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## Rabbits Shed Light on Virus's Origins

By Jon Cohen  
ScienceNOW Daily News  
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Scouring genomes from 46 kinds of mammals, researchers have plucked out a startling insight about the origin of lentiviruses, a clan that includes HIV, equine anemia, and other devastating diseases. Lentiviruses have been infecting vertebrate genomes for far longer than anyone had previously shown, and the "genomic fossil" that led to this new discovery comes from the European rabbit (*Oryctolagus cuniculus*), a species that until now no one had connected to these pathogens.

Lentiviruses belong to the family of retroviruses, which have been attacking vertebrates for at least 50 million years. But analyses of lentiviruses themselves have indicated they are no more than 2 million years old, and some studies suggested they were much younger still. Now, evolutionary virologist Robert Gifford at Stanford University in Palo Alto, California, and co-workers say they have found remnants of a lentivirus in the European rabbit that dates back at least 5.7 million years. "I was quite excited by this," says John Coffin, a leading retrovirologist at Tufts University in Boston, Massachusetts. "All retroviruses are very old, despite what many card-carrying evolutionary biologists have been saying."

Gifford's team used known lentiviral DNA sequences to pluck out what they have dubbed RELIK, for rabbit endogenous lentivirus type K. RELIK is a fossil trace of what presumably once was an infectious virus that subsequently became endogenous, meaning it integrated into the genome and was passed from generation to generation. Several lines of evidence, including a molecular clock that compares expected DNA changes driven by mutation to the ones actually observed, led to what Gifford calls a "conservative" estimate that RELIK has infected rabbits for 5.7 million to 7 million years. The team reports its find online this week in *Proceedings of the National Academy of Sciences*.

Jonathan Stoye of the U.K. National Institute for Medical Research in London says RELIK may help researchers better understand the relationship between lentiviruses and their hosts, which can co-evolve in powerful ways. He notes that the immune system, for example, can evolve to dodge one retrovirus and in the process become more susceptible to another. RELIK may also help clarify the origins of other lentiviruses, such as HIV, which has a murky and controversial history. "It's a footprint of HIV a million miles away," says Stoye. "But it is at least a footprint."

One way to learn more would be to bring RELIK back to life, which Gifford hopes to do, possibly leading to a new lentiviral animal model.

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### Ancient clues.

The European rabbit's DNA harbors evidence of a lentivirus infection over 5 million years ago.

Credit: Eric Steinert