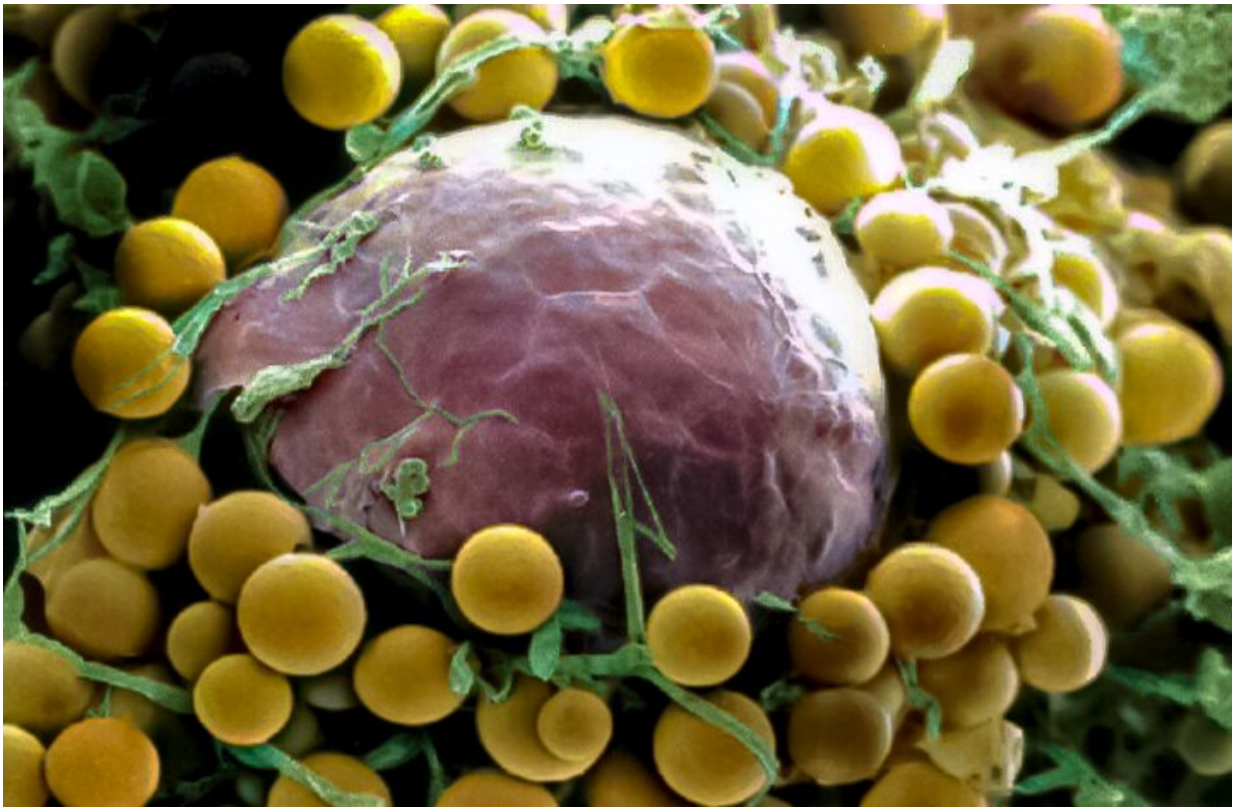
The protective role of cells in overwintering fungi

October 12 2021



An overwintering fruiting structure of the fungus A. nidulans (shown here in pink), surrounded by nurturing and protective Hülle cells. Credit: Liu et al.

Scientists have discovered a new role for cells that are known to nurture the overwintering reproductive structures in a type of fungi, according to a study published today in *eLife*.

The findings suggest that Hülle cells in the fungus Aspergillus nidulans (A. nidulans) also play a key part in its chemical defense strategies to ward off hungry predators.

"As immobile organisms, fungi can't run away from attacking predators or organisms such as bacteria that compete with them for resources, so they turn instead to chemical defense strategies by producing protective compounds called secondary metabolites," explains first author Li Liu, a Ph.D. student at the University of Göttingen, Germany. "In our study, we wanted to investigate where the proteins that assist the production of these compounds are located in A. nidulans."

The team found that the proteins behind the production of secondary metabolites are concentrated heavily within the fungus' Hülle cells. The production of these defensive chemicals ramps up as the fungus' fruiting structures develop, aided by the Hülle cells.

They then showed that a regulator called the 'velvet complex' controls the pathway for the production of these defense chemicals. Without this regulator, the fungi are unable to make them. When the production of the chemicals is interrupted, intermediate compounds build up within the Hülle cells that impair the growth of the fungus' fruiting structures.

Finally, the team exposed the fungus to tiny arthropod predators, including woodlice. They found that the predators avoid eating the reproductive parts of the fungus that produce defensive chemicals, but they will gobble up the reproductive parts that lack them. "The chemicals are not toxic to the predators—they simply make the fungus and their reproductive parts unappealing to them," says co-senior author Jennifer Gerke, a postdoctoral researcher at the University of Göttingen.

"Together, our experiments highlight a previously unknown role for Hülle cells in protecting A. nidulans from predators," concludes senior

author Gerhard Braus, Professor of Microbiology and Genetics at the University of Göttingen. "We've shown how the cells accumulate deterrent chemicals that protect the fungus' reproductive structures from predators, ensuring its long-term survival. The work provides new insight on both the ecology of A. nidulans fungi and the ecological functions and impact of the secondary metabolites they produce to defend themselves."

More information: Li Liu et al, Secondary metabolites of Hülle cells mediate protection of fungal reproductive and overwintering structures against fungivorous animals, *eLife* (2021). DOI: 10.7554/eLife.68058

Provided by eLife