

## Firearm Examination

### What is Firearm Examination?

Firearms examiners study the markings on fired bullets. Using comparison microscopes, they compare two bullets simultaneously. Each time a gun is fired, the barrel rifling leaves markings on the bullet. These marks are unique to the barrel that made them. Rifling patterns are ideal for matching fired bullets to a specific firearm.

Firearms examination is part of the larger field of forensic ballistics. Forensic ballistics also includes trajectory analysis, firearm serial number restoration, and gunshot residue testing.

### Dr. Calvin Goddard and Firearm Examination

In 1925, Dr. Calvin Goddard co-founded the Bureau of Forensic Ballistics in New York. Forensic science was a new and growing field. Law enforcement agencies did not have specialized crime labs, so Goddard and his team worked on cases from around the country.

The lab maintained a catalog of the rifling patterns on American- and European-made guns. Evidentiary bullets (or bullets collected at the scene of a crime as evidence) were compared with ones that Goddard and his team test-fired into wastebaskets filled with cotton.

Dr. Goddard and chemist Philip Gravelle created a specialized comparison microscope to analyze two bullets simultaneously.



*Joseph Wilimovsky and Dr. Calvin Goddard using a comparison microscope.*

### How are Bullets Identified?

When firearms are manufactured, spiral groove patterns known as rifling are produced inside the barrel. These grooves exert torque and create a spin that helps stabilize the trajectory of a bullet. Rifling creates markings on bullets as they pass through the barrel. These marks are called **lands** and **grooves**. Rifling helps to identify which gun fired the bullets used in a crime.

Evidentiary bullets are analyzed side by side with other unknown or known samples. The type, number, size, and direction of grooves can help narrow down the search for the firearm used in the crime.

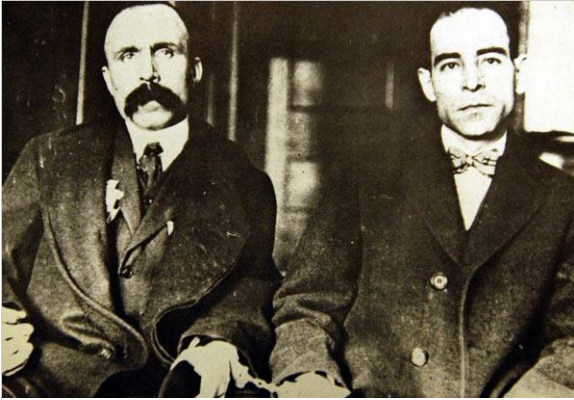


*Bullet used in the St. Valentine's Day Massacre showing lands and grooves from rifling.*

### Reading Review

1. What is firearm examination and how is it used?
2. What is the significance of the comparison microscope?  
Why would it be so helpful in the field of firearm examination?
3. When examining bullets, what are firearm analysts looking for?

## Case study: The Sacco and Vanzetti Trial



*Nicola Sacco and Bartolomeo Vanzetti.*

On April 15, 1920, a guard and paymaster at the Slater and Morrill Shoe Company in Braintree, Massachusetts were murdered. Nicola Sacco and Bartolomeo Vanzetti, two Italian immigrants and anarchists, were convicted of the murder. The controversial trial was considered by many to be botched. Both the jury and the prosecution were accused of racism and xenophobia.

At the murder trial, Dr. Calvin Goddard introduced many people in the public to the science of firearm identification. Goddard compared bullets fired from Sacco's revolver with bullets found at the crime scene. He confirmed that one of the bullets had been fired from Sacco's gun, but firearm experts hired by the

defense disagreed with Goddard's testimony. The men were convicted, but the verdict was tainted with accusations of anti-immigrant and anti-political dissenter prejudice.

Because of the controversy, Goddard's findings have been retested twice. Each time his results were confirmed—proving his expertise and contributions to the field.

## Case study: The St. Valentine's Day Massacre Investigation

Explore [The Mob Museum's St. Valentine's Day Massacre microsite](#) to answer the following questions about investigating the massacre.

1. Who financed the private lab that Dr. Goddard used to investigate the massacre. Why did they do this?
2. What is the name of the hitman whose Thompson submachine guns were used in the massacre?
3. Was anyone convicted for the murders of the seven men killed in the massacre?



National Museum of Organized Crime & Law Enforcement®

## ANSWERS

1. What is firearm examination and how is it used?

Firearm examination is the forensic science field responsible for comparing the rifling marks on bullets. These marks are ideal for matching fired bullets to a specific firearm.

2. What is the significance of the comparison microscope? Why would it be so helpful in the field of firearm examination?

Comparison microscopes allow users to analyze two bullets simultaneously, which improves accuracy in presumed matches.

3. When examining bullets, what are firearm analysts looking for?

The type, number, size, and direction of grooves and lands on a bullet.

1. Who financed the private lab that Dr. Goddard used to investigate the massacre. Why did they do this?

Chicago business leaders on the coroner's jury decided to finance the establishment of a private crime laboratory in Chicago. It was established as a private crime lab to keep it at arm's length from the Chicago Police Department, which was rife with corruption at that time.

2. What is the name of the hitman whose Thompson submachine guns were used in the massacre?

Fred "Killer" Burke.

3. Was anyone convicted for the murders of the seven men killed in the massacre?

No.

