

FY2021 Annual Report



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A Message from Executive Director Budowle



The Center for Human Identification (CHI) is located at and has the full support of the University of North Texas Health Science Center (HSC) in Ft Worth. CHI is a unique institution in that it is:

1. A full service, accredited forensic DNA and anthropology laboratory system authorized by the State of Texas to perform criminal casework and missing persons identifications to support investigative leads;
2. Authorized by the FBI to enter and search genetic data in the Combined DNA Index System (CODIS);
3. A highly innovative and productive research entity; and
4. An education and training center for students, lawyers, judges, practitioners, and investigators.

I came from the FBI to join CHI at the HSC more than 12 years ago and have never looked back, for I have the honor and privilege to work with the most impressive team of scientists and supporting staff. They are the brightest, most capable, and dedicated team I have met in my almost 40 years of working in the forensic field. They apply their skills and talent diligently contributing their part to making a safer, healthier, and more secure society.

The past 30-40 years have witnessed tremendous leaps in the field of genomics. New technologies and bioinformatics constantly expand the frontiers of science and offer new solutions for improving the human condition. With scientific advances, however, CHI and its students and stakeholders have a responsibility to be better educated and trained, which are essential components to maintaining a high-quality system, providing meaningful results with confidence, and maintaining cutting edge research and innovation.

Equally important is for scientists to always remember that they serve in a greater infrastructure. At CHI, we combine advanced forensic testing methods, next generation research and development, continuing education and training resources, dynamic government partnerships, and digital and analytical innovations within one collaborative and nimble hub of subject matter experts – a world-renowned Center of Excellence.

Sincerely,

Bruce Budowle, PhD
Executive Director
The Center for Human Identification
University of North Texas Health Science Center at Fort Worth

The Center for Human Identification: An Overview

With funding provided by the State of Texas and multiple Federal Government agencies, the Center for Human Identification (CHI) at the University of North Texas Health Science Center at Fort Worth is a world-renowned hub for forensic DNA testing; anthropological analysis; medicolegal training and education efforts; advanced research and development initiatives; digital and analytical innovation; and forward-thinking government and commercial partnerships. CHI is uniquely positioned as an accredited crime laboratory recognized as a criminal justice agency by the State of Texas, as well as a research and education Center operating within a university system.

CHI's primary operational mission is to assist investigations seeking to provide answers for victims, their families, and the community; to develop investigative leads to assist in resolving criminal cases; and to provide information that may exculpate individuals who have been wrongly associated with crime scene evidence. By continuing to pursue advanced technologies and solutions, more cases can be assisted and even decades-old cases may be resolved.

What CHI Does

- Perform forensic genetic analyses and anthropological examinations to support criminal investigations and missing and unidentified persons identifications
 - Reduce casework backlog, particularly sexual assault cases, for the State of Texas
 - Interpret casework
 - Provide testimony support
- Provide expert consultation
- Manage the Texas Missing Persons DNA Database
 - CHI processes the United States' majority of missing persons and family reference DNA profiles that reside within CODIS.
- Manage local CODIS Operations
- Improve forensic identification capabilities through an innovative research and development unit
- Train students and medicolegal professionals in various aspects of forensic genomics
- Train and enhance DNA testing and database capabilities in Central America
- Serve the State of Texas on various initiatives/task forces
 - Texas Governor's Sexual Assault Survivor Task Force
 - State of Texas Human Trafficking Prevention Task Force
 - Texas Forensic Science Commission (2 commissioners)
 - Texas Attorney General's Unresolved (Cold) Case Task Force
- Manage the National Missing and Unidentified Persons System (NamUs) for the US Department of Justice (through September 30, 2021)
 - CHI's decades-long missing persons work will continue after the transition of NamUs

CHI Units

- Evidence
- Forensic Anthropology
- Forensic (DNA)
- Missing Persons
- CODIS
- Research & Development
- NamUs – Transitioning on October 1, 2021
- Information, Development, Engineering and Analytics (IDEA) – Starting formally on September 1, 2021

As an accredited criminal justice agency, CHI and its scientists must comply with all technical laboratory qualifications of the ANSI National Accreditation Board (ANAB). The Texas Forensic Science Commission (TFSC) licenses the analysts and technicians of the laboratory for the State of Texas and relies on ANAB for the accreditation process of the laboratory. Our operational laboratories are located on secure-access floors and access to the testing laboratories themselves is limited strictly to authorized personnel.

Federal Funding

<i>U.S. Department of Justice, National Institute of Justice</i>			
Project	Award Number	Award Period	Amount
FY2018 Forensic DNA Laboratory Efficiency Improvement and Capacity Enhancement Program: Backlog Reduction of Missing Persons' Samples	2018-DN-BX-0198	01/01/2019 – 06/30/2021	\$2,260,781
Dense DNA Data for Enhanced Missing Persons Identification	2019-DU-BX-0046	01/01/2020 – 12/31/2021	\$743,927
Better Algorithms and Chemistry for Mixture Interpretation, Award Number	2018-DU-BX-0177	01/2019 – 06/30/2021	\$694,525
FY2019 Capacity Enhancement and Backlog Reduction Program	2019-DN-BX-0087	01/01/2020 – 12/31/2021	\$477,688
Efficient and Effective SNP System for Analysis of Highly Degraded DNA Samples	2020-DQ-BX-0005	01/01/2021 – 12/31/2022	\$444,723
COPS Grant: Best Practices for Cold Case Investigations in American Indian and Alaska Native Jurisdictions	2020-HE-WXK001	08/01/2020 – 07/31/2022	\$399,902
Interpretation of Y Chromosome STRs for Missing Persons Cases	2020-DQ-BX-0018	01/01/2021 – 12/31/2021	\$198,362
Genetic Distance to Improve Human ID from Skin Microbiome	2020-R2-CX-0046	01/01/2021 – 12/31/2022	\$81,058
National Missing and Unidentified Persons System (NamUs)	2016-MU-BX-K007	02/01/2021 – 09/30/2021	\$3,341,165
		10/01/2020 – 09/30/2021	\$4,288,461
	VOCA/Tribal	10/01/2020 – 09/30/2021	\$100,000
<i>U.S. Department of State, Bureau of International Narcotics and Law Enforcement Affairs (INL)</i>			
Project	Award Number	Award Period	Amount
Reducing Human Trafficking Through Forensics in Central America (Panama/Costa Rica)	S-INLEC-19-GR-0383	04/22/2021 – 03/29/2023	\$7,000,000
		09/01/2019 – 04/30/2021	\$3,500,000
Reducing Human Trafficking Through Forensics in Central America (Guatemala, El Salvador, Honduras)	S-INLEC-19-GR-0383	07/15/2021 – 07/15/2023	\$9,999,222
		07/15/2020 – 07/15/2021	\$3,500,000

State Funding

Project	Sponsor Number	Award Period	Amount
Forensic Genetic Research and Education: Prevention of Human Trafficking		09/01/2020 – 08/30/2021	\$5,000,000
Strategy: DNA Laboratory		09/01/2020 – 08/30/2021	\$2,895,646
Rape Kit Testing: DNA Analysis of Sexual Assault Evidence	405-17-P012859	09/01/2020 – 08/30/2021	\$2,500,000
Texas Missing Persons and Human Identification Program		09/01/2020 – 08/30/2021	\$923,700

Additional Funding

Project	Number	Award Period	Amount
Signature Science, LLC Project		07/02/2018 – 10/03/2021	\$451,419.45
Thermo Fisher Scientific LifeTech		08/2021 – 12/31/2022	\$94,000
NTT Data Project	PSC-18-080	09/01/2020 – 08/31/2021	\$11,633

The CHI Team



Leadership

Dr. Bruce Budowle, Executive Director
Dr. Michael Coble, Associate Director
Dr. Jianye Ge, Associate Director



Forensic Unit

2 Technical Leaders, 8 Analysts, 5 Technicians



Missing Persons Unit

1 Technical Leader, 1 Assistant Technical Leader,
7 Analysts, 5 Technicians



CODIS Unit

1 Administrator, 1 Alternate Administrator,
1 Data Analyst



Forensic Anthropology Unit

1 Director, 1 Associate Director,
2 Forensic Anthropologists



Research and Development Unit

6 Faculty, 1 Laboratory Manager, 2 Post-Doc
Research Scientists, 5 Research Staff,
1 Bioinformatician, 1 PhD student,
1 INL International Coordinator



Administration

2 Records Management, 1 Legal Director,
1 Communication Director, 1 Quality Manager,
1 Deputy Quality Manager, 3 Operations,
6 IT Development



Evidence Unit

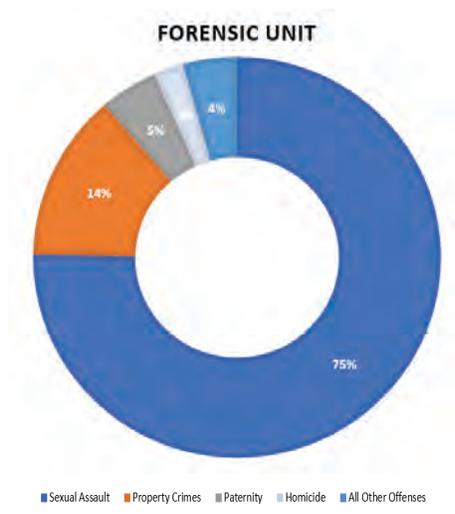
Law enforcement agencies submit evidence from criminal and missing and unidentified persons cases directly to CHI for appropriate forensic testing to be performed. The integrity of the evidence is maintained in every case by strict security and quality assurance standards at every step of the evidentiary chain of custody.

All evidence submission forms for biological screening, anthropological analysis, and/or DNA testing of evidence are first reviewed by our Evidence Specialists to confirm the integrity of the packaging, and that the evidence meets the criteria for acceptable samples outlined in our policies.

The Evidence Unit Manager is Hector Saenz.

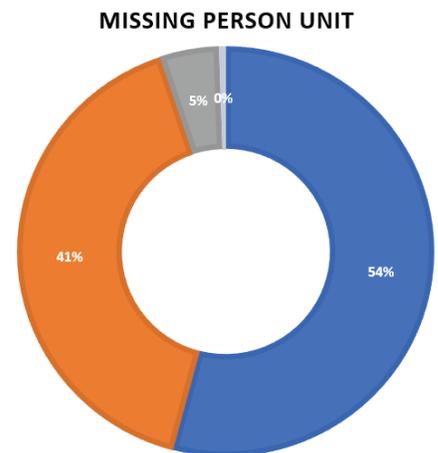
Accessioned Evidence

Forensic Unit	Cases
Sexual Assault	970
Property Crimes	174
Paternity	59
Homicide	31
Other	23
Aggravated Robbery	16
Aggravated Assault	9
Robbery	6
Assault	1



Time period: 07/01/2020 - 06/30/2021

Missing Persons Unit	# of Cases
Family Reference Sample (FRS)	518
Unidentified Human Remains (UHR)	390
Direct Reference Sample (DRS)	44
Unidentified Living Person (ULP)	5



■ Family Reference Samples (FRS) ■ Unidentified Human Remains (UHR)
 ■ Direct Reference Samples (DRS) ■ Unidentified Living Person (ULP)

Forensic anthropologists analyze skeletal remains to assist in human identification and/or determining the cause and manner of death.

The Forensic Anthropology Unit provides services to state and local law enforcement agencies, medical examiners, coroners, and Justices of the Peace. Analysis of skeletal remains can include the assessment of forensic significance; the creation of estimated biological profiles; comparisons with medical/dental records to support personal identifications; and the investigation of trauma to the remains.

CHI forensic anthropologists also support Texas law enforcement agencies by assisting with the search for, excavation, and field recovery of a site, ensuring the proper documentation and integrity of the remains.

The Forensic Anthropology Unit Director is Dr. Harrell Gill-King.

Forensic Anthropology Unit

Total Cases Analyzed	197
Cases determined to be medicolegally significant	139
Cases determined to be non-human and not medicolegally significant	52
Cases determined to be human, but archeological/historical remains	6

Time period: 07/01/2020 - 06/30/2021

4

Field Searches and/or Recovery Efforts Assisted by Forensic Anthropology Unit in FY2021.

Forensic Unit

The Forensic Unit provides biological screening and DNA testing services for evidence submitted by law enforcement agencies seeking assistance with criminal investigations. Using state-of-the-art methods, CHI forensic technologists and analysts process evidence from cases ranging from homicide and sexual assault to property crimes. The generated DNA profiles are used to include or exclude an individual as a potential contributor of an evidence item. These profiles can provide answers to investigative questions and offer insight for investigators into the events that may have taken place at a crime scene.

Through state funding, the Forensic Unit assists the Texas Department of Public Safety (DPS) in reducing the backlog of sexual assault cases in Texas. In addition, the Forensic Unit receives federal funding from the US Department of Justice's (DOJ) National Institute of Justice (NIJ) to process cases within the State of Texas. These funds enable the Unit to provide DNA testing services (i.e., autosomal and Y chromosome STR typing) to law enforcement in several North Texas counties at no charge to the agencies.

Our forensic DNA analysts are also called upon to give expert testimony in criminal cases on the forensic testing performed in a specific case, as well as general forensic DNA principles and processes. As it impacted so many other areas, in the past year the COVID-19 pandemic caused the temporary shutdown of Texas state courts, creating a trial backlog which will likely demand a very active testimony schedule for our analysts in the coming months.

In addition to standard casework analyses and comparisons, specialty testing services, such as forensic paternity and kinship analyses, are provided to law enforcement agencies statewide.

The Forensic Unit Technical Leaders are Christina Capt and Melissa Haas.



Completed Cases: 1376



1165

Sexual Assault



71

Property Crimes



57

Forensic Paternity



35

Homicide



29

Robbery



13

Other



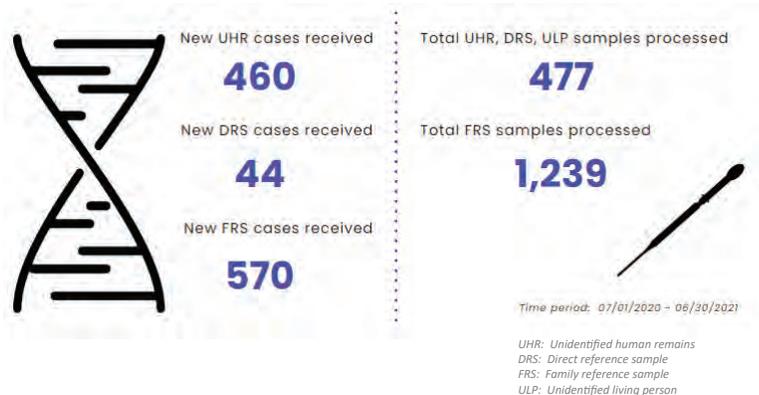
6

Assault

Completed cases include testing of the evidence and a report issued to the law enforcement agency.

Time period: 07/01/2020 - 06/30/2021

Missing Persons Unit



Medical examiners and other medicolegal authorities across the country are routinely challenged with determining the identity of discovered human remains; over time the sheer number of unidentified waiting for identification has resulted in a silent mass disaster. These long-term “Jane” or “John Doe” cases are often referred to as “cold,” however, from the CHI perspective they simply are unresolved, awaiting assistance.

The Missing Persons Unit provides DNA testing (i.e., autosomal and Y chromosome STR typing and mitochondrial DNA (mtDNA) sequencing) of biological evidence related to the identification of missing and unknown persons. In addition, the Unit provides mtDNA sequencing of hair evidence related to Texas criminal investigations. To assist in the identifications of the missing and unidentified persons, the unit generates and compares DNA profiles from direct reference samples (DRS) and/or family reference samples (FRS) from family members of missing persons to those obtained from the unidentified human remains (UHR).

As custodian of the Texas Missing Persons DNA Database for almost two decades, CHI has long been committed to assisting in solving these cases. Funding through the State of Texas and the NIJ has allowed CHI to assist in thousands of missing and unidentified persons cases across the country. It is through this unit that DNA profiles are developed which can support identification of individuals who have been missing recently, as well as for decades, bringing resolution to family and friends. To date, CHI has processed the majority of the genetic profiles for unidentified human remains and family references that reside within CODIS for the United States.

The Missing Persons Unit Technical Leader is Dixie Peters.

CODIS Unit

The Combined DNA Index System (CODIS) is the FBI's support program for criminal justice DNA databases, enabling federal, state, and local forensic laboratories to share and compare suspect DNA profiles electronically, allowing agencies to link evidence from violent crime scenes to known offenders and to link evidence from different cases.

Access to this system created the game-changing ability for law enforcement agencies to compare evidence from cases occurring in their own jurisdictions directly to other cases around the nation, as well as on an international level.

CODIS' National DNA Index System (NDIS) also assists law enforcement in the investigation of missing and unidentified persons cases. The DNA profiles available for comparison in NDIS include direct reference samples (DRS), taken from the missing person, samples from unidentified human remains (UHR), and family reference samples (FRS), taken from family members of the missing person.

CHI is a CODIS participating laboratory that maintains and administers a local CODIS database, assisting with both violent crime and missing and unidentified persons investigations. DNA profiles generated by CHI's Forensic Unit scientists are uploaded to CODIS from forensic casework, including sexual assault, homicide, robbery, aggravated assault, burglary, theft, and other violent crime. Associations made through CODIS searches provide investigative leads for law enforcement agencies – 4,101 have been made through CHI's forensic casework submissions to date.

Through the long-time work of its Missing Persons Unit, CHI has current ownership of more than half the DNA specimens in the national CODIS missing persons indices. To date, 3,275 associations have been reported to the submitting agencies from this information.

The CODIS Unit Technical Leader is Melody Josserand.

Forensic Unit

816 Profiles entered into CODIS

373 CODIS hits

Time period: 07/01/2020 - 06/30/2021

Missing Persons Unit

348 UHR profiles entered into CODIS

1,117 FRS profiles entered into CODIS

205 CODIS associations

Time period: 07/01/2020 - 06/30/2021

Research and Development Unit

CHI is rather unique in that in addition to maintaining an operational crime laboratory it has a robust Research and Development Unit. The Research and Development Unit allows CHI to pursue cutting-edge technologies and solutions in genomics and in particular for enhancing forensic genomics.

CHI active research efforts support the service work done at CHI and the missions of HSC. Current projects underway within the unit include advanced bioinformatics software development, microbial forensics, human and wildlife trafficking prevention, exploring advanced genome applications, forensic DNA interpretation tools and strategies, and improving capabilities to analyze highly degraded DNA samples. CHI researchers collaborate substantially with scientists around the world and thus are involved in a number of international efforts.

In the past decade, CHI has published approximately two hundred peer-reviewed publications related to forensic genetics in human identification, microbial forensics, molecular autopsy, to name a few. In FY2021, CHI researchers produced 29 peer-reviewed papers:

Analytics

Reducing noise and stutter in short tandem repeat loci with unique molecular identifiers, **August Woerner, Sammed Mandape, Jonathan King, Melissa Muenzler, Benjamin Crysup, Bruce Budowle**, *Forensic Science International: Genetics* 51:102459, 2020.

Exploring the advantages of amplifying the entire extract versus splitting the extract and interpreting replicates using a continuous model of interpretation, T. Bille, **Michael Coble**, J.A. Bright, *Australian Journal of Forensic Sciences*, doi:10.1080/00450618.2021.1882568, 2021.

ProDerAI: reference position dependent alignment, **Benjamin Crysup, Bruce Budowle, August Woerner**, *Bioinformatics*, doi:10.1093/bioinformatics/btab008, 2021.

A novel approach for visualization and localization of small amounts of DNA on swabs to improve DNA collection and recovery process, E. Kitchner, J. Chavez, L. Ceresa, **Magdalena Bus, Bruce Budowle**, Z. Gryczynski, *Analyst* 146(4):1198-1206, 2021.

Fractionation of DNA and protein from individual latent fingerprints for forensic analysis, K.Q. Schulte, F.C. Hewitt, T.E. Manley, A.J. Reed, M. Baniasad, N.C. Albright, M.E. Powals, D.S. LeSassier, A.R. Smith, L. Zhang, L.W. Allen, B.C. Ludolph, K.L. Weber, **August Woerner**, M.A. Freitas, M.W. Gardner, *Forensic Science International: Genetics* 50:102405, 2020.

Informatics

STRait Razor Online: An enhanced user interface to facilitate interpretation of MPS data, **Jonathan King, August Woerner, Sammed Mandape, Kapema Bupe Kapema**, R.S. Moura-Neto, R. Silva, **Bruce Budowle**, *Forensic Science International: Genetics* 52:102463, 2021.

Graph Algorithms for Mixture Interpretation, **Benjamin Crysup, August Woerner, Jonathan King, Bruce Budowle**, *Genes (Basel)*, 12(2): 185, 2021.

Are low LR's reliable? J.S. Buckleton, S.N. Pugh, J.A. Bright, D.A. Taylor, J.M. Curran, M. Kruijver, P. Gill, **Bruce Budowle**, K. Cheng, *Forensic Science International: Genetics*, 49:102350, 2020.

Kinship

Linkage and disequilibrium among the markers in the forensic MPS panels, R. Li, **Bruce Budowle**, H. Sun, **Jianye Ge**, *Journal of Forensic Sciences*, doi: 10.1111/1556-4029.14724, 2021.

Forensic investigation approaches of searching relatives in DNA databases, **Jianye Ge, Bruce Budowle**, *Journal of Forensic Sciences*, 66(2):430-443, 2021.

How many familial relationship testing results could be wrong?, **Jianye Ge, Bruce Budowle**, *PLoS Genetics*, 16(8):e1008929, 2020.

Microbial Forensics

Evaluation of 16S rRNA hypervariable regions for bioweapon species detection by massively parallel sequencing, V.H. G. Dias, P. Gomes, A.C. Azevedo-Martins, B. Cabral, **August Woerner, Bruce Budowle**, R.S. Moura-Neto, R. Silva, *International Journal of Microbiology*, Vol. 2020, ID:8865520, 2020.

Population informative markers selected using Wright's fixation index and machine learning improves human identification using the skin microbiome, **Allison Sherier, August Woerner, Bruce Budowle**, *Microbial Forensics*, doi: 10.1128/AEM.01208-21, 2021.

Mitochondrial DNA

Association of whole mtDNA, an NADPH G11914A variant, and haplogroups with high physical performance in an elite military troop, C.G.M Santos, N.G. Rolim-Filho, C.A. Domingues, M. Dornelas-Ribeiro, **Jonathan King, Bruce Budowle**, R.S. Moura-Neto, R. Silva, *Brazilian Journal of Medical and Biological Research*, 54(6): e10317, 2021.

A Continuous Statistical Phasing Framework for the Analysis of Forensic Mitochondrial DNA Mixtures, **Utpal Smart, Jennifer Cihlar, Sammed Mandape, Melissa Muenzler, Jonathan King, Bruce Budowle, August Woerner**, *Genes (Basel)*, 12(2):128, 2021.

MMDIT: A tool for the deconvolution and interpretation of mitochondrial DNA mixtures, **Sammed Mandape, Utpal Smart, Jonathan King, Melissa Muenzler, Kapema Bupe Kapema, Bruce Budowle, August Woerner**, *Forensic Science International: Genetics*, Epub 06 Aug 2021, Vol 55, 102568, 2021.

Developmental Validation of a MPS Workflow with a PCR-Based Short Amplicon Whole Mitochondrial Genome Panel, **Jennifer Cihlar**, C. Amory, R. Lagacé, C. Roth, W. Parson, **Bruce Budowle**, *Genes (Basel)*, 11(11):1345, 2020.

Mitochondrial DNA and NUMT Sequences Amplified with the Precision ID mtDNA Whole Genome Panel, **Jennifer Churchill Cihlar**, C. Strobl, R. Lagace, **Melissa Muenzler**, W. Parson, **Bruce Budowle**, *Mitochondrion*, 55:122-133, 2020.

Numt identification and removal with RtNI, **August Woerner, Jennifer Cihlar, Utpal Smart, Bruce Budowle**, *Bioinformatics*, 36(20):5115-5116, 2020.

Mixture Analysis

Enhanced mixture interpretation with macrohaplotypes based on long-read DNA sequencing, **Jianye Ge, Jonathan King, Sammed Mandape, Bruce Budowle**, *International Journal of Legal Medicine*, DOI: 10.1007/s00414-021-02679-9, 2021.

Population Data/Genetics

Genetic study with autosomal STR markers in people of the Peruvian jungle for human identification purposes, C.D. Nevra-Rivera, R.E. Delgado, S.F. Diaz, R.J.S. Quispe, **Jianye Ge, Bruce Budowle**, *Canadian Society of Forensic Science Journal*, 54(3):117-138, 2021.

Autosomal STR and SNP characterization of populations from the Northeastern Peruvian Andes with the ForenSeq™ DNA Signature Prep Kit, E.K. Guevara, J.U. Palo, **Jonathan King, Magdalena Buś**, S. Guillén, **Bruce Budowle**, A. Sajantila, *Forensic Science International: Genetics*, 52:102487, 2021.

Allelic frequencies with 23 Autosomic STRs in the Aymara population of Peru, C.D. Neyra-Rivera, A. Arenas Ticona, E. Ramos Delgado, M. Velasquez Reinoso, **Bruce Budowle**, *International Journal of Legal Medicine*, 135(3): 779-781, 2021.

Population genetic study of a Peruvian population using human identification STRs, C.D. Neyra Rivera, E. Ramos Delgado, C.S. Robles Mamani, M. Velasquez Reinoso, O.A. Caceres Rey, **Bruce Budowle**, *International Journal of Legal Medicine*, 134(6): 2071-2073, 2020.

Genetic assessment reveals no population substructure and divergent regional and sex-specific histories in the Chachapoyas from northeast Peru, E.K. Guevara, J.U. Palo, S. Översti, **Jonathan King**, M. Seidel, M. Stoljarova, F.R. Wendt, **Magdalena Bus**, A. Guengerich, W.B. Church, S. Guillén, L. Roewer, **Bruce Budowle**, A. Sajantila, *PLoS One*, 15(12):e0244497, 2020.

Trafficking

International Wildlife Trafficking: A perspective on the challenges and potential forensic genetics solutions, **Utpal Smart, Jennifer Cihlar, Bruce Budowle**, *Forensic Science International: Genetics*, 54:102551), 2021.

A standalone humanitarian DNA identification database system to increase identification of human remains of foreign nationals, **Bruce Budowle, Magdalena Bus, Melody Josserand, Dixie Peters**, *International Journal of Legal Medicine*, 134(6):2039-2044, 2020.

Validation

Reverse complement-PCR, an innovative and effective method for multiplexing forensically relevant single nucleotide polymorphism marker systems, **Magdalena Bus, E.A. de Jong, Jonathan King, W.V. der Vliet, J. Theelen, Bruce Budowle**, *BioTechniques*, doi: 10.2144/btn-2021-0031, 2021.

Evaluation of Promega PowerSeq™ Auto/Y systems prototype on an admixed sample of Rio de Janeiro, Brazil: Population data, sensitivity, stutter and mixture studies, R. Moura-Neto, **Jonathan King, I. C. Mello, V. H. G. Dias, Benjamin Crysup, August Woerner**, et al, *Forensic Science International: Genetics*, 53:102516, 2021.

Magazine Articles

PG software and the courts: the verdict so far, **Bruce Budowle**, *The Prosecutor*, 55(1):8-12, 2021.

Probabilistic genotyping software has helped forensic labs close more cases and exonerate individuals wrongly accused of a crime, **Bruce Budowle**, *Route Fifty*, 24 Feb 2021

Checking the Evidence, **Michael Coble**, *Sheriff and Deputy Magazine*, May/June 2021.

Probabilistic Genotyping in the Forensic Lab, **Michael Coble**, *Lab Manager Magazine*, 30 Mar 2021.

“Breakthrough” Technology Improves DNA Analysis in Cold Cases, Sex Crimes, **Michael Coble**, *The Crime Report*, 24 Dec 2020.

Probabilistic genotyping in forensic DNA analysis, **Bruce Budowle**, *American County & City*, 30 Nov 2020.

Probabilistic genotyping: the forensic lab software used to crack cold cases, **Bruce Budowle**, *SelectScience*, 11 Nov 2020.

Book Chapters

Summary of forensic DNA kinship testing and the promise of genome age technology to improve processes, *Recent Progress on Forensic Sciences and DNA Transfer*. **Bruce Budowle**, *Laboratoire d’Hématologie Médico-Légale, Bordeaux, France*, pp. 6-15 and 101-109, 2021.

Silent Witness: Forensic DNA Evidence in Criminal Investigations and Humanitarian Disasters. (H. Erlich, E. Stover, and T.J. White, eds.), *Oxford University Press*, 2020.

- *Microbial Forensics: Concepts and Application from Epidemiology to Crime Investigations*. A. Sajantila, and **Bruce Budowle**.
- *Analysis of Forensic Mixtures*, **Michael Coble, Bruce Budowle**, H. Erlich.

Patent Submissions

Forensic DNA mixture interpretation with single-cell profiling, **Jianye Ge, Bruce Budowle, Jonathan King, Amy Smuts**

Macrohaplotypes for forensic DNA mixture deconvolution, **Jianye Ge, Bruce Budowle, Jonathan King, Sammed Mandape**

National Missing and Unidentified Persons System NamUs

Since 2011, CHI has managed for the US DOJ's NIJ the NamUs program, which consists of a central online repository of information related to missing and unidentified person cases that supports law enforcement, medical examiners, coroners, and the general public.

The NamUs program will transition to another organization on October 1, 2021.

4,336

NamUs Missing
Person cases resolved.

592

NamUs Unidentified
Person cases resolved.

204

Namus Unclaimed
Person cases resolved.

Time period: 07/01/2020 - 06/30/2021

6,307

New Missing Person
cases reported to
NamUs.

913

New Unidentified
Person cases reported
to NamUs.

2,423

New Unclaimed
Person cases reported
to NamUs.

Time period: 07/01/2020 - 06/30/2021

To better support investigative and training efforts, CHI is developing multiple digital and information solutions. In partnership with the US Department of State's Bureau of International Narcotics and Law Enforcement Affairs (INL), CHI is developing an advanced information system to support the identification of missing persons and prevention of human trafficking in five Central American countries. This project is designed to create a technological and medicolegal framework through which the countries can share information within and across international borders to identify missing persons; develop effective methods to collect and analyze relevant information in support of investigations; and engage stakeholders to support the program's long-term sustainability.

Additional projects include the development of learning technologies to aid in the training of forensic professionals and provide education on human trafficking. Virtual reality (VR) technology is being utilized to provide more impactful learning and experiences. For example, a forensic professional will learn and practice common procedures in a virtual DNA lab; another VR tool will allow law enforcement and others agencies involved in preventing human trafficking to experience examples of grooming and recruitment often used on victims by traffickers. The efficacy of these VR modules will be assessed to measure learning, empathy and understanding of the content, and to inform future VR efforts.

The possibilities for digital and information innovation to address challenges confronted by the State of Texas cannot be overstated. To embrace these new opportunities and challenges, CHI has created its first IDEA Unit, which begins operations on September 1, 2021. This newly formed interdisciplinary team consists of professionals with expertise in a variety of technologies and investigative fields, including development of missing and unidentified persons systems, learning technology, data analytics, research, and evaluation.

Future projects will focus on the development of specialized reporting systems, creation of an unresolved cases system, and evaluation of human trafficking victimization.

The IDEA Unit Chief is Lynley Dungan.

Information, Development, Engineering and Analytics (IDEA) Unit

Presentations in the COVID Age

Many conferences and events in all fields were postponed in the past year due to public health concerns. The presentations CHI experts were asked to give moved online to virtual audiences, where the discussion of these critical issues persevered.

Bruce Budowle

“Advances in forensic DNA technologies”, Canadian Society of Forensic Science Meeting, 2021.

“A project to combat human trafficking in Latin America”, XI International Congress of Legal Medicine and Forensic Sciences: Challenges for Forensic Sciences during the COVID-19 Pandemic, 2020.

With Magdalena Bus, “Combating human trafficking with DNA analysis, DNA databases, legislation, policy, privacy protection, and public outreach”, 7th Annual Human Identification Solutions Conference (HIDS), 2021.

Michael Coble

“Probabilistic Genotyping: A Paradigm Shift in Forensic DNA Mixture Interpretation”, South African Academy of Forensic Sciences, 2021.

“DNA in human identification” and “What’s done cannot be undone: The potential of forensic DNA testing”, 5th Lagos Forensic Symposium, 2021.

With T. Bille, J. Bright, “Exploring the advantages of amplifying the entire extract versus splitting the extract and interpreting replicates using a continuous model of interpretation”, 7th Annual Workshop on STRmix™ Implementation and Casework Approach, 2021.

“Probabilistic Genotyping”, Minnesota Public Defenders, 2021.

“Probabilistic Genotyping, the LR and Bayes Theorem” and “Black Box or Expert-Software Pair”, AAFS 73rd Annual Scientific Meeting, 2021.

“Probabilistic Genotyping and PopStats: Future Possibilities”, 2020 Virtual CODIS Conference panel, 2020.

“Probabilistic Genotyping: Legal Issues”, “Likelihood Ratios” and “Probabilistic Genotyping”, Prosecuting the Forensic Science Case Webinar Series, DOJ National Advocacy Center, 2020.

“Arguing the Case for DNA Evidence Based on Probabilistic Genotyping”, 31st International Symposium on Human Identification, 2020.

“An Introduction to Probabilistic Genotyping, Thermo Fischer Scientific Webinar, 2020.

“Likelihood Ratios and Probabilistic Genotyping Unpacked: The Future of DNA Mixture Interpretation”, North Carolina Conference of District Attorneys, 2020.

Jianye Ge

“Generating Investigative Leads with Alternative Database Search Approaches”, Forensic Magazine, 2021.

“Introduction to Forensic Genomics”, Chinese Genomics Meetup, 2021.

Dawn Boswell

“Conviction Integrity Units: Reforming Post-Conviction Reviews”, Tarrant County Criminal Defense Lawyers Association, 7th Annual Death Penalty Defense 2021.

“Understanding DNA Reports”, Bureau of Justice Assistance’s Upholding the Rule of Law and Preventing Wrongful Convictions Program, Quattrone Center for the Fair Administration of Justice, 2021.

“Testifying from ‘the COVID box’”, Covid-19 Emerging Issues: Remote Testimony, Forensic Technology Center of Excellence, ASCLD, 2021.

With Michael Coble, “Bayes & LR – ‘The Denzel Washington School of Statistics’: Advanced Topics in Probabilistic Genotyping”, Association of Forensic DNA Analyst and Administrators Association Spring Workshop, 2021.

Linda LaRose

“The HSC Center for Human Identification: An Overview”, Byron Nelson High School, 2021.



The CHI Mission

To provide quality service through accurate and timely DNA test results, forensic anthropology and investigative support to law enforcement, medicolegal agencies and all stakeholders throughout the State of Texas, the USA and internationally. The Center for Human Identification is dedicated to research, education, training and the development of new technologies.

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