

Promega | *Powered for 34 years*

ISHI INTERNATIONAL SYMPOSIUM ON HUMAN IDENTIFICATION

DENVER, CO | SEPTEMBER 18-21, 2023

November 2022

The ISHI Report

News from the World of DNA Forensics

Start Reading

What's inside:

Introduction

Letter from our Editorial Board

The 33rd International Symposium on Human Identification: The Past, Present and Future of Investigative Genetic Genealogy

In the Bones: How DNA Identification Helps to Bring Closure to Families of Migrants Missing on the U.S.-Mexico Border

Catching Up With Olivia McCarter: Genealogy with 'Moxie'

'Baby Alpha Beta' and the Birth of Investigative Genetic Genealogy

The Power of 8-Color: More Data from Every Amplification

Forensic Scientist of Note: Meet Kelly the Scientist

2023 Calendar of Events



The ISHI Report

Letter from the Editor

It's hard to believe that 2022 is drawing to a close, yet a glance out the window in Wisconsin confirms that winter is indeed around the corner. Here's hoping that the articles gathered in this edition of the ISHI Report provide a hint of warmth and opportunity to appreciate the dedication and perseverance of the forensic professionals who contributed to the Report.

We start out with a recap of the 33rd International Symposium on Human Identification from first time attendee, Jordan Nutting. She shares her impression of the symposium including highlights from the general session talks, workshops and social activities. This year's symposium was both educational and a lot of fun. If you weren't able to attend this year, make sure to mark your calendar for ISHI 34. The venue will be Denver, Colorado. Conference dates are September 18-21, 2023. Workshop proposals are being accepted now through the official symposium website, www.ishinews.com

Author and Pulitzer Prize winning journalist Ed Humes provides a sneak peek at his recently released book, The Forever Witness. This true story details how Investigative Genetic Genealogy was employed by CeCe Moore to solve a double murder of two young lovers that had been cold for decades. The book is fascinating and provides a behind the scenes look at how this powerful technology was first deployed. Ed and CeCe shared behind the scenes details on the case during a table topic presentation at ISHI.

We check in with Kelly Knight, also known as *Kelly the Scientist* who was interviewed for this issue. A forensic scientist and educator, Knight is working to break down barriers for women and especially women of color who would like to enter the sciences. Kelly talks about finding mentors, staying focused, leading with authenticity and appreciating your own unique gifts.

Guest contributor Rebekah Zemansky chronicles the efforts of various agencies struggling to identify the remains of migrants who perish during border crossings. Their work is made more difficult by a lack of government records, distrust of governmental authorities and the poor sample quality of many remains from exposure to the elements.

MOXXY Forensic Investigations is the name of a new start up formed by the team of young women including recent ISHI Student Ambassador, Olivia McCarter. Their success is further proof of the power of investigative genetic genealogy to solve previously unsolvable cold cases. We wish them success in their endeavors.

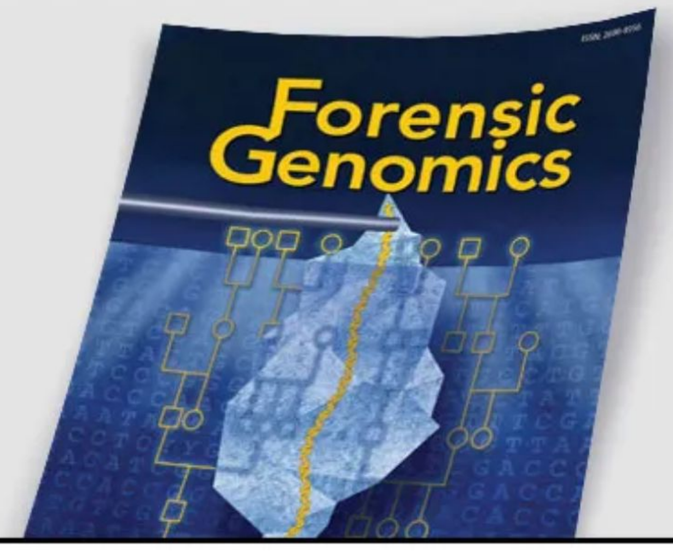
As always, we hope your enjoy this ISHI Report. Feel free to contact the editorial board with ideas for future topics, or to contribute an article. It's our hope that the remaining days of 2022 bring you good health and joy. See you in 2023.

The Editorial Board

Contact ISHI

Get a discounted rate on *Forensic Genomics*!

Sign Up Now





The 33rd International Symposium on Human Identification

The Past, Present and Future of Investigative Genetic Genealogy

Jordan Nutting, Promega

Share this article

If a database represents about 1% of a population, the probability of finding a third cousin match is 90%

GEDmatch and FTDNA have a combined total of nearly 3M profiles for UHR identification

That's a 90% chance of solving your case

By contrast, the hit rate in CODIS is 30%

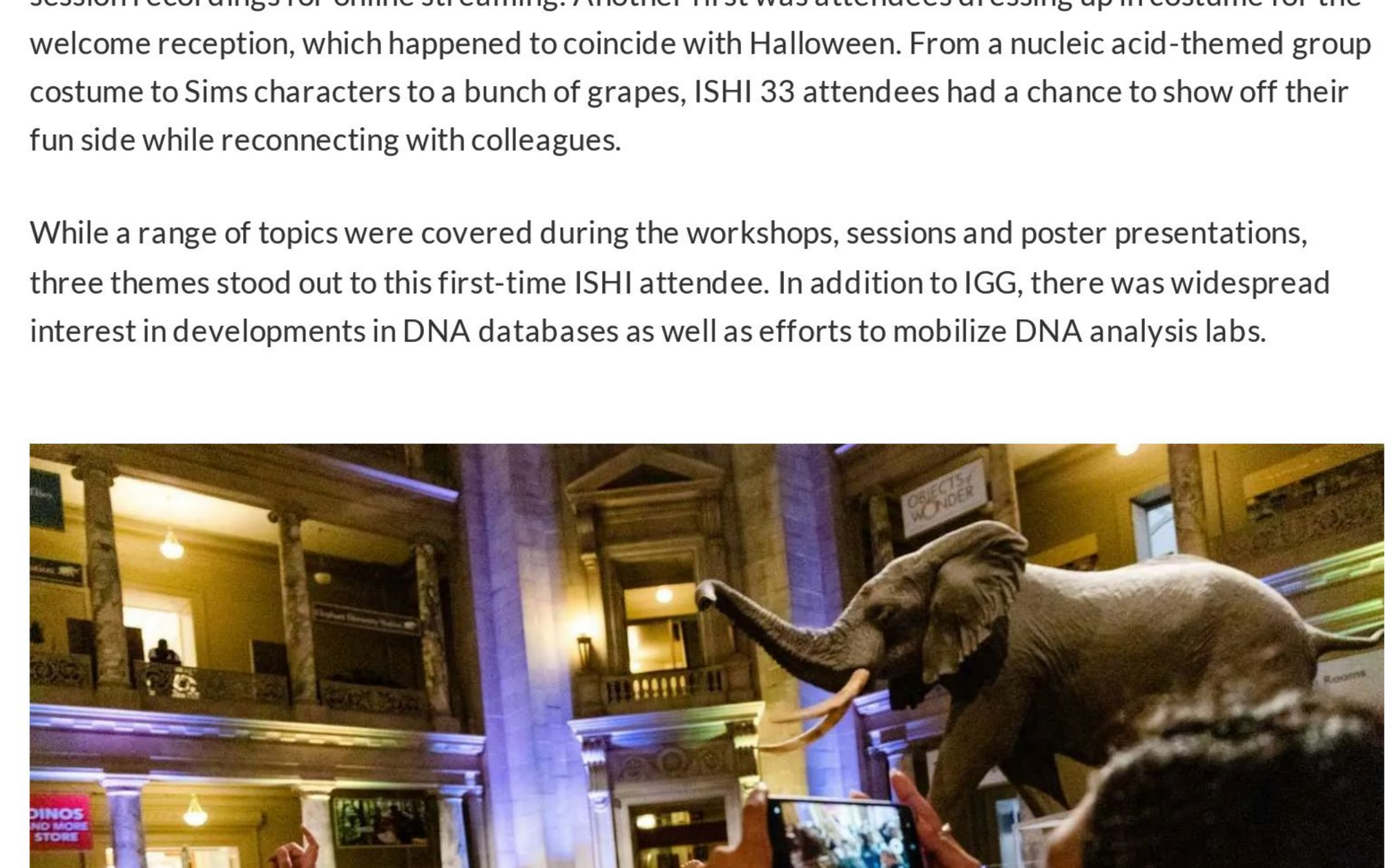
Learn how to get a guaranteed uploadable profile today

VEROGEN GENE BY GENE

It's hard to imagine a better way to celebrate the 33rd International Symposium of Human Identification than a night spent wandering through the Hall of Human Evolution at the Smithsonian Museum of Natural History. The meeting, which took place in Washington D.C. from October 31–November 4, focused largely on using investigative genetic genealogy (IGG). When used to identify human remains or solve cold cases, IGG (a.k.a. forensic genetic genealogy or forensic investigative genetic genealogy, take your pick) relies heavily on techniques developed to sequence DNA from ancient human remains.

New to ISHI this year were live-streamed presentations, building off the success of last year's session recordings for online streaming. Another first was attendees dressing up in costume for the welcome reception, which happened to coincide with Halloween. From a nucleic acid-themed group costume to Sims characters to a bunch of grapes, ISHI 33 attendees had a chance to show off their fun side while reconnecting with colleagues.

While a range of topics were covered during the workshops, sessions and poster presentations, three themes stood out to this first-time ISHI attendee. In addition to IGG, there was widespread interest in developments in DNA databases as well as efforts to mobilize DNA analysis labs.



Attendees dancing in the rotunda of the Smithsonian Museum of Natural History

The Wild West of Investigative Genetic Genealogy

IGG is a technique used to identify human remains or cold case crime scene samples by tracing potential genetic familial relationships through genealogical DNA databases One of Monday's workshops, "Investigative Genetic Genealogy: A Comprehensive Review", outlined the laboratory methods, bioinformatics tools and databases that enable IGG. Danny Hellwig (Intermountain Forensics) provided an overview of how to isolate high quantities of DNA from highly degraded samples and compared the pros and cons of different instruments—microarray, next generation sequencing and whole genome sequencing—for sequencing those samples. Kevin Lord (DNA Doe Project) discussed how bioinformatic tools help process the huge amount of data generated from sequencing and how methods like imputation help fill in gaps to prepare sequences that are high enough quality to upload to DNA databases. They emphasized that these DNA extraction and bioinformatics methods are relatively established practices that were developed originally for sequencing DNA from Neanderthals and other ancient human remains.

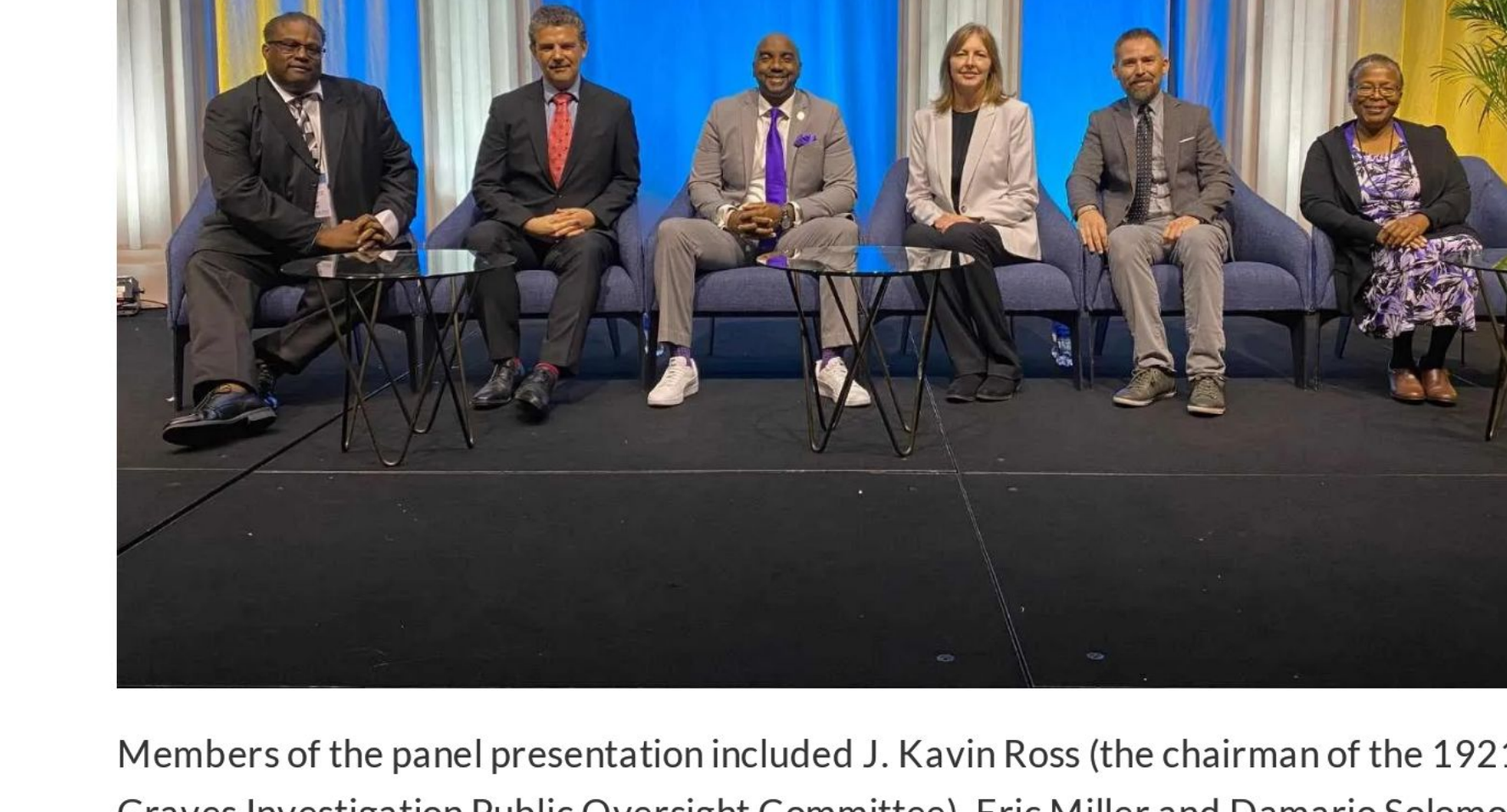
More recent updates to those techniques were on display during Ed Green's (University of Californica, Santa Cruz) Wednesday talk on extracting useable DNA from rootless hairs. By prioritizing extraction of short DNA lengths, Green showed how a rootless human hair sample can provide a similar call rate as those from saliva samples.

In contrast, using genetic information to establish familial relations and determine the identity of the original sample or unidentified remains is a recent advance for the forensics community. CeCe Moore (Parabon), Margaret Press (DNA Doe Project) and Alison Wilde (Cold Case Coalition) presented methods for carrying out these genealogical investigations, including how to use the two DNA databases that are available to law enforcement and best practices for ethical application of IGG. They emphasized the need for standard methods and approaches that will help IGG progress from what they characterized as "the Wild West."

Tuesday's keynote sessions focused on the Tulsa Race Massacre and the efforts to use IGG to identify bodies recently uncovered in an unmarked mass grave in a Tulsa, Oklahoma graveyard.

Read more about these efforts in our May issue of the ISHI Report.

DeNeen Brown, a Washington Post reporter, spoke about the history of this and other massacres committed against Black people in the United States and exhorted the audience to "afflict the comfortable and comfort the afflicted." Hellwig provided updates about Intermountain Forensics' work with unidentified remains found last summer in Tulsa's Oaklawn Cemetery. From the 14 samples, usable quantities of DNA were extracted from two teeth, but no DNA was extracted from the bones. Additional samples were collected during a second exhumation that occurred in October 2022. Work to sequence the extracted DNA and assess the new samples is underway.



Members of the panel presentation included J. Kavin Ross (the chairman of the 1921 Graves Investigation Public Oversight Committee), Eric Miller and Damario Solomon-Simmons (Justice for Greenwood), Alison Wilde and Danny Hellwig (Intermountain Forensics), and Phoebe Stubblefield (Pound Human Identification Laboratory, University of Florida)

Colleen Fitzpatrick (Identifinders International) and Nathan Scudder (Australian Federal Police) also gave talks on IGG. Fitzpatrick discussed the risks and benefits of IGG, including how IGG, which relies on single nucleotide polymorphisms (SNPs), introduces more privacy concerns than other DNA forensics tools like Y-STRs. Fitzpatrick also highlighted the legal, technical and genealogical ways IGG has evolved over its five-year history, likening the developments to the analog to digital transformation. Scudder discussed international developments in IGG and recommended that an international working group be established to ensure consistent use of IGG in the countries that adopt it as well as a guidance document that helps standardize the field.

Updates in the World of DNA Databases

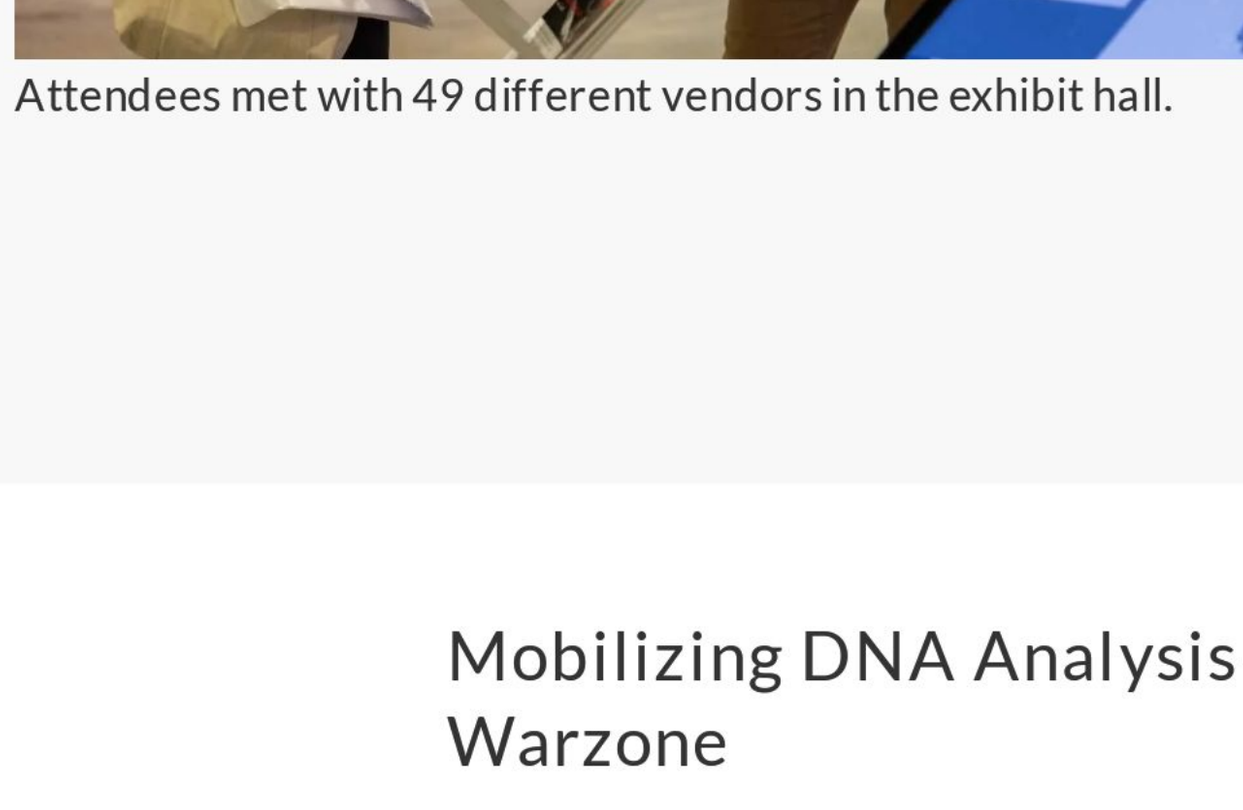
Genetic genealogical databases are a key tool for IGG, and, as such, were a major topic of discussion at ISHI 33. Multiple speakers emphasized that only two databases—GEDmatch and FamilyTreeDNA—currently allow law enforcement officers to access their data and submit samples. Because there are privacy concerns associated with DNA databases, it was emphasized that users closely follow databases' Terms of Use, and that failure to do so can jeopardize cases, public opinion and legal use of these tools. There was also informal chatter around the possibility of a database that was not owned by for-profit organizations.

François-Xavier Laurent (INTERPOL) presented a new database, I-Familia. INTERPOL developed this as an international database that allows close family members of missing persons to submit DNA for a potential match to unidentified remains. In the presentation, Laurent noted that 25% of missing persons cases have a transnational dimension, including tourism, migration and trafficking. Furthermore, the missing person's DNA is available in only 30% of cases, making direct matching impossible. I-Familia, which uses STR loci, is now used in 68 countries and has helped make three confirmed matches and 40 pending matches. Laurent shared one example. In late 2004, an unidentified body was found in the Agean Sea. Using I-Familia, those remains were matched to an individual who had been reported missing in Italy only a few weeks before the body had been found. Laurent concluded by noting that CODIS data can be exported to I-Familia.

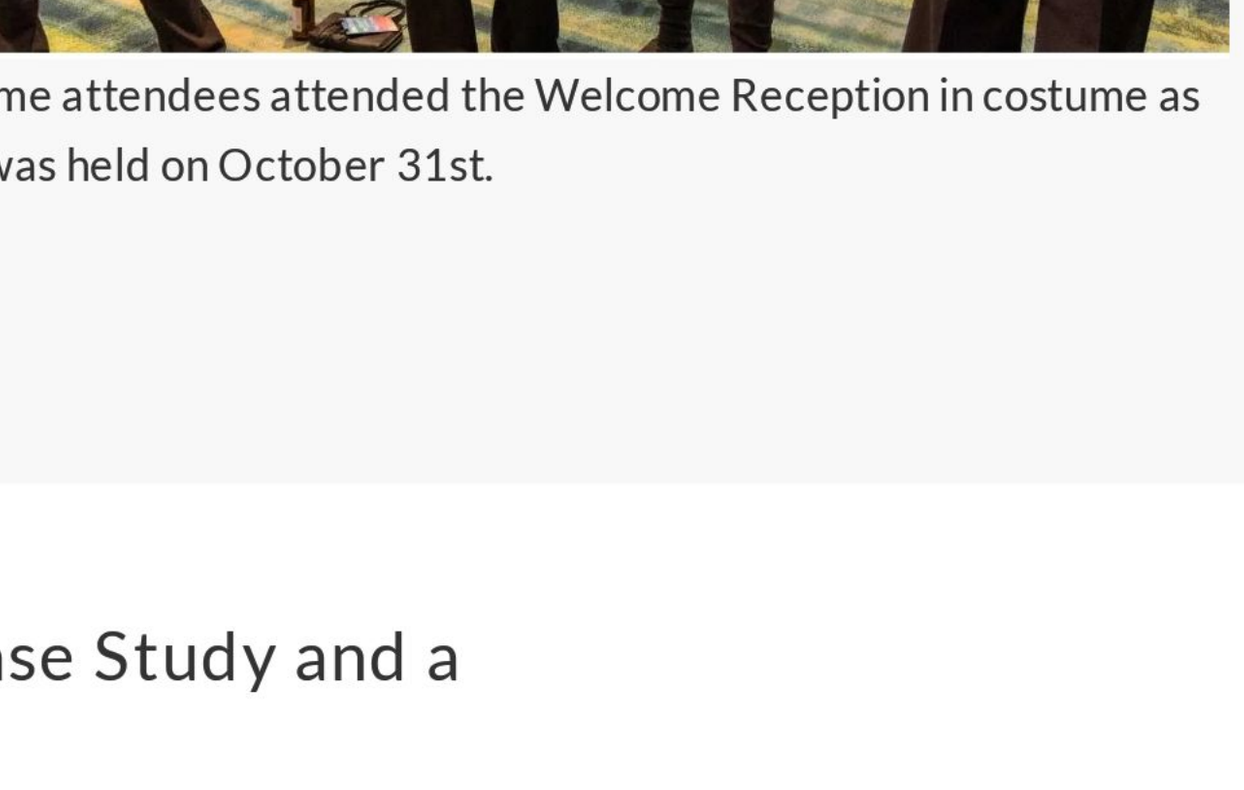
Read more details about the data analysis behind I-Familia in this peer-reviewed article.

The next day, Ray Wickenheiser (New York State Police Crime Lab System) argued for Enhanced DNA Indirect Matching (EDIM) to expand criminal DNA databases beyond direct matching capabilities. Such a database would go beyond the core CODIS loci to include search keys for Y-STRs, X-STRs, mtDNA and, perhaps, SNP data. He included a business case and ethical considerations for an expanded database.

Douglas Hares (FBI) shared how Rapid DNA technology is helping standardize DNA collection from arrestees and how Rapid DNA profiles can provide potential hits to criminal DNA databases within 24 hours of booking. Louisiana became the first state to use Rapid DNA at the booking station in April 2022. Using the platform, the state identified three hits in three weeks, one to the National DNA Index (NDIS) and two to the DNA Index of Special Concern (DISC). Work is underway to determine potential improvements to help Rapid DNA meet quality assurance standards. Hares shared plans to have standards for modified Rapid DNA, which require a DNA analyst to interpret the Rapid DNA results, potentially published by 2025.



Attendees met with 49 different vendors in the exhibit hall.



Some attendees attended the Welcome Reception in costume as it was held on October 31st.

Mobilizing DNA Analysis—A Case Study and a Warzone

Mobile DNA labs can be used to provide identification of human remains in mass casualty incidents. However, implementing these labs is a major logistical challenge.

Julie Conover Sikorsky (Palm Beach County Sheriff's Office) presented how her team used detailed planning to design, implement and validate a mobilization effort for their Rapid DNA infrastructure. With only a $6,500 investment (not including instruments), Sikorsky's team was able to equip themselves for a field test of a new mobile lab. However, the emphasis of Sikorsky's presentation was on the planning efforts rather than the cost of the field test. She has made her team's planning documents available to the forensics community.

On the last day of ISHI, Sylvain Hubac (French Gendarmerie) shared how a mobile DNA lab patented by the French Armed Forces was deployed by the French government to the city of Bucha in Ukraine to aid in the identification of bodies left behind by occupying Russian forces. In April and May 2022, the lab was transported to Ukraine with a team of 16 forensics experts. In five weeks, the DNA analysts carried out 200 DNA analysis from bodies in varying stages of decay and from victims' families. Hubac noted this was the first use of the mobile unit in a war context. The team trained 11 Ukrainians on the mobile unit's DNA analysis workflow, and the mobile unit was later implemented to identify remains from mass graves found in Izyum, Ukraine.

Read more about the mobile DNA lab in this article.

Conclusion

The other presentations at ISHI 33 ranged from the customary updates about CODIS and DNA testing standards to graphic descriptions of cases where DNA analysis proved instrumental. However, one speaker and her story stood out. Ashley Spence, the founder of the DNA Justice Project, shared a powerful testimony to how Rapid DNA and closing gaps in DNA collection of criminal offenders can bring justice to victims. Spence was the victim of a brutal home invasion rape. DNA evidence collected from her body was critical for identifying and convicting Spence's attacker, who was given a 138-year sentence. As a testament to the power of DNA, Spence has the loci for her STR profile printed on her business card. Spence also emphasized how much she valued the compassion and diligence of the officer, nurse, detective, DNA analyst and prosecutor who helped bring closure to her case.

Echoing Brown's exhortation to comfort the afflicted, Spence's testimony reminded ISHI 33 attendees of their work's ultimate purpose—to pursue justice for victims.

ISHI 34 will be held in Denver Colorado next year. Until then, make sure to stay up to date with the ISHI report and follow the latest updates in DNA forensics in the ISHI blog.



Catching up with Olivia McCarter

Genealogy with 'Moxie'



Interview written and condensed by Tara Luther, Promega

Share this article



You may recognize Olivia McCarter as a former ISHI Student Ambassador. At 19 years old and a freshman at the University of South Alabama, she was one of the youngest to work forensic cases using forensic investigative genetic genealogy.

Olivia had never done genealogy work before, but she poured herself into the work, even foregoing meals and sleep to give names back to those who remained unidentified. As part of the team who worked on the Christine Jessop, Delta Dawn Jane Doe, and Mississippi County John Doe cases, Olivia found what she was meant to do. While working on completing upper-level courses, she had made it her mission to provide names for as many of the 40,000 unidentified remains cases in the United States as possible.

Since we last saw her at ISHI last year in Orlando, Olivia has begun working with the Mobile County Sheriff's Office as a Genealogy Analyst and Reserve Deputy in their Cold Case Unit. Now 21 years old, she and two other women have launched their very own company, Moxxy Forensic Investigations.

The dictionary defines 'moxie' as a force of character, determination, or nerve. Playing on the XX and XY chromosome pairs that determine biological sex in humans, Moxxy Forensic Investigations is a woman-owned and operated force of determination and nerve utilizing genetic genealogy to help identify otherwise inscrutable individuals.

We caught up with Olivia to learn more about the company and her co-founders, some of the cases they have begun working on, and what it means to her to have launched a new company while taking on a full college caseload.



Olivia and Moxxy co-founder, Katie Thomas

Can you tell us a little more about who you're working with at Moxxy Forensic Investigations?

My co-founders are Kaycee Connelly of Illinois and Katie Thomas of Texas.

Kaycee is an investigative genetic genealogist as well as marketing and social media manager. She has been a genealogist for over 20 years and has worked on countless adoptee cases utilizing DNA.

Katie is our business manager and an investigative genetic genealogist. She has over 10 years of investigative social work experience, supervisory experience, and genealogical experience. She is also a researcher, area director and district manager for the Doe Network and holds a Lean Six Sigma green belt certification.

We had interned at a separate company together and found that we all really worked well together. We all have different strengths and when we come together, we are an absolute powerhouse team. This summer, we were able to ID an African-American Jane Doe within an hour of genealogical research, which is something that is almost unheard of.

Katie is good with the business side of things… I mean, she is wonderful. She gets things done quickly and professionally. Kaycee is in marketing and has great ideas for big picture stuff.

I consider myself to be knowledgeable about the lab process needed for investigative genetic genealogy. Something neat about our team is that we are all learning by watching others perform their strengths. Before becoming a member of this team, I knew nothing about starting a business. But after watching both Kaycee and Katie, I learned all about it!

Along with the three of us, Bryan Worters (also of the DNA Doe Project) and an unnamed individual are also part of the Moxxy Forensic Investigations team.

How did the idea for the company come to be?

We all became close friends from working on previous cases together. When I started to get cases from Alabama through the Mobile County Sheriff's Office, I approached Kaycee Connelly, Katie Thomas, and Bryan Worters about helping me identify people in my home state.

For the first few cases, they volunteered their efforts to help me without compensation. Some of these folks have never even been to Alabama, but they came together and helped me provide answers for people here.

I don't think I can ever thank them enough for what they've done for me and for Alabama. Because they all live outside of Alabama, they wanted to work on cases in their home states as well, so we decided to develop a company (owned by Kaycee, Katie, and I) to make that easier.

What was it like getting the business up and running?

When we started to work on cases in Alabama, we realized how well we worked together. We rarely clash on ideas and while we're all very professional, we have a good time with one another. I don't even know whose idea it was to start a company, but it was something that all felt completely natural to us.

Katie really stepped up to handle the legal and business side of things. She designed our website too. Kaycee handles a lot of our social media and media outreach. I am great with the lab process and working on the scientific side of things.

Everyone in the IGG community has been supportive and has given us advice on what labs to use for specific samples, etc. We have already started to get cases too. Everything is going amazing.

What types of cases will you be focusing on at Moxxy?

We are focusing on perpetrator cases and unidentified remains cases across the United States and Canada. If a case can be closed with IGG, we will take it–no matter the difficulty.

Are there any cases that you can share yet?

So far, we have solved almost three cases together, none of which have been announced. All of these are from the state of Alabama.

One current case that I can talk about is an unidentified Indigenous male who drowned in Gulf Shores, Alabama, in September of 2005. We are currently working his genealogy and because he is 96% Indigenous, it has been a bit of a difficult case.

If anyone would like to follow Moxxy's progress, we have a Facebook page. This is where we will be announcing cases and solves.

What's it like being all female-owned and operated?

I think one word to describe how I feel about us being an all-female-owned company is proud. I am the youngest of the three and I really look up to Katie and Kaycee as professionals and as women, in general.

You're taking on much more than the typical 21-year-old college student! Can you talk about that?

I am juggling owning Moxxy, working for the Mobile County Sheriff's Office, and have sixteen credit hours this semester for school. I am also twenty-one years old. I think that I was able to do this at such a young age because of the support that I've had. The entire IGG field has really encouraged me to go far and the folks at the sheriff's office have really been so supportive. There have been times where I have wanted to quit and move away to live in a cabin on a secluded island. However, I know that no matter how tough times get, that I can help a lot of people in my career. That is the thing that matters most to me. And times do get tough. 2022 has probably been the worst year of my life but the amount of love that the people in this field have shown to me has really pulled me out of that space.

Look out, world. Katie, Kaycee, and Olivia are coming to show what we are made of!



Advertorial

The Power of 8-Color: More Data from Every Amplification

Rohaizah James, Promega

Share this article

Forensic DNA analysts have relied on the ease and accuracy of short tandem repeat (STR) genotyping technology for almost 30 years. The increased use of STR kits is accompanied by the growth in DNA databases over the years, resulting in the inevitable increase of potential adventitious matches with the older smaller STR panels. To reduce this undesired potential, larger panels of STR markers started to be used. These large STR panels can result in some performance limitations with challenging samples, as they use a broad range of amplicon sizes. With detection of only six dyes using a standard capillary electrophoresis (CE) instrument, an amplicon size range of approximately 60 to 500 bp is necessary to include all the required loci. The use of long amplicons becomes problematic while genotyping highly degraded DNA, as commonly recovered from a crime scene, because they would be the first to "drop out." Additionally, these longer amplicons would also be more likely to drop out in the presence of amplification inhibitors. Consequently, the loci with long amplicons provide less information with challenging forensic samples.

To address the limitation of 6-dye CE technology, Promega developed a new 8-dye CE instrument, the Spectrum CE System, and an accompanying 8-dye STR amplification system, the PowerPlex® 35GY System, which co-amplifies the most markers in one amplification than any other commercial STR kit. The 35 markers in this STR multiplex system include 23 autosomal loci which satisfies the CODIS and ENFSI requirements, 11 Y-STR loci, and Amelogenin (Figure 1).

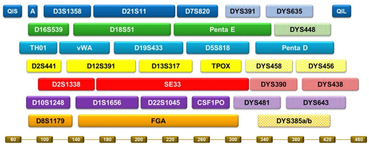


Figure 1: The PowerPlex® 35GY System - Next Generation STR Multiplex

With two new dye channels, the median allele size of autosomal loci in PowerPlex® 35GY System is 25% smaller than the median allele size in 6-dye autosomal STR systems. Additionally, alleles for 22 autosomal loci in PowerPlex® 35GY System are smaller than 325 bp, reducing the occurrence of dropout and providing maximal information from amplification of degraded or inhibited samples. Furthermore, the most discriminatory STR locus, SE33, has the smallest panel in this kit that in any other commercial STR kit, thereby improving the discrimination power of partial profiles.

In addition to smaller autosomal STR amplicons, this 8-dye STR multiplex also amplifies 11 Y-STR loci, making it the largest CE-based commercial STR multiplex system. To provide the most information from each crime scene sample, the Y-STR loci are selected based on their high gene diversity, which also increases the potential of more accurately identifying the minimal number of male contributors in a mixture (Figure 2). Additionally, the Y-STRs could provide an opportunity to simplify the familial DNA searching process. Currently, familial searching is a two-step process. The first step is to search for potential male relatives of the offender in an autosomal database. The second is to exclude false potentials by matching Y-STR haplotypes. Data from PowerPlex® 35GY System allows direct, one-step searching using Y-STR haplotypes.

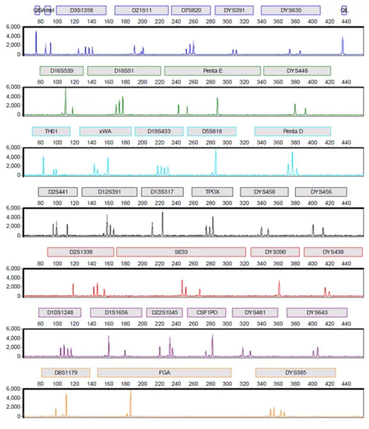


Figure 2: A 2-person Male:Male Mixture Genotyped with PowerPlex® 35GY System

To further improve the ease-of-use of this trusted CE technology, the PowerPlex® 35GY System has two Quality Indicators, QIS and QIL, as the smallest and largest peak, respectively, in the blue channel. The QIL is designed to be sensitive to commonly found PCR inhibitors and could confirm indication of inhibitors detected during quantification. When direct amplification of single source reference and database samples are performed without DNA quantification, where there would be no indication of inhibitor presence, sloping STR peaks accompanied by low QIL peak will indicate inhibition of the amplification reaction (Figure 3).

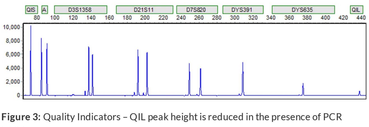


Figure 3: Quality Indicators – QIL peak height is reduced in the presence of PCR inhibitors

However, sloping STR peaks accompanied by high QIL peak indicate that the DNA is degraded (Figure 4). The ability to distinguish inhibited samples from degraded samples by the low or high QIL peak heights helps DNA analysts determine the next best course of action for the analysis, thus saving sample, time, and cost.

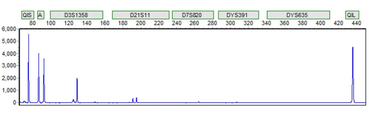
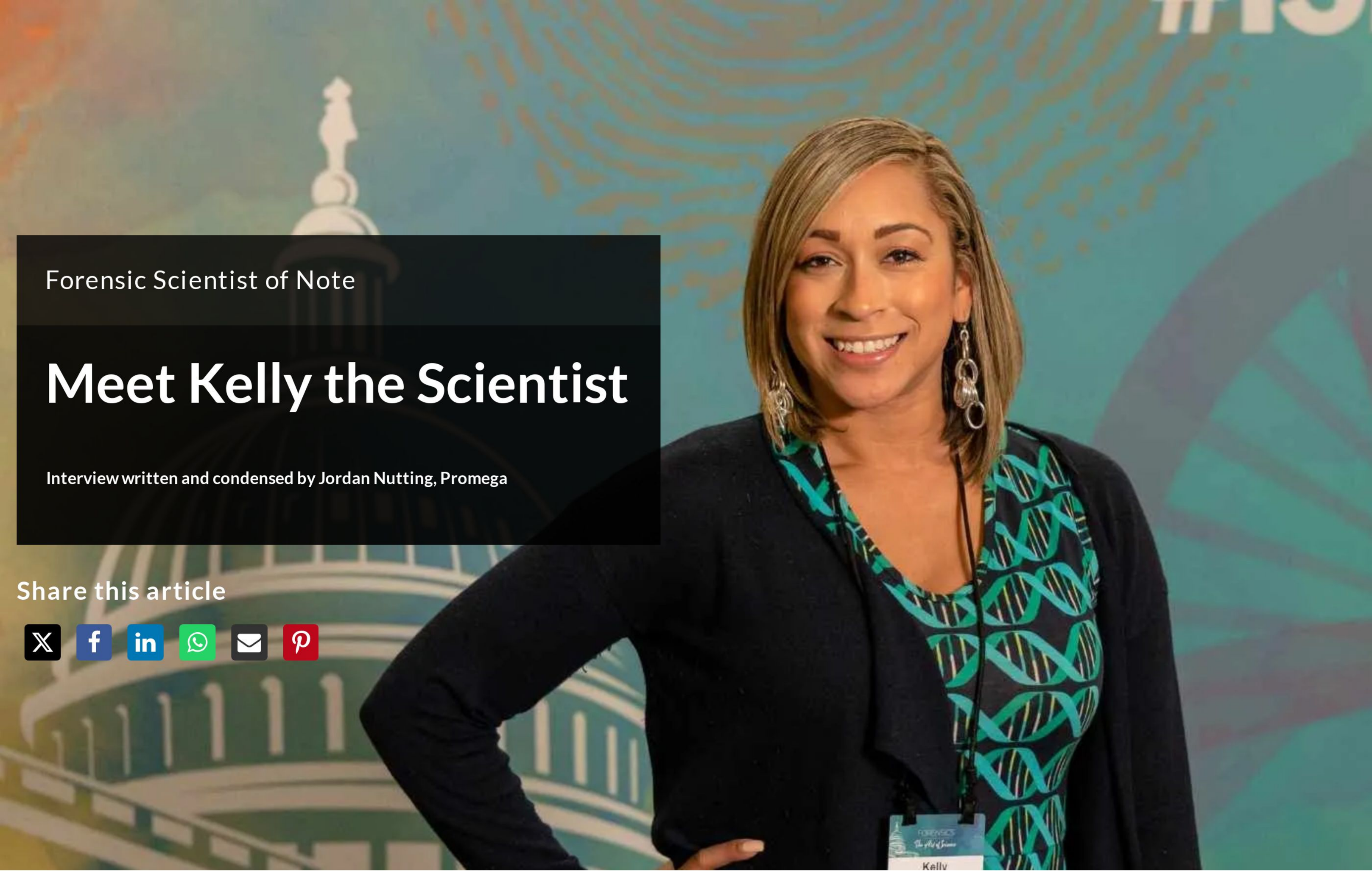


Figure 4: Quality Indicators – QIL peak height is not affected in the presence of degraded DNA

This 8-dye STR system, together with the Spectrum CE system, has the potential to generate more information from each forensic crime scene and database sample than 6-dye CE-based assays. In addition to significantly enhancing the quality of STR analysis with 8-dye technology, the Spectrum CE system was designed to improve efficiency with simplified sample setup and operation. It has four 96-well plate positions that are continuously accessible, allowing DNA analysts to load and unload plates while the instrument is running. This will improve the productivity of the forensic laboratory by allowing partially full plates to be run and reducing instrument scheduling conflicts without sacrificing time or efficiency. Rush cases can be prioritized to run first even when the plate was added to the queue later. Additionally, four plate positions will increase overnight and weekend throughput without increasing the number of CE instruments.

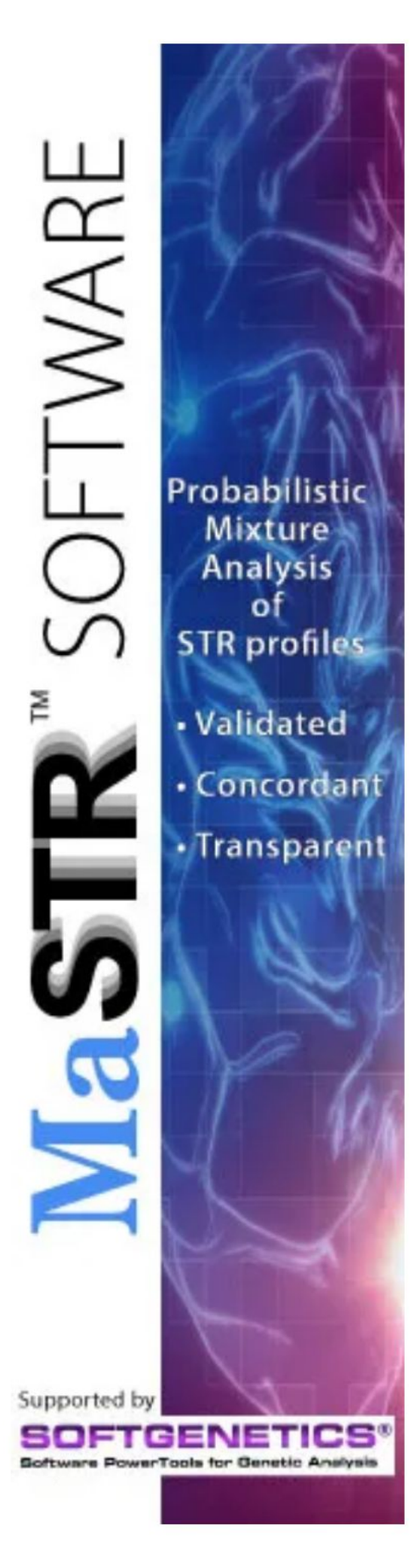


Forensic Scientist of Note

Meet Kelly the Scientist

Interview written and condensed by Jordan Nutting, Promega

Share this article



If you're a forensic scientist and spend any time on "science Instagram", you've probably come across Kelly Knight and her @kellythescientist profile. If you haven't, it's worth taking a look. Scrolling through her profile, you'll encounter topics ranging from touch DNA to a crime-scene-tape-meets-Kim-Kardashian Halloween costume to honest discussions about biases and barriers in STEM.

Knight, who is an associate professor of forensic science at George Mason University where she teaches and conducts research, uses the account to give her over 13,000 followers a new perspective on who can be a scientist. Knight recently met with the ISHI Report team to talk more about her background as a scientist, what motivates her outreach and her experience being a scientist on social media.

This interview has been edited for clarity and length.



Photo Credit: Kelly Knight

You're a professor, you're working on your Ph.D., you have a robust social media presence, and you do a ton of outreach work. What drives you to take on all these different projects?

I'm a very multi-passionate person. I enjoy working, I really do. And it's hard to set boundaries when you're not only passionate about your work, but you're also passionate about the populations you serve. As a professor, I think of that as a service position to students. I'm passionate about making my classroom the best place for them, which is what led me to get my Ph.D., because I felt like I knew a lot about science, but I didn't know a lot about teaching. So, instead of being like a normal person and just reading articles and going to trainings, I was like, "no, I'm going to get a whole Ph.D. in [science education] because I have to do everything to the max."

And then with outreach, that really got ramped up when I was working with the Maryland State Police Crime Lab as a forensic DNA analyst, and I became the lab tour coordinator. I became the default outreach person. And I was okay with that because I found that I really enjoyed it.

I liked what I did as a scientist, but I also liked sharing my science with others, which is why I think I'm not only passionate about outreach, but I also like teaching. I became a professor because I like being at the bench. I like doing lab work. But just as much, I like telling other people about it, whether it be you know, a kindergartener or a college student or someone on social media.

All my interests have kind of become interconnected in some way. And it boils down to me being hyper-passionate about sharing my science and connecting with other people.

"I'm passionate about making my classroom the best place for them, which is what led me to get my Ph.D., because I felt like I knew a lot about science, but I didn't know a lot about teaching. So, instead of being like a normal person and just reading articles and going to trainings, I was like, 'no, I'm going to get a whole Ph.D. in [science education] because I have to do everything to the max.'"

Photo Credit: Kelly Knight



Can you tell me how you became interested in science and forensics?

My dad worked for the Federal Aviation Administration as an air traffic controller. But he was also passionate about space, and he introduced me at a very young age to those types of things. I think my love for all things STEM grew from that. I used to build rockets with him and launch them in our backyard. He would buy pig brains that I could dissect. I was a weird child.

But one of the most beautiful things about him and my mother, who's an educator, was their encouragement. I think things are getting better now, but when I was much younger, being a woman in STEM was still kind of like looked down on in some ways. Not necessarily explicitly, but there were many implicit messages that were sent through the fact that I never saw representation of people who looked like me in any of my science books. It was always the stereotypical older white man with crazy hair and glasses shown as a scientist. It was never a fashionable, quirky Black woman. But thanks to my parents and their encouragement, they never made me feel like I was out of place.

I think because of that, as a Ph.D. student, I'm really interested in evaluating not just how women and women of color come into STEM but, more importantly, the stories of how they persist and how they've been resilient. I had familial capital around me that pushed against the messages I was receiving from outside of my family. If I didn't have that, I may not be where I am today. Even when I didn't see anybody who looked like me in my studies, or even when I felt like I was struggling in a subject, it didn't make me want to quit. But some people don't have that same support system, and then they leave the field.

My career interests have evolved a lot. At one point I wanted to be a veterinarian, so I worked as a vet assistant. When I helped with my first euthanization, I cried harder than the pet owner so clearly that wasn't going to work. Then when I started out in undergrad, I didn't know what I wanted to do. I started out pre-med. I do not know why. I never wanted to be in medicine. I just feel like it was one of those things where, if you were interested in science, it was the cool thing to be pre-med. I ended up hating it. I didn't want to be a doctor but somehow, I ended up doing well in my chemistry classes and because I'm a type-A perfectionist, I like things that affirm my intelligence, so I decided I was going to be a chemistry major. But I wasn't really passionate about that either.

I took so many biology and chemistry classes, and a lot of times I didn't feel like the teachers taught the applications of the science or the "real-world" reason why we were learning all these equations or memorizing the periodic table. But then I was exposed to forensics in an Anatomy and Physiology class, and, for the first time, I was like, "Oh, this is why we're learning science."

In my senior year, I ended up interning with Bode. I was getting bits and pieces of forensics through my undergrad degree since my concentration was forensic chemistry so I went to Bode to get more hands-on experience and that sealed the deal. I decided that a career in DNA was what I wanted to do for the rest of my life.

At that point, however, I still lacked a lot of the academic requirements I needed to be a DNA analyst, so I made the decision to apply to one graduate school. I only applied to one because my GPA wasn't great, and I didn't even think I was going to get into a program. I told myself, "I'm going to try this one school and see what happens." I was waitlisted at first, but, ultimately, I think my experience at Bode propelled me higher on the wait list when they were going down the ranks.

The rest is history. I got my master's degree and now here we are today.

Having support from your parents and developing the grit that comes from working in spaces where you don't necessarily feel like you're well represented, I imagine a lot of that background comes into your outreach work. Can you tell me a little bit more about the outreach programs that you support?

At George Mason University, there's a couple of programs that I run regularly. One is called FOCUS, and that stands for Females of Color and Those Underrepresented in STEM. It's a summer program for middle and high school girls of color. But we have people of all different identities who have attended the program. There's another high school program that I do in July that's called the Envision Law and CSI program and that program has hundreds of high schoolers from all over the country who attend each week.

Most recently, I've gotten really involved with an organization called STEMNoire, which is an organization for women who identify as being from the African diaspora. That organization really supports and uplifts Black women, from students all the way up to professionals, which I felt like was a huge missing link for me personally. There's a lot of outreach that's geared towards students, but much less when you get to higher education, and then there's even less when you get to the professional level. At that point, you still need support. It's not like things get better once you become a professional!

I identify as someone who's Black. I identify as a woman. But I also identify with students who feel they're struggling with specific subjects and like they can't succeed. I identify with those who feel judged, or that they don't have a mentor or feel that teachers and faculty are not approachable.

I use my experiences to try to connect with students who may have had similar experiences as me. I can connect with women, I connect with students of color, but I can also connect with the white male who feels like he can't get to that next level because I can empathize with that.



Photo Credit: Kelly Knight

To me that's one of the reasons why outreach is so important. You're not always going to get everything you need in a formal academic setting. You know your teachers are amazing, but sometimes they have so many students in a classroom and they're so overstretched and overburdened that they may unintentionally overlook things. I'm a teacher. I overlook things sometimes. I make mistakes. Having outreach programs extends a student's network and allows you to connect with them in a way that's not so formal. It allows me to really say, "You know what? Scratch all the content we were going to do. You seem like you need to have a moment to connect and chat."

My experiences and struggles weren't always fun, but I believe that everything happens for a reason. Now, I'm thankful that I had the experiences I had because I can use them to connect with students in ways I may not have been able to if everything had been easy-peasy for me.

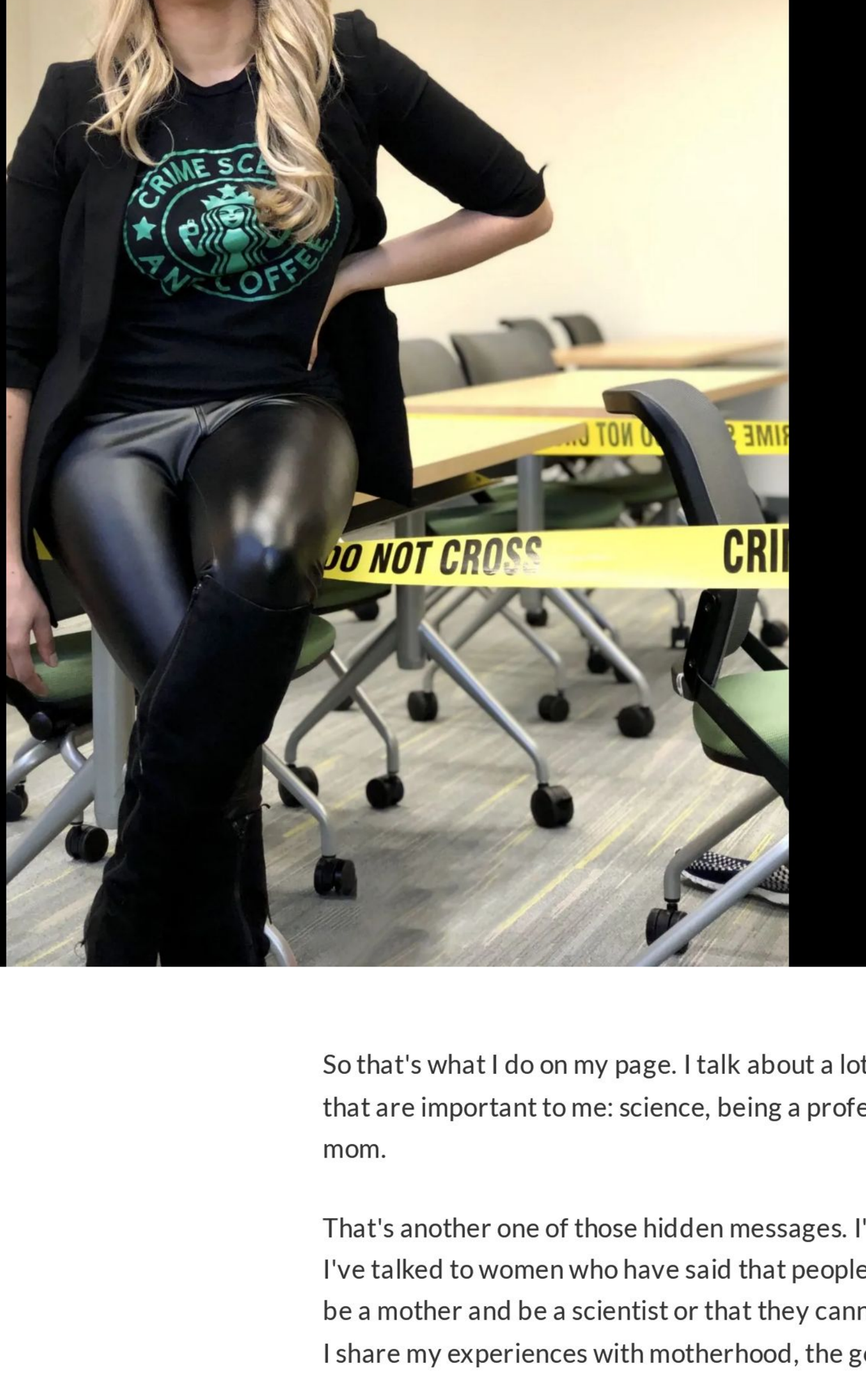
You have your Kelly the Scientist (@kellythescientist) Instagram profile. When did you start that? What three words would you use to describe the account? What has your experience on social media been?

I started that page in 2019. I had a personal page, but I don't think my family and friends were nearly as interested in me sharing about capillary electrophoresis as I was, so I started the Kelly the Scientist page because I wanted to have a space to talk about science and other things that interest me. At the time, I didn't even know that this whole world of science social media existed!

And it's funny that you ask about three words because I actually have three words in my bio to describe the page: science, academia, motherhood. Those are the main topics that I talk about. But I think if I were to describe the way I do talk about those topics, it's definitely through humor, relatability, authenticity and transparency. That is what's allowed me to connect with my audience and grow the platform in ways that I would have never expected. I was excited when I had 50 followers. I was like, "Yes! 50!" I had no idea. Now I have over 10,000 followers.

I don't know a lot of people who dance and talk about forensic science at the same time, but I think the reason I do it is because it's important for me to connect to other people and for students who come behind me to understand that scientists are whole people. When I think about this stereotypical scientist again, I go back to this image of the crazy-haired old white guy with glasses who wakes up in the morning thinking about chemical equations. And let's be honest, I know scientists like that, and there's nothing wrong with that. But I think what I try to do is to just be my authentic self so that others can understand that you can like science and dance and fashion, and you can be silly, goofy and quirky. You can be this person who has all these different types of personalities, and you still can identify as someone who's smart, who works in a lab and who's capable of being professional.

It's too much of a burden for me to try to change who I am on a daily basis. I just can't. I just finished my first day of the fall semester with a new group of students. By the end of class, they probably all thought I was a nut job. But this is me. This is Professor Knight. This is my personality and I'm not going to stress myself out and put an additional burden on me by trying to change my personality and change myself.



"I think about the number of people who I'm empowering and the ways that I'm helping to redefine what someone in STEM looks like. If we always have the same visual of what someone in STEM is, we're always going to have implicit biases against people who don't fit into that box. I want to show that, yes, you can be a scientist and you can dance and have fun too."

Photo Credit: Kelly Knight

So that's what I do on my page. I talk about a lot of things that I'm interested in, things that are important to me: science, being a professor, life as a Ph.D. student, being a mom.

That's another one of those hidden messages. I've never been told this explicitly, but I've talked to women who have said that people have literally told them they cannot be a mother and be a scientist or that they cannot be a mother and work in academia. I share my experiences with motherhood, the good and the bad, for that reason.

There's a lot that I do keep private, but I do try to be transparent about some of my struggles and sometimes I regret things as soon as I post them, like "Oh, I got too real on that one." But then I'll get a message from someone who shares, "Thank you so much for showing this because I was feeling this exact same way and I felt crazy. You reminded me that it's okay." That's what has pushed me to continue to post even when it feels too much for me sometimes.

At least once a week I have these moments where I want to delete the account because I feel like I've given people too much access to my personal life. Also, being someone who's from a marginalized population, there's always that part of me that's like, "Alright, I'm just giving people one more reason to think that I don't belong in STEM."

But then I think about the other side, and I think about the number of people who I'm empowering and the ways that I'm helping to redefine what someone in STEM looks like. If we always have the same visual of what someone in STEM is, we're always going to have implicit biases against people who don't fit into that box. I want to show that, yes, you can be a scientist and you can dance and have fun too.

Sign Up to Receive Future Issues In Your Inbox

Deadlines

January 9, 2023

Workshop Proposals Due

February 2023

ISHI Registration Opens

June 1, 2023

Oral Abstracts Due

June 1, 2023

Interesting Case Abstracts Due

July 7, 2023

Poster Abstracts due

July 15, 2023

Early Registration Deadline

Sign up to receive future issues

First name

Last name

Email

Company

Country

I consent to adding my name to the ISHI mailing list

Submit

Do you like what you see in ISHI Magazine?

Your customers do too. Consider advertising in an upcoming issue and reach a targeted forensic audience of more than 5,000 people (US and international combined)

Contact Tara Luther to inquire about rates and specifications. Space is strictly limited.

tara.luther@promega.com

DNA Solutions from Spent Shell Casings and Rootless Hairs

Bode X-traction technology enables DNA recovery from spent shell casings and rootless hairs. Advanced sampling methods developed from the ATF[8] combined with technology developed at Bode enable analysts to obtain **~10 X more DNA from spent shell casings** and obtain useable nuclear **DNA profiles from a single hair**.