



Post kinematic garnets found in sillimanite gneiss

Higher Himalayan Crystalline Series which sits above the Main central Thrust Zone. The sillimanite we saw here has a preferred orientation parallel to the main schistosity of the rock. There are also many garnets reflecting the highest level of metamorphism. In places the fabric of the rock can be seen flowing around the garnets indicating they were either pre or syn-kinematic. In addition to the pressure required for formation, it was hinted that there may also have been some shear in the orientation direction. Several miles along the border we see post kinematic, cherry-coloured garnets. Here they clearly cut across the foliation of the rock; different to those nearer the campsite. Also, the rocks take on a more layered appearance with garnets, a more felsic rock in between, and then a biotite rich layer – possibly either a migmatite or gneiss.

For this part of our trip we had been split up into groups. Others did find more sillimanite and leucogranites. At another location we found kyanite crystals; the other barrow zone minerals remained elusive.

After 4 days of camping and studying this area in the mountains we started our journey back to the hustle of Darjeeling and to the luxury of running water,.

Sandwood Bay, Assynt

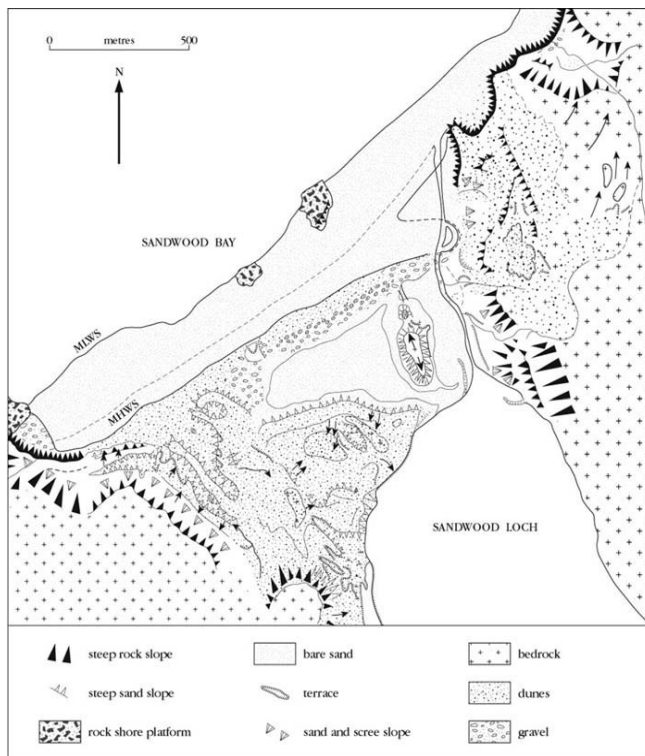
Jane Browning

Charles Hiscox was not the only Bath geologist to visit Assynt recently. Sandwood Bay, western Sutherland, about 5 miles south of Cape Wrath, was the destination of Melissa Freeman, Alec Thomson and myself in August this year. It is not an easy place to get to. The sign marker shows it to be a 4 ½ mile walk from the nearest habitation. It was a long walk over moorland; luckily there had been little rainfall in the preceding weeks, otherwise it would have been extremely wet underfoot. Sandwood Bay is a most beautiful bay with stunning sand dunes which provide a welcome on descending to the beach from the moorland. It is the dunes about which most has been written, being naturally unstable and one of the most dynamic beach-dune systems in Britain. But there are also some beautiful gneisses at the northern end.



Descending to Sandwood Bay, on the left, with Sandwood Loch to the right.

The south-east to north-west orientation of Sandwood Bay corresponds to a structural depression along the junction of the near-vertical cliffs of Torridonian sandstones to the south and the bold convex cliffs cut in Lewisian gneisses to the north.



Sandwood Bay, Sutherland, is dominated by a large and highly dynamic area of blown sand and machair that lies between the sea and the freshwater Sandwood Loch. Arrows show slope direction. (After Ritchie and Mather, 1969.)<http://jncc.defra.gov.uk/pdf/gcrdb/GCRsiteaccount229.pdf>

The steep sandstone cliffs which form the southwest limit of the bay, rise to over 90 metres and are variously subject to block failure and granular disintegration. They have suffered some huge collapses in recent years, and they are rapidly eroding, as seen in the great sea stack of Am Buachaille to the west of Sandwood Bay.



Sea stack, Am Buachaille

The cliffs to the north are formed of gneiss. I can do no better than quote the owners of Sandwood Bay, the John Muir Trust, *"the rocks of Sandwood are mainly Torridonian gritstone, sandstone and conglomerate, with outcrops of Lewisian gneiss. Sandwood Loch is at the junction between the two rock types. Lewisian gneiss is multicoloured, with stripes, swirls and bubbles, metamorphic and one of the oldest rocks in the world. Torridonian sandstone is sandy, layered sedimentary rock, often blocky in shape, laid down about six hundred million years ago."*

Stripes, swirls and bubbles are there in profusion. These rocks are more massive and resistant than the sandstone cliffs to the south and provide little detrital material.

Between the two headlands is a wide variety of spectacular soft coastal landforms. To the landward side of the wide sandy beach, a gravel-cored bar capped with highly dynamic sand dunes impounds the freshwater of Sandwood Loch. Other features of interest include extremely mobile sand dunes with large blowthroughs and climbing dunes that reach altitudes of over 100 m OD on adjacent hilltops (Ritchie and Mather, 1969).

This exposed Atlantic beach is among the most dynamic in Britain and is characterized by ephemeral bars that develop and erode depending on prevailing wind and wave conditions (MacTaggart, 1996). There is some development of rip currents in the nearshore zone, possibly controlled by the partially submerged rock skerries.

The lower beach has a relatively steep slope and the upper beach has a convex-up profile with a well-developed summer beach berm (MacTaggart, 1996). The reddish-coloured, mediumgrained sand has median diameter of 0.46 mm within the dunes, but although the shell content is unknown it is likely to be about 40–50%, similar to most other west coast beaches of Sutherland. The gravels of the bar are largely composed of Torridonian sandstones (Ritchie and Mather, 1969) seen best where the stream outlet of Loch Sandwood traverses the beach at its northern extremity.

I finish with a few photos of the Bay and the Lewisian gneiss.



Sandwood Bay from the south

