

Birds of a Feather: Pigeon Head Crest Findings Extend to Domesticated Doves

Evolutionary biologist Michael Shapiro and his team made international headlines in 2013 when they found that a prominent change in pigeon plumage, head crests, could be traced to a mutation in a single gene.

Now, in the new advanced online edition of *Molecular Biology and Evolution* (Vickrey et al. 2015), the research team has found an almost exact repeat in the evolutionary playbook. A mutation in the same gene, *EphB2*, has led to a similar result in domesticated ringneck doves. The mutation causes the feathers on the back of the head and neck to grow up toward the head in a striking look.

Domesticated rock pigeons have more than 300 varieties that have been bred and chosen for their prized looks and vibrant feather colors. The head-crested birds had one version of the gene, a single mutation that made an aberrant protein (Arg758Cys) responsible for the feather difference between them and uncrested birds.

The researchers performed DNA analyses from 50 crested and 75 uncrested ringneck doves and found a different mutation in the same gene, which led to a single Gly636Arg amino acid substitution. In both cases, a single DNA base change hinders normal protein function by changing an amino acid at a crucial spot, causing the feather to sloop up toward the head rather than tuck neatly down.

“Crested birds from both species have mutations in the same gene, and even in the same functional part of the gene,” said Shapiro. “This suggests that only a limited number of genes—perhaps only genes in the *EphB2* pathway—can cause crest formation without causing other problems that

affect survival of the embryo or adult. Studying other species will help us understand if this same genetic mechanism is used repeatedly throughout crested bird species, or if it’s a mechanism that’s limited to the pigeon and dove family.”

Given that the ringneck dove is a domesticated species that last shared a common ancestor with the rock pigeon 23–35 Ma, the study shows that the same gene can be implicated as a prime driver of feather variation in completely different species, separated over a great evolutionary distance.

“We know that many genes are involved in feather development, so it’s rather remarkable that the same gene appears to control the same trait in two distantly related species,” said Shapiro.

Next, armed with new DNA banks of bird species, Shapiro’s team will examine how far and wide this unique evolutionary twist may be found among other bird species and wild populations.

Reference

Vickrey AI, Domyan ET, Horvath MP, Shapiro MD. Convergent evolution of head crests in two columbids is associated with different missense mutations in *EphB2*. *Mol Biol Evol*. Advance access published June 23, 2015, doi:10.1093/molbev/msv140.

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