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PRESIDENT'S EDITORIAL

Standing up for forensic science

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The American Academy of Forensic Sciences (Academy) has been a fixture in my professional life since 1987 when I was admitted as a Student Affiliate. As a graduate student in Anthropology, with a concentration in Forensic Anthropology, there was a tacit expectation that I would join the Academy, give presentations every year at the annual conference, and play an active role in the Section (which at that time was called Physical Anthropology). My primary mentors, Dr. J. Michael Hoffman and Dr. Walter H. Birkby, would not have permitted or tolerated less. They both had strong ties to the Academy, having each served in the Section leadership. One of my proudest moments was when J. Michael, as Chair, announced that I had won the J. Larry Angel Student Paper Award. Another was when all of Walt's graduate students put together a symposium in his honor, for which I'm pretty sure he never forgave us. Although both are deceased now, they continue to serve as the "voices in my head" as I navigate the complexities of serving as Academy President.

Just as the Academy has featured prominently, Forensic Anthropology has been in my blood for 40 years. During my sophomore year in college, Dr. Hoffman presented a lecture on Forensic Anthropology and after attending, I never looked back. I enrolled in Dr. Birkby's program at the University of Arizona, from which I earned a PhD. After moving to Phoenix, AZ in 1991, I began serving Maricopa County as their forensic anthropologist. I also serve King County in Seattle, Gwinnett County in Georgia, and the Federal Public Defender in multiple states. I love my profession and I love the Academy; I have spent countless hours in service to the basic tenets: professionalism, fostering research, enhancing educational opportunities, and conducting outreach. My professional life has been influenced by so many individuals in all disciplines and walks of life. These collaborations have informed my career, and the work that I do every day. There is no way to recognize the efforts of all the villages that raised me, so I hope this heartfelt acknowledgment will suffice.

Every Academy President has a pet project and is encouraged to develop a theme for the annual conference over which they preside. I've been thinking about the focus for the Academy's 75th Anniversary Conference for several years. One of the traditions of the Academy is to have a primary theme and a sub-theme, but I opted to eschew that in favor of something pithy and direct: Science Works. This statement encapsulates many of the other ideas I considered on the path to selecting just one. The main vision is that "Science" as a concept – the objective experimentation that tests a hypothesis and is reliable and reproducible – can be used to make rational, informed decisions based on facts. "Works" means that something produces a desired effect or is successful. My hope is that by highlighting our efforts to use tested methods with reproducible results, we can demonstrate to our leaders, globally, nationally, at the local level, and to our communities as well, that they can trust the results instead of denying or denigrating them. The Academy should have a strong voice regarding forensic science standards, and the importance of scientific evidence as a critical part of the justice system.

"Science Works" is also a celebration of the membership, each of whom labor every day in forensic science. We are engaged in cutting-edge research, innovative technology, improved methods and standards, educational outreach, and the everyday routine that comprises our workday. We all have gripes – ask anyone at any given time, and they can list 30 things they would change about their job. But at the end of the day, commitment is what keeps us engaged and participating. We are highlighting achievement, recognizing successes, and commiserating with losses all year to celebrate our members and the role we play in forensic science, be it working at a bench, pushing the boundaries of what's possible, educating our future, or investigating our dead. We do work at science, and consequently Science Works.

Modern forensic sciences did not spring spontaneously into being. Like any endeavor, they evolved from previous iterations. We, as practitioners, did not pop up like daisies, fully formed and leading the charge. Each of us has specific mentors, and as a collective we have mentors for our disciplines. These are the shoulders upon which we stand. And those shoulders have shoulders, just as our shoulders will provide support for those who come after us. My

father always impressed upon me the importance of recognizing your history and acknowledging the role key precepts and people played. Our scaffolding is comprised of intricate webs of relationships, research, theories, practice, and outcomes. As forensic science disciplines grow, develop, and evolve, we should continually reflect on our history, remind ourselves of the principles we revere, and conduct course corrections to ensure that we are remaining true to our original precepts.

Forensic science can be traced to early civilizations and there are numerous examples in early Egypt, Roman cities, and China, to name a few. One of my favorite anecdotes stems from early entomology and is reported in one of the early books to assess the cause of death [1]. The tale begins with the murder of a villager. The scientific method was employed to compare different wounds inflicted on animal carcasses to the wounds observed on the victim. Once a sickle was determined to be the likely weapon, villagers were asked to bring their sickles to the equivalent of the town square where they were asked to stand in a row. Flies immediately began to circle and land on the end of one of the sickles, and the owner was then accused of the murder. He ultimately confessed. This ancient example combines foundational principles in Forensic Pathology, pattern comparison, systematic data collection and analyses, and Forensic Entomology.

Early Italian scientists began studying the effect of injury on internal organs, while others began to engage in fiber comparisons and footprint analyses. Early Chinese scholars used fingerprints for the identification of business documents. Over time these processes became more systematic and were tested using scientific principles. Fingerprint assessment was formed into a classification system. Ballistic comparisons became more rigorous, and gunshot residue testing was initiated. Similarly, arsenic levels in corpses were assessed using tenets of Forensic Toxicology.

While scientific principles or their precursors were being developed, other less scientific principles continued to flourish. Throughout history, scientific and unscientific thoughts and ideas evolved in concert. Copernicus and Galileo used the scientific method to determine that the Earth moved around the sun, while the conventional wisdom and the church continued to put forth the more egocentric view that the Earth was the center of the universe. Another well-documented example is the effort to determine whether an individual was a witch or engaged in the occult by subjecting them to various conditions, like dunking them in water. Phrenology and other methods attempted to determine criminality by studying bumps on the cranium or taking a set of measurements. While these techniques have been debunked, other types of unscientific principles continue to be part of our everyday life (e.g., COVID-19 vaccine can change DNA, or that climate change is a thousand-year normal fluctuation).

Forensic science was not immune to these trends. While slowly and surely techniques in forensic science became more consistent and reliable, many methods subjected to rigorous research resulted in dogmatic thinking to be refined or discarded. Over time, Forensic Pathology and Toxicology became more common aspects of courtroom testimony. The legal community in the United States steadily became more reliant on forensic scientists and the evidence they could provide to inform juries and the court. Consequently, these disparate but similarly focused groups aligned and began to have scientific sessions to share research, theories, and data. In 1948 they, along with members of the legal community, established the American Academy of Forensic Sciences and a new era in forensic science was ushered in [2]. Today, all forensic sciences are engaged in development of standards, and producing strong research to support discipline-specific dogma (see www.aafs.org/ASB).

While scientific developments evolve exponentially, healthy skepticism grows apace. Scientists and skeptics enjoy a somewhat symbiotic relationship; each side producing new and enlightening evidence in support of their positions. Witchcraft, the occult, otherworldly explanations, religion, and intuition are as closely held, and cited, as the use of fingerprint comparison, pattern recognition, and DNA profiles. There is a distribution of belief vs trust in science that runs the gamut from total denial of scientific principles to complete acceptance. Feelings on each side are equally strong; in some cases, producing useful dialogue, in others resulting in violence and *ad hominem* attacks. Scientists work to refute non-scientific principles, and non-scientists seek to poke holes in research and data. The recent divide over COVID-19 facts and falsehoods is a pertinent example of this schism. The rejections of scientific evidence in prominent trials provide examples of denial in forensic science.

Today, science and skepticism continue to march side by side. For some, science continues to be theoretical, and not factual. Data are set aside, or spurned, in favor of individual "knowledge" that something else is true. In some cultures, the mythical or spiritual world is as real as the tangible one. Some would say that the tangible world is also mythical – think, The Matrix. Scientists, on the other hand, sometimes mock and disparage those who believe in things that cannot be seen, or touched, or quantified in some way. The two sides are equally firm in their stance that their view is the correct one. Television has added to the conversation by sensationalizing forensic science and providing viewers with a glorified view of the capabilities of forensic science laboratories and medicolegal death investigation, and the people who work in those arenas. Often the storyline is fantastic, with a very tenuous basis in truth. However, the reality is that these types of programs do impact individual viewers, and consequently, can have an impact at trial, or in conversations around forensic science. One of our tasks as forensic scientists is to present a more realistic view of our world, at every opportunity, not just in the courtroom, or during interviews, but in over-the-fence conversations with our neighbors, or during family debates. We represent the reality, and as such, we must represent the reality.

Refutation is part of our adversarial system, and forensic science is subject to it as much as any other evidence presented in court. Any scientifically derived data can be questioned, simply by finding and exploiting weakness in the study design, or the laboratory conditions, or the credentials of the personnel. No data are insulated from these attacks. Forensic scientists must maintain the highest standards in all casework and research because the stakes

are so high. While seemingly impossible to comprehend, sometimes reliable data obtained using good techniques by qualified personnel are simply ignored. There are many reasons for this – a lack of comprehension of the science, negative judgment of the individual imparting the information, favorability, or lack thereof, of the players involved, and sometimes just plain disbelief and distrust. The DNA evidence in the OJ Simpson trial is one of the more classic examples of these phenomena. For many forensic scientists there is little doubt that the DNA pointed to one conclusion, but for other non-forensic scientists there is a lot of doubt. The jury had so much doubt that they acquitted OJ Simpson of a double homicide. As scientists, we have an absolute obligation to promote science and reliable data based on the scientific method, starting with our appearances in court.

In addition to the complexity of presenting forensic evidence, many practitioners have difficulty during expert testimony. Some find it very intimidating. Some are unable to relax and relay the information to the jury in digestible, lay terms. Many scientists use scientific language, or discipline lingo, which is off-putting and on occasion too dense for juries to parse. Forensic scientists face multiple challenges in court: the adversarial system, public perception of forensic science, and the high stakes of the trial. We all try to adopt a serious, buttoned-up mien in court, and this can come across as pompous or unlikable. There is an intangible effect of being disliked; there is some research that suggests juries weigh evidence based on their judgment of the person providing it (e.g., Parrot et al., 2015) [3]. We are all accustomed to being called "egg-heads," and some take pride in the moniker, but unfortunately this observation extends to our perception as experts during trial. We need to spend time reflecting on our demeanor in court and to develop strategies for simplifying complex data without sacrificing credibility, or the scientific underpinnings of the testimony. Each of us should ask for feedback on our courtroom demeanor, and the way in which we present evidence. Attorneys, student observers, and others can provide valuable information that can help us to hone our skills in presenting complex information.

Another forum in which we can defend ourselves is during the "BBQ scenario." Most forensic scientists are familiar with the feeling of being an object of entertainment when gathering with friends or family. This uncomfortable position includes being asked about our most salacious case, or most horrific experience, or details of whatever is in the news in the moment. Being placed in this situation can result in personality shutdown. We are cautious by nature, with an ingrained sense of confidentiality and awareness of the high stakes involved, and that causes us to appear aloof, or remote. These traits only increase as we move forward in our careers. One place this often manifests is in our courtroom demeanor. Being under oath only exacerbates the personality traits we already exhibit. We must learn and practice techniques to help us combat this natural reserve so we can be positive voices for forensic science in formal, and informal, settings.

We have all been in situations where individuals or groups have been discussing current events with science at the core. One strategy to keep the peace is non-engagement. When neighbors begin espousing beliefs that forensic science labs are government funded and, therefore, suspect, or that big corporations own the scientists and skew results, or that we are using DNA to profile individuals, or that those in government service are "prosecution witnesses," or any one of the arguments we have all heard, rather than staying quiet and taking a passive stance to keep the peace, we need to defend ourselves, and our science. While this can lead to uncomfortable situations, out and out shouting matches, and/or the loss of friendships, if we do not stand up for science, who will? We have the knowledge, the understanding, and the ability to explain our work, to condense it into relatable terms, and to counter notions with facts. While an easier and more comfortable path is to remain quiet when these conversations spark, we should consider the ramifications of this action, and consider attempting some education or information to combat the misinformation being spread.

The final piece of "Science Works" involves our objectivity as forensic scientists. As human beings, we are part of our communities. We have strong opinions regarding various issues confronting us. In the realm of forensic science, these feelings are not part of the scientific method. This may seem like a non sequitur, but it falls in line with qualified personnel providing accurate, reliable information based on solid methods to our justice system. Our findings are based on validated methods and should not be presented with any bias, prejudice, or rancor. In court, we are often asked to consider the person on trial or the victim who died under egregious circumstances. We cannot allow that goading to influence us. Each judicial procedure has at least two sides, and experts are called to support one theory of a case or another. In these instances, experts are often referred to as "your" expert or "prosecution" or "defense" witnesses. While many of us believe that we speak for the "victim," in court we speak for the "science."

As human beings, we would be viewed as callous and indifferent were we to express nothing at brutal death; however, as forensic scientists, our responsibility is to do just that. Judges and juries may weigh the validity of our science on our courtroom demeanor, the posts we share on social media, or the positions we take publicly. These events can be exploited to impeach us, allowing judges and juries to discount the scientific findings we present. As forensic scientists, our loyalty is to the scientific underpinnings of our findings, and we cannot and should not try to control how they are interpreted by the end-users. If we base our reports on data derived by using reliable techniques, accepted methods, and our training, we should be able to retain our objectivity, and reliability in our interactions with the justice system. We may not agree with each other on the interpretation of the facts, but we all should rely on those facts that are gathered through sound methods.

The Academy membership has been at the forefront of the response to criticism regarding some of our methods. We have seen a flurry of research papers addressing basic dogma and the creation of quality assurance, competency testing, and validation studies. This response has enabled us to speak with authority regarding methods with proven scientific underpinnings. Some of the methods relied

upon in the past have been demonstrated to be unscientific, and many practitioners have discontinued their involvement in those cases as the result. The Academy remains committed to developing scientifically based practice and supporting our members who provide research data that fine-tune our methods and standards in the interest of reliability and reproducibility. Our membership will continue to form the vanguard that promotes science as the structure upon which we rely.

At the end of the day, as a forensic science community made up of thousands of practitioners in multiple disciplines, we have the privilege of providing a voice to our science. We have the unique ability and opportunity to promote it, to explain it, and to defend it. We can promote standards for our disciplines and actively participate in the forward momentum. We can reflect on 75 years as an Academy, and project forward into the next 75 years. We can learn from our past to be more successful in our future. We can continue to make course corrections to ensure reliability, accuracy, and reproducibility in our work. And in the present, we can ensure that Science Works, and that our global community knows it, and believes it.

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REFERENCES

1. Tz'u S (translated by McKnight BE). The washing away of wrongs: Forensic medicine in thirteenth-century China. Science, medicine, and technology in East Asia, vol. 1. Ann Arbor, MI: Center for Chinese Studies, University of Michigan; 1981. https://doi.org/10.3998/mpub.19945
2. Field K. 1998 history of the American Academy of Forensic Sciences: 1948–1998. West Conshohocken, PA: ASTM; 1998.
3. Brodsky SL, Neal TM, Cramer RJ, Ziemke MHJ. Credibility in the courtroom: How likeable should an expert witness be? J Am Acad Psychiatry Law. 2009;37(4):525–32.