# *Evolution of Gene Regulation and Regulatory Modules in Yeast*


## Wen-Hsiung Li

### 2003 Balzan Prize for Genetics and Evolution

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The development and the physiology of an organism are controlled by genes. For this purpose a gene must be turned on or off at the right time and under the right conditions, and when it is on, the level of its expression must be appropriate. Otherwise, the organism can become sick or even die. The turn-on and -off and the level of expression of a gene are called gene regulation. Hence, evolutionary change in gene regulation, or regulatory evolution, is important for the morphological or physiological differences between organisms. Wen-Hsiung Li chose budding yeast as the model organism to study gene regulation because its genetics and molecular biology are well understood and it is experimentally much easier to manipulate than higher organisms.

The purpose of Wen-Hsiung Li's project was to study how the regulation of yeast genes has evolved over time. Instead of looking at one gene at a time, the aim was to look at a group of genes (or regulatory module) subject to the same or similar regulation at the same time.

**Publications**


Marland E, Prachumwat A, Maltsev N, Gu Z, Li W-H. 2004. Higher gene duplicabilities for metabolic proteins than for non-metabolic proteins in yeast and E. coli. J. Mol. Evol. 59: 806-814.

Prachumwat A, Li W-H. 2006. Protein Function, Connectivity, and Duplicability in Yeast. Mol. Biol. Evol. 23: 30-39.
Chang Y-W, Liu F-GR, Yu N, Sung H-M, Yang P, Wang D, Huang C-J, Shih M-C, Li W-H. 2008. Roles of cis- and trans-changes in the regulatory evolution of genes in the gluconeogenic pathway in yeast. Mol. Biol. Evol. 25: 1863-1875.
Prachumwat A, Li W-H. 2008. Gene number expansion and contraction in vertebrate genomes with respect to invertebrate genomes. Genome Research. 18: 221-232.