

Tees Valley RIGS Group

QUARTERLY NEWSLETTER

Issue N^o. 3

June 2014



View of Cowbar Nab, Staithes and Penny Nab from
Cowbar

Photo: Andy Cooper

www.tvrigs.org.uk



Conserving geodiversity in the districts of

Redcar & Cleveland · Middlesbrough · Stockton · Hartlepool · Darlington

Contents

1. News 2

Featured Articles:

2. SSSI Review: Loftus Quarries 8

Includes revised mini geotrail

3. Sequel to Marske Quarry 23

New plant species from Burmese amber

4. Events 24

5. News from the Web 27

News

Hello and welcome to the third issue of the TVRIGS newsletter for June 2014.

York Potash Update

Further details of progress in York Potash's proposal to establish a polyhalite mine at Dove's Nest Farm, Sneaton have emerged since we first reported on the matter in our last issue.

The original planning application envisaged raising, and crushing, the ore at the minehead before transportation in a brine suspension along a sub-surface pipeline through NYMNP to processing facilities on Teesside.

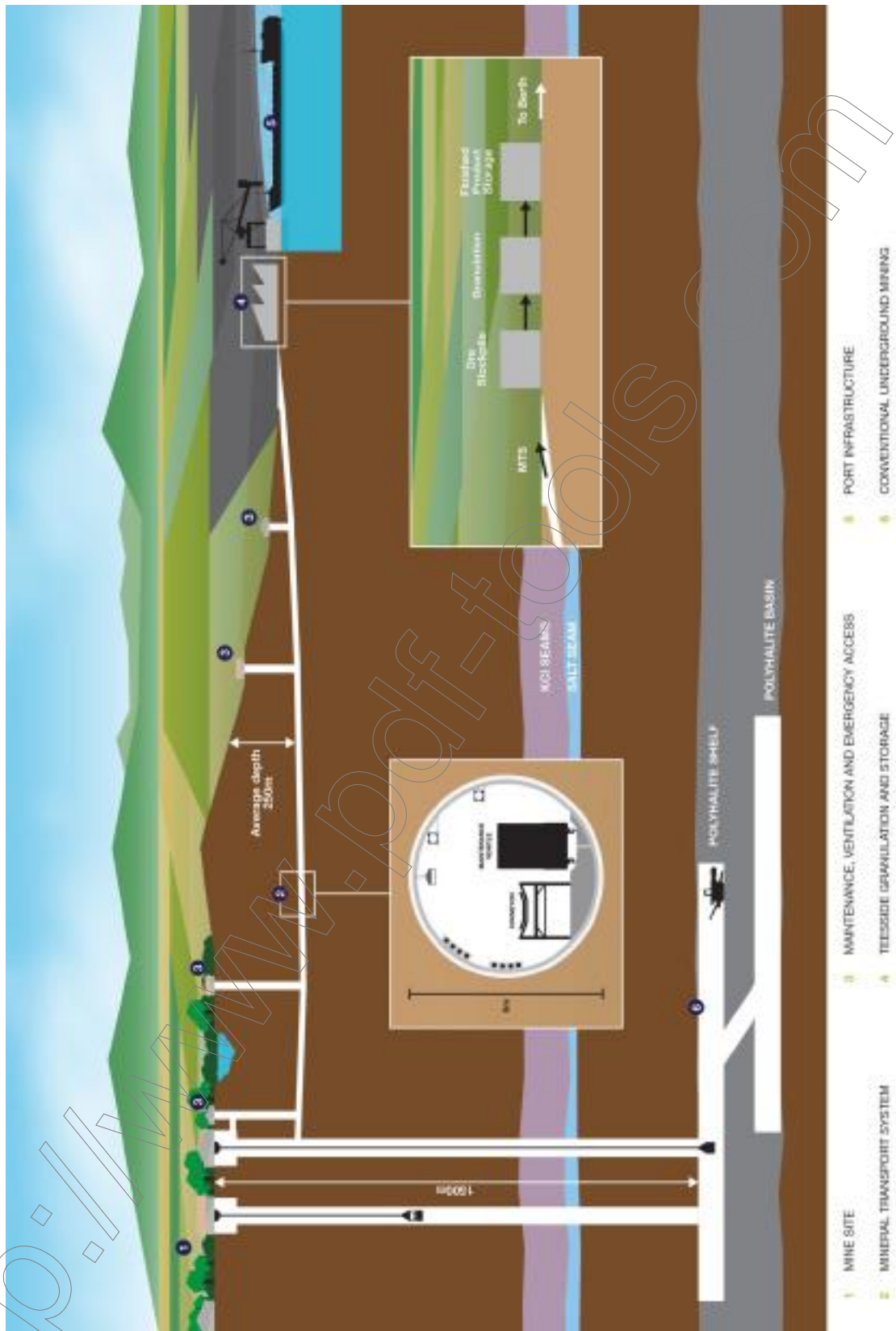
This application has been withdrawn by York Potash in favour of a new Planning Performance Agreement (PPA). The PPA will cover the cost of North York Moors National Park Authority to work alongside York Potash as advisors during preparation of the new proposal. Funding includes appointment of a part-time planning officer, meeting costs and document review. The agreement ceases when the new application has been submitted and all fees paid.

The new proposal involves the dry mineral being raised only part-way up the shaft before carriage on an underground conveyor belt system contained within a 6 metre diameter tunnel between 180 and 360 metres below the surface to Wilton on Teesside - a distance of around 37.5 kilometres. The tunnel is to follow the Redcar Mudstone Formation in a bid to protect surrounding aquifers. Also planned are three 9 metre diameter access shafts at sites between Wilton and the minehead.

Two planning applications will eventually be submitted. The first, in July 2014, will be to the National Park Authority for development of the minehead and extraction of polyhalite from beneath the Park.

The second, in November 2014, will involve the tunnel and mineral transport system along with a materials handling and storage facility on Teesside. Identical documents will be submitted as a *straddling* application to both NYMNP and Redcar & Cleveland Borough Council.

Further details can be found [at http://www.northyorkmoors.org.uk/living-in/planning/york-potash](http://www.northyorkmoors.org.uk/living-in/planning/york-potash) and <http://yorkpotash.co.uk/>.



Schematic from the York Potash website

Postscript: Coastal View & Moor News (a free newspaper in East Cleveland)

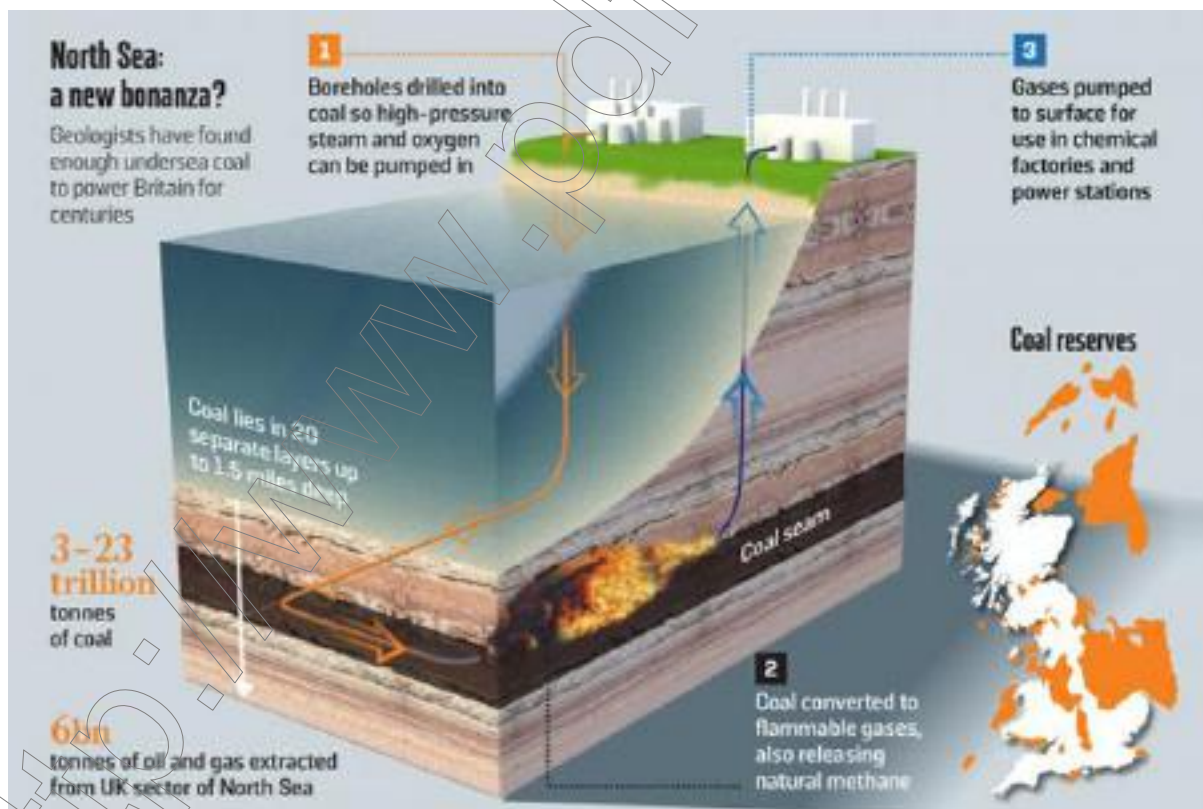
reports in its July issue that an exploratory drilling program has commenced in the area of Swindale Lane (NZ 674 139) near Lockwood Beck Reservoir for one of the proposed access shafts.

Coal is new black gold under the North Sea

(From Sunday Times 30th March 2014)

Seismic and borehole data gathered during oil and gas exploration of the North Sea Basin have been reviewed to reveal the true extent of offshore coal deposits. Although geologists knew of their existence, the extent of offshore deposits was unknown.

The review demonstrated that as many as twenty different seams lie beneath the sea-floor which could be accessed using existing technology. Dermot Roddy, former Professor of Energy at Newcastle University, estimates a minimum of around three trillion tonnes of coal may lie there, exploitation of a small percentage of which could power the UK for decades, perhaps centuries.



Schematic showing coal gasification process and extent of offshore coal measures

The coal will not be 'mined' in the conventional sense. Instead a high pressure mixture of superheated steam and oxygen will be pumped down boreholes into the seams. This 'gasifies' the volatile components which, along with methane, are pumped back to the surface for use in petrochemical and power industries. It is hoped to make the system carbon neutral by pumping CO₂ back into the crust.

It is envisaged that the first boreholes may be sunk by autumn 2014 from a rig east of Tynemouth.

For more information visit

<http://www.naturalgaseurope.com/unconventional-gas-aberdeen-2014-five-quarter-harry-bradbury>

Renewable Energy Conversion and Storage Scheme

Energy from fresh air

Wind farms seem to have sprung up everywhere over the past few years but this emission-free means of energy generation suffers a fatal flaw – the energy generated by wind has no way of being stored. Consequently low demand at times of high supply results in wasted energy, which the generators are actually paid for! Also demand when the wind isn't blowing cannot be serviced. So (ideally) a way of storing the energy would be advantageous. I believe that Teesside, and its surrounding area, may provide an ideal way of doing this using, for the most part, tried and tested methods.

Excess energy from wind farms could be converted to other forms and stored until required without the need for 'super-batteries'.

Beneath Teesside lie evaporite deposits from the Permian Period in which caverns have been excavated using hydraulic methods. Industrial gases are stored in such voids for the local cluster of chemical processing facilities.

Similar cavities could be created into which air would be compressed using the excess energy from renewable sources such as wind farms. The compressed air could then be released to turbines at times of greater need.

Such systems are expected to have efficiency in excess of 70% with additional geothermal heating, and the potential to provide base load.

Methane can also be manufactured and stored using similar methods.

Presentations in May 2014

TVRIGS would like to extend their thanks to two people for providing edifying presentations to group members during May this year.

On 8th May Dr Jonathan Imber of Durham University held forth on the subject of Faulting within the Cleveland Basin. He has been working upon the possible effects of hydraulic fracturing upon faults in oil shale sequences. Within our area the Jet Rock and Bituminous Shale of the Mulgrave Shale Member (Whitby Mudstone Formation) provide good proxies exposed at the surface, particularly along the coast between Saltwick Bay and Port Mulgrave.

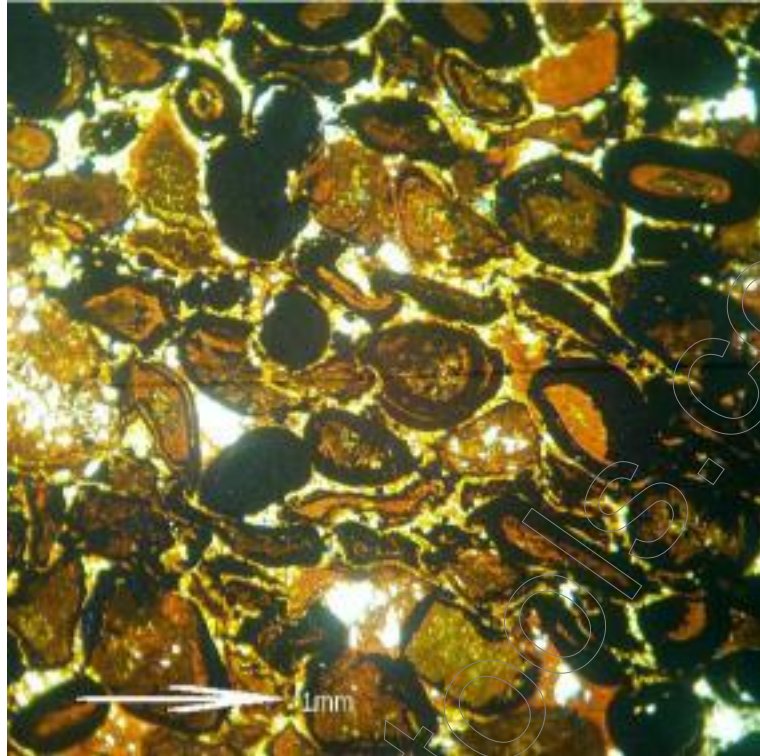
Cleveland Basin

- Thick shale-dominated sequences
- Excellent coastal exposures



Slide from Dr. Imber's presentation

On 22nd May John Waring gave a Presentation upon the preparation and interpretation of geological thin sections. John has been creating such sections for many years during his investigations of strata country-wide. Locally John has a penchant for the Dogger Formation at the Lower-Middle Jurassic junction which is laterally very variable.



This specimen of ironstone or magnetite (under **plane polarised light**) is from the now disused West Mine Grid Ref. SE729 945, (aka Low Works or Hollins Mine) on the west side of Rosedale, North Yorkshire. The hand specimen was able to deflect a compass needle, hence its name. Here, the magnetite (Fe_3O_4) has wholly or partially replaced the original berthierine or chamosite oolites. According to J.T. Greensmith in his "Petrology of the Sedimentary Rocks", the replacement of the berthierine may have occurred in the soft sediment under weakly oxidising to mildly reducing, alkaline conditions, and the change may have been promoted by certain varieties of bacteria. The cores of some of the oolites still have goethite (?) preserved. It will be noticed that some of the oolites have been broken up. A hint of the original concentric structure can still be seen in some of them.

It was near Hollins farm that the working of ironstone in Rosedale began in 1856. Samples of ore from the initial quarry were found to be of very high quality. The ironstone vein was about 18ft. thick and was easily worked by drifting.

Image and text from NEGS website

<http://www.northeast-geolsoc.50megs.com/pages/page34thinsections-thumbnails.htm>

GEOLOGICAL REVIEW OF SSSI AND ADJACENT SITES IN THE TEES VALLEY RIGS AREA

Part 1: Loftus Quarries

1. GENERAL DESCRIPTION

Location NZ 736 200 to 744 200

Status

SSSI (Not RIGS, other reference No. 53). Open access (National Trust to the National Park boundary at NZ 744).

Overview

Extensive former alum quarries of great historical and industrial archaeological interest. The Cleveland Way passes around the southern edge, along the top of the quarry back wall that is nearly 200m O.D. The coastal scenery is impressive.



Entering Loftus Quarries from the cart track off the Cleveland Way. The large boulder of ripple-marked river channel sandstone marks where footpaths fork.

Geology

Saltwick Formation. This forms the southern back wall of the quarry, some 750m in length and over 30m in height. It is formed predominantly of river channel sandstones. It is difficult to reach and is best examined closely from fallen blocks.

Dogger Formation. This is about 4m thick and is unique re. coastal exposures. It consists mainly of '*murchisonae*' shale and is one reason for the location being SSSI. The apparent transitional beds upwards to Saltwick Formation flood plain deposits have been a source of fossil plants.

Whitby Mudstone Formation, Alum Shale Member. There are extensive exposures of the lower beds that form the quarry floor (including some Mulgrave Shale).

Reasons for SSSI status. (1) Occurrence of '*murchisonae*' shale, (2) Finding of various reptilian species. (Note: the SSSI status is named as 'Boulby' but the site plan includes both Boulby and Loftus. The '*murchisonae*' shale only occurs at Loftus and the pterosaur and ichthyosaur in Whitby Museum are also from there. However, the other reptiles may have come from Boulby. Benton & Taylor (1984) lists four specimens from 'Loftus' but do not seem to differentiate between Loftus and Boulby Quarries)

Access

The main access point is at NZ 735 198 where a track into the quarries branches off the Cleveland Way. This point can be reached on foot in various ways but particularly by following the Cleveland Way eastwards from Skinningrove where there is parking (see the mini-geotrail).

Geomorphology

Several past and potential landslips and rockfalls can be seen and, in contrast, examples of slow, gradual subaerial cliff erosion.

Historical geology

Lewis Hunton's family were alum makers and agents here. Hunton's study of the stratigraphy at Boulby and Loftus Quarries was a major contribution to the development of geological science.

Industrial archaeology

The quarry is a major alum site with several stages of development. However, industrial archaeological remains are somewhat sparse especially in comparison with Boulby.

The quarries are underlain by the extensive underground workings of the Main Seam (Cleveland Ironstone Formation) of Loftus Mine that are exposed along the sea cliffs. Jet workings are also present along the sea cliffs not far below the lowest alum levels.

Associated sites

Boulby Alum Quarries (SSSI, other reference no. 54)

Hummersea Sea Cliffs and Foreshore (Heritage Coast, other reference no. 51)

Boulby and Cowbar Nab Sea Cliffs and Foreshore (Heritage Coast, other reference no. 80)

General assessment

The quarries are an excellent venue for demonstrating Lower and



View looking west within Loftus Quarries. Note the shale faces and pink calcined shale close the cliff edge

Middle Jurassic geology and industrial archaeology (alum workings).

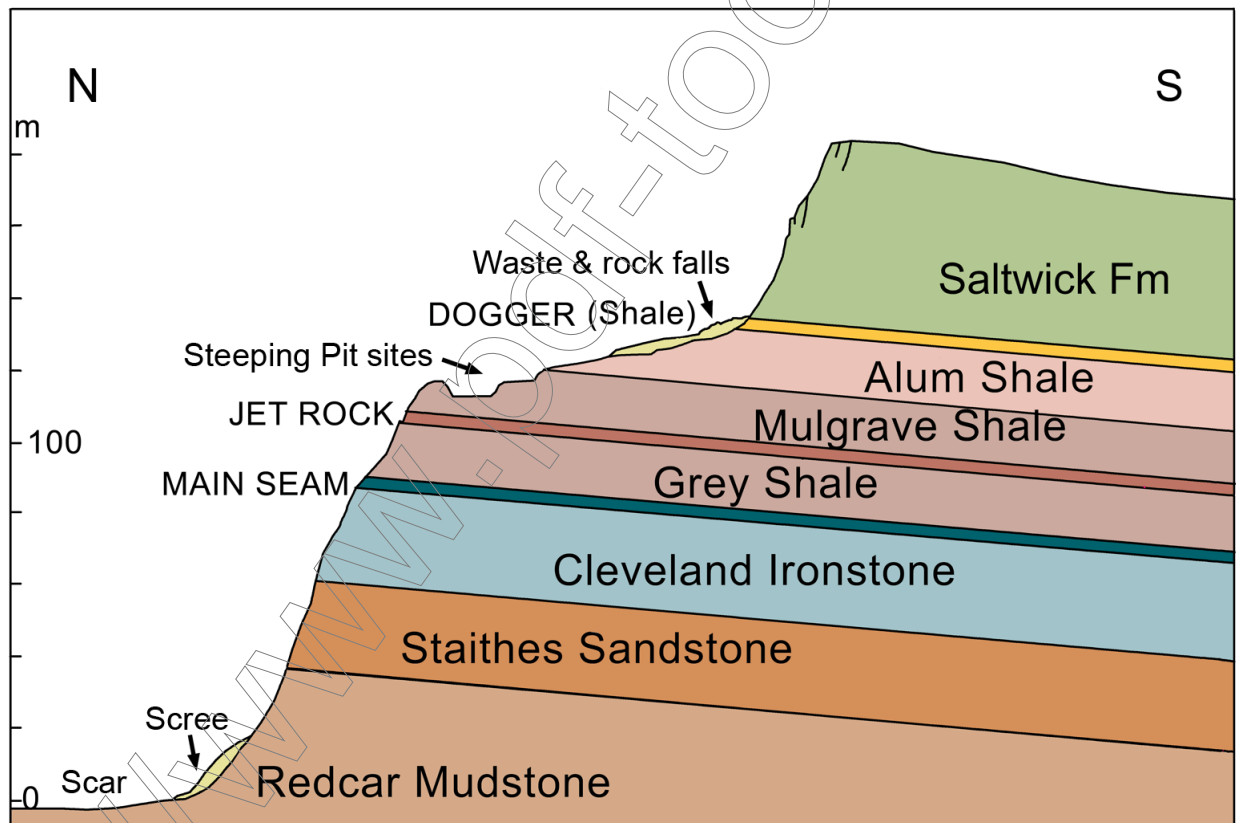
The cliff edge requires extreme care. The area is unsuitable for children and dogs off the leash.

2. SUPPLEMENTARY DETAILS

Geology

Structure

The succession is shown in the accompany section. The beds dip about 3° to the south.



Sketch cross-section on grid line NZ 726

Saltwick Formation (deltaic/alluvial)

This forms the impressive back wall of the quarry and consists principally of massive lenses of river channel sandstone. It is generally difficult to reach owing to the fallen rock. Blocks, some

extremely large, can be readily examined showing sedimentary structures such as cross-bedding, ripple-marking and the imprints of plant remains.

Dogger Formation (marine incursion)

The peculiar nature of this Formation at this locality was, perhaps, first noticed by Hunton (1836) who reported 10ft (3m) of shale at the top of the succession distinct from the alum shale. Later, Tate and Blake (1876, page 26) and Barrow (1888, page 43) described the section in some detail. Tate and Blake provide a lengthy fossil list of 20 species from bed 11, a 3 inch (7.5cm) thick bed described as 'impure limestone dogger' and reported *Ludwigia murchisonae* (an Aalenian zone ammonite) from bed 10 ('shale', 1 ft 6 ins (46 cm)) that is directly above.

The geology was subsequently investigated by Black (1929 and 1934) and has been summarised by Rastall and Hemingway (1940). Black's section is also shown in the British Regional Geology, 'East Yorkshire and Lincolnshire' (1948, page 38). Black records about 11ft (3.3m) of *murchisonae* beds with a basal 'pebble bed' (mainly of mudstone) overlain by ferruginous shale with bands of siderite mudstone nodules, some of which are fossiliferous with the basal bed carrying the zone fossil. The beds are overlain, apparently without any break, by flood plain deposits ascribed to the Saltwick Formation and including coaly shale and fossil plant beds. They are also cut out laterally by channel sandstone that passes laterally into a thin bed of sandstone above the plant-rich layers.

The locality is described by Tate and Blake as 'due north of Upton', i.e. at the extreme western end of the quarries at NZ 737 198 but is now rather difficult to reach and is in a poor state.

Other possible locations where the beds are (a) in the gully north of the old alum reservoirs (NZ 743 198), and (b) NZ 740 199 marked Y on the map where, on a steep slope, grey shale with nodules underlies the channel sandstone. The nodules of brownish weathering mudstone are aggregated together, rounded but irregular in shape and up to about 3cm in size. One

of these localities is probably that described by Herries (1906, page 425).

No comparable localities are known elsewhere along the coast (at Boulby Quarries the Dogger is of the usual coastal facies of sideritic sandstone with ironstone) but similar beds are found inland especially at Cold Moor, Kirkby where they overlie the limestone-rich facies type that is also of *murchisonae* age. One possible implication is that at Loftus Quarries there is a considerable gap in the stratigraphic succession with several missing time zones at the level of the pebble bed.



Looking east within the 'Kidney Quarry' (see mini-geotrail below)

Alum Shale and Mulgrave Shale Members (marine, recovering from the anoxic event of the Jet rock - (Caswell, Coe & Cohen, 2009))

Some 30m of beds are exposed at various sub-quarry levels along the northern, seawards side. They probably belong to the Hard Shale sub-unit of the Member and beds below, the Bituminous Shale sub-unit of the Mulgrave Shale. They consist of weathered, friable, grey, iron-stained, poorly bedded, flaky shale with vertically disposed, small-scale jointing. Fossils, chiefly poorly preserved belemnites with occasional harpoceratid and dactyloceratid ammonites, are present and, when seen, may be found in clusters. Small acicular crystals of iron-stained gypsum are common. Occasional beds of lighter grey, calcareous, sometimes septarian, nodules occur and in places the bare shale surface is littered by loose pieces of these nodules. So far, Howarth's (1962) detailed lithostratigraphic succession has not been elucidated. From the ammonites, it is likely that the beds exposed belong to the lower part of the Member (the Hard Shale sub-unit) and to the upper part of the Mulgrave Shale Member.

The upper sequence of the Alum Shale Member is mostly obscured by waste dumps and rock falls but can be seen from a distance in some places. Black (*ibid*) and Rastall and Hemingway (*ibid*) report shale with cementstone nodules (and typical Alum Shale ammonites) overlain by about 2 feet (0.6m) mainly consisting of 'chocolate mudstone', of 'doubtful age', below the Dogger Formation pebble bed.

Fossil reptiles. The SSSI description refers to type specimens of two plesiosaurs (*Eretmosaurus macroptera* and *Thaumatosauros zetlandicus*), one ichthyosaur (*Ichthyosaurus crassimonus*) and one pterosaur (*Parapsicephalus (Schaphognathus) purdoni*). The pterosaur was found at Lofthouse (Loftus) by the Rev. D. W. Purdon in 1881 and was described by Newton (Phil. Trans. Royal Soc. London, 1888). It is now at the British Geol. Survey, Keyworth (information from the Pterosaur data base where there are photos). Another ichthyosaur (*platyodon*) takes pride of place on the south-east wall of Pannett Park Museum, Whitby. Labelled No. 5, it is 5m in length and was extracted by Lewis Hunton and then donated to the museum by his brother.

Geomorphology

The back wall of the quarry has been subject to rock falls and there is now much debris at its foot including some huge boulders. At the top, on the Cleveland Way there are open fissures with the quarry wall being in a poor state.

At quarry level on the seawards edge there have been several landslips and some cliff erosion. In particular, the seawards ends of several stone-built alum steeping pits have been lost. In other places there are stretches of cliff that are apparently little changed. The ground between the Boulby and Loftus Quarries illustrates how the original cliffs looked.

Historical geology

As noted above, Hunton (1836) published an extremely important paper concerning the collection of fossils *in situ* and their stratigraphic significance. Hunton's home was at Hummersea House and he must have been familiar with Loftus Quarries even though his section refers to Rockcliff, Boulby where there was, at the time, an easy track down to the beach.

Industrial history and archaeology

Alum

The alum works was started in the mid-17th Century and closed in about 1860. There was a major redevelopment about 1800 when a new alum house was constructed by Hummersea beach. The history and industrial archaeology of the alum works has received much attention in recent years and, in particular, there is the major survey by English Heritage (Hunt *et al.* 2004). The main sites are included in the mini-geotrail.

Ironstone

The Main Seam of the Cleveland Ironstone Formation has been worked extensively under the quarries as part of Loftus Ironstone Mine, the surface works of which are now the Cleveland Ironstone Mining Museum at Skinningrove (at NZ 712 193). The seam typically consisted of a Bottom Block (1.2m) and

Top Block (1.5m) separated by a dogger or shale parting up to 0.2 m (but thicknesses varied across the reserve). Tuffs (1996) gives a brief and Chapman (1998) a detailed description. The mine workings are shown by Morris (1978) at 1:10,000 scale and the abandonment plans are available at Teesside Archives.

Mini-Geotrail (see accompanying quarry plan)

Note: *a more detailed description of the industrial archaeology is available in CIAS newsletter No. 100, Feb., 2011 from which this is abridged.*

Car Park At NZ 713 201 by the mouth of Skinningrove Beck north of the village.

- ▶ Make your way across the beck and follow the Cleveland Way up the steep, stepped path and then eastwards where there is a view of the Old Gut dock (marked 1 on the plan). Pass the path down to the shore at NZ 725 198 and North Warren Cottage (Tile Shed). View two large stone-lined cisterns (2) if one deviates along the coast path and, as well, there are views back of the New Gut and Hummersea beach.

At NZ 735 198 fork left off the Cleveland Way to go down the track in to the quarries.

3 (NZ 736 199) Where the coastal path rejoins the track Loftus Quarries come in to view. There is a sandstone quarry (4) and below it a large alum shale quarry (5), its south-eastern face being the location of the *murchisonae* beds that can be viewed from this point.

- ▶ Continue down the track.

6 (NZ 737 200) Foot of ramp track. There are views of tiered quarries to the N. There were two sets of steeping pits near the cliff edge (7) and there is now a crown hole, the result of jet working. To the east one can leave the path temporarily to examine the alum shale face close by.

- ▶ Cross the embankment and follow the path for about 200m to, just before a large fallen block of sandstone with ripplemarks on one face (NZ 739 200 marked X on the map), descend down a faint path to the site of the smithy (8). (the main path continues on the south side of the boulder and at one place (NZ 741 200 marked Y on the map) it's possible to scramble up close to the base of the Saltwick Sandstone and examine the shale with small nodules noted above that might also be Herries' site)

8 (NZ 739 201) This is the site of the smithy and 2 steeping pits as shown on the 1st edition O.S. map. Little is seen but there are indications of other steeping pits on the cliff edge to the west.

- ▶ Go down the short ramp into the 'kidney' quarry immediately to the east.

9 (NZ 740 201) 'Kidney quarry'. This quarry is sheltered from the north by an *in situ* shale wall that has an opening for waste disposal over the cliff. The O.S. map shows that there was a set of 6 steeping pits here.

- ▶ Trek eastwards over the desolate landscape, crossing several cols and quarries (scoops) and passing archaeological locations 10, 11 and 12. There is the opportunity to look for (a) zone ammonites such as species of *Cleviceras* and *Orthodactylites* and (b) the small bivalve *Dacryomya ovum* regarded by Hunton as characteristic of shale suited to alum making. Researchers believe that this was the time of slow recovery from a major sea floor extinction event (during formation of the Jet Rock (Caswell *et al, ibid*).

13 (NZ 744 200) There is a stone slab platform here, probably the base of a steeping pit, slightly bowed as a result of expansion of the shale beneath it. It is a good spot to view the archaeological remains (14, steeping pits, cistern and lengths of a stone trough) in the quarry further to the east and examine large limestone concretions with *Dactylioceras* that are close by. The extreme eastern end of Loftus Quarries is not far beyond. Here, the

Horse Back (15) is the landslipped ground between Loftus and Boulby Quarries.

- ▶ Make your way on a thin path to 16 (NZ 744 199) where a path goes up a steep but safe slope to the Cleveland Way (or return on the path that leads back to the large boulder, (NZ 739 200) and the cart track entrance).

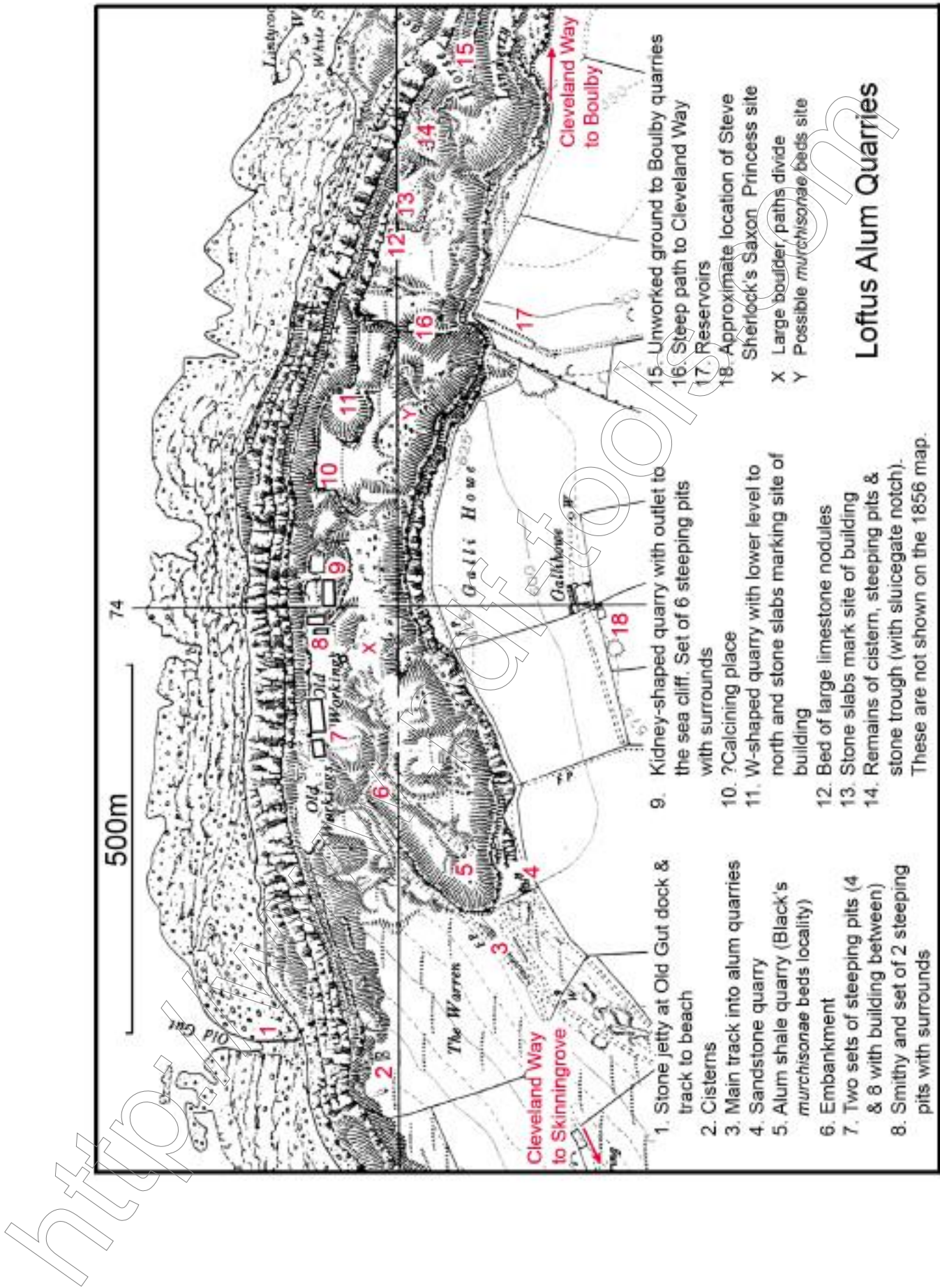
17 (NZ 743 199) This is the site of two reservoirs for the alum works, long and narrow in outline that takes advantage of the local terrain. This area (Street Houses).

18 This is the site of important archaeological research by Sherlock (2013) including that of the 'Saxon Princess' and of an Iron Age salt works.

- ▶ Return westwards to Skinningrove along the Cleveland Way. There are at first fine views of the quarries to the north and the rolling dip slope to the south.



Looking west on the Cleveland Way above Loftus Quarries near the reservoirs. Note the high back wall (left), boulder field (centre) and shale exposures (right)



500m

74

1. Stone jetty at Old Gut dock & track to beach
2. Cisterns
3. Main track into alum quarries
4. Sandstone quarry
5. Alum shale quarry (Black's *murchisoniae* beds locality)
6. Embankment
7. Two sets of steeping pits (4 & 8 with building between)
8. Smithy and set of 2 steeping pits with surrounds
9. Kidney-shaped quarry with outlet to the sea cliff. Set of 6 steeping pits with surrounds
10. ?Calcing place
11. W-shaped quarry with lower level to north and stone slabs marking site of building
12. Bed of large limestone nodules
13. Stone slabs mark site of building
14. Remains of cistern, steeping pits & stone trough (with sluicgate notch). These are not shown on the 1856 map.
15. Unworked ground to Boulby quarries
16. Steep path to Cleveland Way
17. Reservoirs
18. Approximate location of Steve Sherlock's Saxon Princess site

- X Large boulder, paths divide
- Y Possible *murchisoniae* beds site

Loftus Alum Quarries

Bibliography

Maps

Geological Survey Yorkshire Sheet IX SW, Rockcliff, scale 6 inches to 1 mile, 1878 (Ordnance Survey 1856). *This shows a large number of industrial features that have since disappeared such as several sets of steeping pits and an outline plan of the alum house.*

Excursion guides

Goldring, D. 2001. Along the Scar. Peter Tuffs, Guisborough, 145p. *See pages 59 to 65.*

Goldring, D. 2011. Guided walk to Loftus alum quarries, 24th July, 2010. CIAS Newsletter No. 100, 5-11. *The mini-geotrail is based on this.*

Geology

Barrow, G. 1888. The Geology of North Cleveland. Mem. Geol. Survey, H.M.S.O., London, 101p. *Official memoir. Page 43 shows the Dogger section.*

Benton, M. J. and Spencer, P. S. 1995. Loftus GCR site no. 1169 in Fossil reptiles of Great Britain. Geol. Conservation Review Series No. 10, Chapman & Hall, 386p.

Black, M. 1929. Drifted plant beds of the Upper Estuarine Series of Yorkshire. Quart. Journ. Geol. Soc. 85., 389 -

Black, M. 1934. Sedimentation of the Aalenian Rocks of Yorkshire. Proc. Yorks. Geol. Soc., 22, 265-279. *Details of the Dogger Formation succession*

Benton, M.J. & Taylor M.A. 1984 Marine Reptiles from the Upper Lias (Lower Toarcian Lower Jurassic) of the Yorkshire Coast. Proc. Yorks. Geol. Soc., 44, 399 -429.

Caswell, B. A., Coe, A. L. and Cohen, A. S. 2009. New range data for marine invertebrate species across the early Toarcian (Early Jurassic) mass extinction. Journ. Geol. Soc., London, 166, 859-872.

Goldring, D. 2012. Geological Background to the North Yorkshire Alum Industry. Cleveland Industrial Archaeologist, No. 33, 43-65. *Gives a modern view of the geology.*

Fox-Strangways, C. 1892. The Jurassic Rocks of Britain, Volume 1, Yorkshire. Geol. Survey, H.M.S.O., London, 551p. *Similar to Barrow, 1888.*

Herries, R. S. 1906. The Geology of the Yorkshire Coast between Redcar and Robin Hood's Bay. Proc. Geol. Ass., 19, 410-444. *Additional information to Tate & Blake.*

Howarth, M. K. 1962. The Jet Rock Series and the Alum Shale Series of the Yorkshire coast. Proc. Yorks. Geol. Soc., 33, 381-418. *The main bed by bed description of the strata, followed by subsequent researchers.*

Morris, C.H. 1978 Report on Abandoned Mineral Working and Possible Surface Instability Problems. Unpublished report, County of Cleveland, Dept. Of County Surveyor and Engineer.

Rastall, R. H. & Hemingway, J. E. 1940. The Yorkshire Dogger, 1. The Coastal Region. Geol. Mag., 77, 177-197 & 257-275. *This is the main detailed description of the Dogger Formation for the Cleveland coast. Pages 192 and 193 refer to the Loftus section.*

Simms, M. J., Chidlaw, N. and Page, K. N. 2004. Boulby GCR site no. 257 in British Lower Jurassic Stratigraphy. Geol. Conservation Review Series No. 30, Joint Nature Conservation Committee, Peterborough, 458p.

Tate, R. and Blake, J. F. 1876. The Yorkshire Lias. John Van Voorst, London, 475p. *The measured section and fossil list of the Dogger Formation is on page 26 (cliff due north of Upton hamlet). Pages 132 and 133 show the ironstone section as seen on the path to the shore at Boulby.*

Wilson, V. 1948. British Regional Geology, East Yorkshire and Lincolnshire. HMSO, 94p. *Black's section is reproduced on page 38.*

Historical geology

Hunton, L. 1836. Remarks on a section of the Upper Lias and Marlstone of Yorkshire, etc. Trans. Geol. Soc. London, 5, 215-220. *This is Hunton's classic paper and includes his section at Boulby, undoubtedly the best by the early 19th Century geologists.*

Torrens, H. S. and Getty, T. A. 1984. Louis Hunton (1814-1838). English pioneer in Ammonite Biostratigraphy. Earth Sciences History, 3, 58-68. *A biography stressing the scientific importance of Louis Hunton.*

Industrial History & Archaeology

Alum

Goldring, D. 2007. Louis Hunton and Loftus Alum Works. Cleveland Industrial Heritage, No. 21, 9-15. *Includes a copy of Hunton's famous section emphasising points of industrial interest.*

Hunt, A. et al. 2004. Loftus Alum Works, Redcar and Cleveland, Cleveland. An archaeological and historical survey. English Heritage, Survey Report A1/02/2004, 67p. *This is a major survey of Loftus Quarries with detailed plans covering the whole site. It is a pity that there is not more geology, that there are few survey levels and that information on the early 6 inches to 1 mile O. S. maps is missing.*

Ironstone

Abandonment Plan (at Teesside Archives)

Loftus (1 plan), abandoned 27/06/1959. Reference No. 15168.

Chapman, S. 1998. The Loftus Mines, Skinningrove. Peter Tuffs, Guisborough, 100p. *Account of ironstone mining and description of surface remains.*

Tuffs, P. 1996. Catalogue of Cleveland Ironstone Mines. Peter Tuffs, Guisborough, 56p. *General details of Loftus mine.*

Other

Sherlock, S.J. & Vyner, B. 2013 Iron Age Salt Working on the Yorkshire Coast at Street Houses, Loftus, Cleveland. *Yorks Arch Review* 85, 46-67

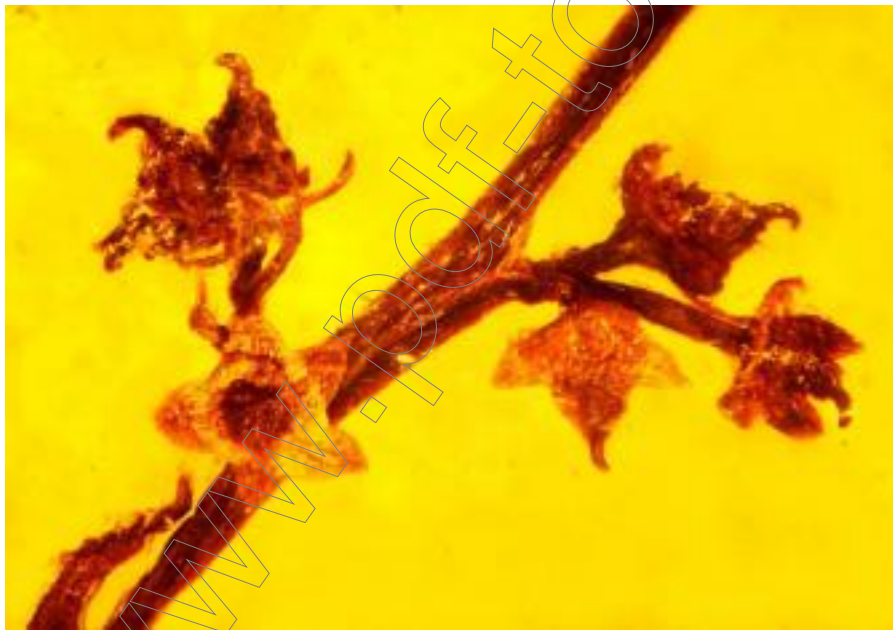
<http://www.pdf-tools.com>

Sequel to Marske Quarry Plant Fossils

As we know from our Marske Quarry project last year plant life in the Jurassic comprised bryophytes (mosses and liverworts), horsetails, ferns, Cycads, ginkgos, conifers, club-mosses and seed-ferns – not a single flowering plant amongst them.

Flowering plants (angiosperms) appeared in the early Cretaceous and today are the most numerous types of plants with almost 250,000 of the 300,000 known species in the World being angiosperms.

The fossil record seldom includes the flowers themselves due to their fragility. More usually it is the leaves, stems, branches or seeds which become fossilised.



Micropetasos burmensis – named after the valley in Burma where it was found

A remarkable recent discovery from Burma (Myanmar) sheds new light on early flowering plants in the Middle Cretaceous, some 100 million years ago. Encased in amber have been found small flowers each about 1mm across which of an extinct, previously unknown, genus seemingly unrelated to any modern taxonomic Family named *Micropetasos burmensis*. The fossil is described in the Royal Horticultural Society journal *The Garden* thus;

“One flower is preserved near fertilisation, with tubes growing from two pollen grains actually penetrating the flower’s stigma. The pollen appears to be sticky, suggesting it was carried by insects – proof that the reproductive mechanisms used by plants today have stayed largely unchanged for 100 million years”

More information on this can be found at www.brit.org/webfm_send/455 and check any amber in your own collections for more remains of past life.

A.S.

Events Diary

Listed here are various events publicised on other geological sites...

From the website of the [North East Geological Society](http://www.north-east-geological-society.org):

Field Trips 2014:

Saturday 5th July

Millstone Grit Group Rocks around Blanchland including a guided tour of Lady Cross Quarry and nature Reserve (£5/person donation to Nature Reserve requested).

Leader: Elizabeth Pickett (North Pennines AONB)

Meet Blanchland - more information later.

Sunday 20th July

Lower Palaeozoic and Quaternary geology of Austwick and Crummackdale.

Leader: Eric Johnson (Retired BGS).

Meet Horton in Ribblesdale - more information later.

Saturday 13th September

Visit to Whitby - Saltwick Bay foreshore.

The purpose of the visit is to study the succession of the Lower and Middle Jurassic (Whitby Mudstone, Dogger, and Saltwick) Formations with the emphasis on their lithology, structural features, depositional environment and palaeontology including the famous Whitby Plant Bed. The traverse can be regarded as a follow up to Dr. Martin Whyte's successful field excursion in 2011 which concentrated on dinosaur foot prints.

Meet at 10.30 am in the Whitby Abbey Car Park NZ 905110 (pay and display). Toilets available at the Abbey car park and in Whitby itself. Bring a packed lunch.

Low Water: 1.45pm, height, 0.8m.

Leader: John Waring.

Saturday 25th October

Building Stones of Durham Cathedral. Organised as a formal Cathedral tour (at a cost of £5/person).

Leader: Brian Young (retired BGS/ Durham University)

Further Information: <http://www.northeast-geolsoc.50megs.com/pages/page3fieldvisits.htm>

From the website of [Limestone Landscapes](#):

DATE	EVENT	TITLE
29/06/2014	Guided Walk	Botanical treasures: Coast between Easington and Hawthorn
05/07/2014	Workshop	Hetton Smithy Open Day [2 of 3 sessions] (Limestone Festival Event)
06/07/2014	Guided Walk	Sunderland Geology Tour (Limestone Festival Event)
12/07/2014	Fun Day	Hartlepool Headland Heritage Festival

- 13/07/2014 Guided Walk [Coastal Footpath Walk \(Durham Heritage Coast\)](#)
- 15/07/2014 Guided Walk [Wingate Quarry Local Nature Reserve](#)
- 19/07/2014 Family Friendly [Celebrating Our Coast at Dalton Park](#)
- 26/07/2014 Family Friendly [Big Watch Weekend for Marine wildlife](#)
- 30/07/2014 Guided Walk [The Coastal Defences of Seaham walk \(Limestone Festival Event\)](#)
- 01/08/2014 Guided Walk [Disappearing Guns of Trow Point walk \(Limestone Festival Event\)](#)
- 02/08/2014 Workshop [Hetton Smith Open Day \[3 of 3 sessions\] \(Limestone Festival Event\)](#)
- 02/08/2014 Guided Walk [The Coastal Defences of Sunderland walk \(Limestone Landscapes Festival\)](#)
- 12/08/2014 Guided Walk [Historical walk through Hawthorne Dene \(Limestone Festival Event\)](#)
- 19/08/2014 Guided Walk [Historical walk through Castle Eden Dene \(Limestone Festival Event\)](#)

TVRIGS Cleveland Naturalists Event

On Saturday 30th August 2014 there will be a joint walk with TVRIGS and Cleveland Naturalists from the bandstand at Whitby to Sandsend led by Denis Goldring. Departs at 11am.

PLEASE CHECK THE APPROPRIATE WEBSITE FOR FULL DETAILS

News from the Web

Given below are links to geologically-themed stories on other websites.

Vanadium: The metal that may soon be powering your neighbourhood

Hawaii has a problem, one that the whole world is likely to face in the next 10 years. And the solution could be a metal that you've probably never heard of - vanadium.

<http://www.bbc.co.uk/news/magazine-27829874>

Dinosaurs 'neither warm nor cold blooded'

Dinosaurs fit in an intermediate class between warm and cold blooded animals, a study in the journal Science claims.

Scientists compared the growth rates of hundreds of living and extinct species, using growth rings and bone size to calculate the rates for dinosaurs.

<http://www.bbc.co.uk/news/science-environment-27794723>

A New Epoch?

If we are living in the Anthropocene, when did it start? Currently, we're officially in the Holocene – an epoch which began at the end of the Pliocene, 11,700 years ago, characterised by a stable, relatively warm climate. Some argue the Anthropocene began with the industrialisation of the nineteenth century; others, that it is a post war phenomenon, beginning not more than 70 years ago.

<http://blog.geolsoc.org.uk/2014/06/10/a-new-epoch/>

Sherwood Sandstone Group of England, Wales and south-west Scotland

(DOWNLOAD)

This Research Report presents a reviewed and revised lithostratigraphical nomenclature for the Sherwood Sandstone Group (latest Permian to Mid Triassic). The SSG is composed mainly of brown, red, buff, greenish grey and yellow sandstones of fluvial or aeolian origin. Three options were considered

and the 'clean slate' option chosen. The constituent formation names proposed are: Helsby Sandstone, Wilmslow Sandstone, Chester, Moira, and Hopwas Breccia formations.

<http://www.bgs.ac.uk/downloads/start.cfm?id=2904>

EARTHQUAKE ALERT! ROTHERHAM,S YORKSHIRE

DATE 18/06/2014
ORIGIN TIME 08:44:39.8 UTC
LOCATION 53.403 -1.384
DEPTH 4 km
MAGNITUDE 2.8
LOCALITY ROTHERHAM,S YORKSHIRE

Felt Rotherham, Sheffield and Doncaster.

http://earthquakes.bgs.ac.uk/earthquakes/recent_events/20140618084400.html#page=summary

PLEASE NOTE: Tees Valley RIGS Group cannot be held responsible for the content held on external sites.

Editor's Note

We at TVRIGS hope that you enjoy reading our newsletter as much as we do putting it together. However, the quarterly publication was produced on a trial basis, to see whether such frequency of publication was possible.

Unfortunately pressures of work dictate that in future our newsletter will be published on a biannual basis meaning that the next issue will be published in January 2015.

We apologise for any inconvenience this may cause.

A.C.

Email Contact Details

INFO@tvrigs.org.uk

tvrigs@gmail.com