



An intriguing new vertebrate fossil from Lyme Regis

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Discovery of the material

The first piece of this specimen was found by Nigel Larkin on the beach beneath the Spittles Slip east of Lyme Regis during the SVPCA meeting in the town in September 2011. It was a large (approximately 40kg) block from the Shales-with-Beef Member of the Charmouth Mudstone Formation (Lower Jurassic). Bones were visible in cross section on all four sides in a layer about a third of the way down into the block. Due to weathering, some aspects of the bones other than simple cross-sections were slightly visible. The block was taken from the beach and shown to colleagues at the conference. After reporting it to staff at Lyme Regis museum and to Richard Edmonds, the Earth Science Manager of the Jurassic Coast World Heritage Team, more material was found by local palaeontologists Paddy Howe, Chris Andrew and Mike Harrison.

The specimen then comprised one large block and fourteen smaller blocks, many of which joined up to form a second large block (those that did join have been glued back together). Two pieces recovered from high on the slip were part and counterpart and were not glued back together as they show so many interesting features on their broken surfaces. As all the blocks recovered contain bones or fragments of bones (spread over 102cm in the longest axis) it is clear that the complete specimen must have been much bigger.

Despite many bone fragments being visible naturally, no-one was able to positively identify any of the elements. Therefore the specimen was regarded as potentially of significant scientific importance and as a result it was recorded as a category 1 specimen in the West Dorset Fossil Collecting Code of Conduct (record number 273) and the specimen was donated to Lyme Regis Museum. Funding was then provided by Dorset County Council to undertake a limited amount of initial preparation to facilitate the identification of the material.

Preparation and conservation

The rock was very hard and the bones were generally very small, fragmentary and brittle and lay in unpredictable positions. Using sodium bicarbonate powder with a swabblaster airabrasive unit cleaned the bone fragments nicely when found but it was not strong enough to remove of the overlying rock on its own. More aggressive powders could have been used to remove the rock but these would have been far too damaging to the bones. Therefore the top couple of inches of each block had to be removed with a pneumatic preparation pen (Ken Mannion's 'ST' tool) down to the level of the bone layer - which was less gentle than ideal.

Bones that were visible in the breaks between adjoining pieces were inevitably in poor condition as they had been damaged on the beach or during their time in the slip. However, the rock was in good enough condition that the adjoining pieces could successfully be glued back together.

The surfaces of the breaks were treated with a couple of applications of Paraloid B72 (a reversible methacrylate co-polymer) in acetone at 5 to 10%, before Paraloid B72 adhesive was applied and the pieces left at a suitable angle for the glue to set. When all the smaller pieces had been glued back together and prepared, their undersides were treated with Paraloid B72 consolidant (in acetone at 10%) to form a reversible protective barrier layer. Then plaster of paris was applied to the undersides of these pieces to make the specimen a uniform depth (the blocks as found were all of different thicknesses) and to give it additional mechanical strength so it was less likely to fall apart when moved.

The pieces that had been split while on the slip were not glued back together as this would have involved losing some useful information. All chips of rock more than 2mm in size (amounting to about 10kg) have been retained in case they are useful for research, i.e. looking at microfauna to determine the environment the specimen is from.



Richard Edmonds trying to work out which piece goes where...

The various pieces laid out in position before preparation and not yet glued together.



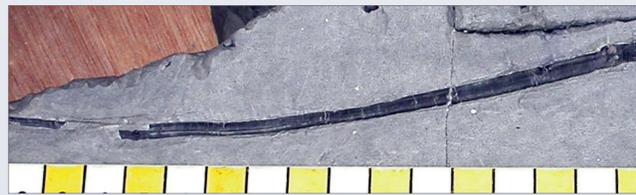
The bones



Above left, the main block during preparation, with some of the overburden removed front and right). Above right, Bone 1 (long axis 53mm).



Above left, Bone 2 (long axis 48mm). Above right, tiny sections of slender bone (fin bones?) in a pocket of much softer sediment, which occurs several times (Bone type 3).



Above left, Bone 4, a bifurcating rib? (cm scale). Above right, Bone 5 (long axis 41mm).



Above left, Bone 6 (long axis 73mm). Above right & below, several strange bones (Type 7), almost identical to one another with a distinctive figure of eight shape in cross section.



Discussion, conclusion and a request

Preliminary preparation of all the blocks has revealed a curious association of bones and bone fragments so strange that so far no one has been able to positively identify any elements of the specimen. Ideas have ranged from chondrosteian, sarcopterygian, the actinopterygian *Pachychormus* and even crustacean to regurgitate - and if the latter is true then a mixture of any of these (and more) is possible and further assistance with identification is required.

Colleagues are therefore encouraged to study these images and the specimen itself and to convey their thoughts. All ideas will be warmly welcomed and will be suitably acknowledged in any ensuing publication. So, **answers on a postcard, please!** If you have any thoughts regarding the identification of any of the individual elements please write them down, noting the image number where relevant and please include your email address. Many thanks.

Acknowledgements

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