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Natural competence for exogenous DNA uptake in yeast: Do we know enough?

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The yeast cell is naturally competent for exogenous DNA uptake under laboratory conditions resembling its natural environment(s). However, although the natural transformability seems crucial for maintaining genetic variability in prokaryotes, the obvious lack of genetically determined mechanism(s) of natural competence in yeast renders its evolutionary impact in lower eukaryotes elusive since they rely on meiosis. Nevertheless, genomic insights showing evidence of horizontal gene transfer significantly support its evolutionary role in eukaryotes. Moreover, vehicles plausibly contributing to spontaneous yeast competence appeared to be comprehensive. Thus transforming exogenous DNA could be passed into yeast cell by the aid of either biological mediation or environmental induction. For instance, wild yeast might be transformed through conjugation by cell-to-cell contact mediated either by *Escherichia coli* or *Agrobacterium tumefaciens*. Moreover, natural competence can be enhanced by mechanical and physiological mechanisms. On the other hand, such natural yeast competence dramatically improved under the human assistance has turned into a powerful technology of paramount application for both basic and applied research. During this endeavor we have managed to scrutinize many parameters that affect yeast competence (both genetic and non-genetic). Many genes and/or entire cell processes responsible for the phenomenon were abstracted. Acquired knowledge allows us to propose a conclusion that yeast competence is controlled by both its genome and the surrounding environment either natural or artificial. Therefore, spontaneous yeast competence here is defined as a complex (quantitative) genetic trait that bears the power to vary over real time and thus allows yeast to better adopt over evolutionary time.

Biography

Petar Tomev Mitrikeski has completed his Ph.D. from University of Zagreb (Croatia) and postdoctoral studies from Ruđer Bošković Institute (Zagreb, Croatia). He is a Scientific Associate at the Institute for Research and Development of Sustainable Ecosystems (Zagreb, Croatia). He has published 7 papers in reputed journals and books.

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