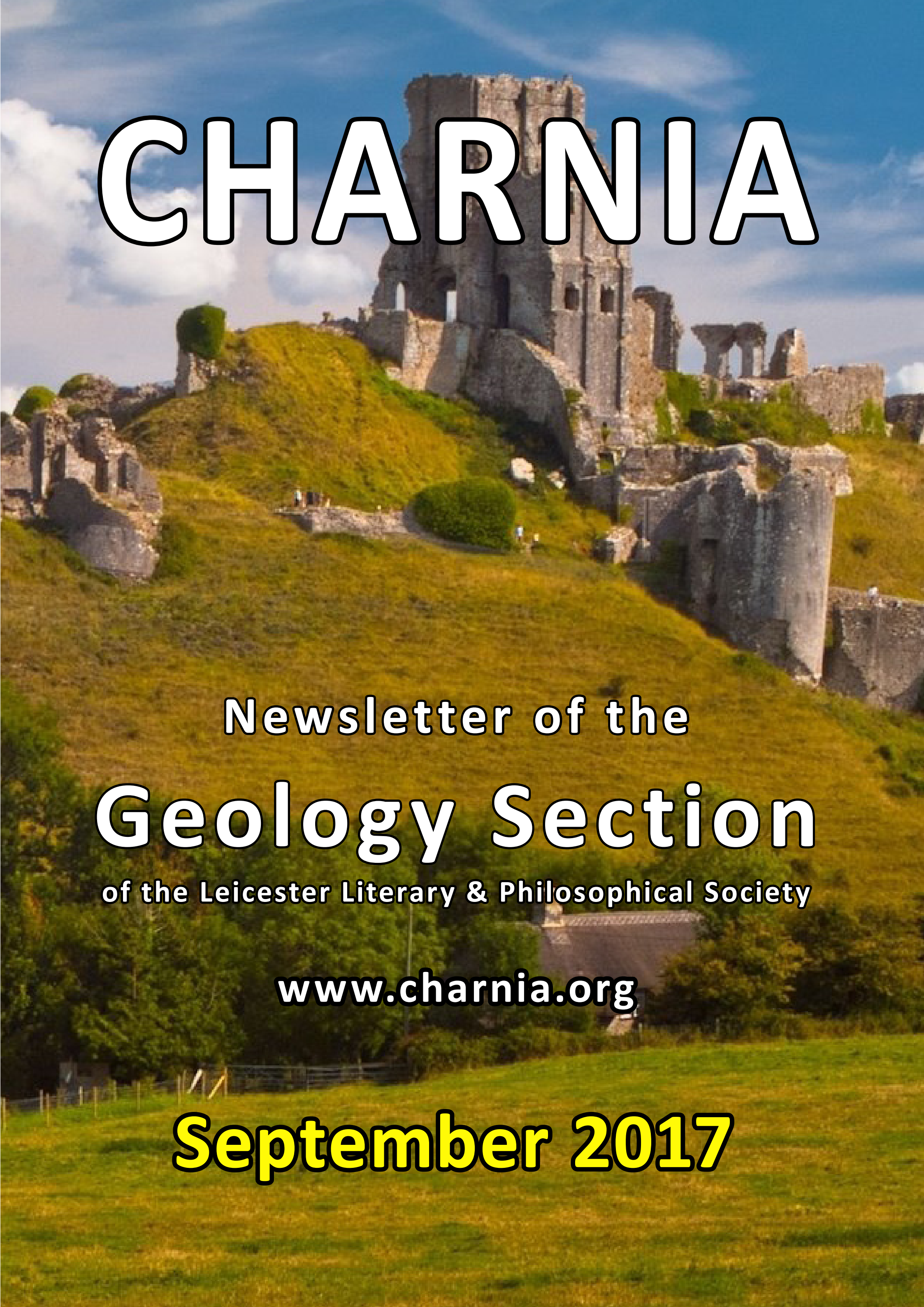


CHARNIA

Newsletter of the

Geology Section

of the Leicester Literary & Philosophical Society

www.charnia.org

September 2017

EDITOR'S NOTE

This issue returns more to normal, following May's special commemorative for Trevor Ford and Peter Long, with holiday snaps from the Dorset summer weekend field excursion in July and three not-too-serious articles by members on (broadly) geological and palaeontological themes. Don't forget, folks, *Charnia* is the Section members' newsletter, and all contributions (written pieces, photos, announcements, recent finds, etc.) are more than welcome.

It's subscription time. Enclosed is the membership form for 2017 - 18; please use it - by post, or see Fiona Barnaby (membership secretary) with your subs money at the first meeting you can get to. Or save the price of a stamp or the effort of queuing: set up a bank Standing Order, if you haven't already done so.

As you may know, as a charitable body (part of the main Lit & Phil), we claim Gift Aid repayments from the tax man on donations. For us, donations are primarily the money you very kindly put in the jar when Gillian makes you a cup of coffee before the evening meetings. Please bear in mind how much you would pay for a hot drink in a cafe when you make your donation. The Gift Aid rate is 28p in the pound, so 20 pences don't raise very much. Thanks!

COVER: See **page 2**

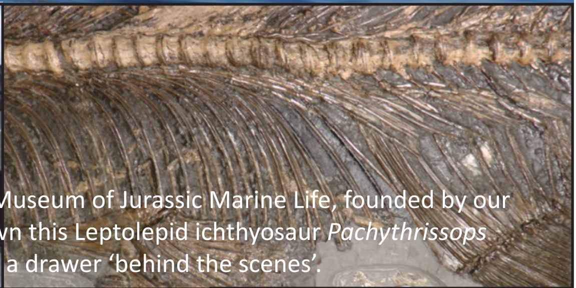
Corfe Castle, visited on this year's summer excursion to Dorset

WEEKEND EXCURSION TO DORSET

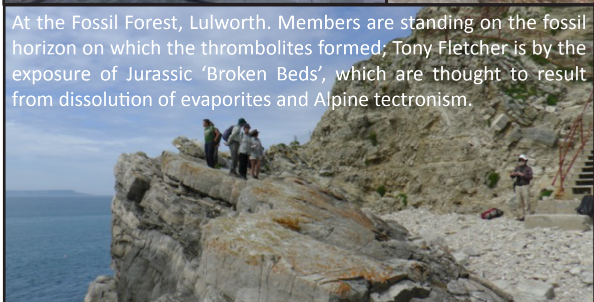
Rob Tripp

Do you remember the weather in Cumbria 2016?

Well, Dorset was a bitty too warm for many, and not everyone visited all of the sections(!). This was Osmington Mills...



On our visit to the Kimmeridge Museum of Jurassic Marine Life, founded by our host Steve Etches, we were shown this Leptolepid ichthyosaur *Pachythrissops* showing traces of fins and gut in a drawer ‘behind the scenes’.



At the Fossil Forest, Lulworth. Members are standing on the fossil horizon on which the thrombolites formed; Tony Fletcher is by the exposure of Jurassic ‘Broken Beds’, which are thought to result from dissolution of evaporites and Alpine tectronism.

Osmington Mills coast section. ‘Doggers’ at base of Benecliff Grit in Jurassic Corallian strata.

Portland Bill lighthouse stands over the Pleistocene raised beach, tidal flat deposits, and the erosion surface on the top of the Portland stone.

IRCHESTER COUNTRY PARK – A NEW IRONSTONE HERITAGE TRAIL

Diana Sutherland

Thanks to recent Heritage Lottery Funding visitors can begin to appreciate the history and layout of this extensive public park near Wellingborough (NGR: SP 910660). It was an ironstone quarry, working until 1941 (Fig.1).

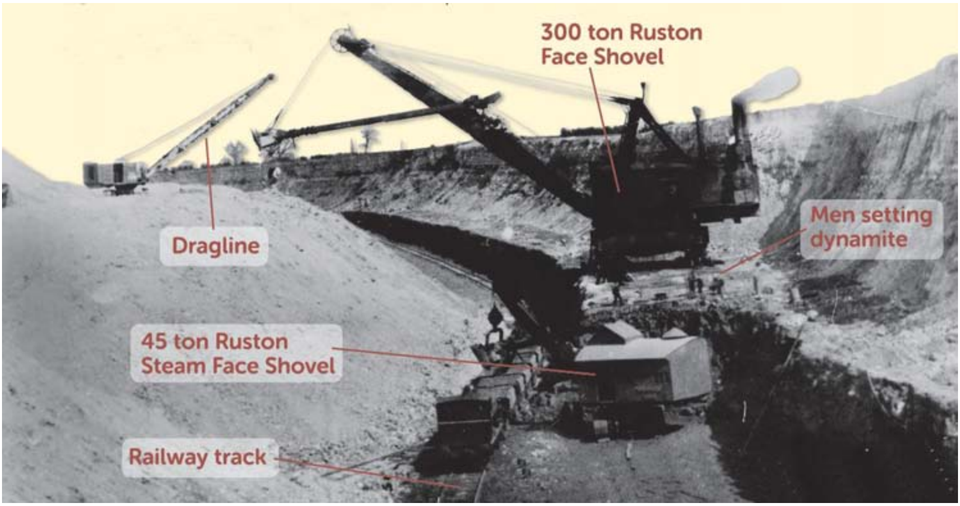


Fig. 1. Ironstone quarrying in Wembley Pit, Irchester, in the 1930s. Illustration from the trail guide

The overburden was stripped by huge machines, creating successive ridges of spoil which were later planted with a forest of mixed conifers. The ironstone, cut by steam-powered face-shovel, was transported by rail along the quarry floor to the calcining banks, prior to heading for blast furnaces off-site. The final cutting remained unfilled, a quarry face sliced through some 20 metres of Middle Jurassic rocks, with Northampton Sand ironstone at the bottom overlain by Rutland Formation and Blisworth Limestone. It is a Regionally Important Geological Site (RIGS). The 2.5-mile trail begins in forest, leading to the main path where new viewpoints have been created to overlook the quarry (Fig.2), finally visiting the calcine area; the route is punctuated by attractive new information boards.

Geologists of course are most interested in the quarry face; Hugh Torrens (1967) measured the Blisworth Limestone at the north end, even before Northamptonshire County Council acquired the site for a Country Park in 1971. Several of us from Leicester University conducted Adult Education courses in Northamptonshire, with fieldwork visiting the vast array of active or recently worked ironstone

Fig. 2 Viewpoint and Panel 4, 2017. The Quarry Face, Blisworth Limestone

quarries. And in 1972-3 John Hudson, Roy Clements and I had an enthusiastic group studying the Irchester quarry face, measuring sections in some detail and listing fossils. The geology around Wellingborough differs from the Corby area in having no Lincolnshire Limestone in the succession. The Wellingborough geological map 186 (1958) at the time showed Northampton Sand overlain by 'Lower Estuarine Series' followed directly by 'Upper Estuarine Series'. The 'Upper Estuarine Series' was subsequently renamed the' Rutland Formation' by Martin Bradshaw (1978), after having studied available sections over a wide region. The 'Lower Estuarine Series' (renamed Grantham Formation) is now thought to be absent from the Wellingborough district; the mapped outcrop on the 2007 edition of BGS 186 is taken to be the lowest (Stamford) member of the Rutland Formation. A simplified version of the section measured in 1973 is included in one of the information boards (Panel 8) on the new trail. The quarry face at the west end covers 13 Ma of Middle Jurassic time: marine deposits of iron-rich Northampton Sand (c.178 Ma) were followed by erosion adjacent to an Anglo-Belgian landmass, and succeeded unconformably by the Rutland Formation, the lower sandier deposits having plant rootlet horizons and black carbonaceous layers, a changing near-shore environment of swamps and forests. The overlying Wellingborough member brings in layered oyster beds (*Preexogyra hebridica*), wavy banded algal limestone, and sandy to shelly limestone varieties (with bivalve *Placunopsis* and the echinoid *Acrosalenia*). The overlying dark clays with rootlet horizons have been found locally to contain occasional roots of large trees (Fig.3).

Fig. 3. Roy Clements (yes - 1973!) with 2.7m tree root in the Rutland Formation. Finedon Hill quarry, Wellingborough

Panel 8 illustrates some of the plants known to survive from the Jurassic, and also introduces the 'Rutland dinosaur', *Cetiosaurus.* At the top of this end of the Irchester section marine clays lead into 'stripy' (marly) limestones with *Kallirhynchia sharpi*, the incoming Blisworth Limestone the product of a widespread shallow sea (c.165 Ma).

Fig. 4. The quarry face, east end, in 1973, Blisworth Limestone.
Photo Richard Pegg

Fig, 5. The quarry face, west end, in 1973. The prominent rib is Wellingborough Limestosne.
Photo DSS

In 1973 the quarry face was pretty well exposed, the steep wall of Blisworth Limestone thickening to 17 ft (over 5 m) at the north-east end (Fig.4). The clay slope of the Rutland Formation, and the Wellingborough Limestone rib, were plainly seen at the west end (Fig.5); the lower slope had collected scree, but cutting into it revealed the sandier lower Rutland beds; ironstone outcrops, though, were few and far between (Sutherland & Hudson 1982). Since then the growth of vegetation has gradually obscured the quarry face, and put an end to geological visits; however, the value of local geological sites recognised by the RIGS movement in the 1990s provided the opportunity for active liaison with local authorities, and in 2008 Northamptonshire RIGS Group's 'Site Management Plan' for Irchester quarry was submitted to Northamptonshire County Council,

Fig. 6. New viewpoint structure, at location 6 on the Heritage Ironstone Trail, 2017

Fig. 7. The new Heritage Ironstone Trail. Panel 8

appealing for clearance of the vegetation to restore the visible geology, with access to the quarry, and encouraging the promotion of public interest at all levels in the geology and history of this important site. While the new trail provides imaginative viewpoints (Fig. 6), the potentially interesting rocks (Fig.8) are at present still hidden from view! Provision of access is already under way which will reach exposed ironstone, and the promised selective clearance of the quarry slope will be good news indeed for present and future geologists (Fig.7).

Fig. 8. View of quarry face at the same location as viewpoint in Fig. 6 in 1976; algal banding in Wellingborough Limestone. Photo DSS

References:

Bradshaw, M.J., 1978: *A facies analysis of the Bathonian of eastern England.* Unpublished D. Phil. Thesis, University of Oxford.

Sutherland, D.S. & Hudson, J.D., 1982*; Irchester Country Park; The Quarry Face; a Geological Guide.* Leisure and Libraries Department, Northamptonshire County Council, Northampton.

Torrens, H.S., 1967: The Great Oolite Limestone of the Midlands. *Transactions of the Leicester Literary and Philosophical Society,* LXI, 65-90

SUMMARY OF THE TALK ON WEDNESDAY OCTOBER 18

Ediacaran fossils and geoengineering in the gorges of the Yangtze River, China

Roger Mason

The Yangtze River is the third longest in the world. Its source is 5,342 m above the sea on the Tibetan Plateau and it flows 6,300 kms east into the East China Sea. Its entire course lies in the People's Republic of China. It was diverted eastwards from the Sichuan Basin across central Chinese mountain ranges by river capture in relatively recent geological times, cutting three deep gorges. The rocks of the mountains had been thrown into arches and downfolds by a complex continental collision that ended about 200 million years ago.

The eastern Xiling Gorge cuts through the highest anticline down to Archaean rocks up to 3000 Ma old, intruded by a large mass of granite 800 Ma old. This is the site of the controversial Sandouping Dam which has an electricity generation capacity of 22,500 MW, about 1/6 of the maximum power transmitted through our British National Grid. The Precambrian crystalline rocks are overlain by a continuous succession of Proterozoic to Permian sedimentary rocks, including unmetamorphosed Cryogenian tillites, fossiliferous Ediacaran carbonates and fossiliferous Cambrian and Ordovician rocks.

My colleagues from China Geosciences University in Wuhan and I have discovered a continuous Ediacaran to Cambrian succession near the Dam that contains new and yet undescribed Ediacaran fossils. The top of the succession has a sharp boundary between white Ediacaran dolostone and black Cambrian shale, and we are continuing to search for fossils and improve our description of the succession.

WINTER PROGRAMME 2017-18

AUTUMN 2017 TALKS

All at 7.30 pm in lecture theatre 3, Ken Edwards Building, University of Leicester, unless shown otherwise. Doors open and refreshments served from 7.00 pm.

Details: Mark Evans 0116 454 0231 markevans@leicester.gov.uk

Wednesday October 4

Tory McCoy *Soft tissue preservation in amber*

Wednesday October 18

Roger Mason *Ediacaran fossils and geoengineering in the gorges of the Yangtze River, China* (abstract p.7)

Wednesday November 1

David Siveter *The Herefordshire lagerstatte: soft-bodied fossils from a Silurian volcanic ash*

Wednesday November 15

Mike Lovell *Petrophysics in the kitchen*

Wednesday November 30

Jan Zalasiewicz *Latest on the Anthropocene* (title to follow) **NOTE** There will be a full-day meeting on this theme before the Section C meeting. Members are welcome to attend - details to follow.

Wednesday December 13

Christmas meeting at New Walk Museum

Two contributions from **Helen Boynton** in this issue…

1. An interesting question

Editor's note: Helen's speculations chime with parts of a new paper in this May's *Journal of the Geological Society*, although her manuscript – it was held over to make space in the special June 2017 *Charnia* – was written before its publication. I have put references to the JGS paper and the Fedonkin work Helen refers to (although you need to be able to read Russian) below.

What do you think? Not only whether Trevor knew it all along, but if Helen is also correct that there could be (should be?) fungal sporangia among the Leicestershire Precambrian biota.

Incidentally, 'Poinsettia' (*Euphorbia pulcherrima*) is known to be susceptible to infection by, among other pathogens, *Phytopthora* – which produces sporangia.

Last Christmas I was given a large red Poinsettia which flowered. After a while, the red bracts began to drop, followed by the 'branches'. What was left of the skeletal plant structure was seen to be covered by small white balls (<1mm diameter) that appeared, on examination, to be fungal sporangia filled with spores (which emerged when I squashed one of the balls).

This set me thinking about where I had seen similar structures before – in the fossil record. It was on fossil-bearing bedding planes in the Leicestershire Precambrian, in particular associated with the best-known specimens of *Charnia masoni* and *Primocandelabrum labrum*.

Charnia masoni (left), *Primocandelabrum hiemalaranum* (="Hiemelara") and *Primocandelabrum labrum* (right)

I wondered if the balls preserved on the bedding planes were also reproductive structures containing 'spores'. I was also reminded that Mikhail Fedonkin, in a paper in 1980, recorded what he speculated might be 'sporangia' associated with a specimen of *Hiemelora* (which is now believed to be a structure assopciated with the frond-like *Primocandelabrum*).

Perhaps Trevor had solved the mystery too, but (see my reminiscences of his life in the May edition), would he have said so?

Cunningham et al 2017 The Weng'an biota (Doushanto Formation): an Ediacaran window on soft-bodied and multicellular microorganisms JGS ***174*** *793-802*

Fedonkin, M.A. (1980). "New representatives of the Precambrian coelenterates in the northern Russian platform". Paleontologicheskij Zhurnal (in Russian). ***2****: 7–15.*

2. A geological find

On a cold winter's day in the early '80s, we met Diana Sutherland and her family for a walk from Smeeton Westerby to Foxton Locks. As we were walking up to the canal we spotted a large boulder, which Diana pronounced to be a glacial erratic of basalt. It was too big to carry away [as if they would have!: Ed.] so we had to leave it where it was. We presumed it had come out of the excavations when this section of the canal was being dug (in about 1796).

I think the erratic has since disappeared, but if anyone walks the bridleway here and re-locates it I'll be very pleased to hear; however I fear it is by now in someone's garden rockery! Many erratics have wandered again since they were dropped by the ice, for example, the 'Great Stretton' erratic which has been moved twice since it was first located and described in 2012).

A chance chip – a compact slice of Jurassic time; River Welland, Barrowden

Roy Clements

In spite of the title of this series, this particular jaunt takes us outside the limit of the combined counties into Northamptonshire – just – 10 metres say, although the actual material came from right on the border between northern Northamptonshire and Rutland.

The largely south-east facing border between the combined Leicestershire and Rutland with its neighbour Northamptonshire follows almost exactly the course of the River Welland (Market Harborough being one of the obvious exceptions). Between the villages of Barrowden (Rutland) and Wakerley (East Northamptonshire District), it follows the course of the river very nicely; and the Welland meanders through a fine flood plain (figure 1), although this has a strong human imprint on it as can be clearly seen in aerial photographs.

Figure 1: View of Barrowden (Rutland) from the flood plain (Wakerley, Northamptonshire) showing the Environment Agency workings to the lower right.

The Government's Environment Agency is currently undertaking works on the weir, weir pool, and new fish pass at its Barrowden gauging station (figure 1). On a family stroll over the fields, in late July this year, I came across debris in the form of dredgings from these works (at about NGR SP949 999) (figure 2).

It was the younger eyes in our party who started to find things! The debris was largely a muddy gravel, with lots of pebbles from the drift, human artefacts (including a blue porcelain shard), and, most interestingly, a lot of nicely preserved fossils. These latter, all ultimately derived from the Whitby Mudstone Formation ("Upper Lias", Toarcian, Lower Jurassic), included belemnites (of course) and lots of very nice ammonites representing the

Figure 2: Dredgings, legs and the River Welland

common Upper Lias forms Dactylioceras s.l., Harpoceras s.l., and Hildoceras s.l. The BGS map of the region (1978, England and Wales Sheet 157, Stamford, solid and drift edition) shows a finger of the Whitby Mudstone Formation underlying the alluvium of the Welland valley at this point, which suggests that 'solid' rock may not be too far below the current Environment Agency workings.

Figure 3: Belemnite - ventral view with "pale shadow"

Figure 4: Belemnite - dorsal view

I want to comment on two interesting, but not particularly beautiful, finds. The first, briefly, is a 51 x 9 mm belemnite guard, fairly typical, with a groove running the length of the ventral surface (figure 3) and two, shorter, grooves on the dorso-lateral surfaces of the apical end (figure 4). The interesting thing is that whilst the overall colour is the typical rich brown of belemnite guards, there is an elongate figure-of-eight shaped pale "shadow" occupying the length of the ventral surface (figure 3). Whether this is of original biological significance or merely a preservational artefact, I do not know.

Figure 5: Concretion fragment ('lower' surface) with hildoceratid – external mould

Figure 6: Concretion fragment ('lower' surface), detail, showing phosphatic ooliths/pisoliths.

The second specimen of interest shows the external mould of a lateral, spiral surface of an hildoceratid ammonite, preserved in part of a phosphatic(?) concretion (figure 5; dimensions, length 45 mm, height 40 mm, thickness 11mm). Viewed from this surface in more detail we can see that this part of the concretion is itself made up of rounded ooliths/pisoliths – phosphatic ooliths (figure 6). Such phosphatic ooliths are widespread in the middle part of the Whitby Mudstone formation in our area (they occur at our classic sites at Holwell and Tilton Railway Cutting to my knowledge), and have been so documented and well described by Horton et al (1980) (and see also Horton 2012). They probably were originally aragonitic, having been concentrated and altered to make them as we find them.

Figure 7: Concretion fragment ('upper' surface), general view

Figure 8: Concretion fragment ('upper' surface), detail showing Dactylioceras fragments

Figure 9: Concretion fragment ('upper' surface), detail showing 'white dust' of nubeculariids

Turning the specimen over, the character of the concretion is quite different (figure 7). There is a distinct thin layer of shell debris with, prominently, three-dimensional fragments of the ammonite Dactylioceras s.l.(figure 8). By their nature, the shell fragments suggest a residuum of feasting rather than the ravages of time and tide – well, maybe!! This shell layer is partly buried in a rather irregularly surfaced continuation of the concretionary material. This in turn seems to have been dusted by a white powdery structure (figure 9) – and here we come to the real interest ...

Figure 10: Concretion fragment ('upper' surface), enlarged detail showing nubeculariids

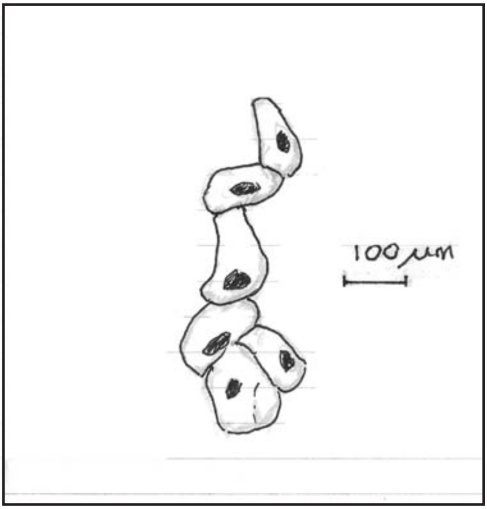


Figure 11: Sketch of group of nubeculariids – scale (micrometres) indicated

On examination under a microscope (a hand lens will do), we can see that the "dust" consists of little strings of white (probably aragonite) shelly cells (figure 10), joined together in strings of two, three or a few such cells, usually with black dot-like cell opening(?) (figure 11), and attached to the very irregular (in detail) concretion surface. Such cell-like structures are forms of Foraminifera - a prominent protozoan group. Unlike most foraminiferans which are often beautiful spiral and globular shell-forming organisms (forming a significant proportion of the plankton and benthos of the world's oceans), these – the nubeculariids – are unusual and more irregular encrusting organisms, that are rather rarely reported. All this shows that this must have been the upper (stratigraphically younger) surface of our concretionary chip.

Thus our 11mm of specimen has a story – a sequence of events; starting with the earliest these are:

- life and death of the hildoceratid ammonite;
- formation, transport, alteration, and concentration of the ooliths;
- Dactylioceras was on the menu for someone;
- continuation and end of the growth of the concretion;
- concretion surface exposed on the sea floor, and corroded;
- nubeculariid foraminifera find a suitable substrate;
- the rest of time happened until I came along.

Don't take any of this too seriously, but it was a lovely day for some fruitful pondering. Pip the dog just enjoyed the walk!

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Horton, A., 2012: The occurrence of calcium phosphate in the Mesozoic and Tertiary of Eastern England. Mercian Geologist. 18, 60-68.

Horton, A., Ivimey-Cooke, H.C., Harrison, R.K., and Young, B.R., 1980: Phosphatic öoids in the Upper Lias (Lower Jurassic) of central England. Journal of the Geological Society of London, 137, 731-740.

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