

SEG STUDENT CHAPTER TRIP REPORT: NORTHERN IRELAND

UNIVERSITY OF
Southampton



This report details the SEG student chapter trip to Northern Ireland from 3rd – 7th April 2017.



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Introduction

In April 2017 the University of Southampton SEG Student Chapter organized a 5-day field trip to Northern Ireland for 10 student participants. The trip was led by Dr Steve Hollis (University College Dublin/iCRAG) and Professor Mark Cooper (Geological Survey of Northern Ireland) and focused on the evolution of the Tyrone Igneous Complex during the Grampian orogeny, with a particular focus on the existing mineralization and future potential for exploration.

The aim of this course was to not only focus on 'deposit' scale, but to also put the mineralization into a regional context. The trip was also designed to provide an opportunity for the undergraduate students to develop fieldwork skills in an area of active mineral exploration and exploitation.

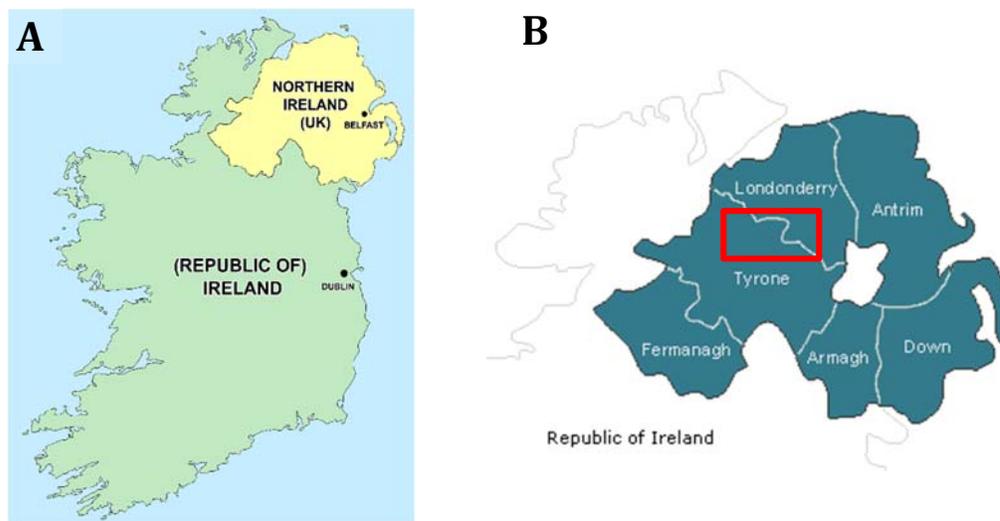


Figure 1: A) Map showing the location of Northern Ireland within the island of Ireland. B) Map of Northern Ireland highlighting the study area (red rectangle).

BACKGROUND

The Tyrone Igneous Complex extends over approximately 350 km² across the counties of Tyrone and Londonderry, Northern Ireland. It consists of two main lithological Groups: The Tyrone Plutonic Group (predominantly tectonized and metamorphosed layered, isotropic and pegmatitic gabbros) and the Tyrone Volcanic Group (comprised of pillow lavas, volcanoclastic tuffs, rhyolites, banded cherts, silica iron exhalites and argillaceous sediments). It is closely associated with the Tyrone Central Inlier (a psammitic and semi pelitic paragneiss).

The Tyrone Igneous Complex and Tyrone Central Inlier form part of the basement of the Midland Valley Terrane of Scotland and Ireland, which broadly correlates with the Notre Dame Subzone of the Dunnage Zone of the Appalachians in Newfoundland. This correlation links to a zone of prolific VMS prospectivity which stretches across Canada, to Greenland and across parts of the Republic of Ireland and Northern Ireland, giving rise to increased interest in the mineral potential of the island of Ireland.

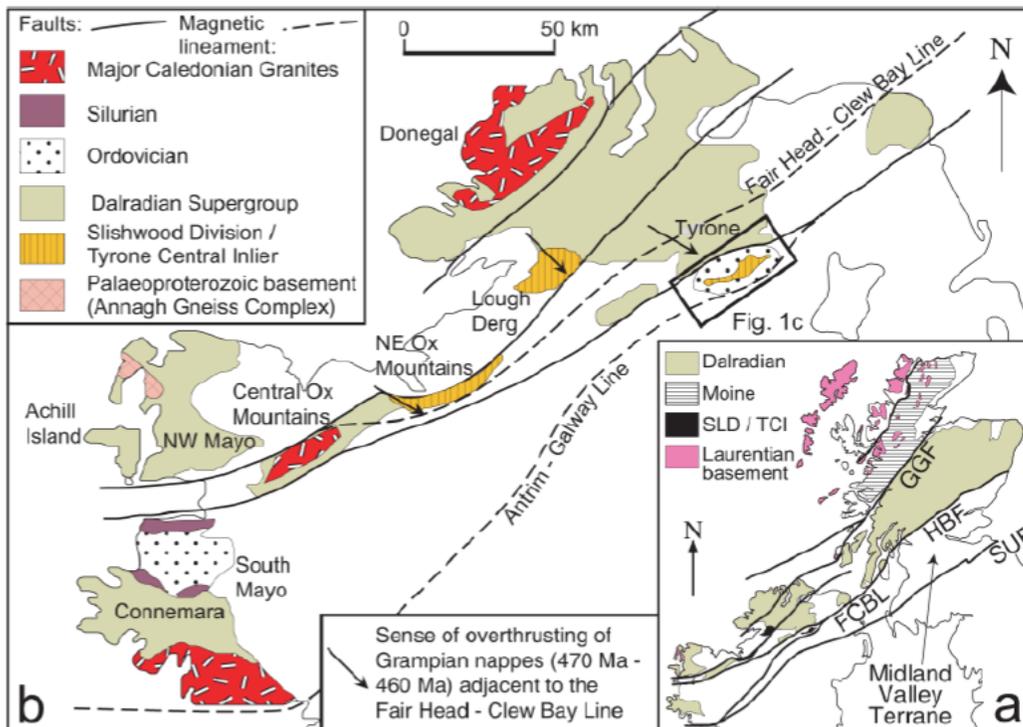


Figure 2: Geological background map from Cooper and Hollis unpublished field guide. Summarises the regional setting of the Tyrone Igneous Complex in relation to other relevant geology across Northern Ireland, Ireland and Scotland.

Itinerary

Day 1 (3rd April)

The Chapter flew into Belfast airport at around midday and proceeded to meet Dr Hollis and Professor Cooper in the field in the afternoon at Mountfield Quarry, where we saw basaltic Tyrone Arc volcanics, exposed immediately south of the Omagh Thrust, that had undergone extensive epidotization with minor pyrite mineralization.

At the end of the day's fieldwork the Chapter was able to join undergraduates from the University of Leeds for a talk about the history of 'Irish Gold' and the Curraghinalt Gold Mine, by Dr Garth Earls. Dr Earls is a former Director of the Geological Survey of Northern Ireland and former Managing Director of Dalradian Gold Ltd, the owners of Curraghinalt Gold Mine. Dr Earls' talk lead onto the tour of Dalradian Gold's core facility planned for the following day.



Figure 3: A) Students receiving an introductory talk from Dr Steve Hollis upon arrival in Northern Ireland. B) Dr Garth Earls provided an insightful evening lecture addressing the 'history of gold in Ireland' and the story behind the discovery of the Curraghinalt gold deposit.

Day 2 (4th April)

In the morning the Chapter travelled to Dalradian Gold's Curraghinalt gold mine core storage facility in Omagh, County Tyrone where we met Professor Cooper. We were able to attend a tour of the core storage facilities, a presentation on the history of the mine and also view show core. Examples of several different mineralized vein types were studied, with corresponding assay data for key intercepts also on show. The morning afforded the students a first opportunity to see a range of vein characteristics, textures and host rocks from the largest known gold bearing system in Northern Ireland.

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In the afternoon, Dr Hollis and Professor Cooper led the chapter to several sites across a prospective VMS deposit associated with the upper Tyrone Volcanic Group. The Cashel Rock Au prospect is hosted in mid-Ordovician silicified rhyolites of the upper Tyrone Volcanic Group. Historic drilling across the prospect returned intercepts including 3.63 m at 30.51 g/t Au, with gold being associated with silicification and hydrothermal brecciation, forming a stockwork structure. The exact nature of mineralization at Cashel Rock remains unclear, and students were able to engage in discussion as to its origin, based on their observations of host rocks, textures, mineralization and alteration minerals.



Figure 4: A) Students inspecting Dalradian Resource Inc. show core from the Curraghinalt gold deposit. B) Students assessing mineralization processes within the Tyrone Volcanics.

Day 3 (5th April)

The group began the day by visiting a series of localities throughout the Tyrone Ophiolite. The transect began with the inspection of magnetite-bearing silica iron exhalites (jasper), interpreted to have precipitated on the seafloor from hydrothermal vents associated with rifting of the Tyrone Arc. Students then had the opportunity to observe some pillow lavas at Mweela More, where characteristic oblate spheroid pillows can be seen with devitrified glassy margins, relict vesicles and contraction joints. Stratigraphically below the pillow lavas, pegmatitic hornblende gabbros and dolerite dykes were studied at Black Rock. Remelting textures between pegmatitic gabbros and dolerite dykes were studied, allowing for student discussion regarding mid-ocean ridge processes and geochemistry.

In the afternoon Dr Hollis and Professor Cooper led the Chapter to the final locality of the trip, Corvanaghan quarry. This quarry is within the Tyrone Central Inlier and freshly exposes

paragneisses which have undergone polyphase deformation. An early, bedding-parallel S1 foliation is folded by isoclinal F2 folds, with an axial-planar S2 foliation well developed in the F2 fold hinges. The host rocks are cut by a series of minor felsic intrusions including quartz-plagioclase leucosomes and later muscovite and tourmaline-bearing pegmatites. In addition to the excellent exposure, this locality allowed the students to visit an operational aggregate quarry and observe the crushing process.



Figure 5: A) Prof. Mark Cooper gave an introduction to the economic geology of the Corvanaghan Quarry. B) Students gaining a 3D perspective of geological structures in Corvanaghan Quarry.

Day 4 (6th April)

The final day consisted of travel back to Belfast via the Giant's Causeway World Heritage site. The Giant's Causeway is world renowned for an outcrop of interlocking columnar basalts and the visit allowed the students to think about the tectonic evolution of Northern Ireland, which was heavily influenced by the opening of the North Atlantic Ocean during the Paleocene. The group returned to Southampton on the 7th April.



Figure 6: Group photo of all University of Southampton SEG Chapter attendees at the Giant's Causeway

Attendees

1. Charlie Oldman – 3rd year undergraduate Geology student
2. Jamie Kelly – 3rd year undergraduate Geology student
3. Lewis Banks – 4th year undergraduate Geology student
4. James Shaw – 4th year undergraduate Geology student
5. Ashley Tuton – 3rd year undergraduate Geology student
6. Will Young – 3rd year undergraduate Geology student
7. Alex Smith – 3rd year undergraduate Geology student
8. Charlie King – 4th year undergraduate Geology student
9. Iain Stobbs – 2nd year PhD student – Economic Geology
10. James Davey – 2nd year PhD student – Economic Geology

Acknowledgements

The participants on the fieldtrip are extremely grateful for the financial support provided by the Society of Economic Geologists and from our academic advisor, Professor Steve Roberts.

We would also like to place on record a particular note of thanks to Dr Steve Hollis (University College Dublin/iCRAG) and Professor Mark Cooper (Geological Survey of Northern Ireland) for sharing their expertise in the field. Additional thanks are due to Orla McKenna (Dalradian Resources Inc.) for a superb tour of the Curraghinalt core facility and to Dr Garth Earls for an insightful presentation on the history of gold in Northern Ireland and of the discovery of the Curraghinalt deposit. Dr Koen Torremans and Alex Russell provided excellent additional guidance whilst in the field.

Finally, a debt of gratitude is owed to those who helped to organize the logistics for the trip. These include Aisling Hubert, Charlie Oldman, Will Knapp, Jamie Kelly and Jake Launder.