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► To cite this version:

Camila Gomez, Sandrine Vialet, Charles Romieu, Laurent Torregrosa, Markus Klein, et al.. Two *Vitis vinifera* MATE proteins act as tonoplast acylated anthocyanin / H⁺ antiporters. 8. International Symposium on Grapevine Physiology and Biotechnology, Nov 2008, Adelaide, Australia. hal-01607862

HAL Id: hal-01607862

<https://hal.science/hal-01607862>

Submitted on 3 Jun 2020

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Two *Vitis vinifera* MATE proteins act as tonoplast acylated anthocyanin/H⁺ antiporters

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Anthocyanin pigments are particularly important for red wine quality. Their extraction depend on their location in the berry and their solubility. In cells, anthocyanins are synthesised in the cytoplasm and accumulated inside the vacuole. However, little is known about the transport of these compounds through the tonoplast. Recently, the sequencing of *Vitis vinifera* genome allowed us to identify genes encoding proteins highly homologous to a putative anthocyanin permease described in tomato [1]. Two genes were selected as anthocyanin transporter candidates and named anthoMATE1 and anthoMATE3 since they contain conserved domains of the multidrug and toxic compound extrusion protein family (MATE). The expression of both genes was evaluated in order to define changes associated with anthocyanin biosynthesis. *AnthoMATE1* and *anthoMATE3* expression is essentially fruit-specific and concomitant with the accumulation of anthocyanin during berry development. In *Vitis* transformed roots cells, anthoMATE1 and anthoMATE3 are localized at the tonoplast (je pense encore que cette phrase manque de précision, the site at which anthocyanin transport occurs Yeast vesicles expressing anthoMATE proteins transported a mixture of acylated anthocyanins in the presence of MgATP. Inhibitor studies demonstrated that anthoMATE1 and anthoMATE3 proteins act *in vitro* as acylated anthocyanin /H⁺ antiporters. By contrast, anthoMATE proteins could not transport malvidin-3-O-glucoside (the major anthocyanin present in grape berry) or cyanidin-3-O-glucoside, this suggests that acyl residues are important determinants for transport. In a range of cultivars showing variable anthocyanin composition the expression of *anthoMATE3* is well correlated with acylated anthocyanins berry content. This is not the case with *anthoMATE1* suggesting that this protein may have additional function to anthocyanin transport.

1. Mathews, H., et al., *Activation tagging in tomato identifies a transcriptional regulator of anthocyanin biosynthesis, modification, and transport*. Plant Cell, 2003. **15**(8): p. 1689-1703.