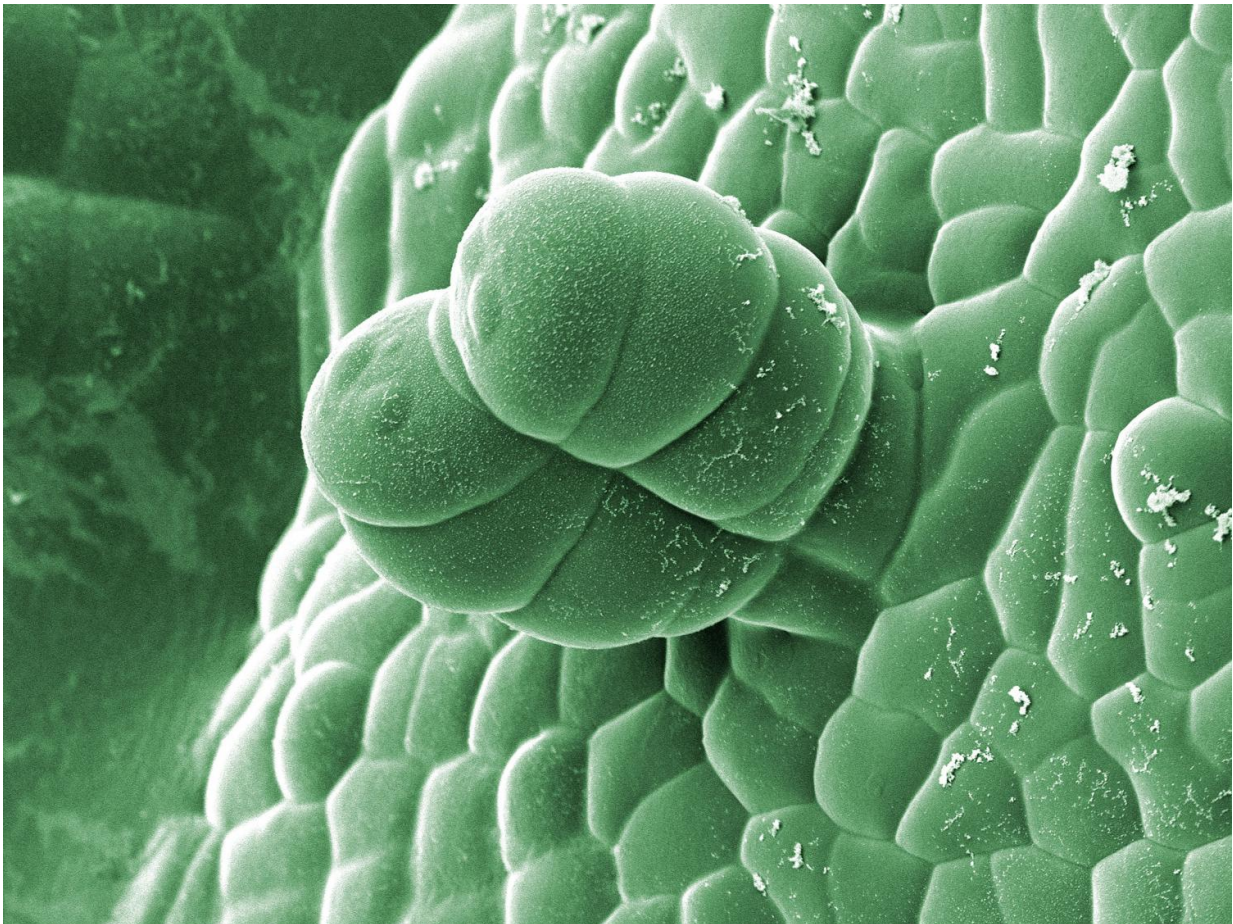


Plant 'chemical factory' could produce variety of commercial products

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A highly magnified image of an *Artemisia annua* leaf depicts the glandular structure which produces the anti-malarial drug, artemisinin. Credit: Meg Stark (Technology Facility, Department of Biology, University of York, UK)

A 'chemical factory' on the surface of plant leaves could help produce more commercially useful products, researchers at the University of York have found.

The team found that the final stages of the production of artemisinin, a substance used in anti-malarial drugs and naturally harvested from the plant, *Artemisia annua*, is a spontaneous process and does not involve the actions of proteins to trigger a chemical reaction.

This spontaneous process means that a very particular chemical environment must be created in order to produce and store often toxic chemicals in the plant.

The findings, published in the journal, *PNAS*, suggest that companies could potentially utilise this 'chemical factory' system within the plant itself for use in the production of a whole host of chemical-based products, such as anti-bacterial gels, fragrances, natural sweeteners, and compounds to aid food crop production.

Professor Ian Graham, who led the research at the University of York's Department of Biology, explains: "Plants make lots of high value compounds but often in very small amounts. To produce these compounds on a commercial scale industrial biotechnologists aim to transfer the whole production process from [plants](#) to yeast cells which can then be grown at scale in large fermenters.

"Many of the valuable plant compounds, however, can be toxic to [yeast cells](#). Our new findings, suggests that we may have a solution to this problem."

The study shows that the 'chemical factory', called glandular trichomes, not only produces complex chemicals, but can store them without being toxic to the plant.

The team also found that the pathway that produces artemisinin can be diverted to make entirely new products. The researchers argue that using the plant itself as the 'factory' can work in creating products on a commercial scale.

Dr Tomasz Czechowski, co-author of the research paper at the University of York, said: "We have shown that *Artemisia annua* not only produces the most effective medicine to cure people suffering from malaria but it can also be altered to produce other complex molecules, which is an exciting discovery.

"We now know that it employs a very sophisticated system that stores complex chemicals that could be used in many other products. This could pave the way for other plant-based [products](#) being made naturally within the plant itself."

More information: Artemisia annua mutant impaired in artemisinin synthesis demonstrates importance of nonenzymatic conversion in terpenoid metabolism, *PNAS*,
www.pnas.org/cgi/doi/10.1073/pnas.1611567113

Provided by University of York

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