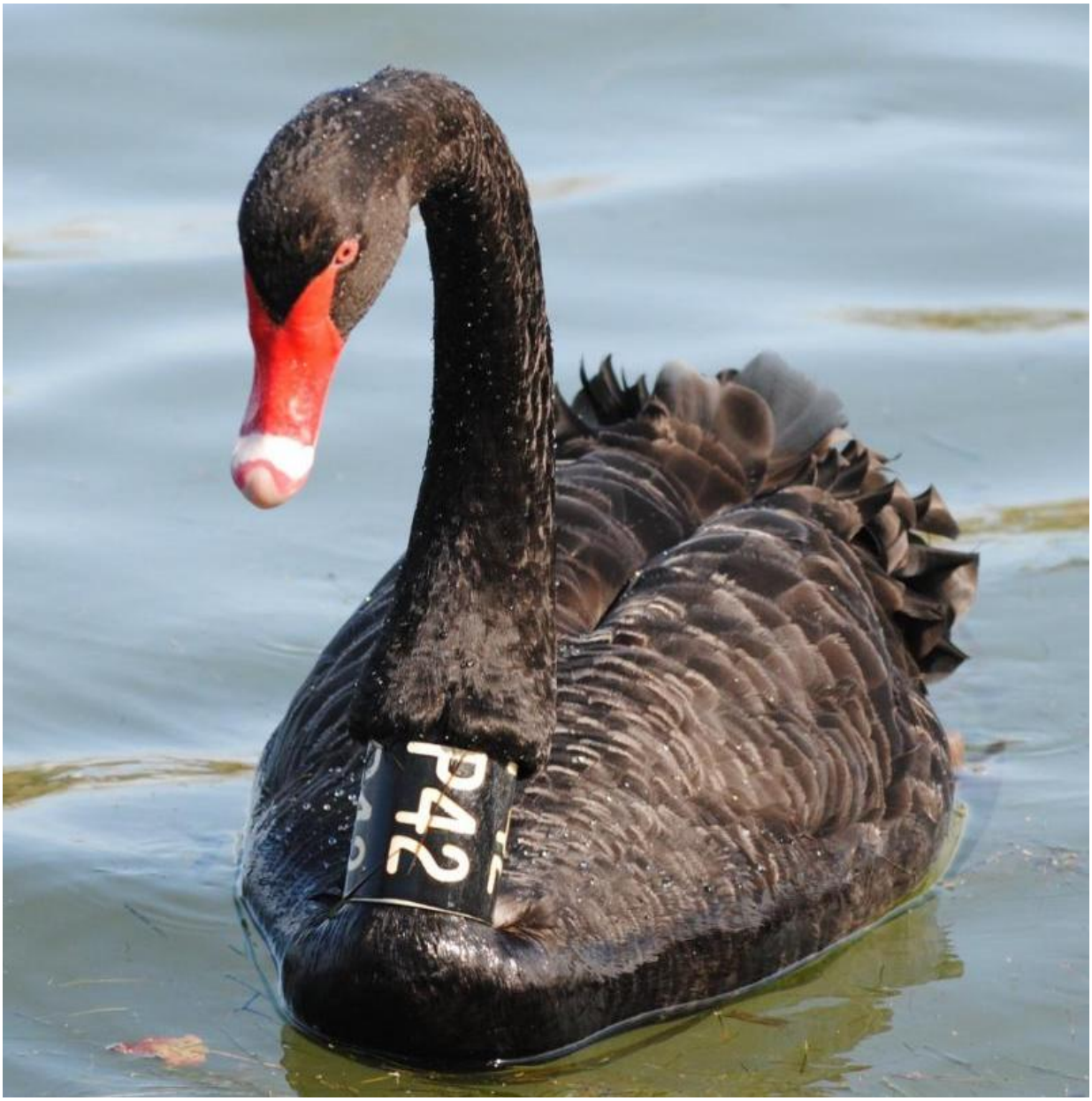
Urban swans' genes make them plucky

December 10 2015



Cygnus atratus. Credit: Catherine Payne

Researchers have discovered that swans' wariness is partly determined by their genes. The research, which is published in the open access journal *BMC Evolutionary Biology*, suggests that swans which are genetically predisposed to be timid are more likely to live in non-urban areas, and the findings could have important implications for releasing animals bred in captivity into the wild.

It is often assumed that animals that live in urban areas become less wary of humans through habituation, but until now, no research has been conducted which tests whether animals' preference for an urban or non-urban environment might be genetically determined.

A team of researchers from Victoria University, Deakin University and The University of Melbourne, Australia, conducted a series of tests to establish the wariness of two separate populations of black swans (*Cygnus atratus*). One population of 80 swans were living in an urban parkland setting, where they frequently encountered humans, while a second population of 20 swans were living around 30km away in a non-urban area, much less frequented by people.

The researchers quantified the birds' wariness by walking slowly towards them, and then measuring the distance at which the bird flew away, called the Flight Initiation Distance (FID). Separately, they also took blood samples from the two populations of birds so that they could look for variations in two sets of genes - DRD4 and SERT - typically associated with behaviours related to anxiety and harm avoidance in animals.

As expected, the swans living in an urban setting were much bolder than their rural counterparts, with an average FID of 13 meters, compared to 96 meters for the non-urban swans. The genetic tests revealed no

significant differences between the two populations in SERT genotypes, but they found five different variants of DRD4 which were associated with different levels of wariness.

The vast majority (88.8%) of the urban swans shared the most common genotype for DRD4, whereas only 60% of the rural swans exhibited this genotype. Of all the swans, 83% with the most common DRD4 genotype had a shorter average FID, suggesting that the birds' wariness is at least partly determined by their genes.

As swans are typically highly mobile, and have the ability to migrate between different habitats, the researchers conclude that wary swans may be more likely to choose to inhabit a non-urban site, with bolder swans colonising urban areas.

Lead researcher, Wouter van Dongen, says: "Growing global urbanisation means that wild animals are increasingly settling near to humans. Although we often assume that animals become less wary of humans by simply getting used to them, our results suggest that at least part of this response might be genetically determined. This has important implications for conservation, particularly for the introduction of animals bred in captivity, which could in future be screened for genotypes that are associated with wariness, allowing them to be released to a location commensurate with their expected wariness."

More information: Wouter F.D. van Dongen et al. Variation at the DRD4 locus is associated with wariness and local site selection in urban black swans, *BMC Evolutionary Biology* (2015). DOI: 10.1186/s12862-015-0533-8

Provided by BioMed Central