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01 APR Songbird genome shows how genes are involved in learning a tune

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The zebra finch is the second bird genome to be sequenced after that of the chicken.

Scientists have announced that they have sequenced the genome of the zebra finch, the second bird genome to be sequenced after that of the chicken. The research published in Nature could help reveal the genetics underpinning some of the uniquely fascinating traits of birds, such as plumage and song.

The zebra finch also offers the opportunity to understand the genetics behind the wiring and re-wiring that occurs in the brain when we learn and memorise.

The research was carried out by groups from the USA, Sweden, UK, Spain, Israel and Germany, and included scientists from Oxford University.

Zebra finches and other songbirds have one important thing in common with humans: they learn how to converse with one another, which is very rare in other animals. Chickens (the only other bird we have a sequence for) do not demonstrate this kind of vocalisation and so a comparison between the zebra finch and chicken genomes has helped to identify where the genes that are directly involved in vocal learning are located.

It has been known for a while that listening to songs turns genes on or

> The next stage will be to investigate whether

Further information

- Nature
- MRC Functional Genomics Unit
- Biotechnology and Biological Sciences Research Council

off in certain areas of the brain of a zebra finch. This project has shown that there are also important changes in what the genome actually produces when a young male zebra finch first learns his song from an adult tutor.

> these exotic molecules play roles in learning and memory for the zebra finch, or even for humans.
>
> Professor Chris Ponting, MRC Functional Genomics Unit

Professor Chris Ponting, an author on the paper from the MRC Functional Genomics Unit at the University of Oxford, said: ‘ Normally we think of genomes providing a blueprint for making only proteins, but there are indications here that song stimulates the zebra finch to turn off the production of even more exotic molecules called RNAs.

‘ The next stage will be to investigate whether these RNAs play roles in learning and memory for the zebra finch, or even for humans.’

The zebra finch genome could also give insights into other areas of the biology and evolution of birds, including genes that are important in immunity and fighting infections and in fertility.

Dr Jon Slate, an author on the paper from University of Sheffield said: ‘The zebra finch is a useful model for research and the genome information provides the tools we need to find genes responsible for the remarkable diversity of plumage, song and behaviour that we see in birds – features that have fascinated biologists and ornithologists for centuries.’

The research was funded by the US National Human Genome Research Institute with further support from the Biotechnology and Biological Sciences Research Council, US National Institutes of Health, Swedish Research Council, and the Knut and Alice Wallenberg Foundation.