

OUTCROP

The Newsletter of the Avon RIGS Group

Issue No. 18 Summer 2004

RIGS are Regionally Important Geological and Geomorphological Sites

The Group's aim is to identify, survey, protect and promote geological and geomorphological sites in the area of the former County of Avon – the modern Unitary Authorities of Bath & North East Somerset, Bristol, North Somerset and South Gloucestershire. RIGS are selected for their educational, research, historical and aesthetic value.



Inside this issue

Eileen Stonebridge has written the second in the series on the geology and geomorphology of local landmarks. This time she examines a major feature of the local landscape - the scarp slope of the Cotswold Hills.

We are still very much hoping that the next articles in the series will be contributed by readers.

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The Geology and Geomorphology of Local Landmarks, No. 2

The Cotswold Scarp Eileen Stonebridge

My focus is the part of the scarp from Bath to Alderley, the area known locally as the Southwolds. This landscape feature dominates the eastern skyline from Bath northwards as far as Alderley, within the Avon RIGS area, and as a landform feature it continues in the Cotswolds as far as Chipping Camden. Beyond this, the scarp extends northwards until its termination at the Market Weighton axis in Yorkshire. Thus it can be described as the largest continuous landform feature in the lowland England. It is comprised of Jurassic rocks that also continue to the south coast, but not as one distinctive landform. The separation of rocks in Somerset and Dorset from those at Bath is by an axis that extends eastwards from the Mendips.

The highest points along this part of the escarpment are around 200 m, but the views afforded from the edge of the scarp give the illusion of much higher ground. The steep slopes up the face of the scarp also suggest greater relief, however, once on the dip slope, the gently rolling landscape gives little sense of elevation.

Structurally this is a classic scarp and dip, the beds gently dipping towards the east/south-east. A north-westward extrapolation of the beds demonstrates that at one time they must have extended over the rocks of Triassic age and older and, by the processes of erosion, these younger rocks have been stripped off to reveal older landscapes. By comparison, the landscape of the escarpment is relatively young, as the wearing back of the edge has taken place during the Quaternary, with some areas still actively wearing away.

Evidence of periglacial activity comes from gravel fans at the edge of the scarp just to the north of our area whereas landslipping, both fossil and recent, can be seen in many areas. A more recent time marker comes from the Iron Age hillfort at Old Sodbury where some of the outer ramparts have slipped down the slope. Landslipping in the Bath area is notorious and merits a separate article.

The process of scarp retreat is well documented and can be demonstrated in the field. The rock succession gives a clue. At the foot of the scarp and underlying the younger beds, is the Lias Clay. This acts as an impermeable layer enabling the formation of springs where the percolating waters can no longer penetrate. An example of this is the headwaters of the Little Avon, which rises in

Ozleworth Bottom. Around the spring, the enlarging of the joints weakens the rocks and the stream cuts further and further back into the scarp. This is a particularly long valley or coombe incorporating both current and past processes as the valley was probably formed by summer meltwaters during the glacial periods. Springs and small valleys fret the whole scarp face. The larger of these valleys support streams and have several tributary valleys; others are dry, suggesting they were formed in periglacial conditions.

There is a close relationship between topography, land use, man-made features and the underlying geology. At the base of the scarp are the clay vales of the Lower Lias, above this the Middle Lias within which is a distinctive topographical feature known as the Marlstone bench. This is a band of harder rock on which the settlement of Wotton-under-Edge, and a string of those to the south such as Hillesley and Horton have developed. Upper Lias clays and Cotteswold Sands are the next in the succession. The latter are silty ferruginous sands, which are relatively soft; roads and lanes have cut down deeply into them, particularly in the days when iron-rimmed cartwheels were used on unmetalled roads. The beds of these rocks are diachronous, oldest in the north, but becoming younger in the south. There is also a variation in the facies across the region.

At the top of the succession in this part of the Cotswolds is the Inferior Oolite of the Middle Jurassic. Rock exposures are difficult to see; there are only tiny overgrown quarries that may have been used for buildings. Older houses are made of the limestone and are in the traditional Cotswold style. In this area there is nothing like the big quarries of Gloucestershire or those in the Great Oolite in the Bath area.

Numerous strip lynchets such as those near Dyrham and Hinton show that the steep scarp was used for arable land in the Middle Ages. They increased the area that could be used for ploughing at periods of land hunger and are much broader than the terracettes, another feature of steep slopes; minor rotational land-slips within the soil profile

Access to the Cotswold scarp is by numerous pathways; the longest the Cotswold Way from Bath to Chipping Camden. Much of the route is actually along the scarp or in the deep coombes and a walk along it affords views of all the features mentioned. Several RIGS have been designated because of their significance as landforms.

Recreating Triassic Bristol

If you take a train from Temple Meads Station towards Bath you shortly approach cliffs of bright red sandstone that one person at least always refers to as Ayer's Rock. The line then goes into the deep, sheer-sided St Anne's cutting. Here is exposed a remarkable major unconformity between dark grey Carboniferous Pennant Sandstone and bright red Triassic sandstone.



St Annes' railway cutting

What you are looking at is a slice through what would have been a rocky hill that was standing above a wide valley in the great desert where the site of Bristol lay 215 million years or so ago.

This is one of the sites around Bristol that, taken together, give us a detailed information on the environments of that time. Many have been selected as RIGS and as SSSI.

Bristol itself owes its foundation to a ridge of Triassic sandstone that lies between the Frome and Avon rivers. The quartz grains of sand are rounded, showing that they had been moved by wind. It provided a dry and secure site for the settlement, with a water supply from wells down into the aquifer.

The sandstone can be clearly seen *in situ* at one of our RIGS - the remains of the castle in Castle Park.



Another RIGS locality in this Triassic desert basin is the red cliff that gives part of the city its name. Redcliff Caves were dug into beds that show several cycles of sandstone and marl deposition.

The Downs would have been bare, with wadis choked with scree up to the boulder size seen in the RIGS in Bridge Valley Road. Presumably there were some patches of vegetation that would have supported the small dinosaur *Thecodontosaurus*. Maybe there was an oasis at the foot of the wadi that is followed by modern Park Street. These animals would have been watchful for predators and for the flash floods that ripped through this landscape after occasional torrential downpours. With little vegetation there was nothing to get in the way of the water. Jumbled bones have been excavated from Durdham Down and Tytherington, where flash floods carried them into fissures. The flood waters would have collected and evaporated in salt pans in the lowlands, forming beds of evaporite minerals, such as at Yate and Shortwood.

Armed with the information that can be gathered from these sites and more, you can travel back to Triassic Bristol in the imagination. Sitting then on this rocky outcrop, you are in the tropics, just north of the equator. You are in the middle of the vast supercontinent of Pangea and thousands of miles from the ocean – the split in the Earth's crust that became the Atlantic has not yet opened. Desert and mountains stretch away in every direction.

Near to hand, you may be able to see a lizard we call *Clevosaurus* sunning itself on a boulder. It is related to the tuatara that lives in New Zealand today. On the other side of the valley a group of small dinosaurs is foraging in the oasis. Away to the north is a level depression in which dust-devils are stirring up the red mud that surrounds the salt pans that have dried up since the last rain fell. To the south and west are tall bare limestone hills.

Our rocky outcrop at St Anne's was gradually covered by the encroaching desert sands and marls that have preserved its surface. Eventually it was buried under a great thickness of sediment, most of which has been eroded away again in the recent geological past. We have the opportunity of seeing a section through this episode of history because Isambard Kingdom Brunel built his Great Western Railway through it in 1839. Originally the line was in a tunnel here, but this was opened out into the present cutting a few decades later.

Although Railtrack (or whoever now minds the railway) will not allow visits, this piece of our geological history is available daily to commuters. Next time you travel from Bristol to Bath, take a slow train, sit back and watch the rocks and imagine the reptiles in their desert!

Current work of the RIGS Group

The group is working on producing a new leaflet to publicise the range of geology that is available in our area. It will focus on the top ten sites that are relatively easily accessible.

Also in preparation is a revamping of display material, so that we can have something to take to venues. The graphic panels will be sealed, so we can even brave the elements outdoors.

The Designation Committee will be considering some sites that have been proposed as new RIGS, including stalactite formations in an old railway tunnel and a building that is partially constructed of an unusual stone.

The Group may soon be embarking on a thorough review of the RIGS in South Gloucestershire. We believe that some areas of interest are under-represented, especially in the Palaeozoic strata of the Tortworth Inlier and some new Coal Measures sites have been proposed.

Recent publications

The King of Siluria by John L. Morton, Broken Spectre Publishing, £12.99.

John Morton has followed on from *Strata*, the 'other' book about the life and work of William Smith, with a popular biography of another giant of the history of geology. Sir Roderick Impey Murchison was the man who gave us the terms Silurian, Devonian and Permian to describe the rocks of periods of geological history. He is primarily remembered his work on the Silurian rocks of the Welsh borders and the subsequent book 'The Silurian System'. He is also associated with the long-running feud with Adam Sedgwick, the professor of geology at Cambridge.

Silurian rocks are found in the former Avon in the Tortworth Inlier of South Gloucestershire. Brinkmarsh Quarry in Falfield and Cullimore's

Quarry in Charfield are Avon RIGS sites. Damery Road in Tortworth and the Buckover cutting on the A38 road are Sites of Special Scientific Importance.

There is a local connection with Murchison in our area. Bathampton church, on the eastern side of Bath contains a memorial to him and several members of his family are buried there.



Sir Robert Impey Murchison (1792-1871)

The Bristol coal industry by Keith Ramsay, 2003, Bristol Branch of the Historical Association, £3.

This booklet gives a useful potted history of coal mining in the coalfields around Bristol. It describes conditions in the pits, output of coal and examines the reasons, many of them geological, for the industry's decline and eventual closure. Although slim, the booklet acts as a digest of numerous old references, including parliamentary reports. It should provide a starting point for anyone wishing to delve deeper into our mining past.

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Don't forget that the two booklets of building stone trails are still available. You should be able to find *Bristol Heritage in Stone* and *Bath in Stone* in bookshops in the respective cities.

Bristol Heritage in Stone is also available from BRERC.

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Listings

Museums with geology displays in former Avon

Bath at Work Museum

Bath Stone quarrying and other industries.
Julian Road, Bath BA1 2RH
tel: 01225 318348
website: www.bath-at-work.org.uk
open: 10.30-4pm April-October (every day),
November-March (Sat & Sun only).

Bristol City Museum & Art Gallery

Local and global rocks, fossils and minerals
Queen's Road, Bristol BS8 1RL
tel: 0117 922 3571
website: www.bristol-city.gov.uk/museums
open: every day 10am-5pm.

Kingswood Heritage Museum

Coal mining and brass production
Tower Lane, Warmley, Gloucestershire
tel: 0117 956 4896 or 967 5711
open: Tues, 2nd Sun 2-4pm (and 4th Sun, April-October).

North Somerset Museum

Mendip minerals and some fossils.
Burlington Street, Weston-super-Mare BS23 1PR;
tel: 01934 621028
email: museum.service@n-somerset.gov.uk
website: www.n-somerset.gov.uk
open: Mon-Sat 10am-4.30pm.

Radstock Museum

Coal mining, minerals, Jurassic and Carboniferous fossils.
Waterloo Road, Radstock BA3 3ER
tel: 01761 437722
email: radstockmuseum@ukonline.co.uk
website www.radstockmuseum.co.uk
open: Tue-Fri & Sun 2-5pm, Sun & Bank Holiday
Mon 11am-5pm.

Coming talks, events and field trips

13 June 2004

Watchet, Somerset field trip
Dr Eric Robinson

WEGA

15 June 2004

Combe Down field trip.
Dr David Workman

Bath GS

19 June 2004

Watchet and the Brendon Hills field trip
Dr Eric Robinson, again!

WEGA

1 July 2004

Volcanoes on Earth and the planets.
Prof. Lionel Wilson, Lancaster University.

Bath GS

2-10 July 2004

Lake District field trip
Pat Brenchley

WEGA

17 July 2004

Lulworth Cove field trip

Bath GS

14 August 2004

Tortworth Inlier field trip
Charles Hiscock

Bath GS

Bank Holiday 25 August 2004

Rock It! Bristol-Bath Railway Path event.
Simon Carpenter

BNS/Bath GS/WEGA

2 September 2004

Club evening

Bath GS

10-13 September 2004

St David's area field trip
Sid Howells

WEGA

7 October 2004

The Permian extinction: when life nearly died.
Prof. Mike Benton, Bristol University

Bath GS

4 November 2004

Recent and ancient arid coastal plain sediments.
Dr Peter Bush, Imperial College, London

2 December 2004

Geology of Iceland: where geological processes happen in real time!

Chris Darmon, publisher of "Down to Earth"

Contacts for further information

Bath Geological Society (Bath GS)

Secretary: Elizabeth Devon, Heleigh House,
Middle Hill, Box, Wiltshire SN13 8QB tel/fax:
01225 742752
email: bathgeolsoc@bathgeolsoc.org.uk
Meetings are held at 7.15 pm, Bath RLSI, 16-18
Queen Square, Bath.
website: www.bathgeolsoc.org.uk
Note new web address

Bath Royal Literary & Scientific Institution (BRLSI)

16-18 Queen Square, Bath; tel: 01225 312084,
fax: 01225 429452
email: enquiries@brlsi.org
website: www.brlsi.org Note new web address

Bristol City & Art Gallery (BCM)

Queen's Road, Bristol BS8 1RL. tel: 0117 922
3571
email: general_museum@bristol-city.gov.uk
website: www.bristol-city.gov.uk/museums

Bristol Lapidary Society

Jim Edmundson, 60 Lays Road, Keynsham,
Somerset

Bristol Naturalists' Society Geological Section (BNS)

Field Secretary: Simon Carpenter
tel: 0773 2116671
email: simonccarpenter@yahoo.com
Meetings: 7.00, University of Bristol Earth
Sciences Department lecture theatre (G25).
website: www.bristolnats.org.uk

Open University Geology Society (OUGS)

Jan Ashton-Jones, tel: 01432 870827,
email: Jashtonjon@aol.com
website: www.btinternet.com/~mtne/OUGS/

Rockwatch

The national club for young geologists
website: www.rockwatch.org.uk

University of Bristol (UB)

Department of Continuing Education
8-10 Berkeley Square, Bristol BS8 1HH, tel. 0117
928 7153 website: www.bris.ac.uk/

West of England Geologists' Association (WEGA)

Graeme Churchard email: secretary@wega.org.uk
Recently redesigned website:
www.churchard.pwp.blueyonder.co.uk/WEGA

How you can support the work of the Avon RIGS Group

Surveying and interpreting geological and geological sites in the former County of Avon can be very interesting and rewarding work. The Avon RIGS Group is always looking for fresh volunteers, so if you are interested and able to commit a small amount of time to this work, please contact one of the following Avon RIGS members:

Andrew Mathieson
Eversleigh, Newlands Hill, Portishead, BS20 9AZ
email: andrew@mathiesons.org.uk

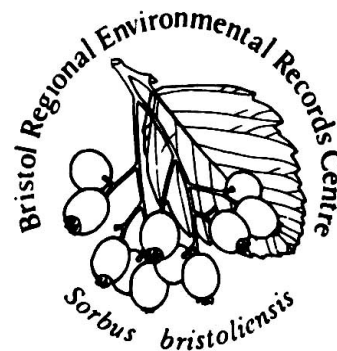
Simon Carpenter tel: 07732116671,
email: simonccarpenter@yahoo.com

Contributions to *Outcrop*

Short articles and photographs of geological and geomorphological interest are always welcome. Please contact Roger Clark-
City Museum & Art Gallery, Queen's Road, Bristol BS8 1RL,
tel: 0117 922 3593
email: roger_clark@bristol-city.gov.uk

Getting yourself on to the *Outcrop* mailing list

To receive your FREE copy of the Avon RIGS Newsletter, please contact BRERC, Ashton Court Visitor Centre, Long Ashton, BS41 9JN, tel: 0117 953 2140, fax: 0117 953 2143, email: brerc@btconnect.com



The Avon RIGS Group is co-ordinated by Bristol Regional Environmental Records Centre (BRERC).