



HAL
open science

Novel regulatory mechanisms of plant aquaporins revealed by interactomic

Chloé Champeyroux, Jorge Bellati, Marie Barberon, Valérie Rofidal,
Christophe Maurel, Véronique Santoni

► **To cite this version:**

Chloé Champeyroux, Jorge Bellati, Marie Barberon, Valérie Rofidal, Christophe Maurel, et al.. Novel regulatory mechanisms of plant aquaporins revealed by interactomic. *Protéome vert*, INRA, Jun 2019, Paris, France. pp.1788 - 1801. hal-04178575

HAL Id: hal-04178575

<https://hal.inrae.fr/hal-04178575v1>

Submitted on 8 Aug 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Résumés dans l'ordre du programme

Novel regulatory mechanisms of plant aquaporins revealed by interactomics

Chloé Champeyroux¹, Jorge Bellati¹, Marie Barberon, Valérie Rofidal¹, Christophe Maurel¹, Véronique Santoni¹

¹BPMP, Univ Montpellier, CNRS, INRA, Montpellier SupAgro, Montpellier, France

²Department of Botany and Plant Biology, Quai Ernest-Ansermet 30 Sciences III CH-1211 Genève 4 Switzerland

The absorption of soil water by roots allows plants to maintain their water status. Water transport is regulated by the function of aquaporins (1) and can be affected at the endodermis by initial formation of a Casparian strip and further deposition of suberin lamellas (2). Proteins that molecularly interact with two major root aquaporins (PIP1;2 and PIP2;1) were searched to get new insights into regulatory mechanisms of root water transport using an immuno-purification strategy coupled to protein identification and quantification by mass spectrometry. Such interactome revealed PIPs to behave as a platform for recruitment of a wide range of transport activities and provided novel insights into regulation of PIP cellular trafficking by osmotic and oxidative treatments. We also show that members of the receptor-like kinase (RLK) family can modulate PIP activity (3). Interestingly, 4 Casparian strip membrane domain proteinlike (CASPL) also co-purified with PIP2;1. We showed that 3 of them (CASPL1B1, CASPL1B2, and CASPL1D2) are exclusively expressed in suberized endodermal cells, suggesting a cell-specific role in suberization and/or water transport regulation. None of the mutants showed root hydraulic conductivity (L_p) phenotype, whether in control or stress conditions. However, the data suggest a slight negative role for CASPL1D1 and CASPL1D2 in suberization under control or salt stress conditions. At the molecular level, CASPL1B1 was able to physically interact with PIP2;1 and potentially could influence the regulation of aquaporins by acting on their phosphorylated form (4). The overall work opens novel perspectives in understanding PIP regulatory mechanisms and their role in adjustment of plant water status.

1. Maurel C, et al. (2015) Aquaporins in Plants. *Physiological reviews* 95(4):1321-1358.
2. Geldner N (2013) Casparian strips. *Current Biology* 23(23):R1025-R1026 .
3. Bellati J, et al. (2016) Novel aquaporin regulatory mechanisms revealed by interactomics. *Molecular and Cellular Proteomics* 15:3473-3487.
4. Champeyroux C, et al. (2019) Regulation of a plant aquaporin by a Casparian strip membrane domain protein-like. *Plant Cell Environ.* doi: 10.1111/pce.13537.