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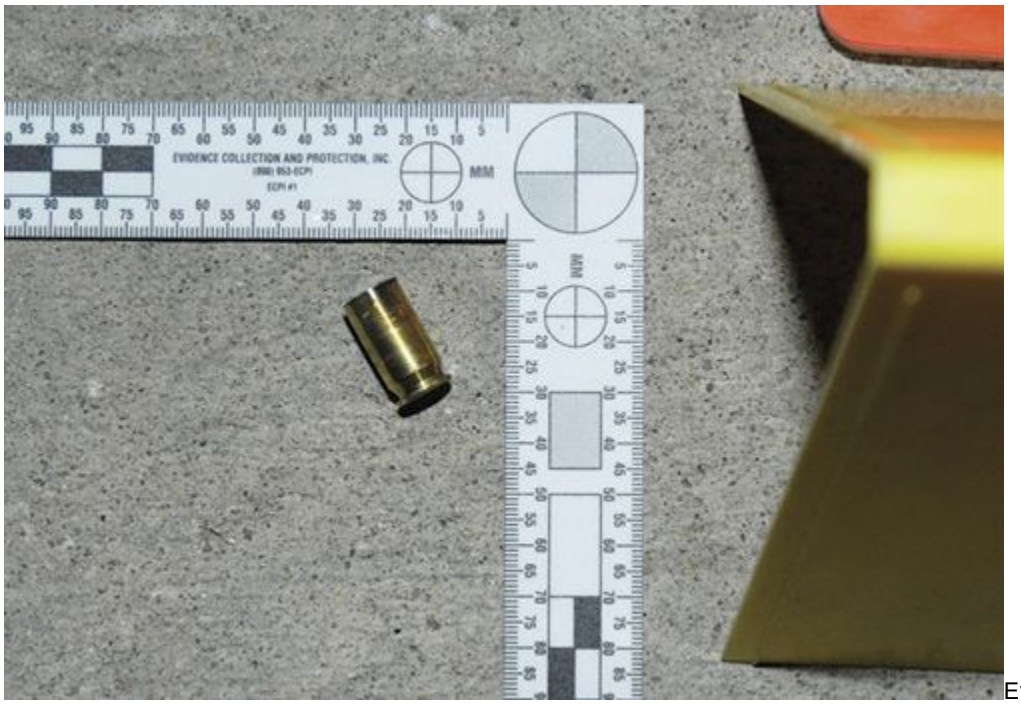
Firearms Forensics

Ballistic evidence can help solve a homicide case, even if you never find the murder weapon.

by David Spraggs



Evidence from the bullet casings found at a 2006 murder crime scene in boulder, Colo., were instrumental in convicting the killer.

In January 2009 residents of an upscale Boulder, Colo., neighborhood heard three loud explosions shattering the otherwise still, quiet night. A few of the residents looked out their windows and saw a light-colored sedan speeding away from the area. A few seconds later an unsuspecting passerby found a grisly scene. Officers and detectives responded and quickly discovered the victim had been shot three times at close range with a 12-gauge shotgun.

Three spent shell casings were scattered near the victim's bloody body. Crime scene reconstruction would later show that the first two shots, both striking the victim's chest, were most likely delivered as

the victim was still seated in the car. One of these shots was fatal; the other wasn't. The victim was dragged out of the car until he was lying on his back on the cold, icy street. As the shotgun muzzle was placed between the victim's eyes, the suspect pulled the trigger for the third and final time.

Joseph Carlos Abeyta was arrested a few days later. He was charged with, and later found guilty of, the first-degree murder of his one-time friend William D. Andrews. In the days and weeks and months following the shooting, Boulder PD detectives like myself continued to search for the murder weapon. By this time we knew we were looking for a sawed-off, pump-action 12-gauge shotgun with a pistol grip. We never found the shotgun used in the murder.

I was reflecting on this fact as I sat as advisory witness through Abeyta's three-week murder trial. I realized that even without the murder weapon, the prosecution still had an immense amount of significant ballistic physical evidence linking Abeyta to the murder. And thanks to good forensic work and the invaluable NIBIN database that tracks images of ballistics evidence, it was enough to convict him.

Closing the Case

Colorado Bureau of Investigation Laboratory Agent Dale Higashi testified that all three spent 12-gauge shells found at the scene of Andrews' murder had been fired from the same weapon. Higashi also testified that a fired 12-gauge shell recovered from another location was fired from the same weapon as the three shells that killed William Andrews. This is significant because eye witness testimony puts the shotgun in Abeyta's hands about an hour before the murder. Abeyta illegally discharged the shotgun at this location, leaving behind the fired casing that was later recovered by police.

To aid the criminalists completing the crime scene reconstruction, Higashi test fired the same kind of ammunition from shotgun barrels of different lengths. His tests provided useful information regarding the approximate distances between the victim and the shotgun muzzle at the time the shots were fired.

The ballistic data from this firearm was also entered into a federal ballistics database called NIBIN, the National Integrated Ballistic Information Network. If the rifle had been used in another crime, this would be the way to find out. And although we didn't get a match in this case, adding information that could help future cases in any jurisdiction is helpful.

Working with Higashi on this case got me thinking about what most cops know (or maybe don't know) about firearms and ballistics examinations. Hopefully this article can shed some more light on firearms examinations and NIBIN-both important parts of any criminal investigation involving firearms.

What Firearms Examiners Can Do

Higashi spent 18 ye ars as a firearms examiner with the Los Angeles County Sheriff's Office before he joined the Colorado Bureau of Investigation five years ago. In his more than 20-year career he has worked thousands of cases. Higashi would tell you that he is a tool mark examiner. The firearm is the tool, leaving its mark on the fired bullet and the spent cartridge casing.

When a law enforcement agency submits evidence, Higashi will examine the firearm itself, any projectile fired from a gun, and any recovered fired cartridge casing. He'll then examine the expended ammunition to determine the caliber of the fired object.

Firearms examiners like Higashi can provide a list of possible firearms that may have fired the projectile. This is based on the barrel's twist rate and whether the barrels' lands and grooves twist to the left or to the right. Of course, this only works with projectiles fired from rifled barrels.

The fact that the lab can supply a list of manufacturers whose barrels match the twist rate and direction of the fired projectile is significant. In cases where the gun isn't immediately recovered, investigators can limit their search to only certain firearm brands.

Firearms examiners can determine whether the submitted firearm is the source of the expended ammunition. They can also determine how many guns were responsible for firing all of the expended ammunition and whether recovered shell casings were fired from the same gun. The laboratory's tests are non-destructive, so the marks on the fired bullets and cartridge cases will remain for an indefinite period of time. This is significant in cold cases, or cases that might not be prosecuted for many years.

Most firearms examiners can "function test" firearms to determine whether the firearm functions properly or has been modified. They can also test fire weapons to determine expended cartridge casing trajectories to aid with scene reconstruction. Investigators can speak with their local firearms examiners to request any special testing or analysis that may be available to assist with a current investigation.

Note that firearms examiners can't say who fired the gun or when the gun was fired. With the advent of trace DNA, hopefully most agencies are taking the proper steps to preserve any trace biological evidence on the firearm at the time it's collected.

What You Can Do

As is true in so many cases, the first responding patrol officer has the ability to ensure that any firearm evidence is identified, preserved, and (depending on your agency) collected properly. The best rule of thumb is always: first, do no harm.

As previously stated, DNA can be obtained from the trigger, grip frame, or any other part of the firearm that's handled. This DNA may consist of minute amounts of epithelial or skin cells. That's why it's so important to protect the gun from the elements as well as excessive handling.

Higashi prefers to receive firearms that don't have anything inserted directly into the gun's barrel. It's important to submit the gun to the laboratory in a safe condition, but nothing needs to be directly inserted in the barrel to ensure that the weapon is functionally safe.

Because cartridge casings can retain fingerprints as well as the tool marks from the gun, it's best to package these carefully so the casing can't roll around. Also package each shell casing separately.

Fired projectiles are particularly delicate. The striations of the barrel are preserved in the lead or copper jacket of the fired bullet. Fired bullets must be packaged in a manner that won't damage these impressions. I prefer small cardboard boxes with soft cotton or paper lining the box. As with cartridge casings, package each fired projectile separately, in its own packaging. This is especially important in preserving the markings that can be entered and matched in the NIBIN database.

NIBIN Database

Once the evidence is collected and submitted to the crime laboratory, the firearms examiner can take digital images of the markings made on spent ammunition or from test firing the gun and enter them into a national database called NIBIN, the National Integrated Ballistics Information Network.

NIBIN was created in 1999 and is administered by the Bureau of Alcohol, Tobacco, Firearms and Explosives. It's a database that stores images of the breechface impressions found on the primers of fired cartridge cases. NIBIN also stores images of the scanned circumference of fired bullets.

What makes this database so useful is that when an image is entered it is automatically compared against other images in the database. Possible matches are then visually confirmed by technicians to determine whether each is a valid match or not. NIBIN allows agencies to link crimes that otherwise would potentially never be linked to one another.

According to an April 2009 factsheet found on the NIBIN Website, the NIBIN database has more than 1.5 million acquisitions and there have been more than 28,000 hits. The New York City Police Department leads the way with more than 2,100 hits alone. No doubt many more have occurred since then.

Success Stories

Hits, or matches, don't necessarily solve crimes or put criminals behind bars, but they certainly can. Dozens of success stories appear on www.nibin.gov:

In September 2005, the Charlotte Mecklenburg (N.C.) Police Department responded to four shootings, including a homicide where gunfire from outside an apartment struck the occupant and an armed robbery where a newspaper deliveryman was carjacked and shot. Using NIBIN, Charlotte Mecklenburg PD was able to link all of the shootings.

In October 2005, officers recovered the stolen vehicle and, using DNA, were later able to identify a suspect. In January 2006, detectives executed a search warrant at the suspect's residence, recovered a 9mm pistol, and arrested the suspect. Ballistics examination results matched the pistol to all four shootings.

In October 2007, following admissions related to the homicide and armed carjacking, the suspect pleaded guilty to second-degree murder and was sentenced to 20 years imprisonment. In January 2008, following arrest and conviction, the second suspect from the armed carjacking was sentenced to 11 years in prison.

In 2008 the Denver (Colo.) Police Department used NIBIN to link evidence recovered at an aggravated assault to an arrest of a gang member discharging a firearm.

Officers from the Aurora (Colo.) Police Department responded to a report of a drive-by shooting. When the officers arrived, they discovered that an unknown suspect had fired numerous rounds at the occupants of a residence and a vehicle in the driveway. The officers were able to locate the suspect vehicle and the four suspects inside. No firearm was recovered, but further investigation led officers to believe that the firearm was hidden at a friend's apartment. Eleven shell casings were recovered at the scene and submitted for entry into NIBIN.

Several months later, Denver police officers arrested a suspect for discharging a firearm. The firearm was test fired, entered into the NIBIN system in Denver, and found to match the ballistic evidence recovered during the aggravated assault that occurred in Aurora.

These success stories show the value in firearms examinations and the NIBIN database. Many agencies, including the Denver Police Department and the Los Angeles Police Department, mandate that every applicable case be entered into NIBIN and every recovered gun go through the NIBIN database. Both of these agencies have had exceptional results in linking and solving crimes.

Of course, the database is only as good as the data entry. If law enforcement agencies aren't submitting cases for entry, then the database won't be as effective as it should be. More submissions mean more hits. More hits mean more arrests. More arrests mean more convictions... Well, you get the idea.

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