Flowering genes offer human clues

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(PhysOrg.com) -- Dundee scientists studying how plants control the time at which they flower have uncovered an unusual form of gene control that could have implications for both plant and medical science.

Researchers at the University of Dundee and SCRI have been studying the genes that determine the time at which a plant will flower.

'This is something that plants are quite particular about - as we move through the year different species come into flower at different times,' said Dr Gordon Simpson, who leads the research team.

'This careful control is made possible by very precise gene regulation. In studying this we've made some unexpected discoveries about how genes can be controlled that might be generally important, not just for plants but for humans as well.'

The research forms the cover story of the latest issue of the scientific journal, *Developmental Cell*, where it is also the subject of a special preview article.

The findings made by Dr Simpson and team members Csaba Hornyik and Lionel Terzi relate to the way genes are switched 'on' and 'off' within the famous DNA double helix structure in our cells.

When a gene on one strand of the double helix is switched `on', it is copied into a related molecule called sense RNA. When the copy is complete, the RNA is `cut' at the end and what is called a `poly A tail' is

added.

Dr Simpson's team were examining this process when they made their discovery.

'We found that the flowering regulator we were studying could control where the RNA copy ended,' said Dr Simpson. 'When we asked how this related to flowering time we got a surprise. We knew which flowering time gene to look at, but we didn't find any poly A tail differences there.

'Instead, we found a change on an RNA copy made from the opposite strand of the DNA double helix, called anti-sense RNA.

'We found that if these anti-sense RNA copies got their poly A tail early, almost no copies of the flowering time gene on the other DNA strand would be made, but if the poly A tail was added much later then lots of copies of the flowering gene were made.

The work may be important for medical science too. 'If this form of gene regulation exists in humans, then its possible that disease-causing mutations that map to specific genes may actually be disrupting anti-sense RNAs and this could affect how we think about treatment design' said Dr Simpson.

Previewing the research in Developmental Cell, Professor James Manley of Columbia University, New York, said the work, "has the potential to provide a significant new mechanism of gene control, not only in signalling when a plant will flower, but also more generally in animals as well as plants'.

Provided by University of Dundee