CEDRIC P. OWENS, Ph.D.

Assistant Professor of Biochemistry
Schmid College of Science and Technology
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EDUCATION

Ph.D. in Biological Sciences *2007-2012*
University of California, Irvine, Irvine, CA
Advisor: Dr. Celia Goulding

B.A. in Chemistry/Biochemistry and B.A. in Mathematical Sciences, *cum laude* *2003-2007*
Colby College, Waterville, ME

Abitur (High School), Bayreuth, Germany *1995-2003*

PROFESSIONAL EXPERIENCE

Assistant Professor *2016 – present*
Chapman University, Orange, CA

Postdoctoral Researcher *2013 - 2016*
University of California, San Diego, San Diego, CA
Advisor: Dr. Akif Tezcan

PUBLICATIONS

An up-to-date list of publications can be found using:
Google Scholar: **https://scholar.google.com/citations?user=6GKVlWYAAAAJ&hl=en**
Owens lab website: **https://sites.chapman.edu/owenslab/publications/**

At Chapman University

(* = undergraduate coauthor, # = former undergraduate working as a research technician, ‡= corresponding author)

1. Willard, D. L,* Arellano J. J.,* Underdahl, M.,* Lee, T. M.,* Ramaswamy, A. S.* Gabriella, F.*, Kliman, A.,* Wong, E. Y.,* **Owens, C. P.‡** Mutational analysis of the nitrogenase carbon monoxide protective protein CowN reveals that a conserved C-terminal glutamic acid residue is necessary for its activity, Under review in *Biochemistry*
   Preprint: https://www.biorxiv.org/content/10.1101/2023.08.25.553292v1

2. Standke H. G.*, Kim L.*, **Owens, C. P.**‡ (2023) Purification and biochemical characterization of the DNA binding domain of the nitrogenase transcriptional activator NifA from *Gluconacetobacter diazotrophicus*. **Accepted** to *The Protein Journal*
Preprint: https://www.biorxiv.org/content/10.1101/2023.05.30.542961v1

3. Omori, K. K#, Drucker, C. T., Okumura T. L. S.*, Carl N. B.*, Dinn B. T.*, Ly D.*, Sacapano K. N.*, Tajii A.*, **Owens C. P.**‡ (2023) Structural characterization of a Lactobacillus chlorogenic acid esterase and investigation of its insertion domain dynamics. *FEBS Letters,* Available online: https://febs.onlinelibrary.wiley.com/doi/10.1002/1873-3468.14731

4. Lo Verde, C. #, Paciolas, C. T., Paterson, N. #, Chin, J.*, **Owens, C. P.**, Senger, L. W. (2023) Hydrolysis of chlorogenic acid in sunflower flour increases consumer acceptability in sunflower cookies by improving cookie color. *Journal of Food Science*, **88**, 3558-3550. https://ift.onlinelibrary.wiley.com/doi/abs/10.1111/1750-3841.16692

5. Pepra-Ameyaw, N. B., Lo Verde, C. #, Drucker C. T., **Owens C. P.**, Senger L. W. (2023) Preventing chlorogenic acid quinone-induced greening in sunflower cookies by chlorogenic acid esterase and thiol-based dough conditioners. *LWT* **174**, 114392 https://www.sciencedirect.com/science/article/pii/S0023643822013275

6. Lo Verde, C.#, Pepra-Ameyaw, N. B., Drucker C. T., Okumura T. L. S.*, Lyon K. A.*, Muniz, J. C.*, Sermet C. S.*, Senger L. W., **Owens C. P.** ‡ (2022) A highly active esterase from *Lactobacillus helveticus* hydrolyzes chlorogenic acid in sunflower meal to prevent chlorogenic acid induced greening in sunflower protein isolates. *Food Res. Int.* **162**, 11199, https://www.sciencedirect.com/science/article/pii/S0963996922010547

7. Medina, M. S., Bretzing K. O.*, Aviles, R. A.*, Chong, K. M.*, Espinoza, A.*, Garcia, C. N. G.*, Katz, B. B., Kharwa, R. N.*, Hernandez, A.*, Lee, J. L., Lee, T. M.*, Lo Verde, C.*, Strul, M. W.*, Wong, E. Y.*, **Owens, C. P.** ‡ (2021) CowN sustains nitrogenase turnover in the presence of the inhibitor carbon monoxide. *J. Biol. Chem.* **296**, 100501, https://www.jbc.org/article/S0021-9258(21)00277-5/fulltext

8. Chao, A., Sieminski, P. J., **Owens, C. P.** ‡, Goulding, C. W. (2019) Iron acquisition in *Mycobacterium tuberculosis*. *Chem. Rev.* **119**, 1193-1220, https://pubs.acs.org/doi/10.1021/acs.chemrev.8b00285

9. **Owens, C. P.**, Tezcan, F. A. (2018) Conformationally gated electron transfer in nitrogenase. Isolation, purification and characterization of nitrogenase from *Gluconacetobacter diazotrophicus*. *Methods Enzymol.* **599**, 355-386, https://www.sciencedirect.com/science/article/abs/pii/S0076687917303373

10. Katz F. E., Shi X., **Owens C. P.**, Joseph, S., Tezcan F. A. (2017) Determination of nucleoside triphosphatase activities from measurement of true inorganic phosphate in the presence of labile phosphate compounds. *Analytical Biochem.* **520**, 62-67, https://www.sciencedirect.com/science/article/abs/pii/S0003269716304262

Prior to joining Chapman:

11. **Owens, C. P.**, Katz, F. E. H., Carter, C. H.*, Oswald, V. F., Tezcan, F. A. (2016) Tyrosine-coordinated P-cluster in *G. diazotrophicus* nitrogenase: Evidence for the importance of O-based ligands in conformationally gated electron transfer. *J. Am. Chem. Soc.* **138**, 10124-10127, https://pubs.acs.org/doi/10.1021/jacs.6b06783

12. Katz F. E. H., **Owens, C. P.**, Tezcan F. A. (2016) Electron Transfer Reactions in Biological Nitrogen Fixation, *Isr. J. Chem.* **56**, 682-692

13. **Owens, C. P.**, Katz, F. E. H., Carter, C. H., Luca, M. A., Tezcan, F. A. (2015). Evidence for functionally relevant encounter complexes in nitrogenase catalysis. *J. Am. Chem. Soc.* **137**, 12704-12712

14. **Owens, C. P.**, Chim, N., and Goulding, C. W. (2013) Insights on how the Mycobacterium tuberculosis heme uptake pathway can be used as a drug target. *Future Med. Chem.* **5**, 1391–1403

15. **Owens, C. P.**, Chim, N., Graves, A. B., Harmston, C. A., Iniguez, A., Contreras, H., Liptak, M. D., and Goulding, C. W. (2013) The Mycobacterium tuberculosis secreted protein Rv0203 transfers heme to membrane proteins MmpL3 and MmpL11. *J. Biol. Chem.* **288**, 21714–21728

16. McMath, L. M., Contreras, H., **Owens, C. P.**, and Goulding, C. W. (2013) The structural characterization of bacterioferritin, BfrA, from Mycobacterium tuberculosis. *J. Porphyrins Phthalocyanines* **17**, 229–239

17. Honsa, E. S., **Owens, C. P.**, Goulding, C. W., and Maresso, A. W. (2013) The near-iron transporter (NEAT) domains of the anthrax hemophore IsdX2 require a critical glutamine to extract heme from methemoglobin. *J. Biol. Chem.* **288**, 8479–8490

18. Chim, N., **Owens, C. P.**, Contreras, H., and Goulding, C. W. (2012) Advances in Mycobacterium tuberculosis therapeutics discovery utilizing structural biology. *Infect. Disord. Drug Targets.* e-pub, [published online November 16, 2012: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3695056/]

19. Ekworomadu, M. T., Poor, C. B., **Owens, C. P.**, Balderas, M. A., Fabian, M., Olson, J. S., Murphy, F., Balkabasi, E., Honsa, E. S., He, C., Goulding, C. W., and Maresso, A. W. (2012) Differential function of lip residues in the mechanism and biology of an anthrax hemophore. *PLoS Pathog.* **8**, e1002559

20. **Owens, C. P.**, Du, J., Dawson, J. H., and Goulding, C. W. (2012) Characterization of heme ligation properties of Rv0203, a secreted heme binding protein involved in Mycobacterium tuberculosis heme uptake. *Biochemistry* **51**, 1518–1531

21. Tullius, M. V., Harmston, C. A., **Owens, C. P.**, Chim, N., Morse, R. P., McMath, L. M., Iniguez, A., Kimmey, J. M., Sawaya, M. R., Whitelegge, J. P., Horwitz, M. A., and Goulding, C. W. (2011) Discovery and characterization of a unique mycobacterial heme acquisition system. *Proc. Natl. Acad. Sci. U.S.A.* **108**, 5051–5056

PATENTS

2023

Christine Lo Verde, Cedric P. Owens, Lilian Were Senger, Enzymatic breakdown of chlorogenic acid in sunflower meal and butter to enable use of sunflower meal and butter in baking, United States Patent Application 1959206.00036

ACTIVE GRANTS

Sept. 2019 – Aug. 2024

RUI: Nitrogenase and friends: Uncovering how diazotrophs regulate and maintain nitrogenase activity under unfavorable environmental conditions

NSF-Chemistry of Life Processes, $325,000 (all funds to Chapman University)
Role: PI

July 2020 – June 2024

Constructing a Better Nitrogenase by Uncovering Protein-protein Interactions That Protect the Enzyme and Expand its Chemistry

Research Corporation for Science Advancement (Cottrell Scholarship), $100,000 (all funds to Chapman University)
Role: PI

COMPLETED GRANTS

External

September 2023 – August 2024

The activation heat capacity of enzymatic catalysis is a new target for protein engineering
Research Corporation for Science Advancement Postdoctoral Fellowship Supplement, $50,000 (all funds to Chapman University)
Role: PI

June 2020 – May 2023

Eliminating undesired greening in sunflower seed derived ingredients by hydrolysis of chlorogenic acid using an engineered esterase
USDA-National Institute of Food and Agriculture, $196,405 (all funds to Chapman University)
Role: Co-PI with Dr. Lilian Senger, Chapman University

August 2020 (Instrument grant)

A request to fund the purchase of a fermenter, a vessel for learning and knowledge creation

Research Corporation for Science Advancement, $10,000 (all funds to Chapman University)
Role: PI

Jan. 2015 – July 2019

Deciphering conformational gating in electron transfer in biological nitrogen fixation

USDA National Institute of Food and Agriculture - Agriculture and Food Research Initiative Postdoctoral Fellowship, $137,815 ($48,165 to Chapman)
Role: PI

Internal

June 2019 – May 2020

Uncovering how molybdenum-nitrogenase avoids inhibition by the environmental gas carbon monoxide via a possible hydrocarbon production pathway

Faculty opportunity fund (Chapman Office of Research), $14,564

Role: PI

COLLABORATOR ON FUNDED GRANTS

Chapman University REU program in Earth Sciences, 2017 (NSF grant 1659892), 2022 (NSF grant 2150540)

PI: Dr. Chris Kim, Chapman University

Beckman Foundation, Beckman Scholars Program, 2020

PI: Dr. Elaine Schwartz, Chapman University

PRESENTATIONS

Invited talks

2022 Warning to all diazotrophs! Carbon monoxide kills nitrogen fixation activity. Take preventative action now.
Carleton College, Northfield, MN, USA

2021 How does CowN protect nitrogenase from inhibition by carbon monoxide?
Colby College, Waterville, ME (virtual)

2019 Coordination of electron transfer in nitrogenase
South Dakota State University, Brookings, SD

2017 Redox dependent structural changes in nitrogenase
California State University, Los Angeles, CA

2016 Electron transfer and protein-protein interactions in nitrogenase
California State University, East Bay, Hayward, CA

2015 Protein-protein interactions in biological nitrogen fixation
Chapman University, Orange, CA

2015 Protein-protein interactions in nitrogenase turnover
California State University, San Bernardino, CA

Conference presentations

2023 Determining how diazotrophs protect nitrogenase from carbon monoxide inhibition.
European Nitrogen Fixation Conference (ENFC), Naples, Italy

2022 Warning to all diazotrophs! Carbon monoxide kills nitrogen fixation activity. Take preventative action now.

	Molybdenum and Tungsten Enzyme Conference (MoTeC), Indianapolis, USA
2018	Structures of reduced and oxidized MoFeP from Gluconacetobacter diazotrophicus European Nitrogen Fixation Conference (ENFC), Stockholm, Sweden
2016	Evidence for functionally relevant encounter complexes in nitrogenase catalysis American Chemical Society National Meeting, San Diego, CA
2015	Protein-protein interactions in biological nitrogen fixation National Institute of Food and Agriculture fellows meeting, Washington, DC
2011	Investigation of the heme binding properties of mycobacterial heme uptake proteins Bioinorganic Chemistry, Gordon Research Seminar, Ventura, CA
2010	Heme binding properties of the mycobacterial proteins Rv0203 and MmpL3 and heme transfer between the two proteins Bioinorganic Chemistry, Gordon Research Seminar, Ventura, CA

COURSES TAUGHT

Physical Biochemistry, BCHM 420 (Every fall, 2016 - 2023, 15-25 students): The aim of the course is to present fundamental principles of physical chemistry to biochemistry students.

Physical Biochemistry Laboratory, BCHM 420L (Every fall 2016 – 2023, 8-18 students): The laboratory course covers physical methods used in biochemistry research, including spectroscopy, microscopy, and protein crystallography.

Biochemistry I-Biomolecules, BCHM 335 (Fall 2019, 2020, 40-60 students): Biochemistry I covers the structure and function of all major classes of biological molecules with an emphasis on enzyme structure and function.

Biochemistry II-Metabolism and Bioenergetics, BCHM 336 (Spring 2017, 2018, 2019, 2023, 15-35 students): This course describes energy flow in a biological system, central metabolism, and other important metabolic pathways.

General Chemistry Lab, CHEM 150L (Spring 2017, 2018, 2022, ca. 20 students): General Chemistry Laboratory covers basic lab techniques and encourages critical thinking by keeping several of the laboratory assignments open ended.

STUDENT MENTORING

Undergraduate student mentoring at Chapman University

Research mentoring: Since 2016, I have mentored 45 Chapman University undergraduate students. In addition, I also mentored 13 community college students through my 2019 NSF grant and a Chapman-run REU program (SURFEE program).
Student publications and presentations: 24 students appear as co-authors on peer-reviewed papers. Undergraduate students in my group have given a total of 23 external conference presentations at conferences such as the *Protein Society* conference, the *ASBMB* conference, and the *Council on Undergraduate Research* meeting.

Student research awards: Six student have researchers have received $1,000 fellowships from the Chapman Center for Undergraduate Excellence and five were awarded a $3,000 summer research fellowship.

List of current and former research students

Jacob Mullen '17	Christine Lo Verde '20	Emily Wong '22	Vivianna Juarez '25	Diana Torres (REU)
Andrew Stepien '17	Chloe Garcia '20	Brendalyn Figueira '23	Jamie Chin '25	Krishna Chandramouli (REU)
Patrick Lin '17	Kiersten Chong '20	Sophia Kelsey '22	Katie Sanders '25	
Eddie Wador s '18	Chloe Sermet '21	Allie Tajii '22	Richard Aviles (REU)	
Sarah Amaya '19	Ruchita Kharwa '21	Julia Munoz '22	Andrea Hernandez (REU)	
Ashna Shah '19	Lois Kim '21	Alex Baker '23	Elliot Valdez (REU)	
Sophia Ellis '19	Michelle Jin '21	Myles Downey '24	Jocelyn Gonzalez (REU)	
Kevin Bretzing '19	Terrence Lee '21	Alex Mayorga '24	Gildardo Limon (REU)	
Justyn Gobolic '20	Estevan Harris '24	Brianna Dinn '23	Andrew Field (REU)	
Hiba Zaidi '20	Kate Lyon (joint student with Dr. Lilian Senger) '22	Destiny Ly '23	Gabriella Fumes (REU)	
Prachi Patel '20	Dustin Willard '22	Kylie Sacapano '23	Avinash Ramaswamy (REU)	
Heidi Standke '20	Kellie Omori '22	Mitch Underdahl '23	Nate Carl (REU)	
Alejandro Espinoza '20	Caroline Monahan '22	YouGyeoung Lee '24	Josh Arellano (REU)	
Max Strul '20	Tracie Okumura '22	Julia Chia '24	Agatha Kliman (REU)	

Master's thesis committee member:

Yundi Liang, Master's in Food Science '19
Allany Chayasing, Master's in Food Science '20
Jarett Guillow, Master's in Data Science '20

COLLABORATIONS

Chapman University:

Dr. Hagop Atamian, Biology
Dr. Chris Kim, Chemistry
Dr. Criselda Toto Pacioles, Mathematics
Dr. Elaine Schwartz, Chemistry
Dr. Lilian Were Senger, Food Science

External collaborators:

Dr. Andy Borovik, UC Irvine

Mr. Ben Katz, UC Irvine
Dr. Celia Goudling, UC Irvine
Dr. Rou-Jia Sung, Carleton College

PROFESSIONAL SERVICE

Chapman University

Schmid College laboratory safety committee	2022-present
Faculty Advisor, ASBMB student chapter at Chapman University	2019-present
Institutional Animal Care and Use Committee (IACUC)	2018-present
Capstone conference moderator	2017-present
Capstone conference co-coordinator	2023
Chair of faculty search committee, general and organic chemistry	2023
Faculty search committee, inorganic chemistry	2022
Faculty search committee, biochemistry	2020
Faculty search committee, biochemistry	2019
Collaborator on successful Beckman Scholars Program application	2020
Collaborator on unfunded Beckman Scholars Program application	2019
Collaborator on successful ASBMB accreditation application	2019
Collaborator on successful ACS accreditation application	2019
Reviewer, Faculty Opportunity Fund (Chapman internal funding)	2020
Schmid Science Forum (seminar series) organizer	2018-19

External service

Organizing committee for 21th International Conference for Biological Inorganic Chemistry (ICBIC), Long Beach, CA, *2025*

Occasional reviewer for Scientific Reports, RSC Interface, Applied Microbiology and Biotechnology, ACS Catalysis, Journal of the American Chemical Society, Microbial Pathogens

Ad-hoc grant reviewer for NSF-Chemistry of Life Processes, Research Corporation, Swiss National Science Foundation

Grant review panelist for the American Heart Association pre- and postdoctoral fellowship program, *2020, 2021*

Grant review panelist for NSF – Chemistry of Life Processes, *2022*

Membership

American Chemical Society (ACS), American Society for Biochemistry and Molecular Biology (ASBMB)

LANGUAGES

Native in spoken and written English and German
Highly proficient in spoken and proficient in written French