

Remote sheep population resists genetic drift

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A wild sheep population on a remote Indian Ocean island is creating a buzz among genetics researchers.

A whimsical attempt to establish a herd of mouflon for sport hunting on a remote island in the Indian Ocean 50 years ago has inadvertently created a laboratory for genetic researchers and led to a surprising discovery.

A mouflon population, bred over dozens of generations from a single male and female pair transplanted to Haute Island from a Parisian zoo, has maintained the genetic diversity of its founding parents. This finding challenges the widely accepted theory of genetic drift, which states the genetic diversity of an inbred population will decrease over time.

"What is amazing is that models of genetic drift predict the genetic diversity of these animals should have been lost over time, but we've found that it has been maintained," said Dr. David Coltman, an evolutionary geneticist at the University of Alberta.

"We think this has happened because natural selection is more important to the evolutionary process than is commonly believed," he added.

Genetic diversity refers to the total amount of possible gene combinations that a mating male and female couple can produce. Scientists believe greater genetic diversity corresponds with greater odds of survival and successful reproduction due to a greater variety of genetic tools an organism has to combat the forces, such as diseases, that

may otherwise weaken or kill it.

Coltman believes the harsh environment of Haute Island, with its cold winters, scarce resources and grass-borne parasites, has "kept the mouflon on their genetic toes, so to speak."

He argues that the extreme conditions on the craggy, windswept island have prevented genetic drift due to the premium advantage the more genetically diverse mouflon on the island hold over their less genetically diverse cousins.

"This herd certainly challenges our understanding of genetic drift," he said. "And I think it shows us the power of natural selection."

Coltman and his colleagues, including Renaud Kaeuffer and Denis Réale from the University of Quebec at Montreal, and other collaborators from France, have published the results of their research recently in the journal *Proceedings: Biological Sciences*.

Haute Island sits in the Kerguelen Archipelago in the southern Indian Ocean and is more than 3,000 kilometres from its nearest port. The French government has used the island as a military outpost since the early 1900s, with French settlers arriving in the 1950s.

The Haute Island mouflon descended from two Corsican mouflons taken from the Vincennes Zoo in Paris in 1957. Mouflon are a hardy and fecund species of sheep, with the ewes able to produce an average of more than five offspring in a four-year lifespan. The Haute Island mouflon population peaked around 700 in the 1970s and since then has bounced between 200 and 600.

Coltman and his colleagues were able to trace the DNA of the original Haute Island mouflon couple using some samples of teeth, bone and fur

that had been preserved from the Vincennes Zoo since in the 1950s. DNA samples from subsequent generations were taken from the mouflon that had been kept as hunted "trophies" in the 1960s, and then scientists arrived in the '70s and began collecting samples themselves.

"The Haute Island mouflon have presented us with a rare opportunity," Coltman said. "There may be other natural populations that may have been studied in a controlled environment over the years, but I don't think there has ever been one in which you've been able to trace the DNA of the original, founding couple."

Source: University of Alberta

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