# PRELIMINARY EXPERIMENTAL INVESTIGATIONS REGARDING THE SPECIFICITY OF THE FIRING PIN IMPRINT

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**Abstract:** *The identification of firearms is currently done by studying traces left on the bullet or the case, found during onsite investigations. In the case of shotguns, as the trace carrying projectile is missing, weapon identification can only be done by studying traces left on the shell. Unlike traces left on the bullet, those left on pellet cartridges, can at present only lead to weapon identification if the rifle is found immediately after the event and the obtained comparison model allows the identification of characteristics similar to those of the found shell.*

*This paper presents preliminary experimental investigations conducted in order to find particularities of the imprint left on the primer cup by the firing pin. To that purpose, the surface microtopography of the primer cup was mapped by aid of a laser profilometer, and various particularities are highlighted.*

***Keywords****: firearm, expertise, firing pin, imprint, laser profilometry*

## 1. Introduction

Expert investigation in its various forms can be traced back to antiquity, mostly in the field of medicine. The first information on expert reports are found at the Babylonians, in the Hammurabi Code, [1], and at the Egyptians, in Menos's laws.

In Europe, in the Greek civilization, the physician also had the role of a municipal official, who participated in the performance of the act of justice. In the Roman laws known as "*leges regiae*", it was stipulated that in case of crimes, the bodies of the victims were to be studied by physicians and their role was even more important than that of witnesses.

The pioneers of expert evaluations were the Romans, as they developed the expertise of written documents.

As far as ballistics expertise is concerned, [2], the first historic record on the identification of a firearm by traces left on the bullet dates from 1835. It was then that the London police department first recorded the use of such information in identification of a murderer.

Although it might seem strange, the coroners were the ones who first made advancements in ballistic research, and not criminologists. The idea of using traces left on the projectile for weapon identification belonged to medicine professor Alexandre Lacassagne, who, after conducting an autopsy, found seven longitudinal stripes on the bullet. He then compared those stripes to the rifling found inside the barrel of the suspect weapon.

The comparison model, used at present in forensics was discovered in 1898 by the judicial chemist, Paul Jeserich.

The year 1935 was a landmark in the passage to modern judicial ballistics. It was then that Phillip O. Gravelle invented the comparison microscope, which allowed to simultaneously visualizing on the same image, two different bullets, [3].

These first findings make the United States of America the birthplace of judicial ballistics.