U3A geology field trip to Eype. November 2020

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The group managed to fit in two socially distanced field trips to Eype before the second lockdown started in November. There were two main aims to this trip,

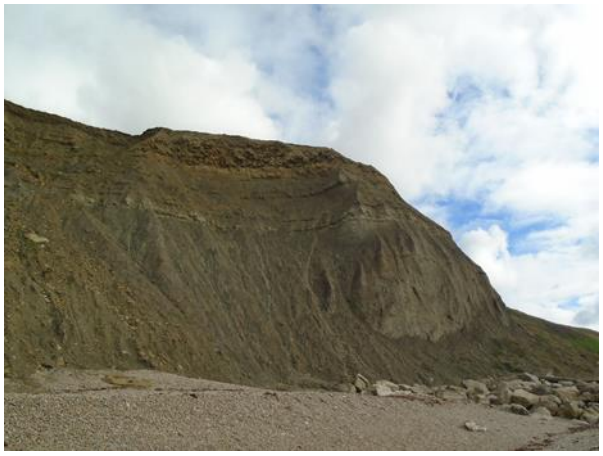
1. Review part of the lower Jurassic in the Dyrham formation (Middle Lias)

2. Observe the Eype mouth fault which can be observed at the eastern side of the beach.

The Dyrham formation at Eype is comprised of Eype Clay, seen at beach level, with overlying sandstones of the Downcliff Sand and Thorncombe Sand. During the trip we observed rounded calcite doggers (concretions) of the Thorncombe Sand which litter the beach after landfalls. At the base of the Downcliff sand is the Starfish bed. Although not clear in the cliff it is possible to find blocks of this sandstone on the beach containing the remains of fossilized starfish. These starfish were caught up in a large catastrophic storm and buried instantly.

Walking east several very large sea bleached limestone blocks on the shoreline were observed. They contained ammonites and belemnites and some very rare Neptunian sills which were formed by vacuum injection of sediment during Jurassic fault movement. This is the Beacon Limestone (former name, Junction Bed). This bed is a highly condensed limestone, meaning that it was a relatively thin deposit formed over 6 to 7 million years. These blocks had fallen from above the Thorncombe sand in the cliff. This limestone has a maximum thickness of 3m in the cliff section and it was noticed that above it was another clay layer, the Downcliff Clay. This clay is the base of the Bridport Sand formation.

We walked further east past the limestone blocks identifying the rock lithologies and noticed getting closer to West Bay the rock types had changed dramatically.



At the base of these cliffs we identified another clay lithology, Frome Clay, which had also been identified in a previous field trip to Hive Beach. At the top of this clay section a very prominent limestone band could be traced along the cliff section. This was the Boueti Bed. Named after a fossil brachiopod (shell) that is found in it. This layer defines the base of the Forest Marble formation. It should be noted that this is not a classic metamorphic marble. The term marble here is used by stone masons for a rock takes a shine when polished. The lower 15m is of shales and clays. At the top is a more consolidated grey weathered sandy calcareous mudstone. The rocks on

this side of the beach are of younger age (Middle Jurassic, part of the Great Oolite group) than the rocks seen at the start of this trip. What had caused such a change in a short distance? To understand this, we had to trace our steps back west to where we observed the bleached limestone blocks and then look up to the cliff.

At this location (see picture right) we can see the dramatic change in lithology near the center of the picture. At this location we observed the Eype Mouth Fault which is part of a larger Jurassic age fault network which extends over Dorset and offshore. Here the younger sediments of the middle Jurassic (on the right side) have been downfaulted by as much as 210m against the older Lower Jurassic (Dyrham formation) on the left. The actual fault plane can also be observed by a very smooth surface, dipping to the south.

On the 15th of November this exact location suffered a major cliff collapse, shown in the photographs above. The collapse was caused by the porous sandstones of the Thorncombe and Down Cliff sands sitting on top of the impermeable Eype clay. Water pressure and gravity within the sandstones created a slip surface at the junction with the Eype Clay and a catastrophic failure in the rocks occurred. This same process is happening all over the Jurassic Coast.

We walked further west towards Thorncombe Beacon observing again the Dyrham section. It was explained that the layers making up Thorncombe Beacon included the Jurassic Eype Clay, Down Cliff Sand, Thorncombe sand, Beacon Limestone, Downcliff Clay and Bridport Sandstone. However on top of this sits two Cretaceous layers, Gault Clay and Greensand. So what happened to the rest of the Jurassic layers above the Bridport Sand?

During the early Creataceous there were significant earth movements that caused uplift, some folding and tilting of layers from west to east. The uplifted layers

were eroded down. Then the sea started to transgress (invade) landward and deposit the Cretaceous sediments. The junction between the Jurassic and Creataceous sediments here is known as the Great Unconformity and it is an angular unconformity to give it the correct term. This angular unconformity is seen across the Jurassic Coast and Cretaceous sediments sit on more older sediments as you go west. The Cretaceous sediments back step the older sediments.

The plan is to continue the field trips west with the next trip planned for Seatown to look at the upper part of the Lower Lias.