Signal proteins for plant stem cells discovered

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Wageningen University (The Netherlands) biochemist Dolf Weijers and his German colleagues have discovered how stem cells in a plant embryo are formed. The cells communicate with one another via the transportation of a protein, reports Weijers this week in *Nature*.

Unlike animals, plants produce new organs - leaves, roots and flowers - throughout their entire life. This task is undertaken by the meristems, growth tips in which stem cells are located. Meristems are located in the young plant embryo. Weijers studied the forming of root meristems in the embryo of the model plant Arabidopsis thaliana. The process begins with the programming of one cell as the 'hypophysis' which regulates stem cells in the roots. It is known that the formation of the hypophysis is controlled by the gene activator called Monopteros. However, it was hitherto not known how this activator regulates hypophysis formation.

Weijers isolated - in the young embryo of Arabidopsis - the genes which are activated by Menopteros, the so-called 'Target of Monopteros' (TMO). By doing this, he discovered the gene TM07, with the codes for a small protein which is transported to the future hypophysis. This shows that the signal transmitted by the surrounding cells to form the hypophysis is a protein. Earlier on, his research group had already shown that the plant hormone auxine, which turns on the activator Monopteros, is also transported to the future hypophysis. Therefore, at least two signals are sent to the nearby cell to define it as the hypophysis.

'The meristems are the key to plant growth', says Weijers.

'Understanding how this key works will open up possibilities for research into how to enable plants to grow better. How do plant cells in the young embryo know what they have to become? We know the answer to this now: the nearby cells tell them by sending a gene activator. We now have direct evidence of the communication during embryogenesis, the process by which the embryo is formed after fertilization.' This communication makes sure that the meristems are at the right places, to enable stem cells to form roots at these places.

Provided by Wageningen University