

Text adapted for classroom was originally from <https://learn.genetics.utah.edu/content/pigeons/crest/>.

Trait: Crest

Some pigeons have smooth heads, while others have feathers on the back of their heads and necks that stand up to form crests. Both of the pigeons pictured to the right are colored “spread blue.” The one on the left has **no crest**, while the one on the right has a small **crest**.



Alleles and Inheritance

There is one gene on the chromosome above with two different alleles that control this trait.



In pigeons, one gene controls the presence or absence of a crest. This gene comes in 2 different versions, or alleles: “crest” and “no crest.” Pigeons inherit two copies of the *crest* gene, one from each parent. To have a crest, a pigeon must have two copies of the “crest” allele.

From Genetic Information to the Substances That Cells Produce

Inherited characteristics are the products of proteins, and proteins are controlled by genes. Genetic information differences can affect how the substances that cells produce function, or when and how those substances are made. The EPHB2 protein appears to have something to do with setting up feather orientation early in development. The “no crest” allele gives instructions for a functional protein. It sits on the outside of the cell, and when a signal from outside the cell attaches to the EPHB2 protein, it sends the signal inside the cell. The “crest” allele gives instructions for a nonfunctional protein. The changed shape of the protein causes it not to transmit the signal inside the cell. This signal seems to affect the orientation in which the feathers develop.

Other Important Information

While one gene controls whether a pigeon has a crest, a variety of other genes influence crest size and shape. These genes are often called “modifier” genes. All of the birds shown below carry two copies of the “crest” allele. Some of the crests are subtle, and others are quite extreme. The differences are due to different modifier alleles. There are probably several modifiers, each with slightly different effects. We don’t understand the inheritance of these modifier genes, or exactly how they affect crest.

