Personal Statement

Dr. Jessica R. Bame has 15 years of experience in applying mass spectrometry, chromatography and NMR to a wide variety of analytical applications. She worked in collaboration with RTI International and the University of North Carolina at Greensboro for 4 years in natural product drug discovery, isolating and identitying a previous unknown efflux pump inhibitor against S. aureus in Alkanna Orientalis. She moved to the Georgia Institute of Technology working with the CDC and international partners to further develop MS/MS detection methodologies for sphingolipids in mouse/human tissue samples. She obtained her PhD at the University of Bristol focusing in NMR, developing techniques for quantitative distance determination via NOE. With this wide variety of skills, she worked for 3 years at the University of Glasgow under Professor Leroy Cronin as part of a project team developing a metric for chemical space complexity quantification via NMR, IR and Mass Spectrometry to be used by international space agencies. In addition, she co-managed a 600 MHz NMR for a highly discipline diverse team of 70 researchers, performing experimental optimisation and development to assisting team in approach to analytical research. Now she is a co-manager of the PAC Mass Spectrometry Facility at the University of Strathclyde along with a lecturer of 3rd year undergraduate students in mass spectrometry theory and applications.

Qualifications

Doctor of Science, PhD in Chemistry, University of Bristol
Award Date: 16 Jan 2018

Master of Chemistry, Georgia Institute of Technology, Georgia Institute of Technology
Award Date: 3 Aug 2013

Bachelor of Science, Bachelors in Chemistry with Concentration in Research, The University of North Carolina at Greensboro
Award Date: 7 May 2011

Projects

Analysis of nicotine commercial products

Anderson, G. (Principal Investigator) & Bame, J. (Co-investigator)
BBC British Broadcasting Corporation
19/05/25 → 30/06/25

Analysis of potentially contaminated samples

Anderson, G. (Principal Investigator) & Bame, J. (Co-investigator)
BBC British Broadcasting Corporation
6/11/23 → 31/12/23

CPI GCMS Analysis 40 samples

Bame, J. (Principal Investigator) & Anderson, G. (Co-investigator)
Cpi Innovation Services Limited
15/04/25 → 30/09/25

CPI process sample screening

Bame, J. (Principal Investigator) & Anderson, G. (Co-investigator)
Cpi Innovation Services Limited
6/11/23 → 31/03/24

Determination of residual process material by GC-MS

Anderson, G. (Principal Investigator) & Bame, J. (Co-investigator)
Kanthal Ltd
18/05/23 → 31/07/23

Facility Manager of PAC Mass Spectrometry

Bame, J. (Technician) & Anderson, G. (Principal Investigator)

Gate 1 Funding for Industrialisation of PAC Mass Spectrometry Facility and SCMB

Bame, J. (Principal Investigator) & Anderson, G. (Principal Investigator)

Gate 2 Funding for Commercialisation of PAC MS and SCMB
Bame, J. (Principal Investigator) & Anderson, G. (Principal Investigator)

GC-MS analysis of residual process material
Anderson, G. (Principal Investigator) & Bame, J. (Co-investigator)
Kanthal Ltd
26/06/23 → 31/08/23

Ink Analysis by LCMS
Bame, J. (Principal Investigator) & Anderson, G. (Co-investigator)
Integrated Graphene Ltd (formerly RD Graphene Ltd)
24/11/25 → 15/12/25

Kanthal-Identification of toxic substances in processes
Bame, J. (Principal Investigator) & Anderson, G. (Academic)
31/05/23 → 30/06/23

Keltic Pharmaceuticals
Bame, J. (Principal Investigator) & Anderson, G. (Principal Investigator)
15/03/23 → 18/06/23

Priority access to GCMS and LCMS for KE CC208
Bame, J. (Principal Investigator) & Anderson, G. (Co-investigator)
Terumo Aortic Limited
24/08/22 → 2/09/22

Spirit Aerosystems - GCMS analysis of solvent recycling
Bame, J. (Principal Investigator) & Anderson, G. (Co-investigator)
Spirit Aerosystems (Europe) Ltd
22/02/23 → 31/03/23

Terumo Aortic- Analysis of Industrial Contamination
Bame, J. (Principal Investigator) & Anderson, G. (Principal Investigator)
1/09/22 → 30/11/22

Terumo Aortic GCMS Screening 36 samples
Bame, J. (Principal Investigator) & Anderson, G. (Co-investigator)
Terumo Aortic Limited
2/12/24 → 28/02/25

Dr. Jessica R. Bame
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Key Skills

- Management of Industry Facing University wide Analytical Facility
  - Lead manager of Analytical Facility covering whole of University of Strathclyde focusing in Mass Spectrometry but also techniques such as ICP-MS and GC-FID
  - Modernised Facility after taking over from previous management
    - digitising accounts, installed Wi-Fi, overhauled website and improved data security/management
    - purchased Mestrenova so users of site could work from home instead of data processing only in active lab space
    - Applied 5S principles to organisation of space for improved efficiency, safety and security
    - Overhauled lab for sustainability goals such as switching to paperless reporting and use of tablets
  - Regularly obtained external funding for facility improvement

- External collaborations
- Successful funding bids

oProvide support, regular maintenance and organise external PMs for 9 instrument set ups including advanced techniques such as MALDI-TOF, ICP-MS and UPLC-Orbitrap
oOrganises and provides training for end-users of equipment
oCreated and organised yearly conference in Scotland for Mass Spectrometry Users (currently focusing in lowland wide region with academia and industry partners)

- Currently assisting in the conference setup and management for EuroMar 2023, along with presenting own research at event

oPromoted collaborations with other facilities within University and without to improve analytical offers for scientific enquiries of end users.
oSet up monthly meetings with end user base to keep in touch with user's changing needs and priorities

- Teaching 3rd year lecture course in Mass Spectrometry

oFull design of course overhaul to better connect with students post-pandemic
oUse of props and real world applications
oProvide test questions examples and multiple sessions to go over them in person along with weekly office hours
oDesign test and marking
oCurrently in progress to obtain PgCert in Academic Practice along with HEA fellowship in 2023

- NMR Spectroscopy

oStructural elucidation with variety of advanced NMR experiments

- Use of 1H-1H, 1H-13C scalar coupling and NOE intermolecular distances for 3D structural elucidation

oInterpretation of spectra
oOptimisation and Development of new experiments
oProficiency is use of V NMR J & Topspin instrumental software and Mestrenova data processing software
oManagement of Bruker Ascend Aeon 600 MHz NMR spectrometer for research group of 60+ members at University of Glasgow

- Maintenance of NMR including weekly preventative maintenance and troubleshooting/repair of hardware and software malfunctions when required.
- Changing probes every 2-3 months between DCH cryoprobe and Room temperature BBFO probe
- Adding new experiments to NMR and optimisation for use for group analytical needs varying from organometallic synthesis to peptide mixtures and biological samples
- Training new users, assisting in individual group members project needs to determine best NMR experimental approach, managing user issues that arise with NMR use, teaching weekly core NMR theory to group members of varied scientific backgrounds
- Creating workable workflows from high field NMR to low field benchtop NMR

- Mass Spectrometry

oExpertise across multiple morphologies including: GC-MS/GC-FID, UPLC-MS, UPLC-Orbitrap, MALDI-ToF
oOptimisation of experiments

- Creation of MRM pairs for detection of analytes in complex biologicial mixtures (spinal fluid, urine, liver and brain tissue from human clinical trials and mouse models)
- Optimisation of ionisation and fragmentation (whether in-source or via collision chamber)
- Testing in positive and negative modes when appropriate
- Choosing best choice of mass spectrometer when variety of instruments available (such as choosing between ion-trap versus TOF mass analyser)
- Facilitating hybridisation of mass spectrometer with HPLC/UPLC chromatography set-ups for mixture analysis

oInterpretation of spectra for structural elucidation and analyte detection in complex mixtures

- Creating interpretation reports for collaborators and for in lab use.

oTroubleshooting and Maintenance

- Cleaning ion-source and front end (when possible without engineer)
- Identifying sources of ion suppression
- Identifying which vacuum pump causing vacuum leaks or incorrect pressures in system
- Communicating with instrument's providers technicians for higher complexity malfunctions
- Troubleshooting issues arising from integration with HPLC
- Tracking leaks in solvent lines and clogs
- Optimising solvent pressure for desired gradient and separation
- Maintaining solvent levels, changing solvents and purging lines when appropriate

oTraining of new users
oProficiency in use of XCalibur, Analyst and Mestrenova instrumental software

- ICP-MS

oSetup and analysis of ICP-MS experiments

- Evolved in analysis of environmental metal detection

oTrained by Agilent Technologies in cutting edge applications (4 training courses both online and at Waldbronn, Germany site)

- Computational Modelling
  - oDFT geometry optimisation and frequency calculations
  - oConformer Searches
  - oProficiency in use of Gaussview and Macromodel computational software
  - oUse of UNIX and Python, including creating new code to automate data analysis

- Chromatography
  - oCreation and optimisation of gradients using flash chromatography and HPLC set-ups
  - oTroubleshooting and day to day maintenance of Shimadzu HPLC

- Biological Bacterial Assays for minimal inhibitory concentration antimicrobial assays

- Peptide synthesis via solid state Biotage peptide synthesiser

- 3D printing

- Management of students including training, mentorship and assistance in paper/ thesis writing

- Proficiency in all areas of Microsoft Office, including Access, Excel, Word and PowerPoint

- Training in communication via Vox training and Masterclass provided by Udemia

Research History

Facility Manager of Pure and Applied Chemistry Mass Spectrometry & Analytical Facility, University of Strathclyde, Glasgow, UK
(November 2021 – Current)

- Manage Analytical Facility that serves whole of University of Strathclyde primarily in Mass Spectrometry analysis needs also including ICP-MS
- Modernised Facility upon taking over facility from individual who managed facility for 41 years
  - oAccount digitisation, website overhaul and improved data security/management
  - oApplied 5S principles to lab to improve efficiency and safety/security of lab
  - oApplied and obtained several thousand in funding to promote facility offering to academia and industry
- Regularly work with industry such as Spirit Aerosystems to provide analytical testing and as collaborators in ongoing projects
- Promote facility through creation of yearly conference along with attending conferences and reaching out to academia and promotion through website
  - oWorked with external consultant to perform market research and optimise how to improve promotion of facility to external clients

Researcher in Chemical Robotics with Lee Cronin Group, University of Glasgow,Glasgow, UK
(November 2018 – October 2021)

- Development of NMR methodology to determine Molecular Complexity via the Molecular Assembly algorithm metric for molecules isolated and in mixtures to be applied to biomarker detection for space agencies working in combination with mass spectrometry.
- Management of Bruker Ascend Aeon 600 MHz NMR spectrometer for 60+ members, including assistance in group members projects using NMR and other analytical methods
- Creating new NMR experiments for mixture separation and molecular complexity determination including HPLC methods for flow NMR
  - oDeveloping new HPLC methods that work with both mass spectrometry analysis and NMR for cross validation of results from high throughput screening
  - oTesting mixture analysis methodology with mass spectrometry(optimising conditions) followed by NMR analysis

Doctoral Research, University of Bristol, Bristol, UK
(September 2013 – February 2018)

- Using 1H-1H & 1H-13C scalar coupling and NOE to determine accurate 3D structure of compounds via advanced NMR experimentation.
- Optimisation via temperature profiling of NOE for determination of quantitative intermolecular distances in small molecules
- Calculating scalar couplings and intermolecular distances from DFT optimized computational molecular structures from Monte Carlo conformer searches

Masters Research, Georgia Institute of Technology, Atlanta, Georgia, USA
(August 2011 – June 2013)

- Analysis of sphingolipid profiles of samples from biological tissues via LC-MS-MS
- Optimisation of LC gradients for separation of sphingolipids
- Creation and optimisation of MS methods for optimised MRM fragment pair tracking for accurate identification of sphingolipids in complex samples.
- Troubleshooting, repair and day to day maintenance of Shimadzu LC and Applied Biosystems Linear Ion trap MS.
- Preparation of biological samples for LC-MS analysis
- Creation of excel reports for each sample analysed with determined concentrations of sphingolipids analysed by MS.

Undergraduate Research Degree and Internship, University of North Carolina at Greensboro, Greensboro, North Carolina, USA
(January 2008 – August 2011)
- Bioassay guided screening of a series of natural products from RTI International for antimicrobial activity
- Bioassay/Mass Spectrometry guided fractionation and purification of the flavanoid sarothrin in Alkanna Orientalis, determined to be antimicrobial agent and reflux pump inhibitor against S. Aureus
- Chromatographic optimisation via Flash Chromatography and HPLC for gradients for higher purity of isolate.
- Mass Spectrometry and NMR analysis for structural determination and identification of sarothrin as antimicrobial agent in Alkanna Orientalis

Undergraduate Research Internship, University of Bristol, Bristol, UK
(July 2010 – August 2010)
- Trained in Advanced 2D NMR techniques
- Testing the effects of solvent on quantitative NOE distance determination in Strychnine

Natural Products Research Internship, Research Triangle Institute International, North Carolina, USA
(May 2008 – August 2008)
- Organising and creating a catalogue of over 2000 plants to be screened in antimicrobial and possibly anticancer assays
- Extracting raw plant material via liquid-liquid extraction for later antimicrobial screening

Teaching History

Lecture 3rd year Mass Spectrometry Course, University of Strathclyde,Glasgow, UK
(November 2022-Present)
- Full design of course overhaul to better connect with students post-pandemic
- Use of props and real world applications
- Provide test questions examples and multiple sessions to go over them in person along with weekly office hours
- Design test and marking

Postgraduate Demonstrator, University of Bristol, Bristol, UK
(September 2014 – May 2016)

- Teaching 2nd year analytical labs theory and procedures to perform various types of chromatography and to use tandem GC-MS
- Creating quizzes, marking lab reports and providing feedback to improve student understanding of concepts

Graduate Teaching Assistant, Georgia Institute of Technology, Atlanta, Georgia, USA
(August 2011 – May 2013)

- Teaching 1st year Chemistry students theory and procedures of various experiments
- Marking weekly reports and providing office hours for help and feedback
- Running weekly recitation sessions for students to work through practice problems for lecture courses and provide increased understanding in concepts.
- Preparing lab materials for experiments and optimising experiments for students understanding

Education and Qualifications

Six Sigma Yellow Belt
(September 2023)

HEA Fellowship
(January 2022 – Current)

PG Certificate in Academia Practice
(January 2022 – Current)

PhD in Chemistry, University of Bristol
(September 2013 – February 2018)

Masters in Chemistry, Georgia Institute of Technology
(August 2011 –August 2013)

Bachelors in Chemistry with Concentration in Research, University of North Carolina at Greensboro-Graduated Cum Laude
(August 2007 –May 2011)

Publications

1.Bame, J. R.; Graf, T. N.; Junio, H. A.; Bussey, R. O., III; Jarmusch, S. A.; El-Elimat, T.; Falkinham, J. O., III; Oberlies, N. H.; Cech, R. A.; Cech, Cech, N. B. Sarothrin from Alkanna orientalis is an antimicrobial agent and efflux pump inhibitor. Planta Med. 2013, Vol. 79, 5, 327-329.

2.Park, W.; Park, J.; Erez-Roman, R.; Kogot-Levin, A.; Bame, J. R.; Tirosh, B.; Saada, A.; Merrill, A. H., Jr.; Pewzner-Jung, Y.; Futerman, A. H. Protection of a Ceramide Synthase 2 Null Mouse from Drug-induced Liver Injury. J. Biol. Chem. 2013, Vol. 288, 43, 30904-30916
3.Farfel-Becker, T.; Vitner, E. B.; Kelly, S. L.; Bame, J. R.; Duan, J.; Shinder, V.; Merrill, A. H., Jr.; Dobrenis, K.; Futerman, A. H. Neuronal accumulation of glucosylceramide in a mouse model of neuronopathic Gaucher disease leads to neurodegeneration. Hum. Mol. Genet. 2014, Vol. 23, 4, 843-854
4.Burns, M.; Essafi, S.; Bame, J. R.; Bull, S. P; Webster, M. P.; Balieu, S.; Butts, C. P.; Harvey, J. N.; Aggarwal, V. K; Dale, J. W. Assembly-line synthesis of organic molecules with tailored shapes. Nature. 2014, Vol. 513, 7517, 183-188
5.Jones, C. R.; Greenhalgh, M. D.; Bame, J. R.; Simpson, T. J.; Cox, R. J.; Marshall, J. W.; Butts, C. P. Subtle temperature-induced changes in small molecule conformer dynamics - observed and quantified by NOE spectroscopy Chem. Comm., 2016, Vol. 52, 14, 2920-2923
6.Bame, J.; Hoeck, C.; Carrington, M.J.; Butts, C.P.; Jager, C.M.; Croft, A.K. Improved NOE fitting for flexible molecules based on molecular mechanics data – a case study with S-adenosylmethionine. Phys. Chem. Chem. Phys., 2018, 20, 7523-7531
7.Sinclair, Zoe; Bell, Nicola; Bame, Jessica; Long, De-Liang; Cronin, Lee. (2022). A Water-soluble Self-assembled {Pd84}Ac Polyoxopalladate Nano-wheel as a Supramolecular Host. Angewandte Chemie. 135. 10.1002/ange.202214203.
8.Bame, Jessica; Jirasek, Michael; Sharma, Abhishek; Bell, Nicola: Marshall, Stuart: Mathis, Cole: Macleod, Alasdair: Cooper, Geoffrey; Swart, Marcel; Mollfulleda, Rosa; Cronin, Leroy. (2023). Multimodal Techniques for Detecting Alien Life using Assembly Theory and Spectroscopy.