# Occasional Erratics

Newsletter of the

**MEDWAY FOSSIL AND MINERAL SOCIETY**

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The editor of this edition of the MFMS Newsletter was Nick Baker

**Cover picture**

Aylesford…… on the Medway. September 2015

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**Editor's Notes**

In this edition I have quite a varied collection for you, dear reader. First of all, Gary has supplied us with an account of a tour of fossil sights in North Western USA, in this account dealing with Colorado. The tour will continue in later editions. The editor has then added an in-fill, looking at the 'white sands of Seal Chart'. White sands can occur anywhere but they have a particular interest in this instance. John Taylor has then invited us to look on a particular type of limestone scenery—that of Karst. And so we are in the Pennines, but we could be in the Mendips, or any large area of limestone, looking at the features particular to that rock type. The editor then invites you to have a look at ostracods. One might say out of sight, out of mind, but one may forget that these are crustaceans and therefore complex, but all we find is the carapace. The editor continues with the lime theme, with a look at the Chalk on the Thanet Coast, and it is timely that Fred supplied me with an account, by Ron Stillwell, of the finding of a fossil shark. Photos of the 40th anniversary party then follow, also with an account of a visit to the Hermitage quarry, at Barming. Meeting reports and next term's calendar then complete this edition.

## North Western USA Fossil Sights #1

**Gary Woodall**

First the title is spelt correctly it is 'sights' not 'sites' as you can only look at and not take anything from the national and state parks. The penalties are quite severe and as I did not fancy an orange suit even I did not dare collect!

Judy and I went on a three week fly drive of [mainly] Colorado and Wyoming in June 2015. We also went briefly into Utah, Montana, South Dakota and Nebraska and each of these had very interesting fossils on display.

We flew into Denver, Colorado, which conveniently has a direct flight from Heathrow. We spent the first day at a town called Golden on the outskirts of Denver.

**Victor open-cast gold mine**

As you might suspect the name does come from the fact that gold used to be mined in the area back in the 'old west' days. Gold is still mined today, though not in the manner of the old prospectors. It is now mined open cast and the top of a whole mountain has been removed!

Because of the large number of mines and quarries that were in the Denver area the world famous Colorado School of Mines was established there in 1874. It is still going strong educating geologists and mining engineers.

On the campus is a fantastic geological museum displaying specimens from around the world but especially Colorado. some of the minerals are truly spectacular, even to a fossil collector!

**One of the galleries, note the Amethyst. Amazonite and Smokey Quartz.**

In Denver itself is one of the best natural history museums in the world. There and many galleries including a fantastic mineral gallery and dioramas of stuffed animals from around the world. (much better than it sounds). But I went there specifically to see the dinosaur galleries which contain fossils from Colorado which is one of the best locations for Jurassic dinosaurs in the world. The specimens are all 'real' skeletons not the plastic reproductions that we [mostly] have in the British Museum. They have been re-displayed in recent years into 'active' poses which is believed to be much more likely than the old fashioned 'lumbering giant' posture.

**Allosaurus and Stegosaurus.**

**Brachiosaurus.**

Right on the outskirts of Denver is a site where dinosaur footprints are displayed in-situ. These are conveniently [naturally] inclined to better display the tracks.

**Dinosaur footprints at Golden.**

All of these sights are very interesting but the last place I will mention from Colorado is unique in the world, Florissant Fossil beds National Monument. It is geologically more recent than the others being of Oligocene age 'only' some 34 million years ago. The most obvious feature are the petrified trees which can be viewed on a mile long trail. They consist only of stumps but are preserved in-situ.

**A large fossil tree at Florissant, me for scale!**

Though interesting the petrified trees are not the reason for the importance of Florissant. It is for the fossil insects and other invertebrates that the place is so famous. The fossils here were formed when nearby volcanoes erupted burying the surrounding land and preserving the insects. It is especially noted for butterflies and moths which are so very rare in the fossil record, here have been found over half of the specimens ever collected.

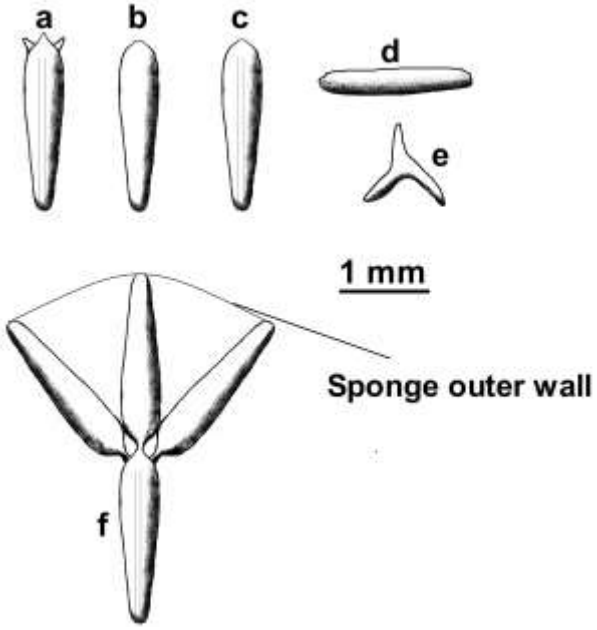

In my next article I will describe the greatest dinosaur sight in the world.

**Florissant Visitor Centre Museum.**

## The White Sands of Seal Chart

### Nick Baker

While walking along Seal Chart in July 2011, I came upon areas on the footpath where the sand had been worked into small 'delta fans' during a recent heavy thunderstorm. The storm had occurred six days earlier and the weather had been dry since the storm—and the path undisturbed. What caught my attention was the whiteness of the sand. In fact, that area is one of the nearest we have to moorland in that part of Kent—Silver birch, some evergreens, gorse, heather, bracken, bilberry. So the sand had been bleached by humic acid. On first inspection the sand appeared to contain a lot of elongated crystals. Final inspection showed the array (a-e).




Much of the material was eroded to simple elongate crystals (d), with occasional other 'sponge' material, as in (e). There was also a large amount in the form of (b) and (c), with occasional (a) where the ends had, what appeared to be, broken off 'joint segments'. There was a straight tubule apparent through many of the fragments, which appeared to branch into the small end joint segments. The material was of silica, but uncertain as to whether normal quartz or chalcedony.

As to what they were: I was of the opinion that they were sponge spicules, but consultation with my close associate, A. J. Rundle, gave the impression that they were 'undecipherable'. However, my subsequent investigation gave the indication that the juxtaposition of the different morphology of the material indicated that they were sponge spicules from Tetraxonid sponges.

The figure (f) gives the complete structure of (a-c). The drawing shows the structure in a flat plain, but in reality you need to think of this as an inverted tripod, with the three 'supports' being attached to the outer wall of the sponge, with a separation of 120 degrees. The fourth single segment is angled into the centre of the sponge. The tubule running through the spicules is the axial canal. In living sponges this is occupied by organic matter and is the first part of the spicule to be formed, subsequently mineral matter is formed around it.

In the fossil state, and where the axial canal is visible, the outer material is generally of colloidal silica, while the canal is infilled with crypto-crystalline silica and is thus visible, especially under polarised light. But often the canal is invisible due to the whole spicule being replaced with cryptocrystalline silica.

All of this material is derived from the underlying Folkestone Sands, but given that the path was on the highest ground, the source rock must be in that vicinity and there are quarries and road banks in the area. Just to the north, at Oldbury Common, there are numerous examples of rock entirely composed of spicules, where the spicules are composed of chalcedony, with very wide axial canals, so that the spicules appear more as tubules within the rock.

## Karst your eyes over this!

### John Taylor

Apart from two years in the north of Scotland, when I was young, I have lived all of my life in southern England in Kent, Surrey and Hampshire. I spent my formative years growing up in an area characterised by woods, gently sloping downs, chalk pits, hop fields, apple and cherry orchards – once justifiably called "The garden of England". There's no doubt that there are some beautiful areas of countryside in the south – but its mostly flat.

I have spent many holidays in the West Country, Devon and Cornwall, Wales, Shropshire and Scotland. Here the country-side tended to be more rugged, the basic rock tends to be granite rather than chalk and there are even some sizeable mountains, especially in Wales and Scotland. I suppose that this is what attracted me to these holiday locations. But things were about to change! After completing her schooling my daughter went off to university in Nottingham. There she met her future husband, married and settled down, first in Nottinghamshire then in Derbyshire, and has lived in that part of England ever since and loves it. Visiting her, I realised that this was a part of England of which I had little experience and started to take holidays in the north of England in Derbyshire, Yorkshire and Northumberland to learn more - and loved what I saw.

While on holiday, slightly further north at Kettlewell in Yorkshire, and looking at the local Ordnance Survey map, I noticed that the hill to the south was peppered with black dots labelled 'sink hole' I suddenly realised why several of my college friends had spent so much of their spare time in this area – they were enthusiastic potholers who spent as much of their time as possible crawling through muddy cracks and holes exploring a vast underground world that was hidden until caves became popular and were safely opened up to the general public!

The predominant rock of the area is limestone, a combination of Calcite (calcium carbonate) and Dolomite (calcium magnesium carbonate), that stretches from the midlands all the way to the Scottish border. Like all carbonates these are attacked by acids to give off carbon dioxide. Rain falling through the atmosphere absorbs carbon dioxide to form a weak acid, carbonic acid. Seeping through topsoil, the acidic water penetrates cracks in the underlying limestone rock gradually eroding it to open the cracks and eventually large caverns as it makes its way towards the sea. Welcome to the field of Karst geology, the study of rocks shaped by water action.

Sinkhole

To the west of Kettlewell Ingleborough, at a height of 723 metres (2,372 feet), is the second highest mountain in Yorkshire. Silurian and Ordovician rocks form an impervious base to the mountain. Above this lies the belt of carboniferous limestone some 180 metres thick. Over millions of years, acid rain falling on the mountain has percolated down through the mountain, forming numerous potholes and caverns that today form a major visitor attraction.

In 1923, Christopher Long, a Cambridge University student on holiday in the dales, noticed a narrow slot in the ground and decided to investigate, crawling on his stomach and using candles stuck to the rim of his hat to light his way. Eventually, after he had swum an underground lake, he was brought up short by a large boulder but he had penetrated a cave complex now known as '**White Scar Cave'**. An easier entrance was cut to the cave, which is now open to the public.

White Scar

In 1971, members of the Happy Wanderers Pothole Club broke through into a large cavern 100 metres long and 30 metres high that they named the 'Battlefield Cavern'. The first person to enter the cavern was teenager Hilda Guthrie; presumably she was the only one slim enough to get through the hole! In 1991 a party of Cornish tin miners, often working up to their chests in water, cut a 65 metres long shaft from the main cave system into the Battlefield Cavern that is now floodlit so that the public can view it from an elevated steel walkway.

On our visit, the guide pointed to a small hole in the base of the **Battlefield Cavern** and told us that was the original entrance. If the tunnel behind us, cut by the miners, was to collapse that was our only way out! No doubt he was trying to encourage his visitors to return!

Battlefield

Another example of the scale of these underground caverns is Gaping Gill. Fell Beck, a mountain stream on the lower slopes of Ingleborough, disappears abruptly at Gaping Gill, a huge pothole, where it plunges into a cathedral-size cavern in a quoted free fall of 365 feet. It then disappears into underground streams to emerge eventually further down the valley at Ingleborough Cave. The cavern links underground with several other famous potholes and the route from Gaping Gill to Ingleborough Cave was proved many years ago by Fluorescein dye test. But in May 1983 potholers, working often through flooded passages and clearing blockages, managed to establish a connection between Gaping Gill and Ingleborough Cave and return. Because of the dangers it poses Gaping Gill is only accessible to approved potholing groups. However, twice a year the Bradford Pothole Club and the local Craven Pothole Club set up a facility to lower members of the public to the floor of the cavern in a winch operated chair on a steel cable. For those crazy enough to take the ride the descent takes a minute and the cost (for a return journey) is £15 – you provide your own wet-weather gear!

Thankfully, not all beautiful Karstic features are buried underground. The north of England is famous for its waterfalls such as those at Richmond, **Aysgarth,** High Force, Low Force, Kinder Downfall and Hardraw Force as well as geological attraction like Malham Cove, and Gordale Scar.

Aysgarth

So far we have considered only chemical action namely the action of an acid on limestone, a carbonate. There are other forces at work in karstic geology, namely those due to energy changes. Rest an axe on a piece of wood and it will do no harm. Swing it and strike the same piece of wood and it can do considerable damage. Rest a cold iron on your shirt and it will do no harm. Heat it up and repeat the process and you may do considerable harm. There are different kinds of energy; heat energy due to an object's temperature, kinetic energy due to its velocity and potential energy due to its height above a 'free-fall' datum; all of course a function also of the object's mass.

Water at the top of a fall has energy due to its horizontal velocity, its height and its temperature. Plunging over the fall it mostly exchanges height energy for kinetic energy as the water accelerates during the fall. Most of this excess energy is absorbed by the body that stops the water at the bottom of the fall. This excess energy is dissipated either as heat or by fracturing the rock or dislodging rocks and giving them energy due to their acquired horizontal velocity. Most of the energy due to the horizontal velocity at the top will be retained as the water flows away from the fall at the bottom.

We have all seen the rocks, pebbles and sand or silt carried by streams. A heavy rock needs a lot of energy to move it; they therefore move downstream very slowly. Smaller rocks move faster and travel further because they take little energy from the flowing water. This is why fine silts indicate a deep sea environment – they travel further downstream before coming to rest.

Erosion Holes

Waterfalls are all associated with flowing streams and rivers as rain makes its way back to the sea and they have many characteristics in common:-

- They tend to be stepped as layer after layer of the bedrock is stripped away by the flowing water.
- They tend to be littered at the side with rocks that appear to have come to rest.
- They frequently have scour holes at the sides where debris, carried by static whirlpools, has abraded the surface of the bedrock.

Look for these features when next close to a waterfall. There are also some Karstic features that have no obvious connection with water today because they have their origin in the distant past when conditions were much different from today. **Malham Cove** is a popular visitor attraction close to the village of Malham in Yorkshire. It is a high rocky limestone cliff at the end of a valley looking a little like a dam wall. It is famous for its limestone pavement. Climb to the top of Malham Cove and you will see before you a flat table-like bare limestone surface seemingly divided into blocks by vertical cracks in its surface. This is the famous '**Limestone pavement'**, examples of which can be found all over the world and certainly in the north of England, Scotland and Ireland. The blocks are called 'Clints' and the cracks are called 'Grykes'. Limestone pavements in other countries tend to lack the patterning of British pavements.

**Malham Cove**

Limestone pavement

Goredale Scar (1)

The limestone was deposited in the Carboniferous period some 350 million years ago and was originally covered by dense carboniferous forest. During the last Ice age this area was covered by glaciers up to a kilometre thick. As the ice age receded and the ice melted the vegetation was stripped off exposing the underlying rock. Vertical cracks in the rock were eroded by acid rain to form the Grykes we see today. They are mostly wide enough to step into and support a wonderful range of plants that get protection from the weather. But beware; they can be hazardous for the unwary. I was checking my facts on the internet when I came upon a relevant news item. An elderly party was visiting the site when one of their number, a gentleman in his mid-seventies, slipped, fell into a gryke and became jammed. His fellows were unable to lift him out. The local mountain rescue team was called out and they had him freed and on his way in no time at all.

Not far away and still in Malham is the equally famous **Goredale Scar (1)** This, like Malham Cove, is a shear limestone rock face but still has the remnants of a waterfall that has gradually worked its way down the rock face but from which a significant amount of water still flows. **Goredale Scar(2)**

**Goredale Scar (2**)

Finally, one cannot leave karstic features without mentioning the **Buttertubs.** Located at the western end of Swaledale where the minor 'B' class road swings southwards towards Wensleydale, the Buttertubs is a huge sink hole, 25 metres deep filled with limestone columns rising to surface level. It was formed by water running off the hills and dissolving the underlying limestone until the cracks are now as big as the limestone columns. The name is said to derive from local dairy farmers resting on the way to market and lowering their butter into the holes to keep it cool.

There is another 'Good Samaritan' story gleaned from the internet while confirming facts. A visiting motorist was foolish enough to drop his car keys into the Buttertubs. The local mountain rescue team came to his rescue. Two of their members descended into the hole, found the keys and returned them to their careless owner.

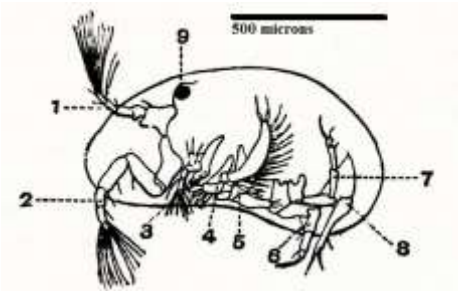
The moral is surely "If you are accident prone, holiday in the Yorkshire Dales – they look after their visitors".

**Buttertubs**

# Focus on Ostracods

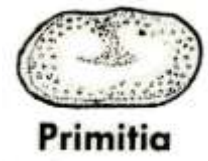
**Nick Baker**

Ostracods are a form of crustacea and are indistinctly segmented and generally of minute size. The body is usually compressed laterally, and is completely enclosed in a bivalved carapace, which may be horny or calcareous. One valve is placed on each side of the animal, and the two valves are joined together dorsally by an elastic ligament which serves to open the shell; sometimes a hinge is formed by means of interlocking teeth and ridges; an adductor muscle passes from the interior of one valve to the other and by its contraction the shell is closed; usually the muscular impression can be seen from the outside. There are seven pairs of appendages, which can be protruded when the shell is opened. In some of the marine forms the shell is notched anteriorly so as to allow the antennas to pass through when the shell is closed. The head carries two pairs of large antennae which are used for locomotion, one pair of mandibles, and two of maxillae; the mandibles have a palp, usually large, which is not present in the Branchiopoda. The trunk has two pairs of appendages, which are not of the phyllopod type; the posterior part is without appendages and terminates in a caudal fork. A simple unpaired median eye is usually present and sometimes lateral compound eyes also. Respiration takes place by means of the general surface of the body. The carapace is in almost all cases the only part which occurs fossil, but specimens of *Palceocypris* with the appendages preserved have been found in the Coal Measures of St Etienne. The surface of the carapace may be smooth or variously ornamented. The drawing to the right is of ***Cypris candida*** and the parts numbered are as follows..



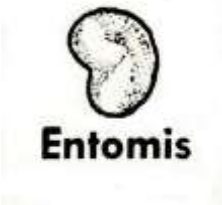

1 antennules, 2. antenna, 3. mandibles, 4. first maxillae, 5. second maxillae, 6-7. first and second pairs of legs, 8, tail, 9. eye. Ostracoda occur from the Ordovician to the present day. There follows a few examples of the common families.

**Leperditia.** Carapace thick, smooth, convex, sub-oblong, a little higher posteriorly. The right valve larger than the left, and overlapping its ventral edge. Hinge-line straight; ventral margin rounded. There is a small tubercle ('eye-spot') placed anteriorly near the hinge; and posterior to it is a circular muscular imprint, sometimes visible on the exterior. Ordovician to Devonian. Ex. *L. hisingeri,* Silurian

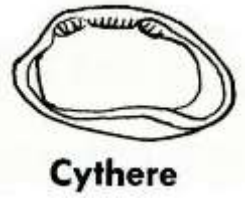

**Primitia.** Carapace generally equivalve, convex, oblong or ovate. Hinge-line straight. Each valve has a transverse sulcus which starts from the hinge-line. Ordovician to Permian. Ex. *P. strangulata,* Bala Beds.

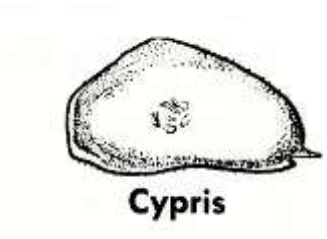
**Beyrichia.** Carapace elongated, inflated, posterior border a little higher than the anterior; dorsal border straight, ventral border semicircular. Two or three large furrows pass from the dorsal towards the ventral edge; the parts between the furrows are convex and often tuberculate, the middle part being the smallest. Silurian and Devonian. Ex. *B. kloedeni,* Silurian-Llandovery.


**Entomis.** Carapace equivalve, almond-shaped, with a deep transverse furrow which passes from thedorsal border (a little in front of the middle) towards the ventral border. Surface smooth or with raised lines. Anterior margin notched for the passage of the antennae. Silurian to Permian. Ex. *E. tuberosa,* Silurian.

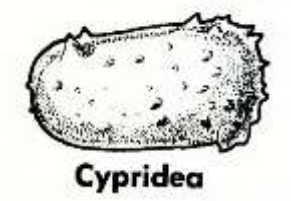
**Cythere.** Shell oblong-ovate or subquadrate, highest in front; smooth or ornamented with pits, spines, or ridges. Hinge with teeth anteriorly and posteriorly. Permian to present day (chiefly Cretaceous and later). Ex. *C. striato-punctata,* Eocene; *C. punctata,* Pliocene.



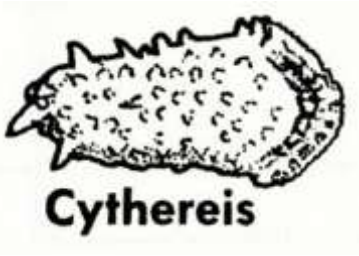




**Cypris** Carapace thin, smooth or punctate, kidney-shaped or oval; ventral edge often concave. Left valve the larger. Hinge without teeth. Tertiary to present day. Fresh water. Ex. *C. faba,* Miocene; *C. gibba,* Oligocene to present day.

**Cypridea.** Valves ovate-oblong, convex in the middle, broad at the anterior tliird, narrower behind; with a notch at the anterior ventral angle behind a beak-like process. Surface smooth, punctate, or tuberculate. Hinge-margin straight, along the middle third of the dorsal edge. Left valve the larger. Purbeck, Wealden, and Oligocene. Fresh water. Ex. *C. valdensis,* Wealden Beds, etc.




**Bairdia** is a triangulate form, very common in the Upper Cretaceous. Lower down, within the Gault, **Cythereis** is elongate and covered with spines




**Distribution of the Ostracoda**

The Ostracods have a very wide distribution at the present day; many forms are marine, and some are abundant in fresh water. The marine forms often occur in shoals; some are pelagic, but others live on the seafloor and are more abundant in shallow than in deep water. According to Woods (1963) only fifty-two species are found beyond the 1000 metre depth.

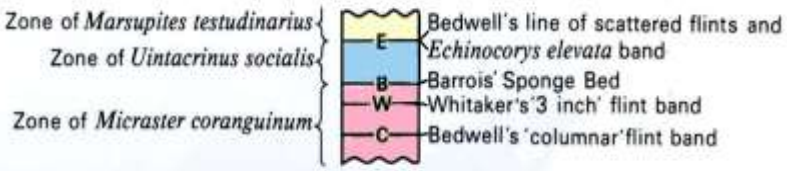
The fossil forms are very numerous, the earliest occurring in the Upper Cambrian. *Leperditia, Primitia,* and *Beyrichia* are abundant in the Ordovician and Silurian; *Entomis* in the Devonian; and *Cypridina* and *Bairdia* in the Carboniferous. *Cypridea* is common in the Purbeck and Wealden Beds; and *Cythere* in the Tertiary formations. Most ostracods range from 100-2000 microns in length. In micro-samples most are found below 500 microns.

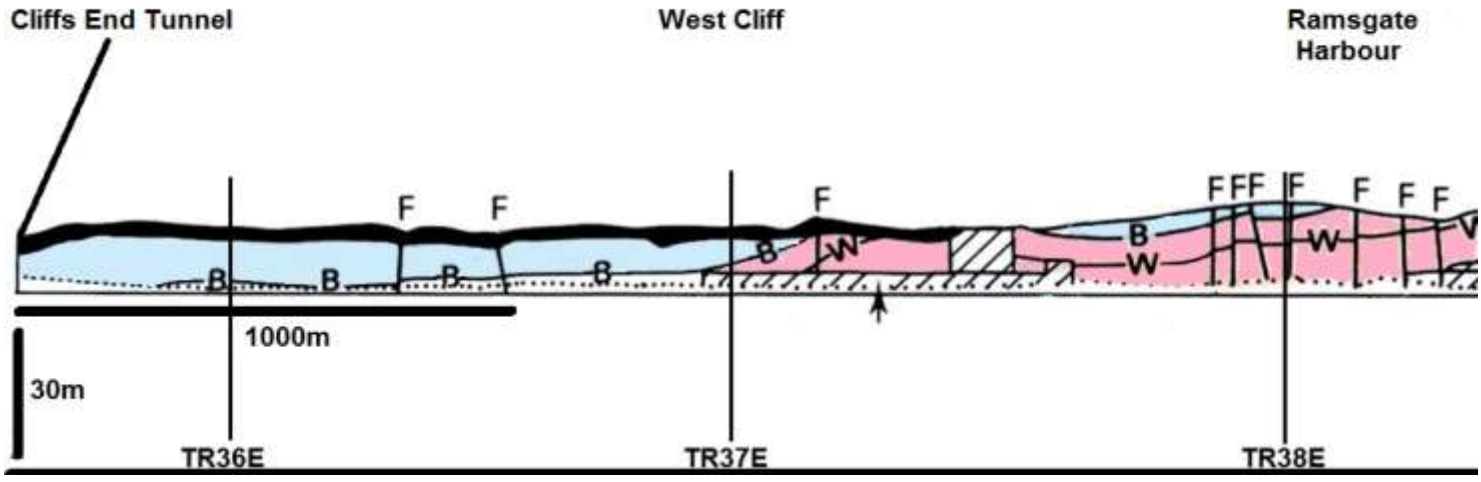
Reference. Woods, H (1963). *Palaeontology (Invertebrate)* 8th edition. Cambridge University Press

## The Chalk of the Thanet Coast

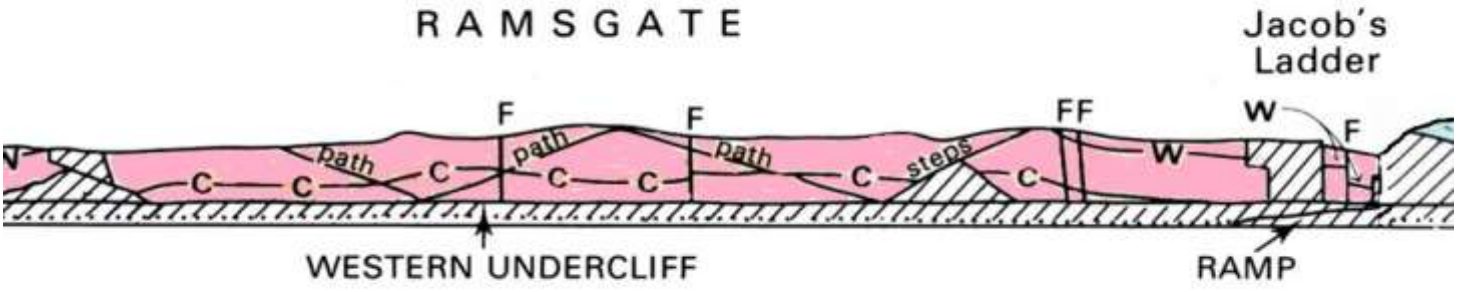
**Nick Baker**

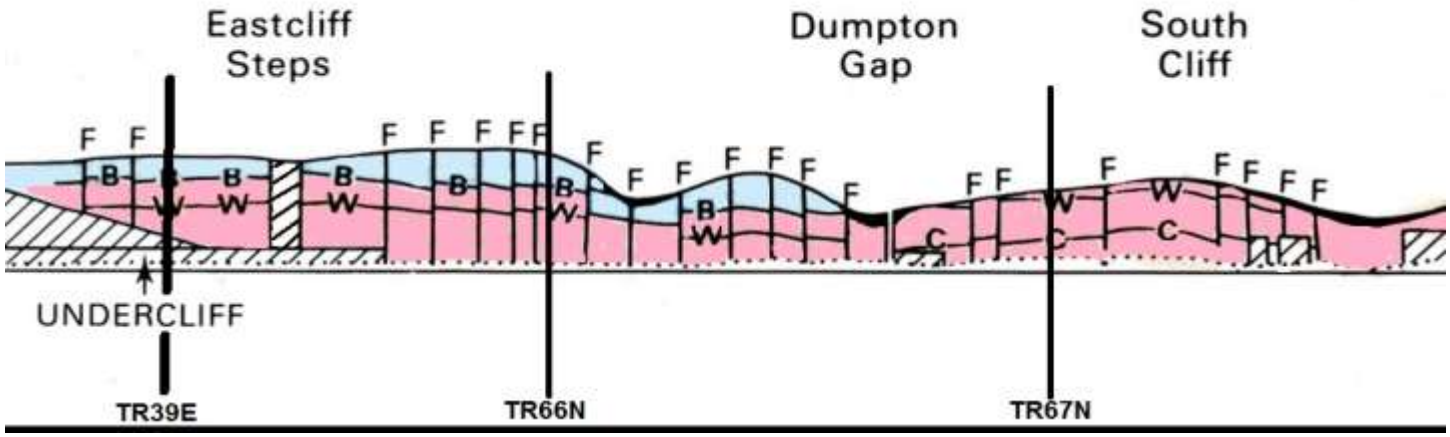
The chalk on the Isle of Thanet coast includes the youngest Chalk within Kent. The three youngest zones are those of *Uintacrinus socialis, Marsapites testudinarius,* and *Offaster pilula*. The last-mentioned use to be exposed at a small pit just inland from Broadstairs (TR 3843 6863) but is now infilled. The other two zones are exposed in the cliffs west of Joss Bay, while the *socialis* zone can also be seen at Pegwell. The visible sections between Ramsgate and Joss Bay are mostly composed of the upper part of the *Micraster coranguinum* zone. It follows that there is an anticline running approximately east-west through the centre of the peninsula. The middle sections of the anticline are heavily faulted. I will describe the zones more later, but here follows some sections of the coast between Pegwell Bay and Grenham Bay. The sections around Margate town have been truncated due to the fact that there is less to see! To the right is a key to the sections.

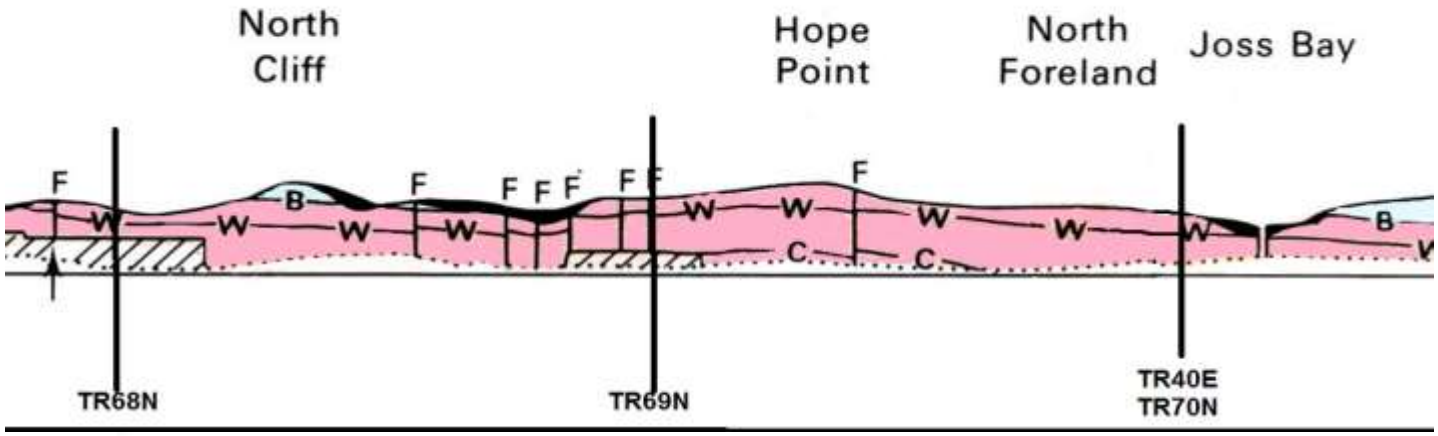


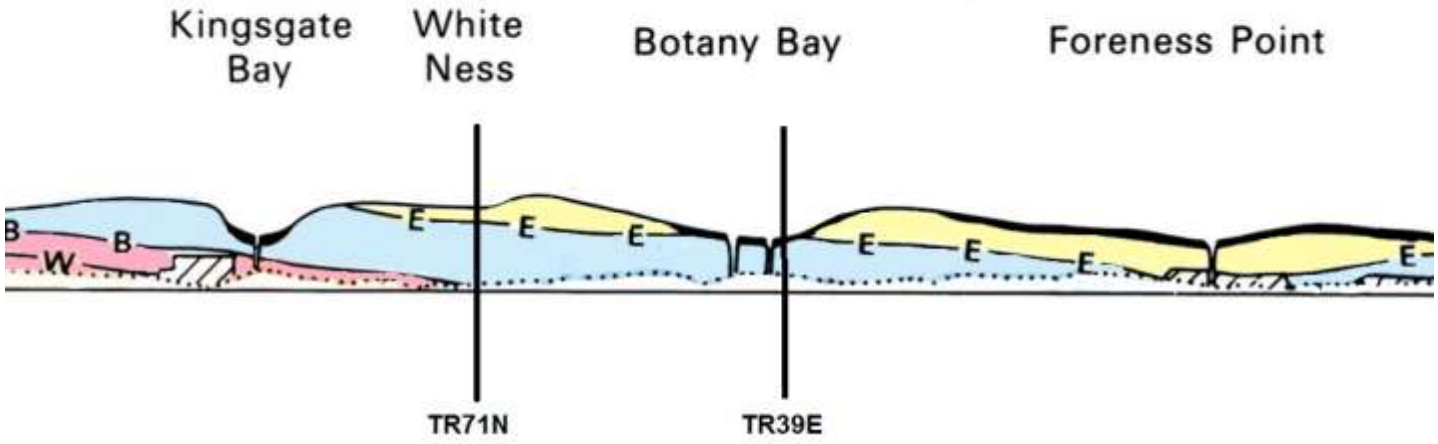




At Pegwell Bay the cliffs largely comprise relatively unfaulted Chalk of the *M. testudinarius* zone, while the wavecut platform is mostly in the top layers of the *M. coranguinum* zone. Echinoids are common but often tend to be crushed, none-the-less there are often examples of transition between *M. coranguinum* and *M. gibbus*. Barrois' Sponge Bed can be seen in base of the cliff and rising slowly as one proceeds towards West Cliff. This forms the top of the *coranguinum* zone. At West Cliff Whitaker's 3-inch flint rises into the cliff and much of the (largely obscured) Chalk from Ramsgate Harbour onwards is in heavily faulted *coranguinum* zone.

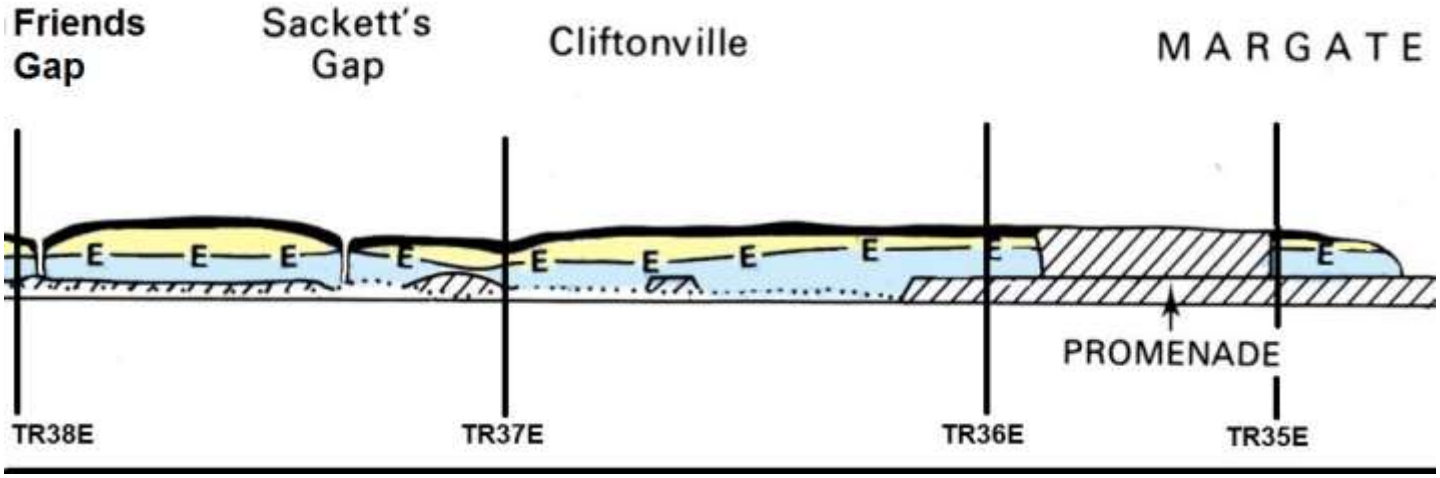

RAMSGATE
Jacob's Ladder
path
steps
WESTERN UNDERCLIFF
RAMP

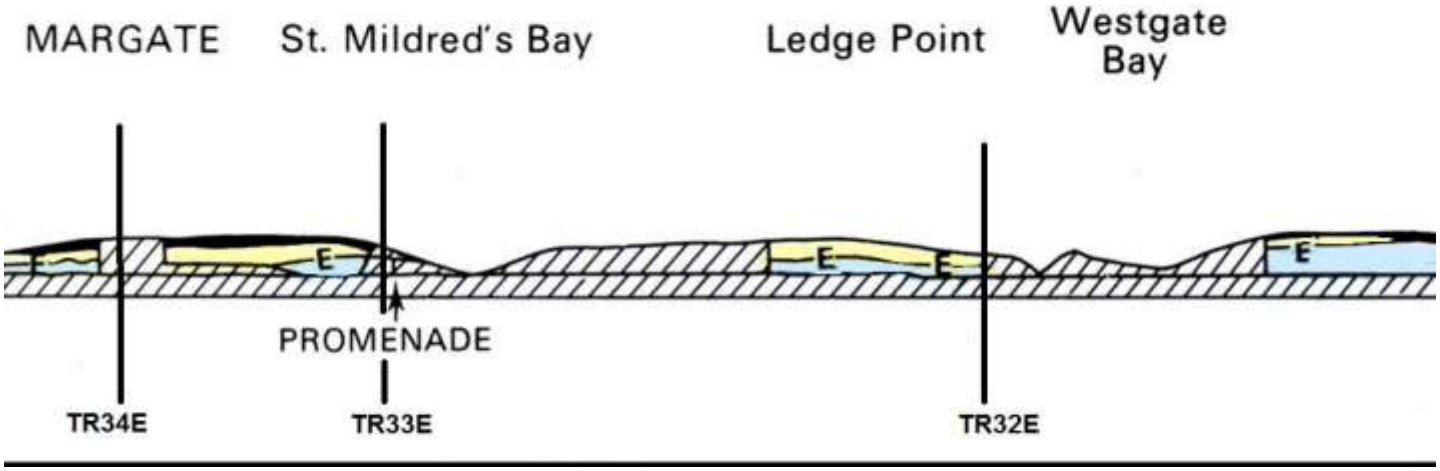

Eastcliff Steps
Dumpton Gap
South Cliff
UNDERCLIFF
TR39E
TR66N
TR67N

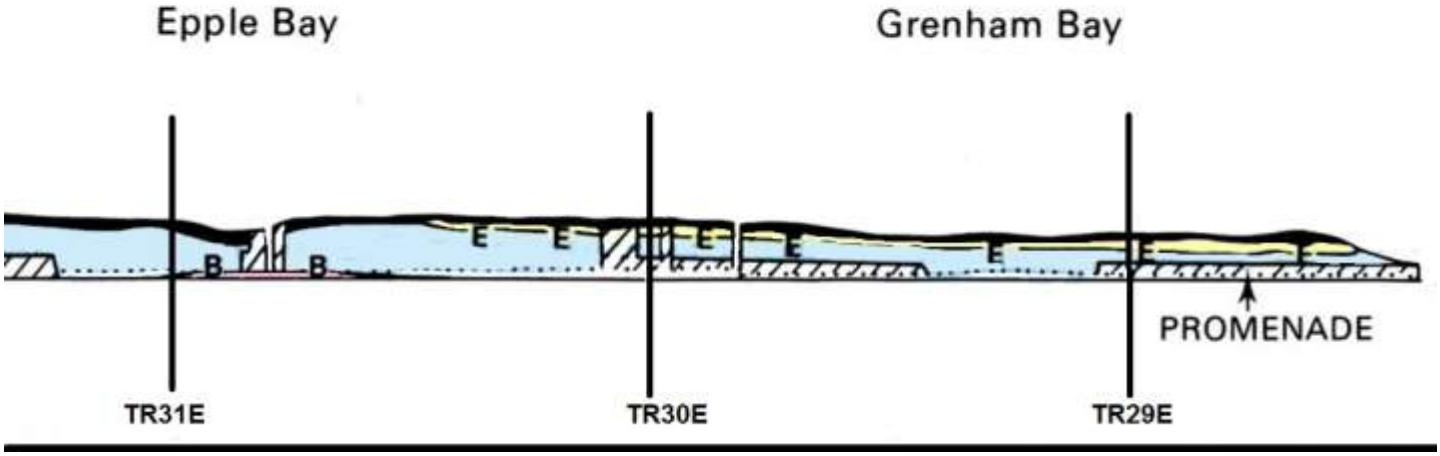

North Cliff
Hope Point
North Foreland
Joss Bay
TR68N
TR69N
TR40E
TR70N


Kingsgate Bay
White Ness
Botany Bay
Foreness Point
TR71N
TR39E

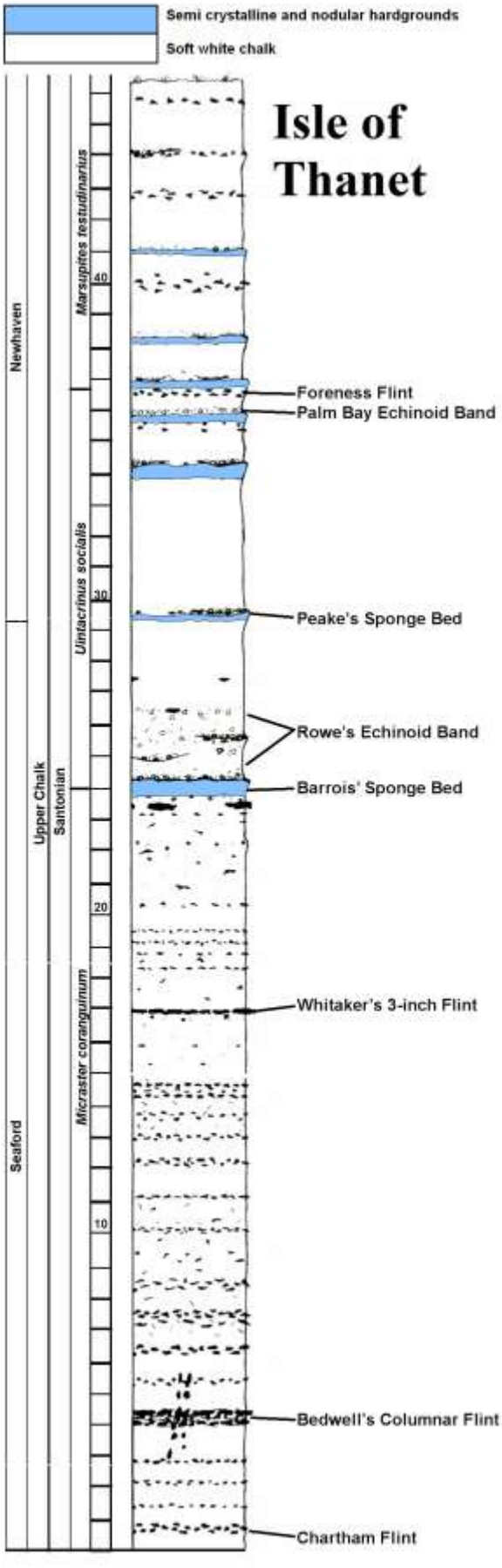
The ground between Ramsgate Harbour and Joss Bay is largely composed of the *M. coranguinum zone*. Where cliff is exposed, Bedwell's Columnar Flint can be seen, especially so to the north of Dumpton Gap, where a fault brings the flints up above beach level on the north side. At this point the Chalk is heavily faulted, but less so towards Hope Point and North Foreland. The best sections for examining the *coranguinum* zone below Bedwells Columnar Flint is probably Hope Point. Towards Kingsgate Bay the higher marker beds come down to beach level. By White Ness the cliff are composed of the *U, socialis* zone and are back at the horizon of Pegwell Bay, so are well on the north side of the anticline. At Foreness Point the *M. testudinarius* zone comes down to beach level, but towards Cliftonville we are we back in the *socialis* zone.




Around Margate, sections are poor but wave-cut platforms will show mostly *socialis* zone. The cliffs at Epple Bay and Grenham Bay have sections showing the *Echinocorys elevata* band.




## The Chalk Zones

### The zone of *Micraster coranguinum* (Part) 24m

Only about one third of the total thickness of this zone is exposed on the Isle of Thanet. Soft white chalk with regularly-spaced flint bands is characteristic of this zone. There are three notable flint bands. The Chartham Flints are the lowest observed in the area. Three metres above this is Bedwell's Columnar Flint, while Whitaker's 3-inch Flint occurs 13 metres higher. Fossils are variable in frequency, tending to be concentrated at certain levels, while at others the zone appears barren. Echinoids, such as *Micraster, Echinocorys*, and *Conulus* are common in the fossiliferous locations. **In my coast sections the Barrois Sponge Bed is taken as the top of the zone, but currently Peake's Sponge Bed is use officially**

### The zone of *Uintacrinus socialis* 13m

Soft white blocky chalk with few flints make up this zone; calcitic body plates of the free-swimming crinoid *Uintacrinus socialis* become common at the level of Peake's Sponge Bed and continue through the zone. Another rusty nodular sponge bed, marks the top of the zone. Immediately below it *Echinocorys elevata* occurs in some abundance, forming the *elevata* Band (or Palm Bay Echinoid Band); a band of scattered flints (the Bedwell Line) is present about 0.6 m above the *elevata* Band.

The cliffs of the Isle of Thanet provide excellent continuous sections in the chalk of this zone. It also caps the cliffs around the South Foreland and north of St Margaret's Bay. Inland, it crops out extensively, although partly obscured by Clay-with-flints, on the narrow dip-slope interfluves north of the Dour Valley, where the zonal index has been recorded from many old chalk-pits.

Apart from the zonal index, macrofossils are not notably abundant. Of interest are the rust-stained casts of the large ammonite *Parapuzosia leptophylla,* first recorded by Bedwell in 1874, that occur at intervals through the zone. The more common fossils include the calcareous sponge *Porosphaera globularis,* the small crinoid *Bourgueticrinus papilliformis*, the brachiopods *Terebratulina rowei, T. striatula, Kingena lima,* and *Orbirhynchia* sp., the echinoids *Phymosoma koenigi, Stereocidaris sceptifera* small forms of *Micraster coranguinum,* species of *Echinocorys* and *Conulus.* Belemnites are found at some levels and include common *Actinocamax verus* and rare *Gonioteuthis granulata.*

### The zone of Marsupites testudinarius. 15m

This zone is exposed in the cliffs of the north coast of the Isle of Thanet from Grenham Bay to Kingsgate Bay. The greatest thickness is seen at Foreness Point [384 716] where the *elevata* Band drops to beach level. At Pegwell Bay, west of the fault, the zone is present beneath the unconformity at the base of the Thanet Beds.

The lithology of the zone is very similar to that of the *socialis* zone, with a somewhat larger number of flints, arranged in scattered courses. The zonal index *Marsupites* is a larger free-swimming crinoid than *Uintacrinus. Marsupites* body plates from the lower few metres of the zone are smooth, but become progressively more ornamented higher in the sequence, providing a useful guide to horizon.

Another species *Uintacrinus, U. anglicus* which occurs in the top 2 to 3 m of the zone, was discovered during the survey in chalk dug from graves in St Peter's churchyard [3779 6862], near Broadstairs, and was also recorded from the top of the cliff at Foreness Point. Other fossils generally continue through from the *socialis* Zone. The band of chalk with *U. anglicus* has been given the status of a Zone by Bailey and others (1984).

### Zone of *Offaster pilula* (up to 6m)

This is the highest zone of the Chalk preserved in east Kent. Although previous workers had suggested its presence in the Isle of Thanet, this was only confirmed during the survey by the finding of the zonal index, *Offaster pilula* in a disused lime pit [TR 3843 6863] 400 m north-east of St Peter's Church, Broadstairs. Here, up to 3m of chalk was visible beneath the base of the Thanet Beds. The lower part of the pit, in which *Marsupites* and *Echinocorys* had been recorded, was backfilled at the time of the survey. The zone forms a small outlier preserved in a synclinal flexure on the northern flank of the Thanet Anticline, between Broadstairs and Foreness Point. The chalk of the zone is poorly known, but flints appear to be uncommon; up to 6m are believed to be present

Ref: Bailey, K W., Gale, A S., Mortimore, R. N., Swiecicki, A., and Wood, C. J. 1983. *The Coniacian to Maastrichtian Stage boundaries of the United Kingdom with particular reference to Southern England.* Geol Soc Denmark 01/1984:33

## *Ptychodus polygyrus*
### A Cretaceous shark

**Ron Stilwell,** - (supplied by Fred Clouter)

The first thirty teeth were found by George Slade on the third of December 1993. Although not a palaeontologist, Mr. Slade was informed enough to know that his find was of some importance. He contacted Ron Stilwell at Monkton Field Study Centre who identified the find as *Ptychodus sp.* On the twelfth of December George accompanied Ron Stilwell to the find site (a wave-cut chalk platform in the *Micraster coranguinum* zone of the Santonian). On this occasion a further ninety-one teeth were found, and this number would have been exceeded if light and tide conditions had allowed. (zero temperature and horizontal rain and sleet didn't help!)

**Lower jaw palette**

**Close-up of lower jaw palette**

Speed of extraction was essential because the site was being scoured by shifting shingle banks in the December storms. Photographs were taken before the teeth were removed, but there was not enough time for proper drawings to be made.

All the teeth were found 'in situ' but only one pair of teeth were joined or attached. The teeth were in a 'jumbled' situation but the original pattern was still apparent. All the large (c.50mm) teeth were down the mid-line. and there was a definite trend of size reduction to either side. In addition to this, nearly all the teeth were orientated with the grinding surface downwards. It is suggested that the set represents virtually all the teeth of the lower jaw, and that possibly the upper jaw set remains below the present chalk surface. On the first January 1994 a further twenty teeth were recovered from the site. These were mainly small teeth and were still oriented downwards. They were in a position expected for these smaller edge teeth from the lower jaw.

Note the wear on some of the teeth in photo 2. This is surely feeding wear as the teeth were not exposed to tidal-damage. There is also an interesting mark on one of the larger teeth. This damage was not caused during excavation. There are two parallel scratches which may have been made by a scavenger.

No attempt has been made up to now to probe for the upper jaw set. This work will not be carried out until we can arrange a more gentle extraction.

Ptychodus sharks are thought to have been fairly large bottom feeding sharks much like a Ray. They are thought to have eaten large shell-fish which they crushed between the two massive pallettes of ridged teeth.

For details of the Ptychodus genus in North America and links to many other Ptychodus sites take a look at Mike Everhart's excellent palaeontology web site: Cretaceous Palaeontology of Kansas (www.oceansofkansas.com/Ptychodus2.html)

The **40th Aniversary Party** of The Medway Fossil and Mineral Society (formerly The Medway Lapidery and Mineral Society) is this year. A party to mark this occasion was celebrated on November 4th. The editor was absent, (in both mind and spirit) due to unforeseen travel difficulties. I have no first-hand report, but **Ann Barrett supplied these photos**. I'm told that Betty Mitchell made the cake, which Tony is shown cutting jn the photo on the right. An interesting and detailed account was given by David Rayner in last summer's newsletter. Like most good societies, this one began with an idea, which then *evolved* (surprise) over the 40 years and in that time we have *adapted* to changing *environment*. I have seen only five of those 40 years, but perhaps it is our weekly (rather then monthly) format that makes it seem longer. But longer in a positive sense. It takes a lot of cerebral stamina, for the team, to maintain that intensity of activity. Those 5 years have helped keep me sane, when circumstances elsewhere became somewhat stressful. In his article, David Rayner entitled the account with the question—Was it worth it? I don't think there is anyone present or past who would answer in the negative.

## Seven go-a –bashing – Report from the Hermitage Quarry (Barming) Field Trip

**Paul Wright**

Under decidedly dodgy looking clouds, seven MFMS members met at the Hermitage Quarry near Barming on Saturday 24 Oct 2015. The trip would have been a tad earlier in the year however, a change in the management meant that my e-mail went into the ether. Anyhow after a fresh approach to get the necessary permission led to me dealing with the new Managing Director Bill Bowley. So with a date fixed, with weather uncertain, fossil finds uncertain we awaited the day.

We all duly arrived for eight o'clock and our host took us into the company briefing room for the mandatory Heatlth and Safety briefing as well as providing a hot drink. We were taken on a brief tour of the quarry with particular focus on a large ammonite that had been found last year and the newly constructed quarry tunnel that gave Gallagher access to the newest area of exploitation.

There is space here to do a short re-cap on the geology. The quarry is in the Lower Greensand (Lower Cretaceous) Hithe Beds. These generally consist of alternating layers of sandy, glauconitic limestone (Ragstone), separated by calcareous sand or argillaceous sandstone (Hassock). It is the ragstone that is valued, as a high quality building stone. In the last year or so the quarry has begun to extend westward into Oaken Wood, requiring the construction of a tunnel under the trackway connecting several large farms with Barming Heath. Fossils are most abundant within the Hassock, but not always well preserved. Better preserved in the Ragstone but more difficult to extract. Some of the more common fossils are.:-

| | |
|---|---|
| Brachiopods. | *Sulcirhynchia hythensis, Rhynchonella gibbsiana, Sellithris sella* |
| Bivalves. | *Exogyra, Chlamys, Cucullaea, Linotrigonia, Pterotrigonia* |
| Nautiloids | *Cymatoceras pseudoelegans* |
| Ammonites | *Cheloniceras, Deshayesites, Ammonitoceras, Tropaeum, Australiceras* |
| Belemnites | Common but no detail to hand! |

Right—Large ammonite.
Below- 'Our area'. Below right—Newly quarries area. Bottom– New Tunnel
Bottom Right— Ammonite (45-60cm) ***(Editor)***


**Stop press! Some more photos of the party**—supplied by Dave Talbot

## Some final news…

This autumn the committee has been working on the Rules and Constitution of the society in order to bring them more up to date. Changes to the layout and design of our publicity leaflet are also being considered.

One aspect that will effect all of us is a change in our meeting times. As from January, our meeting time will be from 19:00 to 21:00, rather than 19:30 to 21:30. The membership voted for this at the AGM. The conditions which dictated the later time no longer apply.

Our 'Christmas—mid-winter' evening meal is planned for 19:30, January 30th 2016, and will be at *The Sadlers* (formerly *Coffee Cups*) Faversham. Dave Talbot will be collecting payment for this in the next few weeks. There is a copy of the menu on the final page of this letter.

## Round-up of this autumn's evening meetings.

Sep 16 An evening of general exhibits, including exam ples of what geological books you could buy between 1860 and 1900. I suspect they would have been luxuary items for many.

Sep 23 In our period themes we have reached the Upper Cretaceous. Some discussion as to when the 'Mid Cretaceous' occured. Answer, there never was! If you did have such a division, Gault and Lower Chalk might be likely components.

Sep 30 Gary Woodall gave the first of his illustrated talks on the Western United States, this one being on '*Wyoming and Colorado,* -and looking at the museums and fossil sites. His article and very fine photos at the start of this letter covers this.

Oct 7 Gary's second talk was on *Teton and Yellowstone*. Two more articles are promised for the newsletter—in the next edition and the one after.

Oct 14 Anne Padfield provided an exhibit on *'Minerals, rocks, and fossils with spots and stripes'*. These are more common than one might suppose—depending on the definitions of spots and stripes. But, one rock has it in its name—'spotty hornfels'

Oct 21 Fred gave a talk/demo on Isle of Sheppey fossils—illustrated from quite a comprehensive collection. Notice that this title does not say London Clay, although almost all the fossils found will be from London Clay. At one point a visitor might find Lower Carboniferous species. Carboniferous Limestone used as road bed is being washed on to the beach!

Oct 24 Field trip. To Hermitage Quarry, Barming. Lower Greensand, Hithe Beds. Quite a good site for finding large and complete fossils, including ammonites. See photos within this letter.

Oct 28 AGM—discussing mostly the updating of the Rules and Constitution of the Medway Fossil and Mineral Soc.

Nov 4 The 40th Anniversary Party. See photos within this letter.

Nov 11 The theme was gastropods—some good collections exhibited

Nov 18 Anne P. organised a mapping exercise, explaining, among other things, the use of trigonometry applied to rock beds.

Nov 25 Photo images—some demonstrations from Canyons to lichens.

Dec 2 Tony gave a very interesting talk on Armenia. This was part of his (and Betty's) tour of last May.

Dec 11 Finds of 2015

Dec 18 End of Term Party

## Program for January—July 2016

| | | | |
|---|---|---|---|
| Jan | 13 | General activities | All members |
| Jan | 20 | Tertiary Volcanics | James |
| Jan | 27 | County Geology – Gloucester | All members |
| Feb | 3 | Field Trip discussion | All members |
| Feb | 10 | Palaeocene-Eocene Theme | Tony and members |
| Feb | 17 | Nodules: mineral and fossil | All members |
| Feb | 24 | More aspects of Australia | Ann B |
| Mar | 2 | Practical- TBA | Anne P |
| Mar | 9 | Canyonlands | Dave T |
| Mar | 16 | Q and A | Tony and members |
| Mar | 23/30 | Easter break | |
| Apr | 6 | Virtual Geology | James |
| Apr | 13 | County Geology – Derbys | All members |
| Apr | 20 | Oligocene-Pliocene Theme | Tony and members |
| Apr | 27 | The Eifel Volcanic Region | Nick |
| May | 4 | TBA | |
| May | 11 | Armenia and Azerbaijan | Tony |
| May | 18 | Talk TBA | Anne P |
| May | 25 | Images night (20 pics on a memory stick) | All members |
| Jun | 1 | County Geology – Cornwall | All members |
| Jun | 8 | Pleistocene-Holocene Theme | Tony and members |
| Jun | 15 | The muck above the Chalk | Nick |
| Jun | 22 | TBA | |
| Jun | 29 | European volcanoes | Dave T |
| Jul | 6 | The Country of Georgia | Tony |
| Jul | 13 | End-of-term party | |

# Christmas at The Saddlers

01795 537927

**Set Evening Menu**

**3 Course £24.95**

*We will place a complimentary bottle of Rose, White & Red Wine on tables booked for 10 or more people*

## Starters

- *Spiced Carrot & Ginger soup with fresh bread & butter*
- *Homemade Chicken Liver & Brandy Parfait served with melba toast & a fruit chutney*
- *Prawn, Crab & Smoked Salmon Mousse, rocket & plum tomato salad with a citrus dressing*
- *Grilled Flat Field Mushroom filled with Roquefort cheese topped with bread crumbs & balsamic dressing*

## Mains

- *Traditional Roast Turkey served with all the festive trimmings*
- *Roast Beef with Yorkshire Pudding & horseradish sauce*
- *Chicken Ballotine with cream cheese & spinach, roasted new potatoes & a wholegrain mustard sauce*
- *Herb Crusted Salmon Fillet, wilted spinach tuscan potatoes &herb butter*
- *Roasted Mediterranean Vegetable Crepes with a cheese sauce topped with breadcrumbs served with side salad*

## Dessert

- *Traditional Christmas Pudding served with brandy sauce*
- *Winter Fruit Crumble topped with oats served with custard*
- *Homemade Warm Chocolate Brownie, chocolate sauce & vanilla ice cream*
- *Lemon & Lime Cheesecake with Chantilly cream*
- *Saddlers Cheeseboard*