A PIECE OF NORTH YORKSHIRE'S JURASSIC COAST

Alan Saxon

Childhood memories

My first recollections go back to the summer of '65 when I was ten and we were going to Whitby for our holiday. Most years we toured northern Scotland, for that was where we lived and would stay at various campsites. I have some very fond memories of those times when we borrowed a tent from the local sea scouts. Sadly, all too often the rains would set in and we would cut short our trip, retreating homeward somewhat damp and dejected earlier than planned. I'm afraid that's Scotland for you; the weather is always a lottery.

This time was different; Mum and Dad were really pushing out the boat and we were self-catering and heading for the sunny south. Even better, I was leaving school one week before the end of term. I had read about the great Captain Cook and before long I'd visit the place where H.M.S. Endeavour set sail to discover new lands. I got out my Collins pocket book of Rocks, Gemstones and Minerals and flicked through the pages till I reached the ammonites. I gazed at them adoringly and dreamt that perhaps I'd find one just as good. This was going to be the best holiday ever!

Whitby Ammonites preserved in Jet

It was a long old journey from the far north in the sixties. The narrow roads hugged the contours of the hills; time and again the road would traverse up one side of a steep sided valley to a tiny single-arch bridge, built to cross a stream as economically as possible. Then back we would go along the other side having made up very little ground in the desired direction. Steep hills necessitated zigzags with hairpin bends, and the double de-clutch, 4 up with roof rack, in the Ford Popular could reduce speeds to a walking pace. The little cross-flow engine would hiss and groan defiantly but, for all that, it was a reliable little car. Its only weakness was a reluctance to start on damp mornings. As we slogged up hills, going slower and slower, Dad would have one eye on the temperature gauge, nervously watching it creep up towards the hot end. Cars and passengers had to be rested more frequently than today and both needed a drink of water on warm days.

We would make two night stops on the way, one near Perth and another in the Borders. On the afternoon of the third day, Whitby finally loomed into sight under a blue sky and what a place. My sister and I could hardly contain our excitement and wanted to explore straight away, but the car had to be unloaded first and the sleeping arrangements sorted out and Mum had to fathom the workings of the cooker and hot water supply.

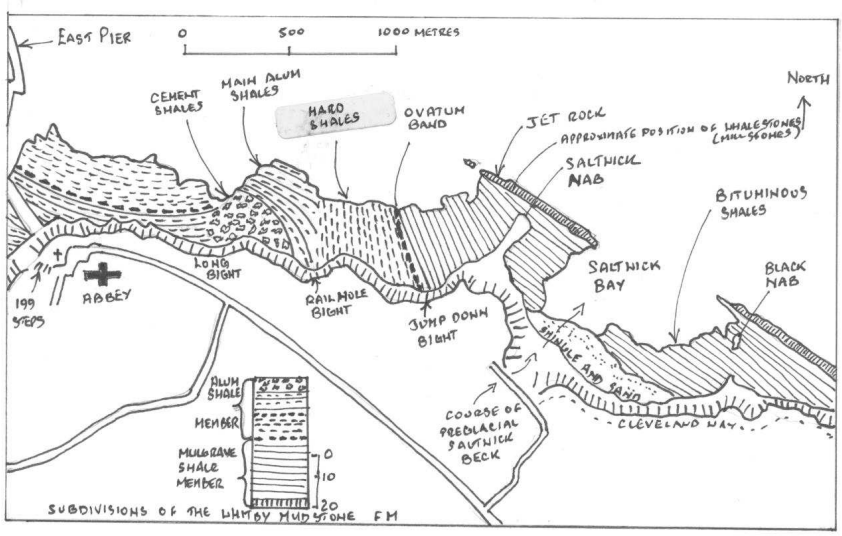
It was such a magical place: a lovely sandy beach, long piers, fishing boats unloading their catches, narrow cobbled streets, the Abbey steps and ruins. The shops were amazing; we had never seen anything like this before and they stayed open well into the evening. You could go on the dodgems and have candy floss every day. The seafood stalls sold delicious shell-on prawns. I'd only ever had them from a tin before, and you got eight or nine in a paper poke for sixpence. Such were the simple pleasures of childhood.

I've revisited a fair few times since then and first introduced my daughter to the place when she was only three. She is now twenty-one and smitten with the Whitby bug and still goes back as often as she can. I suppose everyone has his or her special place and this is ours.

Origins of place names

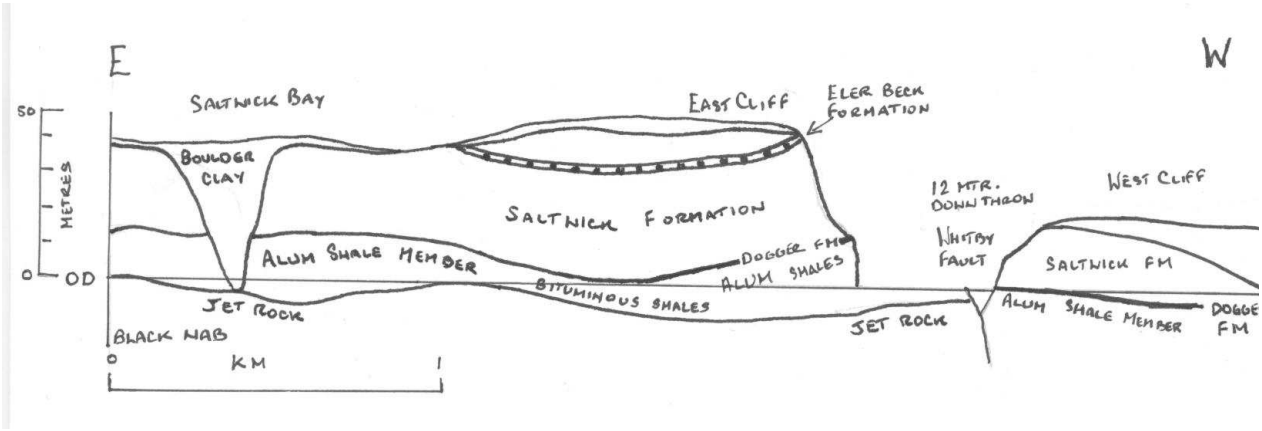
As you head towards the north and east of England you begin to find one village after another ending in the letters "by". Take a look at the maps and you will see what I mean. These place names are in fact of Scandinavian origin. They are a legacy left over from the Vikings who first raided and later settled and farmed a large part of England.

A few years ago at Whitby I was talking with a Swedish woman who was married to a local man. She told me the meanings of several words common to the area. A word ending in "by" means a village. Most of the streams in these parts are called "Becks" such as Sand beck and this same word is still used today in Sweden. Many of the roads in the town centre end in the word "gate"; this means street. Studying the coastal sections on a map reveals many two-part names ending in "Wyke". This comes from the Norse word Vik meaning inlet. One place name that had me intrigued was "Ugglebarnby near Blue Bank; could she throw any light on this for me. "Yes of course" she replied. "It means Owl child village." We can never know exactly what this name implied. Was there a very wise young child here that astounded her elders, or did it have some birth abnormality, perhaps very large eyes that caused people to liken it to an Owl? Place names can give us a fascinating glimpse into the past and to the origins of some of us English people.



Map to show the geology from Saltwick to Whitby

E-W section from Saltwick Bay to West Cliff



From Saltwick to Whitby with the Essex Rock & Mineral Society

This section reveals marine fossils, terrestrial plants and dinosaur footprints as well as interesting geological structures. The following description is loosely transposed from the Geological Association Guide No 34 "The Yorkshire Coast" by P. F. Rawson & J. K. Wright. It has been embellished by me in so far as adding my own personal account of a trip in the Easter break of 2003. Our leader Derek was a big, burly, bearded Yorkshire man who obviously loved his food and beer. Although the objectives of this field trip were principally to collect fossils, Derek endeavoured to describe many of the features from the G.A. Guide.

Saturday Morning

We left one car at the supermarket near Whitby railway station and by making two trips transferred the full party of eight to Saltwick Bay. First, we crossed the swing bridge and followed the road up the estuary several hundred yards. We then turned sharply to the left a little way before the old railway viaduct and up a steep hill through a housing estate to the T-junction. Now we turned right and continued for about half a mile, then left towards the campsite. The road passes between the campsite reception buildings and the cliff. This is where we parked up, Grid Ref. 914-109.

As I got out of the car above Saltwick Bay, I was met by a cold blast of air and very quickly decided that my waterproofs were going on to act as a wind break, if nothing else. The weather could best be described as blustery, with dark clouds scudding across the sky. Far off in the distance I could make out a small huddle of fishermen perched on the edge of the reef with the waves beyond breaking out into white caps everywhere. We quickly readied ourselves and made our way to the cliff edge.

Derek pointed out the solitary sea stack of Black Nab a single stump of shale far out on the wave cut platform to our right.

Black Nab with Saltwick Nab in the distance

"Not too long ago", he intimated, "there were three stacks here. Two were destroyed in the 1953 storm surge and the remaining one much reduced in size. Keep looking the same way but come back to the shingle beach. Can you see that long line of broken rocks? Well what do you make of

that then?" He looked quizzically at each one of us in turn "Well, anyone got any ideas?" He was met with blank faces. "Come on, some of you budding geologists must know." John piped up, "Some sort of fault is it?" Derek's previously raised eyebrows slowly dropped as his face turned into a broad grin. "That's today's trick question. It's actually not a geological structure at all but it does look like it from up here. It's the remains of a harbour built to serve the Alum quarries nearby. If you look to the left directly behind Saltwick Nab, you can see the remains of the Alum works, but they are difficult to pick out except for that patch of reddened ground where the fires used to be. The cliff tops for many miles along this stretch of coast were extensively worked for Alum over hundreds of years".
"Now let's get off this exposed top" and he lead us down the footpath through the glacial boulder clay to the beach. As we reached the bottom, the wind seemed to die away, much to everyone's relief. We turned left and spread out in a straggling line towards Saltwick Nab to the sounds of shingle crunching under our feet. Presently, Derek stopped and drew us round into a huddle. "Now, I know you've all come here to get ammonites but like I said in the pub last night, it's not easy". He drew in a deep breath and a glum expression began to spread across his face. "A few years ago I could take you here and almost guarantee that you'd all leave with at least one good specimen. I can't promise you that today; it's been cleaned out by the professional collectors".

Having got that off his chest, he developed a more up-beat tone. "I'll tell you what to look for and where to look. Nobody will leave the beach empty handed. How well you do largely depends on how hard you're prepared to work at it. This is what you're after". He opened a large clenched fist that unbeknown to us was concealing an ammonite nodule with part of the keel showing. "Where did you get that?" I said, eager to gleen all the knowledge I could. "Just back there a moment ago" was his tart reply. He passed it round. "It's not a brilliant specimen but worth keeping. Take a good look. Feel the weight of the nodule; it's quite heavy for it's size. You will find lighter nodules with ammonites but the centres will be missing. It's what the guidebook refers to as a sideric concretion. Try saying that after a few pints. Ursula, you walked right past it. What did you do that for?" It didn't really warrant an answer and she shrugged it off with a gesture. "Don't forget," he said softening his tone, perhaps sensing a hint of disappointment in her face, "I've been coming here for years; this is your first time".

He looked up and slowly scanned our faces one by one as he talked. "Anywhere between here and Whitby pier, you've got the potential of good finds, so take a good long look, pass it round and get your eye in. The stony beach sections and the under cliff are all good hunting grounds. Right, let's get on".

We set of again to that now familiar crunch of shingle under our boots, but not for long as the beach gave way to a low saddle, the landward end of Saltwick Nab. It seemed a bit too slippery an obstacle to cross even though it was not steep, so we turned seaward towards the wave cut platform. Derek stopped again, "The rocks here that form the reef belong to the Mulgrave shale member; mainly the bituminous shales but what you need to know is they are exceptionally slippery, so go easy".

These laminated shales contain mainly crushed and flattened ammonites, often pyritized suggesting a deeper-water environment with low oxygen levels in the sediments. Another clue to poorly oxygenated conditions is the absence of mud-burrowing bivalves. It was, indeed, very slippery and we all moved out on to it like novice ice skaters venturing away from the edge for the very first time. Several of the party ended up in undignified heaps, but thankfully no one dented much more than their pride. I was doing rather well, or so I thought and feeling a bit smug about it too. You know how the old saying goes - pride comes before a fall. Well, one minute I was striding out confidently and the next I was looking up at the sky, wondering how I got there. My hard hat had bounced off in one direction and with a clang and clatter my hammer and chisel in another. I got up quickly and promptly went straight down again. I got up more slowly this time and stayed upright. I grinned rather sheepishly and could tell by the assembled faces that it had been very entertaining to watch. Having retrieved my hard hat, hammer and a more modest composure, I set off again. As we rounded the end of the promontory we were caught once more by the wind and had been unknowingly sheltered in the lee of Saltwick Nab.

"Keep heading on towards the sea to reach the lowest division of the Mulgrave Shale Member, the Jet Rock Dogger and the Whale stones," said our leader. As we moved on, the Bituminous Shales disappeared, giving way to a tough impure limestone, the Jet Dogger and it became steadier under foot, helped in no small part by the sudden appearance of barnacles. Then we saw the first Whale stone standing out, a pale white against a grey limestone backdrop. "These are described by the guide book as circular discoidal concretions," said Derek with a grin. "The biggest is just over there at 4.2 metres across. This area was once worked extensively for its Jet, apparently only exposed at spring tides like today. Before anyone asks me where, don't bother. I've never been able to find it".

Jet is a black lignitic material derived from Jurassic driftwood. It appears as very thin elongated coal-like seams. It can be cut and polished and made into beautiful jewellery and Whitby still has one or two very fine jet shops. We were very close to the end of the reef at this point and it was colder than ever, so were all glad to turn our backs on the sea and the wind and head towards the cliffs. Now on the other side of Saltwick Nab, we were making for the first enbayment, Jump Down Bight. We soon left the jet dogger behind and were once more on those slippery rocks. Presently, we passed, without any further mishaps, from the Bituminous Shales and into the

Alum shales. As the rock cleared of weed and barnacles, we began to find vast numbers of the Belemnite *Cuspiteuthis tubularis* many 5 to 6 inches long. Walking now became less precarious. This upward change in lithology reflects a return to better-oxygenated conditions on the sea floor. Mud-burrowing bivalves gradually return and become common higher in the sequence and ammonites appear in nodules not flattened and crushed as before.

We were fairly close into the cliff now. Short stretches of shingle were interspersed with shale ledges and it was all pleasantly sheltered from the wind. The sun suddenly appeared and everywhere brightened up. The cliffs were soon echoing to the intermittent tap! tap! tap! of hammers. Derek was moving between us like a mother hen spending a little time with each encouraging and cajoling. "Lets have a look at what you've got in your bag, Alan. Is that all you've found? You're not doing very well are you?" I drew in a deep breath and was about to go on the defensive but before I could say anything he began again "You are not looking hard enough. Come on, you can do better than that". Then he was on his way to the next person. He was just out of earshot, but as he conversed with them and went through a similar routine, I formed the distinct impression that he had told them much the same and they too needed to make more effort.

We slowly worked our way round to the second enbayment, Rail Hole Bight. Derek drew us together again. "Now let's have a quote from the Guidebook. The Alum Shales are well exposed here and are very fossiliferous. Belemnites are common, so are the shallow-burrowing bivalves, *Dacryomya,* so prolific in places as to form thin limestone bands." He tapped his foot on the stone. "See what I mean? Here you will find the Ammonites *Dactylioceras* and *Hildoceras* in nodules, usually with the inner whirls crushed and missing. As you make your way up the strata close to the under-cliff, the last of the true *Dactylioceras* ammonites are abruptly replaced by *Peronoceras."*

It was here that I spotted a rather promising nodule, mostly buried in a shale ledge close to the cliff. I crouched down to get a closer look and yes, sure enough, I could see the keel of the ammonite exposed with its finely ribbed pattern on show. I looked up; the rest of the party were moving off again, but I was staying put till I'd got this beauty out. A trickle of tiny stones showered down from above and I looked up rather nervously. I'd been told that this might precede a rock fall. I hesitated. Should I go or should I stay? The trickle of stones slowed and stopped and I sighed with relief. Straightening my hard hat, I took a few deep breaths to regain my composure and began carefully working round the nodule with hammer and small chisel until it lifted clear. The keel appeared to go all the way round. "Yes", I said under my breath and thought inwardly that this looks like a good one, Alan. I quickly retreated to a safer position and set off to catch up with the rest of the group. They were much further away by now and it took a while to make up the ground.

By the time I'd caught up, we had reached the headland between Rail Hole and Long Bight. Derek looked somewhat perplexed, heading one way then veering off in another. "We're looking for a large fallen block of red sandstone with green weed hanging off the edges. It's somewhere round here, I know it is". He scanned around with both hands cupping the peak of his hard hat to lend some extra shade. "There it is", he said, and you could hear the relief in his voice. It was where the guidebook said - about 10 metres west of the northern-most tip of the headland. "Now feast your eyes on these, the famous Dinosaur footprints. Recent studies suggest they were made by a Stegosaur. As you can see, there are at least 8 prints showing the broadly triangular, three-toed hind feet and the smaller crescent fore feet". Derek grinned. "You can see by the direction of the pathway that he was heading straight for Whitby, which just goes to prove that it was a popular watering hole in Jurassic times too. Now let's read again from the guidebook. The footprints were made in the siltstone and infilled with a medium-grained sand. The softer siltstone has weathered away leaving the footprints standing proud of the surface. Apparently, some twenty metres east of the headland is another similar block, although I've never managed to find it. It contains yet more prints of a bipedal dinosaur some showing a peculiar dragging of the foot and yet more are to be found in Whitby Museum, which, by the way, comes highly recommended on your must-do list".

We pressed on past Long Bight, conscious of the slowly advancing tide, and passed a rock fall and the twisted remains of a shipwreck and then on to the next small bay. Here, a shallow syncline allows you to look at the upper part of the Alum shales, known as the Cement Shales. These form the highest part of the Whitby Mudstone Formation. The shales obtain their name from the abundant calcareous nodules at this level. Belemnites and ammonites may sometimes be found. Directly above the Cement Shales is an unconformity forming a shelf dipping gently west near the base of the cliff. It consists of tough, very pebbly iron-rich (sideric) sandstones described as dogger and is 0.4 metres in thickness. Above this bed is the non-marine Saltwick formation. This classic site is a part of the deltaic beds of the Cleveland basin and together with about 29 other local sites forms the world standard for the middle Jurassic flora with over 500 species identified. Suitable conditions for the deposition of abundant well-preserved plant material were found only in certain parts of the delta such as the margins of sluggish river channels and the richest accumulations, called plant beds, are very localised.

About 4 metres up, it contains a bed of thick horizontal stems of carbonised wood and has in the past been worked for coal. This would have represented a swampy area. We were able to find several large fallen blocks on the shore to study containing plant stems as described in the book. When you see the size of some of these fallen blocks you certainly would not like to be too close when they came down. According to the guidebook, 5.7 metres above the dogger and considered to be a fresh water deposit is a shell

bed. On the western side of Long Bight, a large rock fall consisting of fine-grained sandstones with concretions of sideric mudstones is to be found. These have fallen from just above the dogger as it climbs westward in the cliff and belong to the famous Whitby plant bed, an estuarine deposit mentioned earlier. Excellent plant material can be found, although none of our party was successful. The Whitby museum has superb plant material and is well worth a visit. It has lots of ammonites as you might expect, but is probably most renowned for its marine reptile specimens, a topic we will return too later in this article.

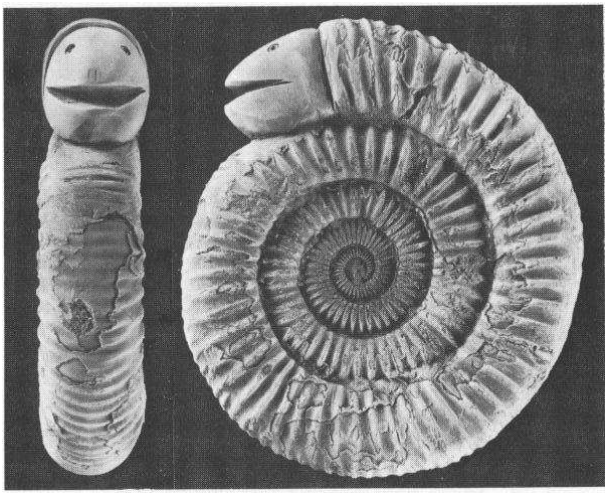
Some of the rock falls from the higher sections of cliff contain beautiful, golden yellow sandstones and much evidence of cross-bedding and channel structures. You will find many buildings around Whitby constructed from this very attractive stone. However, it does weather badly with the passage of time. As you continue on towards the pier, you can, if you so wish, have a change from studying sedimentary structures and take a look at the massive igneous granite boulders. I believe they came from Norway in a ship and have been placed under the cliff to slow down erosion. They run continuously for several hundreds of metres up to the foot of east pier.

As we reached East Pier we took a brief rest before climbing the concrete ramp and steep footpath back into Whitby. This led us into a charming, narrow, cobbled street with picturesque cottages huddled together on either side. Smoke was drifting down towards us and carrying the aroma of freshly smoked kippers. Soon, we passed by the little smokehouse. It must be one of only a handful of such establishments left in the country. This little road meets the foot of the Abbey steps and another one of my favourite haunts, the Abbey Teashop. I could have murdered a Yorkshire Cream Tea but, considering the state I was in it did not seem fair to the other customers and in any case we had my car to pick up from Saltwick. I consoled myself with the promise that I'd return when cleaned up and presentable. A short walk along yet another lovely cobbled street brings you out at the swing bridge again and crossing it returns you to the starting point and journey's end.

Snakes in the grass

St.Hilda founded Whitby Abbey on the East Cliff in 657. At this time, little more would have existed than a few fishing cottages far below at the mouth of the river Esk. The story goes that the area was infested with snakes. St Hilda raised her staff and drove these serpents into the sea, turning them into stone. So the Ammonite was a snake that curled up in its death throws. Locally, these became known as snakestones. At one time enterprising individuals carved snakes heads onto the ammonites and sold them to visitors, *(see illustration).*

You don't have to go back very far in time to an age where superstition was widespread. The devil and his disciples were all around in dark corners or isolated places and could appear in many guises. When we look around today, sometimes we see ammonites built into the walls and door-



Snakestone from the Upper Lias of Whitby carved from a speciment of Dactylioceras commune, preserved as jet

ways of old cottages in various parts of the country. Some say that they were placed here for aesthetic reasons and others that they were to ward off evil spirits. I prefer to believe the later. If the devil or his followers dared to pass this way, they too may be turned to stone.

The Alum Industry

What was it and why was it so important? Alum was used in the clothing industry for the fixing of coloured dyes. It was so highly sought that England wanted its own independent supply. The secret of making Alum on mainland Europe was jealously guarded by the few and it made them fabulously wealthy. After Henry VIII fell out with the Catholic Church, the Pope, together with his allies, tried to cut off supplies. Exactly when the great search for our own source started in earnest is uncertain. In the intervening years, no doubt quantities were quietly smuggled in at greatly inflated prices.

Alums are double salts which crystallise from solutions containing the soluble sulphates of a trivalent metal, almost always aluminium, and a monovalent metal such as potassium, or equivalent, such as ammonium.

Aluminium is one of the most common elements in the earth's crust and one might suppose that Alum could be extracted from a wide variety of rock types. However, almost all of it is combined in extremely stable compounds with silicon and other elements and very difficult to separate. In order to produce alum successfully the rock must contain aluminium in an accessible form and sulphur, usually in the form of pyrite, which can be processed to form the sulphate. As will follow, some carbon content was needed in the historical process.

It was discovered that some parts of the shales of North Yorkshire contained these in just the right amounts. The extraction of Alum was once widespread along this coast and at some inland locations too.

In England it would appear that Alum was successfully worked here from about 1620 onwards. The Alum shales occur in a band up to 35 metres in thickness in the Lower Jurassic Toarcian. All along the Cliff tops, the shales were exploited for this lucrative prize.

Alum Processing

It was extracted using picks and shovels, transported in wheelbarrows, crushed and heaped into huge piles, sometimes as long as 150 feet and as high as 100 feet. Under these piles, large platforms of brushwood had been placed. The whole structure was then set alight. This was known as calcining. The carbon in the shales sustained the fires. When the fires eventually went out, about 9 months later, the piles were broken open and the shales had changed into a powdery mixture of ferrous sulphate and aluminium sulphate, with some insoluble silicates. Next, clean water was added, dissolving the sulphates and leaving the silicates behind to be discarded. The sulphate solution was then channelled to the Alum works.

The next stage in the process required the addition of potash in the form of kelp or potassium chloride, or ammonia in the form of urine. Human urine proved cheap and plentiful and was widely used. It was transported from the ports of Newcastle, Sunderland and as far away as London in specially adapted ships to Whitby, Sands-end, Saltwick and other small ports. It must surely have been about the most unglamorous cargo that any sea captain ever carried.

The final stages in the process required the evaporation of the liquids and separation of the excess ferrous sulphate from the potassium-aluminium sulphate or ammonium-aluminium sulphate (alums). The liquor was heated up in huge open pans called mothers. When the solution reached the correct specific gravity it was then allowed to cool. It was found that this occurred when a hen's egg floated to the surface. At this point the valuable Alum crystallised out.

Many fortunes were made exploiting this valuable commodity but, as the saying goes, all good things must come to an end. The writing was on the wall for traditional methods of Alum production by the 1870s when sulphuric acid became cheap and easy to produce and Alum could be made by simple chemical processes. When technology moves on, the effects on traditional industry are usually swift and brutal and the Alum works were quickly abandoned and became derelict. As for the huge piles of shale that had been set on fire in the initial process of calcining, they were left to burn out in due course. It was said in 1924 that the main seam on the cliffs of Boulby was still smouldering over 50 years after it had been abandoned.

Miscellaneous facts on the Jet Rock

In the early 1800s, the head Alum-maker at the Loftus and Boulby works carried out an experiment using the Jet Rock series rather than the Alum shales. When he calcined these rocks the melted bitumen and sulphur was said to have flowed in flaming streams.

In the 1870s jet jewellery became very popular. Some people attribute this to Queen Victoria's mourning after the loss of her husband. She wore nothing but black for many years and is believed to have worn Jet brooches etc. Many workshops were soon very busy in Whitby and employed 1400 people out of a total population of some 4,000. These workers were nicknamed 'red devils' on account of their faces and hands being coated with jeweller's rouge acquired while buffing and polishing the stone. There are still three shops working jet in Whitby and you can watch them making fine pieces.

Science and the Bible

Many early geologists were, by virtue of the times they lived through, brought up with a very strict religious belief. Some became greatly troubled when their enquiring minds led them to question parts of the scripture itself. The evidence presented in the rocks seemed to tell a different story from that preached at the Sunday services and written in the Bible.

Theology had worked out that the world was created about 4,400BC and, as we know from the Bible, this was achieved in six days with God resting on the seventh. As for the strange creatures turning up in quarries, cliffs and shorelines, the Church could not deny their existence but had a perfectly rational explanation. These were the unworthy creatures Noah was not permitted to take on to the Ark, and, as the floods took hold, (often referred to as the Great Deluge) these animals drowned.

The Yorkshire coast-line was a constant inspiration to early geologists; its towering cliffs and frequent rock falls allowing many hundreds of feet of strata to be examined in great detail and relative safety. As Alum production flourished, many more strange creatures would be unearthed in a much shorter time span than otherwise might have occurred by the natural processes of erosion.

As literacy grew, so too did public curiosity. Whitby was one of those special places that would fire the imagination of all those who read or came to see the evidence at first hand. The next few paragraphs give a glimpse into those times.

The Crocodile on the shore

The first of these great discoveries occurred in 1758 near Saltwick Bay, when two friends, Captain William Chapman and Mr Wooler, found what they believed to be the remains of an Alligator. In itself, the discovery of fossil bones was not at all unusual along this stretch of the coast, but both men undertook to write formal reports that found their way into the Philosophical Transactions of the Royal Society. This was the original scientific journal. By doing so, they spread the word far and wide and sowed the seeds of what would become a great debate as to the origins and age of the Earth.

The following is an extract from the letter written by William Chapman: *"The bones were covered five of six feet with the water every full sea, and were about nine or ten yards from the cliff, which is nearly perpendicular and about 60 yards high, and is continually wearing away, by the washing of the sea against it; and if I may judge by what has happened in my own memory, it must have extended beyond these bones less than a century ago. There are several regular strata or layers of stone, of some yards in thickness, that run along the cliff, nearly parallel to the horizon and to one another. I mention this to obviate an objection, that this animal may have been upon the surface, and in a series of years may have sunk down to where it lay; which will now appear impossible, at least when the stones and sea have their present consistency."*

This is an extract from the letter written by Mr Wooler. *"The different strata above this skeleton never could have been broken through at any time, in order to bury it to so great a depth as 180ft; and consequently it must have been lodged there if not before, at least at the time those strata were formed, which will not admit of a later date than the Great Deluge."*

The snout sticking out

In December 1824, an interesting discovery was made at Whitby. Brown Marshall, a well known collector of 'petrifactions', observed, in the face of a steep cliff, not far from the town, part of the head of a large animal, standing out from the surface of the Alum shale, several yards above high water mark. Having, with no small labour and danger obtained the head, he presented it for my inspection. Being very desirous to procure a complete specimen I directed him to obtain the whole of it. After several days' labour, attended with considerable peril, as the spot could not be reached but by the aid of ropes suspended from the upper part of the cliff, the whole specimen was got out. Most of the bones of both hind-legs, with fragments of those of the fore legs were distinctly perceived. At the same time, the appearance of portions of the scaly crust of the animal, arranged in squarish compartments, as in the crocodile, made it easy to determine what family it belonged to."

It was purchased for £7.00 by the Whitby Literary and Philosophical Society and is today one of the museum's most cherished specimens.

The Mulgrave Monster

"Wm. Vizard Esqr.
Mulgrave Alum Works
August 30th 1844

Dear sir I presume that you have heard in the course of their quarrying, Messrs. Liddell and Gordon found a fossil Plesiosaurus in detached parts, which, by much care and at some expense they saved from the burning kiln and have collected and put together so as to exhibit a pretty perfect specimen. For its further improvement they have sent it to the keeper of the York museum - an accomplished geologist, to have it better cleaned.

The Kettleness Sea Dragon

The grandest fossil reptile specimen ever found on the Yorkshire coast recently discovered on the 27th of July 1848 in the Kettleness Alum quarry. A plesiosaur measuring 23ft 4 inches by 13ft was saved from the crusher but not before one of its paddles was destroyed. It has been taken by the quarry owner, the Marquis of Normanby, and is displayed at his home Mulgrave castle.

What subsequently happened to this fossil is a long story, but well worth following to its conclusion. I will try to keep it as brief as possible. The Marquis gave it away less than a year later to his friend, the eminent surgeon and naturalist Sir Philip Crampton. Shortly afterwards, Sir Philip attended the British Association's annual meeting in Dublin, hosted by the Zoological Society of Ireland, an organisation he also belonged to, and would later become president of. He brought his giant reptile with him with a view to having it put on display. However, it would seem that no suitable building could be found. So the Council had a building specially constructed, 36ft long, for this prize exhibit. Some six years later, Sir Philip passed away and his son donated the reptile to the Zoological Society of Ireland. It was found to be a new species and in 1863 named *Rhomaleosaurus cramptoni* after its former owner. It was on public display on and off until 1961 but has since been dismantled and put into storage. However, three plaster casts were taken at some time in the past and are on display at the following locations; The Natural History Museum London, Cornell University New York and, last but not least, our very own Bath Royal Literary and Scientific Institution. But one final puzzle remains unanswered. Next time you are leaving the B.R.L.S.I you might give this monster more than a passing glance and wonder, as I do, how it miraculously grew a new paddle and which one is the fake!

Bibliography

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Whitby silver ring with ammonite preserved in jet