

Dean R. Lomax

Fossils of the Whitby coast A photographic guide

Siri Scientific Press



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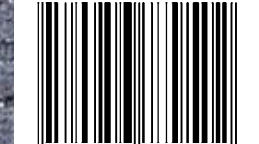
A photographic guide

Dean R. Lomax



The small coastal town of Whitby is located in North Yorkshire, England. It has been associated with fossils for hundreds of years. From the common ammonites to the spectacular marine reptiles, a variety of fossils await discovery. This book will help you to identify, understand and learn about the fossils encountered while fossil hunting along this stretch of coastline, bringing prehistoric Whitby back to life. It is illustrated in colour throughout with many photographs of fossil specimens held in museum and private collections, in addition to detailed reconstructions of what some of the extinct organisms may have looked like in life. As well as the more common species, there are also sections on remarkable finds, such as giant plesiosaurs, marine crocodylians and even pterosaurs. The book provides information on access to the sites, how to identify true fossils from pseudo fossils and even explains the best way of extracting and preparing fossils that may be encountered. This guide will be of use to both the experienced fossil collector and the absolute beginner. Take a step back in time at Whitby and see what animals once thrived here during the Jurassic Period.

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More than 200 colour photographs and illustrations
Photography by Benjamin Hyde and Illustrations by Nobumichi Tamura

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Cover image: Saltwick Bay and various fossils illustrated throughout the text.

Whitby – a fossil hunter’s paradise

Whitby, a small coastal town in North Yorkshire, is a name familiar to most fossil collectors in Britain and Europe. For hundreds of years, it has been well known as a source of a diverse range of fossils from the distant past. Whitby is set on a part of the Yorkshire Coast often referred to as *the dinosaur coast*, an illustrious section of coastline stretching from the mouth of the River Tees in the north to Flamborough Head in the south. Internationally significant fossils have been discovered around Whitby. The fossils range from the remnants of large and ferocious marine reptiles to common ammonites, allowing the fossil hunter to paint a vivid picture of the prehistoric ecosystem they once inhabited.

Many fossils found in and around Whitby are spread across museums and private collections throughout the world. It’s not surprising that large numbers of fossils are found all year round and collectors come flocking to this coastline because it is one of the most productive Jurassic localities in the UK, perhaps even rivalling the Jurassic Coast World Heritage Site situated along the Dorset and East Devon coast.

This guide illustrates some of the most common fossil species collected around Whitby, based on images of museum authenticated specimens and those in private collections. It explains how to identify them and reconstructs how some of the extinct organisms may have appeared in life. From a practical view point, it explains where the fossils are found, how to go fossil hunting, provides an explanation of each fossil group and the likelihood that you, the collector, may be able to discover a similar specimen.

Important: do not over collect fossils and keep hammering to a minimum – it is rarely the best way to look for fossils. Your eyes are the best tool for finding specimens. The majority of this coastline is a SSSI (site of special scientific interest) and hammering off the cliffs is prohibited by law. Please protect the fossils found around this coastline; they have been here for millions of years, so deserve a considerable degree of respect.

The stunning scenery at Port Mulgrave.

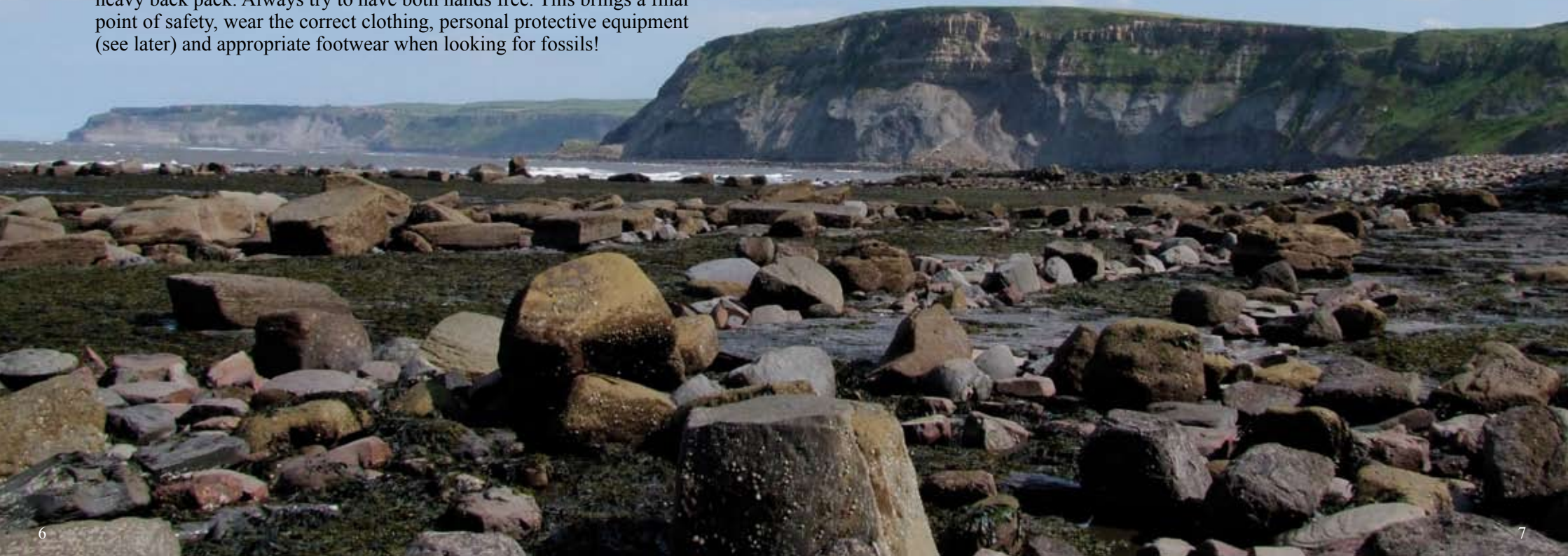
Safety and equipment

Always safety first!

It's very easy when searching for fossils to forget your surroundings and become lost in an ancient world, but the fossil hunter must always be aware. The cliffs are continually eroding; this is great for fossil hunters hoping to discover that next great specimen, though the cliffs are unlike the tide and you cannot predict when they're going to collapse! However, enticing a huge landslip looks, the potential of finding something fantastic at the top is very low and it is best to let the tide do its job and slowly reduce the newly formed rock pile. Fossils are most often found in the loose shingle on the beach. Not only are the eroding cliffs dangerous but in conjunction with the tide they can be treacherous. The tide can come in quickly and cut you off as quite a few fossil hunters experience every year. Not only are the erosion of the cliff and turning of the tide dangerous but other problems can occur. Lying on all beaches around Whitby are many rocks ranging from small to huge, which can be difficult to walk across and some are deceptively unstable. Many are made slippery by algae, seaweed or water and it is very easy to fall, especially when carrying a heavy back pack. Always try to have both hands free. This brings a final point of safety, wear the correct clothing, personal protective equipment (see later) and appropriate footwear when looking for fossils!

One vital point each fossil hunter should have in mind: you should never hammer at the cliff face or beds of rock on the foreshore because it is unnecessary. If something highly important is spotted in such a location then a museum or specialist should be contacted in order to extract it appropriately and safely. Palaeontologists cannot search the entire coastline and keen amateurs have always played a key role in finding spectacularly rare fossils.

Looking across the rocky beach at Port Mulgrave towards Kettleness in the background.





You must always be aware of potential dangers while out collecting, safety is paramount. Above: landslide near Kettleless. Below: seaweed and underlying rocks cover the beach at Runswick Bay.



Equipment

When most people think of equipment what springs to mind are hammers and chisels which are a basic part of a fossil hunter's kit. Not just any old hammer or chisel though; many people make the mistake of trying to use toffee hammers and basic chisels to crack open fossil containing rocks. This is more dangerous to the collector than to the fossil as the hammer may splinter and cause injury. It is not necessary to buy expensive equipment, all you need for a successful trip is a good, strong, geological, rock or brick hammer with stone chisels, ideally with guards, small plastic bags to put your finds in, bubble wrap/cloth to wrap fragile specimens, goggles to protect your eyes from bits of rock when hammering, a hard hat (though you shouldn't venture under cliffs) and a strong backpack to carry it all, and something to eat and a drink to maintain energy levels. A camera is useful because it allows you to take images of the fossils embedded in the rock, and of the location where you are collecting. It is rare to see a fossil hunter fully equipped with geological maps, glues, dental picks, notepad, pen, tape measures etc. However, once you have become fully engaged with this fascinating endeavour you can branch out into additional kit. Make sure you have an understanding of what equipment the location you are planning to visit requires, because sometimes the area may not warrant tools such as hammers, and might need only a keen eye and strong back to bend down and pick up specimens. Do remember to keep hammering to a minimum.



Some of the equipment used by fossil hunters - discussed above.

Fossil hunting is for everybody!

No matter what your age, everybody is able to participate in fossil hunting and from the instant you find your very first specimen you are likely to be hooked. Remember, you are the first person to find and see that fossil that was once a living, breathing organism many millions of years ago. Furthermore, you may have even discovered a species new to science.

There isn't really much skill to fossil hunting but naturally a planned trip tends to produce the best results in terms of fossil finds. Think about it. If you go fossil hunting armed with a basic understanding of the geology and what fossils you may be able to find in a specific area, you have a higher chance of finding fossils and indeed better, more complete specimens. Nonetheless, novice fossil hunters make some of the best and most significant new discoveries. Patience is a virtue when it comes to fossil hunting, because it can take a considerable degree of time before you get your eye in and begin to find much. Much of this comes down to noticing shapes (for example, be sure to look for rounded nodules with fossils poking out), structures and patterns that stand out from the surrounding rock. You may be able to visualise what the fossil looked like in life and catch a glimpse of planet earth when it was populated with all kinds of fascinating animals and plants that are now extinct! Many fossils along this coastline can be found in large boulders and blocks, and it is best to leave such specimens, perhaps take a photograph of the specimen as it is, rather than attempting to remove it and most probably destroying it in the process. Most fossils found here belong to organisms that lived in the sea, although some (notably dinosaur footprints and plants) are of terrestrial (lived on land) origin.

As you will discover through reading this book hundreds of fossils are found embedded in large rocks such as this chunk of lignite (coal-like material) from the sandstones (Aalenian) at Saltwick Bay. Such specimens (including footprints) are best left alone, perhaps take a photograph. Do not attempt to remove such fossils as you will destroy the individual. Unnecessary hammering is prohibited.



Responsible collecting

Fossil collecting is a relaxing, rewarding and thoroughly enjoyable hobby. However, be considerate towards others – and nature – and **do not over collect specimens**. Take one fossil, leave the rest. There is no real need to collect twenty specimens of the same ammonite, leave some for others to find. A small part of an ammonite or a common bivalve may lose its value to you once you are experienced at finding fossils. However, any specimen collected or seen should always be taken with care and never intentionally destroyed! That unwanted specimen has the potential to stimulate the imagination of a beginner and even initiate a life-long passion for palaeontology – if possible, take it back to where you found it or give it to someone who will appreciate it. Always remember that each fossil you find was once part of a living thing. It is rare for any organism to preserve in the fossil record and they have been there for millions of years, so consider carefully before you attempt to remove one. Do not forget that fossils are very important. Palaeontologists around the world research and publish their findings on fossils in scientific journals. This includes fossils from Whitby and its surrounding areas.

Hildoceras bifrons

Age: Lower Toarcian
Whitby Mudstone Formation
Alum Shale Member
Location: Saltwick Bay
Occurrence: Reasonable
Lomax Collection

This specimen was discovered as a positive and negative specimen. The positive of an ammonite is the actual fossil itself, whereas the negative is the impression. In most cases the negative can display just as much detail as the positive. Note the differences between this and the previous species.



The life reconstruction of a *Hildoceras* ammonite displays a dark v-shaped structure below the eyes. This is the aptychus. It was previously suggested that the aptychus functioned as an operculum (a sort of opening and closing ‘door’), but in more recent years the aptychus has been considered to be part of the jaw apparatus.

Reconstruction of a *Hildoceras*



Pseudolioceras lythense

Age: Lower Toarcian
Whitby Mudstone Formation
Alum Shale Member
Location: Port Mulgrave
Occurrence: Reasonable
Smith Collection

Often many ammonites are found together, referred to as life or death assemblages. Other fossils may be found with them, such as the small chunk of bone (probably a rib) in the specimen illustrated.



Eleganticeras elegantulum

Age: Lower Toarcian
Whitby Mudstone Formation
Mulgrave Shale Member
Location: Sandsend
Occurrence: Reasonable
Smith Collection

Some of the chambers of this ammonite are visible and display a beautiful structure. Often *Eleganticeras* is found in extremely rounded nodules termed ‘cannonballs’.



Ovaticeras ovatum

Age: Lower Toarcian,
Whitby Mudstone Formation
Mulgrave Shale Member
Location: Sandsend
Occurrence: Rare
Smith Collection

Ovaticeras, *Pseudolioceras* and *Eleganticeras* have very similar ribbing, it orientates with a slight ‘kink’ in the pattern. Also note the prominent keel of *Ovaticeras*.



Dacryomya ovum
 Age: Lower Toarcian
 Whitby Mudstone Formation
 Alum Shale Member
 Location: Whitby
 Occurrence: Very common
 Doncaster Museum
 DONMG: ZG2682



Cardinia listeri
 Age: Upper Sinemurian
 Redcar Mudstone Formation
 Location: Robin Hood's Bay
 Occurrence: Reasonable
 Whitby Museum
 WHITM: GEO3644



Probably *Ceromya* sp.
 Age: Upper Pliensbachian
 Cleveland Ironstone Formation
 Location: Kettlewell
 Occurrence: Uncommon
 Whitby Museum
 WHITM: SIM343.1



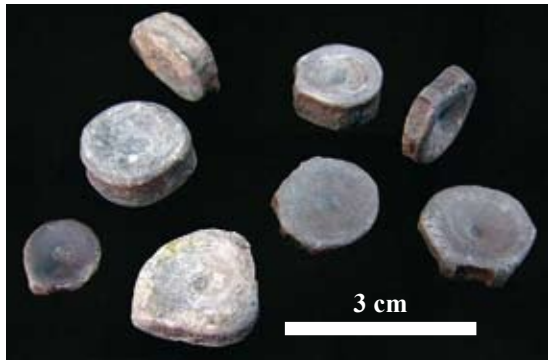
Pseudolimea sp.
 Age: Lower Toarcian
 Whitby Mudstone Formation
 Location: Port Mulgrave
 Occurrence: Very common
 Hyde Collection

These bivalves are found in mass accumulations. They are usually found in worn nodules, which once cracked open yield detailed individuals.





Ichthyosaur skull and close up of teeth
Stenopterygius sp.
 Age: Lower Toarcian
 Whitby Mudstone Formation
 Location: Probably Kettleless
 Occurrence: Rare
 Manchester Museum
 L.7543



Selection of small ichthyosaur vertebrae
 Age: Lower Toarcian
 Whitby Mudstone Formation
 Location: Sandsend
 Occurrence: Common
 Smith Collection



Medium-sized ichthyosaur vertebrae
 Undetermined species
 Age: Lower Toarcian
 Whitby Mudstone Formation
 Location: Ravenscar
 Occurrence: Uncommon
 Manchester Museum
 REP.061



Ichthyosaur jaw section with teeth
 Probably from a small
Temnodontosaurus sp.
 Age: Lower Toarcian, Whitby
 Mudstone Formation
 Location: Whitby
 Occurrence: Uncommon
 Smith Collection



Articulated ichthyosaur vertebrae
 Undetermined species
 Age: Lower Toarcian
 Whitby Mudstone Formation
 Location: Sandsend
 Occurrence: Uncommon
 Smith Collection

Dinosaurs

In reference to Whitby and the Yorkshire Coast the name 'Dinosaur Coast' is a little misleading. Whitby has yielded some bone material tentatively identified as dinosaur but it is extremely rare. However, finding dinosaur remains is not impossible and if anything was discovered it could be of utmost importance. It is the marine reptiles that are often confused with dinosaurs and labelled 'swimming dinosaurs' which is incorrect because the marine reptiles were not dinosaurs. However, we know dinosaurs lived here during the Jurassic Period because numerous footprints have been discovered near Whitby. The footprints are preserved as natural casts in epirelief; they have been attributed to theropod, sauropod, ornithopod and even thyreophoran dinosaurs. However identifying what particular dinosaur made the footprint is near impossible. Dinosaur footprints, although present in large numbers, are difficult to find and often need a bit of imagination when visualising some fossils, as erosion has often 'deformed' specimens on the beach. Most dinosaur footprints are found in huge, impossible to carry boulders. Please do not try and remove dinosaur footprints as you will destroy them. Allow others to see and learn from such specimens.

This footprint belongs to either an ornithopod or theropod dinosaur. Note the tridactyl (three-toed) print.



The large, flattened and spherical surface indicates this print may belong to a sauropod dinosaur. Note the strong toe impression at the bottom.



Both of the above have been taken from the image opposite.

Theropod/ornithopod (bottom) and probable sauropod (top) footprints
Age: Aalenian
Saltwick Formation
Location: Saltwick Bay
Occurrence: Uncommon
Hammer = 32.5 cm



Glacial erratics 'derived fossils'

Not all fossils found at Whitby originate from the Jurassic Period. There are numerous pebbles containing corals from the Carboniferous Period (around 330 million years ago) and mammal bones and teeth from more recent times including the Pleistocene (2.5 million–12,000 years ago) and Holocene Epochs (12,000 years ago–modern day) of the Quaternary Period. These fossils and unusual rocks found with them are known as glacial erratics. The glacial erratics were transported here by glaciers during the last ice age which finished around 12,000 years ago. It is difficult to pinpoint the exact location from which the fossils originated, however it is not impossible because you may be able to link specimens from Whitby with specimens found in other more northerly locations such as Scotland!

Coral
Siphonodendron sp.
Age: Carboniferous Period (Visean–Namurian)
around 330 million-years-old
Location: Whitby
Occurrence: Very common
Lomax Collection



Coral specimens such as those illustrated are often discovered in large numbers. They may look worn and rather dull, but once you put one in water you see a completely different fossil with beautiful detail! This huge coral erratic was found lying on the beach at Kettleless. Hammer = 32.5 cm.



Ammonite erratic
Psiloceras erugatum
Age: Hettangian
Redcar Mudstone Formation
Location: Runswick Bay
Occurrence: Uncommon
Manchester Museum
LL.5720



Ammonite and carboniferous fossils are the most common glacial erratics to discover. Though it must be said, any fossil found further down the coast and not from its usual collection site is considered an erratic.

Isolated crinoid stem
Age: Carboniferous Period (Visean–Namurian)
around 330 million-years-old
Location: Whitby
Occurrence: Common
Hyde Collection



Pleurotomaria cognata
Age: Lower Sinemurian
Redcar Mudstone Formation
Location: Staithes (originally from Redcar)
Occurrence: Uncommon
Yorkshire Museum
YORYM: 2005.813.2



Hexactinellid sponge
Hyalostelia-type root tuft
Age: Carboniferous Period (Visean–Namurian)
around 330 million-years-old
Location: Runswick Bay
Occurrence: Reasonable
Robinson Collection



The tiny pterosaur: Pterosaurs, pronounced ‘teh-row-sores’ with a silent ‘p’ were some of the strangest and most fantastic animals ever to have lived. They were flying reptiles that soared in the skies around Whitby at the same time that the marine reptiles lived in the ocean. Only one pterosaur specimen has been recorded from the Whitby area and belongs to a species called *Parapsicephalus purdoni*. It is the only known specimen and consists of a partial skull with a cast of the brain cavity visible. The fossil is kept in the collections of the British Geological Survey (BGS). Pterosaur fossils are usually rare, most probably due to their fragile, hollow bones. The specimen was found at Loftus Quarry near Whitby in the 1880s, although theoretically, future discoveries could be made at any of the locations discussed in this guide! If any other pterosaur material is discovered, it should be reported to a museum.



Parapsicephalus purdoni
British Geological Survey
BGS GSM 3166 (holotype)



Reconstruction of *Parapsicephalus purdoni*.

Fossil extraction and preparation

One thing people repeatedly ask is “how do you crack/get fossils out of the rocks?” The theory is relatively simple, but in reality it can be very difficult to extract specimens from the rocks that entomb them. For an ammonite specimen inside a nodule the easiest and most convenient way to remove the specimen (this is not the best way for all fossils) is to first of all secure the fossil between two strong rocks (if on the beach) so that the specimen will not roll over or move. Once secure you are ready to use your hammer and chisel to crack open the nodule. Make sure you wear your safety goggles when using these tools. Aim the chisel along the junction between the shell and the rock if the ammonite’s keel is visible. Or you can just use your hammer, relying on the plane of weakness between the ammonite and the rock to allow it to ‘pop’ – nodules from some beds do this more easily than others. Do not worry too much if you break the specimen, about one in three Whitby ammonites split awkwardly and end up cracking. This is not necessarily the user’s fault, but is due to how the ammonite was fossilised. However, remember that hammers and chisels should not be used just to hit rocks at random in the hope of finding a fossil. They need to be used properly in order to extract fossil specimens and should be used responsibly. Preparing some fossils can be a lot more difficult because it can include the use of air-powered tools such as air ‘pens’ and air abrasive units, which remove the surrounding rock (matrix) from the fossil. These tools are expensive and it may be better to let a specialist prepare some of the fossils for you, especially if it is something rare. Remember that every fossil is unique and that if you destroy a specimen it will be gone forever! You can improve the appearance of your fossils further by polishing them with wax, such as bees wax or similar. Although please be aware of your fossil’s potential importance and make sure that it is not something unique beforehand because the use of waxes and glues can damage specimens and be difficult to remove.

Three stages to finding and extracting a fossil

1. Find a promising looking nodule.
2. Safely secure the nodule.
3. A fantastically preserved pos/neg ammonite *Hildoceras bifrons*.

