Curriculum Vitae, Erdal Toprak, Ph.D.

EDUCATION

- Ph.D., 2007, Biophysics and Computational Biology, University of Illinois at Urbana-Champaign, USA
- M.S., 2001, Physics, Bogazici University, Istanbul, Turkey
- B.S., 1998, Physics, Bogazici University, Istanbul, Turkey

Summer Schools

- 2006, Physiology Summer School, Marine Biology Lab, Woods Hole, MA

APPOINTMENTS

- 2014-Present: Assistant Professor, UT Southwestern Medical Center, Green Center for Systems Biology
- 2011-2014: Assistant Professor, Program for Biological Sciences and Bioengineering, Sabanci University
- 2008-2011: Postdoctoral Research Associate, Department of Systems Biology, Harvard Medical School
- 2007-2008: Postdoctoral Research Associate, Department of Physics, UIUC
- 2003-2007: Graduate Research Assistant, Department of Biophysics and Computational Biology, UIUC
- 1998-2003: Graduate Research Assistant, Department of Physics, Bogazici University

MEETING ORGANIZATION

- Co-organizer, "Stochastic Biology: from Cells to Populations", IST Austria, May 5-7, 2014

PROFESSIONAL ASSOCIATIONS

- Member of the Biophysical Society: **2004-2012**
- Member of the American Chemical Society: **2007-2009**

AWARDS and GRANTS

- Southwestern Medical Foundation Scholar in Biomedical Research, 2014-2019
- Human Frontiers Science Program Research Grant, 2013-2016
- The Young Scientists Award by the Turkish Academy of Sciences (TÜBA), 2013-2016
- EMBO Installation Grant, 2013-2018
- Marie Curie Career Integration Grant (CIG), 2012-2016.
- UIUC "Teachers Ranked Excellent by Their Students", 2007.
- Eugene Rabinowitch Graduate Fellowship, 2007.
- Physiology Summer School Fellowship, Marine Biology Laboratory, Woods Hole, MA, 2006.
- UIUC Graduate College Student Travel Award. 2006.

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Curriculum Vitae, Erdal Toprak, Ph.D.

TEACHING EXPERIENCE

- **Course Instructor**, BIO 580 Special Topics: Physiology of Bacteria and Bacterial Drug Resistance, Sabanci University, Fall 2012,Spring 2012, Fall 2013
- **Course Instructor**, NS 102 Nature of Science (Freshman Biology), Sabanci University, Spring 2012, Spring 2013, Spring 2014
- **Course Instructor**, BIO 466 Biophysics: Molecules and Systems, Sabanci University, Fall 2011, Spring 2013, Spring 2014
- **Teaching Assistant,** Biophysics 401, University of Illinois, Urbana-Champaign, Fall 2007
- **Teaching Assistant**, Physics 301 Mechanics, Bogazici University, Turkey, Fall 2001
- **Lab Instructor**, Physics 101&201, Bogazici University, Turkey, 2001-2003

PUBLICATIONS

1. Oz, T., Guvenek, A., Yildiz, S., Karaboga, E., Tamer, Y.T., Mumcuyan, N., Ozan, V.B., Senturk, G.H., Cokol, M., Yeh, P., **Toprak, E.***, "Selection strength contributes to the complexity of antibiotic resistance evolution", Molecular Biology and Evolution, doi: 10.1093/molbev/msu191, (Published online: June 24, 2014, *** corresponding author**).
2. B. Okumus, S. Yildiz, **E. Toprak*,** "*Fluidic and microfluidic tools for quantitative systems biology*", Current Opinion in Biotechnology, 2014, DOI: 10.1016/j.copbio.2013.08.016, *** corresponding author.**
3. A.C. Palmer, **E. Toprak,** S. Kim, A. Veres, S. Bershtein, R. Kishony, *"Delayed commitment to evolutionary fate in antibiotic resistance fitness landscapes",* (under review, **A.C.P. and E.T. contributed equally).**
4. **E. Toprak*,** A. Veres, S. Yildiz, J.M. Pedraza, R. Chait, J. Paulsson, R. Kishony*, *"Building a Morbidostat: An automated high-throughput fluidic system for studying bacterial drug resistance in dynamically sustained drug environments"*, Nature Protocols, 2013; doi:10.1038/nprot.2013.021, **E.T. and R.K. are corresponding authors).**
5. **E. Toprak**, A. Veres, J.B. Michel, R. Chait, D.L. Hartl, R. Kishony, "*Evolutionary paths to strong antibiotic resistance under dynamically sustained drug stress*", Nature Genetics, 2012.
6. **E. Toprak**, C. Kural, P. R. Selvin, "*Getting around the diffraction limit: Using single molecule microscopy for studying molecular motors*", Methods in Enzymology, 2010.
7. **E. Toprak**, A. Yildiz, M.T. Hoffman, S.S. Rosenfeld, P.R. Selvin, "*Why kinesin is so processive*", PNAS, 2009.
8. J. G. Reifenberger, **E. Toprak**, H. Kim, D. Safer, H.L. Sweeney, P.R. Selvin, "*Myosin VI undergoes a 180° Power stroke implying an uncoupling of the front lever arm*", PNAS, 2009, **(J.G.R. and E.T. contributed equally).**
9. **E. Toprak**, H. Balci, B.H. Blehm, P.R. Selvin, "*3D Particle Tracking via Bifocal Imaging*", Nano Letters, 2007.
10. **E. Toprak** and P.R. Selvin, "New Fluorescent Tools for Watching Nanometer-Scale Conformational Changes of Single Molecules", Annual Review of Biophysics and Biomolecular Structure, 2007.
11. H. Park, **E. Toprak**, P. R. Selvin, "Single-molecule fluorescence to study molecular motors", Quarterly Reviews of Biophysics, 2007.
12. P.R. Selvin, T. Lougheed, M.T. Hoffman, H. Park, H. Balci, B.H. Blehm, **E. Toprak,** "*In vitro* & *in vivo FIONA and other acronyms for watching molecular motors walk*", Single Molecules: A Laboratory Manual. Cold Spring Harbor Press. Edited by Selvin, P.R., Taekjip Ha, Univ. of Illinois, 2007.
13. J. Enderlein, **E. Toprak**, P. R. Selvin, "Polarization effect on position accuracy of fluorophore localization", Optics Express, 2006.

14. **E. Toprak**, J. Enderlein, S. Syed, S.A. McKinney, R.G. Petschek, T. Ha, Y.E. Goldman, P.R. Selvin, "Defocused Orientation and Position Imaging of Myosin V", PNAS, 2006.
15. **E. Toprak** and O.T. Turgut, "*Large N limit of SO(N) Scalar Gauge Theory*", Journal of Mathematical Physics, 2002.
16. **E. Toprak** and O.T. Turgut, "*Large N limit of SO(N) Gauge Theory of Fermions and Bosons*", Journal of Mathematical Physics, 2002

CONFERENCE PRESENTATIONS

1. **Erdal Toprak**, Roy Kishony, "Genomic evolutionary pathways to antibiotic resistance", Weizmann Institute, March 2011.
2. **Erdal Toprak**, Adrian Veres, Roy Kishony, "Strong Antibiotic Resistance Evolves Through a Deterministic Sequence of Stepwise Genetic Changes", NERCE meeting, November 2010.
3. **Erdal Toprak,** Steven S. Rosenfeld, and Paul R. Selvin. "Kinesin-1 waits for ATP with one head strongly bound to the microtubule", Biophysical Society Meeting, Long Beach, 2008.
4. Hamza Balci, Benjamin Blehm, **Erdal Toprak**, Vladimir Gelfand, Paul Selvin, "*In Vivo* Particle Tracking Using Fluorescence Microscopy and Optical Trapping", Biophysical Society Meeting, Baltimore, 2007.
5. Jeff Reifenberger, **Erdal Toprak**, Dan Safer, Sheyum Syed, Jörg Enderlein, Lee Sweeney, and Paul Selvin, "Simultaneous Defocused Orientation Imaging and Position Imaging of Myosin VI", Biophysical Society Meeting, 2007.
6. **Erdal Toprak**, Hamza Balci, Benjamin Blehm, Reifenberger, J., Selvin, P.R., "Simultaneous bifocal Imaging", Biophysical Society Meeting, 2007.
7. **Erdal Toprak**, Jörg Enderlein, Sheyum Syed, Sean A. McKinney, Rolfe G.Petschek, Taekjip Ha, Yale E. Goldman, Paul R. Selvin, "Lever Arm Dynamics of Myosin V", Biophysical Society Meeting, 2006.
8. Syed, S., Muellner, F., **Erdal Toprak**, Sigworth, F., Selvin, P.R., "New Algorithms for analysis of noisy single molecular motor data", Biophysical Society Meeting, 2006.
9. F.J. Sigworth, F. Muellner, **Erdal Toprak**, P.R. Selvin, "Hidden Markov Models for Molecular Motors", Biophysical Society Meeting, 2006.
10. **Erdal Toprak**, Jörg Enderlein, Sheyum Syed, Sean A. McKinney, Rolfe G.Petschek, Taekjip Ha, Yale E. Goldman, Paul R. Selvin, "Simultaneous Position and Orientation Analysis Using Focused and Defocused Image Analysis: Application to Quantum Dots and Myosin V", Biophysical Society Meeting, 2005.

SEMINARS AND INVITED TALKS

1. "Is Evolution of Antibiotic Resistance Predictable?", Instituto de Biología Molecular y Celular de Plantas,Valencia, Spain, November 21, 2013
2. "Stepwise evolution of antibiotic resistance", CRG Barcelona, Spain, November 20, 2013
3. Evolution of Antibiotic Resistance On A Six Dimensional Hypercube", IST Austria, October 23, 2013
4. "Revealing genetic pathways to antibiotic resistance", Bogazici University, Physics and Chemical Engineering Departments Joint Seminar, April 10, 2013
5. "Antibiyotik dirençli bakterilerle mücadele edilebilir mi?", Department of Physics, Marmara University, March 11, 2013 (in Turkish).
6. "Evolution of Antibiotic Resistance On A Six Dimensional Hypercube", Department of Industrial Engineering, Bogazici University, February 28, 2013.
7. "Following Evolution of Antibiotic Resistance (FEAR)", Science Seminar, Koc University, December 13, 2012.

8. "Bakterilerde antibiyotik direncine sebep olan genetik yollar nasıl bulunur?", Department of Physics, Akdeniz University, December 7, 2012 (in Turkish).
9. "Evolution of antibiotic resistance on a multi-peaked fitness landscape", Department of Molecular Biology and Genetics, Bogazici University, November 30, 2012.
10. "MORBIDOSTAT: How can we identify genetic trajectories leading to drug resistance using LEDs costing less than 1$?", 14th National Photonics Workshop, Koc University, September 2012 **(invited)**.
11. "Evolution of antibiotic resistance through a multi-peaked fitness landscape", University of Illinois at Urbana-Champaign Center for Living Cell, September 2012 **(invited)**.
12. "MORBIDOSTAT: A novel fluidic apparatus for studying bacterial drug resistance", 2nd International Workshop on Cleanroom Training, Bilkent University, June 2012 **(invited)**.
13. "Evolutionary trajectories to bacterial drug resistance", National Nanotechnology Research Center, Bilkent University, May 2012.
14. "Evolution of drug resistance on a maximally "rugged" fitness landscape", California Institute of Technology Division of Biology, February 2012.
15. "Optimal survival in an evolutionary maze", UT Southwestern Medical School Green Center for Systems Biology, February 2012.
16. "Strong Antibiotic Resistance Evolving Through an Ordered Sequence of Stepwise Genetic Changes", Istanbul Statistical Physics Days, 2011 **(invited)**.
17. "Studying Molecular Motors by Using Simultaneous Bifocal Imaging", ACS National Meeting Washington DC, 2009 **(invited)**.
18. "Kinesin waiting for ATP", ACS National Meeting Boston, 2007 **(invited)**.
19. "A Single Molecule Approach to Measure the Lever Arm Dynamics of Myosin V and Myosin VI". Bilkent University, 2007. Ankara, Turkey.
20. "Biophysical Tools to Study Molecular Motors". Bogazici University, July 16, 2007. Istanbul, Turkey.
21. "Single Molecule Techniques to Study Molecular Motors". Koc University, July 12, 2007. Istanbul, Turkey.
22. "Single Molecule Measurements of Molecular Motors, in vitro & in vivo", Third Annual Omaha Imaging Symposium 2006, Omaha, NE, Oct. 28, 2006 **(invited).**
23. "Lever Arm Dynamics of Myosin V with DOPI", Gordon Research Conference, Muscle Contractile Proteins, Colby Sawyer College, New London, NH, July 2005.

NEWS and HIGHLIGHTS

- **BBC episode covering our Morbidostat work** (http://www.bbc.co.uk/programmes/b01ms5c6)
- **Interview with Illumina iCommunity Newletter** (http://www.illumina.com/documents/icommunity/article_2012_07_Morbidostat.pdf)
- **Nature Genetics News and Views** (http://elowitz.caltech.edu/publications/Evolution%20in%20Real%20Time.pdf)
- **Genome Biology** (http://genomebiology.com/2012/13/1/140)
- **Science** (http://www.sciencemag.org/content/333/6049/1562.2.full.pdf)
- **Faculty 1000** (http://f1000.com/13445979)
- **Nature Press Release** (http://www.natureasia.com/en/highlights/details.php?id=1583)
- **Nature Medicine** (http://blogs.nature.com/spoonful/2011/12/welcome-to-the-morbidostat-researchers-watch-deadly-drug-resistance-in-action.html)
- **The Scientist** (http://the-scientist.com/2011/12/18/the-evolution-of-drug-resistance/)
- **PhysOrg** (http://www.physorg.com/news/2011-12-whole-genome-sequencing-evolution-drug-resistance.html)

- **New Scientist (**http://www.newscientist.com/article/mg21228443.300-stealth-tactics-of-bacteria-revealed.html)
- **Scientific American** (http://blogs.scientificamerican.com/lab-rat/2012/01/10/discrete-steps-to-antibiotic-resistance/?print=true)
- **Photonics,** (http://www.photonics.com/Article.aspx?AID=30400)
- **Photometrics**, (http://www.photometrics.com/resources/technotes/pdfs/3Dparticle-tracking.pdf)
- **Biophotonics International**, (http://people.physics.illinois.edu/Selvin/PRS/Biophotonics_Erdal.pdf)

REFERENCES

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