

Hibernating pygmy-possums can sense danger even while dormant

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Pygmy-possum. Credit: Gerhard Koertner

What happens to hibernating or torpid animals when a bushfire rages?
Are they able to sense danger and wake up from their energy-saving

sleep to move to safety? Yes, says Julia Nowack of the University of New England in Australia, lead author of a study in Springer's journal *The Science of Nature* about the reaction of pygmy-possums in such instances. The study is the first to investigate in detail the physical response of hibernating animals to smoke and fire.

Pygmy-possums (*Cercartetus nanus*) live in trees mainly along the south-east coast of Australia. These small and agile nocturnal marsupials use their tails to grasp onto branches while moving about, and are even able to climb up their own tails.

Nowack's team conducted tests under laboratory conditions on five eastern pygmy-possums while they were experiencing torpor. During this state of inactivity and metabolic rest, the animals do not need food, their body temperatures drop and they experience periods of deep dormancy that can go on for up to a month at a time. In possums, these energy-saving events are not linked to specific seasons, and can occur year-round. In nature, they stay put in a nest of bark and leaves in tree hollows, underground or in bird nests. This puts these creatures at risk of falling victim to [prescribed burns](#) during winter, but also during the summer wildfires that are increasing in frequency in Australia because of climate change.

It was found that pygmy-possums are able to pick up the smell of smoke while experiencing torpor, but that their subsequent responses are temperature dependent. No movements were observed when the [outdoor temperature](#) stood at a cold 10 degrees Celsius and the possums had a low body temperature. By 15 degrees Celsius, the three males in the study aroused enough to start moving, while the two females still only lifted their heads. The animals' body temperature also played a role for their ability to move. When their body temperature was around 24 degrees Celsius, the pygmy-possums were able to perform advanced moves such as climbing up their tails. A drop of their [body temperatures](#)

to below 13 degrees Celsius, caused their reactions and movements to be extremely slow and very basic.

The study is the first to show that animals are able to smell while in torpor. The results are particularly important in light of expected increases in the frequency of fires due to climate change. It also has implications concerning the implementation of prescribed burns during the colder months of the year. In many areas where bushfires occur regularly during summer, such as in Australia, prescribed burns are conducted in winter to reduce the amount of flammable plant material during the warmer months and to help maintain a healthy ecosystem.

"Prescribed burns during winter should be avoided on very cold days to allow torpid [animals](#) enough time to respond," says Nowack.

More information: Julia Nowack et al, Can hibernators sense and evade fires? Olfactory acuity and locomotor performance during deep torpor, *The Science of Nature* (2016). [DOI: 10.1007/s00114-016-1396-6](https://doi.org/10.1007/s00114-016-1396-6)

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