Department of Molecular Genetics and Microbiology
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Yi-Shan Chen

SKILLS AND TRAINING

Protein biochemist with 10 years of working experience in biochemistry and molecular biology.

- Experienced in systematic approaches including next generation sequencing (NGS) for single-nucleotide polymorphism (SNP) identification in bacteria, gene expression profiling (microarray) of mammalian cells upon pathogen infection, and protein interactome mapping (proteomics).
- Developed PCR assays for SNP screening and immunoprecipitation-coupled mass spectrometry (IP/MS) protocols for mapping protein-protein interactions with the Duke Proteomics Facility.
- Proficient in protein-based techniques, including protein expression & purification (affinity and native), column chromatography (FPLC), western blot, protein pull down, and immunoprecipitation. Generated ~10 antibodies from rabbits that recognize target proteins with high specificity.
- Extensive hands-on experience in molecular biology techniques, including DNA/RNA extraction/isolation, Gateway/traditional cloning, and site-directed mutagenesis.
- Hands-on experience in analytical methods such as HPLC, flow cytometry (FACS), and qRT-PCR.
- Skilled in several cell-based functional assays, such as cell culture, siRNA/shRNA knock-down, microscopy, and cell line development.

EDUCATION

PhD, Biochemistry Duke University, Durham, NC *2014*

- Thesis: Type III Secretion Chaperones in *Chlamydia trachomatis:* Identification of a New Effector Protein and Insights into Hierarchical Protein Secretion During Early Infection.
- Advisor: Raphael Valdivia, Ph.D.

MS, Biochemistry and Molecular Biology National Yang-Ming University, Taiwan *2006*

BS, Biological Science and Technology National Chiao-Tung University, Taiwan *2004*

RESEARCH EXPERIENCE

Postdoctoral Associate, Duke University, *Chlamydia* Pathogenesis Lab *2014-present*
Principal Investigator: Raphael Valdivia, Ph.D.

- Applied systematic approaches to identify host interacting partners of a *Chlamydia* virulence protein.

Ph.D. Research Assistant, Duke University, *Chlamydia* Pathogenesis Lab *2007-2014*

- Leveraged multiple biochemical and genetic approaches in bacterial and mammalian cell systems that led to the discovery of a novel virulence protein secreted into host cells during *Chlamydia* infection.
- Designed and conducted high-throughput screening, including bacterial- and yeast-two-hybrid to identify host-pathogen protein-protein interactions.
- Established collaborations with the Duke Proteomics Facility and Division of Laboratory Animal Resources for protein interactome mapping in *Chlamydia* and customized antibody production.
- Performed functional transcriptome analysis with the Duke Microarray Facility to determine the effect of a chlamydial protein on host gene expression.
- Conducted interdisciplinary research with a crystallography/NMR lab at Duke to investigate the interaction of a bacterial chaperone protein and its cargos.
- Proven interpersonal communication skills by building multi-lab/core facility collaborations among scientists with various types of expertise and co-authorship publications in five peer-reviewed journals.
- Demonstrated leadership in mentoring several graduate and undergraduate students on biochemical and high-throughput protein interaction studies.

Research Assistant, National Taiwan University, Toxicology Lab *2007*
Principal Investigator: Jaw-Jou Kang, Ph.D.

- Identified several biomarkers associated with exposure to toxic aromatic amines in hair dye products in mammalian cells using flow cytometry.

Master Research Assistant, Academia Sinica, Biotechnology Lab *2004-2006*
Principal Investigator: Jei-Fu Shaw, Ph.D.

- Identified, characterized, and optimized a bacterial enzyme (trehalose synthase) that led to a US patent for the industrial production of trehalose, a carbohydrate used as a food additive and with potential medical applications.
- Designed proline substitution mutants that resulted in a 40% increase in enzyme thermostability and a 30 % increase in activity.

PATENT

- Shaw, Jei-Fu, Lee, Guan-Chiun, **Chen, Yi-Shan**, Novel trehalose synthase from *Picrophilus torridus* and methods of use thereof. United States, Academia Sinica, 20080182311, 2008

PUBLICATIONS

Chen YS, Bastidas RJ, Saka HA, Carpenter VK, Richards KL, Plano GV, Valdivia RH. The *Chlamydia* Type III secretion chaperone Slc1 engages multiple early effectors, including TEPP, a tyrosine-phosphorylated protein required for the recruitment of CrkI-II to nascent inclusions. *Plos Pathog*. 2014; 10(2):e1003954

Saka HA, Thompson JW, **Chen YS**, Kumar Y, Dubois LG, Moseley MA, Valdivia RH. Quantitative proteomics reveals metabolic and pathogenic properties of *Chlamydia trachomatis* developmental forms. *Mol Microbiol*. 2011; 82(5):1185-203

Chou HH, Chang SW, Lee GC, **Chen YS**, Yeha T, Akohe CC, Shaw JF. Site-directed mutagenesis improves the thermostability of a recombinant *Picrophilus torridus* trehalose synthase and efficiency for the production of trehalose from sweet potato starch. *Food Chemistry* 2010; 119(3): 1017–1022

Spaeth KE, **Chen YS**, Valdivia RH. The *Chlamydia* type III secretion system C-ring engages a chaperone-effector protein complex. *PLoS Pathog*. 2009; 5(9):e1000579

Chen YS, Lee GC, Shaw JF. Gene cloning, expression, and biochemical characterization of a recombinant trehalose synthase from *Picrophilus torridus* in *Escherichia coli. J. Agric. Food Chem.* 2006; 54(19): 7098-104

HONORS AND AWARDS

- Selected speaker at American Society for Cell Biology (ASCB) Conference, New Orleans, LA *2013*
- Chairman's Travel Award - Molecular Genetics & Microbiology Dept., Duke University *2013*
- Best Poster Presentation - Federation of American Societies for Experimental Biology (FASEB) Conference, Snowmass, CO *2013*
- Best Oral Presentation - Molecular Genetics & Microbiology Dept. retreat *2012*
- Academic Achievement Award - National Yang-Ming University, top 5 percentile *2004-2005*
- Scholarship for Student Exchange Program - Australian National University, 10,000 USD *2004*
- Academic Achievement Award - National Chiao-Tung University, top 5 percentile *2000-2003*

ACTIVITIES

- Organizer of the Duke University volleyball club team. *2009-present*
- Activities coordinator for the Duke University Taiwanese Student Association. *2007-2008*