MDR-transporters: intracellular localization and function during sporulation of *Saccharomyces cerevisiae*

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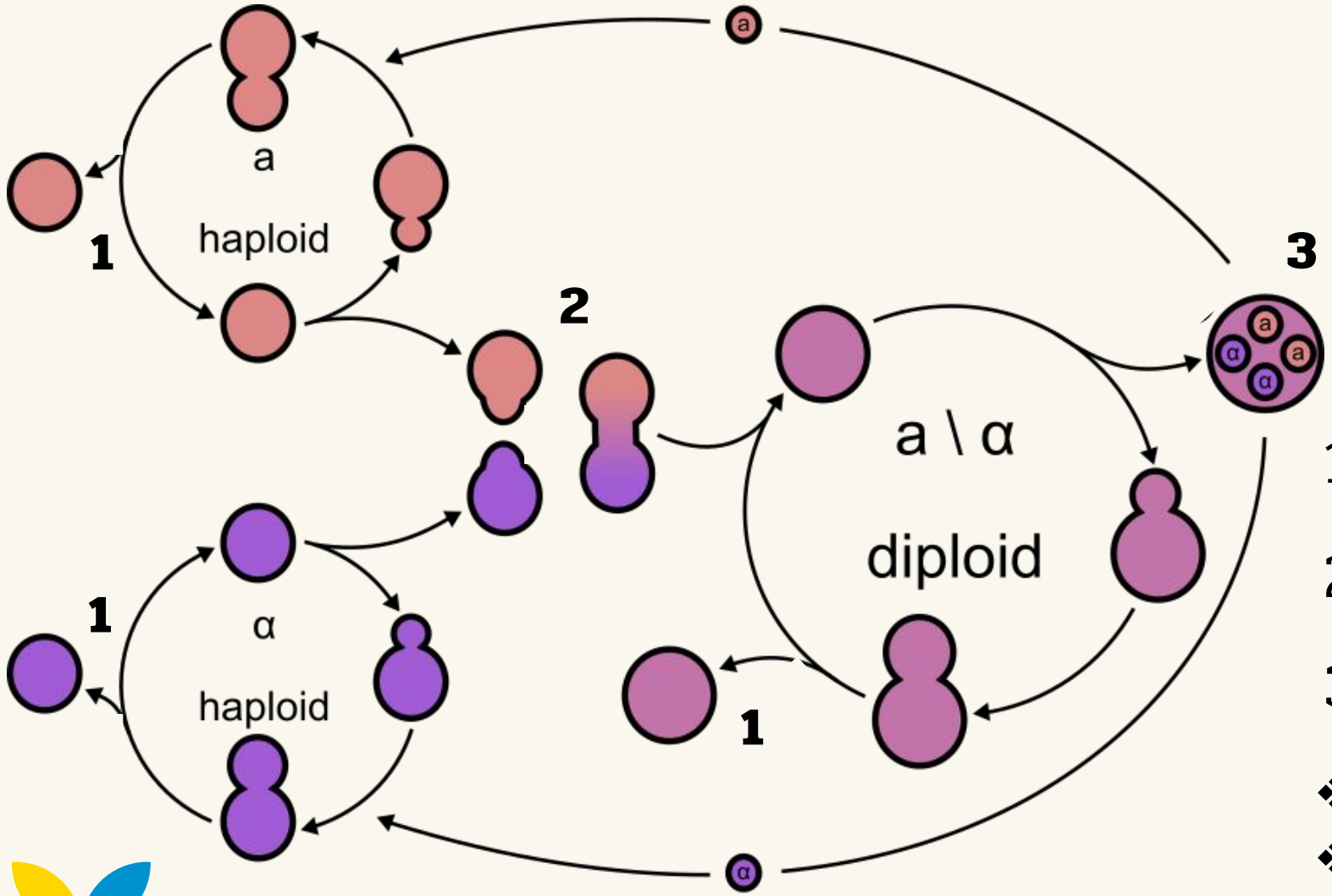
Life cycle of *Saccharomyces cerevisiae*



1 - budding yeast

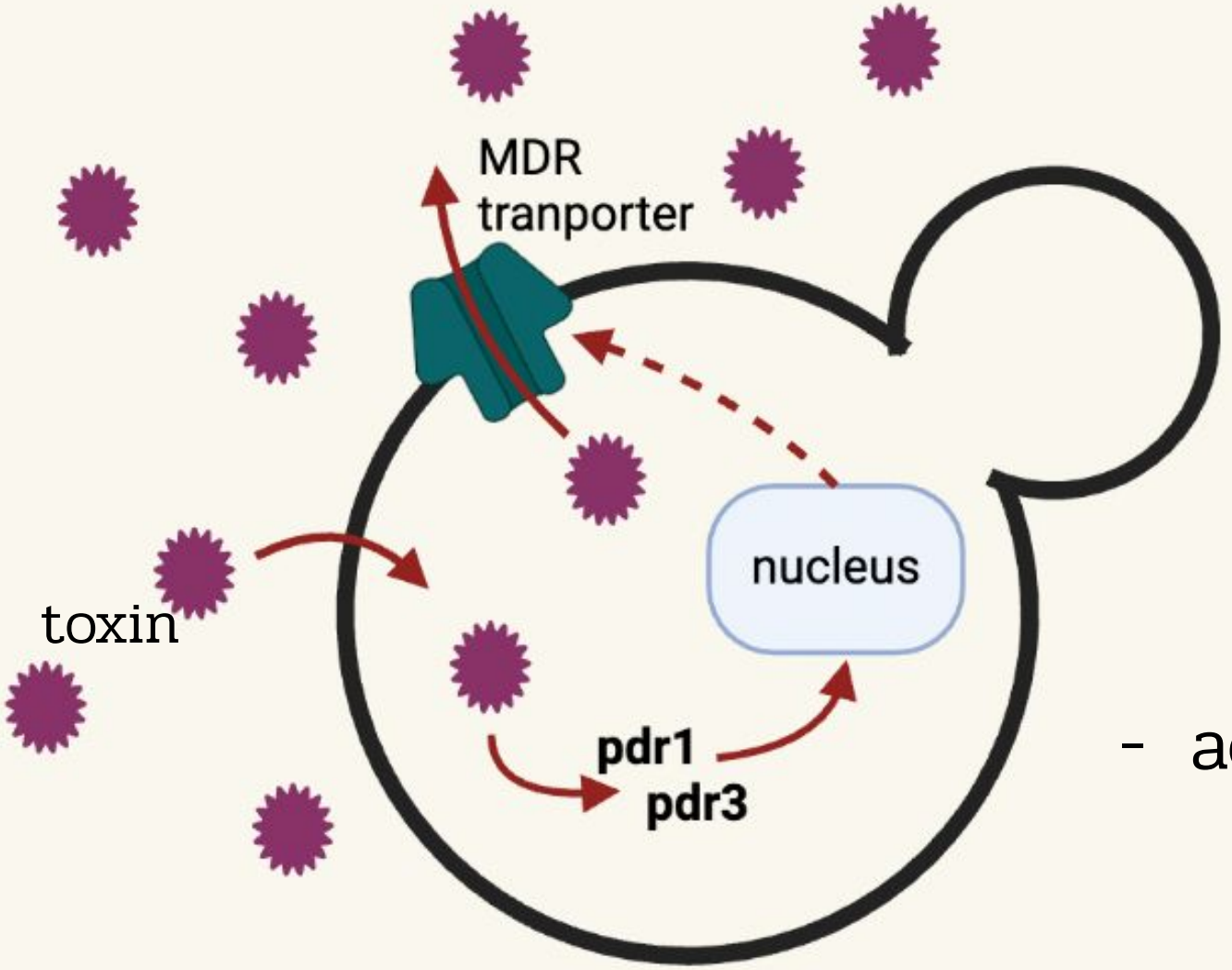
2 - mating yeasts

3 - yeast **spore** :

- dormant stage
- conserve resources
- resistant to stresses

https://pt.m.wikibooks.org/wiki/Engenharia_gen%C3%A9tica/Saccharomyces_cerevisiae_como_modelo_biol%C3%B3gico_em_engenharia_gen%C3%A9tica

Yeast Multiple Drug Resistance (MDR)



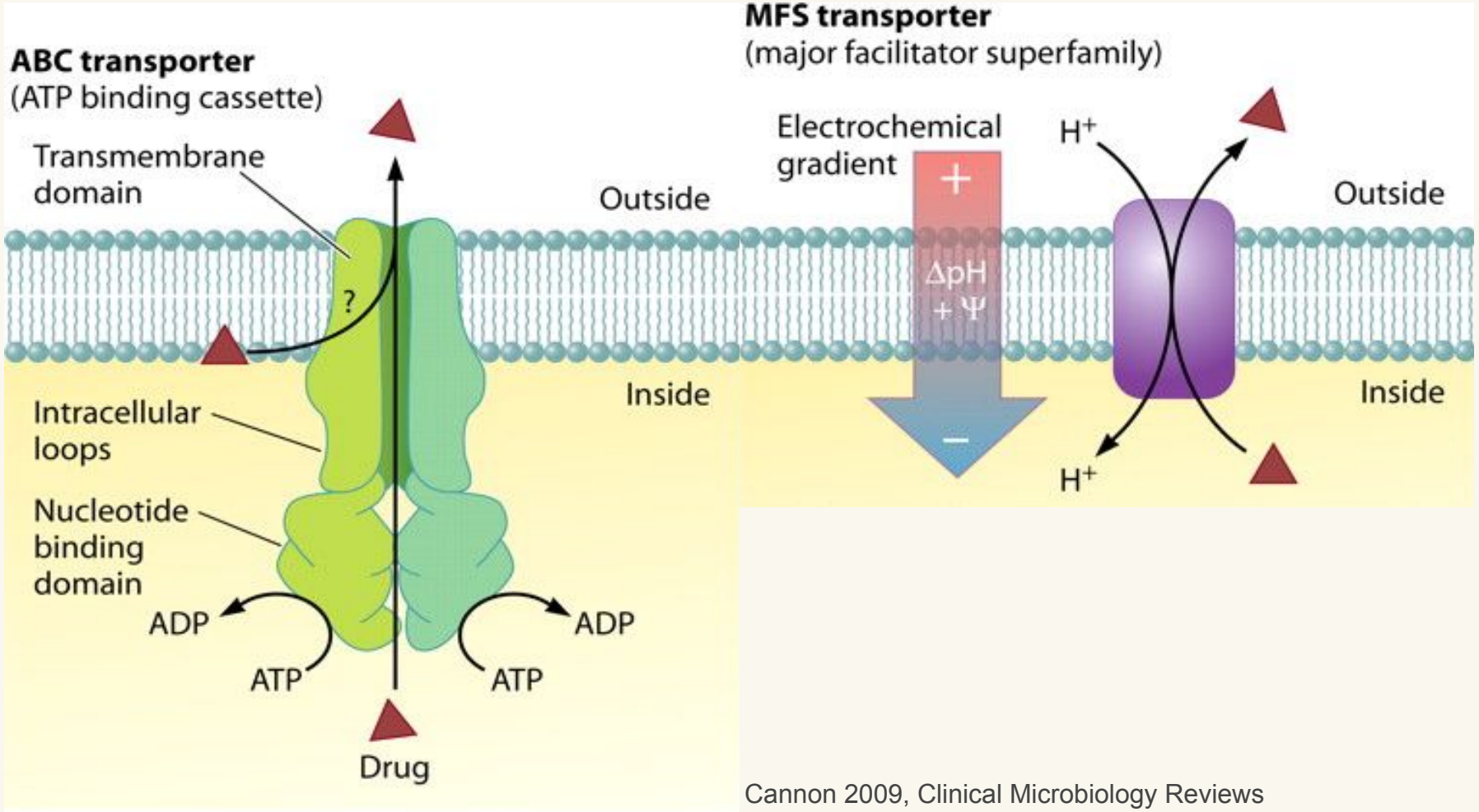
- provided by transmembrane transporters

- activated by transcription factors Pdr1 and Pdr3

Two superfamilies of MDR transporters

ABC transporters
use the energy of ATP hydrolysis

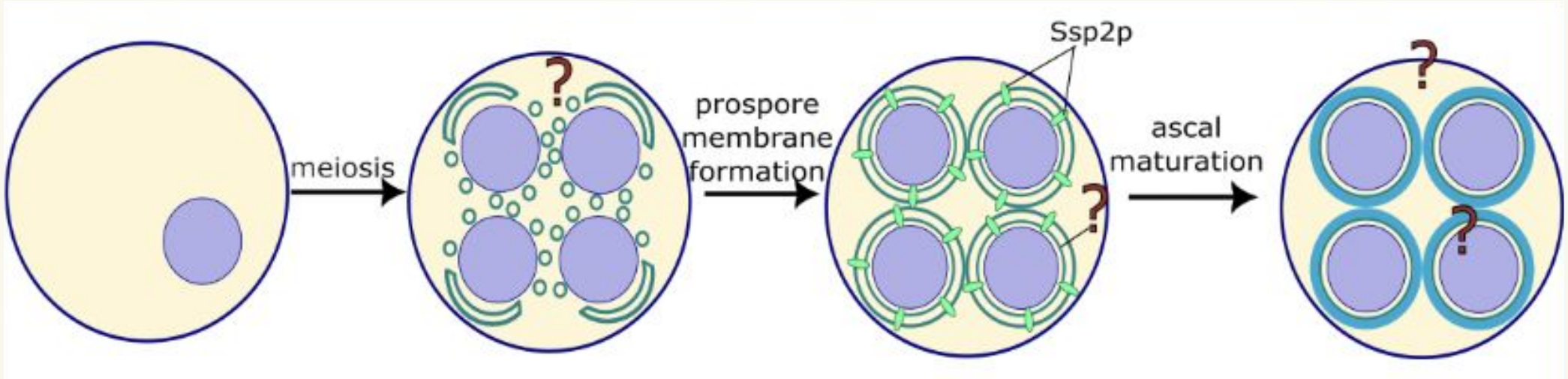
MFS transporters
use the energy of proton transport



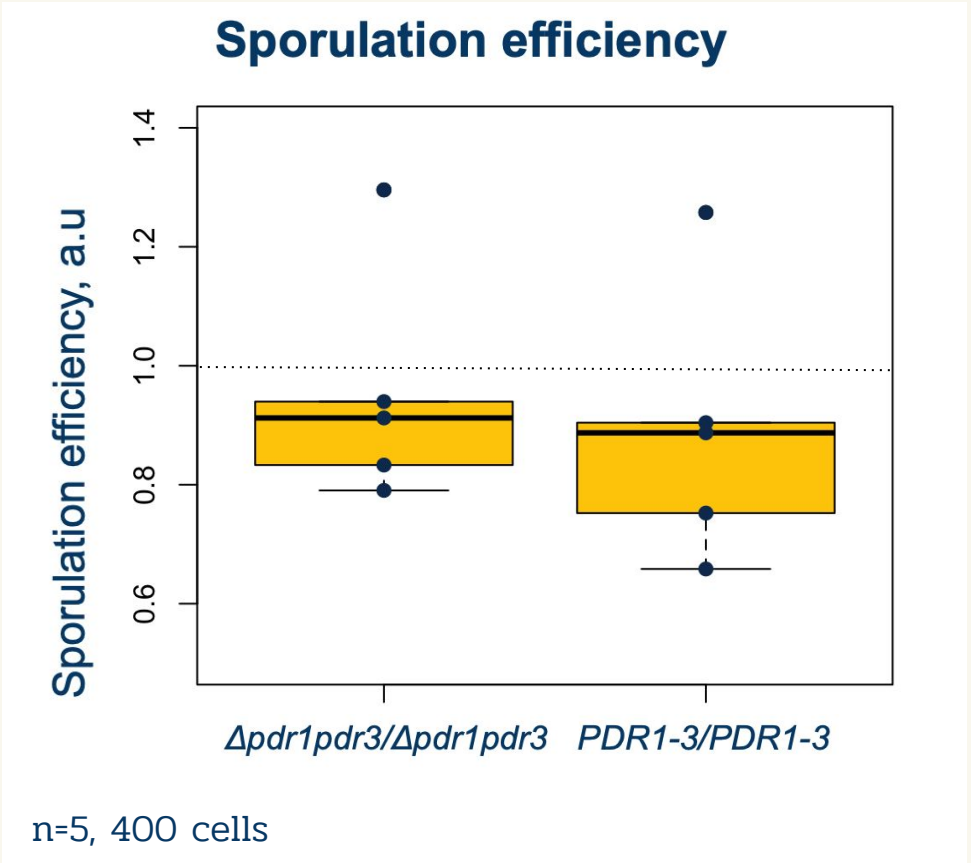
Cannon 2009, Clinical Microbiology Reviews

Aim

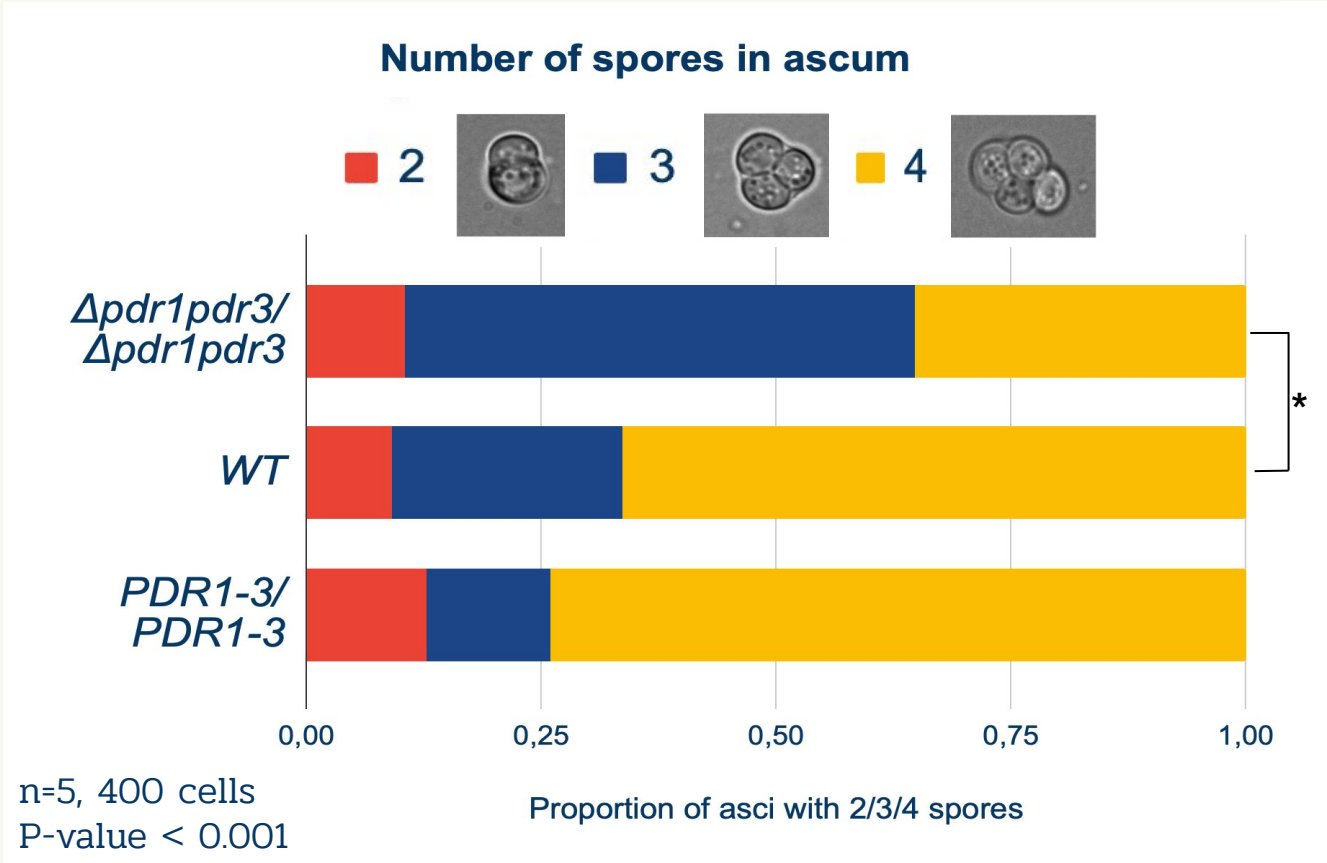
Determinate the role of ABC- and MFS-transporters with broad substrate specificity in the formation and maturation of ascospores S.cerevisiae



Deletion of *PDR1* and *PDR3* reduces the number of spores in asci



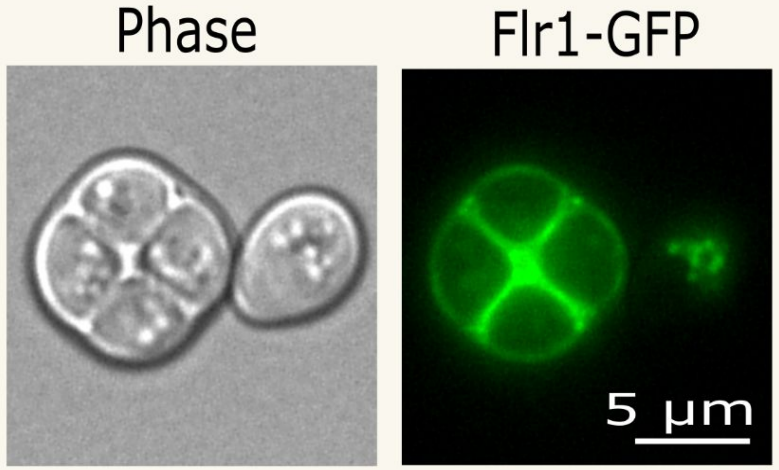
n=5, 400 cells



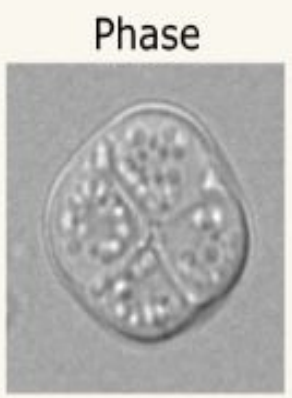
n=5, 400 cells
P-value < 0.001

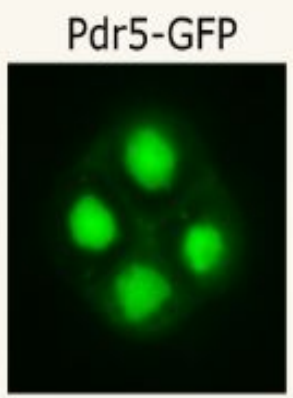
Neither deletion (*Δpdr1Δpdr3*) nor overexpression (*PDR1-3*) of transcription factors affected sporulation efficiency

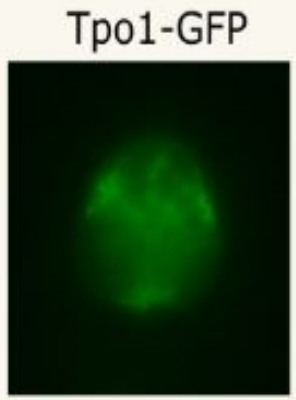
Localisation of MDR transporters in spores

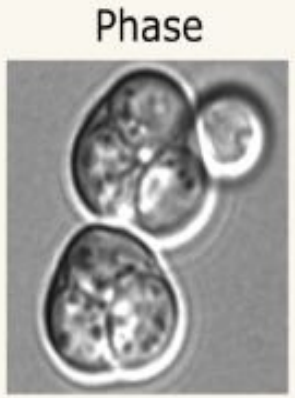


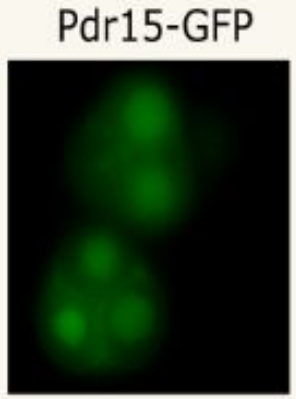
The MFS transporter Flr1 probably localizes in the prospore membrane

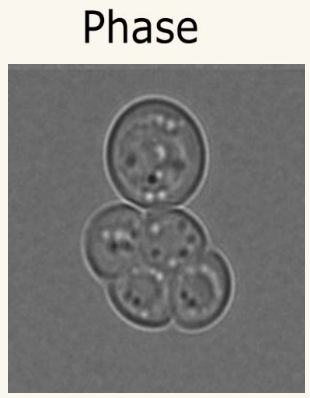


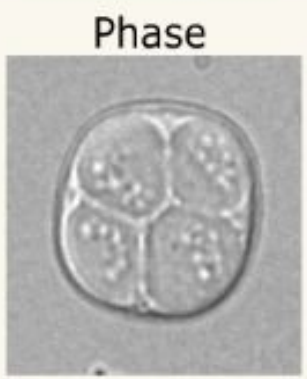


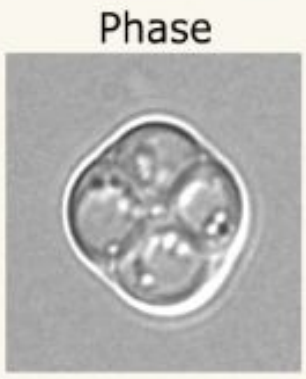


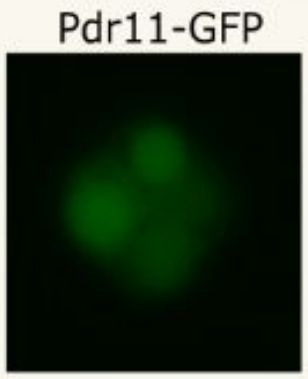


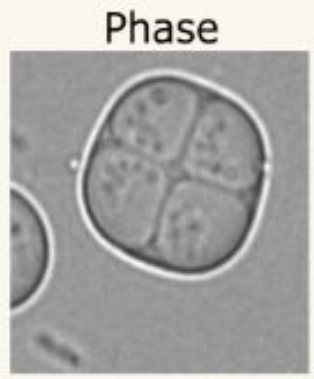


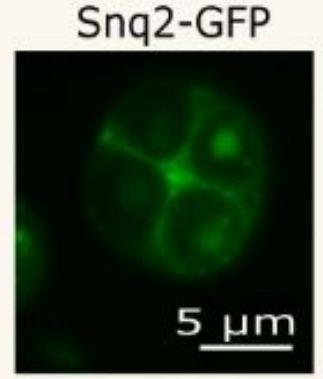




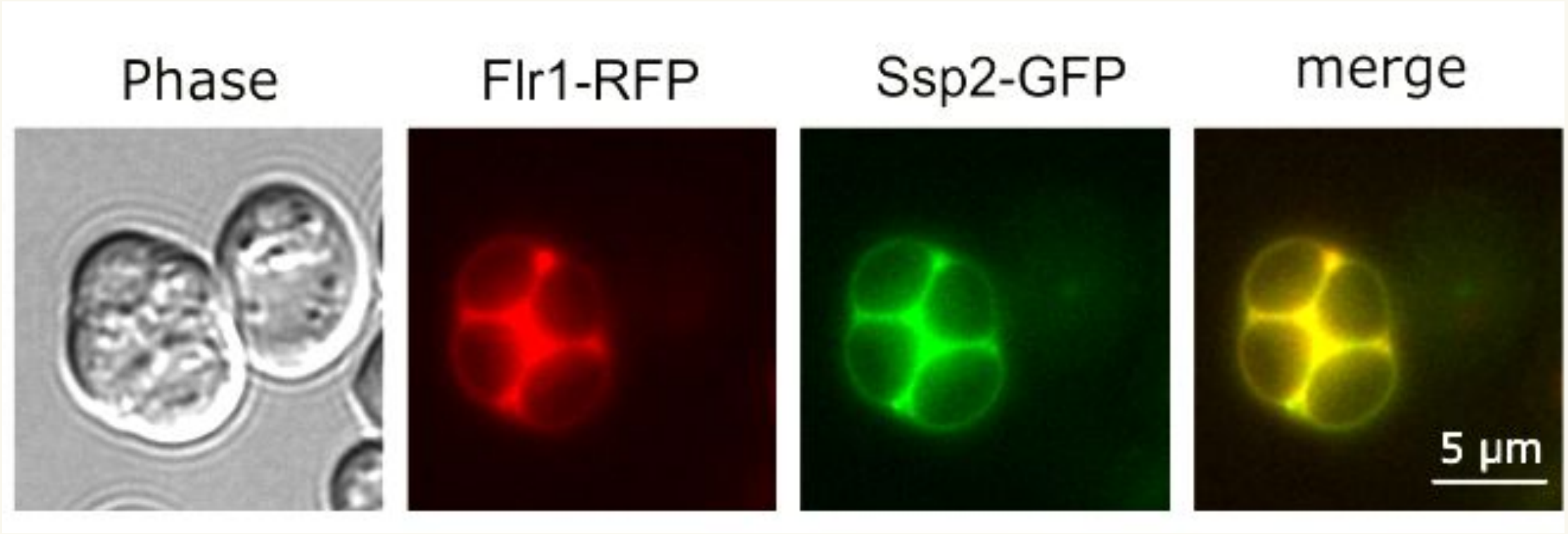






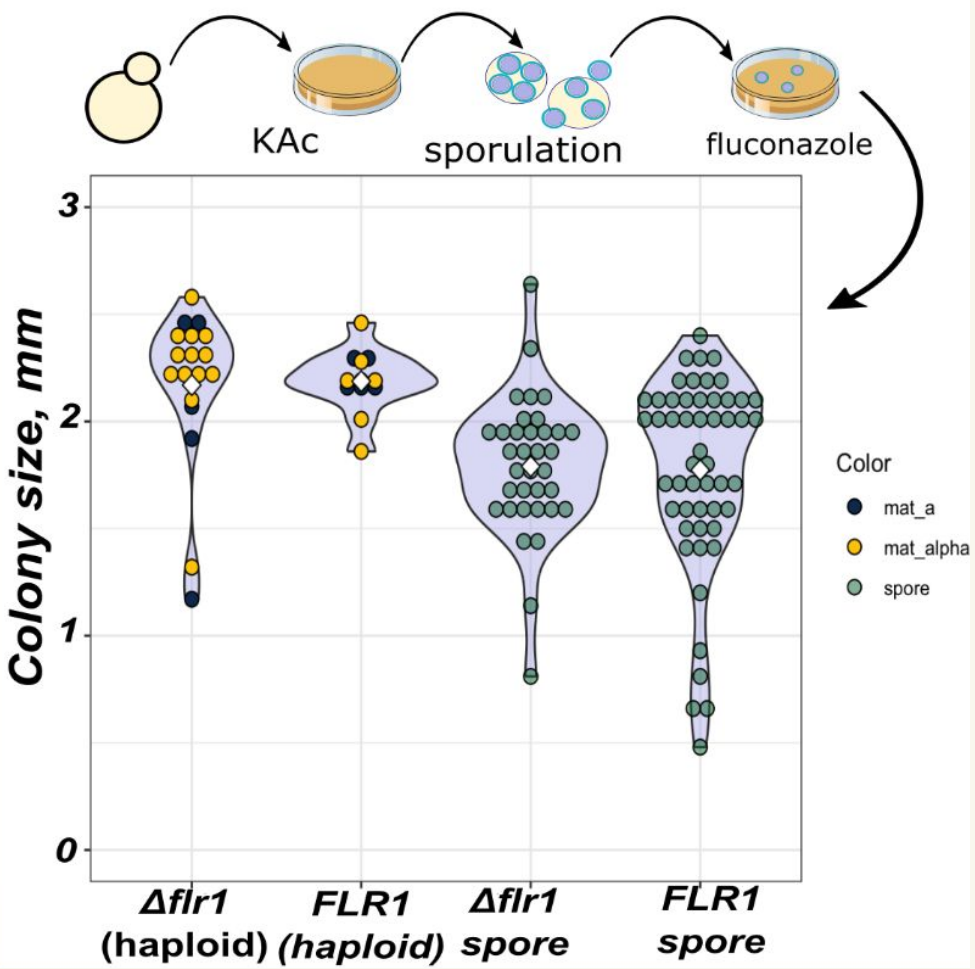


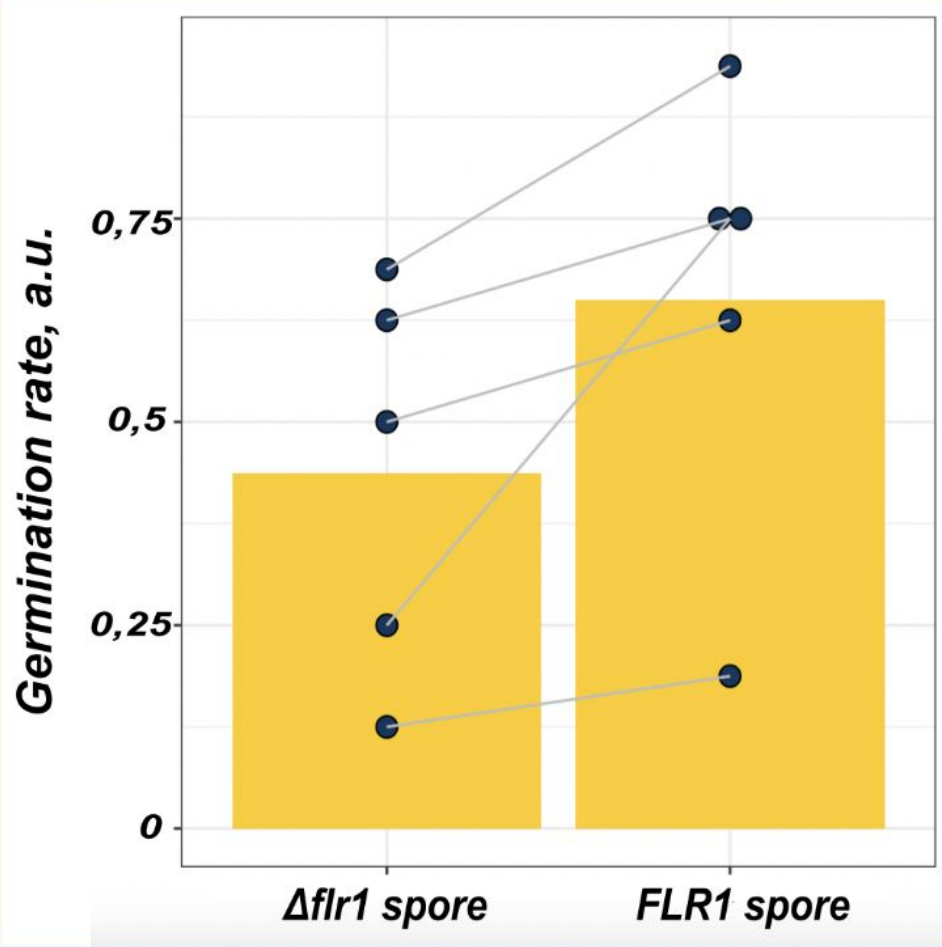
Localization of Flr1 corresponds with localization of Ssp2 in the prospore membrane



Ssp2 – prospore membrane marker protein

Flr1 provides more efficient spore germination in media with fluconazole





Flr1 does not affected on the size of colonies grown from spores.

Conclusions

- Deletion of both the *PDR1* and *PDR3* transcription factor genes decreases the number of spore in asci.
- The MDR MFS-transporter Flr1, but not MDR ABC-transporters, accumulates in yeast cells during reductive division and localizes in the prospore membrane.
- FLR1 provide more efficient germination of spores in the presence of the antifungal fluconazole.

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