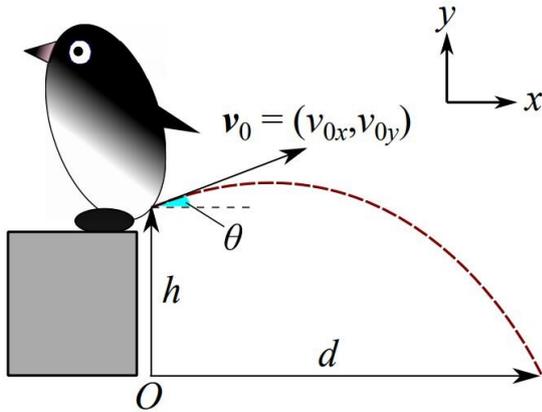


# Calculating the true pressure required to propel penguin feces

9 July 2020, by Bob Yirka



Configuration for a penguin trying to defecate towards his/her rear side. Credit: arXiv:2007.00926 [physics.bio-ph]

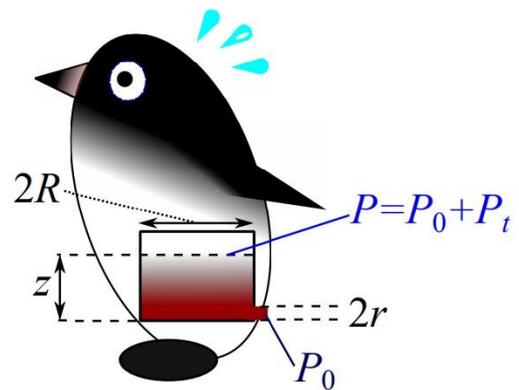
A pair of researchers, one with Kochi University, the other Katsurahama Aquarium, both in Japan, has refined the estimate of the amount of pressure required by an Adélie penguin to shoot its feces a necessary distance. Hiroyuki Tajima and Fumiya Fujisawa have written a paper describing their new calculations and what it could mean for zookeepers.

Back in 2003, a different pair of researchers [calculated](#) the amount of pressure required by Adélie penguins to shoot feces from their cloaca to account for the distance it traveled. In this new effort, the researchers have added a new variable to make the [calculation](#) more precise.

Adélie penguins are reluctant to leave a nest when they are brooding eggs—the danger to the eggs is too great. But they also have a need to keep a clean nest. Evolution has stepped in to solve the problem for the penguins—when they need to defecate, they point their body away from the nest, lift their tail, and shoot their feces away from the

[nest](#), leaving a colored trail. The researchers of the 2003 study wondered how much pressure would have to build up inside of their bodies to shoot their waste such a distance, which was 30 to 40 centimeters. By measuring the distances of the colored trails, the consistency of the excrement and the aperture of the cloaca, they were able to calculate how much pressure is required to shoot the excrement the distance the penguins achieved—about three times that of humans.

In this new effort, the researchers noted that in the first study, the team had left out an important factor in their calculations—the arc of the flung feces. If the feces were traveling along an arc as it left a [trail](#) on the ground, it would have to cover more distance, which was not included in the original calculations. The researchers reworked the [pressure](#) formulas after finding an average arc height and came up with a new answer—one that was just slightly more than the original answer—a little more than 10 to 60 kilopascals.



Model for penguin's stomach. Credit: arXiv:2007.00926 [physics.bio-ph]

**More information:** Projectile Trajectory of

Penguin's Faeces and Rectal Pressure Revisited,  
arXiv:2007.00926 [physics.bio-ph]  
[arxiv.org/abs/2007.00926v1](https://arxiv.org/abs/2007.00926v1)

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