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
The summit of Pikes Peak, 14,110 ft (4,302m) —See article by Gary Woodall, on American Parks.

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Contents of this edition No. 15

Editor's notes.

Welcome to edition No. 15 of *Occasional Erratics.* Well, it's seven years since I took on this task and I've put out the challenge to you, the readers, to avoid some entity called *Nick's Geological Journal*. And if it was not for at least one other supplier, it would have arrived. I've become aware of late, that a smart phone (as aside from a tablet) , may not allow this production to take place, if that is all you have to hand. Well, it would not be easy for me. I was using a 'Smith-Corona' in the 1960s and then until now, the idea of the 'printed page' became of fundamental importance. And that was the situation when I took on (1985) an *Amstrad 512*. It was a strange beast—it had no built-in software. You switched on and then loaded 'disc A', which had all the software—which included a word-processing item called *Locoscript.* When the signal came on screen, you loaded disc B, which you were going to write unto. And so I went through - *Dell* (1992), then a 'bespoke item, which the word '*Amphlon*' might describe (2000) and then to *Acer*(2014). It is a strange fact, that although most of my neighbours are older

-*Continued on final page*

American Parks Part 5: Pikes Peak

by Gary Woodall

Whilst not strictly a National Park, Pikes Peak mountain is in the Pike National Forest. Not being a true National Park doesn't in any way detract from its beauty and interest, it just means that it is administered by the US Forestry Service and trees can be cut down in specified areas which they cannot in a National Park. In any event it is a fantastic place to visit and again is a little off the usual tourist route.

Approaching Pikes Peak

It is part of the southern front chain of the Rocky Mountains, about a dozen miles west of Colorado Spring and at 14110 feet high it towers above the surrounding countryside. It was 'dis-covered' by early Spanish explorers coming up from Mexico, who called it El Capitan, meaning the Leader. Later American explorer Zebulon Pike rediscovered it in 1812 and it was eventually named after him. Though native American Indians, of the Ute tribe, called the mountain the Sun and called themselves the Tabeguache meaning 'people of the sun', for many centuries before.

Pikes Peak is mostly composed from Pikes Peak Granite which originally formed as a batholith in Precambrian times. It is a pink/red colour due to the large amount of microcline feldspar. The mountain itself was created during the Laramide orogeny between 70 and 40 million years ago, when the rest of the Rocky Mountain chain was also being uplifted.

Now one doesn't have to be ultra-fit to get to the top of Pikes Peak as there is a paved road (the highest in America) up the mountain. But I was told it was quite a scary drive and the rangers stop you to check the cars brakes are not overheating on the way down. Once a year the Pikes Peak Car Rally takes place where drivers race up and down the mountain at phenomenal speeds, rather them than me! But there is another, much more enjoyable, way to get to the top. This is the Pikes Peak cog railway.

Diesel railcar.

Original 19th century steam train

The railway runs from the town of Manitou Springs to the summit of Pikes Peak, a distance of 9 miles and at an average incline of 17 degrees. The trains have a cog wheel mechanism that links into a toothed third rail thus providing grip on the steep gradient. The Mount Snowdon railway works in a similar way and there are many cog railways in Switzerland. Nowadays the trains are diesel powered railcars but when it opened in 1891 steam trains were operated. These had the chassis fitted at an angle of 17 degrees so that as the engine went up the mountain the boiler remained mostly horizontal. The roundtrip ride to the top takes a bit over 3 hours, including around 40 minutes at the top. You have to make sure to watch the time as you must go back down on the same train you went up on, the alternative is a 13 mile walk back down the mountain on the Barr trail.

When we were there in June 2015, the weather at the Manitou station at the bottom was 70 degrees and we saw a hummingbird, enticed by a sugar-water feeder. However when we got to the top it was zero degrees with snow over 6 ft deep in places. Indeed little did we realise that this much snow was unusual for June and they had only just cleared the snowdrifts from the tracks, otherwise the trains wouldn't have been able to operate.

Hummingbird.

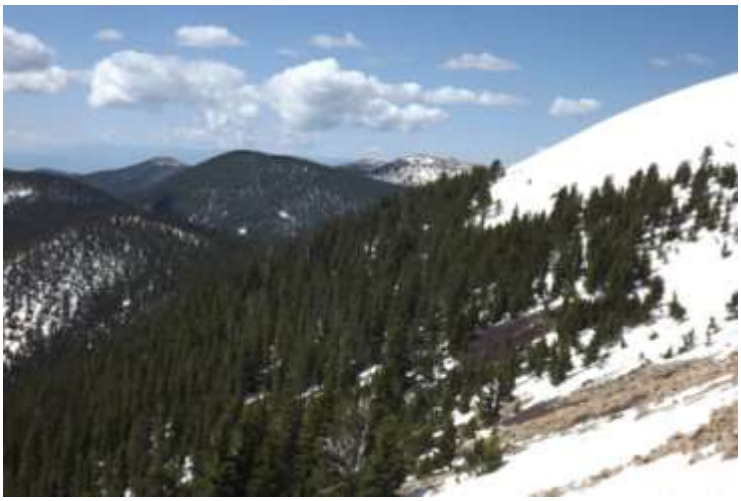
Work team clearing the snowdrift.

As you travel up the mountain for a long time you are travelling through pine and aspen forests, but as you approach the tree-line the vegetation changes and includes ancient Bristlecone Pine Trees, which are as much as 2000 years old.

Then suddenly you clear the trees and the land is bare of vegetation, but even in this inhospitable place animals such as Yellow-bellied Marmots can thrive, out of the way of most predators.

A little while later you arrive at the summit where there is the summit house restaurant and gift shop!. The unexpected snow had blocked the main door out of the summit house but we managed to find a way around after crossing a small safety barrier. There we found the summit marker and were rewarded with the most spectacular views.

Bristlecone Pine.



The tree line.

Yellow Bellied Marmott.

Approaching the summit

Summit Marker.

View from the top.

Indeed the view from the top inspired Katherine Lee Bates to write the words of 'America the Beautiful' the one which goes: O beautiful for spacious skies, for amber waves of grain, for purple mountain majesties, above the fruited plain, America! America!.....etc

This in turn came to Pikes Peak being named 'America's Mountain'. Well even ignoring this bit of Yankee BS, I can say that visiting Pikes Peak is certainly a memorable experience.

Ancient Cups—A cold field trip to a small fossil.

Nick Baker

When Captain Scott's Party first got sight of the Beardmore Glacier, Captain Oats said to Scott, "The man who first saw that did a fantastic job". He was referring to Shackleton, who had blazed a trail four years before. Yes, Scott was following the path of Shackleton, which was relatively easy. Shackleton was working almost by instinct. That massive glacier must lead up to the Polar Plateau. Yet, Shackleton was cautious and never lost a single man. Scott took risks and we know the story. Shackleton also did pioneering field-work, which Scott's party were able to refer.

Both parties ended up man-hauling their sledges up the glacier (10,000 ft in 120 miles) amid some of the world's most amazing scenery, and especially the Wild Mountains to the west, with their slopes a mass of what appeared to be coal measures. Shackleton placed the geology first—The Pole took second place. And so it was that his party steered towards Mount Buckley and spent several days on a geological survey. Just to the south is a second peak—Mount Bowers. The first feature that gained their notice was several hundred metres of coal measures containing plant fossils of the genus *Glossopteris*., indicating that these beds were most likely of Permo-Carbonfierous age. Later, they examined the southern end of Mount Bowers and found seams of limestone containing *Archeocyathus* - of which, more in a moment.

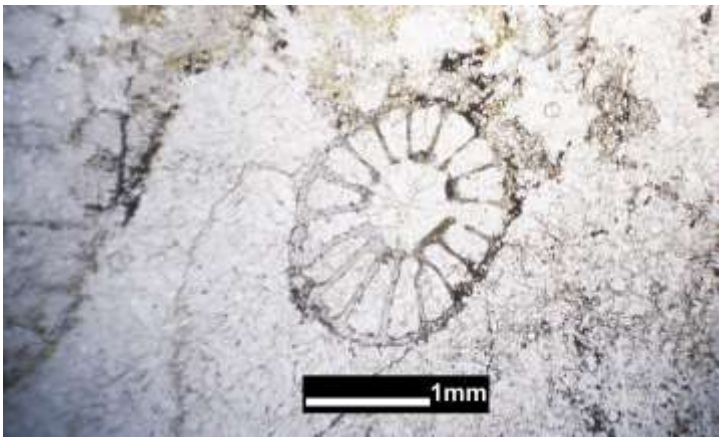
Mts Darwin, Buckley and Bartlett

Shackleton then moved towards Mt Darwin, although his note books do not indicate that he actually did go there, or that he knew his actual position—remember, he was trail-blazing. What he did do was turn south towards the Pole, but he was cautious and he stopped about 60 miles short before turning back.

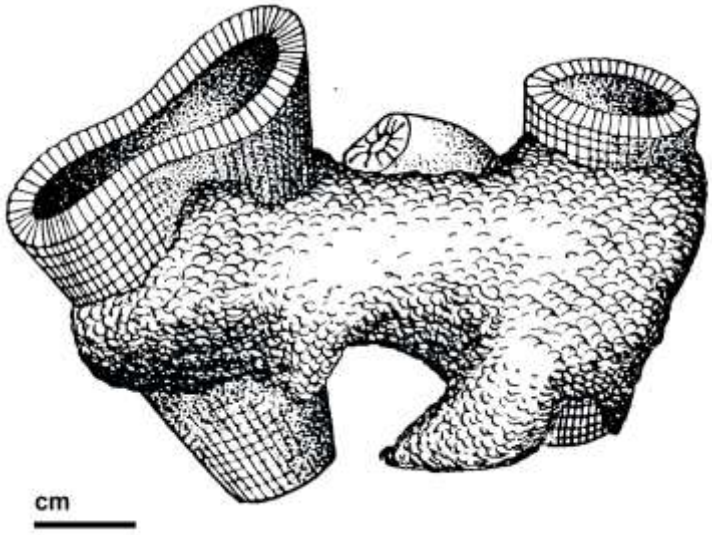
Scott's journey to the Pole was driven by his sponsors, who wanted a win. Scott did get there, only to find that Amundsen had beaten him. He is dejected but on return to the Beardmore he decides to make up for any loss with a little science. Before their journey out, Frank Debenham (Geologist—and later Director of the BGS) asked Scott to try and find 'Shackleton's limestones'. And so the party visited Mt Buckley. They thought that the limestones were at Mr Darwin, and so did not pay much attention to Mount Bowers. Scott was sure they would find the limestones at Mt Buckley. They didn't but they did find more *Glossopteris*. Their field work was often carried out in temperatures of –30C or below.

So, what was *Archeocyathus*? They were reef-building organisms, similar to corals and to sponges, but really like neither. They were a class of their own. They were already established in the early Cambrian but were extinct by mid-Cambrian. So, Shackleton's Limestone, as it was later named, was Cambrian in age, and there is no stratigraphic link to the later Beacon group. At the south end of Mount Bowers the limestones dip at 78 degrees to the SW, while the Beacon Group dips 10-15 degrees to the east. But a short way to the east, the limestone dip about 70 degrees to the east. The limestones appear to be on a steep anticline, plunging to the south and probably lying on the Pre-Cambrian basement. The difference in dip is hardly surprising—considering we are dealing with a gap of c200 million years..

Here are some pictures of *Archeocyathus* from the Copley limestone Formation, South Australia. The 'cups' are quite small and those obtained through dealers are often cut into slabs. This does enable polishing and often the preservation is quite good.



The micro-slide , above, shows a section through a very small individual, <2mm diameter, also from the Copley Limestone of South Australia. Above-right is another photo of the first slab, showing more, slightly larger individuals. To the right is a reconstruction, curtacy of the Natural History Museum. The fossils are found in Cambrian deposits on all continents, and would seem to have inhabited warm seas.



Lastly, much of the original research has been qualified by research carried out by the **New Zealand Geological and Survey Antarctic Expedition of 1961-62**

Sources

There are many sources referring to the history of the Scott-Shackleton expeditions to the Antarctic, so I am not listing them here but much of the updating of the geological data was carries out by the 1961-62 expedition op-cit. The following contains a lot of useful information (on-line)

Grindley G. W. ***The Geology of the Queen Alexandra Range, Beardmore Glacier, Ross dependency, Antarctica; with notes on the correlation of Gondwana sequences*.**
New Zealand Journal of Geology and Geophysics (1963) pp 307-342 (ISSN: 0028-8306).

The Case of the Missing Chalk—Making sense of the Chalk at Lower Culand

Nick Baker

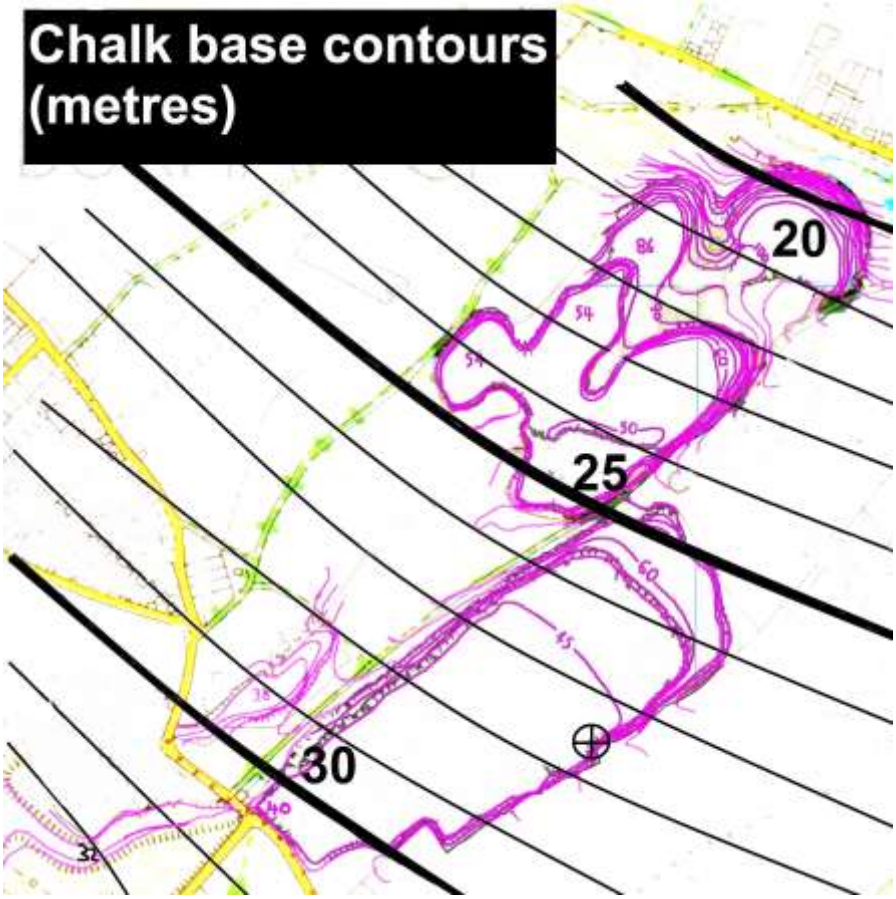
I'm not sure of what my initial attraction was for Blue Bell Hill. I must have seen large ammonites in the Natural History Museum labelled as 'Lower Chalk, Burham, Kent.(1960) *The Wealden District* Regional Guide stated that large ammonites could be found in the Lower chalk, and that it was exposed in the large quarries in the Medway Valley – among other areas. The OS map showed large quarries just NE of Aylesford, and so one day early in 1961 I set out to investigate. I was surprised at the size of some of the quarries, and presumed that the large, greyish quarry furthest down the hill contained the Lower Chalk. At that time, as well as a farm called Little Culand to the southwest of the quarry, there was a ruined barn, to the north of the quarry, labelled as 'Great Culand'. This was

all that remained of a farm, marked on the 19th Century maps as 'Great Kewland'. By 2000, there was no trace of the farm or barn, but the location stuck in my mind as 'Great Culand'.

The survey maps confirmed that the whole pit was Lower Chalk, and that the junction with the Gault was in the old rail cutting leading out of the quarry, towards Eccles. So there was a vague idea of where I was in terms of the geology. But as time went on, the term 'Lower Chalk' became inadequate. Early on, it was not easy to find fossils. For a start, they would not appear pristine in the 'field' as they did in the museum, and I did not have a human guide and would not for 20 years, and near 30 years in terms of this particular area. On two occasions, someone had dug a trench in the rail cutting and had excavated the Gault Clay and Glauconite Marl (1962 and 1984).

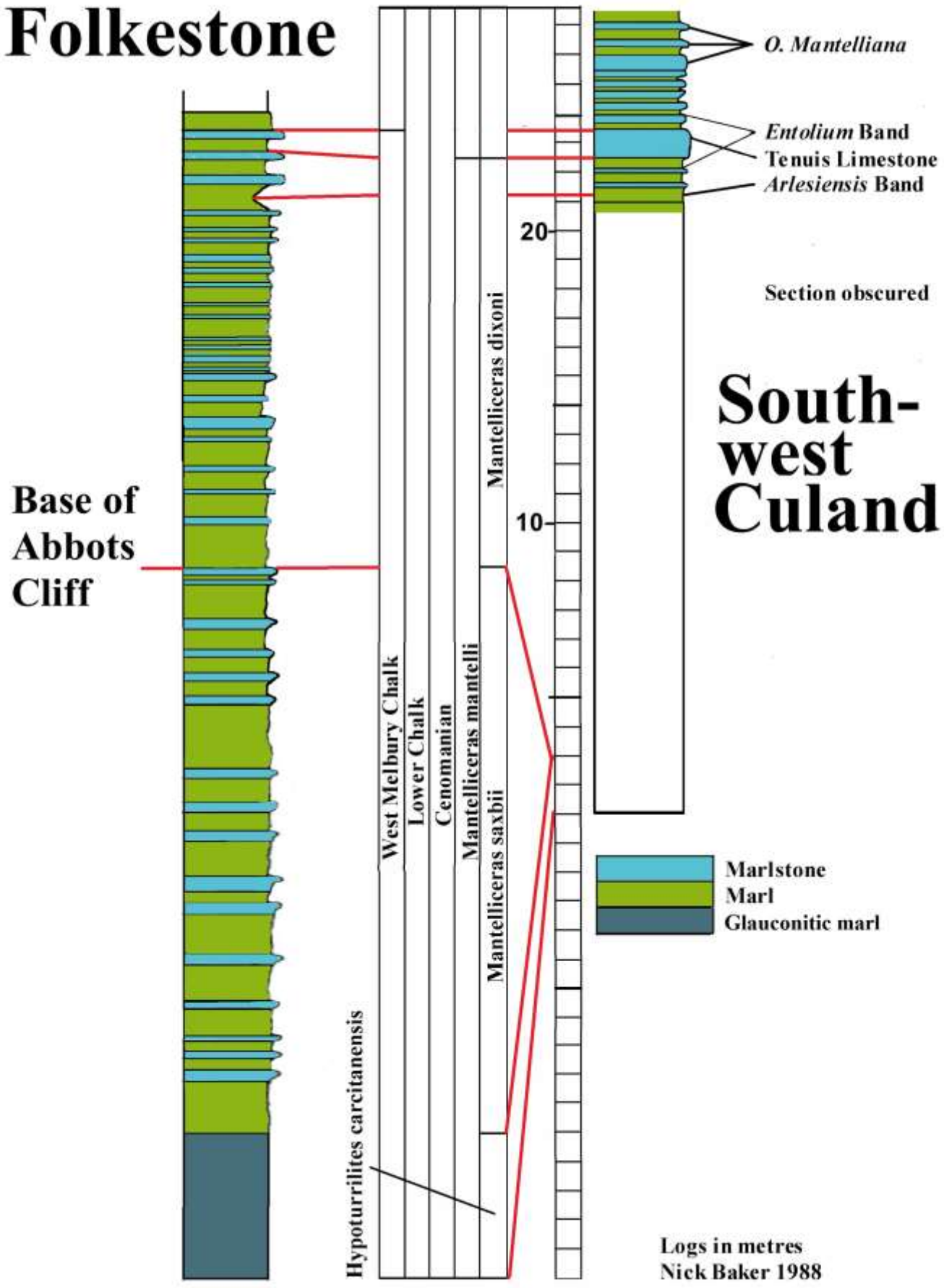
In the early stages I was dealing with two fossil zones – a higher *Holaster subglobosus* zone and a lower *Schloenbachia varians* zone – both reported to be about 30 metres in thickness. My collecting did not help matters very much, since I was concentrating on two main locations – which turned out to be the same bed. And that bed almost coincided with the boundary of the two zones! Which would explain why I was finding whole or fragmented examples of two groups of ammonite; a *Schloenbachia – Mantelli* group (of the *Varians* zone) and an *Acanthoceras* group (of the *subglobosus* zone). So I seemed to have the zone boundary in a low bluff half way along the SE edge of the quarry, dipping down to the northernmost corner—giving a shallow (apparent) dip of about 1.6 degrees at 10 degrees azimuth, but given the strike of the geological boundaries at 300-120 degrees azimuth, then the true dip is more likely to be at 30 degrees azimuth and as much as 2.1 degrees in declination.

I set about trying to ascertain the altitude of the Chalk base. (see bottom-right) The upper ledge of the middle pits cuts the top of the Cenomanian Chalk at an altitude of 86 metres. Borehole records gave the Lower Chalk a total of 64 metres—I did not know if this included the *Plenus* Marls, but I decided that the chalk base at that locality was at an altitude of 22 metres. At the same time, the top of the Gault, SW of Little Culand cuts the surface at 32 metres OD. I had to work on the assumption that there was a constant dip and no faulting. This meant that the chalk base by the low bluff was at about 28 metres (below-right). This gave the thickness of the *Varians-Mantelli* zone a total of 24 metres, while the rest of the Chalk, including the *Plenus Marls* was 40 metres (a total of 64 metres) - but this all hangs on my estimate of the thickness in and beneath the higher quarries. Non the less, this gave me a better idea of the structure of the Cenomanian/Lower Chalk in the Culand Pit.



In the 1980s I leant of a more enhance zonal scheme for the Lower Chalk, although it had been applied since the 1960s. I have set this out on the following page. It makes use of the ammonite faunas. You will notice that the Tenuis Limestone is included in the upper beds giving the lower beds a thickness of 22metres and the upper beds 42 metres.

Text continues on page 12


Folkestone
O. Mantelliana
Entolium Band
Tenuis Limestone
Arlesiensis Band
20
Section obscured
South-west Culand
Base of Abbots Cliff
10
West Melbury Chalk
Lower Chalk
Cenomanian
Mantelliceras mantelli
Mantelliceras dixoni
Mantelliceras saxbii
Hypoturrilites carcitanensis
Marlstone
Marl
Glauconitic marl
Logs in metres
Nick Baker 1988

Before I refer to the stratigraphic log on the previous page—Fast forward to September 15th 1991. The KGG had a trip to Folkestone, organised by (the late) Jim Craig. The weather deteriorated in the afternoon and the meeting broke up, but myself, Jim Craig and Steve Frederick walked a little way into East Wear Bay. The subject of the Chalk, and Blue Bell Hill came up. I mentioned that I got the impression that the Lower Chalk was considerable thinned as compared to Folkestone, especially the *Mantelli* zone. Jim commented that the *Mantelli* zone was about 22 metres, much of which seemed to be the *Mantelliceras dixoni* sub-zone. The excavations in the rail cutting seemed to indicate that the chalk just above the Glauconite Marl had a strong *dixoni* assemblage. *The Mantelliceras saxbyii* subzone may well be missing—possibly due to sub-marine erosion at the time of deposition.

In 2018, Dr Andy Gale (*pers comm*) commented that a lack of hard limestones in the lowest zones of the Chalk at Blue Bell Hill, made it difficult to be precise but the fact that some of the beds were missing was apparent.

And so the mystery of the 'missing Chalk' was solved, albeit partially. In the strat diagram on page 11, I have compared the Chalk at Blue Bell Hill with the equivalent beds at Folkestone. I have left the *Saxbyii* zone out in the Culand section, although what beds and just how much Chalk is involved is difficult to say when you don't have a continuous exposure. The Glauconite Marl at Folkestone is shown as several metres in thickness, although the beds that I have seen as the pure marl is less than a metre.

Some Lower Chalk Ammonites

Nick Baker.

In the following gallery the zones and sub-zones in the Lower Chalk are as follows
In the Cenomanian bio-division, the topmost bed is in the Melbourne Rock of the Middle chalk.

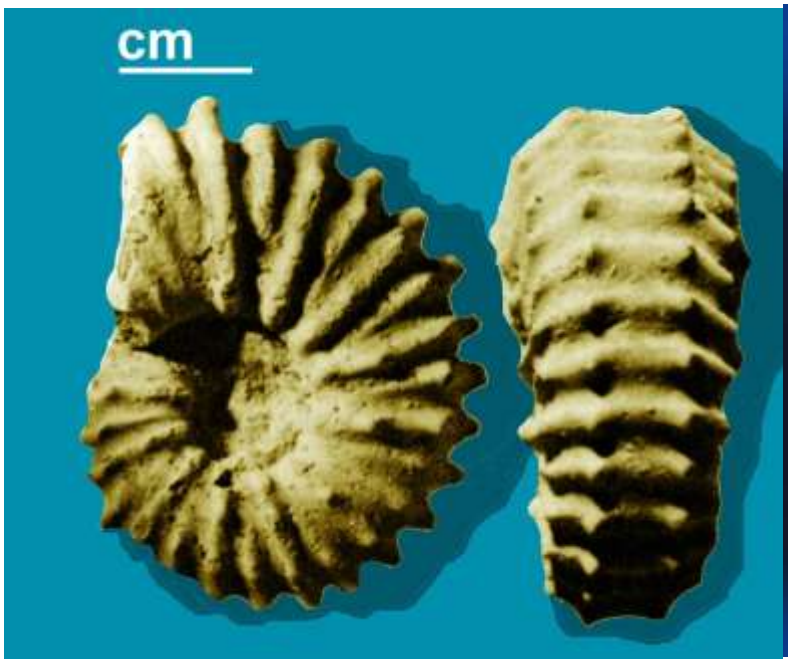
Middle Chalk
Neocardioceras juddi
Lower Chalk
Metoicoceras geslinianum (Plenus Marls)
Calycoceras naviculare
Acanthoceras jukes-brownii

Acanthoceras rhotomagense - *Turrillites acutus*
- *Turrillites costatus*

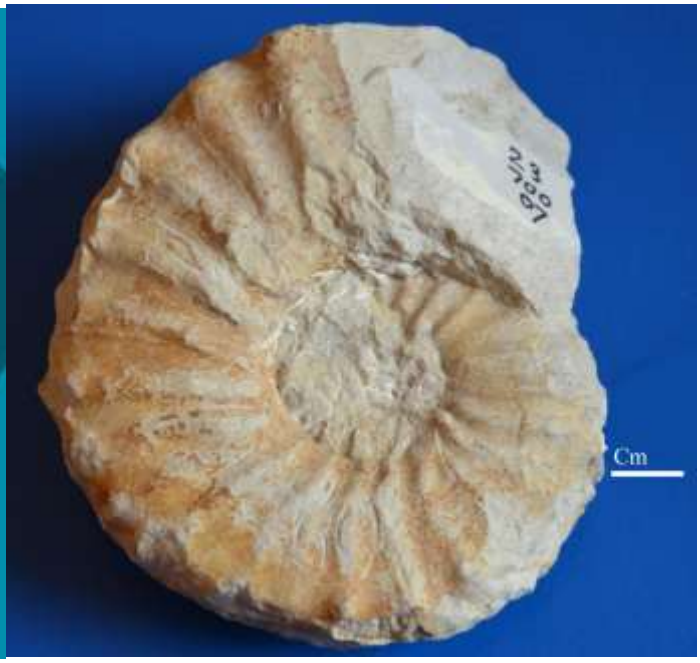
Mantelliceras mantelli - *Mantelliceras dixoni*
- *Mantelliceras saxbyii*
- *Hypoturrillites carcinatensis* (Glauconite Marl)

Mantelliceras saxbyii, Saxbyii zone, St Lawrence, Isle of Wight.

Mantelliceras dixoni, Dixoni zone, Dover, Kent



Mantelliceras Mantelli, Dixoni zone, Blue Bell Hill Range –Glauconite Marl to *Dixoni* zone



Acanthoceras rhotomagense, Costatus zone, Blue Bell Hill. Range—*Costatus* to *Jukes-Brownii* zone

Schloenbachia subtuberculata, Dixoni zone, Blue Bell Hill, Kent

Protacanthoceras sp.
Costatus zone, Blue Bell Hill

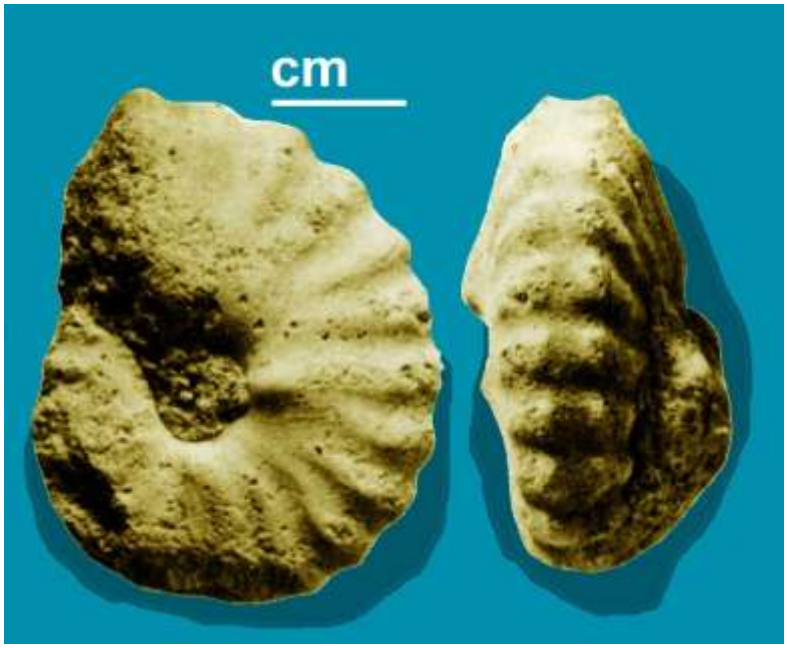
Turrillites costatus
Costatus Zone, Blue Bell Hill, Kent

Turrillites acutus
Acutus zone. Blue Bell Hill, Kent

Acanthoceras jukes-brownii, Jukes-brownii zone, Blue Bell Hill, Kent

Scaphites obliquus, costatus zone, Blue Bell Hill, Kent

Calycoceras naviculare, geslinianum zone, Seaton, Devon. Range *Naviculare-Geslinianum* zone.



Metoicoceras geslinianum Geslinianum zone (Plenus Marls) Peters Pit, Wouldham

Neocardioceras juddi Juddi Zone (Base of Melbourn Rock, Folkestone, Kent

Mineral Gallery—Heavy Iron

Haematite, Boot, Cumbria

Haematite, Boot, Cumbria

Specular Haematite, Dollgelau, Wales

Green Calcite on Haematite, Micheldean, Glos

Micaceous Haematite, Ardgarten, Argyllshire

Pyrite, Wanlockhead, Lannockshire

Pyrite, Kelly Bray, Cornwall

Pyrite, Kelly Bray, Cornwall

Pyrite, Minas Gerais, Brazil

Pyrite? Chalk, Blue Bell Hill, Kent (see my note next page)

Pyrite, Minas Gerais, Brazil

Wad, Wolfach, Germany

Continued from Page 4

than me, they all seem to have smart phones, but have never handled a computer. Whereas yours truly has a computer but no smart phone. I do have an entity called a Doro 6520. Not smart. And that is becoming increasingly disadvantageous. A few days back I had need to go into my local bank. I was stopped by a sign saying that I should hold my smart phone over this—er pattern (citation needed)—attached to a board, and I would be let in. Anybody get the impression that IT erodes democracy? (citation needed). The door was open anyway so I went in and hovered around . They were waiting for customers, so I got served.

Anyway, Some news is that the zoom meetings have had a degree of success, - we are learning and getting the hang of the process. Of the content of the letter—it has been heavily fossilled, so I have added another mineral gallery. And there's a story around one of the minerals. I was on a field trip with Chris Darmon, we were on our way to Islay and we made a night stop at Ardgarten. Between the evening meal and sunset, we had a look around the local area, which is in Glen Croe. The rock was mostly schist. In one lump we found this grey, platey mineral—which Chris was convinced was Molybdenite and was going to send it off to the BGS. However the local geological guide did mention 'plate-like Micaceous Haematite in the area. We de-programmed Chris—thereby preventing Rio-Tinto Zinc strip-mining the whole area for Molybdenum.

So, the mineral gallery is Heavy Iron—no, not *Pumping Iron*—Pyrite, Haematite, Micaceous and otherwise etc.

My comment on this sample

This was found in the Lower Chalk at Culand Pit in 1965. I labelled it as "Marcasite" but it has not decayed in 55 years and has more of Haematite than Pyrite in structure. I am of the idea that this is the end point of the decay. The decay in the Chalk may be different than that in the London Clay or Gault. In Chalk the amount of alkali would control the production of sulphuric acid and even the formation of iron sulphate, probably allowing free iron oxide to form . The sulphate radicals dispersed as gypsum. In the sample some of the iron oxide has been oxidised to Limonite.

I rest my case

Bye.