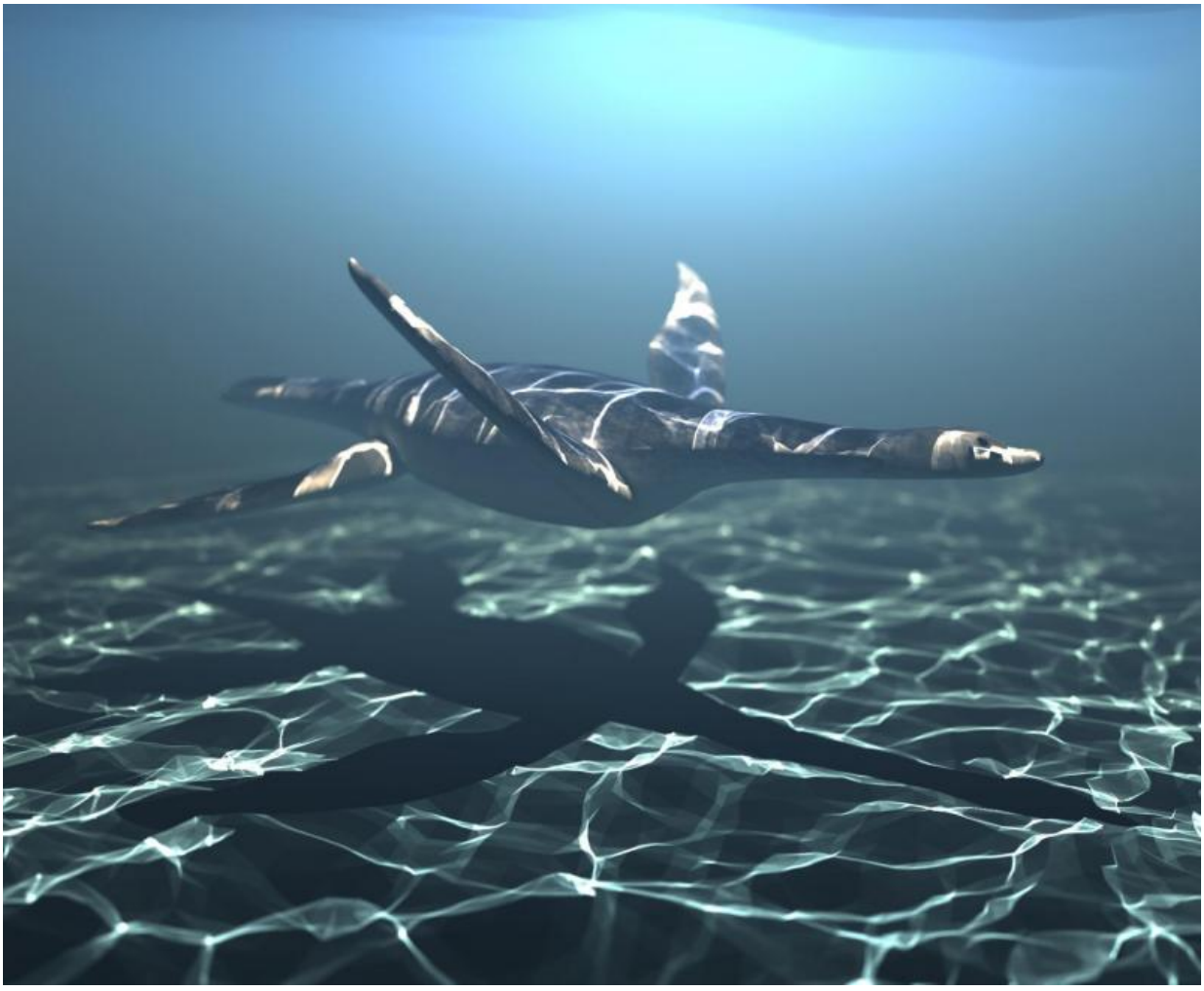
Ancient four-flippered reptile flapped like a penguin

December 17 2015



Ancient four-flippered reptile flapped like a penguin. Credit: Liu et al. 10.1371/journal.pcbi.1004605

The puzzle of the plesiosaur has been revealed by computer simulations showing how the ancient animals used their unusual four-flippered body to swim through the ocean.

The study published this week in *PLOS Computational Biology* by computer scientists, led by Greg Turk from the Georgia Institute of Technology and in collaboration with paleontologist Adam Smith at Wollaton Hall, Nottingham Natural History Museum, investigates the long-standing puzzle of plesiosaur swimming.

The researchers find that the most effective swimming motion for the plesiosaur is flapping the two front flippers in an underwater flight motion, similar to that of a penguin. Surprisingly, however, the simulations revealed that the rear flippers would not have substantially increased their forward speed. Instead, the back flippers of plesiosaurs were probably used for steering and stability.

Plesiosaurs are an extinct group of marine reptiles that were apex predators for 135 million years during the age of the dinosaurs. Their unique four-flipper body plan is unlike any modern-day swimming animal and paleontologists have debated their possible swimming style since the first complete plesiosaur skeleton was described in 1824. The study uses computer simulations to help resolve this question. Thousands of different swimming motions were simulated to identify the most effective swimming strategy for the plesiosaur body plan.

Future computer simulations could be used to discover the degree of agility that plesiosaurs gain from their rear flippers. The method can also be applied to understand the swimming motion of other prehistoric animals.

"Plesiosaur swimming has remained a mystery for almost 200 years, so it was exciting to see the plesiosaur come alive on the computer screen"

said Smith.

"Our results show that the front limbs provide the powerhouse for plesiosaur propulsion while the hind limbs are more passive" said Smith.

More information: Liu S, Smith AS, Gu Y, Tan J, Liu CK, Turk G (2015) Computer Simulations Imply Forelimb-Dominated Underwater Flight in Plesiosaurs. *PLoS Comput Biol* 11(12): e1004605. DOI: 10.1371/journal.pcbi.1004605

Provided by Public Library of Science