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[Molecular Biology] Academia Sinica's Biologists Find Length of Small RNAs Critical to Gene Silencing Amplification in Plants

[Molecular Biology] Academia Sinica's Biologists Find Length of Small RNAs Critical to Gene Silencing Amplification in Plants (Chinese Version)

Academia Sinica Newsletter (2010/09/09) RNA silencing is the prevailing molecular mechanism adopted by living organisms for programmed development and for defeating the invasion of pathogens. However, little is known about how RNA silencing is controlled and executed. A recent investigation led by Dr. Shu-Hsing WU, an Associate Research Fellow of the Institute of Plant and Microbial Biology at Academia Sinica, has provided an important clue to the molecular mechanism of RNA silencing by suggesting that the size of the small RNA determines whether RNA silencing can be amplified. The discovery was published in the prestigious journal Proceedings of the National Academy of Sciences on August 24, 2010, and was highlighted in a commentary article in the issue.

Ribonucleic acid (RNA) is an important biological molecule that is crucial for protein synthesis and regulation of genes in the cell. There are several types of small RNAs including microRNAs (miRNAs) and small interfering RNAs (siRNAs). Previous studies on Arabidopsis (a small flowering plant often used as a model plant for scientific studies) found that only specific miRNAs could trigger the production of secondary small interfering RNAs (siRNAs) for RNA silencing amplification, suggesting that in order to understand the mechanism of RNA silencing it is critical to reveal the unique molecular signatures of these miRNAs.

In an effort to better understand these signatures, Dr. Shu-Hsing WU and colleagues performed comprehensive bioinformatic analyses of small RNAs in Arabidopsis. The team discovered that only small RNAs of a certain length (22-nucleotides-long) are capable of initiating the production of secondary siRNAs leading to efficient RNA silencing in plants. The result proves that the size of small RNAs dictates their capacity to initiate the amplification of RNA silencing.

The complete article entitled "22-nucleotide RNAs trigger secondary siRNA biogenesis in plants" can be found at the PNAS journal website at: http://www.pnas.org/content/107/34/15269

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