Assessing the hydro- and thermodynamic capabilities of long-necked plesiosaurs using computational fluid dynamics

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Reconstructing the appearance of ancient organisms is a major focal point of paleontological research. Typically, our ideas for life-like reconstructions derive from exquisitely preserved specimens with soft tissues. However, many animals are not commonly preserved with fossilized soft parts and among these are the plesiosaurs. These marine reptiles have a fossil record that extends over more than 130 million years during the Mesozoic Era, and their remains have been found in deposits representing both warm, equatorial waters and cold, high-latitude environments. Reconstructions of plesiosaurs are often characterized by a narrow, snake-like neck attached to sea turtle-like body. However, this design is at odds with the otherwise prevalent spindle- to torpedo-shaped bauplan of marine animals.

Given the presence of plesiosaurs in cold-water environments, it is reasonable to assume that these secondarily aquatic reptiles utilized blubber for insulation, in similarity with modern-day whales and adult individuals of the leatherback turtle (*Dermochelys coriacea*). Blubber is also beneficial in enhancing streamlining, which reduces drag. To test this alternative scenario, a traditional long-necked form was 3D generated along with a blubber-lined geometry to assess their hydro- and thermodynamic capabilities using computational fluid dynamics. A model that is both hydrodynamic and thermodynamically efficient is here hypothesized as the most likely candidate for the actual appearance of a plesiosaur in life. Computational fluid dynamics is a burgeoning experimental approach in paleontology that holds great potential as an avenue to assess likelihood scenarios for reconstructions of the appearance and adaptations of extinct animals.

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Regular Poster Session 2 (Thursday, October 31, 2024, 4:30 - 6:30 PM)

New chondrichthyans from the Early Permian Phosphoria Formation from Grand Tetons National Park, Wyoming, U.S.A.

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United States Geological Survey (USGS) work in the northwest corner of Grand Tetons National Park (GRTE), in western Wyoming in the early 1950's had identified a rich fossil fish assemblage from the Early Permian Phosphoria Formation. This initial survey recovered fish fossil samples that included

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