Discovering what keeps cellular cargo on track

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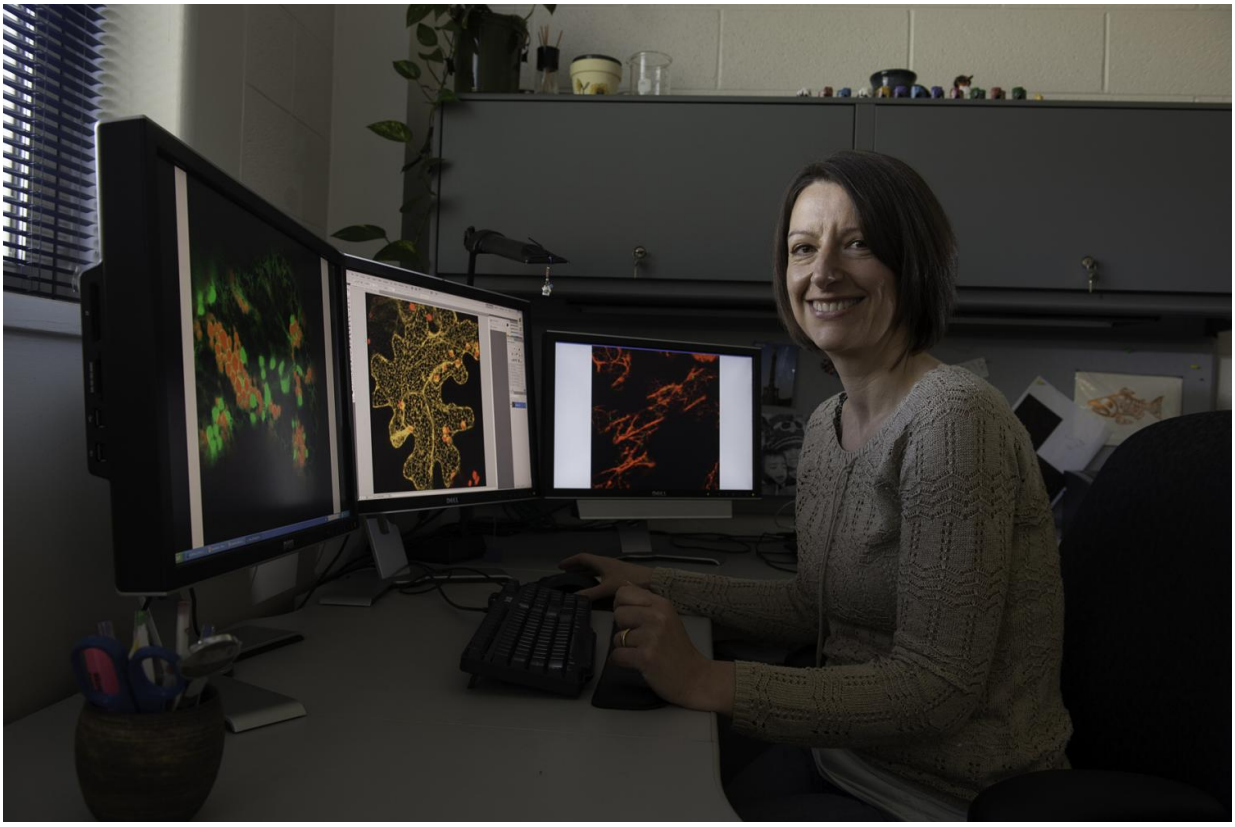

Michigan State University researchers in Federica Brandizzi's lab, for the first time, have identified how plants' largest cell factory moves to maintain vital functions, which could lead to advances in improving plant cells' critical functions and growing better crops. Credit: Kurt Stepnitz

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how plants' largest cell factory moves to maintain vital functions, which could lead to advances in improving plant cells' critical functions and growing better crops.

The findings, published in the current issue of *Current Biology*, reveal a new protein that keeps cellular cargo on track, quite literally. The discovery of SYP73, a plant protein, allowed the researchers to explain how the factory stuck to its track.

"Healthy cells operate as smoothly as the best Minecraft city imaginable," said Federica Brandizzi, MSU Foundation Professor of plant biology. "The miniature cities are fully equipped with all of the facilities, or organelles, that are necessary for a smooth-running operation."

Administration center, factories and even recycling centers are all there, running at 100-percent efficiency. In contrast to the infrastructures and city buildings in cells, however, the organelles, are not built on static foundations. They are huge, mobile cellular cargos that travel rapidly to reach resources and deliver products. When organelles go off the rails and mobility is disrupted, bad things happen.

"In human neurons, glitches in these movements result in severe neuro diseases," said Brandizzi, an MSU AgBioResearch scientist. "But before our paper, scientists had little idea about how the organelles moved on their tracks in plant cells beyond the conventional proteins that make up the cytoskeleton."

Brandizzi and her team of MSU scientists, focused on the largest factory in a cell - the endoplasmic reticulum. Earlier studies had proven that the ER moved around the cell on a track, known as actin cytoskeleton propelled by myosin, structures that give cells their shape as well as serve as a rail and motor system at the molecular level.

Taking an interdisciplinary approach using elaborate microscopic and biochemical techniques, the team revealed where the cellular rubber hit the road.

"Scientists have been looking for this direct connection for many years," Brandizzi said. "Since SYP73, we find that this connection is crucial to plant development, and we can now seek new ways to increase plant yield through cell biology."

More information: Pengfei Cao et al. SYP73 Anchors the ER to the Actin Cytoskeleton for Maintenance of ER Integrity and Streaming in Arabidopsis, *Current Biology* (2016). dx.doi.org/10.1016/j.cub.2016.10.024

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