

News on the Fight-2 Project

News nº 8



01st June 2020

Divulgation of the Fighth-two Project in a journalistic article in “Science” magazine of the American Association for the Advancement of Science (AAAs)

The Fight-Two Project, entitled "Development of an edible vaccine for the control of the type 2 viral hemorrhagic disease virus (RHDV2) in wild rabbits", funded by the Foundation for Science and Technology (PTDC / CVT-CVT / 29062 / 2017-PT2020), was recently mentioned in a journalistic article in the Science magazine of the American Association for the Advancement of Science (AAAs), published on May 20, 2020 by Erik Stokstad, Science reporter since 1997, and a specialist in environmental issues, with a focus on natural resources, sustainability and conservation biology in addition to agriculture, forests and fisheries.

The interest in the Fight-2 Project arises from the recent detection of RHDV2 in the United States, namely in the state of? in rabbits of the genus *Sylvilagus*, such as the desert rabbit or Audubon rabbit (*Sylvilagus audubonii*), both susceptible to the virus. The article can be consulted at <https://www.sciencemag.org/news/2020/05/deadly-virus-killing-wild-rabbits-north-america>.



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PTDC/CVT-CVT/29062/2017-PT2020 – Fundação para a Ciência e Tecnologia

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Desert cottontails, like this healthy animal, are susceptible to a new virus. JOHN J. MORESSO/U.S. GEOLOGICAL SURVEY

A deadly virus is killing wild rabbits in North America

By Erik Stokstad | May 20, 2020, 2:40 PM

A deadly virus is **spreading** quickly among wild rabbits in southwestern North America, threatening populations and possibly endangered species. Last week the virus, which causes a hemorrhagic disease, reached Southern California.

“The outlook right now is so unbelievably bleak,” says Hayley Lanier, a mammologist at the University of Oklahoma. “We’re simply left to watch the wave spread out and worry about imperiled species in its path.”

Rabbit hemorrhagic disease virus first spread worldwide in the 1980s, devastating domestic rabbit populations in China and Europe. It raced through Australia, where feral rabbits had flourished after being introduced in the 18th century. Populations began to recover, but then a new strain emerged in France in 2010 that also kills wild species.

Strains of this new pathogen—rabbit hemorrhagic disease virus 2 (RHDV2, also called *L. europaeus/GI.2*)—are more prone to recombination, which could explain the broader range of hosts, says Joana Abrantes, a researcher in virus evolution at the Research Centre in Biodiversity and Genetic Resources in Portugal. The new strain is less deadly in adults, but unlike its predecessor it also kills young rabbits. After the virus hammered populations in the Iberian Peninsula, killing 60% to 70%, two predators that depend on rabbits also declined: the Spanish imperial eagle by 45% and the Iberian lynx by 65%.

Both types of RHDV are extremely infectious. They also persist in the environment, surviving in dead animals for at least 3 months. Predators and insects can spread it through their feces. The virus is now poised to spread throughout North America, says Robyn Hall, a veterinary virologist and epidemiologist with the Commonwealth Scientific and Industrial Research Organisation, where RHDV2 sped cross-country in 18 months between 2015 and 2016.

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First detection

The virus was first detected in North America in 2018, in domesticated rabbits in Canada, followed by three U.S. states, but not in wild species. In early March, biologists in New Mexico began to find dead wild rabbits. One of the first known victims was discovered by Gary Roemer, a wildlife biologist at New Mexico State University (NMSU), Las Cruces, while walking his Chesapeake Bay retriever in the desert. The dog “never catches jackrabbits, they’re just too damn fast,” he says. But the rabbit must have been sick and weak, he guesses. Since then, Roemer has found 18 carcasses in 1 half-square kilometer.

Biologists and wildlife veterinarians in neighboring states were on the alert and began to receive reports of multiple dead rabbits in many locations. “This is very, very unusual and what happens when we have a disease that is brand new to the landscape,” says Anne Justice-Allen, a wildlife veterinarian with the Arizona Game and Fish Department. “We would never see tularemia or plague spread like this in rabbits.” She has sent several carcasses to the U.S. Geological Survey (USGS) National Wildlife Health Center (NWHC), which is helping with necropsies and preparing samples for genetic testing. Because RHDV is a foreign virus, only a high containment laboratory run by the U.S. Department of Agriculture (USDA) on Plum Island off the New York coast is allowed to test for the virus.

USDA has sequenced genomes of RHDV2 samples collected from 2018 to the present, according to a **report** submitted to the World Organisation for Animal Health on 5 May. The viral strain in the southwest—the same strain has been found in both domestic and wild rabbits there—differs from samples from other U.S. states and Canada, which suggests a single introduction to the desert region. The genomes will be published as soon as possible, a spokesperson told *ScienceInsider*. Knowing more about the strains, and possibly their virulence, could help biologists know what kind of impact to expect in wild populations, Justice-Allen says. Challenge experiments, in which rabbits are intentionally infected with the virus, would also help. In 2017, researchers at the Plum Island lab showed that **RHDV2 can kill eastern cottontails**, a wild species, but experimental infections are not planned for other wild species.

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Concern for endangered species

In the meantime, USGS has **warned** that all North American species of lagomorph—which include rabbits, hares, and distant relatives called pikas—could be susceptible. Biologists fear the virus could have an especially negative impact on some species that are already struggling. Overall, just two species of North American lagomorph are considered stable; the rest are declining because of threats such as climate change or habitat degradation from livestock grazing. Other species are not well enough studied to know their status, Lanier says.

Species of particular concern include the pygmy rabbit, which has populations at risk, such as those in Washington state. The virus is already affecting species in northern Mexico, a center of lagomorph diversity that is home to rare and endangered species such as the volcano rabbit and the Davis Mountains cottontail.

“We are very concerned,” says Jesús Fernández, a mammologist at the Autonomous University of Chihuahua, Chihuahua. “We believe that [the virus] can pose a serious threat.” Fernández and colleagues have been telling local cattle ranchers they should burn any rabbit corpses they find, bury them 1 meter deep, and report any with bloody faces. Fernández and colleagues are organizing sampling work to figure out which species in Mexico can be infected and how the populations are faring. A future worry is that if rabbit and jackrabbit populations plummet, coyotes may hunt cattle instead, which might cause ranchers to use poison to kill the coyotes. Poisoned carcasses could in turn endanger scavengers such as eagles and vultures.

Roemer says there are not a lot of data on rabbit populations in the U.S. Southwest. He has done surveys in three parts of New Mexico for several years and hopes to find funding to determine the impact of the virus on rabbits and their predators. He and other researchers would also like to know whether certain species act as a reservoir for the virus, which could lead to it becoming endemic. “There’s so much we don’t know that it is extremely difficult to make a prediction,” says Matt Gompper, a wildlife ecologist at NMSU.

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Could a vaccine help?

If the virus does become established, some researchers hope a vaccine might help protect populations. Commercial vaccines for domestic rabbits, available in Europe, can't be used in wild species because they must be injected. "The stress induced by animal capture and manipulation is often lethal," Abrantes notes. And the vaccines are made from inactivated infectious viruses, which raises concerns the vaccines themselves could spread problematic pathogens.

Four institutions in Portugal are **working on a different approach**. Project Fight 2 aims to develop an oral vaccine for RHDV2, incorporated into bait, for the wild rabbit populations of the Iberian Peninsula. The project, which began in October 2018, has a budget of about €120,000 to develop a prototype vaccine based on viruslike particles that mimic viruses without being infectious. The group expects initial results on the effectiveness by the end of 2021. If successful, it could take two to three more years to license the vaccine, they say. One drawback: Like the vaccines for domestic rabbits, boosters will be necessary every 6 months, and cost could be an issue.

Robert Dusek, a wildlife biologist at NWHC, sounds a note of caution: "That's a long road to go down and pretty expensive." Carlos Rouco, a wildlife ecologist at the University of Córdoba, is also skeptical. He says the best hope is to prevent the introduction of the virus. "I don't consider myself an alarmist person, but the virus is unstoppable." Once it reaches a population, managers should try to reduce other stresses on the population, such as supplying water if necessary. A certain percentage of the population should be resistant to the virus, he says.

In Arizona, Justice-Allen has her hopes. "We are still seeing live rabbits in areas where the outbreak has been going on for more than a month. So that is reassuring."

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