

## Scientists discover the 'universal law of urination'

Researchers say that the discovery may assist with the construction of water towers.



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Scientists have determined just exactly what is behind the need to urinate, reports **New Scientist**. Patricia Yang and her colleagues at the Georgia Institute of Technology in Atlanta utilized video to examine the physics behind urination. The seemingly silly study actually has important real-world implications; Yang and her team hope that their results will help in detecting urinary problems in mammals in the future. In order to investigate urinary practices, the team shot footage of animals urinating at a local zoo. They noticed that animals, male and female, in a range of sizes all took the same amount of time to empty their bladders.

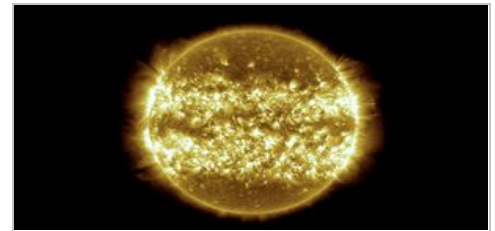
The team filmed rats, dogs, goats, cows and elephants and utilized YouTube videos to examine the urination patterns of other species. Then they combined that information with data that they had on mass, bladder pressure and urethra size of each animal in order to determine why mammals took the same length of time to empty their bladders, despite obvious differences between species.

The team discovered that urethra size played a significant role in how long it took an animal to empty its bladder. Elephants have significantly more urine than a small animal to dispose of, so one might think that it would take more time to do so. However, researchers were able to determine that an elephant's urine was able to gain more speed during its exit from the body, thus resulting in the elephant being able to empty their bladder in the same time as a smaller animal.

Appearances are not necessarily deceiving; an animal's size does play a factor, just not a big one. The law of urination that the team came up with states that the "time a mammal takes to empty a full bladder is proportional to the animal's mass raised to the power of a sixth," says **New Scientist**. For animals that are much smaller, however, this rule does not hold true, explains **Popular Science**. For animals that are extremely small, like mice, the gravitational force works differently; David Hu, an assistant professor at GIT described it like water stuck in a thimble. Thus, the team hypothesizes that the theory only holds true for animals that weigh more than a kilogram.

Understanding the physics behind urination may assist scientists in determining when there is a problem in larger mammals; Yang also theorizes that the design may be used in water tower construction, which also utilizes gravitational force to pump water.

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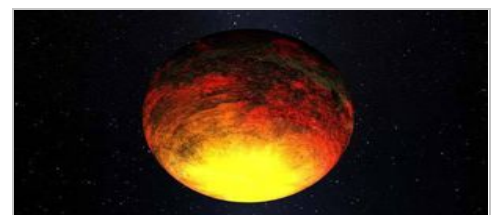
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