

DNA evidence is putting rhino poachers behind bars, study shows

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Rhinoceros. Credit: Cindy Harper, D.V.M. Veterinary Genetics Laboratory University of Pretoria

In murder investigations, DNA evidence often helps to link a perpetrator to a crime scene and put him or her behind bars. Now, researchers

reporting in *Current Biology* on January 8 show that DNA evidence is also successfully being used to link rhinoceros horns seized from poachers and traffickers in various countries directly to the specific crime scenes where rhinoceros carcasses were left behind.

Their Rhino DNA Index System (RhODIS) includes a chain-of-custody-compliant biosampling kit and sampling methodology. It has already been used in more than 5,800 forensic cases with links made between recovered horns, blood-stained evidence items, and specific [rhinoceros](#) carcasses in more than 120 cases.

"Unlike similar work in which genetic databases provide an indication of geographic provenance, RhODIS provides individual matches that, similar to human DNA profiling, is used as direct evidence in criminal court cases," says Cindy Harper of the Veterinary Genetics Laboratory at the University of Pretoria in South Africa.

Black and white rhinoceros (*Diceros bicornis* and *Ceratotherium simum*) are listed by the International Union for the Conservation of Nature (IUCN) as endangered and near threatened, respectively. The new report comes at a time when poaching incidents have seen an uptick after decades of progress. In South Africa, rhinoceros poaching incidents increased from 13 in 2007 to 1,215 in 2014. Rhinos are killed for their horns, which are sought after for medicinal purposes and, increasingly, as cultural status symbols. In the last 10 years, more than 7,000 African rhinoceros have been hunted and killed illegally.

To calculate the probability of a match between confiscated DNA evidence and a crime scene, the researchers relied on allele frequencies calculated from a collection of 3,085 white rhinoceros and 883 black rhinoceros. Their analyses show that it's possible to reliably match the unique DNA profile of an individual animal obtained from any tissue, including horns or curios and powders made from the horns, with a panel

including 23 short tandem repeat (STR) loci.

The report highlights nine cases in which DNA matches were made and that evidence was used for the prosecution, conviction, and sentencing of perpetrators of rhinoceros crimes. One case involving three horns and tissues from two carcasses led to a sentence of 29 years.

The RhODIS dataset also offers insight into rhino populations. For instance, the data support the species classification of white and black rhinoceros and three subspecies of black rhinoceros. As a result, Harper says the genetic panels include loci that can also be used to identify horns as originating from white or black rhinoceros. Information on the population structure can also help investigators narrow their search for specific carcasses linked to seized horns.

Because rhinoceros horns often move extremely rapidly from the crime scenes to the consumer countries, the researchers note that the investigation, sampling, and analysis of forensic evidence must be expedited and internationally coordinated. Fortunately, Harper says they've found extensive support for the program from within South Africa, from provincial wildlife and enforcement authorities, the national government, police services, national parks, and the majority of states where rhinoceros live.

"Thanks to this support, we've seen rapid growth of the database into a representative source of rhinoceros genetic data for both forensic and management applications from its inception," Harper says. "The unprecedented cooperation and support for the program from these authorities has been surprising and encouraging."

These cases now show that forensic data resources for wildlife species that are under severe threat from illegal hunting and trafficking can be applied successfully across borders to assist in the investigation and

ultimate conviction of wildlife criminals. The hope is that the increasing risk of conviction and stiff sentencing will play an important role in decreasing incentives to deal in illegal wildlife products.

The researchers say the RhODIS database continues to grow as new samples are added. With funding support and the use of genetic data to better manage remaining rhinoceros populations, "this effort will further ensure that the survivors remain healthy while efforts to curb wildlife trafficking and educate consumers continue," Harper says.

More information: *Current Biology*, Harper et al.: "Robust forensic matching of confiscated horns to individual poached African rhinoceros" [www.cell.com/current-biology/f ... 0960-9822\(17\)31450-1](http://www.cell.com/current-biology/fulltext/S0960-9822(17)31450-1) , DOI: [10.1016/j.cub.2017.11.005](https://doi.org/10.1016/j.cub.2017.11.005)

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