

ISU plant pathologist updates science community on TAL effector proteins groundbreaking research

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In the two years since Iowa State University's Adam Bogdanove, along with student Matthew Moscou, published their groundbreaking gene research in the cover story of the journal *Science*, researchers around the world have built on those findings to explore further breakthroughs.

Science has published another article by Bogdanove in the Sept. 30 issue that updates the scientific community on where the research has been since 2009 and where it is heading.

"In the past two years, an extraordinary number of things have happened in this field," said Bogdanove, a professor of [plant pathology](#). "This is really pretty revolutionary."

Bogdanove's research published in 2009 uncovered how so-called TAL (Transcription Activator-like) effector proteins bind to different DNA locations, and how particular [amino acids](#) in each [protein](#) determine those locations -- called binding sites -- in a very straightforward way.

Knowing this, scientists are using the proteins to target and manipulate specific genes, something that was much more difficult to accomplish prior to this research.

That could lead to breakthroughs in understanding gene function and improving traits in livestock and plants, and even treating human genetic

disorders, according to Bogdanove.

Bogdanove says in the two years since his and Moscou's work was published, nearly two dozen research papers have been published using this discovery.

"We are so excited about the potential of these proteins. Just in the past six months they have been used successfully in model organisms such as [yeast](#), [zebrafish](#), and *C. elegans* (a type of worm used to study development), and even in human [stem cells](#). There is some really innovative stuff going on," he said.

Model organisms are used to understand particular biological functions.

Bogdanove collaborated on this Science article with Dan Voytas, a former member of the Iowa State University faculty and now director of the Center for Genome Engineering at the University of Minnesota.

Bogdanove cautions in the article that the power of the technologies based on TAL effectors raises legal, sociological and ethical questions about how their use should be regulated, but says that it may be just a matter of a few years before these proteins see real application in areas such as crop improvement and human medicine.

Provided by Iowa State University

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