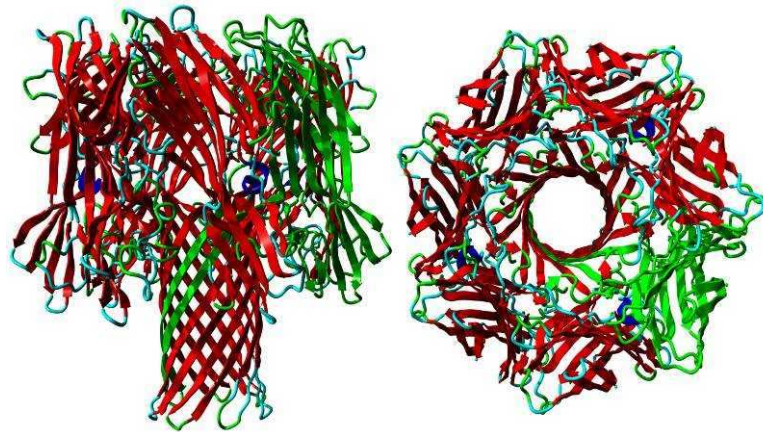
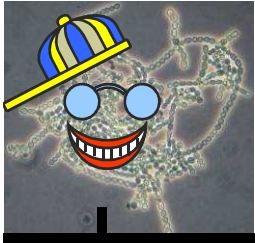


β -Barrel Proteins The Beauty of the Membranes



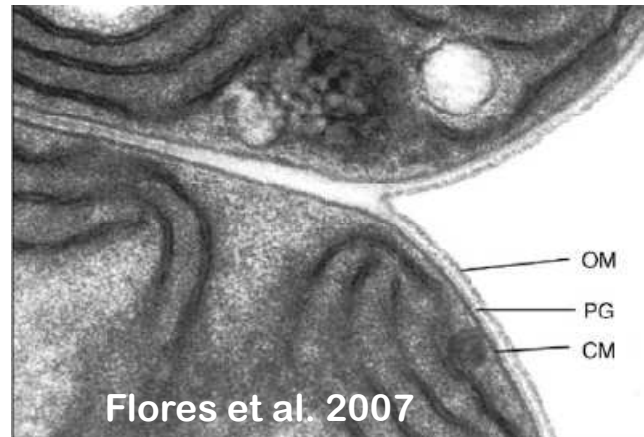
Enrico Schleiff

2008



β -Barrel Proteins

The Beauty of the Membranes



Flores et al. 2007

Anabaena sp. strain PCC7120



Enrico Schleiff

2008

The outer membrane

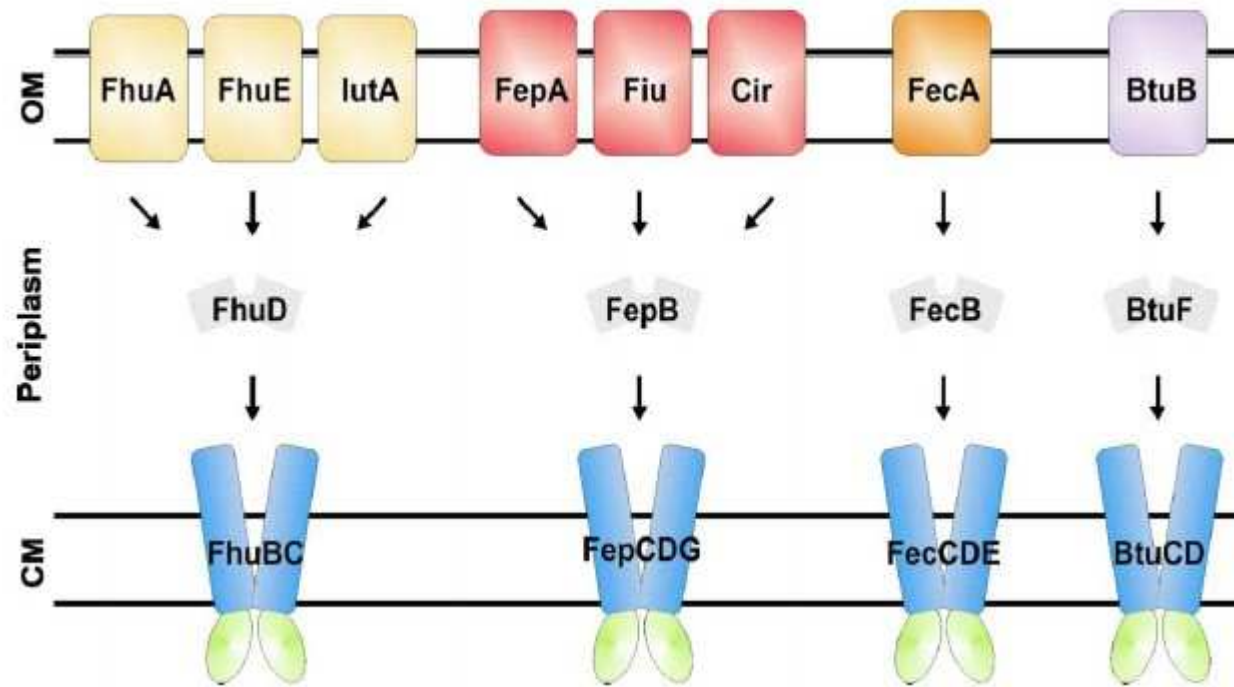


■ The Function

- Protection of the cell environment
- Regulation of the transfer of
 - Ions
 - Metabolites
 - Chemical compounds
 - Proteins
 - Lipids

An example: Iron transport

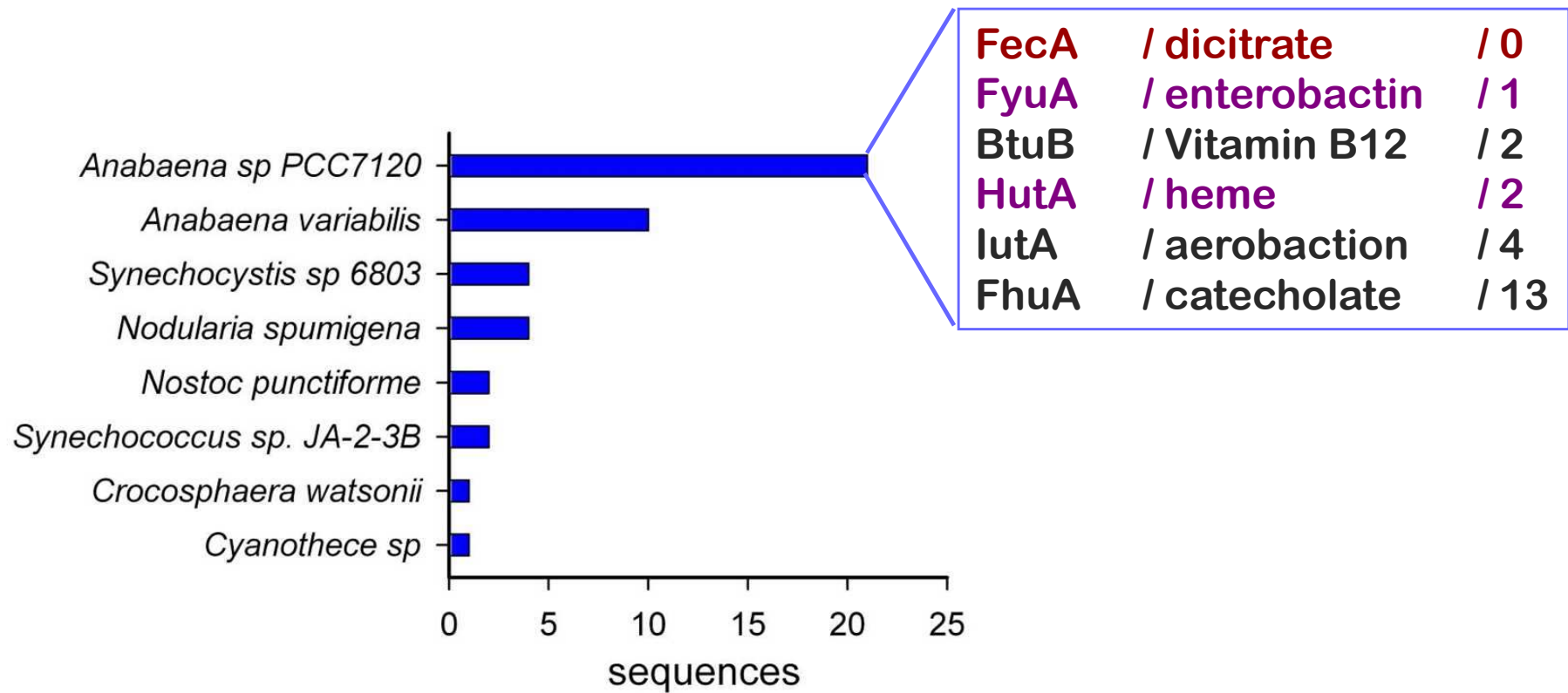
Siderophore-dependent pathways



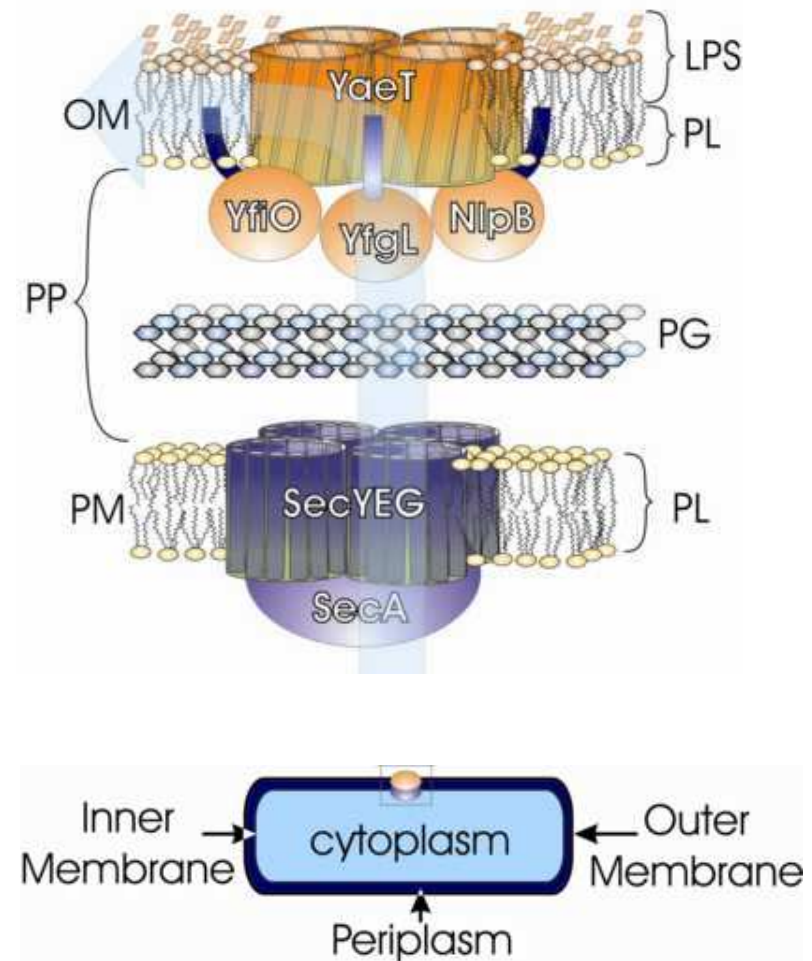
E. coli

Ferguson & Deisenhofer, Cell, 2004

An example: Iron transport

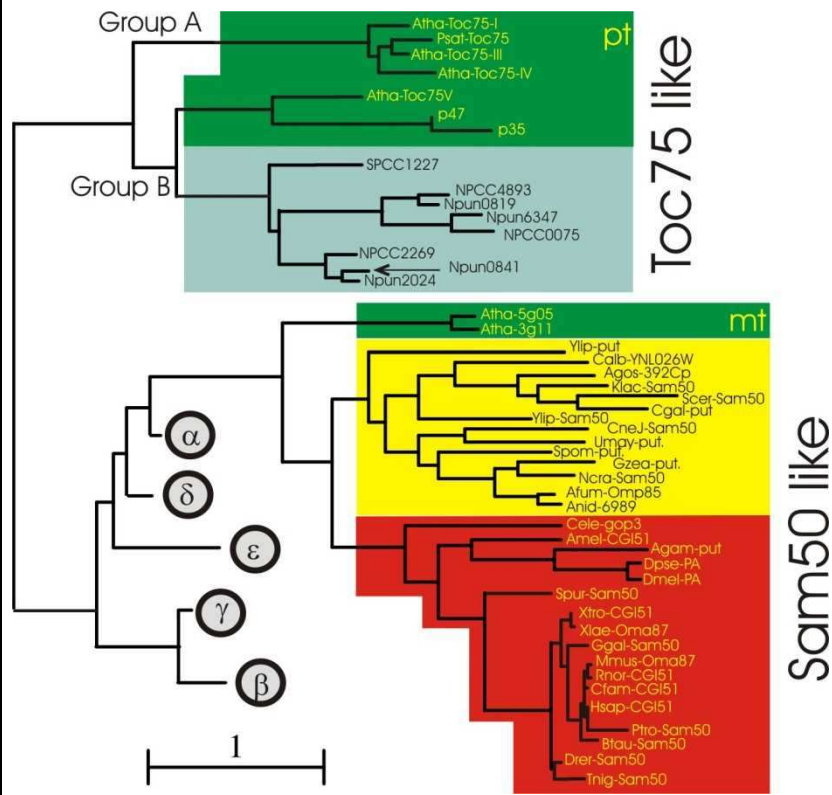


Insertion of outer membrane proteins

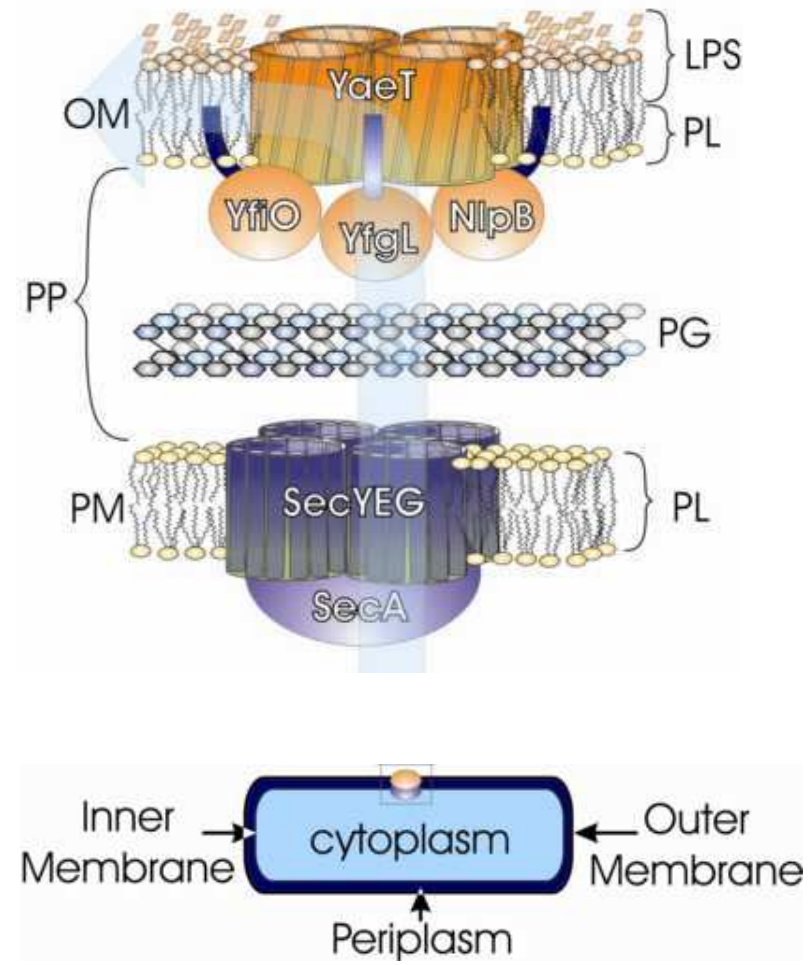


Schleiff & Soll, EMBO R. 2005

The Omp85 Family

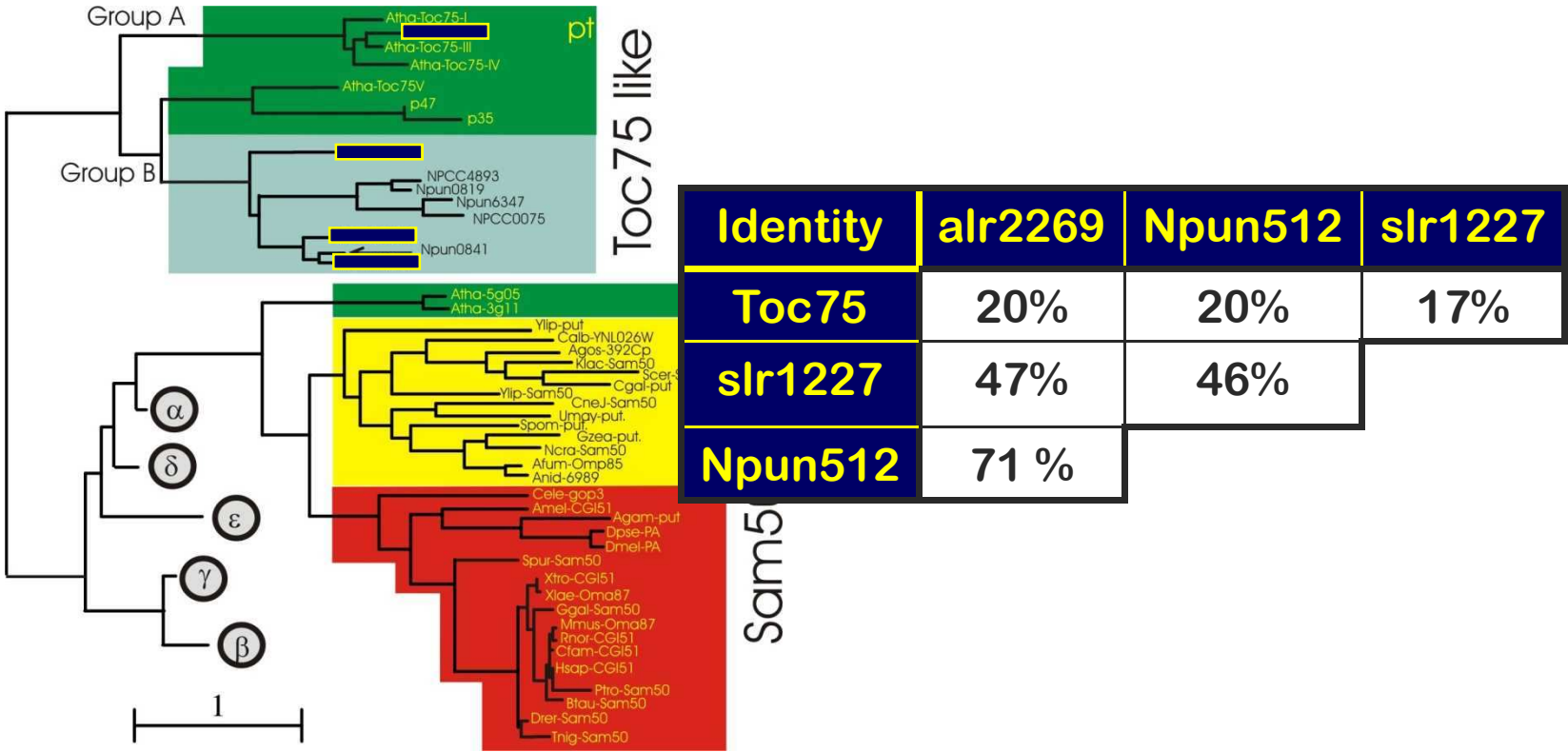


Bredemeier et al., JBC. 2007



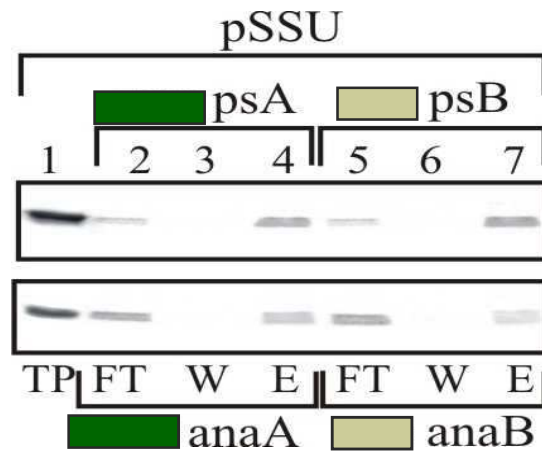
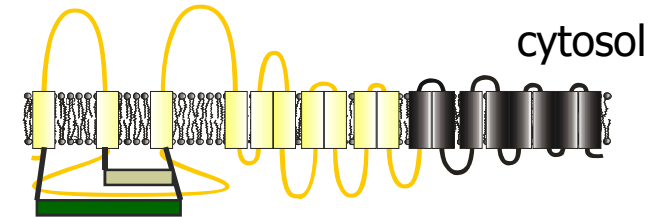
Schleiff & Soll, EMBO R. 2005

The Omp85 Family

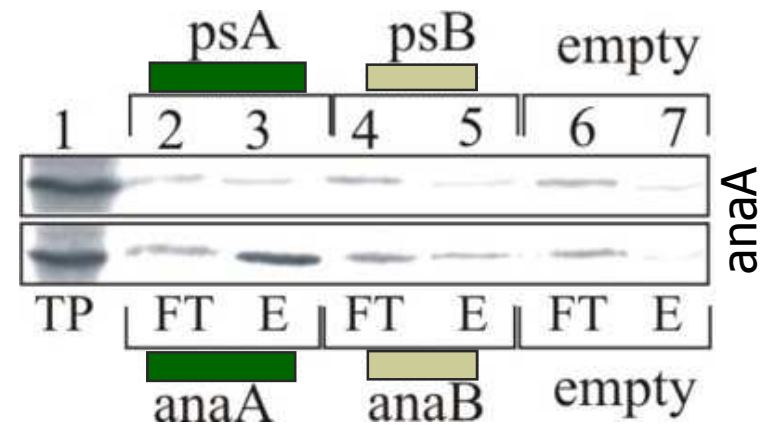


Bredemeier et al., JBC. 2007

The N-Terminus



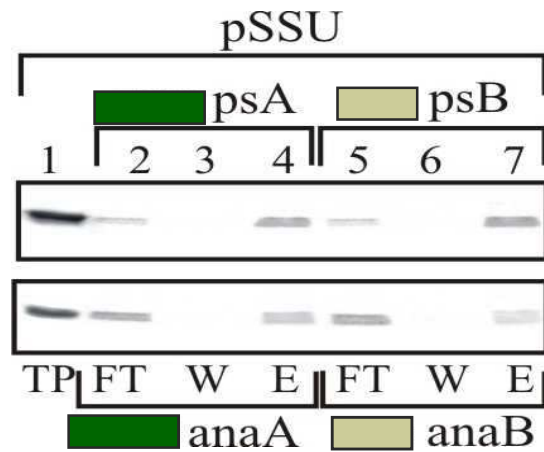
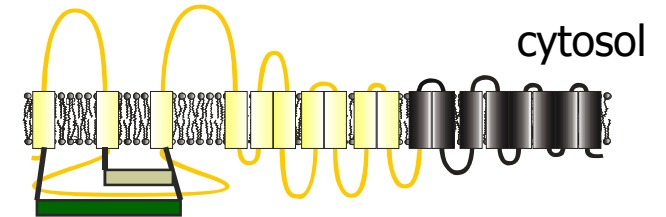
Preprotein Binding



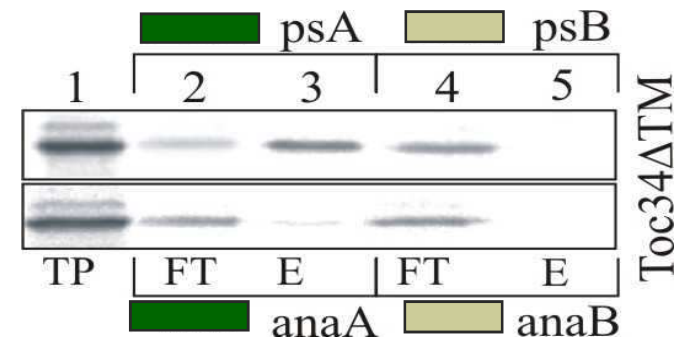
Complex formation

Ertel et al., JBC. 2005

The N-Terminus



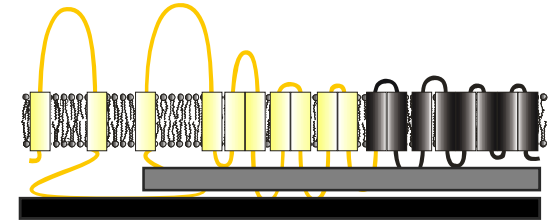
Preprotein Binding



Complex formation

Ertel et al., JBC. 2005

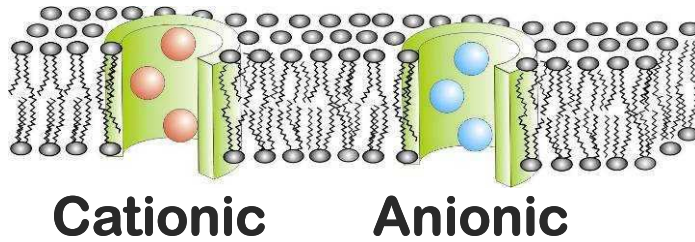
The C-Terminus



The reverse potential

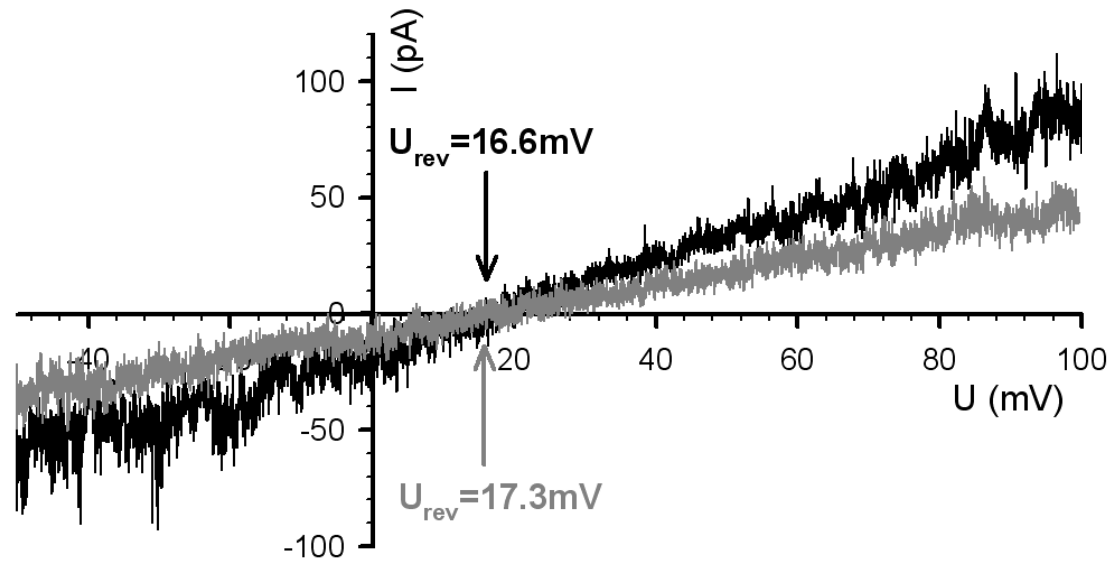
$$U_{\text{rev}} > 0$$

$$U_{\text{rev}} < 0$$



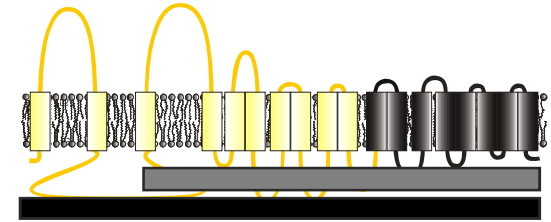
Cationic

Anionic

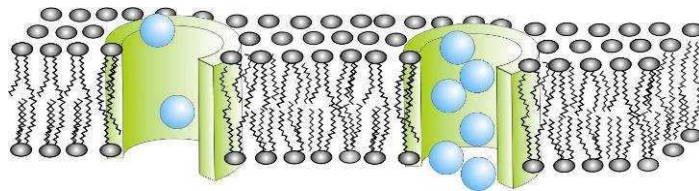


Ertel et al., JBC. 2005, Bredemeier et al., JBC 2007

The C-Terminus

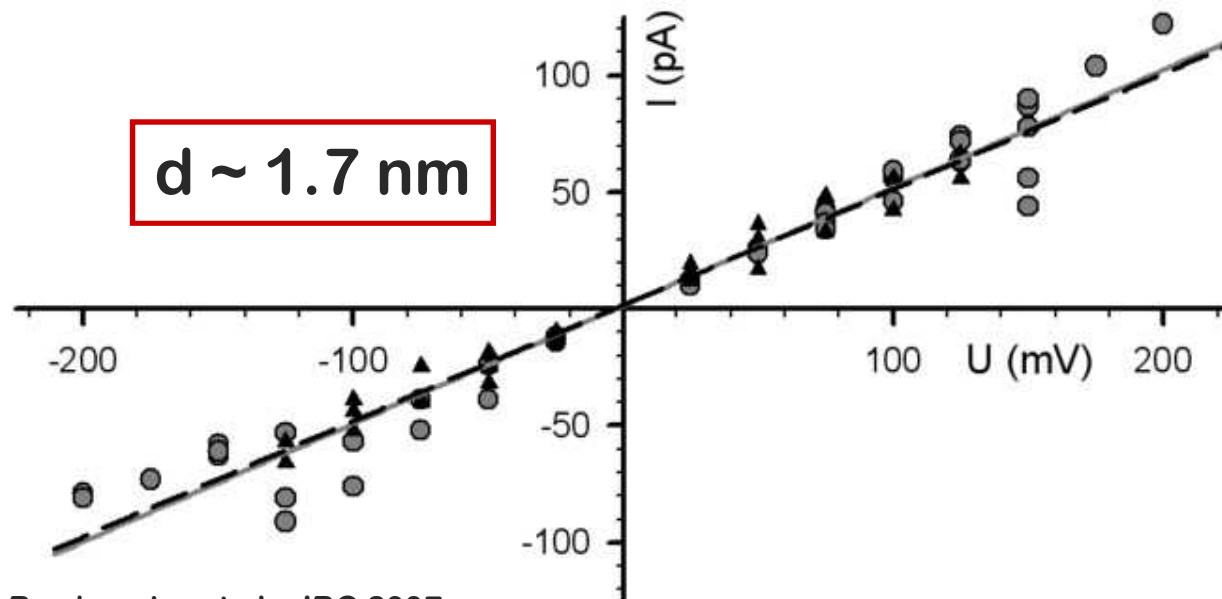


The conductivity



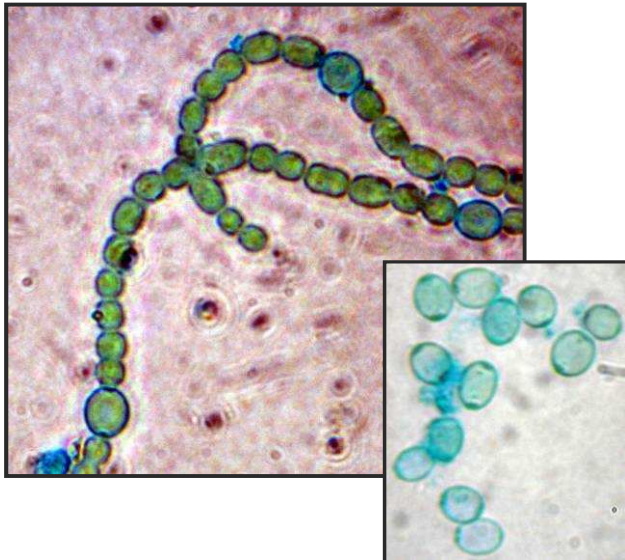
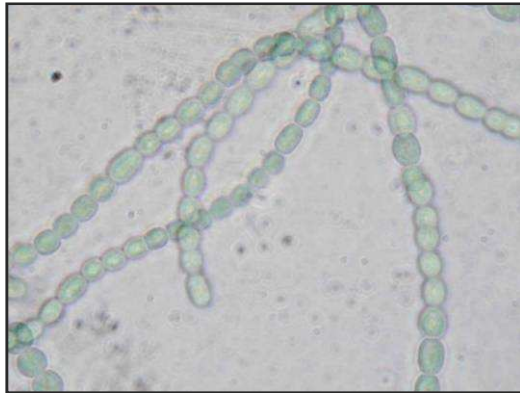
$g1 < g2$

$d \sim 1.7 \text{ nm}$



Ertel et al., JBC. 2005, Bredemeier et al., JBC 2007

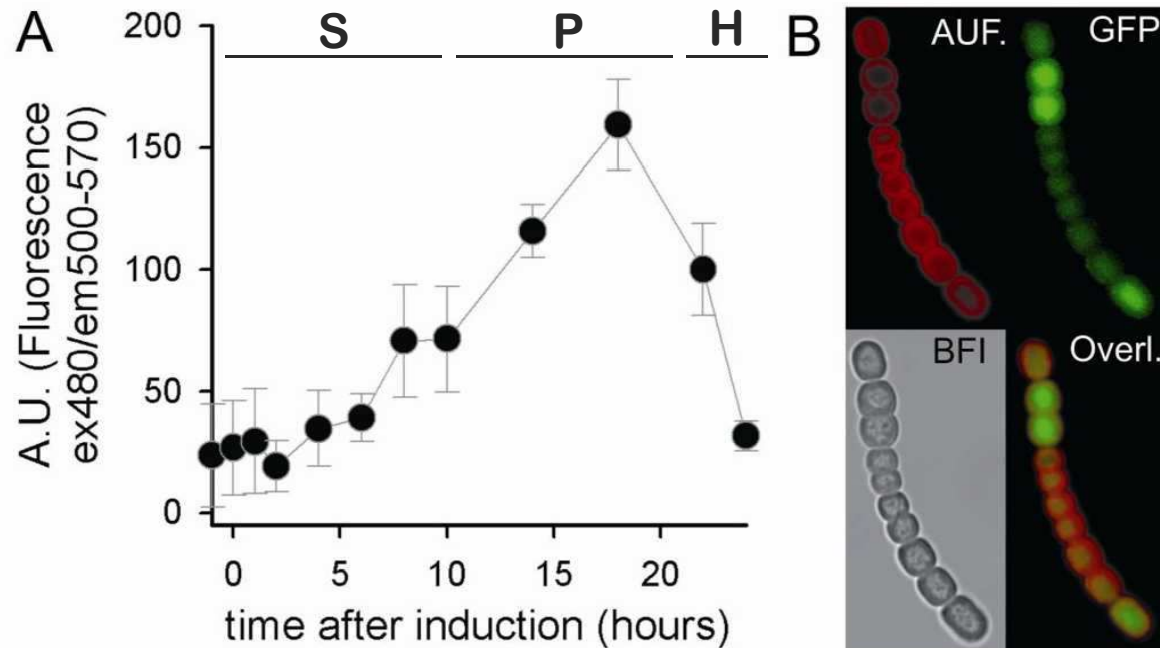
Isolation of the cell wall



Put. loc	HT & VT	Function
OM	alr2887	??

Moslavac et al., JPR. 2005, Moslavac et al., Biol Chem. 2007

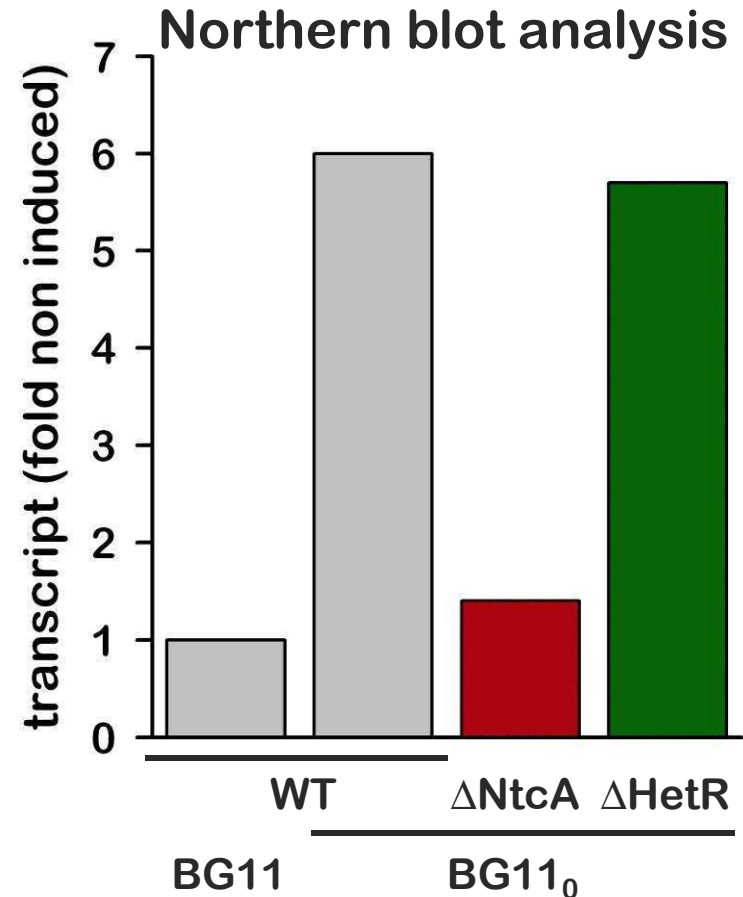
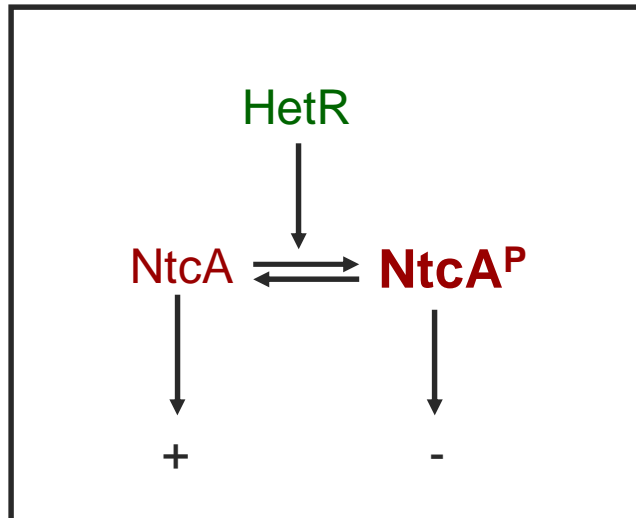
The expression of *alr2887*



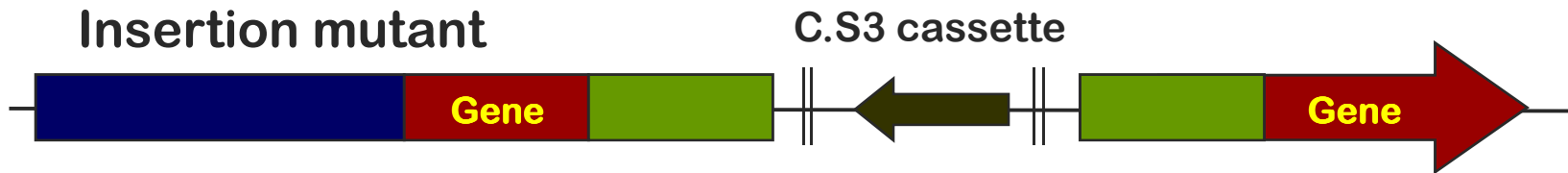
Moslavac et al., J. Bac. 2007

The expression of *alr2887*

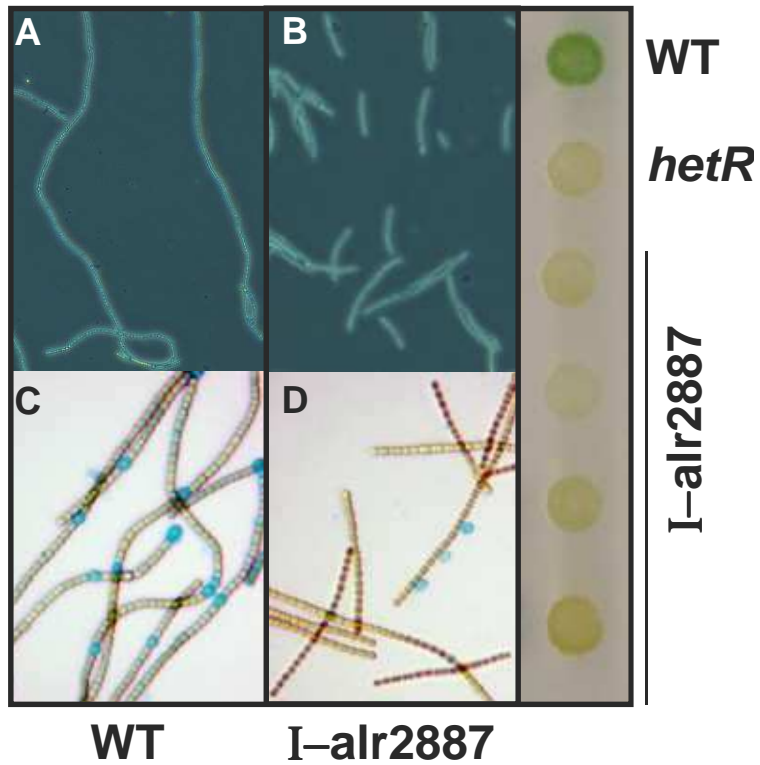
Regulation of Heterocyst development



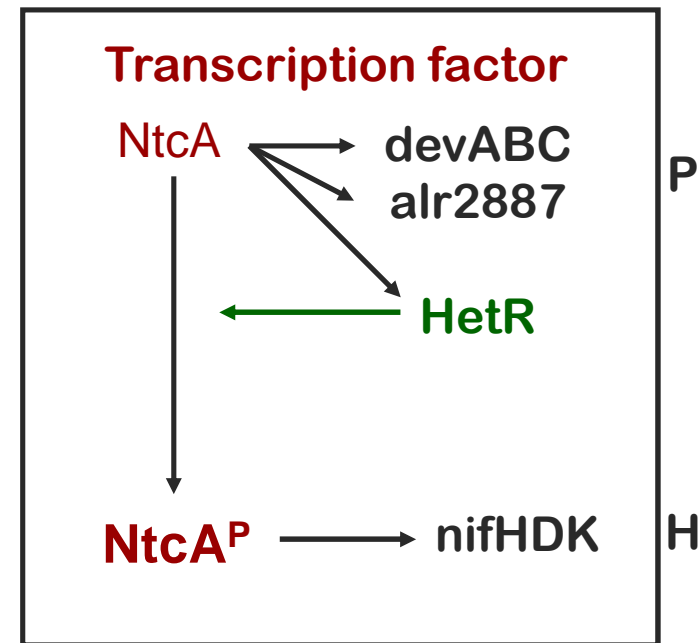
The function of Alr2887



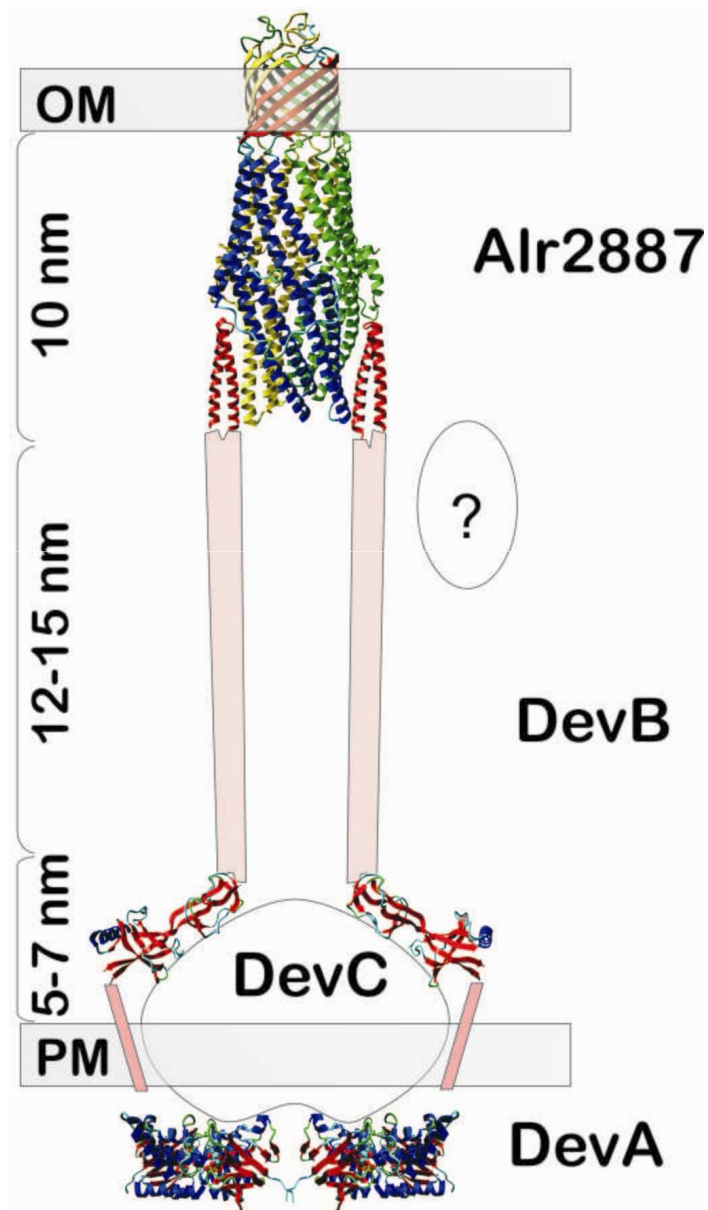
N_2 source



Regulation of heterocyst development

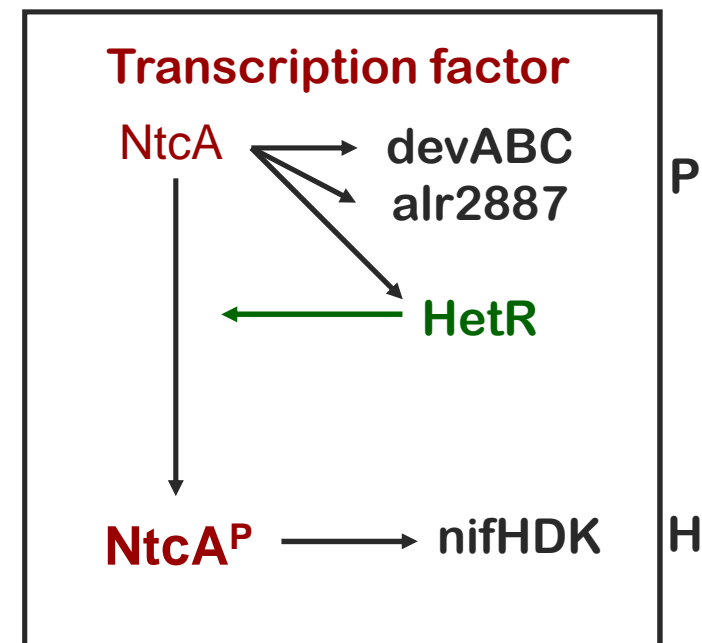


The function of Alr2887

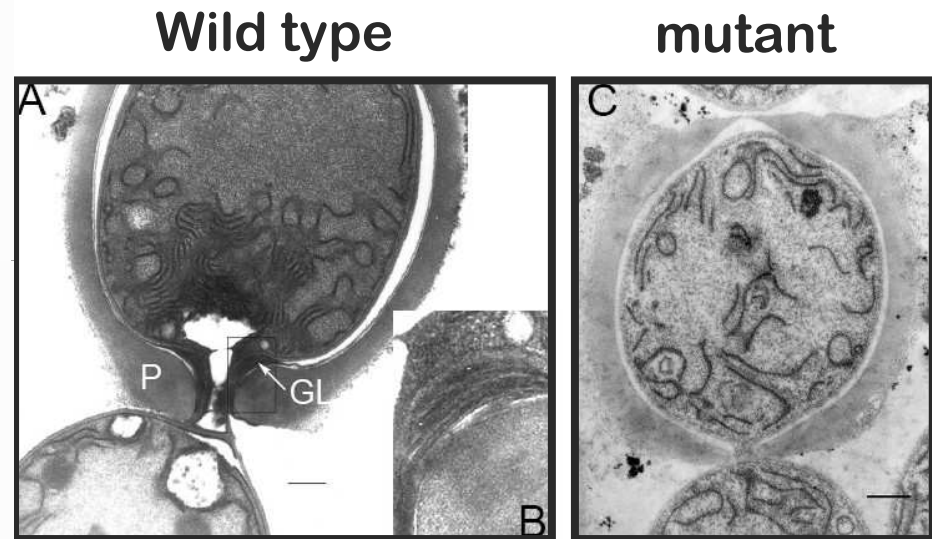
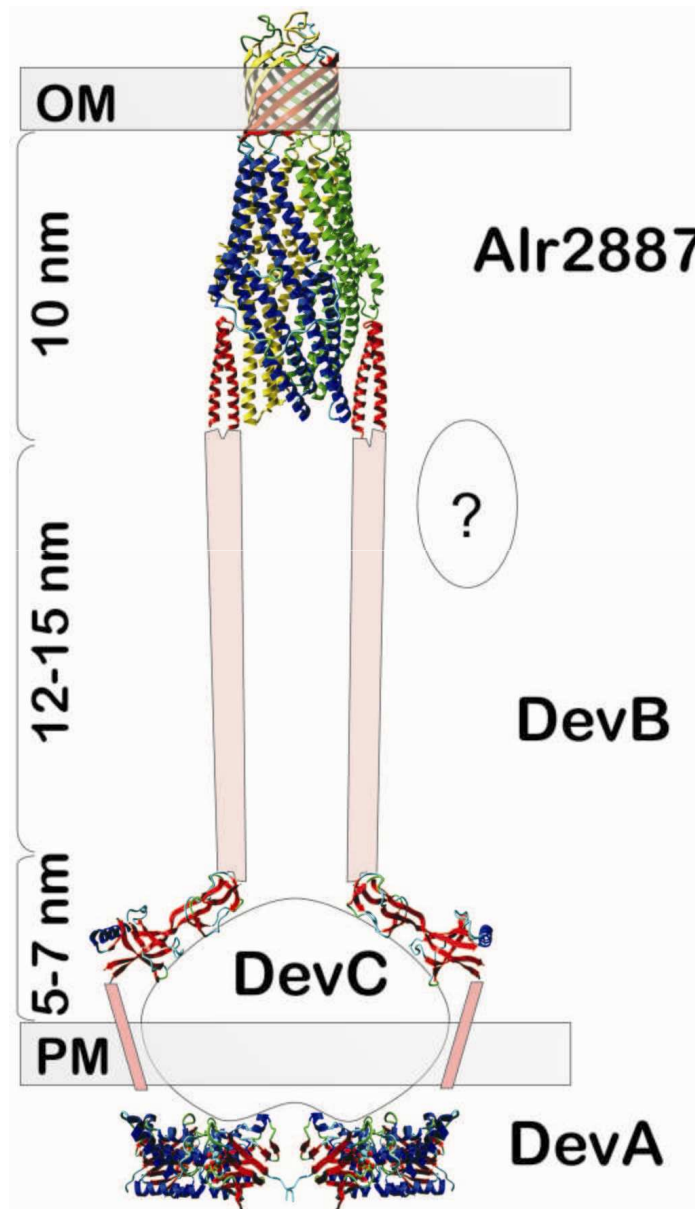


Moslavac et al., J. Bac. 2007

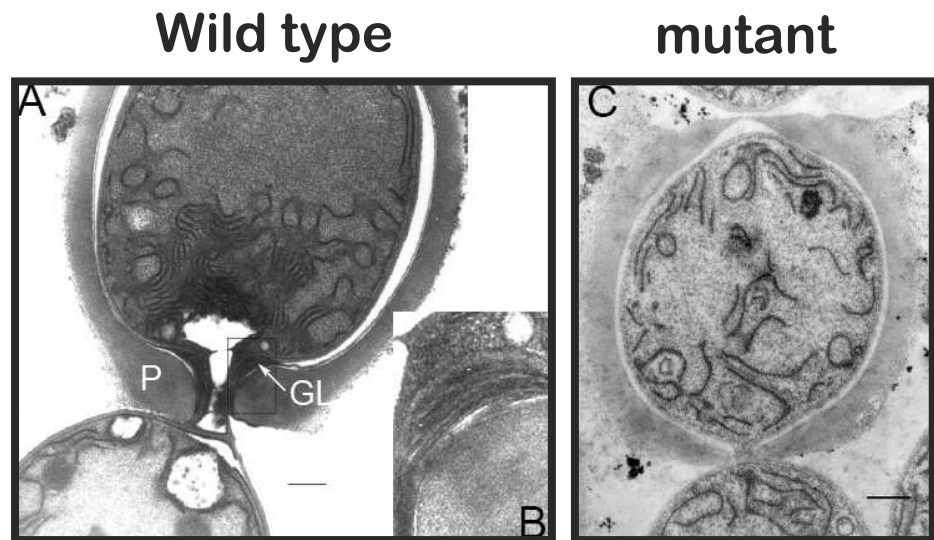
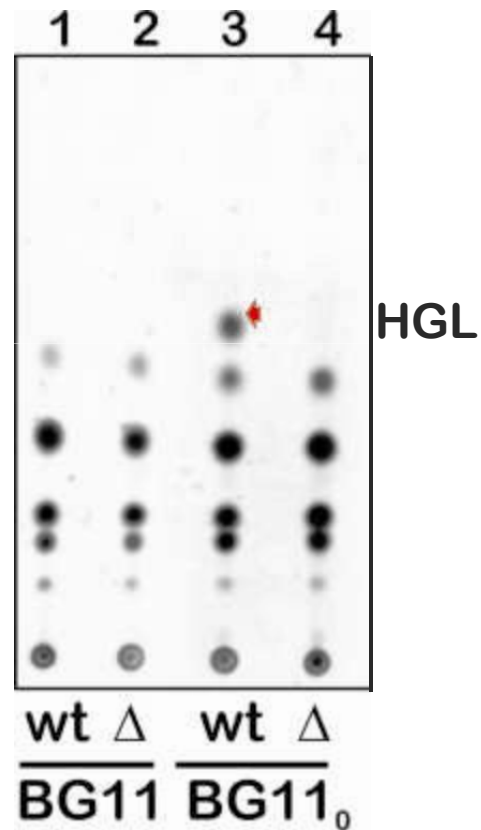
Regulation of heterocyst development



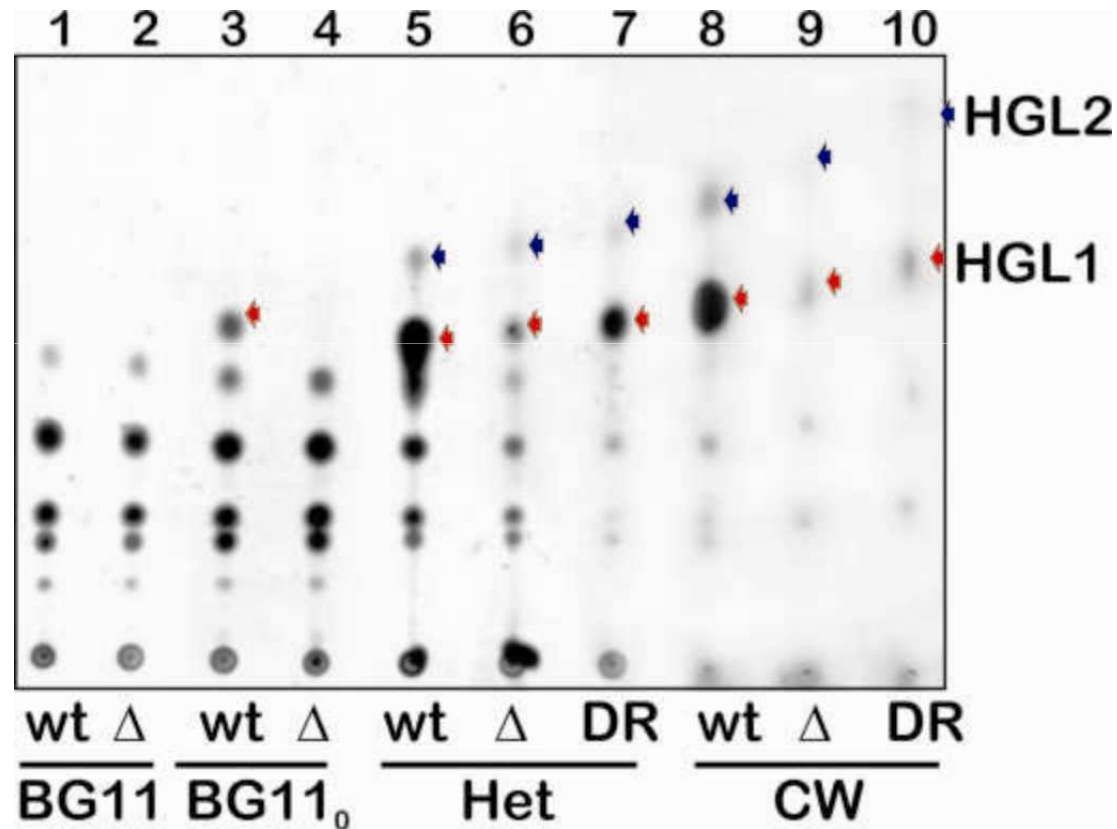
The function of Alr2887



The function of Alr2887



The function of Alr2887

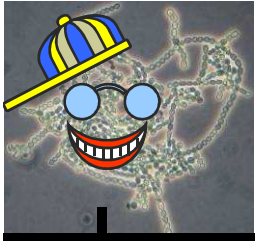


Summary

- TonB dependent transporter
 - At least 22 expressed genes encoding iron transporter
 - Differential expression

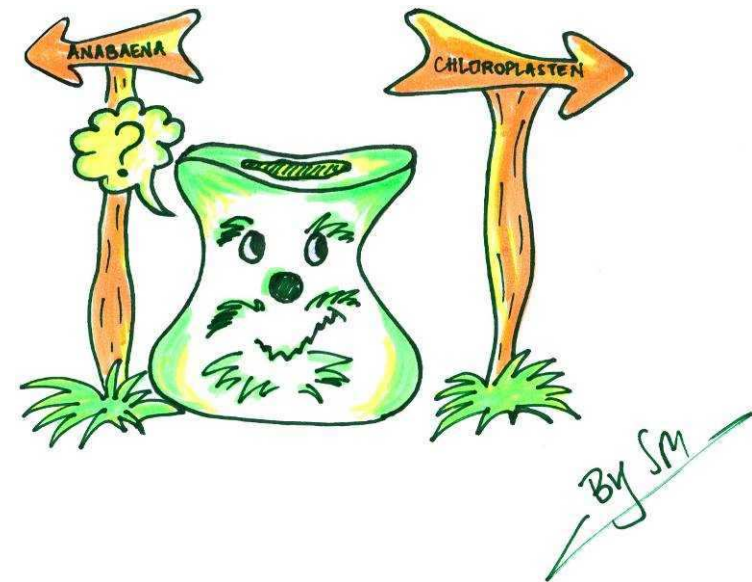
- Omp85
 - Conserved among all species
 - N-terminal recognition site
 - C-terminal pore domain
 - Pore domain regulated by N-terminal section
 - Three homologues in *Anabaena* sp. PCC 7120 with putative cell-type specific function

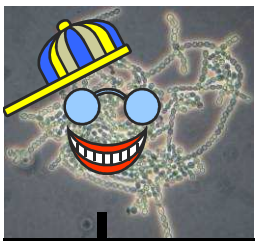
- Alr2887
 - TolC-like protein
 - NtcA-dependent upregulation during heterocyst development
 - Essential for heterocyst development
 - Possibly interacting with DevABC
 - Possibly involved in protein secretion



Who did the work?

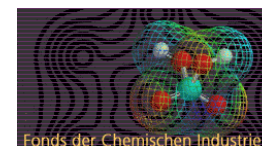
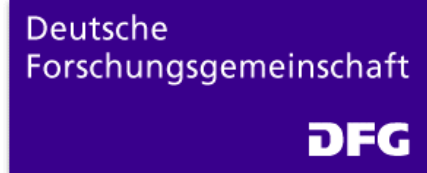
- Rolf Bredemeier
- Franziska Ertel
- Alexander Hahn
- Oliver Mirus
- Suncana Moslavac
- Kerstin Nicolaisen
- Anastasie Samborski
- Maike Ruprecht
- Tobias Wunder





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2008