

Sloth guts are designed for hanging upside down, study finds

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A three-toed sloth (*Bradypus*) plays at the Aiunau Foundation in Caldas, Colombia on September 15, 2012

Three-toed sloths have a unique abdominal design—their innards fixed to their lower ribs to avoid squashing the lungs while hanging upside down, a study said Wednesday.

The South and Central American forest dweller, also known as the

brown-throated [sloth](#), spends a large part of its life hanging from its [hind legs](#) to reach young, tender leaves growing on the tips of branches, as well as to groom.

With its slow metabolism, it may take the sloth a month to digest a single leaf, and it can store a third of its bodyweight in urine and faeces—which it deposits about once a week.

"This means that the stomach and bowel contents make up a considerable proportion of their body mass," said Rebecca Cliffe of the Swansea Laboratory for Animal Movement in Wales, who co-authored the study in the Royal Society journal *Biology Letters*.

"With their limited energy supply, it would be energetically very expensive, if not impossible, for a sloth to breathe whilst hanging upside down," she told AFP.

Cliffe and a research team say they believe they solved the riddle: numerous unique adhesions in the abdomen anchor organs such as the liver, stomach and kidneys, thus preventing them from pressing on the diaphragm when the sloth is inverted.

"These seemingly innocuous adhesions are likely to be important in the animal's energy budget and survival," said the study.

They could reduce a sloth's [energy expenditure](#) by 13 percent, added Cliffe.

More information: Mitigating the squash effect; sloths breathe easily upside down, *Biology Letters*, [rsbl.royalsocietypublishing.org1098/rsbl.2014.0172](https://rsbl.royalsocietypublishing.org/doi/10.1098/rsbl.2014.0172)

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