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BIOLOGICAL SCIENCES

The Future of Carrion and Hooded Crows; To Speciate, or Not to Speciate?

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A study looking at the genetics of two related crow subspecies provides a snapshot of speciation in action - one of the most interesting processes in biology by which new species arise.

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What's in a name?

Most of us have a good idea of what we mean when we talk about animals as being different species although sometimes it's not always easy to tell.

Carrion crows (Corvus corone corone) and hooded crows (Corvus corone cornix) differ in colour and behaviour but have both evolved from an ancestral population separated into two by a glaciation event.

The different subpopulations diverged genetically while separate and accumulated differences through a combination of assortative mating (mate choice based on similarity in traits) and sexual selection (females selecting males with certain traits to mate with) to produce the subspecies existing today.

While the subspecies do share some genetic compatibility and are able to interbreed where their ranges overlap, it is unclear whether complete speciation will occur or if the two subspecies will merge together.

The study led by J. W. Poelstra sequenced crows from four different European populations (two for each subspecies) and compared the DNA and expression patterns between populations to understand which processes are responsible for creating and maintaining the differences between the subspecies.

Image: Differences in colouration between the carrion crow (left) and hooded crow (right). Poelstra et al, 2014.

Spot the difference

The subspecies were similar at 62% of SNPs-sites where one base differs from another within a species-but differed greatly in a small genetic region making up less than 1% of the genome. Gene flow was also supported between subspecies populations.

Both subspecies were even more similar in their levels of gene expression with differences in less than 0.41% of genes. 95% of these genes related to feather colour and were underexpressed in the hooded crows, probably resulting in their grey colour.

Bizarrely one particular gene, RGS9, was expressed at higher levels in hooded crows which influences behaviour by regulating hormone levels in the brain and could be responsible for the different behaviours seen between subspecies.

Next stop speciation?

The study findings show that the two subspecies are genetically different and have accumulated a number of differences since their common ancestor 2 million years ago that act as barriers to hybridisation. More importantly, the findings show that the subspecies remain distinct despite differences in less than 1% of their genome and against gene flow which tends to merge populations together.

While the two crows remain subspecies for now, continued assortative mating operating alongside sexual selection within each subspecies will likely produce further genetic differences between the forms and allow complete speciation in the future.

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