

Field Trips and Reports

FIELD TRIP TO PEMBROKE SEPTEMBER 2009

Friday afternoon

We arrived to find St Davids bathed in beautiful sunshine, so after meeting our leader Sid Howells, the party headed to Caerfai Bay, our first stop.

A short walk down to the coast brought us onto the beach. Sid explained that the N side of St Brides Bay – where we were – was composed of Cambrian and Precambrian rocks and that we would be examining them on both Friday and Saturday. The Cambrian and Precambrian rocks are folded into a south plunging anticline, severely eroded at the end of the Cretaceous to give the very apparent peneplain, which stands at 60 m here. We crossed the beach to the E side cliffs, which were bedded sediments of striking purple colours amongst more sober greys and pale greens. Dip of these rocks was about 60deg S, increasing southwards to perpendicular, and faults were seen cutting across the bedding.

Sid explained that the sequence here was :-

Cambrian - Caerbwly Sandstone – red-purple; Caerfai shales – bright red strong rock with bands of 2-5cm thick pale tuff; St Nons Sandstone – soft easily crushed, green, feldspathic or an arkose; Basal conglomerate.

Precambrian - Perbidian

A major fault runs NW-SE into the bay and with some deep consideration, we decided that the movement on the fault was about 50m . The E side of this bay revealed an anticlinal structure in the Caerbwly SSt, in which could be seen white feldspars. Here, the Caerbwly dipped at about 80 deg S.

On the W side of the Bay there is a basic dyke which intrudes the Caerfai, and offshore in a reef, we could just make out the Basal Conglom, which also was exposed in the cliff path by the Monastery. 100 m further W and we found rhyolitic tuffs, blue-green, fine grained glassy rocks, our first meeting with the Precambrian Perbidian.

We now retraced our steps to the cars, checked into the B&Bs, proceeded smartly to the Grove Hotel to finish an excellent day with food and of course drink.

Saturday morning

We started our morning at Porth Clais harbour in glorious sunny conditions. The local granophyre was examined and the historical significance of a trench dug by Green in 1909 at this location; the result supported Hicks's claim in the 1880's, in a dispute with Geikie, that an unconformity existed between the Cambrian and Pre-Cambrian. Trace fossils in the St Non's Sandstone pavement of the old river bridge were discussed and the local Lime kilns viewed.

An uphill walk to the harbour entrance permitted a great view of the flat plateau land surface, caused by erosion in the late Cretaceous/early Tertiary and the connection between the local bays and their associated wrench faults.



A further westerly stroll along the cliff gave access to Ogof Golchfa. Two significant features were examined at this stop. The location comprised a large Cambrian micro-tonalite sill adjacent to a glacial raised beach (5 m above current High Water), attributed to a period 120k BP, and solifluction and till above. Some of these granite cobbles had been traced to Ailsa Craig in Scotland.

The Pembrokeshire coastal path was followed further west to Whitesands Bay. Along the walk we climbed down part of the cliff to view Cambrian Basic Dykes and a prize was offered to the individual to discover an Ultra-Basic (Picrite) erratic boulder believed to originate from the NW coast of Scotland. David Price first spotted the

0.5 m diameter, dark grey crystalline rock partially hidden in the local heather.

Saturday Afternoon



After a lunch on the beach, a quick swim by Sid and a paddle by those not so brave, we resumed our examination of the rocks.

Whitesands Bay is on the other arm of the monocline, so the beds are steeply dipping but are in reverse order. The Solva group is present on the south side of the bay, the younger Orovician rocks are to the north. On the north side of the bay are the Lingula flags, a Cambrian sandstone/siltstone named for Lingula fossil, an inarticulate brachiopod. This is topped with glacial drift.

There is an unconformity between the Lingula Flags and the Arenig rocks, the Ogof Hen formation which contains phosphatic nodules an indication of fossil remains. There follows black mudstones containing, rarely, trilobites and a creamy colour in some beds shows volcanic activity occurring deposition. The high point of the area is a huge intrusive sill (Ordovician) of gabbro and diorite which stretches out to the Bishop Rock.

At this point the party split into two groups. One went to look at the gabbros in the next bay, the other to climb to the top of Carn Llidi (181m).

Carn Llidi

The climb to Carn Llidi was fairly straightforward with a little rock scrambling at the top and worth the magnificent views. The flat valley below was carved during the last Ice-age, the ice flowing down from Scotland and Ireland - though no striations have been found.

The area of St David's Head has been used since the Stone-age. There are several tombs and earthworks of an Iron age fort. The fields show signs of early agricultural techniques.

Porthmelgan

Porthmelgan has the same facies and bedding on either side of the bay, dipping towards each other, forming a north-eastwards-trending synclinal fold.

This is a summary of the rocks found on the beach. On the storm beach are large, wave polished, rounded boulders of dolerite, gabbro and pegmatite. These boulders represent zones within the St. David's Head layered, igneous intrusion. This intrusion has been divided up into zones. The lower and upper margins of the intrusion are; composed of three rocks



(left to right) - a Quartz Dolerite, a Quartz Gabbro with layered horizontal and repeated bands of feldspars crystals and a Pegmatite with prismatic crystals of feldspar some 8 centimetres long.

The boulders on this storm beach have been eroded out of the boulder clay, deposited in the eroded synclinal fold at the back of the bay

Sunday

The itinerary for the day began at Aberreiddi Bay which is situated between St David's and Fishguard. The steep sided valley with a flat bottom is the result of an Ice Age, 2 million to 10 thousand years ago, the source of this ice is known as the Irish Sea Ice Sheet. Erosion of the bay is due to sub-glacial melt water channels that carved out the valley we see today.

The group gathered on the beach to hunt for fossils. In the Black Organic Mudstones, Cyffredrin Shale Member, that contained sulphides of Copper (Cu) and Iron (Fe) were graptolites (25 different genus of graptolites), inarticulate brachiopod *Lingula* and the mineral Pyrite were found, also "Rose crystals of Gypsum" (CaSO_4) in between the mudstone layers. The rocks were formed 470 mya during Ordovician times when deep water muds were interbedded with the volcanic ash, tuff - the Llanrian Volcanic Formation. 420mya continental drift and collision transformed these rocks into slates by regional low grade metamorphism. The rocks were then folded into a syncline.



We walked towards the Blue Lagoon, a flooded slate quarry, passing a headland stack which showed a lighter shelly limestone interbedded with a black mudstone. Good quality slate was mined in this quarry. There are still the remains of the quarry buildings and the railway line that delivered the slate to Porthgain. The quarry wall shows black slates interbedded with volcanic ash with intrusive sills of dolerite. The whole deposit is inverted to a 125° dip. A number of children were enjoying the fine weather and using the remains of the mine as a launching site to jump into the lagoon.

We then drove near to Strumble Head and walked to a high point called Pegubor Caer, one of the northwest trending crags of Carnwnda, part of a sheet-like intrusion called the Llanwnda Gabbro. This forms multiple doleritic plugs of magma with columnar

jointing, intruded into the Ordovician Arenig Shales. The exposure showed six, five and four sided columnar jointing, dipping 50° north. Erosion by solifluxion processes removed material in the Pen Caer area during Quaternary times 2.6 million to 10,000 years ago, and has left Pegubor Caer protruding out of the Pen Caer Peninsular along with others that are now remnants of their former selves.

We left Strumble, drove to Fishguard and walked to a hill close to Angles Point. A grey/greenish rock with dark and light thin bands also slightly folded, a flow banded Rhyolite. The headland is hugely flow banded and folded due to submarine volcanism, intrusions of pillow lavas. Continued onto Penrhyn Point and made our way down the cliff to see layered bands of the flow banded and folded Rhyolites, some with rip up clasts. We returned to Angles Point to see a multiple outcrop of dolerite dykes again showing columnar jointing with six, five and four sided columns. Across the bay southwards were outcrops of pillow lavas.

We said our goodbyes and thanks to Sid and made our way home after a very enjoyable and successful weekend.