



DNA Analysis Report

St. Louis County Police Department  
ASCLD/LAB Accredited since 2005

**COPY**

**DNA Case # 14-D450**

Complaint # 99-14-43984

Investigating Officer:

Offense: Assault on LEO

Department Name: Saint Louis County P. D.

VICTIM: P.O. Wilson

SUSPECT: Michael Brown

**Evidence submitted for DNA analysis (Note: RBS indicates reddish-brown stain):**

- Q1-1 Swabs from Michael Brown's t-shirt (shirt, item #3)
- Q2-1 Swabs from Michael Brown's shorts (shorts, item #2)
- Q5 Swabs from the palm of Michael Brown's left hand (RBS) (item #7)
- Q6 Swabs from the back of Michael Brown's left hand (RBS) (item #8)
- Q7 Swabs from the palm of Michael Brown's right hand (RBS) (item #9)
- Q8 Swabs from the back of Michael Brown's right hand (RBS) (item #10)
- Q9-1 Swab from the fingernail scrapings/clippings of Michael Brown's left hand (scrapings/clippings, item #11)
- Q10-1 Swab from the fingernail scrapings/clippings of Michael Brown's right hand (RBS) (scrapings/clippings, item #12)
- Q11 Piece of apparent tissue or hardened nasal mucus from the driver front exterior door of Ferguson P.D. vehicle 108 (RBS) (item #8)
- Q12 Swab from the driver rear passenger exterior door of Ferguson P.D. vehicle 108 (RBS) (item #9)
- Q13 Swab from roadway in front of 2943 Canfield (RBS) (item #19)
- Q14 Swab from roadway in front of 2943 Canfield (RBS) (item #20)
- Q15 Swabs from RBS on the upper left thigh of P.O. Wilson's uniform pants (item #2B-1)
- Q16 Swabs from top exterior left front door of Ferguson P.D. vehicle 108 (item #4)
- Q17 Swabs from exterior left front door mirror of Ferguson P.D. vehicle 108 (item #5)
- Q18 Swabs from interior left front door handle of Ferguson P.D. vehicle 108 (RBS) (item #6)
- Q19 Swabs from P.O. Wilson's "SIG P229" (RBS) (item #1B)
- Q20-1 Swabs from P.O. Wilson's uniform shirt – left side and collar (shirt, item #2A)
- Q21-1 Swabs from P.O. Wilson's uniform pants – left side (pants, item #2B)
- K1 Buccal swab reference sample from P.O. Wilson
- K2 Bloodstain card reference sample from Michael Brown

DNA Case #14-D450

August 14, 2014

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## DNA EXAMINATION

Amplification of extracted DNA from the above evidence was performed using the Polymerase Chain Reaction (PCR) and profiled at the following STR loci (locus abbreviations used in this report are noted in parenthesis): D3S1358 (D3), vWA, D16S539 (D16), CSF1PO (CSF), TPOX, D8S1179 (D8), D21S11 (D21), D18S51 (D18), D2S441, D19S433 (D19), TH01, FGA, D22S1045(D22), D5S818 (D5), D13S317 (D13), D7S820 (D7), SE33, D10S1248 (D10), D1S1656 (D1), D12S391 (D12), D2S1338, DYS391 (STR locus on the Y male chromosome), Y indel (a Y insertion/deletion locus), and the sex-determining marker, Amelogenin.

### RESULTS OF ANALYSIS AND CONCLUSION

The DNA typing results obtained from **Q1-1** (Michael Brown's t-shirt) are consistent with being a mixture of two or more individuals. This profile can be separated into a major component profile consistent with Michael Brown and one or more trace contributors. Due to the limited genetic information available from the trace component of the mixture, no inclusionary statements will be made regarding the trace component. P.O. Wilson is excluded as a contributor to this mixture profile.

The DNA typing results obtained from **Q2-1** (Michael Brown's shorts) are consistent with being a mixture of three or more individuals. This profile can be separated into a major component profile consistent with Michael Brown and two or more trace contributors. Due to the limited genetic information available from the trace component of the mixture, no inclusionary statements will be made regarding the trace component. P.O. Wilson is excluded as a contributor to this mixture profile.

The DNA typing results obtained from **Q5** (palm of Michael Brown's left hand, RBS) are consistent with being a mixture of two or more individuals. This profile can be separated into a major component profile consistent with Michael Brown and a minor contributor. One additional allele indicates a possible trace contributor. Due to the limited genetic information available from the possible trace contributor, no conclusions regarding the possible trace contributor can be made. P.O. Wilson is included as a possible source of the minor contributor profile. The observed mixture profile is 98 times more likely if it originated from Michael Brown and P.O. Wilson than if it originated from Michael Brown and an unknown individual in the in the general unrelated population.

The male DNA profile obtained from **Q6** (back of Michael Brown's left hand, RBS), **Q7** (palm of Michael Brown's right hand, RBS), and **Q8** (back of Michael Brown's right hand, RBS) is consistent with the DNA profile of Michael Brown.

The DNA typing results obtained from **Q9-1** (Michael Brown's left hand fingernail scrapings/clippings) are consistent with being a mixture of three or more individuals. This profile can be separated into a major component profile consistent with Michael Brown and two or more trace contributors. Due to the limited genetic information available from the trace component of the mixture, no inclusionary statements will be made regarding the trace component. P.O. Wilson is excluded as a contributor to this mixture profile.

The male DNA profile obtained from **Q10-1** (Michael Brown's right hand fingernail scrapings/clippings, RBS) is consistent with the DNA profile of Michael Brown.

Michael Brown is the source\* of the DNA profile obtained from **Q11** (apparent tissue or hardened nasal mucus from vehicle 108), the **Q12** (driver rear passenger exterior door of Ferguson P.D. vehicle 108, RBS), **Q13** (RBS from roadway in front of 2943 Canfield), and **Q14** (RBS from roadway in front of 2943 Canfield).

The DNA typing results obtained from **Q15** (RBS on the upper left thigh of P.O. Wilson's uniform pants) are consistent with being a mixture of two or more individuals. This profile can be separated into a major male component profile and a minor contributor consistent with P.O. Wilson. One additional allele indicates a possible trace contributor. Due to the limited genetic information available from the possible trace contributor, no conclusions regarding the possible trace contributor can be made. Michael Brown is the source\* of the major male component profile detected from Q15.

The DNA typing results obtained from **Q16** (top exterior left front door of vehicle 108) are consistent with being a mixture of three or more individuals. This profile can be separated into a major mixture of two individuals with a trace contributor. Due to the limited genetic information available from the trace contributor, no conclusions regarding the

possible trace contributor can be made. Michael Brown and P.O. Wilson are included as contributors to this major mixture profile. The observed major mixture profile is 6.9 million times more likely if it originated from Michael Brown and P.O. Wilson than if it originated from P.O. Wilson and an unknown individual in the in the general unrelated population.

The partial DNA profile obtained from **Q17** (exterior left front door mirror of vehicle 108) is consistent with being a mixture of two or more individuals. Due to the limited genetic information available the presence or absence of P.O. Wilson and Michael Brown cannot be determined.

The DNA typing results obtained from **Q18** (interior left front door handle of vehicle 108) are consistent with being a mixture of two or more individuals. This profile can be separated into a major male contributor profile and one or more minor contributors. Michael Brown is the source\* of the major male contributor profile. Due to the limited genetic information available from the minor component the presence or absence of P.O. Wilson cannot be determined.

The DNA typing results obtained from **Q19** (P.O. Wilson's "SIG P229", RBS) are consistent with being a mixture of three or more individuals. This profile can be separated into a major mixture of two individuals with a trace contributor. Due to the limited genetic information available from the trace contributor, no conclusions regarding the possible trace contributor can be made. Michael Brown and P.O. Wilson are included as contributors to this major mixture profile. The observed major mixture profile is 2.1 octillion times more likely if it originated from Michael Brown and P.O. Wilson than if it originated from P.O. Wilson and an unknown individual in the in the general unrelated population.

The DNA typing results obtained from **Q20-1** (P.O. Wilson's uniform shirt – left side and collar) are consistent with being a mixture of three or more individuals. This profile can be separated into a major mixture of two individuals with a trace component. Due to the limited genetic information available from the trace component, no conclusions regarding the possible trace contributor can be made. Michael Brown and P.O. Wilson are included as contributors to this major mixture profile. The observed major mixture profile is 2.1 trillion times more likely if it originated from Michael Brown and P.O. Wilson than if it originated from P.O. Wilson and an unknown individual in the in the general unrelated population.

The DNA typing results obtained from **Q21-1** (P.O. Wilson's uniform pants – left side) are consistent with being a mixture of three or more individuals. This profile can be separated into a major mixture of two individuals with a trace component. Due to the limited genetic information available from the trace component, no conclusions regarding the possible trace contributor can be made. Michael Brown and P.O. Wilson are included as contributors to this major mixture profile. The observed major mixture profile is 34 sextillion times more likely if it originated from Michael Brown and P.O. Wilson than if it originated from P.O. Wilson and an unknown individual in the in the general unrelated population.

\*Conclusion based on the calculated frequency of the DNA profile being rarer than approximately 1 in 310 billion unrelated individuals (Caucasian, African American, Hispanic, and Asian population groups) which is approximately one thousand times the population of the United States. Identical siblings will share the same DNA profile.

The DNA typing results obtained from K2 and Q12 will be transferred to CODIS (Combined DNA Index System) and searched against other DNA profiles on a regular basis. Should a match be generated, a notification will be sent.

#### **PRESERVATION OF SAMPLES**

The remaining portion(s) of the above evidence and a portion of any remaining extracted DNA that may still exist are being preserved in the St. Louis County Police Crime Laboratory for any additional tests that may be requested in the future.

DNA Technical Leader

 Technical Reviewer, DSN, Date



## DNA Analysis Report

St. Louis County Police Department  
ASCLD/LAB Accredited since 2005

DNA Case # 14-D450-2  
Complaint # 99-14-43984  
Investigating Officer:  
Offense: Assault on LEO  
Department Name: Saint Louis County P. D.

VICTIM: P.O. Wilson  
SUSPECT: Michael Brown

**This report is a supplement to the original report 14-D450 dated August 14, 2014.**

### **Evidence submitted for DNA analysis (Note: RBS indicates reddish-brown stain):**

- Q22-1 Swabs from red "Cardinals" baseball cap (item #2)
- Q23-1 Swab from RBS on Left "Nike" sandal (item #6)
- Q23-2 Swabs from Left "Nike" sandal (item #6)
- Q24-1 Swab from RBS on Right "Nike" sandal (item #7)
- Q24-2 Swabs from Right "Nike" sandal (item #7)
- Q25-1 Swabs from black, yellow, and white rubber bracelet (item #1)
- Q26-1 Swabs from dark brown beaded bracelet (item #5)

### **Evidence previously submitted (refer to original report 14-D450):**

- K1 Buccal swab reference sample from P.O. Wilson
- K2 Bloodstain card reference sample from Michael Brown

## **DNA EXAMINATION**

Amplification of extracted DNA from the above evidence was performed using the Polymerase Chain Reaction (PCR) and profiled at the following STR loci (locus abbreviations used in this report are noted in parenthesis): D3S1358 (D3), vWA, D16S539 (D16), CSF1PO (CSF), TPOX, D8S1179 (D8), D21S11 (D21), D18S51 (D18), D2S441, D19S433 (D19), TH01, FGA, D22S1045 (D22), D5S818 (D5), D13S317 (D13), D7S820 (D7), SE33, D10S1248 (D10), D1S1656 (D1), D12S391 (D12), D2S1338, DYS391 (STR locus on the Y male chromosome), Y indel (a Y insertion/deletion locus), and the sex-determining marker, Amelogenin.

## **RESULTS OF ANALYSIS AND CONCLUSION**

The DNA typing results obtained from **Q22-1** ("Cardinals" baseball cap) are consistent with being a mixture of two or more individuals. This profile can be separated into a major component profile and one or more trace contributors. Due to the limited genetic information available from the trace component of the mixture, no inclusionary statements will be made regarding the trace component. The presence or absence of P.O. Wilson as a possible trace contributor cannot be determined. Michael Brown is the source\* of the major male component profile detected from Q22-1.

Michael Brown is the source\* of the DNA profile obtained from **Q23-1** (RBS on Left "Nike" sandal) and **Q24-1** (RBS on Right "Nike" sandal).

No definitive DNA typing results were obtained from **Q23-2** (Left "Nike" sandal) and **Q24-2** (Right "Nike" sandal). Due to the limited genetic information obtained, no conclusions regarding these samples will be made.

The DNA typing results obtained from **Q25-1** (black, yellow, and white rubber bracelet) are consistent with being a mixture of two or more individuals. This profile can be separated into a major male component profile and one or more minor contributors. Due to the limited genetic information available from the minor component of the mixture, no inclusionary statements will be made regarding the minor component. Michael Brown and P.O. Wilson are excluded as contributors of the major male component profile, however, the presence or absence of Michael Brown and P.O. Wilson as possible minor contributors cannot be determined.

The DNA typing results obtained from **Q26-1** (dark brown beaded bracelet) are consistent with being a mixture of three or more individuals. This profile can be separated into a major male component profile and two or more minor contributors. Due to the limited genetic information available from the minor component of the mixture, no inclusionary statements will be made regarding the minor component. Michael Brown and P.O. Wilson are excluded as contributors of the major male component profile, however, the presence or absence of Michael Brown and P.O. Wilson as possible minor contributors cannot be determined.

\*Conclusion based on the calculated frequency of the DNA profile being rarer than approximately 1 in 310 billion unrelated individuals (Caucasian, African American, Hispanic, and Asian population groups) which is approximately one thousand times the population of the United States. Identical siblings will share the same DNA profile.

No DNA profile will be transferred to CODIS (Combined DNA Index System).

#### **PRESERVATION OF SAMPLES**

The remaining portion(s) of the above evidence and a portion of any remaining extracted DNA that may still exist are being preserved in the St. Louis County Police Crime Laboratory for any additional tests that may be requested in the future.

Technical Reviewer, DSN, Date

DNA Technical Leader

7900 Forsyth Blvd.  
Saint Louis, MO 63105

*Email:*

## **Education**

- 05/09      **Master of Arts - Biology**  
Washington University in St. Louis
- 05/04      **Bachelor of Science – Biology**, minor in Chemistry  
**Bachelor of Arts – Anthropology**  
Departmental Honors (Biology)  
University of Missouri-Columbia

## **Experience**

- 2/11-present      **Forensic DNA Technical Leader, St. Louis County Police Department  
Crime Laboratory**
- Manage the technical operations of the Laboratory
  - Ensure compliance with all FBI and ASCLD accreditation standards for forensic DNA analysis
  - Perform and approve validation studies to benefit the Laboratory
  - Coordinate and oversee technical problem solving of analytical methods, oversee training, quality assurance, and proficiency testing as it pertains to the DNA Unit and review all above documents on an annual basis
  - Perform DNA casework and casework review; prepare reports and testify to results in court
- 12/05-2/11      **Criminalist - DNA Analyst and back-up CODIS Administrator (6/10  
to 2/11), St. Louis Metropolitan Police Department Crime Laboratory**
- Assist the CODIS Administrator with CODIS hit dispositions, notifications, and record keeping
  - Purify, quantitate and amplify forensic samples using EZ1 robots, ABI 7500 (Quantifiler and Quantifiler Duo kits) and Identifiler
  - Perform STR DNA typing on forensic samples using 310/3130 Genetic Analyzers and GeneMapper ID software
  - Prepare reports and testify to results in court
  - Train new analysts in forensic biology and DNA analysis
  - Perform validation studies to benefit the Laboratory
- 1/05-12/05      **Contract Forensic Biologist, St. Louis Metropolitan Police  
Department Crime Laboratory**
- Screen evidence for biological fluids using an alternate light source, STMP, phenolphthalein, and other presumptive tests
  - Take cuttings or swabs of biological materials and retain for DNA

analysis

- Examine slides using oil immersion microscopy
  - Prepare reports based on laboratory results using JusticeTrax-LIMS software
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- 6/04-8/04     **Intern at St. Charles County Crime Laboratory, St. Charles Missouri**
- Participated in validations of ABACard, HemaTrace and Phadebas
  - Observed working of rape, homicide, and drug cases including use of GC/MS, FTIR, and presumptive color tests
- 1/01-6/04     **Student Assistant at Research Reactor, University of Missouri (UMC)**
- Trained employees in laboratory procedures and safety policies
  - Revised safety procedures and protocol for laboratory equipment
  - Prepared standards and archaeological samples for Neutron Activation Analysis (NAA)
  - Utilized ICP-Mass Spectrometry, Scanning Electron Microscope, analytical balances, fume hoods, ovens and gas torches
  - Worked with hazardous materials including radioactive material, Nitric, Hydrochloric and Hydrofluoric acids weekly
- 6/02-8/02     **Undergraduate Researcher at Research Reactor, UMC**  
Funded by Life Sciences Undergraduate Research Opportunity Program
- Investigated Barium/Strontium ratios in prehistoric human bones using Laser Ablation ICP-MS to determine dietary patterns

### **Association Memberships**

- 02/10 **American Academy of Forensic Sciences** – Member in Criminalistics, 2014  
10/07 **Midwestern Association of Forensic Scientists** – Regular Member, 9/2012

### **Additional Training/Meetings**

- 09/14 **ASCLD/LAB International Internal Auditor Training Course**  
Sponsored by the St. Louis County Police Academy  
Instructor: Emma Dutton
- 08/14 **Association of Forensic DNA Analysts and Administrators Summer 2014**  
Sponsored by AFDAA – Houston Texas  
Instructors: various speakers
- 07/14 **Future Trends in Forensic DNA Technology Seminar – San Francisco**  
Sponsored by Life Technologies/Thermo Scientific  
Instructors: various speakers
- 04/14 **Mid-America 2014 Forensic DNA Conference**  
Sponsored by Paternity Testing Corporation

Workshop: ISO 17025 Top Ten Non-Conformances  
Workshop: ISO 17025 Root Cause Analysis  
Instructor for workshops: Anna Yoder

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- 08/13 **Grant Writing USA Workshop**  
Sponsored by the St. Louis County Police Academy  
Instructor: Jennene Colky
- 05/13 **ASCLD/LAB 40<sup>th</sup> Annual Symposia**  
**Workshops:**  
Improving the Effectiveness of Forensic Services: Using the FORESIGHT Project  
Instructors: Paul J. Speaker and Richard Riley  
Laboratory Lean Six Sigma: A Recipe for Dramatic Efficiency and Quality  
Instructors: Tim Kupferschmid, Adam Becnel, and Cami Green  
Using FORESIGHT Output to Improve Employee Retention, Satisfaction, and Leverage  
More Resources  
Instructors: David Dawley, Richard Riley and Paul Speaker
- 04/13 **DNA Analyst Training on Mixture Interpretation**  
Sponsored by NIST (web delivered)  
Instructors: John Butler, Bruce Heidebrecht, Mike Coble, Robin Cotton, and  
Charlotte Word
- 04/13 **Mid-America 2013 Forensic DNA Conference**  
Sponsored by Paternity Testing Corporation  
Instructors: various speakers
- 03/13 **GeneMapper ID-X Training**  
Sponsored by St. Louis County Police Crime Laboratory  
Instructor: April Orbison
- 01/13 **3500 Genetic Analyzer Install Training**  
Sponsored by St. Louis County Police Crime Laboratory  
Instructor: April Orbison
- 04/12 **Mid-America 2012 Forensic DNA Conference**  
Sponsored by Paternity Testing Corporation  
Instructors: various speakers  
**Workshops:**  
Introduction to CODIS 7.0, Instructor: Melody Josserand  
Paternity Testing for Crime Laboratories, Instructor: Michelle Beckwith
- 02/12 **DNA Mixture Interpretation Workshop**  
Sponsored by St. Louis County Police Crime Laboratory  
Instructor: Bruce Heidebrecht
- 02/12 **64<sup>th</sup> Annual Scientific Meeting of the American Association of Forensic**

**Sciences (AAFS)**  
Sponsored by AAFS  
Instructor: various speakers

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- 08/11 **ASCLD/LAB-*International* Preparation Course**  
Sponsored by ASCLD/LAB  
Instructor: Anja Einseln
- 06/11 **2011 NIJ Conference**  
Sponsored by the National Institute of Justice  
Instructors: various speakers
- 11/10 **16<sup>th</sup> Annual National CODIS Conference**  
Sponsored by the Federal Bureau of Investigation  
Instructors: various speakers
- 09/10 **Forensic Y-STR Training**  
Sponsored by Marshall University  
Instructor: Sarah Bowen
- 07/10 **Introduction to SQL**  
**Intermediate Applications of SQL**  
**Introduction to Crystal Reports**  
Sponsored by the University of Missouri-St. Louis, Computer Education and Training Center  
Instructor: Sandy Lux
- 07/10 **Quality Assurance Standards/Auditor Training**  
Sponsored by the U.S. Department of Justice, Federal Bureau of Investigation Laboratory Division  
Instructor: Online self-paced training
- 06/10 **2010 NIJ Conference**  
Sponsored by the National Institute of Justice  
Instructors: various speakers
- 04/10 **Mid-America 2010 Forensic DNA Conference**  
Sponsored by Paternity Testing Corporation  
Instructors: various speakers
- 10/09 **2009 NIJ Grant Management Summit**  
Sponsored by the Investigative and Forensic Sciences Division, the Office of Science and Technology, the National Institute of Justice and the U.S. Department of Justice  
Instructors: various speakers

- 06/09 **Advanced DNA Training**  
Sponsored by NIJ President's DNA Initiative and Marshall University  
Instructor: Justin Godby
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- 04/09 **To Hell and Back: The Ethics of Stewardship and the Stewardship of Ethics**  
Sponsored by the National Institute of Justice  
Instructor: Paul J. Voss, Ph.D.
- 03/09 **Bloodstain Pattern Analysis for DNA Scientists**  
Sponsored by the St. Louis Metropolitan Police Department Crime Laboratory  
Instructors: Kevin R. Winter and Michael J. Van Stratton
- 04/08 **Mid-America 2008 Forensic DNA Conference**  
Sponsored by Paternity Testing Corporation  
Instructors: various speakers
- 03/08 **Screening Hair for DNA**  
Sponsored by St. Louis County Police Department  
Instructor: William Randle
- 10/07 **18<sup>th</sup> International Symposium on Human Identification**  
Sponsored by Promega  
Instructors : various speakers  
Validation workshop – John Butler, PhD  
Expert Witness Testimony workshop – Charlotte Word and George Clarke
- 06/07 **Hair Identification for DNA Analysts**  
Sponsored by West Virginia University and Midwest Forensics Resource Center  
Instructor: Dick Bisbing
- 03/07 **Mid-America 2007 Forensic DNA Conference**  
Sponsored by Paternity Testing Corporation  
Instructors: various speakers
- 03/07 **Continuing Education for Forensic Professionals**  
Sponsored by National Institute of Justice and West Virginia University Forensic Science Initiative  
Instructors: various speakers  
Expert Testimony Workshop  
Ethics in Forensic Science  
Scientific and Technical Writing
- 01/07 **FBI CODIS version 5.7.3 Software Training**  
Sponsored by Federal Bureau of Investigation  
Instructors: Meghan Carlin and Inez Kendall

11/06 **Forensic Statistics: The Calculations Behind PopStats and Beyond**  
Sponsored by Missouri Association of Crime Laboratory Directors  
Instructor: John Planz, Ph.D.

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10/06 **Courtroom Testimony Techniques: Success Instead of Survival**  
Sponsored by Midwest Forensics Resource Center  
Instructor: Dwane Hilderbrand

04/06 **Mid-America 2006 Forensic DNA Conference**  
Sponsored by Paternity Testing Corporation  
Instructors: various speakers

**Paternity Statistics Workshop**

Instructor: David W. Gjertson

**Forensic DNA Statistics Workshop**

Instructor: George Carmody

10/05 **Midwestern Association of Forensic Scientists Annual Meeting**  
Sponsored by: Midwestern Association of Forensic Scientists  
Instructors: various speakers

**Genemapper ID Software Workshop**

Instructor: Erica Currie-Fraser

**Real-Time PCR Workshop**

Instructor: Catherine Caballero

03/05 **Mid-America 2005 Forensic DNA Conference**  
Sponsored by: Paternity Testing Corporation  
Instructor: various speakers

**Forensic Statistics Workshop**

Sponsored by: Paternity Testing Corporation

Instructor: Charles Brenner

02/05 **Forensic Statistics Workshop**  
Sponsored by: St. Louis Metropolitan Police Department—Crime Laboratory  
Instructor: Donna Becherer

## **Papers Presented**

- 2014 Globalfiler Casework and Express Kits Validation. Presented at the Summer 2014 Association of Forensic DNA Analysts and Administrators Meeting in
- 2014 Globalfiler Casework and Express Kits Validation. Presented at the 2014 (July) Future Trends in Forensic DNA Technology Seminar in
- 2014 Globalfiler Casework and Express Kits Validation. Presented at the 2014 (April) Mid-America Forensic DNA Conference in
- 2013 Casework Experience with Erase-Update. Presented at the 2013 Mid-America Forensic DNA Conference in

- 2012 Casework Experience with Erase. Presented at the 2012 Mid-America Forensic DNA Conference in
- 2008 Minifiler: Designer Primers for the Degradation Blues. Presented at the 2008 Mid-America Forensic DNA Conference in
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- 2003 Reconstruction of Prehistoric Human Dietary Patterns by Laser Ablation ICP-MS. Presented at the annual Society for American Archaeologists meeting in Milwaukee, WI.
- 2002 Laser Ablation ICP-MS of Missouri Chert. Presented at the MURR Nuclear Sciences Research Symposium in Columbia, MO.

**References upon request**