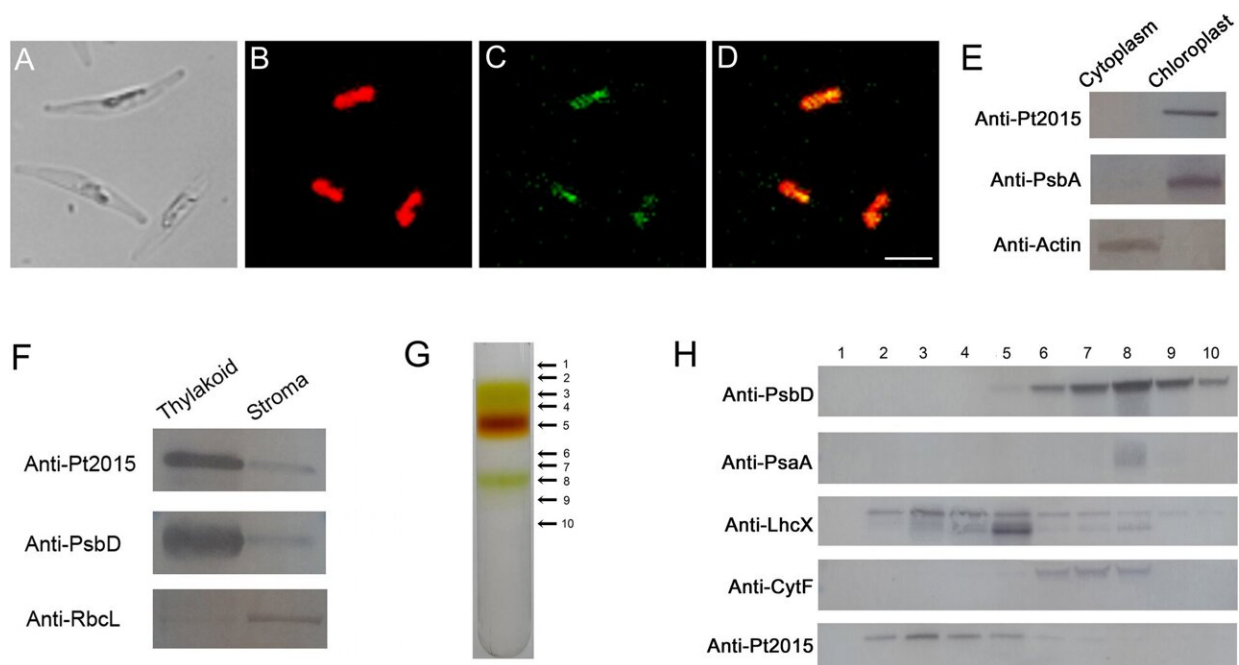


Overexpression of gene endows diatom *P. tricornutum* with high lipid content and grazing resistance

December 14 2022, by Li Yuan



Subcellular localization of Pt2015. Fluorescent microscopy of Pt2015 green fluorescence protein (GFP) fusion proteins in a *P. tricornutum* Pt2015:GFP mutant. A Light image, B Chlorophyll autofluorescence, C GFP fluorescence, D Merged image of (B and C) (Scale bar, 5 μ m). E Immunoblotting analysis of Pt2015. The cytoplasm and plastid were extracted from the wild-type (WT) strain. F Immunoblotting analysis of Pt2015. Plastids were extracted from the WT strain and then fractionated into thylakoid membranes and stroma. G The thylakoid membranes have been solubilized using n-dodecyl- β -D-maltoside (β -DM) and subjected to sucrose density gradient ultracentrifugation. The solubilized thylakoid membranes (200 μ g chlorophyll) have been loaded on a

gradient. The gradient was divided into ten fractions according to band color. H An equal volume of each fraction was used for immunoblotting analysis using antibodies against PsbD, PsaA, CytF, LhcSR, and Pt2015, respectively. Credit: *Biotechnology for Biofuels and Bioproducts* (2022). DOI: 10.1186/s13068-022-02221-y

Phaeodactylum tricornutum is a commercially important species that is widely used in aquaculture. It also has the potential to be used as biofuel.

However, contamination of algivorous microzooplankton has been one of the main constraints in *P. tricornutum* large-scale cultivation. Therefore, isolating a new strain with grazing resistance is important for overcoming zooplankton contamination.

Recently, a research team led by Prof. Wang Guangce from the Institute of Oceanology of the Chinese Academy of Sciences (IOCAS) has revealed that overexpression of a novel gene Pt2015 enables the *P. tricornutum* high lipid content and grazing resistance.

The study was published in *Biotechnology for Biofuels and Bioproducts* on Nov. 26.

The researchers used CRISPR/Cas9 gene editing technology to knock out Pt2015, and found that there was no significant difference between Pt2015KO (Pt2015 knockout line) and wild type in cell morphology and growth.

While, the overexpression of Pt2015 could lead to the transformation of [cell morphology](#) of *P. tricornutum* from fusiform morphotype to triradiate morphotype with special spatial structure, indicating that Pt2015 protein is a positive trigger factor for the transformation of cell

fusiform to triradiate of *P. tricornutum*.

The economic characteristics of the triradiate strain caused by overexpression of Pt2015 were extremely stable. The triradiate strain demonstrated a three-dimensional three radial pattern, and had obvious resistance to the algivorous microzooplankton (amoeba), said Prof. Wang.

"Moreover, the total lipid content in triradiate strain [cells](#) was about 30% higher than that of the wild type, and the [growth rate](#) was no different from that of the wild type," said Gao Shan, first author of the study.

More information: Shan Gao et al, Overexpression of a novel gene (Pt2015) endows the commercial diatom *Phaeodactylum tricornutum* high lipid content and grazing resistance, *Biotechnology for Biofuels and Bioproducts* (2022). [DOI: 10.1186/s13068-022-02221-y](https://doi.org/10.1186/s13068-022-02221-y)

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