Robert Thomas Young

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EDUCATION

Rutgers University, New Brunswick NJ

Doctor of Philosophy, Chemistry & Chemical Biology — Oct 2022
Dissertation: *The Twists and Turns of DNA: The Importance of DNA Deformability and Local Features that Influence Genomic Structure and Function* (Advisor: Wilma K Olson)

Master of Science, Physics & Astronomy — Jan 2022
Thesis*: Structural Variation in Circular DNA Influenced by Nucleotide Sequence and Rotational Rigid Body Parameters* (Advisor: Wilma K Olson)

Master of Science, Computational Biology & Molecular Biophysics — Oct 2013
Thesis*: Investigating the characteristics of collagen in protein-protein interactions through NMR relaxation experiments and indirect ELISA binding assays* (Advisor: Jean Baum)

Appalachian State University, Boone NC

Bachelor of Science, Applied Physics- *Cum Laude* — Aug 2011
Minors: Mathematics; Biology; Chemistry

RESEARCH EXPERIENCES

Postdoctoral Research — Jan 2024 – Jun 2024
Dept. of Physics, Cleveland State University, Cleveland, OH (Remote) — Advisor: *Sebastian Sensale-Rodriguez*
Researched effects of external electric fields on circular DNA and DNA origami structures as influenced by sequence and structure utilizing all-atomic molecular dynamics simulations through NAMD3, Gaussian 09/16, and VMD

Dissertation Research — Jan 2015 – Aug 2022
Dept. of Chemistry & Chemical Biology, Rutgers University, New Brunswick, NJ — Advisor: *Wilma K. Olson*
Utilizing statistical mechanics, elastic polymer theory, and machine learning methods to produce and evaluate three-dimensional meso-scale DNA models with respect to various internal and external factors

- Studied the influence of purine-heavy sequences on elastically-optimized 150-bp circular DNA fragments
- Designed and studied the influence of linearizing and kinking proteins on lac repressor-bound DNA loops
- Constructed nucleosome-bearing minichromosomal circles to evaluate structural relationship between supercoiled-bound DNA and neighboring free DNA
- Developed and implemented an updated empirical elastic potential forcefield of both dimer and tetramer steps

Master's Research — Jan 2011 – Sep 2013
BioMaPS Institute & Dept of Chemistry& Chemical Biology, Rutgers University — Advisor: *Jean Baum*
Conducted biophysical studies of collagen peptides using solution NMR and indirect ELISA assays

RESEARCH & TECHNICAL SKILLS

Python, Linux, Terminal and Command Line, Anaconda, Jupyter, VMD, NAMD, emDNA, 3DNA, PyMol, Protein DataBank and Nucleic Acids KnowledgeBase, Visual Studio Code, High-Performance Computing, SLURM, Machine Learning [*NumPy*, *SciPy*, *Pandas*, *Scikit-Learn*, *Seaborn]*, Git, Gaussian 09/16, Tableau Public, Mathematica, C++, HTML, FORTRAN, SQL, Binder, MATLAB

PUBLICATIONS

2024

Yeboah IO, **Young RT**, Mosioma M, Sensale S. A mean-field theory for characterizing the closing rates of DNA origami hinges. *The Journal of Chemical Physics*, 161(7). https://doi.org/10.1063/5.0222446

Bishop TC, Thayer KM, **Young RT**. The Albany Conversations Are Now the Next Generation Conversations: Albany@Ruston. *Biophysical Reviews*. https://doi.org/10.1007/s12551-024-01215-4

Olson WK, **Young RT**, Czapla L. DNA Simulation Benchmarks Revealed with the Accumulation of High-resolution Structures. *Biophysical Reviews*. https://doi.org/10.1007/s12551-024-01198-2

Pekar K, **Young RT**, Sensale S. Optimizing Binding among Bimolecular Tethered Complexes. *Journal of Physical Chemistry*, 128 (22), 5506-12 https://doi.org/10.1021/acs.jpcb.4c01088

2022

Young RT, Czapla L, Wefers ZO, Cohen BM, Olson WK. Revisiting DNA Sequence-dependent Deformability in High-Resolution Structures: Effects of Flanking Base Pairs on Dinucleotide Morphology and Global Chain Configuration. *Life*, 12 (5), 759. https://doi.org/10.3390/life12050759

Young RT, Clauvelin N, Olson WK. emDNA – A Tool for Modeling Protein-decorated DNA Loops and Minicircles at the Base-pair Step Level. *Journal of Molecular Biology*. 167121 https://doi.org/10.1016/j.jmb.2022.167558

2021

Tse D, Becker NA, **Young RT**, Olson WK, Peters JP, Schwab TL, Clark JK, Maher III LJ. Designed architectural proteins that tune DNA looping in bacteria. *Nucleic Acids Research*. 48 (18), 10382-10396. https://doi.org/10.1093/nar/gkab759

Todolli S, **Young RT**, Watkins AS, Bu Sha A, Yager J, Olson WK. Surprising twists in nucleosomal DNA with implications for higher-order folding. *Journal of Molecular Biology*. 433 (18), 1-19. https://doi.org/10.1016/j.jmb.2021.167121

2014

Parmar AS, Zahid S, Belure SV, **Young RT**, Hassan N, Nanda V. Design of net-charged abc-type collagen heterotrimers. *Journal of Structural Biology*. 185, 163-7. https://doi.org/10.1016/j.jsb.2013.04.006

INVITED TALKS

Seminar. University of Texas- Dallas (Sep 2023)

Senior Seminar Lecture Series. University of North Carolina-Greensboro (Mar 2022)

Multiscale Genomics Organization Sub-Group Meeting. Biophysical Society (Nov 2021)

Senior Seminar Lecture Series. Appalachian State University (Feb 2021)

Undergraduate Seminar Lecture Series. University of Wisconsin- La Crosse (Feb 2021)

Physical Chemistry Seminar Series. Rutgers University (Nov 2020)

CONFERENCE PRESENTATIONS

Torsional Diversity in Nucleosome Core Particle Structures Influences the Folding of Closed DNA Minichromosomes. Poster, 13th European Biophysical Societies Association Congress. Vienna, Austria. 2021

Exploration of Configurational and Topological Properties of Minichromosomes using Elastic Energy Optimizations at the DNA Base-Pair Level. Poster, 64th Biophysical Society Annual Meeting. San Diego, CA. 2020

Effect of Tetrameric Base-Pair Context on the Sequence-Dependent Configurations of DNA Minicircles. Poster, 63rd Biophysical Society Annual Meeting. Baltimore, MD. 2019

Sequence Dependence Studies of a 336-BP DNA Circle of Various Topology Through Energy Minimization Calculations. Poster, Biophysical Society Thematic Meeting: Genomic Biophysics. Santa Cruz, CA. 2018

NOTEABLE GRADUATE COURSEWORK

Rutgers University

Biophysical Chemistry (CHE 537-538, Fall 2011 – Spring 2012)
Physics of Living Matter (PHY 567, Spring 2014)
Introduction to Bioinformatics (CBMB 617, Spring 2015)
Thermodynamics & Kinetics (CHE 541, Fall 2016)
Chemical Thermodynamics (CHE 525, Spring 2017)
Physical Applications of Computers (PHY 509, Spring 2018)
Advanced Topics in Statistical Mechanics and Biophysics (PHY 677, Fall 2018)

HONORS & AWARDS

2022 Excellence in Leadership & Teaching, School of Graduate Studies, Rutgers University
2022 Francis C. Van Dyke Research Award, Chemistry & Chemical Biology, Rutgers University
2020 Chemistry & Chemical Biology Service Award, Rutgers University
2019 Chemistry & Chemical Biology Travel Award, Rutgers University
2012 *Honorable Mention*, William Rieman Award for Outstanding Teaching Assistant, Chemistry & Chemical Biology, Rutgers University
2011 University Honors Graduate, Appalachian State University
2011 Syngenta Biochemistry Award, Appalachian State University
2010 J. William Byrd Outstanding Senior in Physics, Appalachian State University

TEACHING EXPERIENCE

2023 Assistant Clinical Professor- University of Maryland, College Park
First-Year Innovation & Research Experience FIRE 120, 198, 199,& 398
2013 – 2023 Recitation Instruction- Rutgers University
General Chemistry I, General Chemistry for Engineers I, General Chemistry II
2021 – 2022 Instructional Assistance- Data Science Boot Camp, The Erdös Institute
2021 – 2022 Workshop Instruction, Data Science Basics. Rutgers University Libraries
2021 – 2022 Technical Course Advisor, Chemistry & Chemical Biology. Rutgers University
Chemistry of Life, Elementary Organic Chemistry, Genomic
2015 – 2020 Course Content Producer, Cyberlearning Innovation & Research Center. Rutgers University
General Chemistry I, Honors General Chemistry I, General Chemistry II, Honors General Chemistry II
2011 – 2013 Laboratory Instruction, Chemistry & Chemical Biology. Rutgers University
2009 – 2011 Supplemental Instruction, *General Chemistry 2*. Appalachian State University

LEADERSHIP & SERVICE

2024 Planning Committee, 21st Albany Conversations of Biomolecular Structure & Dynamics, Louisiana Tech, June 2024
2023 *Student Engagement Committee Member* and *Summer Experiences Committee Member*, First-Year Innovation and Research Experience Program, University of Maryland
2020 – 2021 *Coordinator*, Rutgers Chemistry Graduate Writing Center, Rutgers University
2020 – 2021 *Coordinator*, Rutgers Chemistry Graduate Seminar Series, Rutgers University
2019 – 2020 *Fellow*, Pre-Doctoral Leadership Development Academy, Rutgers University
2019 – 2020 *Director of Academic Development*, Rutgers University Graduate Student Association
2013 – 2014 *Graduate Advisor*, RU-STEPed Up for Success, Rutgers University

2012 – 2013 *Fellow*, Rutgers Academy for the Scholarship of Teaching and Learning, Rutgers University

SOCIETY MEMBERSHIPS

Biophysical Society (2017 – 2024)
American Physical Society (2021 – 2024)