

Bursary Report – Benjamin Jost

In the first week of May, I, together with my supervisor, Lloyd White and another PhD student from the Southeast Asia Research Group (SEARG) of Royal Holloway University of London joined Dr Daniel Viete and two PhD students from Durham University on a 5-day field trip to Scotland. The aim of the trip was to look at metamorphic rocks in north-eastern Scotland, the type localities for the Barrovian and the Buchan zones. These zones are defined by the successive appearance of distinctive minerals during prograde regional metamorphism in pelitic rocks along medium P/T and low P/T paths, respectively. Daniel Viete was the ideal leader for this trip, as he studied these rocks thoroughly during his PhD. The reason for me to go to Scotland to look at these rocks is less obvious, particularly as my PhD project focuses on northwest New Guinea.

I am investigating the metamorphic basement rocks of West Papua. These rocks are recorded on geological maps of the area, but apart from this there is very little information about them. We thought that it would be useful to compare what we see in West Papua to the better-studied and better-exposed, classical examples from Scotland. The idea for this trip was conceived at the MSG RiP meeting earlier this year and was partially supported by a bursary of the Mineralogical Society.



Unlike Barrow, who found and documented his famous mineral zones in poorly exposed sections along valleys into the highlands to the north of the Highland Boundary Fault (HBF), we kept to the coast to study the same rocks with perfect exposure. Starting just NW of Stonehaven, where the HBF cuts the coastline, we continued further along the cliffs to the NW. Immediately north of the HBF, the Dalradian sediments have been metamorphosed to the Chlorite Zone. As the beds dip steeply to the NNW, we quickly passed into the Biotite Zone, marked by the appearance of abundant biotite porphyroblasts. The contact to the successive Garnet Zone is less obvious, as the newly formed crystals are likely to be so small that their first appearance can only be documented by careful study of a sequence of thin sections. We found layers with abundant porphyroblasts of garnet, but only well into the Garnet Zone. The next index mineral encountered was staurolite (Staurolite Zone), and by car we reached outcrops of the higher-grade Sillimanite Zone near Portlethen. Further NW, at Cove Bay and Nigg Bay, we observed increasing proportions of migmatite, which testify for partial melting of the sediments.

Along the northern coast of Aberdeenshire, between Portsoy and Banff, we looked at other examples of Barrovian type and meta-ultramafic rocks, but what proved to be much more interesting for me were the Buchan type Cordierite and Andalusite zones observed at Banff and Whitehills, respectively. I was surprised by how closely the rocks exposed along this coastline resemble the basement rocks I described and sampled for several weeks in the jungles of West Papua halfway around the world. Even though the low P/T regional metamorphism of the Buchan type rocks does not seem to be well understood yet, it will certainly be a valuable analogy to interpret the metamorphic basement of NW New Guinea.

The field trip to Scotland was very instructive in terms of metamorphic petrology and structural aspects of metamorphic rocks, as well as different hypotheses regarding the medium- and low-grade overprint of these rocks. Furthermore, this trip meant making several new friends and strengthening future collaboration between Durham University and Royal Holloway University of London.

Benjamin Jost, 30 May 2016