

Tiny pterosaurs dominated cretaceous skies

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An artist's impression of the hatchling pterosaurs. Credit: Megan Jacobs

New research has found that it was the babies of giant pterosaurs—known as flaplings—who overshadowed their small adult rivals.

The newly hatched juveniles of large and gigantic pterosaurs likely outcompeted other smaller adult pterosaur [species](#) to dominate the Late Cretaceous period around 100 million years ago, a new study led by

researchers from the University of Portsmouth has found.

Pterosaurs were the flying cousins of dinosaurs—some were as large as a Spitfire fighter plane and others as small as a thrush.

During the Triassic and Jurassic periods, 252–145 million years ago, pterosaurs reached only modest sizes, but by the Late Cretaceous period many were giants—some with a wingspan of 10 meters or more.

It had been previously thought that the smaller species of pterosaurs were outcompeted by newly evolving birds, but this research has found that it was actually the babies of giant pterosaurs—known as flaplings—who overshadowed their small adult rivals.

Lead author, Roy Smith, from the University of Portsmouth's School of the Environment, Geography and Geosciences, worked on the study with scientists from Africa and the UK. The international team comprised of experts from the universities of Cape Town, Leicester, Portsmouth and Casablanca.

He said: "Over the last 10 years or so, we've been doing fieldwork in Morocco's Sahara Desert and have discovered over 400 specimens of pterosaurs from the Kem Kem Group, highly fossiliferous sandstones famous worldwide for the spectacular dinosaur Spinosaurus.

"We'd found some really big pterosaur jaws and also specimens that looked like smaller jaws—about the size of a fingernail—but these tiny pterosaur remains could have just been the tips of big jaws so we had to do some rigorous testing to find out if they were from a small species or from tiny juveniles of large and giant pterosaurs."

Roy and his colleagues examined five small jaw fragments and a neck vertebra using sophisticated microscope techniques to determine the age

of the individual when the animal died.

Co-investigator, Anusuya Chinsamy-Turan, from the University of Cape Town in South Africa, is a world expert on the bone microstructure (histology) of pterosaurs and dinosaurs. She said: "By looking at the paper-thin section of the bones under a microscope, I could tell that they were from juveniles as the bone was fast growing and didn't have many growth lines.

"We also examined the surface of the bones and found they had a rippled texture. This was further evidence they were the bones of immature individuals as mature pterosaur bones have an incredibly smooth surface once they are fully formed."

The researchers also inspected the jaws and found that the number of tiny holes where nerves come to the surface for sensing their prey, known as "foramina," were the same in the small jaws and the big jaws.

"This was more proof we were looking at the jaws of juveniles because if the specimens were just the tip of a jaw, there would be a fraction of the number of foramina," said Roy.

Recent findings have suggested that hatchling pterosaurs could fly soon after hatching so they were quickly independent.

Professor David Martill of the University of Portsmouth said: "What really surprised me about this research is that the feeding ecology of these magnificent flying animals is more like that of crocodiles than of birds.

"With birds, there will be perhaps 10 different species of different sizes alongside a river bank—think kingfisher, little bittern, little egret, heron, goliath heron or stork for a large European river. There are several

species all feeding on slightly different prey. This is called niche partitioning.

"Crocodiles on the other hand are much less diverse. On the river Nile, hatchling crocodiles feed on insects, and as they grow they change their diet to small fish, then larger fish and then small mammals, until a big adult Nile croc is capable of taking a zebra.

"There are lots of different feeding niches, but they are all occupied by one species at different stages of its life history. It seems that pterosaurs did something rather similar, occupying different niches as they grew—a much more reptilian rather than avian life strategy.

"It's likely that the juvenile pterosaurs were feeding on small prey such as freshwater insects, tiny fishes and amphibians. As they grew they could take larger fishes—and who knows—the biggest [pterosaurs](#) might have been capable of eating small species of dinosaurs, or the young of large dinosaur species."

The pterosaur specimens are part of the collections of Casablanca Hassan II University and the paper is published in *Cretaceous Research*.

More information: Roy E. Smith et al, Small, immature pterosaurs from the Cretaceous of Africa: implications for taphonomic bias and palaeocommunity structure in flying reptiles, *Cretaceous Research* (2021). [DOI: 10.1016/j.cretres.2021.105061](https://doi.org/10.1016/j.cretres.2021.105061)

Provided by University of Portsmouth

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