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UCT palaeontologists challenge method used to estimate age of crocodiles and dinosaurs

Dr Maria-Eugenia Pereyra and Professor Anusuya Chinsamy-Turan.

Photo: Supplied

Do the bones of Nile crocodiles have the same number of growth marks as their age? And can such growth rings be counted to accurately gauge the age of these reptiles? Is this also an accurate method to use when trying to "age" dinosaurs and other extinct and extant reptiles? No, not according to a *Scientific Reports* study by Professor Anusuya Chinsamy-Turan and Dr Maria-Eugenia Pereyra of the Department of Biological Sciences at the University of Cape Town (UCT).

They found that the growth marks in crocodiles' bones cannot be used as a reliable indicator of age. The two UCT palaeontologists further caution against using it along with derived growth curves to age extinct vertebrates such as dinosaurs.

Growth marks are like "tree rings"

"Many vertebrates grow in a cyclical manner. This leaves definable growth marks in their bones, and is like tree rings," explained Professor Chinsamy-Turan, an expert on deciphering biological signals in the bone microstructure of extinct and extant vertebrates.

Researchers have used these rings to estimate the minimum age of extant and extinct amphibians, mammals, birds and reptiles; a study termed skeletochronology. Using this information, they deduce growth curves and so learn more about the growth dynamics and life history of an animal.

To test this technique on crocodiles, the research duo investigated bone slices from four two-year-old crocodiles raised together under similar circumstances. Under the microscope they saw very clear growth marks in dense, compact parts of the two-year old animals' bones – but many more than were expected for crocs of that age. Added to this, the "extra" growth marks did not merely correspond to yearly growth. The "extras" presumably were laid down during favourable growing periods possibly related to environmental factors such as competition for food, dominance or extreme heat.

Had the UCT research duo only counted the number of visible growth marks in the bones of the two-year-old animals they studied, they would have overestimated the age of the crocs in the *Scientific Reports* paper at between five and six years old.

Growth rates not fixed

The fact that growth marks varied so much within the bones of young crocodiles shows that their growth is flexible and can change in response to environmental conditions.

"Many vertebrates, including alligators and newts, similarly change their relative growth rates in response to environmental conditions," noted Dr Pereyra, an Argentinian postdoctoral researcher based at UCT.

What do the findings mean for dinosaur research?

Chinsamy-Turan says such flexibility is likely to have been present in a wide variety of extinct vertebrates, especially those closely related to crocodiles, such as dinosaurs. Palaeontologists often study the microstructure of dinosaur bones to among others better understand how long it took for them to grow up to adult sizes.

Based on their results, Chinsamy-Turan and Dr Pereyra caution against using growth marks and derived growth curves to age modern-day animals as well as extinct vertebrates.

"It is better to think of growth marks seen in the dense outer part of bones as signs of intermittent periods of growth rather than marks that consistently formed once each year," advised Dr Pereyra.

Their latest *Scientific Reports* paper is already the fourth published since Pereyra joined Chinsamy-Turan's research group three years ago. One of these was in the *Journal of Anatomy*, on an extinct small, long-necked marine reptile whose fossilised remains were

recovered in Argentina. Two others, in the *Journal of Morphology*, focused on broad-snouted caimans from Argentina.

In between their research work, they are working closely on another major endeavour: to bring the 7th International Palaeontological Congress (IPC7) to Africa – and to Cape Town – for the first time in its history.

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