Christina Bourne

Assistant Professor
Department of Chemistry and Biochemistry
College of Arts and Sciences
The University of Oklahoma

Contact Information:
Email: cbourne@ou.edu
Phone: 405-325-5348
Office:

Research Interests:
Our research interests are in the relation of protein function to macromolecular structure. We are integrating X-ray crystallography with microbiology and biochemistry to answer questions about toxin-antitoxin systems and other proteins, and their roles in bacteria that cause human disease.

Education:
1998: B.S. Biochemistry, University of Oklahoma
2003: Ph.D. Biochemistry, Structural and Molecular Biology, OMRF and the University of Oklahoma Health Sciences Center
2007: Postdoctoral Fellow, Structural Virology, OUHSC

Academic Appointments:
2014-Present: Assistant Professor, University of Oklahoma, Dept. of Chemistry and Biochemistry, Norman, OK
2007-2013: Associate Research Scientist, Oklahoma State University, Center for Veterinary Health Sciences, Stillwater, OK
2005-2007: American Cancer Society Mary Horton Postdoctoral Fellow, University of Oklahoma Health Sciences Center, Oklahoma City, OK
2003: Adjunct Instructor, Oklahoma City Community College, Science Division, Oklahoma City, OK
1997-1998: Associate Research Technician, Oklahoma Medical Research Foundation, Dept. of Crystallography, Oklahoma City, OK

Awards and Honors:
2000: Participant, RapiData X-ray Diffraction Data Collection and Structure Solving at Brookhaven National Laboratory, Upton, NY
200-Present: Member, American Crystallographic Association
2003-Present: Member, American Society for Biochemistry and Molecular Biology
2008- Present: Member, American Society for Microbiology
2009: Participant, MolSoft2009 Workshop on Modern Drug Target Crystallography and Structure Based Drug Discovery, San Diego, CA
2010: Guest Scientist, Community outreach program “Born To Do Science”
2011-Present: Member, Editorial Advisory Board, Journal of Molecular Recognition
2011-2012: Member, BEI Resources Scientific Focus Group for Biodefense and High Containment Bacteria

2012-2013: Chair, BEI Resources Scientific Focus Group for Biodefense and High Containment Bacteria
2012-2013: Mentor, Oklahoma State University Women's Mentorship Program
2014: Participant, RapiData X-ray Diffraction Data Collection and Structure Solving at Brookhaven National Laboratory, Upton, NY
2014-2017: Member, Editorial Board, Scientific Reports
2015: Participant, BioCAT Advanced SAXS Training Course, Argonne National Laboratory
2015: Tech to Trek guest promoting science careers to young women, Southwestern Okla State Uni
2015-Present: Member, OU Institutional Biosafety Committee
2001: Ludo Frevel Crystallography Scholarship, International Centre for Diffraction Data
2003: Pauling Poster Prize, American Crystallographic Association
2005: Travel Grant for attendance at the 20th International Union of Crystallography Congress and General Assembly, US National Committee for Crystallography
2005: Mary Horton Postdoctoral Fellowship, American Cancer Society
2014-2015: VPR Summer Faculty Fellowship, University of Oklahoma
2018: Louis Stokes Alliance for Minority Participation (LSAMP) Outstanding Faculty Mentor Award
2020: Peggy Cotter Early Career Travel grant
2020: Nancy L. Mergler Faculty Mentor Award for Undergraduate Research

Research Support:
Current:

- Department of Defense PRMRP Discovery Award, PR192335, Role: Principal Investigator, "Unlocking the potential of bacterial ParE toxins: Developing a blueprint for co-opting molecular time bongs that impact bacterial cell survival", February 2020-Feburary 2022.

Past:

- Oklahoma Center for the Advancement of Science, HR17-099, Role: Principal Investigator, "Targeting bacterial cell metabolism by manipulating toxin-antitoxin systems", January 2017-January 2020.
- NIH National Institute of General Medical Science, 1P20-GM-103640, Role: Project Leader, "Molecular Interactions of Toxin-Antitoxin Modules in Pseudomonas aeruginosa", June 2014-May 2017.
- Oklahoma State University Core Facilities Supporte, Role: Principal Investigatory, "Upgrade of OSU Macromolecular X-ray Equipment", November 2012-December 2012.
- NIH NIAID Division of Microbiology and Infectious Disease, IDIQ Contract HHSN2722011000201, Role: Co-investigator, "In VitroAssessment for Antimicrobial Activity, PartA: Bacteria and Fungi", June 2011-May 2014.
- NIH National Institute for Allergy and Infectious Disease, R01-AI-090685, Role: Co-Investigator, "Broad-spectrum Antifolates for Treatment of Drug Resistant Bacillus anthracis", July 2010-July 2015.

Selected Publications:

1. Bourne C.R., Finn M.G., Zlotnick A. Global structural changes in hepatitis B virus capsids induced by the assembly effector HAP1. J Virol. 2006; 80(22): 11055-61. Pubmed PMID: 16943288; PubMed Central PMCID: PMC1642186.
2. Zlotnick, A., Lee, A., Bourne C.R., Johnson, J.M., Domanico, P.L., Stray, S.J. *In vitro* screening for molecules that affect virus capsid assembly (and other protein association reactions). Nat. Protoc. 2007;2(3):490-98. PubMed PMID 17406612; PubMed Central PMCID: PMC2099249.
3. Barrow E.W., Clinkenbeard P.A., duncan-Decocq R.A., Perteet R.F., Hill K.D., Bourne P.C., Valderas M.W., Bourne C.R., Clarkson N.L., Clinkenbeard K.D., Barrow W.W. High-throughput screening of a diversity collection using biodefense category A and B priority pathogens. J Biomol Screen. 2012 Aug;17(7):946-56. PubMed PMID: 22653912; PubMed Central PMCID: PMC3700734.
4. Bourne C.R., Wakeham N., Bunce R.A., Nammalwar B., Berlin K.D., Barrow W.W. Classifying compound mechanism of action for linking whole cell phenotypes to molecular targets. J Mol Recognit. 2012 Apr;25(4):216-23. PubMed PMID: 22434711; PubMed Central PMCID: PMC3703735.
5. Muthramalingam M, White JC, Murphy, T., Ames, J.R., Bourne C.R. The toxin from a ParDE toxin-antitoxin system found in *Pseudomonas aeruginosa* offers protection to cells challenged with anti-gyrase antibiotics. Mol. Microbiol. 2019 Feb; 111(2):441-54. PubMed PMID: 30427086; PubMed Central PMCID: PMC6368863.
6. Ames, J.R., Muthuramalingam M, Murphy, T., Najar F.Z., Bourne C.R. Expression of different ParE toxins results in conserved phenotypes with distinguishable classes toxicity. Microbiol. Open. 2019 July;e902. PubMed PMID: 31309747; PubMed Central PMCID:in progress.
7. McGillick, J. Ames, J.R., Murphy, T., redeem, E., Bourne C.R. A YoeB toxin from *A. tumefaciens* has metal-dependent DNA cleaving activity. 2019 BioRxiv 79521 [Preprint, version 1]. doi: 10.1101/795211
8. AMes, J.R., McGillick, J., Murphy, T., Redeem, E., Bourne, C.R. Identifying a molecular mechanism that imparts species-specific toxicity to YoeB toxins. Front. Micro. 2020 Accepted, *In press*.
9. . Bourne C.R., Barrow E.W., Bunce R.A., Bourne P.C., Berlin K.D., Barrow W.W. Inhibition of antibiotic resistant Staphylococcus aureus by the broad-spectrum dihydrofolate reductase inhibitor RAB1. Antimicrob Agents Chemother. 2010 Sep;54(9):3825-33. PubMed PMID: 20606069; PubMed Central PMCID: PMC2934973.
10. Bourne C.R., Wakeham N., Webb N., Nammalwar B., Bunce R.A., Berlin K.D., Barrow W.W. The structure and competitive substrate inhibition of dihydrofolate reductase from Enterococcus faecalis reveal restrictions to cofactor docking. Biochemistry. 2014 Feb 25;53(7):1228-38. PubMed PMID: 24495113; PubMed Central PMCID: PMC3985486.
11. Bourne C.R., Wakeham N., Nammalwar B., Tseitin V., Bourne P.C., Barrow E.W., Mylvaganam S., Ramnarayan K., Bunce R.A., Berlin K.D., Barrow W.W. Structure-activity relationship for enantiomers of potent inhibitors of B. anthracis dihydrofolate reductase. Biochim Biophys Acta. 2013 Jan;1834(1):46- 52. PubMed PMID: 22999981; PubMed Central PMCID: PMC3530638.
12. Muddala, P.N., White, J.C., Nammalwar, B., Pratt, I., Thomas, L.M., Bunce, R.A., Berlin, K.D., Bourne, C.R. Inhibitor design to target a unique feature in the folate pocket

of Staphylococcus aureus dihydrofolate reductase. 2020 Eur. J. Med. Chem. Accepted, In press.
13. Stray S.J., Bourne C.R., Punna S., Lewis W.G., Finn M.G., Zlotnick A. A heteroaryl dihydropyrimidine activates and can misdirect hepatitis B virus capsid assembly. Proc Natl Acad Sci U S A. 2005 Jun 7;102(23):8138-43. PubMed PMID: 15928089; PubMed Central PMCID: PMC1149411.
14. Bourne C, Lee S, Venkataiah B, Lee A, Korba B, Finn MG, Zlotnick A. Small-molecule effectors of hepatitis B virus capsid assembly give insight into virus life cycle. J Virol. 2008 Oct;82(20):10262-70. PubMed PMID: 18684823; PubMed Central PMCID: PMC2566253.
15. Bourne C.R., Katen S.P., Fulz M.R., Packianathan C., Zlotnick A. A mutant hepatitis B virus core protein mimics inhibitors of icosahedral capsid self-assembly. Biochemistry. 2009 Mar 3;48(8):1736-42. PubMed PMID: 19196007; PubMed Central PMCID: PMC2880625.
16. Alverado U.R., DeWitt C.R., Shultz B.B., Ramsland P.A., Edmundson A.B. A method for growing protein crystals in capillary tubes. J Cryst Growth 2001; 233:407-414.
17. Terzyan S.S., Bourne C.R., Ramsland P.A., Bourne P.C., Edmundson A.B. Comparison of the three dimensional structures of a human Bence-Jones dimer crystallized on Earth and aboard US Space Shuttle Mission STS-95. J Mol Recognit. 2003 Mar-Apr;16(2):83-90. PubMed PMID: 12720277.
18. Ramsland P.A., Upshaw J.L., Shultz B.B., DeWitt C.R., Chissoe W.F., Raison R.L., Edmundson A.B. Interconversion of different crystal forms of Fabs from human IgM cryoglobulins. J Cryst Growth 2001; 232:204-214.
19. Ramsland P.A., Terzyan S.S., Cloud G., Bourne C.R., Farrugia W., Tribbick G., Geysen H.M., Moomaw C.R., Slaughter C.A., Edmundson A.B. Crystal structure of a glycosylated Fab from an IgM cryoglobulin with properties of a natural proteolytic antibody. Biochem J. 2006 May 1;395(3):473-81. PubMed PMID: 16422668; PubMed Central PMCID: PMC1462693.