Weigang Qiu, Professor of Biology

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Education:

- B.Sc. 1986, Biochemistry, Fudan University, China
- Ph.D. 1999, Ecology and Evolution, State University of New York at Stony Brook (with Dr

Dan Dykhuizen)
- Postdoc. 2002, Bioinformatics, University of Maryland Biotechnology Institute (with Dr Arlin Stoltzfus)

Research Interests:

- **Biological Questions.** I am interested in the **population genomics** of microbial species. The main focus of my lab is the comparative analysis of multiple genomes of the **Lyme disease pathogen**. The goals of my research include reconstructing the **history of worldwide diversification** of the Lyme disease bacteria, an understanding of the mechanisms of their genome evolution (e.g., **the roles of recombination and natural selection**), and inference of **gene and genome functions**.

- **My Research Approach** is **bioinformatics**, and more specifically, the computational and statistical testing of evolutionary hypotheses. Students learn and use modern computational tools such as relational database/SQL, Perl/BioPerl, and statistical computing with R.

Teaching and Curricular Development:

- BIOL 375. Molecular Evolution [Fall 2012 Syllabus]
- BIOL 425. Computational Molecular Biology [Spring 12 Syllabus]
- BIOL 470. Bioinformatics Summer Workshop [2010 Syllabus]
- BIOL 230. Microbiology [Latest Syllabus]
- The QuBi Project : Curricular Improvement in Quantitative Biology

Bioinformatics Tools:

- Borrelia Ortholog Retriever: Obtain ortholog alignments from 23 Borrelia spp genomes. Search by gene names and IDs.[Web Link]
- SimBac: A package for simulating bacterial genome evolution [Hosted by SourceForge]

- DNATweezer: A Perl wrapper of the BioPerl modules [Hosted by SourceForge]
- The Bio::Align::Graphics module [Perl Doc] [Code]

Recent Publications (2008-2012; Lab Members in Bold):

- See my Google Scholar Profile for a full publication list & citation statistics
- Casjens SR, Mongodin EF, **Qiu W-G**, Luft BJ, Schutzer SE, Eddie B. Gilcrease, Wai Mun Huang, Marija Vujadinovic, John K. Aron, **Levy C. Vargas** , **S am Freeman** , Diana Radune, Janice F. Weidman, George I. Dimitrov, Hoda M. Khouri, Julia E. Sosa, Rebecca A. Halpin, John J. Dunn, Claire M. Fraser. (2012) Genome Stability of Lyme Disease Spirochetes: Comparative Genomics of *Borrelia burgdorferi* Plasmids. PLoS ONE 7(3): e33280. doi:10.1371/journal.pone.0033280

- Schutzer SE, Fraser-Liggett CM, **Qiu WG**, Kraiczy P, Mongodin EF, Dunn JJ, Luft BJ, Casjens SR (2012). Whole-Genome Sequences of *Borrelia bissettii* , *Borrelia valaisiana* , and *Borrelia spielmanii* . Journal of Bacteriology 194: 545-546.

- **Haven J**, **Vargas LC**, Mongodin EF, **Xue V**, **Hernandez Y**, **Pagan P**, Fraser-Liggett CM, Schutzer SE, Luft BJ, Casjens SR,
Qiu WG.
(2011). Pervasive Recombination and Sympatric Genome Diversification Driven by Frequency-Dependent Selection in
Borrelia burgdorferi
, the Lyme disease Bacterium. Genetics. 189:951-966.

- Chavadi SS, Stirrett KL, Edupuganti UR, Vergnolle O, Sadhanandan G, Marchiano E, **Mar tin C**
,
Qiu WG
, Soll CE, Quadri LE. (2011). Mutational and phylogenetic analyses of the mycobacterial
mbt
gene cluster. J Bacteriol. 2011 Aug 26.

- **Weigang Qiu.** (2011). A Review of *Lyme Disease: The Ecology of a Complex System* by Richard S. Ostfeld. The Quarterly Review of Biology 86 (3): 241.

- Xie XF, **WG Qiu**, PN Liple. 2011. Accelerated and adaptive evolution of yeast sexual adhesins. Mol. Biol. Evol. 28 (11): 3127-37.
- Sherwood R. Casjens, Claire M. Fraser-Liggett, Emmanuel F. Mongodin, **Wei-Gang Qiu**,J ohn J. Dunn, Benjamin J. Luft, and Steven E. Schutzer. (2011). Whole Genome Sequence of an Unusual
Borrelia burgdorferi Sensu Lato
Isolate. J. Bacteriology. 193:1489-1490.

- Schutzer, SE; Fraser-Liggett, CM; Casjens, SR; **Qiu, WG**; Dunn, JJ; Mongodin EF; Luft, BJ. (2011). Whole-Genome Sequences of Thirteen Isolates of
Borrelia burgdorferi.
J. Bacteriology. 193:1018-1020.

- Wywial E, **Haven J**, Casjens SR, **Hernandez YA**, Singh S, Mongodin EF, Fraser-Liggett CM, Luft BJ, Schutzer SE, **Qiu WG**.
(2009). Fast, adaptive evolution at a bacterial host-resistance locus: The PFam54 gene array in
Borrelia burgdorferi
. Gene. 445:26-37.

- Tran D, **Haven J**, **Qiu WG**, Polle JE. (2009). An update on carotenoid biosynthesis in algae: phylogenetic evidence for the existence of two classes of phytoene synthase. Planta. 229(3):723-9.
- Arva NC, Talbott KE, Okoro DR, Brekman A, **Qiu WG**, Bargonetti J. (2008). Disruption of the p53-Mdm2 complex by Nutlin-3 reveals different cancer cell phenotypes. Ethnicity and Disease. 18(S2):1-8.
- Qiu, WG; Bruno, JF; McCaig, WD; Xu, Y.; Livey, I.; Schriefer, ME; Luft, BJ. 2008. Wide distribution of a high-virulence borrelia burgdorferi clone in Europe and North America.

Emerging Infectious Diseases. 14(7):1097-1104. [Open Access] **Qiu, WG**; Bruno, JF; McCaig, WD; Xu, Y.; Livey, I.; Schriefer, ME; Luft, BJ. (2008). Wide distribution of a high-virulence
Borrelia burgdorferi
clone in Europe and North America. Emerging Infectious Diseases. 14(7):1097-1104. [Open Access]

- Otoo HN; Lee KG; **Qiu WG**; Lipke PN. (2008). *Candia albicans* Als adhesins have conserved amyloid-forming sequences. Eukaryotic Cell. 7 (5):776-82.