ROCKWATCH

GEOLOGY, FOSSILS AND MAPPERTON

Exploring fossils, geology and the bubonic plague at Mapperton Quarry in Dorset

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ROCKWATCH
EVENT SERIES 2020

Geology, Fossils and Mapperton

Mapperton is a small village between Bridport and Beaminster in Dorset. In this area there is a quarry previously known as 'Sheepwash quarry' that is of considerable geological interest. As the name suggests the quarry used to be used to wash sheep. There was a gate with a pit to keep the animals free of disease by bathing them in disinfectant. In early times many village residents were killed by the plague.

The 'posy tree' remembering plague victims at Mapperton

Question: When did the Bubonic Plague happen?

Until recently a tree stood near the quarry reminding us of those who lost their lives. The tree has now gone having rotted and become unstable over the years.

We will make a virtual visit to the quarry, now known as Coombe quarry commemorating those who died and highlighting some interesting history of the area. This is rather relevant now as our visit has been postponed by Corona virus.
Hopefully we can return at a later time?

The quarry we will visit stands on some of the highest ground in the area. It consists of limestone deposited as part of the Jurassic System (the rocks deposited during the Jurassic Period) around 175 million years old. The limestones are called 'Inferior Oolite'. In this case 'Inferior' means below the rocks of the Great Oolite commonly seen around Bath.

Coombe Quarry viewed from the air

Question: What is an oolite? Now look it up!

Part of the quarry face at Mapperton exposing the Inferior Oolite Formation.

In the 1990s the site was purchased to house farm buildings and this involved clearing the faces of the old quarry. It turned out that the site had lots of fossils, some of which had not been recorded before.

In the 18th and 19th centuries, life in the area was very hard. Early records of the geology nearby come from a site now completely gone, known as Charity Ground Quarry. This was very close to Coombe quarry, which at that time may not have existed. Charity Ground would have been used to find employment for people who had fallen on hard times.

During the Jurassic Period, Dorset was at the western end of a channel linking two oceans - the Pacific and Tethys. At this time the Atlantic had only just begun opening.

Question: What are the weather conditions like today at 35⁰ north of the equator? That's about where Britain was in the Jurassic Period.

The fossils we find are those of the animals that lived in our waters at the time. They are all marine, mostly of organisms with shells that preserve well as fossils.

Many of them are ammonites. Ammonites are Cephalopods, very distant relatives of Octopus, Nautilus and squid.

Question: What does the word cephalopod mean?

One question that interests' geologists is 'how old are the rocks we study?' To give a number in millions of years is not possible from the information at Mapperton alone. Ammonites can be useful in this respect as they can be used as geological clocks. Different ammonites occur in each different bed of layered sedimentary rock. In fact, in some beds it is possible to find different levels with different ammonites. We say that the ammonites come from different horizons. By placing the horizons in order, lowest, therefore oldest first, it is possible to construct a relative time scale that can be used to compare rocks with ammonites in different places and see what is present or missing. This type of study is called **'biostratigraphy'**.

The pictures below show a number of the ammonites that occur at Mapperton - some common and some very rare. Ammonites are easily big enough to see, are common and changed (evolved) rapidly. We can use the different ammonites to compare rocks that contain them all over Western Europe. This is called correlation and it allows us to build a relative time scale. Ammonites in higher rock beds must be younger than those below and so on.

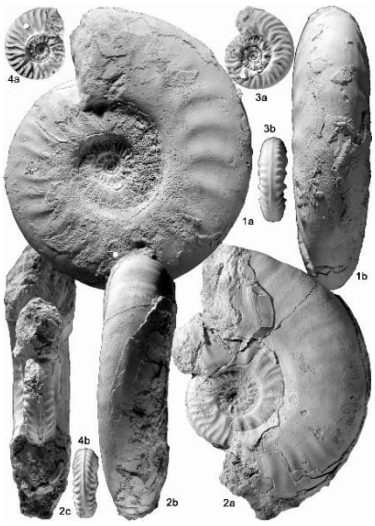
This ammonite is called *Sonninia*, it is typical of one of the beds at Mapperton that we call the 'mush bed' (see bed 3 in the quarry section below).

Sonninia ammonite

This ammonite is called *Hyperlioceras*, it occurs with *Sonninia*. *Hyperlioceras* is what we call a guide fossil. It is found in a zone of rock called the Discites Zone. So, if we find these two ammonites we know we are in the rocks of the Discites Zone.

Hyperlioceras ammonite

Some of the oldest rocks exposed at the quarry contain ammonites that are common but not well represented elsewhere. They belong to a group called *Leioceras*. This picture shows the selected specimens that has the new name *Leioceras comptocostosum*. These we call the type series of a new species.



Leioceras comptocostosum

Recently I have discovered a new horizon that contains ammonites that are new to science and have only been described before in southern Europe. The owner of the quarry is called Mr Higgins. He has been working with me on the fossils at the quarry for 40 years. I thought it was only right to name an ammonite in honour of his family. This is one of the type specimens of *Docidoceras higginsi*.

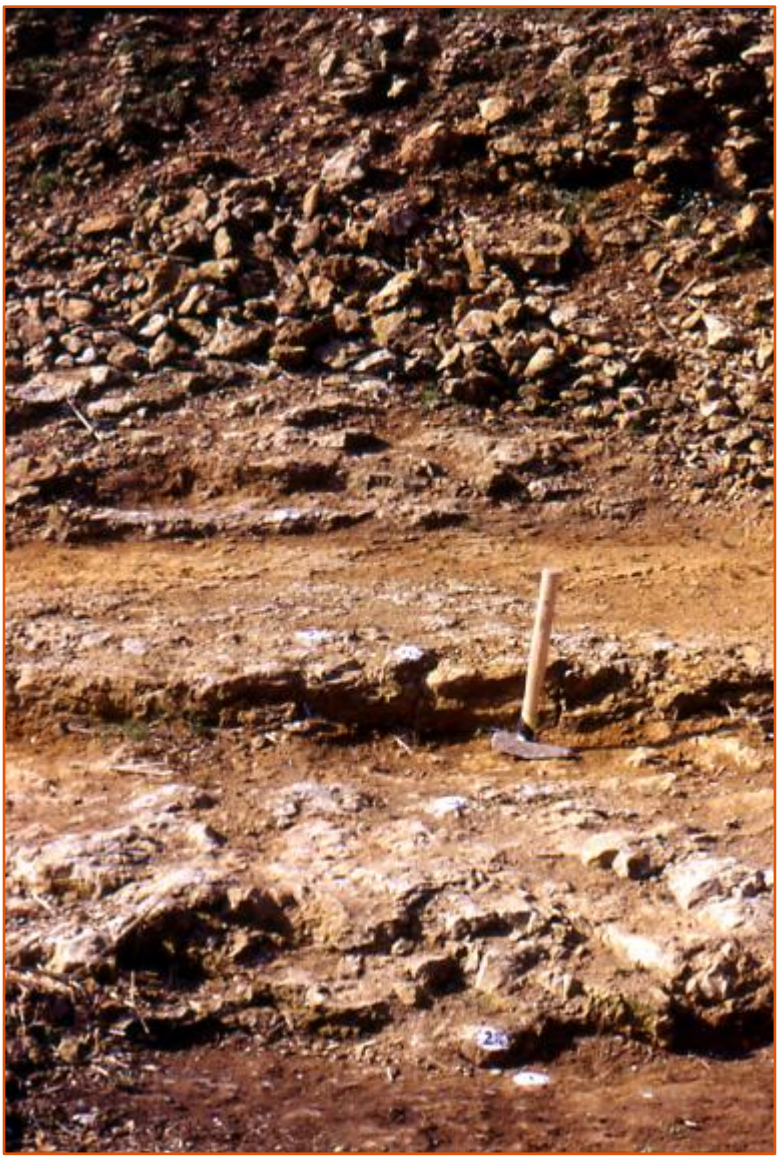
Docidoceras higginsi

The next image shows a section of the rock beds we see at Mapperton.

The bed at the bottom is the oldest and must therefore contain the oldest ammonites, the *Leioceras* specimens shown above.

You can see that when I work at Mapperton I label each bed.

It is very important to record your finds, write a label for the fossils with a bed number and take a photograph of the rock face where it was found. You can add a ruler or your hammer as a scale.



Of course, there are other fossils apart from ammonites.

Ammonites are completely extinct but you may recognise some types of creature that still exist in this picture.

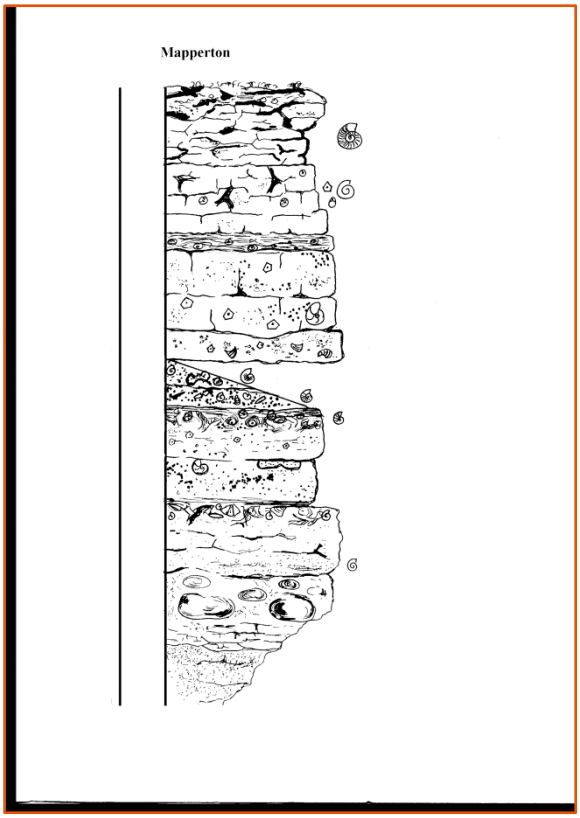
Question: Can you identify, snail shells and mussel shells? Where do you think these creatures lived?

Swimming in the sea, living on the sea bed or on the beach?

Are the shells badly broken? If not, why would you think they were not fossilized on a beach? Next time you visit a beach look at the edges of the shells that have been rolled around on the beach.

In fact, the ammonites did swim and only fell to the sea bed to be preserved after they had died. So, we find them where they are preserved, not where they died.

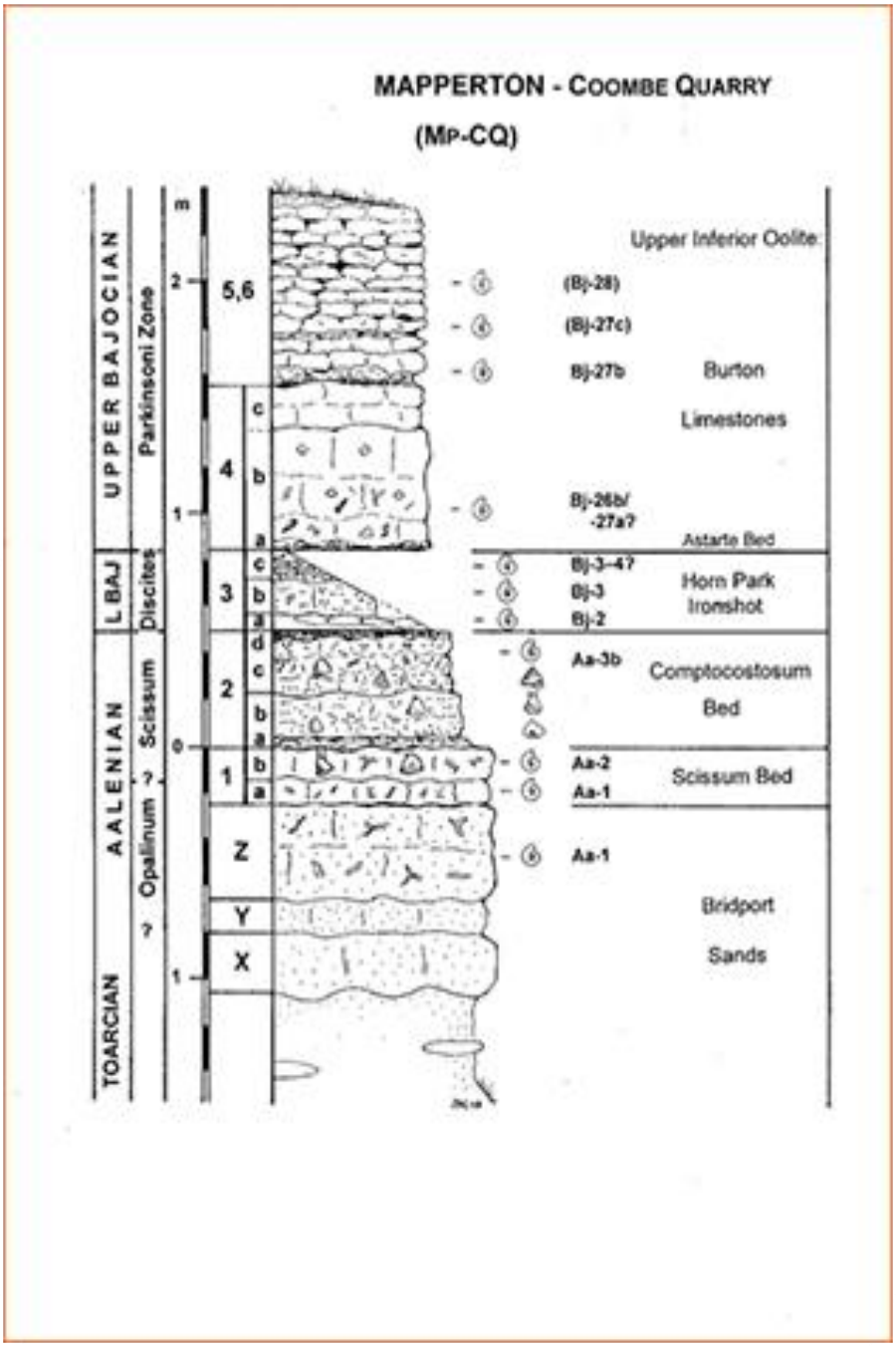
When I first visited the quarry, I made a drawing called a section of the rock beds that I could see exposed. Here is the drawing.



The softer beds stick-out less than the hard beds and I have drawn fossil symbols to show where I found ammonites.

Question: Why do you think I drew small ammonites next to some rock beds?

I have now written a geological report about the site and how interesting the fossils are. See the next image for a lot more detail.



We use library books and the work from earlier visitors to name the rock beds and we use codes to identify the age of the rocks. Finally, I was able to publish the work at the quarry. The names on the chart above are geological terms used for rocks and their ages. I also use codes for the horizons that I find in the field.

Nearby there are other quarries and we can use the information from Mapperton to make comparisons.

PLEASE REMEMBER THE QUARRY IS PRIVATELY OWNED AND VISITORS ARE NOT PERMITTED OTHER THAN AS PART OF A ROCKWATCH VISIT.

Acknowledgements

I am grateful to the Higgins family, particularly Mike Higgins for allowing Rockwatch access to his property and for the constant collaboration he has offered over many years. I thank the late Professor John Callomon for scientific collaboration at Mapperton, also the late Andy (Walrus) England, William Jones, Andy Steadman and John Whicher who provided the aerial view of the site.

I hope you will be able to join me at the quarry soon.

Regards

Robert

Answers to questions

- The Bubonic plague arrived in Europe in 1347.
- Oolite is a term used to described small egg-shaped grains of limestone. Some are made by being washed back and forth on the seabed. The ooliths at Mapperton are iron ooliths formed by microorganisms on the sea floor.
- In the middle part of the Jurassic Period southern Britain was roughly where southern Portugal is today. It would have been warmer than Britain today.
- Cephalopod means ‘head foot’. An organism that uses its head as a foot.
- In the picture you can see mussel shells. These are bivalves (molluscs with two halves to the shell). You can also see gastropods, snails. They use the stomach as a foot.
- If an organism dies in an area where there is no current or waves and is buried by sediment quickly, it will be preserved without damage. If it is in an area with strong moving water it will be rolled and broken. The edges of the shell may be broken and rounded. In many cases creatures like sea urchins and sponges destroy the shell before it becomes a fossil. So remember, if a rock seems not to have fossils, they may have been there and were destroyed before they became fossils.

Some important words explained.

- Stratigraphy is the study of layered rocks. Biostratigraphy is the study of dividing the rocks up by the fossils they contain.
- You will notice that some words have capital letters in the middle of sentences. This is correct and it is a standard used by geologists e.g. Bajocian, Jurassic, Formation, Inferior Oolite etc.
- Scientific names of fossils are written in italics. The first name or genus starts with a capital letter. The second name or species is lower case. *Leioceras comptocostosum.*
- A Period is a time unit. The Jurassic Period occurred between about 205 Million years ago to about 146 Million years ago. The Jurassic System is all the rocks that were created in the time of the Jurassic Period.
- The fossils in the pictures are not shown as they were found. They have been extracted from the rock using modern techniques (air pens and abrasive powder blasting).

This is what the fossils may look like when you first break them out of the rock with a hammer and chisel.

IMPORTANT! You must follow the Geologists' Association Code of Conduct and always wear safety equipment and eye protection. See the Rockwatch website for details about the Code.

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