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Editorial

Happy Birthday

Ten years ago The Forensic Teacher Magazine was launched with the purpose of helping high school and university forensics educators make fake blood, set up a crime scene, or any of the dozens of other tasks we’re called on to make forensics engaging and meaningful. Forensic education at the time was a field where educators often didn’t have any training or experience. Sure, textbooks illustrated the differences between cat and dog hair, but how to organize a lab for students to see for themselves, and then assess their prowess? How best to give students the experience of lifting fingerprints a half dozen ways? Other science disciplines give students background and content, but forensics is unique in that it requires our charges to pull from what they’ve learned, mix it with material often straight off the TV screen, and demonstrate they can reach conclusions. And more, that they can defend their answers.

The summer before I taught high school forensics I was fortunate enough to attend the Forensic Science Educators Conference (FSEC) at St. Louis University sponsored by the AAFS. It was like trying to sip from a firehose. I came home fired up with a hundred ideas of how to present material and run labs and exercises. I returned with a thick binder of resources and hit the ground running. Life was good.

Two years later I returned to St. Louis for an advanced conference and it hit me that for every person present there were hundreds of others who were feeling their way through the benefit of the excellent lectures, labs, examples, and modeling I was experiencing. There really ought to be a resource for the teacher in a small Kentucky town or crowded inner-city to see how others successfully led their students through bite marks or maggot-wrangling. There should be a place for educators to share what works for them, and for suppliers and textbook publishers to get their goods seen.

And so The Forensic Teacher Magazine was born. Every year we make just enough money to stay in business, and our staff are volunteers. We pay our writers and we’re always glad to hear from anyone with an article idea. Help us out: contribute and spread the word.

Here’s to another ten years!

Dr. Mark Feil

Volume 10, Number 29, Fall 2016

The Forensic Teacher Magazine (ISSN 2332-3973) is published quarterly and is owned by Wide Open Minds Educational Services, LLC. Our mailing address is P.O. Box 5263, Wilmington, DE 19808. Letters to the editors are welcome and should be sent to admin@wideopenminds.com. Submissions are welcome and guidelines are available, as is a rate sheet for advertisers at our website www.theforensicsteacher.com. If you sign up for a subscription you will receive an email when it is ready for download provided your spam filter doesn’t screen it out; sign up at our website. Back issues are available singularly on our website, or all on CD priced as per the website. The Forensic Teacher is copyrighted 2012 Wide Open Minds Educational Services, LLC, all rights reserved. All opinions expressed by contributors represent their own views, and not necessarily the views of the staff or editorial board.

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What teachers are saying

• “I am delighted to have found your website. It brings all the content we teach together in such a real-life way. It’s fantastic! Thank you for an amazing resource!”

• “I found this a fascinating site. I went through the first case because I am assigning it to my students as part of a CSI unit. I can’t wait to do the other two cases. Thank you for making science fun.”

This work was supported in part by a grant from the National Science Foundation to the Fort Worth Museum of Science and History.
Mini-Mystery

THE HARLAND AVENUE SYNDICATE

THOMAS P. STANWICK and Inspector Matt Walker sat in comfortable armchairs beside a blazing hearth. This Thursday evening found them as usual in the lounge of the Royston Chess Club. While Walker moodily chewed on his cheap cigar, Stanwick blew leisurely clouds of smoke from his Calabash pipe.

“Your rook maneuver was quite unorthodox, Matt,” Stanwick remarked contentedly, “but even with best play it couldn’t save the endgame.”

“Maybe not,” grumped Walker, “but it’s been a long week, and I’m tired.”

“When will I ever convince you of the restorative powers of an afternoon nap?” Stanwick grinned at his friend. “Churchill never missed his, and he carried a war.”

“I’m not the one who needs convincing. Tell the chief. If he found me napping, he’d bust me down to traffic cop.”

“Come, come. Next time you stop at a doughnut shop, rest in the parked car,” Stanwick said as Walker’s face began to redden. “Well, you say it’s been a long week. Any particular case on your mind?”

“Only extortion and murder,” replied Walker, still irritated. “The Harland Avenue syndicate runs an extortion operation in that end of town. Many of the small shops there pay ‘protection’ money. Our racketeering unit’s been after them for months.

“Now there’s been a homicide,” he continued more calmly. “Josie Welch owned Welch Electronics, a small computer repair shop on Harland. She refused to pay up, and last week the gang decided to make an example of her.”

“How was it done?” Stanwick asked somberly.

“Four members of the syndicate visited the shop about five last Friday afternoon,” said Walker. “While one waited in the car, three of them, including the driver, went inside. Some shouting was heard, and then one of them beat Welch to death with a small club that was left at the scene. No fingerprints. The killer was neither the driver nor the one who set the shop on fire just before they all fled in the car.”

“How much fire damage was done?”

“Not too much. Someone in a shop across the street saw the smoke and called it in. Our investigators are cooperating with the RFD arson squad.”

Stanwick toyed with the tip of his mustache. “Since you know the four were members of the syndicate,” he said, “I presume you have an idea who they were.”

“You are correct, sir,” replied Walker with a grim smile. “This was an equal-opportunity assault: two men and two women. They were John Mears, Edie Sullivan, Debra Hassey, and George Higgins. The arsonist, the killer, a backup thug or lookout, and a driver, in some order. We’re still gathering information from witnesses, snitches, and other sources.”

“I suppose these four have priors,” Stanwick remarked.

“Yes, but our information is incomplete. Many files were lost in another fire--the big one at the archives repository several years back. We do know that all four did time in Chisholm Penitentiary. One did three years, another did six, and the others did nine and twelve years. While there, they had amusing little pastimes. One tried digging an escape tunnel-right into the warden’s office. Another boned up on legal aid and appeal procedures. A third ran drugs. The fourth specialized in enforcing the pen’s unwritten rules. We just don’t know which was which!”

“Ah yes, that unfortunate fire!” Stanwick laughed. “It’s caused many a head-scratch. I hope your other info sources are reliable.”

“I think so. Word of the murder and the fire got on the street quickly--as I’m sure the syndicate intended by making an example of Welch. Would you like to know what we have so far?”

“By all means.”

Walker extracted a small notebook from his pocket and flipped over several pages. “The legal aid expert was in prison for nine years,” he said, “which was half again as long as the arsonist. The backup thug is either Mears or Higgins. Neither the arsonist nor Hassey was either the drug runner or the tunnel digger while in prison.”

“You’ll give me a headache yet,” remarked Stanwick. “Do you have anything more specific?”

“Yes, a bit,” replied Walker. “Sullivan was the prison’enforcer. Mears, who is not the backup thug, was in prison only half as long as Sullivan. The driver has never known a thing about legal aid, and the drug-runner was not the one who served the longest prison term.”

Stanwick smiled as he jotted notes on the back of a chess scoresheet. “Go home and sleep on it, napless one,” he said as he handed the scoresheet over to Walker. “With a clearer brain, you should be able to verify these deductions. Here are the identities of your killer and the rest!”

Who is the killer? (The answer is on page 39)

Stan Smith was the author of three books of Stanwick mini-mysteries that have been published in nine languages and sold over 120,000 copies.
Hot Sites

https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/forensic-chemistry.html
If you like chemistry and are thinking about a career in forensics this site provides background info to consider.

http://bsapp.com/forensics_illustrated/index.html
There’s some well-designed labs on this site if you’re looking to flesh out your curriculum, especially if you teach chemistry.

Plans for you to make a galvanic skin meter AKA a lie detector. Maybe you won’t catch one of your students in a lie, but you’ll have fun nonetheless.

http://fitsmallbusiness.com/how-to-detect-counterfeit-money
A neat guide to a whole new way to look at currency. Think you know what a real and fake bill look like? Think you can tell the difference? This site has some interesting things to say.

http://www.nclark.net/ForensicChem
A great collection of resources, but be warned: you’re going to get sucked in.

https://www.ncjrs.gov/pdffiles1/nij/225320.pdf
Talk about the Holy Grail—this is the Fingerprint Sourcebook from the National Institute of Justice. This book is so complete it’s forgotten more than you’ll ever know about fingerprints. Wow. Just wow.

http://www.naturphilosophie.co.uk/we-delve-into-time-of-flight-mass-spectrometry-forensics/
Don’t let the technical language distract you and you’ll be rewarded with a cool explanation of how great fingerprints really are.

Congrats!

To Nancy Kochis who teaches at LaSalle-Peru High School in Illinois. She was randomly selected from those who took the time to send us a lesson to publish. She’s won a snazzy digital microscope.

We’ll have more raffles in the coming months. Keep an eye on our website for more information. To be entered all you have to do is send us a lesson, lab, or exercise you created that’s worked great in your classroom.

Do you have a topic you’d like us to cover?
Do you have a lab you’d like to feature?
Email us, tell us about it!

admin@theforensicteacher.com
Going Postal
In a Good Way
The U.S. Post Office moves over half a billion pieces of mail every day. Think about that for a second.

Keep thinking.

Over five hundred million packages, letters, postcards, and other items fly through the system so fast they’re invisible to the naked eye. Yet, in spite of this blizzard of mail the U.S. Postal Inspection Service manages to fight crime in the form of fraud, theft, or the hazardous materials, drugs, and weapons people try to ship to one another. Staying on top of it all so Americans aren’t placed at risk is the role of the Silent Service, a group of men and women dedicated to ferreting out criminals and the items they try to mail. And leading them is Patricia Manzolillo, Laboratory Director at U.S. Postal Inspection Service.

To say she’s qualified would be an understatement: after delivering mail summers while a college student she became a forensic document examiner. After a several outstanding years she had the chops to rise to be the assistant lab director, then the top seat, director. She’s got a couple decades in, folks.

To say she’s dedicated would be a misnomer: the postal tradition in her family includes her father, grandfather, uncle, great-uncle, sister and husband’s grandfather. She bleeds postal blue.

She’s published research papers, belongs to a long list of forensic organizations, developed forensic science policy for the U.S. Attorney General, upgraded digital collection tracking of evidence for the U.S. Postal Service, and was responsible for the successful accreditation of the 45,000 square foot National Forensic Laboratory. When she talks forensics you better pay attention. Her lab is second only to the one over at the FBI. And, on top of all that, she’s fun to talk to.

We were fortunate to catch up with her on the phone from her office in our nation’s capital. She told us about what she and her people do, and what she thinks of education.
Forensic Teacher Magazine: What kind of kid were you? Were you curious about everything? Were you into solving mysteries and puzzles? Or, were you of the sort of kid that just didn’t care about that kind of stuff?

Patricia Manzolillo: I thought that normal kids were the ones that were curious and interested in solving mysteries and puzzles, but yes I was very interested in mysteries, I was always very interested in science. My mother was a chemist and then went on to be a science teacher and then actually a principal in the New York City school system. She fostered and encouraged all of those things in me to the extent that I would say one of my first experiences with science and labs was when she went back to college, and I was five years old, and she started to do her fetal pig dissection. And I have very strong memories of thinking this was the coolest thing ever!

FT: No way!

PM: And I wanted to dissect any dead thing I found.

FT: So, you were hooked from an early age! Let me ask you: I see in your bio you got a degree in history—but wait—if you were interested biology to that extent why did you get the degree you did?

PM: My original intent—I knew I wanted to be a forensic scientist from the time I was in high school, but at that time in the 1980s, pretty much our role model was Quincy. And I think some medical examiners had written some books about cases they had had. So, I had read all of those. I thought I would go to medical school and become a medical examiner. But the University of Chicago didn’t allow dual degrees. I probably could have gotten another degree in science because I took all my science classes in preparation for medical school, but I love history too so I wanted to study that as a secondary since I had a chance and I knew the rest of my career was going to be dedicated to science.

FT: That’s great!

PM: So, I ended up taking all these extra credits, but I think it’s important to be well-rounded, and history is my second love. And if you look at the courses I took I always ended up in law enforcement or legal because most of my history was focused on legal history. My thesis was on legal standing and issues of women in the ancient Mediterranean world, and then my sub minor in history was with American legal history. So, it all came together eventually.

FT: And, no doubt, you came across the Lindbergh case and other uses of forensics through history.

PM: Actually, I didn’t become interested in other aspects of forensic science immediately. I was still focused on being a medical examiner, so I decided to wait a few years and worked as a research assistant in a neurology lab at the University. At that point I decided that instead of going to medical school perhaps there were other areas in forensic science and I started doing research and that’s when I decided to get a masters in forensic science because, rather than spending years in medical school, and then years in a residency, and years getting competent and up to speed and getting a position as a medical examiner. By getting a masters in forensic science I would have a greater range of forensic disciplines to choose from and I would be working cases and doing stuff much faster.

FT: So, how did you go from wanting to be a medical examiner, where it’s dirty, wet work because you’re literally getting your hands up in someone’s body, to becoming a document examiner? That’s very dry work!

PM: You would think! Let me explain—I worked as a research assistant for a couple years and I started my masters program and, because of the work I had been doing, I felt that DNA would be it. That was the up-and-coming at the time, and I had done a lot of DNA technology and I had a large familiarity with it from my research position, and I thought that would be the area I would go into. And then one of the first classes in my masters program was an overview and we got talks from many different practicing forensic examiners. One day we had a document examiner come in and show us and tell us what they did and I thought this was so interesting because every case was different. And document examiners do such a wide range of things. You’re not extracting DNA and then following a set procedure every single time because that’s what you have to do with DNA. With documents everything is a puzzle and a mystery and that’s what I could be doing. So, I changed my focus in my first month of graduate school.

FT: That is too funny! Did you parlay your love for document examining into looking for a career for the post office?

PM: As you said, most people don’t know about us and that is by design and that has worked for many, many years. We’re encouraged to be the silence service, getting the work done,
capturing and convicting criminals. I think we’re trying to change a little bit so people understand who we are and the important role we have played in the Postal Service over our long history of over 200 years. I like to say my family has had postal blue in their veins: my father was 32 years with the Postal Service, my grandfather, my uncle, great uncles, various other relatives, and that was my summer job in college. I would come home and work as a casual, or temporary, employee delivering mail. Great summer job.

FT: No kidding!

PM: When I started doing research on if I wanted to be a document examiner I wondered where I should go, what laboratories I should aim for and I decided I would aim for a federal laboratory because I always thought working for the federal government would being an excellent career choice. And I spoke to my father he said I think the inspection service does this sort of thing, and I said yes dad they do, and they’re one of the most widely and best known for doing it, they’ve been doing it for years.

He got me the name of the inspector in charge who was responsible for the laboratory system at the time, and I made contact and set up my internship. I was an intern the Memphis Laboratory during my graduate program and that was in 1995.

FT: From your tone of voice I’m guessing you loved it?

PM: Absolutely! I trained with two very well respected document examiners, and I will say I understood the importance of an internship: you should treat it like a three month-long or however long interview, and this is the same advice I give to any interns or students who come to work for us. You never know how your paths will cross or the people you meet and demonstrate your skills to will be able to help you in future.

It was a wonderful experience, it solidified everything I thought about document examination—how much fun it could be, how interesting, how challenging—because every case is a puzzle. I went back and finished my degree six months later.

A still photo of a mail sorting machine that can sort thousands of pieces per minute.
And it was very lucky that the Memphis Laboratory of the inspection service where I did my internship had an opening. I applied, and because they knew me, they took me on and knew I had good training.

FT: Excellent! So here’s a question that popped into my mind just now—how do cases come to you, what flags a piece of mail and makes the inspection service want to look at it closer?

PM: How much do you know about the postal inspection service?

FT: Not much. I know you guys are good at what you do. I know you have labs second only to the FBI. I know you’re very effective because we never hear about the cases you foil, but that’s about it.

PM: The postal inspection service is the law enforcement arm of the Postal Service, and our mission is to support and protect the Postal Service. That mission means we are to protect the mail, we are to protect consumers of the mail, which is basically the entire population of United States, we are to protect our employees, which at the latest count is over 600,000 individuals, and we are also to protect our brand and our facilities. So, anything that is a threat to the Postal Service, it’s employees, its facilities, the mail itself, or the consumers of the mail is under our jurisdiction to protect.

We conduct the investigations with our inspectors, Federal law enforcement agents just like the FBI, Secret Service, or DEA, in order to further that mission. They look for prohibited use of the mail, which is the use of the mail to further any criminal activity. And that would be the shipping of controlled or illegal substances. They look to deter that, stop that, and prosecute any individuals or organizations using the mail for that. They will go after the use of the mail to commit fraud. I’m sure you’ve heard about people preying on the elderly or certain populations through the use of lottery scams. That’s a big issue now with individuals both inside and outside the country. And one of the biggest focus of the inspection service is keep that mail from reaching the Intended victim, and then investigating and prosecuting those individuals.

FT: Excellent! So here’s a question that popped into my mind just now—how do cases come to you, what flags a piece of mail and makes the inspection service want to look at it closer?

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And of course any violent crimes or robberies of any of our postal employees or our facilities. We will investigate and prosecute those in federal court. So, there’s a wide range of criminal activities the Postal Service is involved in investigating, and the forensic lab will have items submitted to us for examination by our different experts. We have four different units, and in those units I have about 65 forensic scientists. I have administrative personnel. I have a fingerprint and AFIS unit where I have fingerprint analysts who will do the traditional fingerprint examination—process evidence, develop the latent prints, do the comparisons, and identify or eliminate suspects.

I have my question documents and imaging unit where I have document examiners who will do handwriting exams, typewriting exams, altered document examinations, and counterfeit document examinations. The Postal Service has two products that are like cash: stamps and money orders, two items that people do try to counterfeit so we have document examiners to look at those. So, basically anything under documents—paper, ink, threatening letters. Before, you mentioned that document examination is kinda dry, but many times (laughs) they will have other things included with them.

FT: Like body parts or blood?

PM: They’ll put bodily fluids on them, whether it’s feces or blood or something that is intended to look like blood. We always treat it as carefully as possible and act as though the substances are real. Documents are not always clean. I also have the physical sciences unit and I have forensic chemists in that unit, and some of them do the analysis for controlled substances. And we do see a lot of illegal drugs in the mail. And we prosecute those individuals. The other half of my chemical unit does trace evidence. They do characterization of what types of hairs and fibers, any fire debris, any explosive devices, and we’ve seen those in the mail.

FT: Like letter bombs.

PM: Yes, and the most famous of these was the Unibomber. He used the mail system for all of his attacks. After 9/11 when people wanted to scare their ex-husband or their neighbor they might put some baking soda or other white powder in their threatening letter. We take those incredibly seriously because you don’t know what that white powder is and how it could harm our employees. [Ed. note: in 2001 letters containing a white powder that turned out to be anthrax spores were mailed to several individuals including two US senators. Five people died and 17 were infected.] And the last unit I have is one for digital evidence. These are computer forensic analysts placed at about 20 locations around the country and they will investigate any sort of media relevant to investigation.

FT: Now, a letter with fake blood on the outside is pretty obvious, but do your machines and employees screen them or they have to be reported to the Postal Service? I don’t imagine

Investigators focus on suspicious packages.
threatening letters or scams would be too obvious from the outside of the envelope.

**PM:** These investigations come about in a variety of different ways. The Postal Service does have a hotline or a tip line where people can call and make complaints or notify us, and a certain number of those will get sent to the inspection service for further investigation and follow-up. Some calls will also go to the office of Inspector General depending on the nature of what the call is about. They might be handled by the Postal Service or referred to another federal agency. Sometimes there will be an incident and the inspectors will investigate because of that. And obviously through normal law-enforcement investigation techniques, which we don’t always get involved in because on the backend of it. The postal inspectors do their thing to initiate the investigation and the evidence for examination will be sent to us. So, usually, the laboratory is not involved in the initial part of investigation.

**FT:** So, do you guys testify in court?

**PM:** Absolutely! We testify about the work we did, about the forensic investigation. We don’t testify about the rest of the case.

**FT:** Tell me, what was the most memorable case in your career?

**PM:** People ask that question all the time. A case that I worked, or a case that I was involved with in some way?

**FT:** Involved.

**PM:** Okay, it was a case that I had become manager of a document examiner. It was a very tough case because it was a very high-profile case, and of course that means there’s a lot of pressure on everyone to hurry up, get the results, and work very fast as there is in any high-profile case, especially because this involved a violent crime. I had a very qualified
return money to the victims. And I think that just because the convictions we’ve gotten, we’ve actually been able to others and stealing more money. In many cases, because of individuals from committing further fraud and victimizing because we stop the fraud. We identify it and we stop of fraud cases I think of how we are protecting the consumers played in some of the largest fraud cases. And when I think we are or even that we exist, and the significant role we have

Another thing is that I don’t think the public knows who warrants and they have to follow all the legal procedures. I have to have probable cause and they have to get search just go into a mail and open it up because they want to. They most sacred issues is that of privacy. Postal inspectors cannot case. What we do is try to protect the mail, and one of the One of the most common is that, since we are the inspection service, we inspect the mail, that what we’re doing easier for us to explain.

In the beginning I think it was challenging because forensic scientists didn’t realize it was happening, and didn’t realize what the expectations or the knowledge base of the jurors were, I think now it’s actually helped. I think most jurors understand that things don’t get done in 30 minutes, and there are still some challenges to overcome in the way technology is used and portrayed on the television shows or in movies because that is not reality.

It’s actually educated the public so much more that it helps us to do our job. When we are explaining things people are very interested, well, they’ve always been interested when we would testify because we are entertaining—well, I should say less dry—than other kinds of testimony, which is often, “This happened, then that happened, then this happened.” We also typically use demonstrative or court exhibits to help explain what we’re talking about, so that’s always more interesting. But I think it’s really helped because people understand where they have expectations about what we should do. And they ask questions like, “Why didn’t they do fingerprint on this case?” But I think it’s helped people understand the things that are being done and it makes it easier for us to explain.

FT: You guys have a lot of very sophisticated equipment in protocols and procedures for identifying threats in the US mail. Can you share any information with us about how something gets flagged? I mean, is there a machine that sorts letters and will beep if there’s an item that passes through the needs closer inspection?

PM: No, that’s another misconception about the postal service. People do not understand how fast the processing is. You can’t even see the individual letters as they fly by on the processing equipment (laughs). The rate and number of letters processed in a minute is astronomical. It’s amazing what we
do to move mail around the country. So, no, there is not a machine sitting there beeping when a suspicious letter comes through.

FT: So, you’re more dependent on people reporting things?

PM: Yes, I would absolutely say that investigations that are handled by the postal inspection service, the majority comes from other law enforcement agencies or from victims.

FT: You sound very passionate about what you do, and I think that’s perfect considering the job you have. You seem like a self starter, kind of person who looks at the world and says “Hey I gotta know more.” When you were in school you were the sort of pupil that teachers can only dream about—if it’s a subject you like all they have to do is bring it to your attention and you’re off and running. So, I have to ask—were there any teachers who helped fan the flames of inquiry and really lit a fire under you?

PM: I already mentioned my mom who was a teacher. And any child who has a teacher as a parent has a similar experience, but I would say yes. There was my fifth grade teacher who also understood that, while I was a child, you could set me off on my own, but it had to be something I was interested in or I wasn’t going to pay any attention to it (laughs). And, he gave me great freedom to do what I was interested in and didn’t pigeonhole me and say I had to do something a certain way.

And I’d also like to mention my AP history teacher in high school. I was also very quiet; I didn’t really speak up in class. And sometimes teachers, if they don’t pay attention, may not recognize what an individual has to offer. But she did recognize and bring things out of me that maybe other teachers wouldn’t have through one-on-one interactions with me.

FT: What do you think is the most important thing a teacher can do for their students?

PM: I think it’s very similar to what, as a manager, you have to do with your employees, and I understand this can be

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**US Postal Inspection Service Forensic Laboratories**

The U.S. Postal Inspection Service maintains a state-of-the-art National Forensic Laboratory in Dulles, VA, comprising highly trained forensic scientists and technical specialists who play a key role in identifying, apprehending, prosecuting, and convicting individuals responsible for postal-related criminal offenses. Its mission is to provide scientific and technical expertise to the criminal and security investigations of the U.S. Postal Inspection Service. Laboratory services are divided into discreet units which can be seen at [https://postalinspectors.uspis.gov/aboutus/lab.aspx](https://postalinspectors.uspis.gov/aboutus/lab.aspx).


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**The Question:**

I roughly recall that the motto of the U.S. Postal Service is in part, “Neither snow nor rain nor dark of night . . .” How does the rest go? And where does it appear?

**The Answer:**

Contrary to popular belief, the U.S. Postal Service has no official motto.

The familiar sentence you are thinking of is this:

“Neither snow nor rain nor heat nor gloom of night stays these couriers from the swift completion of their appointed rounds.”

This is commonly misidentified as the creed of our mail carriers, but actually it is just the inscription found on the General Post Office in New York City at 8th Avenue and 33rd Street.
challenging given today’s class sizes, but it’s to understand what motivates each child. Every child is different, and every child is going to react differently, and I understand it can be very, very hard. But don’t necessarily discount the quiet children (laughs). And don’t always discount the loud children either—they just need to be motivated differently. And I’m sure that’s nothing new to anyone who’s been a teacher.

FT: That makes a lot of sense. Any tips for students who want a career in forensics?

PM: A very strong science and math background. Statistics, which have always been very important in the certainty of measurements, are very important. Chemistry and DNA are going to play a much bigger role in the comparative sciences like fingerprints and handwriting and footwear and firearms. And I think it’s very important that everyone understand the foundations in those areas so they can talk knowledgeably about not just what they did, but how they reach the conclusions and the scientific basis for those conclusions.

FT: Sounds great. Listen, if Inspection Service received a letter or a package that needs to be checked out, how long does the process take? Does the person who is supposed to have received that mail wonder why the first class letter they were expecting in a couple days is still missing after three weeks?

PM: The mission of the Postal Service is to move the mail, to get the mail from the sender to the intended recipient within whatever time frame is appropriate for that mail rate. If something is flagged because, well let’s say it’s a package that’s leaking something, it could be a care package just going to a college kid, but if it’s leaking something it would have to be pulled out. We try not to delay mail for an investigation, to making sure it’s safe and can move forward any more than 24 hours.

I have to say there are times when the laboratory has to be involved, and we have a policy that if it’s something called live mail, that’s mail currently in the mail stream, but we need to investigate and make sure it’s safe to keep moving it forward, and it’s not anything that can harm someone we’ll have it sent to us or look at it remotely, but we’ll often turn things around in 24 hours to get that done. We don’t want to delay the mail.

FT: That’s the same with packages, even if they are overnight priority?

PM: Absolutely. There’s about 1300 postal inspectors. We are a very small federal law enforcement agency, but we’re very effective. Inspectors can respond and can handle it. We have protocols and procedures for doing exactly this. They check out the parcel, contact the mailer, find out exactly what it is, making sure it’s safe, or repackaging it to move it along as quickly as possible.

FT: I have other questions, but I expect you aren’t going to be able to answer them. Things like, how do you know a package contains drugs? Or, if the package isn’t ticking why do you suspect it contains bomb? This is the sort of general information I don’t imagine you want to give people tips about, how to sneak things through. But maybe you can answer this one: is there an arms race going on between smugglers and the Postal Service? They up their game, so you up yours, and so on?

PM: I think that’s true in any type of criminal activity once we are able to figure out what the scheme is. And this is true for any law-enforcement agency; the criminals are going to try to figure out a way around it. That’s just the nature of criminal activity.
A crime wave has hit the animal kingdom, and your students can help put a stop to it—even as they investigate the science behind animal-species identification and threats against wild animals.

*Using Forensics: Wildlife Crime Scene* opens with an overview of crimes that threaten different wild animal species around the world. Next come eight forensic training lessons and a simulation for the students to play out!

**Preserve the Evidence!**

To read a chapter, or to order your copy, visit [www.nsta.org/store](http://www.nsta.org/store) or call 1-800-577-5300.
GOING for BROKE

In the majority of cases involving a pistol, the person concerned knows very little about its mechanism. His first shot may be his last.

1 Evelyn Knight, the senior partner of the City firm of Knight and Deay, was still poring over ledgers at nine o'clock one night. The accounts were in a bad state.

2 The junior partner, Howard Deay, sat in an adjoining room writing a letter.

3 Barring the caretaker in the basement, the only other person in the building was Nigel Reeves, one of the clerks, who was reorganizing the files.

4 Just after 9 p.m. Reeves was summoned to Deay's room. The junior partner asked him to slip across the road to post a letter. He was back in ten minutes.

5 Later, Deay entered Reeves' room and asked the clerk to find the file on one of the overdue accounts. "Knight's too easy on them," Deay said. "He should make them pay up."

6 Reeves was just about to locate the file in question when the two young men were suddenly startled by a muffled report from the senior partner's room.

7 Deay ran into Knight's office, followed by Reeves. Evelyn Knight was slumped forward on his desk, a bullet wound in his head. There was a revolver on the floor.
Reeves wasted no time. He immediately phoned Scotland Yard to report the death, while the junior partner stayed with the dead man.

Inspector Black examined the body. It was not a pretty sight. He noted that the position of the bullet's entry was consistent with suicide — it had penetrated the right temple. He had used a small calibre gun, .22.

Then Inspector Black saw a cheque on the desk beneath the dead man's chest. In searching the room, he noted that the electric fire was a little.

He stopped to pick up some shreds. There were no scratches or markings of any kind on the desk or the floor.

Inspector Black then listened to the junior partner's details of the events of the evening. Finally, he questioned each man privately, taking careful note of the answers.

Besides the mysterious shreds and the strong scent of men's cologne, the Inspector found nothing out of the ordinary. He learned that the gun belonged to the dead man and was kept in his desk. Knight had worried about burglars.

The answer is on page 41.
# Forensic Analysis of Paper

**EQUIPMENT AND MATERIALS**

By Robert Bruce Thompson and Barbara Fritchman Thompson

You’ll need the following items to complete this lab session. (The standard kit for this book, available from [http://www.thehomescientist.com](http://www.thehomescientist.com), includes the items listed in the first group.)

## MATERIALS FROM KIT

- Goggles
- Coverslips
- Forceps
- Herzberg’s stain
- Jenk’s stain
- Magnifier
- Pipette
- Slides, flat

## MATERIALS YOU PROVIDE

- Gloves
- Camera with microscope adapter (optional)
- Desk lamp or other incident light source
- Microscope
- Paper towels
- Scissors
- Ultraviolet light source (optional)
- Watch or clock with second hand
- Specimens, known and questioned paper

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**WARNING**

Herzberg’s stain and Jenk’s stain are toxic and corrosive. Wear splash goggles, gloves, and protective clothing. Read the MSDS for each chemical you use and follow the recommended safety precautions.

[http://www.thehomescientist.com/kits/FK01/fk01-main.html](http://www.thehomescientist.com/kits/FK01/fk01-main.html)
BACKGROUND

Although it is made up primarily of cellulose fibers, paper is not the simple material that most people think it is. The basic material may be new or reprocessed fibers of cotton, linen, straw, or another natural fiber, or it may be chemically pulped or mechanically pulped wood fibers. Paper may be laid (produced on a patterned, directional screen; now used almost exclusively for handmade and art papers) or wove (produced on a fine, nondirectional screen; now used for 99% of all paper production). Various coatings, binders, and fillers are used in different papers, as are visible dyes (to change the tint) and ultraviolet brighteners. Better quality papers are often watermarked, which is a process that introduces a mark that is invisible by reflected light but visible by transmitted light.

Most people are aware that high-quality papers often contain high percentages of cotton or linen (so-called “rag”) fibers. In fact, high-quality paper is often marketed using such terms as “100% cotton bond.” But the original source of the fibers actually has little bearing on the quality of paper produced from them. How those fibers, regardless of their source, are extracted and treated determines the quality of the paper.

Most paper is produced using primarily or exclusively wood pulp, which is the least expensive source of cellulose fibers. Wood pulped mechanically, which essentially means grinding it up, gives high yields—one kilogram of wood yields about one kilogram of paper—but the quality of the paper is low because the lignin content is high. Such mechanical pulp papers are used primarily for newsprint, paperback books, and similar purposes, where paper longevity is not an issue. Wood pulped chemically—by treatment with concentrated sulfite or soda solutions—has most of the lignin removed. The downside of that is lower yields—as little as 50%—and accordingly higher costs, but the upside is that paper produced from chemical pulp is of excellent quality, as good as that produced from rag.

It is sometimes important forensically to determine if two paper specimens are closely similar or have distinguishable differences. For example, a question may arise as to whether a page was added to a contract or will. If the paper of the questioned page appears identical to the accepted pages under forensic examination, the questioned page may or may not be a part of the original document, because the person who added the questioned page may simply have used paper from the same stock as was used for the original document. But if the questioned page uses different paper from the rest of the document, it may reasonably be assumed that the questioned page was added later and was not a part of the original document.

A thorough forensic examination of a questioned paper specimen is typically done in four phases:

**Visual examination**
A preliminary visual examination of the gross physical characteristics of the paper specimen—color, weight, texture, transparency, watermarking, and so on—is occasionally sufficient to establish that the questioned specimen differs from the accepted specimen.

**Microscopic examination**
If the gross visual examination is inconclusive, the next step is to examine the questioned paper specimen microscopically by reflected and transmitted light. Two specimens that appear identical on gross visual examination may appear very different at 40X to 100X magnification. Differences in the type, length, or structure of the fibers, the size and shape of sizing or coating particles, or the dye absorption pattern of a colored paper are often sufficient to establish that two specimens differ.

**Differential staining**
It may be difficult or impossible to discriminate among the types of fibers present in the paper specimen using only visual and microscopic examination. Using differential stains—those that dye different types of fibers different colors—allows the examiner to determine which types...
Soil under the microscope

Lab X-3: Forensic Analysis of Paper

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of fibers are present in the specimen and in what relative numbers. We’ll use two differential paper stains in this lab session, called Herzberg’s stain and Jenk’s stain.

Instrumental analysis

If all other methods are inconclusive—and if the matter is sufficiently important to justify it—instrumental analysis may be used to compare the questioned paper specimen against an accepted specimen. The most common techniques used for this purpose are electron microscopy and neutron-activation analysis, both used to compare the minor constituents of the paper specimen, such as sizing and coating particles.

In this lab session, we’ll use the first three methods to compare various paper samples and discriminate one from another.

For your known and questioned paper specimens, obtain examples of as many similar types of white paper as possible. That is, try to obtain paper specimens that have no gross differences that would make it easy to discriminate between them at first glance. Specimens about 5 cm square are ideal, because they’re large enough to allow visual comparison but not so large as to include gross differentiators such as watermarks. Try to obtain specimens ranging from inexpensive copy paper to high-quality bond paper with differing rag percentages. We got our specimens from sources ranging from junk mail to old letters to old hardback books that were destined for the discard pile. For your questioned specimen, ask a friend or relative to choose one of the sources of your known specimens and produce the questioned specimen from it.

FORMULARY

If you don’t have the FK01 Forensic Science Kit, you can purchase Herzberg’s stain and Jenk’s stain from a law enforcement forensics supply vendor or make them up yourself. Wear gloves and safety goggles while making up and using these stains. Both are hazardous, particularly Herzberg’s stain, which is extremely corrosive.

It’s particularly important to use accurate weights and measures in making up Herzberg’s and Jenk’s stains, because small differences in the ratios between the components can cause major differences in staining behavior. For that reason, specimens stained with one batch of one of these stains cannot be compared to specimens stained with a different batch.

Herzberg’s stain and Jenk’s stain are reasonably stable in tightly capped containers stored in a cool, dark place. We’ve used samples of both that were five or more years old, and they worked properly. Note, however, that paper tests done years apart with the same batch of stain cannot be compared because the stains do gradually age and change properties.

Herzberg’s stain

Dissolve solid zinc chloride in 25 mL of distilled or deionized water to produce a saturated solution. (Caution: Corrosive!) Zinc chloride is hygroscopic and available in several hydration forms. It is also extremely soluble in water. Continue adding solid zinc chloride to the solution until undissolved crystals remain.

Separately dissolve 5.25 g of potassium iodide in about 5 mL of distilled or deionized water. Add 0.25 g of iodine crystals to the iodide solution and swirl until the iodine dissolves. Make up the iodide/iodine solution to 12.5 mL with distilled or deionized water.

Add 25 mL of the saturated zinc chloride solution to the 12.5 mL of the iodide/iodine solution with swirling to mix the solutions. Allow the mixed solutions to sit undisturbed overnight and then carefully decant off the red liquid, leaving any sediment present behind. Label the storage container Herzberg’s stain and date it.

Jenk’s stain

Dissolve magnesium chloride in 50 mL of distilled or deionized water to produce a saturated solution. Continue adding solid magnesium chloride to the solution until undissolved crystals remain.

Separately dissolve 2 g of potassium iodide in about 4 mL of distilled or deionized water. Add 1.15 g of iodine crystals to the iodide solution and swirl until the iodine dissolves. Make up the iodide/iodine solution to 20 mL with distilled or deionized water.

While swirling to mix the solutions, add 2.5 mL of the iodide/iodine solution to 50 mL of the saturated magnesium chloride solution. Allow the mixed solutions to sit undisturbed overnight and then carefully decant off the liquid, leaving any sediment present behind. Label the storage container Jenk’s stain and date it.
EXAMINE PAPER SPECIMENS VISUALLY

1. Examine the questioned specimen visually by transmitted light and by reflected flat and oblique light, both with the naked eye and using your magnifier. Note all visible characteristics, including color, texture, pattern, or weave, finish, and so on. If you have an ultraviolet light source, repeat your observations by ultraviolet light. Record your observations in your lab notebook.

2. Repeat step 1 for each of your known specimens, and attempt to determine if the questioned specimen is consistent visually with one or more of the known specimens.

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EXAMINE PAPER SPECIMENS MICROSCOPICALLY

1. Cut a small sliver of the questioned specimen, place it on a slide and cover it with a coverslip. Do not use any water or other mountant; we’ll examine the specimen first using a dry mount.

2. Examine the questioned specimen at 40X and 100X by incident (reflected) light. If solid particles are visible at 100X, they are probably coating or filler material. Increase magnification to 400X and try to determine the size, shape, color, and other characteristics of the solid particles. Record your observations in your lab notebook. If you are equipped to do so, shoot images of the specimen.

3. Turn off the incident light source and add one drop of water under the cover slip (or more, if necessary to wet the specimen thoroughly).

4. Examine the questioned specimen again at 40X and 100X by transmitted light. Record your observations in your lab notebook. If you are equipped to do so, shoot images of the specimen.

5. Repeat steps 1 through 4 for each of your known specimens, and attempt to determine whether the questioned specimen is consistent microscopically with one or more of the known specimens.

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EXAMINE PAPER SPECIMENS BY DIFFERENTIAL STAINING

1. If you have not already done so, put on your splash goggles, gloves, and protective clothing. (Jenk’s stain and particularly Herzberg’s stain are hazardous; although you will use them dropwise, you still need to protect your eyes, hands, and clothing.)

2. Label one microscope slide “Q-H” for your questioned specimen that is to be stained with Herzberg’s stain, and a second slide “Q-J” for the questioned specimen to be stained with Jenk’s stain.

3. Position a small sliver of your questioned specimen centered on each of the two slides.

4. Note the time, and put one drop of Herzberg’s stain on the “Q-H” slide and one drop of Jenk’s stain on the “Q-J” slide. (Use more stain if necessary to thoroughly wet each specimen.)

5. Allow the stains to work for one minute by the clock.

6. Use the corner of a paper towel to wick up the excess stain from each slide.

www.theforensicteacher.com
7. Using the disposable pipette, apply several drops of distilled water to each specimen to rinse out excess stain. Use a clean corner of a paper towel to wick off the rinse water. Repeat as necessary until all excess dye has been rinsed out.

8. Place a coverslip over the specimen and observe it at 40X magnification. Note your observations in your lab notebook. If you are equipped to do so, shoot images of the specimen.

9. Repeat steps 2 through 8 for each of your known specimens, and attempt to match the questioned specimen to one or more of the known specimens. Figure X-3-1 shows a typical differentially stained specimen at 40X. This specimen, stained with Jenk’s stain, reveals a combination of chemical wood pulp and chemical straw pulp fibers.

The effect of these two stains depends on their exact composition as well as the particular types of fibers being stained.

Herzberg’s stain dyes mechanical (ground) wood pulp—as well as other wood-like fibers that contain significant lignin, including jute, flax, and hemp—a yellow shade that may vary from lemon yellow to egg-yolk yellow. Chemical (sulfite or soda) straw or wood pulp and similar wood-like fibers from which most or all of the lignin has been removed are dyed a blue shade, from sky blue to navy blue. Cotton and linen fibers (from high-rag content bond papers) are dyed a wine-red color.

Jenk’s stain dyes mechanical wood pulp fibers yellow, chemical wood pulp fibers anything from colorless to deep red, chemical straw pulp fibers blue to violet, and cotton or linen fibers brown.

**Figure X-3-1: A differentially stained paper specimen at 40X**

**REVIEW QUESTIONS**

Q1: Which, if any, of your tests allowed you to determine that a possible match existed between your questioned specimen and one or more of your known specimens? How?
Q2: You have treated a paper specimen with Herzberg’s stain and Jenk’s stain and found that both stains dye all of the fibers in the specimen a yellow color. What do you conclude about the fiber type and general quality of the specimen?

Q3: You have a paper specimen thought to be a high-quality bond paper with 50% rag content. What results would you expect if you treated this paper with Herzberg’s stain and Jenk’s stain?
In my unit on documentation (handwriting analysis, ink chromatography, art forgery and currency evaluation), I include the study of codes and ciphers. My students LOVE this portion of the unit! Secret codes and ciphers are always intriguing and bring out the kid in all of us. After teaching students about the various ciphers available for use, we practice generating and deciphering our own secret messages. Then, as an assessment of their learning, I developed a cipher scavenger hunt which sends students around our school building in order to find the next message. While this was time-consuming for me to create at first, it is easy to use each year and modify as needed. Students decipher their first message in my classroom and then follow the clue to the next message (our guidance office) and then another eight stops around the school. Colleagues are always happy to be part of the scavenger hunt stops and have the messages on their desks or near their classroom doors for distribution. I have run this activity for several years and soon realized that I needed to start with an email to my fellow teachers about students in the hallway and to provide rules of behavior to my students before they left the classroom. I also found it helpful to meet students at the first stop to clear up any misconceptions and put them back on track if they were becoming frustrated. It’s a little more relaxed when deciphering messages at your own desk than it is when you’re racing other teams and trying to find your next clue! My students have enjoyed this activity greatly and I look forward each year to providing it to them.

Cypher Assessment Rules:

1. Stay together as a group (DON’T run).
2. Stay quiet and ask for clues politely (don’t interrupt class)...if they don’t know what you’re talking about, your solution to the cipher is wrong.
3. Keep all clues IN ORDER.
4. Identify cipher type and properly translate the clue.
5. Each person on your team MUST SOLVE at least two ciphers (initial the paper).
6. Return to the room when there are five minutes left of the period (finished or not).
7. Winning team: keeps all clues, has the proper order, translates them properly, returns earliest to the classroom.
8. You MAY use your deciphering ring(s), Braille paper, Morse code paper, notes. This counts as a QUIZ grade!

For the PowerPoint file I use to show my class to explain codes and ciphers and the background on all the methods used please click [Here].
As a culminating activity for my students’ work on codes and ciphers, I have teams of students work through scavenger hunt clues around our school building. The clues they are to solve require using ciphers they’ve learned in class such as: codeword, simple (shift 4), complex (using a deciphering ring), pigpen, Braille, Morse (code), second-letter, simple, and block cipher.

In order to make this work, I received permission from my principal to have my students in the hallway during their class period and then contacted fellow staff members to see if they would be willing to be included in the hunt. After that, I created a list of the places students would report to for a clue and the types of ciphers I could use. For example:

<table>
<thead>
<tr>
<th>Cipher type</th>
<th>Begins where</th>
<th>Sends students to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code stick</td>
<td>(my room)</td>
<td>Guidance</td>
</tr>
<tr>
<td>Complex cipher (5-3)</td>
<td>Guidance</td>
<td>Mrs. Bandy’s room</td>
</tr>
<tr>
<td>Codeword cipher</td>
<td>Mrs. Bandy’s room</td>
<td>Chemistry lab</td>
</tr>
<tr>
<td>Braille</td>
<td>Chemistry lab</td>
<td>Mr. Seller’s room</td>
</tr>
<tr>
<td>Pigpen cipher</td>
<td>Mr. Seller’s room</td>
<td>Attendance office</td>
</tr>
<tr>
<td>Complex cipher (shift 4)</td>
<td>Attendance</td>
<td>Mr. Ward’s room</td>
</tr>
<tr>
<td>Simple cipher</td>
<td>Mr. Ward’s room</td>
<td>Study hall</td>
</tr>
<tr>
<td>2nd letter cipher</td>
<td>Study hall</td>
<td>Main office</td>
</tr>
<tr>
<td>Morse (code) cipher</td>
<td>Main office</td>
<td>Mr. Fetter’s room</td>
</tr>
<tr>
<td>block cipher</td>
<td>Mr. Fetter’s room</td>
<td>back to my room</td>
</tr>
</tbody>
</table>

Finally, with this guideline in place, I wrote the clues for the hunt (see the next pages) and then sent an email out to the staff warning them that students would be out and about during class time.
PREPARING THE CLUES:

1. Codestick cipher: wrap a piece of adding machine tape around a meter stick so that each wrap is next to the one before it and forms a long piece of paper. While in place, use a marker to write your cipher along the length of the meter stick (I wrote: “Begin by going to the guidance office”). Unwrap the paper from the meter stick and leave both in place for your teams to analyze. Make as many of these clue strips as you have teams (I use these over and over each time I run this activity)

2. Clue 2 is a complex cipher…this means that students must use a deciphering ring (with a window)—see below—in order to solve the clue. It is a 5-3 cipher meaning, students set the ring so that the number 5 appears in the window. After each letter, they advance the ring 3 places. I pick up a box of brass brads from an office supply store so students have a way to keep the rings together. Templates for deciphering rings are at the end of this article. The clue sent them to Mrs. Bandy’s room (our Spanish teacher) and reads “Next find Mrs Bandy”:
   
   KTAQ/ZNRB/XON/SXWVZ

3. Clue 3 is a codeword cipher…this means that a word is given. Students then write the codeword and the rest of the alphabet (but they skip any duplicated letters found in the codeword). The codeword for my clue was “Spanish”. What the student would write is listed below (notice that the S is written only one time even though it appears in the word Spanish twice):

   Cipher:

   | S | P | A | N | I | H | B | C | D | E | F | G | J | K | L | M | O | Q | R | T | U | V | W | X | Y | Z |
   | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |

   This clue sent students to the chemistry lab and reads:
   
   “Go to the chemistry lab”

   (Spanish)

   BL/TL/TCJ/ACIJDRTQY/GSP
4. Clue 4 is written in Braille. Students are allowed to use their copy of the Braille alphabet. This clue sends them to Mr. Sellers room (our MRDD teacher) and reads

“Off to Mr Sellers room”

![Braille Characters]

*note: if you copy this type of clue several times onto one page, be sure to indicate which side is up.

5. Clue 5 is a pigpen cipher (my favorite!). Students write a grid (like a tic tac toe) and then an X. Pairs of letters are written into these symbols (see below). The first letter uses the shape of the area it’s sitting in. The second letter uses the same shape, but also includes a dot.

![Pigpen Cipher]

More information is at [http://www.civilwarsignals.org/cipher/pigpencipher.html](http://www.civilwarsignals.org/cipher/pigpencipher.html)

This clue sent my students to the attendance office and is deciphered as “attendance”

![Cipher Characters]
6. Clue 6 is a complex cipher with the following clue given: “Shift 4”. This tells the person deciphering the clue to write the normal alphabet (plaintext) and then write the cipher by writing the alphabet again, this time shifting four letters (as below):

| E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | A | B | C | D |

Cipher:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
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<td>A</td>
<td>B</td>
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<td>T</td>
<td>U</td>
<td>V</td>
<td>W</td>
<td>X</td>
<td>Y</td>
<td>Z</td>
</tr>
</tbody>
</table>

Therefore the clue: KS/XS/QV/AEVHW/VSSQ deciphers into:

“GO TO MR WARD’S ROOM”

7. Clue 7 is a simple cipher. To decipher the clue, students write the alphabet (plaintext) and numbers as the cipher. They then use this information to translate. Therefore the clue: 14-15-23/20-15/19-20-21-4-25/8-1-12-12 deciphers into: "Now to study hall"

8. Clue 8 is a “second letter cipher”. This requires the participant to start with the first letter in the message, then read every other letter. When the clue is finished, the return to the beginning Cipher: the second letter, then every other letter thereafter. Here’s the message:

PTLHEEAMSAEIGNOOOFFFITCOE

Deciphering as described above, this clue says:

PLEASE GO OFF TO THE OFFICE
9. Clue 9 is written in Morse Code (this would actually be considered a cipher). Students have a copy of the code which they can use to help solve the next clue*:

```
--./--- ||-/-||/--- ||-/-||/--- ||-/-||/--- / / / / / / / / / / / / ---/---/---/---
```

Which deciphers into: GO TO MR FETTERS ROOM

*because this is on a strip of paper (and might get flipped upside down), it is good to note where to begin deciphering the message

10. The final clue, clue 10 is a block cipher. The message gets enciphered by dividing it into rows. For example, the original message was GO BACK TO THE ROOM. The message consists of 15 letters. It was enciphered by blocking it into 3 rows of 5 letters like this:

The clue was then created by reading “down” the columns…this is what appeared on the slips for students to decipher:  **GKE OTR BOO ATO CHM**

I keep a copy of the clues on my computer in case I need to change them. I also made envelopes to contain the clues at each stop. On the outside of the envelope, I write the name of the person I should give the clue to…that person holds onto the envelope and passes out clues from it…then returns it to me or my mailbox at the end of the day. The envelopes and clues are used over and over.

Students **always** enjoy this assessment activity…it allows them to show what they’ve learned and apply that knowledge in a fun and interesting way.

Deciphering Ring examples:        Simple…

<table>
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<tr>
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<td>E</td>
<td>R</td>
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<td>O</td>
<td>M</td>
</tr>
</tbody>
</table>
Braille is an example of a cipher:

\[
\begin{array}{c|ccccccccccc}
\text{a} & \text{b} & \text{c} & \text{d} & \text{e} & \text{f} & \text{g} & \text{h} & \text{i} & \text{j} \\
\text{k} & \text{l} & \text{m} & \text{n} & \text{o} & \text{p} & \text{q} & \text{r} & \text{s} & \text{t} \\
\text{u} & \text{v} & \text{w} & \text{x} & \text{y} & \text{z} \\
\end{array}
\]

Morse "code" is also a CIPHER:

**INTERNATIONAL MORSE CODE**

1. A dash is equal to three dots.
2. The space between parts of the same letter is equal to one dot.
3. The space between two letters is equal to three dots.
4. The space between two words is equal to five dots.

\[
\begin{array}{ll}
\text{A} & \text{B} \\
\text{C} & \text{D} \\
\text{E} & \text{F} \\
\text{G} & \text{H} \\
\text{I} & \text{J} \\
\text{K} & \text{L} \\
\text{M} & \text{N} \\
\text{O} & \text{P} \\
\text{Q} & \text{R} \\
\text{S} & \text{T} \\
\text{U} & \text{V} \\
\text{W} & \text{X} \\
\text{Y} & \text{Z} \\
\text{1} & \text{2} \\
\text{3} & \text{4} \\
\text{5} & \text{6} \\
\text{7} & \text{8} \\
\text{9} & \text{0} \\
\end{array}
\]
A Blacklight on the Cheap

Step 1: Get tape (transparent is best), smartphone, and blue and purple Sharpie markers.

Step 2: Grab a small piece of tape and fold it over on the end so you can peel it off easily.

Step 3: Apply the tape.

Step 4: Color the first layer of tape with blue.

Step 5: Put one more layer of tape with blue and then make the final layer of tape with purple.

Enjoy your smartphone-hacked Black light!
For those of you who were unable to attend the awards dinner during the annual American Academy of Forensic Sciences meeting in San Diego, you missed a tall tale on compelling forensics presented by AAFS President Don Harper Mills in his opening remarks. The following is a recount of Dr. Mills’s story:

On March 23 the medical examiner reviewed the body of Ronald Opus and concluded that he died from a gunshot wound to the head caused by a shotgun. Investigation to that point had revealed that the decedent had jumped from the top of a ten-story building with the intent to commit suicide. (He left a note indicating his despondency.) As he passed the 9th floor on the way down, his life was interrupted by a shotgun blast through a window, killing him instantly. Neither the shooter nor the decedent was aware that a safety net had been erected at the 8th floor level to protect some window washers, and that the decedent would not have been able to complete his intent to commit suicide because of this.

Ordinarily, a person who starts into motion the events with a suicide intent ultimately commits suicide even though the mechanism might be not what he intended. That he was shot on the way to certain death nine stories below probably would not change his mode of death from suicide to homicide, but the fact that his suicide intent would not have been achieved under any circumstance caused the medical examiner to feel that he had homicide on his hands.

Further investigation led to the discovery that the room on the 9th floor from whence the shotgun blast emanated was occupied by an elderly man and his wife. He was threatening her with the shotgun because of a spat and became so upset that he could not hold the shotgun straight. Therefore, when he pulled the trigger, he completely missed his wife, and the pellets went through the window, striking the decedent.

When one intends to kill subject A, but kills subject B in the attempt, one is guilty of the murder of subject B. The old man was confronted with this conclusion, but both he and his wife were adamant in stating that neither knew that the shotgun was loaded. It was the longtime habit of the old man to threaten his wife with an unloaded shotgun. He had no intent to murder her; therefore, the killing of the decedent appeared then to be accident. That is, the gun had been accidentally loaded.

But further investigation turned up a witness that their son was seen loading the shotgun approximately two days prior to the fatal accident. The investigation showed that the mother (the old lady) had cut off her son’s financial support, and her son, knowing the propensity of his father to use the shotgun threateningly, loaded the gun with the expectation that the father would shoot his mother. The case now becomes one of murder on the part of the son for the death of Ronald Opus.

Further investigation revealed that the son became increasingly despondent over the failure of his attempt to get his mother murdered. This led him to jump off the ten story building on March 23, only to be killed by a shotgun blast through a 9th story window. How did the medical examiner rule the manner of death?

The answer is on page 39.
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Written by a Science Teacher - edited by a Cop!
Using Parents to Learn Forensics

By Chris Bily

Background

In July of 2012 I was hired by West Virginia University as a Forensic Science Instructional Coordinator to lead the Next Generation Forensic Science Initiative, a K-12 outreach program. My immediate challenge was to create an interactive forensic science exhibit for the 2013 National Scout Jamboree held at the Bechtel Reserve in southern West Virginia. At the conclusion of the Jamboree my responsibilities shifted to the development and delivery of forensic science outreach programs for the youth and educators of West Virginia.

My programs were directed initially towards offering classes in a variety of forensic science disciplines for middle school and high school students. At these classes I would regularly receive requests from parents asking if they could attend. These requests were not unusual. I have taught forensic science to youth for many years and without exception I have always had parents that expressed an interest in learning the material being taught to their children. I decided it was time to offer a series of classes for parents and children, thus the Parent/Child Forensic Science Classes.

The classes were advertised for the fall of 2015. The registrations were so numerous that I decided to offer two sections with a capacity for ten parent/child teams. After the first class both sections were filled to capacity, presumably through word of mouth.

The Curriculum

Developing the curriculum for this series of classes was fairly straightforward: I wanted to emphasize hands-on activities. Regardless of the age of the audience, there is one universal truth that I always try to follow, namely, “Participants would much rather learn how to do something rather than learn how something is done!”

Based on previous experiences, three forensic disciplines were chosen: footwear impression evidence, firearm identification, and bloodstain pattern analysis. In the footwear impression evidence class participants learned how to recover footwear evidence through dental stone casting and how to compare and identify crime scene impressions to exemplars of
suspect’s shoes. In the firearm identification class they learned how to measure and evaluate class characteristics of fired bullets and how to compare bullets from crime scenes/victims to test fired bullets from a suspect’s gun. In the bloodstain pattern analysis class participants created bloodstain patterns employing a variety of different mechanisms.

Program Success

At the conclusion of the first set of classes, I held an informal discussion and distributed an anonymous written survey to assess the effectiveness of the classes. The data gathered from these assessments was powerful and compelling. The consensus from the participants was that they thoroughly enjoyed the content of the classes as well as the way they were delivered and they would participate in another set of classes if they were offered. This provided the impetus necessary to develop a second series of classes to be offered in the spring of 2015.

The new topics were Fingerprints I, Fingerprints II, Shooting Reconstruction, and a class titled You Crack the Case which consisted of mock crime scenes that would allow the participants to apply their cumulative knowledge within the framework of a simulated criminal case. This class proved to be an excellent synthesis of participants’ retention and ability to apply information learned in isolation to a novel situation. The results provided significant empirical evidence that the Parent/Child Forensic Science Classes are a successful model of education.

Benefits

The benefits of the Parent/Child Forensic Science Classes are numerous and noteworthy:

- **Parent/Child Relationships** – A goal throughout this series of classes was to provide an opportunity for parents and children to build and strengthen relationships through mutual interest in scientific inquiry. The images in figures 1 through 5 qualitatively illustrate the memorable relationships that developed between parent and child. Not only did the participants get to learn exciting and interesting science, they forged memories together that will last for many years to come.

- **Vested Interest** – Having parents intimately involved in their children’s education is an ideal situation. Rarely do parents get to go to school with their children and learn the same material together. The Parent/Child Forensic Science Classes give parents a sense of ownership in their child’s education and it also gives them confidence in the nature and quality of instruction that their children are receiving at school.

- **Maintaining Focus** – The overwhelming number of our child participants fell into the middle school category. As anyone who has ever taught middle school students can tell you, keeping them on task can be challenging. This was not the case when their parents were present and actively engaged in the same environment, instruction, and materials. On the rare occasion that a child got off task, their parent/guardian quickly reined them in.

- **Public Relations** – It is impossible to overemphasize the positive impact that these classes have on the community at large. Parents come from all walks of life; welders, accountants, teachers, doctors, politicians and the like. They are valuable assets as you grow and develop your program. As individuals of power and/or influence in the community, they will be an excellent source of advertising. It’s important to remember that you are doing much more than teaching a class; you are building relationships and a reputation.

- **Science Education** – Increasing people’s knowledge, whether it be parents or children, in any type of science is valuable and worthwhile. To our society, which is increasingly driven by science and technology, enhancing scientific literacy, in any venue, is of critical importance.

- **Combating the CSI Effect** – The CSI Effect is a term that has been coined in the criminal justice system to refer to the negative influence that criminal justice/forensic science based television programming has had on the criminal justice system. As this genre of television programming has proliferated, the expectations of society in regard to the prevalence of forensic evidence at crime scenes and the capabilities of crime laboratories has
become grossly over exaggerated and unrealistic. This problem has become clearly evident in the court room and has negatively impacted cases in such a way as to allow justice to go unserved. These classes demonstrate that science proceeds more slowly and involves more work as opposed to the way that it’s portrayed on television.

- **Science Isn’t Easy** – Revisiting television once again, forensic science is presented in such a way as to appear easy and uncomplicated. This is anything but the case. When presenting fundamental topics in a serious and structured academic environment, the participants very quickly realized that being a forensic scientist is a difficult job that requires a great deal of education in math and science.

- **A Dose of Reality** – This is a golden opportunity to provide youth with genuine experiences that allow them to make decisions about whether or not they are really interested in forensic science. Watching something being done on television that is presented in a glamorous environment surrounded by compelling graphics and images is one thing; rolling up your sleeves, sitting at a lab bench, and doing the work is another thing altogether.

**Lessons Learned**

The first lesson I learned was the importance of having staff that is properly trained and that enjoy working with parents and children. One of the reasons for the success was because of the student workers and their ability to engage and interact with the participants.

The second lesson I want to emphasize is preparation. Good preparation and knowing your audience yields positive experiences. All but one of the labs went off without a problem. The participants had performed so admirably in all of the other classes that I assumed that they would be able to handle the math which included geometry and trigonometry in the shooting reconstruction class. That error in judgment resulted in a lot of unnecessary confusion and frustration.

The third lesson I learned was not to underestimate the importance of take-away items produced during the course of the classes. Several parents and children commented that they really enjoyed being able to take home the exhibits that they made in class and that they were prominently displayed in their homes. While I never queried them as to why, I suspect that these tangible items provided a physical reminder of an enjoyable and stimulating shared learning experience between parent and child.

**Closing Remarks**

The value of the Parent/Child Forensic Science Classes were personally and professionally rewarding and a great deal of fun. Their scientific value is substantial and multidimensional. The short and long term benefits of holding these classes should not be underestimated. Future social bonding between parent and child is an unanticipated outcome. I hope that you consider offering similar classes yourself.
Going for Broke

It wasn’t difficult to suspect foul play in this so-called “suicide” case. Firstly, it was August 11th, and a warm night (the partners and clerk were in their shirt sleeves), yet the electric fire in Knight’s room was burning. Also, why would a man about to commit suicide bother to endorse a cheque? The little shreds I picked up from behind Knight’s desk meant nothing to me until Reeves said that he had thought it strange to see a toy balloon on Deay’s desk before he went out to post a letter (see pic. 2). When Reeves ran into Knight’s office upon hearing the shot, he noticed some shreds near the gun on the floor. Here is my theory: Deay shot Knight while Reeves was out posting the letter. The junior partner had picked an opportune moment to get the clerk out of the office, since the letter could have been posted the next day, there being no collection that late at night. Then he blew up the balloon and turned on the fire. When he heard Reeves return, Deay tied the balloon to the heater and went into Reeves’ room with some papers. The heat of the electric fire burst the balloon, creating the sound of a revolver going off. (The revolver was of .22 calibre and would have accounted for the muffled sound.) While Reeves phoned the police, Deay dashed in and turned off the fire. I did find the other shreds of balloon in Deay’s room.

The Harland Avenue Syndicate Mini Mystery (page 6)

Debra Hassey is the killer. The weary Walker failed to notice that if the backup thug was either Mears or Higgins, but not Mears, he had to be Higgins. The prison legal aid expert, who served nine years, was not the arsonist, who served six years. Since the arsonist was neither the prison drug runner nor the prison tunnel digger, he must have been the prison “enforcer,” who was Sullivan. Sullivan, both arsonist and prison “enforcer,” served six years. The longest term, twelve years, was served not by the legal aid expert (nine years) or by the drug runner, and so was served by the tunnel digger. This leaves the prison drug runner as the one who served three years. This was Mears, who served half as long as Sullivan. The tunnel digger was not Hassey, and was therefore Higgins. Hassey by elimination was the legal aid expert, and served nine years. Hassey, the prison legal aid expert, is not the driver (who knows nothing of legal aid) or the arsonist (the prison “enforcer,” Sullivan) or the backup expert, and served nine years. Hassey, the prison legal aid expert, is not the driver (who knows nothing of legal aid) or the arsonist (the prison “enforcer,” Sullivan) or the backup thug (the prison tunnel digger, Higgins). She is therefore the killer. Mears by elimination is the driver.

Critical Thinking Exercise: The medical examiner closed the case as a suicide.
Ink Analysis

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Ink from most ball-point pens and markers can be developed by paper chromatography using 70% isopropyl rubbing alcohol as the eluting solvent.

Materials:
- Assorted pens
- Chromatography paper (either one sheet 10 cm x 20 cm, or single strips)
- Beaker, 600 mL or plastic 8 ounce (or larger) cups
- Stapler
- Watch glass or plastic wrap
- Isopropyl rubbing alcohol
- Pencil
- Rulers, 12 inch
- Safety glasses or goggles

Safety Precautions
Wear safety glasses or goggles to protect your eyes from the alcohol vapors or any splashes.

Isopropyl alcohol is flammable. Avoid sparks or flames. Dispose of waste alcohol in a safe manner.

Procedure
Obtain a sheet of chromatography paper. Hold the paper by the edges to avoid fingerprints which will interfere with the chromatography process.

Draw a pencil line on the chromatography paper about 1 cm from the bottom. This will be the origin.

Using the test pens available, place a small spot of ink on the pencil line. Directly above each spot, label the paper, in pencil, with the name or identification of the pen used. (See Figure I-1)

Place a spot of ink from the “crime scene note” on the pencil line and label the paper accordingly. (Note: you may have someone select one of the pens used to spot the paper as ink from the “crime scene note”.)

Roll the paper into a cylinder, butt the ends together, but do not overlap them, and staple the paper together.

Add about 25 mL of isopropyl alcohol to the 600 mL beaker. Place the chromatography paper into the beaker. Cover the beaker with a watch glass or with plastic wrap. (See Figure I-2)

Allow the beaker and chromatography paper to sit for up to 30 minutes for the inks to separate. Do not disturb the beaker during this time.
When the inks have separated sufficiently or the ink smears have moved approximately 2/3 of the way up the paper, remove the chromatography paper from the beaker. Open it flat and place it on a paper towel to dry.

Does the ink from the “crime scene note” match any of the inks from the known pens?

As an alternative procedure, inks can be placed on separate strips of chromatography paper. (Author’s Note: Use the same method for all ink samples to insure reproducible results.)

Suspend the chromatography paper into a plastic or glass tumbler which contains approximately 10 mL of the solvent that was effective in dissolving the ink from the note paper. (Either water or isopropyl alcohol.) (See Figure I-3)

When the ink has separated sufficiently or the ink smear has moved approximately 2/3 of the way up the paper, remove the chromatography paper from the container. Lay it flat on a paper towel to dry.

**Figure I-1.** A sheet of chromatography paper for analyzing ink from several pens at one time.

**Figure I-2.** The chromatography paper placed in a container of alcohol to separate inks.

**Figure I-3.** Chromatography of a thin strip of paper for single ink samples.
Analyzing ink from a written note

Any letter or note to be analyzed must be photographed before examination. The note should not be cut up or destroyed, however, a small piece of the note can be cut out to analyze the ink.

Ink from a note or letter can be removed and developed by paper chromatography. The ink is usually tested with methanol (wood alcohol), 70% isopropyl rubbing alcohol, or, stronger solvents, such as pyridine, as needed. For safety purposes, this procedure will only use water or alcohol as solvents.

**Materials:**
- A “crime scene note”
- Chromatography paper (either one sheet 10 cm x 20 cm, or single strips)
  (Note: Strips of white, smooth surface coffee filters can be used.)
- Beaker, 600 mL (Note: A clear plastic or glass tumbler can be used.)
- Watch glass or plastic wrap
- Test tube or small container such as a 10 mL beaker
- Dropper
- Water
- Methanol (wood alcohol, available from hardware stores)
- Isopropyl rubbing alcohol
- Pencil
- Paper clip
- Scissors
- Safety glasses or goggles
- Capillary tube or small coffee stirrer straw

**Safety Precautions**
Wear safety glasses or goggles to protect your eyes from the alcohol vapors or any splashes.

Methanol and isopropyl alcohol are flammable. Avoid sparks or flames. Dispose of waste alcohol in a safe manner.

Alcohol used in this experiment should be placed in small containers, for student use, to minimize spills.

**Procedure**
Cut a small piece of paper from the “crime scene note” containing a dark sample of the ink. A strip containing a few words works well. (Do not cut up the original note into small pieces, it is needed for handwriting analysis. It is good practice to photograph or to make Xerox copies of any “crime scene notes” before cutting off samples.)

NOTE: Ball point pen ink is usually not water soluble. If you are certain the ink is from a ball point pen, go directly to the isopropyl alcohol procedure.

Place the piece of paper into a test tube or small container. Add one or two drops of methanol to wet the paper and the ink. There should be enough methanol so that all of it is not absorbed by the paper. Avoid a large excess of liquid or the ink solution produced will be too dilute for good results.
Allow the sample to sit for several minutes. If the ink is not soluble in the methanol, repeat the procedure with a fresh sample of ink from the “crime scene note” using isopropyl rubbing alcohol as the solvent.

Note: If the ink is not soluble in methanol or isopropyl alcohol, then this procedure cannot be used.

Obtain a piece (or several single strips) of chromatography paper. Hold the paper by the edges to avoid fingerprints which will interfere with the chromatography process.

Draw a pencil line on the paper about 1 cm from the bottom. This will be the origin. (See Figure I-1)

Using a capillary tube or a coffee stirrer straw, dip the end into the ink solution in the test tube, then, lightly touch the capillary tube to the chromatography paper to place a small spot of the ink solution the pencil line. At the top of the paper, label it, in pencil, with the name or identification of the ink sample used. Note: The ink spot may not be dark, as compared to the ink on the original note. You can add additional spots of the ink solution directly on top of the spot on the chromatography paper. Be sure to allow the spot to dry completely before adding additional spots of ink solution.

If you are using a 10 x 20 cm sheet of chromatography paper, place small spots of ink from suspect pens on the paper spaced along the pencil line. Label the chromatography paper at the top with the identity of the pens. If you are using single strips of chromatography paper, then prepare strips for each pen and mark each strip with the proper identification.

When the ink has separated sufficiently or the ink smear has moved approximately 2/3 of the way up the paper, remove the chromatography paper from the container. Lay it flat on a paper towel to dry.

Compare the chromatogram of the ink with samples from pens found at the crime scene. The colors and order of separation should match, but the individual sample most probably will not be as dark as ink samples from the pens.
INK ANALYSIS

Data and Results

Name _______________________________     Course and Section _______________

Partner(s) _______________________________     Date _________________________

Ink Analysis

Attach the chromatography paper to this sheet.

Does the ink from the “crime scene note” match any of the inks from the known pens? Explain.

Analyzing ink from a written note

Was the ink soluble in alcohol?

Did the ink sample from the “crime scene note” match the ink from any of the pens you previously tested?
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Bloomin’ Easy!
One of the best things about teaching forensics is watching your students mature intellectually. Benjamin Bloom first published his taxonomy of thinking skills in 1956. As teachers we have an obligation to help students learn to use their minds in more powerful ways. The chart below lists suggestions for you to push your students mentally to higher places. Give them a try; often the difference between an easy forensic assignment and a challenging one is what you ask of your students.

<table>
<thead>
<tr>
<th>Level</th>
<th>Type of Activity or Question</th>
<th>Verbs Used for Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest level</td>
<td>Knowledge</td>
<td>define, memorize, repeat, record, list, recall, name, relate, collect, label, specify, cite, enumerate, tell, recount</td>
</tr>
<tr>
<td></td>
<td>Comprehension</td>
<td>restate, summarize, discuss, describe, recognize, explain, express, identify, locate, report, review, translate</td>
</tr>
<tr>
<td></td>
<td>Application</td>
<td>exhibit, solve, interview, simulate, apply, employ, use, demonstrate, dramatize, practice, illustrate, operate, calculate, show, experiment</td>
</tr>
<tr>
<td>Higher levels</td>
<td>Analysis</td>
<td>interpret, classify, analyze, arrange, differentiate, group, compare, organize, contrast, examine, scrutinize, survey, categorize, dissect, probe, inventory, investigate, question, discover, text, inquire, distinguish, detect, diagram, inspect</td>
</tr>
<tr>
<td></td>
<td>Synthesis</td>
<td>compose, setup, plan, prepare, propose, imagine, produce, hypothesize, invent, incorporate, develop, generalize, design, originate, formulate, predict, arrange, contrive, assemble, concoct, construct, systematize, create</td>
</tr>
<tr>
<td></td>
<td>Evaluation</td>
<td>judge, assess, decide, measure, appraise, estimate, evaluate, infer, rate, deduce, compare, score, value, predict, revise, choose, conclude, recommend, select, determine, criticize</td>
</tr>
</tbody>
</table>

Chart courtesy of Dr. Alicia T. Wyatt, McMurry University, Abilene, TX
By Susan Cabello
pollen can do more than irritate your allergies or pollinate plants. It can also solve crimes. My name is Susan Cabello and I am a scientist educator for the Laredo Independent School District, assigned to Raymond and Tirza Martin High School. I teach three forensic science classes (seniors) and a PAP physics class (juniors). I have a master’s degree in forensic science specializing in crime scene investigations. I have taught forensic science for four years at this high school. I was conducting a palynology lab before it was popularized in a number of forensic textbooks, and I’m glad to see this specialty get the attention it deserves. I complement my lecture with an NCIS episode title “Loyals and Royals” from their eight season.

SAFETY MATERIALS

- Goggles
- Mask
- Gloves

MATERIALS

- Scenario
- Three pairs of blue jeans
- Three name titles
- Three flowering plants with different pollen or seeds (your choice) purchased from a grocery of florist
- Microscope
- Microscope slides
- Cellophane tape
- Three prepared slides with the pollen and/or seeds from your flowers
- Bowl with soapy water

TEACHER SLIDES: Exemplars

1. Prepare either four or six slides per flower depending on your student group sizes. I used four for my groups.
2. Take the first four slides and dust or scrape off the pollen from your first flower onto the microscope slide. I have found that cellophane tape works better than the cover slips. I do not like to use epoxy glue or Superglue because it sometimes changes the color.
3. Take the second four slides and do the same as above with your second flower.
4. Take the third four slides and do the same as above with your third flower.
5. Label each type exemplar 1, 2, and 3 respectively. Identify each slide with the name of the flower on your blackboard. See Figure 1 below.

TEACHER PREP

First I bought the three different flowers from a local grocery store. I bought a China millet, Asiatic lilies, and Blooms painted pompoms. I had each bundle of flowers bagged separately so I could limit the contamination of pollen. I separately divided the seed or pollen in individual containers. I then refrigerated the bundles of flowers in separate layers of the fridge and covered the flowers to keep them from contamination. See figure 2.

I prepared my microscope slides as noted above. I prepared four of each seed or pollen for teams of four students. I set up three pairs of blue jeans and on the right back pocket of each I sprinkled the pollen and labeled them with fictitious names. In this lab I used the names Mario, Jaime, and Maxwell. See figure 3.
Figure 2: purchased flowers (from l to r) China millet, Blooms painted pompoms, Asiatic lily.

Figure 3: the suspects’ jeans (available cheap at a thrift store or cheaper on loan from your family).
THE SCENARIO: FORENSIC PALYNOLOGY

Mrs. Green lives in a beautiful apartment complex that has a garden in the center courtyard. She has been maintaining this garden for ten years. She knows every flower and every grass that grows here. She is cautious not to plant flowers that cause severe allergies to the other tenants so all may come down and enjoy the fragrances and blossoms.

On Friday, October 13th, after an all-night rain shower, Mrs. Green woke early, made her coffee, and decided to go outside to drink it. She loved the smell of rain in her garden. To her surprise there were two police officers questioning Mrs. Martinez from apartment 126.

Mrs. Green noticed that Mrs. Martinez apartment’s window was broken. In front of the broken window, the garden flowers had been trampled on and there were muddy footprints across the sidewalk. Another resident, Mr. Brownstone, was relating his observations to the first police officer about what he saw in the garden at 3:30 AM. He said he spotted a white teenage boy wearing blue jeans, a blue or black hoodie, and tennis shoes. Miss Lee, who lived next door, was telling the second officer that she was coming in from her mother’s house at about the same time when she saw a young man in blue jeans, a hoodie, and muddy tennis shoes running out of the garden.

The police had already detained three teenage boys who resembled the descriptions. The police officers were already taking samples and pictures of the pollen from the garden that was disturbed. They gathered three samples from the garden. Mrs. Green informed them that all three flowers were the same species but different coloration. They noted this information.

The boys’ clothing had already been sent to the lab for further investigation. Upon receiving the three blue jeans, the palynologists began preparing microscope slides to use for comparison with the samples brought in from the field.

There would be only one pollen the police are looking for: the Asiatic lily.

The student knows that the pollen he is looking for is the Asiatic lily, but does not know what it looks like on the jeans.

In my case, the perpetrator was Maxwell.

Student worksheets are on the next page.
STUDENT PROTOCOL

Observe and sketch the exemplars in their respective circles below. Next, lift seed or pollen from each of the blue jeans using cellophane tape. Place the tape on a microscope slide, sketch each below, and compare with the three exemplars available. Finally, obtain pollen collected from the crime scene, make a new slide, and sketch it in the circle at the bottom of the sheet. Which suspect broke the window?

EXEMPLAR #1 ___________________ (10X)  
EXEMPLAR #2 ___________________ (10X)

EXEMPLAR #3 ___________________ (10X)  
JEAN SAMPLE #1 _______________ (10X)

JEAN SAMPLE #2 _______________ (10X)  
JEAN SAMPLE #3 _______________ (10X)

CRIME SCENE (10X)

CONCLUSION:
Crossword Puzzle

Forensic Chemistry

Across
2. Flammable liquid used in arson
4. The chemical name of Superglue
5. When this halogen sublimates the vapors deposit themselves on a latent fingerprint
6. The concentration of this metal ion in the eyeball helps determine time of death
7. Reacts with the iron in hemoglobin to produce light
9. The medical study of the chemistry, effects, and treatment of poisonous substances
11. EDTA or sodium citrate, used to keep blood from clotting
12. When this ionic compound reacts with the sodium chloride left behind in a fingerprint, gray silver chloride shows the print
14. The yellow liquid of blood after the cell have been removed
15. A potent poison, this element burns bright green in a flame test
16. This type of chemical identification test turns a hue if positive for a narcotic; used by field agents

Down
1. A process that separates a mixture of different chemicals into its individual components
2. The type of chemistry used to solve crimes, both quantitative and qualitative
3. Chemical used to visualize fingerprints on porous surfaces; makes pink prints
8. Produced by a body's muscles after death, this substance is responsible for rigor mortis
10. 1918 NYC toxicologist who revolutionized and standardized the field
13. The majority of evidence submitted to crime labs comes from this sort of crime
14. A process used to make many copies of a defined segment of DNA
Ask the Morgue Guy

Q. I have a forensics class of bright, enthusiastic, respectful students who can’t get enough of the subject. I look forward to their class every day, but not so much anymore.

I’ve noticed we’re running out of consumables like fingerprint powder a lot faster than I ever did before. I know at least one fingerprint brush has vanished and I suspect one of my students has sticky fingers. I can’t tell when supplies vanish and I don’t want to make any accusations even though I have a couple of suspects. Any advice on how to get to the bottom of this?

— Rick Wilson, Canton, MD

A. Sure. You can’t police all your students all the time even though it sounds like someone is setting up their own little investigative unit. The best thing to do is make them accountable.

I’m guessing you set out the materials for an activity and trust your students to take what they need and return what they took. Normally, this is a good system. However, you’ve got a fly in your ointment.

Instead of setting out materials for your students to help themselves to, have them work in groups and make one member of the group sign out materials from you. When the materials come back take a good look at them and don’t hesitate to ask when something turns up missing. I’ll bet you see thefts go down dramatically, especially if you keep supplies not being used that day under lock and key.

I wish all good kids were good kids, but, hey, serial killers are always described as being so nice by their neighbors.

2016

11/15-17
The Animal Crime Scene workshop at the University of Florida focuses upon detection and excavation of animal crime scenes involving surface deposition and burial. Students will attend lectures covering methods for the detection and excavation of a grave site, as well as mapping techniques for the exhumation of animal remains. Afternoons will be spent in the field at the Austin Cary Forest processing mock crime scenes and excavating grave sites. Go to http://maples-center.ufl.edu for more information.

12/5-9
Introductory Bloodstain Pattern Analysis Workshop, Miami-Dade Public Safety Training Institute. Presented by the Specialized Training Unit at the Miami-Dade Public Safety Training Institute, Doral, Florida. This is an introductory level bloodstain pattern analysis workshop. The workshop is designed to be the first training step to becoming a bloodstain pattern analyst. The student will learn basic bloodstain pattern identification, reconstruction, preservation, and documentation through hands-on laboratory exercises, practicals, lectures, and case studies. Upon completion of the workshop, the student will be able to identify, preserve, and document bloodstain pattern evidence for analysis by a qualified bloodstain pattern analyst. For more information go to http://www.miamidade.gov/mdpsti/library/2016_stu_training_catalog.pdf.

2017

1/2-6
Outdoor Human Remains Recovery. Texas. This course is designed for persons that want to enhance their knowledge of forensic recovery techniques in anFACTS Icon outdoor context. The course will include two days of lecture and three full days of hands on recovery at the Forensic Anthropology Research Facility. Participants of the course will gain practical knowledge and experience identifying, recording, and recovering scattered and buried human remains. Lecture topics will include basic methods for estimating the post mortem interval, basic human osteology, and the role of the forensic anthropologist in medicolegal death investigations including forensic archaeology. Website: http://www.txstate.edu/anthropology/facts/workshops/fieldrecovery.html

1/9-13
St. Louis University’s 116th Medicolegal Death Investigator Training Course, Saint Louis University SOM, Div. of Forensic Path. Offered three times each year, this five (5) day program teaches individuals how to conduct scientific, systematic and thorough death scene and telephone investigations for medical Examiner and Coroner offices. This training is equally valuable to police officers, physicians, nurses, emergency medical personnel, attorneys, forensic scientists and others who are involved with the investigation of violent, suspicious or unexpected deaths that fall under the jurisdiction of medicolegal authorities. The purpose of this course is to train individuals to fill a critical role in medicolegal offices.
Going On?

With the training program offered at Saint Louis University, medicolegal death investigators learn to develop the essential facts regarding the death scene, medical history, and other information that assists the Medical Examiner/Coroner in the determination of a person’s cause and manner of death. Go to http://medschool.slu.edu/mldi/.

1/26-27
**Introduction to Fingerprint Comparison**, Houston Forensic Science Center. This course provides students with a short history on fingerprints, fingerprint pattern interpretation, classification systems including AFIS, the basic physiology of friction ridge formation, the taking of inked fingerprints, basic tools/methodology used in fingerprint comparison and basic courtroom testimony dealing with enhanced punishment (pen packet testimony). The bulk of this class will be devoted to comparing inked prints to inked prints. Each student will need to bring a fingerprint magnifier. This is a beginner course designed for criminal justice personnel who may work with fingerprints. No experience is necessary. This class does not prepare students for latent print comparison. That topic is covered in two separate training programs. It is best to work with a mentor for a year between each class. [Http://houstonforensicscience.org/training.php](http://houstonforensicscience.org/training.php).

3/27-31
**40 Hour Recognition and Recovery of Human Remains Course**, Suffolk, VA. This 40 hour Recognition and Recovery of Human Remains School is for field forensic investigators, arson investigators, medico-legal death investigators, and detectives. At the end of this course, the student shall be able to properly locate, document, process, preserve, and analyze surface remains and clandestine grave sites. A practical dig from locating the site to recovering the remains will be included in training to utilize skills learned during the course. Contact Lurena Huffman at 757-514-7940 or lhuffman@suffolkva.us.

Online Forensic Education

Please see the listing of online forensic learning opportunities on this page in the previous issue or search for “online forensic education” with Google. We regret we do not have the space to present the list here.

Do you or your organization have a workshop, seminar, conference, training opportunity, or announcement you’d like to share and have included free? Please email us at admin@theforensicteacher.com and tell us about it!
Stoopid Crooks

The police just dream about geniuses like these guys...

When Eric Spivey and Chenequa Austin of Lauderhill, FL filed a police report after their house was burglarized they had no idea the Secret Service would get involved. Police arrested a man who confessed to robbing the house, a man who told police he thought credit cards were being manufactured in the residence based on what he saw. A Secret Service agent posed as a local cop and, with a detective from the Lauderhill PD, visited the home to take Spivey and Austin’s statements. Spivey led them through the residence where the men observed not only dozens of credit, debit, and gift cards, but also a machine for manufacturing them. The investigators returned with a warrant and arrested the pair and confiscated the machine, hundreds of cards, a half ounce of ecstasy, thousands of dollars of new, high-end electronic goods, a large cache of stolen credit card numbers, and a gun that tied Spivey to an attempted murder case in Miami.

When Nazario Conchua Gonzalez of Los Angeles, CA wanted to celebrate his 21st birthday he came up with an awesome idea. The MS-13 gang member liked the comedy movie Goldmember, a parody of the James Bond film Goldfinger so much he decided to duplicate the effect. He and some friends stole a professional automotive gold plater from a nearby garage and got to work coating his genitals with gold. However, everyone knows a good paint job begins with a layer of primer and Nazario and his friends made sure to steal plenty of the lead-based primer on hand in the garage. Shortly after painting he died at the local ER where a physician admitted this was the third such fatal attempt this year.

Lynn A. Cook, 38, of Tunkhannock, PA was observed wandering around a grocery store and consuming multiple food items without checking out. The staff thought they had her nailed when she suddenly approached an employee and demanded a refund because she claimed the food she’d eaten was spoiled. Police were called and not only did they verify the food was still good, but they found drug paraphernalia and heroin on Ms. Cook when they searched her.

Rahiem Shafik Motaal, 23, of Fruitland, MD was the subject of a routine traffic stop in Salisbury, MD after officers observed him coming out of a suspected drug house. They smelled marijuana in the car and asked him to step out so they could search the vehicle. They found 187 grams of pot, $3,100, a couple cell phones, and a digital scale and put Motall under arrest. He sat on the curb while they processed the evidence, then abruptly ran into some nearby woods. After he was captured he told the cops why he was in the drug trade. “I’m trying to raise money for my wedding.” Though sympathetic, the police took him to jail.

Joseph A. Rosado, 21, showed a gun to a teller in Wilmington, DE and she filled a bag with cash. He darted to the parking lot where his car idled, but Rosado realized his fatal error: he’d locked himself out of his car. He was forced to flee on foot and authorities soon tracked him down and apprehended him. It turned out he was wanted in four other Wilmington bank robber over the past month.

Nicholas Salerno, 90, of Dennis, MA recently called police to report a gold chain of his had been stolen. He said a local prostitute, Karen Proia, 48, had performed oral sex on him and then stolen his jewelry. He’d waited a week to see if she’d bring it back, but she didn’t. Police later located the chain at a nearby pawn shop and returned to tell Salerno he was going to face charges for hiring a prostitute. His response? “I don’t give a f**k. I’m 90 years old. The charges were soon dismissed.
A number of real police departments, notably the Statham Police Department of Georgia and the Salley Police Department of South Carolina, as well as the Bath Township Police Department in Michigan all posted similar announcements on Facebook. The post has been shared thousands of times, but there’s no word on how many have brought their meth in to be checked.