



Daniel Herschlag

Professor of Biochemistry and, by courtesy, of Chemical Engineering

CONTACT INFORMATION

- **Administrative Contact**

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Bio

BIO

The overarching goal of the Herschlag Lab is to understand the fundamental behavior of RNA and proteins and, in turn, how these behaviors determine and impact biology more broadly. We are particularly interested in questions of how enzymes work, how RNA folds, how proteins recognize RNA, and the roles of RNA/protein interactions in regulation and control, and the evolution of molecules and molecular interactions. The lab takes an interdisciplinary approach, spanning and integrating physics, chemistry and biology, and employing a wide range of techniques.

ACADEMIC APPOINTMENTS

- Professor, Biochemistry
- Professor (By courtesy), Chemical Engineering
- Member, Bio-X
- Faculty Fellow, Sarafan ChEM-H
- Member, Stanford Cancer Institute

ADMINISTRATIVE APPOINTMENTS

- Senior Associate Dean of Graduate Education and Postdoctoral Affairs, School of Medicine, (2011-2015)

HONORS AND AWARDS

- Member, American Academy of Arts and Sciences (2023)
- Stein and Moore Award, Protein Society (2022)
- Founders Award, Biophysical Society (2020)
- Excellence in Mentoring and Service Award, Stanford University Biosciences (2019)
- Member, National Academy of Sciences (2018)
- Student Service Faculty Award, Biochemistry, Stanford School of Medicine (2012)
- William Rose Award, ASBMB (2010)
- Fellow, AAAS (2005)

- Merit Award, NIH (2002)
- Cope Scholar Award, ACS (2000)
- Established Investigator, AHA (1998-2002)
- Pfizer Award for Enzyme Chemistry, ACS (1997)
- Fellowship in Science and Engineering, David and Lucile Packard (1995-2000)
- Scholar, Searle (1993-1996)
- Scholar in Biomedical Science, Lucille P. Markey (1990-1997)
- Postdoctoral Fellowship, Helen Hay Whitney (1989-1990; Colorado)
- Fellowship, Gillette Foundation (1986-1987; Brandeis)
- Award in Biochemistry, American Institute of Chemists (1982; SUNY)
- Award for Excellence in Biochemistry, SUNY (1982)
- Phi Beta Kappa, Michigan (1979)
- Scholar, James B. Angell (1978, 1979; Michigan)

LINKS

- Herschlag lab website: <http://herschlaglab.stanford.edu>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

The overarching goal of the Herschlag Lab is to understand the fundamental behavior of RNA and proteins and, in turn, how these behaviors determine and impact biology more broadly. We are particularly interested in questions of how enzymes work, how RNA folds, how proteins recognize RNA, and the roles of RNA/protein interactions in regulation and control, and the evolution of molecules and molecular interactions. The lab takes an interdisciplinary approach, spanning and integrating physics, chemistry and biology, and employing a wide range of techniques.

Teaching

COURSES

2023-24

- Biochemistry Mini-Course: BIOC 202 (Aut)
- Developing an Original Research Proposal: BIOC 360 (Spr)

2022-23

- A Practical Guide to Success in Science: BIOS 246 (Win)
- Biochemistry Mini-Course: BIOC 202 (Aut)
- Developing an Original Research Proposal: BIOC 360 (Spr)
- Understanding Kinetics for Biologists and Biology: BIOS 202 (Aut)

2021-22

- Biochemistry Mini-Course: BIOC 202 (Aut)
- Chemistry for Biologists and Others: BIOC 294, BIOS 294 (Aut)

2020-21

- Becoming a Resilient Scientist: BIO 315 (Win, Spr)
- Biochemistry Mini-Course: BIOC 202 (Aut)

- Chemistry for Biologists and Others: BIOC 294, BIOS 294 (Aut)
- Connections: Life, Science, and, Community: BIOC 227 (Win, Spr)
- Understanding Kinetics for Biologists and Biology: BIOS 202 (Sum)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Peter Cavanagh, Simone Evans, Abby Thurm

Postdoctoral Faculty Sponsor

Patrick Almhjell, Prathamesh Datar, Lauren Hagler, Albert Lee

Doctoral Dissertation Advisor (AC)

Siyuan Du, John Shin, Gabriel Tauber

Doctoral Dissertation Co-Advisor (AC)

Eliel Akinbami

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biochemistry (Phd Program)
- Biophysics (Phd Program)

Publications

PUBLICATIONS

- **Decoupling of catalysis and transition state analog binding from mutations throughout a phosphatase revealed by high-throughput enzymology.** *Proceedings of the National Academy of Sciences of the United States of America*
Markin, C. J., Mokhtari, D. A., Du, S., Doukov, T., Sunden, F., Cook, J. A., Fordyce, P. M., Herschlag, D.
2023; 120 (29): e2219074120
- **Author Correction: RNA conformational propensities determine cellular activity.** *Nature*
Ken, M. L., Roy, R., Geng, A., Ganser, L. R., Manghrani, A., Cullen, B. R., Schulze-Gahmen, U., Herschlag, D., Al-Hashimi, H. M.
2023
- **RNA conformational propensities determine cellular activity.** *Nature*
Ken, M. L., Roy, R., Geng, A., Ganser, L. R., Manghrani, A., Cullen, B. R., Schulze-Gahmen, U., Herschlag, D., Al-Hashimi, H. M.
2023
- **Refinement of Multiconformer Ensemble Models from Multi-temperature X-ray Diffraction Data.** *bioRxiv : the preprint server for biology*
Du, S., Wankowicz, S. A., Yabukarski, F., Doukov, T., Herschlag, D., Fraser, J. S.
2023
- **Obtaining anomalous and ensemble information from protein crystals from 220 K up to physiological temperatures.** *Acta crystallographica. Section D, Structural biology*
Doukov, T., Herschlag, D., Yabukarski, F.
2023; 79 (Pt 3): 212-223
- **Building a quantitative and predictive model of 5' SS selection by human U1 snRNP using RNA-map**
White, D. S., Carrocci, T. J., Shin, J., Lin, C., Black, D. L., Greenleaf, W., Herschlag, D., Hoskins, A. A.
CELL PRESS.2023: 219A
- **Building a quantitative and predictive model of 5'SS selection by human U1 snRNP using RNA-map.** *Biophysical journal*
White, D. S., Carrocci, T. J., Shin, J., Lin, C., Black, D. L., Greenleaf, W., Herschlag, D., Hoskins, A. A.
2023; 122 (3S1): 219a

- **Refinement of multiconformer ensemble models from multi-temperature X-ray diffraction data.** *Methods in enzymology*
Du, S., Wankowicz, S. A., Yabukarski, F., Doukov, T., Herschlag, D., Fraser, J. S.
2023; 688: 223-254
- **Ensemble-function relationships to dissect mechanisms of enzyme catalysis.** *Science advances*
Yabukarski, F., Doukov, T., Pinney, M. M., Biel, J. T., Fraser, J. S., Herschlag, D.
2022; 8 (41): eabn7738
- **A comprehensive thermodynamic model for RNA binding by the *Saccharomyces cerevisiae* Pumilio protein PUF4.** *Nature communications*
Sadec, C., Hagler, L. D., Becker, W. R., Jarmoskaite, I., Vaidyanathan, P. P., Denny, S. K., Greenleaf, W. J., Herschlag, D.
2022; 13 (1): 4522
- **Evaluating the impact of X-ray damage on conformational heterogeneity in room-temperature (277 K) and cryo-cooled protein crystals.** *Acta crystallographica. Section D, Structural biology*
Yabukarski, F., Doukov, T., Mokhtari, D. A., Du, S., Herschlag, D.
2022; 78 (Pt 8): 945-963
- **Ensemble-function relationships to connect structure to mechanism: application of EnsemblePDB to the serine protease reaction coordinate and its catalytic features**
Du, S., Kretsch, R. C., Parres-Gold, J., Penaherrera, D. A., Yabukarski, F., Pinney, M. M., Herschlag, D.
CELL PRESS.2022: 441A
- **Direct Measurement of Interhelical DNA Repulsion and Attraction by Quantitative Cross-Linking.** *Journal of the American Chemical Society*
Hamilton, I., Gebala, M., Herschlag, D., Russell, R.
1800
- **Systematic investigation of the link between enzyme catalysis and cold adaptation** *ELIFE*
Stark, C. D., Bautista-Leung, T., Siegfried, J., Herschlag, D.
2022; 11
- **Systematic investigation of the link between enzyme catalysis and cold adaptation.** *eLife*
Stark, C., Bautista-Leung, T., Siegfried, J., Herschlag, D.
1800; 11
- **uPIC-M: Efficient and Scalable Preparation of Clonal Single Mutant Libraries for High-Throughput Protein Biochemistry.** *ACS omega*
Appel, M. J., Longwell, S. A., Morri, M., Neff, N., Herschlag, D., Fordyce, P. M.
2021; 6 (45): 30542-30554
- **Cation enrichment in the ion atmosphere is promoted by local hydration of DNA.** *Physical chemistry chemical physics : PCCP*
Ma, C. Y., Pezzotti, S., Schwaab, G., Gebala, M., Herschlag, D., Havenith, M.
2021
- **High throughput and quantitative enzymology in the genomic era.** *Current opinion in structural biology*
Mokhtari, D. A., Appel, M. J., Fordyce, P. M., Herschlag, D.
2021; 71: 259-273
- **High-throughput dissection of the thermodynamic and conformational properties of a ubiquitous class of RNA tertiary contact motifs.** *Proceedings of the National Academy of Sciences of the United States of America*
Bonilla, S. L., Denny, S. K., Shin, J. H., Alvarez-Buylla, A., Greenleaf, W. J., Herschlag, D.
2021; 118 (33)
- **Revealing enzyme functional architecture via high-throughput microfluidic enzyme kinetics.** *Science (New York, N.Y.)*
Markin, C. J., Mokhtari, D. A., Sunden, F., Appel, M. J., Akiva, E., Longwell, S. A., Sabatti, C., Herschlag, D., Fordyce, P. M.
2021; 373 (6553)
- **Revealing enzyme functional architecture via high-throughput microfluidic enzyme kinetics** *SCIENCE*
Markin, C. J., Mokhtari, D. A., Sunden, F., Appel, M. J., Akiva, E., Longwell, S. A., Sabatti, C., Herschlag, D., Fordyce, P. M.
2021; 373 (6553): 411+
- **Parallel molecular mechanisms for enzyme temperature adaptation.** *Science (New York, N.Y.)*

- Pinney, M. M., Mokhtari, D. A., Akiva, E., Yabukarski, F., Sanchez, D. M., Liang, R., Doukov, T., Martinez, T. J., Babbitt, P. C., Herschlag, D. 2021; 371 (6533)
- **Assessment of enzyme active site positioning and tests of catalytic mechanisms through X-ray-derived conformational ensembles.** *Proceedings of the National Academy of Sciences of the United States of America*
Yabukarski, F., Biel, J. T., Pinney, M. M., Doukov, T., Powers, A. S., Fraser, J. S., Herschlag, D. 2020; 117 (52): 33204–15
 - **Instrumentation and experimental procedures for robust collection of X-ray diffraction data from protein crystals across physiological temperatures.** *Journal of applied crystallography*
Doukov, T., Herschlag, D., Yabukarski, F. 2020; 53 (Pt 6): 1493–1501
 - **Rapid and accurate determination of atomistic RNA dynamic ensemble models using NMR and structure prediction.** *Nature communications*
Shi, H., Rangadurai, A., Abou Assi, H., Roy, R., Case, D. A., Herschlag, D., Yesselman, J. D., Al-Hashimi, H. M. 2020; 11 (1): 5531
 - **The individual and the team in collaborative science.** *Proceedings of the National Academy of Sciences of the United States of America*
Herschlag, D. 2020; 117 (28): 16116
 - **The structural ensemble of a Holliday junction determined by X-ray scattering interference.** *Nucleic acids research*
Zettl, T., Shi, X., Bonilla, S., Sedlak, S. M., Lipfert, J., Herschlag, D. 2020
 - **Slow Molecular Recognition by RNA**
Sengupta, R., Herschlag, D. WILEY.2020
 - **Biosciences Proposal Bootcamp: Structured peer and faculty feedback improves trainees' proposals and grantsmanship self-efficacy.** *PLoS one*
Botham, C. M., Brawn, S. n., Steele, L. n., Barrón, C. B., Kleppner, S. R., Herschlag, D. n. 2020; 15 (12): e0243973
 - **How to measure and evaluate binding affinities.** *eLife*
Jarmoskaite, I. n., AlSadhan, I. n., Vaidyanathan, P. P., Herschlag, D. n. 2020; 9
 - **A Quantitative and Predictive Model for RNA Binding by Human Pumilio Proteins** *MOLECULAR CELL*
Jarmoskaite, I., Denny, S. K., Vaidyanathan, P. P., Becker, W. R., Andreasson, J. L., Layton, C. J., Kappel, K., Shivashankar, V., Sreenivasan, R., Das, R., Greenleaf, W. J., Herschlag, D. 2019; 74 (5): 966–+
 - **Demonstration of protein cooperativity mediated by RNA structure using the human protein PUM2** *RNA*
Becker, W. R., Jarmoskaite, I., Vaidyanathan, P. P., Greenleaf, W. J., Herschlag, D. 2019; 25 (6): 702–12
 - **Blind tests of RNA-protein binding affinity prediction.** *Proceedings of the National Academy of Sciences of the United States of America*
Kappel, K., Jarmoskaite, I., Vaidyanathan, P. P., Greenleaf, W. J., Herschlag, D., Das, R. 2019
 - **A Microfluidics-Based Assay for Mapping Connectivity in Highly Proficient Enzymes Reveals Functional Modularity**
Markin, C. J., Mokhtari, D. A., Sunden, F., Herschlag, D., Fordyce, P. M. CELL PRESS.2019: 66A
 - **Sequence-dependent RNA helix conformational preferences predictably impact tertiary structure formation.** *Proceedings of the National Academy of Sciences of the United States of America*
Yesselman, J. D., Denny, S. K., Bisaria, N. n., Herschlag, D. n., Greenleaf, W. J., Das, R. n. 2019
 - **Quantitative Studies of an RNA Duplex Electrostatics by Ion Counting.** *Biophysical journal*
Gebala, M. n., Herschlag, D. n.

2019

- **Computational design of three-dimensional RNA structure and function.** *Nature nanotechnology*
Yesselman, J. D., Eiler, D. n., Carlson, E. D., Gotrik, M. R., d'Aquino, A. E., Ooms, A. N., Kladwang, W. n., Carlson, P. D., Shi, X. n., Costantino, D. A., Herschlag, D. n., Lucks, J. B., Jewett, et al
2019
- **Enhancement of RNA/Ligand Association Kinetics via an Electrostatic Anchor.** *Biochemistry*
Sengupta, R. N., Herschlag, D. n.
2019
- **The roles of structural dynamics in the cellular functions of RNAs.** *Nature reviews. Molecular cell biology*
Ganser, L. R., Kelly, M. L., Herschlag, D. n., Al-Hashimi, H. M.
2019
- **Ion counting demonstrates a high electrostatic field generated by the nucleosome.** *eLife*
Gebala, M. n., Johnson, S. L., Narlikar, G. J., Herschlag, D. n.
2019; 8
- **Serum electrolytes can promote hydroxyl radical-initiated biomolecular damage from inflammation.** *Free radical biology & medicine*
Komaki, Y. n., Simpson, A. M., Choe, J. K., Pinney, M. M., Herschlag, D. n., Chuang, Y. H., Mitch, W. A.
2019; 141: 475–82
- **Increasing the length of poly-pyrimidine bulges broadens RNA conformational ensembles with minimal impact on stacking energetics** *RNA*
Merriman, D. K., Yuan, J., Shi, H., Majumdar, A., Herschlag, D., Al-Hashimi, H. M.
2018; 24 (10): 1363–76
- **The Story of RNA Folding, as Told in Epochs.** *Cold Spring Harbor perspectives in biology*
Herschlag, D., Bonilla, S., Bisaria, N.
2018; 10 (10)
- **Structural Coupling Throughout the Active Site Hydrogen Bond Networks of Ketosteroid Isomerase and Photoactive Yellow Protein** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Pinney, M. M., Natarajan, A., Yabukarski, F., Sanchez, D. M., Liu, F., Liang, R., Doukov, T., Schwans, J. P., Martinez, T. J., Herschlag, D.
2018; 140 (31): 9827–43
- **High-Throughput Investigation of Diverse Junction Elements in RNA Tertiary Folding.** *Cell*
Denny, S. K., Bisaria, N., Yesselman, J. D., Das, R., Herschlag, D., Greenleaf, W. J.
2018
- **Hydrogen Bonds: Simple after All?** *BIOCHEMISTRY*
Herschlag, D., Pinney, M. M.
2018; 57 (24): 3338–52
- **Recording and Analyzing Nucleic Acid Distance Distributions with X-Ray Scattering Interferometry (XSI).** *Current protocols in nucleic acid chemistry*
Zettl, T., Das, R., Harbury, P. A., Herschlag, D., Lipfert, J., Mathew, R. S., Shi, X.
2018; 73 (1): e54
- **Gold nanocrystal labels provide a sequence-to-3D structure map in SAXS reconstructions** *SCIENCE ADVANCES*
Zettl, T., Mathew, R. S., Shi, X., Doniach, S., Herschlag, D., Harbury, P. B., Lipfert, J.
2018; 4 (5): eaar4418
- **Hidden Structural Modules in a Cooperative RNA Folding Transition** *CELL REPORTS*
Gracia, B., Al-Hashimi, H. M., Bisaria, N., Das, R., Herschlag, D., Russell, R.
2018; 22 (12): 3240–50
- **Dissecting the Electrostatics of Nucleic Acids**
Gebala, M., Allred, B. E., Herschlag, D.
CELL PRESS.2018: 441A–442A

- **Differential catalytic promiscuity of the alkaline phosphatase superfamily bimetallo core reveals mechanistic features underlying enzyme evolution** *JOURNAL OF BIOLOGICAL CHEMISTRY*
Sunden, F., AlSadhan, I., Lyubimov, A., Doukov, T., Swan, J., Herschlag, D.
2017; 292 (51): 20960–74
- **Slow molecular recognition by RNA** *RNA*
Gleitsman, K. R., Sengupta, R. N., Herschlag, D.
2017; 23 (12): 1745–53
- **Quantitative tests of a reconstitution model for RNA folding thermodynamics and kinetics** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Bisaria, N., Greenfeld, M., Limouse, C., Mabuchi, H., Herschlag, D.
2017; 114 (37): E7688–E7696
- **An Activator-Blocker Pair Provides a Controllable On-Off Switch for a Ketosteroid Isomerase Active Site Mutant** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Lamba, V., Yabukarski, F., Herschlag, D.
2017; 139 (32): 11089–95
- **Kemp Eliminase Activity of Ketosteroid Isomerase** *BIOCHEMISTRY*
Lamba, V., Sanchez, E., Fanning, L. R., Howe, K., Alvarez, M. A., Herschlag, D., Forconi, M.
2017; 56 (4): 582–591
- **Pseudouridine and N-6 methyladenosine modifications weaken PUF protein/RNA interactions.** *RNA (New York, N.Y.)*
Vaidyanathan, P. P., AlSadhan, I., Merriman, D. K., Al-Hashimi, H., Herschlag, D.
2017
- **Lessons from Enzyme Kinetics Reveal Specificity Principles for RNA-Guided Nucleases in RNA Interference and CRISPR-Based Genome Editing.** *Cell systems*
Bisaria, N., Jarmoskaite, I., Herschlag, D.
2017; 4 (1): 21–29
- **Determination of the conformational ensemble of the TAR RNA by X-ray scattering interferometry.** *Nucleic acids research*
Shi, X., Walker, P., Harbury, P. B., Herschlag, D.
2017
- **Single-Molecule Fluorescence Reveals Commonalities and Distinctions among Natural and in Vitro-Selected RNA Tertiary Motifs in a Multistep Folding Pathway** *Journal of the American Chemical Society*
Bonilla, S., Limouse, C., Bisaria, N., Gebala, M., Mabuchi, H., Herschlag, D.
2017: 18576–18589
- **Determination of Ion Atmosphere Effects on the Nucleic Acid Electrostatic Potential and Ligand Association Using AH⁺C Wobble Formation in Double-Stranded DNA** *J. Am. Chem. Soc.*
Allred, B. E., Gebala, M., Herschlag, D.
2017; 22 (139): 7540–7548
- **Mechanistic and Evolutionary Insights from Comparative Enzymology of Phosphomonoesterases and Phosphodiesterases across the Alkaline Phosphatase Superfamily.** *Journal of the American Chemical Society*
Sunden, F., AlSadhan, I., Lyubimov, A. Y., Ressler, S., Wiersma-Koch, H., Borland, J., Brown, C. L., Johnson, T. A., Singh, Z., Herschlag, D.
2016; 138 (43): 14273–14287
- **RNA Structural Modules Control the Rate and Pathway of RNA Folding and Assembly** *JOURNAL OF MOLECULAR BIOLOGY*
Gracia, B., Xue, Y., Bisaria, N., Herschlag, D., Al-Hashimi, H. M., Russell, R.
2016; 428 (20): 3972–3985
- **Does Cation Size Affect Occupancy and Electrostatic Screening of the Nucleic Acid Ion Atmosphere?** *Journal of the American Chemical Society*
Gebala, M., Bonilla, S., Bisaria, N., Herschlag, D.
2016; 138 (34): 10925–10934
- **Kinetic and thermodynamic framework for P4-P6 RNA reveals tertiary motif modularity and modulation of the folding preferred pathway.** *Proceedings of the National Academy of Sciences of the United States of America*

- Bisaria, N., Greenfeld, M., Limouse, C., Pavlichin, D. S., Mabuchi, H., Herschlag, D.
2016; 113 (34): E4956-65
- **Evaluation of the Catalytic Contribution from a Positioned General Base in Ketosteroid Isomerase.** *Journal of the American Chemical Society*
Lamba, V., Yabukarski, F., Pinney, M., Herschlag, D.
2016; 138 (31): 9902-9909
 - **Tungstate as a Transition State Analog for Catalysis by Alkaline Phosphatase** *JOURNAL OF MOLECULAR BIOLOGY*
Peck, A., Sunden, F., Andrews, L. D., Pande, V. S., Herschlag, D.
2016; 428 (13): 2758-2768
 - **Correction to "Evaluating the Catalytic Contribution from the Oxyanion Hole in Ketosteroid Isomerase".** *Journal of the American Chemical Society*
Schwans, J. P., Sunden, F., Gonzalez, A., Tsai, Y., Herschlag, D.
2016; 138 (24): 7801-7802
 - **Visualizing the formation of an RNA folding intermediate through a fast highly modular secondary structure switch** *NATURE COMMUNICATIONS*
Xue, Y., Gracia, B., Herschlag, D., Russell, R., Al-Hashimi, H. M.
2016; 7
 - **The solution structural ensembles of RNA kink-turn motifs and their protein complexes.** *Nature chemical biology*
Shi, X., Huang, L., Lilley, D. M., Harbury, P. B., Herschlag, D.
2016; 12 (3): 146-152
 - **High-throughput analysis and protein engineering using microcapillary arrays.** *Nature chemical biology*
Chen, B., Lim, S., Kannan, A., Alford, S. C., Sunden, F., Herschlag, D., Dimov, I. K., Baer, T. M., Cochran, J. R.
2016; 12 (2): 76-81
 - **An active site rearrangement within the Tetrahymena group I ribozyme releases nonproductive interactions and allows formation of catalytic interactions.** *RNA*
Sengupta, R. N., Van Schie, S. N., Giambasu, G., Dai, Q., Yesselman, J. D., York, D., Piccirilli, J. A., Herschlag, D.
2016; 22 (1): 32-48
 - **Differential Assembly of Catalytic Interactions within the Conserved Active Sites of Two Ribozymes.** *PloS one*
Van Schie, S. N., Sengupta, R. N., Herschlag, D.
2016; 11 (8)
 - **Cation-Anion Interactions within the Nucleic Acid Ion Atmosphere Revealed by Ion Counting.** *Journal of the American Chemical Society*
Gebala, M., Giambasu, G. M., Lipfert, J., Bisaria, N., Bonilla, S., Li, G., York, D. M., Herschlag, D.
2015; 137 (46): 14705-14715
 - **Evolutionary Conservation and Diversification of Puf RNA Binding Proteins and Their mRNA Targets** *PLOS BIOLOGY*
Hogan, G. J., Brown, P. O., Herschlag, D.
2015; 13 (11)
 - **Comment on "Extreme electric fields power catalysis in the active site of ketosteroid isomerase"** *SCIENCE*
Natarajan, A., Yabukarski, F., Lamba, V., Schwans, J. P., Sunden, F., Herschlag, D.
2015; 349 (6251)
 - **Determination of Hydrogen Bond Structure in Water versus Aprotic Environments To Test the Relationship Between Length and Stability** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Sigala, P. A., Ruben, E. A., Liu, C. W., Piccoli, P. M., Hohenstein, E. G., Martinez, T. J., Schultz, A. J., Herschlag, D.
2015; 137 (17): 5730-5740
 - **Extensive site-directed mutagenesis reveals interconnected functional units in the alkaline phosphatase active site** *ELIFE*
Sunden, F., Peck, A., Salzman, J., Ressler, S., Herschlag, D.
2015; 4
 - **Learning from ribozymes** *RNA-A PUBLICATION OF THE RNA SOCIETY*
Herschlag, D.
2015; 21 (4): 527-528

- **Probing the kinetic and thermodynamic consequences of the tetraloop/tetraloop receptor monovalent ion-binding site in P4-P6 RNA by smFRET** *BIOCHEMICAL SOCIETY TRANSACTIONS*
Bisaria, N., Herschlag, D.
2015; 43: 172-178
- **From static to dynamic: the need for structural ensembles and a predictive model of RNA folding and function** *CURRENT OPINION IN STRUCTURAL BIOLOGY*
Herschlag, D., Allred, B. E., Gowrishankar, S.
2015; 30: 125-133
- **Three aSNAP and 10 ATP Molecules Are Used in SNARE Complex Disassembly by N-ethylmaleimide-sensitive Factor (NSF).** *journal of biological chemistry*
Shah, N., Colbert, K. N., Enos, M. D., Herschlag, D., Weis, W. I.
2015; 290 (4): 2175-2188
- **Quantifying Nucleic Acid Ensembles with X-ray Scattering Interferometry.** *Methods in enzymology*
Shi, X., Bonilla, S., Herschlag, D., Harbury, P.
2015; 558: 75-97
- **Single-molecule dataset (SMD): a generalized storage format for raw and processed single-molecule data.** *BMC bioinformatics*
Greenfield, M., van de Meent, J., Pavlichin, D. S., Mabuchi, H., Wiggins, C. H., Gonzalez, R. L., Herschlag, D.
2015; 16: 3-?
- **Probing the Origins of Catalytic Discrimination between Phosphate and Sulfate Monoester Hydrolysis: Comparative Analysis of Alkaline Phosphatase and Protein Tyrosine Phosphatases** *BIOCHEMISTRY*
Andrews, L. D., Zalatan, J. G., Herschlag, D.
2014; 53 (43): 6811-6819
- **A kinetic and thermodynamic framework for the Azoarcus group I ribozyme reaction** *RNA-A PUBLICATION OF THE RNA SOCIETY*
Gleitsman, K. R., Herschlag, D. H.
2014; 20 (11): 1732-1746
- **Understanding nucleic Acid-ion interactions.** *Annual review of biochemistry*
Lipfert, J., Doniach, S., Das, R., Herschlag, D.
2014; 83: 813-841
- **Using unnatural amino acids to probe the energetics of oxyanion hole hydrogen bonds in the ketosteroid isomerase active site.** *Journal of the American Chemical Society*
Natarajan, A., Schwans, J. P., Herschlag, D.
2014; 136 (21): 7643-7654
- **Assembly line polyketide synthases: mechanistic insights and unsolved problems.** *Biochemistry*
Khosla, C., Herschlag, D., Cane, D. E., Walsh, C. T.
2014; 53 (18): 2875-2883
- **Roles of Long-Range Tertiary Interactions in Limiting Dynamics of the Tetrahymena Group I Ribozyme** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Shi, X., Bisaria, N., Benz-Moy, T. L., Bonilla, S., Pavlichin, D. S., Herschlag, D.
2014; 136 (18): 6643-6648
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