Ballistics

Chapter 15

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What is ballistics?

- Ballistics is the study of projectiles. In forensics this usually means knowledge on the use of firearms and knowledge of how bullets or other fragments are 'projected' around a crime scene.
- Ballistics is also used when determining where a bomb was located, after an explosion.

What is Forensic Ballistics?

Forensic ballistics is the scientific analysis or interpretation of all ballistic related evidence with the purpose of interpreting and establishing the facts in a shooting related crime

Related evidence includes

(a) firearms or guns
(b) bullets
(c) cartridge cases

v is it useful to C

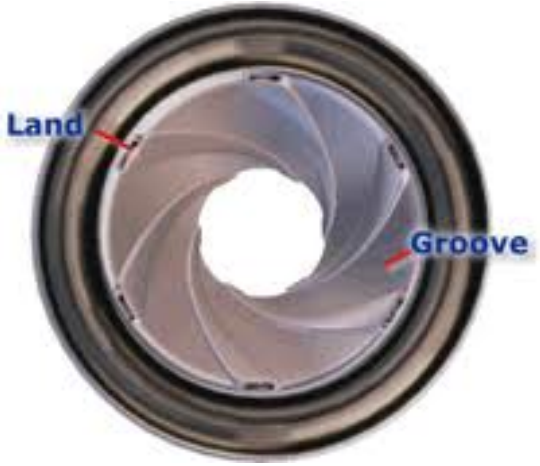
- To a forensic officer, a bullet retrieved from a crime scene holds a lot of information .
- The caliber (diameter) of the bullet is useful because it tells you what type of gun fired the bullet.
- There is also information left on the bullet and the bullet case.

Bullets

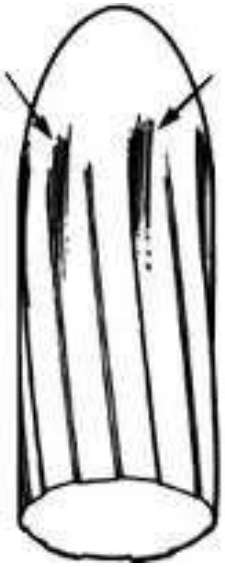
- Bullets come in variety of different **calibers**. The caliber indicates the **diameter of the bullet**. Some common calibers include:

.22
.25
.357
.38
.44
.45

- For example, you have probably heard of a ".22 caliber rifle." In all of these cases, the caliber number indicates the diameter of the bullet in **inches**. So a .25 caliber bullet is a quarter of an inch in diameter.
- Words like "Magnum" and "Special" imply that a higher-energy powder is used with the bullet.
- The gauge of shotgun shells and says that the gauge numbers for a shotgun (12 gauge, 14 gauge, etc.) are "the numbers of lead balls -- of diameters equal to the inside diameter of the gun -- that are required to total up to a pound of lead."



Rifling marks



- The barrel of a gun contains spiral ribs called *lands* which cause a bullet to spin as it leaves the barrel of a gun.
- The lands produce indentations, called rifling marks, on the bullet as it leaves the barrel.
- Rifling marks are unique to each gun. Even the same model gun will not produce exactly the same rifling marks.
- It is therefore relatively easy to match a bullet to a particular gun - and hopefully to the person who fired it. This is very useful in solving crimes involving firearms.

- http://resources.education.tas.gov.au/item/edres/0b134aae-ed04-458d-8757-cf08e96c3815/2/Ballistics.zip/ballistics_rifling.html

How are samples collected?

- A bullet collected from a crime scene is called an *unknown sample*. The caliber of the bullet and the marks present will identify the type of firearm the bullet was fired from.
- During their enquiries the police may come across a firearm of that type and want to know if the *unknown sample* was fired from that particular weapon. To check this, the police will:
- Load the firearm with a similar bullet (same make and caliber) then fire it into a recovery tank.
- Recover the bullet and compare its rifling marks with the *unknown sample*.
- Discuss why the sample bullet is fired into a water tank.
- http://www.nij.gov/training/firearms-training/embed_swf.htm?link=images/videos.swf&flvLink=module07/images/fir_m07_t13_04.2.flv&slides=0

How are samples analyzed?

- Used or 'spent' bullets may be found at a crime scene. They may be lodged in walls, trees, plants and of course, in bodies. These bullets must be collected without scratching or damaging them, and stored for later examination and comparison.
- Photographs of the precise position in which they were found can be used to help determine the trajectory (path) of each bullet.
- Ballistics is not just about bullets but includes any projectiles and fragments. This photograph shows where a bomb has exploded in the corner of a room, causing fragments to scatter across the room. The colored tape has been used to show the paths of the fragments. The path of bullets at a crime scene is recorded in a similar manner.

Comparison microscope

- The *comparison microscope* is an essential scientific tool for forensics.
- It consists of two high-quality microscopes connected together. The microscopes are optical (the operator can look through them) as well as being connected to two high resolution video cameras.
- The video from each microscope is mixed together and fed to a TV monitor for easy display. The signal can also be fed to a high quality colour printer to produce colour prints to be handed to a jury.
- The officer in this case has placed two spent cartridge cases under the microscope and is viewing the ends of the cases.
- The screen is displaying a magnified image of the end of each cartridge where the rifle's *firing pin* struck. The marks left by the firing pin will show whether the two cartridges were fired by the same gun.

Comparison Microscope Images

- This image shows a comparison between two bullets from the gun of the infamous killer, Ivan Milat.
- The picture on the left is made up of two separate images - you can see the vertical line down the middle.
- The left hand portion of the image is an enlargement of an actual bullet fired by Ivan Milat and recovered by police from the scene of the murders.
- The right hand portion of the image is an enlargement of a bullet test-fired by a police forensic officer using one of the guns found hidden at Milat's house.
- The scratch marks and indentations caused by the rifling marks as the bullet passed up the barrel of the gun can be seen quite clearly.
- The fact that they coincide can also be clearly seen, providing forensic proof of Milat's guilt.