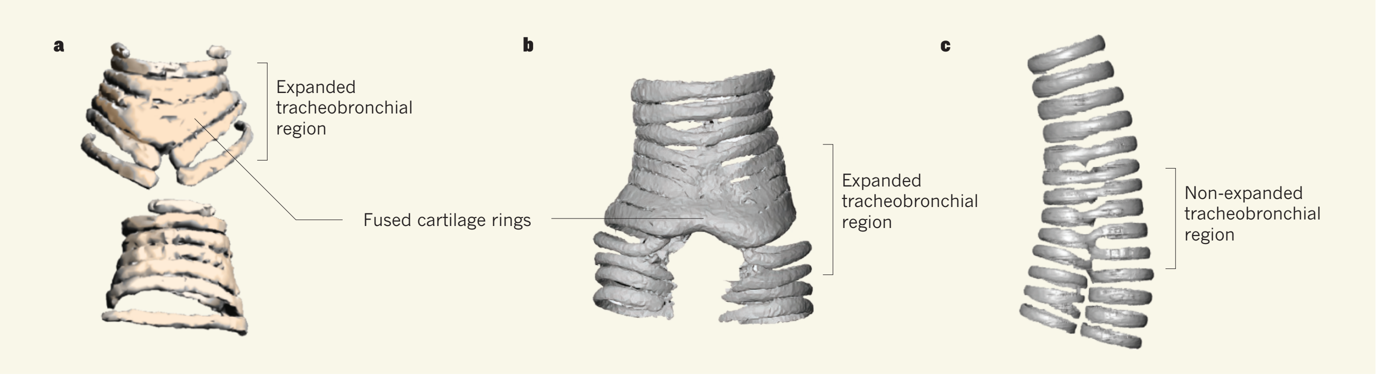

Figure 1 | Three-dimensional vocal cord reconstructions. **a**, Clarke *et al.*[3] identified the sound-producing syrinx vocal organ in a fossil of the bird *Vegavis iaai* from the Late Cretaceous (69 million to 66 million years ago) of Antarctica. Using three-dimensional reconstruction techniques, the authors generated the image shown of the syrinx. The structure has an expanded tracheobronchial region (bracket) at the junction between the lung and the windpipe, and some fused cartilage rings. **b**, A reconstruction of a syrinx from a present-day duck shows many similarities to the overall arrangement of the *V. iaai* syrinx in **a**. **c**, By contrast, in a present-day alligator (a representative of the group of living animals that are most closely related to modern birds), the tracheobronchial region (bracket) is not expanded and the syrinx does not possess fused cartilage rings.

species *Vegavis iaai*, which belongs to the group that includes ducks, geese and swans. The specimen was recovered from Antarctic rocks in layers just below and older than the layer corresponding to the Cretaceous–Palaeogene extinction event some 66 million years ago, which wiped out the non-avian dinosaurs and many other organisms around the globe. The current research builds on the earlier landmark study[5] establishing the species *V. iaai* as the only unambiguously identified modern bird fossil known from the entirety of the Mesozoic Era (252 million to 66 million years ago). Now *V. iaai* is revealing clues about the evolution of the avian vocalization apparatus, and about vocal communication in the group more generally.

The researchers scanned the fossil specimen using a high-resolution X-ray imaging technique termed microcomputed tomography, which enabled them to construct a three-dimensional representation of the syrinx, a structure about 1 centimetre in diameter. To improve the anatomical interpretations and constrain the range of sounds that the bird might have produced, the authors used another type of tomography that provides information on both hard and soft tissues to assemble an additional data set for samples from 12 groups of present-day birds. This approach of contextualizing fossil data with information derived from extant animals, in which both hard and soft tissues can be linked to functional and performance parameters, represents the current standard in palaeontology. Both hard and soft tissues are necessary for sound production, with the cartilaginous rings providing support for the vibrating soft-tissue membranes.

The authors defined the basic shape and size of the fossil syrinx and its associated bronchial (lung) and tracheal (windpipe) segments, noting several characteristics, such as the fusion of cartilage rings and asymmetry between the left and right sides of the syrinx, that are useful for making comparisons with structural data from the present-day birds (Fig. 1). The researchers refrained from over-interpreting the fossil, particularly with regard to inferring the presence of the intricate muscular and membranous tissues known to be crucial for complex vocalization in living birds. Instead, the authors note general features that are similar to those in present-day ducks and geese, an interpretation that is consistent with other skeletal features affiliating *Vegavis* with this branch of the bird family. This structural-reconstruction analysis suggests that *V. iaai* had the ability to produce basic honks and other simple sounds typical of ducks and geese.

Despite a truly amazing fossil record containing evidence that has expanded the distribution of certain avian features such as feathers among non-avian theropod dinosaurs, fossilized components of the vocal apparatus have yet to be discovered in non-avian theropods. Taking the fossil record at face value, Clarke and colleagues suggest that the syrinx therefore represents a feature that evolved relatively late in the bird lineage compared with feathers and flight. In other words, the syrinx might be a defining avian feature that played a vital part in the tremendous diversification of the group. But as we repeatedly find in the world of palaeontology, inferences derived from the fossil record are ephemeral entities lasting only until the next spectacular fossil is recovered.

Clarke and colleagues' study also highlights the potential for other researchers to take a much closer look at both new and previously recovered fossils for evidence of the syrinx. I suspect that there are additional examples of this seemingly avian-specific structure already in museum collections around the globe. Moreover, studies such as that by Clarke *et al.* will certainly inform fossil examination, and, perhaps most importantly, how scientists frame questions about bird evolution. For example, comparative biologists have had no reason to consider the possibility that something like the syrinx would be discoverable in a fossil — now that scientists can characterize its precise size and shape, an entire field of enquiry about how the syrinx functions in living birds, and its role in social evolution, is ripe for the picking.

As any real 'birder' enthusiast will be quick to inform the casual naturalist, a bird's appearance is only one aspect of its biology, with chirps, honks and other more complex vocalizations offering the best insight into the vast array of behaviours and social interactions exhibited by the plentiful species of extant birds. Clarke and colleagues have uncovered one key piece of that puzzle in a small bird fossil from Antarctica, foreshadowing the soundscape of things yet to come during avian diversification. ■

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This article was published online on 12 October 2016.

CORRECTION

The News & Views article 'Genomics: A matched set of frog sequences' by Shawn Burgess (Nature **538,** 320–321; 2016) incorrectly stated that the two paired sets of chromosomes in *Xenopus laevis* are referred to as S and X. In fact, they are dubbed S and L. The article has now been corrected accordingly.