

Researchers Track How Biology's Army Is Mobilized

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(PhysOrg.com) -- Like a well-trained army, the fundamental biological processes of organisms are coordinated through a hierarchy of finely tuned molecular commands. In a new paper published online Dec. 18 in the journal *Genes and Development*, Yale University researchers describe how they used a new technology to track life's colonels and generals as they orchestrate thousands of key movements of the army of life.

"We've never been able to do that before in anything like this detail," said Michael Snyder, the Lewis B. Cullman professor of molecular, cellular and developmental biology and professor of molecular biophysics and biochemistry and senior co-author of the study.

Similar studies of protein interactions have been conducted in animals, but this study is the most extensive undertaken in plants and has the potential to improve agriculture, said senior co-author Savithramma P. Dinesh-Kumar, associate professor of molecular, cellular and developmental biology.

"Understanding (these pathways) and their key targets during different biological processes will help us to engineer better crops in the future," Dinesh-Kumar said.

Snyder and Dinesh-Kumar used protein microarray technology developed at Yale to look at plant tissue and study the targets of mitogen-activated protein kinases, or MPKs, in signaling molecular troops to carry out a host of biological functions. Organisms as diverse as tulips

and humans share the MPK pathway, which helps regulate numerous developmental and various stress-related processes.

Understanding the intricate network of MPKs and their targets will help scientists to unravel how MPK signaling pathways process internal and external “orders” that regulate complex cellular processes.

But there is more work to be done. “We only understand a portion of the pathway, so we need to do a lot more research,” Snyder said. “And we don’t know exactly how the colonels and generals are giving the troops their marching orders. We know they are regulating them, but we don’t know how.”

Other Yale authors on the paper are Sorina C. Popescu, George V. Popescu, Shawn Bachan, Zimei Zhang and Mark Gerstein.

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