Sticking your neck out: How did plesiosaurs swim with such long necks?

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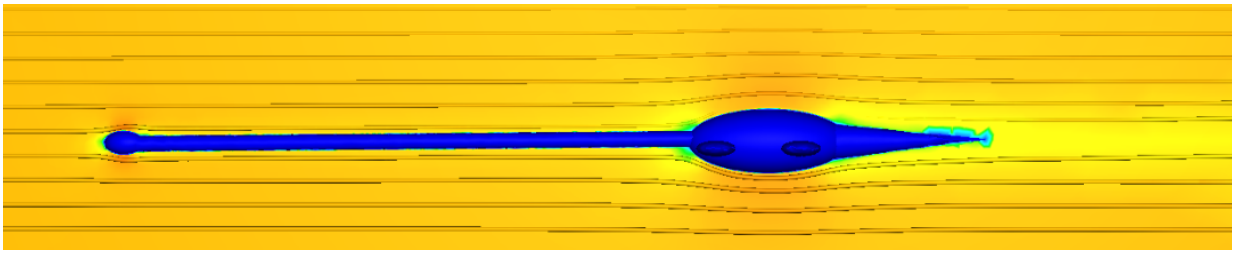


A side view of the plesiosaur model in the hydrodynamic simulation. Credit: Ms Pernille V Troelsen

When dinosaurs ruled the land, plesiosaurs ruled the oceans. Famous for their incredibly long necks - some of which were up to 7 metres long - plesiosaurs have remained an evolutionary mystery for hundreds of years. Pernille V. Troelsen, a PhD student at Liverpool John Moores University, UK is simulating plesiosaur locomotion with a 3D model to understand how they could swim with such long necks.

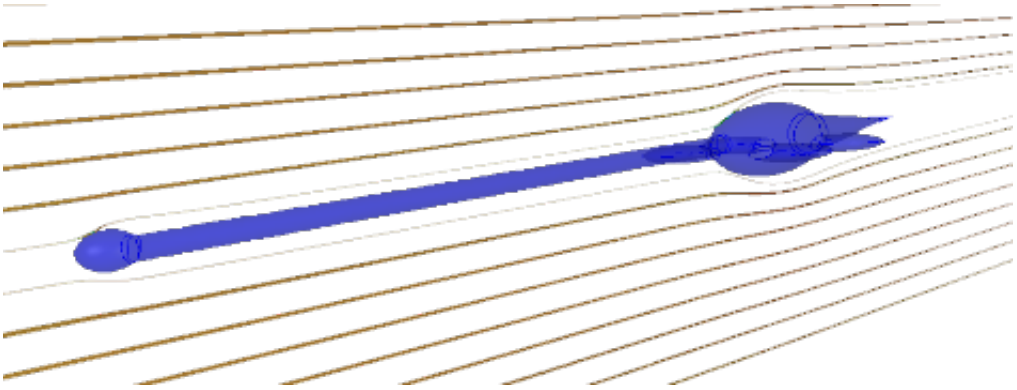
"A steady neck would be more hydrodynamic than a bent neck, and due to the pressure on a bent neck, plesiosaurs would probably only bend them when moving at slow speeds or when floating,' says Ms Troelsen.

She reveals that not only increasing the bend in a plesiosaurs neck would have a big effect on the production of 'hydrodynamic drag', but the

location of the bending may also play a large role. She adds that plesiosaurs would likely have had a more patient hunting style similar to today's crocodiles and snakes.

"We have some ideas about why they had long necks and they mainly concern feeding strategies, but we still don't fully understand how they moved," explains Ms Troelsen. "These were extremely successful animals that existed for 140 million years, but we don't have any living equivalents to compare with".

Several possible theories suggest that plesiosaurs may have developed long necks to extend their feeding range. By laying immobile on the sea floor or floating at the surface and using their protruding necks to hunt, they may have been able to sneak up on their prey more easily, or simply been more effective at snapping up fast-moving prey.



Rotated 3-D model of plesiosaur in hydrodynamic simulation. Credit: Ms Pernille V. Troelsen

To test the hydrodynamic effects of different neck bending degrees and locations, Ms Troelsen created a digital 3D model based on a simplified plesiosaur body shape and uses computational fluid dynamics to visualise

and determine how bending the neck affects the flow of water around the animal.

To improve these 3D models for in future, Ms Troelsen will be looking at fossil evidence for more information about the shape and bendiness of plesiosaur necks: "Further studies will include digitized neck vertebrae from actual plesiosaurs which will allow us to have an even more realistic approach."

Ms Troelsen believes that these and future results will provide deeper insights into this mysterious group of marine reptiles: "We hope that we can shed some light on the biomechanical implications of having such a long neck and learn more about the lifestyle and evolutionary history of plesiosaurs."

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