Robin Couch, PhD

Associate Professor, Department of Chemistry and Biochemistry

Education

PhD, Biochemistry, University of Calgary

Key Interests

Metabolomics | Enzymology | Small Molecule Purification | Protein Purification | Antibiotics | Isoprene Biosynthesis | Volatile Organic Compounds (VOCs)

CONTACT

Phone: 703-993-4770 | Email: rcouch@gmu.edu

Websites: mason.gmu.edu/~rcouch/

SELECT PUBLICATIONS

- R. D. Couch *et al.*, The approach to sample acquisition and its impact on the derived human fecal microbiome and VOC metabolome. *PLoS One* 8(11), e81163 (2013).
- R. D. Couch *et al.*, Alcohol induced alterations to the human fecal VOC metabolome. *PLoS One* 10(3), e0119362 (2015).
- A. Haymond *et al.*, A high-throughput screening campaign to identify inhibitors of DXP reductoisomerase (IspC) and MEP cytidylyltransferase (IspD). *Anal Biochem* 542, 63-75 (2018).
- X. Wang *et al.*, MEPicides: α,β-unsaturated fosmidomycin analogues as DXR inhibitors against malaria. *J Med Chem* 61, 8847–8858 (2018).

Research Focus

With more than 20 years of research experience, my research career is centered upon the purification and characterization of biomolecules. My research group has expertise and experience in purifying and characterizing volatile organic compounds (VOCs), non-volatile metabolites, enzymes and other proteins, nucleic acids, carbohydrates, lipids, and other small molecule metabolites. My research lab is very well equipped with modern biochemistry related instrumentation, including multiple UV-Vis spectrophotometers, two GC-FIDs, a GC-NPD, and semi-preparative and preparative HPLCs. Our metabolomics platform is centered upon an Agilent 7890A Gas Chromatograph with 5975C Mass Spectrometer, an Agilent 1290 Infinity LC with a 6530 QToF (MS/MS), and an Agilent 1100 LC-MSD (with interchangeable ESI, APPI, and APCI sources). Coupled with our custom designed software algorithms and the commercially purchased Agilent Mass Profiler Professional software package, these instruments enable a comprehensive examination of biomolecules present in biological samples.

Current Projects

- Ongoing research projects capitalize on our metabolomics and protein chemistry expertise to develop inhibitors of the methyl erythritol phosphate pathway to serve as new antibiotics
- Investigate alcohol and diet induced changes to the fecal and serum metabolome and correlate these biomarker changes to various stages of disease
- Develop a diagnostic blood test to identify diabetic patients suitable for transplant of insulin producing cells
- Identify microbial biomarkers for the development of a rapid diagnostic for the identification of antibiotic sensitive and resistant strains of biothreat agents