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Engineer Provides New Insight into Pterodactyl Flight

Giant pterosaurs are ancient reptiles that flew over the heads of dinosaurs -- were at their best in gentle tropical breezes, soaring over hillsides and coastlines or floating over land and sea on thermally driven air currents, according to new research from the University of Bristol.

Pterosaurs (also referred to as pterodactyls) were too slow and flexible to use the stormy winds and waves of the southern ocean like the albatrosses of today, the research by Colin Palmer, an engineer turned paleontology PhD student in Bristol's School of Earth Sciences, found.

Their slow flight and the variable geometry of their wings also enabled pterosaurs to land very gently, reducing the chance of breaking their paper- thin bones. This helps to explain how they were able to become the largest flying animals ever known.

Using his 40 years of experience in the engineering industry, Colin Palmer constructed models of pterosaur wing sections from thin, curved sheets of epoxy resin/carbon fibre composite and tested them in a wind tunnel. These tests quantified the two-dimensional characteristics of pterosaur wings for the first time, showing that such creatures were significantly less aerodynamically efficient and were capable of flying at lower speeds than previously thought.

Colin Palmer said: "Pterosaur wings were adapted to a low-speed flight regime that minimizes sink rate. This regime is unsuited to marine style dynamic soaring adopted by many seabirds which requires high flight speed coupled with high aerodynamic efficiency, but is well suited to thermal/slope soaring. The low sink rate would have allowed pterosaurs to use the relatively weak thermal lift found over the sea".

"Since the bones of pterosaurs were thin-walled and thus highly susceptible to impact damage, the low-speed landing capability would have made an important contribution to avoiding injury and so helped to enable pterosaurs to attain much larger sizes than extant birds. The trade-off would have been an extreme vulnerability to strong winds and turbulence, both in flight and on the ground, like that experienced by modern-day paragliders."

The research is published November 24 in Proceedings of the Royal Society B.