

Zhenglong Gu

Web Bio

Information

Biography

Biographical Statement

- Dr. Zhenglong Gu received his Bachelors of Science degree in Biochemistry and Molecular Biology from Peking University in 1998, and his PhD degree in Ecology and Evolution in 2003 from University of Chicago. He conducted his postdoctoral research at Stanford Genome and Technology Center from 2004 to 2006. He became an Assistant Professor in the Division of Nutritional Sciences at Cornell University in 2006.
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- Dr. Gu's laboratory uses a combination of computational and experimental approaches to understand the structure of metabolic networks and how these have been shaped over evolutionary time by selective pressures, such as those imposed by nutrient constraints. Much of the effort is devoted to understanding these issues in *Saccharomyces cerevisiae*, because of its simplicity, rapid growth and the availability of robust experimental and computational tools. Specific interests include evolution of aerobic fermentation in yeast and its implication in ethanol production and cancer physiology, duplicate gene regulation and evolution of antagonistic pleiotropy, genetic and evolution of complex life traits in pathogenic fungi. His laboratory also has interests in using computational and experimental approach to investigate function, evolution and diseases relevance for mitochondria.

Department Website Summary

Our laboratory uses a combination of computational and experimental approaches to understand evolution of metabolism in model organisms and human, and its diseases implication.

Teaching

Teaching and Advising Statement

- *Teaching*: I believe the primary goal of teaching at a prestigious academic institution is to provide knowledge and instruction to students, encourage them to fulfill their potential and challenge them to perform above their own expectations.

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- *Advisory*: The primary goals of an advisor are to serve as a mentor to students, and assist them in their pursuit of meaningful educational programs, which is important for fulfilling their life goals. The positive experience for students during their years at Cornell will have a great impact on their future. I have been fortunate to serve as an advisor to many students, and I have performed this role with care.

Professional

Current Professional Activities

- Genomics (minor field), 2009-present
- Genetics & Development, 2008- present
- Computational Biology, 2008-present
- Nutritional Sciences, 2006-present

Research

Current Research Activities

- Evolution of Aerobic Fermentation in Yeasts
- Metabolic Adaptation during Human Evolution
- Mitochondrial DNA Variation and Their Phenotypic Consequences
- Mitochondrial Function and Diseases

Extension

Education

Education

- PhD in Ecology and Evolution, University of Chicago, 2003
- BS in Biochemistry and Molecular Biology, Peking University, 1998

Courses

Courses Taught

- NS2750, Human Biology and Evolution
- NS7030 Seminar Nutritional Science
- BIOG 4990, Independent Undergraduate Research
- NS 4010, Empirical Research (Independent Study)

Websites

Related Websites

[Gu Lab website](#)
[Cornell Center for Comparative & Population Genomics](#)

Administration

Administrative Responsibilities

- Division Curriculum Committee, Chair, 2012-present
- Executive Committee (Seed Funding and Shared Resources), VERGE, 2011-present

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Publications

Selected Publications

1. Ye K, Lu J, Ma F, Keinan A, Gu Z. Extensive pathogenicity of mitochondrial heteroplasmy in healthy human individuals. *Proc Natl Acad Sci U S A*. 2014 Jul 22;111(29):10654-9
2. Ahmad KM, Kokošar J, Guo X, Gu Z, Ishchuk OP, Piškur J. Genome structure and dynamics of the yeast pathogen *Candida glabrata*. *FEMS Yeast Res*. 2014 Jun;14(4):529-35.
3. Liu, X., Jiang, H., Gu, Z. & Roberts, J.W. High-resolution view of bacteriophage lambda gene expression by ribosome profiling. *Proc Natl Acad Sci U S A*. 110:11928-11933 (2013)
4. Shestov, A.A., Barker, B., Gu, Z. & Locasale JW Computational approaches for understanding energy metabolism. *Wiley Interdiscip Rev Syst Biol Med*. doi: 10.1002/wsbm.1238, (2013)
5. Ye, K. Lu, J., Madhura Raj, S. & Gu, Z. Human expression QTLs are enriched in signals of environmental adaptation , *Genome Biol Evol*. 5:1689-1701 (2013)
6. Xu, L., Barker, B. & Gu, Z. Dynamic epistasis for the different alleles of the same gene, *PNAS*, 109:10420-10425 (2012)
7. Jiang, H., Guo, X., Xu, L. & Gu, Z. Rewiring of post-transcriptional RNA regulons: Puf4p in fungi as an example, *Mol Biol Evol*. 29:2169-2176 (2012)
8. Stover, P. & Gu, Z. Polymorphism: effect on nutrient utilization and metabolism. Book Chapter, *Modern Nutrition in Health and Diseases*, (2011)
9. Ye, K. & Gu, Z. Recent advances in understanding the role of nutrition in genome evolution, *Advances in Nutrition*, 2:486-496, (2011)
10. Xue, Z., He, Y., Ye, K., Gu, Z., Mao, Y. & Qi, L. A highly-conserved structural “hinge” bridging the kinase and RNase domains of the IRE1 protein is critical for its stability and activation. *J Biol Chem* 286:30859-30866 (2011)
11. Xu, L, Jiang, H & Gu, Z. Genetic architecture of complex traits revealed by epistatic interaction. In press, *Genome Biol. & Evol*. 3:909-914 (2011)
12. Zou, Y., Huang, W., Gu, Z. & Gu, X. Predominant gain of promoter TATA box after gene duplication associated with stress responses. *Mol Biol Evol*. 28:2893-2904 (2011)
13. Jiang, H. Xu, L & Gu, Z. Growth of novel epistatic interaction by gene duplication, *Genome Biol & Evol*, 3:295-301 (2011)
14. Xu, L. & Gu, Z. Asynchronous regulation of backup circuits as a strategy for survival in the fluctuating environments. *International Journal of Systems and Synthetic Biology*, 1: 227-239 (2010)
15. K.T. Nishant , Wei, W., Mancera, E., Argueso, J.L., Schlattl, A., Delhomme,

N., Ma, X., Bustamante, C., Korbel, J., [Gu, Z.](#), Steinmetz, L., Alani, E. The baker's yeast diploid genome is remarkably stable in vegetative growth and meiosis, *PLoS Genetics* 6(9): e1001109 (2010)

16. Zanders, S., Ma, X., RoyChoudhury, A., Hernandez, R., Demogines, A., Barker, B., Indap, A., [Gu, Z.](#), Bustamante, C., & Alani, E. Detection of heterozygous mutations in the genome of mismatch repair defective diploid yeast using a Bayesian approach. *Genetics* 186:493-503 (2010)

17. Jiang, H., Guan, W. & [Gu, Z.](#) Tinkering evolution of a posttranscriptional RNA regulon by Puf3p in yeast. *PLoS Genetics* 6(7): e1001030 (2010)

18. Guan, W., Jiang, H., Xu, L., Li, Y., Steinmetz, L.M., Li, Y. & [Gu, Z.](#) Antagonistic changes in sensitivity to antifungal drugs by functional loss of an important ABC transporter gene. *PLoS ONE* 5(6): e11309 (2010)

19. Li, Y., Liang, H., [Gu, Z.](#), Lin, Z., Guan, L., Zhou, L., Li, Y. & Li, W.-H. Detecting positive selection in the budding yeast genome, *J. Evol. Bio.* 22:2430-2437 (2009)

20. [Gu, Z.](#) & Oliver, S.G. Yeasts as models in evolutionary biology. *Genome Biology* 10:304 (2009)

21. Xu, L., Su, Z. [Gu, Z.](#) & Gu, X. Parallel adaptation vs. mutation hotspot for the evolution of RNases in leaf monkeys. *Mol. Phyl. & Evol.* 50:397-400 (2009)

22. Jiang, H., Wang, W. & [Gu, Z.](#) Genetic diversities detected by translational efficiency between *Ashbya gossypii* and yeasts. *BMC Evol Biol.* 8:343 (2008)

23. Chen, H., Xu, L. & [Gu, Z.](#) Regulation dynamics of the WGD genes during the yeast metabolic oscillation. *Mol. Biol. & Evol* 25:2513-2516 (2008)

24. Jiang, H, Guan, W., Pinney, D., Wang, W. & [Gu, Z.](#) Functional relaxation of mitochondria after WGD in yeast. *Genome Res.* 18:1466-1471 (2008)