Excursion to the Pentland Hills
21st June 2014

Joint Field Trip arranged by The Geological Society of Edinburgh
Leader: Dr. Richard Smith
Report: Allison Drummond Participants: 12 from GSG

The aim of the excursion was to study the geomorphology and glacial features to be found in the Pentland Hills.
In the main we were following the locations set out in the Pentland Rocks leaflet produced by Lothian and Borders Conservation, a committee of the Edinburgh Geological Society
We had arranged to meet our Edinburgh colleagues at Threipmuir where we also met our leader Dr. Richard Smith who gave us an introduction to the area.
The Pentland Hills form an area of high ground which rises above the surrounding Carboniferous rocks. Most of the rock that forms these hills is igneous, created from molten magma. Close to the end of the Devensian glaciation, ice retreat had left the summits of the Pentland Hills free of ice but with high level meltwater channels draining eastwards through the hills. So this was a glacial drainage area. The grinding of the ice sheets gave the Pentland Hills their rounded profile which can be seen today. The oldest rocks are sedimentary i.e. mudstones and siltstones of Silurian age. The youngest surviving rocks are red sandstone (~370 Ma). When the ice retreated it produced a vast amount of water with the hills acting as a dam. Eventually the water broke through creating deep valleys leaving the landscape much as it is today. Other remains from this period are mounds of sand and gravel which were left behind after the ice melted and is now used in road workings.

We left the car park and proceeded to our first location which was a small exposure of the Bavelaw inlier. This is of Silurian age and had been pushed up due to the Caledonian orogeny. Devonian dykes cut through the sediments. From here we could see meltwater channels formed at the end of the last ice age. They drain eastwards and in some places the channel goes uphill due to the meltwater flowing at pressure under the ice.

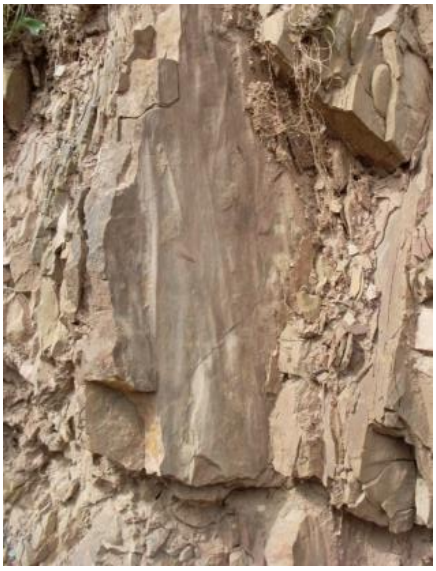
We then carried along the path to our next location which was a narrow gully on the right hand side of the path and is the site of a fault line. The rocks to the left hand side of the gully are red sandstone of the Carboniferous period which have dropped down during the faulting process to become level with the older rocks of the Silurian period. These older rocks can be seen on the right hand side of the gully. After climbing up towards the gully and examining the different rocks we continued along the path to the next location.

Black Hill which is the remains of a viscous dome of magma and is composed of a rock called microgranite (formerly known as felsite) which is very hard and slow to break up. It forms sharp edged fragments called clinker and weathers to a light pink colour. Black Hill shows how rock type can affect vegetation. The rock is rich in silica and makes acidic soil with heather being one of the few plants which can survive in these conditions.

Continuing along the path we entered Green Cleugh which is a narrow valley and is thought to have been a glacial drainage channel carrying meltwater eastwards to what is now the Loganlea reservoir. Here (location 4) we found fallen blocks of Devonian conglomerate which originated from The Pinnacle, an area which lies above the path through Green Cleugh. The conglomerate includes pebbles of sandstone, lava and chert all of which are derived from rocks older than the conglomerate.

Further along the path near the "The Howe" farmhouse almost vertical beds of sedimentary rocks could be seen (location 5). These are sandstones, siltstones and mudstones which would have originally formed as horizontal beds on the floor of the Iapetus Ocean. The present day vertical nature of the beds shows the compression associated with colliding continents as the ocean disappeared.

Flute marks could be seen on the soles of some of the beds indicating an environment where turbidities had been common.



We continued along the tarmac road and could see on the left hand side intercalcated sandstone and lavas with tuff sitting on top of the basaltic lava .
This was the last of the locations from the Pentland Rocks leaflet that we were to see but we continued along the tarmac road towards what is now the Glencorse reservoir.

Here we were passing through Devonian rhyolite and we could see flow banding and gas bubbles in the rock .

Finally a short distance from the road side we could see mounds of sand and gravel, now grass covered, which had been dumped by the glacier as the ice retreated.

This was the end of the geological trail and we continued along the road to the Flotterstone Inn where we had a tasty high tea. After a vote of thanks and a presentation to Dr. Richard Smith for giving us a clear and informative explanation for all we had seen, we returned to Glasgow having had a most enjoyable excursion.