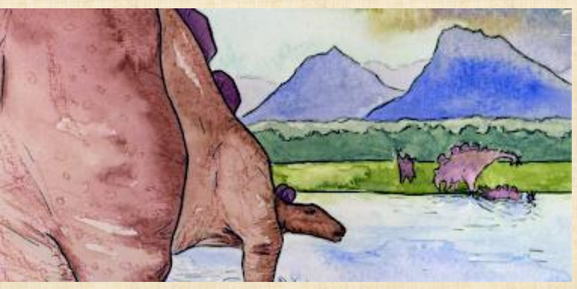

The preparation of the Stegosaur bone from the Isle of Eigg, Scotland.

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Introduction

In 2017, a bone was discovered in intertidal deposits on the Isle of Eigg, Scotland, dating to the Bathonian (Middle Jurassic) – a time period for which dinosaur body fossils are rare worldwide. In addition, this was the first dinosaur bone to be found in Scotland outside the Isle of Skye.

However, the bone had been exposed to weathering, scavenging and transport before burial making the surface less than robust. Compounding this, prior to its discovery it had been partly eroded away by tidal action, leading to the loss of the middle portion of the bone (Fig. 1). Thankfully, the fragile bone was preserved in a relatively hard sedimentary rock (a calcite-cemented sandstone concretion of the Valtos Sandstone Formation (Fig. 2)) that was more resistant to erosion, resulting in a natural mould of the underside of the missing middle portion still being present. Careful preparation to remove the 70+ kg of rock from around the bone after filling the natural mould with resin ultimately allowed the study of the whole bone, including the morphology of one side of the missing section and the total length of the bone was preserved.

Above: Fig 1. The bone as found, with the middle portion missing.

Right: Fig 2. Careful removal of 70kg of sandstone containing the bone.

Preparation

The pieces of the bone could have been left in the host rock after preparation of the 'top' side as found (Fig. 3). However, this surface had suffered from the depredations intertidal erosion and was extensively damaged, including the loss of the middle section. Careful preparation of the top surface and sides of the bone with pneumatic preparation pens (Kenn Mannion and a Pferd) under magnification revealed that the hitherto unexposed surfaces were in much better condition. Knowing that the 'underside' of the bone preserved better detail meant that the decision was taken to completely prepare the bone and remove it from the rock, but without losing the data preserved in the form of the natural mould of the missing section of bone.

Below: Fig 3. The specimen with the degraded top surfaces prepared.

Therefore, the surfaces of the bone were consolidated with reversible Paraloid B72 consolidant (at 5% to 10% in acetone) to strengthen and protect the bone surfaces; the natural mould of the missing section of bone was then filled with Jesmonite acrylic resin with woven glass fibre matting; then when this had set the top surfaces of both the blocks containing the bone fragments and resin cast were covered in silicone wacker rubber (Silastic 3481 base with 81F catalyst) about 1 to 2 cm thick; when set this was followed by several layers of Jesmonite acrylic resin with glass fibre matting. This rubber and resin jacket was to hold the specimen securely in place so that it experienced much less stress when being turned over and prepared from the underside. The rubber provided the bone with a soft layer to sit on. It also meant that, should the worst happen, a physical record of the top surface of the bone was preserved.

The edges of the two blocks were trimmed with a large petrol-driven circular saw to make them smaller and lighter so that they were easier to handle and, being lighter, should be less likely to damage the specimen when being turned over. After turning the blocks, the removal of the underburden was undertaken with a small pneumatic circular saw (a Draper 75mm air cut-off tool) and preparation pens (Ken Mannion and Pferd) until all of the underside of the bone and the underside of the resin infill of the mid-section was exposed. All of the matrix has been kept for future study.

Below: Fig 4. The complete bone with the Jesmonite acrylic resin middle section cast from the natural mould in the sandstone. There is some excess resin shown in this photo that requires trimming. It was left in place so as not to destroy any data.

Health and safety

When using the petrol-driven circular saw thick gloves, steel toe-capped boots, dust mask and full goggles were worn and the work was done outdoors. All other preparation work took place in a large well-lit glovebox with dust extraction. Regular breaks were taken to reduce the chances of 'White finger', Hand Arm Vibration Syndrome (HAVS) or repetitive strain etc.

Discussion

The fossilised remains of tetrapods dating to the middle Jurassic are very rare all around the world. Therefore identifying this enigmatic bone would be important not just for the Isle of Eigg or for Scotland but would have wider significance for our understating of the terrestrial fauna globally during this time period. The time taken to fully prepare the specimen and preserve the existing data relating to the missing mid-section so that the bone remained 'complete' (about three weeks' work) was easily justified. It enabled the fullest possible study of the specimen.

The bone morphology and histology strongly suggest that this is a fibula of a juvenile stegosaur dinosaur (Panciroli et al, 2020). The surface of the bone was weathered before burial and includes some bite marks, presumably from scavenging after death. The bone was ultimately washed into a shallow sea where it was preserved.

Acknowledgements

Dr Elsa Panciroli found the bone whilst on fieldwork on the Isle of Eigg that was funded by National Geographic.

I thank Dr Panciroli for her evocative artwork that I have mercilessly cropped and used at the top of this poster. Also for Figs.1 & 2. I also thank Professor Steve Brusatte who asked me to undertake the preparation of this challenging specimen.

References

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