Ewelina Działek
doctoral student at the Andrzej Frycz Modrzewski Krakow University
dzialek.ewelina@gmail.com

Diagnostic value of gun identification based on traces from cartridge cases and bullets

Summary

The aim of this article is to present the issues related to the diagnostic value of expert opinion on the identification of a gun based on fired cartridge cases and bullets. The content evoked conducted research projects on an international scale, involved the identification of individual gun; in Poland, the project was performed in 1928. In addition, current methodology for performing identifying expertise in the field of firearms by Polish laboratories is shown. Attention was also drawn to marks left by a firearm, which prove important when performing this type of identification. The conclusions clearly indicate the legitimacy of launching a study on the identification of handguns through traces left by it on cartridge cases and bullets.

Keywords diagnostic value, ballistic forensics, traces on firearms, pistol identification

Introduction

Expert evidence from a range of firearms does not occur in the criminal proceedings as often as expert evidence of a psychologist or an expert of genetic testing. The number of offenses committed using firearms, in respect of all identified offenses, is relatively small. For example, in 2014, 325 related to firearms offenses have been committed, which is 0.04% of all recorded crime in Poland[1]. It should be noted that ballistic forensics covers the scope of a wide range of issues[2], and one of them is the identification of firearms based on spent cartridge cases or bullets.

Referring to the number of expert opinions from the identification of individual guns based on the evidential bullets and cartridge cases, for example, in 2013 the forensic laboratory of the Provincial Command of the Police in Krakow finished their 13[3]. In the literature appears the view showing the disadvantages of identifying an individual, and even methodologically challenges the possibility of giving a categorical opinion[4]. Therefore, it is appropriate to return to make a detailed discussion of the diagnostic value of individual identification methods. It seems that, so far, relatively little attention has been devoted to the diagnostic value of identifying a gun based on traces left on a cartridge or projectile.

1 In 2014, the number of all identified offences amounted to 873 245 – data obtained from statistics posted on the website: http://statystyka.policja.pl/st/wybrane-statystyki/bron/bron-przestepstwa/50844,Przestepstwa-przy-uzyciu-broni.html (accessed: January 16, 2016).

2 Z. Brożek-Mucha, *Chemical Ballistics*, Institute of Forensic Research, Krakow 2008, A. Filewicz A. Mazurek, *Efektywność zbierania pozostałości po wystrzale (GSR) z włosów i rąk za pomocą obustronnego przylepca*, "Problemy Kryminalistyki" [*Efficiency of collecting the gunshot residue (GSR) from hair and hands using double-sided adhesive take ("tape-lift")*, "Issues of Forensic Science"] 1996, No. 206, pp.79-86, J. Widacki, *Badania identyfikacyjne broni palnej i śladów jej użycia,* [w:] *Kryminalistyka* [*Iidentification of firearms and traces of its use,* [in] *Criminolgy*], ed. J. Widacki, ed. CH Beck, Warsaw 2012, pp. 342-357; CF. also: http://clk.policja.pl/clk/badania-i-projekty/badania-wykonywane-w-c/badania-broni-i-balist/10438,BADANIA-BRONI-I-BALISTYKI.html, (accessed: March 3, 2015).

3 Number of conducted casework examinations in 2012 amounted to 6 in 2011, 6 in 2010, but for the year 2010: 12; data established based on consultations with employees of the Police Forensic Laboratory in Krakow.

4 J. Konieczny, *Kryzys czy zmiana paradygmatu kryminalistyki?,* "Państwo i Prawo" *[Crisis or forensics paradigm shift?,* "State and Law"] 2012, No. 1, p. 3.

The diagnostic value, and the value of evidence – general issues

Reflecting on the diagnostic value of expertise-related issues, I shall limit myself to determine if evidentiary projectiles or concrete evidentiary cartridge cases were fired from the determined handgun specimen, namely a pistol. The practice of forensic ballistics involving the identification of firearms based on the traces left by the weapon on the cartridge or shell frequently leads to the identification of an individual, made categorically (categorical opinion). The question to be answered concerns the theoretical basis for unambiguous determination that a cartridge (or projectile) was fired from a specific firearm. This is a real question about the diagnostic value of ballistic forensics of this kind.

The first step is to bring the concept of evidential value that is assigned to the method used in the process. The literature indicates that the determinants of evidential value can be, among others, the diagnostic value of specific methods, legal method used, as well as other evidence, particularly the testimony of witnesses or the accused's explanation[5].

The term "diagnostic value" refers to the value of the method of identifying or tests that are used by an expert to establish certain facts for the purposes of legal proceedings. It refers to the method used by the expert making the identification. The diagnostic value is often called credibility or the function of the method[6]. It is determined by specifying percentages to correct results obtained by application of the method[7]. It can be calculated using a variety of methods relating to an external or objective criterion.

Integral diagnostic value concepts, on which special attention should be paid, are accuracy (*validity*) and reliability (*reliability*) of the method used to constitute the basic criterion of quality of the performed research[8]. Reliability refers to the accuracy of the method used and the precision of execution of the expert. An expert is required to focus primarily on the principles and methods of applied research, and not on the conclusions which it generates[9]. Starting from the foundation up to the final conclusions, the expert must indicate the methodology applied[10]. Moreover, he should explain why applies the method of research, and not another. It also seems necessary to appeal to outside sources, confirming the validity of the methodology of research[11].

It follows from the foregoing that the conceptual range of probative value contains a diagnostic value. Therefore, they can conclude that the correct assessment of the probative value depends on the correct valuation of the diagnostic method used.

There are many empirical studies that allow a determination of the diagnostic value of some forensic identification methods; the best known is the diagnostic value of polygraph testing[12]. In the literature, there is also empirically determined diagnostic values of different identification methods: among others, methods of fingerprinting, blood or sniffer dog identification[13].

In the United States, five criteria are designated (so-called Daubert standards) that must be met to be considered for a specific test method to be reliable, the result being that the result of the test can be regarded as conclusive evidence before the trial authority[14]. It should be noted that the "Daubert Standards" question regarding diagnostic value is key. The first of the Daubert Standards principles refers to verifiability and repeatability of the method. Application of the method (while maintaining certain conditions), in principle, should lead to results. An objective possibility of applying a method to others in other laboratories or the possibility to check whether the application of that method leads to obtaining specific results. It comes to ascertain whether the proceedings as a fixed schema of methods will lead to the determination of the application (of receiving the result). Another criterion is knowledge of the potential for error during application of the method. The fact that something is scientific,

5 J. Konieczny, J. Widacki, *Wprowadzenie do problematyki identyfikacji indywidualnej*, [w:] *Kryminalistyka* [*Introduction to individual identification*, [in] *Criminology*], ed. J. Widacki, ed. C. H. Beck, Warsaw 2012, p. 189.

6 J. Konieczny, J. Widacki, *Wprowadzenie do problematyki identyfikacji indywidualnej*, [w:] *Kryminalistyka* [*Introduction to individual identification*, [in] *Criminology*], ed. J. Widacki, ed. C. H. Beck, Warsaw 2012, p. 187.

7 *Ibid.*

8 K. Sosin, J. Widacki, *Wartość diagnostyczna i wartość dowodowa. Propozycje ustaleń terminologicznych*, "Z zagadnień kryminalistyki" [*Diagnostic value and evidential value. Proposals for the understanding of terminology,* "Problems of forensic science"] in 1992, XVI-XVII, p.117.

9 J. Griffin, DJ LaMagna, *Daubert challenges to forensic evidence: Ballistic next on the firing line, September / October 2002* (source: www.nacdl.org).

10 *Ibid.*

11 *Ibid.*

12 Cf. J. Widacki, *Wartość diagnostyczna badania poligraficznego i jej znaczenie kryminalistyczne* [*Diagnostic value of lie-detection* (Polygraph examination)], ed. Jagiellonian University, Krakow 1977; J. Widacki, F. Horwath, *An Experimental Investigation of the Relative Validity and Utility of the Polygraph Technique and Three Other Common Methods of Criminal Identification*, "Journal of Forensic Science", 1978, no. 3, vol. 23, pp. 596–601.

13 J. Konieczny, J. Widacki, *Wprowadzenie do problematyki identyfikacji indywidualnej*, [w:] *Kryminalistyka* [*Introduction to individual identification*, [in] *Criminology*], ed. J. Widacki, ed. C. H. Beck, Warsaw 2012, pp. 189.

14 R.A. Grzybowski, J.E. Murdock, *Firearm and toolmark identification – meeting the Daubert challenge*, "AFTE Journal", winter 1998, vol. 30, no. 1, pp. 3-14.

does not mean that it is infallible – every expert should have this in mind. The next principle is that the method used has been described in professional journals in the field of science. In the case of forensics, before all, will be magazines such as "Forensic Science International" and "Journal of Forensic Sciences." The last criterion is a common acceptance of the application of the method in the scientific community, that is, of its majority. It is worth noting that the above criteria do not allow, however, for obtaining a titre of reliable reviews from the fields of science, in which the expert does not perform the tests accurately[15].

In addition, foreign-language literature accentuates the lack of opinion, which was released based only on expert experience, qualifications, and personal assurance of the reliability of the method used[16]. They are not in fact objective criteria, but only the personal conviction of the expert held by his skills and abilities[17].

Returning to the issues related to the diagnostic value, is an examination of the concept of "relevancy". By this term (in relation to the application of a specific test method), one should understand the confidence or the accuracy of the method used during the execution of the research. You also need to bear in mind the possibility of the potential fallibility of the method. The literature emphasizes the need for an appeal to science as a condition for the admissibility of expert opinion[18]. There is a risk that the wrong expert opinion may introduce the judicial body into error as to the findings of the relevant facts and circumstances of the case. Furthermore, the procedural authority may have difficulty with the disqualification of an incorrect opinion because it does not have expertise in the field of science.

Diagnostic value in the understanding of the scope of identifying individual pistol

Unknown or, in any event, a little-known work, is on the diagnostic value of expertise to identify individual handguns based on cartridge cases and bullets. Among experts on firearms, there is widespread recognition of the uniqueness of features mapped on cartridge cases and bullets fired from a firearm – this applies both to the experts from Poland and other countries[19].

In Poland, the first work which deals with the uniqueness of these traces is the article J. Piątkiewicz[20] (more widely the mechanism described by him was presented by W. Sobolewski[21]). Based on analysis of the literature, a general conclusion can be drawn that the uniqueness of traces left by a firearm specimen, experts justify, referring to three issues: the production of firearms, their operation and corrosion[22].

By analysing the Polish literature on firearms identification, you can find one article that would justify the adoption of uniqueness and individuality of traces left by every firearm specimen. In 1928, J. Piątkiewicz conducted an experiment concerning the traces left on cartridge cases and bullets on consecutively manufactured firearms specimens[23]. He initially assumed that traces left by successive firearm specimens would be so similar that to distinguish a gun may not be possible[24]. However, after testing and a detailed analysis of the evidence produced at the cartridge cases and bullets pointed out that "the shells and missiles fired from completely new weapons, already have specific features, enabling an absolute identification"[25]. The above statement proves that the studies carried out by J. Piątkiewicz clearly indicate the uniqueness of marks caused while firing a shot[26].

It should be noted, however, that the above-mentioned experiment was conducted in 1928 – since then, both the firearm production process, as the identification of handgun cartridge cases and bullets has changed.

Please note that a firearm is made up of many elements, thus producing a single copy is associated with the production and processing of its parts. Early

15 J. Griffin, D.J. LaMagna, *op. cit*.

16 *Ibid.*

17 P.C. Giannelli, *Daubert Challenges to Firearms ("Ballistics") Identifications (2007)*, http://scholarlycommons.law.case.edu/cgi/viewcontent.cgi?article=1153andcontext=faculty_publications, (accessed 15 May 2015).

18 J. Griffin, D.J. LaMagna, *op. cit.*

19 H. Clarence, A. Romig, *The psychical evidence technician*, University of Illinois, 1975, 14-1, pp. 14-2, 1; B.J. Heard, *Forensic Ballistics in Court*, John Wiley and Sons 2013 p. 163; J. Rosiak, *Automatyczne Systemy Identyfikacji Balistycznej*, "Problemy Kryminalistyki" [*Automatic Ballistic Identification Systems*, "Issues of Forensic Science"], 1999, no. 225, pp. 15-25.

20 J. Piątkiewicz, *Identyfikacja broni palnej* [*Identification of firearms*], „Na posterunku. Gazeta Policji Państwowej" 1928, no. 28.

21 W. Sobolewski, *Identyfikacja łusek i pocisków z krótkiej broni palnej do celów sądowych*, „Przegląd Policyjny" [*Identification of cartridges and shells from handguns for the purposes of the Court*, „Review of the Police"], 1936, no. 5.

22 Cf. W. Sobolewski, *op. cit.,* J. Piątkiewicz*, op. cit.*

23 A pair of newly-manufactured Mauser 7.65 cal. no. 443837 and no. 443838, Browning 7.65 cal. no. 273748 and no. 273749, Browning 6.35 cal. no. 861564 and no. 861565 pistols were used in this research:. When performing the analysis, the following traces were considered: breech face, ejector, firing pin, the wall of the barrel and bore.

24 J. Piątkiewicz*, op. cit.*

25 *Ibid.*

26 Cf. H. Juszczyk, J. Dyga*, Błędy w typowaniu modelu broni na podstawie zabezpieczonych łusek*, "Problemy Kryminalistyki" [*Errors in typing a gun model based on seized cartridges*, "Issues of Forensic Science"], 2013, no. 279 (1), pp. 64-67.

firearms were largely manufactured manually, which resulted in the formation of the individual characteristics of the machining process of the parts. Currently, the production process is very automated, so few items require manual processing. During the production of weapons and, above all, by the treatment of its individual parts may arise upon them the characteristic bumps, dents or scratches. These traces are characteristic only for a specific weapon, and therefore, have unique characteristics. Individual features can also arise from the use of firearms – creation of various types of scratches, damage, or other impairments resulting from improperly performed maintenance or try to make changes in the original construction of weapons, and even the occasion of cleaning weapons. In addition, corrosion or improper cleaning of weapons may also give rise to the characteristic parts of the cavities, which are individual characteristics.

Conducting research on the identification of handguns comes down to carrying out a comparative analysis of traces located on the evidence and the comparator[27]. Evidence is secured at the scene of the cartridge cases and bullets, while the comparative material are cartridge cases and bullets acquired from a secured specimen which are a kind of benchmark. In the traces left by the weapon, the parts that play the biggest role in the studies, are – in principle – the following[28]:

- firing pin hole,
- scratches on the breech face,
- extractor,
- ejector,
- barrel.

Moving on to discuss the methodology of comparative testing, in the first place it should be noted that firearms are first subjected to a primary studied to determine whether in relation to the copy there was some external interference further determines the state of the barrel (corrosion, dirt)[29]. Then with the secured weapon at a sufficiently adapted shooting range is used to fire shots to obtain bullets and cartridge cases of comparative material. It is recommended that ammunition, which is used to obtain comparative material come from the same manufacturer as the ammunition in evidence. As a rule, for the purposes of research, a few cartridge cases and missiles were used. In Polish practice, three examples of comparative material (which are the most distinct features of the individual) are obtained and sent to the Central Forensic Laboratory of the Police in Warsaw to study identification[30]. The action described above is intended to perform comparative studies of the bullets or cartridge cases in the National collection of Cartridge Cases and Bullets of the Central Forensic Laboratory of the Police, which contains bullets and cartridge cases in places of crimes committed on Polish territory.

Comparative studies of cartridge cases and bullets, aimed at the identification of firearms, are carried out under a stereoscopic microscope Forensic Laboratories Provincial Police Headquarters. In the first group are checked features appearing on both cartridge cases and bullets. Then the test is performed with the use of a microscope comparison. The basis for the research is to analyse the traces on evidence and comparative. For this purpose, the imaging is a list of attributes that are the basis for later published reviews. There is no developed method, which it found, of how many qualities must be repeated at both sites. There are always some differences between the evidential and comparative, even if they were fired from the same gun[31].

One of the most important issues to be aware of is the fact that now – in principle – expertise on the identification of firearms in Poland are performed by employees of the police forensic laboratories. Currently in Poland there are about 30 police specialists in weapons and ballistics, but not every provincial laboratory is a specialist in this field[32]. Candidates for the profession several training courses, exams and practice under the supervision of an experienced expert. Very important is the fact that experts from the research of weapons and ballistics from the Central Forensic Laboratory of the Police annually participate in projects aimed at verifying their skills in this area[33].

It is worth mentioning that the former expert on the identification of firearms were gunsmiths. Only W. Sobolewski[34], thanks to forensic knowledge

27 See. S. Skorek, *Identyfikacja pistoletu na podstawie badań łusek i pocisków*, "Prokuratura i Prawo" [*Gun identification based on cartridges and shells*, "Prosecution and the Law"] 2012, no. 1, pp. 118-122.

28 W. Kędzierski, *Broń palna i ślady jej użycia*, [w:] *Technika kryminalistyczna* [*Firearms and traces of its use*, [in] *Forensic Technique*], ed. W. Kedzierski, Szczytno*,* 1995, p. 338*.* While performing some examinations, mutual (angular) position of marks: for example, extractor and ejector, are taken into account.

29 Established on the basis of consultation with LK Police Headquarters in Krakow, cf. also*:* W. Sobolewski*, op. cit.*

30 Established on the basis of consultation with LK Police Headquarters in Krakow.

31 B.J. Heard, *Forensic Ballistics in Court*, John Wiley & Sons, 2013, p. 162.

32 Cf.: http://clk.policja.pl/clk/badania-i-projekty/badania-wykonywane-wc/badania-broni-i-balist/10438,BADANIA-BRONI-I-BALISTYKI.html.

33 See: http://www.ctsforensics.com/store/main.aspx?DepartmentId=34.

34 Referred to as „the father of Polish ballistics," see. D. Buras, *Kryminalistyczna działalność inspektora PP dr. Władysława Sobolewskiego w Polsce w okresie międzywojennym,* „Problemy Kryminalistyki" [*Forensic activity of Inspector PP dr. Władysław Sobolewski in*

acquired on foreign training courses (including the Institute of Lausanne), began introducing scientific methods of research on firearms and other areas of forensic science[35]. He paid special attention to the negligence and recklessness of gunsmiths in giving an opinion on the identification of firearms[36]. In support of the claims, he gave examples where opinions made by gunsmiths mistakenly resulted in the conviction of innocent people[37]. Examinations, performed by the Central Forensic Laboratory of the Police, to verify previous opinion of gunsmiths, confirmed a low level of expertise. They did not carefully study traces created on bullets, for example, failing to paying attention to the number of fields and furrows located on both evidential and comparative bullets[38]. Many examples from other countries, summarily executed by gunsmiths' opinions, have been shown extensively in the famous work of J. Thorwald "Century of the Detective"[39].

W. Sobolewski called for expert opinions in the range of firearms to be carried out by institutions or laboratories of scientific research or other institutions for scientific nature [40]. He stood for the position that it is necessary to develop scientific expertise on the identification of firearms based on cartridge cases and bullets[41]. It can be stated that the demands Sobolewski has been partially fulfilled because – as mentioned – most examinations are performed by police forensic laboratories. It is worth noting that today's Central Forensic Laboratory of the Police, which supervises forensic laboratories of provincial police commands, received the title of research institute[42].

Referring to the foreign literature on the identification of firearms, you will notice that it is much more rich in descriptions of the trials or experimental research[43]. In 1998, "AFTE Journal"[44] published an article in which the authors argued in favour of scientific methods for the identification of firearms as well as methods used in Mechanoscopy[45]. In the contents, they referred to each of the identification criteria for the, citing the arguments in favour of their fulfilment. It raised the argument that the possibility of error in relation to the total number of correct decisions is 12% (they are considered ambiguous results), and the reference level of error only to the number of incorrect decisions, amounts to 1.4%[46]. You can also find an article concerning questioning scientific methods of firearm identification[47], in which the author complains that the methodology is based on criteria such as subjectivism, education and experience of the expert, which cannot be called objective criteria. In addition, it raises the issue that the basic problem of identification of firearms is a lack of conducting empirical experimental research.

In 2009, in "AFTE Journal"[48] appeared an article that described a research project on the identification of firearms. The study involved 507 experts from 20 different countries from 4 continents[49]. For the experiment were used pistols which had (consisted of) 10 consecutively produced barrels. Fired cartridge cases were used as research material for the project. 240 sets were prepared, which consisted of a total of 7,605 bullets. The findings indicated that the testing revealed no case of mistaken identity, even though the project included testing by experts from different countries. The fact that non-occurrence of errors during the procedures relating to the identification, can attest to the high diagnostic value of the method.

An important role in verifying the expert skills of some laboratories is played by accreditation institutions, which is a formal acknowledgement of the competencies of the organization in the field of science[50]. It is sometimes called the official confirmation of laboratory operations

Poland in the interwar period, „Issues of Forensic Science"] 2009, no. 264, pp. 70-71.

35 D. Buras, *Kryminalistyczna działalność inspektora PP dr. Władysława Sobolewskiego w Polsce w okresie międzywojennym*, "Problemy Kryminalistyki" [*Forensic activity of Inspector PP dr. Władysław Sobolewski in Poland in the interwar period,* "Issues of Forensic Science"], 2009, no. 264, pp. 70-71.

36 W. Sobolewski, *op. cit.*

37 *Ibid.*

38 *Ibid.*

39 J. Thorwald, *Stulecie detektywów* [*Century of the Dectective*], translated by K. Bunsch, W. Kragen publ. Znak, Krakow 2009.

40 *Ibid.*

41 *Ibid.*

42 Cf. *Decree No 12 of the Director of the Central Forensic Laboratory of the Police of 20 December 2013*.

43 Cf. J.E. Hamby, D.J. Brundage, J.W. Thorpe, *The Identification of Bullets Fired Consecutively from 10 Rifled 9 mm Ruger Pistol Barrels: A Research Project Involving 507 Participants from 20 Countries*, "AFTE Journal", Spring 2009, vol. 41, no 2.

44 Short name: Association of Firearm and Tool Mark Examiners.

45 R.A. Grzybowski, J.E. Murdock*, Firearm and toolmark identification – meeting the Daubert challenge*, "AFTE Journal", winter 1998, vol. 30, no 1.

46 *Ibid.*

47 J. Griffin, D.J. LaMagna, *Daubert challenges to forensic evidence: Ballistic next on the firing line, September / October 2002*

48 J.E. Hamby, D.J. Brundage, J.W. Thorpe, *The Identification of Bullets Fired from 10 Consecutively Rifled 9 mm Ruger Pistol Barrels: A Research Project Involving 507 Participants from 20 Countries*, "AFTE Journal", Spring 2009, vol. 41, no 2.

49 *Ibid.*

50 T. Bednarek, *Akredytacja laboratoriów wydających opinie kryminalistyczne*, "Prokuratura i Prawo" [*Accreditation of laboratories issuing opinions in forensic science*, "Prosecution and Law"], 2012, no. 1, p. 138. Polish accreditation standard to institutions that perform casework is included in the PN-EN ISO / IEC 17025.

in accordance with a documented management system and having the competence to perform the tests indicated in the described scope[51].

Summary

While describing the diagnostic value, it was shown that it was possible to give percentage values which will be, e.g., the number of achieved positive, negative, unsolved results by applying the given method[52]. As for Polish literature, there is no reference point to identify the range of firearms. In our country, studies that investigated individuality traces left by firearms, were carried out the first and last time in 1926 by J. Piątkiewicz. In turn, the foreign literature describes the results of research projects, research or experimentation on the identification of firearms, sometimes including even several countries. It should be noted that in the literature there are arguments for both approving and denying scholarship identification methods used in ballistics.

What then is the certainty that two bullets were fired from the same firearm? It is not disputed that during the firing of a shot, by result of the interaction of firearms, traces are left on both the projectile and the cartridge case. However, do we have the confidence that the resulting traces could only be left on this one gun? Given the results of these studies, it should be assumed that the marks left by a firearm on the cartridge case and bullet are features unique, individual, characteristic only for a specific weapon. It is important also that these studies were carried out under certain conditions, and the evidence secured at the scene may also have other traces that are a result of other factors such as hitting the target. Therefore, there will always be some differences between traces located on evidence and comparator. As a rule, characteristics on elements of a firearm may arise because of production, operation or corrosion. If elements of the weapon do not have individual features, performing that kind of identification is impossible. In conclusion, it must be noted that, in the light of the test results of both Piątkiewicza, as well as recent research abroad, it can be assumed that the diagnostic value for the identification of weapons based on traces on cartridge cases and bullets is high enough for the adoption of the capability to perform the identification of an individual and use it as evidence in a criminal trial. It is, however, worth considering the initiation of experimental research in this field, which would facilitate the determination of diagnostic value by specifying a numerical value or a percentage of identification accuracy, and thus present the possibility to identify incorrectness, which would help to precisely determine this value.

51 Guidelines on the principles on the basis of which accreditation is granted by the Polish Accreditation Centre, are included in the PN-EN ISO / IEC 17025. Referring to the accreditation of the Central Forensic Laboratory of the Police, it is worth paying attention to the range of obtained accreditation in respect of the Department of Firearms and Toolmark Examination. Granted accreditation to perform tests for group and individual identification of tools and objects and objects of closing a method of analysis of toolmark traces. In Poland there are 18 police forensic laboratories, most of which confirmed the fulfillment of requirements specified in PN-EN ISO / IEC 17025.

52 J. Konieczny, J. Widacki, op. *cit.,* p. 189.

Bibliography

1. Bednarek T., *Akredytacja laboratoriów wydających opinie kryminalistyczne*, "Prokuratura i Prawo" 2012, no. 1, p. 138.
2. Brożek-Mucha Z., *Balistyka chemiczna*, Instytut Ekspertyz Sądowych, Kraków 2008.
3. Buras D., *Kryminalistyczna działalność inspektora PP dr. Władysława Sobolewskiego w Polsce w okresie międzywojennym*, "Problemy Kryminalistyki" 2009, no. 264, pp. 70-71.
4. Clarence H., Romig A., *The psychical evidence technician*, University of Illinois, 1975, 14-1, pp. 14-20.
5. Filewicz A., Mazurek A., *Efektywność zbierania pozostałości po wystrzale (GSR) z włosów i rąk za pomocą obustronnego przylepca (technika "tape-lift")*, "Problemy Kryminalistyki" 1996, no. 206, pp. 79-86.
6. Giannelli P.C., *Daubert Challenges to Firearms ("Ballistics") Identifications (2007)*, http://scholarlycommons.law.case.edu/cgi/viewcontent.cgi?article=1153&context=faculty_publications.
7. Griffin J., LaMagna D.J., *Daubert challenges to forensic evidence: Ballistic next on the firing line, September/October 2002*, (źródło: www.nacdl.org).
8. Grzybowski R.A., Murdock J.E., *Firearm and toolmark identification – meeting the Daubert challenge*, "AFTE Journal", winter 1998, vol. 30, no. 1, pp. 3-14.
9. Hamby J.E, Brundage D.J., Thorpe J.W., *The Identification of Bullets Fired from 10 Consecutively Rifled 9 mm Ruger Pistol Barrels: A Research Project Involving 507 Participants from 20 Countries*, "AFTE Journal", spring 2009, vol. 41, no. 2.
10. Heard B.J., *Forensic Ballistics in court*, John Wiley & Sons, 2013, p. 162.
11. Juszczyk H., Dyga J., *Błędy w typowaniu modelu broni na podstawie zabezpieczonych łusek*, "Problemy Kryminalistyki" 2013, no. 279 (1), pp. 64-67.

12. Kędzierski W., *Broń palna i ślady jej użycia*, [w:] *Technika kryminalistyczna*, red. W. Kędzierski, Szczytno 1995, p. 338.
13. Konieczny J., *Kryzys czy zmiana paradygmatu kryminalistyki?*, "Państwo i Prawo" 2012, no. 1, pp. 3-16.
14. Konieczny J., Widacki J., *Wprowadzenie do problematyki identyfikacji indywidualnej*, [w:] *Kryminalistyka*, red. J. Widacki, wyd. C.H. Beck, Warszawa 2012, p. 189.
15. Piątkiewicz J., *Identyfikacja broni palnej*, "Na posterunku. Gazeta Policji Państwowej" 1928, no. 28.
16. Rosiak J., *Automatyczne Systemy Identyfikacji Balistycznej*, "Problemy Kryminalistyki" 1999, no. 225, pp. 15-25.
17. Skorek S., *Identyfikacja pistoletu na podstawie badań łusek i pocisków*, "Prokuratura i Prawo" 2012, no. 1, pp. 118-122.
18. Sobolewski W., *Identyfikacja łusek i pocisków z krótkiej broni palnej do celów sądowych*, "Przegląd Policyjny" 1936 , no. 5.
19. Sosin K., Widacki J., *Wartość diagnostyczna i wartość dowodowa. Propozycje ustaleń terminologicznych*, "Z zagadnień kryminalistyki" 1992, z. XVI-XVII, p. 117.
20. Thorwald J., *Stulecie detektywów*, tłum. K. Bunsch, W. Kragen, wyd. Znak, Kraków 2009.21. Widacki J., *Wartość diagnostyczna badania poligraficznego i jej znaczenie kryminalistyczne*, wyd. UJ, Kraków 1977.
21. Widacki J., Horwath F., *An experimental Investigation of the Relative Validity and Utility of the Polygraph Technique and Three Other Common Methods of Criminal Identification*, "Journal of Forensic Sciences" 1978, no. 3, vol. 23, pp. 596 – 601.
22. Widacki J., *Badania identyfikacyjne broni palnej i śladów jej użycia*, [w:] *Kryminalistyka*, red. J. Widacki, wyd. C.H Beck, Warszawa 2012, pp. 342-357.

Translation Ronald Scott Henderson