

## CURRICULUM VITAE

**Name of Lab:** Broward County Sheriff's Office                      **Date:** May 15, 2017  
Crime Laboratory

**Name:** George T. Duncan    **Job Title:** Criminalist Unit Manager  
DNA Specialist

**Discipline(s):** Forensic DNA Analysis

### **Education:**

<u>Institution</u>	<u>Date Completed</u>	<u>Major</u>	<u>Degree Completed</u>
Florida Int'l. University	1996	Biology	Ph.D.
Florida Atlantic University	1983	Chemistry	M.S.
University of Miami	1970	ACS Chemistry	B.S.

### **Professional Affiliations:**

Association of Forensic DNA Examiners and Administrators (AAFDA), since 2004 inactive  
American Society of Genetics, member since 1998 lapsed  
American Association for the Advancement of Science, since 1992  
American Society of Human Genetics, member 1994 - 2010  
Technical Working Group on DNA Analysis Methods (TWGDAM), 1989-2001  
Forensic Science Society (Great Britain), member since 1991 lapsed  
American Academy of Forensic Sciences, member since 1974  
American Chemical Society, member since 1970 (Past president- South Florida Subsection)

### **Professional Certifications:**

American Board of Criminalistics, Diplomate, Molecular Biology, 2015 to present  
American Board of Criminalistics, Fellow, Molecular Biology, 2005 - 2015  
American Board of Criminalistics, Diplomate , General Criminalistics, since 1997  
Licensed technologist in Clinical Chemistry and Immunohematology (Department of Rehabilitative Services, since 1971 (Presently Inactive Status)

### **Employment History:**

(1) **Job Title:** Criminalist I, II, III Criminalist Unit Manager (1972-present)                      **Employer:**  
Broward Sheriff's Office **Principal Duties:** Supervisor of DNA Unit (ten employees). Analysis and identification of biological stains using classical serological techniques, comparison of stains using RFLP/DNA and PCR/STR typing.

(2) **Job Title:** Technician (1970-1972)                      **Employer:** Dade County Public Safety Department  
Crime Laboratory **Principal Duties:** Police Officer and Crime scene technician (on the road). Trained in all aspects of Criminalistics including; drug analysis, crime scene investigation, firearms, blood alcohol analysis, trace evidence processing and started training in serological methods.

(3) **Job Title:** Criminalist Intern (1969 – 1970) **Employer:** Dade County Crime Laboratory  
**Principal Duties:** Analysis of drug cases.

(4) **Job Title:** Courtesy Professor Appointment (Chemistry Dept.)(Member of the Graduate Faculty, Biology Department)(1996-2010) Adjunct Professor, **Employer:** Florida Int'l. University, **Principal Duties:** Teach courses in Biology, Forensics (1996-2006) and participate in Graduate MS and PhD student research as a committee member or assist Dr. Bruce McCord in supervision of students.

(5) **Job Title:** Biology and Chemistry Instructor (2004-present) **Employer:** Nova Southeastern University **Principal Duties:** Teach courses in Biology and Chemistry. Courses include core courses of Introductory Biology as well as Genetics. Courses included: Genetics 3600 lecture and laboratory, Cellular and Molecular Biology (BIOL 4340), Chemistry 1100.

(6) **Job Title:** Chemistry Instructor (1985-2003) **Employer:** Broward Community College  
**Principal Duties:** Teach courses in Chemistry. Courses include core courses of Introductory Chemistry as well as an Introduction to Chemistry and Biochemistry course designed for nursing and health sciences students. Courses included: Chemistry 1033, 1040, 1041, 1045, 1046 and 1046e General Biology BSC 1005.

(7) **Job Title:** Courtesy/Adjunct Professor **Employer:** Florida Int'l. University **Principal Duties:** Teach courses in Biology and Forensics. Courses including: PCB 6935, Advanced Topics in Genetics-Chromosome Structure and Repeat DNA, January, 1999; January, 2000 Forensic Biology, September, 1999; January, 2001, Advanced Topics in Genetics-The Mitochondrion.

### **Publications:**

Joana Antunes , Deborah S.B.S. Silva · Kuppareddi Balamurugan · George Duncan · Clarice S Alho · Bruce McCord. Forensic discrimination of vaginal epithelia by DNA methylation analysis through pyrosequencing , *Electrophoresis*, 2016, <http://dx.doi.org/10.1002/elps.201600037>

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Antunes, Joana, Deborah SBS Silva, Kuppareddi Balamurugan, George Duncan, Clarice S. Alho, and Bruce McCord. "High-resolution melt analysis of DNA methylation to discriminate semen in biological stains." *Analytical biochemistry* 494 (2016): 40-45.

Silva, Deborah SBS, Joana Antunes, Kuppareddi Balamurugan, George Duncan, Clarice S. Alho, and Bruce McCord. "Developmental validation studies of epigenetic DNA methylation markers for the detection of blood, semen and saliva samples." *Forensic Science International: Genetics* 23 (2016): 55-63.

Antunes J, Silva DS, Balamurugan K, Duncan G, Alho CS, McCord B., High-resolution melt analysis of DNA methylation to discriminate semen in biological stains. *Anal Biochem.* 2016 Feb 1;494:40-5. doi: 10.1016/j.ab.2015.10.002. Epub 2015 Oct 22.

Soares Bispo Santos Silva D, Antunes J, Balamurugan K, Duncan G, Sampaio Alho C, McCord B., Evaluation of DNA methylation markers and their potential to predict human aging. *Electrophoresis*. 2015 Aug;36(15):1775-80. doi: 10.1002/elps.201500137. Epub 2015 Jul 14.

Antunes J, Balamurugan K, Duncan G, McCord B., Tissue-Specific DNA Methylation Patterns in Forensic Samples Detected by Pyrosequencing®. *Methods Mol Biol*. 2015;1315:397-409. doi: 10.1007/978-1-4939-2715-9\_27.

Book Chapter; Antunes, Joana, Kuppareddi Balamurugan, George Duncan, and Bruce McCord. "Tissue-Specific DNA Methylation Patterns in Forensic Samples Detected by Pyrosequencing®." *Pyrosequencing: Methods and Protocols* (2015): 397-409.

Kuppareddi Balamurugan, Robin Bombardi, George Duncan, Bruce McCord: "Identification of spermatozoa by tissue-specific differential DNA methylation using bisulfite modification and pyrosequencing" *Electrophoresis* 2014, 35, 3079–3086.

Pomeroy RS, Balamurugan K, Wong H, Duncan G, "High Resolution Melt Analysis of the Minisatellite D1S80: A Potential Forensic Screening Tool" *Journal Electrophoresis*, 2014 Nov;35(21-22):3020-7.

Thompson RE<sup>1</sup>, Duncan G, McCord BR, *J Forensic Sci.* An investigation of PCR inhibition using Plexor(®) -based quantitative PCR and short tandem repeat amplification. 2014 Nov;59(6):1517-29.

Madi T, Balamurugan K, Bombardi R, Duncan G, McCord B. The determination of tissue-specific DNA methylation patterns in forensic biofluids using bisulfite modification and pyrosequencing. *Electrophoresis*. 2012 Jul;33(12):1736-45.

Balamurugan K, Tracey ML, Heine U, Maha GC, Duncan GT. Mutation at the human D1S80 minisatellite locus, *ScientificWorld Journal*. 2012; 2012:917235. Epub 2012 May 3.

Balamurugan K, Duncan G., Y chromosome STR allelic and haplotype diversity in a Rwanda population from East Central Africa., *Leg Med(Tokyo)*2012 Mar;14(2):105-9. Epub 2012 Jan 28.

Balamurugan K, Kanthimathi S, Vijaya M, Suhasini G, Duncan G, Tracey M, Budowle B. Genetic variation of 15 autosomal microsatellite loci in a Tamil population from Tamil Nadu, Southern India. *Leg Med (Tokyo)*. 2010 Nov;12(6):320-3. Epub 2010 Sep 1.

Balamurugan K, Pomeroy R, Duncan G, Tracey M., Investigating SNPs flanking the D1S80 locus in a Tamil population from India., *Hum Biol*. 2010 Apr;82(2):221-6.

Kuppareddi Balamurugan, G. Suhasini, M. Vijaya, S. Kanthimathi, Nicole Mullins, Martin Tracey, George Duncan, Y chromosome STR allelic and haplotype diversity in five ethnic Tamil populations from Tamil Nadu, India, *Leg Med (Tokyo)*. 2010 Sep;12(5):265-9. Epub 2010 Jul 10.

Heather E. LaSalle, George Duncan, Bruce McCord, An Analysis of Single and Multi-Copy Methods for DNA Analysis by Real-Time Polymerase Chain Reaction, (2010) *Forensic Sci Int Genet.* 2011 Jun;5(3):185-93. Epub 2010 Apr 24.

Robert Pomeroy, George Duncan, Bulbin Reeder, Elen Ortenberg, Melba Ketchum, Hannah Wasiluk, and Dennis Reeder (2009) A Low Cost, High-Throughput, Automated, SNP Assay for Forensic Human DNA Applications, *Anal Biochem.* 2009 Dec 1;395(1):61-7. Epub 2009 Jul 3..

Rene J. Herrera, Leslie R. Adrien, Luis M. Ruiz, Nahir Y. Sanabria, George Duncan (2004) D1S80 A Single-Locus Discrimination Among African Populations, *Human Biology*, Feb., 2004, vol. 76, no. 1, 87-108.

Duncan, G.T., Tracey, M.L. Stauffer, E.(2003). *Forensic Science: An Introduction to Scientific and Investigative Techniques*, Edited by S.H. James and J.J. Nordby, chapter entitled: *Techniques of DNA Analysis*, CRC Press, Boca Raton, 221-250.

Kuppareddi Balamurugan, N. Prabakaran, M.Sc., George Duncan, Bruce Budowle, Mohammad Tahir, and Martin Tracey (2001): Allele frequencies of 13 STR loci and D1S80 locus in a Tamil population from Madras, India. *J Forensic Sci.* 2001 Nov;46(6):1515-7.

Brown, R.J., Rowold, D., Herrera, R.J., Tahir, M., Barna, C., Duncan, G.T. (2000): Distribution of the HLA-DQA1 and Polymarker alleles in the Basque population of Spain, *Forensic Sci Int* 108:145-151

Tahir, M.A, Herrera, R.J., Khan, A.A., Kashyap, V.K., Duncan, G., Barna, C., Budowle, B., Rowold, D.J., Amjad, M., Sinha, S. (2000) Distribution of HLA-DQA1, CSFF1PO, vWA, THO1, tpoX, D16S539, D7S820, D13S317, AND D5S818 alleles in East Bengali and West Punjabi populations from indo-pak subcontinent, *J Forensic Sci*:45(6):1320-1323.

Balamurugan, K., Abdel-Rehman, H., Duncan, G.T., Budowle, B., Anderson, S., Macechko, J., Tahir, T., (1998): Distribution of D1S80 alleles in the Jordanian population. *Int. J Legal Med.* 111:276-277.

Duncan, G.T., Balamurugan, K., Budowle, B., Smerick, J., and Tracey, M. (1996): Microvariation at the human locus D1S80. *Int. J Legal Med.* 110:150-154.

Duncan, G.T., (1996): *Collection and Analysis of DNA Evidence.* The Texas Prosecutor, The Official Journal of the Texas District & County Attorneys Association. 26:13-15.

Duncan, G.T., Tracey, M.L. (1996). *Introduction to Forensic Sciences*, 2nd Edition, chapter entitled: *Serology and DNA typing.* CRC Press, Boca Raton, 233-293.

Duncan, G.T., Balamurugan, K., Budowle, B., and Tracey, M. (1996): Hinf I/Tsp509 I and BsoF I polymorphisms in the flanking regions of the human VNTR locus D1S80. *Genetic Analysis: Biomolecular Engineering*, 13: 119-121.

Duncan, G.T., Thomas, E., Gallo, J.C., Baird, L.S., Garrison, J., Herrera, R.J. (1996): Human

phylogenetic relationships according to the D1S80 locus. *Genetica*, 98:277-287.

Novick, G.E., Novick, C.C., Yunis, J., Yunis, E., Martinez, K., Duncan, G., Troup, G.M., Deininger, P.L., Stoneking, M., Batzer, M.A. and Herrera, R.J. (1995) Polymorphic human specific Alu insertions as markers for human identification. *Electrophoresis* 16:1596-1601.

Sovinski, S. M., Baird, L. S., Budowle, B., Caruso, J. F., Cheema, D. P. S., Duncan, G. T., Hamby, P. P., Masibay, A. S., Sharma, V. K., and Tahir, M. A. (1996). Development of a deoxyribonucleic acid (DNA) restriction fragment length polymorphism (RFLP) database for Punjabis in East Punjab, India. *Forensic Sci. Int.* 79, 187-198.

Novick, G.E., Menendez, C.M., Novick, C.C., Duncan, G.T., Yunis, J., Yunis, E., Deininger, P.L., Batzer, M.A., Herrera, R.J. (1994): The Use of Polymorphic Alu Insertions as a New Methodological Alternative in Human Paternity Testing and Child Identification. *International Pediatrics* 9, 60-68.

Duncan, G. T., Noppinger, K., Carey, J., Tracey, M. (1993): Comparison of VNTR Allele Frequencies and Inclusion Probabilities Over Six Populations. *Genetica*, 88, 51-57.

Noppinger, K., Duncan, G. T., Ferraro, D., Watson, S., Ban, J. (1992): Evaluation of DNA Probe Removal from Nylon Membrane. *BioTechniques* 13, 572-575.

Watson, S.M., Ban J.D., Duncan, G.T., Noppinger, K.E., Saxner, D.J. (1992): Restriction fragment length polymorphism analysis of zoo animals using Hae III and four single-locus probes. *Appl. & Theoret. Electrophor.* 3, 109-114.

Duncan, G.T., Seiden, H., Vallee, L., Ferraro, D, (1986) Effects of Superglue, Other Fingerprint Developing Agents and Luminol on Bloodstain Analysis, *American Association of Official Analytical Chemists (AOAC)* 69: 677-680.

Seiden, H., Duncan, G.T., (1983) Presumptive Screening Test for Seminal Acid Phosphatase Using Sodium Thymolphthalein Monophosphate, *American Association of Official Analytical Chemists (AOAC)*, 66: 207-209.

### **Seminar Presentations:**

Green Mountain DNA Conference, Next Generation Sequencing applied to Forensics, July 28-August 1, 2014, Ron Fourney, Bruce McCord, George Duncan, Jennifer Delong, Florida International University and the Broward Sheriff's Office.

Green Mountain DNA Conference, Setting a bottom, July 29-31, 2013, Bruce McCord, George Duncan, Jennifer Delong Florida International University and the Broward Sheriff's Office.

Green Mountain DNA Conference, Epigenetic Markers: A forensic tool for the determination of

biofluids present at sexual assaults and other crime scenes, August 1, 2012

8th Annual CFS: Promega 2011 – DNA Technical Education Workshop entitled: “Future DNA Forensics”. “Current State of Mixtures in Forensics”, Nov 1 – 2, 2011.

NIJ Workshop; Advanced DNA Typing Population Genetics, taught with Dr. Martin Tracey in Minneapolis, MN July 17-19, 2009

NIJ Workshop; Advanced DNA Typing Population Genetics, taught with Dr. Martin Tracey at North Miami Beach, August 2-7, 2010

Green Mountain DNA Conference, Post-Amp Purification, the good, bad, and ugly, July 24, 2010

Casework Genetics Symposium, Forensic SNP Symposium, Update on Mixture Interpretation in the United States, March 23, 2010

NIJ Workshop; Advanced DNA Typing Population Genetics, taught with Dr. Martin Tracey at FIU July 13-17, 2009

MAFS (Midwestern Association of Forensic Scientists), presented a 5 hour seminar dealing with mixture de-convolution with Dr. Bruce McCord, FIU. Sept. 29 – Oct. 1, 2008

SATC center presentation at Hollywood Memorial Hospital, 7-6-2007

Association of Forensic Analysts and Administrators. Topic; ABI Lim system, August 2 -3, 2007

Association of Forensic Analysts and Administrators. Topic; ABI Lim system, July 28, 2006

Forensic Molecular Biology; Presented a four hour course given at the Fourth Annual Advanced DNA Technology Workshop in Hawks Key, Florida, May 23, 2005, Sponsored by Bode Technology Group

Forensic Molecular Biology; Presented a four hour course given at the Second Annual Advanced DNA Technology Workshop in San Diego, California, April 25, 2005, Sponsored by Bode Technology Group

FDIAI Educational Training Conference, November 3, 2004. Presentation DNA and CODIS Update. Florida Division of the International Association for Identification

Nova Southeastern University, Keynote Speaker, Student Research Symposium, April 2, 2004.

PE Biosystems User's Group Meeting, Chicago, February 18, 2003. Presentation on identifier, ab 3100 and robotic systems for a group at the American Academy of Forensic Sciences.

Florida Prosecuting Attorneys Association, 1999-2003. Presentations for prosecuting attorneys

dealing with DNA analysis. This involved two trips to Orlando for these presentations. The others were here in Broward County.

American Genetic Association, May 19-20, 2001. Poster presentation before evolutionary biologists and population geneticists dealing with the evolutionary variation of the D1S80 locus.

PCR Applications III, Crime Lab Council, May 1998, Presentation Entitled: Microsatellite Considerations.

Organized with Dr. Ron Fournery and Dr. Steven Lee, The Science of Forensic STR Analysis and Data Interpretation Workshop, American Academy of Forensic Sciences, February, 1998.

Duncan, G.T., Tracey, M., Kuhn, D.N., Garrison, J., Baird, L.S., Sixth International Symposium on Human Identification, (1995), Detection of D1S80 (pMCT 118) Microvariant Polymorphisms by Single-Strand Conformation Polymorphism Analysis. Published in Manuscripts and Abstracts, Promega, Corporation.

**Member as Advisor-Student Committees (Master's Degrees and Phd's) at F.I.U. and Nova:**

2014- Kim Finnegan, MS Nova Oceanographic completed now Woods Hole Oceanographic Institute

2014- Teagen Gray, MS Nova Oceanographic completed now Salk Institute

2014- Renee Potens, MS Nova Oceanographic ongoing

2011-Georgiana Gibson-Daw PhD (FIU) ongoing

2011-Joana Antunes PhD (FIU) ongoing

2009-Lilly Moreno PhD (FIU) ongoing

2008-Tania Madi MS (FIU) completed now Source Molecular Inc.

2008-Robert Lowry PhD (FIU) completed now asst. prof. Indian River State College

2008-Maurice Aboud MS (FIU) completed

2008-2014 Christine Prowser PhD candidate (Nova Southeastern University) completed

2007-Ana Nunez MS (FIU) (completed)

2007-Matt Buettner PhD (FIU) dropped out

2006- Kerry Opel PhD (FIU) (completed) now asst. prof. Upper Iowa College

2006- Vince Richards PhD (Nova Oceanographic) completed post-doc Cornell, now asst. prof. Clemson University

2005-2009 Jason Somarelli PhD (FIU) presently post-doc at Duke University

2005- Tanya Simms PhD (FIU) completed  
2008-Tenzin Gayden PhD (FIU) completed  
2004-2006 Tenzin Gayden MS (completed) (FIU)  
2003- Christina la Paglia (completed) (FIU)  
2003- Claudia Recinos (completed) (FIU)  
2003- Rachel Chow (completed) (FIU)  
2003- Arif Kalantar (completed) (FIU)  
2001-2003 Hellen Thompson (completed) (FIU)  
2001- Desiree Diaz (FIU) (on-hold) dropped out  
2001- Julie Wan Young (FIU) dropped out  
1999-2001 Beth Julian (completed) (FIU)  
1999-2002 Leslie Adrian (completed) (FIU)  
2000-2002 Linsay Weis MS (completed) (FIU)

**Reviewer of Journal Articles:**

2015 to present reviewer for; Journal of Forensic and Legal Medicine

2009 to present reviewer for; The Journal of Forensic Sciences

2009 to present reviewer for; Forensic Science International-Genetics.

2009 to present reviewer for; The Journal Electrophoresis.

2004 to 2010 reviewer for American Genetic Association

May, 2003 National Institute of Justice Grant Reviewer under the direction of; Lois Tully US DOJ. Reviewed over 10 grants for funding by NIJ for the year 2003-2004.

May, 2003 Reviewed; "DNA Typing Analysis" in the second edition of the "Encyclopedia of Molecular Cell Biology and Molecular Medicine". The author of the article, Chantal J. Frégeau, Rémy A. Aubin, Bruce Budowle and Ron M. Fournay

March, 2001- Review of manuscript: 4833 Partial Cytochrome b Sequences for Six Hymenoptera of the Eastern United States for the Journal of Heredity.

**Member of Professional Committees:**

US Department of Justice NIJ TWG, 2005 to present (meets once a year to choose research topics) Nonstandard Laboratory Processing Subgroup



Member of University wide; Institutional Biosafety Committee Florida International University since 2005 to present

NIJ-DNA Grant Review committee, May, 2011

NIJ-DNA Grant Review committee, April, 2010

NIJ-DNA Grant Review committee, April, 2009

NIJ-DNA Grant Review committee, October, 2008

NIJ-DNA Grant Review committee, April, 2008

NIJ-DNA Grant Review committee, May 2, 2007

NIJ-DNA Grant Review committee, May, 2006

NIJ-DNA Grant Review committee, April 31 – May 2<sup>nd</sup>, 2005