

How frog tongues are like commercial dry adhesives

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The horned frog (*Ceratophrys cranwelli*) hunts by burying itself in loose soil, staying motionless and waiting for prey to get close. Credit: Kleinteich

Scientists from the Functional Morphology and Biomechanics research group at Kiel University have shown, for the first time, what happens

when a frog's tongue makes contact with a surface. They discovered similarities to conventional adhesive tape. Like sticky tape, the tongues form lots of little threads (fibrils) when being removed from a surface, which break one at a time before the contact disconnects.

"We got horned frogs to spit their tongues towards a cricket, which was placed behind a sheet of glass", said Dr Thomas Kleinteich from the Zoological Institute to describe the experiment. The glass was connected to a [light source](#) which lit up the places the tongue came into contact with. The researchers then filmed these lit areas using a [high-speed camera](#) with a time resolution of 0.5 milliseconds (half of a thousandth of a second). This enabled them to observe exactly how the contact formed and then disconnected again.

The zoologists also investigated the anatomy of the frog's tongues. Using 3D models created by micro computer tomography, they were able to see how individual muscle fibres in the tongue were arranged. According to this, the muscle that pulls the tongue back into the frog's mouth literally fans out under the surface of the tongue. When the frog pulls its tongue back into its mouth, the force is spread evenly over the entire surface of the [tongue](#).

Kleinteich: "This is a similar effect to trying to vertically pull a strip of Sellotape off a surface, instead of starting from one end - you need significantly more strength to do so." This enables the animals to lift insects, or even other [frogs](#) or small mice, in one go.

More information: "Frog tongue acts as muscle powered adhesive tape." *R. Soc. open sci.* 2: 150333. [dx.doi.org/10.1098/rsos.150333](https://doi.org/10.1098/rsos.150333)

Provided by Kiel University

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