



Criminalistics Section – 2011

A185 Bullets as Trace Evidence

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The goal of this presentation will be to discuss issues concerning shooting reconstructions. More specifically, attendees of this presentation will learn how recovered bullets from crime scenes as well as from victims may provide significant information, beyond “traditional” firearm examination, for the reconstruction of an event.

This presentation will impact the forensic science community by providing a broad perspective concerning the value of bullet evidence in shooting scene reconstructions. This presentation has important implications for trace evidence and firearm examiners as well as those specializing in crime scene reconstruction.

The complex nature of shooting incidents may generate a variety of firearm-related evidence, such as the firearm itself, cycled or discharged ammunition components, gunshot residue, trace evidence embedded in/transferred to a bullet, or impact sites with traces of the bullet’s prior location. Firearm-related evidence is traditionally viewed as the comparison of ammunition to other ammunition (bullet to bullet or case to case) or ammunition to a firearm. However, another area of firearm evidence is trace evidence on bullets and the interpretation of the condition of the recovered bullet itself (deformed, flattened, expanded, broken, destabilized prior or subsequent to impact, etc.). Whether considered firearm or trace evidence, this information, to be most beneficial, must be integrated with the scene reconstruction.

When a shooting incident takes place and firearm evidence is recovered, whether in the form of cartridge casings or bullets, it is likely

that an examination of these ammunition components will be undertaken using the well-established methods of comparison microscopy. There are occasions; however, when the question of which firearm was involved or which bullet came from what firearm is not in dispute, but instead questions arise about the specific path of a bullet, the relative positions of the shooter and the victim, or the sequence of the shots that were fired. Information that can shed light onto these types of questions may be gleaned from detailed non-routine microscopical examination of the bullet.

Pulling the trigger of a firearm initiates a series of events that culminates with the discharge of a bullet with considerable energy. The bullet may not only impact its intended target but it may perforate or be deflected by an intermediate object(s) on its way to the target, or it may pass completely through the intended target and retain sufficient energy to continue downrange and impact another object.

These types of interactions invariably impart information about the event onto the bullet, in effect serving as a tape-recorder, documenting prior substrate interactions and thus may provide spatial-chronological information. If information from these secondary impacts is recognized, examined, and interpreted in the context of the case, it may provide extremely valuable data for developing more accurate shooting scene reconstructions.

This presentation will discuss the transfer of material from the substrate to the bullet and the overall change to the bullet morphology due to the physical properties of the substrate materials, as well as the angle of incidence of the bullet to the substrate.

This project investigated predominantly 9 mm full-metal jacketed and jacketed hollow point ammunition with a variety of common substrate materials. Bullet-substrate interactions were documented using high-speed photography to capture the bullet impact and deceleration dynamics. After recovery, the bullets were examined microscopically for trace evidence transferred from the substrates and for morphological changes to the bullet surface or the overall shape. The results of these experiments will be discussed in detail.

The presentation will conclude with a case study of a 1979 capital- offense appeal, where assessing and correctly interpreting bullet damage was absolutely critical to the accurate shooting reconstruction. The identity of the shooter was not disputed; however, the nature of the shooting act was the primary contended issue. The information learned from the detailed examination of the bullet and bullet fragments recovered from the shooting scene provided sufficient evidence to offer opinions about the series of events that led up to the fatal shot.

Shooting Reconstruction, Trace Evidence, Microscopy