

Slime mold absorbs substances to memorize them

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Fusion of the venous network of two blobs. Credit: © David Villa / CNRS Photothèque

In 2016, CNRS scientists demonstrated that the slime mold *Physarum*

polycephalum, a single-cell organism without a nervous system, could learn to no longer fear a harmless but aversive substance and could transmit this knowledge to a fellow slime mold. In a new study, a team from CNRS and the Université Toulouse III - Paul Sabatier has shown what might support this memory, and in fact, it could be the aversive substance itself.

Physarum polycephalum is a complex single-cell organism that has no [nervous system](#), however it can learn and transfer its knowledge to its fellow [slime](#) moulds via fusion. How it does so was a mystery until recently. Researchers at the Centre de Recherches sur la Cognition Animale (CNRS/UT3 Paul Sabatier) have recently demonstrated that slime moulds learn to tolerate a substance by absorbing it.

This discovery stems from an observation: slime moulds only exchange information when their venous networks fuse. In that case, does knowledge circulate through these veins? Is it the substance that the slime [mould](#) gets used to that supports its memory?

First the team of scientists forced the slime moulds to cross salty environments for six days to habituate them to [salt](#). Then they evaluated the salt concentration inside the slime moulds: they contained ten times more salt than "naive" slime moulds. The researchers then placed the habituated slime moulds in a neutral environment and observed that they excreted the salt absorbed within two days, losing the "memory." This experiment therefore seemed to show a link between the [salt concentration](#) within the organism and the "memory" of the habituation.

To further advance and confirm this hypothesis, the scientists introduced the "memory" into naive blobs by injecting a salt solution directly into the organisms. Two hours later, the slime moulds were no longer naive and behaved like slime moulds that had undergone a six-day training

When [environmental conditions](#) deteriorate, slime moulds can enter into a dormant stage. The researchers demonstrated that slime moulds habituated to salt stored the salt absorbed before entering the dormant stage and could store the knowledge for up to a month.

The results of this study prove that the aversive substance could be the support of the slime mould's memory. The researchers are now trying to establish whether the [slime moulds](#) can memorise several aversive substances at the same time and to what extent they can get used to them.

More information: A. Boussard et al, Memory inception and preservation in slime moulds: the quest for a common mechanism, *Philosophical Transactions of the Royal Society B: Biological Sciences* (2019). [DOI: 10.1098/rstb.2018.0368](https://doi.org/10.1098/rstb.2018.0368)

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