

2026

NEAFS | MAAFS

Joint Annual Meeting

October 5th-9th 2026



Presented by :



**THE NORTHEASTERN AND MID-ATLANTIC
ASSOCIATIONS OF FORENSIC SCIENTISTS**



Table of Contents

Welcome Message	3
Meet the Team	4
President's Welcome	5
Meeting Sponsors	8
Schedules	
Monday	12
Tuesday	14
Wednesday	16
Thursday	17
Friday	18
Convention Center Map	15
Outreach Event	16
Educators Forum	27
Student Forum	30
Vendor Spotlight	32
Keynote Speaker: Chris Fabricant	33
General Session: The Wild Side of Forensics	35
Evening Session with Pete Diaczuk	37
Chin Cup Competition	39
President's Reception	41
Future Meetings	43
Workshop Abstracts	45
Poster Abstracts	57
Forensic Biology/DNA Session Schedule	71
Abstracts	83
Forensic Drug Chemistry Session	73
Abstracts	89
Toxicology Session	76
Abstracts	96
Criminalistics Session	78
Abstracts	109
Trace/Arson/Explosives/Interdisciplinary Session	81
Abstracts	109





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WELCOME Message

On behalf of the **Northeastern and Mid-Atlantic Associations of Forensic Scientists** we'd like to welcome you to the **2026 Joint Annual Meeting at the Kalahari Resorts and Conventions Poconos, Pennsylvania**. We are so excited for you to join us in this jam packed week of workshops, forums, presentations, scientific sessions and of course networking events. This year we'll hear from Chris Fabricant, the director of strategic litigation at the Innocence Project and Rabia Chaudry, attorney, advocate and author of the NY Times bestselling book "Adnan's Story." I hope these presentations serve as a reminder of the importance of our work and the impact it has once it leaves the laboratory. We will also get a sneak peek into the wild side of forensics with a plenary session featuring members of the Society for Wildlife Forensics. Kim Fraizer, the lab director of the Wildlife Forensic and Fish Health lab for the Wyoming Game and Fish Department as well as their Wildlife Forensic Program Manager, Tasha Bauman and Nicole Chinnici, the director of the Dr. Jane Huffman Wildlife Genetics Institute here in PA. If you are a student, please make sure to show your school pride at our annual Chin Cup Competition by competing for the Cup and the title! All are welcome to come cheer them on! This year's joint meeting brings together NEAFS and MAAFS traditions, in addition to dinner and dance at the Presidents Reception, MAAFS will be hosting their annual cornhole tournament! Please don't forget to dress in your best animal print attire.

Thank you to everyone that made this meeting possible! Our programming team found out quickly how differently both organizations operate but worked together to provide all the wonderful programming we have this year!

We hope you have a great time, get to mingle with your neighboring scientists and maybe take a ride down the lazy river.

-Amanda White

NEAFS Program
Chair

Hello and welcome to the 2026 Joint Annual Meeting between the Mid-Atlantic and Northeastern Associations of Forensic Scientists! It has been an honor to work with the team from NEAFS to put together this year's meeting! The entire planning committee has been working hard for more than a year to find the best of both meetings and bring them together. While you may notice that some things are a little different than you are used to this year, we hope that you will enjoy what we have planned. The reason we hold these meetings each year is not only to make sure you walk away from the meeting having learned something, but we also hope that you leave the meeting with a larger network of colleagues that you can reach out to in those times when you are at your wits end with troubleshooting, or researching a new piece of equipment or method, or especially for the young Forensic Scientists, looking for jobs! I encourage each of you to take the opportunity to introduce yourself to folks outside of your region and take advantage of all this Joint Meeting has to offer! I would also like to extend a sincere thank you to the entire planning committee for all of your hard work this year!

-Lori B Seman

MAAFS Meeting Planning Chair





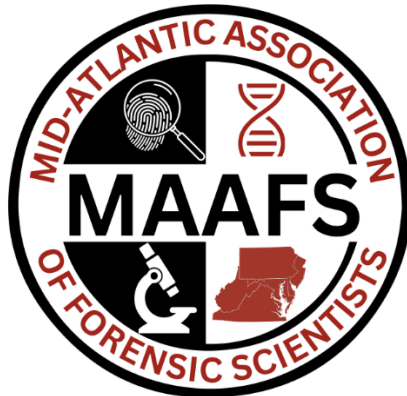
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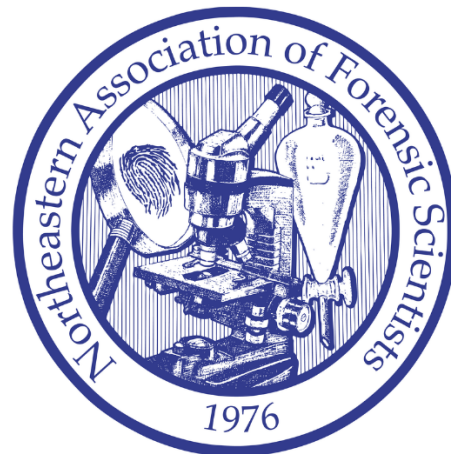
Meet

THE TEAM



Amanda White Program Chair/President-Elect
Janine Kishbaugh Site Chair
Matthew Marino President/Outreach
Brandi Clark Publications Chair
Beth Goodspeed Registration Chair
Keri LaBelle Vendor Coordinator
Sarah Roseman Secretary
Anisha Paul Treasurer/Student Forum Coordinator
Jesse Caron Social Media/Merchandise/AV Coordinator
Sandra Haddad Education Forum Coordinator
Scott Rubins Outreach Coordinator
Allyson Goble Biology Session Chair
Timothy Goble Biology Session Co-Chair
Joanna Urban Chemistry Chair
Dustin Abbott Toxicology Session Co-Chair
Emily Palmer-Jordan Toxicology Session Co-Chair/Exhibits
Diana Vargas Criminalistics Session Chair/ Outreach
Roberta Westerman Trace/Arson Session Chair/ Outreach
Adeena Emery Poster Session Chair
Michael Crowe Poster Session Co-Chair
Stephanie Minero Interdisciplinary Workshop Chair
Megan Chambers Interdisciplinary Workshop Chair

Lori Seman Planning Committee Chair
Robin Bowen Site Coordinator
Cathy Savage Communications Chair
Kimberly Freeman Biology Chair
Jonathan Forsberg Biology Chair Elect
Emily Wilkinson Chemistry Chair
Steve Hokanson Chemistry Chair Elect
Jackson Dimalanta Physical Evidence Chair
Ashley Stein Physical Evidence Chair-elect
Tarah Helsel Vendor Coordinator
Kelly R. Miller President
Allison Laneve President Elect
Erin Przybylski Secretary
Susan Blankenship Treasurer



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NEAFS PRESIDENT'S Welcome

On behalf of the NEAFS Board of Directors and our membership, it is my pleasure to welcome you to the 2026 Joint Annual Meeting of the Northeastern Association of Forensic Scientists and the Mid-Atlantic Association of Forensic Scientists!

After more than a year of planning, it is incredibly rewarding to finally welcome everyone to Kalahari for what promises to be a truly memorable week. Bringing two regional forensic science associations together presents a unique opportunity; not only to expand the scope of our scientific program, but to bring together colleagues who may not ordinarily have the opportunity to learn from one another, exchange ideas, and develop new professional relationships.

This year's program reflects that opportunity. With an expanded selection of workshops, an outstanding group of featured speakers, a diverse scientific program, poster presentations, exhibitors, and numerous opportunities to network throughout the week, there is truly something for everyone. I encourage you to take full advantage of it. Attend a presentation outside your normal discipline. Introduce yourself to someone from another laboratory or region. Spend time with our vendors and exhibitors. Ask questions. Share your own experiences. And, of course, make some time to enjoy Kalahari and everything the resort has to offer.

One of the things I have always valued most about our annual meetings is that some of the most meaningful experiences happen outside the scheduled program. A conversation during a break can introduce a new idea. Someone you meet at a reception can become a future collaborator, mentor, colleague, or friend. The scientific program may bring us to the meeting, but the relationships we build and strengthen throughout the week are an equally important part of what makes organizations like NEAFS and MAAFS so valuable.

A meeting of this scale would simply not be possible without an extraordinary amount of work behind the scenes. I would like to extend my sincere appreciation to the Board members, staff, committees, session chairs, workshop coordinators, moderators, volunteers, speakers, presenters, sponsors, vendors, and everyone from both NEAFS and MAAFS who contributed to making this week possible. Planning a joint meeting adds another layer of coordination to nearly every aspect of the process, and I have been continually impressed by the willingness of both organizations to work together toward a common goal.

I would especially like to recognize our Program Chair, Amanda White, and the entire meeting planning team for the tremendous amount of time and effort they have invested in building this program. What you see throughout these pages represents countless hours of work, and I hope you will join me in thanking everyone involved when you see them throughout the week.

It is an honor to serve as President of NEAFS and an even greater privilege to welcome all of you to this special gathering of our forensic science community. Whether this is your first meeting or you have attended more than you can count, I hope you leave Kalahari at the end of the week having learned something new, made a new connection, strengthened an old one, and been reminded of the value of coming together as a professional community.

Thank you for being here and for helping make this Joint Annual Meeting possible. I am incredibly proud of what our two organizations have put together, and I look forward to experiencing it alongside all of you.

Welcome to Kalahari, and enjoy the 2026 NEAFS-MAAFS Joint Annual Meeting!

Warm regards,

Matthew Marino
President, NEAFS





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MAAFS PRESIDENT'S Welcome

On behalf of the Mid-Atlantic Association of Forensic Scientists and its Board, I would like to extend an enthusiastic welcome to all attendees of the 2026 Joint Annual meeting with the Northeastern Association of Forensic Scientists! As so elegantly stated by NEAFS President Matthew Marino, this meeting presents an opportunity for individuals from multiple states, labs, and educational institutions to come together and learn from one another over a week filled with workshops, presentations, outreach events and more. The effort to combine all of the best features of both organizations has been tremendous, and the dedication of everyone involved in the planning of this meeting has been extraordinary. I would especially like to recognize our Meeting Planning Chair Lori Seman and all members of the Meeting Planning Committee for working tirelessly with their NEAFS counterparts to create an outstanding program. I encourage each of you to take advantage of something new this year – attend the Vendor Spotlight or Educators Forum, participate in the MAAFS fan favorite cornhole tournament or the NEAFS annual George W. Chin Cup Competition, wander through the extensive poster gallery and visit our exhibit hall. Learn from all of the fantastic speakers and workshop presenters and take advantage of the social connection opportunities a meeting of this breadth and depth can provide. I am grateful to be serving as President of MAAFS during this collaboration with NEAFS and am proud of the meeting we have created together – we hope you are as excited as we are to experience everything the joint meeting has to offer. Welcome to the Kalahari and the 2026 Joint Annual Meeting!

--Kelly R. Miller,

Kelly Miller

MAAFS President



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Wednesday, October 7th
3:00 pm – 8:00 pm
Kilimanjaro Suite 1/2





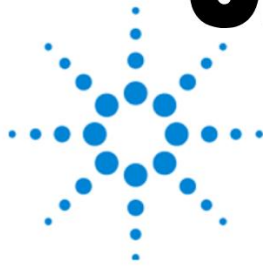
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ACG is a nationwide, third party service group specializing in calibrations, repair, PM, service contracts, IQOQPQ, and service for most laboratory instruments. ISO 17025 accredited. www.acalgroup.biz

ANSI National Accreditation Board (ANAB):

ANAB provides accreditation services and training to certification bodies, laboratories, inspection agencies, validation and verification bodies, and other related bodies in over 85 countries. www.anab.ansi.org

ASAP Analytical:

ASAP Analytical specializes in vapor-phase GC-FTIR for the analysis of isomers. Our products work seamlessly with Agilent Technologies GC and GC-MS. www.asqpanalytical.com

Bode Technology:

For over 30 years, Bode Technology has been leading the forensic industry in innovation and timely resolution within the criminal justice system. www.bodetech.com

Camag Scientific, Inc:

Camag Scientific, Inc. is the exclusive distributor for CAMAG products in the US. CAMAG is the world leader in instrumental Thin-Layer Chromatography (TLC/HPTLC). www.camag.com

CBRE Scientific Solutions:

CBRE Scientific Solutions (formerly Full Spectrum Group) provides laboratory equipment maintenance, repair, calibration, and asset management for chromatography, mass spectrometry, and other high-end lab instruments. www.cbre.com/services/transform-business-outcomes/scientific-solutions/analytical-services

Center for Forensic Science Research and Education (CFSRE):

The CFSRE conducts research, development, and new technology assessment, and delivers educational and training services for the forensic science community and beyond. www.cfsre.org

DNA Labs International:

DNA Labs International is a private, women-owned forensic DNA laboratory founded in 2004, providing advanced testing services to support investigations, identify individuals, and deliver results. www.dnalabsinternational.com

DNA Solutions:

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JEOL USA:

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Loyola University Maryland:

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Shimadzu:

Providing superior sensitivity and analytical precision, Shimadzu's full suite of instruments enables you to obtain the consistent, accurate results critical to your laboratory's success. www.ssi.shimadzu.com

Thermo Fisher Scientific:

The world leader in serving science. www.thermofisher.com/us/en/home

Towson University Forensic Science:

www.towson.edu/fcsm/departments/chemistry/grad/forensic/

Versaterm:

Versaterm Forensics, formerly JusticeTrax, has been providing software to forensic science and law enforcement professionals since 1995. www.versaterm.com

Waters Advanced Diagnostics:

From automated sample prep to streamlined data processing, we can help you overcome challenges & maximize throughput so your team can focus on what matters. www.waters.com/forensics

**Special Thank you to RJ Lee group
for printing for this years meeting!**





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Joint Meeting

Schedule **MONDAY 10/5**

7:00am – 8:30am	Registration	Kilimanjaro Registration
7:00am – 8:30am	Breakfast	Kilimanjaro Suite 7
8:00am – 12:00pm	Half Day Workshops	See next page
8:00am – 5:00pm	Full Day workshops	See next page
9:00am – 1:00 pm	Forensic Educational Outreach and College Fair	Kilimanjaro Suite 9
10:00am – 10:30am	Break	Kilimanjaro Suite 7
12:00pm – 1:00pm	Lunch (Add-on purchase required for all)	Kilimanjaro Suite 7
12:30pm – 1:30pm	Registration	Kilimanjaro Registration
1:00pm – 5:00pm	Half Day Workshops	See next page
3:00pm – 3:30pm	Break	Kilimanjaro Suite 7



**NEAFS | MAAFS****Joint Meeting**

Workshops **MONDAY 10/5**

8:00am – 5:00pm Full Day Workshops	
(W1) MassHunter Unknowns and Qualitative Workflows for Forensic Data Analysis	Kilimanjaro Suite 4
(W2) Beyond Compliance: Unlocking the Power of ISO 17025 in Forensic Laboratories	African Suite 40
8:00am – 12:00pm Half-Day Workshops - Morning	
(W3) Applications of Vibrational Spectroscopy in Forensic Science	Kilimanjaro Suite 3
(W4) Automated DNA Extraction Strategies for Sexual Assault and Missing Persons Casework	African Suite 30
(W5) Professional Ethics in Forensic Science: Challenges & Responsibilities	African Suite 20
(W6) Design and Implementation of Statistical Sampling Plans for Seized-Drug Analysis - Part I	Kilimanjaro Suite 5
1:00pm - 5:00pm Half-Day Workshops - Afternoon	
(W7) Design and Implementation of Statistical Sampling Plans for Seized-Drug Analysis - Part II	Kilimanjaro Suite 5
(W9) How Can We Know If Drug Samples Are Related? Analysis, Association, and Attribution.	Kilimanjaro Suite 3
(W10) Forensic Entomology Workshop	African Suite 20





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Joint Meeting

Schedule **TUESDAY 10/6**

7:00am – 8:30 am	Registration	Kilimanjaro Registration
7:00am – 8:30am	Breakfast	Kilimanjaro Suite 7
8:00am – 12:00pm	Half Day Workshops	See next page
8:00am – 5:00pm	Full Day workshops	See next page
10:00am – 10:30am	Break	Kilimanjaro Suite 7
12:00pm – 1:00pm	Lunch (Add-on purchase required for all)	Kilimanjaro Suite 7
1:00pm – 5:00pm	Half Day Workshops	See next page
12:30pm – 1:30pm	Registration	Kilimanjaro Registration
3:00pm – 3:30pm	Break	Kilimanjaro Suite 7
6:00pm – 8:00pm	Educators Forum	Kilimanjaro Suite 3
6:00pm – 8:00pm	Student Forum	Kilimanjaro Suite 4
7:00pm – 9:00pm	Registration	Kilimanjaro Registration



**NEAFS | MAAFS****Joint Meeting**

Workshops **TUESDAY 10/6**

8:00am – 5:00pm Full Day Workshops	
(W11) LC-MS/MS Method Development and Validation – Fragmenting Ions While Keeping Your Sanity Intact	Kilimanjaro Suite 4
(W12) Advanced Instrument Maintenance: Gas Chromatography-Mass Spectrometry (GC-MS)	Kilimanjaro Suite 3
(W13) Polarized Light Microscopy - A Basic Refresher	African Suite 40
8:00am – 12:00pm Half-Day Workshops - Morning	
(W14) Navigating Leadership and Legal Topics that Affect Forensic Scientists	African Suite 20
(W15) Requirements and Implementation of the Standard for Forensic Autosomal STR DNA Statistical Analyses	African Suite 30
(W16) DESI, DART, ASAP Oh My: Discovering How Direct Ionization Can Enhance Your Forensic and Toxicology Workflow	Kilimanjaro Suite 5
1:00pm – 5:00pm Half-Day Workshops - Afternoon	
(W17) Implementation OF ANSI/ASB Standard 175 and Best Practice Recommendation 171 Regarding DNA Contamination	African Suite 30
(W19) From the Street to the Morgue: Analytical Approaches for Drugs Across the Toxicology Spectrum	Kilimanjaro Suite 5





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Joint Meeting

Schedule **WEDNESDAY 10/7**

7:00am – 9:30 am	Registration	Kilimanjaro Registration
7:00am – 8:30am	Breakfast	Kilimanjaro Suite 1/2
7:00am – 8:00pm	Exhibits	Kilimanjaro Suite 1/2
8:00am – 11:00am	Vendor Spotlight Session	Kilimanjaro Suite 4
10:00am – 10:30am	Break	Kilimanjaro Suite 1/2
11:00am – 12:00pm	Keynote Speaker: Chris Fabricant	Kilimanjaro Suite 4
12:00pm – 1:30pm	NEAFS Business Lunch (<i>Add-on purchase required for non-members</i>)	African Suite 30
12:00pm – 1:30pm	MAAFS Business Lunch (<i>Add-on purchase required for non-members</i>)	African Suite 40
2:00pm – 5:00pm	General/Plenary Session: The Wild Side of Forensics	Kilimanjaro Suite 4
3:15pm – 3:45pm	Break	Kilimanjaro Suite 1/2
5:30pm – 8:00pm	Vendor Reception & Poster Session	Kilimanjaro Suite 1/2
7:00pm – 8:00pm	Registration	Kilimanjaro Registration
8:00pm – 10:00pm	Evening Session & Dessert Reception	African Suite 30



**NEAFS | MAAFS****Joint Meeting**

Schedule **THURSDAY 10/8**

7:00am – 9:30 am	Registration	Kilimanjaro Registration
7:30am – 9:00am	Breakfast	Kilimanjaro Suite 1/2
7:00am – 11:00am	Exhibits	Kilimanjaro Suite 1/2
10:00am – 10:45am	Break	Kilimanjaro Suite 1/2
12:00pm – 2:00pm	Luncheon & Awards Ceremony	African Ballroom
3:30pm – 4:00pm	Break	Kilimanjaro Lounge
9:00am – 5:00pm	Breakout Sessions	
	DNA/Forensic Biology	Kilimanjaro Suite 7
	Criminalistics	Kilimanjaro Suite 3
	Forensic Toxicology	Kilimanjaro Suite 4
	Trace/Arson & Explosives	Kilimanjaro Suite 5
	Forensic Drug Chemistry	Kilimanjaro Suite 9
5:00pm – 6:30pm	George W. Chin Cup Competition	Kilimanjaro Suite 5
6:30pm – 11:30pm	President's Reception & Corn Hole Tournament	African Ballroom





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Joint Meeting

Schedule **FRIDAY 10/9**

8:00am – 9:00 am	Registration	Kilimanjaro Registration
8:00am – 9:30am	Breakfast	Kilimanjaro Suite 1
10:00am – 10:45am	Break	Kilimanjaro Suite 1
9:00am – 12:00pm	Breakout Sessions	
	DNA/Forensic Biology	Kilimanjaro Suite 7
	Criminalistics	Kilimanjaro Suite 3
	Forensic Toxicology	Kilimanjaro Suite 4
	Forensic Drug Chemistry	Kilimanjaro Suite 9



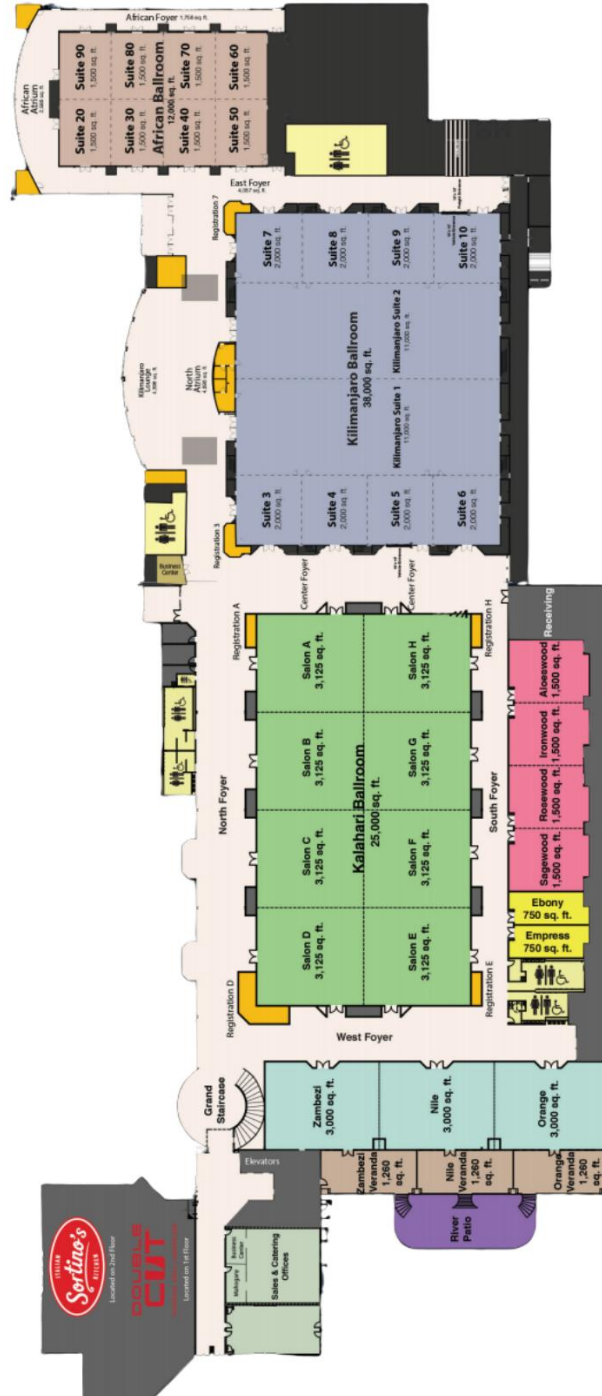
GETTING around



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OUTREACH



Kilimanjaro Suite 9

2026 OUTREACH EVENT

MONDAY OCTOBER 5TH | 9AM - 1PM

Time	Name	Discipline	Affiliation
9:00 - 9:10	Scott Rubins	Forensic Educator Introduction	NEAFS Outreach Coordinator
9:10 - 9:30	Joe Treviño	Latent Prints/Crime Scene	NYPD
9:30 - 9:50	Peter Diaczuk	Firearms/Ballistics	John Jay
9:50 - 10:10	Catherine Savage	Drug Chemistry	Maryland State Police
10:10 - 10:30	Carol Ritter	Bloodstain Pattern Analysis	Cedar Crest
10:30 - 10:50	Kim Freeman	Biology/DNA	Virginia Department of Forensic Science
10:50 - 11:25	Break/College Fair		
11:25 - 11:45	John Biello	Trace/Arson	Massachusetts State Police
11:45 - 12:05 PM	Anisha Paul	Toxicology	Vermont Forensic Lab
12:05 - 12:25	Alyssa Berthiaume	Criminalistics/ Crime Scene	Massachusetts State Police
12:25 - 12:45	Elizabeth Duval	DNA	Massachusetts State Police
12:45 - 1:00 PM	Scott Rubins	Forensic Educator Closing - Q&A	NEAFS Outreach Coordinator





Outreach Instructor Biographies

Dr. Peter Diaczuk received his Ph.D. in criminal justice with a concentration in forensic science from the CUNY Graduate Center in New York. He is a professor of criminalistics in the Department of Sciences at John Jay College of Criminal Justice. Diaczuk is a member of several forensic science organizations. He just completed his term as the Section Chair for Criminalistics in the American Academy of Forensic Sciences (AAFS) and on the Board of Directors for the American Board of Criminalistics (ABC). He is a past president of the Northeastern Association of Forensic Scientists (NEAFS) and the New York Microscopical Society (NYMS). Diaczuk enjoys research involving firearms, ammunition and ballistics. Sometimes he shoots things for fun and calls it “research”. He has given over a dozen workshops on shooting reconstruction and trace evidence, and has been the presenting author on 136 presentations at forensic science conferences and scientific symposia.

Scott Rubins is recently retired after teaching Forensic Science at New Rochelle High School for the last twenty-eight years. This innovative class used experiential learning and authentic assessment to challenge students to think critically about what they see and do. This enabled them to do the real work of real forensic scientists, making their experiences authentic. In 2025 Scott earned Consortium of Forensic Science organization (CFSO) National High School Forensic Science Educator of the Year. Scott was a member of the Dental Identification Team for the Office of Chief Medical Examiner, in New York City and worked for over ten months helping to identify victims of the World Trade Center Disaster and the crash of American Airlines flight 587. He is the President of the Forensic Futures Education Group which provides curriculum and training for both high schools and universities as well as assisting in post crime scene investigations. At the request of the US Department of State, Scott traveled to Belgrade, Serbia as a guest lecturer to both Novi Sad and Belgrade Universities to speak about the state of Forensic Science and Forensic Science education in the United States. Scott is an Adjunct Instructor in the field of Forensic Science for Syracuse University and Western Connecticut State University. He graduated from Clark University and earned his Masters Degrees from Teachers College, Columbia University and the College of New Rochelle. Scott has been a NEAFS member for 20 years.

Dr. Joe Treviño is a Criminalist IV (Supervisor) of the Forensic Innovation & Collaboration Unit at the NYPD Police Laboratory. He is also a supervisor in the Forensic Intelligence Unit, part of a team that has re-engineered the Police Laboratory's approach to data-driven intelligence using forensic analysis data. He has lent technical expertise to units like the NYPD Evidence Collection Team (ECT) and the NYPD Latent Print Section. He was previously assigned to the Firearms Analysis Section (Case Management Unit) of the Police Laboratory and to the NYPD Crime Scene Unit - Quality Assurance Section. Dr. Treviño



was a CSI and LPE (Latent Print Examiner) in the Garland Police Department - Forensic Investigation Unit (Garland, TX). He has a Doctor of Forensic Sciences (DFS) degree from Oklahoma State University, an MS in Forensic Science from Pace University, and a BS in Forensic Chemistry from Sam Houston State University. Dr. Treviño is an Adjunct Assistant Professor in the Forensic Science Program at Pace University (NYC Campus). He is an NIJ LEADS Scholar - Civilian and is the only current forensic science practitioner in the program.

Carol Ritter began her career in 1997 as a forensic scientist with the Pennsylvania State Police (PSP) Crime Laboratory, where she analyzed controlled drug substances, burglary, sexual assault, and homicide cases and utilized bloodstain patterns to reconstruct crime scenes. She is certified by the American Board of Criminalistics, a member of the American Academy of Forensic Sciences, and court qualified greater than 50 times at both the state and federal levels in areas of drug analysis, body fluid identification, hair identification, and bloodstain pattern reconstruction. She also served for 4 years as the technical coordinator for the PSP lab serology section, where she annually audited 6 state labs, trained new forensic scientists, and provided training to local and state law enforcement agencies in evidence collection and bloodstain pattern reconstruction. In 2017, she retired with 20 years of service to PSP and joined Cedar Crest College where she currently mentors research students and teaches undergraduate and graduate forensic science courses/laboratories in forensic pattern analysis, crime scene reconstruction, and DNA analysis. Ms. Ritter's research focuses on forensic pattern analysis including bloodstain patterns, firearm related patterns, as well as DNA analysis. In 2020, Ms. Ritter established a consulting practice where she currently analyzes cases involving bloodshed for the purposes of crime scene reconstruction.

Alyssa Berthiaume earned her Bachelor of Science in Forensic Biology from the University of New Haven in 2016. During her undergraduate studies, she completed an internship with the Massachusetts State Police Crime Laboratory in the Criminalistics Unit. She went on to receive a Master of Science in Cellular and Molecular Biology from the University of New Haven in 2017, where she also worked as a teaching assistant for the Introduction to Biology laboratory. Following graduation, Alyssa returned to the Massachusetts State Police Crime Laboratory, where she has worked for the past nine years in both the Criminalistics and Crime Scene Response Units. In this role, she processes evidence—both in the field and in the laboratory—on a variety of case types, and provides expert testimony in court. In addition to her work at the laboratory, Alyssa has served as an adjunct professor at Bay Path University for the past five years, teaching Crime Scene Investigation and Introduction to Criminalistics, including a laboratory component. She is active within the Northeastern Association of Forensic Scientists (NEAFS), serving on the Board of Directors and as a member of the Registration Committee. Alyssa is also a member of the American Academy of Forensic Sciences (AAFS) where she serves as the Criminalistics Faculty Member for the Student Academy. In her spare time she plays rugby for the Worcester Shamrocks, a hobby she has enjoyed for the past twelve years.

John Biello earned a Bachelor of Science degree in Chemistry from Stonehill College in 1997 and began his career at Merchandise Testing Laboratories, where he worked in analytical chemistry. In 2000, he joined the Massachusetts State Police Crime Laboratory as a Forensic Scientist II. During his 26 years



with the laboratory, he has worked in the Drug Unit, Crime Scene Response Unit, and Trace/Arson and Explosives Unit. His forensic experience includes controlled substance analysis, crime scene response, gunshot residue, fire debris, explosives, and other trace evidence examinations.

John joined the Trace/Arson and Explosives Unit in 2005 and became a supervisor in 2014. Since 2021, he has served as a Forensic Scientist V, Technical Leader, and Section Supervisor for the Trace/Arson and Explosives Unit. In addition to his laboratory responsibilities, he participates in the certification of explosives- and ignitable-liquid-detection K9 teams. Over the course of his career, he has examined thousands of cases and testified approximately 150 times.

Anisha Paul works in the Toxicology division of the Vermont Forensic Laboratory. She graduated with a Master of Science in Forensic Science from Arcadia University and received a Bachelor of Science degree in Biochemistry, Chemistry, and Microbiology from Osmania University in India. She also holds board certification as a Diplomat of the American Board of Forensic Toxicology (D-ABFT-FT). At the Vermont Forensic Laboratory, her primary responsibilities include analyzing blood samples for alcohol and impairing drugs, performing method validations, and providing expert testimony and alcohol and drug physiology and pharmacology. Outside of the lab, she is an adjunct professor at Champlain College and is an active member of the National Safety Council-Alcohol, Drugs and Impairment Division (NSC-ADID), Society of Forensic Toxicologists (SOFT), International Alliance of Clinical and Forensic Toxicologists (IACFT), Council of Forensic Sciences Educators (COFSE), and Northeastern Association of Forensic Scientists (NEAFS), where she currently serves on the Board of Directors. When Anisha isn't working you will find her hanging out with her two cats, dog, and turtle. She loves a good beer and is still working on truly enjoying life in the tundra!

Kim Freeman is currently a Forensic Scientist in the Forensic Biology section of the Virginia Department of Forensic Science's Eastern laboratory located in Norfolk. She has been with the department for 11 years. Prior to working for the department, she was employed first as a technician and then as a DNA Analyst at Bode Technology, a private DNA testing laboratory located in northern Virginia, for approximately 6 and a half years.

Kim holds a Bachelor of Science in Biology from the University of Maryland, a Master of Forensic Sciences with a concentration in Forensic Molecular Biology from The George Washington University, and a Graduate Certificate in Forensic Genetic Genealogy from the University of New Haven. She is the current Biology Chair of the Mid-Atlantic Association of Forensic Scientists and an Associate Member of the American Academy of Forensic Sciences, and is certified by the American Board of Criminalistics in Biological Evidence Screening and Forensic DNA Examination.

Outside of work, Kim enjoys reading, running, and petting as many dogs as possible.



Elizabeth Jenkyn-Duval is currently a supervisor in the DNA Unit at the Massachusetts State Police Crime Laboratory. She also continues to work on cases as a DNA Analyst. Ms. Jenkyn-Duval holds two Bachelor of Science Degrees, one in Genetics and the other in Forensic Science. Additionally, she also holds a Masters Certificate in Forensic Genetic Genealogy. Elizabeth loves being a member of NEAFS since 2013 and has held many roles within the organization including serving on the Board of Directors and as its President in 2023. Outside of her professional realm she enjoys volunteering for a genetic genealogy non-profit organization when not traveling or planning her yearly over the top Halloween Party!

Catherine Savage obtained a BS in Chemistry from Chestnut Hill College in 1998. She received an MA in Chemistry from the University of Delaware in 2000. She worked for the Harris County Medical Examiner's Office in Houston, TX from July 2000 to January 2002. There she analyzed Controlled Dangerous Substance (CDS) cases and also urine samples for Parole and Probation in the Forensic Urine Drug Testing (FUDT) and Toxicology Unit.

In February of 2002 Cathy joined the Maryland State Police Forensic Sciences Division Controlled Dangerous Substance unit as a Forensic Scientist (FS) I. She worked in the Berlin Regional Laboratory. Cathy progressed from an FS I to an FS III, and in May of 2016 she transferred to the CDS Unit at the main lab in Pikesville, Maryland. In July of 2017 she became a Forensic Scientist Advanced after taking over as the Training Coordinator for the CDS Unit. In March of 2019, she was named the Supervisor of the CDS Unit in Pikesville. She currently supervises four MSP Chemists, three Allied Chemists and one contractual Administrative Specialist.



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 Forensic Technical Assessor Training (5-day) November 2-6, 2026: Live Online November 16-20, 2026: Live Online And More 2027 dates!	\$900
 Understanding the Requirements of ISO/IEC 17020:2026 and AR 3120 for Forensic Service Providers March 30-31, 2027: Live Online October 5-6, 2027: Live Online	\$795



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EDUCATORS FORUM



Kilimanjaro Suite 3

TUESDAY OCTOBER 6TH | 6PM- 8PM

NEAFS Education Chairperson, Sandra Haddad

The Educator's Forum serves as a collaborative space for university professors, high school science teachers, and forensic professionals. Our primary goal is to discuss the evolving landscape of forensic science education and ensure that students are being prepared with the skills currently required in crime laboratories.

6:00pm	Welcome
6:00pm – 6:20pm	Wellbeing in Forensic Education <i>Lyndsie Ferrara, Ph.D. Duquesne University</i>
6:20pm – 6:40pm	Strategies for Assessing the Forensic Science Student of Today <i>Rhys Williams, Ph.D. Loyola University Maryland</i>
6:40pm – 7:00pm	Improving Communication Skills Through the Use of Mock Forensic Casework <i>Allison Myers, Ph.D. University of the Incarnate Word</i>
7:00 pm – 7:05 pm	Break
7:05 pm – 7:25 pm	Turning Students in the Classroom into Experts in the Courtroom <i>Katie O'Connor, Hofstra University</i>
7:25pm – 7:45pm	Survey of Instrumentation Use in Crime Laboratories: What do Crime Lab Directors Expect from New Forensic Scientists? <i>Tom Brettell, Ph.D. Emeritus Professor of Chemistry, Department of Forensic Science and Justice Studies, Cedar Crest College and Andra Lewis, Ph.D. Piedmont University</i>
7:45pm – 8:05pm	Beyond the Bench: Demystifying Forensic Career Pathways Through Educational Outreach <i>Claire Muro, Ph.D., Forensic Scientist, New York State Police and Samantha Whitfield, M.S., Technical Coordinator, New York State Police</i>





Educators Forum Abstracts

Wellbeing in Forensic Education

Lyndsie Ferrara, Ph.D., Duquesne University

Preparing students for the psychological and emotional demands of a forensic science career is more critical than ever. By integrating wellbeing practices into the curriculum, educators can help students build healthy habits and greater resilience, better equipping them for the stresses inherent in forensic work. This presentation will outline practical activities that can be incorporated into forensic science courses. Student feedback indicates that exposure to a variety of wellness strategies is both valuable and positively received.

Strategies for Assessing the Forensic Science Student of Today

Rhys Williams, Ph.D., Loyola University Maryland

This session explores a range of strategies for teaching and assessing graduate forensic science students whilst navigating the modern education landscape. New approaches seek to reestablish student autonomy and ownership of education in attempt to overcome the impact of AI tool misuse and the growing illiteracy crisis. Strategies are framed within heavily contextualized forensic experiences, developed from a decade of teaching university students. This session provides ideas and discussion prompts for the forensic educator community.

Improving Communication Skills Through the Use of Mock Forensic Casework

Allison Myers, Ph.D., University of the Incarnate Word

One of the most common fears found in society is the fear of public speaking, which is well represented by the number of students that utter (or sometimes loudly proclaim) the phrase "I hate presentations." Compounded by increasingly diminished interpersonal skills, students today are graduating and entering the workforce unable to effectively communicate with a variety of audiences. Here, I will present how I use mock forensic casework to assist students in improving their ability to communicate orally and in writing using both layman and scientific terms, skills that are both vital in the field of forensic science.

Turning Students in the Classroom into Experts in the Courtroom

Katie O'Connor, Hofstra University

Employers consistently seek forensic science graduates who can communicate findings clearly, collaborate across disciplines, and perform effectively in high-pressure environments. This presentation describes an innovative undergraduate course that immerses forensic science students in a semester-long homicide case simulation, culminating in grand jury and trial testimony alongside law students. Through authentic casework, report writing, expert witness preparation, cross-disciplinary collaboration, and courtroom performance, students develop both technical and professional competencies highly valued by forensic laboratories, law enforcement agencies, and legal professionals. Assessment data, student outcomes, and employer-relevant skill development will be discussed. Attendees will leave with practical strategies for implementing experiential, workforce-focused learning opportunities within forensic science curricula.



Survey of Instrumentation Use in Crime Laboratories: What do Crime Lab Directors Expect from New Forensic Scientists?

Tom Brettell, Ph.D., Cedar Crest College, and Andra Lewis, Ph.D., Piedmont University

Instrumental analysis is used in almost every discipline in crime laboratories. It is important that students entering the forensic science workforce be best prepared to operate and understand the theory of basic instruments used in crime laboratories. Undergraduate curriculum must be designed to offer the student the opportunity to learn about these instrumental techniques, so they are best prepared to enter the workforce. Survey results from crime laboratory directors and managers in the United States will be presented. The survey focused on identifying what experience and expertise of chemical instrumentation laboratory managers expected for students and new hires choosing to enter the forensic science field.

Beyond the Bench: Demystifying Forensic Career Pathways Through Educational Outreach

Claire Muro, Ph.D. and Samantha Whitfield, M.S., New York State Police

Bridging the gap between university coursework and operational lab reality relies on strong, collaborative ties between higher education and forensic practitioners. To address this divide, our laboratory developed a multi-disciplinary program in collaboration with local colleges to present on the wide variety of careers in our lab system and real-world pathways to each of them. In addition to detailed presentations, we have also created several different opportunities for one-on-one conversations to allow students to ask forensic scientists their own personal questions. The hope is to engage future scientists while they are still in school and make sure they are on the right track to being competitive candidates for laboratory openings. The program is continuously reexamined and modified to maximize student impact with minimal resources or disruptions to the volunteers' laboratory duties. This presentation reviews its evolution from early pilot activities to the current model. It also illustrates how using self-evaluation—a critical component of the scientific process—can systematically enhance community and educational engagement efforts. Additional outreach opportunities that were created as a result of this program will also be shared.





STUDENT FORUM



Kilimanjaro Suite 4

TUESDAY OCTOBER 6TH | 6PM- 8PM

You're in the home stretch of all these years of classes, studying and research and on the cusp of getting your degree and getting that "real job." How do we do that? What's the best way to interview? What are the right questions to ask? Am I expecting too much? Am I expecting too little? What if there's a hiring freeze at my dream agency – do I flip burgers until I get my dream job? Once I have that "perfect" job – how do I stay current and competitive as the person with the least seniority? Join us as we discuss the ins and outs of interviewing, getting the right job, keeping the right job and deciding if and when it is best to move onto another opportunity. Topics to be discussed include: job requirements and descriptions, civil service rules and salaries, internships, resumes, interviewing skills. They'll also compare and contrast the differences between working in the public and private sectors. Bring your resume and your questions!

You'll hear from:

Anisha Paul, Vermont Forensic Laboratory, Toxicology Section

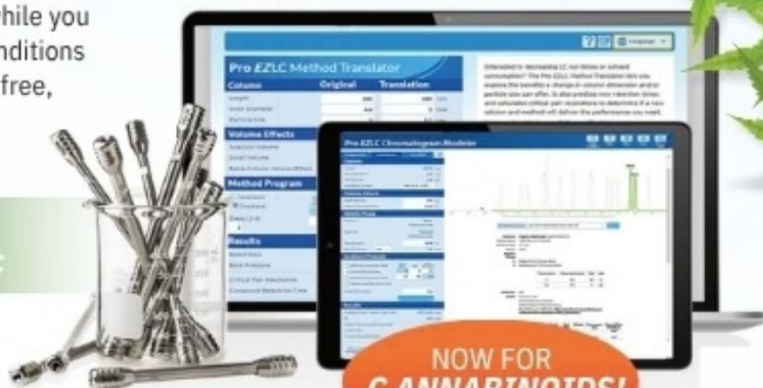
Lynda Niles, New York State Police, Forensic Investigation Center, Biological Sciences Casework

Amanda White, New York State Police, Mid-Hudson Satellite Crime Lab, Seized Drugs

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STUDENT FORUM



Kilimanjaro Suite 4

Student Forum Bios

Anisha Paul, Vermont Forensic Laboratory, Toxicology Section

Anisha works in the Toxicology division of the Vermont Forensic Laboratory. She graduated with a Master of Science in Forensic Science from Arcadia University and received a Bachelor of Science degree in Biochemistry, Chemistry, and Microbiology from Osmania University in India. She also holds board certification as a Diplomat of the American Board of Forensic Toxicology (D-ABFT-FT). At the Vermont Forensic Laboratory, her primary responsibilities include analyzing blood samples for alcohol and impairing drugs, performing method validations, and providing expert testimony and alcohol and drug physiology and pharmacology. Outside of the lab, she is an adjunct professor at Champlain College and is an active member of the National Safety Council-Alcohol, Drugs and Impairment Division (NSC-ADID), Society of Forensic Toxicologists (SOFT), International Alliance of Clinical and Forensic Toxicologists (IACFT), Council of Forensic Sciences Educators (COFSE), and Northeastern Association of Forensic Scientists (NEAFS), where she currently serves as Treasurer and is Program Chair for 2027!

Amanda White, New York State Police, Mid-Hudson Satellite Crime Lab, Seized Drugs

Amanda is a Forensic Scientist III at the NYSP Mid-Hudson Satellite Crime Lab in the Seized Drugs section. She got her dual Biology and Anthropology degree from SUNY Oneonta and her Masters in Biomedical Forensic Science from Boston University. She began her career at the NYPD Police Laboratory in the Controlled Substances Section and was then trained and worked in Latent Print Development. She spent some time in the Drug Section of Westchester County Department of Labs and research and found her home (and 12 minute commute) with the NYSP Mid-Hudson lab in 2018. She started with NEAFS as merchandise/social media coordinator and is now this year's Program chair!

Lynda Niles New York State Police, Forensic Investigation Center

Lyn Niles is a Senior Laboratory Technician who has worked at the NYSP Forensic Investigation Center since 2001. She attended HVCC and SUNY Empire. Ms. Niles began her career at the Lab in Evidence Receiving and was later promoted to her current job in the Biological Sciences Casework Section, where she processes crime scene samples for DNA, via the processes of extraction, quantitation and amplification. Her favorite part of the job is training new staff on the chemistries and theory behind each process, as well as working on validations for upcoming instrumentation/workflows in the section.





NEAFS | MAAFS



Kilimanjaro Suite 4

VENDOR SPOTLIGHT

WEDNESDAY OCTOBER 7TH
8AM -11AM

8:00 am – 8:05 am Open Remarks

Waters Advanced Diagnostics Presented by Ciara Pitman

8:05 am – 8:15 am From Screening to Confirmations: Solutions for Forensic Success

8:16 am – 8:26 am **Versaterm**

ANAB Presented by Deanne Emory

8:27 am – 8:37 am ANAB Training- Advancing Quality One Course at a Time

8:38 am – 8:48 am **DNA Solutions**

Forensic Advantage Presented by Brent Smith

8:49 am – 8:59 am NEAFS & MAAFS Annual Meeting- Forensic Advantage Systems

Bode Technologies Presented by Scott Reierstad

9:00 am – 9:10 am Bode Technology Advanced DNA Services

SCIEX Presented by Taylor Marschean

9:11 am – 9:21 am From Classroom to Crime Lab

DNA Labs International Presented by Amanda Fazi and Amanda Murray

9:22 am – 9:32 am Impactful DNA Technology: Helping Solve Crime

Shimadzu Presented by Kelly Collins

9:33 am – 9:43 am Advancing Forensic Investigations Through Shimadzu's Innovations in GC and GCMS Technology

Agilent Presented by Rachael Ciotti

9:44 am – 9:59 am From Screening to Confirmation: Agilent Solutions for Modern Forensic Laboratories

10:00 am – 10:30 am Morning Break

I. Miller Microscopes Presented by Gretchen Falter

10:30 am – 10:40 am Coming in 2027!

QIAGEN Presented by Megan Gillespie

10:41 am – 10:51 am Automating Differential Extraction with the EZ2 DNA Investigator Sep&Prep Kit



Join us for an exclusive Vendor Spotlight, where the industry's leading innovators showcase the latest breakthroughs in laboratory instrumentation and services. Whether you're looking to upgrade your current setup or scout for next-gen technology, this is your chance to get a "front-row seat" to the newest products and services hitting the market.

To keep things exciting, each participating vendor is raffling off a prize worth \$100! Winners will be drawn at the end of each presentation. It's simple: Show up, level up your lab knowledge, and you might just walk out a winner. You must be present during the presentation to claim your prize, so make sure to arrive on time and stay for the full session!





KEYNOTE SPEAKER



Kilimanjaro Suite 4

UNTANGLING THE EVIDENCE

How Flawed Science Reached the Courtroom— and How We Fix It

CHRIS FABRICANT



Chris Fabricant is the director of strategic litigation (Joseph Flom Special Counsel) at the Innocence Project. In this role, he leads the Innocence Project's strategic litigation department, whose attorneys develop and execute national litigation and public policy strategies to address the leading causes of wrongful conviction.

Chris is one of the United States' leading experts on forensic sciences and scientific litigation. Prior to joining the Innocence Project, he was a longtime public defender and law professor. He frequently serves as a public speaker on law reform issues, and is widely published in both legal scholarship and in mainstream media. In his new book, *Junk Science and the American Criminal Justice System*, Chris examines the role that faulty scientific evidence has in continuing and strengthening an unjust and racial biased criminal legal system.

WEDNESDAY OCTOBER 7TH 11AM





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PLENARY SESSION



Kilimanjaro Suite 4

THE WILD SIDE of forensics WEDNESDAY OCT 7TH 2PM

It's CSI meets the animal kingdom. Come hang out with The Society for Wildlife Forensic Science and take a dive into the wild side of our field as Wildlife Forensic Scientists Kim Fraizer, Tasha Bauman and Nicole Chinnici give us a birds eye view of their specialties!



Kim Frazier:
Laboratory Director
Wyoming Game and
Fish Department:
Wildlife Forensic and
Fish Health Lab

Kim Frazier holds a Master of Science degree in Forensic DNA and Serology from the University of Florida and a Bachelor of Science degree in Molecular Biology from the University of Wyoming. She presently serves as the Laboratory Director of the Wyoming Game and Fish Department's Wildlife Forensic and Fish Health Laboratory, where she is responsible for the oversight of all laboratory programs, including wildlife forensics, fish health, and tooth aging. In this capacity, she ensures that all results comply with the requirements for ISO 17025:2017 accreditation through ANAB. Ms. Frazier possesses extensive technical training and expertise in wildlife forensics and has provided numerous trainings to professionals within the field, wildlife officers and students. She is the vice president of the Society for Wildlife Forensic Science and an active member of the Society's Technical Working Group. Additionally, she participates in the American Academy of Forensic Sciences wildlife consensus body, contributing to the development and advancement of standards and best practices in wildlife forensic science. She also previously held the position of chair for the Organization of Scientific Area Committees (OSAC) Wildlife Forensic Biology Committee.



Tasha Bauman, M.S., C.W.F.S.
Wildlife Forensic Program
Manager: Wyoming Game and
Fish Department

Tasha Bauman is a certified wildlife forensic scientist serving as the Wildlife Forensic Program Manager for the Wyoming Game and Fish Wildlife Forensics and Fish Health Laboratory. With 17 years of wildlife forensic experience and a master's degree in Forensic Science, she specializes in DNA sequencing and STR analysis for poaching investigations. A leader in her field, Tasha has served as Past President and Director of Assessment for the Society for Wildlife Forensic Science (SWFS), and as Chair of the Wildlife Biology Subcommittee for OSAC. Outside of the lab, she enjoys outdoor activities and spending time with her two dachshunds, Sherlock and Liam.



**Nicole Chinnici, DHSc,
C.W.F.S.**
Director: Dr. Jane Huffman
Wildlife Genetics Institute

Dr. Nicole Chinnici is the Director of the Dr. Jane Huffman Wildlife Genetics Institute at East Stroudsburg University, where she leads applied research in wildlife genetics, molecular ecology, and wildlife forensics. Her work focuses on using advanced molecular and genomic tools to address questions related to wildlife health, species identification, population dynamics, and conservation enforcement. With training in epidemiology and molecular biology, Dr. Chinnici integrates genetic methodologies into interdisciplinary One Health frameworks that connect wildlife, environmental, and public health systems. Under her leadership, the Institute has expanded its capacity in genetic analysis, high-throughput molecular diagnostics, and applied research that supports wildlife management agencies and forensic investigations.





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EVENING SESSION



African Suite 30

October 7th 8PM

EVENING SESSION with Pete Diaczuk

Diaczuk is an associate professor at John Jay College of Criminal Justice and owns the Pedico Research Institute, a private range and shooting laboratory in Northeast Pennsylvania. He is a past president of NEAFS and of the New York Microscopical Society. As a Fellow of the American Academy of Forensic Sciences, he was Chair of the Criminalistics Section in 2024. He just termed out of the American Board of Criminalistics Board of Directors. He has been the "official photographer" for NEAFS since 1999. He has an entire wardrobe of official NEAFS attire. Diaczuk has been involved with firearms for decades and has worked on many cases as a private consultant. Diaczuk enjoys shooting at random objects for fun and then calls it research.



"Caught by the Laws of Physics"

Peter Diaczuk, Associate Professor, Department of Sciences, John Jay College of Criminal Justice, and owner of Pedico Research Institute in Northeast Pennsylvania.

This is a case study about the death of Michelle O'Connell on 02Sep2010. She was found in her bedroom with an intraoral gunshot wound by her boyfriend. Her boyfriend is a deputy sheriff and it was his duty sidearm that fired the fatal bullet. There was an injury over Michelle's eye that was explained by a bizarre theory that defies one of the immutable laws of physics. A sort of "negative recoil", essentially the firearm lurching forward at the moment of firing, as opposed to recoiling rearward as would be expected, was said to have caused her eye injury. This absurd theory was disproven with the use of high-speed video, after verbal explanations failed to convince those who proposed the theory initially. The investigation had several missteps, as will be discussed during this presentation. This sad event was covered by the New York Times, Frontline, and the ABC 20/20 show on television.



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GEORGE W. CHIN CUP COMPETITION



Kilimanjaro Suite 5

Thursday October 7th 5PM

Teams of up to four students will compete in two rounds of a Jeopardy style game followed by a double Jeopardy round! Questions will span all aspects of forensics! There will be one Undergraduate and one Graduate winner!

The George W. Chin Collegiate Competition a brief history:

In 2004 NEAFS instituted the collegiate competition where each participating school would submit one paper for judging, but we just got too many great student papers and opened it up to all students. In order to bring back a bit of competition between the schools the Dr. Quarino instituted the "Kirk" Cup back in 2014. This competition was renamed to honor one of our Association's pioneers, George W. Chin.

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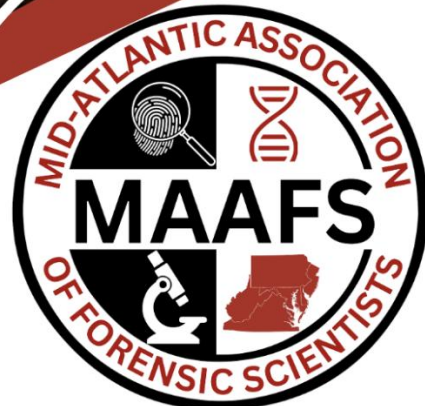
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WORKSHOP ABSTRACTS

October 5-9, 2026 - Poconos, PA



MONDAY, OCTOBER 5th

(W1) MassHunter Unknowns and Qualitative Workflows for Forensic Data Analysis *Presented by: Dr. Kirk Lokits, GCMS Applications Scientist, Agilent Technologies [VENDOR]* Full-Day Workshop - Monday - (Member \$250/Non-member \$300)

The full day workshop is designed to introduce the audience to the workflows involved when using Unknowns Analysis in the MassHunter software. The workshop begins with an ~20-minute explanation of the deconvolution process, differences between deconvolution and peak integration, and some of the variables involved when using this powerful data analysis tool. Running through workflows, utilizing forensic data, the session will illustrate how to translate established workflows within MSD ChemStation Data Analysis to MassHunter Unknowns Analysis. The workshop will include how to generate an in-house library in Unknowns Analysis, how to link retention time and or retention indices to each library entry and apply these entries to increase your Library Match Score (LMS) confidence level. Examples of Unknowns Analysis reporting templates will be demonstrated from the workshop exercises. Qualitative Analysis software will also be introduced. Laptops with MassHunter software and forensic data will be provided through this full day of hands-on learning.

The course is limited to the first 16 registrants due to the number of laptops available. However, additional students (~10) may join the course if they can provide their own laptop with MassHunter Quantitative and Qualitative Analysis software pre-loaded (rev 12.0 is preferred but not required) on the laptop. The forensic data files can be loaded in the morning prior to the start of the course. Please contact the course instructor if you have additional questions.

(W2) Beyond Compliance: Unlocking the Power of ISO 17025 in Forensic Laboratories. *Presented by: Deanne Emory, Instructional Designer, ANSI National Accreditation Board (ANAB)* Full-Day Workshop - Monday - (Member \$250/Non-member \$300)

ISO standards provide requirements for accreditation, certification and self-declaration of conformance. Within these requirements are tools that organizations can use to not only implement the requirements, but also as value-added tools for improvement. These tools include risk-based thinking, cause analysis and corrective action, internal audits and management review.

The objective of this course is to have participants evaluate standard requirements from a new perspective: looking at why the requirements exist, how the requirements are interrelated and how to leverage the tools within the requirements for a more robust management system, and overall, more effective laboratory operations.



This course will use the ISO/IEC 17025:2017 requirements and is geared specifically for Forensic Service Providers. It is designed for quality managers, analysts and other contributors who develop or enhance a culture of quality within their laboratory. It is also well-suited for any personnel who want to strengthen their skills and understand the effective implementation and added value of standard requirements.

This training workshop is designed for laboratory management, technical staff, and new staff that need a general understanding of continual improvement and the skills reviewed in the workshop.

(W3) Applications of Vibrational Spectroscopy in Forensic Science

Presented By: Lewis Smith, Forensic Chemist, Cape May County Pros. Office Forensic Lab Half Day Workshop - Monday Morning - (Member \$125/Non-Member \$225)

Vibrational Spectroscopy is another tool, in addition to Mass Spectrometry, which can aid in the precise molecular identification of unknown forensic submissions. This is particularly important in isomer determination of designer drugs.

This form of spectroscopy is unique in that a change in the physical state of a sample (solid, liquid, gas) can dramatically change the spectral profile. There are both advantages and disadvantages for each physical state. Examples will be given illustrating the strength and weaknesses of spectral profiles according to the physical state in which it was sampled.

SOLID PHASE FTIR – Solid phase sampling techniques Transmittance, ATR, Diffuse Reflectance. Matrix Effects - hydrogen-bonding, water content, polymorphism
Changes in crystallinity - cast films, solid melts
Low Frequency Vibrations – the importance of FAR INFRARED and FT RAMAN for inorganic and organometallic compounds

SOLIDS IN SOLUTION - use of solution cells for hydrogen-bonding studies and quantitation

GASES / VAPORS of simple molecules

ROTATIONAL BANDS IN GASES – use of band profiles to determine molecular geometry Linear Molecules - spectral comparisons between Nitrous Oxide and Carbon Dioxide Corrosive Liquids – use of gas cells to capture the vapor from corrosive liquids **CONTROLLED PYROLYZATES** – gas analysis of heated polymers

VAPOR PHASE INFRARED

HEATED VAPOR CELLS - analysis of Butanediol isomers and other compounds
CHROMATOGRAPHIC SEPARATION – Development and history of GC/FTIR and Light-Pipe Technology
DEVELOPMENT of Hewlett Packard's 5965a IRD through to the ASAP IRD3 of today Installation Requirements and Maintenance of the ASAP IRD3
Sensitivity comparisons between Benchtop GC/FTIR vs GC/IRD

Data comparisons between GC/IR Light-pipe technology vs GC/IR solid deposit Use of Isomer determination in designer drugs using the GC/IRD

MOLECULAR BOND ROTATION - this property, only existing in vapor phase (and dilute solutions), creates unique special bands that aid in the identification of Synthetic Cannabinoids.



(W4) Automated DNA Extraction Strategies for Sexual Assault and Missing Persons Casework

Presented by: Sarah Rosenstein (HID-FAS), Josh Abernathy (HID-CSM), and Carole Cummings (HID-CSM) - QIAGEN North America - HID & Forensics [Vendor]

Half Day Workshop - Monday Morning - (Member \$125/Non-Member \$225)

Forensic laboratories are increasingly challenged by complex sample types encountered in both sexual assault and missing persons investigations, where low DNA quantity, degradation, and PCR inhibitors can significantly impact downstream analytical success. This workshop highlights the versatility of the EZ2 Connect Fx automated extraction platform and its role in supporting robust and reliable DNA workflows across diverse forensic applications.

Part 1: Automated DNA Purification Strategies for Complex Forensic Samples Part 1 of the workshop will focus on recently implemented EZ2 Connect Fx workflows supported by the DNA Investigator portfolio. This includes the EZ2 DNA Investigator Sep&Prep protocol for automated differential extraction of sexual assault evidence, as well as the DNA Investigator Bone Extra Large Volume and Fired Cartridge Casings (FCC) workflows for challenging skeletal and ballistic samples. Attendees will gain practical insight into how protocol design, chemistry, and automation work together to support effective inhibitor removal and consistent DNA purification, enabling reliable downstream STR and NGS analysis.

Part 2: Integrated SNP-NGS Strategies for Identification of Highly Degraded Human Remains Part 2 will present a real-world pilot study from a World War II Missing Persons project conducted in Greece, involving highly compromised skeletal remains. This case study will walk through an integrated QIAGEN workflow incorporating EZ2 Connect Fx extraction, library quality assessment using QIAxcel, and SNP-based analysis on the MiSeq FGx using the ForenSeq Kintelligence workflow. Results from this pilot demonstrate how optimized purification and quality control can enable SNP-NGS analysis in cases where conventional STR-CE methods yield partial or no profiles, supporting extended kinship analysis and identification efforts in historical and missing persons investigations.

This workshop is intended for forensic practitioners seeking applied guidance on implementing adaptable extraction strategies, understanding purification performance, and evaluating integrated workflows that expand investigative potential in both sexual assault and missing persons casework.

(W5) Professional Ethics in Forensic Science: Challenges & Responsibilities *Presented By: Robin Bowen, Teaching Assistant Professor, West Virginia University and Jerome F. Buting, Attorney, Buting, Williams, & Stilling, S.C.*

Half Day Workshop - Monday Morning - (Member \$125/Non-Member \$225)

Many people may think of ethics as a personal matter, but it also includes professional and public issues. Proper ethical behavior is required by scientists making complex decisions which help to improve the quality of forensic science. Which problems to pursue, interpretation of data, and when to conclude an experiment are important decisions guided by scientists' integrity. Scientists must also be aware of various conflicts they may encounter with police, prosecutors, or others who may have different expectations.



On a personal level, a forensic analyst's reputation and credibility are as important over the course of a career as their scientific expertise. A damaged reputation is very difficult to repair, particularly if it concerns one's character and credibility for court. Analysts never know which of their cases will require courtroom testimony, so they must assume that all tests performed could end up in court and they must be prepared to confront and address ethical issues encountered or observed so as not to damage their credibility in court or the public's perception of the scientific community.

This workshop will include both the perspective of a forensic science educator and a criminal defense attorney with more than 40 years of experience in many high-profile cases involving forensic science evidence. While this workshop includes many "basics," the course relates those ideas to the forensic science profession and real-world scenarios. To understand forensic-specific ethics, it is important to look at the interactions between the cultures of science, law, research, and law enforcement.

- Upon completion of this course, the student will be able to:
- Demonstrate the relationship between science, technology, and society in ethics
- Examine the various types of conflicts and the problems they may create
- Analyze what ethical standards are in place for forensic scientists and related professions
- Evaluate how codes of ethics in science may contradict other professions
- Understand how and why unethical situations occur
- Analyze when and how to report misconduct and associated consequences

Attendees will have the opportunity to interact and discuss ethical situations that have taken place within the forensic science community. Attendees will be presented with scenarios and the ethical considerations involved. The attendees will share insight from their work environments and represent the "real-world" of ethics in forensic science. Participants should be open to discuss and debate, while keeping an open-mind and positive environment.

(W6) Design and Implementation of Statistical Sampling Plans for Seized-Drug Analysis - Part I

Presented by: Jack Prothero, Mathematical Statistician, National Institute of Standards, and Technology and Laurel Bobka, Forensic Scientist Advanced, Maryland State Police, and Dr. Jennifer Bonetti, Virginia Department of Forensic Science and MAAFS SWGDRUG representative Tiffany Ribadeneyra, Nassau County Office of the Medical Examiner and NEAFS SWGDRUG representative

Half-Day Workshop - Monday morning - (Member \$125/Non-member \$225)

This workshop will detail the process of establishing statistical sampling plans for seized drugs analysis.

The morning session will focus on the mathematical fundamentals for the statistical analysis of a seizure, including random sampling, the hypergeometric distribution, confidence intervals, hypothesis testing, and statistical significance. These concepts will be related to the various phases of analyzing a seizure, including estimating unit counts and performing inference about the number of units or the total weight of material containing controlled substances. A series of hands-on exercises will allow attendees to explore these ideas further and introduce them to multiple web-based tools available from ENFSI and NIST to aid in performing these analyses.



(W7) Design and Implementation of Statistical Sampling Plans for Seized-Drug Analysis - Part II
Presented by: Jack Prothero, Mathematical Statistician, National Institute of Standards, and Technology and Laurel Bobka, Forensic Scientist Advanced, Maryland State Police, and Dr. Jennifer Bonetti, Virginia Department of Forensic Science and MAAFS SWGDRUG representative Tiffany Ribadeneyra, Nassau County Office of the Medical Examiner and NEAFS SWGDRUG representative
Half-Day Workshop - Monday afternoon - (Member \$125/Non-member \$225)

This workshop will detail the process of establishing statistical sampling plans for seized drugs analysis.

The afternoon session will focus on the implementation of statistical sampling plans in a laboratory, with particular focus on Maryland State Police's incorporation of the NIST sampling app into workflows as a case study. Topics discussed will include techniques for achieving random samples, aligning sampling with customer needs, reporting, testimony, and handling of unexpected sampling outcomes such as negative units or heterogeneous units. Particular focus will be placed on options for handling negative units during an analysis targeting a jurisdictional weight threshold and options for handling heterogeneous units as part of a report on the total number of units in a seizure containing controlled substances.

(W8) Next-Generation Sequencing: From Theory to Implementation

Presented by: Kelly Elkins, Cindy Zeller, and Filipa Simão - Department of Chemistry & Forensic Science, Towson University
Half Day Workshop - Monday Afternoon - (Member \$125/Non-Member \$225)

WORKSHOP CANCELLED

(W9) How Can We Know If Drug Samples Are Related? Analysis, Association, and Attribution.

Presented By: Dr. Joshua DeBord, Senior Scientist; The Center for Forensic Science Research and Education and Dr. Agnes Winokur, Director, DEA Special Testing and Research Laboratory
Half Day Workshop - Monday Afternoon - (Member \$125/Non-Member \$225)

Source attribution of illicit drug samples remains a persistent challenge in forensic chemistry and is largely limited to a small number of highly resourced laboratories. Although analytical capabilities have evolved substantially, the interpretive frameworks required to translate chemical similarity into defensible association are constrained by limited shared datasets, poorly characterized sources of variability, and the absence of broadly accepted statistical models. As a result, many current approaches emphasize exploratory association rather than statistically supported inference.

This half-day, discussion-driven workshop is designed for practicing forensic scientists and introduces the concept of source attribution as a graded inferential process built upon concordant results across macro-, meso-, and micro-analytical scales. Participants will examine how profiles are built from



contextual information, formulation, impurities, and other characteristics collectively contribute to association strength, and how disagreements across scales should be interpreted. Emphasis will be placed on concepts critical to generating meaningful comparison profiles, including feature stability, reproducibility, discrimination, and susceptibility to temporal and market-driven drift.

Case-based presentations will highlight analytical approaches that have shown promise for drug sample comparison, including impurity profiling, untargeted high-resolution mass spectrometry, isotope ratio analysis, and multivariate similarity metrics. Rather than promoting specific methods, discussion will focus on the assumptions underlying these approaches and outline the advantages and the limitations that commonly available forensic instrumentation have for making source-level claims.

Modern data storage, processing, and visualization tools are now relatively inexpensive and widely accessible, placing the large datasets needed to estimate the significance of chemical profile similarity increasingly within reach of the forensic community. At the same time, the application of machine-learning and other advanced computational approaches introduces new challenges related to data integrity, curation, scalability, interoperability, and model interpretability. These considerations underscore the need for coordinated, transparent research efforts rather than isolated single-laboratory solutions.

Beyond technical discussion, this workshop is intended to assess and foster mutual interest in forming a committee or working group dedicated to advancing collaborative research, shared datasets, and interpretive frameworks for drug sample association. Rather than prematurely prescribing method solutions, the session emphasizes critical evaluation, responsible communication of uncertainty, and cooperative research progress.

(W10) Forensic Entomology Workshop

Presented by: Dr. Jennifer Rosati, Associate Professor of Forensic Entomology, John Jay College of Criminal Justice

Half Day Workshop - Monday Afternoon - (Member \$125/Non-member \$225)

This workshop will provide attendees with basic fundamental knowledge on the use of insect evidence as a tool in forensic investigations. Topics will include a brief history of the field, techniques employed by forensic entomologists, the importance of proper evidence collection and the various applications of insect evidence within legal investigations. Attendees will gain practical experience in recognizing and collecting insect specimens and in the proper documentation of such evidence to aid in the proper utilization of this information should a forensic entomologist be involved within the investigative process.

TUESDAY, OCTOBER 6th

(W11) LC-MS/MS Method Development and Validation – Fragmenting Ions While Keeping Your Sanity Intact

Presented by: Dustin L. Abbott, MS, D-ABFT-FT Forensic Scientist IV New York State Police – Toxicology

Full Day Workshop - Tuesday - (Member \$250/Non-member \$300)



The two primary hurdles that must be overcome by any forensic laboratory to bring a new analytical method online for casework are method development and method validation, and while the two are closely linked, the rules of engagement for each differ greatly. One is an exercise in creativity and ingenuity that rewards a deeper understanding of chemistry and instrumentation, the other is regulated and meticulous with strict criteria and detailed documentation. The successful creation of a new method requires mastery of both.

This presentation is an in-depth discussion of modern liquid chromatography-tandem mass spectrometry (LC-MS/MS) method development as well as the steps to a successful validation according to ANSI/ASB Standard 036. Development topics will include selection of mobile phases and columns, chromatography evaluation, transition selection, optimization/deoptimization, and commonly observed drug trends and interferences. Validation topics will include advice and techniques for completion of all required and optional studies outlined in Standard 036 as well as additional helpful studies recommended by the presenters. There will be a discussion of identification criteria as outlined in ANSI/ASB Standard 098 as well as the ANSI/ASB Standard 113 point system and considerations for using it in place of a traditional screen/confirmation testing scheme.

This workshop is designed for scientists who are making the transition from traditional single quadrupole gas chromatography-mass spectrometry (GC-MS) analysis or want to improve their ability to optimize LC-MS/MS methods, as well as those looking to expand their general understanding of chromatography, mass spectrometry, and the standardized techniques used to determine method validity. It also serves as a valuable resource for students, educators, and administrators who would benefit from a broader understanding of the analytical chemistry that is routinely employed by forensic testing laboratories. While the content is toxicology focused, the instrumental techniques discussed are applicable to any discipline which utilizes mass spectrometry, and the validation studies can act as a starting point for testing the validity of any piece of instrumentation or new methodology used for forensic analysis.

(W12) Advanced Instrument Maintenance: Gas Chromatography-Mass Spectrometry (GC-MS)

Presented by: Mikaela Romanelli, Marilyn De Apodaca, and Mark Filandro, Senior Forensic Chemists
Full Day Workshop - Tuesday - (Member \$250/Non-Member \$300)

Gas chromatography mass spectrometry (GC-MS) is the primary analytical technique utilized by forensic laboratories for the identification of controlled substances. The Advanced Instrument Maintenance: GC-MS workshop is designed for seized drug analysts with beginner to advanced experience seeking to enhance analytical proficiency and instrument stewardship to support dependable, court-defensible results.

Through the use of both lecture-based modules and practical hands on time with offline instrumentation, attendees will be provided a brief overview of GC-MS theory, preventative maintenance procedures, case-related troubleshooting, and application of the Drug Enforcement Administration's Global Uniform Analysis and Reporting of Drug Related Substances (GUARDS) GC-MS method. Specific maintenance topics will include inlet and column care, split valve line cleaning, source cleaning, vacuum system performance, tuning stability, and early recognition of instrument degradation indicators. Participants will learn how routine maintenance practices directly impact sensitivity, reproducibility, and data quality. With



the implementation of high quality routine maintenance procedures, high-throughput controlled substances laboratories are able to reduce instrument down times and continue to provide reliable GC-MS results in compliance with ISO/IEC 17025 accreditation standards.

(W13) Polarized Light Microscopy - A Basic Refresher

Presented by: Jack Hietpas and Peter Diaczuk, Assistant Professors, John Jay College of Criminal Justice

Full Day Workshop - Tuesday - (Member \$250/Non-Member \$300)

Polarized light microscopy is the backbone of criminalistics, particularly in the area of trace (microtrace) evidence analysis. The experienced microscopist can accurately and reliably characterize, identify, and compare an enormous variety of materials spanning biological tissues, pollen grains, diatoms, minerals, hairs, fibers, glass, general unknowns, food ingredients, paints/pigments, building materials, among many other particle types. To fully exploit the information available in microscopic evidence, the microscopist relies on both the proper use of the microscope and their training and experience. This workshop will serve as a refresher course that will cover basic polarized light microscopy theory and practical applications to forensically relevant materials. We will cover the proper alignment of the microscope which will serve as the basis for the acquisition of high-quality images for both particle identification as well as the capture of photomicrographs, which can serve for both evidence documentation/ observation as well as quantitative image analysis.

(W14) Navigating Leadership and Legal Topics that Affect Forensic Scientists *Presented by: Theresa DeAngelo, QA Manager, Maryland State Police Forensic Sciences Division and Dr. Kelly Elkins, Professor, Chemistry and Forensic Science, Towson University* Half Day Workshop - Tuesday Morning - (Member \$125/Non-Member \$225)

Beyond the science and evidentiary findings within the lab, Forensic Science practitioners have to traverse through external influences such as changes to applicable laws, leadership and the justice system. Balancing the expectations of these outside factors can be demanding and exhaustive to the scientist and the forensic community as a whole. What changes to the legal system affect a forensic case testimony? How do modifications to various leadership affect standards and regulations within forensic science? What can the forensic scientist do to be prepared and pivot to ensure accuracy and effectiveness through these domains? During this workshop, these questions will be explored and specific legal topics such as Smith v. Arizona and Brady/Giglio will be discussed with participants and guidance will be provided on how to successfully navigate through these changes outside of the control of the forensic scientist.



(W15) Requirements and Implementation of the Standard for Forensic Autosomal STR DNA Statistical Analyses

Presented by: Michael Coble, Ph.D.; Executive Director, Center for Human Identification, UNT Health, Caitlyn Taveira, M.S.; Forensic Scientist, Nassau County Office of the Medical Examiner, Division of Forensic Services, and Charlotte J. Word, Ph.D.; Consultant

Half Day Workshop - Tuesday Morning - (Member \$125/Non-Member \$225)

The critical last step in DNA testing and reporting is often the generation of an appropriate statistical value following the interpretation and comparison of a DNA profile from an evidence item to the profiles from known individuals. This is especially necessary when a resulting inclusion or positive association will be reported. This workshop will focus on the Standard for Forensic Autosomal STR DNA Statistical Analyses, which is currently available for implementation as a Proposed Standard on the OSAC Registry (OSAC 2021-S-0021) and under development for publication as ANSI/ASB Standard 186. The requirements of this standard address the: 1) general laboratory protocol for performing statistical analyses; 2) verification and consistent use of the statistical analysis protocol; and 3) necessary case record documentation for statistical value calculations at the sub-source and sub-sub-source levels in the hierarchy of propositions. The requirements and supplemental information in the Annex address the use of both probabilistic genotyping software for the generation of likelihood ratios (LR) as well as manual/binary statistical approaches using likelihood ratios, the random match probability (RMP), and the combined probability of inclusion/exclusion (CPI/CPE).

The standard's requirements will be presented and discussed with the goal of aiding attendees in understanding the individual requirements and the implementation of this standard in forensic DNA testing laboratories. In addition, information and guidance regarding the implementation of this standard along with other standards having complimentary requirements will also be presented [e.g., FBI Quality Assurance Standards; ANSI/ASB Standard 020, Standard for Validation Studies of DNA Mixtures, and Development and Verification of a Laboratory's Mixture Interpretation Protocol; ANSI/ASB Standard 040, Standard for Forensic DNA Interpretation and Comparison Protocols; ANSI/ASB Standard 018, Standard for Validation of Probabilistic Genotyping Systems]. While this standard applies directly to the use of data generated with the polymerase chain reaction (PCR) amplification of autosomal short tandem repeats (STR) for identification testing and biological relationship testing, many of the general requirements may also apply to other types of DNA testing and analysis.

Through the presentations and general discussions, attendees, such as DNA analysts, DNA technical leaders, quality assurance staff, laboratory directors and attorneys should leave the workshop with a sound understanding of the individual requirements for the standard as well as constructive information regarding the implementation of each requirement. ¹<https://www.nist.gov/standard/811>



(W16) DESI, DART, ASAP Oh My: Discovering How Direct Ionization Can Enhance Your Forensic and Toxicology Workflow

Presented by: Dr. Ciara Pitman, Clinical and Forensic Account Manager, Waters [Vendor], Patrice Ohouo MLS(ASCP), Ph.D., NRCC-TC Clean Slate Centers, Melissa Fogarty MSFS, D-ABFT-FT The Center for Forensic Science Research & Education, Fran Diamond The Center for Forensic Science Research & Education, and Melanie Tanis, Duquesne University

Half Day Workshop - Tuesday Morning - (Member \$125/Non-Member \$225)

Direct ionization, or also known as ambient ionization, is a type of ionization that requires no chromatography and little to no sample preparation. Since the creation of the first ambient ionization source, there have been several variants and techniques that have emerged both commercially and in research. Desorption Electrospray Ionization (DESI) uses the same ionization mechanism as traditional ESI. In the case of DESI, one would have the sample on the sample platform, and a charged spray would impact the sample to create the desorption needed to then enter the mass spectrometer. DESI has been used for several matrices but can be great for biologics such as blood or urine. Along with DESI, Atmospheric Solids Analysis Probe (ASAP) and Direct Analysis in Real Time (DART) are popular commercial sources. ASAP and DART are plasma-based techniques and align with the traditional APCI ionization mechanism. The key difference between the two sources is that ASAP uses nitrogen-based plasma for ionization and DART uses a helium metastable. Both techniques have been used for small molecule work and can be used to explore seized drugs or post-blast explosive materials.

Direct ionization can offer simplicities and increased throughput to laboratory workflows and is growing continuously in popularity and interest. This workshop is designed to create a learning environment for those curious about direct ionization techniques or would like to increase throughput in their labs. We will begin by exploring the history and scientific principles behind these techniques to establish a strong foundational understanding. Building on that foundation, we will then examine a range of real world applications and highlight compelling stories of laboratory success.

(W17) Implementation OF ANSI/ASB Standard 175 and Best Practice Recommendation 171 Regarding DNA Contamination

Presented by: Beth Ordeman, MS, ABC-MB, DNA Analyst/CODIS Administrator, Pinellas County Forensic Laboratory and Charlotte J Word, Ph.D., Consultant

Half Day Workshop - Tuesday Afternoon - (Member \$125/Non-Member \$225)

Every forensic laboratory doing DNA testing periodically has to address the presence of a possible contaminating DNA profile within the profile obtained from an evidence item or a negative control. This contaminating DNA may be from known individuals associated with the collection, handling and/or testing of the item, or from an unidentified source. Two documents relevant to this topic were drafted by the Organization for Scientific Areas Committees (OSAC)¹ for Forensic Science, developed through the American Academy of Forensic Sciences (AAFS) Academy Standards Board (ASB)², and have been published as ANSI/ASB documents. They are available at no charge on the ASB and OSAC Registry websites for implementation in forensic laboratories.



Through presentations by the speakers and interactive discussions with the attendees, this workshop will focus on guidance for using and implementing these two related documents that specifically address issues with contaminating DNA in casework and the benefits of their implementation into the laboratory. These two documents are:

1. **ANSI/ASB Best Practice Recommendation 171**, *Best Practice Recommendations for the Management and Use of Quality Assurance DNA Elimination Databases in Forensic DNA Analysis*, First Edition, 2024;³ and
2. **ANSI/ASB Standard 175**, *Standard for Interpreting, Comparing and Reporting DNA Test Results Associated with Failed Controls and Contamination Events*, First Edition, 2024.⁴

Best Practice Recommendation 171 provides recommendations for the collection, storing, searching, and retention of DNA elimination samples and/or profiles in a quality assurance database as one component of a comprehensive approach to detect and monitor contamination. Standard 175 provides requirements for the laboratory protocols for evaluating, interpreting and comparing data associated with contamination events or with failed controls. In addition, Standard 175 provides requirements for the: 1) assessment of the risks of re-testing vs. not re-testing an item of evidence; 2) necessary documentation in the case record for that assessment; as well as 3) reporting of the event and the associated data and conclusions when the DNA profile obtained is suitable for interpretation and comparison based on that assessment, but re-testing is not possible or feasible. Implementation of Standard 175 may be vital in situations where exculpatory/exclusionary conclusions can be made in order to avoid legal issues associated with Brady violations.

Various scenarios that occur in laboratories with approaches to consider for evaluating, decision-making and reporting data without re-testing will be presented along with hands-on problems and through interactive discussions. Effective communication of the data, conclusions and events to individuals in the criminal justice system through conversations, trainings and testimony will also be discussed.

Additional guidance and information regarding other relevant and related standards will also be addressed during the workshop [e.g., FBI Quality Assurance Standards; ANSI/ASB Standard 020, *Standard for Validation Studies of DNA Mixtures*, and *Development and Verification of a Laboratory's Mixture Interpretation Protocol*; ANSI/ASB Standard 040, *Standard for Forensic DNA Interpretation and Comparison Protocols*; and ANSI/ASB Standard 018, *Standard for Validation of Probabilistic Genotyping Systems*].

This workshop may be instructional for DNA analysts and DNA technical leaders, supervisors, QA/QC managers, trainers and laboratory directors overseeing any type of testing where controls may fail or contamination can occur. By attending this workshop, the attendees should gain a sound understanding of the individual requirements and recommendations in these two documents and leave with insights on how to develop appropriate protocols and policies for addressing them with the goal of full implementation of the documents in their DNA testing program.

¹<https://www.nist.gov/osac/registry>

²<https://www.aafs.org/academy-standards-board>

³<https://www.nist.gov/osac/standards-library/ansiasb-best-practice-recommendation-171-24>

⁴<https://www.nist.gov/osac/standards-library/ansiasb-standard-175-24>



(W18) Understanding and Implementing OSAC IGSR Standards

Presented by: Mary Keehan, Trace Evidence Section Supervisor, Virginia Department of Forensic Science and Thomas (Rusty) White, Team Lead ILR/GSR, Texas Department of Public Safety
Half Day Workshop - Tuesday Afternoon - (Member \$125/Non-Member \$225)

WORKSHOP CANCELLED

(W19) From the Street to the Morgue: Analytical Approaches for Drugs Across the Toxicology Spectrum

Presented by: Laura Kimble, Chief Drug Analyst, Hamilton County Coroner's Office, Michelle Peace, Ph.D., Professor – Department of Forensic Science, Virginia Commonwealth University, Teeshavi Acosta, PhD, Head Toxicology Technician, John Jay College of Criminal Justice, and Aria McCall, Senior Toxicologist/Technical Lead, Tarrant County Medical Examiner's Office
Half Day Workshop - Tuesday Afternoon - (Member \$125/Non-Member \$225)

Illicit drugs present unique challenges for the chemist. This is particularly true depending on where along the toxicology spectrum the analysis takes place. Seized drugs and seemingly innocuous products require insights to preserving, preparing, and successfully analyzing the materials to discern identification, composition, and purity. Biological matrices, such as postmortem blood and tissues, present their own unique challenges surrounding preparation, analysis, and data interpretation.

Attendees of this workshop will explore the variable lifecycle of some notable illicit formulations, from seized drugs through postmortem extraction and analysis. We will examine some of the common complications surrounding this work, including matrix interference and removal techniques, managing detection of adulterants, and even uncovering novel substances. This session will demonstrate successful workflows pertaining to GC-MS, LC-MS/MS, and high-resolution mass spectrometry (Q-TOF).

Through real-world casework, attendees will be shown practical approaches to avoiding errors and improving confidence in their own analytical work. Emphasis will be placed on sample preparation, technical troubleshooting, and developing trends in the modern toxicology laboratory.





POSTER PRESENTATIONS



Kilimanjaro Suite 1/2

Poster Session

Location: Kilimanjaro Ballroom Suite 1/2

NEAFS

Adeena Emery, Poster Session Chair

Mike Crowe, Poster Session Chair

MAAFS

Kimberly Freeman, Biology Section Chair

Jonathan Forsberg, Biology Section Chair-Elect

Emily Wilkinson, Chemistry Section Chair

Steve Hokanson, Chemistry Section Chair-Elect

Jackson Dimalanta, Physical Evidence Section Chair

Ashley Stein, Physical Evidence Section Chair-Elect

Wednesday, October 7 - 5:30 pm - 8:00 pm

P1 Legitimate and Credible Forensic Source Evaluations Enabled by Single Cell Data

Gian Bates - Rudolph, Dr. Qhawe Bhembe, Dr. Desmond Lun, and Dr. Catherine Grgicak - Rutgers University

In cases where a traditional bulk DNA signature is a mixture of fluorescence from numerous sources, the LR ratio distributions do not always well discriminate between H1 and H2, not only affecting evaluative reports, but also the effectiveness of database search queries. One way to address this gap is to change the data from bulk signal to single-cell signal which, when clustered, gives us the following information: i) the number of clusters estimates the number of (unknown) donors; ii) the number of cells in a cluster estimates the level of contribution by each (unknown) donor; and iii) the LR when compared to a given genetic profile from a known individual.

To verify the performance of the model, we use a challenging single-cell mixture test set, use the decomposed log-loss scoring rule, and treat clustering as a latent variable so that the full LR is the weighted average of a LR for a given clustering multiplied by that clustering's probability. Ground-truth donor labels are retained for all 365 H1 and 365 H2 tests because the mixtures were constructed by randomly sampling at the scEPG level such that it comprised 72 epithelial, 71 blood, and 99 sperm mixtures, with donor numbers ranging from one to five. The analysis revealed that the CAL component of log-loss were $6e-4$, $8e-7$ and $2e-2$ for epithelial, leukocyte and sperm mixtures, respectively, showing very reliable predictions about the clustering; additionally, there was no overlap between H1 and H2 empirical WoE distributions and the median WoE was <-40 for H2 tests, which implies that single-cell data yields source level (i.e., cell type) evaluations that behave like single source profiles.



P2 Assessing Environmental Effects on Bone Marrow Biomarkers for Improved Postmortem Interval Estimation

Niyah Belton - George Mason University

This study explores how bone marrow biomarkers can improve postmortem interval (PMI) estimation in skeletal remains, when traditional methods become unreliable. Using pig tibia samples, it analyzes three indicators: cytoplasmic morphology, DNA integrity, and lipid profiles, across different environments (temperate, aquatic, frozen, and arid). Tentative results show that decomposition patterns vary by condition; cytoplasmic structure degrades fastest, DNA shows moderate but environment-sensitive changes, and lipids persist the longest. Environmental factors like temperature and moisture significantly influence these processes, producing non-linear and context-dependent degradation patterns based on the control comparison. Overall, the findings support a multimarker approach to PMI estimation, offering a more reliable and adaptable framework for forensic analysis.

P3 Evaluating the Collection Efficiency of Swab Materials for Inorganic Oxidizer Residues on Common Evidence Substrates

Sara R. Ciavardini, Marianne Staretz, Jared Estevanes, and Andra Lewis -Cedar Crest College

Efficient recovery of post-blast inorganic oxidizer residues from porous substrates remains a critical challenge in forensic explosive investigations. This study compares the collection efficiency of cotton, polyester, and nylon swabs across four common evidence substrates: denim, 100% cotton, 100% polyester, and 100% rayon. Swabs were tested using five inorganic oxidizer salts at varying concentrations to evaluate recovery performance. Following sample recovery, Raman spectroscopy is used to measure the intensity and quality of the resulting spectra. The results of this study will aid the forensic community by identifying the most effective swabbing materials for evidence surfaces encountered in the field.

P4 The effect of ultraviolet radiation on DNA degradation in blood samples.

Kiersten Davis - Fairmont State University

Analyzing deoxyribose nucleic acid (DNA) is one of the unique types of evidence found at a crime scene. Ultraviolet radiation (UV), a natural component of sunlight, is a common environmental factor that can cause damage to biological molecules like DNA. In this project, aseptic human blood was dried on a piece of hardwood flooring and exposed to UV light for varying periods of time. Results indicated degradation in samples exposed to UV-A after four weeks; samples exposed to UV-B and UV-C indicated little to no change.



P5 Analysis of Designer Cannabis Products using DSI-GC-MS

Alexis Drucker, Nicholas Brancato, Ling Huang, PH.D - Hofstra University

Designer cannabis products such as gummies and vapes are largely unregulated and often come with unknown compositions, packaged with incomplete or misleading labels. The current gold-standard method in seized drug labs for analyzing cannabis products is GC-MS using a S/SL (Split/Splitless) inlet and autosampler. Our lab is exploring a DSI-GC-MS method that yields a more accurate representation of the composition which incorporates the active ingredients, cannabinoids and matrix components in the results. DSI (Direct Sample Injection) includes a small sample size (i.e. 4.1mg or 3.3mg) that is directly heated in a PTV (Programable Temperature Vaporization) inlet. The DSI-GC-MS method has shortened the overall analytical time due to the minimal sample preparation, has improved separation of cannabinoids and shows the matrix components not shown in GC-MS results.

P6 Internal Validation and Assessment of STRmix™ v2.12 Using Challenging Mock Case-Type Samples

Madison Fleck, BS; Charla Marshall, PhD; Coral Smith, MS; Sara Bodnar, MS - The Center for Forensic Science Research and Education

Forensic DNA mixture interpretation has become increasingly challenging due to advances in analytical sensitivity and the growing prevalence of complex, low-template DNA profiles. Traditional binary interpretation methods may not fully utilize profile information; while fully continuous probabilistic genotyping (PG) systems like STRmix™ address these limitations by incorporating biological modeling, peak height information, and statistical algorithms to examine complex DNA profiles from multiple contributors and calculate likelihood ratios (LRs). This work completes the internal validation of STRmix™ v2.12 PG software at the Center for Forensic Science Research and Education (CFSRE) in accordance with the STRmix™ Implementation and Validation Guide. To further test the validated parameters, challenging mock case-type samples were created, including touch DNA mixtures, simulated sexual assault samples, and UV-degraded samples, and interpreted with LR calculations using STRmix™. Results from this study will support future implementation of STRmix™ at the CFSRE for research and educational purposes while contributing to ongoing advancements in forensic DNA mixture interpretation and PG software validation and implementation.

P7 Evaluation of chiral solvating agents for methamphetamine enantiomer analysis by 1HNMR

Kiersten Frey - Cedar Crest College

Chiral solvating agents (CSAs) are often used as a quick method for studying the enantiomeric composition of chiral compounds using proton nuclear magnetic resonance (1HNMR). For controlled substances such as methamphetamine, an understanding of the stereochemical composition is key for forensic analysis and may assist in distinguishing materials produced through different synthetic routes. This study compares several chiral solvating agents for their ability to differentiate and quantify the enantiomers of methamphetamine. Varying molar equivalents of each CSA ((S)-BINOL, Mosher's Acid, camphorsulfonic acid, along with several BINOL derivatives) will be added to a 10.76 mM solution of racemic methamphetamine in CDCl₃ and resulting 1H NMR spectra will be obtained. Results of this study may identify an optimal CSA and experimental conditions for the rapid determination of methamphetamine enantiomeric composition by 1H-NMR.



P8 Elemental analysis of suspected cremated remains with laboratory and portable elemental analysis

Melody Gokce, Kelly M. Elkins, Rhys Williams - Towson University

The goal of the investigation was to assess the remains from a Baltimore pet crematorium suspected of mishandling animal remains. Received samples and comparison reference materials were inventoried and analyzed using microscopy, ALS, pXRF, and ICP-OES. Analysis using the ALS and microscopy indicated the presence of unknown bone, sand, building material, marine deposit, and a human tooth, among other components. Selected samples were digested in nitric acid at high temperatures and reacted with hydrogen peroxide prior to filtering and reconstituting in dilute nitric acid for ICP-OES analysis. The elemental composition was determined using a multi-element and internal standard. The Ca/P ratio indicated that the samples were of mixed provenance primarily consisting of non-cremation products such as cement or sand commercial products but also contaminated with materials such as human bone and animal remains. The metal content suggested casket hardware or soil contributors. This study explored the value of high-precision laboratory techniques alongside non-destructive screening when analyzing suspected cremated remains.

P9 Assessment of Soil Geolocation by ATR FTIR and ICP-OES Spectroscopy

Melody Gokce, Lauren Brinkmann, Jaden Force, Sam Hulett, Sean Jones, Dana Kollmann, Shital Vaidya, Julie Schablitsky, Kelly M. Elkins - Towson University

In this study, we assessed ICP-OES and ATR FTIR spectroscopy for analyzing soil for forensic geolocation predictions. Samples were collected from different soil types and locations in Maryland. Soil samples were prepared for the ICP-OES by digesting in nitric acid, heating at high temperatures, reacting with hydrogen peroxide, filtering, and reconstituting in dilute nitric acid for analysis. Soil samples were placed directly on the ATR interface and 128 scans were collected on the FTIR with air as the background. Analysis was performed by searching several libraries within the IR's Omnic software, as well as the elemental composition from the ICP-OES using a multi-element standard within the prepared range. The library search on the FTIR instrument identified the materials as soil and soil components. The elemental composition from the ICP-OES revealed unique fingerprints for various samples. This was used to analyze samples from a historic site in Maryland.

P10 Investigating the Effects of Gasoline on the Recovery of DNA from Blood Jarrett Gordon, Heather Miller Coyle PhD - University of New Haven

While most studies in the field of arson and DNA involve degradation due to high temperatures caused by fire, this one isolates the chemical effects of ignitable liquids (gasoline, acetone, and ASTM E1618 test mix) on DNA. Two different methods (phenol chloroform extraction, E.Z.N.A. Soil DNA Extraction Kit) were used to extract DNA from human whole blood samples that have been exposed to ignitable liquids for 24 hours at room temperature. Additionally, two different volume ratios (1:1, 1:10) of blood to ignitable liquid were tested, and DNA quantification was performed by



Quantifiler Trio and Qubit methods. Results showed that the phenol chloroform extraction method, while more time consuming, is superior at retrieving DNA from these samples, and that little to no DNA degradation or PCR inhibition occurred. Further analysis will include STR amplification and DNA profiling. This research confirms the reliability of temperature-based studies for arson investigations and opens the door for future studies involving DNA exposure to different ignitable liquids and sample conditions.

P11 Effect of Silica Based Extraction Method Choice on STR Profiling Success from Human Ribs and Vertebrae

Madison Hansell, BS; Coral Smith, MS; Sara R. Bodnar, MS; Charla Marshall, PhD - Center for Forensic Science Research and Education

The identification of human remains in forensic investigations often relies on recovering high-quality DNA from degraded skeletal remains, but this can be especially challenging when processing bones of lower quality. This study aims to compare two silica-based DNA extraction methods (silica magnetic beads and Roche large-volume spin columns) to determine the optimal method for DNA recovery and short tandem repeat (STR) profile quality on the sixth rib and T10 vertebrae skeletal elements collected from five human cadavers. DNA yield, degradation, inhibition, and STR profile completeness was evaluated and compared between the sample types and extraction methods. The findings of this study will aid in the determination of the most effective silica-based extraction method for forensic DNA analysis of bone types of varying quality to be applied to the identification of missing persons and unidentified human remains.

P12 Evaluation of Dye and Fiber Persistence in Assorted Fibers Following Complete Combustion Using HPLC-MS and ATR-FTIR

Truc Hoang, Dr. Allison Myers - University of the Incarnate Word

This study assessed the persistence dye and fiber in assorted fibers following combustion, with the aim to determine whether the dye and fiber remained detectable after thermal degradation through visual and chemical analysis. Combusted fibers were analyzed using high-performance liquid chromatography, coupled with mass spectrometry (HPLC-MS) and Fourier transform infrared spectroscopy, coupled with an attenuated total reflectance (ATR-FTIR) to assess dye retention and fiber type. The findings helped determine whether combusted fibers could provide meaningful evidence in forensic investigations.

P13 An Analysis of DNA Loss During the Wash Steps of the Promega Differex™ Extraction Process

Margaret King, B.S., Lyndsie Ferrara, Ph.D., and Pamela Marshall, Ph.D. - Duquesne University

Differential extraction is commonly required in sexual assault evidence examination, since victim DNA is often present in much greater quantities than perpetrator DNA. When a DNA profile can be matched to a known perpetrator, cases are more likely to move forward through the judicial system and result in convictions or guilty pleas (Cross et al. 2022). Currently there is a lack of research investigating whether the early wash steps in the Promega Differex™ extraction method result in the loss of male DNA, and this study addresses that gap by using contrived sexual assault samples with seminal fluid dilutions ranging from 1:10 to 1:250, 0.206 ng/μL to 0.00584 ng/ μL, to quantify DNA loss during the wash steps



of the Promega Differex™ extraction process and to evaluate the resulting STR allele recovery. We hypothesize that most DNA loss will occur in the first wash step, resulting in reduced STR allele recovery. So far, this research has shown that male DNA is lost with the epithelial fraction and full profiles from individual washes have not been obtained due to the low quantities of DNA. Identifying when and how much DNA is lost during extraction steps can inform improvements to differential extraction protocols, with the potential to strengthen case outcomes in sexual assault investigations.

P14 Ethanol Stability Over Time in Blood Samples Undergoing Headspace Analysis

Ava La Lande, Dr. Denise Gemmellaro - Kean University

This study examined how three different Headspace analysis procedures impacted ethanol stability in blood samples and the effectiveness of their quantification. The samples were analyzed via Headspace Gas Chromatography with a Flame Ionization Detector (HS-GC/FID). Three alterations to the current methodology were tested: the stability of unpunctured Headspace vials, repeated injections into the same vials, and recapping previously injected samples at multiple time points. This was done to replicate the real-life troubleshooting procedures forensic laboratory technicians may encounter. Results indicated the most consistent data came from unpunctured vials tested immediately after aliquoting; however, vials recapped six hours post-injection retained statistical significance. "

P15 Identifying Blood and Semen from Used Menstrual Underwear After Laundering

Olivia Law, BS; Charla Marshall, PhD; Sara Bodnar, MS; Coral Smith, MS - Center for Forensic Science Research and Education

Menstrual underwear has emerged as a potential new avenue for physical evidence in sexual assault investigations, but there is currently a dearth of research on their utilization in forensic biology. This research aims to evaluate the ability to locate menstrual blood and semen on laundered menstrual underwear samples that may be encountered in sexual assault investigations and subsequently develop a DNA profile from the identified stains. Mock case-type samples were created by depositing semen onto menstrual underwear worn by actively menstruating participants and then laundering the stained underwear. Serological testing with immunochromatographic assays and Christmas Tree staining were used to identify the semen and menstrual blood after laundering, and spermatozoa positive samples were forwarded to STR typing to evaluate the ability to obtain a DNA profile. Findings of this study will potentially provide insight on how forensic biologists can best tailor their methods when encountering laundered menstrual underwear in sexual assault investigations.

P16 Evaluating DNA Recovery from Compromised Bone Samples Using the Applied Biosystems™ RapidHIT™ ID System and RapidINTEL™ Plus Cartridges

Kendall Mallarnee, B.S.(1), Michael Scheers, Detective(2), Lyndsie Ferrara, Ph.D.(1), and Pamela Marshall, Ph.D.(1) (1) Forensic Science & Law Program, Duquesne University, Pittsburgh, PA 15282, USA. (2) Beaver County Detective Bureau, Beaver County District Attorney's Office, Beaver, PA 15009, USA.

Rapid DNA technology provides a potential advantage in situations where rapid human identification is



critical, particularly in disaster scenarios where remains are degraded and conventional DNA profiling requires significant processing time. Limited research exists on the performance of the novel RapidINTEL™ Plus Cartridges when challenged bone samples are used; thus, this study evaluates the Applied Biosystems™ RapidHIT™ ID System on bones exposed to heat and water, mimicking real-world scenarios. To determine whether reliable DNA profiles can be generated, bones will be experimentally degraded through controlled heat exposure in a kiln or prolonged immersion in ultrapure water, then pulverized to two substrate consistencies, rock salt and fine powder, to compare Rapid DNA preparation methods. Resulting DNA profiles will be assessed for allele recovery and overall profile quality and compared between methods to evaluate the cartridge's performance and identify when conventional testing may be more suitable, as it is hypothesized that DNA profile quality will decrease as degradation increases. Expanding the understanding of RapidINTEL™ Plus Cartridge capabilities will support the development of faster, effective identification workflows for degraded remains.

P17 Effect of Packed Cell Volume and Surface Area on Drip Bloodstains *Aleah McCoy, Carol Ritter, Michelle Lambert, Paul Quinn - Cedar Crest College*

Bloodstain pattern analysis (BPA) involves the initial classification of bloodstains based on physical features to understand the events that occurred during a bloodletting event. An understanding of the influence of fluid dynamics and physical properties of blood is crucial to the proper classification of bloodstain patterns. The focus of this study was to evaluate how variations in packed cell volume (PCV) and substrate surface area influence drip stain formation and blood loss from objects. Human blood was adjusted to a broad range of PCV values (25 – 65%), representing both physiologic and pathologic conditions, and applied under standardized conditions to a stainless-steel knife and aluminum bat. Drip stain characteristics, including number, volume, and timing of drip stains produced for 30 trials at each PCV%, were recorded and statistically evaluated to understand the combined influence of blood physical properties and object geometry. The findings will provide a better understanding of blood behavior across diverse populations and within the legal system, using experimentally validated data to strengthen bloodstain pattern interpretation in casework involving blood-bearing weapons.

P18 Evaluation of Sperm HY-LITER™ Express as an Alternative Method for Spermatozoa Identification in Forensic Sexual Assault Evidence

MaryClaire McKenna, Cassie Collea, Victoria Williamson, K. Paul Meyers, Dr Christian Westring - University at Albany & Niagara County Sheriff's Office Forensic Lab

The identification of spermatozoa is a critical step in the forensic examination of sexual assault evidence and is traditionally performed using the Christmas Tree stain. Although effective, conventional staining methods can be time-consuming and rely heavily on analyst interpretation, particularly in samples containing low numbers of sperm cells or degraded material. This study evaluates the performance of Sperm HY-LITER™ Express, an immunofluorescence-based assay targeting sperm-specific proteins, as an alternative method for sperm identification. The assay will be assessed for its sensitivity, specificity, efficiency, and ability to detect spermatozoa across varying sample conditions, with results compared to those obtained using the traditional Christmas Tree stain. Findings from this study will help determine the forensic applicability of Sperm HY-LITER™ Express and its potential to improve the accuracy, consistency, and efficiency of sexual assault evidence examination.

P19 Application of the MiSeq FGx™ Next-Generation Sequencing System for the Deconvolution of DNA Mixtures

*Renee M. Mercer, B.S., Jennifer Bracamontes, M.S., Pamela Marshall, Ph. D., & Lyndsie Ferrara, Ph. D.
- Duquesne University*

Samples collected from sexual assault kits (SAKs) often contain uneven mixtures of male and female DNA, which can complicate profile generation when the male contributor is present in low quantities or shares alleles with the female contributor. This research evaluates the use of Massively Parallel Sequencing (MPS) as an alternative to traditional Capillary Electrophoresis (CE) in generating more robust male DNA profiles in contrived SAK mixtures. Continued evaluation of MPS for DNA mixture analysis could lead to an improved method of mixture deconvolution and identification of the perpetrator's profile in SAK testing. Known and casework-type SAK mixtures will undergo extraction, quantification, amplification, detection, and interpretation for both CE and MPS, and the resulting data will be compared. MPS is expected to produce more comprehensive and interpretable DNA profiles than CE across all sample types.

P20 The effect of cleaning agents on Bluestar and luminol blood detection *Taylor Milburn and Mark Flood - Fairmont State University*

Often criminals will clean up blood evidence and claim the positive test results come from the chemicals in the cleaning solutions. The objective of this study is to determine if different household substances can provide false positives when using Bluestar and luminol tests. The results for this research indicate that none of the substances tested provide a false positive other than bleach and Bar Keepers Friend. Therefore, no household cleaning products other than bleach and Bar Keepers Friend should interfere with detecting blood at the scene of the crime.

P21 Comparison of Two Silica-Based DNA Extraction Methods on Human Femora and Ribs

Taylor Nagel, BS; Coral Smith, MS; Sara Bodnar, MS; Charla Marshall, PhD - Center for Forensic Science Research and Education

The extraction of DNA from human remains presents several challenges due to degradation from environmental exposure and the copurification of inhibitory substances. The objective of this study is to compare the recovery success of large-volume silica spin columns and automated silica magnetic bead purification methods optimized for ancient DNA extraction. Cuttings of femur bones (n=5) and 6th ribs (n=3) were collected from five human cadavers for DNA processing. The quantity of total double-stranded and human DNA was measured using Qubit™ fluorometry and qPCR, respectively, with degradation and inhibition considered in quality assessments. Conclusions regarding DNA yield and STR profile completeness will inform forensic analysts on the most effective procedure for human remains identification.

P22 Evaluation of the Astrea™ Forensics DNA Extraction Kit for Mitochondrial DNA Recovery from Rootless Hair Shafts

Ashley Perez Diaz, BA; Coral Smith, MS; Sara Bodnar, MS; Charla Marshall, PhD - Center for Forensic Science Research and Education



Hair is one of the most frequently encountered forms of trace evidence at crime scenes, as naturally shed hairs can unknowingly be transferred to people, clothing, vehicles, and surrounding surfaces. Rootless hair shafts, however, are challenging samples as they can contain limited and degraded DNA, making the recovery of sufficient genetic information difficult, highlighting the need for improved methods. Recent advances in massively parallel sequencing (MPS) have enabled whole mitochondrial genome sequence analysis beyond the traditionally examined mitochondrial control region, increasing the amount of probative genetic information that can be recovered from such hair samples, however, improved DNA extraction methods are still needed to maximize the amount of mitochondrial DNA (mtDNA) recovery from rootless hair shafts. This study evaluates the performance of the newly released Astrea™ Forensics DNA Extraction Kit from Rootless Hair for whole mitochondrial genome sequencing from rootless hair shafts by assessing the effects of hair length, extraction input quantity, hair pigmentation, and sample degradation. Results from this study aim to provide insight into the kit's efficacy and potential to improve the recovery of genetic information from challenging rootless hair samples for forensic applications.

P23 The Development of Recombinase Polymerase Amplification (RPA) to Augment mini STR Amplification of 'Touch DNA' Samples for Human Identification (HID) Workflows

Joseph M. Rahm, Ph.D., DeEtta Mills, Ph.D. - Lasell University

The commonplace nature of touch DNA at crime scenes has allowed for successful DNA typing to identify crime victims and suspects. However, it has also highlighted limitations with the widely used polymerase chain reaction (PCR) that generates human DNA profiles. Testing the proposed RPA-PCR solution to improve the profile quality of touch DNA samples was done with an optimal amount of DNA, 3 ng, for processing with RPA. Primers for specific core STR targets, Amelogenin, D5, D16, and Penta D, were 25-30 base pairs in length. The amplification of STR mini loci, D7, D21, TH01, CSF1PO, Amelogenin, and FGA was done using RPA at 32 C and then amplified using PCR. The quality of alleles produced from the RPA-PCR assay was compared to the same assay with the addition of a direct spike of 1 ng of DNA to provide insight into the viability of RPA mechanisms as a tool to eventually augment touch DNA samples using RPA templates as the input for PCR amplification of mini STRs in forensic DNA workflows for Human Identification.

P24 An Evaluation of Deactivations on Gas Chromatographic Stationary Phases for the Analysis of Seized Drugs of Abuse

Amanda Rigdon, Thi Do, Corby Hilliard, Jamie York - Restek

Gas Chromatography–Mass Spectrometry (GC-MS) is commonly used for screening seized drugs due to its ease of use and high specificity. When drugs of abuse are analyzed in their underivatized form, active functional groups can interact with active sites on the fused-silica column surface. These interactions can result in poor peak shape, potentially leading to inaccurate or unreliable results. Recent advancements in column chemistry, particularly the development of improved deactivation strategies that minimize active silanols on the fused-silica surface, have significantly enhanced the analysis of active compounds without derivatization.



P25 Effects of Household Chemical Exposure on Hair Root Structure and Nuclear Integrity

Macey Rodriguez - University of the Incarnate Word

Hair has been of interest to crime laboratories since the discovery that hair roots contain extractable nuclear DNA, although the number of nuclei present can be highly variable and may affect DNA recovery. To determine how common household chemicals affect nuclei visibility, nuclei number, and DNA recovery in human hair roots, samples were exposed to bleach, vinegar, hydrogen peroxide, baking soda, and muriatic acid and examined using polarized light microscopy before and after exposure. DNA was then extracted from treated hair roots and quantified using UV spectrophotometry to evaluate the presence and concentration of recoverable DNA following chemical exposure. This study examines how household chemical exposure may influence the forensic value of hair roots for DNA analysis.

P26 Assessing Permanent Markers as Vectors for Human DNA Contamination in Forensic Casework

Kiley Roman, B.S.; Lyndsie Ferrara, Ph.D.; Julie Sikorsky, M.S.; Pamela Marshall, Ph.D. - Duquesne University

Permanent markers are frequently used in crime laboratories to mark evidence, but their porous felt tips may retain and transfer human DNA, making them a potential source of contamination when reused, which occurred in a Texas laboratory contamination incident. This study evaluated whether previously used permanent markers contained detectable human DNA and assessed the effectiveness of common decontamination methods. DNA was extracted, quantified, amplified, and analyzed from donated markers and intentionally contaminated markers after cleaning with commonly used decontamination agents to determine the presence or absence of interpretable DNA. Preliminary findings demonstrate that detectable human DNA can persist on previously used laboratory markers, with STR analysis yielding partial, full, and mixed DNA profiles from donated markers. Findings from this research will support the development of standardized protocols for cleaning, replacement, and quality control of laboratory markers to minimize preventable DNA transfer and strengthen contamination control in forensic biology laboratories.

P27 Comparison of Semi-Continuous and Continuous Probabilistic Genotyping Models for STR DNA Mixture Interpretation

Nilay Sengezer, Kelly M. Elkins, Ph.D. - Towson University

Short tandem repeat (STR) DNA mixtures can produce different likelihood ratios (LRs) depending on probabilistic genotyping model assumptions, analytical settings, and signal quality, creating challenges for consistent forensic interpretation. This study compares a Python semi-continuous likelihood ratio (LR) model with the continuous peak-height model EuroForMix using public PROVEDIt STR mixture datasets and laboratory-generated mixtures from IRB-approved volunteer samples to evaluate agreement in LR direction and strength across varying mixture complexity and analytical conditions. We have established a reproducible workflow for calculating quality-control metrics, generating semi-continuous LRs, and evaluating the effects of dropout, drop-in, and injection time on LR behavior and data conditions associated with disagreement between model types.



P28 The Effect of DNA/RNA Shield Incubation on Touch DNA Recovered from Band-Aids and Duct Tape

Deborah Silva, Cassandra Coscia, Kailyn Joseph, Lucas Joseph, Joshua Kim, Ethan Tang - Hofstra University

Adhesive materials such as Band-Aids and duct tape can be encountered in forensic investigations, yet the DNA recovered from these substrates is particularly susceptible to degradation prior to laboratory processing. This study evaluated whether incubation of adhesive evidence in DNA/RNA Shield, a nucleic acid preservation reagent, improves the quantity and quality of touch DNA compared with incubation in Buffer ATL or immediate extraction. Touch DNA samples were generated by applying Band-Aids and duct tape strips to a volunteer's leg for 12 hours. A total of 36 samples (18 Band-Aids and 18 duct tape strips) were randomly assigned to one of three treatment groups: untreated control, DNA/RNA Shield incubation, or Buffer ATL incubation. DNA was extracted using the QIAamp DNA Investigator Kit and quantified using the Quantifiler Trio DNA Quantification Kit on the Applied Biosystems QuantStudio 5 Real-Time PCR System. DNA yield was generally higher in the DNA/RNA Shield and Buffer ATL treatment groups than in the untreated control for both adhesive types. DNA/RNA Shield also produced lower degradation indices than Buffer ATL for duct tape, while both preservation treatments reduced degradation relative to the untreated control for Band-Aid samples. Despite these improvements, overall DNA recovery remained low. Overall, DNA/RNA Shield provided more consistent protection against DNA degradation; however, neither preservation treatment substantially increased the likelihood of obtaining complete DNA profiles, suggesting that the primary limitation in recovering touch DNA from adhesive evidence is the low quantity of DNA rather than degradation.

P29 Using a Virtual Chromatography Tool to Expand the Scope of an Existing LC-MS/MS Method

Melinda Urich, Samantha Herbick, Justin Steimling, Chris Nelson, Tim Yosca - Restek Corporation

By attending this presentation, attendees will be informed about simpler and more efficient ways to expand their testing scope when constantly dealing with new and emerging compounds. Using emerging compounds from the Center for Forensic Research and Education's (CFSRE) Scope Recommendations, 20 compounds were selected to be added to an existing LC-MS/MS method that contained 231 analytes. This work includes the use of a virtual chromatography tool to model the addition of new analytes and optimize resolution, which can ease the burden on laboratories since the method development can be done without the full-time use of a production instrument. To show the accuracy of the modeler, retention times of the experimental data was compared to the modeler data and all retention times fell within +/- 15 seconds, well within the span of a typical MRM window.

P30 Method Development and Validation for the Determination of Fentanyl and Cutting Agents by GC-MS

Taryn Wallen, Paige Ickes, Sarah Heinrichs, Constantinos Pistos, Lisa Mundy - West Chester University

A rapidly evolving illicit drug landscape is frequently complicated by the emergence of veterinary sedatives, such as medetomidine and xylazine, used as cutting agents in the fentanyl supply. The aim of this study was to develop and validate a single gas chromatography-mass spectrometry (GC-MS) method, for the simultaneous determination of fentanyl, xylazine, and medetomidine in whole blood to be



applied in forensic laboratory settings. Analytes were extracted by solid-phase extraction (SPE) and analyzed with Selected Ion Monitoring (SIM) mode, with calibration curves demonstrating satisfactory linearity and acceptable extraction recovery for fentanyl and medetomidine. However, blank blood extractions revealed a co-eluting matrix component with xylazine, affecting proper quantitation. Future work will focus on refining the SPE procedure to resolve this interference, ultimately providing forensic toxicology laboratories with an efficient tool to process complex polydrug cases much faster.

P31 DNA profiling of human DNA extracted from *Dermestes maculatus* using CE and NGS

Ny'Gia Williams, Jenna Buckshaw, Madison Simms, Kylie Thayer, Kayden L. Phillips, Filipa Simão, Kelly M. Elkins - Towson University

Dermestes maculatus (dermestid beetles) are forensically significant insects encountered at crime scenes, where they contribute to postmortem interval (PMI) estimation in death investigations. These beetles are typically associated with dry, warm environments and primarily colonize remains during later stages of decomposition particularly when tissues are skeletonized or mummified. Previous research has demonstrated that other insects, such as head lice, can yield viable human DNA profiles when recovered from crime scenes. The application of next generation sequencing (NGS) technologies has shown promise in successfully analyzing DNA from low template samples. In this study, we extracted and analyzed genetic material from the gut contents of dermestid beetles to evaluate the extent to which human DNA can be recovered and profiled the beetles fed on human remains as the larvae grew. DNA samples were subjected to both NGS and CE analysis to compare their effectiveness. STR typing using CE generated more complete partial human DNA profiles from the gut contents than NGS. Notably, samples obtained from more immature beetle larvae produced more complete profiles compared to those derived from adult beetles. Additionally, early-stage larvae yielded more complete profiles than late-stage larvae. One larval sample that produced a usable DNA profile using NGS. This profile matched the human remains on which the beetle had fed and produced phenotypic predictions, including hair color, eye color, and ancestry of the individual. This result highlights the potential power of NGS technology, even when working with trace quantities of human genomic DNA in complex mixtures and degrading environments.

P32 Application of a validated LC-MS/MS method to accurately quantify cannabinoid doses in commercially available tablets

Kyle Yuncza, Michelle Carlin - Rutgers University Camden

Cannabis products are rapidly becoming more readily available to consumers as many states legalize cannabis and recent overtures from the federal government signal a relaxation of legal policy. Loosening of regulations has led to a flood of new products, many of which include misleading advertising and are often manufactured to a more lenient standard than typical pharmaceutical drugs - creating a risk for consumers who use these products. In this study, a previously validated method designed to quantify 10 cannabinoids in a methanol matrix was applied to determine the actual dose of cannabinoids in 2 commercially available CBD-based tablets. The results of this study will elucidate the difference in advertised dose and the actual dose in these tablets and highlight the effectiveness of this method in a practical application.



P33 Differentiation of Synthetic Tryptamines Using Direct Analysis in Real Time Time-of-Flight Mass Spectrometry (DART-TOF)

Kevin Zencak, Margaret Garrett - Virginia Department of Forensic Science

Over the past few years, there has been a rise in psilocyn/psilocybin food products. However, these products frequently contain unlisted synthetic tryptamines that may or may not be controlled. These compounds function similarly to psilocyn as hallucinogens. Due to these synthetic tryptamines being isomers and analogs to each other, they have similar mass spectra and retention times. This research uses Direct Analysis in Real Time Time-of-Flight (DART-TOF) Mass Spectrometry in order to differentiate between these tryptamine isomers and analogs.

P34 Analyzing the Effects of UV Radiation on DNA Recovery from Hair Strands *Arshjot Multani, Dr. Allison Myers - University of the Incarnate Word*

DNA recovery from human hair has long been considered a foundational component of trace evidence analysis in crime labs, providing investigators with biological material that may contribute to individual identification. Of particular interest is how varying environmental stressors may cause gradual changes in the number of observable nuclei within hair samples and the amount of DNA extracted. This research specifically focused on the impact of UV radiation on human hair due to its ability to induce molecular damage to DNA, potentially reducing the amount of genetic material available for forensic analysis. Hair samples were exposed to simulated environmental UV radiation for varying durations to model differences in environmental exposure over time, then stained and analyzed microscopically before DNA was extracted and quantified relative to an unexposed control. By examining the relationship between UV exposure and DNA recovery, this study seeks to provide insight into factors that may affect the success of forensic trace evidence analyses.

P35 The Effect of Ultraviolet Radiation on Latent Fingerprints

Addison Tenney, Mark Flood - Fairmont State University

Fingerprints are used as a way to scientifically place a certain person to a crime scene. Ultraviolet rays (UV) have the potential to degrade the oils left behind in fingerprints. This was tested by printing 4 plates in total that were left under a UV-A, UV-B, UV-C and a control plate that was left in an enclosed space, meaning there was no light exposure. The fingerprints were left under the different UVs for varying amounts of time then sprayed with small particle reagent, to show any visible difference between the plates. Based on results, UV-C showed the greatest change once reaching one month compared to the control plate.

P36 Analysis of the Behavior of Eccrine Fingerprints on Stanadard, Acquired, and Engineered Vehicular Coatings

Sara Wynne, Carol Ritter M.S., Joseph Cordoma Ph.D, Andra Lewis Ph.D, David Rusak Ph.D - Cedar Crest College

Crime scene investigators must evaluate composition and substrate properties when determining the best enhancement and lifting scheme for friction ridge evidence at crime scenes. Automotive finishes



represent a particularly underexplored surface for fingerprint deposition, persistence, and analysis. The purpose of this study was to better understand the behavior of fingerprints on four exterior vehicle surface types and determine a best-practice-protocol for developing and lifting latent fingerprints.

Ten volunteers, five male and five female, deposited eccrine prints onto four surfaces: standard UV top clearcoat on a new 2026 Hyundai Kona, Avery Dennison vehicle vinyl wrap, weathered vehicle paint, and Raptor Truck bed lining. All substrates and eccrine-based fingerprints were prepared the same with each participant depositing a series of four consecutive fingerprints with their right index finger. A variety of enhancement and lifting techniques were evaluated on both smooth and textured automotive surfaces. Using the Bandley 0-4 scale, a qualified fingerprint examiner graded the quality of fingerprints prior to and after processing. Statistical analysis was performed to assess the significance of the results. The results of this study will provide law enforcement with an optimized method when processing vehicles."

P37 Bayesian network modeling for assessment of drug-related deaths: a forensic toxicology approach

Kenny K. Khatri¹, Priscilla T. Merlino¹, Anders L. Madsen², Alan M. Langford³, Michelle G. Carlin¹ - ¹ Department of Chemistry, Rutgers University, 315 Penn Street, Camden, NJ 08102, USA,

² Hugin Expert A/S, Aalborg, Denmark/Department of Computer Science, Aalborg University, Denmark, ³ Faculty of Science and Environment, Northumbria University, Newcastle upon Tyne, NE1-8ST, UK

Post-mortem toxicology is essential in establishing whether drugs contributed to an individual's death. However, interpretation is complicated by numerous factors that are not captured in standard toxicological reference tables. These include the choice of biological samples and sampling sites, post-mortem drug redistribution, chronic or previous drug use, and underlying pathological conditions. Post-mortem redistribution can significantly alter drug concentrations from the moment of death to when samples are taken, indicating that the concentration may not reflect the concentration present at the time of death. Such variables can significantly influence toxicological outcomes and must be considered in context.

In this study, a Bayesian network was developed and tested using a dataset of over 10,000 cases, each including a recorded cause of death and, in most instances, an associated toxicology report. The initial phase involved data cleaning and the construction of a baseline model using only three variables: Cause of death (as determined by a pathologist or coroner), Age, and Sex; however, this was expanded to include multiple variables including Alcohol, Opioids, Stimulants and Sedative drug classes. This model was trained on the full dataset and used to assess the likelihood of a death being drug-related. Results were compared to official classifications on death certificates, and a receiver operating characteristic (ROC) curve was generated. The area under the curve (AUC) was calculated to evaluate performance, with values closer to 1 indicating stronger predictive ability, and 0.5 indicating performance equivalent to random chance. The baseline network gave an AUC value of 0.54 and current network tested producing an AUC of 0.74. This represents a significant enhancement compared to the baseline, showing that data on drug classes helps in more precisely identifying drug-related deaths. Work continues to improve this value and to establish its use in interpretation of toxicological cases.



FORENSIC BIOLOGY/DNA SESSION



Kilimanjaro Ballroom Suite 7

NEAFS

Allyson Goble, Biology Session Chair

Timothy Goble, Biology Session Co-Chair

MAAFS

Kimberly Freeman, Biology Section Chair

Jonathan Forsberg, Biology Section Chair-Elect

Thursday, October 8

- 9:00 am** **Updates on Available Biology and DNA Standards with Strategies for Implementation**
Charlotte Word
- 9:30 am** **Strengthening DNA Analyst Training for Courtroom Testimony**
Amanda Murray, PhD - DNA Labs International
- 10:00 am** **Break**
- 10:45 am** **Evaluating miRNA expression level from burned bone and bone marrow for use in PMI estimation**
Dani Bailey - Towson University
- 11:00 am** **Evaluation of Different Collection Methods for Trace DNA Recovery on Fabrics**
Jesada Sanders, Ashley Morgan, PhD - University of New Haven
- 11:15 am** **Finding the Perfect Solution : Examining the Utility of Abrasive Wiping With Dilute Bleach Solutions as a Contamination Prevention Step in Forensic DNA Evidence Examination**
Morgan Christopherson, Katherine O'Connor - Hofstra University
- 11:30 am** **The Impact of Immigration on Forensic Databases: Preliminary Results from Mitochondrial DNA Analysis**
Filipa Simão, Ashley Gonzalez-Castro, Joan Oruitemeka, Amanda Hewitt - Towson University
- 11:45 am** **STRUCTURE and ForenSeq UAS Ancestry Predictions: A Comparison Study**
Melody Gokce, Büşra Tosun, Filipa Simão, Kelly M. Elkins - Towson University
- 12:00 pm** **Lunch**
- 2:00 pm** **Strategies to improve STR genotyping for forensic touch DNA samples collected from challenging surfaces**
Joseph Rahm, PhD - Lasell University



- 2:30 pm** **Probabilistic searching of databases compared to binary CODIS eligibility: An improved methodology for maximizing investigative leads using STR DNA profiles**
Michael D. Coble, PhD - Center for Human Identification; Cesar Garza Sanchez, M.S.; Duncan Taylor, PhD; Curt Schuerman, B.S.; Tim Kalafut, PhD
- 3:00 pm** **Improving DNA Recovery from Multiple Fired Cartridge Cases Through Traditional and Automated Firearm-Based Grouping**
Savannah Koontz, M.S., Kayla Nichols, B.S., Elizabeth Reilly, Stephanie Walcott, M.S., Tracey Dawson Green, PhD - Virginia Commonwealth University
- 3:30 pm** **Break**
- 4:00 pm** **Scoring Multi-source Single-cell Forensic Evaluations when Clustering is a Latent Variable**
Catherine Grigcak, Desmond S. Lun; Gian Bates-Rudolph - Rutgers University Camden
- 4:30 pm** **Evaluation of Zar-Pro lifting strips as a mapping technique for the recovery of DNA from biological stains**
Meenakshi Anoop, MS., Amy N. Brodeur, M.F.S. ABC-GKE - Boston University

Friday, October 9

- 9:00 am** **1952 Crash of C-124 Globemaster on Mount Gannett, Alaska: DNA Identification of Human Remains, 2012-2025**
Nancy Stokes - AFDIL - SNA International, Alexa Atencio, Deanna Ciampo, Kristen Dubyna, Brian Givens, Sherie Longshore, Miriam Narvaez, Rayna Ndongo, Jennifer Perez, Kathleen Tumblety, Malachi Weaver, Taylor Dickerson, and LTC Robert Nadeau
- 9:30 am** **From Backlog to Breakthrough: Lessons Learned from Baltimore Police Department's Historical SAFE Kit Project**
Lake Prescott, MSFS and Morgan Mack, MSFS - Baltimore Police Department
- 10:00 am** **Break**
- 10:45 am** **Performance Evaluation of the SERATEC® PAM Immunochromatographic Test for the Detection of Semen and Saliva in Forensic Samples**
Hannah Foor, BS; Charla Marshall, PhD; Sara R. Bodnar, MS; Coral Smith, MS - Center for Forensic Science Research and Education, Thomas Jefferson University
- 11:00 am** **Characterization of cell-free DNA in seminal plasma**
Francis Vu, M.S., Robin W. Cotton, PhD - Boston University
- 11:30 am** **Modernizing Forensic DNA Workflows Using Artificial Intelligence**
Amanda Fazi - DNA Labs International





FORENSIC DRUG CHEMISTRY SESSION



Kilimanjaro Ballroom Suite 9

NEAFS

Joanna Urban, Chemistry Session Chair

MAAFS

Emily Wilkinson, Chemistry Section Chair

Steve Hokanson, Chemistry Section Chair-Elect

Thursday, October 8

- 9:00 am** **Opening Remarks**
- 9:10 am** **Characterized Authentic Drug Samples for Forensic Method Validation**
Sarah A. Shuda, Katya A. Beltran, Edward Sisco - National Institute of Standards and Technology
- 9:25 am** **Are You Using a Green Solvent? How do you know?**
Thomas A. Brettell, Ph.D., GKE-ABC - Cedar Crest College
- 9:40 am** **Differentiation of Synthetic Tryptamines Using Direct Analysis in Real Time Time-of-Flight Mass Spectrometry (DART-TOF)**
Margaret Garrett¹ and Kevin Zencak² - ¹West Virginia University, ²Virginia Department of Forensic Science
- 10:00 am** **Break**
- 10:45 am** **Money Laundering: Cleaning Drugs From Currency Before Returning it to Next-Of-Kin**
Lisa Mundy and Emily Murphy - Philadelphia Medical Examiner's Office Toxicology Lab
- 11:00 am** **Split Injection GC/MS Method for the Analysis of Phenethylamines**
Joshua Rosenthal - New York City Police Department Police Laboratory
- 11:30 am** **Investigating the Stability and Degradation of Psilocybin in Mushroom Gummies: Implications for Forensic Analysis**
Marianne Staretz, Alyssa Ricca, Thomas A. Brettell, Mia Bercier - Cedar Crest College
- 11:45 am** **Tracking the Shift: NIST's RaDAR Program and the Evolving Drug Landscape**
Meghan G. Appley, Sarah A. Shuda, Edward Sisco - National Institute of Standards and Technology
- 12:00 pm** **Lunch**
- 2:00 pm** **Identification of Cannabidiol (CBD) and THC in Designer Cannabis Products using 2D "Dirty" NMR**
Rachel Green and Ling Huang, PhD - Hofstra University



- 2:15 pm** **These drugs are so last year, what's trending now?**
Holly Fox, Justin Hoang, Emily Frey - Cumberland County DA's Office Forensic Laboratory
- 2:45 pm** **Investigation of a Portable Combination Raman and Surface-Enhanced Raman Spectroscopy (SERS) Instrument for the Analysis of Forensic Drug Samples**
Katya A. Beltran and Sarah A. Shuda - The National Institute of Standards and Technology
- 3:00 pm** **Supporting Forensic Drug Identification with a Comprehensive In-House Standard Database**
Katherine Harkins and Alyssa Reyes - Baltimore Police Department
- 3:15 pm** **Greener Color Test for Designer Cannabis Product Detection**
Christopher Collins; Kolby Vautour; Nanette M. Wachter, PhD.; Robert B. Cody PhD.; Ling Huang PhD. - Hofstra University
- 3:30 pm** **Break**
- 4:00 pm** **Evaluating Portable Spectrometry for Field-Based Detection and Identification of Synthetic Opioids**
Lauryn Cammarata, B.S.¹; Pauline E. Leary, Ph.D.²; Seth Fisher³; Eric Wallis³; Brooke W. Kamrath, Ph.D.¹ - ¹University of New Haven, ²Noble, ³1st Detect Corporation
- 4:15 pm** **Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) Update**
Tiffany Ribadeneyra, M.S., ABC-CC¹, Jennifer Bonetti, Ph.D, ABC-DA², Jaclyn Iera, Ph.D³ - ¹Nassau County Office of the Medical Examiner, ²Virginia Department of Forensic Science, ³U.S. Drug Enforcement Administration

Friday, October 9

- 9:00 am** **Opening Remarks**
- 9:10 am** **Adulterant Trends in the Illicit Drug Supply Across the Northeast and Mid-Atlantic Regions**
Alexis Quinter - The Center for Forensic Science Research and Education
- 9:25 am** **Using Direct Analysis in Real Time Triple Quadrupole Mass Spectrometry (DART-TQ-MS) to Generate and Compare Compositional Profiles of Authentic Fentanyl Samples**
Joel E.R. Moss, Joshua S. DeBord, Nicholas Khorozev, Alexis Quinter, Heather L. Harris - Center for Forensic Science Research and Education
- 9:40 am** **Analysis of Physical Drug Evidence in Suspected Overdose Cases**
Ashley Dillard - Allegheny County Office of the Medical Examiner
- 10:00 am** **Break**
- 10:45 am** **Going Grey During Your Forensic Career: A Senior Scientist's Take On LC-MS/MS Troubleshooting for a Drug Chemistry Application.**
Richard T. Ramsey - Allegheny County Office of the Medical Examiner



- 11:00 am** **Evaluation of Direct Analysis in Real Time-Triple Quadrupole-Mass Spectrometry (DART-TQ-MS) for Rapid Multi-Class Drug Screening**
Nicholas Khorozov, M.S, Joshua DeBord, PhD, Alex Krotulski, PhD, Barry Logan, PhD - Center for Forensic Science Research and Education
- 11:15 am** **Detecting the Next Emerging Drug: The Role of Full-Scan GC/MS in Forensic Drug Surveillance**
Alexandra Kuchinos, MSFS, Mia Borrelli, MSFS, Amanda L.A. Mohr, MSFS, Barry K. Logan, PhD - Center for Forensic Science Research and Education





TOXICOLOGY SESSION



Kilimanjaro Ballroom Suite 4

NEAFS

Dustin Abbott, Toxicology Session Chair

Emily Palmer-Jordan, Toxicology Session Chair

MAAFS

Emily Wilkinson, Chemistry Section Chair

Steve Hokanson, Chemistry Section Chair-Elect

Thursday, October 8

- 9:00 am Welcoming Remarks**
- 9:05 am Investigating the presence of ortho-methylfentanyl in post-mortem casework in Northern Virginia**
Courtney Wardwell, Virginia Department of Forensic Science
- 9:20 am The Biochemistry of Postmortem Redistribution**
Robert Powers - University of New Haven
- 9:50 am Break**
- 10:45 am Development and Optimization of a LC/MS/MS Method for the Detection of Hallucinogens and Their Metabolites in Aqueous and Urine Matrices**
Adilene Y Masopust and Dr. William H Campbell, PhD - The Pennsylvania State University
- 11:00 am Comparison of Hospital-Administered vs. Recreational Blood Ketamine Concentrations in Driving Under the Influence of Drugs Cases**
Stephanie Honeycutt, M.S. and Rebecca L. Hartman, PhD - Monroe County Office of the Medical Examiner
- 11:15 am Uncovering Hidden Lung Responses to E-Cigarette Aerosols: From Inflammatory Biomarkers to Molecular Changes**
Shikha Sharma, Ivanataina Phillips, Haylie L Esposito, Shahira Khosla, Patricia Silveyra - University of New Haven
- 11:45 am Optimizing Protein Precipitation Based Extraction for Kratom Alkaloids in Postmortem Toxicology**
Haley Smith¹, Kristen Griffiths², Danai Taruvunga³, Luigino G. Apollonio, PhD³, Caitlin Miller, PhD¹. - ¹Syracuse University, ²Ohio University, ³Cuyahoga County Medical Examiner's Office and Regional Forensic Science Laboratory
- 12:00 pm Lunch**



- 2:00 pm** **Implementation and Validation of a Robotic Workstation for Toxicology Sample Preparation**
Cory Briscese, Ashley Newell, Andrea Belec - Champlain Toxicology Lab
- 2:15 pm** **The Evaluation of Three Extraction Cartridges for Common Drugs of Abuse in Oral Fluid using LC/MS/MS**
Emily Bourbon¹, Sophia Boor², Bridget Verdino, M.S.³ - ¹University at Albany, State University of New York, ² Rutgers, The State University of New Jersey, ³NJSP Office of Forensic Sciences
- 2:30 pm** **LC/MS/MS Method Development for Confirmation of Drugs of Abuse in Oral Fluid**
Sophia Boor¹, Emily Bourbon², Bridget Verdino, M.S.³ - ¹Rutgers, The State University of New Jersey, ²University at Albany, State University of New York, ³NJSP Office of Forensic Sciences
- 2:45 pm** **Applications of Green Chemistry in Toxicology: Utilizing AGREEprep for Method Comparisons (Part 1 of 2)**
Kira Bochard, MSFS; Shayna Kasher, MSFS - NMS Labs
- 3:15 pm** **Determination of Sodium Nitrite in Blood; A Model for Diagnosing Suicide by Sodium Nitrite**
MacKayla Reed, BS¹; Dr. Lawrence Quarino Ph.D¹, Dr. Robert Powers Ph.D², Marianne Staretz¹ - ¹Cedar Crest College, ²University of New Haven
- 3:30 pm** **Break**
- 4:00 pm** **Benzodiazepines: A Year in Review – Trends, Patterns, and Takeaways**
Sammantha Montague - New York State Police
- 4:30 pm** **The Effect of Ethanol on GABA Catabolism via Succinyl Semialdehyde Dehydrogenase**
Kayla O'Brien, Robert Powers - University of New Haven

Friday, October 9

- 9:05 am** **LC-MS/MS Methods for Alcohol Biomarkers in Urine and Whole Blood**
Samantha Herbick, Melinda Ulrich, Jamie York - Restek Corporation
- 9:20 am** **Applications of Green Chemistry in Toxicology: Utilizing AGREEprep for Method Comparisons (Part 2 of 2)**
Shayna Kasher, MSFS; Kira Bochard, MSFS - NMS Labs
- 10:00 am** **Break**
- 10:45 am** **Crashing out: A Data Retrospective Investigating Rush/Crash Symptomology in Methamphetamine-related DUID cases from Virginia**
Robyn Amos-Kroohs - Virginia Department of Forensic Science





CRIMINALISTICS SESSION



Kilimanjaro Suite 3

NEAFS

Diana Vargas, Criminalistics Session Chair

MAAFS

Jackson Dimalanta, Physical Evidence Section Chair

Ashley Stein, Physical Evidence Section Chair-Elect

Thursday, October 8

- 9:00 am** **Opening Remarks**
- 9:05 am** **Effects on skeletonization and skeletal weathering across contrasting annual seasonal cycles.**
Maeghan Fisher and Kristy Henson - Fairmont State University
- 9:25 am** **Comparative Optical Assessment of Natural and Synthetic Latent Fingermarks: Effects of Composition and Storage Conditions on Aging Patterns**
Abigail Grey, B.S., Josep De Alcaraz-Fossoul, PhD - University of New Haven
- 9:45 am** **Assessing Physical Class Characteristics in Burlap Bags**
Elizabeth Leggieri and Ted R. Schwartz, MS - University of New Haven
- 10:00 am** **Break**
- 10:50 am** **Comparative Evaluation of Drip Bloodstain Patterns Produced by Human, Porcine, and Synthetic Blood on Fabric Substrates**
Adam Werwie, Lawrence Quarino, Ralph Ristenbatt III, Andra Lewis - Cedar Crest College
- 11:10 am** **Assessing the Suitability of Commercial Portable Raman Spectrometers for Body Fluid Identification**
Emily B. Tattrie, B.S.¹, Mohamed O. Amin, PhD², Pauline E. Leary, PhD³, Richard Crocombe, PhD⁴, Marisia A. Fikiet, PhD¹, Claire L. Glynn, PhD¹, Virginia M. Maxwell, D. Phil¹, Igor K. Lednev, PhD², Brooke W. Kammrath, PhD.¹ - ¹University of New Haven, ²University at Albany, ³Noble, ⁴Crocombe Spectroscopic Consulting
- 11:30 am** **From River to Resolution**
Alyssa Berthiaume, M.S. - Massachusetts State Police Crime Laboratory
- 12:00 pm** **Lunch**



- 2:00 pm** **Collection of Biological and Chemical Threats: Visualizing Effectiveness and Contamination**
Riley P. McCullough, McKenzie Pochiro, Roman P. Karas, Colby E. Ott - FBI/ORISE
- 2:15 pm** **A Presumptive Colorimetric Test for the Identification of Decomposition Material in Soil**
Emily Halpern, McKenzie Pochiro, Colby E. Ott, Christopher A. Tipple - FBI/ORISE
- 2:30 pm** **Canine Detection of Electronic Storage Devices: Determination of Odor Profiles from Electronic Storage Devices Using Mass Spectrometry**
Remi S. Acord, Riley P. McCullough, Emily Halpern, Christopher A. Tipple, Colby E. Ott - FBI/ORISE
- 2:45 pm** **Combined Narrative and Virtual Crime Scene Reconstruction in Forensic Science Education**
Beth Saucier Goodspeed, MS, ABC-BIO and Hailey Garrison, MS - Lasell University
- 3:00 pm** **Subpoenaed by the Syllabus: The Lasting Impact of Forensic Science Professionals in the High School Classroom**
Scott Rubins and Bianca Brandon - New Rochelle High School
- 3:30 pm** **Break**
- 4:10 pm** **Examining the Perceptions of Music Therapy to Address Work Stress for Forensic Professionals**
Jennifer Krizner, B.S., Stephenie Sofield, A.B.D., M.M., M.T.-B.S., Pamela L. Marshall, PhD, Matthew Regentin, M.S., and Lyndsie Ferrara, PhD - Duquesne University
- 4:30 pm** **Where was the shotgun shooter at discharge**
Andrew J. Winter, PhD, Sophia DeSando, Ema Almeida Sanles, Mia Rivera-Diaz, & Peter J. Diaczuk, PhD - New Jersey Institute of Technology

Friday, October 9

- 9:00 am** **Opening Remarks**
- 9:05 am** **50 Years Since Incorporation Some Memories of the First Years of NEAFS**
Thomas A. Kubic , JD, Ph.D., CABC, Founder of NEAFS - John Jay College of Criminal Justice
- 9:30 am** **The Impact of Pre-Wetting on Bloodstain Formation on Fabric Surfaces**
Riley Ocasio B.S. and Peter Valentin PhD - University of New Haven
- 9:45 am** **Building a New Training Program for Friction Ridge Examiners: Lessons Learned and What We Do with the Knowledge We Almost Lost**
Joe Treviño, PhD - NYPD
- 10:00 am** **Break**



- 10:45 am** **Introducing the Forensic Science Research and Training Laboratory (FSRTL)**
An-Di Yim, Emily D Rancourt, Mary Ellen O'Toole - George Mason University
- 11:20 am** **A Study on Latent Print Processing of Envelopes With Glue-Strips**
Jessica Tarry and Siobhan Brchnel - NYPD Police Laboratory





TRACE/ARSON/EXPLOSIVES INTERDISCIPLINARY SESSION



Kilimanjaro Ballroom Suite 5

NEAFS

Roberta Westerman, Trace/Arson Session Chair

MAAFS

Jackson Dimalanta, Physical Evidence Section Chair

Ashley Stein, Physical Evidence Section Chair-Elect

Thursday, October 8

- 9:00 am** **Leveraging Flies as Sentinels for the Detection & Identification of Illicit Chemicals by Portable Mass Spectrometry and Ion Mobility Spectrometry**
Brooke W. Kammrath, PhD^{1,2}, Lauryn Cammarata, B.S.¹, Hadleigh J. Sargent¹, Kalyna Karpishka, B.S.¹, Hailey Ruddock, B.S.¹, Pauline E. Leary, PhD³, Samantha J. Sawyer, PhD¹ - ¹University of New Haven ²Henry C. Lee Institute of Forensic Science ³Noble
- 9:15 am** **Pairwise Comparisons versus Regression Statistics to Determine Processed Sample Stability**
Matthew J. Keller, Emily Halpern, McKenzie Pochiro, Riley McCullough, Roman Karas, Christopher A. Tipple, Colby E. Ott - FBI/ORISE
- 9:30 am** **Analysis of Product Removal from Hair Shafts for Forensic Applications**
Lauren Lozano - University of the Incarnate Word
- 9:45 am** **Differentiation of 3 cm Single-Hair Fragments by 9 Selected Amino Acid Ratios**
Mara Hann, Robert Powers, PhD, Alyssa Marsico, PhD - University of New Haven
- 10:00 am** **Break**
- 10:45 am** **Real Time Detection of Organic Gun Shot Residue using a Novel Diel electric Barrier Discharge Ionization Source**
Charlotte Fletcherova, M.S., Adam Hall, PhD, Ciara Conway, Jan-Christoph Wolf, PhD - Boston University
- 11:00 am** **Application of Image Analysis Tools To The Differentiation of Packaging Tape Samples Examined By Polarized Light Microscopy**
Walter F. Rowe, PhD - The George Washington University
- 11:15 am** **Detection of Energetic Materials and Smokeless Powder Additives for Explosives Residue Analysis**
Matthew J. Keller, Christopher A. Tipple, Colby E. Ott – FBI



- 11:30 am** **A First-Principles Investigation of Shock Sensitivity in Triacetone Triperoxide**
Grace E. Patzer, BS, Taylor M. Davis, BS, Matthew T Kieber-Emmons, PhD - Cedar Crest College
- 11:45 am** **Analysis of Extraction Methods for Explosives in Soil Matrixes Characterized by Total Organic Content and Separation for Identification and Quantification Utilizing Gas-Chromatography Mass-Spectroscopy and High-Performance Liquid-Chromatography**
Taylor Geist, MPS¹, William Campbell, PhD¹, Jason Herrington, PhD², Michael Kuslusi, MFS¹ - ¹Pennsylvania State University, ²Restek
- 12:00 pm** **Lunch**
- 2:30 pm** **O–O Bond Cleavage Selectivity in Copper-Mediated Hydroperoxide Decomposition: Mechanistic Insights for the Forensic Interpretation of Peroxide Explosive Decomposition**
Alexis R. Kline , Matthew Kieber-Emmons, Ghazanfar Ali, Marianna Mancuso - Cedar Crest College
- 2:45 pm** **Target practice or executions?**
Pete Diaczuk, Nick Petraco - John Jay College
- 3:00 pm** **Visual and Elemental Analysis of Fraudulent Pet Cremations**
Rhys Williams - Loyola University Maryland
- 3:30 pm** **Break**
- 4:00 pm** **What to Expect When You Are Assessing: A Beginner's Guide to Forensic Assessments**
David Greene - ANAB
- 4:15 pm** **Wrongful Convictions Related to Forensic Procedures: A Comparative Analysis of Legal Frameworks and Practice in the United States and Europe**
Dariusz Wilk - Jagiellonian University in Kraków
- 4:30 pm** **ABC Update 2026**
Heather L Harris - Arcadia University



Forensic Biology/DNA Session

Location: Kilimanjaro Ballroom Suite 7

NEAFS

Allyson Goble, Biology Session Chair

Timothy Goble, Biology Session Co-Chair

MAAFS

Kimberly Freeman, Biology Section Chair

Jonathan Forsberg, Biology Section Chair-Elect

Updates on Available Biology and DNA Standards with Strategies for Implementation

Charlotte Word

By the time of the joint MAAFS/NEAFS meeting, ~32 Standards, Best Practice Recommendations and Technical Guidance Documents will be available for implementation in Biology and DNA sections of forensic testing laboratories. An organized summary of the various documents available for training, validation, protocol development, statistics, contamination and familial searching using serological and DNA testing methods along with strategies for laboratory implementation will be presented. Basics on the standards development process, information on the 5 year updates, and the various ways for laboratories and individuals to get involved will be presented. These documents are available free of charge on the websites for the American Academy of Forensic Sciences Academy Standards Board (ASB)¹ and the Organization of Forensic Science Committees for Forensic Science (OSAC)².

¹<https://www.nist.gov/osac/registry>

²<https://www.aafs.org/academy-standards-board>

Strengthening DNA Analyst Training for Courtroom Testimony

Amanda Murray, PhD - DNA Labs International

As forensic DNA interpretation continues to advance, courtroom testimony has become increasingly complex. Modern DNA analysts are now expected to clearly explain probabilistic genotyping results, statistical weight of evidence, and the implications of emerging technologies to judges, attorneys, and juries with varying levels of scientific literacy. Despite these growing demands, initial training programs for new DNA analysts have historically emphasized laboratory methods and technical interpretation, often placing courtroom preparation as a secondary focus. As a result, many analysts enter casework with limited formal training in testimony and are left to develop courtroom skills reactively through on-the-job experience. This approach can leave analysts underprepared for challenging cross-examinations, complex legal questions, and evolving expectations regarding transparency and communication of uncertainty. This presentation examines the expanding scope of DNA testimony and identifies key gaps in traditional analyst training programs. Practical recommendations are provided for better integration of courtroom-focused education into initial analyst training, including early exposure to legal concepts, structured communication training, and more extensive use of moot court exercises. Emphasis is placed on building confidence, consistency, and clarity in testimony before analysts appear in court. Strengthening courtroom preparation during initial training can enhance analyst performance, support scientific integrity, and improve the effective communication of DNA evidence within the justice system.



Evaluating miRNA expression level from burned bone and bone marrow for use in PMI estimation

Dani Bailey - Towson University

Generally, postmortem interval is estimated utilizing rigor mortis, body temperature, concentration of potassium in the vitreous humor, and insect activity. More recent studies have found the ability to use decreasing RNA expression analysis as a method of PMI estimation, however it is only accurate up to 30 days after death. The purpose of this project is to evaluate the use of miRNA in estimating postmortem interval from burned bones and bone marrow. RNA was extracted using TRIzol organic extraction method for both burned and unburned bone and bone marrow, then RT-qPCR was performed using purchased primers targeting miRNA for RNA quantitation. The statistical analysis will determine if it is likely miRNA degradation is able to be used in estimating postmortem interval from burned bones and bone marrow.

Evaluation of Different Collection Methods for Trace DNA Recovery on Fabrics

Jesada Sanders and Ashley Morgan, PhD - University of New Haven

Since trace DNA may be the only evidence available in a case, the selection of the best collection method is critical to the success of subsequent DNA typing. The porosity of the substrate can affect DNA recovery success, as the adherence of trace DNA to the material could lead to difficulties in its subsequent release from the material. In this experiment, trace DNA was collected from three donors, deposited onto natural and synthetic fiber towel swatches, and five different collection methods: double swabbing, single swabbing, dry vacuum, scraping, and cuttings, were used and compared to one another. Key findings related to sample preparation, towel material, collection method, and their impacts on DNA recovery success will be discussed.

Finding the Perfect Solution : Examining the Utility of Abrasive Wiping With Dilute Bleach Solutions as a Contamination Prevention Step in Forensic DNA Evidence Examination

Morgan Christopherson and Katherine O'Connor - Hofstra University

Contamination in a DNA laboratory is a detrimental situation; however, there is no formal standard for how multi-use metallic tools used in evidence examination procedures prior to DNA extraction should be cleaned. This study aims to determine the efficacy of abrasive wiping combined with a dilute bleach solution as a cleaning procedure for these tools. Metallic scissors and tweezers were abrasively wiped with a KimWipe soaked with a dilute bleach solution for various amounts of time, and were immediately swabbed for residual DNA. The residual DNA was then extracted and quantified, following applicable standard manuals. The data was then analyzed for any observable trends.

The Impact of Immigration on Forensic Databases: Preliminary Results from Mitochondrial DNA Analysis

Filipa Simão, Ashley Gonzalez-Castro, Joan Oruitemeka, Amanda Hewitt - Towson University

Mitochondrial DNA (mtDNA) is widely used in forensic genetics, particularly when nuclear DNA is highly degraded or unavailable. The statistical weight of a mtDNA match depends on the frequency of the profile within reference populations. However, migration may influence these frequencies, as genetic lineages introduced through immigration are not always well represented in forensic databases. This study



evaluates the impact of generational migration on mtDNA diversity in the United States. Buccal swabs were collected from Maryland residents following informed consent, and information on mother and maternal grandmother birthplaces was recorded. The mtDNA control region was sequenced using Sanger sequencing, and haplogroups were assigned through the EMPOP database. Preliminary analysis of 19 samples showed that 53% belonged to haplogroups of Eurasian origin. Lineages from the three continental backgrounds – Eurasian, Native American and African - were identified among first-generation U.S. residents (individuals whose mothers were born outside the United States), indicating recent introduction of diverse genetic backgrounds through migration. Although the current sample size is limited, these findings highlight the diverse maternal ancestry present within the U.S. population. A larger, ongoing study will enable evaluation of whether recent immigrants and long-established resident populations differ in their mtDNA composition and assess the potential impact of these differences on the representativeness of forensic mtDNA databases.

STRUCTURE and ForenSeq UAS Ancestry Predictions: A Comparison Study

Melody Gokce, Büşra Tosun, Filipa Simão, Kelly M. Elkins - Towson University

Ancestry predictions can be useful for guiding criminal investigations. In this project, we compared software predictions for ancestry using a dataset collected at an American university in the Mid-Atlantic. Buccal swabs were collected from deidentified donors with approval from the Institution Review Board (IRB). DNA was extracted using an EZ1 instrument (Qiagen) and quantified using qPCR. Libraries were prepared using the ForenSeq Signature Prep kit Primer Set B (Qiagen) and sequenced on a MiSeq FGx instrument, following the manufacturer's protocol. Genotypes were assigned within the ForenSeq Universal Analysis Software (UAS) software. Ancestry predictions generated by UAS and STRUCTURE were compared. For UAS output, the four ancestry groups reported by the software - Admixed American, African, East Asian, European – were evaluated using Principal Component Analysis (PCA) plots. Using the STRUCTURE software, ancestry proportions were estimated using four continental groups as reference: African, European, Native American and Asian. For samples classified as Admixed American by the UAS, more detailed ancestry composition was outputted by STRUCTURE which provided proportional estimates of the ancestry. This additional resolution provides more specificity and granularity, uniquely informing investigations.

Strategies to improve STR genotyping for forensic touch DNA samples collected from challenging surfaces

Joseph Rahm, PhD - Lasell University

Over the last thirty years, DNA amplification with polymerase chain reaction has revolutionized forensic DNA profiling for human identification. The prevalence of touch DNA, small amounts of skin cells and cell free DNAs left on surfaces and objects left after contact, has highlighted the challenges associated with each step of the DNA profiling process. First, the use of the cotton swab during the collection step limits the success of DNA profiling, especially when used to collect from challenging surfaces like stainless steel and brick material as cotton swabs tend to rip and tear on rough surfaces which is destructive to the sample. The cotton swab was compared to the novel Venturi Vacuum Device with a Polycarbonate Filter for collection of touch DNA from steel and brick. Second, extraction efficiencies for samples collected from cotton swabs have a wide range of recovery (20-80%) due to the swab's inability to properly release cellular material when collected. Therefore, a DNA extraction workflow was compared to a direct amplification workflow for HID. Skipping the extraction step in favor of direct amplification seemed promising but the analytical issues and more complex profiles associated with PCR persist.



Probabilistic searching of databases compared to binary CODIS eligibility: An improved methodology for maximizing investigative leads using STR DNA profiles

Michael D. Coble, Ph.D. - Center for Human Identification; Cesar Garza Sanchez, M.S.; Duncan Taylor, Ph.D.; Curt Schuerman, B.S.; Tim Kalafut, PhD

Probabilistic methods of DNA mixture interpretation have improved our ability to deconvolve complex mixtures for subsequent searching of POIs in a DNA database. Current approaches use a summarization of obligate alleles or genotypes based on a threshold (e.g. 99% genotype weights). We compared the effectiveness of directly searching a database of mock offender DNA profiles versus the current criteria for searching CODIS. We show the use of an alternative searching strategy (such as the software DBLR) has great potential to identify true donors in a database compared to current binary methods for searching.

Improving DNA Recovery from Multiple Fired Cartridge Cases Through Traditional and Automated Firearm-Based Grouping

Savannah Koontz, M.S., Kayla Nichols, B.S., Elizabeth Reilly, Stephanie Walcott, M.S., Tracey Dawson Green, Ph.D. - Virginia Commonwealth University

Fired cartridge cases (FCCs) represent a valuable source of both firearm identification evidence and trace DNA, although DNA recovered following discharge is frequently low-template and results in incomplete STR profiles. This study evaluated whether grouping FCCs associated with the same firearm using traditional firearm examination or the Ballistics IQ automated comparison system prior to DNA analysis could improve DNA recovery and STR profile quality while assessing the effects of cartridge case metal type and caliber. Traditional firearm examination achieved 97.91% grouping accuracy, and Ballistics IQ achieved 92.59%, with neither method producing incorrect firearm associations, while grouping significantly increased total DNA yield ($p < 0.05$); aluminium cartridge cases and 9 mm ammunition produced the most complete STR profiles ($p \leq 0.05$). These findings demonstrate that firearm-based grouping strategies can improve DNA recovery while maintaining reliable firearm associations and support integrating firearm examination with forensic DNA analysis as a practical multidisciplinary workflow. Adoption of this approach has the potential to improve laboratory efficiency, maximize the evidentiary value of fired cartridge case evidence, and increase the likelihood of obtaining informative STR profiles in forensic casework.

Scoring Multi-source Single-cell Forensic Evaluations when Clustering is a Latent Variable

Catherine Grgicak, Desmond S. Lun, Gian Bates-Rudolph - Rutgers University Camden

Bulk DNA signatures do not deliver source (cell type) evaluations, instead yielding sub source LRs about DNA that sometimes fail to well discriminate between H1 and H2, affecting evaluative reporting and database search effectiveness.

With each cell being imaged and clustered by their cell-type and genetic signatures, single cell analysis offers a way forward. Prior works show forensic-aware clustering methods outperformed general purpose approaches but assuming a single clustering, nevertheless, remains insufficient when scEPGs are low fidelity.

In this presentation we explain a new method that assigns a probability to each clustering, motivate its use and evaluate its performance using the log loss scoring rule that was decomposed into its CALibration and REFinement elements, which offers a valued verification strategy.

Results showed that when single-cell data are coupled with probabilistic clustering and high resolution imaging, they yield source level evaluations that behave like single source profiles, potentially reshaping the way biological evidence is generated, interpreted and understood.



Evaluation of Zar-Pro lifting strips as a mapping technique for the recovery of DNA from biological stains

Meenakshi Anoop, MS., Amy N. Brodeur, M.F.S. ABC-GKE - Boston University

Forensic alternate light sources (ALS) are commonly used to detect latent biological stains by fluorescence, but their effectiveness depends on the substrate, as certain fabrics can interfere with visualization. This limitation can result in biological evidence being overlooked and reduce opportunities for DNA recovery. This study evaluated the use of Zar-Pro™ lifting strips to transfer latent semen and saliva stains from ALS-incompatible substrates onto the strips, thereby aiding in mapping the location of stains and subsequent DNA recovery. The lifting strips demonstrated some success transferring both types of biological stains, with better performance observed for semen. Additionally, the some of the transferred stains remained suitable for DNA recovery, demonstrating the potential of Zar-Pro™ lifting strips as a possible alternative screening method for challenging substrates.

1952 Crash of C-124 Globemaster on Mount Gannett, Alaska: DNA Identification of Human Remains, 2012-2025

Nancy Stokes - AFDIL - SNA International, Alexa Atencio, Deanna Ciampo, Kristen Dubyna, Brian Givens, Sherie Longshore, Miriam Narvaez, Rayna Ndongo, Jennifer Perez, Kathleen Tumblety, Malachi Weaver, Taylor Dickerson, and LTC Robert Nadeau

A C-124 Globemaster carrying 52 servicemen from McChord AFB, WA to Elmendorf AFB, AK crashed in bad weather on Mount Gannett, Alaska, on November 22, 1952 and shortly after the plane wreckage was lost in Colony Glacier. Observations of debris on the glacier in 2012 resulted in re-discovery of the C-124 crash site and efforts for recovery of human remains and personal effects were initiated that year. All human remains were delivered to the Armed Forces Medical Examiner System (AFMES) for identification by fingerprint comparisons or DNA processing and kinship analyses with family reference samples. After 14 years of annual search & recovery events (2012-2025), a total of 7,082 samples of bone, soft tissue, teeth, hair, and nails were processed for auSTR, Y-STR, and/or mtDNA by the Armed Forces DNA Identification Laboratory (AFDIL). Despite difficult search conditions on the receding glacier and overall poor quality of the samples recovered, by 2025 - 73 years after the crash - all 52 servicemen had been identified.

From Backlog to Breakthrough: Lessons Learned from Baltimore Police Department's Historical SAFE Kit Project

Lake Prescott, MSFS and Morgan Mack, MSFS - Baltimore Police Department

A prominent challenge facing many forensic DNA laboratories is a backlog of untested historic Sexual Assault Forensic Examination (SAFE) kits that must be addressed, in addition to all other case types that come through the laboratory. The Forensic Biology Unit (FBU) of the Baltimore Police Department set out to address this issue through strategic planning and workflow optimizations, including streamlined batching schedules, a direct-to-DNA approach, and adopting a Y-screening protocol. This presentation will provide data to demonstrate how these adjustments successfully eliminated the backlog of historic SAFE kits, while also having a lasting impact on the unit's routine casework. Attendees will learn how BPD is continually refining and improving DNA workflows to achieve a notable decrease in casework turnaround time and how to implement these strategies within their laboratories, with a long-term goal of reaching real-time analysis.



Performance Evaluation of the SERATEC® PAM Immunochromatographic Test for the Detection of Semen and Saliva in Forensic Samples

Hannah Foor, BS; Charla Marshall, PhD; Sara R. Bodnar, MS; Coral Smith, MS - Center for Forensic Science Research and Education, Thomas Jefferson University

The SERATEC® PAM assay is a multiplex immunochromatographic test that simultaneously detects prostate-specific antigen and α -amylase for the identification of semen and saliva. However, its performance under extreme antigen concentrations has not been fully characterized. This study evaluated the analytical sensitivity of the SERATEC® PAM assay, investigates its susceptibility to the high-dose hook effect for both semen and saliva, and assesses its performance using controlled semen-saliva mixtures and mock casework samples across a range of forensically relevant conditions. This research will provide additional data regarding the capabilities and limitations of the SERATEC® PAM assay and its application in forensic body fluid identification.

Characterization of cell-free DNA in seminal plasma

Francis Vu, M.S. and Robin W. Cotton, PhD - Boston University

Cell-free DNA (cfDNA) has been reported in multiple biological fluids in both medical and forensic literature, but forensic research has mainly classified its relevance as a source of DNA to be recovered from touch deposits. Beyond the DNA that is found in sperm, cell-free DNA occurs in semen at a high enough concentration to generate populated electropherograms. With no use of an extraction kit, 34 unique unpurified seminal cfDNA samples were quantitated by qPCR and 33 of those samples were amplified for capillary electrophoresis, resulting in electropherograms displaying 13 full profiles, 14 partial profiles, and 6 null profiles. DNA extraction methods employed in forensic laboratories can incur excessive cfDNA loss, but successful purification, especially with other kits designed to capture small DNA fragments, has been shown to improve electropherogram quality. Preliminary data also shows that seminal cell-free DNA is recovered from a sterile swab in the epithelial cell fraction after differential extraction with the EZ1® DNA Investigator® Kit.

Modernizing Forensic DNA Workflows Using Artificial Intelligence

Amanda Fazi - DNA Labs International

The integration of artificial intelligence (AI) into forensic DNA laboratory workflows offers opportunities to improve efficiency, consistency, and analytical throughput while maintaining rigorous scientific and ethical standards. This presentation outlines practical implementation considerations, ethical safeguards, and an example of a successfully deployed AI-enabled workflow suitable for international forensic collaboration. AI can support multiple stages of the forensic DNA pipeline, including sample triage, contamination-risk assessment, data interpretation, and reporting. Machine-learning models trained on validated datasets can identify low-quality samples, inform amplification strategies, and promote consistency in mixture interpretation. When responsibly implemented, these tools reduce analyst workload, minimize inter-analyst variability, and accelerate turnaround times without replacing expert judgment. Ethical deployment requires transparency, auditability, and continuous human oversight. Models must be trained on representative data to mitigate bias, and AI-generated outputs must remain interpretable, reviewable, and subject to challenge by qualified analysts. Laboratories implementing AI-assisted interpretation alongside probabilistic genotyping have demonstrated reduced review time, improved reproducibility, and clearer documentation of analytical decisions. These outcomes illustrate how AI can responsibly augment forensic DNA workflows while preserving human experts as the final decision-makers.



Forensic Drug Chemistry Session

Location: Kilimanjaro Ballroom Suite 9

NEAFS

Joanna Urban, Chemistry Session Chair

MAAFS

Emily Wilkinson, Chemistry Section Chair

Steve Hokanson, Chemistry Section Chair-Elect

Characterized Authentic Drug Samples for Forensic Method Validation

Sarah A. Shuda, Katya A. Beltran, Edward Sisco - National Institute of Standards and Technology

Method development and validation in forensic chemistry laboratories requires access to characterized authentic samples to ensure methods are fit for purpose. This can be challenging for research and forensic laboratories. The Characterized Authentic Drug Samples (CADS) project provides real-world samples that have been analyzed using a variety of techniques including DART-MS, FTIR, GC/MS, GC/FID, color tests, and lateral flow immunoassay test strips to practitioners and researchers. The data generated from these analyses is also made available for those requiring real world data for the development of data analysis tools. The project aims to aid in the development of new technology and help ensure quality in methods in forensic chemistry laboratories.

Are You Using a Green Solvent? How do you know?

Thomas A. Brettell, Ph.D., GKE-ABC - Cedar Crest College

The importance of solvent choice cannot be overemphasized for sample preparation in the forensic chemistry laboratory. While solvent consumption in forensic science is a fraction of what is used in the overall general industry, the cumulative volumes are still substantial. With increasing stringent regulations of solvent usage and disposal, the chemical and pharmaceutical analytical laboratories are shifting towards the use of greener solvents to reduce the environmental impact and toxicity of sample analysis. For decades solvent selection in forensic chemistry has lacked clear evidence-based guidelines tailored to the specific needs of evidential analysis. While solvent guides exist, they are essentially being ignored. This presentation will bring awareness to available solvent guides that can be used by the forensic chemist and toxicologist to choose and assess greener solvents for their analyses.

Differentiation of Synthetic Tryptamines Using Direct Analysis in Real Time Time-of-Flight Mass Spectrometry (DART-TOF)

Margaret Garrett¹ and Kevin Zencak² - ¹West Virginia University, ²Virginia Department of Forensic Science

Over the past few years, there has been a rise in psilocyn/psilocybin food products. However, these products frequently contain unlisted synthetic tryptamines that may or may not be controlled. These compounds function similarly to psilocyn as hallucinogens. Due to these synthetic tryptamines being isomers and analogs to each other, they have similar mass spectra and retention times. This research uses Direct Analysis in Real Time Time-of-Flight (DART-TOF) Mass Spectrometry in order to differentiate between these tryptamine isomers and analogs.



Money Laundering: Cleaning Drugs From Currency Before Returning it to Next-Of-Kin

Lisa Mundy and Emily Murphy - Philadelphia Medical Examiner's Office Toxicology Lab

In Philadelphia, it is not uncommon to encounter drug death scenes where the decedents were snorting drug powders through rolled dollar bills. Our investigators will bring the money into the office as evidence, though it is rarely tested. This presentation describes a proof-of-concept method for cleaning drug residue from currency using a sodium hydroxide solution, and a liquid-liquid extraction followed by GC/MS analysis, to ensure the currency is safe to return to the next of kin. Further research is also proposed.

Split Injection GC/MS Method for the Analysis of Phenethylamines

Joshua Rosenthal - New York City Police Department Police Laboratory

The New York City Police Department Police Laboratory has historically analyzed phenethylamines such as amphetamine, methamphetamine, and MDMA in chloroform, however it has been observed that breakdown products in the chloroform can react with primary and secondary amines such as these substances, causing potential issues identifying the components of a seized drug sample. The laboratory's current splitless injection GC/MS method has a run time of 12 minutes and produces optimal chromatography when these substances are prepared in chloroform, but poor chromatography when prepared in methanol. A new split-injection method with an eight minute runtime has been developed to analyze these substances in methanol, which will reduce the possibility of solvent-related issues and increase the efficiency of the laboratory.

Investigating the Stability and Degradation of Psilocybin in Mushroom Gummies: Implications for Forensic Analysis

Marianne Staretz, Alyssa Ricca, Thomas A. Brettell, Mia Bercier - Cedar Crest College

Psychedelic mushrooms are increasingly being incorporated into edible products such as gummies, presenting new challenges in forensic analysis due to the instability of psilocybin and psilocin, as well as the complexity of edible matrices. This study evaluated the effects of storage condition and time on psilocybin and psilocin in gummy samples using LC-MS/MS, with optimized extraction methods used to maximize recovery. Psilocybin remained relatively stable under most storage conditions, while psilocin demonstrated significant degradation at room temperature (light and dark) and elevated temperatures. Qualitative evidence of psilocybin-to-psilocin conversion was observed under all storage conditions, with conversion most prominent at elevated temperatures and least frequent under frozen storage. Within the scope of this study, frozen storage best preserved sample integrity, demonstrating that the chemical composition of mushroom gummies may change during storage, with important implications for forensic interpretation, regulatory compliance, and consumer safety.

Tracking the Shift: NIST's RaDAR Program and the Evolving Drug Landscape

Meghan G. Appley, Sarah A. Shuda, Edward Sisco - National Institute of Standards and Technology

The drug landscape across the United States is constantly evolving in both component presence and concentration. The Rapid Drug Analysis and Research (RaDAR) program at the National Institute of Standards and Technology (NIST) is a specialized drug-checking initiative that provides near-real-time, comprehensive information on the chemical makeup of illicit drugs. This presentation highlights recent trends detected within the drug supply alongside critical programmatic updates regarding RaDAR's operational expansion. Additionally, we will share insights from ongoing research aimed at improving



analytical workflows across public health and safety agencies. Through these efforts, RaDAR continues to provide timely, high-quality data to inform harm reduction strategies and forensic science standards.

Identification of Cannabidiol (CBD) and THC in Designer Cannabis Products using 2D “Dirty” NMR *Rachel Green and Ling Huang, PhD - Hofstra University*

The continual development of designer CBD products in the United States poses a major issue for crime laboratories, as analysis techniques must evolve to contend with a growing market and new sample matrices. Currently, Gas Chromatography-Mass Spectrometry (GC-MS) is widely used for screening cannabinoids, but it requires cumbersome sample preparation and is destructive. This study presents a non-destructive, streamlined approach for screening cannabidiol (CBD) in designer cannabis products through “Dirty” two-dimensional Nuclear Magnetic Resonance (2D NMR) Spectroscopy. The name refers to the minimal sample preparation involved in this method, extracting cannabinoids from designer drug products without time-consuming traditional liquid-liquid extraction.

This method employs Homonuclear Correlation Spectroscopy (COSY) to identify CBD across a variety of sample matrices, including CBD plant material, gummies, and oils. Beyond qualitative analysis, this method has shown potential for semi-quantitative analysis through calibration studies and determination of a COSY limit of detection.

The results from this study show that “Dirty” 2D NMR is a viable method for screening CBD in designer matrices. The COSY spectra from the three test matrices were compared to those of a CBD standard. The resultant data demonstrates that this method could possibly be used to identify CBD in designer cannabis products, as possible signals from CBD were found in all spectra.

These drugs are so last year, what’s trending now?

Holly Fox, Justin Hoang, Emily Frey - Cumberland County DA's Office Forensic Laboratory

Cumberland County is the second fastest-growing county in Pennsylvania and has easy access to major cities such as Baltimore and Philadelphia. The Cumberland County DA's Office Forensic Laboratory is located approximately 30 miles west of Harrisburg, PA, the state capital. The Seized Drugs section analyzes items submitted by local and state departments, as well as items submitted by the Pennsylvania Department of Corrections. This presentation will discuss the trends of controlled substances and other compounds observed in case submissions, including the changes of cutting agents/adulterants observed in street drugs, and the compounds observed in items found in the state prisons of Pennsylvania.

Investigation of a Portable Combination Raman and Surface-Enhanced Raman Spectroscopy (SERS) Instrument for the Analysis of Forensic Drug Samples

Katya A. Beltran and Sarah A. Shuda - The National Institute of Standards and Technology

Raman spectroscopy is a powerful technique for identifying components in drug samples, but it has limitations when compounds are present in mixtures or at low concentrations (below $\approx 5\%$ by weight). Surface-enhanced Raman spectroscopy (SERS) amplifies the Raman signal, allowing for the detection of trace analytes at parts-per-million concentrations. A study was conducted to investigate a portable combined Raman and SERS instrument. Combining the techniques allowed lower limits of detection to be achieved (1 $\mu\text{g/mL}$ for some tested compounds) and identification of multiple components present in mixtures. Analysis of real-world samples demonstrated that Raman coupled with SERS is overall a suitable, efficient, and sensitive technique for forensic drug checking applications.



Supporting Forensic Drug Identification with a Comprehensive In-House Standard Database

Katherine Harkins and Alyssa Reyes - Baltimore Police Department

This presentation focuses on the development of an in-house drug standard reference database to streamline the policy and procedures of the Drug Analysis Unit (DAU) of the Baltimore Police Department. A variety of Novel Psychoactive Substances (NPS), including synthetic opioids and cannabinoids, were purchased from Cayman Chemical and analyzed via an Agilent Gas Chromatograph-Mass Spectrometer (GC-MSD series 7890B/5977A), using validated methods. The column used was a HP Ultra 1 (12 meters long, 0.2 mm bore with 0.33-micron film coating), and instrument parameters such as: oven/ inlet temperature, run time, and split ratio were adjusted accordingly. The expected results will include information on chromatography, retention time, relative retention time, mass spectra fragmentation patterns, and isomer differentiation. The primary goal of this project is to update our policies to account for new emerging designer drugs and analogs that pose a significant challenge to drug chemists.

Greener Color Test for Designer Cannabis Product Detection

Christopher Collins; Kolby Vautour; Nanette M. Wachter, PhD.; Robert B. Cody PhD.; Ling Huang PhD.
- Hofstra University

The presumptive color test, known as the Lemay-Vautour (LV) test is similar to the Duquenois-Levine test, but is simpler and safer for forensic scientists and law enforcement. The LV test does not require hazardous reagents such as chloroform and acetaldehyde. The development of deep red or maroon color is indicative of a positive result while the sample will remain a pale yellow for a negative result. Since visible color is subjective from person to person, the LV test utilizes UV-Vis spectroscopy to obtain an objective representation of the color. A positive result will reveal a large peak at 587 nanometers.

Evaluating Portable Spectrometry for Field-Based Detection and Identification of Synthetic Opioids

Lauryn Cammarata, B.S.¹; Pauline E. Leary, Ph.D.²; Seth Fisher³; Eric Wallis³; Brooke W. Kammrath, Ph.D.¹ - ¹University of New Haven, ²Noble, ³1st Detect Corporation

The increasing prevalence of illicitly manufactured drugs, including fentanyl, its analogues, and other novel psychoactive substances (NPS), has created an urgent need for rapid and reliable field-based detection methods due to their high potency and occurrence in complex street mixtures. Portable mass spectrometry (MS) offers a promising approach for on-site detection; however, factors such as mass analyzer type, ionization method, operating conditions, and matrix effects can influence spectral quality and identification accuracy. This study evaluated approximately 300 synthetic opioids and NPS compounds across three commercially available portable MS platforms, including toroidal ion-trap GC-MS, quadrupole GC-MS, and linear ion trap MS systems. Instrument performance was assessed based on detection and identification capabilities, spectral fidelity, and library matching performance using NIST, Cayman Chemical, and vendor-specific spectral libraries. The results provide insight into the capabilities and limitations of portable MS platforms for reliable field identification of emerging synthetic opioids and related substances.



Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) Update

Tiffany Ribadeneyra, M.S., ABC-CC¹, Jennifer Bonetti, Ph.D, ABC-DA², Jaclyn Iera, Ph.D³ - ¹Nassau County Office of the Medical Examiner, ²Virginia Department of Forensic Science, ³U.S. Drug Enforcement Administration

The Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) was formed in 1997 in a joint effort between the U.S. Drug Enforcement Administration (DEA) Office of Forensic Sciences and the Office of National Drug Control Policy (ONDCP). Historically, SWGDRUG recommended minimum standards for the forensic examination of seized drugs and sought their international acceptance. Considering the formation of the Organization of Scientific Area Committees (OSAC), SWGDRUG continues to work as part of the international community to improve the quality of the forensic examination of seized drugs. In addition, the extensively utilized resources provided on the SWGDRUG website will continue to be updated and available including free spectra libraries and monographs.

This presentation will provide attendees with an update on SWGDRUG activities during the year 2025 and currently in 2026 including future initiatives including the newly published Stop Testing Procedure, NIST Sampling App and EPA Open Spectra App.

Adulterant Trends in the Illicit Drug Supply Across the Northeast and Mid-Atlantic Regions

Alexis Quinter - The Center for Forensic Science Research and Education

This presentation will examine the prevalence of adulterants found within the illicit drug supply, which will be impactful for forensic laboratory testing. Various types of drugs will be evaluated, with an emphasis on the increasingly complex opioid supply. Commonly encountered adulterants will be examined based on their presence, concentration, and trends over time and geographical regions will be presented. The presentation will describe the analytical approaches used to identify and characterize adulterants in illicit drug samples, including the importance of quantitative drug chemistry data. Participants will be instructed on the trend analysis of the qualitative and quantitative results used to evaluate the changes in prevalence and potency of adulterants. Understanding these emerging trends can help forensic laboratories, medical professionals, and other public health and safety stakeholders better recognize changes in the composition and concentration of the illicit drug supply, supporting informed decision-making and risk mitigation efforts.

Using Direct Analysis in Real Time Triple Quadrupole Mass Spectrometry (DART-TQ-MS) to Generate and Compare Compositional Profiles of Authentic Fentanyl Samples

Joel E.R. Moss, Joshua S. DeBord, Nicholas Khorozov, Alexis Quinter, Heather L. Harris - Center for Forensic Science Research and Education

The detection and identification of fentanyl and fentanyl-related substances in seized drug evidence is crucial in law enforcement investigations. Since its development, the use of DART ion sources has been explored in forensic applications, including the rapid analysis of seized drug materials. In this study, a direct analysis in real time triple quadrupole mass spectrometry (DART-TQ-MS) method was developed for the rapid analysis of 15 authentic fentanyl samples to evaluate the feasibility of using chemical profiles to distinguish samples manufactured through similar processes and assess their potential for common source determination. The results of the DART-MS/MS method supported accurate detection and identification of fentanyl-related substances when compared to previously obtained results from gas



chromatography-mass spectrometry and liquid chromatography-quadrupole time of flight-mass spectrometry. Although the generated chemical profiles did not support defensible common source determinations, the results demonstrated potential for distinguishing between samples manufactured using similar but different processes.

Analysis of Physical Drug Evidence in Suspected Overdose Cases

Ashley Dillard - Allegheny County Office of the Medical Examiner

Overdoses are a public health concern of epidemic proportion with devastating consequences for individuals, families, and communities. Physical drug evidence is critical to the understanding of the public health crisis, but also necessary for potential criminal investigations. With the ever-changing drug supply, the analysis of drug evidence collected at these types of scenes can provide valuable insight into drug trends within a community. At the Allegheny County Office of the Medical Examiner, drug evidence from suspected fatal overdose scenes was analyzed, using GC-MS/FID, for all cases involving primarily stamp bag submissions, in 2025-2026. This data shows trends in substances confirmed within those bags as well as the stamp bag markings, which can act as a branding or marketing mechanism for suppliers. Through this analysis, we are able to collaborate with the Toxicology department and outside organizations, such as the health department and various law enforcement agencies, that can utilize this information. Identification of substances present at suspected overdose scenes can help assess critical gaps in detection of emerging drug threats, particularly those not yet observed in the seized drug supply. This information can also facilitate timely notification of appropriate public health authorities, supporting a more rapid and effective response.

Going Grey During Your Forensic Career: A Senior Scientist's Take On LC-MS/MS Troubleshooting for a Drug Chemistry Application.

Richard T. Ramsey - Allegheny County Office of the Medical Examiner

One day you wake up and go to the laboratory and the realization hits you. You are the most senior member of your department. When did this happen??? Most of your daily statements begin with "back in my day" or "when I ran a TLC plate" we analyzed it that way. Looking in the mirror has only confirmed this realization, you are indeed going grey in Forensics!! This talk will cover rekindling the passion in not only the younger coworker generational jargon, but more importantly, the quest to keep learning new technology and in this situation, troubleshooting the LC-MS/MS.

The LC-MS/MS is quickly gaining ground on replacing the GC/MS as the go-to instrument for drug analysis. Even though the letters and parts are similar, the hands-on utilization and especially troubleshooting are very different. This is where one must pivot from what you have always learned and done to an excitingly different frontier. Is the passion still there to try? What if I fail or worse yet, never attempt? I will be covering a couple entry level issues that have occurred during the validation of my laboratory's LC-MS/MS and maybe a story or two along the way.



Evaluation of Direct Analysis in Real Time-Triple Quadrupole-Mass Spectrometry (DART-TQ-MS) for Rapid Multi-Class Drug Screening

Nicholas Khorozov, M.S, Joshua DeBord, PhD, Alex Krotulski, PhD, Barry Logan, PhD - Center for Forensic Science Research and Education

The use of ambient ionization techniques for rapid drug chemistry screening is of growing interest in forensic labs. Direct Analysis in Real Time (DART), paired with tandem quadrupole mass spectrometry can allow for the rapid analysis of a wide variety of drugs of abuse with minimal sample preparation. Our laboratory has developed a comprehensive workflow for the analysis street-level samples for a nitazene analogs, benzodiazepines, and nineteen other common substances found in drug samples. Results were compared to previous analyses by GC/MS and LC-QTOF, utilizing threshold criteria involving relative internal standard area comparison, ion ratio deviation, and absolute principal ion area. False positive identification of drug substances by DART were low, demonstrating the potential for rapid, multi-class drug screening using ambient ionization methods.

Detecting the Next Emerging Drug: The Role of Full-Scan GC/MS in Forensic Drug Surveillance

Alexandra Kuchinos, MSFS, Mia Borrelli, MSFS, Amanda L.A. Mohr, MSFS, Barry K. Logan, PhD - Center for Forensic Science Research and Education

The illicit drug supply continues to evolve with the frequent introduction of novel psychoactive substances (NPS), creating challenges for laboratories tasked with monitoring emerging drug trends. While targeted analytical methods, such as gas chromatography/mass spectrometry (GCMS) with selected ion monitoring (SIM), are well suited for the detection of known compounds, laboratories supporting public health and drug monitoring efforts require analytical approaches capable of identifying unexpected substances outside an established target list. At the Center for Forensic Science Research and Education (CFSRE), full-scan GC-MS is routinely used to comprehensively characterize street drug samples submitted through public health drug checking and surveillance initiatives. This approach has facilitated the detection of numerous NPS, including emerging drugs such as cathinones, designer benzodiazepines, and novel synthetic opioids such as nitazenes and orphine compounds, which often elute late in the chromatographic run and may fall outside the scope of shorter, targeted analytical methods used in routine casework. The early identification of emerging compounds through full-scan GC/MS supports timely public health alerts, informs forensic laboratories of evolving drug trends, and strengthens drug surveillance efforts.



Toxicology Session

Location: Kilimanjaro Ballroom Suite 4

NEAFS

Dustin Abbott, Toxicology Session Chair

Emily Palmer-Jordan, Toxicology Session Chair

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Emily Wilkinson, Chemistry Section Chair

Steve Hokanson, Chemistry Section Chair-Elect

Investigating the presence of ortho-methylfentanyl in post-mortem casework in Northern Virginia *Courtney Wardwell - Virginia Department of Forensic Science*

In early 2026 during routine casework, an unidentified peak appeared in a targeted fentanyl analog screen and was determined to be ortho-methylfentanyl, which is not currently in the scope of testing for the method. ortho-Methylfentanyl was investigated in overdose deaths involving potentially lethal levels of fentanyl. Semi-quantitative concentrations of ortho-methylfentanyl were determined and compared to the fentanyl concentrations in these cases to assess its potential impact. This presentation will investigate co-occurring substances seen with ortho-methylfentanyl as well as demographics associated with these cases.

The Biochemistry of Postmortem Redistribution

Robert Powers - University of New Haven

This presentation explores the phenomenon of Postmortem Redistribution (PMR) from a biochemical perspective and considers the implications of PMR for the interpretation of toxicologic findings. The current explanation for PMR will be discussed as an introduction to the underlying biochemical mechanisms of drug distribution before and after death. Specifically, the biochemical basis and mechanisms for antemortem tissue-specific drug accumulation and concentration will be presented, along with the implications for enzyme-based phase I and II drug metabolism. Relevant postmortem changes in tissue biochemistry and structure will be discussed, including factors affecting diffusion-based drug redistribution. Specific case examples will be presented demonstrating the impact that consideration of PMR may have on the interpretation of toxicologic results, potentially impacting the understanding of the role that a drug or drugs may or may not have had in causing or contributing to a death.

Development and Optimization of a LC/MS/MS Method for the Detection of Hallucinogens and Their Metabolites in Aqueous and Urine Matrices

Adilene Y Masopust and Dr. William H Campbell, PhD - The Pennsylvania State University

Hallucinogenic compounds comprise multiple pharmacological classes, including psychedelics such as LSD and psilocybin, empathogens such as MDMA and related compounds, and dissociatives such as PCP and ketamine, creating a need for comprehensive analytical methods capable of simultaneously detecting structurally diverse parent compounds and metabolites in biological matrices. A liquid



chromatography-tandem mass spectrometry (LC/MS/MS) method, utilizing electrospray (ESI) ionization and optimized multiple-reaction-monitoring parameters, was developed and optimized for a panel of nineteen (19) hallucinogenic compounds by evaluating five stationary phase chemistries (superficially porous C18, Amide, Biphenyl, and Phenyl-hexyl as well as one fully porous C18), with all columns measuring 2.1×100 mm. The Biphenyl and Phenyl-hexyl stationary phases provided the greatest chromatographic resolution and were carried forward for quantitative studies. Calibration curves demonstrated good linearity in aqueous and urine matrices with R^2 values greater than 0.95 for all compounds, while acceptable matrix effects and suitable limits of detection were achieved across the analyte panel. The optimized method successfully detected all nineteen (19) analytes with high sensitivity, selectivity, and reproducibility, providing a comprehensive analytical workflow for forensic toxicology, clinical toxicology, and regulatory monitoring of hallucinogenic compounds.

Comparison of Hospital-Administered vs. Recreational Blood Ketamine Concentrations in Driving Under the Influence of Drugs Cases

Stephanie Honeycutt, M.S. and Rebecca L. Hartman, Ph.D. - Monroe County Office of the Medical Examiner

Interpreting ketamine findings in driving under the influence of drugs (DUID) cases can be complicated due to its many uses ranging from a prescription for depression/anxiety, hospital or medical administration as an anesthetic, or recreational intake for its dissociative/hallucinogenic properties.

Driving cases from 2009-2026 with ketamine detected in blood were evaluated based on available information to determine whether or not ketamine was hospital (N=14) or recreationally (N=14) administered, and blood ketamine and norketamine concentrations compared.

Median [range] ketamine concentrations in cases with documented or apparent hospital administration and suspected recreational intake were 650 [<10 -2010] ng/mL and 168 [<10 -786] ng/mL, respectively (Mann-Whitney $U=46.0$, $p=0.017$). Norketamine blood concentrations were 172 [<10 -477] ng/mL ($n=13$) and 211 [<10 -859] ng/mL ($n=12$), respectively (Mann-Whitney $U=83.0$, $p=0.939$).

Although there was substantial overlap, significantly higher ketamine concentrations following medical intervention may be related to blood draw time (relative to intake/administration), and/or higher acute doses associated with emergency anesthesia.

Uncovering Hidden Lung Responses to E-Cigarette Aerosols: From Inflammatory Biomarkers to Molecular Changes

Shikha Sharma, Ivanataina Phillips, Haylie L Esposito, Shahira Khosla, Patricia Silveyra - University of New Haven

Using a mouse model, we investigated early lung responses following short-term exposure to e-cigarette aerosols with varying nicotine concentrations. While traditional markers of lung inflammation remained unchanged, lung tissue revealed distinct molecular changes that differed between male and female mice. These findings suggest that e-cigarette exposure may leave a molecular footprint in the lungs before more apparent signs of inflammation emerge.



Optimizing Protein Precipitation Based Extraction for Kratom Alkaloids in Postmortem Toxicology

Haley Smith¹, Kristen Griffiths², Danai Taruvinga³, Luigino G. Apollonio, PhD³, Caitlin Miller, PhD¹. -

¹Syracuse University, ²Ohio University, ³Cuyahoga County Medical Examiner's Office and Regional Forensic Science Laboratory

Introduction: Kratom is a plant native to Southeast Asia that contains alkaloids including mitragynine. Kratom-derived and semi-synthetic alkaloids are increasingly encountered in forensic casework. Major analytical challenges posed by this compound class is documented sensitivity to temperature, light, pH, and protic environments (Basiliere and Kerrigan). Consequently, the development of a robust and reliable sample preparation methods is essential to effectively identify these complex and isomeric analytes.

Objectives: To develop and compare sample preparation methods to account for the sensitivity of mitragynine alkaloids to degradative conditions using an LC-MS/MS.

Methods: Three variations of protein precipitation (PPT) extractions involving zinc sulfate (0.2M ZnSO₄) and acetonitrile (ACN) were explored. The first approach involved a standard PPT protocol with no added steps. The second and third approaches incorporated additional cleanup steps following PPT, utilizing filter vials and phospholipid removal, respectively. To compare the protocols, three separate authentic postmortem whole blood samples (200 µL) were fortified at the intended limit of detection (LOD) of 1.0 ng/mL for each of the eight target analytes: mitragynine, 7-OH mitragynine, mitragynine pseudoindoxyl, speciogynine, speciociliatine, mitraciliatine, 7-OH speciogynine, and dihydro-7-OH-mitragynine (MGM-15).

Results: Evaluation of chromatographic quality, signal-to-noise ratio, and peak area abundance indicated similar performance for all analytes across all three protocols, with one protocol showing an advantage. Given the relative polarity of 7-hydroxy mitragynine, particular attention was paid to its recovery: Mean peak areas were 70,500 for the standard PPT protocol, 82,019 for the PPT and phospholipid removal protocol, and 51,857 for the PPT and filter vial protocol. Visually, the two protocols incorporating an additional cleanup step produced higher clarity extracts than the standard PPT protocol. Analyst efficiency and practicality varied across protocols: The filter vial step proved tedious to execute, and the phospholipid removal step required a positive pressure manifold and a cumbersome cartridge-loading process.

Discussion: The final sample preparation protocol that was chosen was a refined version of the standard PPT protocol. Sample volume was increased to 250 µL, and the ZnSO₄ concentration was reduced to 0.1M and combined with ACN at a 1:9 ratio (ACN:ZnSO₄, 9:1). The scope, based on vendor availability, was also expanded to include the following: 7-acetoxy mitragynine, dihydromitragynine, and 10-fluoro-dihydro-7-mitragynine (MGM-16). The chosen protocol was selected over the two 'cleaner' alternatives despite their improved extract quality, as the standard PPT approach offered comparable analytical performance without the added consumable burden associated with the filter vials and phospholipid removal steps. To mitigate the reduced phospholipid removal inherent to this approach, two LC guard columns were stacked in series with the analytical column on the LC/MS-MS instrument to provide additional protection against phospholipid-related matrix effects.

Ideally, a more robust comparison would involve a full calibration curve, replicates of quality controls at low, medium, and high concentrations, and replicates at the LOD and lower limit of quantitation. However, this study was limited to LOD-level comparisons, as filter vial availability was restricted (n=5).



Implementation and Validation of a Robotic Workstation for Toxicology Sample Preparation

Cory Brisce, Ashley Newell, Andrea Belec - Champlain Toxicology Lab

Champlain Toxicology Lab needed to streamline sample preparation for clinical toxicology samples prior to LC/MS/MS analysis. Using the Integra Assist Plus, virtually all of the sample preparation steps were able to be automated. This presentation will detail the steps we wanted to automate, our validation and the impact in our lab.

The Evaluation of Three Extraction Cartridges for Common Drugs of Abuse in Oral Fluid using LC/MS/MS

Emily Bourbon¹, Sophia Boor², Bridget Verdino, M.S.³ - ¹University at Albany, State University of New York, ² Rutgers, The State University of New Jersey, ³NJSP Office of Forensic Sciences

In 2025, the Society of Forensic Toxicology (SOFT) released oral fluid drug testing guidelines, generating a movement from urine to oral fluid (OF) drug testing for DUI/D cases. In 2025, the NJSP Office of Forensic Sciences, the NJSP ADTU and New Jersey AG's office decided to move forward with implementing Oral Fluid testing and are actively preparing for a pilot program. The OFS will need to validate and institute a procedure to extract and confirm impairing drugs in Oral Fluid. To perform oral fluid extractions, both solid phase extraction (SPE) and supported liquid extraction (SLE) columns were isolated for evaluation. Three types of extraction cartridges were evaluated with a few variations; UCT Clean Screen DAU extraction columns (3mL), Biotage's Evolute Express CX (3mL) and Biotage's Isolute SLE+ cartridges (1mL). The UCT Clean Screen DAU columns are composed of copolymeric sorbents containing both hydrophobic and ion exchange functional groups that are polymerized to a silica gel support, all done to enable large-scale analysis of acidic, basic, and neutral drugs of abuse. Their oral fluid protocol describes one elution that accommodates both acidic and basic drugs. The Biotage Evolute Express CX column are designed with mixed-mode non-polar/strong cation exchange retention mechanisms that works best with basic drug compound recovery. Their oral fluid protocol describes two elution methods, either a DCM/iPA/NH₄ OH mixture or an EtAC/NH₄ OH mixture. The Biotage Isolute SLE+ columns are designed for a "load-wait-elute" procedure due to a primarily diatomaceous earth cartridge intended to extract a wide range of analytes. Their oral fluid protocol describes three different elution solvents, either DCM/iPA, a combination of DCM/iPA and EtAC, or EtAC. The varying elution solvents play a critical role in the successful elution of target analytes, in which a drug mix of 35 individual drugs of abuse was used to test these columns. Synthetic saliva, unadulterated saliva, and saliva collected with an oral fluid swab collection kit were used to test the efficacy of each column and their elution(s). Two commercially available buffers, NeoSal and Quantisal, were included in the synthetic sample trials.

An Agilent 1260 Infinity II with an Agilent 6470 LC/TQ was used for all recovery studies. Advantages and disadvantages of all variations of the extractions were evaluated, including ease of use, solvent usage, reproducibility, recovery, and time. The Biotage SLE+ column with combination elution of DCM/iPA and EtAC was observationally the most efficient in priority drug analysis from the mix used like delta-9-THC. Focusing on synthetic data, quantitative data analysis will be performed to accurately determine matrix effects of two buffers, as well as the most successful column and individual benefits of each column.



LC/MS/MS Method Development for Confirmation of Drugs of Abuse in Oral Fluid

Sophia Boor¹, Emily Bourbon², Bridget Verdino, M.S.³, - ¹Rutgers, The State University of New Jersey, ²University at Albany, State University of New York, ³NJSP Office of Forensic Sciences

In 2025, the Society of Forensic Toxicology (SOFT) released new drug testing guidelines, transitioning from urine to oral fluid (OF) as the recommended matrix in DUID cases. Shortly after, the NJSP Office of Forensic Sciences, NJSP ADTU, and NJ Attorney General's Office actively pursued a qualitative OF drug confirmation method utilizing a dynamic multi-reaction monitoring (dMRM) method on an Agilent 1260 Infinity II C18 column coupled with an Agilent 6470 LC/TQ, first operating in full-scan acquisition mode. Extracted ion chromatograms (EICs) of 35 individual drug of abuse stocks and a single standard mix were analyzed to determine retention times and authenticate a new mobile phase gradient beginning with 95H₂O:5ACN and 0.1% formic acid, then quickly shifting to a higher percentage of organic mobile phase for maximal selectivity. Within each drug's retention time window, precursor ions and most abundant fragments were optimized to test three OF matrices, including synthetic, expectorated, and Quantisal collection swabs spiked with a single standard drug mix and three internal standards, then subjected to Isolute SLE+ supported-liquid extraction (SLE) and both Evolute Express CX and UCT Clean Screen DAU solid-phase extraction (SPE) cartridges with six elution reagent combinations. All OF matrices and neat standard drug concentrations were evaporated and reconstituted in H₂O:ACN (95:5, v/v, 200uL) at respective drug cutoff levels to address percent recovery, signal-to-noise ratios, response ratios, carryover, and potential matrix interferences for further method application to 36 live OF samples and comparison to accompanying urine samples.

Applications of Green Chemistry in Toxicology: Utilizing AGREEprep for Method Comparisons (Part 1 of 2)

Kira Bochard, MSFS; Shayna Kasher, MSFS - NMS Labs

As forensic laboratories begin to move towards more sustainable practices, it is necessary to adopt a standardized method of evaluating the environmental impact, or greenness, of a procedure. In a previous presentation, we introduced a modified version of the AGREEprep scoring criteria to account for limitations inherent to evaluating toxicology methods. Expanding upon our prior presentation, we will utilize the adapted AGREEprep scoring to compare widely used extraction methods against emerging 'green' toxicology techniques. The presented examples will illustrate the role of green chemistry techniques in forensic workflows, discuss alternate 'green' methods and solvents from recent publications, and demonstrate how to use the AGREEprep scoring criteria to evaluate extraction techniques for method development/redevelopment.

Determination of Sodium Nitrite in Blood; A Model for Diagnosing Suicide by Sodium Nitrite

MacKayla Reed, BS¹; Dr. Lawrence Quarino Ph.D¹, Dr. Robert Powers Ph.D², Marianne Staretz¹ - ¹Cedar Crest College, ²University of New Haven

Cases of suicide by sodium nitrite ingestion have been increasingly reported in the scientific literature in recent years. Following ingestion, sodium nitrite oxidizes hemoglobin iron from the ferrous (Fe²⁺) to the ferric (Fe³⁺) state, forming methemoglobin. Because methemoglobin cannot effectively bind and transport oxygen, severe tissue hypoxia develops, which may ultimately result in death. The postmortem diagnosis of nitrite poisoning is challenging because nitrite is chemically unstable and is converted to nitrate upon interaction with oxyhemoglobin. The diagnosis typically relies on a combination of toxicological findings, methemoglobin measurements, scene investigation, and autopsy findings rather than a single definitive test. Often confirmation of nitrite/nitrate is performed by methodologies such as ion chromatography that are often beyond the routine capability of post-mortem toxicology laboratories. This study is designed to develop a model that can be used for the detection of sodium nitrite ingestion with common analytical instrumental and wet methods accessible to most forensic laboratories. In this study, 500 uL samples of



whole human blood were incubated up to two hours with 5uL of deionized water (to serve as a blank), 1M NaNO₂, 0.1M NaNO₂, 0.01M NaNO₂, and 0.001M NaNO₂, respectively. Using UV-Vis spectroscopy in combination with derivatization, the extent of methemoglobin formation was quantified across the range of sodium nitrite concentrations and compared with a potassium ferricyanide-generated methemoglobin standard. The results demonstrated a concentration- and time-dependent increase in methemoglobin formation, with the 1.0 M sodium nitrite solution producing complete conversion of hemoglobin to methemoglobin, whereas the 0.1 M solution induced a more gradual conversion over time (approximately 17% after 2 hours). Quantifiable levels of methemoglobin above those over the control were not observed in the 0.01M NaNO₂, and 0.001M NaNO₂ test samples. Test samples were then subjected to hemoglobin precipitation with 6mM zinc sulfate followed by centrifugation. The supernatant was then tested for quantifiable amounts of converted nitrate using commercially available test strips. The amount of nitrate present in the 1M and 0.1M sample were well above those of control samples. Given that 17% conversion of methemoglobin found with 0.1M NaNO₂ is below the level typically associated with death, the method appears sensitive enough to detect nitrite exposure in forensic casework. These findings demonstrate that combined methemoglobin measurement and semi-quantitative nitrite/nitrate screening may provide a useful proof-of-concept approach for detecting nitrite exposure.

Benzodiazepines: A Year in Review – Trends, Patterns, and Takeaways *Sammantha Montague - New York State Police*

The Toxicology Section at the New York State Police assists in DUI and DWI investigations by testing biological fluid for the presence or absence of drugs and alcohol. A common challenge for New York State with DUI casework is the tie to Public Health Law 3306. NYS Legislature defines controlled substances and schedules them based on their potential for abuse and medical use. Benzodiazepines are a Schedule IV prescription drug. However, they are also commonly misused and used in combination with other prescription and illicit substances. While studying novel psychoactive substance (NPS) benzodiazepines is interesting and relevant for illicit drug use there are multiple challenges with forensic applications. These challenges include the speed at which trends can change, the time it takes to validate or add a new drug to an existing panel, and certain NPS compounds may be outside legislative definitions.

In the toxicology section, 8 benzodiazepines (alprazolam, clonazepam, 7-aminoclonazepam, diazepam, nordiazepam, oxazepam, temazepam, and lorazepam) are confirmed and quantitated following a positive screen. In this data analysis, the most common scope benzodiazepines seen in casework, as well as common combinations with benzodiazepines and other substances will be reviewed for the year 2025. Are there trends for certain times of the year? Is Xanax more popular than Valium? This topic will be reviewed and discussed, as well as the importance of knowing when it is safe to operate a motor vehicle under the influence of a prescription drug.

The Effect of Ethanol on GABA Catabolism via Succinyl Semialdehyde Dehydrogenase *Kayla O'Brien, Robert Powers - University of New Haven*

The effects of ethanol mimic those of supratherapeutic, or overdose levels of the “GABA-ergic” drugs (e.g. benzodiazepines, barbiturates, “Z-drugs”) all of which function to enhance the effects of the inhibitory neurotransmitter “GABA” (gamma-aminobutyric acid), either by allosteric or direct agonist effects at post-synaptic GABA receptors. The symptomatic similarity has led to the supposition that ethanol effects are mediated to some extent, at least, by exacerbation or potentiation of GABA-based inhibitory neurotransmission. However, no direct agonist effects of ethanol on GABA receptors, adequate to explain the CNS-depressant effect of ethanol, have been identified. We have examined the effects of ethanol on the catabolism of GABA, a function primarily of GABA-Transaminase (GABA-T; generating succinyl semialdehyde from GABA), and Succinyl Semialdehyde Dehydrogenase (SSADH; oxidizing



succinyl semialdehyde to succinate, which may then serve as a TCA cycle intermediate). Our research, utilizing a two-enzyme mixture of GABA-T and SSADH (“GABase” used as the basis for an enzymatic GABA assay) has indicated that EtOH at 0.2 and 0.4 g/dL produces a significant, concentration-dependent decrease in the activity of SSADH, with GABA used as a substrate for the linked reaction system at 0.5, 2 and 10 mM. These results suggest that some degree of the physiological effect of ethanol may be mediated by elevated levels of GABA as a function of inhibition of the GABA-metabolizing enzymes GABA-T and SSADH.

LC-MS/MS Methods for Alcohol Biomarkers in Urine and Whole Blood

Samantha Herbick, Melinda Urich, Jamie York - Restek Corporation

Several established biomarkers are available for monitoring prior alcohol consumption in biological samples using LC-MS/MS. This study presents two analytical methods, one for quantifying ethyl glucuronide (EtG) and ethyl sulfate (EtS) in urine, and another for the analysis of phosphatidylethanol (PEth) in whole blood, providing complementary tools for alcohol monitoring. Two robust LC-MS/MS methods were successfully developed for the quantification of alcohol biomarkers in urine and whole blood. Both workflows are rapid, sensitive, and reliable, meeting the performance requirements for clinical and forensic applications, and enabling flexible monitoring of both short- and long-term alcohol consumption.

Applications of Green Chemistry in Toxicology: Utilizing AGREEprep for Method Comparisons (Part 2 of 2)

Shayna Kasher, MSFS; Kira Bochard, MSFS - NMS Lab

As forensic laboratories begin to move towards more sustainable practices, it is necessary to adopt a standardized method of evaluating the environmental impact, or greenness, of a procedure. In a previous presentation, we introduced a modified version of the AGREEprep scoring criteria to account for limitations inherent to evaluating toxicology methods. Expanding upon our prior presentation, we will utilize the adapted AGREEprep scoring to compare widely used extraction methods against emerging ‘green’ toxicology techniques. The presented examples will illustrate the role of green chemistry techniques in forensic workflows, discuss alternate ‘green’ methods and solvents from recent publications, and demonstrate how to use the AGREEprep scoring criteria to evaluate extraction techniques for method development/redevelopment.

Crashing out: A Data Retrospective Investigating Rush/Crash Symptomology in Methamphetamine-related DUID cases from Virginia

Robyn Amos-Kroohs - Virginia Department of Forensic Science

Anecdotal data suggests that individuals arrested for driving under the influence of methamphetamine were often experiencing sedating effects associated with the crash phase of a central nervous system (CNS) stimulant as opposed to the rush phase. Previously published research focuses solely on the incidence of rush phase symptomology. This retrospective study examines Virginia Department of Forensic Science (VADFS) ante-mortem DUID toxicology data from 2019-2024 and compares analytical results in cases with elevated methamphetamine concentrations against descriptive language in police agency reports. This presentation will focus on two out of four total state regions, exhibiting data related to prevalence within counties, co-occurring substances within casework, and analyzing language to discuss whether elevated methamphetamine concentrations during driving are more often associated with the crash phase.



Criminalistics Session

Location: Kilimanjaro Ballroom Suite 3

NEAFS

Diana Vargas, Criminalistics Session Chair

MAAFS

Jackson Dimalanta, Physical Evidence Section Chair

Ashley Stein, Physical Evidence Section Chair-Elect

Effects on skeletonization and skeletal weathering across contrasting annual seasonal cycles.

Maeqhan Fisher and Kristy Henson - Fairmont State University

Human decomposition rates are extremely influenced by weather patterns and carrion activity, which can affect the determination of the postmortem interval (PMI). The objective of this research was to examine how seasonal patterns, such as those in West Virginia, affect skeletal weathering fractures in deer long bones by analyzing them macroscopically in an effort to determine if simulating weather patterns can help determine the PMI. For 30 days, Deer long bones were placed outside for spring, summer, fall, and winter, along with a controlled environment to mimic each season, including UV, precipitation, and temperature. Results showed weathering fractures between simulated samples were not significantly different ($p=0.52$), while control samples were significantly different ($p=0.00004$). Macroscopically, bones exposed to UV were bleached and mummified, but invertebrates and mold growth were seen on the control rather than the simulated bones.

Comparative Optical Assessment of Natural and Synthetic Latent Fingermarks: Effects of Composition and Storage Conditions on Aging Patterns

Abigail Grey, B.S., Josep De Alcaraz-Fossoul, Ph.D. - University of New Haven

Natural latent fingermarks (LFs) contain sebaceous and eccrine secretions, whereas “synthetic LFs” (sLFs) may be produced with a molded replica of the original ridge pattern and standard pads that have a water-based composition with no additional biological components. LFs and sLFs from six donors were deposited on glass and plastic surfaces and stored at 4°C and 22°C for up to 25 days. Three-dimensional measurements of ridge height and volume were obtained with an optical profilometer, while two-dimensional ridge clarity was evaluated with the Universal Latent Workstation. This study compared the natural degradation of LFs and sLFs to reveal potentially distinct aging patterns due to differences in chemical and/or biological compositions towards developing objective methods for time-since-deposition (TsDp) estimation.

Assessing Physical Class Characteristics in Burlap Bags

Elizabeth Leggieri and Ted R. Schwartz, MS - University of New Haven

Burlap bags are breathable, durable, and eco-friendly containers that have many uses, including agricultural, industrial, crafting, and, at times, criminal activity. Class characteristics of burlap bags were examined in this study to determine if there are enough to distinguish bags from one another, and to what extent they can be distinguished. Construction features including yarns per inch, yarn diameter, bag color, selvage and seam construction, and extra feature additions such as drawstrings and labels were examined. The various physical features of burlap bags are presented here. These features can help to distinguish one bag from another and may aid in the determination of the brand of the bag.



Comparative Evaluation of Drip Bloodstain Patterns Produced by Human, Porcine, and Synthetic Blood on Fabric Substrates

Adam Werwie, Lawrence Quarino, Ralph Ristenbatt III, Andra Lewis - Cedar Crest College

Considerable research has been conducted to distinguish the differences in bloodstain formation on porous and non-porous surfaces, necessitating the need for separate analytical approaches when examining stains on these surfaces^{1,2}. Comparison between human blood and potential blood analogues has also been extensively studied; however, these studies have almost exclusively been conducted on non-porous surfaces³. To the best of the author's knowledge, no peer-reviewed study has broadly compared blood analogues with human blood on fabric substrates using statistical analysis. Despite this, these analogues continue to be used in subsequent studies on porous surfaces without direct experimental validation. The lack of comparative analysis on fabric substrates remains a key gap, as the intrinsic properties of fabrics (e.g., fiber type, construction, and surface roughness⁴) may amplify differences between blood types, potentially limiting their suitability.

To address this gap, the present study aims to systematically evaluate and compare the morphological characteristics of drip stain patterns produced by human, porcine, and synthetic blood⁵ on various fabric substrates, to determine the reliability and limitations of blood analogues for BPA training and research applications on fabrics. Blood was dripped onto four common fabric substrates at controlled drop heights and angles to simulate various real-life drip stain scenarios, and the dimensions, area, and circularity of the resulting stains were measured using ImageJ software. Statistical analyses were conducted to determine if significant differences existed between the analogues and human blood to determine their suitability for use in BPA research and training contexts on fabric substrates. Results indicate differences between human, porcine, and synthetic drip stains, limiting their applicability as analogues on fabrics.

Assessing the Suitability of Commercial Portable Raman Spectrometers for Body Fluid Identification

Emily B. Tattre, B.S.¹, Mohamed O. Amin, PhD², Pauline E. Leary, PhD³, Richard Crocombe, PhD⁴, Marisia A. Fikiet, PhD¹, Claire L. Glynn, PhD¹, Virginia M. Maxwell, D. Phil¹, Igor K. Lednev, PhD², Brooke W. Kammrath, PhD.¹ - ¹University of New Haven, ²University at Albany, ³Noble, ⁴Crocombe Spectroscopic Consulting

Currently, presumptive tests are used at crime scenes to indicate if body fluids are present, but these tests are destructive, produce false positives and negatives, require further confirmatory testing, and each only indicate one type of body fluid. There is a need for a nondestructive, molecularly specific, universal, rapid, and confirmatory method for body fluid identification at crime scenes, all of which are characteristics that Raman spectroscopy possesses. Benchtop Raman spectroscopy has demonstrated its ability to differentiate and identify body fluids (e.g., blood, semen, saliva, urine, and vaginal fluid), causing portable Raman instruments to be suggested as alternatives to presumptive tests for body fluid identification in the field. This research evaluates three commercially available portable Raman spectrometers for their suitability for body fluid differentiation and identification at crime scenes by (1) creating and optimizing a method for different fluid types for each instrument, and (2) creating and testing a spectral library of body fluids on each instrument. This work is intended to enable realization of the potential of body fluid identification using portable Raman instruments, as well as lend support for their use as better alternatives to current presumptive tests used in the field.



From River to Resolution

Alyssa Berthiaume, M.S. - Massachusetts State Police Crime Laboratory

This presentation will follow a homicide from discovery to courtroom resolution. On June 30th 2022, a body was discovered by kayakers in the Connecticut River. Several forensic scientists from the Massachusetts State Police Crime Laboratory responded to crime scenes and processed evidence in the laboratory for this case. This presentation will go into detail regarding the scene analysis and laboratory work and show how collaboration led to a guilty verdict.

Collection of Biological and Chemical Threats: Visualizing Effectiveness and Contamination

Riley P. McCullough, McKenzie Pochiro, Roman P. Karas, Colby E. Ott - FBI/ORISE

Chemical and biological threats pose challenges to both laboratory and on-scene personnel due to the high risk of contamination, transfer, and associated health hazards. Understanding how collection methodologies influence scene contamination and effective collection is critical to developing appropriate protocols and safety precautions. This study explored a comparison between basic collection methods and a bulk-powder vacuum device for collection of material simulating a biological or chemical threat (*Bacillus thuringiensis* and GloGerm powder). Between-sample and scene contamination was assessed using cultures as well as visualization techniques including UV light and laser light sheet imaging. Understanding particle movement during collection activities is paramount to collector safety and efficacy.

A Presumptive Colorimetric Test for the Identification of Decomposition Material in Soil

Emily Halpern, McKenzie Pochiro, Colby E. Ott, Christopher A. Tipple - FBI/ORISE

Victim recovery canines are a powerful asset for the identification of human remains for forensic searches, disaster efforts, and archeological studies; however, the excavation of the sites identified can be costly and time-consuming, necessitating a secondary confirmation of the presence of human remains. Upon decomposition, biomolecules in human remains break down into smaller functionalized organic molecules, including aldehydes. Aldehydes can be selectively detected with Schiff's Reagent, a tool often used in biological staining. In this work, we describe the necessary methods for the application of Schiff's Reagent to presumptively identify decomposition-containing soil in combination with cadaver dog techniques, demonstrating an evident increase in color vibrancy in comparison to blank controls. This relatively inexpensive and straightforward colorimetric soil test is a useful technique that allows secondary verification of cadaver dog alerts.

Canine Detection of Electronic Storage Devices: Determination of Odor Profiles from Electronic Storage Devices Using Mass Spectrometry

Remi S. Acord, Riley P. McCullough, Emily Halpern, Christopher A. Tipple, Colby E. Ott - FBI/ORISE

Electronic storage devices and the evidence they may contain can be crucial in forensic investigations, but little is known regarding their odor profiles and what compounds the canines trained to detect them are alerting to. Methods were developed to identify these odor compounds using HS-SPME-GCMS—for separation of complex profiles—and DART-TOF-MS—for rapid, high-resolution results. Preliminary studies were conducted on 30+ electronic devices/components—including USBs, SIM cards, circuit boards, cell phones, smart watch, lithium/lithium-ion batteries, RAM sticks, and SD compact flash card—and based on the mass spectral data, their odor profiles were generated. Understanding the odor profiles and what the canines are alerting to is critical to foundational scientific understanding and admissibility. Future work includes adding more devices, observing how changes in devices affect the odor profile, determining if compounds deemed relevant can be detected by canines in the field, and developing an accurate and efficient training aid.



Combined Narrative and Virtual Crime Scene Reconstruction in Forensic Science Education

Beth Saucier Goodspeed, MS, ABC-BIO and Hailey Garrison, MS - Lasell University

The use of virtual reality (VR) technology in science education has become increasingly prominent, focusing primarily on crime scene investigation and crime-lab simulations which leaves lecture-based forensic science courses underrepresented. This study focuses on how an immersive narrative-based reconstruction virtual reality activity influenced several factors in an upper-level "Analysis of True Crimes" course. Pre-and post-experience surveys and an instructor reflection were used in this study to gather data. The results of the qualitative and descriptive analysis will be discussed. The findings of this study suggest that immersive VR experiences may improve contextual understanding and engagement in forensic science courses when introduced thoughtfully alongside traditional-lecture methods.

Subpoenaed by the Syllabus: The Lasting Impact of Forensic Science Professionals in the High School Classroom

Scott Rubins and Bianca Brandon - New Rochelle High School

Forensic science professionals, law enforcement officers, and criminal lawyers frequently interact with students pursuing related studies at the university level, either as adjunct professors, research mentors, thesis advisers, meeting attendees, or guest speakers. However, a unique opportunity exists for these same professionals to inspire the pursuit of college majors in forensic science or criminal justice by collaborating with middle or high school teachers and mentoring their students. Drawing on more than three decades of combined experience as forensic scientists and high school educators, the presenters will demonstrate how meaningful collaborations between practitioners and high school educators enrich classroom instruction and create an authentic experience with real-world applications that engage and motivate students. We will give examples of how forensic professionals have enriched our high school forensic science courses and share practical ideas for establishing partnerships with local schools to inspire the next generation of forensic scientists.

Examining the Perceptions of Music Therapy to Address Work Stress for Forensic Professionals

Jennifer Krizner, B.S, Stephenie Sofield, A.B.D., M.M., M.T.-B.S., Pamela L. Marshall, PhD, Matthew Regentin, M.S., and Lyndsie Ferrara, PhD - Duquesne University

Work stressors, methods to alleviate stressors, and vicarious trauma within the forensic science field have often been overlooked despite the field's specialized and demanding work. Stress affects decision-making accuracy and overall job performance, with unique pressures faced across different demographics of forensic professionals. The purpose of this research was to evaluate the perception of music therapy as a possible intervention to address work stress for forensic professionals. A literature review was conducted to determine the primary work stressors identified by forensic professionals and develop a survey that was distributed to gather information about forensic scientists' perceptions of music therapy. Future work will present all this data to a board of certified music (psycho)therapists to provide realistic pathways for implementing music therapy in forensic workplaces as it may offer a novel, accessible, and evidence-informed option for supporting the well-being of this essential workforce.



Where was the shotgun shooter at discharge

Andrew J. Winter, Ph.D., Sophia DeSando, Ema Almeida Sanles, Mia Rivera-Diaz, & Peter J. Diaczuk, Ph.D. - New Jersey Institute of Technology

Recovery of a fired shotcup or wad at the scene of a shotgun shooting can be very useful and informative evidence. A recovered shotcup can reveal the gauge of the ammunition, the brand of the ammunition, and if properly interpreted, the approximate size of the pellets in the payload. Shotgun ammunition contains five components: the shotshell (which contains everything else), the primer, the propellant, the projectiles (most often multiple pellets) and the wads or shotcup to act as an intermediary between the propellant and the payload. The wads or shotcup are propelled outward with the pellets but due to their light weight and low ballistic coefficient, don't travel anywhere near as far as the projectiles, which are often made of lead. Consequently, these shotshell components are deposited downrange from the discharging shotgun and with some patience and a keen sense of direction, they can be identified, noted on a sketch of the scene along with distance measurements and brought to the firearm section of the crime laboratory for further analysis.

50 Years Since Incorporation Some Memories of the First Years of NEAFS

Thomas A. Kubic, JD, Ph.D., CABC, Founder of NEAFS

The presenter was the prime mover in the founding of NEAFS, one of the incorporators, the third president and first educational chairman. He will present some history of the earliest years and relate how the organization came to exist.

The Impact of Pre-Wetting on Bloodstain Formation on Fabric Surfaces

Riley Ocasio B.S. and Peter Valentin PhD - University of New Haven

The porous nature of fabrics makes it difficult to apply the copious amounts of existing research on nonporous bloodstain formation, specifically surrounding wetness and moisture content of the staining substrate. When the moisture content is high, due to humidity or weather, during a nonporous surface deposition, the main factors affected are drying time and degradation. When high moisture content is present for porous surfaces like fabric, which can be due to factors like rain or personal activities, it will change the morphology of the bloodstain due to variations in the wicking process, which makes it a crucial and vastly under-researched aspect of bloodstain pattern analysis. This research aims to expand the preliminary studies done on diluted bloodstain morphology by studying a wider variety of fabrics and reinforcing if the distinctive "coffee ring" phenomena is present in various conditions.

Building a New Training Program for Friction Ridge Examiners: Lessons Learned and What We Do with the Knowledge We Almost Lost

Joe Treviño, PhD - NYPD

This presentation covers lessons learned from creating an ANSI/ASB Standard 014-24 compliant training program for Friction Ridge Examiners. This standard provides clarity on the relevant previous guidance (SWGFAST Document #18) and executes a contemporary application of suggestions and recommendations made by previous experts in the past. These suggestions and recommendations often get lost to time if we are not careful to preserve and revisit existing knowledge for our sake and for the sake of our field.



Introducing the Forensic Science Research and Training Laboratory (FSRTL)

An-Di Yim, Emily D Rancourt, Mary Ellen O'Toole - George Mason University

The Forensic Science Research and Training Laboratory (FSRTL) at George Mason University is a five-acre human decomposition research facility that opened in 2021 to address the absence of such a facility in the mid-Atlantic region. Its mission is twofold: to advance understanding of geographic variation in human taphonomy, and to develop practical forensic applications that support federal and local agencies across the Washington metropolitan area. The facility began accepting whole-body donations in 2024 and has received 18 donors to date. Current research spans variation in decomposition rate, progression, and scavenger activity; the role of imaging technology in criminal investigation; and skeletal analysis in forensic anthropology. This presentation introduces the FSRTL and its ongoing research program and invites interdisciplinary collaboration with colleagues across the forensic sciences.

Investigating Trace Element Distribution in Human Cortical Bone Microstructure: The Potential for Individual Identification and Species Discrimination

Kerri-Ann Matthews - New York University

Positive scientific identification of skeletal remains recovered in a medico-legal context is the main objective of forensic anthropology analysis. The focus of this investigation is to explore the application of scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM-EDS) effectiveness in the morphological and chemical characterization of bone microstructure as a possible method of species discrimination (human vs nonhuman) and to obtain an individual's identity if the remains in question are of human origin. To achieve the research objectives of this study, IRB approved midshaft femoral cross-sections from ten non-human mammals (2 pigs, 3 vervet monkeys, and 5 mice) and six humans (5 of Bantu origin and 1 of Australian origin) will be used to create elemental map profiles associated with the composition of their bone microstructure, specifically secondary osteons. Preliminary assessments conducted showed species determination and discrimination can be achieved through multivariate analysis based on BMDD and elemental concentration obtained from both "bright" and "dark" osteons.

A Study on Latent Print Processing of Envelopes With Glue-Strips

Jessica Tarry and Siobhan Brchnel - NYPD Police Laboratory

Envelopes with glue strips that have not been activated are a common substrate received for latent print development. Upon surveying analysts at the NYPD Police Laboratory, it was observed that some analysts considered the glue strip semi-porous and others considered it porous. A comparison study was performed to determine the ideal sequence for processing envelopes with non-activated glue strips.



Trace/Arson/Explosives & Interdisciplinary Session

Location: Kilimanjaro Ballroom Suite 5

NEAFS

Roberta Westerman, Trace/Arson Session Chair

MAAFS

Jackson Dimalanta, Physical Evidence Section Chair

Ashley Stein, Physical Evidence Section Chair-Elect

Leveraging Flies as Sentinels for the Detection & Identification of Illicit Chemicals by Portable Mass Spectrometry and Ion Mobility Spectrometry

Brooke W. Kammrath, Ph.D.^{1,2}, Lauryn Cammarata, B.S.¹, Hadleigh J. Sargent¹, Kalyna Karpishka, B.S.¹, Hailey Ruddock, B.S.¹, Pauline E. Leary, Ph.D.³, Samantha J. Sawyer, Ph.D.¹ - ¹University of New Haven
²Henry C. Lee Institute of Forensic Science ³Noble

Clandestine production sites for illicit drugs and explosives pose significant health and safety risks to first responders and surrounding communities, and current detection methods often require direct site entry or costly laboratory-based sampling. This study evaluated the use of necrophagous flies as passive chemical sentinels for cocaine, fentanyl, and the explosive TNT, leveraging their natural tendency to contact diverse substrates and passively acquire trace residues. Flies were inoculated with each target analyte, processed using dry swabbing, a methanol cuticle wash, or homogenization, and analyzed with two portable mass spectrometers (1st Detect Tracer 1000, 908 Devices MX908) and a portable ion mobility spectrometer (Smiths Detection IONSCAN 600). All three analytes were detected across preparation methods and instruments, with the methanol cuticle wash yielding the most consistent recovery (100% detection for all three analytes), and target analytes remained detectable within the flies for multiple hours post-exposure. These findings support blow flies as a low-cost, field-deployable complement to canine detection and laboratory testing for surveillance of clandestine drug and explosives production sites.

Pairwise Comparisons versus Regression Statistics to Determine Processed Sample Stability

Matthew J. Keller, Emily Halpern, McKenzie Pochiro, Riley McCullough, Roman Karas, Christopher A. Tipple, Colby E. Ott - FBI/ORISE

Processed sample stability is an important metric for many analytical methods, especially in forensic contexts. The most commonly employed approach is to compare the average analyte response at defined time points to its average starting response. Through extensive simulation and empirical analyses, we evaluated the accuracy of this approach and compared it to the use of regression (linear and quadratic). Regression methods were found to be more accurate than pairwise comparisons across multiple data types and techniques, while requiring fewer samples to be tested. Based on the results, adoption of regression models for stability studies is encouraged for consideration and to provide higher confidence.



Analysis of Product Removal from Hair Shafts for Forensic Applications

Lauren Lozano - University of the Incarnate Word

Hair fibers are an important part of trace evidence in criminal investigations due to their ease of transference and their ability to link suspects and locations to victims, often through DNA analysis. With the exception of microscopic comparison and mitochondrial DNA analysis, the hair shaft itself has limited use in forensic examinations which could be overlooking valuable information the shaft might contain. Styling fiber products are resinous agents used for thickening and texture and are commonly applied to the entirety of the hair strand, which could increase the probative value of the hair evidence by adding an additional defining factor. We are using GC-MS to study this potential, aiming to find if the presence of different brands of styling fiber products can be detected within a recovered hair strand.

Differentiation of 3 cm Single-Hair Fragments by 9 Selected Amino Acid Ratios

Mara Hann, Robert Powers, PhD, Alyssa Marsico, PhD - University of New Haven

A previously developed method using eleven amino acid ratios obtained through gas chromatography-mass spectrometry (GC-MS) successfully differentiated morphologically similar hair samples using 3.0 mg of hair (~50 cm) with an 84% differentiation rate within color grouping. Using five individual 3 cm (~0.015 mg) hair fragments from each of the five different donors, amino acid profiles were generated and evaluated for differentiation between samples. Samples were analyzed using a Shimadzu liquid chromatography-tandem mass spectrometry (LC-MS/MS) system equipped with a hydrophilic interaction liquid chromatography (HILIC) column, amino acids were identified using multiple reaction monitoring (MRM) transitions, and peaks areas were integrated to calculate amino acid ratios. The percent differences between amino acid ratios among donors were calculated to assess hair sample differentiation, and preliminary results demonstrated successful differentiation of all five donors. Across the nine amino acid ratios tested, each donor pair contained at least five ratios with greater than a 10% difference, and when applying a 15% difference threshold, all ten donor comparisons contained at least three ratios above the cutoff, with the majority containing four and six ratios.

Real Time Detection of Organic Gun Shot Residue using a Novel Dielectric Barrier Discharge Ionization Source

Charlotte Fletcherova, M.S., Adam Hall, Ph.D., Ciara Conway, Jan-Christoph Wolf, Ph.D. - Boston University

Organic gun shot residue was detected through the use of a JetDesorber with a dielectric barrier discharge ionization source connected directly to a mass spectrometer. Samples tested over a period of time allowed target peaks to be identified, along with the respective degradation products. Key, target components to help identify the organic gun shot residue included ethyl centralite, diphenyl amine, dibutyl phthalate, and more. Real time detection of the ignition of smokeless powders allowed for quantitative comparisons of target and degradative analytes in pre-ignition, post-ignition, and one month following ignition. This study resulted in reliable identification of degradatory peaks consistent with organic gun shot residue as well as a nondestructive technique to detect organic gun shot residue off of carbon stubs.



Application of Image Analysis Tools To The Differentiation of Packaging Tape Samples Examined By Polarized Light Microscopy

Walter F. Rowe, PhD - The George Washington University

Packaging tapes (bi-axially oriented polypropylene or BOPP tapes) examined between crossed polarizing filters with a polarizing microscope show complex cross-hatched patterns when the tapes are oriented close to extinction. These patterns result from the stretching of the polypropylene tape backing both laterally and in the extrusion direction during the manufacturing process. The cross-hatched patterns can be recorded by photographically and the resulting photomicrographs can be analyzed by a number of image analysis tools, including fractal dimension determination and two-dimensional digital Fourier transforms. The cross-hatched patterns of samples of a number of different brands of BOPP tapes were analyzed. Both fractal dimensions and Fourier transforms were found to be useful in differentiating different brands of tape.

Detection of Energetic Materials and Smokeless Powder Additives for Explosives Residue Analysis

Matthew J. Keller, Christopher A. Tipple, Colby E. Ott - FBI

Protocols for differentiating smokeless powders often rely on multiple methods and instruments. Additionally, the detection of nitroguanidine (an important component of some smokeless powders) from residues is especially challenging due to its high hydrophilicity. We have developed a liquid chromatography-tandem mass spectrometry method for the detection of energetic materials and smokeless powder additives from post-blast samples. This method serves as a powerful approach for screening or confirmation of explosives residue-related investigations.

A First-Principles Investigation of Shock Sensitivity in Triacetone Triperoxide

Grace E. Patzer, BS, Taylor M. Davis, BS, Matthew T Kieber-Emmons, PhD - Cedar Crest College

Triacetone triperoxide (TATP) is a highly shock-sensitive explosive, and because it can be prepared from readily available household precursors, it has become a growing concern in forensic and counterterrorism contexts. TATP is sensitive to both thermal and mechanical stimuli, yet whether a common electronic origin underlies its shock and thermal decomposition remains unclear. The initiating chemical event is believed to be homolytic cleavage of a peroxide bond within the nine-membered ring, yet this step carries a substantial activation barrier (36 kcal/mol)¹. Because of the magnitude of this barrier, a purely thermal initiation struggles to account for TATP's extreme shock sensitivity. To overcome this challenge, various models including hotspots, doorway modes, and mechanical distortion have been conceived in which deposited energy lowers or bypasses the barrier. While these models differ in how energy reaches the initiating bond, each ultimately depends on how the electronic structure responds to distortion, which has not been characterized from first-principles for a peroxide. We investigated this bond-breaking event through density functional theory and multireference ab initio calculations. The breaking peroxide bond was observed to develop open-shell character progressing from near equilibrium geometries, motivating a complete active space treatment of the critical region of homolysis. The converged active space is composed of sigma and sigma-star orbitals of the dissociating O-O bond as well as oxygen lone-pair orbitals, with no carbon-centered orbitals selected, indicating carbon is uninvolved along this reaction coordinate. Along the O-O stretch itself, a relaxed one-dimensional potential energy scan proceeds without an electronic barrier and rises to 43 kcal/mol, comparable to modern dialkyl peroxide bond strengths². The singlet-triplet gap collapses from 25.6 to < 1 kcal/mol between 2.05 and 2.85 Å, identifying the geometric window over which biradical character becomes fully developed. Ongoing work



connects these molecular results with the crystalline lattice. Current results and their implications for TATP sensitivity will be presented.

Analysis of Extraction Methods for Explosives in Soil Matrixes Characterized by Total Organic Content and Separation for Identification and Quantification Utilizing Gas-Chromatography Mass-Spectroscopy and High-Performance Liquid-Chromatography

Taylor Geist, MPS¹, William Campbell, PhD¹, Jason Herrington, PhD², Michael Kusluskj, MFS¹ - ¹Pennsylvania State University, ²Restek

Explosives residues can be recovered from soil and characterized using gas chromatography–mass spectrometry (GC MS) and high performance liquid chromatography (HPLC), but elevated soil organic content can reduce extraction efficiency through binding and degradation of nitrogen containing analytes. This study evaluated and compared the performance of solid phase extraction (SPE), solid phase microextraction (SPME), and solid phase microextraction arrow (SPME Arrow) for the recovery of nitroaromatic and nitroamine explosives from soils classified as low, medium, and high total organic content. The SPME Arrow approach was investigated specifically for its increased sorbent surface area and potential to enhance extraction efficiency while reducing solvent consumption and overall analytical cost.

In parallel, HPLC separation strategies were developed to improve post blast identification of a broad panel of nitroaromatics and nitroamines by systematically varying and combining column chemistries, including C18, phenyl, mixed C18/phenyl, C18 F5, C18 connected to phenyl, and C18 F5 connected to phenyl configurations. Particular attention was given to investigating 2,4 diaminoanisole, a primary breakdown product of 2,4 dinitroanisole, within complex post blast matrices. The optimized extraction and separation methods were applied to field-collected samples and demonstrated utility in a forensic case study, illustrating their applicability to real world investigations.

Because explosives are deployed across military, law enforcement, agricultural, mining, construction, and aerospace contexts, robust analytical approaches are needed to identify and quantify explosive formulations at post blast sites regardless of matrix complexity. The combined use of advanced solid phase extraction strategies and tailored HPLC column chemistries presented here addresses this need by improving the recovery and chromatographic resolution of explosive residues from organic rich soils, thereby strengthening forensic interpretations in explosive related incidents.

O–O Bond Cleavage Selectivity in Copper-Mediated Hydroperoxide Decomposition: Mechanistic Insights for the Forensic Interpretation of Peroxide Explosive Decomposition

Alexis R. Kline , Matthew Kieber-Emmons, Ghazanfar Ali, Marianna Mancuso - Cedar Crest College

Organic hydroperoxides are highly reactive compounds whose decomposition is initiated by O–O bond cleavage, yet the molecular factors governing whether this bond cleaves through homolytic or heterolytic pathways remain incompletely understood. Resolving these factors is important for understanding transition-metal-mediated oxidation chemistry and has significant forensic implications, as the branching between cleavage pathways dictates the decomposition products that can be used to detect and interpret peroxide-based explosives. This study investigates the mechanism of copper-mediated peroxide O–O bond cleavage using a Cu(I)–TMPA (tris(2-pyridylmethyl)amine) complex and the model alkyl hydroperoxide 2-methyl-1-phenyl-1-propyl hydroperoxide (MPPH), whose decomposition yields distinct products depending on whether cleavage occurs through homolytic or heterolytic pathways. Product distributions will be presented that provide mechanistic insight into these pathways. By establishing how proton activity governs the homolytic/heterolytic branching, this work develops a mechanistic framework for cleavage-pathway selectivity that may inform the interpretation of peroxide explosive decomposition.



Target practice or executions?

Pete Diaczuk, Nick Petraco - John Jay College

Some historians theorize that during World War II, while Fort Platte Saline was actually used as a fort for the military, it was used for executing people who were not following the orders of the occupying army. Other historians argue that the numerous bullet holes in the interior walls of the Fort were caused by soldiers conducting target practice, not engaging in the war crime of executing civilian or slave laborers.

The authors were asked to travel to the sites of possible executions on the British Channel Island of Alderney in search of trace evidence that might prove or disprove the execution hypothesis.

Visual and Elemental Analysis of Fraudulent Pet Cremations

Rhys Williams - Loyola University Maryland

The distinction of bone in suspected cremations is a significant challenge to forensic practitioners, particularly when mixed with sediments and other unidentified material. This research explores the forensic analysis of 61 fraudulent cremated remains of pet animals in Baltimore, Maryland. A combination of visual identification of bone fragments, UV fluorescence, and elemental analysis with portable X-ray fluorescence (pXRF) were used. The majority of samples showed no visual or elemental composition of bone, and several samples contained foreign material, including scrap metal, building materials, coral, and human bone fragments. Overall, this research observed materials inconsistent with legitimate pet cremations throughout all the submitted samples.

What to Expect When You Are Assessing: A Beginner's Guide to Forensic Assessments

David Greene - ANAB

After learning about the assessment of forensic testing, inspection, and calibration, the next step—becoming an assessor—can feel intimidating. Taking that first step into forensic technical assessment often raises questions about what to expect and how to get started. This presentation will demystify the process of volunteering as a forensic technical assessor by outlining preparation before the assessment, walking through how an on-site assessment progresses, and highlighting the professional and organizational benefits of serving in this role. Attendees will gain practical insight into the assessor experience and a clearer understanding of how participation strengthens both individual expertise and the broader forensic community.

Wrongful Convictions Related to Forensic Procedures: A Comparative Analysis of Legal Frameworks and Practice in the United States and Europe

Dariusz Wilk - Jagiellonian University in Kraków

Wrongful judicial decisions, which may, for example, result in the conviction of an innocent person, arise from various causes, including, among others, errors made by law enforcement authorities in conducting forensic procedures. These include, in particular, mistaken identification by a witness, false confessions to committing a crime, and errors in forensic expert examinations. Some causes of wrongful convictions may be mitigated by introducing appropriate requirements concerning the procedures and conditions under which forensic activities are conducted. Therefore, for the purposes of the presentation, a comparative legal analysis of the regulations in force in EU Member States and selected U.S. states was conducted in order to determine the optimal conditions for carrying out such procedures. On this basis, several key issues were identified: requirements concerning the conduct of identification procedures; the prohibition of treating a suspect's confession as the sole source of evidence; and the possibility of having an expert opinion verified by another expert.

