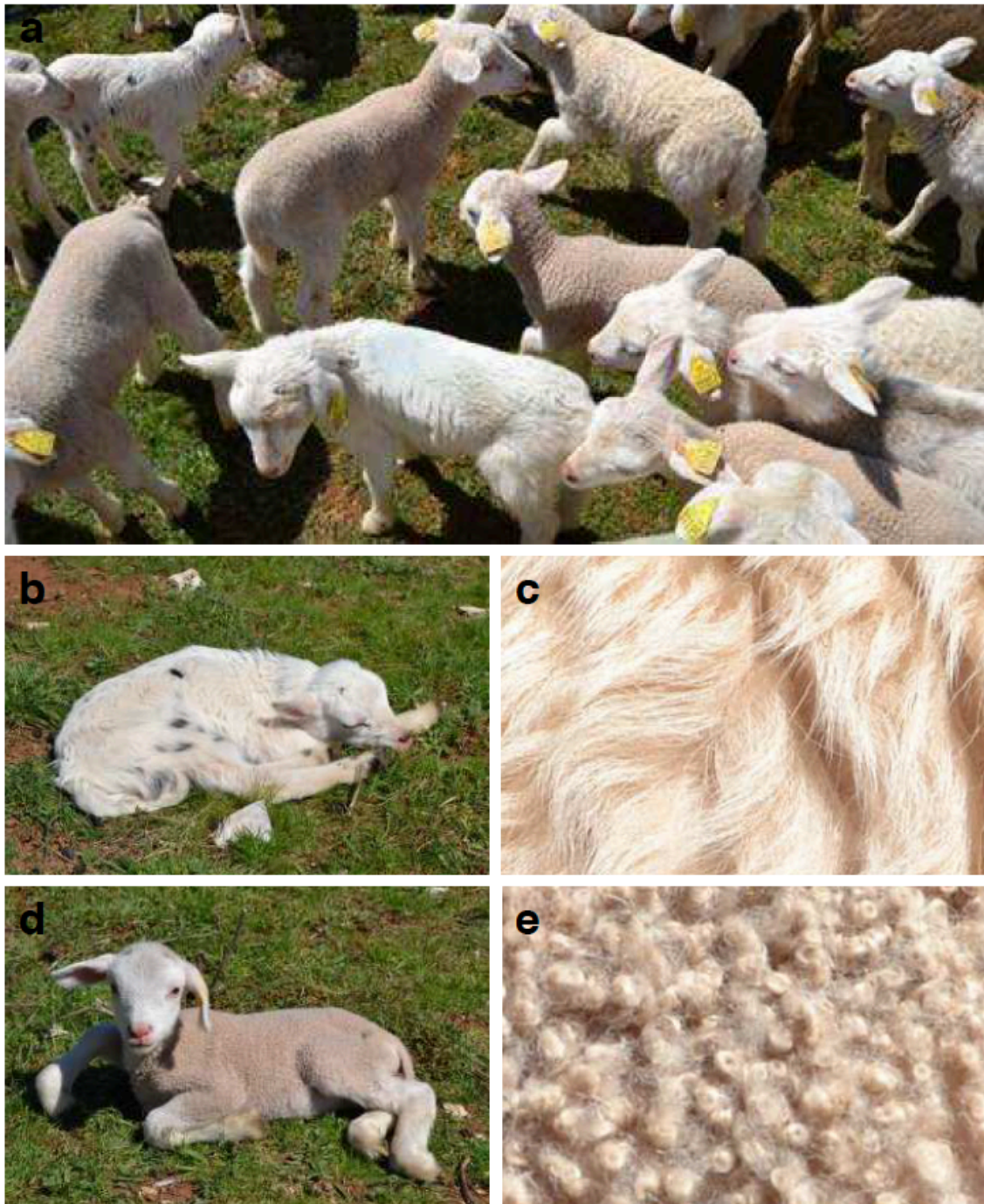


So sheep may safely graze

April 4 2017



From the picture: a, Segregation of the birthcoat type in 1 month old Romane animals. b, c, Romane lamb carrying a long and hairy coats similar to primitive and ancestral sheep species. Haired breeds have a double coated fleece with a

coarse outer coat made of hair fibers and a fine inner coat composed of woolly fibers. d, e, Romane lamb owning a short and woolly coat typical to domestic modern sheep. Woolled breeds have morewoolly fibers and carry a single coated fleece with all fibers nearly similar in dimensions. Credit: Julie Demars

In 1713, Johann Sebastian Bach once wrote a delightful cantata, "Sheep May Safely Graze," whose opening lyric boasts of shepherds protecting sheep from the ravages of the hunt.

Fast forward a few centuries, where now, from a large genome study, a team of French and Argentinian scientists may have successfully identified the [mutations](#) behind the sheep traits that shepherds began saving from the hunt —for their prized wool.

Corresponding author Julie Demars and her colleagues, from the National Institute of Agronomic Research in France and a researcher from the Instituto de Genetica in Argentina were interested in identifying traits from animals being selected after domestication, and choose sheep, whose breeds are as numerous as dogs.

"Nowadays, fleece variation is actively segregating in the French Romane [breed](#) which is a composite breed between the Berrichon du Cher and Romanov," said Demars. "Due to its parental origins, this breed shows large variability in its fleece type. At birth, a highly variable coat type from a short, woolly fleece (typical to Berrichon du Cher and domestic sheep) up to a hairy, long coat (characteristic of Romanov and primitive sheep) is observed in Romane lambs."

A few years ago, researcher Daniel Allain and others showed that the birthcoat type was a very highly heritable trait within this breed.

"Here, we used the Romane breed to map, identify and functionally validated the mutation responsible of fleece variation and various sheep populations representative of both ancestral species and modern [sheep](#) breeds to genetically confirm this singular causal mutation," said Demars.

To find their needle in the haystack, their genomic study involved a total of two-thousand lambs produced from 10 unrelated rams, with a little more than half (57 percent) of the lambs presented a hairy and long coat similar to the rustic Romanov breed and the rest comparable to Berrichon du Cher individuals with a short and woolly fleece.

From their genome-wide map and whole genome DNA sequencing, they hypothesize that the identified mutation may have been caused by an ancient, dead gene (called a retrogene, because it can no longer make a functional protein) that jumped nearby a gene loci, called IRF2B2. They performed additional analysis of the IRF2B2 region and speculate on the unique molecular mechanisms for how the mutation may have occurred.

"We believe that these new genes provide intriguing general insights into molecular basis of hair folliculogenesis and might open up new fields of research."

More information: Xiang Ji et al, A Phylogenetic Approach Finds Abundant Interlocus Gene Conversion in Yeast, *Molecular Biology and Evolution* (2016). [DOI: 10.1093/molbev/msw114](https://doi.org/10.1093/molbev/msw114)

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