

Tracy Young
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Curriculum Vitae

Tracy A. Young, Ph.D.
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PROFESSIONAL PROFILE

- Successful at achieving consistent progress on multiple aspects of complex projects
- Developed skills important for scientific communication in a team environment by working as a student, teacher and collaborator
- Cloning: from genomes, from plasmids, mutagenesis, construction of chimeric and fusion genes
- Protein expression and purification (ÄKTA FPLC and low-pressure systems)
- Biophysical characterization of proteins (Circular dichroism spectroscopy, stopped-flow, and fluorescence)

EDUCATIONAL HIGHLIGHTS

University of California, Berkeley. Ph.D. in Molecular and Cell Biology, 2002-2008

- Thesis entitled "Comparison of proteolytic susceptibility in phosphoglycerate kinases from yeast and *E. coli*: modulation of conformational ensembles without altering structure or stability". The laboratory of Dr. Susan Marqusee.
- Construction of a light-modulated allosteric protein-folding switch. The laboratory of Dr. Susan Marqusee.

University of California, Los Angeles. B.S. in Molecular, Cell and Developmental Biology, 1995-1999

RESEARCH EXPERIENCE

Senior Research Biologist, June 2008-Present Sirna Therapeutics (Merck Research Labs), San Francisco, CA

- Lead biochemist at Sirna Therapeutics - specializing in RNAi induced silencing complex (RISC) biochemistry
- Management of a scientific research associate

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- Developed *in vitro* assays to aid in the prediction of *in vivo* behaviors of chemically modified siRNAs
- Utilized immunoprecipitation, tissue culture and RT-PCR to discover competition rules for protein binding among different sets of siRNAs
- Use of liquid handling robotics to build 96-well and 384-well plates for high-throughput screening of siRNA/protein binding affinities
- Trained in LC/MS for analysis of exogenously introduced molecules in the liver – metabolite identification, determination of active metabolites and immunoprecipitation of protein from the liver for identification of bound molecules
- LC/MS assay/method development
- Protein purification for binding assays with an ÄKTA FPLC - sole user and go-to person for protein purification.

Thesis Researcher, April 2003-May 2008
Prof. Susan Marqusee, University of California, Berkeley, CA

- Employed molecular biology, biochemistry, structural biology and biophysical techniques to investigate the differences in domain cooperativity, stability, and unfolding rates and behaviors among homologous phosphoglycerate kinases.
- Engineered fusion proteins that exhibit tractable, mutually exclusive folding behavior, allowing for complete control of activity.
- Performed gene cloning, mutagenesis, protein expression and protein purification with an ÄKTA FPLC.
- Analyzed protein stability, unfolding rate and secondary structure by circular dichroism spectroscopy.
- Solved an X-ray crystallographic structure: grew crystals and took X-ray diffraction data at the Advanced Light Source at the Lawrence Berkeley National Lab. Built a model of the protein using O.
- Determined differences in protein dynamics by proteolysis, a new technique developed in the lab.
- Knocked out a lethal gene in yeast for phenotype rescue with designed chimeric proteins.
- Trained users, diagnosed problems and made repairs on the circular dichroism spectrometer.
- Trained users, diagnosed problems and made repairs on the ÄKTA FPLC.
- Worked with mass spectroscopy researchers to determine purity and molecular weight of purified proteins.

Biotech Intern, July 2007-October 2007
Amyris Biotechnologies, Emeryville, CA

- Worked as a member of a metabolic engineering team employing synthetic biology to produce artemisinic acid in yeast.

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- Designed and constructed protein mutants and screened them for increased activity *in vivo*.
- Processed and analyzed cell samples for specific chemical products by HPLC.

Staff Research Associate I, March 2001-Janurary 2003
Prof. Tom Alber, University of California Berkeley, CA

- Began the *M. tuberculosis* Ser/Thr protein kinase project that is now the main focus of the lab.
- Employed molecular biology, biochemistry, and structural biology techniques to study the structures and functions of the nine transmembrane Ser/Thr protein kinases in *M. tuberculosis*.
- Performed gene cloning, domain determination, protein expression and protein purification
- Solved an X-ray crystallographic structure: grew crystals and took X-ray diffraction data at the Advanced Light Source at the Lawrence Berkeley National Lab. Built a model of the protein using O.
- Assayed Ser/Thr protein kinase activity.
- Trained graduate rotation students to take over different aspects of the project.
- Trained users, diagnosed problems and made repairs on the ÄKTA FPLC.
- Worked to keep the lab stocked with all research materials and buffers needed to conduct all experiments.

Laboratory Technician, January 2000-March 2001
Dr. David Haake, Department of Veterans Affairs, VA Medical Center, Los Angeles, CA

- Performed Western blots, Southern blots, gene cloning, hamster inoculations and dissections to discover virulence factors in pathogenic *Leptospira* species.
- Worked to keep the lab stocked with all research materials and buffers needed to conduct all experiments.

Undergraduate Independent Researcher, September 1999-December 1999
Prof. Harumi Kasamatsu, University of California, Los Angeles, CA

- Performed gene cloning to separate two overlapping genes to study the assembly of capsid proteins in the structurally simple virus, SV40.

Undergraduate Researcher, September 1997-December 1999
Prof. Jeanne Perry, University of California, Los Angeles, CA

- Employed gene cloning, protein expression and purification in an on campus facility specializing in these techniques.

TEACHING EXPERIENCE

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Graduate Student Instructor, Spring 2005

University of California, Berkeley, CA

MCB 110: General Biochemistry and Molecular Biology

Led a one-hour discussion twice a week. Prepared short summary lectures, composed questions to discuss in class, wrote quizzes, and edited, administered and graded exams.

Graduate Student Instructor, Fall 2003

University of California, Berkeley, CA

MCB 102: Survey of the Principles of Biochemistry and Molecular Biology

Led a one-hour discussion twice a week. Prepared short summary lectures, composed questions to discuss in class, wrote quizzes, and edited, administered and graded exams.

Undergraduate Teaching Assistant, Spring and Fall 1999

University of California, Los Angeles, CA

MCDB 104: Cell and Molecular Biology Laboratory

Set up and demonstrated experiments, graded presentations, administered and graded exams.

PUBLICATIONS

Strapps, W.R., Pickering V., **Young, T.A.**, Burchard, J., Anton, K., Coehlo, D., Pasutti, W., Buehler, E., Pei, Y., Barnett, S.F., Flanagan, W.M., Sachs, A.B., Bartz, S.R. Inverted abasic caps on the 5' terminus of a siRNA strand reduces off-target activity and decreases Ago2 binding. (Manuscript submitted)

Kenski, D.M., Cooper, A.J., Li, J.J., Willingham, A.T., Haringsma, H.J., **Young, T.A.**, Kuklin, N.A., Jones, J.J., Cancilla, M.T., McMasters, D.R., Mathur, M., Sachs, A.B., Flanagan, W.M. Analysis of acyclic nucleoside modifications in siRNAs finds sensitivity and position 1 that is restored by 5'-terminal phosphorylation both in vitro and in vivo. *Nucleic Acids Res.* (2010) **38**(2):660-71.

Young, T.A., Skordalakes, E. and Marqusee, S. Comparison of proteolytic susceptibility in phosphoglycerate kinases from yeast and *E. coli*: modulation of conformational ensembles without altering structure or stability. *J. Mol. Biol.* (2007) **368**(5):1438-47.

Good, M.C., Greenstein, A.E., **Young, T.A.**, Ng, H.L. and Alber, T.A. Sensor domain of the Mycobacterium tuberculosis receptor Ser/Thr protein kinase, PknD, forms a highly symmetric beta propeller. *J. Mol. Biol.* (2004) **339**(2):459-69.

Young, T.A., Delagoutte, B, Endrizzi, J.A., Falick, A.M. and Alber, T.A. Structure of Mycobacterium tuberculosis PknB supports a universal activation mechanism for Ser/Thr protein kinases. *Nat. Struct. Biol.* (2003) **10**(3):168-74.

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Matsunaga, J., Barocchi, M.A., Croda, J., **Young, T.A.**, Sanchez, Y., Siqueira, I., Bolin, C.A., Reis, M.G., Riley, L.W., Haake, D.A. and Ko, A.I. Pathogenic *Leptospira* species express surface-exposed proteins belonging to the bacterial immunoglobulin superfamily. *Mol. Microbiol.* (2003) **49**(4):929-45.

Matsunaga, J., **Young, T.A.**, Barnett, J.K., Barnett, D., Bolin, C.A. and Haake, D.A. Novel 45-kilodalton leptospiral protein that is processed to a 31-kilodalton growth-phase-regulated peripheral membrane protein. *Infect. Immun.* (2002) **70**(1):323-34.

REFERENCES

Dr. Walter Strapps, Sirna Therapeutics (Merck Research Labs)
Prof. Susan Marqusee, UCB – thesis advisor
Prof. Tom Alber, UCB – thesis committee member
(Contact information available upon request.)