

Issue 19

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The Forensic Teacher Magazine

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and Blood**

Spring 2012
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The Forensic Teacher Magazine

Volume 6, Number 19, Spring 2012

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Lesley Hammer was a high school chemistry teacher when her friend, the director of the state crime lab, called to offer her a job. She took it and in a lot of ways the grass really was greener. She went back to the classroom briefly, years later, before returning to law enforcement. She has a unique perspective most teachers don't.

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By Jane Sandstrom.

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Editorial



You Asked For Labs

Almost there. Summer is just around the corner, but some of you are already thinking about next year. This issue's theme is the body and we've packed it with labs and activities we think you'll enjoy using with your students.

We've reprinted two decomposition labs from earlier issues, we've got a phenomenal lab about calculating height based on long bones. Another gem will allow your students to discover for themselves the difference between forensic chemistry and toxicology. We've also got a couple autopsy exercises, take your pick, and an awesome blood lab. This one doesn't just allow your students to determine if what they've found is blood, it asks them to test and think about a number of other substances that will give a false positive for blood. We've even included a pH activity that asks your students to think about what pH is, and to use what they learn to solve a murder.

We've brought back the raffle to our website. Give us your opinion and you'll be entered to win a digital microscope. The next issue is targeted for August, and we'll announce the winner then.

Also, if you're reading this it's likely your spam filter on your email account didn't screen out the digital postcard we sent out to announce the birth of this issue. Unfortunately, about half the people on our email list don't see the postcard because of their spam filters. This is why it's a good idea to like us on Facebook. You'll receive an update, if you've opted to, when announcements are made.

We wish all our readers a happy and safe summer.

We'll see you in August.

Enjoy.

Dr. Mark Feil

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New Products



Trajectory Kit

Precision Forensic Testing is now offering a forensic shooting reconstruction kit. This kit includes multiple hands on exercises to accommodate many students. Also included is a detailed PowerPoint presentation to assist teachers on presenting information to students. Printable laboratory exercises incorporate the skills taught in the lecture. For more information visit: www.precisionforensictesting.com.



Forensic Apps

Law Enforcement Training and Resource Group LLC., is proud to announce a suite of applications for all smart phones. The suite is built around the needs of first responders to services calls, and the apps will satisfy their every need. This suite is for iPhone and Android smart phones with at least a 5 megapixel camera for best results. The suite of a dozen applications is divided into tools, calculators, and evidence. For more information go to www.letrg.com.



Magnetic Serial Number Restoration Kit

Precision Forensic Testing has developed a Serial Number Restoration Kit that is 100% chemical free. The use of strong magnets and magnetic particle solution avoids the use of acids while still allowing students to restore obliterated serial numbers. The PowerPoint presentation included helps discuss the physics involved in polarity and how it is used in the field of forensics. For more information visit: www.precisionforensictesting.com.

Forensic NEWS

Blood Sample Yields Age of Donor

Researchers reported recently in *Current Biology* they've been able to make age estimates of blood donors based on the chemistry of the sample. Such an advance would give investigators a key piece of information when composing a profile. Tests are underway to validate the test.

Research Challenges Photo Lineups

After demonstrating 75% of wrongfully convicted prisoners exonerated by DNA evidence were identified via eyewitness identification, researchers have concluded erroneous identification often depends on how a photo lineup is

presented, and by who. The New Jersey Supreme Court noted in 2011 that since investigators can subconsciously steer a witness toward a particular person in the lineup, a truly blind presentation reduced the risk of error. A blind presentation is one where the person showing the photos has no relation to the case, and doesn't know who the suspect is. Another study, published in 2011 has also shown reduced rates of misidentification when the photos are presented one at a time rather than as a block of six. A handful of states have adopted the suggestions, but many independent law enforcement agencies remain skeptical.

A New Way to Determine Sex

Following a plane crash or traumatic death, medical personnel sometimes have trouble finding and/or piecing back together bones normally used in determining sex. North Carolina State University researchers have learned how to use the seven tarsal bones of the foot to do the job instead. Usually

feet are enclosed in shoes, which helps protect these bones, even if the rest of the body is scattered. Their research has demonstrated the sex of the skeleton can be determined about 94% of the time.

Determining Sex From Fingertips

Dr. Kewal Krishan of Punjab University has just completed a study he noticed that women tend to have a higher density of friction ridges on their fingertips than men. He analyzed 275 men and the same number of women and found, at least in the South Indian population, a fingerprint displaying fewer than 13 ridges per square inch were most likely to belong to men. Women tended to display more than 14 ridges per square inch. Obviously, if these results are generalizable across other populations they would help investigators in searching for suspects.

Mini-Mystery

Stanwick Finds the Magic Words

The small downtown section of Baskerville was unusually busy that Saturday morning. After browsing through several other stores, Thomas P. Stanwick wandered into the Baskerville Bookshop, a crowded, bright little store displaying books, greeting cards and, in a far corner, toys. He was looking for a birthday present for the younger son of his friend Inspector Matt Walker. Tim Walker was about to turn six.

Weaving his way through knots of other customers, Stanwick made his way to the toy corner. There he spotted a toy he knew Tim would love: a bright red fire truck. Scooping it up, Stanwick started for the checkout counter and then stopped with a sudden realization. He had accidentally left his wallet at home.

With a sigh of annoyance, Stanwick turned to put the truck back. As he did, he saw a sign near a collection of puzzle books: SAY THE MAGIC WORDS!

How sharp are your puzzle skills? Tell us the logical conclusion of the following statements and win the book or toy of your choice!



1. All friends of winged armadillos wear striped ties.
2. Only those who eat pickled harmonicas can enter a chocolate courtroom.
3. Members of the Diagonal Club drink martinis only at four.
4. All who eat pickled harmonicas are friends of winged armadillos.
5. Only those green elephants who are members of the Diagonal Club can wear striped ties.
6. All green elephants drink martinis at five.

Stanwick's eyes sparkled. For a few moments, he stood stock still, staring at the sign and fingering the tip of his mustache. Then, with a gesture of triumph, he swung the truck back under his arm, strode to the checkout counter, and won the truck for Tim by saying the magic words.

What are the magic words?

Answer on page 28

Warning: this mini-mystery involves reasoning skills your students may not be very practiced in.

Our suggestion is they either work in pairs or use paper and pencil to keep all the clues straight.



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



<http://www.bbc.co.uk/news/magazine-16187225>
One of the COOLEST crime scene depictions ever.

<http://australianmuseum.net.au/interactive-tools/autopsy/>
An introduction to the autopsy without a lot of gore.

<http://www.crime-scene-investigator.net/index.html>
An unbelievable resource for a ton of forensic information.

http://nationalparalegal.edu/conLawCrimProc_Public/PoliceInterrogation/MirandaVsArizona.asp
A cool refresher about Miranda and how it works. Worth checking out.

<http://www.pbs.org/teachers/thismonth/forensics/index3.html>
A great collection of forensic links compiled by PBS. Nicely done.

<http://www.all-about-forensic-science.com/educational-resources.html>
A compilation of forensic information that will take you a month of planning periods to go through.

<http://www.ncstl.org/education/Finding%20Forensic%20%3CBR%3EResources%20on%20the%20Web>
An unbelievably great resource. These folks are wonderful. The material is first-rate and there's tons of it.

<http://www.nflonline.org/AboutNFL/Advocate>
A site devoted to forensics and debating. Just to see if there are any readers who don't glance at these descriptions. Please, don't send email about the link asking where the crime scene stuff is.
Seriously.
And yet, any folks who get confused will not have read this plea.
We'll let you know if anyone contacts us.

If you come across a free website dealing with forensics that you think is outstanding, and would like others to know about, send us an email at admin@theforensicteacher.com

Walking the Walk Talking the Talk



Imagine: you're teaching high school chemistry when you get a call from the director of the state crime lab. He wants to hire you. It happened to Lesley Hammer, and she's come a long way since. During a phone interview she explained what she misses about the classroom, how forensics teachers can better help their students, and how forensics isn't like it is on TV.

By Mark R. Feil, Ed.D.

The Forensic Teacher Magazine: Hi Lesley. How are you? How is the weather up there in Alaska?

Lesley Hammer: Well...snow flurries just started (laughs). We still have about four or five feet of snow in the yard.

FT: Really?

LH: Yeah. We had record snow this year so it's going to be a while.

FT: Wow. Are you near Anchorage?

LH: Yes.

FT: You're in Wasilla?

LH: No (laughs), now that, that is famous. No, I'm in Anchorage. Wasilla is about an hour north.

FT: That's good. Most of what America knows about Alaska is, unfortunately, restricted to shows like *Alaska State Troopers*.

LH: I know. People tell me about that one and the gold rush one and the crab fishing one, *Deadliest Catch*. And of course, I've never seen any of them.

FT: How do you know Jeanette (FT's contributing editor)? Did you two used to work together?

LH: No. My first director, George Taft, knew Jeanette because he was writing a forensic book for teachers, and Jeanette worked with him on that. George Taft and I stay in touch and he knew that I used to be a teacher. We ended up connecting about her project she does collecting shoeprints by email, then I finally met her when she came up to visit George once [ed. note: George was the Director of the Alaska Crime Laboratory].

FT: Yes, she speaks very highly of him.

LH: Sure. He's a great, great man.

FT: So, tell me about your career as a teacher.

LH: Well, I taught for four years

FT: In Alaska?

LH: Yes.

FT: Have you lived in Alaska your whole life?

LH: Yes. Well, my parents moved here when I was in first grade.

FT: That's close enough.

LH: I taught junior high science for two years, and then I taught high school chemistry for two years.

FT: How did you get interested in forensics?

LH: This is a great story. I used to have George Taft speak to my chemistry students, and he would talk about the lab. One day we were chatting at lunch, and he mentioned he had an opening and was encouraging me about applying. I was interested, but I thought, "I really like teaching," and then I thought about my own kids who were little and thought it would be nice to have a job where you don't take so much home. So, I applied for it, thinking I could always decide later because then I heard there were over 100 people who applied.

FT: Wow.

LH: And the process took quite a while.

FT: What were all these people applying for? What was the position?

LH: It was for a criminalist I position. It was an entry level criminalist position. And that's the trend you'll see when there's forensic jobs open. There's tons of applicants. When you need people with experience, of course it's like anything else. The pool is much more limited in the applications you get.

FT: So this job was for the person who goes to the crime scene and processes it, is that right?

LH: I moved around a little bit. My first



job was in the fingerprint section, the first job opening was for a fingerprint examiner. So I did fingerprint evidence, print evidence, and crime scene. I did that for a few years. At that time fingerprint examiners made less than criminalists. And then a criminalist position opened up that was drug analysis.

FT: And you taught chemistry.

LH: And I taught chemistry, so I applied for that and got it. For a while I would do the drug analysis and also fingerprint the packaging. We traveled long distances to testify here.

FT: Sure.

LH: So, for a while that was something I tried to do for the places that were really far away, if one person had to testify for drugs and latent prints.

FT: You were working for the state police?

LH: It was the state crime lab.

FT: So you were centrally located? In Anchorage?

LH: Yes.

FT: When you were a fingerprint examiner...how much of that is done by computers, like on TV, where they just put up a print and the matches just flip up on the screen.

LH: That's a really good question. The computer database finds possible matches, but it's a latent examiner who does the identification.

FT: Oh.

LH: You can do it onscreen, but there's more. You can set it so the computer finds the top 20 candidates, and then you have to look through all 20. But the one you end up identifying isn't always the number one hit because there might be distortion in the latent or maybe the 10-print wasn't taken very clearly. The computer doesn't always sort those things out.

FT: I see. And you were using AFIS? [ed. note: Automated Fingerprint Identification System]

LH: Yes. AFIS is the database to search.

FT: Did you find fingerprinting rewarding?

LH: I really liked fingerprinting; I like doing puzzles. I miss that kind of work.

FT: And then toxicology came up?

LH: Actually, it's not toxicology because that's looking at body fluids. It's controlled substance analysis. I'm getting a chemical ID on marijuana or cocaine or controlled pills.

FT: How long did you do that job?

LH: I did that for three or four years, and then I actually had about three or four months doing something else. The drug analysis is a little rote after the initial instrumentation, and the lady I student taught with was retiring, and I actually went back to teaching for about three months.

FT: Did you say to yourself, 'Wow, I miss this,' or...

LH: I did. You know, I missed the creativity, I missed the kids, but I went back and...you know, it was such a shock to be back there. I don't know how else to describe it. There were mixed feelings, you know? Teachers are such great people, I love working with teachers. The kids are great. They had more issues than the school I'd been at before, but that didn't really matter. In one class there were no books.

FT: I've been down that road.

LH: Yeah, then you know what a struggle it is to come up with materials.

FT: Uh huh, because they can't read or do homework.

LH: Or you're Xeroxing all afternoon.

FT: After school.



LH: Yeah. You know, I really disappointed George by leaving.

FT: Why did you leave? Did you want to see if teaching still had the magic it used to?

LH: On the drug analysis job, well, I had been talking to my past student teacher supervisor who was leaving, and drug analysis had gotten not that challenging, and I thought, ‘You know, my kids are a little older. I sort of felt as though teaching was my calling, so I thought I’d try it again. And I quickly realized one of the things I really wanted to go back for was that teacher and, of course, she was gone.

FT: She retired.

LH: She retired and moved to the East Coast.

FT: And that was the end of the school year?

LH: She retired at the end of the year. I started at the beginning of the next.

FT: So, you went from September to Christmas.

LH: I actually went in and talked to George and he had another opening that was in the criminalistics section, and it was doing shoe prints and tire tracks, and I could get back involved with crime scenes, and he was definitely willing to work with me in getting back in there.

FT: OK.

LH: But I didn’t feel great about leaving in the middle of the school year so I offered to stay until the end of the school year. But they ended up finding someone, a new teacher all ready to go, so it all just worked out.

FT: I understand. Now, this new job in foot impressions and tire prints, every day is different? It doesn’t get like toxicology, does it?

LH: Right. I find it very challenging. In this kind of forensics there is still a lot

of research that needs to be done, and there’s not a whole lot of people who do it, either. So fast forward ten years and I’ve gotten really involved with it, I’ve published three or four research papers and I just submitted three more this year.

FT: Great!

LH: And there are two *Encyclopedia of Forensics* books out there, and I’ve written the footwear section for both.

FT: Do you get called as a footwear expert?

LH: I did when I was with the state crime lab, but two years ago I went private, so now I’m a private forensic consultant specializing in shoe prints and tire tracks.

FT: Neat.

LH: I also do training in the US and Canada, and do casework in the US and Canada.

FT: So, in a sense, you’re living the dream. You taught science —

LH: Well, it sounds like that, but...I really enjoy it, but I miss the interaction of coworkers. I like the freedom. I travel a lot. My kids are grown now. And now I’m back doing a lot of training which is like teaching except I’m not exhausted (laughs).

FT: And you don’t spend hours photocopying.

LH: I mean, it’s completely different to have a few classes to teach repeatedly. I would change them up a little bit, and you might teach a one day class or a five day class that you have all the time in between to prepare for that. And that’s completely different from trying to be on day after day.

FT: What I meant by “living the dream” is there are a lot of forensic teachers at the high school level who wish they were good enough to go pro. And I understand the grass is always greener on the other side, but a lot of people are going to look



at such a move and say, “Man, I could do that.” But a lot of us would say we’d miss the kids despite all the hassles.

LH: And I do. I still take, and always have taken students I mentor, sometimes high school, sometimes college. I go in and speak at classes pretty often. So, I still try to stay pretty involved. I actually, now that I’m private, have thought it would be really fun to teach teachers about forensics.

FT: Now, I understand you and Jeanette will be teaching the Alaskan State Police this summer?

LH: I’ve only done one workshop with them, but it’s open to teachers and police personnel. There were both there in Montana [last summer].

FT: Looking back, when you were teaching high school, what do you wish you knew then that you know now about presenting science to students?

LH: Well, some things were reinforced. As a science teacher I never felt a lot of memorization was helpful. I mean, it’s more important to know how to use tools like the periodic table. And actually, the scientific method is something I probably breezed over, something that is there and is taken for granted. But it’s really an extremely important process, something I come back to not just when I’m doing research, but in the way I approach a case. So, that process has become much more important. I would have thought it was much more prevalent in my mind as a science teacher, but looking back I think now that I’ve applied it for so long that it’s something I would try to stress more, but not in terms of here’s the steps. But how can you take those steps and apply them to different problem solving scenarios.

FT: Did you teach forensics at the high school level?

LH: No, I’d never heard of it being offered when I was teaching. The first thing I got into was with that teacher I student taught with. During my first year at the crime lab I would go back and work with

her in her chemistry classes to do some forensics.

FT: Interesting. Do you have any advice for educators who teach forensics?

LH: One thing I have gotten involved in that relates directly to education, is there are a lot of kids being turned out of colleges that think they’re qualified to work in a crime lab.

FT: Why is that?

LH: There’s not one job that’s like a CSI. There are different jobs that require different backgrounds and different training routes. So, most of the exciting running around interviewing people and solving crimes is the job of an investigator. If kids are interested in that then the path is one toward investigation in which a lot of these college programs like criminal justice, or what I’ll call soft science or social science, which is a better term, is a good background. But if they want to work in a crime lab, that is lab work. I like to sit and do meticulous work, I like to put jigsaw puzzles together, not running around solving crimes. And that work usually requires a science degree.

FT: Like biology or chemistry?

LH: Right, and sometimes even a master’s degree because it will get competitive. And that takes a real strong science background. But it’s a completely different job. I had a couple of heartbreaking conversations with recent college graduates that had criminal justice degrees, or had been to a university where they had something called a forensic science degree, and it didn’t have enough science. If you want to work in a lab it requires a lot of science at the college level. Whereas if you want to be an investigator or an FBI agent and that excitement, then that’s a great career path too. And that’s what I want to pass on to teachers, to really serve kids the best give them a real look at the different types of jobs in the world of forensic science, all the way from investigation to laboratory and help the kids kind of marry what their expectations are to what it is they like to do with how the actual job is done.



FT: We've interviewed other professionals in the field who have told me if you want to work in a crime lab you should go get a science degree because you know the science, you understand the science, you can do the science.

LH: That's right.

FT: Whereas if you get a forensic science degree sometimes you may have trouble getting a job because a department might want to train you their way instead of having to undo what you were taught in college.

LH: That's right. And you have to have, especially for a drug chemist or a DNA analyst, they have required courses that they need and those are not usually a part of a general forensic science degree.

FT: No, they wouldn't be, would they?

LH: No.

FT: Like quantitative analysis.

LH: Exactly. Or all the instrumentation. They want genetics for the DNA. So, it's really important to help kids look closely at all this. When they say they want to be a CSI, and you start asking them questions some are picturing more of the laboratory work and some are picturing more investigation.

FT: But what about what's on TV? Are you telling me that people who do it all don't exist, that TV somehow lies to us?

LH: (Laughs). They kind of wrap up several people's jobs into one, and books do that too.

FT: Yes, yes they do.

LH: Artistic license, but when it comes to kids I picture this young woman's face as she talked to me and this look of shock and disappointment that she'd been through a four year degree that she assumed qualified her in a laboratory. And it was a criminal justice degree.

FT: Yeah. No, I don't see a lot of heavy-

duty science in a criminal justice program.

LH: And it would be an excellent degree to move into police work which is an excellent career.

FT: Sure.

LH: Make sure you're giving kids the right direction for their current expectations because they never know where they're going to start college and you never know what they're going to end up being interested in.

FT: Any other advice for today's forensics teachers at the high school level?

LH: Pat yourself on the back because you're the world's unsung heroes. I miss the kids, but teachers are just great people. And I realize that many of my skills that have helped me be successful, to be able to explain things to juries, to be able to teach other people, these are all teacher skills. And teachers have those skills when and if they go to make career changes.

FT: And I imagine when you're standing in front of 25-30 cops and they're looking at you with expectations, you have no trouble launching into and delivering your material.

LH: No. It's just all those things that come natural to teachers about how people learn, and being able to apply that and make it hands-on, and relating it. I get a lot of compliments about my teaching and they're exactly the processes that teachers all across the country are doing every day.



DIY Autopsy

By Jane Sandstrom

Autopsies—the very heart of a forensic pathologist’s work; intriguing, somewhat gruesome, maybe a little scary for adolescents, yet captivating and important for forensic science students to understand. There are many television programs that air limited scenes of an autopsy, though most of them don’t show actual autopsy procedures, so the viewer is left to use their imagination. I developed this lesson/laboratory activity to introduce students to the autopsy process and have them take part in an autopsy to replace imagination with knowledge. It has become a standard lesson for the pathology unit in my forensic science course, with over 600 students over the past eight years.



This lesson can be taught in a 75-minute period. If you have a 50-minute class, you might divide the lesson into two parts over a two-day period. I start the lesson by showing students a 14-minute segment of “Autopsy” with Dr. Michael Baden to help them understand the autopsy process. The original video, aired on HBO, is an hour-long production, with segments of

actual autopsy footage dispersed between famous cases Dr. Baden has solved. While the entire video is quite good, I’ve condensed the autopsy segments together so students can see the autopsy footage from start to finish without breaks. While the video is graphic, it is meant to educate rather than horrify. I tell my students to disregard the dirge music and blue light the video is filmed in; these are only production gimmicks that are not part of a real autopsy. In all these years of viewing, I’ve not had a student leave the room or become sick afterwards. [Note: A quick search on Amazon for “Autopsy” will yield numerous videos on the subject; just be sure you purchase a real autopsy video, not a fictitious movie.]

The next step of the lesson is to have students perform the autopsy using a cadaver. In this case, it should be called a necropsy because students use a rodent as their autopsy subject. For many years, my rodent subjects came from friends and neighbors whose cats caught voles throughout the Alaskan summers. We have an abundant vole population, so finding lab supplies has been easy. Dead voles are placed into Ziploc bags and stored in the freezer until ready to use. An overnight thaw in the refrigerator is the only preparation needed for this lab. At parent/teacher conferences, a forensic science





student's parent introduced himself as the head veterinarian for the local university and asked if I ever needed frozen rodents for experiments. These laboratory mice were part of a breeding program whose population had exploded. Now I have numerous bags of frozen mice in my freezer ready to use as necropsy subjects. I'm not sure where other teachers can find enough dead small rodents to meet their classroom requirements, but a call to an exterminator, pet shop, university, or biological supply company may yield unexpected results. In the many years I have done this activity, only one student opted out because they strongly opposed the use of animals in any experimentation. No parent has raised concern about this laboratory activity.

For the autopsy, students work together in small groups (2 to 4), since there is usually one student who is really interested in getting involved, another who is quite content to assist, and a third who can barely watch. Students wear goggles, disposable



gloves, chemical splash aprons, and use standard dissecting trays and tools. Using the laboratory worksheet as a guide, the group note-taker sketches all bodily injuries seen on the exterior of the body (as is done during an autopsy). Another student then cuts a Y incision to look inside the body and begins to remove organs. Students weigh the heart, lungs, and kidneys. They check the stomach for the last meal, and determine the

cause of death. As a conclusion, the group writes up a summary paragraph outlining the injuries noted and final analysis of cause of death. (For voles, the cause of death is usually a sharp-force injury to the neck due to a cat's tooth puncture. For laboratory mice, the cause of death is undetermined, yet students realize the lack of injuries to the neck or ribs along with noticeable singed hair on the nose suggest poisoning/gassing).

At the end of the laboratory activity, rodents are put into plastic bags and disposed of in the garbage. Tools and dissecting pans are soaked in a mild Lysol solution for 10 minutes to disinfect, and laboratory tables are wiped down with a Lysol solution, even with using a newspaper layer on their workspace. Students wash their hands with soap and water.

Students are really excited about performing this lab activity, especially after viewing the autopsy video. They feel this is much more than a simple dissection activity—they are forensic pathologists examining the body for injuries and cause of death. Now when they see a television program with a limited autopsy scene, their experience paints an accurate picture of the steps and process used to document an unknown death.



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Names _____

Medicolegal Autopsy

The autopsy provides the forensic pathologist with an opportunity to examine the body externally and internally to determine what wounds and injuries were sustained and to determine the cause of death. While normally performed, you will not be taking toxicology samples or removing the brain.

1. Draw an outline of the body. Examine the outside of the body and record the location of any markings, discolorations, injuries, artifacts, or unusual aspects of the body on your diagram.

2. Determine the weight and height of the body.

Weight _____ g

Height _____ cm

3. Put the body on its back and make a "Y" incision on the body from the collarbone to (almost) the anus.

4. Examine the internal sections of the body:

a. Are there any broken ribs? _____

b. Remove the heart and weigh = _____ g

c. Remove the lungs and weigh = _____ g

d. Remove the stomach and note the contents along with amount:

Weight of stomach = _____ g

Contents:

e. Open the neck section. Look for bruising, blood clots, and ligature markings at the windpipe. Record your observations.

f. Weigh each kidney:

Left kidney _____ g right kidney _____ g

5. After examining the internal organs, put them all back in the chest cavity. Normally, samples would be taken of each organ and the incision would be sewn up with needle and thread.

6. Write an opinion as to the cause of death for this body on the back of this sheet. For example, "It is my opinion that John Smith, a 30-year old male, died as a result of a gunshot wound to the chest. The bullet, a 38-caliber which was recovered from the body, passed through the right lung and heart causing massive internal hemorrhage. No other injuries or significant natural disease process was found at the time of autopsy".

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Chemistry, Toxicology...

What's the Difference?

A lab that makes everything clear

By Jackie Gnant

A few years ago, a local police sergeant was kind enough to set up a visit for a fellow forensic science teacher and me to visit our regional crime laboratory. Everyone at the lab was fantastic; they answered our questions, showed off equipment, and did mini-demonstrations for us so we could understand some of the things we'd only read about in books.

When we moved from one area marked Chemistry and into another room marked Toxicology, I realized that I hadn't ever really thought about how the two fields were different. As we continued our tour, I gleaned some clues. The "ditch weed" (which was inauspiciously collected in my home town) was soaking in an indicator that turned a lovely shade of purple if THC was present, positively identifying it as marijuana. Chemistry. On the other hand, the gas chromatograph was running a urine sample, not testing for the THC itself, but for the THC metabolite, verifying the person in question had likely introduced marijuana into his or her system in some way. Toxicology. Got it.

Now, if I hadn't connected the dots on my own, I certainly couldn't expect my students to do it without help. But how to go about this task? While my administration is supportive of our forensic science program, I doubted I could get reimbursed for the purchases of marijuana, cocaine, heroin, and the bodily fluids of drug users.

I settled for centering the chemistry portion of the lab around ethanol – a substance I could reasonably have in my lab without raising any eyebrows. All of the rest of the substances I use in the lab – urine samples and testing reagents – are entirely falsified, though I don't tell the students that. I collaborated with a chemistry teacher in my department to work out combinations of solutions that would give distinct precipitates and color changes and use those as my reagents and metabolites.

The first time I did this lab, the set up took quite some time, but it's much easier now. I created sets of labeled testing reagent dropper bottles – one set for every two groups to share. I also created a set of labeled vials for the container contents and the driver and passenger urine samples. At the end of the lab, I empty the bottles and vials, rinse them, and store them in plastic bags in a storage bin. Now when it's time to do the lab, I just have to make the solutions and dispense them into the pre-labeled bottles and vials.

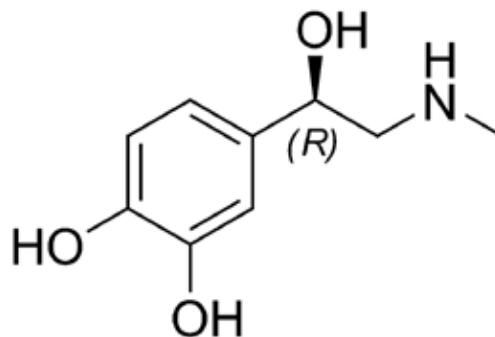
We usually cover chemistry and toxicology around the end of third quarter, so my students have had quite a bit of experience with lab equipment. I expect them to know about keeping samples separate and labeled and about recording thorough observations. I have students work in groups of anywhere from two to four students, depending on the size of the class and the materials available to me that year. Even in a group of two, they can generally complete the data collection portion of the lab in an 80-minute lab period. The lab analysis is homework and is to be completed independently.

As they do the post-lab analysis, I expect my students to refrain from absolutes and make statements like, "Since DMA

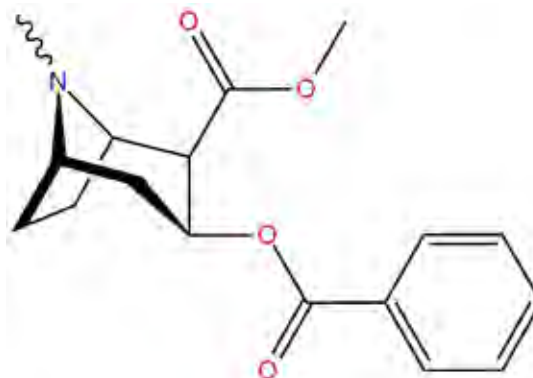
was present in Passenger 4's urine, it is *likely* that Passenger 4 had arsenic in her system." I even threw in a question about cocaine, a substance for which the students did not test, so they would have to acknowledge the limitations of their investigation, as might truly happen while testifying in a real case.

Beyond the "Just the facts, ma'am" aspects of the lab, I always like to give my students a chance to flex their creative muscles and put together the pieces of a puzzle. In this particular investigation, there is an allusion to two female passengers fighting over a boy. In the lab, the students should find that two passengers have been poisoned. Hopefully my students will put together that the two poisoned passengers may have poisoned each other, and that these could be the two girls who had been fighting with each other.

This lab is a favorite among my students. They feel as though they are experiencing real lab work without the drudgery of reading the spikes of a gas chromatograph/mass spec result. Most importantly, they walk away understanding the difference between testing for a specific chemical in an unknown substance (chemistry) or a metabolite present in a bodily fluid (toxicology) making them just a little bit more knowledgeable than I was when I walked into that crime lab.



Any clue what these molecules are? Answers below.



Answer: the top molecule is adrenaline, the bottom cocaine.

Teacher Notes

Phenolphthalein and NaOH – pink color change
Lead II nitrate and sodium iodide (potassium iodide) – yellow precipitate
Bromthymol blue (slightly basic, so blue) and HCl – yellow color change
Silver nitrate and sodium hydroxide – chocolate brown
Sodium carbonate and calcium chloride – white precipitate

Prep:

Assumes a class of 28 students/14 partnerships

Part I

Driver's container: water

Passenger 1 & 3 container: 20 drops ethanol per pair = 280 drops/class = 14 mL/class

Passenger 2 & 4 containers: water

Iodine: 125 drops per pair = 1750 drops/class = 88 mL/class

1 M NaOH: 50 drops per pair = 700 drops/class = 35 mL/class

Part II

Driver's urine: 50 drops per pair = 35 mL NaOH/class

Passenger 1's urine: 50 drops per pair = 35 mL HCl/class

Passenger 2's urine: 50 drops per pair = 35 mL Calcium chloride/class

Passenger 3's urine: 50 drops per pair = 35 mL sodium iodide/class

Passenger 4's urine: 50 drops per pair = 35 mL silver nitrate/class

EtG reagent: 50 drops per pair = 35 mL phenolphthalein (clear)/class

9-carboxy-11-nor-delta-9-THC: 50 drops per pair = 35 mL lead (II) nitrate/class

6-AM reagent: 50 drops per pair = 35 mL Bromthymol blue (blue)/class

DMA reagent: 50 drops per pair = 35 mL NaOH/class

Succinic acid reagent: 50 drops per pair = 35 mL sodium carbonate/class

Solutions needed for 4 classes

Ethanol = 60 mL

Iodine = 352 mL

1 M NaOH = 420 mL

0.1 M HCl = 140 mL

0.1 M Sodium iodide = 140 mL (molar mass = 149.89 g/mol or 7.5 grams in 50 mL water)

0.1 M Silver nitrate = 140 mL (molar mass = 169.87 g/mol or 8.5 grams in 50 mL water)

Phenolphthalein (clear) = 140 mL

0.1 M Lead (II) nitrate = 140 mL (molar mass = 331.2 g/mol or 16.56 grams in 50 mL water)

Bromthymol blue (clear) = 140 mL

0.1 M Sodium carbonate = 140 mL (molar mass = 105.98 g/mol or 5.3 grams in 50 mL water)

0.1 M Calcium chloride = 140 mL (molar mass = 110.98 g/mol or 5.55 grams in 50 mL water)

| | Driver's container | Passenger 1's container | Passenger 2's container | Passenger 3's container | Passenger 4's container |
|-------------------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Observations | No color change | Color change | No change | Color change | No change |
| Ethanol present? | Water | Ethanol | Water | Ethanol | Water |

| | EtG testing reagent Phenolphthalein & dilute acid | 9-carboxy-11-nor-delta-9-THC testing reagent Lead (II) nitrate | 6-AM testing reagent Bromthymol blue | DMA testing reagent NaOH | Succinic acid testing reagent Sodium carbonate |
|---|---|--|--|------------------------------------|--|
| Driver's urine NaOH | Color change to pink | White precipitate | Blue | XXX | XXX |
| Passenger 1's urine HCl | XXX | White precipitate | Color change to yellow | XXX | XXX |
| Passenger 2's urine Calcium chloride | XXX | White precipitate | XXX | Maybe a little cloudy | White precipitate |
| Passenger 3's urine Sodium iodide or potassium iodide | XXX | Yellow precipitate | XXX | XXX | XXX |
| Passenger 4's urine Silver nitrate | XXX | XXX | XXX | Chocolate brown precipitate | Brown (yellow/green?) precipitate |

Name _____

Date _____

Partner _____

Period _____

Chemistry and Toxicology Lab

Background (the technical stuff)

While chemists may be asked to test actual substances obtained from suspects, toxicologists test for the presence of certain metabolites in bodily fluids from the lab. A *metabolite* is a molecule that is produced when the substance in question is broken down by chemical reactions occurring within the body. For example, a suspicious substance in an open container may be tested by a chemist for the presence of ethanol, whereas the toxicologist may test the suspect's urine for ethyl glucuronide (EtG). Similarly, suspicious organic material may be tested for the presence of THC, the active ingredient in cannabis. A person's urine might be tested for the 9-carboxy-11-nor-delta-9-THC. Similarly, cocaine is metabolized into benzoylecgonine and heroin metabolizes into 6-acetylmorphine (6-AM).

Toxicologists may also be asked to analyze bodily fluids for the possibility of poisoning. Arsenic, sometimes found in rat poisons, metabolizes into dimethylarsinate (DMA). Succinylcholine can be given in high doses to kill someone, sometimes used by so-called angels of death. This muscle relaxer can break down into succinic acid.

This lab will consist of two parts. In part one, you will test samples for the presence of ethanol. In part two, you will test urine samples for the presence of different metabolites.

Case Background (the fun stuff)

According to the police blotter, last Saturday at 11:37 p.m. a car was pulled over near the intersection of Green Bay Road and Oak Street. Five high school students were in the car, all under the age of 18. As such, their names have been withheld. Each student was holding a bottle of apple juice, but their erratic behavior gave the officer probable cause to take samples of each beverage, suspecting that the bottles did not actually contain apple juice alone.

While at the station waiting for their parents to pick them up, the teens were all questioned about the night's events. Investigators discovered that there had recently been a lot of animosity between two of the girls regarding a boy, though the others in the car thought the issue had been resolved. All of the students were requested to give urine samples. Because the parents were certain their children hadn't done anything wrong, they gave permission for their children to give samples. The container samples and the urine samples were sent to the state police crime lab.

Your job, as someone who works in both the chemistry and toxicology divisions, is to test all of the samples. Both the container samples and the urine samples have had known substances filtered and distilled out, so they all appear clear. You may be called to testify in this matter and the following questions may come up:

1. Which, if any, of the open containers contained alcohol?
2. Which, if any, of the students were drinking alcohol?

3. Which, if any, of the students were under the influence of other illicit drugs?
4. Which, if any, of the students had been poisoned and didn't know it?

Materials

Five test tubes
 Test tube tray or beaker large enough to hold five test tubes
 Test tube brush
 Microwells tray
 Samples for each of five containers
 Samples for each of five teens
 Droppers for each suspect
 Iodine
 1 M NaOH
 EtG testing reagent
 9-carboxy-11-nor-delta-9-THC testing reagent
 6-AM testing reagent
 DMA testing reagent
 Succinic acid testing reagent

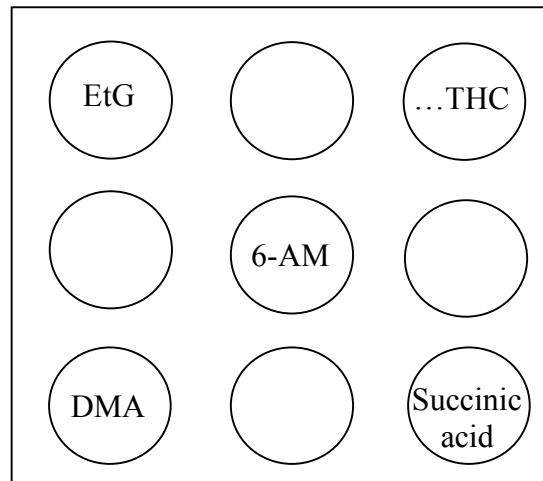
Procedure – Part I – Test for presence of ethanol

1. Thoroughly clean your test tubes with soap and water. Rinse them *very* well. These tests are very sensitive – it will be easy to get a false positive or false negative if your equipment isn't clean.
2. Label your test tubes with each of the container sample numbers. Don't skip this step!
3. Put 10 drops of each of the container samples in their respective test tubes.
4. Put 25 drops of iodine into each of the container samples.
5. Add 10 drops of 1 M NaOH to each test tube.
6. Gently swirl the test tubes until the brown color of the iodine disperses.
7. Wait two minutes.
8. Carefully observe the test tubes and record your results in Table 1. A yellow precipitate indicates a positive test and therefore the presence of ethanol.

Table 1: Test for presence of ethanol in teens' open containers

| | Driver's container | Passenger 1's container | Passenger 2's container | Passenger 3's container | Passenger 4's container |
|-------------------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Observations | | | | | |
| Ethanol present? | | | | | |

Procedure – Part II – Test for presence of metabolites



1. On the diagram above, note the wells with each of the metabolite tests you will perform.
2. Add 5 drops of one of the teens' urine to the wells indicated in the diagram above where a test will be performed.
3. Start with one of the reagents (it doesn't necessarily have to be the THC test).
4. Pay careful attention to make sure you are working in the right column on the data sheet! Add 5 drops of the indicated reagent to the urine samples. You may not need all 5 drops. If you get a color change and/or a precipitate, you can stop adding reagent.
5. *Gently* stir each mixture with a stirring rod. **Clean the rod between samples with running water!**
6. Record your observations in Table 3.
7. Repeat steps 5 through 8 for the remaining reagents.
8. Use the information in Table 2 to determine which tests were positive. Use a colored pencil to shade in the boxes of Table 3 that show a positive test result, and therefore the presence of a metabolite.

Table 2: Positive test result indicators for various metabolite tests

| Test | What a positive result looks like |
|------------------------------|-----------------------------------|
| EtG | Color change to pink |
| 9-carboxy-11-nor-delta-9-THC | Yellow precipitate |
| 6-AM | Color change to yellow |
| DMA | Chocolate brown precipitate |
| Succinic acid | White precipitate |

9. Clean all of your equipment thoroughly with soap and water. Rinse it well.
10. Repeat the test with another student's urine until all students' urine has been tested and results recorded.
11. Clean all materials with soap and water.
12. Return it to the prep table.
13. Spray down your lab station and wipe it down with a sponge.

Table 3: Tests for presence of metabolites in teens' urine

| | EtG testing reagent | 9-carboxy-11-nor-delta-9-THC testing reagent | 6-AM testing reagent | DMA testing reagent | Succinic acid testing reagent |
|----------------------------|----------------------------|---|-----------------------------|----------------------------|--------------------------------------|
| Driver's urine | | | | | |
| Passenger 1's urine | | | | | |
| Passenger 2's urine | | | | | |
| Passenger 3's urine | | | | | |
| Passenger 4's urine | | | | | |

Analysis

- Which teens, if any, were in direct possession of ethyl alcohol?

- Which teens, if any, had been drinking? _____
- Would you be willing to testify against the driver for an "open container" charge? Why or why not?

- Would you be willing to testify against the driver for a DUI? Why or why not?

- Had any of the teens been doing cocaine? Which one(s) and how do you know?

6. Had any of the teens been smoking marijuana? Which one(s) and how do you know?

7. Had any of the teens been doing heroin? Which one(s) and how do you know?

8. Had any of the teens been poisoned? Which one(s), with what substance, and how do you know? ___

9. Which teens would you suspect were involved in the earlier altercation? Was it actually resolved?

How do you know? _____

10. Identify at least three sources of error in this lab. _____

11. Which portion of this lab (Part I, Part II, both, or neither) would a forensic *toxicologist* perform?

12. Which portion of this lab (Part I, Part II, both, or neither) would a forensic *chemist* perform?

Decomp on the Cheap

by Cheryl Hansen

I teach at an independent all girls school in Bethesda, Maryland called Holton-Arms School. For our decomposition study I constructed a large coop-like cage which is placed outdoors on a remote part of the school campus.

The box I built was my own design. It is approximately 4' x 3' x 4' it has a hinged lid for easy access and is open on the bottom so the specimens could be on the ground. It cost about \$80 in materials and I assembled it at school. Once I had it in place I staked it into the ground (to prevent mischief from other critters!) and placed rocks around the edges.

The cage was built from 2 x 2 pieces of wood with chicken wire. I used corner brackets and smaller pieces of wood to brace the inner corners and the hinged lid had a hook and eye closure.

We have done a 'Bass Body Farm' theme whereas every student uses a different variable to monitor the effects of decomposition. Each student had their own rat to study. I bought them frozen at the local pet store. They vary in cost due to size but overall the average price is about \$3 per rat. When we started, each student had to decide a set of conditions under which to observe decomposition. Some just laid their rat out in the open, others dug a shallow grave, others wrapped it in cheesecloth (to simulate being wrapped in a



blanket), others wrapped theirs in foil (to simulate being trapped in an airtight container, ie. a car), others chose watery graves such as a pan of water, a pan of salt water, a pan of acid (vinegar) or a pan of alkali (bleach). Then the girls went out daily to track their observations

and compared against the class so that they would all understand how different factors can affect the rate of decomposition. Overall the experiment was hugely successful.



Forensics in Another Light

Using Reading to Teach Forensics

By Stacey Hervey

The True Story of the Big Bad Wolf

Fairy Tales aren't just for elementary school. The CEC Pig Chronicles began after I attended a seminar titled "Locating Clandestine Graves" sponsored by NecroSearch International <http://www.necrosearch.com/training.html>. NecroSearch International "is a volunteer multidisciplinary team dedicated to assisting law enforcement in the location of clandestine graves and the recovery of evidence (including human remains) from those graves." They also provided yearly training to interested parties and course topics include: animal signs and scavenging of corpses, human and non-human bone identification, botany, hydrology and geology, entomology, and search and mapping techniques. Just as it should be in a real classroom, the lectures took a back seat to the lab work outside where we were able to watch a pig decompose throughout the week and location of graves were pigs had been buried in previous years.



The pig of the year

The course provided an overview of the various sciences that are used to locate

human remains. After completing this course, I decided to introduce "The Pig Chronicles" into my urban classroom located in Denver, Colorado. The first year, our project consisted of one 70 pound dead pig stowed beneath a bush next to a busy street. Needless to say, my principal and the neighbors weren't very enthusiastic about my learning lab and the Humane Society quickly dragged our rotting carcass away. The next year, I put our pig in a secure small lot that our auto body program used to store cars. We were fine until a neighbor lady became curious as to what the students were examining and called the Health Department. After a few phone calls and desperate pleas, the head of the Health Department decided that he would allow our experiment to continue because "I wish I would have done something like that when I was in high school."

Ten years later, the initial dead pig has evolved into a multidisciplinary unit that includes integration of language arts and math as well as science. I also incorporated the Project Learning method used in the book *21st Century Skills: Learning for Life in Our Times* by Trilling and Fadel to guide my inquiry based unit for the following reasons:

1. Project outcomes are tied to curriculum and learning goals.
2. Driving questions and problems lead students to the



The author with the ex-pig of the year

central concepts or principles of the topic or subject area.

3. Student investigations and research involve inquiry and knowledge building.
4. Students are responsible for designing and managing much of their own learning.
5. Projects are based on authentic, real-world problems and questions that students care about.

The unit begins with the reading of the children's book by Jon Scieszka *The True Story of the 3 Little Pigs*. Students learn about writing for different points of view, fact versus opinion, and writing for different purposes. Students then use the Scieszka book and the original version of the fairy tale to create reports for different audiences. We then move on to the decomposition portion of our unit by purchasing a pig from a local farm. In previous years, we used a shed, donated used cars, or half buried the pig to examine different conditions. This year I bought a 75-gallon Rubbermaid outdoor storage container to house our pig for the duration of the experiment to allow for durability with Colorado's ever changing weather. For example, last week we had 85 degrees one day and the next received several inches of snow. The shed protects our pig and bugs from the elements that wash away the evidence. Students respond to the crime scene and perform the duties of a first responder, which include sketching out the crime scene and the location of evidence. After the initial investigation is complete, students are assigned different writing assignments that will later be utilized in the mock trial component of our unit. The writing assignments include police reports, witness statements, newspaper articles, tabloid articles and press releases. When the writing samples are complete, we discuss writing for different audiences and purposes.

The science portion of the unit then begins with the collection of data for two weeks. I have used teacher created worksheets in the past but find that allowing students to create their own data sheets encourages the most learning. Links that can provide more information on forensic entomology include the following:

1. <http://www.maggotsfrommurders.net/>
2. <http://www.rasmussen.edu/student-life/online-community/education-through-entomology/>
3. http://www.clt.uwa.edu.au/projects/asistm/forensic_investigations/forensic_entomology
4. www.wardsci.com

This year, the unit will expand to include a unit on autopsies with new resources from NASCO that allow students to perform a pig autopsy and determine cause of



Teams of students search for the truth.

death. (http://www.enasco.com/product/LS03825MH/?utm_source=Dissection&utm_medium=banner&utm_campaign=featureproduct0911). I introduced the autopsy portion with a video by Frontline that was suggested by my law colleague (<http://www.pbs.org/wgbh/pages/frontline/post-mortem/>). This documentary discusses the controversies involving coroners and medical examiners and also looks at cutbacks in funding which has led to flawed autopsies. Students study manner, cause and mechanism of death while also becoming familiar with different ways to determine time of death. I also try and use a current event that students are familiar with to understand the writing involved in this field. A good example this year was the complete Whitney Houston Autopsy report, which included the initial police report as well as autopsy report. They also created PowerPoints on various organs of the body with views of a healthy and diseased organ and the purposes of the organ to the living organism. Students also reviewed various links regarding autopsies and watched a real autopsy in class.



An autopsy in progress.

- <http://www.whitman.edu/content/virtualpig>
- http://webcom4.grtxle.com/khforensics/VirtualAutopsyPackage/VirtualAutopsy3_fs.html
- <http://australianmuseum.net.au/interactive-tools/autopsy/>

With virtual autopsies complete, it was now time to introduce the fetal pigs for dissection. Due to the fact that my background is criminal justice and my experience in dissection was an earthworm in high school, our school nurse, Tess Callinocos, stepped in to help by walking me through a pig dissection before completing with students. Our final determination was death due to blunt force trauma to the head. Before the actual dissection, I assigned students different groups, each with four roles:

- Medical examiner who would perform the autopsy (volunteer)
- Medical assistant
- Recorder
- Assistant

My personal objective was to create a true learning lab that was student run without teacher participation. Each question they asked me resulted in a five point reduction in their overall grade. I created different stations in which students could go to for information if they needed assistance:

- Station one: computer with pig virtual autopsy
- Station two: resources on pig autopsies from NASCO with visuals
- Station three: textbooks with additional information
- Station four: computer station open to Google.com

The autopsies were a perfect addition to our unit and students enjoyed the interactive component. Each cause of

death was different and students spent a great deal of time writing the reports because they knew their reports would be used during our mock trial.

Student writing samples are used for the basis of our trial but there are many good resources that are out there that already have the documents necessary to hold a basic mock trial:

- <http://apps.americanbar.org/abastore/index.cfm?section=main&fm=Product.AddToCart&pid=3170117>
- <http://www.med.uscourts.gov/kc/mocktrials/mocktrialscripbbwolf.pdf>
- http://19thcircuitcourt.state.il.us/services/pages/mock_trials.aspx

At first I questioned whether high school students would enjoy performing a mock trial geared around a children's fairy tale but my fears were quickly put to rest when students bought pig noses for trial and other students were begging teachers to allow them to view our performance. Voir dire was especially entertaining as the students interviewed characters from other well-known fairy tales such as Little Red Riding Hood.

The Pig Chronicles started off as a simple decomposing experiment and has developed into a month long unit. Each year the program expands and next year we hope to include the new law class for the mock trial segment. It has become a wonderful learning experience but also a great recruiting tool for my program.

The Piggy Chronicles

Objectives:

1. Distinguish between four manners of death: natural, accidental, suicide, and homicide
2. Distinguish between cause, manner and mechanisms of death
3. Understand the mechanism of autopsy
4. Use evidence from autopsy to estimate time of death

By the end of the activity students will be able to:

1. Perform autopsy of pig and determine cause, manner and mechanism of death
2. Collect data to determine time of death based on insect life cycle

Vocabulary:

1. Contusion
2. Abrasion
3. Laceration
4. Puncture
5. Incision
6. Amputation
7. Fracture
8. Rigor mortis
9. Livor mortis
10. Jurisdiction
11. Dorsal
12. Cranial
13. Ventral
14. Caudal
15. Coroner
16. Medical examiner
17. Larva
18. Pupae
19. Blow fly life cycle

A Day in the Life (Continued from p. 57)

both verbal and written, are of benefit as well. I also think a strong ethical nature is important.

22. How much testifying does the job require?

This varies depending upon how many cases an examiner is working, in my experience testimony is required only a few times a year.

23. What do you like best about the job?

It is continually interesting and requires a high level of detail. I get great satisfaction in being meticulous and challenged. I also like feeling that I am doing something honorable that helps bring some closure and justice to a difficult situation. I like that forensic work is about the truth, first and foremost.

24. What do you like least?

I don't have much patience for issues that distract from what the main mission should be: the provision of high quality, reliable forensic services to the community.

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

I am constantly challenged and continue to feel that I am contributing in a positive manner to society. When I stop feeling those things, it will be time to move on to another career.

Stanwick Finds the Magic Words (page 4)

All green elephants drink martinis at five (statement 6). But members of the Diagonal Club drink martinis only at four (3). Therefore no green elephants are members of the Diagonal Club. But only green elephants who are members of the Diagonal Club can wear striped ties (5). Thus no green elephants can wear striped ties.

All friends of winged armadillos, however, wear striped ties (1). Therefore no green elephants are friends of winged armadillos. But all who eat pickled harmonicas are friends of winged armadillos (4). Thus no green elephants eat pickled harmonicas. But only those who eat pickled harmonicas can enter a chocolate courtroom (2). Therefore (and these are the magic words) no green elephants can enter a chocolate courtroom.

EXPERIENCE



THE FIELD OF FORENSICS

CSI: THE EXPERIENCE

VISIT CSI: THE EXPERIENCE WEB ADVENTURES

[HTTP://FORENSICS.RICE.EDU](http://forensics.rice.edu)



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.





Putting the pHun

Back into
pH

By Christi Schultz

Death of A Salesman

By Christi Schultz

Printed in large letters on the whiteboard was “Who Killed Monty Salesman?” I hear an audible gasp as students file into the classroom. “What’s that about? What are we doing today?” They ask. After all, this is not a forensics class, it’s a 9th grade integrated earth and physical science class.

I hold Forensic Fridays as a way to splice a little intrigue into the classroom. Students really look forward to these days. The task of compacting loads of curriculum within the school year forces me to be inventive with ways to use forensic lessons that are content loaded.

On this particular Friday, I had multicolored liquid in tiny flasks sitting on the front table. As students make their way to their seats they can’t take their eyes off the flasks, as if they were jars of treats in a candy store. Since they were so focused on the colorful liquid in the flasks, I made it clear that no one is to touch these example flasks; whose sole purpose is to help them find the pH during their lab work. Students may come close and look at the flasks for comparison but not touch them.

I announced to the class that it was imperative that they have no food or drink in class today. (One student had a water bottle so I locked it in a cabinet.) I explain that the example flasks in front of me contain cabbage juice along with different substances of varying acids and bases. Under each flask is a 3x5 note card announcing its approximate pH value. For review, I asked, “everything below a pH of 7 is a ...” The kids all shouted out, “Acid.” “And anything that is a pH above 7 is a ...” “Base!”

I then read the first paragraph of the handout. “A car salesman has died. The police have asked you to determine which of the foods that he had on his desk had been tampered with. Which one contained the poison? Since we are a low budget laboratory, we will start with some boiled cabbage, which we are using today as our pH indicator.”

One member of each group of three students will come to the front of class and take their own tiny flask of purple cabbage juice along with a small, disposable, plastic pipette. A second member of the group takes a well plate and pipettes one of each of the food items I have clearly marked in beakers on my cart into each well plate. (Well plates, being tiny plastic trays with small divots in them, are perfect to use for cost effective labs since students only need a drop or two of the sample to test.) Students use masking tape and a sharpie to label their well plates before they add the cabbage juice.

Their first task, after preparing test samples, is to determine if each food item is an acid or base by the color the

liquid turned once cabbage juice was introduced.

I heard students exclaim in excited voices, “It’s green!” or “Oh look it turned red!” As I walked around I point at the flasks at the

front of the room reminding them to determine, “Which ones are acids and which are bases?”

When all students complete the first part, I announce, “The police have contacted us and told us the pH of the substance that poisoned our salesman.” I told them to write down the pH on the line provided on their handout before issuing pH paper to them. I told the students to obtain new samples of each of the food items in their well plate, but this time they were to use pH paper to determine the exact pH value. Each student gets a tiny square of pH paper cut from a longer strip in order to save on the lab budget. With tweezers students can plop the square into the well plate divot and pull it out to compare to the color chart on the side of the pH container. As they filled out their table on the pH handout, students start to discuss amongst themselves which food item could be the one that had been poisoned.

Students get a kick out of writing up an official report and signing their names as lab technicians. I have done this activity twice. Both times it has been successful with keeping the interest of all thirty students for the complete hour period I have been allotted. The wonderful by-product is teaching students the pH of different substances.

I can’t help, but smile to myself as kids clean up the well plates and return the cabbage juice to my cart.

Teacher Preparation

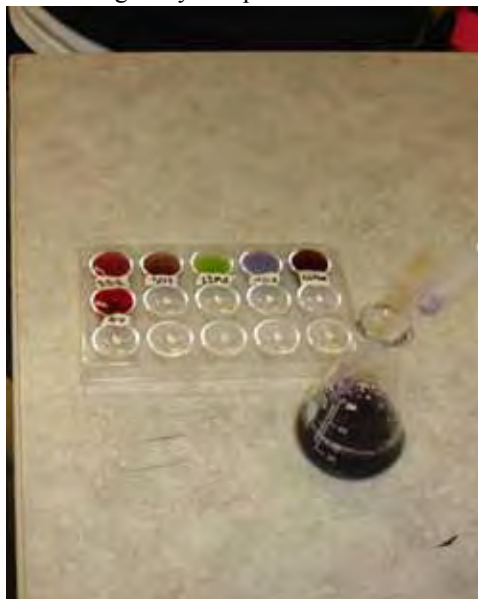
Before lab day:

A. Making cabbage juice. (I find this activity is good to do at home because the smell of boiled cabbage does not endear you to your fellow colleagues in the department.) One small red cabbage should do it. Cover the cabbage with water and boil for over an hour. The cabbage juice infused water can be stored in a glass pickle jar for up to a week. I don’t shred the cabbage, just cut a head in half and boil it.



B. Get the multicolored liquid in the flasks ready. I rooted around in the back finding substances that we have stored for labs as well as taking a visit to the chemical stock room to use some strong acids and bases to make my example flasks in the front of the room.

1. Use six molar hydrochloric acid to get a pH of 1.
2. Vinegar gives about a pH of 2.
3. Bottled BBQ sauce gives a pH around 4.
4. Tea gives a pH around 6.
5. Distilled water gives you a pH of 7.
6. Milk (and antacids) give you a pH of about 8 or 9.
7. Bleach gives you a pH of about 10.

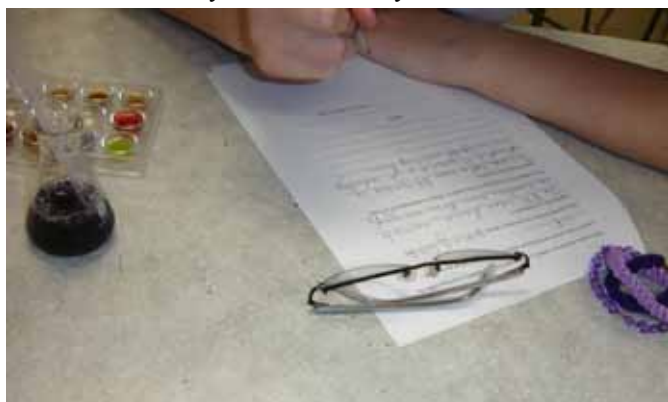


8. Ammonia gives you a pH of about 12 or 13.
9. One molar sodium hydroxide gives you a pH of 14.

If students use the same food items for samples as those that you have used to color the cabbage juice, students will be accurate with their colors. For

example, milk has a white color and when you add cabbage juice it looks lime green which is a dramatic change. If you use milk in your example flasks then the students would see that their milk is the exact color of the sample. I watered down BBQ sauce so that it wouldn't be red because of the sauce but because of the cabbage juice. Likewise tea and coffee give a brown color naturally so adding cabbage juice gives a deeper color of red.

The foods that I used (vinegar and BBQ sauce) were the foods the dead man ate and I also used them in the color indicators in the tiny flasks – that way the colors would



match. The students took a tiny flask of cabbage juice with a plastic disposable pipette and they used this as an indicator to test all of their solutions. The other indicators (flasks with many different colors) stayed near me so I could make sure they didn't use something that was the pH of 2 and get hurt. Students just came up and sighted the colors to see which food they matched after the cabbage juice was introduced.

Because of nervousness of getting my lab prepared in a timely manner, I have set up the sample flasks a few days in advance; however, the unfortunate side effect of being so ambitious is that atmospheric carbon dioxide turns to carbonic acid in the flasks which tends to turn the liquid different colors over time, so it is best to set up the flasks no more than 24 hours in advance. Cover the flasks so that you don't have the confusion of different colors than you started with. For example, over time the bases turn more yellow and brown, but they should have a green to light yellow tint to them.

I have been teaching Integrated Earth and Physical science, Biology, Microbiology and Zoology at Battle Ground High School for eight years. This lesson was used during our walk through the periodic table, to teach properties of matter. The students who did this particular lab were freshman in high school.

I also write mystery novels and these type of activities allow me to marry my two passions. Be creative! If you wish to embellish on the poisoning aspect give symptoms the man went through as well as a list of poisons with their side effects for students to match.

The handout I used during the lesson is on the next couple pages. Add any examples of substances in the table depending on whatever food items you have on hand. Also students can use the approximate pH values written under each sample flask for their pH values if your budget does not allow for the purchase of special pH paper.



Acids and Base Forensic Lab Student Lab Sheet

Name _____ Date _____

You are a lab technician for an investigation into the death of a car salesman. The man died at work. It is believed by the police detectives that this man ingested some type of poison that mixed with an acidic compound and paralyzed him until his heart stopped beating. The problem is that the stomach acid has completely denatured the poison so we don't know exactly what it is or what product he ingested in the last twenty four hours.

You have been given the stomach contents of this man and you have also been given a box of ingredients that were found at his desk at work. Your job is to find out what he ate last in order to determine the direction the detectives can take for what has the poison is in.

Since your lab is on a tight budget you have mixed up some cabbage juice to be your acid and base indicator. Test the following products and tell whether they are acids or bases based in the color they turned in the cabbage juice.

| Name of substance | Color before substance is added | Color after substance is added | Acid or Base? |
|-------------------|---------------------------------|--------------------------------|---------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Which one of the products in the table are acids?

Which one of the products in the table are bases?

Which products would you report to the detectives that may have been tampered with?

Now that you know which products in the man's desk were acids, you call the medical examiner to tell him immediately that you have found the possible products that may have been tampered with. The medical examiner tells you he has done a pH test on the stomach contents and found that the pH is hovering around a _____.

Test the products again and determine their pH.

| Name of product | pH |
|-----------------|----|
| | |
| | |
| | |
| | |
| | |
| | |

If the stomach contents are normally a pH of 2 and the man ingested something acidic the contents of the stomach would become more acidic. Would the pH go up or down?

Which product did the man most likely eat last? _____

Explain why you think that is.

Give a report as to your findings that you would be willing to stand behind if you were called to testify in a court of law:

Signed,

(The lab technician team)

False Positives



If it looks like blood, is sticky like blood, and is found where blood could be found, it's gotta be blood, right? According to forensic TV shows one drop on a Q-Tip is all it takes, and CSIs know instantly if the red substance is blood. And it always is.

But what if it's not? Could something else pass the test for that vital liquid? This lab will show your students many things can reveal a false positive and warn them about jumping to conclusions.

Photos (clockwise from upper left): money after a dye pack exploded, a bloody sock, a real crime scene, making Bloody Marys.
Reprinted with permission from Freeman Publishing, from Investigating Chemistry by David Collins (2009).

Experiment 12

Identification of Blood

Purpose

To introduce the student to common blood identification tests, their sensitivity, and results. Students will become familiar with various substances that potentially give false positives for the presence of blood. Students will recognize the presumptive nature, and limitations, of these tests.

Time Duration 2 – 3 hours

Materials

Obtain the following materials:

1. Five 1-mL disposable plastic pipettes
2. One 100-mL beaker
3. Three 50-mL beakers
4. Filter paper

The following materials and chemicals will be supplied as needed:

1. Spatula
2. Weigh boats
3. Gloves
4. Dark room
5. Leucomalachite green
6. Sodium perborate
7. Glacial acetic acid
8. Distilled water
9. *o*-Tolidine
10. Hydrogen peroxide
11. Ethanol
12. 3-aminophthalhydrazide (luminol)
13. Sodium carbonate
14. Sodium perborate
15. Whole dog blood (sheep or cow)
16. Bleached water
17. Soapy water
18. False positive samples (e.g., apple, cabbage, blackberry jam, bread, horseradish, tomato, rust, potassium permanganate)

Introduction

Blood, the cherished fluid of life, is unique in appearance, physical characteristics, and composition. Wet bloodstains typically have a characteristic brilliant red color, while dried bloodstains often appear dark red to brown in color. Blood has unique adhesive and cohesive properties that allow it to adhere to, and stain, almost anything. The composition of blood, although dynamic and influenced by health, is unique, containing red blood cells, white blood cells, platelets, minerals, and proteins exclusive to blood.

Although the appearance of blood is distinctive, many red stains made by other substances (e.g., ketchup, paint, jam, etc.) may be strikingly similar. Because of this, tests have been developed that allow forensic scientists to quickly and presumptively identify a stain as blood through chemical exploitation of blood's unique composition. Most tests use the heme portion of hemoglobin, found only in red blood cells, to catalyze a reaction that results in either a color change or the generation of light. All of these tests are quite sensitive (i.e., a very faint blood stain invisible to the naked eye can be located and identified), yet only presumptive in nature. Unfortunately, many other substances may also generate the indicative results (e.g., rust, potatoes, bread) and generate a false positive. However, these substances do not typically share the same unique appearance of blood; yet, a mixture of one of these compounds with something having the appearance of blood could become misleading. It is important to be aware of these substances such that a complete and accurate interpretation of results may be obtained.

Procedures

Part A Preparation of Solutions and Samples

1. Prepare 5.0 mL of the following presumptive blood identification solutions in a 50-mL beaker.

A) Leucomalachite Green Solution

| | |
|----------------------|---------|
| Sodium perborate | 0.16 g |
| Leucomalachite green | 0.005 g |
| Glacial acetic acid | 3.3 mL |
| Distilled water | 1.66 mL |

B) *o*-Tolidine Solution

Solution 1 (You will add this first when testing.)

| | |
|---------------------|--------|
| <i>o</i> -Tolidine | 0.08 g |
| Ethanol | 2.0 mL |
| Glacial acetic acid | 1.5 mL |
| Distilled water | 1.5 mL |

Solution 2 (You will add this second when testing.)

| | |
|----------------------|--------|
| 3% hydrogen peroxide | 5.0 mL |
|----------------------|--------|

C) Luminol Solution (This solution will take 20–30 min to dissolve completely. You may need to use a mechanical stirrer.)

| | |
|------------------------|---------|
| 3-aminophthalhydrazide | 0.005 g |
| Sodium carbonate | 0.025 g |
| Sodium perborate | 0.035 g |
| Distilled water | 5.0 mL |

2. Prepare the following solutions of 10%, 1%, 0.1%, 0.01%, 0.001%, 0.0001% animal blood in distilled water. To prepare the first solution, mix one drop of animal blood with nine drops of distilled water. Carry out serial dilutions to prepare the next five solutions (e.g., one drop of 10% solution with 9 drops distilled water to prepare 1% solution).
3. Prepare the following samples in triplicate by rubbing a generous amount of each sample onto a piece of filter paper: apple, cabbage, blackberry jam, bread (may need to place on paper), horseradish, tomato, rust, and one drop potassium permanganate solution.

Part B Analysis of Samples and Blood Dilutions

1. Test the sensitivity of your solutions prepared in part A by adding one drop of each blood dilution in triplicate to a piece of filter paper. Next, test each presumptive blood identification solution. **Record** your results.
2. Test the samples (other than blood) prepared above using all three of the solutions prepared in part A. Add one drop of solution to the filter paper containing the sample and **record** both the immediate and subsequent results. A reaction will not occur between solution B and a sample until one drop of hydrogen peroxide is subsequently added. Tests with luminol must be done in a dark room.

Part C Analysis of Cleaned Bloodstains

1. Add one drop of the most dilute blood solution that gave a positive test for luminol to a piece of filter paper. Add a second drop to a separate piece of filter paper. To one piece of filter paper, add one drop of soapy water and to another add one drop of bleach. Allow the pieces of filter paper to dry.
2. Test the filter paper above using luminol. **Record** your results.
3. Clean up when finished.

Name: _____

Date: _____

Experiment 12 Identification of Blood Worksheet

Results and Observations

Part B Analysis of Samples and Blood Dilutions

Samples

| | Leucomalachite Green | <i>o</i> -Tolidine | Luminol |
|------------------------|----------------------|--------------------|---------|
| Apple | | | |
| Cabbage | | | |
| Blackberry jam | | | |
| Bread | | | |
| Horseradish | | | |
| Tomato | | | |
| Potassium permanganate | | | |
| Rust | | | |

4. Luminol reacts with bleach. Did the addition of the cleaning solutions alter the sensitivity of luminol to the blood samples? Explain.

5. Because hemoglobin is only a catalyst in all of the tests performed in this experiment, is it possible, given enough time, that everything tested with *o*-tolidine would result in the development of a blue-green color indicating the presence of blood? Explain. (Hint: What is a catalyst?)

Experiment 12

Identification of Blood

Instructor Notes and Answers

Part A Preparation of Solutions and Samples

- The common name for 3-aminophthalhydrazide is luminol.
- Sheep, dog, or cow blood may be used. Make sure all local guidelines and/or restrictions are followed.
- Prepare a very dilute (0.001%) potassium permanganate solution in distilled water.

Part B Analysis of Samples and Blood Dilutions

- Bread and potassium permanganate give strong false positives. Some of the other samples give only very weak false positives.
- It is best to have the students perform each test first on blood so that they may become aware of what identifies a positive result.
- A dark room will be needed for the luminol test.

Part C Analysis of Cleaned Bloodstains

- The bleach reacts with the luminol and gives a very strong false positive (this can be done outside of a darkroom). The soap has very little effect.

Experiment 12 Identification of Blood Answers

1. Which samples if mixed with something having the appearance of blood could give ambiguous results for the presumptive identification of blood? Explain.

Answers can include a mixture of anything that might look like blood with anything that gave a positive result. For example, if red paint were mixed with potassium permanganate, the stain produced may look like blood and also give a false positive for blood using one of the chemical tests in this lab.

2. The *o*-tolidine test used in this lab requires two reagents. Both reagents must be added for a positive identification. Sometimes a color change will occur after adding solution 1, but before adding solution 2 (e.g., as with potassium permanganate). Discuss how this two-step test has an advantage over the other tests.

Since a real blood sample will not generate the indicative color until after the addition of the second reagent, a color change prior to the addition of the second reagent would eliminate the potential of the unknown sample being blood. This could not be done with a single-step test.

3. Which test solution was the most sensitive (i.e., tested positive with least amount of sample)? Explain.

Most likely *o*-tolidine will react with the least concentrated blood sample. This should be supported with their own results.

1. Luminol reacts with bleach. Did the addition of the cleaning solutions alter the sensitivity of luminol to the blood samples? Explain.

No. The sensitivity to the blood sample did not change. The bleach simply served as another reagent for the chemiluminescent reaction.

2. Because hemoglobin is only a catalyst in all of the tests performed in this experiment, is it possible, given enough time, that everything tested with *o*-tolidine would result in the development of a blue-green color indicating the presence of blood? Explain. (Hint: What is a catalyst?)

Yes. By definition, a catalyst is not consumed during a chemical reaction, but rather it simply speeds up the reaction. Given enough time (possibly years), the reaction would proceed on its own without the help of the catalyst.



Photo by Cheri Stephens

You Found the Body. Now What?

How tall was he or she? It matters.

And what if you don't have the whole enchilada? Suppose you only have a few bones, what then?

Anthony Bertino and Patricia Nolan Bertino, authors of *Forensic Science Fundamentals & Investigations*, and publisher Cengage Learning have given us permission to reprint a great activity that will help your students estimate the height of a person.





ACTIVITY 13-7

HEIGHT AND BODY PROPORTIONS

Background:

Leonard da Vinci drew the "Canons of Proportions" around 1492 and provided a text to describe what the ideal proportions of a perfect man should be. The drawing was based on the earlier writings of Vitruvius, a Roman architect. Some of the relationships described include:

- A man's height is 24 times the width of his palm.
- The length of the hand is one-tenth of a man's height.
- The distance from the elbow to the ampit is one-eighth of a man's height.
- The maximum width at the shoulders is one-half of a man's height.
- The distance from the top of the head to the bottom of the chin is one-eighth of a man's height.
- The length of a man's outstretched arms is equal to his height.

Leonardo da Vinci's "Canons of Proportions"



Photo by Susan Van Etten

Objectives:

By the end of this activity, you will be able to:

1. Determine which of these relationships most accurately parallels your body proportions in estimating height.
2. Describe how to apply the Canons of Proportions to forensics by estimating someone's height from a limited number different body parts.

Safety Precautions:

None

Time Required to Complete Activity:

40 minutes

Materials:

(students working in pairs)
metric ruler
pen and paper
calculator (optional)
graphing paper

Part A:

Procedure:

1. Standing in your stocking feet with your back to a wall, have your partner carefully measure your height to the nearest tenth of a centimeter. Keep the top of your head level (parallel to the floor).
2. Record your results on Data Table 1.



3. Have your partner measure to the nearest .1 cm and record each of the following measurements of your body:
 - a. width of your palm at the widest point
 - b. length of the hand from first wrist crease nearest your hand to the tip of the longest finger
 - c. distance from elbow to highest point in the armpit
 - d. maximum width of shoulders
 - e. the distance from the top of the head to the bottom of the chin
 - f. the length of outstretched arms
4. Repeat steps 1 to 3, taking the body measurements of your partner and record in Data Table 2.
5. Your partner records your data in his or her Data Table 2.
6. Calculate and record your and your partner's estimated height using the proportions given on the data tables.
7. Determine and record the difference between your actual height and your calculated height on data tables 1 and 2. Use + and - symbols.



Data Table 1: Your Body Relationships
All measurements recorded in centimeters
Gender of person measured _____

| A | B | C | D | E |
|-------------------------------|-----------|-------------|-----------------------|--|
| Trait | Size (cm) | Multiply by | Calculated Total (cm) | Difference between actual and calculated height (cm) |
| Height | | x 1 = | | |
| Palm width | | x 24 = | | |
| Hand length | | x 10 = | | |
| Distance from armpit to elbow | | x 8 = | | |
| Width of shoulders | | x 4 = | | |
| Head to chin length | | x 8 = | | |
| Outstretched arms | | x 1 = | | |



Data Table 2: Your Partner's Body Relationships

All measurements recorded in centimeters

Gender of person measured _____

| A | B | C | D | E |
|-------------------------------|-----------|-------------|-----------------------|--|
| Trait | Size (cm) | Multiply by | Calculated Total (cm) | Difference between actual and calculated height (cm) |
| Height | | x 1 = | | |
| Palm width | | x 24 = | | |
| Hand length | | x 10 = | | |
| Distance from armpit to elbow | | x 8 = | | |
| Width of shoulders | | x 4 = | | |
| Head to chin length | | x 8 = | | |
| Outstretched arms | | x 1 = | | |

Questions:

1. Which measurement and relationship most accurately reflected your height?
2. Was this the same measurement that most people of your gender found to most accurately estimate their actual height? Explain.
3. Which measurement and relationship most accurately reflected your partner's height?
4. Which measurement was the least accurate in estimating your height?
5. Explain why using the Canons of Proportions on teenagers to estimate height would provide less accurate data than using the canons of proportions on adults.
6. Describe a crime scene that could use the Canons of Proportions to help estimate the height of a person.

Part B:

Procedure:

1. The distance from your elbow to armpit is roughly the length of your humerus. Record the humerus length and actual length from everyone in your class and complete Data Table 3.
2. Graph the length of the humerus (x axis) vs. height (y axis). Be sure to include on your graph the following:
 - Appropriate title for graph
 - Set up an appropriate scale on each axis
 - Label units (cm) on each of the x and y axes
 - Circle each data point

Data Table 3: Comparison of Humerus to Actual Height



| Name | Length of Humerus (cm) | Actual Height (cm) |
|------|------------------------|--------------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |

Questions:

1. Plot the data and create the best-fit line.
2. Suppose a humerus bone was discovered at a construction site. From the graph, explain how you could estimate the person's height from the length of the humerus.
3. List the variables that would need to be considered when trying to estimate someone's height from a single bone.

Appendix C

Bone Length Charts

All measurements are in centimeters. (2.54 cm = 1 inch)

American Caucasian Males

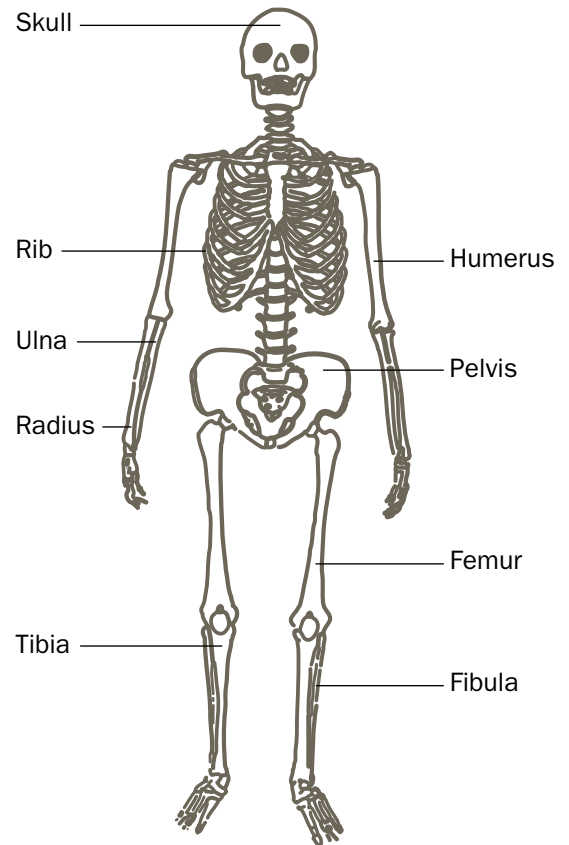
| Factor x Bone Length | Plus | Accuracy |
|---|------------|------------|
| Stature (cm) = $2.89 \times$ humerus | + 78.10 cm | ± 4.57 |
| Stature(cm) = $3.79 \times$ radius | + 79.42 cm | ± 4.66 |
| Stature(cm) = $3.76 \times$ ulna | + 75.55 cm | ± 4.72 |
| Stature (cm) = $2.32 \times$ femur | + 65.53 cm | ± 3.94 |
| Stature (cm) = $2.60 \times$ fibula | + 75.50 cm | ± 3.86 |
| Stature (cm) = $1.82 \times$ (humerus + radius) | + 67.97 cm | ± 4.31 |
| Stature (cm) = $1.78 \times$ (humerus + ulna) | + 66.98 cm | ± 4.37 |
| Stature (cm) = $1.31 \times$ (femur + fibula) | + 63.05 cm | ± 3.62 |

American Caucasian Females

| Factor x Bone Length | Plus | Accuracy |
|-------------------------------------|------------|------------|
| Stature (cm)= $3.36 \times$ humerus | + 57.97 cm | ± 4.45 |
| Stature (cm)= $4.74 \times$ radius | + 54.93 cm | ± 4.24 |
| Stature (cm)= $4.27 \times$ ulna | + 57.76 cm | ± 4.30 |
| Stature (cm)= $2.47 \times$ femur | + 54.10 cm | ± 3.72 |
| Stature (cm)= $2.93 \times$ fibula | + 59.61 cm | ± 3.57 |

Caucasian, Both Sexes

| Factor x Bone Length | Plus | Accuracy |
|---------------------------------|------------|------------|
| Stature = $4.74 \times$ humerus | + 15.26 cm | ± 4.94 |
| Stature = $4.03 \times$ radius | + 69.96 cm | ± 4.98 |
| Stature = $4.65 \times$ ulna | + 47.96 cm | ± 4.96 |
| Stature = $3.10 \times$ femur | + 28.82 cm | ± 3.85 |
| Stature = $3.02 \times$ tibia | + 58.94 cm | ± 4.11 |
| Stature = $3.78 \times$ fibula | + 30.15 cm | ± 4.06 |



African-American and African Males

| Factor x Bone Length | Plus | Accuracy |
|--|-------------|-----------------|
| Stature = $2.88 \times$ humerus | + 75.48 cm | \pm 4.23 |
| Stature = $3.32 \times$ radius | + 85.43 cm | \pm 4.57 |
| Stature = $3.20 \times$ ulna | + 82.77 cm | \pm 4.74 |
| Stature = $2.10 \times$ femur | + 72.22 cm | \pm 3.91 |
| Stature = $2.34 \times$ fibula | + 80.07 cm | \pm 4.02 |
| Stature = $1.66 \times$ (humerus + radius) | + 73.08 cm | \pm 4.18 |
| Stature = $1.65 \times$ (humerus + ulna) | + 70.67 cm | \pm 4.23 |
| Stature = $1.20 \times$ (femur + fibula) | + 67.77 cm | \pm 3.63 |

African-American and African Females

| Factor x Bone Length | Plus | Accuracy |
|---------------------------------|-------------|-----------------|
| Stature = $3.08 \times$ humerus | + 64.67 cm | \pm 4.25 |
| Stature = $3.67 \times$ radius | + 71.79 cm | \pm 4.59 |
| Stature = $3.31 \times$ ulna | + 75.38 cm | \pm 4.83 |
| Stature = $2.28 \times$ femur | + 59.76 cm | \pm 3.41 |
| Stature = $2.49 \times$ fibula | + 70.90 cm | \pm 3.80 |

All Ethnic Groups or, if Ethnicity is Unknown, Both Sexes

| Factor x Bone Length | Plus | Accuracy |
|---------------------------------|-------------|-----------------|
| Stature = $4.62 \times$ humerus | + 19.00 cm | \pm 4.89 |
| Stature = $3.78 \times$ radius | + 74.70 cm | \pm 5.01 |
| Stature = $4.61 \times$ ulna | + 46.83 cm | \pm 4.97 |
| Stature = $2.71 \times$ femur | + 45.86 cm | \pm 4.49 |
| Stature = $3.01 \times$ femur | + 32.52 cm | \pm 3.96 |
| Stature = $3.29 \times$ tibia | + 47.34 cm | \pm 4.15 |
| Stature = $3.59 \times$ fibula | + 36.31 cm | \pm 4.10 |

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- Appendix

Ewww!

Not another decomp article!

By Carol Schutt

Yes, another decomp article. What, you thought this was Martha Stewart's magazine?

I have used forensic science as a way to teach chemistry and physics for eight years at James C. Enochs High School in Modesto, California. This past year I was told I would also be teaching Integrated Forensic Science to freshman. In our program we use the Integrated Science curriculum accepted by the State of California as our backdrop, then I use the forensics to tie it all together for a smooth fit. It is important to note that my students have varying ability levels. I have students who are very talented working in the same class as students with special needs and students who have yet to



find their way academically. My group is definitely diverse in talents, ethnicity, background, language ability, and interest.

Our program is a four year pathway and I wanted to make sure that their entry year was exciting and stimulating so that they would want to continue on in the program. After having read several books on forensic anthropology and forensic entomology as they are used in crime scene investigation, I decided to try to establish a Body Farm so my students could really do some science like the professionals do. I spent my first three years after college doing research, developing experiments, collecting data, and

writing articles for professional journals so I felt confident that this would be a rewarding learning experience for my students. All I needed now was permission from the principal, a site, and materials to make it all happen. I was surprised by the positive reaction to what I wanted to do and the level of support was wonderful.

The first task, after obtaining permission from the principal, was to find a site that could be secured. Our head custodian, John, took me on a trip in one of the golf carts we have on campus, out to the back of the lot where he and the principal had agreed we could run the experiments. I then needed to secure the site, so I bought a 6' x 12" dog run. The dog run is a modular set up that can be added to for future experiments. The custodial staff was fantastic and they set it up so that we had enough panels left over that they were able to put a roof on the run so that when it was locked, it was completely secured from vandals.

Once the site was secured, it was time to prepare my students for experiments on decomposition and entomology. Our first task was to familiarize them with what a Body Farm is. I took my classes to the library and we researched the topics of decomposition and entomology and how these things are used to help detectives solve crimes. We had some frustration because our district blocks websites that it deems inappropriate, and students using the search terms "dead

bodies" and "human decomposition" were having a hard time. In fact, the Body Farm website for the University of Tennessee was blocked until the librarian called and asked that it be unblocked so my students could read up on the world of Dr. Bass and the original Body Farm.



The assignment at the computer lab was to find three legitimate sources of information. I used this exercise as a way to teach students about using sources from the internet, for collecting information on what they were going to study, for seeing the state of the research on decomposition, and for learning how to begin to use outside sources to facilitate research. I began using the idea of APA formatting because in our district, MLA is what the





students are taught when they write a research paper. It was important for them to understand that in addition to scientific methodologies for conducting research, scientists also have rules and regulations for how the results of their research is presented to the public. It was my intention for my freshman to make their first attempt at an APA journal article at the end of their research project.

In order to set up the research, I came up with a list of fifteen different projects I thought we could do in our 6' x 12' space. I explained to the students that our test subjects would be store-bought chickens instead of mammals because I figured since they had all seen a chicken that they would not be focused on what was decomposing as much as they would focus on the process. The fifteen experiments included things like:

- Which decomposes faster, a chicken that is raw or one that is burnt?
- Which decomposes faster, a “naked” chicken or one that is clothed?
- What is the effect of a decomposing chicken on the soil underneath?
- What is the succession of insects on a decomposing chicken on the ground?
- Does a chicken suspended in the air decompose at a different rate than one left on the ground?



- Does a chicken decompose faster if it is on dirt/grass versus being on cement?
- Do flies find decomposing flesh with smell or sight?
- How do decomposing chickens affect seeds planted above them?
- What is the succession of insets on a suspended chicken?
- What is the effect of temperature on maggots in a decomposing chicken?

I think we learned more than we thought we would. We learned that the chickens on the grassy area decayed a lot faster than either those on the cement or the one hanging from the top of the cage. We learned that it takes three to five minutes for flies to find a food source and they are attracted by something other than sight. Our order of succession was measured by corpse invasion, so we found the ants came first, then the flies, then beetles of various types. I was a little surprised we didn't have a rodent problem but the head custodian said he chased off either a fox or coyote heading toward the cage one weekend.

The students learned a very valuable lesson about science. Science isn't pretty, it doesn't always smell

nice, it can be hot, dirty work and that someone has to do it. To see the impact this project had on my class, visit YouTube and type in Enochs B.A.R.F. (making sure you use the periods) and view the video that one of my freshman students put together with photos and video images from our efforts. This next year proves to be more exciting as I will be requiring a more quantitative approach to the research to elevate the information to something that could be used, perhaps, by local law enforcement.



A Day in the life Of...



A Tire/Shoe Impression Expert

By Lesley Hammer

- 1. How many years have you been examining tire and shoe impressions?**
I worked at the Alaska State Crime Lab for 15 years, and have been a private examiner for a little more than two years. I didn't work with shoe and tire evidence until about 5 years into my career in terms of examining it, but did work with it from the beginning in terms of crime scene collection.
- 2. Do you have a specialty as a forensic tire and shoe impression examiner? Do specialties exist?**
Specialties do exist. Usually a crime lab will define the disciplines they employ, and each discipline will have specific training, testing, procedural, and certification or accreditation requirements. Some examples of specialties in addition to shoe and tire examination are latent print examination, DNA analysis, controlled substance (drug) analysis, trace evidence, crime scenes, and firearms.
- 3. What education does one need to get into the field?**
Once an examiner has met the general hiring requirements of the laboratory, which usually include a science or forensic science degree, the specific training in shoe/tire evidence includes specialized classes in photography, enhancement, and comparison of the evidence. These courses are in addition to on the job training with an experienced examiner and a year or so of working cases that are directly supervised.
- 4. Where does one go for training?**
The Federal Bureau of Investigation (FBI) and private training consultants each provide training seminars. Additionally, individual agencies such as state and federal crime labs may have their own training courses.
- 5. How long does training last before one is qualified to work independently?**
Usually a year, however, for many examiners shoe and tire evidence is a part time specialty, so training may span longer lengths of time to meet the requirements.
- 6. Who do forensic tire and shoe impression examiners work for?**
Shoe/Tire or Impression Evidence Examiners work for local, state, or federal crime laboratories or identification sections, or may be private consultants who have worked in these settings in the past.
- 7. What is your official job description?**
Usually there is a general title such as Criminalist or Forensic Scientist that covers all examiners working in all different disciplines, then they are further titled by specialty. For instance, at the Alaska State Crime Lab I was a Forensic Scientist who specialized in crime scene, latent print, and shoe and tire impression evidence. As a private consultant I have retained the title of Forensic Scientist.
- 8. How does one investigate a scene for tire and shoe impressions? What do you look for?**
Some shoe and tire evidence is obvious to the naked eye, such as tire impressions in mud or snow or shoe impressions leading from a heavy pool of blood. Some impressions are latent or invisible to the naked eye, such as shoe impressions in dust. These must be detected using lighting techniques, for example skimming light from a flashlight horizontally across the floor or using lighting from different angles to help spot the impression. This is called using oblique lighting, and is a primary technique for searching for latent shoe evidence at a crime scene.
- 9. What types of clues stand out to point to tire and shoe print evidence?**
Points of entry, such as a broken window or a damaged door, are clues that there may be important shoe print evidence leading to or away from these areas. Paths of travel, such as driveways or hallways, that lead to or away from the impact of the crime (victim, missing items) are also clues that important impression evidence may be found.

10. How long does an investigation typically take?

Processing a crime scene may take hours or days, depending upon many factors such as the amount of evidence to collect and the size or number of scenes involved.

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

I have been accused of being an over-doer when it comes to many aspects of the work, such as detailed note taking, taking lots of photograph,s and being involved in professional activities. I am involved in professional boards and publishing papers above and beyond my normal daily duties. In regards to requirements, there are standards that define the work of examiners that help ensure that competent work is carried out. For shoe print and tire tread examiners they are set by SWGTREAD (the Scientific Working Group for Shoe Print and Tire Tread Examiners (see www.swgtread.org for more information). Most forensic disciplines have similar scientific working groups. Individual agencies or departments may also set their own standards. Currently, there are no national standards that are required to examine this or most other types of forensic evidence. However, if a laboratory is accredited or an individual examiner is certified, there are professional expectations defined by the certificate issuing bodies.

12. What is the typical day like for a crime scene examiner?

I don't think there is a 'typical' day, since there are so many different types of professionals who collect evidence at crime scenes. For example, in some jurisdictions police officers process the crime scenes, in others civilians do this work. Civilians may be technicians who are trained primarily in documentation and collection, or laboratory scientists who respond in teams with members filling specialty roles. For some, crime scene evidence collection is one of many duties, for others it is their primary duty. There is a very wide range of scenarios across the country involving who is collecting the evidence.

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

Crime scenes can be difficult to process particularly if there are environmental conditions that are threatening the evidence, such as an outdoor scene where it is snowing heavily. Extreme cold or heat can also cause issues with evidence, materials, and equipment. Sometimes there can be big challenges in messy or highly used areas in determining what is meaningful evidence and what is peripheral. Such as trying to determine which tire tracks to collect when many vehicles have passed over the same area of interest or which shoe impressions to collect in a high traffic area.

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

A scene is much easier to process when it was cleaned right before the crime occurred, such as a car that was detailed right before it was stolen, or counters that were wiped right before being stepped upon in a robbery. If the perimeter is small and defined, and no weather or other

issues put pressure on the collection process, the scene is usually easier to manage.

15. What hours does an examiner work?

Most examiners that conduct laboratory analysis work a normal workweek. Those that respond to crime scenes often have to make themselves available in shifts to be called out to scenes so that someone is available 24/7.

16. Are working conditions dangerous?

In my experience, as a non-sworn civilian employee, I was always under the protection of an officer at the crime scene. The sworn professionals are in the most dangerous position. For the non-sworn crime scene examiner there can definitely be exposure to dangers from travel hazards to chemical and biological exposures. For these reasons, safety training is an integral component of training programs.

17. Do you work alone? If not, then with who?

Collecting evidence at crime scenes is almost always a team effort. Laboratory analysis is independent work, however in most cases, conclusions are verified by another examiner. As a private examiner I work much of the time alone, but constantly collaborate with peers.

18. What do you wear to work?

Truth be known, I am often in my pajamas or sweats answering emails in the mornings while in my home office. Commonly crime scene units issue uniforms, usually in a dark color because of the ink, powders and chemicals they are exposed to on a daily basis. Examiners in the laboratory often wear white lab coats, and of course for court, business suits are worn. I am usually in business casual when not in my pajamas.

19. Does one case stand out as being particularly difficult?

Cases that involve children are the most emotionally difficult. In terms of professional challenge, cases in which the evidence hasn't been collected properly are the most difficult to analyze.

20. What kind of demand is there for forensic tire and shoe impression examiners?

There are relatively few positions for these examiners. Most have another primary discipline (latent prints, trace, firearms etc.) and do shoe/tire cases part time. When positions come open, they rarely are for a full time shoe/tire examiner, but instead are for one of the other disciplines mentioned. In general job prospects are good for trained forensic examiners, however they are extremely competitive for entry-level positions.

21. What type of person would be well suited for this job?

Someone who likes doing puzzles, is detail oriented, self motivated, interested in science, and who is willing to work within expected standards. Communication skills, both verbal and written, are of benefit as well. I also think a strong ethical nature is important.

(Continued on pg. 28)

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Bloomin' Easy!

One of the best things about teaching forensics is watching your students mature intellectually. Benjamin Bloom first published his taxonomy of thinking skills in 1956. As teachers we have an obligation to help students learn to use their minds in more powerful ways. The chart below lists suggestions for you to push your students mentally to higher places. Give them a try; often the difference between an easy forensic assignment and a challenging one is what you ask of your students.

| Level | Type of Activity or Question | Verbs Used for Objectives |
|---------------|------------------------------|---|
| Lowest level | Knowledge | define, memorize, repeat, record, list, recall, name, relate, collect, label, specify, cite, enumerate, tell, recount |
| | Comprehension | restate, summarize, discuss, describe, recognize, explain, express, identify, locate, report, retell, review, translate |
| | Application | exhibit, solve, interview, simulate, apply, employ, use, demonstrate, dramatize, practice, illustrate, operate, calculate, show, experiment |
| Higher levels | Analysis | 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 |
| | Synthesis | compose, setup, plan, prepare, propose, imagine, produce, hypothesize, invent, incorporate, develop, generalize, design, originate, formulate, predict, arrange, contrive, assemble, concoct, construct, systematize, create |
| | Evaluation | judge, assess, decide, measure, appraise, estimate, evaluate, infer, rate, deduce, compare, score, value, predict, revise, choose, conclude, recommend, select, determine, criticize |

Chart courtesy of Dr. Alicia T. Wyatt, McMurry University, Abilene, TX

Next issue will be about evidence of all types. You might even say it's going to be a Locardapalooza.

Please send us your ideas, labs, and articles!

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Ask the Morgue Guy

Q. When I returned at the beginning of the school year I noticed some of my supplies were missing, including *The Encyclopedia of Serial Killers* and a plastic skull. I suspect some of my coworkers, but haven't seen anything in their classrooms. I wonder if students had access to my room over the summer, but am still distressed with the idea of putting away my stuff for the summer and returning in the fall to find some of it gone. Any suggestions?
Ernie Gill, Canton, GA.

A. *You have a number of choices. First, you could cart everything of value home for the summer—a lot of work, but absolutely fail safe. You should make your administration aware of the thefts because they often keep logs and video of who enters the building between school years. You could also box up your stuff of value, label the boxes as office supplies or worksheets. And finally, my favorite, is to go to Home Depot or Lowes and get some hasps and locks. Install them on the outside of the cabinets you store your supplies in, and keep the keys with you. Most administrators won't mind, especially if you make them aware of the thefts. You'll be the only one with keys, and assured of thwarting thieves. Nothing says security better than a padlock, especially to a casual thief looking for a crime of opportunity.*

What's C

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.**

APRIL 2012

23-27

48th Annual Forensic Identification and Emerging Technologies Lectures and Mini Workshops Sponsored by the Indian Health Service, Division of Oral Health. To be held at the Hotel Valley Ho in Scottsdale, AZ CONTACT: marybeth.kinney@comcast.net

23- 27

Outdoor Recovery Courses To be held at the Forensic Anthropology Center at Texas State (FACTS) in San Marcos, TX. CONTACT: www.txstate.edu/anthropology/facts

30- May 1 Forensic Archaeology to Maximize Evidence Recovery: A Two-Day Field Exercise

To be held at the Rutgers Pinelands Field Station in New Lisbon, NJ. CONTACT: <http://forensicscienceeducation.org/courses-and-seminars/>

MAY 2012

8-11

5th Annual Forensic Investigations Conference To be held at the Downtown Marriott Hotel in Kansas City, MO. CONTACT: www.saintlukeshealthsystem.org/forensic cbrogan@saint-lukes.org

9-11

Advance Forensic Imaging Course To be held at the Maryland Office of Chief Medical Examiner in Baltimore, MD. CONTACT: Eleanor Thomas 900 W. Baltimore Street Baltimore, MD 21223 Thomase@ocmemd.org

14-18

Basic Bloodstain Pattern Analysis Course To be held at the Ohio Bureau of Criminal Identification & Investigation in London, OH. CONTACT: Paul Kish Paul@paulkish.com (607) 962-8092

16-17

Advances in Forensic Medicine & Pathology Presented by the Department of Pathology at the University of Michigan. To be held at the Inn at St. John's in Plymouth, MI. CONTACT: Angela Suliman (734) 615-6371 asuliman@med.umich.edu www.pathology.med.umich.edu/Forensics/index.php

21-25

Detection and Recovery of Human Remains To be held at Chaminade University of Honolulu in Honolulu, HI. CONTACT: Dr. M. Lee Goff lgoff@chaminade.edu www.chaminade.edu/summerinstitutes

21-25

Society for Wildlife Forensic Science 1st Triennial Meeting To be held at Jackson Lake Lodge, Jackson Hole, WY. CONTACT: <http://www.wildlifeforensicscience.org/>

29-June 1

Field Methods in Forensic Anthropology To be held at the Forensic Anthropology Center, University of Tennessee, Knoxville, TN. CONTACT: Rebecca Taylor fac@utk.edu <http://fac.utk.edu/>

JUNE 2012

4-8

Outdoor Recovery Course

To be held at the Forensic Anthropology Center, University of Tennessee, Knoxville, TN. CONTACT: Rebecca Taylor, fac@utk.edu, <http://fac.utk.edu/>

4-8

Visualization of Latent Bloodstains Course

To be held at Elmira College in Elmira, NY. CONTACT: Paul@paulkish.com, (607) 962-8092

11-15

25th Annual Forensic Anthropology Course National Museum of Health & Medicine (Formerly AFIP NMHM Course)

To be held at the Maryland Office of Chief Medical Examiner in Baltimore, MD. CONTACT: Liz Chipchosky, (240) 694-2071, echipchosky@hjf.org, www.cvent.com/d/fcqqkmv

Going On?

18-22

Estimating the Post Mortem Interval

To be held at the School of Forensic and Investigative Sciences at the University of Central Lancashire, UK. CONTACT: Peter Cross, pacross1@uclan.ac.uk

18-22

Outdoor Recovery Courses To be held at the Forensic Anthropology Center at Texas State (FACTS) in San Marcos, TX. CONTACT: www.txstate.edu/anthropology/facts

25-27

Forensic Science Educational Conference To be held at University of Central Oklahoma, Edmond, OK. CONTACT: Nancy Jackson, njackson@aafs.org, Phone: (719) 636-1100.

25-28

Bertino Forensics Summer Institute To be held at Scotia-Glenville High School, Scotia, NY 12302 (near Albany). CONTACT: **Contact Patti Bertino at** patti@bertinoforensics.com or call 518-384-1718, www.bertinoforensics.com

26-28

Alaska Summer Forensics Conference To be held in Wasilla, AK for forensic science educators and law enforcement personnel. Classes will run 8 am to 4:30 pm, cover an exhaustive list of disciplines, and feature forensic experts and hands-on practice. CONTACT: Jeanette Hencken at 314-780-1456 or henckenj@hotmail.com.

JULY 2012

8-13

Summer Forensics Workshop Part I To be held at the College of the Atlantic, Bar Harbor, ME. CONTACT: Howard Schindler at hdsch@gmail.com or Jean Sylvia at 800-597-9500 or <http://coa.edu/summercourseinfo.htm>.

9-12

Bertino Forensics Summer Institute To be held at Scotia-Glenville High School, Scotia, NY 12302 (near Albany). CONTACT: **Contact Patti Bertino at** patti@bertinoforensics.com or call 518-384-1718, www.bertinoforensics.com

9-13

Colloquium on Forensic Science To be held at Rif Auditorium in Pretoria, South Africa. CONTACT: Dr. Adèle Strydom Chief Researcher Centre for Forensic Investigative Sciences Forensics4Africa, A Division of Strategic Investigations and Seminars (Pty) Ltd. Direct: +27 (0) 12 751 0888 Cell: +27 (0) 82 564 0378 dradele@forensics4africa.com / events@forensics4africa.com Fax: +27 (0) 86 684 9119 www.forensics4africa.com

9-13

Human Identification in Forensic Anthropology To be held at the Forensic Anthropology Center, University of Tennessee, Knoxville, TN. CONTACT: Rebecca Taylor fac@utk.edu <http://fac.utk.edu/>

11-13

Forensic Science Educational Conference To be held at University of Alabama, Birmingham. CONTACT: Nancy Jackson, njackson@aafs.org, Phone: (719) 636-1100.

11-13

Forensic Science Educational Conference To be held at San Jose University, CA. CONTACT: Nancy Jackson, njackson@aafs.org, Phone: (719) 636-1100.

25-27

Forensic Science Educational Conference To be held at University of Central Oklahoma, Edmond, OK. CONTACT: Nancy Jackson, njackson@aafs.org, Phone: (719) 636-1100.

15-27

Summer Forensics Workshop Part II To be held at the College of the Atlantic, Bar Harbor, ME. CONTACT: Howard Schindler at hdsch@gmail.com or Jean Sylvia at 800-597-9500 or <http://coa.edu/summercourseinfo.htm>.

16-19

Bertino Forensics Summer Institute To be held at Scotia-Glenville High School, Scotia, NY 12302 (near Albany). CONTACT: **Contact Patti Bertino at** patti@bertinoforensics.com or call 518-384-1718, www.bertinoforensics.com



Just for Fun

Be Someone Else

Halloween is still a long way off, but you don't need an excuse to dress up as your favorite forensics character, especially if it's for a grade.

As the school year winds down many teachers find themselves treading water in their curriculums. Most, if not all, of the units and lessons you wanted to do over the course of the past year have been done. What's left?

Researching biographies of famous and infamous individuals can reveal some fascinating facts, especially if your students have a stake in the report's delivery.

Put a number of famous or infamous names on separate pieces of paper and ask students to draw their subject blindly from a hat. They will have a week to produce an autobiography of their person, and will thank you if you build in a day or two of library or computer time.

To keep the kids from plagiarizing, tell them the report must be in the first person, and if no information is available on a number of questions you give them (childhood/schoolyard/adolescent experiences) they should make them up. On the days they present they should dress like their person and only reveal their name at the end, after other students have tried to guess.

Stoopid Crooks



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

John Jardini of Pittsburgh, PA robbed a young lady he met on the street after she'd gotten off a bus. He was so enamored of the victim he called her a short time later and asked her out. A few minutes later he did it again. Not one to take no for an answer, Jardini assaulted the girl and her mother outside a supermarket. He was arrested there and identified as the robber.

An Indianapolis, IN man was arrested for breaking and entering after a homeowner returned one evening to find him in her house. Ashley Murray claims the man, Keith Davis, must have been on drugs because she can't understand how Davis could break into her house and not realize it wasn't his. Davis claimed it was his house, which explained why he didn't steal anything, had swept her floor, folded her laundry, and cooked what police described as, "A real nice dinner" of chicken and onions. However, Davis did drink the woman's orange juice, but she was OK with that because of the other things he'd done. Regardless, Davis was arrested.

Susan Cole of Denver, CO got out of jury duty last year by smearing on thick makeup, claiming she was homeless and mentally ill. About six months later she'd shared the details of her masquerade with her clients at her hair salon. She went one step further by calling in to a local radio show when the topic of the day was getting out of jury duty and bragging. Unfortunately for her, the judge she'd pleaded with when she'd shown up for jury duty was listening. Cole was arrested for perjury and attempting to influence a public servant, both felonies.

Alan L. O'Neill has discovered one of the pitfalls of spending too much time on Facebook. He married a woman in 2001, stayed with her for eight years, then split. He changed his address, name, and married another woman shortly thereafter. Unfortunately, when the wives went to his Facebook page the "People You May Know" feature clued each in to the other, especially when wife number one saw a picture of O'Neill, his new bride, and their wedding cake. She called O'Neill's mother and things went from bad to worse. O'Neill, a corrections officer, has been charged and may face up to a year in prison, assuming he doesn't marry a third time.

A Florida man has been arrested following a break-in at a motel. Cedrick Mitchell broke into a room and asked the two men inside for pills. When they claimed not to have any he asked for all their valuables. A fight ensued and Mitchell dropped his gun before being pepper sprayed in the face and fleeing. Ten minutes later he returned to the room and offered the men money if they'd sell him back his gun. He was pepper sprayed again, and police caught up with him minutes later.

Jose Romero-Valenzuela of Las Vegas, NV was arrested for meth possession, made bail, but found himself late for his court appearance. In his haste to get to court on time he was clocked going 105 mph before being stopped and ticketed. He was then stopped going 98 mph, and later 92 mph. By the time he arrived at the courthouse he'd managed to accumulate fines totaling \$2000.

Stoopid Movies

More stoopid criminals; these guys are priceless.

Click on the cameras below to see the movies (internet connection required).

