

## Note from the Chairman

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Welcome to our new Autumn session, which starts on Wednesday. As the evenings draw in we hope that you will be tempted to come along to our meetings, which will not only range across continents, but even planets as the programme unfolds.

Geologically speaking, my summer holiday was well-starred this year as we took our boat through the Huddersfield and Rochdale canals. The summit of the for-

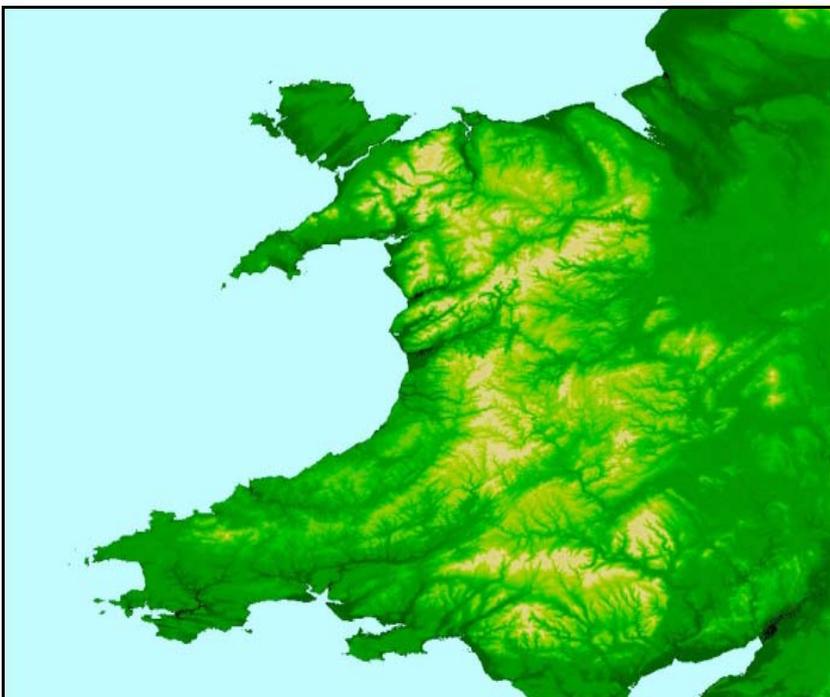
even when illuminated by the powerful headlamp of the electric tug-boat which draws the convoy through. The Rochdale canal has no tunnel, but makes its way through a glacial meltwater channel at 601 feet - an extraordinary sight even from a car on the adjacent road. Both canals feature tea-dark, peat-stained water from their upland catchment, which is most unusual.

My son, newly independent, spent a last-minute-bargain week in Tenerife and paid nothing like sufficient attention to geology, though he did bring me a nice little piece of basalt.

I am able to report that our Summer's field meetings were a great success, although the Kitchen Sink meeting was cancelled at the request of our hosts who had a crisis due to staff holidays and were unable to attend to us as had been hoped. If there is sufficient interest, we will re-schedule this meeting.

Our trip to Yr Arddu was greeted by superb sunshine and we had enormous fun getting to grips with the differences between flow-banded rhyolites and tuffs, pondering upon the origin of nodular horizons and exploring the contacts between the rhyolite and subsequent dykes. We would be there still if we had not dragged Colin Darlington away from an outcrop which displayed rhyolite being assimilated into the dolerite. The jury is still out on whether the final nodular outcrop was actually a sedimentary rock with included rhyolite clasts. I have since made petrographic sections of one nodule - and it proved to be exceedingly difficult - and regret not collecting a specimen of the dolerite for the same purpose. Never mind, that will be an excuse to go back another day.

The trip to the Anglesey coast near Rhoscolyn was well attended, and everyone



Shuttle radar topography of Wales, from the Jet Propulsion Laboratory USA, image courtesy Dr Paul Markwick. The data points used are every 90 metres, with a vertical accuracy of a few metres. We hope to make maps of the North Wales area from this data.

***1st Talk of the  
Autumn Series  
this Wednesday  
(15th), Conwy***

mer is at a mere 645 feet above sea level, and progresses through over three miles of tunnel up to 700 feet below the grit-stone moors above. The tunnel is rock-hewn without lining for much of its length, and intersects a thick sequence of sandstones which dip steadily northwards - which was a surprise. Very few other sedimentary features are visible beneath the accumulations of sooty grime,

enjoyed the superb exposures, challenging rocks and excellent company. Our leaders were Margaret Wood and Stewart Campbell of the local RIGS group, and the event was host to the launch of their pictorial guide to the geology of the Rhoscolyn Coast. The afternoon session was concluded by a trip to outcrops of serpentinite nearby. These outcrops were all different: one black, one green and the other a rather nice gabbro in a pale greyish hue. Examination of the black and

green material by X-ray diffraction proved the rock to be virtually pure antigorite, which is one of the the three polymorphs of serpentine. Sadly the petrographic section of the gabbro was destroyed in a casual moment when I ground the entire slice away while trying to make sense of the interference colours I was observing. I now have to start again, but since my diamond saw blade is too worn to cut straight any longer it may be a little while. What I did discover is that the rock contains not a shred of its original mineralogy and comprises only pseudomorphs, which does not explain its surprising strength and resilience at outcrop. More of this later, perhaps.



Picture courtesy of Arthur Hudson

I shall leave you with the image of our group examining a serpentinite outcrop in a farm track - where wheels and hooves have polished the rock surface to a glassy sheen in wonderful yellow, green and blue colours.

As with all the rocks of Anglesey there is controversy surrounding the origin of the igneous precursors of the rocks we see today - but if it was all known we would have nothing to discuss.....

*Will Jones describes an outcrop that most of us have driven past.....*

## Rhuallt Hill Cutting, A55

The construction of the A55 road cutting down Rhuallt Hill in the early 1990s created an exposure of the Silurian rocks of the Clwyd Hills which was far better than anything which had existed previously. Two cuttings between them provided a total section several hundred metres long and up to about 20 m high. At first the exposure of fresh rock was excellent but weathering over the last decade has blurred some of the detail by now.

The principal rock type where I was able to inspect it on the south side of the upper cutting is shale in units about 20 cm thick alternating with fine sandstone bands generally less than 1 cm thick (Fig 1). Graded bedding is poorly developed but shows that the beds are the right way up, as do occasional scour marks on the base of the sandstone bands. These units are probably distal turbidites, the products of slumping of

sediment from shallow water areas as turbidity currents into deeper water. The generally fine grain size shows that they are the residues of flows, most of which had already been deposited closer to the source.

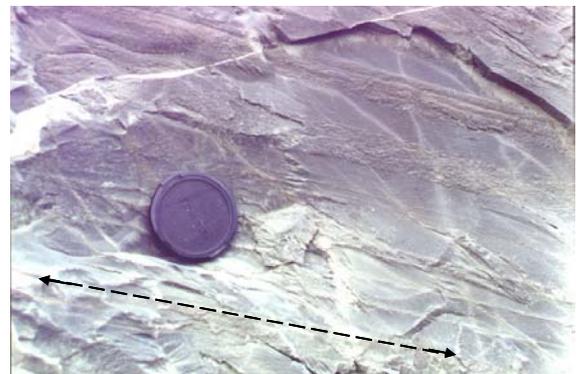


Fig 1 . Close up view of the alternating sandstone (pale) and mudstone (dark) bands (parallel to arrows) exposed on the south side of the upper cutting

The bedding is emphasised by occasional slots a few cm thick on the cut faces which presumably represent layers of less solid material, probably finer grained or less lithified mudstone. One band originally stood out clearly in the upper cutting because of its startlingly white colour. On close inspection this turned out to be a layer 10 cm thick consisting of gritty laminated quartzite with a central zone of conglomerate containing flaky quartz clasts up to a cm long (Fig 2). This unit presumably represents an exceptionally large turbidite flow.

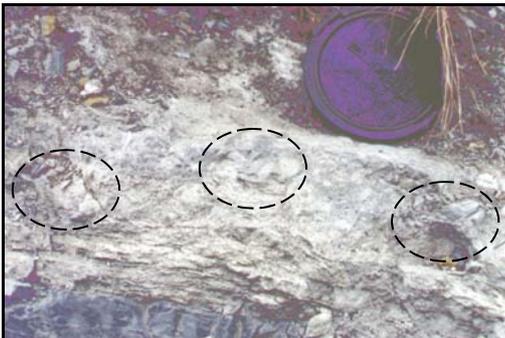


Fig 2 Close up view of the pale conglomerate horizon on the south side of the upper cutting. The outlines of quartz clasts up to 1 cm long can be seen. (ringed)

The most obvious structural feature of the section is that the bedding dips to the west, the beds sloping downhill at a greater angle than the road descends. The dip appears to remain about the same from the bottom to the top. This is interesting as it bears on an old idea about the structure of the Clwyd Hills. The outcrops of Carboniferous Limestone east of the hills dip to the east but there are a few small outcrops of the limestone on the western edge of the hills which dip to the west. It used to be considered that this reversal of dip over the Clwyd Hills indicated an anticlinal fold along the axis of the range which should affect the Silurian rocks just as much as the Carboniferous. This fold should show up as a change in the attitude of the bedding along the cutting.

It is not easy to measure the dip and strike of the bedding in the traditional way by putting a compass clinometer on

the bedding plane as it is hazardous to walk down the side of the road. These days it is aggressively fenced off. However it is possible to measure the attitude of a bedding plane from a distance. You can measure the strike by positioning yourself so that you are aligned with the horizontal extension of the bedding plane and measuring the compass direction towards the outcrop. The dip is found by lining up the clinometer by sight with the dip of the bedding plane. A set of attitude measurements on the north side of the upper cutting, made in this way from the top of the south side, show that there is indeed a change in the dip from the bottom to the top. The variation is from a dip of 25° to the southwest at the bottom to 33° to the

south at the top. This is not much of a change but when these measurements are plotted on a stereogram they show a systematic trend (Fig 3). The trend can be explained as being due to an originally parallel set of beds being bent by a fold whose axis plunges towards 225°, i.e. to the southwest, at 25°. This is almost at rightangles to the NNW-SSE trend of the Clwyd Hills and is not compatible with the idea of the opposed dips of the Carboniferous Limestone on each side of the hills being due to a fold along the axis of the range.

The most impressive structural feature in the exposures is the anticline at the northern end of the lower cutting (Fig 4). This structure is clearly visible because of the contrasting colours of the pale sandstone and dark shale. A fault runs through the crest of the fold dropping the eastern side down by half a metre or so (Fig 5). On the western side of the fold the prominent

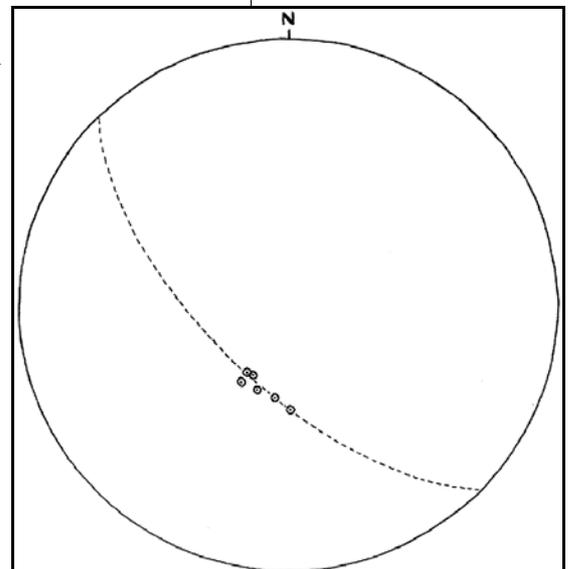


Fig 3 Stereogram of bedding attitude measurements. Direction from the middle indicates the dip direction and distance from the middle indicates increasing dip. The dotted line passes through beds which have been folded around a axis plunging to the southwest at 25°.

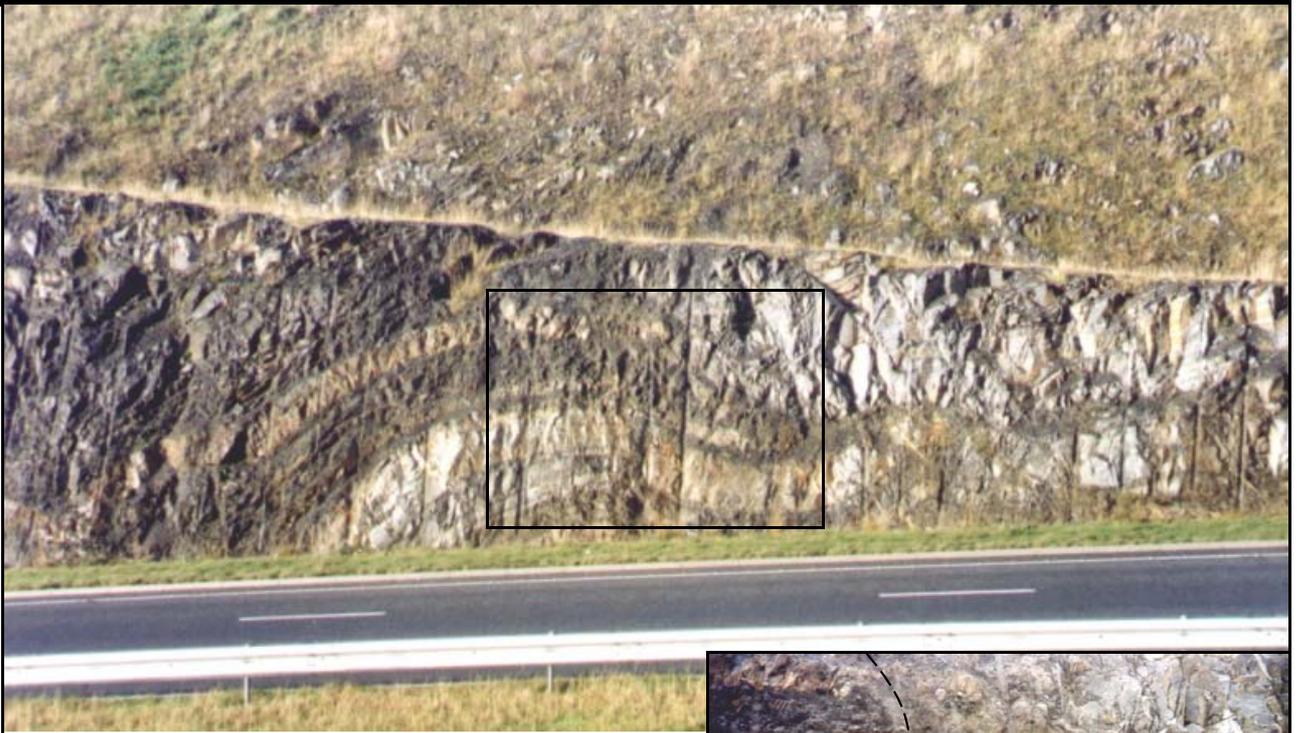


Fig 4. The anticline at the eastern end of the lower cutting, with Fig 5 area outlined.

### Rhuallt Hill Cutting (cont.)

sandstone band is overlain by two metres of shale containing a smaller sandstone band which shows smaller scale folding of its own. The thick shale is missing on the eastern side of the main fold, probably because it has been cut out by a low angle normal fault bringing down the overlying thick sandstones.

Some of the artificial features of the cut faces are of geological interest too (Fig 6). The near vertical tubes are the shot holes. These were drilled into the solid rock along the plane of the intended cutting face. Setting off explosives in a set of these holes simultaneously produces the desired rock face with clinical precision. Triangular patches of stone walling at the top of the faces indicate areas where the rock itself was too unstable to stand up on its own. These all coincide with areas where the notches of weaker rock reach the top of the cutting. Finally there are zones a few metres wide and extending near vertically the whole height of the face which have been covered in cement. These are probably joint zones where the rock is too shattered to

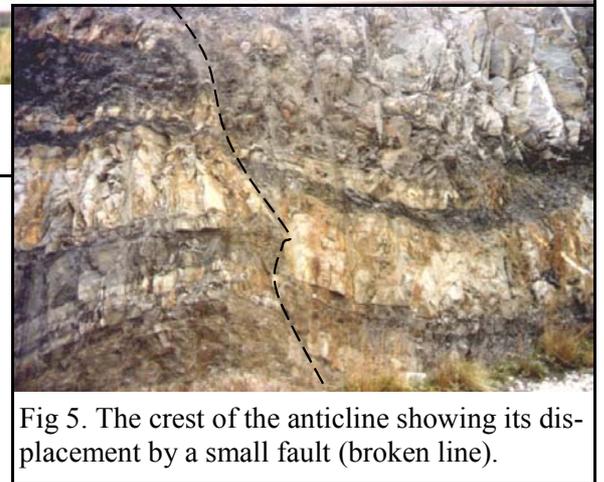


Fig 5. The crest of the anticline showing its displacement by a small fault (broken line).

make a satisfactory cutting face on its own.

Next time you go along the A55 through Rhuallt Hill, get someone else to do the driving and have a good look at the brilliant exposure the tax payer has provided for us.

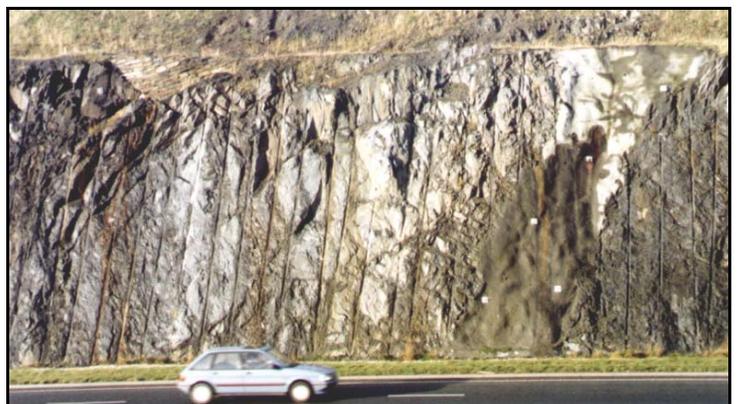


Fig 6. Part of the lower cutting with equally spaced shot holes, a patch of walling where the rock is weak and a cemented zone covering a joint.

## EVENT DETAILS

**September 15 Wed, Conwy, 7.30 pm. The Coastline of Anglesey,** a talk by Gwilym Trefor Jones.

Gwilym's extensively illustrated talk demonstrates the close relationship between geology, coastal processes and aesthetic quality in landform development. He shows how this natural framework has influenced development of settlements across the island and the extent to which man's battle against the power and ferocity of the sea, is recorded in the long history of shipping disasters off the Anglesey coast. This talk arises in part from Gwilym's work over many years at Bangor University, and represents a real chance to benefit from his local knowledge and expertise.

**October 6 Wed, NEWI, Wrexham, 7.30 pm, The Exploration of Mars,** a talk by Jamie Gilmore. Jamie's talk will cover the exploration of Mars since the beginning of the space age, focusing especially on the geology of the Martian surface. The latest published results from current missions will be put in the context of information learned from earlier missions. Jamie is a Senior Lecturer in the Department of Earth Sciences, University of Manchester.

**Nov 5th, 6th & 7th, Geologist's Association Geofest at Cardiff.** The Annual Reunion of the Geologists' Association, being held for the first time on Welsh soil. We hope to fly the North Wales flag - let us know early if you might be interested in the trip.

**Nov 7th, Visit the Prince Madog, Menai Bridge.** The Department of Oceanography at Bangor University is one of the World's leading shelfal sea research institutions. The Prince Madog, built a couple of years ago, is



Folds of Rhoscolyn, Ynys Mon, photo courtesy Arthur Hudson

their main research vessel and hosts much state-of-the-art equipment. This is a rare opportunity to catch the vessel between research cruises. It has taken Fred Owen a year to land this prize catch—you are unlikely to get another chance, so don't miss it. That said, there is always the possibility that the vessel could have to put to sea again at short notice, so Fred is awaiting confirmation of details.

**Dec 1 Wed, NEWI, Wrexham, 7.30 pm, Fantastic Fossils,** a talk by Dr Sarah Gabbott (from Channel 4's Big Monster Dig programme) will be presenting the Christmas Lecture. Sarah will focus on "exceptional preservation" with particular emphasis on the BURGESS SHALE. Sarah has spent time working on the Burgess Shale and will talk about the living conditions of the field season on the site, and the formation and exceptional preservation of the specimens. Sarah has some great specimens too which she will bring along. Sarah was a very enthusiastic and knowledgeable speaker. She is currently working in the Geology department at Leicester University, her research interests are palaeontology and paleobiology of the Upper Ordovician Soom Shale of South Africa and the taphonomy of exceptionally preserved fossil biotas.

*North Wales:  
Geology on our  
Doorstep*

## Talk Venues

NEWI (North East Wales Institute of Higher Education), Wrexham. Derek Jones, NEWI Natural and Built Environment Dept. 01978 293098, d.jones@newi.ac.uk

CONWY, Library and Civic Hall, Castle Street, Conwy (door by pedestrian crossing) (map on website)

EVENT NOTICES: Fred Owen, 01565 651004, fredowen@tinyworld.co.uk  
Chairman & Website: Jonathan Wilkins, 01492 583052, www.ampyx.org.uk/cdgc  
Meetings Will Jone 01492 580056  
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Vice Chairman and Newsletter Editor: Rob Crossley, 01492 623579, pen-crossleys@aol.com

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# NORTH WALES GEOLOGY DIARY: (FOR DETAILS SEE INSIDE)

**September 15th Wed, Conwy, 7.30 pm The Coastline of Anglesey**, a talk by Gwilym Trefor Jones, Geography Department, Bangor University

**October 6th Wed, NEWI, Wrexham 7.30 pm The Exploration of Mars**, a talk by Jamie Gilmore, Earth Science Department, Manchester University.

**Nov 5th, 6th & 7th, Geologist's Association Geofest at Cardiff.**  
The Annual Reunion of the Geologists' Association, being held for the first time on Welsh soil.

**Nov 7th, Visit the Prince Madog, Menai Bridge, NWGA/OUGS joint trip**, details awaiting confirmation.

**November Conwy Meeting**, to be arranged

**December 1st Wed, NEWI, Wrexham, 7.30 pm, Fantastic Fossils**, a talk by Dr Sarah Gabbott, Geology Department Leicester University (and Channel 4's Big Monster Dig programme) will be presenting the Christmas Lecture.

