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THE NATIONAL CLEARINGHOUSE FOR SCIENCE, TECHNOLOGY AND THE LAW

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Editorial

Gun and Schools

Before the Columbine school shooting in 1999 the two main words in the title of this piece rarely appeared together. Since then, however, it seems a month doesn’t pass between the months of September and June before another headline announces another tragedy. But this issue of The Forensic Teacher Magazine isn’t about gun control, gun laws, or even metal detectors or police in our schools. It’s about the forensic disciplines of firearms and ballistics.

Regardless of how the bad guys get and use their guns, this branch of forensics has been making strides in helping to solve crimes. Behind the scenes, away from television crime shows, firearms and tool mark examiners have been honing their craft. And what they know is amazing.

This issue features a number of articles to help familiarize your students with the field. Not guns, just ammunition, and maybe a couple chemicals and some candy. And a lot of links to help you and your students learn a ton more.

Summer is here, and I’d be worried if, for all but a few of you, planning lessons is the first thing on your mind. This is your time to relax. You’ve earned it.

When the students inevitably return we doubt firearms will be the first unit you teach, but we wanted you to have resources when the time comes.

Please write us and tell us how you used the various pieces in your classroom. Please write if there’s something you’d like to see on our pages, and don’t hesitate if you have a different way of approaching a topic, lab, or lesson. We’re at admin@theforensicteacher.com.

Enjoy!

Dr. Mark Feil

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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.
THE CASE OF THE BULGARIAN DIAMONDS

THE POLYGRAPH EXAMINATION ROOM at Royston Police headquarters was conveniently fitted with a one-way mirror. In a small room behind this mirror stood Inspector Matthew Walker and his friend Thomas P. Stanwick, who was taking a break from his freelance editing to observe a slice of a criminal investigation. “You may have seen something in the paper of the Bulgarian Diamond Mining Company securities scam,” said Walker. “Over half a million ‘invested’ dollars were stolen. Of course, there was no such company.”

“And these four were involved?” Asked Stanwick, peering through the glass into the polygraph room.

“That’s right. Louis Lambert, Diane Sorensen, Morty Cameron, and John Thorpe ran the whole operation. One of the men was the salesman, another of the four printed the phony stock certificates, another kept the books, and the fourth acted as the banker, depositing and withdrawing the funds. We’re questioning them now about their roles in the scam.”

As Stanwick and Walker listened, the four suspects were given polygraph examinations. Each made two statements. “I was the bookkeeper,” declared Lambert. “You know what? Thorpe was the bookkeeper too!” He cackled with laughter. “Lambert was not the banker,” said Cameron. “I printed the certificates.”

“Lambert wasn’t the printer,” Sorensen said. “The salesman was Thorpe.”

“Either Diane or Morty kept the books,” said Thorpe. “Diane doesn’t know a thing about printing.”

It was soon apparent that the four suspects would say no more, so Stanwick, who had been taking notes, departed. He returned the next day to visit Walker in his office. He found Walker glaring at the report of the polygraph examiner.

“I can’t believe it!” Walker roared. “The polygraph is acting irregularly again. I’m told that each suspect made one true statement and one false statement, but that we can’t tell which is which! I’ve got to persuade the chief to budget a new machine.” Stanwick laughed heartily.

“I hear that polygraphs are notoriously unreliable,” he said. “If that report is true, though, a little logic can determine which statements were true, which were false, and who played what role in the scam.

“Who did what in the Bulgarian Diamond Mining Company?
Hot Sites

An interesting revelation on the whole hit man persona.

http://www.firearmsid.com
Awesome. One of the best websites we’ve ever seen devoted to a single topic. If you can’t find it here it’s not out there.
Free registration required.

If you or anyone has learned what they know about firearms from TV or movies this site is entertaining.

http://www.atf.gov
The amount of information on this site is incredible if you have the time to dig.

http://www.cartridgecomparisonguide.com/
Sporadic, but when you get there dig a little and prepare to be overwhelmed by cool photos.

If you think you know machine guns take this little quiz.

Fascinating reading about staying alive when the bad guys have guns.

http://www.jjay.cuny.edu/
John Jay College in NYC. If your students want a career in criminalistics this place is worth a gander.
Biting the Bullet

Unless otherwise noted, all photos were taken by Peter Diaczuk © 2004. All rights reserved.
Going Ballistic
With a Real-life
Son of a Gun

Dr. Peter Diaczuk knows guns. He knows bullets. He knows where they live, the company they keep, and what sort of tricks they can pull when an investigator isn’t looking. He knows ricochets and what they’ll do to a projectile. In short, he really, really knows firearms. In fact, he is the director of Forensic Science Training at the Center for Modern Forensic Practice and instructor in the Department of Science at John Jay College of Criminal Justice. He is also a Diplomat of the American Board of Criminalistics, and a Fellow of the New York Microscopical Society.

In short, Diaczuk has forgotten more about firearms than you and I or even doomsday preppers will ever know.

The Forensic Teacher Magazine: Let’s first talk about firearms in general, and let’s see from there. Why firearms? What is it about firearms that fascinated you that you wanted to become an expert in them?

Dr. Peter Diaczuk: It’s really how different they all are from one another. Many have been invented by different people, or by the same person like John Browning, his designs have evolved over time. And then also from not only the mechanical aspect, but an appreciation of just how much they were able to do in a time when computers were not around to assist them in such designs. Again, John Browning was designing firearms in the late 1890s and some of them have almost no change or very little changes from a safety standpoint; they’re still around today. In fact his .45 – the model of 1911 celebrated its centennial just a few years ago.

Anyway, from a mechanical standpoint, there are a couple of different things that a firearm has to go through: a lot of high energy situations and a lot of trauma when they’re fired. And then, the transformation of the chemical energy of the propellant to the kinetic energy of the bullet, which goes hand in hand with the mechanical design. The strength, the metallurgy, and such; these things have always fascinated me. So, consequently, when I see a firearm I am interested in knowing how it works, and how it manages to cycle ammunition through it. With my college training and education in forensic science, there’s an application there to look at firearms and ammunition, fired ammunition from the sense of what firearm discharged a bullet or discharged a spent case, or how close a firearm’s muzzle was to a target. All these things just sort of tied in for me when I was younger. When I was in high school, I was interested in chemistry and mechanical engineering but I was leaning more towards chemistry and I was going to pursue a degree in chemical engineering.

FT: Good.

PD: At this time my senior year in high school I took out a book from the high school library entitled Science against Crime, and on the cover was a fellow in a lab coat holding a double barrel shotgun, either about to fire it or just having fired it. And I thought, ‘holy smokes, here’s firearms and science put together in the same photograph,’ and reading through the book I saw that forensic science was potentially where I could put two things that I like a lot, science and firearms, together.

FT: Nice.

PD: That was what made me decide to go to John Jay College, when I graduated high school.

FT: Cool. So, you had the interest and you knew what was out there, but how did you get into the field as a vocation?

PD: I have to give all thanks to my professor, Dr. Peter De Forest.
He was instrumental not only in my education because he was my professor of criminalistics at John Jay College, but then he also allowed me to assist him on casework, and that’s where I got my feet wet because otherwise I might not be doing this.

FT: That’s nice. It’s always satisfying to have someone who gives you a hand up. What about firearms research going on today? I read something about research going on concerning firearms and tool marks for forensics. What can you tell us about that? In other words, what are forensic tool mark examiners and firearms examiners becoming aware of that hasn’t hit TV yet?

PD: Well, I don’t watch that much TV, but I will say that a combination of the NAS [National Academy of Science] report of a few years ago, and increasing challenges in court about the exact wording of testimony about how a certain piece of ammunition may have originated from a certain firearm has propagated an increasing interest in applying statistics to the conclusions that are made by firearm examiners. Or, it’s not statistics and also just the certainty of the statements and how those statements should be worded properly. So, as a result, what’s really neat, is that I have the distinct honor, despite the fact that Dr. De Forest has recently retired from John Jay College, to work with some folks there, Dr. Nick Petraco, Dr. Thomas Kubic, professor Petraco, Dr. Nick’s father, who are involved in research collectively under the roof of John Jay College.

FT: Nice.

PD: Using computers, and by no means am I suggesting they’ll replace an individual doing a comparison, but computers are looking at it purely objectively, and there can sometimes be an ineffective argument, but nevertheless, there could be an argument that an examiner is biased in some way, or is making a subjective conclusion about whether or not two pieces of ammunition came from the same source. The computer program is currently being used to validate the human decision-making process.

FT: Gotcha.

PD: So, Dr. Petraco and his group of firearm and tool mark researchers are working with comparison microscopy, confocal microscopy, statistics, and a few programs that he wrote in order to have the computer digest this information. The computer is assessing whether or not two pieces of ammunition came from the same firearm or different firearms, and once again the computer has no agenda. It can’t be biased by reading a statement or being told something from an investigator or reading something in a report, so the computer is looking at the surface topography and deciding whether or not the two samples are the same. Concurrent with that, we’re using the more traditional method of optical microscopy with a comparison microscope to see if an examiner is making the same decision, so it is a neat validation, if you will. Comparison microscopy has been used for about a century, plus or minus, depending on what you want to call the beginning. Regardless, it has been around for a century yet it was questioned in the 2009 report, and again by some attorneys. Unfortunately those attorneys don’t have experience using the comparison microscope yet they’re complaining anyway.

FT: You know, some attorneys will always complain.

PD: I’m excited about this work because it could set the record straight and answer the critics’ challenges to whether or not the comparison microscopy is, in fact, valid or not.

FT: Okay, good. I think your decision not to watch a lot of TV is probably a very smart one given the lot of the crap that is on today. But one thing I am curious about, from a real life examiner’s point is how much, or do you get a feeling or do you have any experience about—do the crooks on the street, do guys who are normally carrying guns, and using them and doing all sorts of senseless acts of violence with it, do they actually know about guns or are they just think they know about guns from watching movies and TV? I mean like the guys who hold the gun sideways with one hand when they are about to fire. Do they not realize that you can trace a bullet back to a certain gun?

PD: I am going to be a little speculative here. First of all, I am delighted if folks who should not be using guns are not doing it correctly. That’s great. Then, it is very likely that they wouldn’t hurt anyone, or ideally they would just hurt themselves (laughs).

FT: You know, some attorneys will always complain.

PD: I believe there has been a lot of information on TV over the past decade, and it even goes before that, shows like Quincy. Where certain things were shown on TV where folks who are using guns in an illegal fashion can learn something if that’s what you’re asking me, that’s unfortunate for other folks who are trying to use the science against crime.

FT: Yeah.
FT: Hey speaking of test shots, I know a lot of TV is inaccurate and we’ve got to squeeze all the stuff in before the commercial, but cops will recover a gun and they will bring it back, test fire it into a tank of water, pull out the bullet put it on the comparison scope and within ten seconds say that’s it. How long does it really take?

PD: It’s a good question, the firing in the water is accurate and the comparison microscope is accurate, but it kind of depends on the firearm itself. Some are very difficult to locate marks that are sufficient to make a conclusion of common origin, and in other ones it is much easier. A lot depends on the rifling characteristics, on the wear of the gun, and who made the gun. The less expensive ones may use different manufacturing techniques that don’t leave profound marks on the ammunition.

Also the storage and handling of the gun once it left the factory, if it is in a damp basement, in the damp trunk of a car, and what had happened with the firearm from when it was fired in a criminal act, to when it was recovered, if that is a long time span, and if the firearm has been kept in a poor condition then we are dealing with situation where the microscopy takes longer. So the microscopy could take as little as a half hour or it could take several hours or depending upon the sample it may be unsuitable for comparison.

FT: Wow.

PD: You want to assure yourself, depending on what your conclusion is as well. In addition it is important to know whether, this is an investigative lead where the level of proof or certainty is lower, or is it for the adjudicate stage where the level of certainty has to be considerably higher. For an investigative lead sometimes a lesser amount of time on the microscope is satisfactory for an initial assessment. Making these decisions is important because the investigators have to be interviewing people and making decisions quickly based on some useful information from the lab, whereas, in an adjudicative sense everything has to withstand additional scrutiny and possibly be challenged by the opposing expert.

FT: I see...

PD: A lot more is at stake in the adjudicative stage in an investigation. You may have to spend considerably more time looking at all aspects of whether or not two pieces of ammunition came from the same firearm and that may not even be the only question at hand. Admittedly, the traditional comparison microscopy and historic firearm examiner work is whether or not a piece of ammunition came from the same firearm, different firearms, or specific firearm if one is not recovered. There may be occasions, however, when this may not be in dispute, when it’s not the question at hand, maybe one person fired a couple of shots and doesn’t deny firing those shots, but instead has a specific secondary story behind that involving distance or whether a door is opened or closed or a window was opened or closed and someone unfortunately was in the bullet’s path. There can be a multitude of different circumstances for example those instances when the person says yes, I fired those bullets, that was definitely me. There were no other guns around. But I fired because my life was threatened or a similar scenario where sometimes muzzle to target distances come into play.

Other times maybe bullet damage comes into play where you have to assess what the bullet went through in its journey before it came to rest and also trace evidence on the bullet. Sometimes, there’s a bullet that picks up paint, fibers from a garment, concrete debris from a ricochet.

FT: Right.

PD: In such cases where the bullet is telling a story, it’s up to the forensic scientist to interpret that story.

FT: Ahh. Okay, now speaking about doing ID’s on bullets, I guess your field uses IBIS?

PD: Well, I don’t use IBIS because that’s restricted to law enforcement and I am in the private sector, and I teach at the college. IBIS or NIBIN, those are the firearm community’s version of what the DNA people use as CODIS and what the

A cutaway view of a 9 mm bullet.
fingerprints people use as AFIS, so it is a system where data is inputted from fired ammunition. Of course that data has to be good. If the inputted data is poor, the results will be poor as well. The computer with its speed and ability to go through a lot of user information will, in a short bit of time, suggest several potential hits.

FT: Okay.

PD: Then, just like it is in the other two disciplines, if the computer suggests possible candidates it’s up to an examiner to then physically make the comparison, but it certainly cuts down on a lot of labor intensive work before a conclusion is made. So it is a great time saving element and it’s able to connect evidence from different jurisdictions where it wouldn’t be otherwise possible. It allows the interagency cooperation and communication to perhaps solve crimes spanning several jurisdictions.

FT: Cool, and I bet it helps a lot with cold cases too.

PD: Oh, absolutely because evidence can be entered and then looked up later, or a gun can be recovered later, then test fired, and that information entered into the instrument. I don’t do that because it is solely law enforcement, and even when I work for a district attorney’s office I am still not working with that instrument, but that’s the concept just like it is for the fingerprint folks and the DNA folks.

FT: Hey, I’ve got to ask you, if you don’t mind and forgive me for going back to subject of TV. On the small screen, and in the movies, a bad guy, an assassin, or whoever will calmly select his prey, reach into his pocket, and pull out this a cylinder he will screw on the end of the barrel, and we all know it is a silencer, and it turns a loud bang into a soft POOT. How far off the truth is that?

PD: There are some very effective suppressors that reduce the report at discharge. The first thing that is a spoof on TV is, if the device is small, because they’re not – a small attachment isn’t going to work well, secondly, revolvers can’t be silenced because the noise would escape out the side between the cylinder and the barrel. Also, a threaded barrel is typically necessary to properly attach the suppressor and in all the cases that I have worked, I have only encountered a suppressed firearm twice. They are not common in casework but they do serve a legitimate purpose in the military, and I can even see advantages for them to reduce that annoying sound in a nonconfrontational venue as well. They’re not easy to make. It’s a federal offense if you make one without complying with all of the federal regulations for registration.

FT: Wow.

PD: Making a suppressor requires just as much skill as it takes to design and manufacture anything else that has an important job to do. It is not trivial if its not lined up exactly with the barrel. Making a homemade one is certainly not recommended because even if complying with all Federal regulations, it is being put right where the bullet is going to travel so, clearly it has to be well made, but there’s no universal suppressor that I know of that can just be simply installed on a firearm securely and safely.

FT: That makes sense.

PD: A suppressor has limitations based on the laws of physics such as the velocity of the bullet breaking the speed of sound and the pressure of the escaping gases. And again, they are very rare. I’ve worked only two cases that involved suppressors and both were on small caliber handguns ironically, both of them were homemade and neither worked properly. A suppressor certainly makes for a nice addition in a spy movie if portrayed accurately since there are legitimate reasons for their use.

FT: I had no idea. Hey, do bad guys, the typical criminals on the cases that you’ve worked on, do they ever take forensic counter measures beyond filing, trying to file off the serial number?

PD: I’m going to say yes in respect to trying to alter the microscopic information the firearm puts on the ammunition.

FT: Okay.

PD: Although not common, I do know of a couple of specific cases where I saw some marks that suggested alteration. Do I know that they were deliberate? I don’t. For all I know it could have been inexperience or some other thought process going on, but what I am getting at is, I have seen marks on firearms, whether it be firing pin, the breech face, the barrel, whatever it happens to be I have seen marks that were not incident to manufacture.

FT: Okay.

PD: I don’t know if those were forensic counter measures or not. Clearly, if the serial number is obliterated, that’s an obvious countermeasure. The serial number would not be scratched off if the person didn’t have some ulterior motive like hiding its owner. In other instances of damaged or altered markings I don’t know, if someone was trying to clean a part but did it incorrectly and managed to change it inadvertently. I have encountered that as well.
FT: I’ll be darned. Okay, now most of our readers are teaching at the high school level and some at college and they’ve all gone over lands and grooves with their students, but something occurred to me: it is difficult to set up and replicate and get students to do in classrooms is about trajectory. How important are these in investigations in real life? Do you see much call to figure that out or does it really not matter or does it never come into play?

PD: Oh, it definitely comes into play. In fact, a large part of my work goes well beyond suggesting whether or not a piece of ammunition came from the same firearm or a specific firearm. I enjoy the challenge of doing some sort of a trajectory or bullet path analysis and interpreting what the bullet has encountered during its flight based upon its damage or trace evidence on it. Trajectory is very important, and that’s some of the scenario you gave me about high school, it’s a great way of engaging students with an interest in geometry and trigonometry because those are important skills for the reconstructionist doing trajectory or bullet path analysis. The laws of physics are involved here, such as the kinetic energy of the bullet. It is giving up that kinetic energy as it travels. In flight the velocity is immediately decreasing as soon as the bullet leaves the barrel.

FT: Right.

PD: Gravity is immediately pulling the bullet downward so there’s no straight path as is sometimes suggested on TV. But it might be suggested and, admittedly, we use a straight line for shootings that take place in the room of a home because any downward path is negligible in that short distance. As the distance between the muzzle and the target becomes longer the trajectory becomes more curved as the bullet drops. Then a downward trajectory does have to be taken into account in spite of the laser beam, which of course, is not affected by gravity and remains a straight line.

FT: Gotcha.

PD: These reconstruction concepts provide some of the things that we do at John Jay College. We offer events over the summer, for high school and college students, where we try to incorporate a mock crime scene because the students can get involved and engage themselves. Then the instructors can see if the students were paying attention in mathematics and physics, which is incredibly important. We use laser beams, we use strings, probes, or the surveyors’ transit level in order to set up a potential path of a bullet for calculating where the bullet originated and then that information is used to support or refute witness statements or suspect statements about what happened. Luckily, the work that takes place, or that I do anyway, there is not an infinite amount of possibilities to consider. Because it is in a legal setting, the question to resolve becomes what one person claims versus what the other person claims and so on. If there is a big disparity between those two claims, often the evidence, which doesn’t have an agenda, might support or refute one side or the other, and the bigger the disparity between those two statements, the more you can suggest based upon a scientific interpretation of the evidence.

FT: I’ll be darned. I had no idea it was that important.

PD: In any event, remember Mark, I mentioned earlier that I really like to get involved in distance determination. Or interpreting trace evidence or physical damage to a bullet as a result of what it has encountered during its flight, and I have found that sometimes it is not initially appreciated. Sometimes the question of which gun fired which ammunition that’s more important, whereas other times there is no question which gun was fired but instead what did the bullet impact from when it left the muzzle to when it reached the target. It all depends on the facts of the case.

FT: Well, I’ll be darned. Okay, just a couple of questions about firearms in general because the topic of guns in schools is a tragic one and unfortunately in this day and age there are certain parts of the content that our readers don’t have access to and that is why I asked about trajectories and also what about gunshot residue? How long does it remain on one’s hand? Say you are using a revolver, is it hard to get off?

PD: Well, first of all, let’s have an understanding about gunshot residue. That term can apply either to residue from the primer, which is suggestive of what you mean because you mentioned hands. And the other is the propellant. You have primer residue and propellant residue that can often be included in the more broader term gunshot residue. So let’s start with the primer. The primer residue is a manifestation of the initiation of the firing sequence of the cartridge when the firearm is discharged.

In the classic sense, those items are the three elements lead, barium, and antimony, which if they were present in the primer compound, form a very stable and characteristic particle that is ejected from the firearm whether it be a revolver or a semi automatic or whatever – it can deposit itself on the person who is doing the shooting. It can deposit itself on the person near the person who is doing the shooting, and it could also be transferred from person to person. So, if someone has handled an item that had primer residue on it then that residue can be transferred to the person because the residue itself is transient in nature. It is very,

A lead bullet that flew through a metal screen. Note the impressions the screen left on the bullet.
A 22 cal long rifle unfired cartridge with fired bullets to its left and right showing the obvious difference in class characteristics.

very environmentally stable. The three elements were combined in a high pressure, high temperature environment to form the particle with the characteristic morphology and composition.

FT: Sure.

PD: They are somewhat spherical in nature, small particles, but they are not typically blasted or embedded into a person’s hand. In fact, you have greater likelihood that such a particle would remain for a longer period of time in a garment or in hair than you would on the skin. If deposited on the skin, when you do all routine things with your hands, such as opening doors or touching things the primer residue can be transferred.

FT: Uh huh.

PD: Combing or rubbing your hair or face is another example of potential transfer.

FT: Yup.

PD: The general consensus regarding particle retention is from about four hours to six hours, during which time those particles are in a steady decline. Most laboratories won’t bother looking for those particles after 4 to 6 hours post incident unless the hands of the suspect have been bagged, or the person is taken into custody very early or in a suicide case.

FT: Right.

PD: When the hands are bagged, or a person is in custody it limits how easy it is for those particles to get away otherwise a thorough washing even shortly after discharging a firearm will wash away so many of those particles that it wouldn’t be useful anymore to test for their presence, It also depends on the story that someone says. If someone says that they have never fired a gun, have never been near anybody shoot a gun, but then the test results reveal a few particles present on the person then that becomes probative.

FT: Right.

PD: In a different scenario, if the person does not say they were not near a firearm and you find a few particles, and they were in a car when a firearm was discharged or in a room where there had been a gun discharged nearby it would be an example of the positive results not being very useful. If you were in a car and there are four people in the car there is a likelihood that everybody who was present when the gun discharged may have some primer residue on them.

FT: Okay. All right.

PD: So primer residue particles are environmentally stable, but transient. That’s the golden rule with primer residue. Conversely, the propellant residue, also sometimes called organic gunshot residue, is used more to determine distance between the muzzle and the target, but it can also be indicative of the brand of ammunition since the exact composition varies among manufacturers.

FT: Oh.

PD: Just like the primer residue, the propellant can only travel a finite distance in air. Air is a tough medium to get through for a particle that has such a small mass and depending on the conditions and the kind of powder present in the cartridge, and some other factors such as ambient air movement, the maximum distance propellant particles can travel averages between two to five feet with rare exceptions. Sometimes it may not even travel beyond that distance because some small caliber firearms with not a great deal of propellant in their cartridges may only go out about two feet.

FT: Wow.

PD: Some large caliber rifle powders may go a little bit farther due to their greater mass, and here too ambient air movement can be a factor to increase or retard the distance traveled by the propellant particles. So, it’s very important for distance determinations to be aware of the ammunition, the firearm, and even environmental factors. The utility of performing a distance assessment can be expressed in a couple examples. Someone says an aggressive person was right on top of me about to clock me over the head with a sledgehammer so I fired at that person. When examined it is found that the victim, is loaded with gunshot residue propellant particles, then there is a potential confirmation of the survivor’s interpretation of what happened at that moment when the shot was fired.

FT: Yup.

PD: As opposed to the opposite scenario, when there is not a
single particle on that person who was shot and then you might inquire, ‘well how far away was this person when you were being attacked?’

FT: So tell me what’s a typical case like for a firearms examiner? Workload, expectations, that sort of thing?

PD: Well those are tough questions for me because I’ve never been in the trenches working as a firearm examiner in a crime lab.

FT: Ah, okay.

PD: I would imagine that you know in a big city like New York, there are plenty of firearm cases that come in and operability is the first thing that is performed because the folks who are assigned the case are deciding on the criminal charges so they have to know if a firearm is in working condition, and there is a certain time limit when charges have to be filed once a person is in custody. I don’t know whether that is 72 hours or something similar but the time frame is important. Within that period of time, it would have to be determined whether the firearm is capable of discharging a deadly projectile.

FT: Then what?

PD: If it is capable of discharging, then it would be test fired to obtain an example of a spent bullet and cartridge case; both for entry into one of the firearms databases to see if there are any other cases associated with that particular firearm and for comparison microscopy. If there are spent cases or bullets recovered from the crime scene or from autopsy then those can be compared to the test fired exemplars from the firearm. If crime scene evidence is associated with that firearm, then that firearm may be associated through other means to an individual, such as fingerprints, biological material, trace evidence, or witness statements or whatever it happens to be, because the gun didn’t shoot the person by itself. Someone had to be handling the firearm. It all has to come together by the multidisciplinary actions of the crime lab. Unfortunately I can’t tell you about the workload, but I’m sure everybody would prefer to have more people to reduce the work load.

FT: Oh yeah.

PD: And to make sure everything goes smoother but I don’t really know how that goes.

FT: Do you happen to know after a case whether the person is convicted or not, what happens to the firearms that the police collect? Are they melted down?

PD: In my conversations with folks who are within the law enforcement community, many firearms are kept in what you could call a firearm library which is incredibly important. In my opinion, a firearm library can never be too big where an example of a specific firearm can be available for examination. Let’s say, hypothetically, you get a firearm as evidence in a shooting that maybe has a broken component and then, in order to make it work, you would take a piece of one from the reference firearm library and make it operable to obtain test fires. You can also use the reference library right off to train new people getting into the firearm section so they can become familiar with a wide variety of firearms. Since these reference firearms are no longer evidence in an active case, if a mistake is made in training disassembly or assembly its not catastrophic.

FT: Right.

PD: You are not dealing with evidence anymore with a reference library, but then every lab has only a finite amount of space. There is no unlimited room for anything, firearms included. At some point someone, and ideally someone who really knows what should be saved and what should be not saved, someone with that knowledge would have to go in and say, “take these guns, they are not needed. We already have samples of all these guns we’ll never need these again, and the case has been adjudicated long ago. We can melt these down.” But again, in my opinion, we can’t have enough books, hairs, fibers, sand, pollen, firearms, ammunition, or whatever it happens to be in a reference collection. It would be ideal to have the largest collection that space permits.

FT: I agree. What types of cases do you spend most of your time on?

PD: Mostly reconstruction. It’s a question of who did something and where they were at the time and where the victim was and that kind of thing. Often, it’s not whether or not this particular firearm fired this piece of ammunition, more often it’s who was doing the shooting and the distance between the two people, and could something have been in between, things like that.

FT: Do firearms examiners and tool mark specialists visit crime scenes or do they wait in the lab for someone to come back with their evidence?

PD: It’s kind of both, but unfortunately its more in the laboratory,
and I am totally an advocate of having, if it is a shooting scene, someone who is firearms savvy to be at the scene especially if it is a complex situation.

FT: Why do you say that?

PD: Because as talented as the crime scene people are, there may be an expertise that the firearm expert can bring to a crime scene. It certainly wouldn’t hurt, and I’m not saying every single shooting incident, but if it is just a firearm being recovered, well then that’s pretty straightforward. However, if it is a complex shooting scene then an understanding of how the gun functions and cycles, the capability and maximum range of the ammunition, and things like that. These are the things that the firearm examiner is really good at. A firearm examiner could offer something like, “Oh, you might want to look over here because this gun ejects its spent cases in this direction or its bullets have a certain amount of energy associated with them and could or could not have done a certain amount of damage. An example is an automobile I remember looking at.

There was what appeared to be a 5.56 mm M-16 type of bullet that supposedly hit this car straight on. Luckily, one person who looked at the car realized that kind of a bullet has so much energy, if fired at the car point blank it would have done more damage as opposed to it coming to rest right there in the outer part of the sheet metal. That suggested one of two things, either that bullet came from a really long distance or something got in its way and slowed it down, like a person, so it would have so much less energy by the time it got to the car.

FT: That makes a lot of sense.

PD: The tool mark community is even more complex because tools can leave marks that are not so easy to replicate because of the degrees of freedom in how a tool can be used or held. Just think: you’ve got a firearm and it is typically well made, and consequently there’s little room for movement of the ammunition inside the firearm. So the tolerances are well defined.

FT: So the tolerances are well defined. Consequently there’s little room for movement of the ammunition think: you’ve got a firearm and it is typically well made, and of the degrees of freedom in how a tool can be used or held. Just tools can leave marks that are not so easy to replicate because The tool mark community is even more complex because PD: Because as talented as the crime scene people are, there may be an expertise that the firearm expert can bring to a crime scene. It certainly wouldn’t hurt, and I’m not saying every single shooting incident, but if it is just a firearm being recovered, well then that’s pretty straightforward. However, if it is a complex shooting scene then an understanding of how the gun functions and cycles, the capability and maximum range of the ammunition, and things like that. These are the things that the firearm examiner is really good at. A firearm examiner could offer something like, “Oh, you might want to look over here because this gun ejects its spent cases in this direction or its bullets have a certain amount of energy associated with them and could or could not have done a certain amount of damage. An example is an automobile I remember looking at.

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firearms section, and their department sponsors them, can get involved in this National Firearms Academy where there’ll meet experienced people in firearms examination from around the country in addition to onsite expert staff from the ATF who teach the group. It is a neat system whereby the student examiners go to ATF headquarters and get their hands on training there, and then they go back to their departments to practice the skills and concepts learned. These examiner trainees then perform numerous exercises and report the results. Everyone is also required to conduct a research project which becomes the capstone experience and is often presented at a training conference.

FT: Ahh.

PD: By obtaining the scientific training at the ATF laboratory and then gaining proficiency at the local laboratory level it doesn’t overburden the ATF because they have their own case load to do as well. But nevertheless, this system still provides a really thorough education for the folks who are involved in the academy. It is fortunate that it exists because otherwise training would be in the old fashioned way of the apprentice method, which has some drawbacks.

FT: Yes. That’s a fantastic opportunity, I had no idea they did that.

PD: The ATF has been running the firearm academy for several years and hopefully it will remain in spite of budgetary limitations, so folks who have the support of their departments can learn from the best.

FT: What was your favorite subject in high school and why?

PD: Remember in high school I was still looking to do chemistry as a career. I couldn’t, even in junior high school, get enough science, specifically chemistry, and same thing in high school and admittedly I had a one track mind when it came to learning more chemistry. For example, I wanted to figure out how propellants work. How the latent chemical energy within chemicals could be used to propel objects great distances.

FT: Yeah.

PD: I was going to do the chemical engineering route, but then I veered somewhat when I read that book I mentioned earlier, *Science Against Crime*.

FT: You mentioned Dr. DeForest as being one of your most memorable teachers?

PD: Oh yes, there is no doubt about it.

FT: What made him so special? How did he approach the topic that really lit a fire in you?

PD: It was over time I guess, and I don’t even really think I appreciated the magnitude of Dr. De Forest until after school was over, because during school you just had to try to get good grades and do the best you could in your classes, but it was many years later where I was really able to appreciate just how brilliant he is and how he can use problem solving skills to figure out some of the most complex things. He would typically look at something and come up almost instantaneously with so many relevant questions about what needed to be investigated in a certain crime scene.

FT: I’ll bet that was amazing.

PD: It didn’t always have to be firearms either. He is adept at so many other forensic disciplines as well. I would be with him
predominantly when he called me to consider a firearm case, but I’ve seen him in action in other types of cases as well, and it just boggles my mind how his critical thinking skills and problem solving is just unbelievable. He hates a mystery. He likes to unravel things. It’s truly amazing and I am honored to call him my professor and my friend. And obviously, my mentor as well.

FT: Sure, that’s just unbelievable you had a chance to study with someone that magical. That is fantastic. Do you have any advice for today’s science or forensic science teachers, how to keep kids turned on, to keep them hungry, to keep them wanting to put the pieces together?

PD: When I teach I try to tie in the theoretical with the practical by including some case stories where something has eluded me or others initially, and then after applying critical thinking skills that I have learned from Dr. De Forest and developed a little on my own, the solution became crystal clear once the right question was asked.

FT: Sure.

PD: Sometimes the right questions were never asked at the beginning and subsequently they finally are asked. Not to make an entire class full of war stories, but just to use them where they really tie in from the scientific concept to the case. It’s rewarding to hear a student say, “Oh wow, it really comes together, I see why that is important. I see why I have to learn that.”

FT: I love that.

PD: Dr. De Forest did that to us, he brought his casework to the classroom. And then I had the good fortune of hooking up with him again while in the Ph.D. program, I fully appreciated it, the way that he works, and the way he looked at things and I try to look at them the same way.
back the extra 20,000 pounds of pressure that is developed in a .357 magnum cartridge. The same exact principle is used in the .44 special versus the .44 magnum. The .44 magnum came out in ’55. It is the Smith and Wesson model 29 and was made famous by Clint Eastwood in his Dirty Harry movies.

FT: Oh, yes.

PD: But in any event, the .44 special is a great practice round for those with a .44 magnum revolver just like the .38 special is a great practice round for those with a .357 magnum revolver. It makes for quieter shooting, less recoil, and more economical shooting.

FT: Yeah.

PD: You could still develop your targeting skills with the less powerful ammunition and then it is just a matter of firing a few rounds of the magnum ammunition to acquaint oneself with the pressure, noise, and recoil of the full power loads. So, that is my short answer which did not seem short (laughs), but that’s my short answer to your question about co-mingling calibers, it is not often that one can do that. Those are two very popular calibers where that can be done. By the way, in a revolver that’s chambered for a .22 long rifle cartridge you could chamber .22 shorts. Just be aware that it is necessary to thoroughly clean the chambers when you’re done shooting.

FT: Really?

PD: Yes, the reason for this is if you fired a lot of .38 specials in that .357, or a lot of .44 specials in a .44 magnum, what happens is there is a little bit of residue that builds up in the very, very far end of the chamber because there’s no cartridge case there. There is an area where the discharge components can accumulate. So, what will commonly happen is if you fired a couple hundred rounds of the shorter ammunition, you may have to force your magnum load into the chamber because they’re longer, and now it gets in the way of some leading, some propellant residue. So, if you have to force them in it stands to reason you’ll have to force them to get them out.

FT: I hadn’t thought of that.

PD: You don’t want to go to battle if you have to reload then you can’t get your empties out. So, hypothetically, if you’re a trooper, and that was your duty gun, you were carrying a .357 on your hip and you did a lot of practice shooting over the weekend with .38’s, then I would run a brush through each one of those six chambers to make sure your duty ammunition is going to slide in and slide out very quickly.

FT: Oh, yes. I understand how that could be very important. Hey, you mentioned some high school workshop or workshops for high school teachers at John Jay College?

PD: Yes. There were some folks at Jay whose job it is specifically to arrange and coordinate these outreach activities. I think it’s called the STEM program.

FT: Oh yes.

PD: John Jay College also offers a program called College Now to students from any City high school to get a taste of college. It’s a longer program delivered over several days during the summer by the instructors and staff in the Department of Sciences. They are very talented people who teach the students about molecular biology, in which I am not at all fluent, and physics and math and then sometimes in my discipline, forensic science. The idea is just to stimulate their interest and appreciation of science.

FT: Neat.

PD: By necessity the students have to come to John Jay for these programs because we include hands-on exercises and demonstrations to dispel some of the myths of what they see on TV. It’s the real thing. They will charge them a minimal amount of money to cover the materials we consume like fake blood, or if I go to the range and make some test fires, and they get to take their bag of science goodies home. We give them gel lifters, litmus paper, little things they may not have in their own schools. I was surprised to hear that sometimes in these other high schools they have far more limited resources than my high school had. So, we try to give them something to think about when they leave.

FT: And you’re going to send photos for this article?

PD: I can. Remember Mark even though I’ve done the traditional comparison microscope work, I am also an advocate (as I get on my soapbox) for having a bullet tell the complete story. That includes impact damage and trace evidence transfer. I can send you a bunch of different things like a pattern on a bullet because the bullet hit a zipper or it hit a screen. These are times when a bullet is recovered at a scene or at autopsy and it has a peculiar mark or impression on it. Initially you can’t figure out what caused the marks or what it went through and then you look at A 9mm intact cartridge (with full metal jacket bullet) next to a bullet hole made previously.
The barcode ballistics lab was created to give my students some practice on matching striations before they went online and attempted to use the virtual comparison microscope found at www.firearmsid.com. In previous years, I noticed that my students were having problems matching striations between two bullets. I wasn’t sure if the problem was lack of patience or actually having problems matching up the patterns of light and dark which make up the striations. Looking at the striations, they reminded me of bar codes and I had an idea. What better way to practice than using something that my students are familiar with?

I looked for and found a variety of bar codes, some similar and others very different, to use that my students could practice matching. I scanned in the barcodes and created the activity seen on these pages. It was interesting to watch how each student went about matching the bar codes.

The students that cut out the bar codes from the student sheet carefully (leaving no white around the edges) had the best success since they could actually get them close enough to the test standards to show the continuation of the pattern. As I was circulating around during the activity, this was a suggestion that I made often. Some students forgot that they could rotate the bar codes 180° and were frustrated that they could not find a match. Some students cut all of the bar codes out at once and attempted to match them. This method was frustrating since a slight breeze would blow the bar codes off the sheet, mixing them up and they would have to start again. Other students would cut out one bar code at a time and then glue it down.

Whenever their method, the students became adept at looking for pattern recognition. I often referred to this activity as students were using the virtual comparison microscope to match fired and test standard bullets, reminding them that they were looking for patterns of light and dark. This activity served as a great introduction to striation pattern recognition as we began our study of ballistics. This activity took about 40 minutes and requires the student worksheets, scissors and glue sticks.

Barcode Ballistics

By Terri Bradford
Neatly cut out the following barcodes and match them with the ones on the other page.

Each student group gets half a sheet.

Neatly cut out the following barcodes and match them with the ones on the other page.
Barcode Ballistics

Find the matching bullet barcodes. Place it right next to its match on the line to the right.

On the back of this sheet, write a paragraph that explains how this activity is similar to matching bullets using a comparison microscope. Does this type of examination provide class or individual evidence? Explain.
Barcode Ballistics

Name _______________________

Find the matching bullet barcodes. Place it right next to its match on the line to the right.

On the back of this sheet, write a paragraph that explains how this activity is similar to matching bullets using a comparison microscope. Does this type of examination provide class or individual evidence? Explain.

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Mini-Mystery Answer
(from p. 4)

The Case of the Bulgarian Diamonds

If Thorpe’s first statement (T1) is true, then both of Lambert’s statements (L1 and L2) are false. This contradicts the premise that each made one true and one false statement, so T1 is false and T2 is true. Therefore neither Sorenson nor Cameron was the bookkeeper, and Sorensen was not the printer. Since she was not the salesman either (the salesman having been one of the men), she must have been the banker. This means that T1 is true, so T2 is false and Cameron was not the printer. He must therefore be the salesman.

This proves that S2 if false, so S1 is true and Lambert was not the printer. Lambert was therefore the bookkeeper, and Thorpe was the printer.
The small, white marshmallow soars through the air, slowing in velocity and descent until it finally hits the concrete and rolls to a stop. A student runs over to the lone mallow and marks the spot, yelling out the distance in meters to his classmates some twenty feet away. Then another mallow of sugary greatness takes flight on the same pathway landing next to the previous projectile, almost hitting the student. As mallows continue to take to the skies, laughter lifts from the small crowd.

This is the second year that Knight High School has offered a Forensic Science course, and like all new classes, it is still under development. It is a project-centered, grant-funded class that requires the students to apply the techniques and methods that they learn throughout the school year. I try to incorporate as many labs as possible, but I prefer those activities that make the students design and implement the experiment.

This year when I got to the firearms topic, I wanted to incorporate the concept of ballistics. It is the perfect subject for inquiry-based techniques, data tracking and analysis. But to really study ballistics on an experimental level, I had to come up with a cheap and effective experiment that did not incorporate real firearms. I could not afford enough Nerf guns to arm the classroom and paintball guns were out of the question. So, after much deliberation, I decided to make marshmallow shooters.

The PVC marshmallow shooter is the perfect weapon. They are cheap and easy to build and I have never heard of anyone acquiring wounds by flying marshmallows.

**Supplies:**
- 2 full length ½ inch PVC pipes
- 7 L bends (non-threaded)
- 2 bags of small marshmallows
- 1 measuring tape
- 1 hack saw or tube cutter
- 3”x4” Paper/cardboard to roll and make mouthpieces out of (one per student)
- Class set of rulers
- Calculator
- Protractors

Using a tube cutter, I cut varying barrel lengths from 6 inches to 38 inches. I then placed an L-bend at one end of each barrel. I had my teaching assistant roll and tape pieces of flexible cardboard to serve as mouthpieces. These were designed to fit inside the L-bend, and they ensured that students would not put their mouths directly on the shooter.

I gave the students a lecture about firearms and ballistics. They were also given the formula on the following page:
The students were placed into groups (4-6) and given two objectives. For six guns:

1. Determine the range. Generate a graph of barrel length vs. range.
2. Determine the velocity. Generate a graph of barrel length vs velocity.

We set up a firing range in the outside lunch area, which was essentially a measuring tape and a big open space. I informed the students that the independent variable was the barrel length. The experimental design and source of air was up to them. Most groups chose to blow through the gun, but I did have one group that brought in a shop vacuum and reversed the flow. Some groups tested different angles, and some groups changed height. I gave them very little direction, because I wanted them to collect data that they deemed to be usable.

For two days, they shot the guns and collected their data. On occasion, I would point out an error. For example, one group was measuring where the marshmallow rolled to as opposed to where it originally landed. They could not understand why their results were all over the place. I merely pointed out, “What is more important? Hitting the target or rolling past the target?” The light bulb went on and they quickly scrambled to collect new data.

After the students generated their graphs, each group was assigned one of the six guns. They were given a set angle (anything between 0 and 40 works well). They were asked to calculate the approximate distance that the mallow should travel at that angle. They were given one shot to validate their hypothesis. A variation could be done by giving them the range and have them back solve for angle.

The last experiment involved a new marshmallow gun that none of them had shot with a different barrel length. Using their graphs, they had to determine the range of this gun then each group was given one shot to hit their predetermined mark. Their grade was based off accuracy and I made them calculate their accuracy by using the following formula:

\[(\text{Final} – \text{Initial})/\text{Initial} \times 100\]

At first, I did not know if this experiment would work. There were a lot of variables that needed to be controlled and I was not sure if teenagers could design an experiment. But I quickly discovered that the students really got into it and had a blast (no pun intended) shooting marshmallows. After three days of mallow war, the students had successfully utilized mathematics, experimentation, data analysis, and teamwork to study ballistics. As a teacher, I cannot ask for more.

The marshmallow gun in this exercise is a simple 90 degree bend of PVC. For other configurations please visit the links below.

https://www.youtube.com/watch?v=3SOyV0HudO8&t=72
http://www.instructables.com/id/Marshmallow-gun/
http://www.wikihow.com/Make-a-Marshmallow-Gun

[Ed. note: This is a combination of \(d=vt\) and \(y=\frac{1}{2}gt^2\) when launched at an angle \(\theta\). In this activity your students can keep the barrel of the marshmallow gun parallel to the floor so \(\theta\) will be zero.]

*Photo courtesy of Eric J. Wilhelm. Used with permission. See more at www.instructables.com.*
How many years have you been investigating ballistics?

I have been a Forensic Firearm Examiner for 15 years. The term “ballistics” is commonly used to describe our job. However, ballistics is the study of the flight of a bullet. Movies, TV, and the media have adopted the term and it has commonly been used to inaccurately describe what we do.

Do you have a specialty as a Forensic Firearm Examiner? Do specialties exist?

The duties of a Forensic Firearm Examiner include, gunshot residue (distance determination), serial number restoration, shooting reconstruction, and toolmark identification. Those are all specialties that require separate training to perform.

What education does one need to get into the field?

The minimum education required to get into the field is a bachelors of science in Forensic Chemistry or a bachelors in chemistry, biology, or physics.

Where does one go for training?

Training is performed on the job under the direction of a qualified firearm examiner. Trainees will do mock case work to practice the skills they were taught. After they have sufficiently demonstrated the skills to do the examination, they will do competency tests and proficiency tests on the topic. External training is available from various sources such as government agencies (ATF and FBI). Additional sources of training include professional meetings (Association of Firearm and Tool Mark Examiners), workshops, and university sponsored symposiums.

How long does training last before one is qualified to work independently?

The training period is typically two years for Forensic Firearm Examiners. After trainees have demonstrated competency in their work, they can begin working casework under the supervision of their trainer. Even after they are trained, their notes and reports are checked to verify they performed the correct tests and have sufficiently documented their results.

Who do Forensic Firearm Examiners work for?

The majority of Firearm Examiners work for government agencies on the local, state, or federal level. There are independent firearm examiners who will analyze evidence to either verify or refute work done by examiners in the government system.

What is your official job description?

I am a Forensic Firearm Examiner. My duties include identification of bullets and cartridge cases to a particular firearm. If no firearm is available, I will examine the bullets and cartridge cases to determine if they were fired from the same firearm or multiple firearms were used. I also perform toolmark identification, gunshot residue (distance determination), and serial number restoration.
How does one investigate a scene for ballistics? What do you look for? How?

When Firearm Examiners investigate a scene for evidence, they are looking for fired ammunition components (bullets, cartridge cases, bullet ricochet marks). They are also tasked with determining the directionality of the bullet path to determine where the shot originated.

Shooting reconstruction is done by examining the path of the bullet as it passed through objects such as windows, furniture, and walls. It is done with strings and lasers to back track where the bullet originated.

What types of clues stand out to point to ballistic evidence?

When examining firearm related evidence, some things that stand out are the composition and design of the bullet. Different manufactures will use propriety designs in their bullet construction that are unique to their product. Using this information, even without the presence of a cartridge case, we can determine who made the bullet. This can be an important investigative lead to detectives if the suspect has unique ammunition.

How long does an investigation typically take?

The examination of the evidence depends on the amount of evidence submitted, quality of the samples, and types of tests required. If there are only a couple cartridge cases and they are marked well from the firing process, the examination may only take a couple hours. If there are multiple firearms and the bullets passed through objects which obscure the markings, the examination may take weeks or longer.

Do you do more than the job requires? Please describe.

In my lab, I strictly do forensic firearm examination. Some labs have examiners who are cross trained to perform fingerprint analysis, drug chemistry, or another forensic discipline. The determining factor is the amount of casework submitted to the lab for that particular section.

What is a typical day like for an investigator?

The day varies based on what evidence has been submitted. One day may be processing clothing for gunshot residue, the next few days may be bullet/cartridge case comparison, then serial number restoration the following day. One of the aspects of the job that I like is the variety of jobs that help break up the “routine”.

How do you know a scene will be simple to process?

Simple scenes have one victim, one firearm, and one shot. However, caution must be exercised with even the simplest scene. Inevitably, evidence may be discovered to show there is more to the crime than initially thought. Going into a scene with the mindset of, “this will be an easy one” is not a good practice.

What hours does an investigator work?

We work 9-5 Monday through Friday unless there is a scene that needs processed.

Are working conditions dangerous?

Laboratory conditions are not dangerous if standard safe laboratory practices are followed. Using the proper personal protective equipment for biohazard items is required. Also, when test firing firearms, we wear hearing and eye protection.

Do you work alone? If not, with who?

The size of the Firearm Section is based on the amount of casework submitted to the laboratory. My section has two examiners. Some larger systems may have 10 or more.

What do you wear to work?

I wear khaki pants, golf shirt, and tennis shoes while working in the lab. When I go to court, I change into a suit.

Does one case stand out in your mind as being particularly difficult?

The most difficult cases are high profile ones. This isn’t because the evidence is particularly difficult, but rather that your work, experience, and training will all come under tight scrutiny when the case goes to court. This is not a bad thing, just stressful.

What kind of demand is there for Forensic Firearm Examiners?

This job is not common in the sense that there are many in every city. For example, our agency serves over 110 agencies (cities). Also, the turnover is not very high, so once the lab has a firearm examiner they will serve out their career in that lab until retirement (30 years+).

How do you know a scene is going to be difficult to process?

The more involved the scene, the more difficult it will be. Multiple firearms, multiple shooter locations, and multiple rooms will make the scene a challenge and require quite a bit of time.
What type of person would be well suited for this job?

A good firearm examiner has a science background, pays close attention to detail, and has a general interest in firearms and their mechanical operation.

How much testifying does the job require?

I testify about once a month. Not every case we work goes to court. The defendant may plea out or the defense attorney may stipulate to our findings. That means that they have no issues with our report and it is read into record without our testimony.

What do you like best about the job?

I enjoy the variety of casework that comes to the lab. Almost every day brings a new challenge.

What do you like least?

A majority of my time is in the lab looking through a microscope. I’m a social person and enjoy getting out talking to people. Being in a lab eight hours a day gets a little boring in that sense.

What is it about the job that made you stick with it for so long?

Examining the evidence is a challenge for me. A case can be thought of as a puzzle. Working the evidence is like arranging the puzzle pieces to obtain a picture. That challenge makes the job enjoyable.

Chris Monturo has been a forensic firearm examiner for the last 15 years, and is a distinguished member of the Association of Firearm and Toolmark Examiners. In that time he has published 16 articles in the area of forearm and toolmark identification. He is the owner of Precision Forensic Testing (www.precisionforensictesting.com), and uses his laboratory experience to design products for teachers who want to add toolmark and firearm analysis to their curriculum.

This article originally appeared in Issue 17.
In this issue we’re premiering a new feature called Photo Crimes. The images on the next two pages, comprise a crime. The idea is to present them to your students and challenge them to solve the crime by looking at the photographs and reading the descriptions.

If you want to make a class set of the two pages and have your students work on them in pairs, you’re going to need a printer (and then a copier) capable of printing in color or gray scale. A printer or copier that only turns out black and white products just isn’t going to work. Gray scale is sufficient.

OR, you could transfer the images to a projector that allows every student to see them all at once.

Regarding the note at the bottom right of the second page: there are no clues in this version, and the answers are on page RR.

These photos are from Scotland Yard Photo Crimes, used with permission of Dorling Kindersley Publishers.

Please let us know what you think of this new feature at admin@theforensicteacher.com. We want to know if you can’t read the text or if the photos are jaggy so we can improve. Should we make this a regular feature?
CONCERNING COLNAGHI

The correct interpretation of evidence is necessary not only to identify the actual wrong-doer but just as vitally, to protect any innocent participants.

1 Mrs. Carruthers knew an authentic masterpiece when she saw one, and she was glad that the dealer she had visited that morning did not.

2 It was the find of her life — an original Colnaghi. She hung it proudly in her entrance hall. "It's almost immoral!" she laughed to herself. "Five pounds for a painting worth hundreds!" She could hardly wait to show-off her find to her guests, who would be arriving any minute.

3 The first was her brother, Tim Waverly. He admired her extensive art collection, but he didn't know much about art. His hobby was spending his trust fund.

4 Robin Steinmetz, an art dealer and old friend, came next. Then John Hodgson arrived. He was head of a shipping firm, but he loved art and spent more time at auctions than he did at the office.

5 They all sat and talked about the masterpiece over cocktails. "Amazing," Steinmetz declared. "It's genuine all right — and for five quid! You wouldn't consider working for me, would you Dorothy?" They both laughed.
Choose your suspect; John Hodgson, Robin Steinmetz, or Tim Waverly. Answer on page 41.

By 10 p.m., the guests had left. Mrs. Carruthers went upstairs to bed. She tossed and turned for hours, then went down for another look at her painting. It was gone!

In the morning, Inspector Black sent round his junior, P.C. Hobbs. He surmised that the thief had got in through the window—the hall was on the ground floor. He could find no fingerprints or footprints. The sitting room appeared to be undisturbed. Then Hobbs noticed that the bureau in the sitting room had been ransacked.

He found a pair of cuff-links and five one-pound notes in the drawer. It was clear that the culprit was only after the painting.

Hobbs checked the hall. There was a deep scratch near the bottom of the chair. Mrs. Carruthers was certain that it hadn’t been there before. On another small table was a scarf and a pair of gloves. “My brother always forgets something,” the woman explained. “I expect he’ll be back this afternoon to claim them.”

Hobbs reported back to Inspector Black, for he hadn’t a clue as to the identity of the culprit. Can you help?

Choose your suspect; John Hodgson, Robin Steinmetz, or Tim Waverly. Answer on page 41.
1. T/F ______ If a bullet is dropped from the same height, and at the same time, another identical bullet is fired from a gun whose barrel is parallel to the ground, the fired bullet will land at least a second after the dropped one.

2. T/F ______ Any caliber cartridge can be fired from a gun made for a bigger cartridge, for example: a .357 round can be fired from a .44.

3. T/F ______ Only the US Government normally has access to a gun totally invisible to X-ray scanners in airports.

4. T/F ______ If a gun is powerful enough the impact of the bullet will throw the person being shot off their feet.

5. T/F ______ High volume, special order ammunition magazines for the Glock 32 can hold 32 cartridges.

6. T/F ______ A suppressor (silencer) for most Colt revolvers can be made for less than $25 at any Super Walmart.

7. T/F ______ While the sale of a handgun requires a person to undergo a background check at the store they’re purchasing from, ammunition is available at Amazon.com.

8. T/F ______ A gun fired underwater is lethal for between six and ten feet.

9. T/F ______ Gun shot residue will remain on a shooter’s hands for at least 72 hours. Because it is formed in the chemical reaction of igniting the primer and propellant, GSR is resistant to most hand soaps.

10. T/F ______ A six-shot revolver can actually fire seven cartridges if one is in the chamber when the gun is loaded.

Answers on page 35
Interview continued from page 17.

it closer and say, “holy crap, look this is from a zipper.”

FT: I’ll be darned.

PD: Yes, it’s really rewarding to figure out these non-routine cases. Every time I do one of these complex cases, where the work with Dr. De Forest comes in, you just have to appreciate the science behind the interpretation. Dr. De Forest rarely did the routine stuff. The same applies to my other professors at the College who I named earlier. The routine stuff is either pled out or it never goes to trial. But the non-routine stuff, that’s where it gets complex requiring critical thinking and problem solving skills. For example a paint chip on the bullet, or its impact orientation meant something about reconstructing the incident.

FT: Gotcha.

PD: So, a bullet is very, very easily destabilized by interacting with something, the first thing it runs into, and then may come to rest in someone or something else, and its an appreciation of this that I learned from Dr. De Forest and my own tests fires where I used high speed photography to understand these dynamics. That’s what I bring to the classroom when possible, but I also bring it to the courtroom. Many times there’s a question that we can answer with some scientific experimentation.

I can share with you a link to a case that I worked with Dr. De Forest recently. It was covered by the New York Times. It was a tragic case that involved the death of a person where we disagreed with the interpretation of the evidence. The link is http://www.nytimes.com/projects/2013/two-gunshots.

FT: We’re digital so we’re not short on space. Typically our readers are hungry for content because 95% of them have no experience with handguns or guns at all. What they know is what they see on TV and so do most of their students.

PD: I’m glad I could help.
Great Ballistics on the Cheap

By Bud Bertino

How to produce bullets (projectiles) with perfect lands and grooves for ballistics comparison

Note: Students work with spent ammunition only and no firearms.

Teacher Preparation:

You want to produce some perfect sets of bullets with no deformations for use in forensics class. You saw the Myth Buster’s Episode (#34) “Bulletproof Water.”

A short version is at https://www.youtube.com/watch?v=yvSTuLjiRm8
A long version is at https://www.youtube.com/watch?v=L-VOfpU1qyE or https://www.youtube.com/watch?v=iPJWTiuNVvQ or
a text summary is available at http://www.discovery.com/tv-shows/mythbusters/mythbusters-database/water-bulletproof.htm

You feel excited about asking your next door neighbor’s permission to shoot into his pool for the perfect specimens you need for a ballistics lab activity. This type of shooting would be a BIG mistake for a number of reasons! Here is an alternative you might consider.

The Background:

I was fortunate to have access to a firing range. If you’re not a shooter yourself, find someone who is to help you. Do a Google search for gun shops or gun ranges in your town or city, call and explain who you are and why you’re seeking guidance, and you’ll find a helpful soul. My partner, Tom Milner is a certified NRA instructor. He was enthusiastic about working on this project with me, and helping insure the safest of conditions.

We tried several approaches to producing the perfect bullet. Our unsuccessful approaches included shooting into columns of water and lined up jugs of water. We succeeded in learning a lot about how these approaches were NOT going to work.

We moved on to a new plan. I shot into a two foot long array of phone books. This worked fine in stopping the bullets, but the projectiles were often flattened and far from perfect.

We thought we might be able to slow the bullet without destroying it by using polyester fill used for home insulation. Tom purchased a 10 lb. box of Poly-fil®. I tightly packed the Poly-fil® into three small boxes (see below) and taped them shut. At the range, three boxes were lined up end to end so that I would be shooting at the target end of the first box (see photo below). We had no idea how far the projectiles would penetrate.

This technique worked! The .22 caliber and 9 mm bullets we recovered.
were perfect. They had melted the Poly-fil® as they traveled through the first box and into the second. By checking the back end of each box we could determine if the bullets had passed through and determine where to look for them. The key to success was in the tight packing of the boxes. The results are pictured below.

![.22 LR bullets.](image1)

9 mm bullets – notice Poly-Fil® still adhering to the brass bullet on the right.

Flash drive used as a rotating viewer for counting lands & grooves.

Part 1. Finding evidence on the bullets

1. Determine caliber of each cartridge using calipers to measure the width of each projectile and record their results in a table you provide.
2. Determine the number of lands and grooves. Mark the first projectile with a marker or pen at any land. This will help with the count. (The number of land and grooves will be the same.)
3. Record whether the grooves spiral left or right.
4. Using a flash drive as a pedestal and a hand lens or dissecting scope, count the lands & grooves as you rotate the bullet. Record your count.
5. Using the Internet, reference the firearm that might have been used from a list provided by instructor. [http://www.forensictechnology.com/FRT/](http://www.forensictechnology.com/FRT/)
6. If you want to add additional math, have students measure the widths of the lands and grooves and research and compare information from different firearms manufacturers.

Reference article of interest to get you started: [http://www.pochefamily.org/Books/RimfireBullets.htm](http://www.pochefamily.org/Books/RimfireBullets.htm)

Teacher Notes for the Activity: Class size 24

Materials: (Per two students)

- 3 Spent bullets (.22 from rifle, .22 from pistol, 9 mm from pistol)
- Marking pen
- Flash drive with rotating cover protector
- Hand lens or dissecting microscope
- Calipers
- Super Blue® (available at Sears.com or Amazon.com or lots of other places; Google it.)

Part 2. Lifting Fingerprints from Shell Casings

Premise for your scenario: Shooters leave fingerprints on cartridge casings when they load their firearms. While at the firing range, collect shell casings for use in the following fingerprinting exercise:

Notes on Materials:

1. Spent shell casings from a firing range. A Google search will show you the closest one. The easiest casings to use will be the larger center-fired casings. Most ranges have hundreds on the ground or in bins provided for discard or recycling.
2. Using Windex® (or a similar mild cleaner) and wearing gloves, spray and wash the surfaces of each shell casing to remove all fingerprints.
3. Place a fingerprint on each shell casing and store in a paper bindle or coin envelope.
4. Prepare a solution of Super Blue®. **Caution:** Super Blue® is used to protect a firearm from rusting. It is caustic and should be handled carefully using goggles and gloves. Dilute 20 ml of Super Blue® with 5 ml of
water and store is a closed container. This is your stock solution.
5. Syracuse dishes (or watch glasses)
6. Plastic forceps (missing from photo)
7. Paper towels

Procedure: (develop your own scenario as you see fit)

1. Provide each pair of students with two shell casings prepared by instructor.
2. Describe your scenario about a shooting and the finding of shell casings at the crime scene with possible fingerprints.
3. Have students fill a Syracuse dish (or watch glass) with Super Blue® solution and, using plastic forceps, dip the shell casing for a few seconds and watch the fingerprint develop. Remove from the Super Blue® solution and rinse thoroughly. Place on paper towel to air dry.
4. View, photograph, sketch, and describe the ridge pattern detail of the fingerprint.
5. You can use Super Blue® on other metal surfaces but it will eventually corrode them. I used it to photograph a fingerprint on a quarter.

Additional teaching tips and ideas to explore can be found at www.bertinoforensics.com
Firearm Quiz Answers (From page 30)

1. False. Neither the spin of a bullet as it emerges from the barrel of a gun nor its velocity give it any lift. The fired bullet will be acted on by gravity the same way as the dropped bullet, and both will hit the ground at the same time.

2. False. Because the mechanism of the bigger gun is not designed to work with smaller calibers, the gun will not fire, eject, or load a round safely.

3. False. No gun is totally invisible to X-ray scanners at the airport.

4. False. Newton’s Third Law (for every action there is an equal and opposite reaction) requires the shooter to be thrown off his feet in the opposite direction if the target is likewise moved. Besides, such a gun would shatter the shooter’s wrist and/or arm bones.

5. False. Model numbers on guns usually don’t refer to the number of cartridges it can hold.

6. False. A suppressor like those seen on TV or in the movies doesn’t exist. And if it did, it would cost more than $25, even at Walmart. Also, a revolver can’t be fitted with a suppressor.

7. False. Ammunition is controlled just like the sale of guns. No mail order, or internet-based vendor can legally sell ammunition.

8. False. The density of water robs bullets of their energy after three feet.

9. False, GSR is actually easy to remove from a shooter’s hands with a simple hand washing.

10. False. Revolvers don’t have chambers like a semi-automatic pistols; the chambers are in the cylinder. A six-shot revolver will only fire six bullets maximum.
Teaching Tips: Lindbergh Case Study

The Lindbergh Kidnapping is a classic crime case study that I incorporated into my ‘Document Analysis’ unit (Intro Forensics 25: gr. 10-11). It is truly a tragic tale that really captured the interest of all my students. The numerous letters that were sent by the kidnapper to Charles Lindberg and his family were crucial pieces of evidence in solving the case.

This case study often leads me into an interesting discussion with my students of how school children around the world, despite using similar alphabetic letters, are taught very different styles of printing and cursive handwriting. To reinforce this, I had my students bring in and present various writing samples they collected from relatives/friends who went to school in other countries.
Historical Crime Case Study: Forensic Document Analysis

Kidnapping of the Lindbergh Baby

Above = One of the most famous ransom notes in history. The kidnapper of the young son of Charles Lindbergh, a famous American aviator, left this note.

In 1927, Charles Lindbergh gained international fame by becoming the first pilot to make a solo, non-stop flight across the Atlantic Ocean. He flew from New York to Paris in 33.5 hours in a single-engine airplane named The Spirit of St. Louis.

Charles Lindbergh Jr., the 20-month-old son of Charles Lindbergh, was kidnapped around 9:00 pm on March 1, 1932, from his nursery on the second floor of the Lindbergh estate in New Jersey. A search of the house was immediately conducted after his disappearance. A ransom note demanding $50,000 was found by a window in the nursery. When police were called to the scene they discovered a large wooden ladder that did not belong to the Lindbergh’s, which had been used to gain access to the baby’s room. The ladder was found in two pieces, and had broken sometime during the abduction.

A total of 13 handwritten ransom notes were sent to Charles Lindbergh over a period of several months. Some of the notes increased the ransom demand, while others outlined the details and location for pick up of the ransom money. Examination of the ransom notes by various FBI handwriting experts resulted in the unanimous opinion that all the notes were written by the same person. Also, experts stated they thought the writer was likely of German descent.
In April 1932, after a friend of Charles Lindbergh left $50,000 in gold certificates for the kidnapper, who revealed that the baby was on a boat on Martha’s Vineyard. However, this was a fabrication and he was not found.

In May of 1932 the body of the kidnapped baby was found by accident by a local man. The baby’s partly buried and badly decomposed body was found only about four miles from the Lindbergh home. Examination of the body showed that he had been dead for about two months and the cause of death was a blow to the head.

Two years after the kidnapping, a gas station attendant suspicious of a man who paid for his gas using a ten-dollar gold certificate wrote down his license plate number and gave it to police. The license plate number was traced to Bruno Hauptmann from Bronx, New York. Hauptmann was 35 years old and was born in Germany. Bruno occasionally worked as a carpenter; he had a criminal record for robbery and had spent time in prison. A short time after the kidnapping, Hauptmann began investing heavily in the stock market and quit working. When police confronted Bruno Hauptmann and searched him they found a $20.00 gold certificate in his wallet, while over $13,000 in gold certificates were found hidden in his garage.

After his arrest, FBI writing analysis experts compared samples of Hauptmann’s handwriting to the ransom notes received by the Lindbergh family. Many similarities were found which resulted in the conclusion that Hauptmann wrote the ransom notes. The photo below illustrates a similarities found:

![Handwriting Comparison](Public%20domain%20from%20www.fbi.gov/libref/historic/famcases/lindber/lindbernew.ht)

This handwriting evidence, in addition to other evidence (e.g. tool marks on ladder matched suspect’s tools, wood from ladder matched wood in flooring of suspect’s home, phone number and address of Lindbergh’s friend inside suspect’s closet), resulted in a jury finding Hauptmann guilty of the kidnapping and murder of young Charles Lindbergh, Jr. Bruno Hauptmann was sentenced to death and was electrocuted in April 1936.
**Worksheet: Kidnapping of the Lindbergh Baby**

Name:_________________________________________ Date:______________________________________

1. What did the FBI experts who examined the Lindbergh ransom notes believe the gender and general age of the writer of these notes to be?

2. What did the handwriting experts believe the writer’s nationality to be?

3. Two years before any suspects were arrested, forensic writing experts were able to determine two pieces of information from the 13 Lindbergh ransom notes. What were they?

   *Use the following image to answer the next two questions.*

   ![Handwriting samples](Public domain from www.fbi.gov/libref/historic/famcases/lindber/lindbernew.ht)

4. What is distinctive about the letter ‘y’ in the above examples?

5. What is the most distinctive feature of the letter ‘o’ in the above examples?
Use the following information to answer the next question.

Various Examples of Handwriting Features

1. Distinctive male writing style.
2. Letter ‘q’ given an inverted tail.
3. Letter ‘y’ given a tail with a loop.
4. Distinctive German writing style.
5. Letter ‘u’ written similar to the letter ‘v’.

6. Three handwriting features, as listed above, that were found to match Bruno Hauptmann’s writing samples with the Lindbergh ransom notes included _____, _____, and _____.

(State your answer from lowest to highest numeric order.)

Charles Lindbergh (1902-1974)
Answers

**KEY - Kidnapping of the Lindbergh Baby**

1. A middle-aged male.

2. German.

3. All the notes were written by the same person. The notes were written by someone of German descent.

4. It has a tail with a loop.

5. It is not a complete circle.

6. 3, 4, and 6.

This lab is used with permission from Audri Kowalyk. This lab, and many others are available at [http://forensicsinschools.com/](http://forensicsinschools.com/).

---

**PHOTO MYSTERY ANSWER (From page 29)**

Solving this crime was not, for me, a long drawn-out affair. As you may have noticed, the chair in the hall had been moved to a point just beneath where the Colnaghi had been hanging (pies. 2 and 7). It had been used to reach the picture. Neither Hodgson nor Waverly would have needed a chair, as you can tell by a comparison of heights. Steinmetz, however, was a noticeably short man. He would have needed the chair to reach the picture. Moreover, when he put his foot on the chair, the side of his shoe had caught the back. Ordinarily, this would only have caused a graze, but Steinmetz wore spats (pic. 5). Spats have buckles at the side. The sharp buckle of Steinmetz’ s spat made a deep scratch, which P.C. Hobbs noted. Had the young constable asked Mrs. Carruthers for a detailed description of each of her visitors, he would have had no trouble in solving the case. (The ransacked bureau was probably set up to suggest a common burglar.)
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Do you have a lab your students love?

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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, recall, 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 the Numbers:
1026 Pages
295 Articles
104 Labs/Activities
21 Back Issues
3 clicks to order
1 CD
$0 shipping fee
$29.95 (That’s it!)
Ask the Morgue Guy

Q. There's another teacher in the science department at our school who wouldn't leave me alone during the school year. He seemed to walk past my door half a dozen times a day. And he called me by the name of every female investigator from TV and the movies. I'm getting creeped out. What are my options? I don't have the stomach or time for the politics of making enemies.

— Ruth Capopiano, Easton, UT

A. If you're a really good forensics teacher you've already done the legwork and figured out how to either make his death look like an accident, or how to ensure the body isn't found.

But seriously, this is harassment. Start by talking to this guy. Maybe he just wants you to say hello, if you haven't done so. He could simply be socially inept.

Or he could simply be a creep. This is why it's important to start with him. Go see him before the next school year starts, when the two of you have time to work on your rooms. Ask him what's going on. Listen. Maybe there is a benign reason for the attention. Tell him his actions are making you feel uncomfortable and ask him to stop. Then, cover your butt and write down everything that was said, and share it with another teacher you're close to. This way, if he steps up the weirdness you have it documented you talked to him and shared it with someone else.

If the behavior doesn't change or it gets worse, talk to him one more time, and tell him you've noticed. Document it again. The third time he pulls his crap it's time to talk to an administrator, and you'll have documentation.

What's New

Below are only some of the great training offered by the American Academy of Forensic Science's website (www.aafs.org). Please note: all email and website links are active.

7-10 Bertino Forensic Science 4-Day Summer Institute Scotia-Glenville High School, Scotia, NY 12302 (near Schenectady, NY). Hands-on workshop for teachers focusing on several forensic disciplines as well as lessons, labs, curriculums, and saving money. Contact Patti Nolan Bertino at nolanp@nycap.rr.com or call 518-384-1718 or www.bertinoforensics.com.

8-10 Bloodstain Pattern Analysis To be held at Haskell Research Facility, Rensselaer, Indiana. This hands-on workshop, designed for teachers, is a course in blood spatter. It will cover trajectories, interpretation of drops and sprays, differences in blood patterns, drag patterns, droplets, and velocities of the originating spatter. Go to http://saintjoe.edu/drupal/summer-workshop-courses.

8-12 Human Osteology To be held at the Forensic Anthropology Center at Texas State in San Marcos, TX Contact: Sophia Mavroudas Phone: (512) 245-1900 Email: FACTS@txstate.edu www.txstate.edu/anthropology/facts.

9-11 2014 FSEC for Middle & High School Science Teachers To be held at Arcadia University, King of Prussia, PA. Attendees will experience lectures and intense hands-on forensic labwork, and take home a wealth of resources. Contact: Nancy Jackson. njackson@aafs.org or go to http://www.aafs.org/sites/default/files/pdf/2014/14ARCADIAFSECBrochure_v2.pdf.

14-15, 16-18 Forensic Anthropology Field Methods To be held at Haskell Research Facility, Rensselaer, Indiana. This course for teachers will feature morning lectures on archaeological method and theory, search strategies, mapping outdoor crime scenes, and excavating buried human remains before working in small groups to locate, document, and recover physical evidence from a variety of mock outdoor crime scenes. Go to http://saintjoe.edu/drupal/summer-workshop-courses.

14-15, 16-18 DNA: Evidence Recovery and Comparisons To be held at Saint Joseph's College campus, Rensselaer, Indiana. This course for teachers will provide an introduction to forensic DNA testing, evidence collection, and processing. For more information go to http://saintjoe.edu/drupal/summer-workshop-courses.

14-17 Bertino Forensic Science 4-Day Summer Institute Scotia-Glenville High School, Scotia, NY 12302 (near Schenectady, NY). Hands-on workshop for teachers focusing on several forensic disciplines as well as lessons, labs, and curriculums. Contact Patti Nolan Bertino at nolanp@nycap.rr.com or call 518-384-1718 or www.bertinoforensics.com.

14-18 Introduction to the Science of Fingerprints This course will be held at Sirchie's facility in Youngsville, NC To enroll, call (800) 356-7311 or register online http://www.sirchie.com/training/training-programs/introductiontothescienceoffingerprints.html.

16-18 Advanced Methods in Forensic Anthropology: Ancestry with Dr. M. Kate Spradley To be held at the Forensic Anthropology Center at Texas State in San Marcos, TX Contact: Sophia Mavroudas Phone: (512) 245-1900 Email: FACTS@txstate.edu www.txstate.edu/anthropology/facts.vv.
Going On?

What's Going On?

Hollywood has caused a lot of misconceptions when it comes to firearms. Besides the myth of someone being shot and the impact of the bullet throwing them from their feet, somehow, students nearly everywhere believe that if a bullet is fired from a gun whose barrel is parallel to the floor, and another bullet is dropped from a height equal to the gun, the bullet fired from the gun will always take longer to fall. We offer you the following links to get the discussion going:

If your students only believe in hard numbers go to http://hyperphysics.phy-astr.gsu.edu/hbase/grav.html#bul

But if your students are visual learners take them to the following video URLs to see how Mythbusters tackled the issue:

short version:  https://www.youtube.com/watch?v=cgIOknFz9L4

If your students want to see all the work Mythbusters did to set up the experiment, the longer version of the video (in five parts, but each video automatically goes to the next) is at

https://www.youtube.com/watch?v=2tiOmp1BE8Y&list=PLOdnh5J_7y7KerFi9J_HX0nPndzo_F7

Varying Times and Schedules

Forensic Training for High School Teachers
http://www.teacherstrainingguide.com/forensic-training-for-high-school-teachers.html

Continuing Professional Development  Forensic And Crime Scene Courses For Teachers in the UK
http://www.castleviewuk.com/courses_for_teachers.html

Forensic Science for Teachers

Forensic Education
http://www.forensiceducation.in/

Free Online Classes and Courses for Aspiring Forensic Scientists
http://education-portal.com/articles/Free_Online_Classes_and_Courses_for_Aspiring_Forensic_Scientists.html

Forensic Science Teacher Workshop

Online Forensic and Investigative Science Minor
http://online.wvu.edu/minors/ForensicInvestigativeScience/

Forensic & Crime Scene Training
http://www.imprimus.net/index.html (click on Training Calendar)

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...

Brittny Macintyre, 20 was arrested and charged with prostitution for soliciting an undercover police officer. She approached him immediately after he entered the building and passed him pen and paper to discuss the price and sexual acts to be performed. Workers at the tiny Tewksbury, NH public library were shocked.

Alonzo Liverman, 29, of Daytona Beach, FL, was arrested after soliciting an undercover police officer. He rode his bicycle to an area of the city known for prostitution, and attempted to close a deal with a woman he thought was a hooker. After realizing he had no money, he offered the undercover cop food in exchange for a sex act. She accepted, and he was arrested. The food in play? A salad.

Mathew Michael Lee McMahon, 20, of St. Augustine, FL, liked to use a red and blue light on his dashboard to pull over drivers. In June, 2014, however, he turned on the lights and the target car pulled to the side of the road. The driver of the unmarked car, St. Augustine detective Chance Anderson, was surprised to see a strange face on the man who pulled him over. McMahon was arrested a minute later.

Police responded to a call about a break-in at a Burjassot, Spain funeral parlor. The searched the place from top to bottom without finding the suspect until a cop noticed one of the corpses in a coffin on display wasn’t wearing a suit; in fact, he was wearing dirty, beat-up sweats. The policeman, having some time on his hands, decided to watch the body, which looked dead. Until it suddenly breathed. The man was arrested seconds later.

Four teenagers, all under 18, from Santa Fe, NM, decided to have some fun with a BB gun they’d acquired. They drove around a development taking shots at the windshields of parked cars. One homeowner, deciding to take matters into his own hands, got in his car and followed them at a short distance. His car mimicked the driving patterns of the youths’ car so much they became shaken and afraid. Like many Americans who are faced with a threat, they called 911. The cops arrived soon after, stopped the boys, and attempted to make sense of their story, after which all four were arrested for property damage and possession of drug paraphernalia.

A Montreal, Canada women and her husband decided to stage a robbery in their home to get the insurance money. The police responded as planned, their story checked out and seemed plausible, even the jewelry and other valuables were missing. Unfortunately, the man wasn’t home when the police arrived, and as the police were wrapping up their investigation the woman called him on her cellphone. Speaking in French, she relayed what was going on with the progress of their scheme. Unfortunately for the woman, this entire drama took place in the province of Quebec. And, of course, one of the cops listening was bilingual. She was arrested on the spot.

Not quite a stupid criminal, but worth mentioning, is the story of employees of a tree removal company in Norridgewock, ME, who called 911 because they went to a neighborhood to do some work and a man emerged from the house where the tree truck was parked and ordered the workers off his property. He was described as being shirtless and having a gun tucked into the waistband of his pajama bottoms. The local SWAT team responded, and approached the house, assault rifles at the ready. The man answered the door when the cops knocked, he was shirtless, and wearing pajama bottoms. The gun tucked into his waistband, however, turned out to be a tattoo at waist level. No charges were filed.
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