

DINOFLLAGELLATE GENOME AND CORAL SYMBIOSIS

Prof. LIN Senjie

Professor, University of Connecticut, Marine Sciences;

Guest Professor, Xiamen University;

South China Sea Institution of Oceanology, Chinese Academy of Sciences;

Shanghai Ocean University;

“1000Plan” Award of China (2010)

Dinoflagellate (*Symbiodinium*) symbiosis is essential to the growth and health of coral reefs. Despite morphologically homogeneity, the diversity of the endosymbiotic *Symbiodinium* and the specificity of coral-*Symbiodinium* pairing have increasingly been recognized. With accelerated environmental disturbances by human activities, coral reefs have undergone devastating degradation at global scale, among which coral bleaching is directly linked to the breakdown of coral-*Symbiodinium* the symbiosis. Although extensive and intensive research has been conducted to understand the causes, our knowledge of how the health, or the lack thereof, coral reef is regulated within the symbiosis partners is still limited, largely due to the lack of in-depth understanding of corals as well as dinoflagellates. Recent improved accessibility of high throughput DNA sequencing has provided unprecedented opportunities to address the gap of knowledge, particularly in obtaining insights into the mechanisms underpinning symbiosis establishment and susceptibility to environmental stress. In this talk, I will present a *Symbiodinium* genome in hope to provide insights into 1) what determines *host-Symbiodinium* pairing specificity, 2) how symbiosis function is regulated, 3) and how the symbiosis has evolved. I will also introduce genetic diversity of *Symbiodinium* in the Chinese coral reef systems with the goal to discuss genotype distribution geographically and host species-wise and future direction of research needed to boost coral reef research and conservation technology.

Major Publications

- Lin, S., Cheng, S., Song, B., Zhong, X., Lin, X., Li, W., Li, L., Zhang, Y., Zhang, H., Ji, Z., Cai, M., Zhuang, Y., Shi, X., Lin, L.-X., Wang, L., Wang, Z., Liu, X., Yu, S., Zeng, P., Hao, H., Zou, Q., Chen, C., Li, Y., Wang, Y., Xu, C., Meng, S., Xu, X., Wang, J., Yang, H., Campbell, D. A., Sturm, N. R., Dagenais-Bellefeuille, S. and Morese, D. 2015. The genome of *Symbiodinium kawagutii* illuminates dinoflagellate gene expression and coral symbiosis. *Science* 350: 691-694.
- Yang, F., Xu, D., Zhuang, Y., Yi, X., Huang, S., Chen, H., Lin, S., Campbell, D., Sturm, N., Liu, G. and Zhang, H. 2015. Spliced leader RNA trans-splicing discovered in copepods. *Sci. Rep.* 5: 17411. Doi: 10.1038/Srep17411
- Lin, X., Shi, X., Wang, L. and Lin, S. 2015. Rapidly diverging evolution of an atypical alkaline phosphatase (PhoAaty) in marine phytoplankton: insights from dinoflagellate alkaline phosphatases. *Front. Microbiol.* 6: article 868. doi: 10.3389/fmicb.2015.00868
- Mungpakdee, S., Shinzato, C., Takeuchi, T., Kawashima, T., Koyanagi, R., Kisata, K., Tanaka, M., Goto, H., Fujie, M., Lin, S., Satoh, N. and Shoguchi E. 2014. Massive gene transfer and extensive RNA editing of a symbiotic dinoflagellate plastid genome. *Genome Biol. Evol.* 6(6): 1408-1422.