

THE IMPORTANCE OF BALLISTICS EXPERTISE IN IDENTIFYING THE WEAPON USED FOR COMMITTING A MURDER THROUGH SHOOTING

A.-G. POPA

Anamaria-Georgeta Popa

MA, Applied criminal researches

Alexandru Ioan Cuza Police Academy, Bucharest, Romania

*Correspondence: Anamaria-Georgeta Popa, Alexandru Ioan Cuza Police Academy, Privighetorilor Alley, No. 1-3, Sector 1, Bucharest, Romania

Abstract

As the number of crimes committed using firearms, a new branch made room within the art of forensic ballistics. It is a relatively young branch of forensic engineering, which must keep up with the development of general ballistics and the development of military technology in the construction of portable firearms and ammunition used for them.

Key words: ballistics, forensic ballistics, weapons

Introduction:

As the first weapons were not safe, their loading lasted a long and sometimes exploded unexpectedly, it has been attempted since ancient times perfecting the weapons, creating new and more effective weapons.

“Judicial Ballistics is a branch of forensic techniques studying the construction and operation of firearms, shooting and traces related phenomena determined by them in order to achieve the issues raised by the prosecution”¹.

Article 1 of Law 295/2004 highlights the provisions of categories of weapons and ammunition, and also the conditions under which it is permitted, throughout the country, the holding, carrying and use in different situations of weapons and ammunition. However, paragraph 2 of Article 1 of Law 295/2004 records that it is not applying to operations with arms and ammunition, transactions by public institutions dealing with national defense, national security and the public order².

The legislator, under Article 2 defined as firearm “any portable barreled weapon that can throw, is designed to throw or may be converted to throw shot, bullet or projectile by the action of a combustible propellant”³.

Since firearms are increasingly being used in offenses it is required a distinct field of forensic technique called ballistic court. This field of judicial ballistics became independently in the decade of our 20th century, developing and perfecting of some own methods of examination, particularly after traces formed on identifying weapons and projectile tube.

According to the specialty literature⁴, general ballistics is divided in 3 parts: interior ballistics, exterior ballistics, target ballistics.

The interior ballistics is studying the phenomenon that occurs inside the pipe after percussion. Exterior ballistics is examining the phenomena occurring when the bullet leaves the muzzle end, the trajectory it has when reaching the target.

¹ V. Măcelaru, *Balistica judiciară*, Ministerului de Interne Publishing House, Bucharest, 1972, p. 8;

² Articolul 1 din Legea nr. 295/2004 privind regimul armelor și munițiilor, modificată și completată pin Legea nr. 117/2011, http://www.clr.ro/rep_htm/L295_2004_Rep1.htm;

³ Articolul 2 din Legea nr. 295/2004 privind regimul armelor și munițiilor, modificată și completată pin Legea nr. 117/2011, http://www.clr.ro/rep_htm/L295_2004_Rep1.htm;

⁴ V. Măcelaru, op. cit., p. 7-8;

The target ballistics is to research the phenomena that occur when touching the target by bullet or projectile.

The parts of a firearm are the barrel, closing mechanism, firing mechanism (percussion) and removal of the tube pulled the bed or butt of the weapon and the sighting system.

In terms of forensic examination, the particular interest is on the barrel and the firing mechanism, due to the value that shows the identification process⁵.

The one that provides the direction and the trajectory is the barrel, which consists of the chamber or detonation chamber, forcing the cone or the connection that ensures the bullet penetration in the last area of the pipe and the rifle barrel area⁶.

The rotation of the bullet is given by the rifling of the barrel channel. The rifling is some fullness and emptiness parallel twisted to the right or left and the number, width, direction and angle of twist varies from weapon to weapon and they are printed on the surface of the bullet determining the type of weapon that was fired with.

An important feature of the gun barrel is the caliber. It is the millimeter distance between two full tanks in opposite positions. In America, it is measured the distance between two opposite rifling and two opposite full tanks and then the average is done⁷. In case we have a smooth-bore weapon, the caliber is an abstract number and inversely proportional to the diameter of the pipe⁸.

The ensemble closing mechanisms, fired percussion and removal of the tube is used in the identification process since the engineering and machining component parts come into direct contact with the cartridge.

The firing mechanism is mainly made of trigger, arch recovery and to whom striker. The traces of top bolt on the bottom of the tube cartridge are used to identify gender and individual weapon.

The mechanism of flinging tubes ensures the extraction of cartridge in the chamber, and it consists of a claw extractor and a threshold pitcher. After the burning explosive charge, when the switch makes the race back, the claw extractor catches the tube upstand rosette out of its chamber. Because of this blow on the collar tube is formed the threshold, after that it appears on the opposite side produced by the paw extractor⁹.

The ammunition feed mechanism (charger) differs from one type of weapon to another, as this is with rehearsal, semiautomatic or automatic.

On the bed or handle are imprinted the digital prints of the person who pulls the trigger and is designed to ease the use of weapons.

The ammunitions of the hand weapons are known as cartridges and are distinguished by the channel characteristics for the intended trace pipe and their caliber¹⁰.

The parts of the cartridge for the rifled barrel weapons are: bullet, powder, tube and staple. The bullets can be made of a core of steel, steel coated with lead or lead and a metal jacket. A simple examination of the general characteristics of one bullet can determine the type of weapon used.

⁵ C. Suciu, *Criminalistica*,. Didactică și pedagogică Publishing House, Bucharest, 1972, p. 337-339; V. Măcelaru, *op. cit.*, p. 36-38; V. Manea, C-tin. Dumitrescu, *Curs de tehnică criminalistică*, vol. II, Școala de ofițeri a Ministerului de Interne Publishing House, Bucharest, 1983, p. 41-43.

⁶ E. Stancu, *Tratat de criminalistică*, Ediția a V-a, revăzută și adăugită, Universul Juridic Publishing House, Bucharest, 2010, p. 262.

⁷ V. Iftenie, *Medicină legală*, ediție revăzută și adăugită, Științelor medicale Publishing House, Bucharest 2006, p. 83.

⁸ V. Măcelaru, *op. cit.*, p. 20.

⁹ Idem, p. 151.

¹⁰ I. Mircea, *Criminalistică*, Ed. Lumina Lex, București, p. 168.

THE IMPORTANCE OF BALLISTICS EXPERTISE IN IDENTIFYING THE WEAPON USED FOR COMMITTING A MURDER THROUGH SHOOTING

To obtain the aimed purpose, the bullet must have more weight compared to its volume, and to reduce gas losses, the bullet is manufactured with 0,33 mm higher than the caliber pipe.

The tube is the second part of the cartridge and its role is to unite all its parts and to shed flammable material and explosives. The tubes of the cartridges for rifled barrel weapons is cylindrical, with open ended, in which it is fixed the bullet and another one closed, called rosette¹¹.

The capsule forms the third part of the cartridge and it contains an explosive substance, like mercury fulminant or lead antimonite, which explodes at the impact and ignites the powder.

The powder or gunpowder is the last part of the cartridge which develops through burning a large amount of gas, which by their high pressure, creep and removes the projectile in the channel pipe. This powder is divided into black powder or colloidal smoke powder that is used in most of the rifled barrel weapons.

The cartridges for smooth-bore weapons have all parts of cartridges for rifled barrel weapons plus borax and washer. The projectile cartridges smooth-bore weapons lies in blasting, grape shot and bullet. These shots and grape shots are spherical projectiles of varying sizes, generally made of lead mixed with arsenic and antimony.

The sprinkle is made out of felt, even out of paper or rags for recovered cartridges through replacement and changing the powder and projectile. Her role is to separate the powder from projectiles - shot or grape shot.

The dial is made of pressboard, its place is at the "mouth" of the tube and its role is to prevent projectiles from getting out of the cartridge¹².

The forensic research of firearms used to commit crimes, identify or clarify the manner or circumstances in which the author used them, are issues which have the solution lying in the hands of the forensic specialists, which are facing in recent years a growth of such crimes¹³.

The concept of lead under forensic aspect has a more concretely character; the traces represent various changes that may occur between the environment and humans which can determine the human behavior in this process¹⁴.

By traces of gunshot means specific tracks formed by projectile and are called main firing traces that are divided in drilling traces, traces of penetration and traces of impact.

For the drilling traces are specific three elements: the inlet orifice, the channel and the outlet orifice.

On the human body the inlet orifice is characterized by a lack of tissue, its diameter is close to the projectile. The edges of the hole are slightly directed inward, secondary traces can be found on them, such as the friction ring. The outlet has no shortage of tissue. The channel perforation in all cases does not have a straight form, the deviations of the projectile by the bone is commonly found, which leads sometimes to the fragmentation of the bullet into several pieces. In such circumstances we have more outlets¹⁵.

In the case of hollow organs and soft tissue we may have larger diameter holes or where the tissue contracts it can be found a smaller hole than the projectile¹⁶.

¹¹ Idem, p. 169.

¹² Ibidem, p. 171.

¹³ M. Ruiu, *Investigarea omorului săvârșit cu arme de foc*, Universul Juridic Publishing House, Bucharest, 2012, p. 104.

¹⁴ E. A. Nechita, *Criminalistica. Tehnica și tactica criminalistică*, ediția a II-a, revăzută și adăugită, Pro Universitaria Publishing House, Bucharest, 2009, p. 12.

¹⁵ V. Dragomirescu, *Medicină legală*, Teora Publishing House, Bucharest, 1992, p. 98.

¹⁶ N.V. Popov, *Medicina judiciară*, Ed. de stat pentru literatură științifică, Bucharest, 1954, p. 184.

When the shots are done from 5-10 cm, the inlets also can be larger than the caliber of the bullet and the edges ragged; all due to gas pressure¹⁷. Also, soot and residue are deposited in the epidermis, on a small radius and on a dense layer. Sometimes residues enter into the epidermis, creating so-called tattoo gunshot.

The secondary traces of the shooting side¹⁸ are the result of thermal and chemical phenomena that occur in the barrel and at a certain distance from it.

The metallization ring created by deposits of metal particles detached from the surface of the projectile. The friction ring or erasure is created through a deposit on the inlet margins of grease particles, dust or any other substance which is on the surface of the projectile.

The burns made by the hot gases, and by the flame at the mouth of the pipe, are formed by bonding the pipe to the body¹⁹.

The ruptures caused by gases that occur at shoots less than 10 cm, have a stellar shape, and are formed by gases entering in the hole and breaking its edges.

- Traces resulting from the action of flame;
- Trace resulting from gases action;
- Traces of soot;
- Unburnt powder particles (tattoo);
- Grease particles.

Each weapon is unique in its own way leaving, after firing, on the cartridge elements, namely on the fired cartridge, and the projectile (bullet) certain specific traces. These traces, after the discovery and uplifting the bearing objects, are microscopically analyzed, by the homicide detective/officer, and subsequently, the traces are passed through specific databases in identifying firearms.

When the officer must determine the type, mark, model and caliber of a firearm, usually he encounters some difficulties and in this situation he is provided, for an expert or a technical-scientific, with an unknown firearm²⁰.

To determine the type, mark, model and caliber of firearms with which a crime has been committed, it is preferable to be find shell casings or projectiles (bullets) at the scene of the crime. Conclusions about the characteristics of the firearm used in the commission of an offense are a clue for the police in order to reduce the circle of suspects²¹.

Lucia Forensic is analysis software for ballistic image traces being installed on the platform of a compatible PC. This program is operating with several peripherals analysis and image pickup equipment, namely²²: a scanner, a stereo microscope with video camera. This system enables the operator to control the analysis equipment, taking directly the image and afterwards a complex analysis of it²³.

The *Integrated Ballistics Identification System (IBIS)* has been designed to acquire, store and manage images items of ammunition after firing a firearm. This goal was set to identify, automatically, firearms which are the inventory, this identification transaction being stored in a database²⁴.

The ballistics examination is conducted by a forensic called in literature *expert* who once arrived at the scene, it seeks clues, traces or other material means of evidence, especially items of ammunition in case of criminal offenses when a fire weapon has been used and it has not been discovered at the scene, in order to later discover the weapon used to commit the

¹⁷ C. Suci, op. cit. p. 357.

¹⁸ Denumite și urme suplimentare ale tragerii.

¹⁹ E. Stancu, op. cit. p. 269.

²⁰ Pleșea, I. și Dobrin, G.D., (2013) *Balistica judiciară – aspecte teoretice și practice*, edited by Asociația Criminaliștilor din România și Institutul Național de Criminalistică din cadrul I.G.P.R., Bucharest, p. 59.

²¹ Idem, p. 60.

²² Pleșea, I. și Dobrin, G.D., op. cit., p. 113.

²³ Idem, p. 113.

²⁴ Ibidem, p. 122.

*THE IMPORTANCE OF BALLISTICS EXPERTISE IN IDENTIFYING THE WEAPON USED
FOR COMMITTING A MURDER THROUGH SHOOTING*

offense. However, for faster discovery and uplift of evidence, the intervention at the scene will be done in a short time to not change or even lose the traces of the crime.

Conclusion. Although ballistics have not registered remarkable progress in the last 20 years, however, one can notice the increase of experts' professionalism in the field, the emergence of new research methods, which I think is very important, and the acquirement of ballistic expertise for a better place in the criminal trial.

Bibliography

1. Pleșea, I. și Dobrin, G.D., *Balistica judiciară – aspecte teoretice și practice*, edited by Asociația Criminaliștilor din România și Institutul Național de Criminalistică din cadrul I.G.P.R., Bucharest, 2013;
2. M. Ruiu, *Investigarea omorului săvârșit cu arme de foc*, Universul Juridic Publishing House, Bucharest, 2012;
3. Stancu, *Tratat de criminalistică*, ediția a V-a, revăzută și adăugită, Universul Juridic Publishing House, Bucharest, 2010;
4. Nechita, *Criminalistica.Tehnica și tactica criminalistică*, ediția a II-a, revăzută și adăugită, Pro Universitaria Publishing House, Bucharest, 2009;
5. V. Iftenie, *Medicină legală*, ediție revăzută și adăugită, Științelor medicale Publishing House, Bucharest, 2006;
6. V. Dragomirescu, *Medicină legală*. Teora Publishing House, Bucharest, 1992;
7. C-tin. Dumitrescu, *Curs de tehnică criminalistică*, vol. II, Școala de ofițeri a Ministerului de Interne Publishing House, Bucharest, 1983;
8. N.V. Popov, *Medicina judiciară*, Ed. de stat pentru literatură științifică, Bucharest, 1954;
9. Suciu, *Criminalistica*, Didactică și pedagogică Publishing House, Bucharest, 1972;
10. V. Măcelaru, *Balistica judiciară*, Ministerului de Interne Publishing House, Bucharest, 1972.