

Yerdos Ordabayev

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Education

2012 – 2019 **Washington University School of Medicine, St. Louis, MO**
Ph.D., Computational & Molecular Biophysics Program

2007 – 2012 **Moscow State University, Moscow, Russia**
B.S. and M.S., Chemistry/Bioorganic Chemistry

Research Experience

2022 – Present **Machine Learning Scientist II**
Broad Institute of MIT and Harvard, Cambridge, MA

- Developing machine learning models for cell annotation service based on gene expression profile.

2020 – Present **Contributor to an open-source project Pyro**
Pyro probabilistic programming language (<https://pyro.ai>)

- Developed a parallel variable elimination algorithm for dynamic factor graphs and provided language level support for parallel-scan inference in Pyro.
- Implemented the provenance tracking based stochastic ELBO gradient estimator that uses fine-grained conditional dependency information for variance reduction.

2019 – 2022 **Postdoctoral Associate**, Advisors: Profs. Jeff Gelles and Douglas Theobald
Brandeis University, Waltham, MA

- Developed Bayesian statistical models for analysis of single-molecule colocalization fluorescence image data (<https://tapqir.readthedocs.io>).

2013 – 2019 **Graduate Student Researcher**, Advisor: Prof. Timothy M. Lohman
Washington University School of Medicine, St. Louis, MO
Thesis title: Mechanism of Activation of UvrD Helicase by a Processivity Factor MutL

- Dissertation project focused on determining the regulatory role of MutL protein on the UvrD helicase in *E. coli* methyl-directed mismatch DNA repair. I showed that a single MutL dimer can activate latent UvrD monomer helicase activity which involves closing of UvrD 2B sub-domain and that MutL acts as a processivity factor.

2008 – 2012 **Undergraduate Researcher**, Advisor: Prof. Olga Dontsova
Moscow State University, Moscow, Russia

- Chemical and enzymatic footprinting of 30S ribosome–RsmD methyl-transferase complex.

Publications

1. **Ordabayev YA**, Friedman LJ, Gelles J, Theobald DL. Bayesian machine learning analysis of single-molecule fluorescence colocalization images. *eLife*, 2022. DOI: 10.7554/eLife.73860
2. **Ordabayev YA**, Nguyen B, Kozlov AG, Jia H, Lohman TM. UvrD Helicase Activation by MutL Involves Closing of its 2B sub-domain. *PNAS*, 2019; 116: 16320-16325. DOI: 10.1073/pnas.1905513116
3. **Ordabayev YA**, Nguyen B, Niedziela-Majka A, Lohman TM. Regulation of UvrD helicase activity by MutL. *J. Mol. Biol.*, 2018; 430: 4260-4274. DOI: 10.1016/j.jmb.2018.08.022
4. Nguyen B, **Ordabayev Y**, Sokoloski JE, Weiland E, Lohman TM. Large domain movements upon UvrD dimerization and helicase activation. *PNAS*, 2017; 114: 12178-12183. DOI: 10.1073/pnas.1712882114
5. Petrova V, Chen SH, Molzberger ET, Tomko E, Chitteni-Pattu S, Jia H, **Ordabayev Y**, Lohman TM, Cox MM. Active displacement of RecA filaments by UvrD translocase activity. *Nucl. Acids Res.*, 2015; 43: 4133-49. DOI: 10.1093/nar/gkv186
6. Sergeeva OV, Prokhorova IV, **Ordabaev Y**, Tsvetkov PO, Sergiev PV, Bogdanov AA, Makarov AA, Dontsova OA. Properties of small rRNA methyltransferase RsmD: mutational and kinetic study. *RNA*, 2012; 18: 1178-85. DOI: 10.1261/rna.032763.112

Oral & Poster Presentations

1. “*Bayesian classification and modeling of single-molecule fluorescence colocalization images*” (Poster). “Single Molecule Approaches to Biology” Gordon Research Conference. July 2022, Castelldefels, Spain.
2. “*Parallel Variable Elimination in Dynamic Factor Graphs*” (Poster). International Conference on Probabilistic Programming (PROBPROG). October 2021, Online.
3. “*Bayesian classification and modeling of single-molecule fluorescence colocalization images*” (Poster). Biophysical Society Meeting. February 2021, Online.
4. “*Bayesian classification and modeling of single-molecule fluorescence images using Pyro*” (Poster). International Conference on Probabilistic Programming (PROBPROG). October 2020, Online.
5. “*Activation of UvrD helicase by a processivity factor MutL*” (Oral). Gibbs Conference on Biological Thermodynamics. October 2018, Carbondale, IL. ***selected speaker from abstracts**
6. “*Regulation of UvrD helicase activity by MutL*” (Oral). Midwest Single Molecule Workshop. July 2018, Ames, IA. ***selected speaker from abstracts**
7. “*Regulation of UvrD helicase activity by MutL*” (Poster). Biophysical Society Meeting. February 2018, San Francisco, CA.
8. “*Regulation of UvrD helicase activity through interaction with MutL*” (Poster). Biochemistry, Biophysics and Structural Biology Program Retreat. October 2017, St. Louis, MO. ***awarded best graduate student poster**
9. “*Investigating resistance of bacteria to erythromycin using molecular dynamics simulations*” (Oral). International scientific conference of students and young scientists “Lomonosov”. April 2011, Moscow, Russia.

Awards and Honors

- 2017 *Best graduate student poster*, Biochemistry, Biophysics and Structural Biology Program Retreat, St. Louis, MO.
- 2007 – 2012 *Full Tuition Academic Scholarship*, Moscow State University, Moscow, Russia.
- 2007 *Silver Medal*, 39th International Chemistry Olympiad, Moscow, Russia.
- 2007 *Silver Medal*, 41st International Mendeleev Chemistry Olympiad, Minsk, Belarus.
- 2007 *Bronze Medal*, National High School Chemistry Olympiad, Kazakhstan.

Teaching Experience

- 2013 Fall **Teaching Assistant**, “General Biochemistry” BIO 451
Department of Biology, Washington University in St. Louis, MO
- Led discussion group sessions
 - Graded midterm exams, final exam, and homework assignments

Professional Activities

- 2017 – 2021 Member of Biophysical Society
- 2014 Attended Summer School (Advanced Module: Single Molecule FRET) at the Center for the Physics of Living Cells, *UIUC, IL*

Technical Skills

- Computers Python, PyTorch, Pyro, machine learning, Linux