons old. He based his claim on painstaking observation of rocks and soil over a period of some 30 years.

James Hutton (1726-1797), farmed locally near Reston and was a self-taught geologist. Having already published his theory, he was on a mission to establish the evidence. Before discovering the proof at Siccar Point, by boat with his friends Sir James Hall and John Playfair, Hutton knew what he was looking for and had an idea of where to find it. He sent Sir James, also a geologist and local landowner from Dunglass, to review the area before embarking on their boat trip below the braes. Sir James may have done this by observing that the stone used to construct field boundaries in the vicinity, were (and still are), a combination of rock from the unconformity (Red Sandstone and Greywacke).

JAMES HUTTON, SIR JAMES HALL AND THE YOUNG JOHN PLAYFAIR LEAVING SICCAR POINT WITH THE FINAL PROOF FOR HUTTON'S THEORY

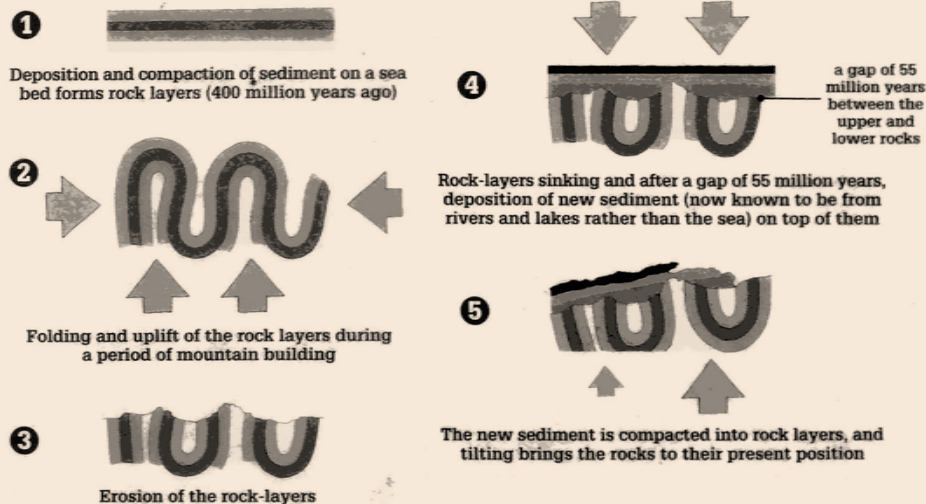


Hutton's theory released science and philosophy from limitations of the biblical age of the earth (6000 years old). Though bitterly disputed at the time, it is now accepted as a fundamental of science. James Hutton, also expounded with authority on theories as diverse as the nature of light, methods of education and was a significant agricultural innovator and improver.

SIR JAMES HALL'S PEN AND INK SKETCH OF THE UNCONFORMITY AT SICCAR POINT: EVIDENCE OF HUTTON'S FINAL PROOF FOR HIS THEORY.

This is part of the Scottish Borders James Hutton Trail. To find out more about the trail see the James Hutton Exhibition located at the Helvie Country Farm Shop, Auchtermuchty. www.jameshutton.org.uk

HOW THE UNCONFORMITY WAS FORMED



If there are sacred spots in geology, this is the Holy of Holies...

Hutton's revelations completed 2/3 of the "Rock Cycle"





“The result, therefore, of our present enquiry is, that we find no vestige of a beginning,—no prospect of an end.”

— James Hutton



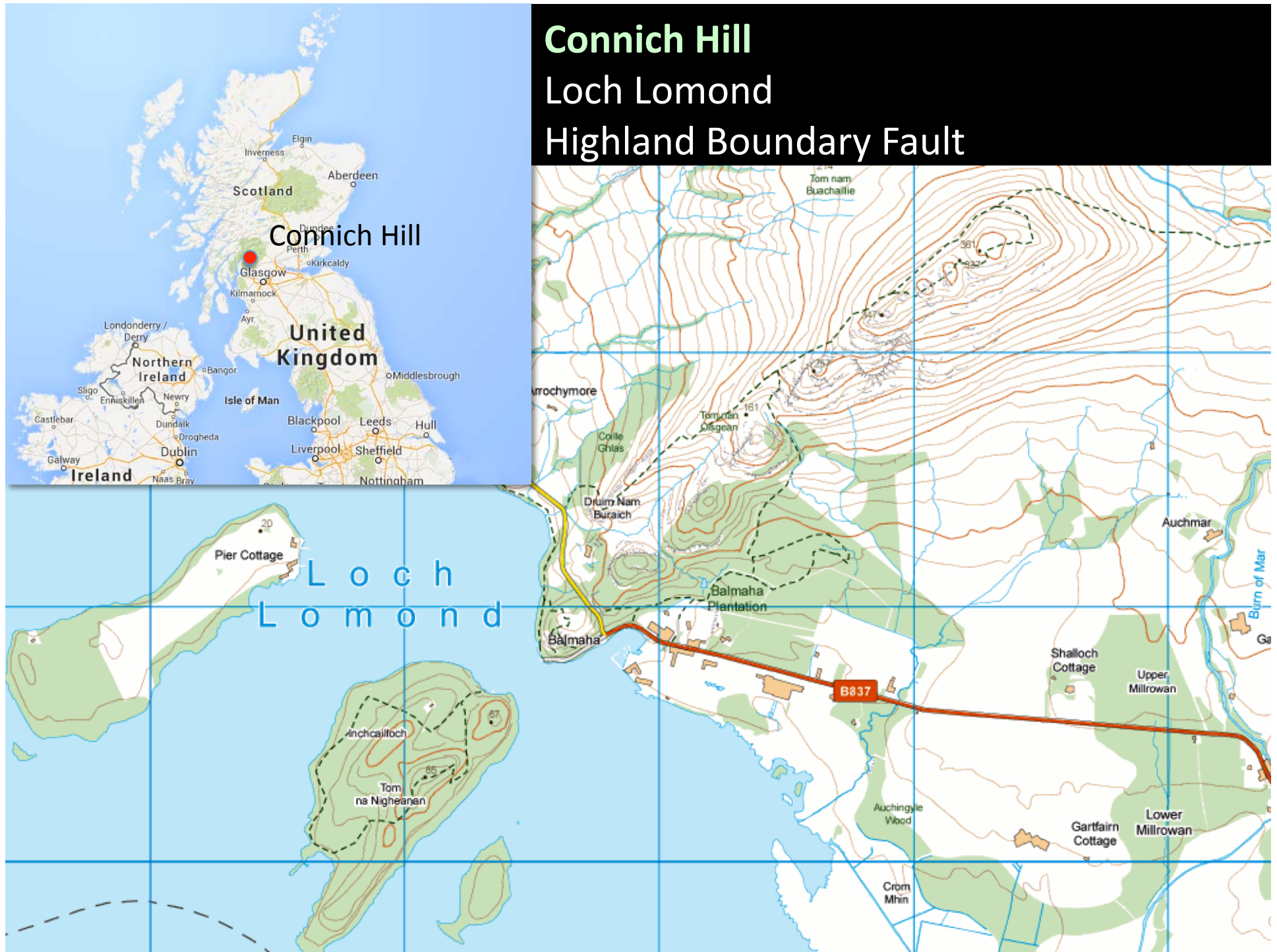
“The mind seemed to grow giddy by looking so far back into the abyss of time...”

— John Playfair

Connich Hill

Loch Lomond

Highland Boundary Fault

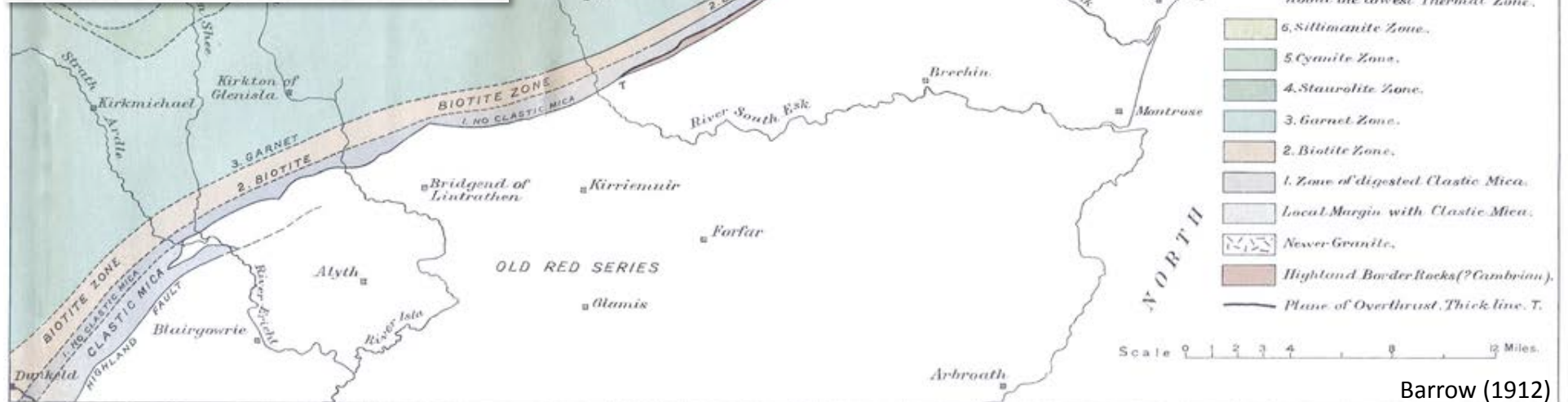




Inchmurrin Conglomerate (Lower Devonian) and Highland Boundary Fault Complex, serpentinite body

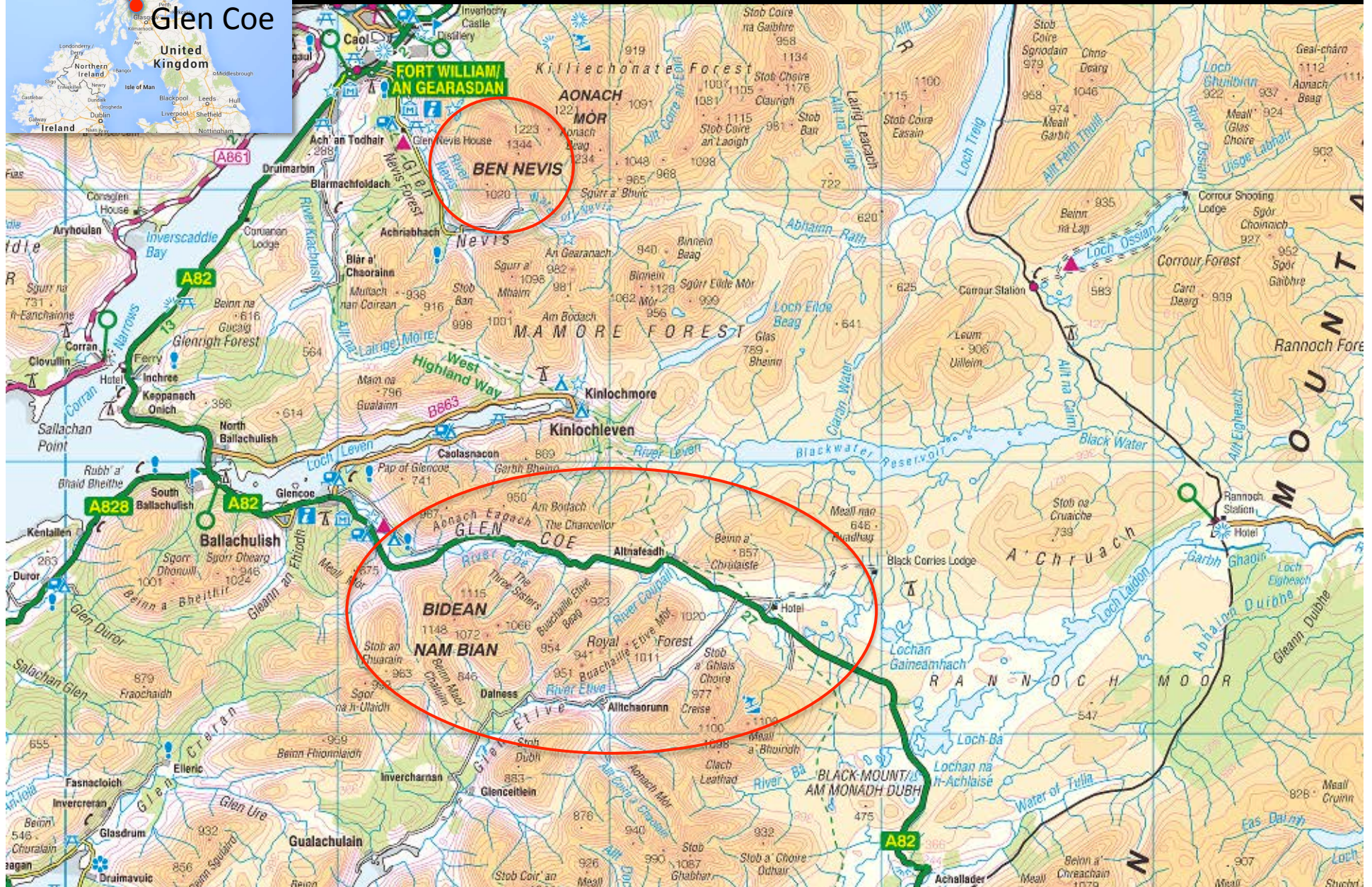


George Barrow mapped metamorphic facies in the Dalradian of Aberdeenshire



Ben Nevis and Glen Coe

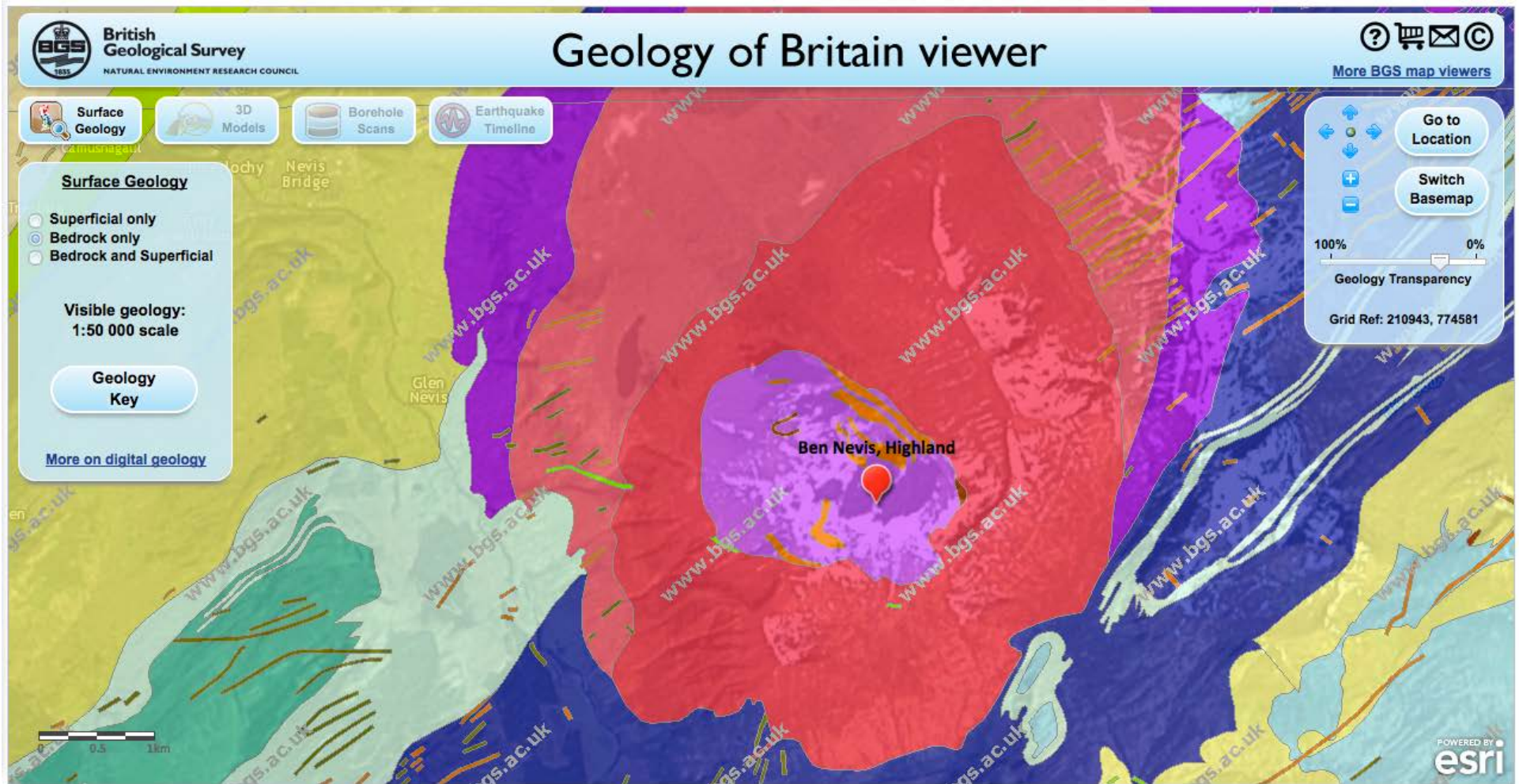
Ancient collapsed calderas (Devonian)

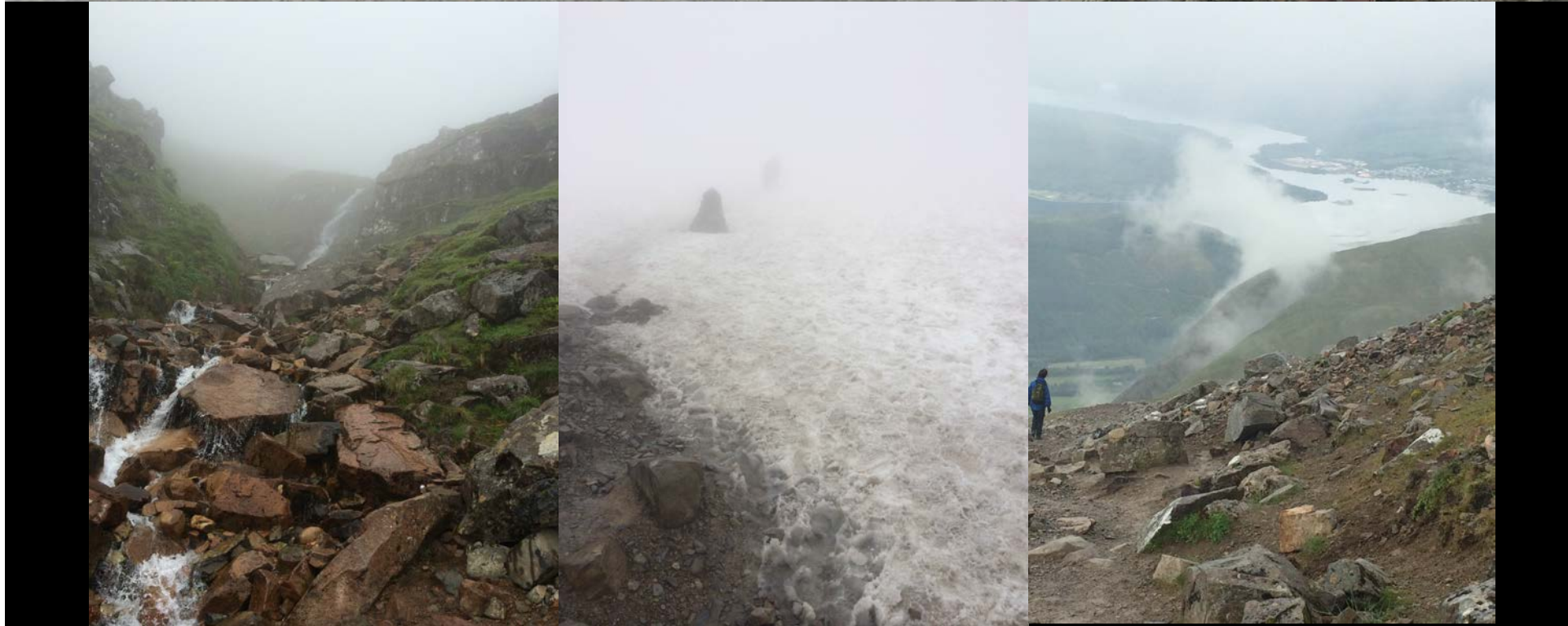


Ben Nevis Volcanics (Silurian-Devonian)

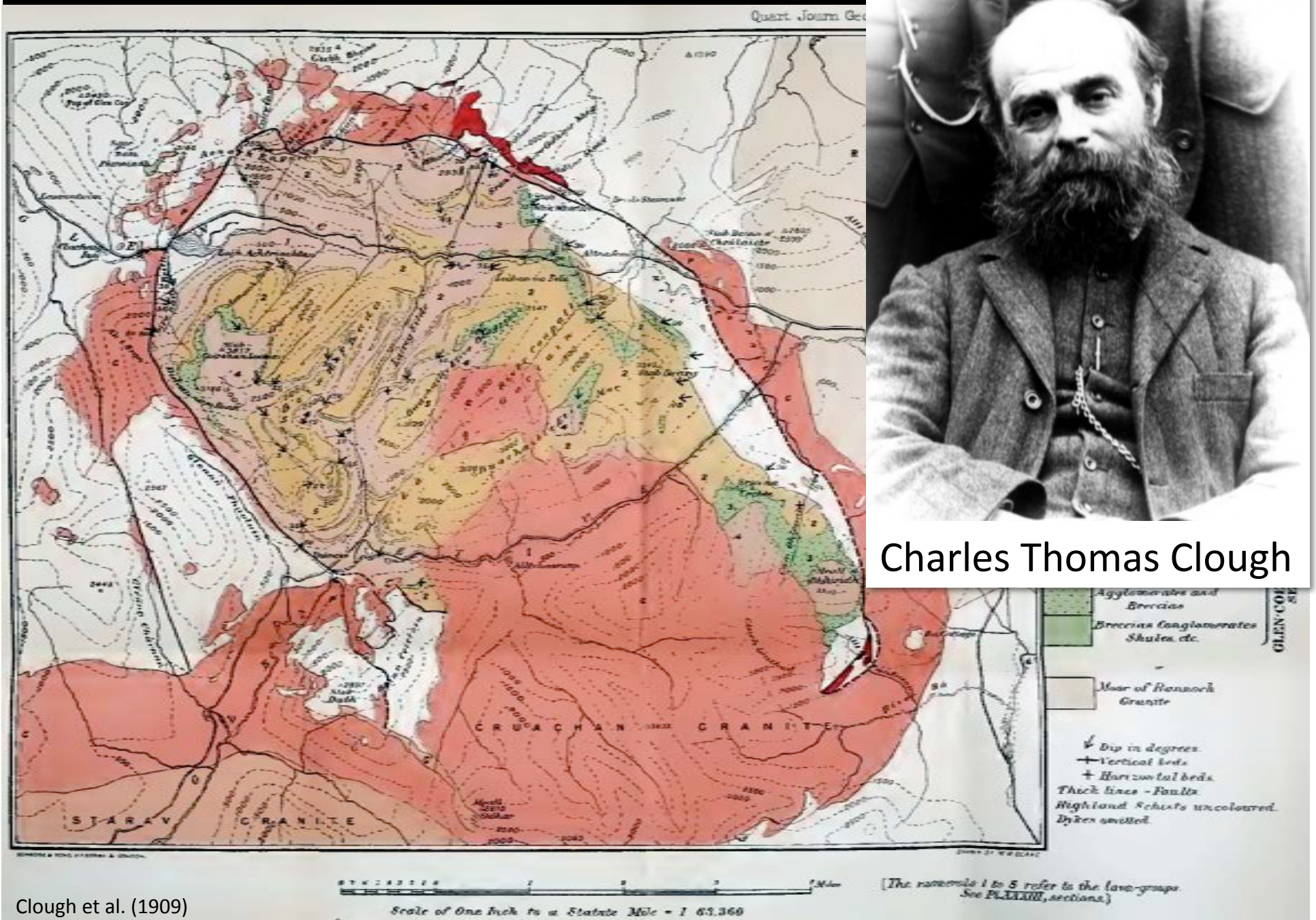
Ben Nevis Complex (granites)

Agglomerate, Lamprophyre, and Paleogene mafic dikes



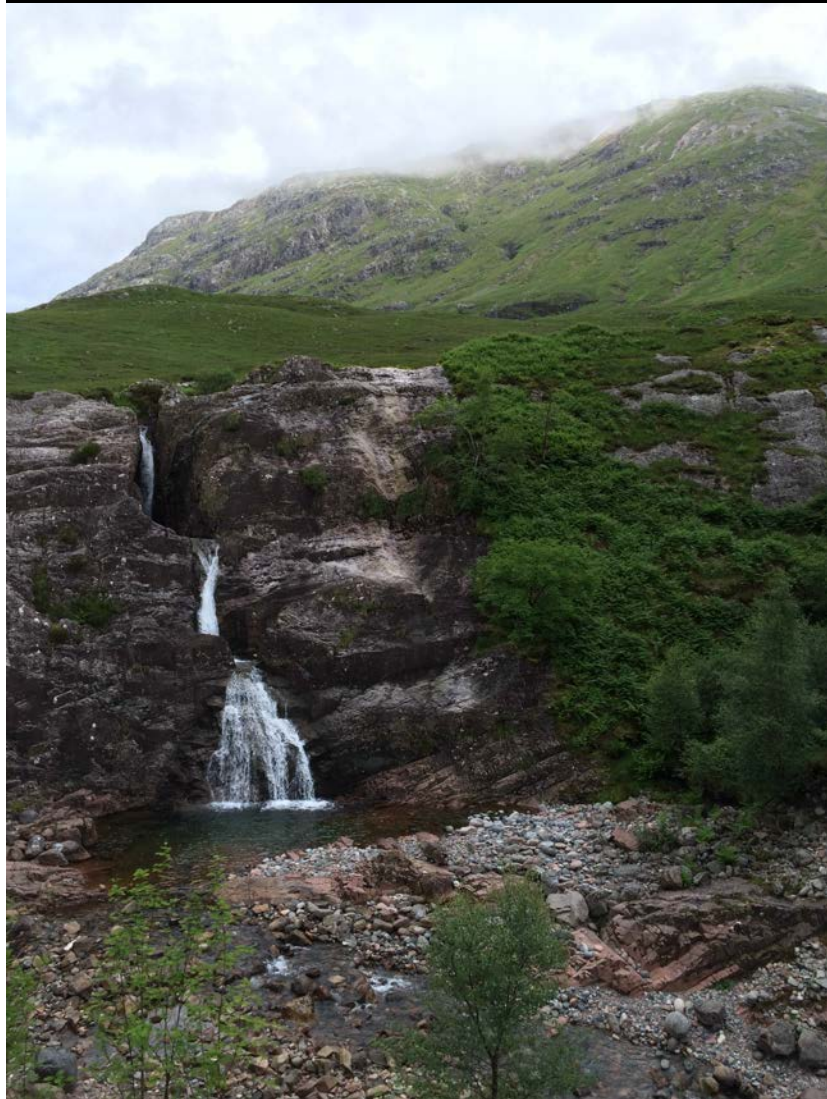


Glen Coe



Charles Thomas Clough

Andesite and rhyolite caldera-fill
succession with alluvial fans,
fossil plants, and ring granite



Three Sisters

Leven Schist (Neoproterozoic)
Glen Orchy
Ballachulish Limestone
Signal Rock near Claighaig Inn

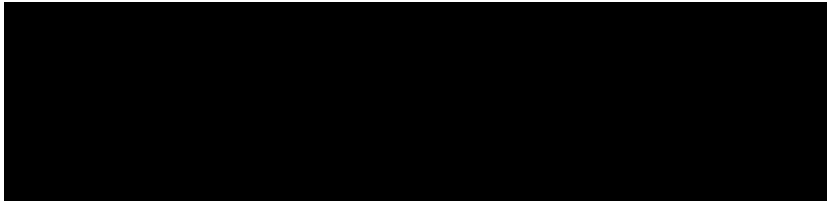




Skye

Red Cuillen
Black Cuillen
Old Man of Storr
Quirangs
Kilt Rock
Dinosaur tracks





Quirangs



Staffin Museum



Kilt Rock

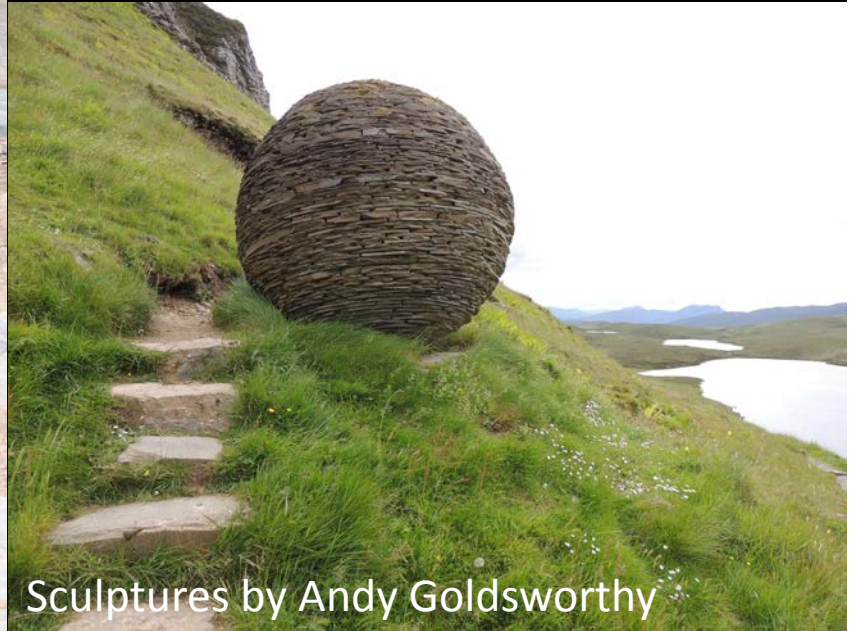


Knochan Crag

One of first thrust faults described — Moine over Torridian and Cambrian (Peach and Horne, 1907)

Mapping the Northwest Highlands began in 1884

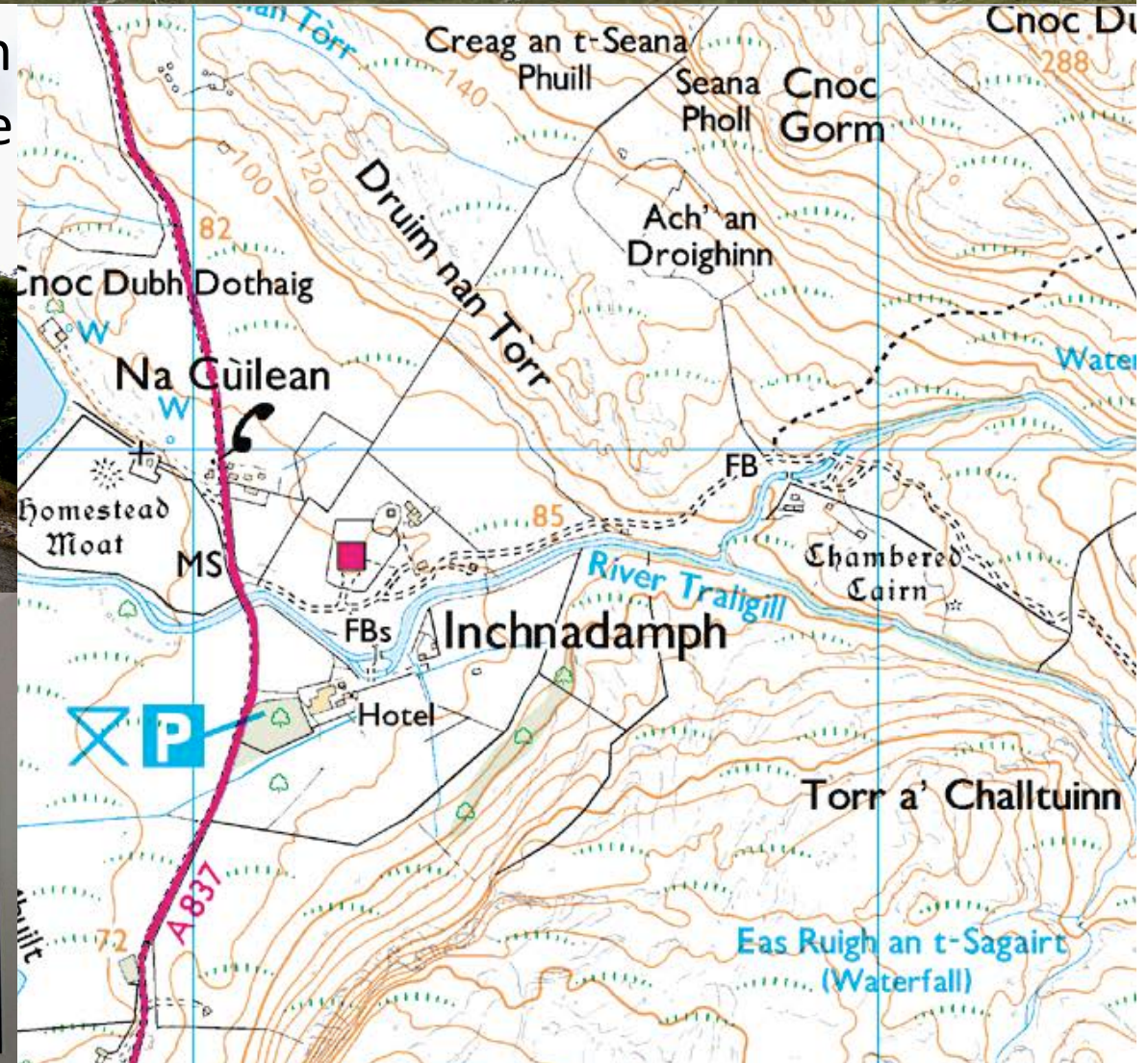
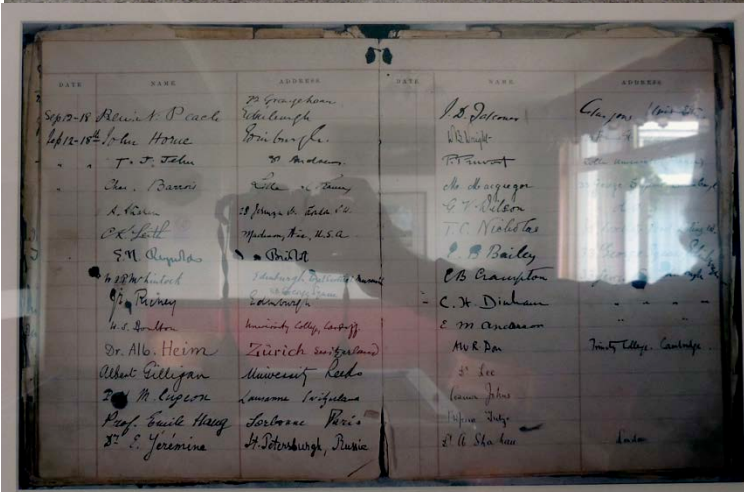




Sculptures by Andy Goldsworthy



Inchnadamp
Lodge





Scotland is where geology and geologists are celebrated...

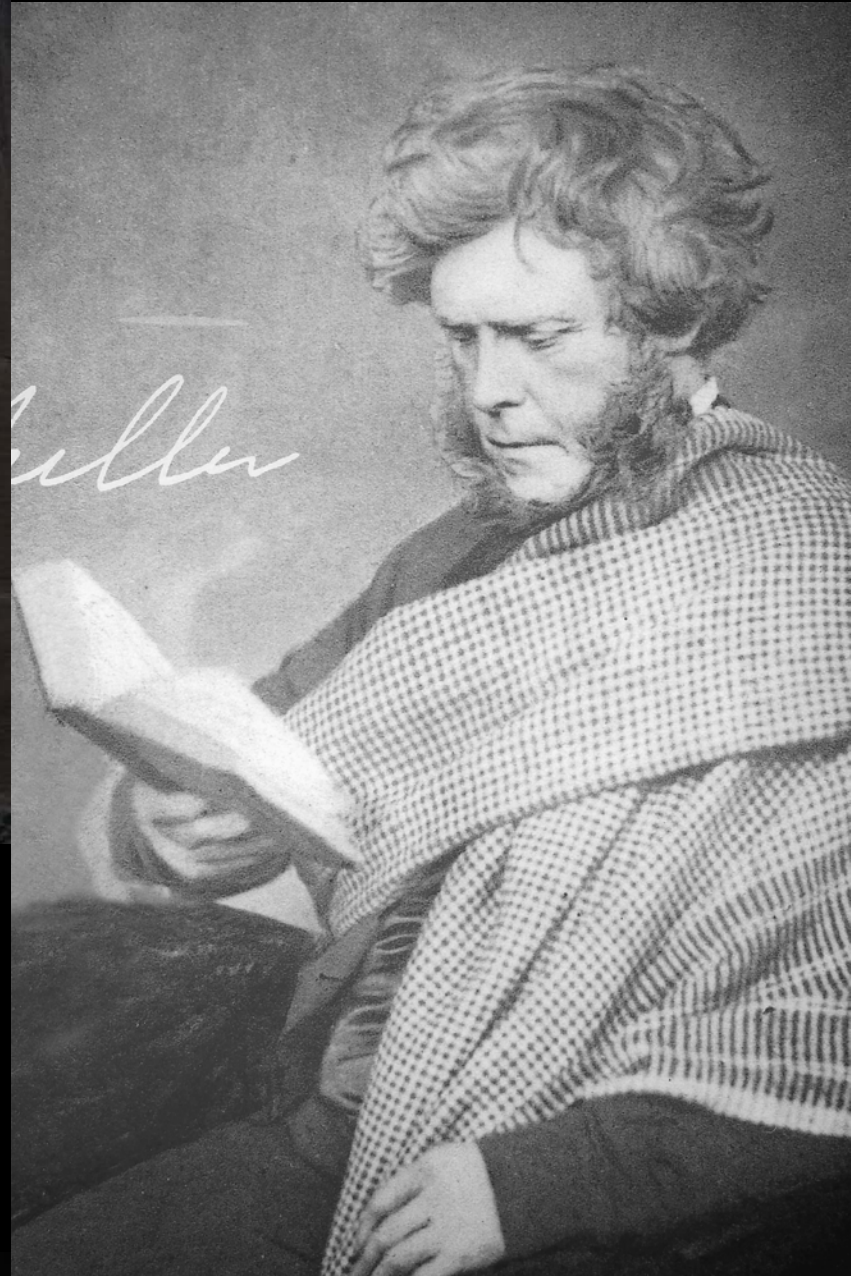
Hugh Miller

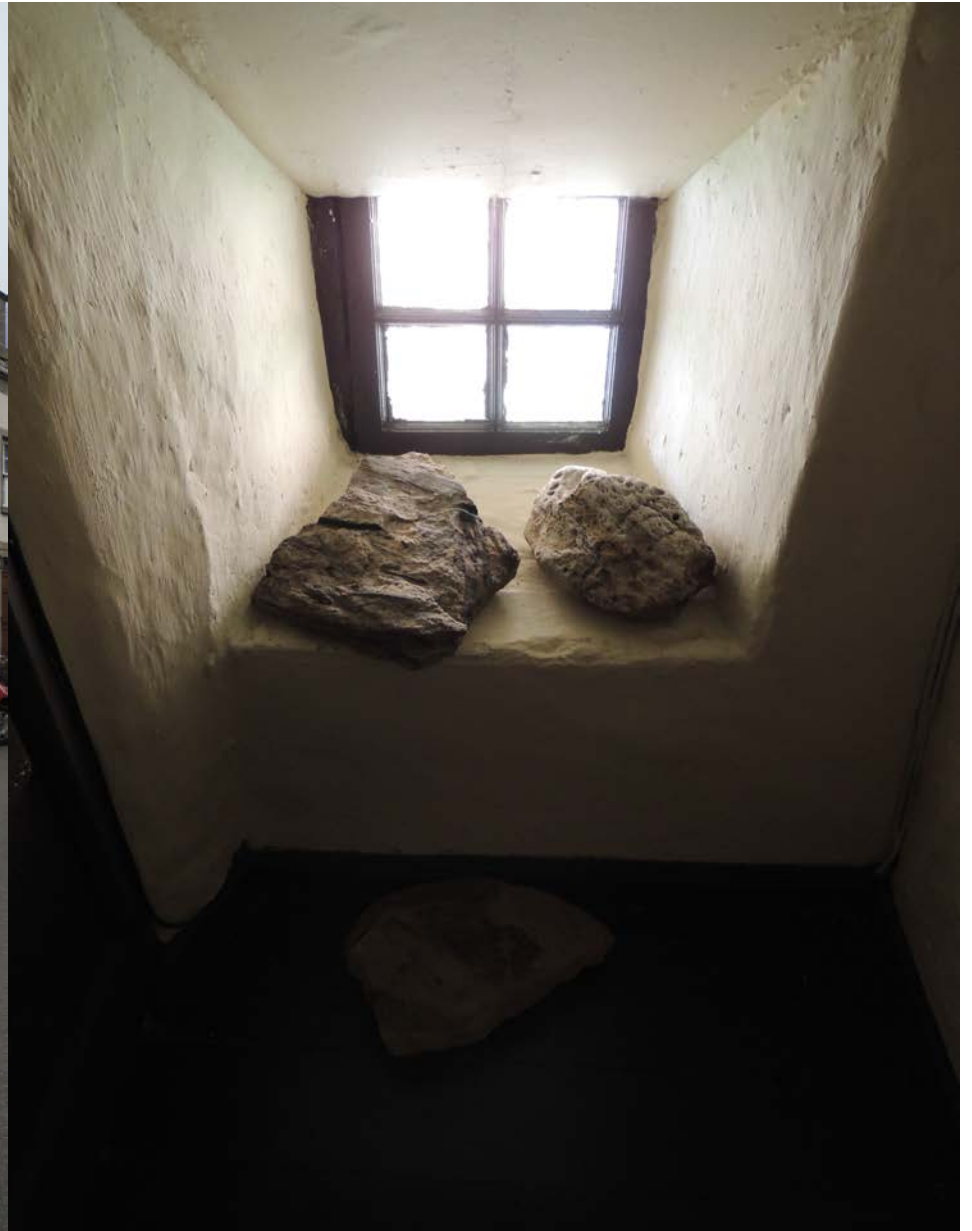


Bust of Miller at Wallace Monument, Stirling

Orphan
Stonemason
Paleontologist
Geologist
Banker

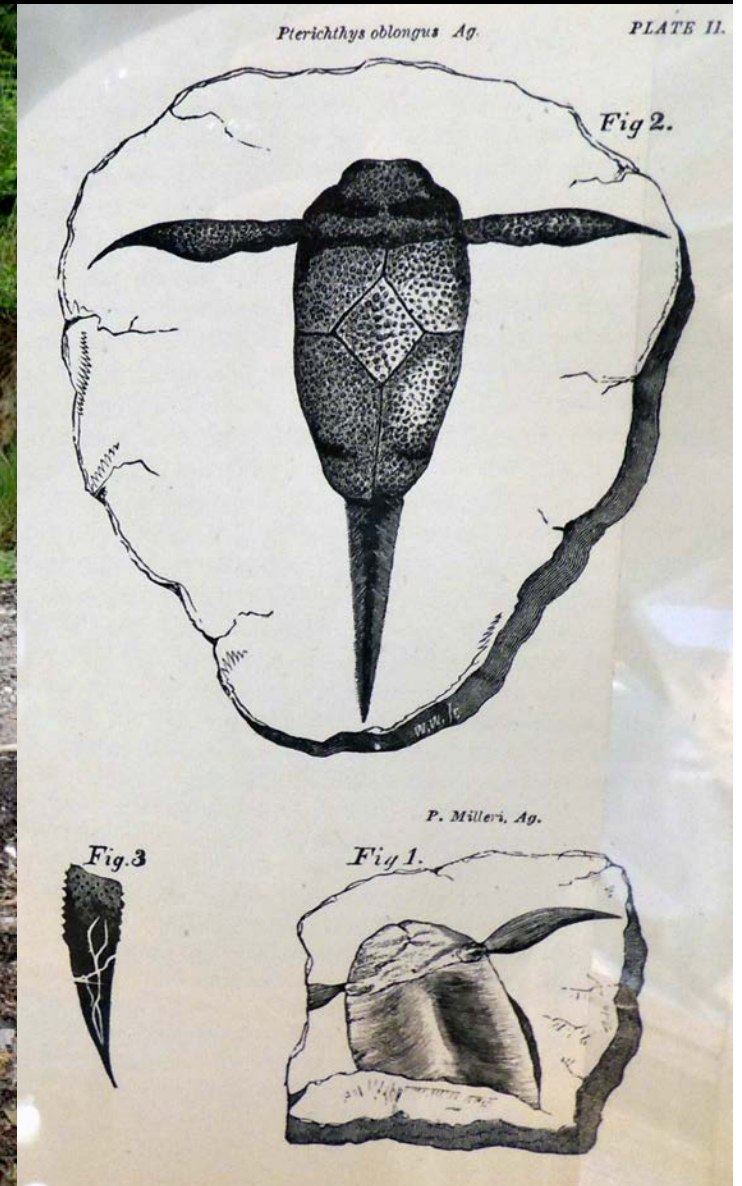
Writer
Editor
Reformer
Geoscience Educator





Cromarty
Birthplace and home of Hugh Miller

Cromarty fish beds of the Old Red Sandstone (Devonian)





Harris and Lewis from Waternish