

**Science Outreach – Athabasca
presents...
Attachment scars of uncinatae
processes indicate an early origin
of avian-like breathing mechanism
in dinosaurs.**



**Speaker: Yan-yin Wang
PhD candidate, Sullivan Lab,
University of Alberta**

Date: Tuesday, January 25, 2022

Time: 7 PM

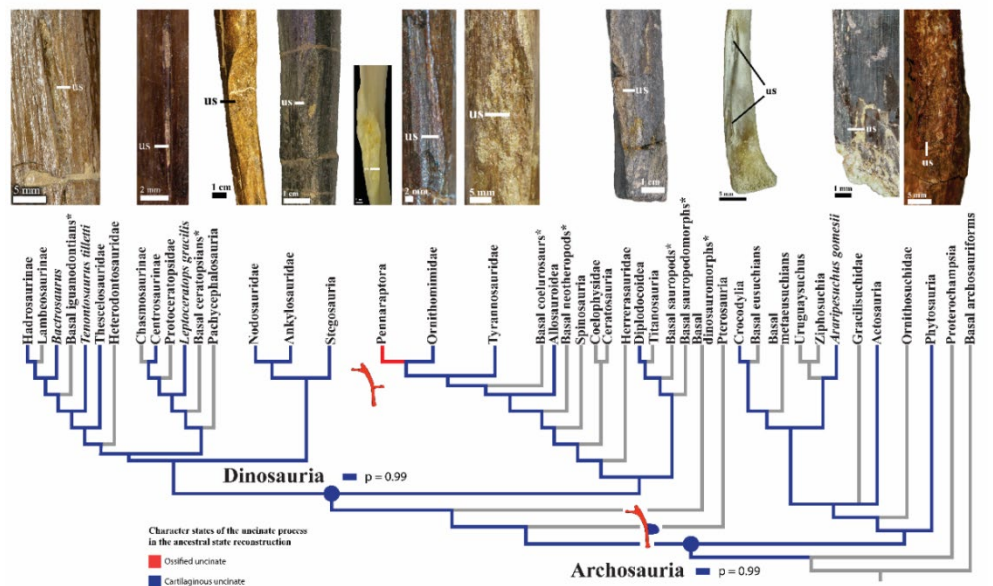
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Birds and crocodylians are modern representatives of Archosauria, a group of amniotes originated in Triassic and filled most of the ecological niches available for large-bodied animals (e.g. non-avian dinosaurs) throughout Jurassic and Cretaceous. Dorsal ribs of archosaurs often carry uncinatae, often called uncinatae processes on the their tail side in the form of ossified hooks in birds, and in the form of cartilaginous tabs in crocodylians. Muscles associated with uncinatae have received experimental support on respiratory functions in Canada geese and American alligators. To better understand how uncinatae assist respirations mechanically, we constructed a musculoskeletal model of paleognaths, a group of terrestrial birds, to examine the mechanical advantages brought by the presence of uncinatae. Our initial results agree with experimental studies on Canada geese and American alligators that uncinatae improve the performance of their associated respiratory muscles. Uncinatae and uncinatae-like structures are known in several groups of fossil dinosaurs where the uncinatae are ossified as in birds, or the cartilaginous elements were lucky enough to be preserved, which raise the potential that uncinatae and their respiratory functions may be an ancestral condition inherited by modern birds and crocodylians. Unfortunately, cartilaginous elements are found less frequently in the fossil records, which makes direct observations of uncinatae less feasible. Instead, we established a proxy on the dorsal ribs called uncinatae scars, to infer the presence of uncinatae when these structures are not preserved using surface features as well as microscopic features. The distribution of the uncinatae scars, and by extension uncinatae, suggest that uncinatae-assisted respirations as in birds likely have appeared already at the dawn of Archosauria.



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