

Zhijian Jake Tu

Professor

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EDUCATION

B.S. in Physiology and Biophysics, 1984-88, Peking University, Beijing, China

B.S. in Law (Second Degree), 1984-88, Peking University, Beijing, China

Ph.D., 1989-94, Department of Entomology, University of Arizona, Tucson, AZ

PERSONEL STATEMENT

My laboratory employs systems biology or functional genomics approaches to study the basic biology of sex-determination and embryonic development in mosquitoes. On the basis of such fundamental information, we are developing novel genetic applications to control mosquito-borne infectious diseases. Such applications include a synthetic gene drive system for efficient and safe spread of refractory genes in mosquito populations and genetic manipulation of mosquito sex ratios and fertility. We have experience with transgenic *Aedes* and *Anopheles* mosquitoes and next-generation sequencing of RNA and genomic samples. We have recently developed novel genomic and bioinformatics approaches to study *Anopheles* Y chromosome genes. We have recently discovered a male-determining factor in *Aedes aegypti*. We have also clearly demonstrated complete dosage compensation in *An. stephensi* by RNA-seq analysis of genes on different chromosomes of both sexes. Our research has the potential to bridge a major gap in our understanding of mosquito biology and lead to novel control strategies based on manipulation of mosquito sex ratios and fertility.

RECENT PEER-REVIEWED SCIENTIFIC JOURNAL ARTICLES

1. Hall A. B., Papathanos PA, Sharma A, Cheng C, Akbari OS, Assour L, Bergman NH, Cagnetti A, Crisanti A, Dottorini T, Fiorentini E, Galizi R, Hnath J, Jiang X, Koren S, Nolan T, Radune D, Sharakhova MV, Steele A, Timoshevskiy VA, Windbichler N, Zhang S, Hahn MW, Phillippy AM, Emrich SJ, Sharakhov IV*, Tu Z*, Besansky NJ*. 2016. Radical remodeling of the Y chromosome in a recent radiation of malaria mosquitoes. **Proc Natl Acad Sci U S A**. pii: 201525164. *Co-corresponding authors.
2. Adelman, Z. and Tu, Z. 2016. Control of mosquito-borne infectious diseases: sex and gene drive. **Trends in Parasitology**, 32, 219-229
3. Gulia-Nuss, M. *et al.*, 2016. Genomic insights into the parasitic vector of Lyme disease, *Ixodes scapularis*. **Nature Communications**, 7, article 10507.
4. Mesquita, R. D. *et al.*, 2015. Genome of *Rhodnius prolixus*, an insect vector of Chagas disease, reveals unique adaptations to hematophagy and parasite infection. **Proc Natl Acad Sci U S A**. 112, 14936-14941.
5. Hall, A. B., Basu, S. Jiang, X., Qi, Y., Timoshevskiy, V. A., Biedler, J. K., Sharakhova, M. V., Elahi, R., Anderson, M. A. E., Chen, X., Sharakhov, I. V., Adelman, Z. N., and Tu, Z. 2015. A male determining factor in the mosquito *Aedes aegypti*. **Science** 348, 1268-70.
6. Jiang X, Biedler JK, Qi Y, Hall AB, and Tu Z. 2015. Complete dosage compensation in *Anopheles stephensi* and the evolution of sex-biased genes in mosquitoes. **Genome Biol Evol.** 7, 1914-24.
7. Neafsey, D., Waterhouse, R., Hall, A.B., Jiang, X., ...Sharakhov, I.V., Tu, Z., Zwiebel, L. and Besansky, N. 2015. Highly evolvable malaria vectors: The genomes of 16 *Anopheles* mosquitoes. **Science**, 347, 1258522.

