Genetic polymorphism in dopamine receptor D4 is associated with early body condition in a large population of greater flamingos, Phoenicopterus roseus.

Body condition is an important determinant of fitness in many natural populations. However, as for many fitness traits, the underlying genes that regulate body condition remain elusive. The dopamine receptor D4 gene (DRD4) is a promising candidate as dopamine is known to play an important role in the regulation of food intake and the metabolism of both glucose and lipids in vertebrates. In this study, we take advantage of a large data set of greater flamingos, Phoenicopterus roseus, to test whether DRD4 polymorphism predicts early body condition (EBC) while controlling for whole-genome effects of inbreeding and outbreeding using microsatellite multilocus heterozygosity (MLH). We typed 670 of these individuals for exon 3 of the homologue of the human DRD4 gene and 10 microsatellite markers. When controlling for the effects of yearly environmental variations and differences between sexes, we found strong evidence of an association between exon 3 DRD4 polymorphisms and EBC, with 2.2–2.3% of the variation being explained by DRD4 polymorphism, whereas there was only weak evidence that MLH predicts EBC. Because EBC is most likely a polygenic trait, this is a considerable amount of variation explained by a single gene. This is to our knowledge, the first study to show an association between exon 3 DRD4 polymorphism and body condition in non-human animals. We anticipate that the DRD4 gene as well as other genes coding for neurotransmitters and their receptors may play an important role in explaining variation in traits that affect fitness.

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