

Exploring the Paleogene Volcanoes of NE Ireland

Our group convened outside the Lough and Quay Hotel in Warrenpoint on a sunny afternoon in early September. Our leader, Dr Fiona Meade, gave an introduction to the geology of the region from an excellent vantage point at the end of the pier. Across Carlingford Lough were the hills of the Carlingford Igneous Centre, behind us to the east were the Mourne Mountains, and to the northwest lay the Slieve Gullion Ring Complex (Figure 1). These three igneous centres formed as part of the North Atlantic Igneous Province ~61-55 Million years ago, and with their sister volcanoes in Scotland (Rum, Skye, Mull etc.) are known as the British and Irish Palaeogene Igneous Province.

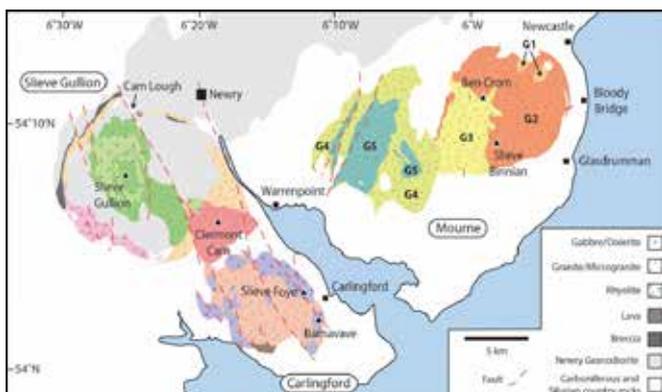


Figure 1: Geological map of the Mourne, Gullion and Carlingford igneous centres, after Cooper & Johnston in *The Geology of Northern Ireland* (2004).

The Silent Valley

We drove to the Silent Valley Mountain Park and explored the visitors' centre which had excellent displays about the geology, engineering works, flora and fauna of the area – a perfect way to take in the 'big picture'. These granites were first mapped by J. E. Richey who identified five separate intrusions: G1-G3 in the east and G4-G5 in the west. The granites are considered to have been intruded laterally from south to north, forming lens-shaped sheets (laccoliths). Each granite intruded under the previous sheet, 'jacking up' the preceding one(s) so that the oldest granite (G1) is at the top.

We drove a short distance to the Silent Valley reservoir and the Slieve Binnian tunnel, which cuts through the mountain, channelling water from the adjacent valley. Further along the Silent Valley, the Ben Crom dam towered majestically above us. We climbed 'hundreds' of steps to the top of the dam – but the view was spectacular! The contact between the G2 and G3 granites can be clearly traced along the western side of the reservoir (Figure 2). We ventured onto the hillside for a closer look at the granite and collected a few samples. After we returned to the main car park, we quickly visited the Mourne

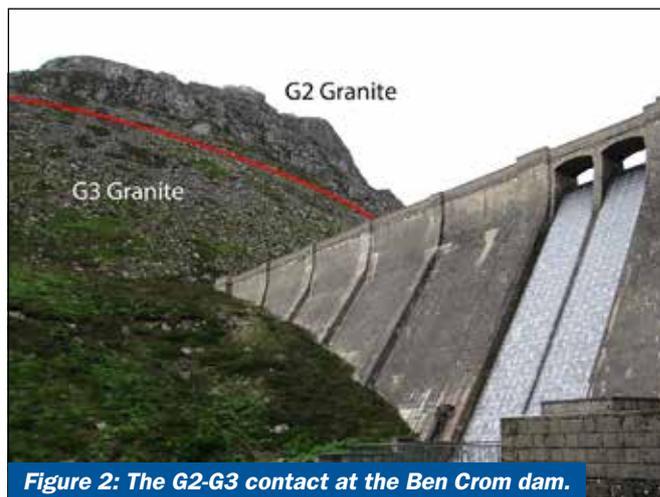


Figure 2: The G2-G3 contact at the Ben Crom dam.

Wall before the park closed. The wall encloses the reservoir catchment and is 2.5 m high, 1 m thick and 35 km long. It runs over 17 mountain peaks and from here it could be seen stretching off into the distance and up the precarious slopes of Slieve Binnian.

Contact metamorphism

The following morning, we examined the effect of the granites on the surrounding country-rock in the well-exposed Bloody Bridge River section, just south of Newcastle. This very wet day began at the shore, examining the Silurian greywackes of the Longford-Down terrane. These siltstones were laid down in the Iapetus Ocean. During the closure of Iapetus the rocks were folded and metamorphosed to greenschist facies. On the river section several groups of youngsters were 'bouldering' and getting very wet, while we tried (in vain!) to keep dry as we traversed the metamorphic aureole. The granite intrusion would have been ~800°C and as we neared the contact the metasedimentary rocks began to show the effect of contact metamorphism, transforming to a stripy hornfels. Pale (quartz and calc-silicate minerals) and dark (biotite-rich) layers represent compositional differences between the original sedimentary beds. We saw increasing numbers of granite veins in the hornfels and soon reached the contact with G2 granite. A few hundred metres on we met more hornfels, a screen of country-rock that had been engulfed by the intruding granite. We saw evidence of widespread melting and gas escape structures, indicating that the granite had begun to digest this large swathe of country-rock. It was still pouring with rain when we returned to the cars, and a very necessary lunch stop was made in the pleasant Galley Café in Annalong!



Figure 3: The composite cone-sheet at Glasdrumman. Rhyolite core on the left, with the hybridised margins to the right.

Mixing and mingling

By the afternoon it had finally stopped raining and we visited the beach at Glasdrumman. Here the Longford-Down rocks are cut by a thick cone-sheet which dips to west below the Eastern Mournes. Cone-sheets are dykes which intrude along an inward-dipping conical fracture. The margins of this dyke are basaltic and the centre is a porphyritic rhyolite. Interestingly there are no internal chilled margins so both magmas must have been intruded at the same time, known as a composite intrusion. These two magmas mixed and mingled during emplacement, often resulting in an intermediate zone of darker hybridised dacite (Figure 3). As we walked along the exposure (this has to be done at lowish tide) we saw many variations on this theme – basaltic enclaves in the rhyolite and vice versa, producing a leopard-print rock. A dyke like this may only have operated for a few days. What an amazing exposure!



Figure 4: Lively chat on Barnavave, looking at microgranite veins/dykes in gabbro.

Carlingford Igneous Centre

Sunday's excursion to Carlingford required a 40 minute drive via Newry despite being just across the lough from Warrenpoint! The Carlingford Igneous Centre comprises two main intrusions, a microgranite and a gabbro, crosscut by basaltic cone sheets. Our first stop was at some beautifully exposed basaltic cone-sheets that cross-cut the Longford-Down rocks just before Carlingford village. This road cut had been specifically cleared of vegetation by the Mourne Cooley Gullion Geotourism group, who also provided a very attractive information board explaining the geology. *It was a real shame to hear the group is no longer funded by the local councils*, as their excellent information panels were a wonderful addition to many of the sites we visited during this trip.

The remainder of the day was spent climbing to the edge of the igneous centre via the well-marked Táin Way. Compared to the rounded granite Mourne Mountains, the Carlingford gabbro is more resistant to erosion and forms steep angular crags. Lunch was taken on the Slate Rock, where we examined a thick feldspar-rich cone-sheet. We continued up to the peak of Barnavave and into the gabbro intrusion, which was crosscut by veins of microgranite (Figure 4). Barnavave translates as "Maeve's Gap", named after the spectacular fault trace which forms a large cleft in the mountain top. After completion of this most enjoyable excursion we walked back to Carlingford for ice-cream.

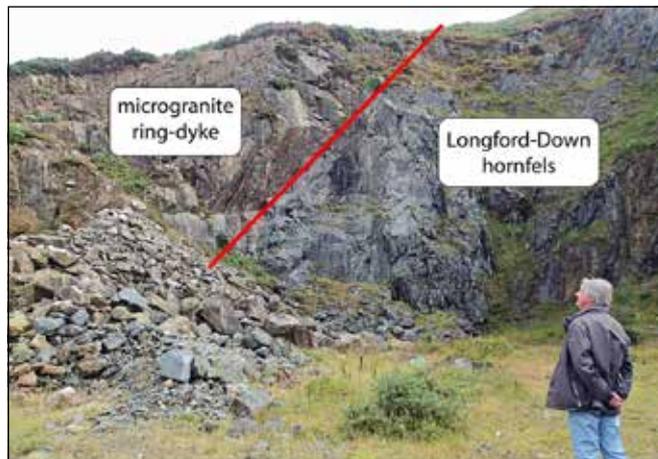


Figure 5: The ring-fault is exposed in Cam Lough quarry.

The Ring of Gullion

On Sunday evening we drove home via Clermont Carn and enjoyed a spectacular view of Slieve Gullion and the ring of Gullion. On Monday we set off for a closer view of this classic ring-dyke. The ring-dyke was formed by the collapse of the roof of the magma chamber, causing magma to be forced up the surrounding crack, forming a ring-shaped intrusion. We spent some time in Cam Lough Quarry investigating the microgranite ring-dyke, which dips outwards over dark Longford-Down hornfels. The contact marks the ring-fault, the plane along which caldera collapse occurred (Figure 5). As we drove up Slieve Gullion, we once again observed the ring of hills that marks the ring dyke intrusion and noted that the 400 Million year old Newry granodiorite forms most of the low ground within the igneous complex. Slieve Gullion is formed of 13 layers of microgranite and dolerite, known as the 'Central Layered Complex'. At the summit carpark we could see two of these layers (Figure 6). Geology over, we headed back to the forest park café where we enjoyed lunch and said a BIG THANK YOU to Fiona for a really happy, interesting and thought provoking weekend.



Figure 6: Dr Fiona Meade (in pink) and the Geological Society of Glasgow at a geology information panel at the summit carpark on Slieve Gullion.

Further information on the geology of the region can be found in *The Geology of Northern Ireland: Our Natural Foundation*, published by the GSNI. Excellent maps and leaflets on the geology and geomorphology of the area are also available from Newry Tourist Office. Self-guided geology leaflets can be downloaded from www.mournecooleygullion.co.uk/news. If your school or society would like to organise a trip to the area with Fiona please visit www.FionaMeade.com for more information. ■