Evidence Log Form

Date: 4-15-14
CSI Name: Magic Nick
Crime #: 1
Type of Evidence: Bullet Trajectory
Date Evidence Collected: 4-15-14
Location Evidence Collected: Kitchen in the residence of Aaron Lee (3209 West 6th Ave #4); the victim.
Summary of how the evidence was processed and analyzed:
The bullet went through the victim's head and arm. After the bullet entrance wound/path on the victim was identified, a laser pointer was directed through the entrance wound in the head, through the exit wound, and through the arm, landing at a point in the table were the wood was chipped. The laser did not match up with the bullet hole in the wall. Because bullets travel at high velocity in a straight line, it is impossible for them to turn in mid-air, thus it is assumed that the wall bullet holes were caused by a potential ricochet or another bullet A wooden dowel was then inserted into the wound(s) to visualize the trajectory of the bullet.

Bullets contain a mixture of gunpowder and cordite, which leave burn marks on the skin of the individual either wounded or killed. They also leave a fine residue on the fingers and hands of the individual firing the gun. These burn marks can signify closeness of the victim to the perpetrator, kind of weapon, and also if the weapon has had any modifications made to it. Some weapons have been disarmed by having the firing pins and mechanisms removed, but there are individuals who can 'reactivate' these weapons for use again. Also, each weapon's barrel contains small ligatures and grooves, which, when a bullet is fired from them, make marks on the shell casing. These marks can be used as a means of identifying the make and model of the gun when these shell casings are found at the scene. When the entry wound was examined, no burn marks from the barrel were observed, only stippling.

What conclusions can be drawn from this piece of evidence?
Because of the angle and manner in which the bullet penetrated the victim's body, it can be concluded that the victim was immobile (not moving) and lying on the table when he was shot. The trajectory of the bullet didn't match up with the bullet hole in the wall, suggesting that the bullet ricocheted off the table and into the wall; further proving that the victim was immobile on the table. Also, the gun was not pressed directly to the head but was instead held farther away and fired at a close distance (a feat impossible for someone who is lying down). Because of this, we conclude that the victim did not commit suicide.

What questions, if any, are raised by this piece of evidence?
Because the victim didn't kill himself, we must question who is responsible for his death and why he was killed?

Evidence Log Form

Date: 4-16-14
CSI Name: Magic Nick
Crime #: 1
Type of Evidence: Fingerprints (collected using superglue fuming technique) from Whiskey and Tequila Bottles, Cup on Fridge, Prescription Bottle, 9mm Gun, Cup, and the Shell Casing
Date Evidence Collected: 4-16-14
Location Evidence Collected: Objects located at (or in the vicinity of) the kitchen table in the residence of Aaron Lee (3209 West 6th Ave #4), the victim.
Summary of how the evidence was processed and analyzed:
Latent fingerprints were collected off of the gun, plastic drink glasses, and the liquor bottles that were present at the crime scene using superglue fuming technique; also known as cyanoacrylate fuming. To understand how the super glue method works, one must first know some basic information about fingerprints themselves. There are three different types of fingerprints: visible, impression, and latent. Investigators normally need a portable, permanent copy of the fingerprints to analyze. A photograph can generally fulfill this need. Of the three types of fingerprints, visible fingerprints can be photographed directly, and impression fingerprints can usually be photographed under special lighting conditions. It is only the invisible latent fingerprints that are difficult to photograph. They must first be made visible. Cyanoacrylate fuming is a chemical technique for collecting latent prints.

Latent fingerprints are composed of several chemicals exuded through the pores in the fingertips and are left on virtually every object touched. The primary component of latent fingerprints is ordinary sweat. Sweat is mostly water, and will dry after a fairly short period of time. The other components of latent fingerprints are primarily solid, and can remain on a surface for a much longer period of time. The other components of fingerprints include organic compounds like amino acids, glucose, lactic acid, peptides, ammonia, riboflavin, and isoagglutinogens, as well as inorganic chemicals like potassium, sodium, carbon trioxide, and chlorine. The basic concept behind super glue technique is to apply something that will chemically react with one of the constituent chemicals of latent fingerprints to the area suspected of containing such a fingerprint (e.g., a gun, glass, or bottle in our situation). Super glue reacts with the traces of amino acids, fatty acids, and proteins in the latent fingerprint and the moisture in the air to produce a visible, sticky white material that forms along the ridges of the fingerprint. The final result is an image of the entire latent fingerprint. This image can be photographed directly, or after further enhancement.

To enable such a reaction to take place, the cyanoacrylate must be in its gaseous form. The basic procedure to develop latent fingerprints using super glue takes this fact into account, but is still not overly complicated. The surfaces that are to be checked for latent fingerprints are placed in an airtight tank along with a small heater. A few drops of liquid super glue are placed into a tiny, open container, and the container is placed on top of the heater inside the tank. The boiling point for most super glue varies between forty-nine and sixty-five degrees Celsius (roughly 120 to 150 degrees Fahrenheit) depending upon its exact chemical composition.

Once the super glue in the container reaches its boiling point, it will begin to boil away into the surrounding atmosphere, creating a concentration of gaseous cyanoacrylate. If any latent fingerprints exist anywhere inside the tank, they will eventually be exposed to the gaseous cyanoacrylate. This exposure and the humidity contained in the atmosphere (from the water cup) are enough to trigger the reaction automatically. Once everything has been set up, the investigator merely waits for the reaction to occur. The whole reaction can take over two hours. However, because it is in practice very difficult to calculate the exact amount of time in advance, the reaction must be monitored to insure that it is not allowed to continue for too long. If it runs unchecked, the latent fingerprints can overdevelop; the chemical images of the ridges will slowly grow wider until they overlap, obscuring vital detail.

After the prints were obtained, we compared them to prints collected from suspects and the victim. When analyzing fingerprints, there are three main types of items to observe: arches, loops, and whorls. Identifying the type of print makes the comparison process much faster because only prints of the same type need to be analyzed. Because all fingerprints have unique identifying characteristics, called minutia, they were compared to samples taken from the suspects and the victim to identify who was at the crime scene.

What conclusions can be drawn from this piece of evidence?
The following prints were collected and identified as follows:
Whiskey Bottle:
- Aaron Lee
- Michelle Lee

Tequila Bottle:
- Aaron Lee
- Michelle Lee

Cup on fridge:
- Aaron Lee
- Michelle Lee
- Scott Henderson

Prescription Bottle:
- Michelle Lee
- Scott Henderson

9mm Gun:
- No prints were recovered

Cup:
- Aaron Lee
- Michelle Lee

Shell Casing:
- No prints recovered

It can be concluded that the victim was having a drink with his wife sometime before he was murdered. It is suspicious that the victim's prints were not found on the prescription bottle found in front of him. Only the wife's and son's prints were on the prescription bottle. Because the wife's prints are also found on the victim's glass, it suggests that she might have drugged her husband. The son may have also been involved because his prints were also on the pills and the cup on top on the fridge, which means at one time he was present in the house and around the alcohol.

What questions, if any, are raised by this piece of evidence?
Did the wife drug her husband in order to kill him? Why would she drug him?

Evidence Log Form

Date: 4-21-14
CSI Name: Magic Nick
Crime #: 1
Type of Evidence: Blood Typing
Date Evidence Collected: 4-21-14
Location Evidence Collected: Kitchen in the residence of Aaron Lee (3209 West 6th Ave #4); the cloths Michelle Lee was wearing during the events of the crime.
Summary of how the evidence was processed and analyzed:

Blood typing is used to help eliminate or categorize suspects in a crime. The function of blood is to transport substances (such as nutrients, waste, heats, hormones, etc.) throughout the body. Blood also aids in the regulations of pH levels, body temperature, and hydration as well as the defense of the body.

Blood is made up of red and white blood cells. The entire cell in general carries plasma, a fluid containing hormones, clotting factors, and nutrients. Red blood cells transports oxygen and carbon dioxide while white blood cells combat foreign invaders.

A person's blood type is determined largely by genetics, and does not change through his or her lifetime. Human blood types are categorized by the presence or absence of proteins in the cells. The combination of these proteins determines your blood type. The most common form of blood typing is the use of the ABO blood grouping system. This system separates the blood types of humans into four categories: A, B, AB or O. (See below for more in-depth explanation.)

White blood cells act as antibodies that react to specific antigens. An antibody, also known as an immunoglobulin, is a large Y-shape protein produced by plasma cells that is used by the immune system to identify and neutralize foreign objects such as bacteria and viruses. Antigens are a toxin or other foreign substance that induces an immune response in the body to a specific antibody. An immune response is the reaction of the cells and fluids of the body to the presence of a substance that is not recognized as a constituent of the body itself.

Human blood includes over 100 different antigens, which could be impractical and time-consuming to test for each antigen during the already-complicated process of crime solution. Forensic serologists instead incorporate the ABO system, which involves examining the surface of the red blood cells for two antigens known as A and B, with blood type being named after the type of antigens it contains, including A, B, AB and O. The basic foundation of serology states that for every antigen, a specific antibody is in existence. The process of routine blood typing includes the utilization of two antigens: A or B. A droplet of these antigens into samples of blood produces an agglutinated effect. Agglutination is the clumping of blood cells, often leading to the bursting of blood vessels.

The results are as follows:
Blood type A - agglutinated by antigen A

Blood type B - agglutinated by antigen B
Blood type AB - agglutinated by both antigen A and B
Blood type O - agglutinated by neither antigen A or B

Blood types, in its most basic forms, can help to categorize a person by their descent. For example, Blood type O is common among Native Americans and Latin Americans, while type A is seen most often in Caucasians and persons of European origin. Type B is seen commonly among African Americans and AB is most frequent in Japanese individuals. This simple type of classification can drastically narrow down a list of potential suspects or victim identification.

Blood typing takes the classification even further with the Rh system, developed in 1940 by Karl Landsteiner, which is far more complicated than the ABO system with around 30 combinations possible, and is typically expressed as either positive or negative (e.g., AB-,O+). The Rh factor is found on the covering of red blood cells. Using an antibody solution to the Rh protein, the same concept is used, where blood clumping determines the absence/presence of this protein, bringing to light the finer blood groups, which include: A+, A-, B+, B-, AB+, AB-, O+ and O-. The ABO system also incorporates subgrouping, using extracts from plants and seeds that create antigens that clot blood types even more selectively, such as O1, A1, AB2, and so on.

Blood typing can also be applied to blood transfusions, to make sure the body doesn't reject a blood sample. For example, if you gave a type A- person A+ blood, because the blood type A- contains Rh antigens, it would reject the A+ transfusion. However, if an AB+ individual were to receive an O- transfusion, the body would accept the blood because O is the universal donor blood type and AB+ doesn't have Rh antigens.

In the collection of biological evidence from crime scenes, wet blood offers significantly more testability than dried blood, and blood begins to dry after five minutes of air exposure. This is especially relevant in the testing for drugs or alcohol. The testing of blood for forensic purposes can also include DNA testing, which is a more complicated process that involves separating pieces of the DNA strands within the blood itself.

Blood typing, when conducted accurately, is a valuable piece of evidence in the criminal justice process, helping to pinpoint individuals and their relation to the crime.

What conclusions can be drawn from this piece of evidence?

Two types of blood were found at the crime scene, O+ and O-. It was found that the O+ sample belongs to Mr. Lee (though contact with his doctor) and that Mrs. Lee is O- (from a sample collected from her).

Blood type O+ was found on the kitchen table where Mr. Lee was murdered, as well as the blood spatter on the wall. On Mrs. Lee's shirt that she was wearing during the night of the murder, there was type O+ blood found, as well as a drop of type O- on the collar. However, the O+

blood that was found on Mrs. Lee's shirt was in the form of spatter, not that of smearing. This suggests that Mrs. Lee was in the room and within range as well as being behind the gun when Mr. Lee was shot (in order to be sprayed with the victim's blood). The one drop on the collar also belongs to Mrs. Lee, meaning that she was bleeding during some point on the night of the murder, but no conclusions can be drawn at this time as to how and why the blood is there.

What questions, if any, are raised by this piece of evidence?

If Mrs. Lee was behind the gun when it was fired, what more evidence can be gathered to formulate a case against her? Also, what are the motives of this crime? Why is there a single drop of Mrs. Lee's blood on her shirt and how did it get there?

Evidence Log Form

Date: 4-23-14
CSI Name: Magic Nick
Crime #: 1
Type of Evidence: Blood Typing
Date Evidence Collected: 4-23-14
Location Evidence Collected: The room of Scott Henderson at the Spanish Trails motel (3141 Main Ave).
Summary of how the evidence was processed and analyzed:

Blood typing is used to help eliminate or categorize suspects in a crime. The function of blood is to transport substances (such as nutrients, waste, heats, hormones, etc.) throughout the body. Blood also aids in the regulations of pH levels, body temperature, and hydration as well as the defense of the body.

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Blood typing, when conducted accurately, is a valuable piece of evidence in the criminal justice process, helping to pinpoint individuals and their relation to the crime.

What conclusions can be drawn from this piece of evidence?

Only two blood types were found in the apartment of Scott Henderson, O- and O+. The O+ blood was found around the faucet of the bathroom sink. The O- blood was located on the lip of the trash can. Both Scott Henderson and Aaron Lee share the blood type O+, which means that the blood on the sink is either Mr. Lee's or Mr. Henderson's. The type O- blood found on the trash can is irrelevant in conjunction with this particular murder because the victim has O+ blood.

What questions, if any, are raised by this piece of evidence?

Is the O+ blood found on the sink Mr. Lee's or Mr. Henderson's; DNA testing should yield clarifying results?

Evidence Log Form

Date: 4-25-14
CSI Name: Magic Nick
Crime #: 1
Type of Evidence: Toxicology
Date Evidence Collected: 4-19-14
Location Evidence Collected: Body of the deceased Aaron Lee at (3209 West 6th Ave #4)
Summary of how the evidence was processed and analyzed:

Toxicologic analysis is applied analytical chemistry. There are many branches of toxicology, such as: regulatory (consumer health & safety), occupational (worker health & safety), and forensic (crime investigation) toxicology. Modern toxicologic analysis depends upon screening and confirmatory tests. Screening tests are typically performed with commercial kits that contain antibodies directed toward common drugs of abuse. If this screening test is negative, then the decedent is usually considered negative for an intoxicating substance. If the screening test is positive, then that positive result must be confirmed, typically with gas chromatography-mass spectrometry (GC/MS).

GC/MS analysis allows separation of compounds based on their retention time within a chromatography column and identification of each compound by the characteristic fragments into which a given chemical is broken following ionization of the compound. Over the years, technologic advances in electronics and detectors have allowed GC/MS to detect ever smaller concentrations of compounds, as has the addition of other analytical techniques, such as liquid chromatography.

In general, screening tests can be performed quickly, but they provide only a qualitative result (e.g., , a substance is or is not present). Confirmatory testing usually takes longer, but it provides an actual concentration of the substance in the body fluid analyzed.

From a medical point of view, collecting and retaining specimens for potential toxicologic analysis is always appropriate in every autopsy that is undertaken to determine the cause of a person's death. Multiple samples should be collected because some drugs, once present in the system, may be altered by the body’s natural processes or redistributed after death, resulting in an inaccurate result. Thorough specimen collection is possible in examinations mandated by law, but hospital autopsies are authorized by the permission of the decedent's next-of-kin.

Blood is obtained from a peripheral vessel for toxicologic analysis, as the concentration of compounds in blood from the heart may be altered after death by redistribution of blood from the lungs or liver. Sources claim that blood from a femoral or iliac vein is least susceptible to contamination from the liver when the vein is first obstructed by a tie or clamp, but others report that ligation (closing) of the vein has no significant effect on the blood sample. The worst mistake, of course, is to have no sample at all.

When available, urine or ocular (eye) fluid should be obtained from every autopsy because they are ideally suited for rapid screening assays. Vitreous fluid can be screened for drugs and ethanol as can cerebrospinal fluid and bile. Depending on the case, vitreous fluid may be stored in a red-top tube (if analysis for electrolytes is being considered) or a gray-top tube (if drug screening may be performed). The tube top color corresponds to the type of test being conducted on the sample. Many medical examiner offices also routinely retain liver, brain, bile, and gastric contents for toxicologic analysis if needed. Splenic tissue and skeletal muscle may be used in decomposed bodies as well.

Subdural hematomas (a collection of blood on the surface of the brain) should be sampled if present. They may contain drugs or alcohols that have since been metabolized in the peripheral blood.

If an individual was evaluated at a hospital before death, then they likely had blood drawn for tests. This perimortem blood is a precious, irreplaceable resource for toxicologic analysis and should be routinely obtained as part of the death investigation. Blood obtained at the hospital would not be subject to postmortem redistribution the way that blood obtained at autopsy is. Hospital pathology laboratories hold blood only for several days, so requesting that the laboratory hold the sample as soon as investigation of the death begins is important. A sample of blood may be retained in the blood bank longer than elsewhere in the laboratory.

The brain can be especially useful for toxicologic analysis because this organ is lightly affected by postmortem redistribution of drugs. Furthermore, the brain, which is fatty and sequestered both by its anatomic location and by the blood-brain barrier, can harbor a drug longer than other body systems. Thus, the brain might be the only positive source for cocaine in a case in which a pathologist suspects the abuse of a drug in a young person, who has died from a hypertensive bleed in the basal ganglia (hair analysis can also be used in the same sort of way as brain analysis). The brain can also be used for molecular analysis in cases of excited delirium (a condition that manifests as a combination of delirium, psychomotor agitation, anxiety, hallucinations, speech disturbances, disorientation, violent and bizarre behavior, insensitivity to pain, elevated body temperature and superhuman strength).

What conclusions can be drawn from this piece of evidence?

The victim, Aaron Lee, tested positive for the opioid oxycodone at 1150 ng/mL. The safe therapeutic range for oxycodone is 10-100 ng/mL. Due to the excess level of opioids present, the victim had to have been passed out when he was killed. Also, because the levels are far beyond the clinically safe amount, it is safe to assume that the victim was purposefully drugged.

What questions, if any, are raised by this piece of evidence?

Did the son or the wife drug Aaron Lee? What were their motives?