



*Education and local involvement is important in the Wren's Nest National Reserve
(All illustrations provided by the Dudley Museum)*

Wren's Nest

Wren's Nest National Nature Reserve is was the UK's first National Nature Reserve for geology. It was established in 1956 and has recently celebrated its 50th anniversary.

This reserve is important both as a stand alone geo-heritage site as well as a reference for UK geoconservation work, a reference for local involvement in geoconservation in urban areas, and a reference for the link between geological natural values and cultural heritage in a mining/industrial setting (Prosser & Larwood 1994, Cutler 1994, Worton, 1994, Reid 1994). It also contains a vast experience pool relevant for geo-heritage and mining history dissemination and geotourism.

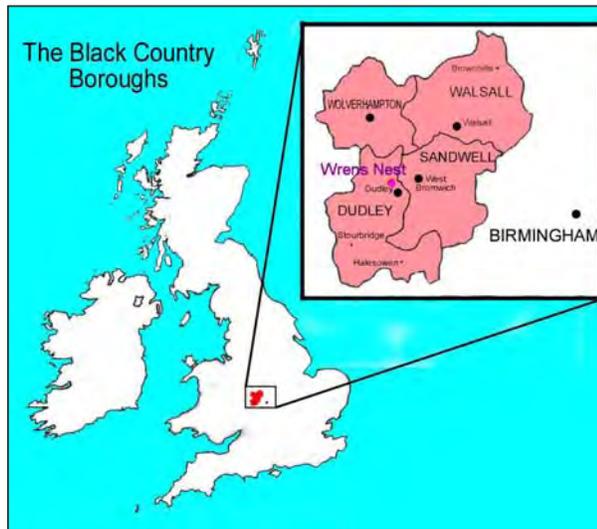
The activity within the area is large and plans for the future are very interesting for the larger geoconservation and geotourism community. Last year Dudley museum was the venue for a conference on geoconservation history (see ProGEO NEWS no 4, 2006).

For general information and as a follow up of the description of the area you will find a closer description in the following taken from the geological A-level guides developed by Dudley museum.

More information and contact information:

<http://www.dudley.gov.uk/leisure-and-culture/museums--galleries/dudley-museum--art-gallery/heritage/wrens-nest-national-nature-reserve>

The editor



Geology of the Dudley area

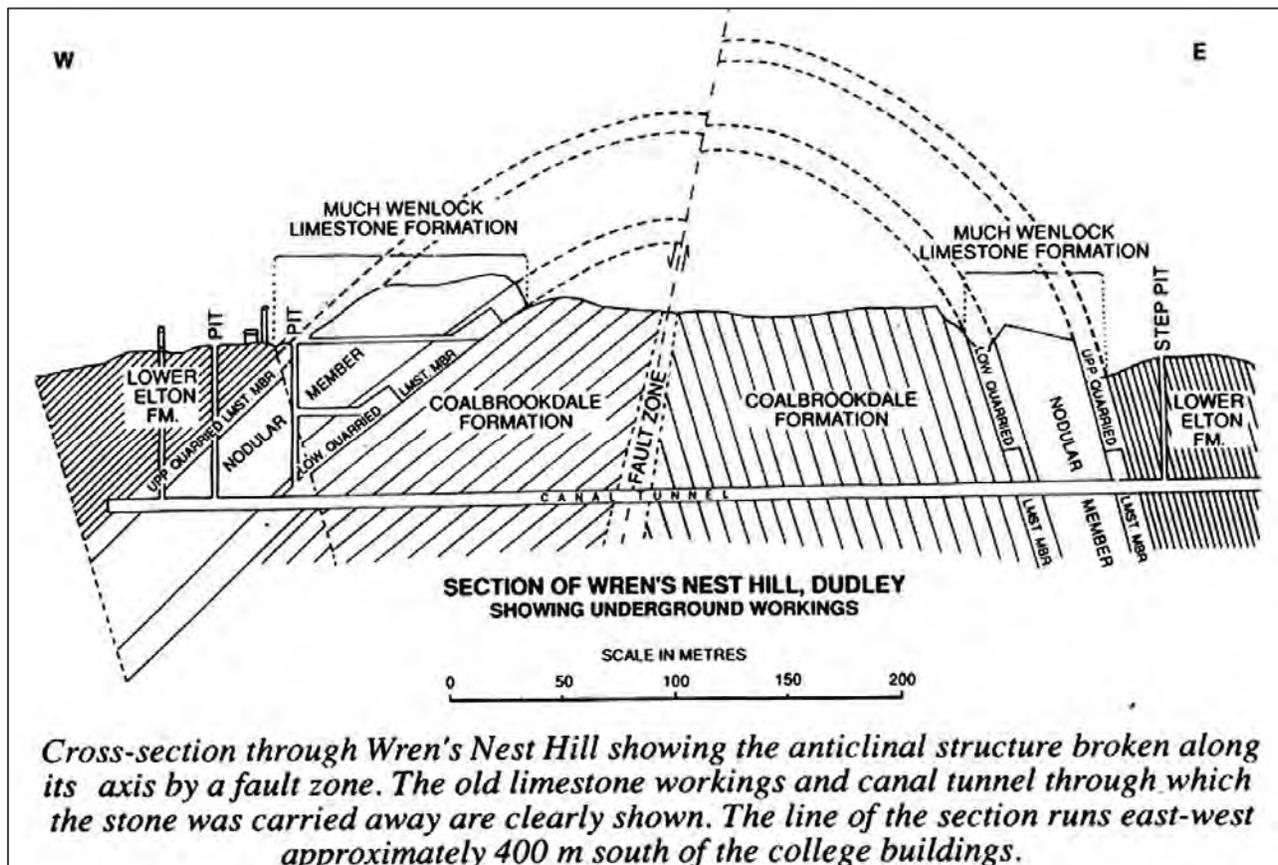
The Silurian Period, records a time when the Midlands, and indeed most of England, was covered by a relatively warm and shallow shelf sea, with the edge of the continental shelf lying to the west. Rivers flowing from a continental landmass far away to the east brought mud, silt and sand, which slowly accumulated in the sea as a series of shales, mudstones, siltstones and

sandstones. Sometimes the supply of this material almost ceased, enabling lime-rich deposits to form and locally, coral reefs to develop. These deposits make up the limestones seen at Wren's Nest. In total, a maximum thickness of about 550m of rocks accumulated in the Dudley area during Silurian times.

The rocks of the Silurian Period are classified into four sub-divisions; the Llandovery Series (at the base), the Wenlock Series, the Ludlow Series and the Pridoli (formerly Downtonian) Series at the top. With the exception of the latter, each of these major sub-divisions is further sub-divided and classified into smaller units. At Wren's Nest, the upper stage of the Wenlock Series (Homerian) and the lowest stage of the Ludlow Series (Gorstian) are represented.

Towards the end of the Silurian Period the area of present day Wales was subjected to a lengthy period of uplift. This caused more shallowing of the Ludlow sea and an increase in the sand content of the sediments through erosion of the uplifted areas. The process eventually led to profound changes in geography, with the transition from a marine environment to a continental one.

During the Middle and Upper Devonian the Wren's Nest area was subjected to mountain building, uplift





Border zones between formations, educational illustration.

and severe erosion. During the Lower Carboniferous much of England and Wales was subject to subsidence and a re-invasion by the sea, but it seems probable that some western parts of the Midlands, including Dudley, remained above sea level and underwent further erosion.

Coal Measures is the name given to the great series of coal-bearing rocks deposited during the Upper Carboniferous, about 300 million years ago. Dudley then lay within four miles of the landward edge of a vast tropical delta swamp, criss-crossed with freshwater channels and rich in luxuriant vegetation which thrived on the raised delta flats.

Towards the end of the Carboniferous Period the region was subjected to further mountain building forces, which folded the rocks at Wren's Nest Hill and its neighbours into great elongated domes. During this process the delta swamps gave way to an arid desert plain.

The action of ice during recent glacial episodes (2.5 million - 10,000 years ago) gave the Midlands its final shaping. On Wren's Nest Hill the more resistant rocks of the Much Wenlock Limestone Formation were exposed to stand proud amidst the Coal Measures. The topographical high points have since been removed by erosion to give the outcrop seen today. The influence of mining activity is also significant, having given rise to the distinctive elongated quarries or trenches and immense caverns where limestone has been removed.

Graptolites, the biostratigraphic 'indicator' fossils used to match up certain sequences of Silurian rocks in different areas, are extremely rare in the limestones of Dudley. However, several specimens of the species *Monograptus flemingii* have been recorded. This fossil is only known from the middle of the Homeric Stage of the upper Wenlock Series. Graptolites found in the limestones at Wenlock Edge are slightly younger than



Ancient ripples at Wrens Nest

this, indicating that, during Wenlock times, carbonate deposition began in the Midlands and gradually transgressed westwards towards the Welsh borders in a diachronous manner.

The Much Wenlock Limestone Formation of Dudley has an extremely rich and varied fossil fauna and flora of well over 600 species, representing almost 30 major taxonomic groups. For many of these species Dudley is also the type locality - the locality from which they were first described, and the source of reference or 'type' specimens to which others are compared for identification. Fossils from Dudley have been cited and figured in hundreds of publications or scientific papers from the 18th century to the present day. Unfortunately, specimens collected and sold during the 19th century were not carefully localised, so while Wren's Nest was undoubtedly the source of many of the best Wenlock fossils, including type and figured material, this is rarely indicated on old specimen labels, or in the literature of the time.

The Dudley fauna comprises the fossil remnants of small tropical reefs and a myriad of associated reef or inter-reef dwelling organisms, reflecting a shallow-water carbonate shelf ecosystem. The reefs were constructed and bound together by calcareous 'framebuilding' and 'framebinding' organisms. The most abundant framebuilders were colonies of tabulate corals, notably *Favosites* (a) and *Heliolites*, and to a lesser extent *Syringopora* and the chain-coral *Halysites* (b). Each colony consisted of several hundred individual polyp tubes, or 'corallae', and could be up to a metre across.

In the Nodular Member in particular, these coral colonies are preserved still in growth position, together with stromatoporoids (*Stromatopora*, *Actinostroma*) and bryozoans (*Hallopora* (c), *Fistulipora*) to form dome or lens-like bodies of very pure limestone, up to 6 metres high and 20 metres wide, known as bioherms. These were called 'crog-balls' by the quarry workers and represent small patch reefs similar to those found behind

barrier reefs in modern tropical lagoons. Compound and simple rugose corals such as *Acervularia* and *Dokophyllum* (d) were also common reef builders. The main organisms responsible for binding the reef into a solid structure were encrusting calcareous algae (*Girvanella*, *Wetheredella* and *Rothpletzella*). Other framebinders included encrusting forms of tabulate coral such as *Alveolites* and *Thecia*, stromatoporoids (*Labechia*) and 'curtain' bryozoans like *Fenestella*.

Many non-colonial organisms, particularly shellfish, thrived within the reefs. Of these the most common were brachiopods ('lamp-shells') such as *Strophonella* (e), *Eospirifer*, *Gypidula* and *Leptaena* (f). Dense communities, dominated by a single genus (notably *Atrypa* (g)) are sometimes found on bedding planes, particularly in the Nodular Member. Molluscs, much less common, include gastropods such as *Acroculia* (h) and *Poleumita* (i), bivalves (*Goniophora* (j), *Pteronitella* (k)) and rare predatory orthoconic nautiloids like *Dawsonoceras* (l). *Cricoconarids*, small ribbed tapering tubes of uncertain affinity are represented locally by *Tentaculites* and *Cornulites*. *Conularids*, an enigmatic group with steep-sided, pyramidal shells composed of finely ribbed chitinophosphate can also be found occasionally.

The best known fossils from the limestone are trilobites. The commonest type, *Calymene* (m), was nicknamed the 'Dudley Locust' or 'Dudley Bug' and incorporated into the town's coat-of-arms as a symbol of the limestone mining industry. Other genera include *Dalmanites* (n), *Encrinurus* and *Acaste*. Most trilobites

probably had a scavenging feeding habit. They are rarely found intact, although head and tail sections are quite common. These are mainly fragments of exoskeleton discarded during periodic moulting. Complete specimens may be preserved in a defensive curled-up position known as 'enrollment'. Rare fragments of the predatory eurypterid or 'sea scorpion' *Pterygotus* (o) have also been recorded from the limestone.

Crinoids (p), also known as 'sea-lilies', grew together in vast colonies or 'gardens' around the reefs, or in depressions in irregular reef surfaces. Despite their plant-like appearance they were, in fact, animals related to modern starfish or sea-urchins. Their descendants are still to be found in the oceans today. The broken stem sections (columnals) of dead crinoids were the most abundant debris to accumulate on the sea floor. This process of accumulation was so slow that the skeleton of each animal remained exposed for a considerable period of time, allowing it to be broken into fragments and scattered before burial.

The History of Mining at Wren's Nest

The Much Wenlock Limestone Formation has been worked from Wren's Nest, Castle Hill, Hurst Hill and numerous other sites within the borough for many centuries. The keep of Dudley Castle, reputedly constructed in 1300 AD, is built of local limestone. The earliest precise reference to underground workings at Wren's Nest is dated 1796, but there is no doubt that rock was being extracted before this date.

Wrens Nest West mine Wrens Nest West mine



Wrens Nest West mine



The Seven Sisters caverns in the 1960's

At first the limestone was worked in open quarries for building stone and for making agricultural lime and lime mortar. Towards the end of the 18th century there was a great rise in demand for limestone, particularly for use as a flux in the local iron furnaces. To meet this demand and in view of the approaching exhaustion of the quarries, extraction began underground and the limestone was raised firstly from adits, and later from pit shafts.

On the west side of the hill mining of the Lower Quarried Limestone Member was carried out using the 'pillar and stall' method, whereby as much as possible of the required rock is removed and pillars are left to hold up the roof. On the east side, where the beds dip almost vertically, the rock was worked in high, narrow caverns without pillars.

To help with the dispersal of the limestone, a private underground canal was constructed in 1805 to connect the limestone workings on the eastern flank of Wren's Nest with the Dudley Canal at Tipton Green. About a decade later the canal was extended westward through the core of the hill to connect up the underground workings then taking place on the western flank. The limestone workings at Wren's Nest were finally abandoned in 1924, although the lime kilns on the west side of the hill continued to function until at least 1935 using



The Seven Sisters caverns today

limestone from Much Wenlock in Shropshire. The limestone workings at Mons Hill were abandoned much earlier.

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Fourth International Symposium MINERAL DIVERSITY , RESEARCH AND PRESERVATION

12 th - 15 th October, 2007
SOFIA, BULGARIA

The Earth and Man National Museum, Sofia and International Group for Preservation of Mineral Diversity, along with governmental and non-governmental organizations and institutions', are pleased to invite all mineralogists and environmental scientists who are interested in the research and preservation of mineral diversity, to participate in the Fourth International Symposium - "Mineral Diversity - Research and Preservation".

For more information on the Sofia Initiative "Preservation of Mineral Diversity", please visit:
<http://mineraldiversity.org/en/symposium.htm>

ProGEO-Albania Geotrip 2007

Afat Serjani, ProGEO-Albania, Tirana

On 2-3 July, ProGEO-Albania organised its yearly Geotrip. This year the itinerary was Tirana – the Shkopeti Gorge – the Burreli Depression – the Bulqiza Chromite Deposit and the Peshkopi salt domes, sulfur thermal water springs and Paleozoic rocks.

The Tirana Syncline of the Pre Adriatic Depression molasses and the Tirana coal basin was crossed. To the east of these areas the Kruja – Dajti Ridge rise. It belongs to the Kruja shallow water Platform. In Miloti, the thrust tectonics of the Krasta-Cukali tectonic zone on Krija tectonic zone was demonstrated and in Shkopeti we visited the Shkopeti Canyon (Photo: 1) and the Shkopeti Gorge. This is one of the best river erosion geosites in Albania. The Shkopeti Gorge is formed in Upper Triassic Limestone, in contact with the Skanderbeu ultrabasic massif, which belongs to the western ophiolite belt of Albania. In the gorge a hydroelectric power station is built.

Crossing the ultrabasic massif along the road and the long water reservoir, we entered the Burreli Depression filled by thick molasses of Neogene age. Thick packets of sandstone, marl and clay sediments are seen on both sides of the road, which crossed the depression from the north to the south. Different erosion figures are formed on the surface of the sandstone. In the central part of the depression Burreli city, the center of this region is located.



Photo 2: Common view of Bulqiza chromite Deposit, beneficiation plant, and Vaikali glacial Valley.

In the most southern part of the Burreli Depression, on the upper part of the slope above the Klosi mining town, next to the western contact of the Bulqiza Ultrabasic Massif we visited the contact between cumulate and tectonite rocks in Cerruja village, the entrance in the longest exploration Klosi gallery (7 km long), and common view of Burreli molasses Depression from south to the north.

Entering the Bulqiza ultrabasic massif, we visited the Plani Bardhe glacial valley, which astonished us with its beauty. The Qafa e Buallit ("The Buffalo's Pass") is another glacial-erosion geosite, from where the Bulqiza Mine, Benefaction Plant, and very nice Vaikal glacial Valley (Photo: 2) can be seen.



Photo 1: Part of participants in Shkopeti canyon.



Photo 3: Some of participants in Bellova salt dome.

Dr. Naim KARAI explained the Bulqiza chromite deposit. The Bulqiza chromite deposit is one of the biggest chromite deposits in the world. Rare example of unique chromite ore body of some kilometers in strike and up to 1.2km in depth, with folded morphology is found here. Entering in wide green Drini River Valley we arrived in Peshkopi town, full of linden-trees, where we stayed overnight. Along the road from Bulqiza to Peshkopi Eng the geology was explained to us by Nexhat HYSÄ.

In the second day our tour we first continued to the Bellova salt dome (Photo: 3), Thermal Sulfur Water springs, and thermal bath hospital. The last stop was dedicated to the Muhri stratigraphic section of Paleozoic rocks (Photo 4).



Photo 4: ProGEO-Albania participants in an outcrop of paleozoic rocks in Muhri stratigraphical section.

The geology of the Peshkopi region and especially the evaporite domes and Paleozoic rocks was explained by Dr. Veisel HOXHA.

The geotrip had 20 participants. ProGEO-Albania supported them with traveling expenses (10 Euro/person). Other expenses (meals and accommodation), were afford by participants themselves.

ProGEO Conference 2008 - NEWS

Dear friends,

At the meeting at Kyiv in September 2006, it was voted to hold the next open conference of ProGEO (including a General Assembly of members) in Croatia, upon the formal invitation conveyed by colleagues in Zagreb.

This is just to keep you up to date with the latest news. Please put the dates 1-5 October 2008 in your diary. This is the planned period for the Croatia conference. Dr Ljerka Marjanac will be posting more information on the ProGEO website and in the newsletter as soon as possible.

*W.A.P. Wimbledon
ProGEO Secretary*

Other upcoming events

as found on our website:

<http://www.progeo.se/events.html>

International Conference GeoPomerania 2007 GeoPomerania 2007. 24–26 September in Szczecin, Poland.

The international conference will be organized by the German Society for Geosciences and the Polish Geological Society. There will be a special symposium on Geosites - Geoparks - Ecotourism organized by Kurt Goth and Bill Wimbledon. Please find all necessary information in the 1st Announcement. See further information on the conference webpage <http://www.geopomerania2007.org> Information is also given in this document. Please also use this Registration form.

Open Conference of the Russian ProGEO group : GEOLOGICAL HERITAGE STUDY AND PROTECTION PROBLEMS. 6–12 August 2007, Ilmen State Reserve, Urals Branch of the Russian Academy of Science, Miass, Russia

The Organizing Committee is pleased to invite ProGEO members and others who are interested in mineralogy and the organization of geosite protection in Russia to participate in a conference organized by the Russian ProGEO group and Ilmen State Reserve. The Ilmen State Reserve, situated in the Southern Urals, is the most important among all nature reserves in Russia. This site is characterized by enormous geodiversity and has been named "a mineralogical Eden". Please read the [1st circular](#).

12th ProGEO WG1 Conference and Annual Meeting GEOLOGICAL HERITAGE IN SOUTH EASTERN EUROPE September 5–9, 2007, in Ljubljana, Slovenia

The meeting and annual conference brings together geoscientists interested in geological heritage. The conference will focus on the evaluation of regional Geosites frameworks, public understanding of geoscience and the economic benefits of geosites through geoparks. Excursions will take place at classical karst area, Idrija mine area and Mezica mine areas. Please

find invitation and other relevant information at the web-site <http://arsis.net/circular/>

International Symposium on Cities and Conservation November 6–7, 2007, in Putrajaya, Malaysia

The aim of the International Year of Planet Earth is to demonstrate new and exciting ways in which Earth Science can help future generations to meet challenges involved in ensuring a safer and more prosperous world. Please read the the [first announcement](#) and visit their web site at http://www.lestari.ukm.my/cities_conservation/.

Inaugural Global Geotourism Conference Australia 2008 August 17–20, 2008, in Fremantle, Western Australia

To help achieve the goals of the International Year of Planet Earth, the Inaugural Global Geotourism Conference aims to be a hallmark event which promises to set a benchmark for the tourism industry in relation to the development, management, marketing and promotion of landscapes. Please read the [information leaflet](#).

IGC33 International Geological Congress, Oslo 2008

Please read this [information](#) and reminder to all contributors and participants in the IGC33 in Oslo 2008. Also use this direct link to their web site: <http://www.33igc.org>





DeGeer moraines in the World Heritage area of Kvarken in the Vasa arkepaligo in Finland. ProGEO regional working group no 3 for Northern Europe had its meeting here in may. Report from the meeting will come in the next issue of ProGEO NEWS

Deadline for the next issue of ProGEO NEWS: 1.10.2007

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