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Studying natural products, the chemical language of nature, helps us better understand how living organisms communicate with each other and interact with their environment. My research group takes unconventional approaches towards natural product discovery and to investigate their chemical and biosynthesis.

Positions

2019.08 – Assistant Professor, National Taiwan University (Taipei, Taiwan)

Education

2010 Ph.D., Chemistry; The Scripps Research Institute
2004 B.S., Chemistry; National Taiwan University

Research Experience

2014 – 2019	**Postdoctoral Associate** | The Rockefeller University	Professor Sean F. Brady
2011 – 2014	**Dreyfus Foundation Postdoctoral Fellow** | Yale University	Professor Alanna Schepartz
2005 – 2010	**Ph.D. Student** | Scripps Research Institute	Professor M. Reza Ghadiri
2003 – 2004	**Undergraduate Intern** | National Taiwan University	Professor Tien-Yau Luh
2003 – 2003	**Undergraduate Intern** | Undergraduate Research Assistant	Professor Andrew H.J. Wang

Honors and Awards

2019 國立台灣大學 化學系 新進教師傑出研究獎助金
2018 Rockefeller University Postdoctoral Association Career Development Award
2013 Yale University Postdoctoral Scholar Travel Fund
2011 Camille and Henry Dreyfus Environmental Chemistry Postdoctoral Fellowship
2004 Dr. An-Tai Chen Distinguished Research Scholarship (陳安泰醫師研究獎學金)

Teaching

Advanced Chemical Biology I, Graduate Level (高等化學生物學)
Biochemistry (生物化學)
Bioorganic Chemistry (生物有機化學)
Lab to the Market (化學家的創業實驗課)
Natural Product Chemistry (天然物化學)

Invited Talks

2024.03 Annual Meeting, Chinese Chemical Society, Tamkang University, New Taipei City, Taiwan
化學年會；淡江大學 新北 台灣
2024.01 Bowei Research Conference; Sun Moon Lake, Nantou County, Taiwan
李謀偉科學論壇；日月潭 南投 台灣
2023.12 Taiwan-Japan Bilateral Symposium on Natural Product Biosynthesis; Academia Sinica, Taipei, Taiwan
台日天然物雙邊研討會；中央研究院 台北 台灣
2023.12 Department of Chemistry, Kaohsiung Medical University; Kaohsiung, Taiwan
高雄醫學大學 化學系；高雄 台灣
2023.08 Asian Chemical Biology Conference; Jeju Island, South Korea
亞洲化學生物學研討會；濟州島 韓國
2023.06 Institute of Biological Chemistry, Academia Sinica, Taipei, Taiwan
中央研究院 生物化學研究所；台北 台灣

2023.04 Department of Fragrance and Cosmetic Science, Kaohsiung Medical University; Kaohsiung, Taiwan
高雄醫學大學 香妝品學系；高雄 台灣

2023.04 Department of Chemistry, Fu Jen Catholic University, Taipei, Taiwan
輔仁大學 化學系；台北 台灣

2023.02 Annual Symposium, Division of Organic Chemistry, NSTC, Taiwan
國科會自然處有機化學小組交流會；高雄 台灣

2022.10 Department of Chemistry, National Changhua University of Education, Changhua, Taiwan
國立彰化師範大學 化學系；彰化 台灣

2021.12 School of Medicine, National Taiwan University, Taipei, Taiwan
國立台灣大學 醫學院；台北 台灣

2021.08 NTU-MIT Frontiers in Biotechnology Symposium, Virtual meeting)
國立台灣大學－麻省理工學院 尖端生物科技交流分享會 (線上會議)

2021.04 Department of Bioscience and Technology, National Chiao Tung University, Hsinchu, Taiwan
國立陽明交通大學 生物科技學系；新竹 台灣

2021.03 Department of Life Sciences, National Taiwan University, Taipei, Taiwan
國立台灣大學 生命科學系；台北 台灣

2020.09 Annual Meeting, Pharmaceutical Society of Taiwan, Miaoli, Taiwan
台灣藥物化學研討會；苗栗 台灣

2020.03 Department of Chemistry, Tamkang University, New Taipei City, Taiwan
私立淡江大學 化學系；新北 台灣

2019.12 Department of Chemistry, National Tsing Hua University, Hsinchu, Taiwan
國立清華大學 化學系；新竹 台灣

2019.12 Chinese Chemical Society and Asian Chemical Congress Joint Meeting, Taipei, Taiwan
中國化學年會 暨 亞洲化學大會；台北 台灣

2019.11 Institute of Biological Chemistry, Academia Sinica, Taipei, Taiwan
中央研究院 生物化學研究所；台北 台灣

2018.03 New Antibacterial Discovery & Development, Gordon Research Conference, Ventura, Calif., USA
抑菌藥物開發 葛登研討會；范圖瓦 加州 美國

Grants and Funding

2024.01 *Cancer Targeting Peptides – Real-Time Diagnosis and Drug Delivery*
Office of Research and Development, National Taiwan University
核心研究群（子計畫）；台大研究發展處

2023.11 *Generation of New-To-Nature Lasso Peptides Using Chemical and Synthetic Biology*
National Science and Technology Council (112-2923-M-002-005-MY3)
台德雙邊擴充加值型計畫；國家科學委員會

2022.08 *Bioinformatics and Chemical Synthesis Join Forces for Natural Product Discovery*
National Science and Technology Council (111-2113-M-002-019-MY2)
個人型研究計畫；國家科學委員會

2021.08 *Biosynthetic, Mechanistic, and Structural Mimetic Studies of MccJ25 Using Chemical Approaches*
Ministry of Science and Technology (110-2113-M-002-022)
化學鍵結整合型計畫（總主持人）；科技部

2021.01 *A Discovery Platform for Overlooked Bioactive Natural Products*
Office of Research and Development, National Taiwan University (109-B-CD-5203-25314)
深耕型計畫；台大研究發展處

2020.01 *Bioinformatics Guided Design of Combinatorial Nonribosomal Peptide Libraries for Antibiotic Discovery*
Ministry of Science and Technology (109-2113-M-002-005-MY3)
個人型研究計畫；科技部

Publications ($ denotes equal contribution, *denotes corresponding author)

18. Chiou, S-L; Chen, Y-J; Lee, C-T; Ho, MN; Miao, J; Kuo, P-C; Hsu, C-C; Lin, Y-S; Chu, J. A boron-dependent antibiotic derived from a calcium-dependent antibiotic. *Angew Chem. Int. Ed.* **2023**, e202317522 (DOI: 10.1002/anie.202317522)
17. Jian, B-S; Chiou, S-L; Hsu, C-C; Ho, J; Wu, Y-W; ***Chu, J**. Bioinformatic analysis reveals both oversampled and underexplored biosynthetic diversity in nonribosomal peptides. *ACS Chem. Biol.* **2023**, *18*, 476 (doi: 10.1021/acschembio.2c00761)
16. Chen, I-H; Cheng, T; Wang, Y-L; Huang, S-J; Hsiao, Y-H; Lai, Y-T; Toh, S-I; **Chu, J**; Rudolf, JD; Chang, C-Y. Characterization and structural determination of CmnG-A, the adenylation domain that activates the nonproteinogenic amino acid capreomycidine in capreomycin biosynthesis. *ChemBioChem* **2022**, e202200563 (doi: 10.1002/cbic.202200563)
15. Chen, P-H; Sung, L-K; Hegemann, JD; ***Chu, J**. Disrupting transcription and folate biosynthesis leads to synergistic suppression of Escherichia coli growth. *ChemMedChem* **2022**, e202200075 (doi: 10.1002/cmdc.202200075).
14. Wu, C.-H.; ***Chu, J**. Total synthesis and biological evaluation of pagoamide A. *Front. Chem.* **2021**, 9:741290 (doi: 10.3389/fchem.2021.741290).
13. Chung, H-H; Kao, C-Y; Wang, A T-S; **Chu, J;** Pei, J; Hsu, C-C. Reaction tracking and high-throughput screening of active compounds in combinatorial chemistry by tandem mass spectrometry molecular networking. *Anal. Chem.* **2021**, *93*, 2456-2463 (doi: 10.1021/acs.analchem.0c04481).
12. **Chu, J**; Koirala, B; Forelli, N; Vila-Farres, X; Ternei, MA; Ali, T; Colosimo, DA; Brady, SF. Synthetic-bioinformatic natural product antibiotics with diverse modes of action. *J. Am. Chem. Soc.* **2020**, *142*, 14158-14168 (doi: 10.1021/jacs.0c04376).
11. **Chu, J**; Vila-Farres, X; Brady, SF. Bioactive synthetic-bioinformatic natural product cyclic peptides inspired by nonribosomal peptide synthetase gene clusters from the human microbiome. *J. Am. Chem. Soc.* **2019**, *141*, 15737-15741 (doi: 10.1021/jacs.9b07317).
10. [§]Vila-Farres, X; **[§]Chu, J**; Ternei, MA; Lemetre, C; Park, S; Perlin, DS; Brady, SF. An optimized synthetic-bioinformatic natural product antibiotic sterilizes multidrug-resistant *Acinetobacter baumannii*-infected wounds. *mSphere* **2018**, *3*, e00528-17 (doi: 10.1128/mSphere.00528-17).
9. **[§]Chu, J**; [§]Vila-Farres, X; Inoyama, D; Gallardo-Macias, R; Jaskowski, M; Satish, S; Freudlich, JS; Brady, SF. Human microbiome inspired antibiotics with improved β-lactam synergy against MDR *Staphylococcus aureus*. *ACS Infect. Dis.* **2018**, *4*, 33-38 (doi: 10.1021/acsinfecdis.7b00056).
8. Cohen, LJ; Esterhazy, D; Kim, SH; Lemetre, C; Aguilar, RR; Gordon, EA; Pickard, AJ; Cross, JR; Emiliano, AB; Han, SM; **Chu, J**; Vila-Farres, X; Kaplitt, J; Rogoz, A; Calle, P; Hunter, C; Bitok, JK; Brady, SF. Commensal bacteria make GPCR ligands that mimic human signaling molecules. *Nature* **2017**, *549*, 48-53 (doi: 10.1038/nature23874).
7. [§]Vila-Farres, X; **[§]Chu, J**; Inoyama, D; Ternei, MA; Lemetre, C; Cohen, LJ; Cho, W; Reddy, BVB; Zebroski, HA; Freudlich, JS; Perlin, DS; Brady, SF. Antimicrobials inspired by nonribosomal peptide synthetase gene clusters. *J. Am. Chem. Soc.* **2017**, *139*, 1404-1407 (doi: 10.1021/jacs.6b11861).
6. **[§]Chu, J**; [§]Vila-Farres, X; Inoyama, D; Ternei, MA; Cohen, LJ; Gordon, EA; Reddy, BVB; Charlop-Powers, Z; Zebroski, HA; Gallardo-Macias, R; Jaskowski, M; Satish, S; Park S; Perlin, DS; Freudlich, JS; Brady, SF. Discovery of MRSA active antibiotics using primary sequence from the human microbiome. *Nat. Chem. Biol.* **2016**, *12*, 1004-1006 (doi: 10.1038/nchembio.2207).
5. Cohen, LJ; Kang, HS, **Chu, J**; Huang, YH; Gordon, EA; Reddy, BV; Ternei, MA; Craig, JW; Brady, SF. Functional metagenomic discovery of bacterial effectors in the human microbiome and isolation of commendamide, a GPCR G2A/132. *Proc. Natl. Acad. Sci.* **2015**, *112*, E48245 (doi: 10.1073/pnas.1508737112).
4. Melicher, MS; **Chu, J**; Walker, AS; Miller, SJ; Baxter, RHG; Schepartz, A. A β-boronopeptide bundle of known structure for differential polyol recognition. *Org. Lett.* **2013**, *15*, 5048-5051 (doi: 10.1021/ol402381n).
3. **Chu, J**; González-López, M; Cockroft, SL; Amorin, M; Ghadiri, MR. Real-time monitoring of DNA polymerase function and stepwise single-nucleotide DNA strand translocation through a protein nanopore. *Angew. Chem. Int. Ed.* **2010**, *49*, 10106-10106 (doi: 10.1002/anie.201005460).
2. Cockroft, SL; **Chu, J**; Amorin, M; Ghadiri, MR. A single-molecule nanopore device detects DNA polymerase activity with single-nucleotide resolution. *J. Am. Chem. Soc.* **2008**, *130*, 818-820 (doi: 10.1021/ja077082c).

1. Huang, KF; Ko, TP; Hung, CC; **Chu, J**; Wang, AHJ; Chiou, SH. Crystal structure of a platelet-agglutinating factor isolated from the venom of Taiwan habu (*Trimeresurus mucrosquamatus*). *Biochem. J.* **2004**, *378*, 399-407 (doi: 10.1042/bj20031507).

Patents

1. Brady, S.; Chu, J. Antibacterial synthetic-bioinformatic natural products and uses thereof. US 18008006, August 31, 2023
2. Chu, C-H; Chiou, S-L. A reduced calcium-dependent antibiotic derived from a calcium dependent antibiotic. US provisional patent, application no. 63/605,584.