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Democracy Dies in Darkness

HIDDEN PLANET

Scientists nally know why Germany's wild boar are surprisingly radioactive



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On April 26, 1986, the infamous explosion at a Chernobyl nuclear power plant unleashed large amounts of radiation into the atmosphere, an event that contaminated wildlife across country lines. The radiation levels seen in animals as a result has decreased in recent years — with the exception of one animal: the wild boar.

For years, scientists questioned why levels of a radioactive isotope known as cesium-137 have remained surprisingly high in wild boars rooting around Germany and Austria, while decreasing in other deer and roe deer. In a <u>new study</u> released last week, a team of researchers finally solved this "wild boar paradox." They uncovered that the main radioactive source is not the Chernobyl accident but nuclear weapons testing from the 1960s.

"My mind was blown when I realized how relevant this source of radioactive contamination in general still is," said Georg Steinhauser, a radiochemist at TU Wien and author of the new study. Steinhauser said people might not think that 60 years after a nuclear weapons explosion, wild boar populations would still be contaminated with radiation levels well above the regulatory food limit.

Researchers have previously proposed other explanations to no avail. Some thought the contamination levels in wild boar were actually decreasing, but the data didn't show up in the limited number of studied samples. Steinhauser previously suggested that perhaps the cesium dissolves better in fat tissue in wild boars and stays present longer, but <u>subsequent research</u> did not support that assertion either.

In the new research, Steinhauser and his colleagues took a step back and reinvestigated the amount and origin of cesium in wild boars. Working with hunters collecting wild boar meat across southern Germany, they measured cesium levels with a gamma-ray detector.

Radioactive cesium results from both nuclear weapons explosion and nuclear energy production. The element comes in different isotopic composition, cesium-135 and cesium-137, depending on the source. By analyzing the ratio of these amounts, the researchers can pinpoint the source of the radiation. From previous literature, the team knew a higher ratio of cesium-137 indicated a nuclear weapons explosion but a lower ratio is linked with nuclear reactors.

In the nearly 50 collected meat samples, the team found 88 percent of the samples were above Germany's regulatory limits for radioactive cesium in food. Calculating the ratio of cesium isotopes in the samples, they found that nuclear weapons testing accounted for 10 to 68 percent of the contamination.

Even if the Chernobyl accident had never happened, "some of the wild boars would actually still exceed the regulatory limits for food safety limits only because of the weapons tests today," said Steinhauser. "I think this is pretty mind-blowing because they were 60 years ago."

Steinhauser said it's hard to attribute the nuclear weapons fallout to any certain location or test because the tests affected the entire Northern Hemisphere quite evenly. An enormous updraft occurs after an explosion, pushing material higher. By the time the fallout falls down to Earth, he said the radioactive material has evenly distributed higher in the atmosphere to create a truly "global fallout" phenomenon.

The wild boars probably ingested the cesium from contaminated deer truffle mushrooms, which they dig up and eat during the winter when corn and acorns on the ground are scarce, he said. Cesium seeps through the soil and is absorbed by the mushrooms, as if it were a nutrient. This also explains why observations show radioactivity levels in wild boar are higher in the winter. (Interestingly, the deer do not fancy deer truffles so much despite the name.)

While cesium from both the nuclear weapons testing and the Chernobyl accident spread through the soil, Steinhauser said, the mushrooms appear to have fully absorbed the source from the nuclear weapons testing so far. Cesium seeps very slowly through the soil, sometimes only one millimeter per year, he said. Deer truffles, located between 20 and 40 centimeters, have already absorbed the "older" cesium from six decades ago. The "younger" cesium from Chernobyl has likely not fully integrated or is just now integrating at the soil depths where the mushrooms are located.

But it could be bad news when the cesium from Chernobyl does reach the mushrooms — radioactivity levels could go up higher.

"There's a chance that the levels will actually go up instead of going down as everybody anticipated," Steinhauser said.

But Steinhauser said humans, including wild boar consumers, probably don't have anything to worry about because they would have to eat "insane" amounts of the animal to show meaningful amounts of radioactive material. Plus, wild boar available through stores and official channels in Germany are tested and regulated.

Radiochemist Ralf Sudowe, who was not involved in the research, said some of the study's results were "really surprising" to him. He said it has always been assumed that the radiocesium stems from the most recent release of radioactive fallout that affected the area, such as the Chernobyl accident in the case of Europe, but this study upends that assumption.

"This study clearly shows that the contribution from legacy sources, i.e., fallout from nuclear weapons tests, cannot be ignored when determining potential environmental consequences and health risks, which was news to me," said Sudowe, a professor at Colorado State University. Nuclear chemist Rebecca Abergel, who was not involved in the study, was less surprised that nuclear weapons testing contributed a significant portion of contamination. She said it has been "known for decades that significant isotope contamination throughout the planet is a result of weapons contamination."

But Abergel, an associate professor at University of California, Berkeley, said the study was interesting because it characterized and highlighted regional disparities in the contamination. Some of those differences may be because of localized factors, such as winds, animal migration or subsurface water flow.

Both Abergel and Sudowe applauded the study's method of radiochemical analysis and the advancement of being able to pinpoint a radiocesium source. The study's methods can be used to further understand the impact of weapons activity through time and to help determine other sources of contamination from radioactive materials, including smuggled material.

Sudowe said that being able to pinpoint the source of a radioactive release "plays an important role in being able to address and remediate the environmental consequences."

Overall, the study underlines the role that humans have in our environment, said Steinhauser. He said his study isn't promoting or opposing the use of nuclear energy but says "it has to be done responsibly."

"It's a cautionary tale that we have to take good care of our environment," said Steinhauser. "Once released, a radioactive substance can never be unreleased again — and nature doesn't forget."



Wild boars near Allersberg, Bavaria. Decades after the Chernobyl nuclear accident, wild boars around Germany and Austria are still highly radioactive even though other animals are not. In a new study, scientists discovered that the high radiation levels come from nuclear weapon testing in the 1960s, not from Chernobyl. (Timm Schamberger/AFP/Getty Images)



Radiation levels in wild boars from Germany and Austria remain surprisingly high 60 years after nuclear weapons testing. (Joachim Reddemann)