

CURRICULUM VITAE
Tadhg P. Begley
Texas A&M University
College Station, Texas 77843
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Positions

2010 - University Distinguished Professor, Texas A&M University
2009 - Barton Professor of Chemistry, Texas A&M University
1999 - 2009: Professor of Chemistry, Cornell University

Honors and Awards

2017: Newton Abraham Visiting Professor, Oxford University
2016: Repligen Award in Chemistry of Biological Processes, American Chemical Society (ACS), for outstanding contributions to the understanding of biological processes with particular emphasis on structure, function and mechanism.
2010: Honorary D.Sc., National University of Ireland
2009: Barton Professor of Chemistry, Texas A&M University
2009: NIH Merit Award

Selected Professional Activities (since 2010)

2016 Journal of Biological Chemistry, Editorial Board
2015 NIH Synthetic and Biological Chemistry Study Section
2014 - 2010: Division of Biological Chemistry, Texas A&M University, Chair
2015-1997: Bioorganic Chemistry, Editorial Board
2015-2010: NIH Mentoring Workshop for New Faculty in Chemistry, Principal Investigator
2016-2013: NIH Director's New Innovator Award Program, Reviewer
2014 NSF Panel - Chemistry of Life Processes
2013 NIH-CSR Evaluation BCMB Integrated Review Group
2013 NIH Special Emphasis Panel - Natural Products and Enzymology, Chair
2011 NIH Macromolecular Structure and Function Study Section, Member
2010-2005: Molecular BioSystems, Editorial Board
2010-2005: Wiley Encyclopedia of Chemical Biology, Editorial Board, Chair

Books

- 1) Organic Chemistry of Biological Pathways (2016, originally published 2005), with John McMurry
- 2) Encyclopedia of Chemical Biology (2009), Editor
- 3) Comprehensive Natural Products Chemistry, Vol 7, 2010, Editor

SELECTED RECENT RESEARCH PUBLICATION (past 10 years, 210 total)

- [1] Wang, Y., Schnell, B., Baumann, S., Müller, R., and Begley, T. (2017) Biosynthesis of Branched Alkoxy groups: Iterative Methyl Group Alkylation by a Cobalamin-Dependent Radical SAM Enzyme, Journal of the American Chemical Society, Accepted for Publication.
- [2] Rodrigues, M. J., Windeisen, V., Zhang, Y., Guédez, G., Weber, S., Strohmeier, M., Hanes, J. W., Royant, A., Evans, G., Sinning, I., Ealick, S. E., Begley, T. P., and Tews, I. (2017) Lysine Relay Mechanism Coordinates Intermediate Transfer in Vitamin B6 Biosynthesis, Nature Chemical Biology, Accepted for publication.

- [3] Chakrabarty, Y., and Begley, T. P. (2017) Cannibalism Among the Flavins: A Novel C-N Bond Cleavage in Riboflavin Catabolism Mediated by a Flavin-Generated Superoxide Radical., *Nature Chemical Biology*, under revision.
- [4] Zhang, X., Eser, B. E., Chanani, P. K., Begley, T. P., and Ealick, S. E. (2016) Structural Basis for Iron-Mediated Sulfur Transfer in Archaeal and Yeast Thiazole Synthases, *Biochemistry* 55, 1826-1838.
- [5] Xu, H., Chakrabarty, Y., Philmus, B., Mehta, A. P., Bhandari, D., Hohmann, H.-P., and Begley, T. P. (2016) Identification of the First Riboflavin Catabolic Gene Cluster Isolated from *Microbacterium maritipicum* G10, *Journal of Biological Chemistry* 291, 23506-23515.
- [6] Nemeria, N. S., Shome, B., DeColli, A. A., Heflin, K., Begley, T. P., Meyers, C. F., and Jordan, F. (2016) Competence of Thiamin Diphosphate-Dependent Enzymes with 2'-Methoxythiamin Diphosphate Derived from Bacimethrin, a Naturally Occurring Thiamin Anti-vitamin, *Biochemistry* 55, 1135-1148.
- [7] Jhulki, I., Chanani, P. K., Abdelwahed, S. H., and Begley, T. P. (2016) A Remarkable Oxidative Cascade That Replaces the Riboflavin C8 Methyl with an Amino Group During Roseoflavin Biosynthesis, *Journal of the American Chemical Society* 138, 8324-8327.
- [8] Fenwick, M. K., Philmus, B., Begley, T. P., and Ealick, S. E. (2016) *Burkholderia glumae* ToxA Is a Dual-Specificity Methyltransferase That Catalyzes the Last Two Steps of Toxoflavin Biosynthesis, *Biochemistry* 55, 2748-2759.
- [9] Eser, B. E., Zhang, X., Chanani, P. K., Begley, T. P., and Ealick, S. E. (2016) From Suicide Enzyme to Catalyst: The Iron-Dependent Sulfide Transfer in *Methanococcus jannaschii* Thiamin Thiazole Biosynthesis, *Journal of the American Chemical Society* 138, 3639-3642.
- [10] Bhandari, D. M., Fedoseyenko, D., and Begley, T. P. (2016) Tryptophan Lyase (NosL): A Cornucopia of 5'-Deoxyadenosyl Radical Mediated Transformations, *Journal of the American Chemical Society* 138, 16184-16187.
- [11] Adak, S., and Begley, T. P. (2016) Dibenzothiophene Catabolism Proceeds via a Flavin-N5-oxide Intermediate, *Journal of the American Chemical Society* 138, 6424-6426.
- [12] Philmus, B., Shaffer, B. T., Kidarsa, T. A., Yan, Q., Raaijmakers, J. M., Begley, T. P., and Loper, J. E. (2015) Investigations into the Biosynthesis, Regulation, and Self-Resistance of Toxoflavin in *Pseudomonas protegens* Pf-5, *ChemBioChem* 16, 1782-1790.
- [13] Philmus, B., Decamps, L., Berteau, O., and Begley, T. P. (2015) Biosynthetic Versatility and Coordinated Action of 5'-Deoxyadenosyl Radicals in Deazaflavin Biosynthesis, *Journal of the American Chemical Society* 137, 5406-5413.
- [14] Mehta, A. P., Abdelwahed, S. H., Mahanta, N., Fedoseyenko, D., Philmus, B., Cooper, L. E., Liu, Y., Jhulki, I., Ealick, S. E., and Begley, T. P. (2015) Radical S-Adenosylmethionine (SAM) Enzymes in Cofactor Biosynthesis: A Treasure Trove of Complex Organic Radical Rearrangement Reactions, *Journal of Biological Chemistry* 290, 3980-3986.
- [15] Mehta, A. P., Abdelwahed, S. H., Fenwick, M. K., Hazra, A. B., Taga, M. E., Zhang, Y., Ealick, S. E., and Begley, T. P. (2015) Anaerobic 5-Hydroxybenzimidazole Formation from Aminoimidazole Ribotide: An Unanticipated Intersection of Thiamin and Vitamin B12 Biosynthesis, *Journal of the American Chemical Society* 137, 10444-10447.
- [16] Mehta, A. P., Abdelwahed, S. H., and Begley, T. P. (2015) Molybdopterin biosynthesis - Mechanistic Studies on a Novel MoaA Catalyzed Insertion of a Purine Carbon into the Ribose of GTP, *Biochimica et Biophysica Acta, Proteins and Proteomics* 1854, 1073-1077.
- [17] Hazra, A. B., Han, A. W., Mehta, A. P., Mok, K. C., Osadchiy, V., Begley, T. P., and Taga, M. E. (2015) Anaerobic Biosynthesis of the Lower Ligand of Vitamin B12, *Proceedings of the National Academy of Sciences of the United States of America* 112, 10792-10797.
- [18] Fenwick, M. K., Mehta, A. P., Zhang, Y., Abdelwahed, S. H., Begley, T. P., and Ealick, S. E. (2015) Non-canonical Active Site Architecture of the Radical SAM Thiamin Pyrimidine Synthase, *Nature Communications* 6, 6480.

- [19] Bhandari, D. M., Xu, H., Nicolet, Y., Fontecilla-Camps, J. C., and Begley, T. P. (2015) Tryptophan Lyase (NosL): Mechanistic Insights from Substrate Analogues and Mutagenesis, *Biochemistry* 54, 4767-4769.
- [20] Mehta, A. P., Abdelwahed, S. H., Xu, H., and Begley, T. P. (2014) Molybdopterin Biosynthesis: Trapping of Intermediates for the MoaA-Catalyzed Reaction Using 2'-DeoxyGTP and 2'-ChloroGTP as Substrate Analogues, *Journal of the American Chemical Society* 136, 10609-10614.
- [21] McRose, D., Guo, J., Monier, A., Sudek, S., Wilken, S., Yan, S., Mock, T., Archibald, J. M., Begley, T. P., Reyes-Prieto, A., and Worden, A. Z. (2014) Alternatives to Vitamin B1 Uptake Revealed with Discovery of Riboswitches in Multiple Marine Eukaryotic Lineages, *International Society for Microbial Ecology Journal* 8, 2517-2529.
- [22] Jurgenson, C. T., Ealick, S. E., and Begley, T. P. (2014) Biosynthesis of Thiamin Pyrophosphate, *EcoSal Plus*, 1-16.
- [23] Cooper, L. E., O'Leary, S. E., and Begley, T. P. (2014) Biosynthesis of a Thiamin Antivitamin in *Clostridium botulinum*, *Biochemistry* 53, 2215-2217.
- [24] Soriano, E. V., Zhang, Y., Colabroy, K. L., Sanders, J. M., Settembre, E. C., Dorrestein, P. C., Begley, T. P., and Ealick, S. E. (2013) Active-site Models for Complexes of Quinolinate Synthase with Substrates and Intermediates, *Acta Crystallographica, Section D: Biological Crystallography* 69, 1685-1696.
- [25] Sikowitz, M. D., Shome, B., Zhang, Y., Begley, T. P., and Ealick, S. E. (2013) Structure of a *Clostridium botulinum* C143S Thiaminase I/Thiamin Complex Reveals Active Site Architecture, *Biochemistry* 52, 7830-7839.
- [26] Sikowitz, M. D., Cooper, L. E., Begley, T. P., Kaminski, P. A., and Ealick, S. E. (2013) Reversal of the Substrate Specificity of CMP N-Glycosidase to dCMP, *Biochemistry* 52, 4037-4047.
- [27] Mehta, A. P., Hanes, J. W., Abdelwahed, S. H., Hilmey, D. G., Hanzelmann, P., and Begley, T. P. (2013) Catalysis of a New Ribose Carbon-Insertion Reaction by the Molybdenum Cofactor Biosynthetic Enzyme MoaA, *Biochemistry* 52, 1134-1136.
- [28] Mehta, A. P., Abdelwahed, S. H., and Begley, T. P. (2013) Molybdopterin Biosynthesis: Trapping an Unusual Purine Ribose Adduct in the MoaA-Catalyzed Reaction, *Journal of the American Chemical Society* 135, 10883-10885.
- [29] Mahanta, N., Fedoseyenko, D., Dai, T., and Begley, T. P. (2013) Menaquinone Biosynthesis: Formation of Aminofutalosine Requires a Unique Radical SAM Enzyme, *Journal of the American Chemical Society* 135, 15318-15321.
- [30] Hicks, K. A., O'Leary, S. E., Begley, T. P., and Ealick, S. E. (2013) Structural and Mechanistic Studies of HpxO, a Novel Flavin Adenine Dinucleotide-Dependent Urate Oxidase from *Klebsiella pneumoniae*, *Biochemistry* 52, 477-487.
- [31] Gokulan, K., O'Leary, S. E., Russell, W. K., Russell, D. H., Lalgondar, M., Begley, T. P., Ioerger, T. R., and Sacchettini, J. C. (2013) Crystal Structure of *Mycobacterium tuberculosis* Polyketide Synthase 11 (PKS11) Reveals Intermediates in the Synthesis of Methyl-branched Alkylpyrones, *Journal of Biological Chemistry* 288, 16484-16494.
- [32] Coquille, S., Roux, C., Mehta, A., Begley, T. P., Fitzpatrick, T. B., and Thore, S. (2013) High-resolution Crystal Structure of the Eukaryotic HMP-P Synthase (THIC) from *Arabidopsis thaliana*, *Journal of Structural Biology* 184, 438-444.
- [33] Cooper, L. E., Fedoseyenko, D., Abdelwahed, S. H., Kim, S.-H., Dai, T., and Begley, T. P. (2013) In Vitro Reconstitution of the Radical S-Adenosylmethionine Enzyme MqnC Involved in the Biosynthesis of Futalosine-Derived Menaquinone, *Biochemistry* 52, 4592-4594.
- [34] Philmus, B., Abdelwahed, S., Williams, H. J., Fenwick, M. K., Ealick, S. E., and Begley, T. P. (2012) Identification of the Product of Toxoflavin Lyase: Degradation via a Baeyer-Villiger Oxidation, *Journal of the American Chemical Society* 134, 5326-5330.

- [35] Lai, R.-Y., Huang, S., Fenwick, M. K., Hazra, A., Zhang, Y., Rajashankar, K., Philmus, B., Kinsland, C., Sanders, J. M., Ealick, S. E., and Begley, T. P. (2012) Thiamin Pyrimidine Biosynthesis in *Candida albicans*: A Remarkable Reaction Between Histidine and Pyridoxal Phosphate, *Journal of the American Chemical Society* 134, 9157-9159.
- [36] Huang, S., Mahanta, N., Begley, T. P., and Ealick, S. E. (2012) Pseudouridine Monophosphate Glycosidase: A New Glycosidase Mechanism, *Biochemistry* 51, 9245-9255.
- [37] Greenwald, J. W., Greenwald, C. J., Philmus, B. J., Begley, T. P., and Gross, D. C. (2012) RNA-seq Analysis Reveals that an ECF σ Factor, AcsS, Regulates Achromobactin Biosynthesis in *Pseudomonas syringae* pv. *syringae* B728a, *PLoS One* 7, e34804.
- [38] Decamps, L., Philmus, B., Benjdia, A., White, R., Begley, T. P., and Berteau, O. (2012) Biosynthesis of F0, Precursor of the F420 Cofactor Requires a Unique Two Radical-SAM Domain Enzyme and Tyrosine as Substrate, *Journal of the American Chemical Society* 134, 18173-18176.
- [39] Coats, D., Shelton-Dodge, K., Ou, K., Khun, V., Seab, S., Sok, K., Prou, C., Tortorelli, S., Moyer, T. P., Cooper, L. E., Begley, T. P., Enders, F., Fischer, P. R., and Topazian, M. (2012) Thiamine Deficiency in Cambodian Infants with and without Beriberi, *Journal of Pediatrics* (N. Y., NY, U. S.) 161, 843-847.
- [40] Begley, T. P., Ealick, S. E., and McLafferty, F. W. (2012) Thiamin Biosynthesis: Still Yielding Fascinating Biological Chemistry, *Biochemical Society Symposium* 79, 115-124.
- [41] Tran, T. H., Krishnamoorthy, K., Begley, T. P., and Ealick, S. E. (2011) A Novel Mechanism of Sulfur Transfer Catalyzed by O-acetylhomoserine Sulfhydrylase in the Methionine-Biosynthetic Pathway of *Wolinella succinogenes*, *Acta Crystallographica., Sect. D: Biological Crystallography* 67, 831-838.
- [42] Pribat, A., Blaby, I. K., Lara-Nunez, A., Jeanguenin, L., Fouquet, R., Frelin, O., Gregory, J. F., III, Philmus, B., Begley, T. P., Crecy-Lagard, V., and Hanson, A. D. (2011) A 5-Formyltetrahydrofolate Cycloligase Paralog from all Domains of Life: Comparative Genomic and Experimental Evidence for a Cryptic Role in Thiamin Metabolism, *Functional & Integrative Genomics* 11, 467-478.
- [43] Paramasivam, S., Balakrishnan, A., Dmitrenko, O., Godert, A., Begley, T. P., Jordan, F., and Polenova, T. (2011) Solid-State NMR and Density Functional Theory Studies of Ionization States of Thiamin, *Journal of Physical Chemistry B* 115, 730-736.
- [44] Mukherjee, T., Hanes, J., Tews, I., Ealick, S. E., and Begley, T. P. (2011) Pyridoxal Phosphate: Biosynthesis and Catabolism, *Biochimica et Biophysica Acta, Proteins and Proteomics* 1814, 1585-1596.
- [45] Krishnamoorthy, K., and Begley, T. P. (2011) Protein Thiocarboxylate-Dependent Methionine Biosynthesis in *Wolinella succinogenes*, *Journal of the American Chemical Society* 133, 379-386.
- [46] Hazra, A. B., Han, Y., Chatterjee, A., Zhang, Y., Lai, R.-Y., Ealick, S. E., and Begley, T. P. (2011) A Missing Enzyme in Thiamin Thiazole Biosynthesis: Identification of TenI as a Thiazole Tautomerase, *Journal of the American Chemical Society* 133, 9311-9319.
- [47] Hanes, J. W., Chatterjee, D., Soriano, E. V., Ealick, S. E., and Begley, T. P. (2011) Construction of a Thiamin Sensor from the Periplasmic Thiamin Binding Protein, *Chemical Communications* (Cambridge, U. K.) 47, 2273-2275.
- [48] French, J. B., Begley, T. P., and Ealick, S. E. (2011) Structure of Trifunctional THI20 from Yeast, *Acta Crystallographica., Sect. D: Biological Crystallography* 67, 784-791.
- [49] Fenwick, M. K., Philmus, B., Begley, T. P., and Ealick, S. E. (2011) Toxoflavin Lyase Requires a Novel 1-His-2-Carboxylate Facial Triad, *Biochemistry* 50, 1091-1100.
- [50] Chatterjee, A., Abeydeera, N. D., Bale, S., Pai, P.-J., Dorrestein, P. C., Russell, D. H., Ealick, S. E., and Begley, T. P. (2011) *Saccharomyces cerevisiae* THI4p is a Suicide Thiamine Thiazole Synthase, *Nature* (London, U. K.) 478, 542-546.

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- [52] Paul, D., O'Leary, S. E., Rajashankar, K., Bu, W., Toms, A., Settembre, E. C., Sanders, J. M., Begley, T. P., and Ealick, S. E. (2010) Glycol Formation in Crystals of Uridine Phosphorylase, *Biochemistry* 49, 3499-3509.
- [53] Paul, D., Chatterjee, A., Begley, T. P., and Ealick, S. E. (2010) Domain Organization in *Candida glabrata* THI6, a Bifunctional Enzyme Required for Thiamin Biosynthesis in Eukaryotes, *Biochemistry* 49, 9922-9934.
- [54] Mukherjee, T., Zhang, Y., Abdelwahed, S., Ealick, S. E., and Begley, T. P. (2010) Catalysis of a Flavoenzyme-Mediated Amide Hydrolysis, *Journal of the American Chemical Society* 132, 5550-5551.
- [55] McCulloch, K. M., Mukherjee, T., Begley, T. P., and Ealick, S. E. (2010) Structure Determination and Characterization of the Vitamin B6 Degradative Enzyme (E)-2-(Acetamidomethylene)succinate Hydrolase, *Biochemistry* 49, 1226-1235.
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- [57] Krishnamoorthy, K., and Begley, T. P. (2010) Reagent for the Detection of Protein Thiocarboxylates in the Bacterial Proteome: Lissamine Rhodamine B Sulfonyl Azide, *Journal of the American Chemical Society* 132, 11608-11612.
- [58] Honeyfield, D. C., Hanes, J. W., Brown, L., Kraft, C. E., and Begley, T. P. (2010) Comparison of Thiaminase Activity in Fish Using the Radiometric and 4-Nitrothiophenol Colorimetric Methods, *Journal of Great Lakes Research* 36, 641-645.
- [59] Chatterjee, A., Hazra, A. B., Abdelwahed, S., Hilmey, D. G., and Begley, T. P. (2010) A "Radical Dance" in Thiamin Biosynthesis: Mechanistic Analysis of the Bacterial Hydroxymethylpyrimidine Phosphate Synthase, *Angewandte Chemie International Edition* 49, 8653-8656, S8653/8651-S8653/8615.
- [60] Bale, S., Rajashankar, K. R., Perry, K., Begley, T. P., and Ealick, S. E. (2010) HMP Binding Protein ThiY and HMP-P Synthase THI5 Are Structural Homologues, *Biochemistry* 49, 8929-8936.