

Leeches are DNA bloodhounds in the jungle

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Copenhagen Zoo and University of Copenhagen have in collaboration developed a new and revolutionary, yet simple and cheap, method for tracking mammals in the rainforests of Southeast Asia. They collect leeches from tropical jungles, which have been sucking blood from mammals, and subsequently analyse the blood for mammal DNA. By using this method, the researchers can get an overview of the biodiversity of the mammals without having to find them. The groundbreaking results are to be published in the prestigious scientific journal *Current Biology*.

"It is not unusual that unknown mammals appear on local markets and end up in soup pots – without scientists knowing of it. Therefore, the new method is important to obtain knowledge of what hides in the jungle - regarding both known and unknown species. I am convinced that the new method is not only useful in Southeast Asia, but can be used in many other parts of the world where such [leeches](#) exist," explains Tom Gilbert, professor at the Centre for GeoGenetics, University of Copenhagen, and one of the initiators of the project together with Mads Bertelsen from Copenhagen [Zoo](#).

Approximately a quarter of the world's [mammal species](#) are threatened with extinction. However, it is difficult and expensive to monitor mammal species and populations living in impassable rainforest areas around the globe.

But Copenhagen Zoo in collaboration with Centre for GeoGenetics at the Natural History Museum of Denmark, University of Copenhagen,

have now developed a new, efficient and cheap method, which could be the solution to this problem. The answer is leeches. In this case, leeches (belonging to the genus *Haemadipsa*), which thrive in the terrestrial habitats of [rainforests](#) in large parts of [Southeast Asia](#).

The significance of the new method is that the researchers do not have to depend on the usual tools, such as camera traps, collecting hair, faeces or tracking footprints to identify the shy mammals in the isolated rainforest areas.

These traditional methods are often cumbersome and inefficient.

Instead, the researchers collect leeches when they eagerly come to them for a blood meal. Afterwards, the leeches' "bloody appetites" are analysed for DNA. In this way, the researchers get a genetic identification of the mammal host species, which the leeches have been sucking blood from.

Veterinarian Mads Bertelsen, Copenhagen Zoo, explains how he came on to the idea of analysing blood from leeches.

"It was in a Zoo project in Malaysia on monitoring and tracking of tapirs that we started thinking about the possibilities. Leeches in the jungle attacked one of my colleagues, and the idea was born. Then we contacted DNA researchers at GeoGenetics, University of Copenhagen, to explore the perspectives directly. First, we used 20 medical leeches fed with goat blood from the Zoo. It turned out that the leeches contained traces of goat DNA for more than four months after eating. Then we knew we were on to something," says veterinarian Mads Bertelsen from Copenhagen Zoo.

"It is an alternative way of monitoring mammalian wildlife. Leeches come to you with the blood samples, rather than you tracking down the

animals in the jungle. Simple and cheap, and the sampling does not require specially trained scientists, but can be carried out by local people. I am convinced that this technique will revolutionise the monitoring of threatened wildlife in rainforest habitats," says Mads Bertelsen.

Next step in the project was to collect leeches from a Vietnamese rainforest and analyse them for mammal DNA. 21 of 25 leeches contained DNA traces from local mammal species. Some of them were even very rare species. Among the catch was a ferret-badger, a deer, a goat-antelope and the Annamite striped rabbit. The latter was particularly exciting, as it was first discovered in 1996, however, has not been seen in this area since, despite 2,000 nights of infrared camera trapping. Thanks to the research team, the rabbit is once again confirmed in the area.

PhD Philip Francis Thomsen, from professor Eske Willerslev's Centre for GeoGenetics at the University of Copenhagen, performed the DNA analyses that led to the groundbreaking results.

"I was very surprised and happy when I saw the first results from the DNA analyses of the leeches. We kept finding new [DNA](#) sequences from local Vietnamese mammals, only from analysing very few leeches. The new method could become very important for gaining knowledge on threatened [mammals](#)," says PhD Philip Francis Thomsen.

"It could give us insight to which mammal species are present in a given area, including new and unknown species. The recent revolution in DNA-sequencing technology, combined with a simple but innovative idea, have made this possible," explains Philip Francis Thomsen.

Provided by University of Copenhagen

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