

Plant research reveals new role for gene silencing DICER protein

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A DICER protein, known to produce tiny RNAs in cells, also helps complete an important step in gene expression, according to research on *Arabidopsis thaliana*.

The expression of a gene, when an organism's DNA is transcribed into a useable product, requires activation via a promoter or an external trigger. Plant research to be published in *Science* helps to show that later stages of transcription are just as important. This is likely to apply to other organisms, including humans.

Termination is the final stage of transcription. Successful termination is dependent on DNA being transcribed into RNA with the correct sections, including a certain length tail.

Scientists at the John Innes Centre on Norwich Research Park have found that where effective termination through the normal mechanisms has not occurred, DICER-LIKE 4 (DCL4) steps in to tidy up. Without termination, transcription continues down the chromosome unchecked.

In this way, DCL4 plays a crucial and previously unknown role in transcription termination. It helps formation of the <u>gene product</u>. DCL4 is more commonly known to play a part in the opposite effect, gene silencing.

"DCL4 is a back-up to termination processes, helping a gene to be successfully expressed," said lead author Professor Caroline Dean from



JIC, which is strategically funded by the BBSRC.

The findings may help explain why gene silencing happens so often with <u>transgenes</u>. It was not known that so much attention should be given to the tail end of a gene.

"Our research shows that for successful expression the end of a gene is just as important as its beginning," said Dean.

When termination fails a lot of aberrant RNA is made – this is degraded as part of a cell's quality control mechanism. This can have consequences for other sequences in the genome that match the aberrant RNA.

"If a gene ends badly, aberrant <u>RNA</u> will trigger silencing pathways," said Dean.

DCL4's ability to step in to rescue poor termination makes it important for both successful <u>gene expression</u>, a previously unknown role for it, and gene silencing.

More information: "Cotranscriptional Role for Arabidopsis DICER-LIKE 4 in Transcription Termination" *Science*, <u>doi</u> <u>10.1126/science.1214402</u>

Provided by Norwich BioScience Institutes

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