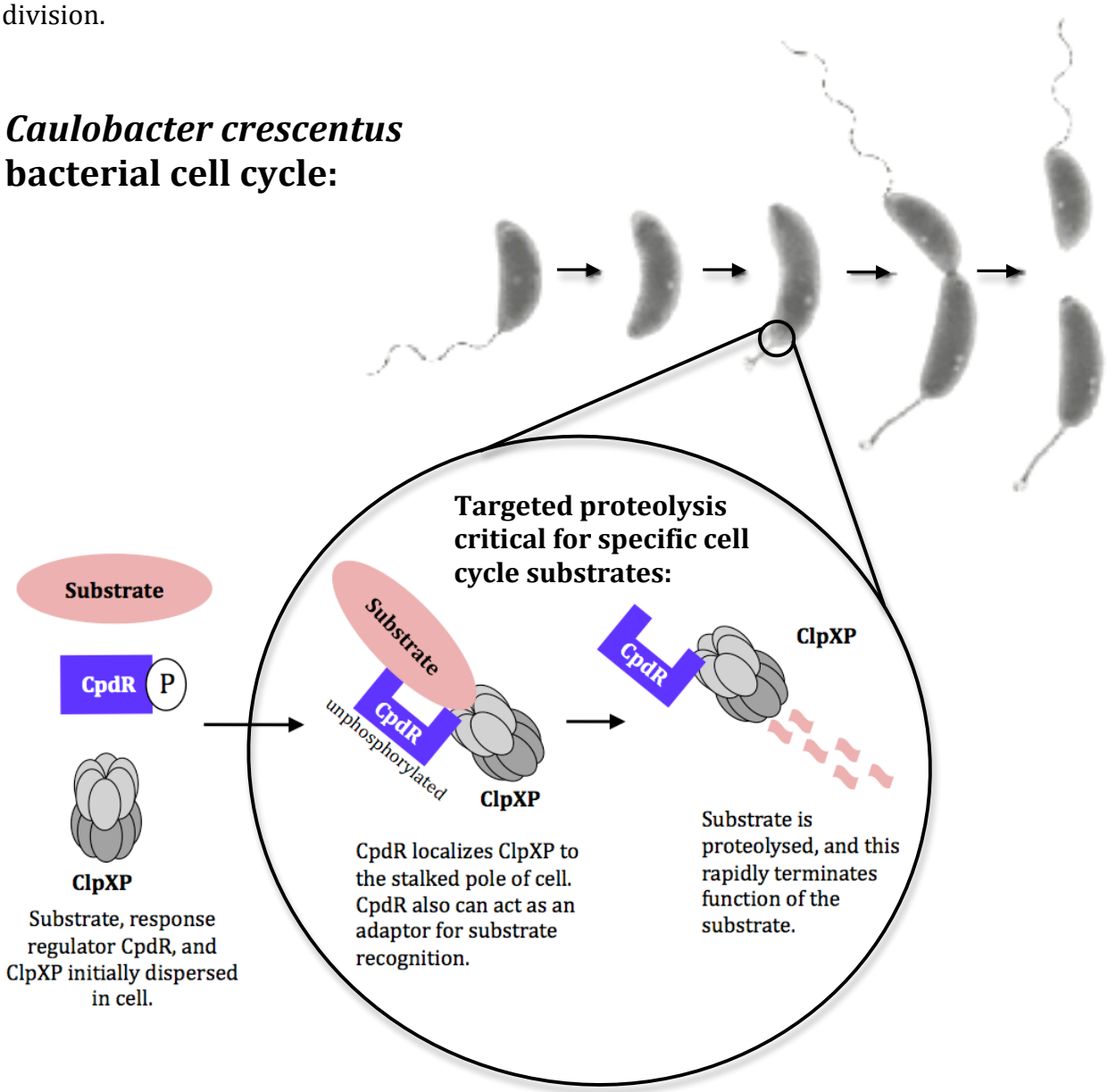
Proteolysis at the right time, right place for bacterial cell cycle and differentiation

The simple process of a cell dividing into two requires a high degree of coordination of several sophisticated cellular processes. Prominent among them is proteolysis of key cell cycle factors to provide accurate levels of intracellular proteins at the right time and place, thus ensuring integrity of the genome and progeny. We present here an integrated study of how a response regulator CpdR controls the activity and localization of ClpXP, a protease complex which regulates a significant number of substrates that are important for cell cycle in *Caulobacter crescentus*. We identify mechanistically important residues of the response regulator through *in vitro* recapitulation of the proteolysis reaction. *In vivo* phenotypic studies further show the downstream effects of these residues in terms of cell motility, morphology and localization of the protease ClpXP. This work shows how a small response regulator protein acts as a regulatory hub in controlling a protease that is essential for cell division.



Presented by Peter Chien and Joanne Lau