
Carreg yr Allwen & Henblas RIGS Sites

NRW RIGS no. 291 [SH 40850 71511]

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RIGS Statement of Interest:

These two groups of massive quartzite/chert blocks are unusual inclusions in Precambrian Gwna Green Mica-schist.

Two, almost identical sites are included in this RIGS as the rocks have a similar origin, and both RIGS stand proud of the Gwna Green-schist in which they are enclosed. At Henblas, the quartzites were previously considered to be large glacial erratics or, a megalith from Neolithic times. They form significant landscape features. At Henblas, the two largest blocks are rough, angular and rise above the ground surface about 3m and 4m, respectively. They are broadly conical and lie on bases with circumferences in excess of 15m. A third block, about 4m square and 1m thick, straddles the others at a low angle. Its underside appears to be ice-smoothed and striated. Beneath these rocks, there appears to be some quartzite which is buried in the ground which could be in situ. Large isolated in situ masses of quartzite/chert occur within 0.5km of the Henblas stones at Cae Mawr Farm these also stand proud of the surrounding Precambrian green-schists and convincingly appear to be in situ. The quartzites are thought to have been 'rafted' in to a mud-rich sediment on an ancient sea bed when they were dislodged from nearby continental rocks. Later, they were dropped into a deep sea trench where they were metamorphosed under moderate pressure and converted into Green-schist with the harder quartz-rich rock remaining as coherent inclusions.

Geological setting/context: The Precambrian basement rocks of Anglesey and south-west Llŷn can be divided into several discrete groups, all of which were juxtaposed along a series of steep, brittle and/or ductile faults and shear zones (e.g. Dinorwic and Aber-Dinlle faults; Berw, Central Anglesey and Llŷn shear zones) collectively referred to as the Menai Strait Fault System (MSFS). First, the Monian Supergroup consists of a thick sequence of polydeformed metasediments and meta-igneous rocks, comprising the South Stack, New Harbour and Gwna groups, the latter representing the type example of a large-scale submarine debris flow or *mélange* said by some researchers to be of Lower Cambrian age. Ongoing research, however, may suggest a much older date for the Gwna Group with possible Cambrian ages being put forward for the South Stack metasediments. Second, the Coedana Complex of central Anglesey comprises high-grade metasediments, amphibolites and gneisses, and low-grade, thermally metamorphosed hornfelses adjacent to a granite (Coedana Granite), which has recently yielded a late Precambrian zircon age of $614 \pm 4\text{Ma}$. Third, a belt of schists and metabasites displaying blueschist facies grade of metamorphism lies within the MSFS. The metabasites exhibit a strong mid-ocean ridge basalt signature and have yielded ages of 580–590Ma. Fourth, the Sarn Complex in Llŷn comprises metagabbros and granite rocks which occur to the south-east of the Llŷn Shear Zone (LSZ), a continuation of the MSFS, which separates these igneous rocks from low-grade Monian *mélange* to the north-west. A late Precambrian zircon magmatic age of $615 \pm 2\text{Ma}$ has been obtained from a metagabbro of the LSZ. Fifth, on the mainland of north-west Wales, the Arfon Group comprises a thick sequence of tuffs and volcanoclastic rocks, dated at $614 \pm 2\text{Ma}$, which are conformably overlain by late Lower Cambrian siltstones. Correlatives of the Arfon Group may occur as isolated outliers on Anglesey and, if proven, would provide an important potential lithostratigraphical link across the MSFS. The stratigraphical correlation between the various units has proved highly controversial. The recent recognition of mylonitic rocks, for example in the LSZ, emphasises the presence of tectonic contacts and indicates that each component may represent a so-called 'suspect terrane' which was transported laterally into position along the major faults and shear zones. Ongoing unpublished research suggests, that Anglesey's Precambrian rocks accumulated in accretionary prisms, providing a tectonic sequence rather than a stratigraphic sequence which was formerly accepted. This new research would reverse the accepted stratigraphic order of the bedded succession, the South Stack Group, the New Harbour Group and the Gwna Group established for the island by Robert Shackleton. This Precambrian basement later formed the north-west margin of the Lower Palaeozoic Basin, the initiation of which was contemporaneous with Arfon basement terranes and was completed at least by early Ordovician times since an unconformable Arenig overstep sequence has been identified at several localities such as Wig Bach, Parwyd and Mountain Cottage Quarry. The Arenig sequence of

Anglesey and Llŷn is considerably less deformed and metamorphosed than the underlying basement, although this distinction is not everywhere obvious.

Network context of the site: Carreg yr Allwyn & Henblas Quartzite is a critical component of a network of two RIGS which demonstrate key features of the Greenly's Precambrian Gwna Green-schist (more recently termed the Monian Supergroup by Horák and Gibbons) in Anglesey. The other site Henblas and Carreg y Alltwn represents large quartzite inclusions in the green schist. The 5 mile long, NW–SE fault-bounded belt of greenschists and blueschists and associated rocks is famous worldwide for preserving some of the oldest, yet mineralogically fresh, blueschists on Earth and in this area it bounds the Green-schists with tectonic junctions on two sides. The Blue-schists have been dated at 560–550 Ma but no date has been given for these Green-schists. Such ages are interpreted as having been produced during rapid uplift of the blueschists during oblique movements on the MSFS. Both Green- and Blue-schists are in regional, unconformable or tectonic contact with the Gwna Group Mélange and are interpreted as having belonged to a Precambrian accretionary prism. It is possible that all Precambrian rocks in southern Britain were part of the same Avalonian subduction system as Nova Scotia, Newfoundland and Canada. To select RIGS to demonstrate the Precambrian evolution of Anglesey and Llŷn, three separate networks were devised. These are: 1. Precambrian stratigraphy and structures. This network includes two sub-sets: a) Precambrian sedimentary structures; and b) tectonic structures, such as folds and faults, which may have occurred during a tectonic event in Precambrian times or later, for example, during the Caledonian Orogeny; 2. Precambrian palaeontology which includes any life-form and trace fossil, such as stromatolites, sponge spicules, worm burrows and bioturbated metasediments. Some current research suggests that some of these fossils may be Cambrian or even Ordovician in age, although this is refuted by other geologists. As these life-forms were previously held to be Precambrian in age, they have been included in this category; and 3. Precambrian reference sections. These aim to represent all important Precambrian rock types found in Anglesey and Llŷn. They include the major mapped units of Greenly (1920). The aim is to provide the best and most accessible exposure of the rock type. These can be considered as RIGS 'type sections'. Where there is a relevant mineralogical, sedimentary, structural or other change across an outcrop, several representative sites have been chosen. In this study, Carreg yr Allwyn & Henblas belongs to Network 3 (RIGS Precambrian reference sections; see above) and has been chosen to demonstrate a typically matrix-rich part of the Gwna Green-schists in Anglesey.

References:

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