

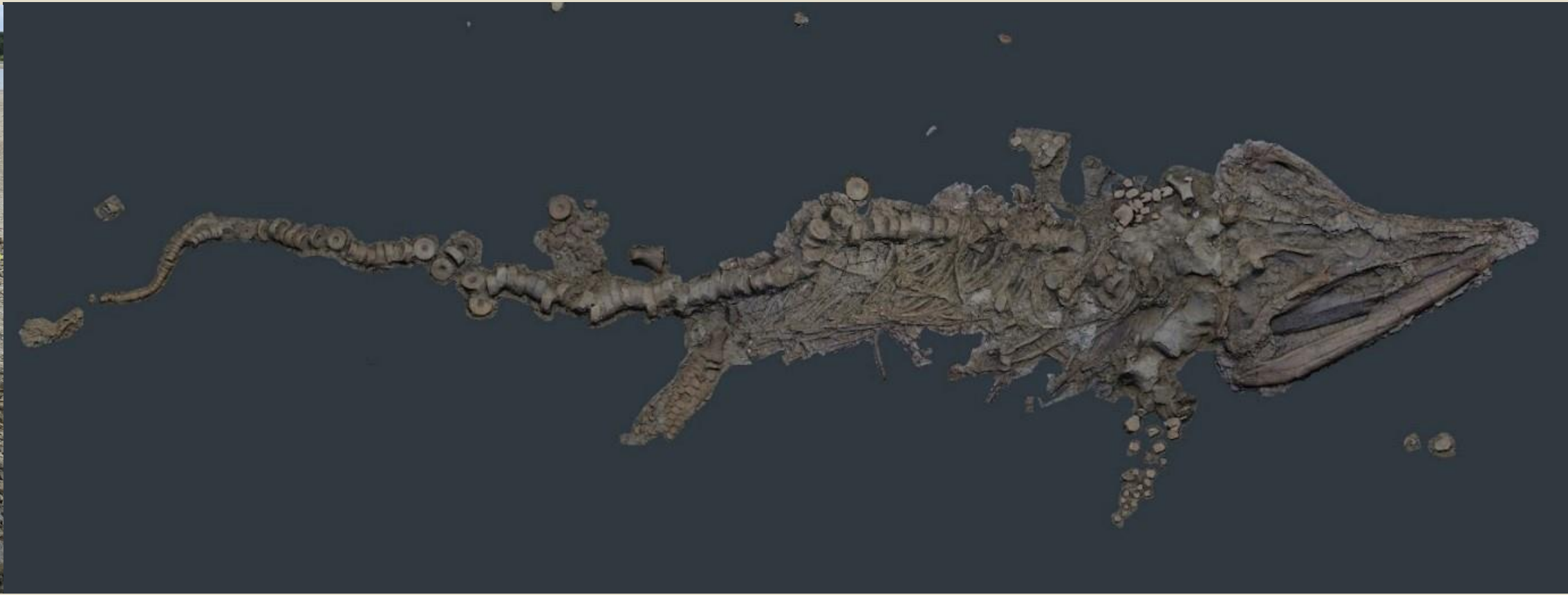
From excavation to exhibition within 10 years (hopefully!): the ‘Rutland Ichthyosaur’ from Rutland, UK.

Symposium on Palaeontological
Preparation & Conservation 2025

Nigel R. Larkin

Natural-History-Conservation.com

Email: nrlarkin00@gmail.com



Discovery and excavation: An almost complete 10m-long *Temnodontosaurus* ichthyosaur skeleton was discovered in Lower Jurassic Toarcian deposits in January 2021 in shallow water at Rutland Water Nature Reserve in the UK during routine maintenance work. This was excavated by a small team of palaeontologists just 7 months later, during the summer when water levels were low enough (above and right). Nicknamed ‘The Rutland Sea Dragon’, the specimen was analysed in situ and recorded (including 3D scanning using photogrammetry – an image from the digital 3D model is above, centre). It was cleaned, excavated and lifted in a series of large plaster field jackets to preserve taphonomic information etc. Significantly, the specimen is the largest ichthyosaur skeleton to have been found in the UK, is almost complete and seems to be the first *Temnodontosaurus trigonodon* to be found in the country, extending the known geographic range of the species significantly.

For almost four years the specimen has remained in storage, preserved and protected in its field jackets, whilst funding and ownership issues are resolved so that the next phase of work can commence: the 2.5 to 3 person-years project to de-jacket, prepare, conserve, record and mount the specimen for display. Extensive research will be undertaken during this phase and all the cleaned and prepared surfaces, including the undersides of the specimen, will be 3D scanned in detail. This work should start in 2025 and be completed by autumn 2027.

The specimen will go on display in Rutland County Museum, which is conveniently located only one mile from the site where the skeleton had lain for 182 million years! However, the specimen is so large that there will have to be a significant project to redevelop the museum building to accommodate it, requiring fundraising and significant building works. The specimen will be ready for display before the building work is completed.

Research and outreach: In the meantime, research on the specimen (identification, taphonomy, tooth microwear etc) is being led by Dr Dean Lomax, an ichthyosaur specialist, together with Dr Mark Evans, an expert in marine reptiles. The detailed digital 3D model made from the photogrammetric 3D scan by Steven Dey of ThinkSee3D (see the image above, centre) is being used extensively for research and outreach, including printing life-size banners of the specimen (right) that are orthographic so accurate measurements can be taken. The digital 3D model has also been used for making videos and animations that bring the skeleton to life (use the QR code, right, to see an example).

Below, the abdomen section after cleaning in the field, prior to being protected by a plaster field jacket. Right, the same section being lifted from the ground and moved offsite. Note the specimen was not ‘Flipped’ – this would be an unnecessary and risky procedure for such a large (1.5 tonne!) field jacket. Instead, it is reinforced with wooden beams from below, also used for lifting.



Rutland County Museum redevelopment project: The Rutland Ichthyosaur is an internationally important find but in 2020 another internationally important discovery was made in the county: an almost perfect 11 x 7 m Roman mosaic that uniquely depicts part of the story of the Greek hero Achilles. These two amazing discoveries need to be made available to the public, but the nearby museum has to be completely redeveloped to accommodate them, including building large new display areas.

Interestingly, in 2024 the bone of a very large pterosaur was discovered in a quarry in Rutland. Not only is this one of the largest Jurassic pterosaurs ever recorded, with an estimated wingspan of 3.5-4.0 m, but it is the first recorded globally of a Bajocian age (Withers et al 2024). Also, in 1968 a partial ~15 m long Bajocian *Cetiosaurus* sauropod skeleton known as ‘The Rutland Dinosaur’ was discovered (currently on display at Leicester Museum and Art Gallery). This is one of the most complete sauropods to have been found in the UK (Upchurch and Martin, 2002). Therefore, Rutland - the smallest county in England - has yielded some of the largest ichthyosaur, pterosaur and dinosaur skeletons to have been found in the UK (representing beasts from land, air and sea), as well as one of the most significant Roman mosaics. The designers of the museum redevelopment, Hayley Sharpe Design, have some amazing specimens to inspire them! Fundraising for the project has started, and the new museum is planned to be a “state-of-the-art cultural and civic centre... a dynamic hub that attracts visitors, supports local businesses, and ensures the long-term sustainability of Rutland's heritage”. The Rutland Ichthyosaur will be the centrepiece of the new museum, and digital exhibits will bring the Ichthyosaur and Roman Mosaic to life, enhancing the visitor experience.



Left, the excavation took place in summer, but this was England: hats and waterproof coats were often needed.

Right, next to the huge skull, three of the excavation team provide a sense of scale.



Plans for the preparation, conservation and mounting of the skeleton: The upper portion of each plaster field jacket will be carefully removed and the bones will be cleaned under magnification, removing more of the Jurassic clay using pneumatic airbrasive units utilising only soft sodium bicarbonate powder. Consolidation and repairs will be made with the well-tested and stable methacrylate co-polymer Paraloid B72. After the upper surface of each section has been prepared and conserved, Steven Dey of ThinkSee3D will record the surface in detail by 3D scanning using photogrammetry. The surfaces of each section will then be protected with silicone wacker moulding rubber and a rigid jacket made out of Jesmonite acrylic resin and fibre glass. A rigid steel cage will be constructed around the new upper jacket and the remaining lower half of the field jacket and chain hoists will very slowly and carefully turn the specimen over. The steel cage will be deconstructed, the remaining field jacket and sediment will be removed and the bones cleaned as before, and the newly revealed lower surfaces of the bones will be 3D scanned in detail. All the scans will be sent to the research team. A barrier layer will be applied to the surface, followed by resin and fibre glass reinforced with steel supports to make a rigid mount, and wheels will be applied. The sections will then be turned the right way up again, ready for research and transport to the museum.



Left, the Rutland Ichthyosaur still stored in its plaster field jackets awaiting conservation, preparation and mounting. Above it is a life-sized and very detailed orthographic print of the 3D scan from which measurements can be taken and which will provide a guide to the opening of the jackets and the preparation of the contents.

References:

- » Larkin, N.R., Lomax, D.R., Evans, M., Nicholls, E., Dey, S., Boomer, I., Copestake, P., Bown, P., Riding, J.B., Withers, D. and Davis, J., 2023. **Excavating the ‘Rutland Sea Dragon’: The largest ichthyosaur skeleton ever found in the UK (Whitby Mudstone Formation, Toarcian, Lower Jurassic).** *Proceedings of the Geologists' Association*, 134(5-6), pp.627-640.
- » Withers, D., Martill, D.M., Smith, R.E., Ashton, M., Chinsamy, A., Wood, C. and Forrest, R., 2024. **A large pterosaur from the Middle Jurassic (lower Bajocian) of Rutland, United Kingdom.** *Proceedings of the Geologists' Association*, 135(6), pp.660-675.
- » Upchurch, P., Martin, J., 2002. **The Rutland Cetiosaurus: the anatomy and relationships of a Middle Jurassic British sauropod dinosaur.** *Palaeontology* 45(6), 1049-1074.

Acknowledgements: With thanks to the Rutland Sea Dragon excavation team (Dean Lomax, Mark Evans, Emma Nicholls, Steven Dey, David Savory, Mick Beeson, Emily Swaby, Phil Rye, Paul de la Salle, Carol Skiggs, Tom Harvey, Natalie Turner, Matthew Butler and Dawn Butler – and Joe Davis who discovered the skeleton. Also, thanks are due to Rutland County Museum, Rutland and Leicestershire Wildlife Trust, Anglian Water, Rutland Water Nature Reserve and Rutland County Council. Funding for the excavation and immediate post-excavation conservation was provided by Anglian Water, The Pilgrim Trust, the Rutland and Leicestershire Wildlife Trust, Rutland County Council, The Curry Fund of the Geologists Association, The Palaeontographical Society and Museum Development East Midlands.