Why dinosaurs had fowl breath

November 7 2007

Scientists have discovered how dinosaurs used to breathe in what provides clues to how they evolved and how they might have lived.

The University of Manchester team, comprising biologists and palaeontologists, has found that theropod dinosaurs like the Velociraptor had similar respiratory systems to present-day diving birds, such as marine birds and wildfowl.

The findings, published in the *Proceedings of the Royal Society B: Biological Sciences* today, present for the first time an explanation of how these dinosaurs may have breathed.

“A number of studies have shown that dinosaurs were the direct ancestors of birds and have identified a suite of avian characteristics in theropods,” said Dr Jonathan Codd, who led the research in the Faculty of Life Sciences.

“Our findings support this view and show that the similarities also extend to breathing structures and that these dinosaurs possessed everything they needed to breathe using an avian-like air-sac respiratory system.”

Birds, and in particular diving birds, have one of the most efficient respiratory systems of all vertebrates which they need in order to supply their bodies with enough oxygen to sustain the high levels of energy required for flight.

Palaeontologist and co-author Dr Phil Manning, in Manchester’s School

of Earth, Atmospheric and Environmental Sciences, studied the fossilised remains of maniraptoran dinosaurs and extinct birds such as Archaeopteryx and found that breathing structures, known as uncinate processes, were also present in the dinosaurs.

Dr Codd said: “Our work on modern birds has shown that the way these animals breathe is more complex than originally thought. The uncinate processes are small bones that act as levers to move the ribs and sternum during breathing. Interestingly, these structures are different lengths in different birds – they are shortest in running birds, intermediate in flying birds and longest in diving birds.

“The dinosaurs we studied from the fossil record had long uncinate processes similar in structure to those of diving birds. This suggests both dinosaurs and diving birds need longer lever arms to help them breathe.

“Finding these structures in modern birds and their extinct dinosaur ancestors suggests that these running dinosaurs had an efficient respiratory system and supports the theory that they were highly active animals that could run relatively quickly when pursuing their prey.”

Source: University of Manchester