

# 127-million-year-old baby bird fossil sheds light on avian evolution

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Artist impression of Enantiornithes by artist Raúl Martín. Credit: Raúl Martín

The tiny fossil of a prehistoric baby bird is helping scientists understand how early avians came into the world in the Age of Dinosaurs.

The fossil, which dates back to the Mesozoic Era (250-65 million years ago), is a chick from a group of [prehistoric birds](#) called, Enantiornithes. Made up of a nearly complete skeleton, the specimen is amongst the smallest known Mesozoic avian fossils ever discovered.

It measures less than five centimetres - smaller than the little finger on an average human hand - and would have weighed just three ounces when it was alive. What makes this fossil so important and unique is the fact it died not long after its birth. This is a critical stage in a bird's skeletal formation. That means this bird's extremely short life has given researchers a rare chance to analyse the species' [bone structure](#) and development.

Studying and analysing ossification - the process of bone development - can explain a lot about a young bird's life the researchers say. It can help them understand everything from whether it could fly or if it needed to stay with its parents after hatching or could survive on its own.

The lead author of the study, Fabien Knoll, from The University of Manchester's Interdisciplinary Centre for Ancient Life (ICAL), School of Earth and Environmental Sciences, and the ARAID—Dinopolis in Spain explains: "The evolutionary diversification of [birds](#) has resulted in a wide range of hatchling developmental strategies and important differences in their growth rates. By analysing bone development we can look at a whole host of evolutionary traits."

With the fossil being so small the team used synchrotron radiation to picture the tiny specimen at a 'submicron' level, observing the bones' microstructures in extreme detail.



Phosphorous mapping image and photo of fossil. Credit: Dr. Fabien Knoll

Knoll said: "New technologies are offering palaeontologists unprecedented capacities to investigate provocative fossils. Here we

made the most of state-of-the-art facilities worldwide including three different synchrotrons in France, the UK and the United States."

The researchers found the baby bird's sternum (breastplate bone) was still largely made of cartilage and had not yet developed into hard, solid [bone](#) when it died, meaning it wouldn't have been able to fly.

The patterns of ossification observed in this and the other few very young enantiornithine birds known to date also suggest that the developmental strategies of this particular group of ancient avians may have been more diverse than previously thought.



Dr Fabien Knoll in lab. Credit: Dr. Fabien Knoll

However, the team say that its lack of [bone development](#) doesn't necessarily mean the hatchling was over reliant on its parents for care and feeding, a trait known as being 'altricial." Modern day species like love birds are highly dependent on their parents when born. Others, like chickens, are highly independent, which is known as 'precocial." Although, this is not a black-and-white issue, but rather a spectrum, hence the difficulty in clarifying the developmental strategies of long gone bird species.

Luis Chiappe, from the LA Museum of Natural History and study's co-author added: "This new discovery, together with others from around the world, allows us to peek into the world of ancient birds that lived during the age of dinosaurs. It is amazing to realise how many of the features we see among living birds had already been developed more than 100 million years ago."

**More information:** Fabien Knoll et al, A diminutive perinate European Enantiornithes reveals an asynchronous ossification pattern in early birds, *Nature Communications* (2018). [DOI: 10.1038/s41467-018-03295-9](#)

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