

Tail hair as an indicator of behaviour and ecology in horses

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Two Przewalski's horses are shown at an oasis in the Mongolian Gobi desert.
Credit: Foto: Martina Burnik Šturm/Vetmeduni Vienna

Life style leaves chemical traces in hair. In horses, the analysis of tail hair is especially suited as long hair can provide information over a long

period of time. Researchers at the Vetmeduni Vienna have developed a method to determine the period of time that corresponds to a segment of hair. They assign individual hair growth to seasons and thus to a specific time frame. The results were published in *Rapid Communications in Mass Spectrometry*.

A common method for learning more about an animal's ecology and behaviour is to analyse the chemical composition of its [hair](#). This involves the analysis of isotopes, which are variants of a chemical element with different atomic weights. The ratio of different isotopes of hydrogen, oxygen, carbon and nitrogen in a sample can provide important insights on water intake, nutrition and habitat.

Martina Burnik Šturm and Petra Kaczensky from the Research Institute of Wildlife Ecology at the University of Veterinary Medicine Vienna investigate the ecology of free-ranging horses and wild asses in the Gobi desert of Mongolia. In order to find out how different wild equid species live together in the Mongolian Gobi, what they eat, drink and how they migrate, the scientists look for answers in hair.

How "long" is one centimetre?

The researches quickly ran into one problem. What does one centimetre of hair actually mean in terms of time? Does one centimetre refer to as one week, one month or more? Measuring how fast hair grows in a particular species does not solve the problem because hair grows at different rates in each individual animal.

First author Burnik Šturm therefore developed a method to clearly align hair segments to time. The habitat of free-ranging equids in Mongolia helped her in this approach. The Mongolian Gobi is subject to extreme climatic conditions. Temperatures vary greatly at different times of year, and so does the composition of the chemical elements in the hair. By

comparing the isotope data from hair with satellite information freely available from NASA's Earth Observing System Data and Information System (EOSDIS), she assigned a summer-winter rhythm to each hair. This allowed her to calculate the exact time corresponding to one centimetre of hair.

On average, the [tail hair](#) of Mongolian wild asses reaches one centimetre in 19 days. Przewalski's tail hair takes 17 days and the tail hair of domestic horses only 13 days to grow one centimetre.

"We found that tail hair growth varies greatly between species and even between individuals. To assume that closely related species exhibit similar [hair growth](#) rates and to use average growth rates for individuals will most probably lead to incorrect results", states Burnik Šturm.

"Isotope analysis of hair is a common method in the study of animal nutrition and migration. Our method makes it possible for the first time to establish exact time lines for an animal's ecology and behaviour. Previous time lines were estimations and not entirely accurate. Now researchers have a relatively simple method with which to correctly interpret their data," says Burnik Šturm.

Special life of wild equids in Mongolia

Tail hair is assumed to provide researchers with information about the ecology and behaviour of Przewalski's horses, wild asses and free-ranging domestic horses in the Mongolian Gobi. All three species share the same habitat in a 9,000 square metres strictly protected area of southwest Mongolia. Closely related species usually compete for food. Moreover, the grassland in the region is quite barren. A key question for the researchers is: "What allows the animals to coexist in this region." The project is still ongoing.

How does hair isotope analysis work?

For the [isotope analysis](#), the tail hair is cut into one centimetre long segments and placed individually in little tin or silver cups before being burnt at a temperature of 1,450 degrees Celsius. Isotopes are then measured in the developing gases using mass spectrometry, a method to sort individual atoms by mass.

Today, isotope analysis is used in many different fields. The method can help to determine the regional origin of animals, food or natural fibres. Isotope analysis is also used to detect cases of doping or environmental contamination.

More information: The article "A protocol to correct for intra- and interspecific variation in tail hair growth to align isotope signatures of segmentally cut tail hair to a common time line", by Martina Burnik Šturm, Budhan Pukazhenthii, Dolores Reed, Oyunsaikhan Ganbaatar, Stane Sušnik, Agnes Haymerle, Christian C. Voigt and Petra Kaczensky was published in the journal *Rapid Communications in Mass Spectrometry*: [wiley-blackwell.spi-global.com ... 01210907/RCM7196.pdf](https://wiley-blackwell.spi-global.com/doi/10.1002/rcm.7196)

Provided by University of Veterinary Medicine—Vienna

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