

## Ethan Van Arnam

Keck Science Department  
 Claremont McKenna, Pitzer, and Scripps Colleges  
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### PROFESSIONAL APPOINTMENTS

Keck Science Department, Claremont, CA Claremont McKenna, Pitzer, and Scripps Colleges <b>Assistant Professor of Chemistry</b> <i>Research interests: antibiotic discovery, chemical ecology</i>	2017 – present
Harvard Medical School, Boston, MA <b>NIH Postdoctoral Fellow</b> , advisor: Jon Clardy <i>Discovery of novel antibiotics that support an insect-microbe symbiosis</i>	2014 – 2017
Pfizer, Groton, CT <b>Medicinal Chemist</b> <i>Organic synthesis, neuroscience medicinal chemistry</i>	2007

### EDUCATION

Caltech, Pasadena, CA <b>PhD, Chemistry</b> (2014), advisor: Dennis A. Dougherty <i>Chemical-scale interrogation of membrane protein structure and function</i>	2008 – 2013
Bowdoin College, Brunswick, ME <b>BA, Chemistry</b> (2007), advisor: Richard D. Broene <i>Synthesis of an improved cobalt catalyst for <math>\alpha</math>-olefin dimerization</i>	2003 – 2007

### TEACHING

#### Courses taught at Keck Science:

Integrated Biology & Chemistry, Lecture and Lab (Chem42L)	S 2021, S 2022
General Chemistry, Lecture (Chem15)	S 2020
Advanced Laboratory in Chemistry (Chem126L)	F 2017, F 2018, F 2019, F 2020
Biochemistry (Biol/Chem177)	F 2017, S 2018, F 2018, S 2019, F 2019, F 2022, F 2023
General Chemistry, Laboratory (Chem15L)	S 2018, S 2019

#### Course taught at Simmons College, Boston, MA:

Organic Chemistry Laboratory (Chem112L)	S 2016
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#### Teaching assistant, Caltech:

Introductory Chemistry (Chem1A)	2009 – 2013
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Scientific Writing (Chem91)	S 2009
Organic Chemistry Laboratory (Chem4A)	W 2009
Organic Chemistry I (Chem41)	F 2008

## RESEARCH MENTORSHIP

Jisue Choi (Claremont McKenna '26)	2023 –
Antara Mallick (Scripps '25)	2023 –
Anna Ermoian (Scripps '25)	2022 –
Maya Lobo (Scripps '25)	2022 –
Carmen Puentes (Scripps '25)	2022 –
Joyce Kim (Claremont McKenna '24)	2021 – 2023
Aman Ahmed (Pitzer '23)	2021 – 2023
Katherine Hansen (Scripps '23), <i>thesis</i>	2021 – 2023
Shekinah Lumpkin (Scripps '23)	2021 – 2023
Arjun Deol (Pitzer '23)	2020 – 2023
Stephanie Lewis (Claremont McKenna '21), <i>thesis</i>	2020 – 2021
Juan Santos (Pitzer '23)	2020 – 2023
Janet Tran (Claremont McKenna '21), <i>thesis</i>	2019 – 2021
Ananya Koneti (Claremont McKenna '22)	2019 – 2022
Elisabeth Lawton (Scripps '21)	2019 – 2022
Georgia Scherer (Claremont McKenna '20), <i>thesis</i>	2019 – 2020
Preston Chang (Pitzer '19), <i>thesis</i>	2018 – 2019
Rose Kim (Pitzer '21)	2018 – 2020
Lauren Longo (Scripps '20)	2018 – 2020
Keon Rabbani (Pitzer '19), <i>thesis</i>	2018 – 2019
Krithika Rao (Scripps '19), <i>thesis</i>	2018 – 2019

## FUNDING AWARDED

American Society of Pharmacognosy Research Starter Grant	2018
“Field collection and isolation of microbial symbionts of North American fungus-growing ants to enable ecologically-guided antibiotic discovery” (\$5000), Principal investigator	
NIH Ruth L Kirchstein National Research Service Award	2016 – 2017
“Chemical biology of ant-associated defensive bacteria” (\$56,118), Principal investigator	

## PUBLICATIONS

*\*undergraduate co-author*

Kim, J. H.\*; Scherer, G.\*; Lumpkin, D. S.\*; Rao, K.\*; Puentes Flores, C. D.\*; Van Arnam, E. B. [Amycolatopsis From Desert Specialist Fungus-Growing Ants Suppress Contaminant Fungi Using the Antibiotic ECO-0501. \*Applied & Environmental Microbiology\*, 2023, 89 \(2\), e01838-22.](#)

- Hansen, K. A.\*; Kim, R. R.\*; Lawton, E. S.\*; Tran, J.\*; Lewis, S. K.\*; Deol, A. S.\*; Van Arnam, E. B. Bacterial Associates of a Desert Specialist Fungus-Growing Ant Antagonize Competitors Using a Nocamycin Analog. *ACS Chemical Biology* **2022**, 17 (7), 1824-1830.
- Fukuda, T. T. H.; Helfrich, E. J. N.; Mevers, E.; Melo, W. G. P.; Van Arnam, E. B.; Andes, D. R.; Currie, C. R.; Pupo, M. T.; Clardy, J. Specialized Metabolites Reveal Evolutionary History and Geographic Dispersion of a Multilateral Symbiosis. *ACS Central Science* **2021**, 7 (2), 292–299.
- Chang, P. T.\*; Rao, K.\*; Longo, L. O.\*; Lawton, E. S.\*; Scherer, G.\*; Van Arnam, E. B. Thiopeptide Defense by an Ant's Bacterial Symbiont. *Journal of Natural Products* **2020**, 83 (3), 725–729.
- McDonald, B. R.; Chevrette, M. G.; Klassen, J. L.; Horn, H. A.; Caldera, E. J.; Wendt-Pienkowski, E.; Cafaro, M. J.; Ruzzini, A. C.; Van Arnam, E. B.; Weinstock, G. M.; Gerardo, N. M.; Poulsen, M.; Suen, G.; Clardy, J.; Currie, C. R. Biogeography and Microscale Diversity Shape the Biosynthetic Potential of Fungus-Growing Ant-Associated Pseudonocardia. (preprint available on *bioRxiv*) **2019**.
- Van Arnam, E. B.; Currie, C. R.; Clardy, J. Defense Contracts: Molecular Protection in Insect-Microbe Symbioses. *Chemical Society Reviews* **2018**, 47 (5), 1638–1651.
- Van Arnam, E. B.; Ruzzini, A. C.; Sit, C. S.; Horn, H.; Pinto-Tomás, A. A.; Currie, C. R.; Clardy, J. Selvamicin, an Atypical Antifungal Polyene from Two Alternative Genomic Contexts. *Proceedings of the National Academy of Sciences* **2016**, 113 (46), 12940–12945.
- Van Arnam, E. B.; Ruzzini, A. C.; Sit, C. S.; Currie, C. R.; Clardy, J. A Rebeccamycin Analog Provides Plasmid-Encoded Niche Defense. *Journal of the American Chemical Society* **2015**, 137 (45), 14272–14274.
- Sit, C. S.; Ruzzini, A. C.; Van Arnam, E. B.; Ramadhar, T. R.; Currie, C. R.; Clardy, J. Variable Genetic Architectures Produce Virtually Identical Molecules in Bacterial Symbionts of Fungus-Growing Ants. *Proceedings of the National Academy of Sciences* **2015**, 112 (43), 13150–13154.
- Dougherty, D. A.; Van Arnam, E. B. In Vivo Incorporation of Non-Canonical Amino Acids by Using the Chemical Aminoacylation Strategy: A Broadly Applicable Mechanistic Tool. *ChemBioChem* **2014**, 15 (12), 1710–1720.
- Van Arnam, E. B.; Dougherty, D. A. Functional Probes of Drug–Receptor Interactions Implicated by Structural Studies: Cys-Loop Receptors Provide a Fertile Testing Ground: Miniperspective. *Journal of Medicinal Chemistry* **2014**, 57 (15), 6289–6300.
- Van Arnam, E. B.; Blythe, E. E.\*; Lester, H. A.; Dougherty, D. A. An Unusual Pattern of Ligand-Receptor Interactions for the 7 Nicotinic Acetylcholine Receptor, with Implications for the Binding of Varenicline. *Molecular Pharmacology* **2013**, 84 (2), 201–207.
- Blum, A. P.; Van Arnam, E. B.; German, L. A.\*; Lester, H. A.; Dougherty, D. A. Binding Interactions with the Complementary Subunit of Nicotinic Receptors. *J. Biol. Chem.* **2013**, 288 (10), 6991–6997.
- Van Arnam, E. B.; Lester, H. A.; Dougherty, D. A. Dissecting the Functions of Conserved Prolines within Transmembrane Helices of the D2 Dopamine Receptor. *ACS Chem. Biol.* **2011**, 6 (10), 1063–1068.
- Baures, P. W.; Caldwell, A. W.; Cashman, C. R.; Masse, M. T.; Van Arnam, E. B.; Conry, R. R. The Influence by Substituents on the Intermolecular Hydrogen-Bonding Interactions in Imidazole-4,5-Dicarboxylic Acid Derivatives. *Crystal Growth & Design* **2006**, 6 (9), 2047–2052.

## PATENT

Van Arnam, E. B.; Ruzzini, A. C.; Sit, C. S.; Pinto-Tomás, A. A.; Currie, C. R.; Clardy, J.,  
“Antifungal Compounds,” U.S. Patent No. 10793590. (October 6, 2020)

## INVITED SEMINARS

Keck Science Department, Claremont, CA (November 2019, October 2023)  
American Museum of Natural History, Southwestern Research Station, Portal, AZ (July 2018)  
University of California Riverside, Department of Entomology, Riverside, CA (April 2018)  
Bowdoin College, Department of Chemistry, Brunswick, ME (September 2016)  
Pomona College, Department of Chemistry, Claremont, CA (December 2013)  
Occidental College, Department of Chemistry, Los Angeles, CA (July 2013)

## CONTRIBUTED PRESENTATIONS

\**undergraduate co-author*, *presenter underlined*

Ermoian, A.\*; Santos, J.\*; Lumpkin, D.\*; Thomson, D.; Van Arnam, E. B. Secondary defense compounds in *Castilleja* species on Santa Rosa Island. American Chemical Society National Meeting, San Francisco, CA (August 2023, poster).

Puentes Flores, C.\*; Lobo, M.\*; Hansen, K.\*; Van Arnam, E. B. Characterization of an antibiotic produced by ant-associated *Pseudonocardia* bacteria. American Chemical Society National Meeting, San Francisco, CA (August 2023, poster).

Lobo, M.\*; Puentes Flores, C.\*; Hansen, K.\*; Van Arnam, E. B. Characterization of a potent antibiotic produced by *Pseudonocardia* bacteria from the ant *Trachymyrmex arizonensis*. American Chemical Society National Meeting, San Francisco, CA (August 2023, poster).

Mallick, A.\*; Ermoian, A.\*; Solomon-Lane, T. Van Arnam, E. B. Liquid chromatography-mass spectrometry analysis of steroid hormones in highly social developing fish. American Chemical Society National Meeting, San Francisco, CA (August 2023, poster).

Hansen, K.\*; Lobo, M.\*; Van Arnam, E. B. Biogeography of Special Metabolites Produced by Ant-Associated Bacteria. American Chemical Society National Meeting, Chicago, IL (August 2022, poster).

Kim, J.\*; Scherer, G.\*; Puentes Flores, C.\*; Lumpkin, D.\*; Van Arnam, E. B. Characterization of an Antifungal Produced by Ant-Associated Amycolatopsis Bacteria. American Chemical Society National Meeting, Chicago, IL (August 2022, poster).

Ahmed, A.\*; Koneti, A.\*; Van Arnam, E. B. Purification and Identification of Antibiotics from *T. pomonae* and *T. arizonensis* Associated Actinobacteria. UC Irvine SoCal Undergraduate Research Symposium (August 2021, poster).

Hansen, K.\*; Lawton, E.\*; Tran, J.\*; Kim, R.\*; Lewis, S.\*; Van Arnam, E. B. Characterization of an Antibiotic Compound Produced by an Amycolatopsis Bacterial Symbiont of *Trachymyrmex smithi*. UC Irvine SoCal Undergraduate Research Symposium (August 2021, poster).

Kim, J.\*; Van Arnam, E. B. Identification of an Antibiotic Produced by an Ant-Associated *Amycolatopsis* Bacteria. UC Irvine SoCal Undergraduate Research Symposium (August 2021, poster).

Lumpkin, S.\*; Scherer, G.\*; Van Arnam, E. B. Isolation and Characterization of an Unknown Antifungal Compound. UC Irvine SoCal Undergraduate Research Symposium (August 2021, poster).

- Lewis, S.\*; Lawton, E.\*; Van Arnam E. B. Using NMR Spectroscopy and Computational Chemistry to Confirm the Structure of a Novel Antibiotic. American Chemical Society National Meeting (April 2021, poster).
- Tran, J.\*; Van Arnam, E. B. Biosynthetic Analysis of a Novel Tetramic Acid Antibiotic. American Chemical Society National Meeting (April 2021, poster).
- Van Arnam, E. B. Antibiotics from Ants: Molecular Defenses from Specialized Insect Microbiomes. American Chemical Society National Meeting, San Diego, CA (August 2019, oral).
- Scherer, G.\*; Rao, K.\*; Van Arnam, E. B. Antifungal Defense Molecules from Bacterial Symbionts of North American *Trachymyrmex* Ants. American Chemical Society National Meeting, San Diego, CA (August 2019, poster).
- Chang, P.\*; Rao, K.\*; Kim, R.\*; Longo, L.\*; Lawton, E.\*; Koneti, A.\*; Rabbani, K.\*; Van Arnam, E. B. Antibiotics from Ants: Molecular Defenses from Specialized Insect Microbiomes. American Society of Pharmacognosy Annual Meeting, Madison, WI (July 2019, poster).
- Chang, P.\*; Longo, L.\*; Van Arnam, E. B. Identification of an Antibiotic Compound Synthesized by the Symbiotic Bacteria of the Fungus-Growing Ant *Trachymyrmex septentrionalis*. Southern California Undergraduate Research Conference in Chemistry and Biochemistry, Los Angeles, CA (April 2019, poster).
- Kim, R.\*; Lawton, E.\*; Van Arnam, E. B. Identification of an Antibiotic Compound Produced by Amycolatopsis, a Bacterial Symbiont of *Trachymyrmex smithi*. Southern California Undergraduate Research Conference in Chemistry and Biochemistry, Los Angeles, CA (April 2019, poster).
- Rabbani, K.\*; Finseth, F.; Van Arnam, E. B. Parallels between the Antifungal Molecule Selvamycin, Nystatin, and Candidin's Biosynthetic Gene Clusters and Digitoxose Sugars. Southern California Undergraduate Research Conference in Chemistry and Biochemistry, Los Angeles, CA (April 2019, poster).
- Van Arnam, E. B.; Ruzzini, A. C.; Sit, C. S.; Horn, H.; Pinto-Tomás, A. A.; Currie, C. R.; Clardy, J. Population-Level Diversity of Antibiotic Production in Defensive Symbionts of Fungus-Growing Ants. Gordon Research Conference: Animal-Microbe Interactions, Mount Snow, VT (June 2017, poster).
- Van Arnam, E. B.; Ruzzini, A. C.; Sit, C. S.; Currie, C. R.; Clardy, J. Antibiotics for Niche Defense and Their Unusual Genetic Origins. Gordon Research Conference: Bioorganic Chemistry, Andover, NH (June 2016, poster).
- Van Arnam, E. B.; Ruzzini, A. C.; Sit, C. S.; Currie, C. R.; Clardy, J. Chemical Basis of Antagonism between Strains of Ant-Associated *Pseudonocardia*. Gordon Research Conference: Animal-Microbe Interactions, Waterville Valley, NH (June 2015, poster).
- Van Arnam, E. B.; McCleary, K. N.; Liu F.; Abrol, R.; Lester, H. A.; Goddard, W. A.; Dougherty, D. A. Investigation of Dopamine Receptor Structure and Function by Structure Prediction and Unnatural Amino Acid Mutagenesis. Biophysical Society Annual Meeting, San Diego, CA (February 2012, poster).
- McCleary, K. M.; Van Arnam, E. B.; Swallow, J. G.\*; Torrice, M. M.; Bower, K. S.; Lester, H. A.; Dougherty, D. A. Probing the Binding Sites of GPCRs through the Incorporation of Unnatural Amino Acids. American Chemical Society National Meeting, Anaheim, CA (March 2011, poster).
- Van Arnam, E. B.; Lester, H. A.; Dougherty, D. A. Probing the Transmembrane Prolines and Putative "Rotamer Toggle Switch" Residues of the D2 Dopamine Receptor with Unnatural Amino Acids. American Chemical Society National Meeting, Anaheim, CA (March 2011, poster).

Van Arnam, E. B.; McCleary, K. N.; Torrice, M. M.; Bower, K. S.; Swallow, J. G.\*; Lester, H. A.; Dougherty, D. A. Probing the Binding Sites and Transmembrane Prolines of GPCRs Using Unnatural Amino Acids. Gordon Research Conference: Molecular Pharmacology, Ventura, CA (January 2011, poster).

Van Arnam, E. B.; McCleary, K. N.; Torrice, M. M.; Bower, K. S.; Jensen, E. H.; Lester, H. A.; Dougherty, D. A. Probing the Binding Sites and Transmembrane Prolines of GPCRs Using Unnatural Amino Acids. Biophysical Society Annual Meeting, San Francisco, CA (February 2010, poster).

## HONORS AND AWARDS

Outstanding Postdoc Award for Research and Service, <i>Harvard Medical School</i>	2016
Kimball Prize, <i>Bowdoin College</i>	2007
American Institute of Chemists Award, <i>Bowdoin College</i>	2007
ACS Undergraduate Award in Analytical Chemistry, <i>Bowdoin College</i>	2006
Goldwater Scholarship	2005
Chemical Rubber Company Freshman Chemistry Award, <i>Bowdoin College</i>	2004

## ACADEMIC SERVICE

Student/Faculty Working Group, <i>Claremont McKenna College</i>	2022 –
Executive Committee, <i>Keck Science Department</i>	2018 – 2020, 2022 –
Writing Committee, <i>Claremont McKenna College</i>	2022
Academic Standards Committee, <i>Claremont McKenna College</i>	2020 – 2021
Facilities Committee, <i>Claremont McKenna College</i>	2019 – 2020
Student Recruitment Committee, <i>Claremont McKenna College</i>	2019 – 2020
Pitzer-Scripps Science Vision Committee	Spring 2019
Academic Computing Committee, <i>Claremont McKenna College</i>	2018 – 2019

## MEMBERSHIPS

American Chemical Society  
 American Society of Pharmacognosy

## PRESS

“Is Pseudonocardia the Next Superhero?” by Caitlyn Fick, *The Student Life: Claremont Colleges student newspaper* (October 2018).

“Summer Ant-ics: Professor Ethan Van Arnam and Students Research Antibiotics from Ants,” Scripps College website (August 2018).

“People Are Letting Ants Bite Them As an Anti-Inflammatory: Could Ants, and the Bacteria They Carry, Be Used As Modern Medicine?” by Mark Hay, *Vice.com* (February 2018).

“Spotlight on Faculty: Ethan Van Arnam, Assistant Professor of Chemistry,” Scripps College website (December 2017).

“Costa Rican Ants Might Have the Secret to Better Antibiotics” by L. Arias, *The Tico Times* (November 2016).

“Could Ants Be the Solution to Antibiotic Crisis?: Bacterial Defences of Fungus-Farming Ants Could Help in Medical Battle against Superbugs” by Robin McKie, The Guardian (September 2016).