Afternoon Excursion
'Rock Around' + Building Stones of the University of Glasgow

19th July 2014
Leader: Maggie Donnelly
Report: Isabel Collins

We met outside the Gregory building armed with our coloured pencils, hand lenses and compass clinometers, all set for our mapping exercise on what turned out to be a very wet but thoroughly enjoyable Saturday afternoon.

This was a two part excursion combining Tim Dempster's 'Rock around the University' project with the excellent publication 'Building Stones of the University of Glasgow – A Geological Trail round the campus' recently updated by Barbara and Allison from Chris Burton's original leaflet.

'Rock around the University' is a project designed as a teaching aid to provide an accessible on campus field exercise. The rocks to be studied do not represent the 'actual' geology of Gilmourehill as all the stone was imported from various sites across Scotland with the intention of representing key chapters of the geological history of Scotland. 16 boulders were positioned in strategic locations around the west side of the University Campus and the plan is that they represent outcrops.

The 'Buildings Stones of the University' trail is dominated by stones from the Devonian and the Carboniferous periods, taken from quarries in both Scotland and England, with limestone and sandstones being the most prolific. In all there were 18 buildings/monuments/architectural features around the campus trail to examine and we managed to take a close look at the majority in between studying the rocks from the 'Rock around the University' project.

Before heading off to find the first outcrop we took a look at the Gregory Building which was originally built to house the Geology and Applied Geology department but was ironically made of brick. The building was closed so we didn't get the opportunity to study the mural inside but we did take a look at the stone monument just outside. We identified the rock of the redundant culvert as being a granodiorite in origin with clearly visible xenoliths which we were informed were of Ballachulish Slate.

Granodiorite Culvert

Boyd Orr Building like many of the post war buildings of the University is constructed in concrete and partly clad with stone panels. This particular cladding had flint pebbles with chatter marks from the action of the sea turning the pebbles on the beach. We then paused at the cobbled area in front of the entrance of the Queen Margaret Union. This had just about every type of rock including Sandstones with migrating ripples. There were several highlights across the road starting at the main building which incidentally is made mainly of Gilmourehill Sandstone. This is a poor quality sandstone as it erodes easily due to its thinner beds and course texture. The builders must have been aware of this at the time as they used a better quality smooth sandstone which is less prone to erosion on the important structural features like the corners and the window cases of the building. Beautiful polished pink Granite pillars can be found at several of the doorways. The pink feldspars are potassium feldspars that readily take in iron, the iron ion is small enough to fit into the potassium feldspar crystal which results in the pink colour. Outside, Lord Kelvin's sundial carved from Carboniferous Sandstone was placed on top of Dolerite setts quarried in North Ayrshire; these setts were traditionally used to pave the streets of Glasgow. The Gable end of the lower section of the James Watt Engineering Buildings was clad in yellow Permian Sandstone with the upper portion clad in an oolitic Portland Limestone which contained an abundance of brachiopod shells.

The magnificent Gilbert Scott Building incorporated the original 1690 staircase taken from the old college building on the high street with its remarkably preserved carved sandstone Lion and Unicorn. The sandstone of the staircase showed signs of ripple marks.

Lion and Unicorn Staircase

The Permian Sandstone of the Davidson Building was a dune bedded aeolian sandstone. You could work out the direction of travel by following the asymptotic curve of the bedding planes. There was also fossiliferous Portland Stone of the Kelvin building with its beds of fossil bivalve shells. I imagine all of us viewed parts of the university campus that we would never have noticed before taking this tour.

Kelvin Building

A pdf version of the 'Building Stones of the University of Glasgow' leaflet can be downloaded from the following web link:
http://geologyglasgow.org.uk/geoconservation/rigs/building-s/

Rock Around Outcrops
Maggie provided us with a contoured map of the campus showing the positions of the 16 outcrops. We took a look at each outcrop in detail, rocks were classified as either being Igneous, Sedimentary or Metamorphic; their lithology was studied to further aid in their identification and to interpret their geological history; heights were estimated using the contours on the map provided; the strike and dip of the rocks were also recorded; with all the information gathered we were then able to determine the nature of the geological boundaries which helped us construct a colourful theoretical geological map.

The majority of the outcrops were straightforward to find with the exception of number 11. Also outcrops 2 and 3‘s location was not so easy to reach – access was via a precarious slope made more difficult by the wet weather. At this point we were reminded to use the law of superposition as we came across two outcrops one on top of the other. We made the assumption the younger rock was sitting on top of the older rock as we could not see any evidence of folding or faulting.

Outcrops 2 & 3

The first schist outcrop we came across showed evidence of sheering and the foliations showed signs of 3 separate deformation events which ultimately resulted in crenulation cleavage. The first deformation squashed the rocks to produce the cleavage, leaving a shiny flattened micaceous schist. The second deformation folded this cleavage to produce asymmetric folds probably in association with a mountain building event. The third deformation is when the rock was squashed in the opposite direction, producing the crenulation cleavage.

These deformations were not caused by a *number* of orogenic events, in fact the deformation and metamorphism of these rocks all occurred in association with the Caledonian orogeny.

Schist

One particular limestone outcrop rich in Crinoids, brachiopods, sea urchin spines had a determinable palaeocurrent, as you could clearly see the direction of flow from the alignment of these fossils. Where bedding surfaces could be seen on the limestones, grey patches could be found, this reflected higher concentrations of mud in the sediment.

Above the limestone a fossiliferous Sandstone was found, and on top of this we identified a Basalt lava flow.

At the highest point we found a Granite Intrusion. We did not find any evidence of heating on the surrounding sedimentary rocks indicating that the granite had been faulted against them. The black shiny biotite showed alignment indicating that the granite had been deformed during a metamorphic event; this alignment suggested that the granite was probably deformed by one or more of the deformation periods that affected the schist. So the Granite must have been intruded, eroded and then the sedimentary rock was laid down on top.

We deduced there must be a transcurrent fault running along University Avenue as there was a significant drop in height in the outcrops on the south side of the road and the Schist, Limestone, Sandstone and Basalt had shifted to the left.

For more detailed information on the ‘Rock around the University’ project follow the link below:
http://www.gla.ac.uk/schools/ges/rockaround/

Real Geology of the Area

Maggie finished the day by giving a description with the aid of various printed illustrations of the real geology of the local area, highlighting that Glasgow was built on a succession of drumlins, Gilmorehill itself being a drumlin on top of carboniferous strata. Carboniferous limestone, sandstone and coal measures have been extracted from numerous local quarries. The strata dips slightly to the south east which of course would have meant that a large proportion of the coal measures would have been inaccessible had it not been laid down during a period of extension in the carboniferous, which resulted in a large number of faults. In fact the midland valley consists of a series of fault blocks and each fault brought a coal seam back up again, avoiding the need for extraction at any great depth.

A special thanks once again to Maggie for all her hard work in the organisation of this excursion, transforming a wet summer's day in Glasgow into an interesting and informative day of geological discovery.