The Entrepreneurial University.

Technische Universität München

# News Release

Freising-Weihenstephan, January 26, 2009

**New growth paths**

## Discovery of new protein controlling hormone transport in plants

**Hormones control development and metabolic processes not only in humans and animals, but also in plants. The substance auxin plays the most important role here. This phytohormone promotes root growth and ensures that flowers and leaves grow in the right places on plants. The fact that auxin is carried from cell to cell by transport proteins is a long established fact. However, researchers at the Technische Universität München (TUM) have now discovered an additional protein that also plays a part in distributing the hormone. If this "controller" is not present, transport proteins do not seem to function correctly. The researchers' discovery has therefore opened up a new dimension to auxin distribution in plants.**

When growing, plants must create new organs such as roots or petals and make sure they grow in the right places - a challenge that neither humans nor animals have to face. The phytohormone auxin is responsible for ensuring that a plant follows a perfect and, in most cases, predictable blueprint throughout its entire lifecycle. Auxin is produced by plants and localized in what are known as founder cells, the cells that grow into roots, leaves or flowers. Scientists already know how the hormone gets to where it needs to be: special export proteins first transport the auxin from a plant cell to the gap between cells; from here, it is taken to the neighboring cell by specific import proteins. This process is repeated until the auxin has reached its final destination.

A research team headed by Prof. Claus Schwechheimer from the Chair of Plant Systems Biology at the TUM's Center for Life and Food Sciences Weihenstephan has now discovered a further protein involved in auxin transport. This protein caught the biologists' attention during investigations into a protein kinase on a thale cress model plant (*Arabidopsis thaliana*). "Protein kinases act as a trigger switch, regulating the activity of other proteins. They do this by modifying them through the addition of a phosphate group. In this particular case, we noticed that the protein kinase we were examining was distributed in the plant cell in a pattern that was strikingly similar to that of the export protein for auxin," explains Professor Schwechheimer.


**Technische Universität München** **Corporate Communications Center** **80290 München** **www.tum.de**

| | | | |
|---|---|---|---|
| Dr. Ulrich Marsch | Head of Corporate Communications | +49.89.289.22778 | marsch@zv.tum.de |
| Jana Bodický M.A. | Media Relations | +49.8161.71.5403 | bodicky@zv.tum.de |

At the same time, the researchers were able to show that plants that did not possess this protein kinase had problems promoting root and flower growth. The team also proved that plants producing excessive amounts of protein kinase were able to grow roots in unusual places where normal thale cress plants were not able to. These studies, coupled with the uniform distribution of both substances, led the team to conclude that the new protein kinase is capable of modifying the export protein for auxin and thus controlling the hormone transport path. The work group has therefore discovered a new dimension to the molecular transport of auxin.

In a second step, the researchers are now examining the exact points at which the protein kinase modifies the auxin export protein. The results of this research may have a significant impact in the agricultural and gardening world. Auxins are used as growth regulators in a wide range of horticultural and agricultural areas, including the promotion of root growth on plant cuttings and shoots. “Developing a more exact molecular understanding of auxin transport will enable us to deploy auxins more effectively in promoting plant growth,” concludes Claus Schwechheimer.

**Contact:**
Prof. Dr. Claus Schwechheimer
Chair of Plant Systems Biology
Technische Universität München
85354 Freising-Weihenstephan
Germany
Phone: +44 (0)8161 / 71 - 2880
E-mail: claus.schwechheimer@wzw.tum.de
http://www.wzw.tum.de/sysbiol/

**Publication:**
Zourelidou, M. et al: The polarly localised D6 PROTEIN KINASE is required for efficient auxin transport in *Arabidopsis thaliana*. Development (2009): 136, S. 627-636.

Available online at: http://dev.biologists.org/current.shtml, abstract available at: http://dev.biologists.org/cgi/content/abstract/136/4/627.

The original article may also be requested as a PDF document.

**Technische Universität München** **Corporate Communications Center** **80290 München** **www.tum.de**

| | | | |
|---|---|---|---|
| Dr. Ulrich Marsch | Head of Corporate Communications | +49.89.289.22778 | marsch@zv.tum.de |
| Jana Bodický M.A. | Media Relations | +49.8161.71.5403 | bodicky@zv.tum.de |

The Entrepreneurial University.

Technische Universität München

**Background:**
The research work was supported by a grant from the Deutsche Forschungsgemeinschaft (German Research Foundation).

**+++ The accompanying images may be used in print format free of charge if accompanied by the "TUM" copyright notice. +++**

bluetenstand.jpg: Significant difference between the standard inflorescence of wild-type thale cress (left) and the inflorescence of the protein kinase mutant (right) (image: Claus Schwechheimer / TUM)

seitenwurzeln.jpg : The effects of "controller overdose" – lack of lateral root growth in the wild-type seedling's shoot axis (left) and lateral root growth caused by over expression of protein kinase (right) (image: Claus Schwechheimer / TUM)

gruppe-schwechheimer.jpg: The team behind the auxin "controller" discovery – seated: Isabel Müller, standing: Claus Schwechheimer and Melina Zourelidou (image: Claus Schwechheimer / TUM)



**Technische Universität München** **Corporate Communications Center** **80290 München** **www.tum.de**

| | | | |
|---|---|---|---|
| Dr. Ulrich Marsch | Head of Corporate Communications | +49.89.289.22778 | marsch@zv.tum.de |
| Jana Bodický M.A. | Media Relations | +49.8161.71.5403 | bodicky@zv.tum.de |