***Curriculum Vitae***

***Brian Allen Eckenrode***

 25857 Cameron Walk Place

 Aldie, VA 20105

 Mobile: (703) 927-8825 Home: (703) 542-7654

*e-mail* (W): *beckenro@gmu.edu*

 *e-mail* (H):*brian.jo.eckenrode@verizon.net*

***EDUCATIONAL BACKGROUND***

Ph.D. in Analytical Chemistry, November, 1988 Michigan State University, E. Lansing, MI.

**Topic** ‑ *The Development and Application of Post‑sector Beam Deflection in Time‑resolved Ion*

*Momentum Spectrometry.* Advisors: Dr. C.G. Enke and Dr. J.T. Watson

M.S. in Analytical Chemistry, December, 1985 Michigan State University, E. Lansing, MI.

**Topic** ‑ *Design and Performance of a Collision Cell for Time‑resolved Ion Momentum Spectrometry*

B.S. in Chemistry, June 1981 Canisius College, Buffalo, NY.

***EMPLOYMENT HISTORY***

01/22- **Full-time Associate Faculty** – George Mason University – Forensics Science Program

 *Research and Instructional Appointment* – Forensic Chemistry FRSC 304/5 405

8/99-11/21 Research Analytical Chemist at the FBI – *Research and Support Unit* - Quantico, VA.

 R&D using chromatographic and detection instrumentation for rapid field trace organic and bacterial analyses, as well as mass spectrometric-based protein, mtDNA /Y-SNP genotyping methodologies for human ID, missing persons, and mass disaster investigations. *(TS-polygraph)*

 *Major cases/investigations/deployments*:

Provided expert testimony for the State of California in CA v. Benigno Salcedo, an attempted homicide investigation. Results of the FBI laboratory sponsored research that tested the ability of the STU-100 to reliably capture and release human scent at room temperature were presented. The court concluded that the STU and canine scent discrimination evidence was admissible, with corroboration. *Kelly-Frye hearing*

Provided expert testimony to assist the state of Alaska in USA v. Joshua Alan Wade, a capital murder investigation. The court concluded that the FBI’s contracted canines and STU protocols were reliable and thus a contested search warrant was indeed valid. The field and laboratory research and training of the canines for human scent trailing was deemed admissible by the court.

*Daubert hearing – Human Scent*

 Provided expert testimony to assist the state of Georgia v. Sam Parker, a capital murder investigation *Kelly-Frye hearing – Human Decomposition*

 *Select Collaborative Exercises, Interactions, and Research Liaisons*

 Omaha Nebraska (child homicide investigation) canine search

 Anthropological Research Facility and Lincoln Memorial University - human subjects research

 Nashville, TN – human remains burial and submerged

 Canine training – Bloodhounds Mia, Montana, and Poncho – laying scent trails

 Springer Spaniels: Morse, Keela, Reebus, and Missi

 Dallas, TX (homicide investigation) canine search over water

 San Antonio, San Marcos, TX and Boston University – human decomposition research

 Nunspeet, Netherlands and Finland Police – canine research

 Pennsylvania State University – canine olfaction flow dynamics

 Canine/scent/odor workshops including SWGDOG member

 Medicine Hat, Canada – Chemical Warfare Agent research

 Singapore – environmental toxins research Australian Federal Police

 CIA, NIST, NRL VOC studies, DTRA bacterial studies Gerstel, CDS-Dynatherm

 FBI Biometric Center of Excellence – epithelial cell and VOC study with WVU and FIU

MITRE Corp, Inficon, Thermo, Agilent, Bruker, Waters, RVM, SAIC, BioAnalyte, NYDEP,

Provided advanced forensic mass spectrometry and chromatography instruction to local and

 regional forensic labs throughout the United States

Internal units supported: ERTU (several on-going research presentations to local and regional law enforcement for human scent, human decomposition, and electronic media canine training and investigative intelligence), CBRNSU, HMRNSU, EU, CU, QDU (database development, footwear and handwriting decision analysis studies – *aka* Black Box)

Adjunct professorship at the Uniformed Services University of the Health Sciences

Adjunct professorship at **George Mason University College of Science Forensic Science Program** – MS (FRSC 540) Forensic Chemistry Spring 2015, Spring 2016 and BS (FRSC 304) Spring 2016 – present (10 semesters as of Spring 2021) Forensic Chemistry – ***planned FRSC 305 and 404***

Collaborative research with The George Washington University Forensics - protein analysis

Collaborative research with West Virginia University Forensics Program - pattern analysis

**GMU and Lance Liotta’s team at the IABR**

Sept. 1990 - **Research Analytical Chemist at Viking Instruments Corp.**, Chantilly, VA.

Nov. 1998 Designed and developed fieldable mass spectrometric instrumentation for analytical applications in forensics, international chemical weapons treaty verification, and the

 environment. Promoted to **Director of** **Research** in August of 1995.

 Directed the company’s software development team and led the design and implementation of the instrument’s automated fieldable inlet system. Provided analytical support and training.

1989 ‑ **Post‑doctoral fellow at Oak Ridge National Laboratory**, Oak Ridge, TN.

Aug. 1990 Supervisors: Dr. Gary L. Glish *(now at UNC)* and Dr. Scott A. McLuckey *(now at Purdue Univ)* Research with instrumentation for the determination of trace quantities of organics (explosives) in air, gas phase ion chemistry, and positron ionization. *(L-clearance)*

1982‑1988 **Michigan State University Graduate Assistant**

 Performed research in mass spectrometry, specifically MS/MS.

1983 **General Motors Research Laboratories**, Warren MI.

June‑Sept. Responsible for providing sample analysis by x‑ray diffraction, in addition to methods

 development. Resulted in a research memorandum entitled:

 *Determination of Polymer Crystallinity by X‑ray Diffraction*.

1981‑1982 **Roswell Park Memorial Cancer Institute**, Buffalo, NY.

 Development of methods for the fractionation and characterization of Calf Thymus H4.

***AREAS OF EXPERIENCE***

*Computers and Computer Languages/Packages*

 80x86 and 68000 based micros

 DEC PDP 11/23 ‑ RSX, VMS

 FORTH, Pascal, Visual Basic, Basic, Fortran, and *minimal* C++

 SIMION vs. 4.02

 OrCAD, AutoCAD, Visio, Windows 3.x, 95, NT, 2000, XP, 7, 10

 Remote control/network: CloseUp, ReachOut, PCAnywhere

 Unscrambler (CAMO, Inc.) for PCA and PLS *multivariate statistical analysis*

*Analytical Instrumentation*

 Gas Chromatography/Mass Spectrometry (GC-MS) and GC-GC/MS (Leco Pegasus)

 Quadrupole MS (Agilent 597X, and Inficon Hapsite) and Sector MS (JEOL HX-110)

 GC‑MS/MS (magnetic sector instrument modified for TOF)

 High Speed Data Acquisition in Time‑of‑flight MS

 MALDI-TOFMS (ABI-DE, Bruker MALDI TOF/TOF)

 LC/MS (Agilent 1100 with APCI, Electrospray, APPI)

 Nano-LC/MS using Thermo Easy Nano System interfaced to a QE+ (*orbitrap* MS)

 Ion Trap Mass Spectrometry (Thermo LTQ, LCQ, and Polaris)

 Ion Mobility Mass Spectrometry - Bruker SPME-RAID, Smith’s Detection and IonTrak Systems

 Atmospheric Sampling Glow Discharge MS

 Membrane Inlet MS X‑ray Powder Diffraction Gel Chromatography

 Hyperspectral Imaging FTIR-Spectromicrotomography

 Capillary Electrophoresis (ABI 310)

 QTOF micro (Waters)

 Caliper Life Sciences SciClone 3000 Automated Liquid Handler Robotics System

 DNA Analysis via Mass Spectrometry (Ibis T5000)

 Chip-based Adaptive High Volume VOC Sampler Development – ***Patent in preparation***

 EPA methods: *Air:* TO-1, TO-2, TO-14, TO-15

 *Drinking water:* 524.2/525

 *Waste water:* 624/625

 *Solid waste/soil:* VOCs 8240/60, Semi-VOCs 8250/70

***RESEARCH INTERESTS***

 Trace organic volatiles analysis for forensic and clinical applications – *whole body and breath*

 High speed MS/MS, GC‑MS/MS, multidimensional and hybrid systems

 Computer assisted data analysis and modeling

 Trace component analysis and collection development – *small form factor*

 Instrumentation development, miniaturization, intelligence and investigative

 Field GC-MS (environment, treaty verification, forensics, and intelligence)

 High-speed GC and multi-dimensional GC

 Single-nucleotide polymorphism (SNP) analysis via mass spectrometry

***HONORS AND SOCIETIES***

 Analytical Chemistry and Merck Index Award for Chemical Research ‑ Canisius College

 Merit Level Teaching Award ‑ Michigan State University

 Four Citations for Special Achievement in Research (FBI): 2007, 2017, 2020, 2021

 FBI Directors’ Award for Research Achievement – *acknowledged in* 2022

 American Society for Mass Spectrometry and American Chemical Society

 Associate Editor of the Field Analytical Chemistry and Technology (FACT) journal

 OnSite Conference Chairman (2011)

***PUBLICATIONS AND PRESENTATIONS***

 1. B.A. Eckenrode, J.T. Watson, J.F. Holland, C.G. Enke: *Post‑sector Beam Deflection in Time‑resolved Ion Momentum Spectrometry*, Int. J. Mass Spectrom. Ion Proc., 83, (1988) 177‑187.

 2. B.A. Eckenrode, J.T. Watson, J.F. Holland and C.G. Enke: *Complete MS/MS Data Field Acquisition on the Chromatographic Time Scale by Time‑resolved Ion Momentum Spectrometry with Time‑array Detection*. Anal. Chem., 62, (1990) 1362-1367.

 3. B.A. Eckenrode, B.H. Newcome, E. Erickson, G. Yefchak, M. Davenport, J.F. Holland: *An Integrating Transient Recorder for Time‑Array Detection in Time‑of‑flight Mass Spectrometry*. Presented at the American Society for Mass Spectrometry (ASMS) Fall Workshop, Washington, DC, 1986.

 4. B.A. Eckenrode, B.H. Newcome, J.F. Holland, C.G. Enke: *Post‑sector Beam Deflection In Time‑resolved Ion Momentum Spectrometry (TRIMS) and Its Use with Time‑Array Detection (TAD) for MS/MS Map Acquisition.* Presented at the 35th ASMS Conference on Mass Spectrometry and Allied Topics, Denver, CO, May 1987.

5. J.F. Holland, E. Erickson, B.A. Eckenrode, and J.T. Watson: *Time‑array Detection: Mass Spectrometry's Answer to High Resolution Chromatography.* Presented at the 35th ASMS Conference on Mass Spectrometry and Allied Topics, Denver, CO, May 1987.

 6. B.A. Eckenrode, B.H. Newcome, J.T. Watson, J.F. Holland and C.G. Enke: *MS/MS On the*

 *Chromatographic Time Scale by Time‑resolved Ion Momentum Spectrometry (TRIMS).* Presented at the 14th Annual Federation of Analytical Chemistry and Spectroscopy Societies, Detroit, MI, Oct. 1987.

 7. B.A. Eckenrode, J.T. Watson, J.F. Holland and C.G. Enke: *Complete MS/MS Data Field Acquisition on the Chromatographic Time Scale by Time‑resolved Ion Momentum Spectrometry (TRIMS) with Time‑array Detection (TAD).* Presented at the 36th ASMS Conference on Mass Spectrometry and Allied Topics, San Francisco, CA, May 1988.

 8. B.A. Eckenrode, K.L. McNitt, R. Tecklenburg and J.F. Holland: *Accurate Mass Assignment From Simultaneous Measurement of Ion Velocity and Momentum*. Presented at the ANACHEM Symposium, Plymouth, MI, Oct. 1988.

 9. M. Davenport, B.A. Eckenrode, K.L. McNitt, R.E. Tecklenburg and J.F. Holland: *The Development of a Parallel Processor Computing System for Real‑time Data Processing in Time‑array Detection Mass Spectrometry.* Presented at the ANACHEM Symposium, Plymouth, MI, Oct. 1988.

10. B.A. Eckenrode, G.L. Glish, and S.A. McLuckey: *Negative Ion Chemical Ionization in an Ion Trap Mass Spectrometer Using Reagent Anions Injected From An External Ion Source*. Presented at the 37th ASMS Conference on Mass Spectrometry and Allied Topics, Miami, FL, May 1989.

11. B.A. Eckenrode, G.L. Glish and S.A. McLuckey: *Ion Trajectory Modelling In an Ion Mobility*

 *Spectrometer Employing Nonlinear Electric Fields*. Presented at the 37th ASMS Conference on Mass Spectrometry and Allied Topics, Miami, FL, May 1989.

12. R.F. Lopshire, B.A. Eckenrode, J.T. Stults, C.G. Enke and J.F. Holland: *Ion Kinetic Energy Release Measurements by Post‑sector Beam Deflection in Time‑resolved Ion Momentum Spectrometry with Time‑array Detection.*  Presented at the 37th ASMS Conference on Mass Spectrometry and Allied Topics, Miami, FL, May 1989.

13. D.L. Donohue, L.D. Hulett, Jr., G.L. Glish, S.A. McLuckey, H.S. McKown, and B.A. Eckenrode: *Positron Ionization Mass Spectrometry*. Presented at the 37th ASMS Conference on Mass Spectrometry and Allied Topics, Miami, FL, May 1989.

14. D.L. Donohue, L.D. Hulett, Jr., S.A. McLuckey, G.L. Glish, and B.A. Eckenrode: *Initial Results of Positron Ionization Mass Spectrometry*. Presented at a workshop on positron interactions in gases, Greenbelt, MD, July 19-21, 1989.

15. B.A. Eckenrode, S.A. McLuckey, and G.L. Glish: *Improved Design of an Ion Mobility Spectrometer for Trace Analysis*. Presented at the 31st ORNL Conference, Gatlinburg, TN, Oct. 1989.

16. D.L. Donohue, L.D. Hulett, Jr., G.L. Glish, S.A. McLuckey, and B.A. Eckenrode: *Positron Ionization Mass Spectrometry*. Presented at the 31st ORNL Conference, Gatlinburg, TN, Oct. 1989.

17. S.A. McLuckey, G.L. Glish, G.J. Van Berkel, B.A. Eckenrode, R.A. Flurer, K.G. Asano, and D.E. Goeringer: *Ion Trap Mass Spectrometry with Unconventional Ionization Methods*. Presented at the 31st ORNL Conference, Gatlinburg, TN, Oct. 1989.

18. B.A. Eckenrode, G.L. Glish, and S.A. McLuckey: *Negative Ion Chemical Ionization in a Quadrupole Ion Trap Using Reagent Anions Injected from an External Ion Source*. Int. J. Mass Spectrom. Ion Proc., 99, (1990) 151-167.

19. D.L. Donohue, L.D. Hulett, Jr., B.A. Eckenrode, S.A. McLuckey and G.L. Glish: *Positron Ionization Mass Spectrometry III: Ionization of Organic Molecules by Positronium Formation.* Chem. Phys. Lett., 168, (1990) 37-40.

20. G.L. Glish, S.A. McLuckey, B.A. Eckenrode, and R.A. Flurer: *Studying Chemistry with a Quadrupole Ion Trap*. Presented at the (ASMS sponsored) Ion Trapping in Mass Spectrometry meeting at Sanibel Island, Fla. Jan. 28-31, 1990.

21. D.L. Donohue, L.D. Hulett, Jr., B.A. Eckenrode, G.L. Glish, and S.A. McLuckey: *A Study of Energy Regimes in Positron Ionization Mass Spectrometry of Organic Compounds.* Presented at the 38th ASMS Conference on Mass Spectrometry and Allied Topics, Tucson, AZ, June 3-8, 1990.

22. B.A. Eckenrode, S.A. McLuckey, and G.L. Glish: *Reactions of the Hydroxide Anion with Substituted Nitroaromatics.* Presented at the 38th ASMS Conference on Mass Spectrometry and Allied Topics, Tucson, AZ, June 3-8, 1990.

23. B.A. Eckenrode, S.A. McLuckey, and G.L. Glish: *Comparison of Electron Impact and Chemical Ionization Sensitivities on an Ion Trap Mass Spectrometer.* Presented at the 43rd Annual Summer Symposium on Analytical Chemistry, Oak Ridge, TN, July 24-27, 1990.

24. B.A. Eckenrode, S.A. McLuckey, and G.L. Glish: *Comparison of Electron Impact and Chemical Ionization Sensitivities on an Ion Trap Mass Spectrometer.* Int. J. Mass Spectrom. Ion Proc.,

 106, (1991) 137-157.

25. B.A. Eckenrode, R.C. Drew: *An Evaluation of Field Processing and Detection Limits for Volatiles and Semi-Volatiles using a Portable GC/MS System*. Presented at the Pittsburgh Conference in Chicago, IL, on March 4, 1991. [Application note for Viking Instruments Corp.]

26. B. Hardesty, B. Eckenrode, and R. Drew: *Evaluation of a Combined Injector/Desorber System for a Portable GC/MS.* Presented at the 39th ASMS Conference on Mass Spectrometry and Allied Topics, Nashville, TN, May 19-24, 1991. [Application note for Viking Instruments Corp.]

27. A. Bacs, B. Eckenrode, and R. Drew: *Design and Evaluation of a Sector Based MS/MS Instrument for Space Applications*. Presented at the 39th ASMS Conference on Mass Spectrometry and Allied Topics, Nashville, TN, May 19-24, 1991.

28. B. A. Eckenrode and B. Owens: *On-Site Well Screening with a Transportable GC/MS System*, Environmental Lab., Feb./March (1992) 42-45.

29. B. Eckenrode, R. Drew, and B. Hardesty: *Soil Analysis by Purge and Trap with Automated Cryofocusing on a Field-Portable GC/MS.* Presented at the Pittsburgh Conference in New Orleans, LA, March 9-12, 1992. [Application note for Viking Instruments Corp.]

30. B. Eckenrode, B. Hardesty, and R. Drew: *Design and Performance of a Dual GC/Membrane MS Interface on a Field-Portable GC/MS.* Presented at the Pittsburgh Conference in New Orleans, LA, March 9-12, 1992. [Application note for Viking Instruments Corp.]

31. B. Eckenrode, R.Drew, and G. Robitaille: *On-Site In Situ Groundwater Well Analysis Using a Gas Sampling Implant and the Viking Transportable GC/MS System.* Field Screening Methods For Hazardous Wastes and Toxic Chemicals Vol. I (1993) 615-623.

32. B. Eckenrode: *On-Site and Real-Time Polynuclear Aromatic Hydrocarbon Analysis for Remediation and Degradation Monitoring Studies*. 1993 [Application note for Viking Instruments Corp.]

33. B. Eckenrode, J. Christenson, R. Drew, and W. Hardesty: *Out of the Lab and Into the Field with a Transportable GC/MS Integrated System.* Presented at the Pittsburgh Conference 1994.

34. B. Eckenrode: *Indoor Air Analysis with the SpectraTrak 620 Portable GC/MS Integrated System*. 1994

 [Application note for Viking Instruments Corp.]

35. B. Eckenrode: *Targeted Source Water Analysis using the Viking SpectraTrak GC/MS*. 1994

 [Application note for Viking Instruments Corp.]

36. B. Eckenrode, R. Starzynski, D. Brennan, R. Drew, B. Andresen, B. Ruiz, G. Coutts, J. Bushman, A. Alcaraz, J. Cornish: *Design Concepts and Performance Criteria in the Development of a Compact, Person-Portable* *GC/MS System*. Proceedings of the Field Screening Methods for Hazardous Wastes and Toxic Chemicals, VIP-47; A&WMA: Las Vegas, 1995; p.589.

37. J. Christenson, B. Eckenrode, and D. Gallis: *Field-Proven Transportable GC/MS: Real-World Case Studies* *and Success Stories*. Proceedings of the Field Screening Methods for Hazardous Wastes and Toxic Chemicals, VIP-47; A&WMA: Las Vegas, 1995; p.1322.

38. B. Eckenrode, W. Niu, and G. Lee: *A Chemical Agent Detection and Identification System*. Proceedings of the 89th A&WMA Annual Meeting and Exhibition, Nashville, 1996, A-1326.

39. B. Eckenrode: *A New Integrated Approach to Field GC/MS for On-Site Analysis* Proceedings of the Field Screening Methods for Hazardous Wastes and Toxic Chemicals, A&WMA: Las Vegas, 1997.

40. B. Eckenrode: *The Application of an Integrated Multi-functional Field-portable GC/MS* *System,* Field Analytical Chemistry and Technology 2(1):3-20, 1998.

41. B. Eckenrode: *Development and Evaluation of Fieldable GC/MS Systems*, Presented at the 27th Annual Conference of the Federation of Analytical Chemistry and Spectroscopy Societies, Nashville, TN, Sept. 2000.

42. B.A. Eckenrode and K.M. Sloan: *Method Development and Implementation of a Novel Temperature* *Programmable Gas Chromatograph for Rapid Forensic Analyses in the Field,* Presented at the 53rd Annual meeting of the American Academy of Forensic Sciences, Seattle, WA, 2001.

43. K.M. Sloan, R.V. Mustacich and B.A. Eckenrode: *Development and Evaluation of a Low Thermal Mass Gas* *Chromatograph for Rapid Forensic GC-MS Analyses in the Field*, Presented at the 49th ASMS Conference on Mass Spectrometry and Allied Topics, Chicago, IL, May, 2001.

44. B. A. Eckenrode: *Environmental and Forensic Applications of Field-Portable GC-MS: An Overview* Journal of the American Society for Mass Spectrometry , 12:683-693, 2001.

45. B.A. Eckenrode and V.J. Schannen: *Developments in Instrumentation for Field Forensics Analysis*, Presented at the 222nd ACS National Meeting, Chicago, IL, Aug. 2001.

46. B.A. Eckenrode, E.G. Bartick, S.D. Harvey, M.E. Vucelick, B.W. Wright and R.A. Huff:  *Portable Raman Spectroscopy Systems for Field Analysis* on-line at Forensic Science Communications, *www.fbi.gov/hq/lab/fsc* Vol. 3(4) October 2001.

47. K.M. Sloan, R.V. Mustacich, and B.A. Eckenrode: *Evaluation and Development of a New Low Thermal Mass Gas Chromatograph for Rapid Forensics Analysis*, Field Analytical Chemistry and Technology,

 5(6):288-301, 2001.

48. B.A. Eckenrode, V. Cavett, P.A. Smith, G. Hook, G. Kimm, and E. Sherry, *Strategies and Instrumentation Developments for Forensic Analyses in the Field*, Presented at the 54th Annual meeting of the American Academy of Forensic Sciences, Atlanta, GA, February, 2002.

49. B.A. Eckenrode, V. Cavett, P.A. Smith, G. Hook, G. Kimm, and E. Sherry, *Addressing Forensic Field Analytical Chemistry Issues*, Presented at the 3rd Workshop on Harsh Environment Mass Spectrometry, Pasadena, CA, March, 2002.

50. V. Cavett, J. Krutak, D. Fetterolf, B. Eckenrode, *Visualization and Rapid SPME GC/MS of Colorless, UV Dye-free Pepper Spray*, Presented at the 50th ASMS Conference on Mass Spectrometry and Allied Topics, Orlando, FL, June, 2002.

51. E. Sherry, C. Whitchurch, D. Elks, and B. Eckenrode, *Temperature Tuning Gas Chromatography with Quadrupole and TOF MS Systems*, Presented at the 50th ASMS Conference on Mass Spectrometry and Allied Topics, Orlando, FL, June, 2002.

52. V. Cavett and B. Eckenrode, *Hyperspectral Imaging of Questioned Documents*, Presented at the 29th Annual Federation of Analytical Chemistry and Spectroscopy Societies, 2002.

53. Brian Eckenrode, Keith Levert, Mark Wilson, and Bruce Budowle, *Developments in SNP Analysis via Quadrupole MS for Forensic Applications*, Presented at the 2003 meeting of AAFS.

54. Brian Eckenrode, Christian Whitchurch and Erin Sherry, *Initial Evaluation of Negative Temperature Ramping in Gas Chromatography*, Presented at the 2003 meeting of AAFS.

55. Brian Eckenrode, Valerie Cavett, Kristy Malak, and Thomas Jourdan, *Continuing Exploration of Cocaine Contamination of U.S. Currency*, Presented at the 2003 meeting of AAFS.

56. Brian Eckenrode, Keith Levert, Mark Wilson and Bruce Budowle, *SNP Genotyping via Quadrupole Mass Spectrometry* presented at the 51st ASMS meeting in Montreal, Canada.

57. Brian Eckenrode, Christian Whitchurch, Valerie Cavett, Kelly Mount, and Mark Miller, *Method Development and Evaluation of Portable Ion Mobility Spectrometers*, Presented at the 51st ASMS meeting in Montreal, Canada.

58. Brian Eckenrode, Valerie Cavett, James Krutak, and Maryam Hojjat, *Structure Elucidation of a Novel Capsaicin Derivative via MSn*, Presented at the 51st ASMS meeting in Montreal, Canada.

59. Brian Eckenrode, Kristi Oberbroeckling, and James Robertson, *Identification of Bacteria and Bacterial Mixtures by MALDI-TOF-MS Marker Ion Patterns*, Presented at the 51st ASMS meeting in Montreal, Canada.

60. B. Eckenrode and Scott Ramsey, *An Adaptive Sampler for Human Scent Measurements in Field Forensics*, Presented at the American Academy of Forensic Sciences held in Dallas, TX, February 16-21, 2004.

61. V. Cavett, E. Waniger, J. Krutak, B. Eckenrode, *Visualization and LC/MS Analysis of Colorless Pepper Sprays,* J. Forensic Sci*,* May 2004, Vol.49(3), pp. 469-476*.*

62. P. Smith, C. Lepage, D. Koch, H. Wyatt, G. Hook, G. Betsinger, R. Erickson, and B.A. Eckenrode, *Detection of Gas Phase Chemical Warfare Agents Using Field-Portable Gas Chromatography-Mass Spectrometry Systems: Instrument and Sampling Strategy Considerations,* Trends in Analytical Chemistry*,* Vol. 23(4), 2004, pp*.* 296-306.

63. A. Vass, R. Smith, C. Thompson, M. Burnett, D. Wolf, J. Synstelien, N. Dulgerian and B. Eckenrode, *Decompositional Odor Analysis Database,* J. Forensic Sci, July 2004, Vol. 49(4), pp. 1-10.

64. P. Smith, M. Sng, B. Eckenrode, S. Leow, D. Koch, R. Erickson, C. Jackson Lepage and G. Hook, *Towards Smaller and Faster Gas Chromatography-Mass Spectrometry Systems for Field Chemical Detection*, J. Chromatography A, Nov. 19, 2004.

65. B. Eckenrode, S. Ramsey, R. Stockham, G. Van Berkel, K. Asano, and D. Wolf, *Performance Evaluation of the Scent Transfer UnitTM (STU) for Organic Compound Collection and Release*, J. Forensic Sci, July 2006, Vol. 51(4), pp. 780-789.

66. **Book Chapter**: *Forensic Analysis on the Cutting Edge: New Methods for Trace Evidence Analysis*, *Ed*. R. Blackledge, Wiley-Interscience, July 30, 2007, ISBN-10: 0471716448, **Chapter 5** *Latent Invisible Trace Evidence: Chemical Detection Strategies*, G. Potonay, B. Eckenrode, J. Krutak, J. Salon, and L. Strekowski.

67. A. Vass, R. Smith, C. Thompson, M. Burnett, N. Dulgerian and B. Eckenrode, *Odor Analysis of Decomposing Buried Human Remains,* J. Forensic Sci, March 2008, Vol. 53(2), pp. 384-391.

68. E. Hoffman, A. Curran, N. Dulgerian, R. Stockham, and B. Eckenrode, *Characterization of the Volatile Organic Compounds Present in the Headspace of Decomposing Human Remains*, Forensic Science International, 2009, Vol. 186, pp. 6-13.

69. G. Cook, P. LaPuma, G. Hook, and B. Eckenrode, *Improving Ion Mobility Spectrometry Detection Methods for Trace Forensic Applications*, J. Forensic Sci, November 2010, Vol. 55, No.6

70. S. Ramsey, R. Mustacich, P. Smith, G. Hook, and B. Eckenrode, *Directly Heated High Surface Area Solid-Phase Microextraction Sampler for Rapid Field Forensic Analyses*, Analytical Chemistry, 2009, 81, 8724-8733.

71. J. Catyb, M. Sabo, P. LaPuma, G. Cook, L. Abendshien, E. Bartick, and B. Eckenrode, *Characterization of a Field-Portable Raman System for Rapid Chemical Identification*, 2007 Thesis, and Forensic Science Communications. (*internal bulletin*).

72. J. P. Dworzanski, D. N. Dickinson, S.V. Deshpande, A. P. Snyder, and B. A. Eckenrode, *Discrimination and Phylogenomic Classification of Bacillus anthracis-cereus-thuringiensis Strains Based on LC-MS/MS Analysis of Whole Cell Protein Digests*, Analytical Chemistry, 2010, 82(1), 145-155.

73. M.E. Stevens, C.A. Tipple, P.A. Smith, D.S. Cho, R.V. Mustacich and B.A. Eckenrode, *Application of a High Surface Area Solid Phase Microextraction Air Sampling Device: Collection and Analysis of Chemical Warfare Agent Surrogate and Degradation Compounds*, Analytical Chemistry, 2013, 85, 8626-8633.

74. C.A. Tipple, P.T. Caldwell, B.M. Kile, D.J. Beussman, B. Rushing, N.J. Mitchell, C.J. Whitchurch, M.A. Grime, R.A. Stockham, and B.A. Eckenrode, *Comprehensive Characterization of Commercially Available Canine Training Aids*, Forensic Science International, 2014, vol 242, 242-254.

75. L.E. DeGreeff, D.L. Snyder, C.A. Tipple, M.A. Grime, R.A. Stockham and B.A. Eckenrode, *Instrument and Canine Detection and Identification of Volatile Organic Compounds Emanating from Human Blood*, Forensic Science International, (*internal*).

76. P.T. Caldwell, D.S. Cho and B.A. Eckenrode*, Detection and Identification of the Volatile Organic Compounds Released from Recently Deceased Humans*: *A Morgue Study*, Forensic Science International, (*internal*).

77. N.I. Caraballo, J. Mendel, H. Holness, J. La Salvia, T. Moroose, B. Eckenrode, R. Stockham, K. Furton, and D. Mills, Forensic Science International, 2016, vol 266, 148-159.

78. B. Eckenrode, B. Allred, N. Vercruysse, T. Carlson, A. Plotner, J. Fleming, H. Castillo, D. Steadman, L. Jantz, K. Hauther, J. Hietpas, J. Buscaglia, S. Shaw, M. Moini, and J. Donfack, *Protein Profiling of Decedent Scalp Hair Segments Exhibiting a Post-Mortem Hair Root Band*, Presented at the 64th ASMS Conference on Mass Spectrometry and Allied Topics, San Antonio, TX, June, 2016.

79. J. Donfack, M. Moini, T. Carlson, D. Steadman, L. Jantz, K. Hauther, H. Castillo, N. Vercruysse, J. Hieptas, J. Buscaglia, and Brian Eckenrode, *Protein Profiling of Decedent Scalp Hairs to Investigate the Potential Mechanisms for the Formation of Postmortem Root Bands*, Presented at the February 2017 meeting of AAFS in New Orleans, LA.

80. Traci L. Carlson, Mehdi Moini, Brian A. Eckenrode, Brent M. Allred, and Joseph Donfack, *Protein extraction from human anagen head hairs one millimeter or less in total length*, Biotechniques, 2018, vol 64, 170-176.

81. Jocelyn V. Abonamah, Brian A. Eckenrode, and Mehdi Moini, *On-site Detection of Fentanyl and its Derivatives by Field Portable nano-Liquid Chromatography-Electron Ionization-Mass Spectrometry (nLC-EI-MS)*, Forensic Chemistry, 2019, 100180.

82. Joseph Donfack, Mehdi Moini, Traci L. Carlson, Brent M. Allred, Linda M. Otterstatter, Dawnie W. Steadman, Lee M. Jantz, Kathleen Hauther, and Brian A. Eckenrode, *Proteomic analysis of Decedent Scalp Hair Segments Exhibiting a Postmortem Hair Root Band,* Forensic Chemistry, 2020, 100226.

83. Brian C. McVicker, Connie Parks, Jan LeMay, Brian A. Eckenrode, and R. Austin Hicklin, *A Method for Characterizing Questioned Footwear Impression Quality*, J. Forensic Identification, 2020, (*in press as a technical note*).

84. **Book Chapter**: *Forensic Analysis: Advances*, *Ed*. R. Blackledge, Wiley-Interscience, Joseph Donfack, Maria Lawas, Jocelyn V. Abonamah, B. Eckenrode, **Chapter 8**: *Characterization of Human Head Hairs via Proteomics* 2021 (*in press*).

85. **Book Chapter**: *Canines: The Original Biosensors*, Ed. L.E. DeGreeff and C.A. Schultz, Pan Stanford Publishing Pte Ltd, B. Eckenrode, P. Riley, N. Salah, A. Dailey and R. Couch, **Chapter 8**: *Towards the Development of a Human Scent Model* 2021 (*in press*).

86. **Book Chapter**: *Canines: The Original Biosensors*, Ed. L.E. DeGreeff and C.A. Schultz, Pan Stanford Publishing Pte Ltd, C.A. Schultz, J.J.Topoleski, W.G. Warren, B. Eckenrode and C. Tipple, **Chapter 10**: *How Science and Law Influence Forensic Canine Utilization* 2021 (*in press*).

87. R. Austin Hicklin, Brian McVicker, B. Eckenrode, *et al*., *Footwear Decision Analysis Study*, Forensic Science International (*in preparation*).

88. R. Austin Hicklin, Linda Eisenhart, B. Eckenrode, *et al., Handwriting Decision Analysis Study*, Forensic Science International (*in preparation*).

89. Linda Eisenhart, B. Eckenrode, *et al*., *An Automated Approach to Trash Mark Evaluation on Questioned Documents*, Forensic Science International (*in preparation*).

90. Jocelyn Abonamah, J. Stephens, L. Eisenhart, C. Ryman, and B. Eckenrode, Automated detection and spatial comparison of xerographically produced print defects using minimum Hausdorff distances, Measurement (*in preparation*)

***Invited talks / Reviews / Theses/Court Testimony/Mentoring via Visiting Scientist Program***

1. Workshop on Methods for Environmental Field Analysis. Presented at the 39th ASMS Conference on Mass Spectrometry and Allied Topics, Nashville, TN, May 19-24, 1991.

2. Compound Structure Elucidation with Tandem Mass Spectrometric Sensors. Presented at the IEEE International Conference on Systems, Man, and Cybernetics, October 13-16, 1991 Charlottsville, VA.

3. Advances in Field-Portable GC/MS Instrumentation and Operating Systems. Presented at the Workshop on Field-Portable Chromatography and Spectrometry, 1996.

4. Forensic and Environmental Applications of Field Portable GC/MS. Presented at the 12th Sanibel Conference on Mass Spectrometry - Field Portable and Miniature Mass Spectrometry, Sanibel Island, FL, 2000.

5. Advances in Rapid Detection of Highly Toxic Chemical Vapors. First International Cyberworkshop in Field Analytical Chemistry (ICFAC), hosted by Henk Meuzelaar of the University of Utah and sponsored by John Wiley and Sons, Inc., April 11th, 2000. [review]

6. E. Sherry (GWU) submitted her thesis for partial satisfaction of the requirements for the degree of Master of Science in Forensic Science. Her thesis is titled: "*High Temperature Programming Gas Chromatography with Mass Spectrometry Using a Prototype Low Thermal Mass Gas Chromatograph*," is currently in review both at the GWU and within the CTFSRU.

7. B. Eckenrode, *Utilizing Mass Spectrometry in Forensic DNA Analysis*, Presented at the Pittsburgh Conference held in Chicago, IL, March 7-12, 2004.

8. B. Eckenrode, *Detection of Pepper Spray on Clothing and Other Evidentiary Items that Contain Inconspicuous Residues*, presented at the Pittsburgh Conference held in Chicago, IL, March 7-12, 2004.

9. B. Eckenrode, *The FBI’s Counterterrorism and Forensic Science Research Unit (CTFSRU),* at the Pittsburgh Conference held in Chicago, IL, March 7-12, 2004.

10. **Adjunct Professor** at the Uniformed Services University of the Health Sciences (USUHS), Bethesda, MD.

11. Provided expert testimony for the State of California in CA v. Benigno Salcedo, an attempted homicide investigation. Results of the FBI laboratory sponsored research that tested the ability of the STU-100 to reliably capture and release human scent at room temperature were presented. The courts concluded that the STU and dog scent discrimination evidence is admissible in court, with corroboration. *Kelly-Frye hearing*

12. Provided expert testimony to assist the state of Alaska in USA v. Joshua Alan Wade, a capital murder investigation (December 9, 2008). *Daubert hearing – Human Scent*

13. Provided expert testimony to assist the state of Georgia v. Sam Parker, a capital murder investigation (2009)

 *Kelly-Frye hearing – Human Decomposition*

14. B. Eckenrode, *Progress in Laboratory and Field-based Instrument Strategies that Integrate Canine Capabilities for Forensic Applications,* presented at the Pittsburgh Conference held in Philadelphia, PA, March 17-21, 2013.

15. **Adjunct Professor** (*2015-* ) at **George Mason University**, College of Sciences, Forensic Science Program, Manassas, VA, teaching Forensic Chemistry to both graduate students (FRSC 504) and undergraduates (FRSC 304). Development of an FRSC 304 complementary laboratory course (FRSC 305). Development of an advanced Forensic Chemistry class hybrid lab/lecture – (FRSC 404). In addition, assisting in mentoring several MS-level graduate students with their research projects – Holly Wilkes, Paige Riley, Kevin Embrey

16. Mentored the following visiting scientists while in the RSU of the FBI Laboratory Division through the Oak Ridge Institute for Science and Education (ORISE) Visiting Scientist Program or in conjunction with George Mason University (GMU) or the Uniformed Services University of the Health Sciences (USUHS):

 *\* = degree granted in conjunction with MSU, USUHS, GWU, or GMU*

 ***PhD***

 \*Greg Cook (USUHS) (10-15/04-11/08/06)

 \*Michael Stevens (USUHS) (6/16/06-8/31/09)

 ***Post-Doctoral***

 Christian Whitchurch (DTRA)

 Keith Levert (CDC) (6/17/02-6/30/03)

 Robert English (UTexas-Medical Center)

 Danielle Dickinson (Northrup-Grumman)

 Douglas Henderson (Northrup-Grumman)

 Heather Hartman (8/1/05-7/17/06)

 Allison Curran (IC)

 Brian Kile (FBI)

 Courtney Tate

 Patricia Caldwell (Battelle)

 Lauryn DeGreeff (NRL)

 David Cho (Dugway Proving Grounds – currently Lawrence Livermore National Lab)

 B McKay Allred (Defense Forensic Science Center, GA)

 ***Masters***

 Kelly Sloan

 Erin Sherry (FBI) (former TEU) (6/1/01-11/30/02)

 Kristi Oberbroeckling (FBI) (ECU) (9/13/02-12/31/03)

 David Koch (USUHS) (1/20/04 – deployed to Iraq late 2004)

 \*Scott Ramsey (NRL)

 Laura Conner (FBI) (OTD)

 Shannon ‘Scott’ McDonald (USUHS) (6/27/05-6/16/06)

 \*Joe Catyb (USUHS) (6/2/06-6/18/07)

 \*Kendra Fletcher (USUHS) (6/16/06-7/2/07)

 \*Robbie Wheeler (USUHS) (6/9/06-5/30/08)

 \*Elie Zussman (MS) (Signature Science)

 Deanna Snyder (AB-SCIEX)

 Raleigh Parrott (FBI) (EU) (1/7/08-1/02/09)

 \*Andrew Plotner (USAF)

 \*Kelleigh Jiu (FBI)

 Nicholas Vercruysse (5/1/14-8/11/17) (Cyber software/programming)

 Katherine Ky (8/1/16-

 Tom Kopczynski (2/13/17-

 Jocelyn Abonamah (GWU) (’18-

 \***Holly Wilkes (GMU) (Fall 2019 - Spring 2020)**

 Paige Riley (BS and MS GMU) (Fall 2020 -

 Kevin Embrey (BS and MS GMU) (Spring 2021-

 ***BS level, Summer, and Short term students/Faculty***

 Erin Hoffman (BS) (Forensics Laboratory)

 Dr. Mark Sabo (Chemistry Department Chairman, Catawba College and CARL) *sabbatical – professor at Tiffin University OH*

 Joshua Stone (BS) (U of Alabama PhD program) – currently at NIH

 Nathan Griffin (BS)

 April Jue (BS) (Pharmacy)

 Dr. Douglas Beussman (St. Olaf College) *sabbatical I (2009-2010)*

 Joseph Manser (BS)

 Cheryl Brophy (BS) (PA-DEP) (3/15/08-8/15/08)

 ***BS level, Summer, and Short term students/Faculty (cont’d)***

 Kathryn O’Brien (BS) (7/16/07-8/15/08)

 Natalie Mitchell (BS) (9/4/07-9/15/08) – as of 3/20 SA with FBI

 Morgan Turano (BS) (5/19/08-9/1/08)

 Lindsay Parsons (BS) (summer 2016)

 Taylor Lewis (BS) (summer 2016)

 Kim Dang (BS) (summer 2016)

 Kim Dang (BS) (7/5/17- end of summer 2018) (Forensics Graduate Student at FIU in the fall of 2018)

 Colbey Ryman (BS) (10/17-10/20 – hired by Bode and working at FBI Firearms and Toolmarks Unit)

 Nirmeen Salah (BS - **GMU**)

 Axell Chandra (BS – **GMU**) (5/19/21 –

17. Selected and mentored **GMU** students as Learning Assistants or Graduate Teaching Assistants:

 LA Abdul Zenhom (Fall 2018)

 GTA Brittany (Spring 2019)

 GTA Felicia (Spring 2019)

 GTA Taylor (Spring 2019)

 LA Sean Whitmer (Spring 2019)

 GTA Sean Whitmer (Fall 2019 – Spring 2021)

 LA Paige Riley (Fall 2019)

 LA Kevin Embrey (Spring 2020)

 LA Ethan Kolonoski (Fall 2020)

 LA Axell Chandra (Spring 2021)

 LA Brittany Groat (Fall 2021)

 GTA Kevin Embrey (Fall 2021)