

New Findings on the Origin of TrpRS

On Nov. 26th, the well-renowned British journal *Nuclear Acid Research* published on line the latest research finding on TrpRS by the Structural Biology Group at the Institute of Biochemistry and Cell Biology (SIBCB), Shanghai Institutes for Biological Sciences (SIBS), Chinese Academy of Sciences. With structural and computational studies, PhD candidates Xianchi Dong and Minyun Zhou, and their mentor Prof. Jianping Ding show that TrpRS has an archaeal origin.

Aminoacyl-tRNA synthetases play an essential role in maintaining the fidelity of transferring the genetic information from mRNA to protein in protein synthesis. The Ding's group has published a series of papers on the mechanisms underlying the Trp activation and the subsequent transfer of the activated Trp to the cognate tRNA by human tryptophanyl- tRNA synthetase (TrpRS). As ancient and ubiquitous aminoacyl-tRNA synthetases constitute a valuable model system for studying early evolutionary events, and the evolutionary relationship of TrpRS and tyrosyl-tRNA synthetase (TyrRS) remains controversial, recently the Ding's group conducted the phylogenetic study of TrpRSs. They determined the first crystal structure of an archaeal TrpRS, the structure of *Pyrococcus horikoshii* TrpRS (pTrpRS) in complex with tryptophanyl-AMP (TrpAMP) and performed a more complete structure-based phylogenetic study of TrpRS and TyrRS, which for the first time includes representatives from all three domains of life. The results show that TrpRS originates from the archaeal branch of TyrRS, and the emergence of TrpRS and subsequent acquisition by Bacteria might have occurred at early stages of evolution. Due to the originality, significance and scientific excellence of the work, the article has been selected as a feature article of the issue.

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