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MYSTERY MATTERS

The Tell-Tale Bullet

by Maria A. Sedotti

By the time the county police arrived at the video store, Thomas B., the clerk, was in shock and unable to speak. An ambulance rushed Tom to the hospital but he was pronounced dead from a bullet wound at 4:05 P.M., Thursday, October 20, 1983, just 90 minutes after the attempted robbery. A witness had seen a 1976 Cadillac speed away from the store, noticed that the car was dented and that its paint was faded blue, but couldn't read the license plate number.

While searching the video store for evidence, the police saw a rectangular hole in one of the ceiling tiles. They removed the tile and found a bullet lodged sideways in the plaster above. They took the bullet, the ceiling tile, and samples of blood from the wall behind the sales counter to the forensic lab for testing.

At the County Forensic Science Laboratory in Valhalla, New York, Fred Drummond and his staff of forensic specialists examined the bullet and found that it contained small amounts of human blood and tissue. Further tests identified the enzyme *phosphoglucomutase*, which is found within red blood cells. Phosphoglucomutase can be used as a genetic marker because the composition of this protein differs from person to person. Other tests revealed that the body tissue recovered was human and had a high melanin content. Melanin, a pigment that may appear black, brown, or yellow, determines skin color. The amount of melanin present was characteristic of black skin. Some fibers were also recovered from the bullet. They were similar to the material found in blue jeans. A bullet usually enters an object point-first and leaves a round hole. The rectangular hole indicated that the bullet had struck the ceiling sideways, probably because it had been deflected from its original path.

The forensic specialists suspected that the bullet had passed through a body before entering the ceiling.

Neither the tissue nor the blood enzyme matched samples taken from Tom's body, so the police concluded that, in addition to Tom, one of the robbers had also been shot. The police set out to find the person who was in the path of the bullet. If they could find a suspect, they could compare his phosphoglucomutase with that on the bullet.

Two days later, police in nearby Brentwood, New York, discovered an abandoned car that had been set on fire. The car fit the description of the getaway vehicle from the video store murder. The police traced the car to the owner and learned that it had been stolen on the day of the crime. The police began interviewing people in the area and uncovered a suspect. When they questioned him at his home, the officers noticed that he appeared ill and had a bulky garment wrapped around his buttocks. In the corner of the room, folded over the back of a chair, lay a bloody pair of jeans. Since the suspect would not answer any questions concerning the bloody jeans, the police took the pants to the forensic laboratory.

The forensic experts observed that the jeans had a rip in the seat area, which was surrounded by a large amount of dried blood, and an L-shaped stain on the right cuff. The L mark resembled the pattern that a gun leaves on another object if it is fired while the side of the gun is in contact with the object. When the blood on the jeans was tested, the phosphoglucomutase matched that on the bullet. The blue fibers recovered from the bullet matched the jeans material, and the human tissue analyzed from the bullet matched the suspect.

Bullets and gunpowder

A chemical test for gunpowder was performed, and the results confirmed that the L-shaped stain contained gunpowder (see box *The gunpowder test*). Using the shape of the stain as a guide, Fred Drummond reconstructed the probable chain of events during the robbery:

"We have photographs of his slacks with a sample revolver in the orientation the revolver would have to be to place that kind of gunshot residue on the cuff. The L-shaped residue indicated to us that during the struggle the weapon was dropped on the floor in back of the right heel of the first suspect. The gun hit the ground, probably the handle or butt first. The hammer was cocked, and the impact jarred the hammer down, discharging the firearm. And it just happened to be pointing up towards the ceiling. It tore into the fellow's rear end...right through up to the ceiling."

When the police went back to the suspect's home and confronted him with the evidence, he confessed to the crime and implicated two accomplices. All three were arrested, prosecuted, and given sentences that varied from 15 years to life in prison for the murder of Thomas B.

SIDE BAR

The gunpowder test

Because the gunpowder in handgun cartridges does not burn completely, gunpowder residue is identified by testing for nitrites, one of the components of gunpowder. The Griess test is a color test for nitrites that uses a solution of sulfanilic acid, α -naphthylamine, and acetic acid. When a sample of the suspected gunpowder is mixed with this reagent, the nitrite (represented above by nitrous acid, HNO_2) adds to the sulfanilic acid to form a diazonium compound that reacts with the α -naphthylamine to form a red azo dye. The brightness of the red color is a rough indication of the quantity of nitrites present.

CAPTION

When a revolver is fired, particles of unburned gunpowder are ejected forward from the muzzle and sideward from the gap between the cylinder and the barrel. If the side of the gun is in contact with an article of clothing, powder residue is deposited in two lines that are at right angles like the legs of the letter L.

BIOGRAPHY

Maria A. Sedotti is a Ph.D. candidate in science education at the University of Connecticut and specializes in adapting forensic science to the school curriculum. Fred Drummond is a forensic research scientist at the Westchester County Forensic Science Laboratory in Valhalla, NY. The author extends special thanks to Barry Wilson for technical assistance.

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