

Researchers Studying Little-Known Genetic Sequences

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(PhysOrg.com) -- University of Arizona researchers are among a group of scientists who have discovered a source of previously scarce small RNA molecules. Their finding, which was recently published in the *Proceedings of the National Academy of Sciences*, provides a valuable new tool for better understanding how plants grow and develop.

All living things contain small RNA molecules, said Vicki Chandler, a UA Regents' Professor and director of the UA's BIO5 Institute. Some small RNA molecules help the genes in cells carry out their instructions, others silence genes and prevent them from acting. In plants, two types of small RNA molecules have been studied, one of them 21 nucleotides long, the other 24 nucleotides long. Nucleotides are the atomic "building blocks" of all genetic material.

Working with a mutant strain of maize, Chandler and her colleagues have honed in on a distinct class of small RNA molecule that is 22 nucleotides long. The 21- and 22-nucleotide RNAs are scarce in most plants, including wild maize, but in the mutant strain, the researchers discovered that they were common because the 24-nucleotide RNAs are dramatically reduced.

Having a reliable source of the 21- and 22-nucleotide RNA means plant biologists can now study these molecules in depth, and work out the pathways they follow to regulate plant genes. "We don't yet know exactly what it (the 22-nucleotide RNA) is doing in the cells, so there'll be a whole new line of experiments as we try to figure it out," Chandler said.

She also said that there may well be other understudied small RNA molecules waiting to be looked at as well. "I think we've only seen the tip of the iceberg with these small regulatory RNAs. There's still a lot to learn, and that's exciting."

The information that results from studying "new" small RNAs will become doubly valuable as other plant biologists, including BIO5 member Rod Wing, finish refining the genetic sequence of maize. "The two together (the small RNA molecules and the sequenced maize genome) will provide a lot of new tools for better understanding plant growth and function," Chandler said.

That work could ultimately have implications for everything from environmental and ecological issues to agriculture and medicine. "Gene regulation is fundamental to so many issues," Chandler said. The 22-nucleotide RNA molecule, she said "is one example of a pathway that – once it's worked out – could be targeted to address them."

Source: University of Arizona

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