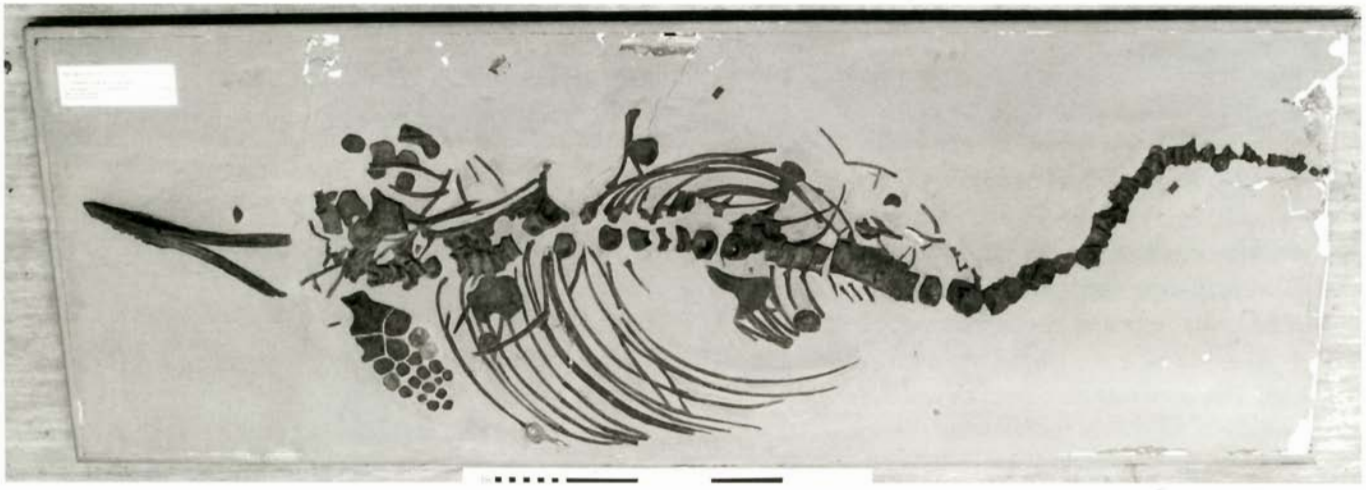
What lies beneath – the conservation of a fossil sea reptile

Routine conservation monitoring of the palaeontological collections in the Department of Geology revealed an ichthyosaur that, on first examination, appeared to require a small amount of remedial work. What was to have been a brief job turned into a major conservation project and resulted in a story that attracted international media interest.

Ichthyosaurs are marine reptiles that lived during the Mesozoic Era, 65-200 million years ago – the same time that dinosaurs inhabited the land. Interpreted in the past as fish, lizards and 'sea dragons', they are now known to be similar in appearance to dolphins, and have large eyes, distinctive long jaws with sharp teeth and limbs modified into paddles.

This particular ichthyosaur was donated to the Cardiff Municipal Museum in the late nineteenth century and subsequently became part of the collections of the National Museum. The specimen is incomplete and comprises the lower jaw, front paddle, ribs, vertebrae and part of the hind paddles. It was prepared originally to partially expose the bone in the rock matrix, then mounted in plaster and supported by a wooden frame, to allow display on a wall. The bones were highlighted in brown paint, and the rock and plaster were covered with several layers of green and grey paint.

The specimen showed evidence of having been restored several times during the twentieth century, although no records exist of this previous work. The restorations included the



Ichthyosaur specimen prior to conservation (1750 mm by 720 mm by 70 mm)

Ichthyosaur specimen after conservation

addition of new plaster and the repainting. A display label attached to the plaster surface identified the species as *Ichthyosaurus intermedius*, and indicated that it had been collected from Street, Somerset. The label described the specimen as *'the greater part of a small individual preserved with but little disturbance of the bones'* – a statement later found to be quite misleading

Examination of the specimen revealed extensive damage, with cracks running through both the bones and the surrounding plaster. Both the specimen and the plaster mount had been painted in a way that obscured previous restorations. Due to the poor condition of the mount and surrounding wooden frame the specimen was at risk of further damage and there was also concern that pieces might be lost, therefore conservation was necessary to ensure its long-term stability. It was also structurally unstable, so we decided to remove all the paint layers and surrounding plaster and to extract the original fossil skeleton and its associated rock matrix.

The paint was chemically and mechanically removed, and during this process it became apparent that the actual skeleton and surrounding rock comprised only a small portion of the specimen, with the greater part being made of plaster. Removal of the paint layers also revealed that several areas had been enhanced. For example, the missing ends of the ribs had been moulded in plaster and then painted to match the rest of the specimen, giving the false impression that areas of the skeleton were complete.

X-radiographs, taken prior to conservation in an attempt to identify any internal damage to the bone and rock matrix, revealed an inconsistency in one section of the vertebral column; a dark shadow surrounded the bones and appeared to be visually out of context. When the paint from this area was removed, it was observed that a channel had been excavated in the rock and individual loose vertebrae had been fixed inside it with plaster.

Beneath the paint layers, the single preserved front paddle of the specimen was revealed to be a reconstruction. All of the bones had been extracted and then rearranged in plaster. 'Bone-shaped *holes' in the surrounding rock matrix suggest areas from which* bones had been removed before being relocated, but it is possible that some bones had come from other specimens.

The biggest surprise came when the paint was removed from the rock surrounding the jaw, revealing it to be a different colour and type to that containing the rest of the skeleton. Not only were at least two individuals involved, but examination proved the head and body to be two different species. This was a specimen that had been greatly enhanced by the original Victorian preparators.

Press coverage of the story!

Once conservation was completed a new support system was required. The size and weight of the original frame made moving and storing the specimen difficult, and a lightweight but strong alternative was required. Supports for the individual pieces of the ichthyosaur were moulded using an epoxy resin laminating paste, and these were attached to a panel composed of an aluminium alloy core faced with a glass epoxy skin.

Although it had been revealed during treatment that the specimen was made up of two different species, it was decided that the head and the body should be mounted together. Some of the old restorations were also retained; the plaster surrounding the paddle and one small area of rib made from a fibrous fill were left intact. The newly mounted specimen was installed in the Museum's interactive Glanely Gallery, in the National Museum & Gallery. Instead of being displayed simply as a taxonomic specimen, the ichthyosaur demonstrates both the recent conservation work and highlights the techniques used by Victorian preparators.

Intense media interest was sparked when the Museum's press office sent out a release to announce a gallery talk for the public on the conservation of the specimen. This resulted in the story being covered in the national and international press in addition to television, radio and the internet, including a live interview with ABC Radio in Australia! The accuracy of the media coverage was very variable, but it did generate enquiries from around the world.

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