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Reasons for not Detecting Fingerprints on the Objects of Expert Examination and Ways to Eliminate Defects

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Abstract

Scientific research aims to identify objective and subjective reasons for the non-detection of fingerprints on the objects of examination and to offer effective ways to eliminate the defects thereof. The system of philosophical, general scientific, and special scientific methods (comparison, description, analysis and synthesis, induction, deduction and analogy, abstraction, generalization, systematic approach, and others) was used to hold the scientific research. The article considers the practical and technical problems of the detection of fingerprints by forensic experts on the objects of research in the example of Azerbaijan. As a result of o scientific research, the reasons for the lack of traces on the objects of study during forensic fingerprint examinations were revealed, the effectiveness of techniques used during such examinations was evaluated and recommendations for experts and law enforcement officers were given. The study resulted in scientific and practical recommendations for the examination and detection of fingerprints. Recommendations for investigators, specialists, and experts on the seizure and packaging of physical evidence, and preparation of materials for fingerprint examination were developed.

Keywords: forensic expert, foreign experience, fingerprints, expertise, holistic processing, composite task

Introduction

Fingerprints are the oldest and most reliable method of identifying individuals. Fingerprints, as evidence of a crime, are an effective means of identifying a person at a crime scene or the victim of a crime. Dactyloscopy was the first forensic method to develop a system for recording and identifying criminals to assist law enforcement officers in investigating crimes. Forensic fingerprinting has been used to identify criminals for over 100 years.

The introduction of fingerprinting into the investigation and detection of crimes is historically associated with the names of F. Galton (1892) as the author of the first book on fingerprints established that friction ridge skin was unique and

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persistent, E. Henry (1900) developed a system for classifying and individualizing criminals using fingerprints, which became standard practice in Britain and was eventually adopted in majority of English-speaking countries, W. Herschel (1880) was the first scientist to study the resistance of friction ridge skin, H. Gross (1899) and E. Locard (1935) explained the theory of poroscopy and how the use of pores can supplement fingerprint comparisons, investigated the sweat pores of friction comb skin, J. Purkinje (1823) developed a classification of nine types of fingerprint patterns, which preceded Henry's classification, H. Faulds (1880; 1922) was the first to publish information in the journal about the value of frictional skin ridge for individualization, especially its use as evidence (Reiss, 1903; Thorwald, 1964).

The problems of identifying and fixing fingerprints on the objects of fingerprint research were the subject of scientific investigation by several Azerbaijani scientists. Among them, it is necessary to name G. Jabarova et al. (2013) who researched methods of human identification by handprints. F. M. Javadov et al. (2002) developed rules for detecting, taking fingerprints at the scene, and sending materials for examination. E. Asgarov (2011) developed methodological recommendations on the use of forensic techniques in the investigation of the scene and fingerprinting. A. Mammadli et al. (2005) researched problems in taking experimental traces of fingers and palm prints for forensic fingerprinting, methods of eliminating them, and rules of transferring these traces to dactylography. It should be noted that the above-mentioned scientists have not investigated the problems associated with the non-detection of fingerprints on objects of fingerprint studies, by the example of Azerbaijan. Without belittling the contribution of these scientists to the development of the problems of fingerprint research, today the reasons for the non-detection of fingerprints on the objects of examination have not been studied and have not been systematized.

The practice is that investigators ignore the forensic recommendations on the examination, fixation, and seizure of traces of the crime. This leads to the inability of forensic experts to identify traces of crimes on the objects of expert examinations (Krasiuk, 2022). Investigators' compliance with the rules of seizure and packaging of physical evidence will help avoid the destruction of traces of the crime. This, in turn, prevents effective detection and investigation of crimes (Sarıjalinskaya, 1999; Law of the Republic…, 1999; Fakiha, 2020; Swofford & Gabel Cino, 2018; Ribeiro et al., 2019).

Fingerprints left on hard surfaces can be visible or latent. Visible prints are formed when a substance such as blood or paint, etc. is transferred from the finger to the surface. Latent prints are formed, for example, on smooth, rough, or

other surfaces. Latent prints form when natural body oils and sweat on the skin are transferred to another surface. Those prints are barely visible and it often requires the use of fingerprint powders, chemicals, or alternative light sources to detect them (Stojanović et al., 2019; Krish et al., 2019; Laws, 2020; Zia et al., 2019).

There is no difficulty in identifying visible fingerprints, and a photographic method is used to capture these prints. Visible fingerprints are photographed in high resolution with a forensic measurement scale on the image for comparison. Latent fingerprints are detected using forensic powders and alternative light sources. Once fingerprints are detected, they are photographed and removed from the surface using clear adhesive tape (Khakhanovskyi & Hrebenkova,2022). The tape is then packaged. Thus, it is necessary to take into account the typological features of fingerprints for the application of forensic tools, methods, and techniques of detection, fixation, and examination of these traces (Azman, 2020; Internet resource of…, 2023).

The research aims to identify objective and subjective reasons for the non-detection of fingerprints on the objects of examination and to offer effective ways to eliminate the defects thereof.

Materials and Methods

The objects of scientific research were submitted to the Criminalistics Center of the Ministry of Justice of the Republic of Azerbaijan for forensic fingerprint examination (according to the expert conclusions for 2017-2021) (Internet resource of…, 2023). In the process of investigating the causes of the non-detection of fingerprints on the objects of fingerprint examinations, by the example of Azerbaijan, six stages of scientific knowledge were consistently implemented.

The main method of research used in the process of studying the causes of non-detection of fingerprints on the objects of fingerprint examinations, in the example of Azerbaijan, is a dialectical method of knowledge. Using the dialectical method, the nature of problems arising in the process of detecting fingerprints on the objects of fingerprint examinations was investigated. The following philosophical categories were used as a tool of cognition: quantity and quality (the number of fingerprints seized with a violation of packaging techniques will not allow to conduct a qualitative fingerprint examination), cause and effect (non-detection of fingerprints on the objects of fingerprint examinations, is a consequence of improper seizure and packaging of traces).

The following general scientific methods of formal logic were used:

– analysis (in the process of studying the findings of fingerprint examinations for 2017-2021, which were provided in the Center of forensic expertise of the Ministry of Justice of Azerbaijan);

– generalization allowed to identify of typical criminal cases in which fingerprint examinations are appointed, objects sent for fingerprint examination, etc.);

– analysis and synthesis of the most common mistakes of investigators and experts allowed to offer recommendations on how to avoid them.

In the process of studying the causes of non-detection of fingerprints on the objects of fingerprint examinations, in the example of Azerbaijan, a systematic method was applied. The systematic method assumes the consideration of the subject of scientific research as a system, which has a certain structure containing interrelated elements. During the study, general scientific and special scientific methods were used, namely: statistical analysis, comparative-legal, system-structural, logical, and formal-legal methods of knowledge. The comparative-legal method allowed to consider the causes of the non-detection of fingerprints on the objects of fingerprint examinations, by the example of Azerbaijan.

The systematization and generalization of the available results of scientific-theoretical and scientific-practical research on the investigated problem were carried out. An empirical study of problems arising for law enforcement officers in the process of detection and investigation of crimes, by the example of Azerbaijan, was held.

Results

Determining the reasons for the non-detection of traces on the objects taken from the place of incident and sent for expert examination

The Criminalistics Center of the Ministry of Justice of the Republic of Azerbaijan (Internet resource of…, 2023) has the necessary equipment and qualified personnel in this domain. To ensure the international recognition of expert opinions in this field, the methods applied in the “Human Traces Research” expert specialty carried out at the Center are accredited according to the ISO/IEC 17025 (ISO, 2023) standard.

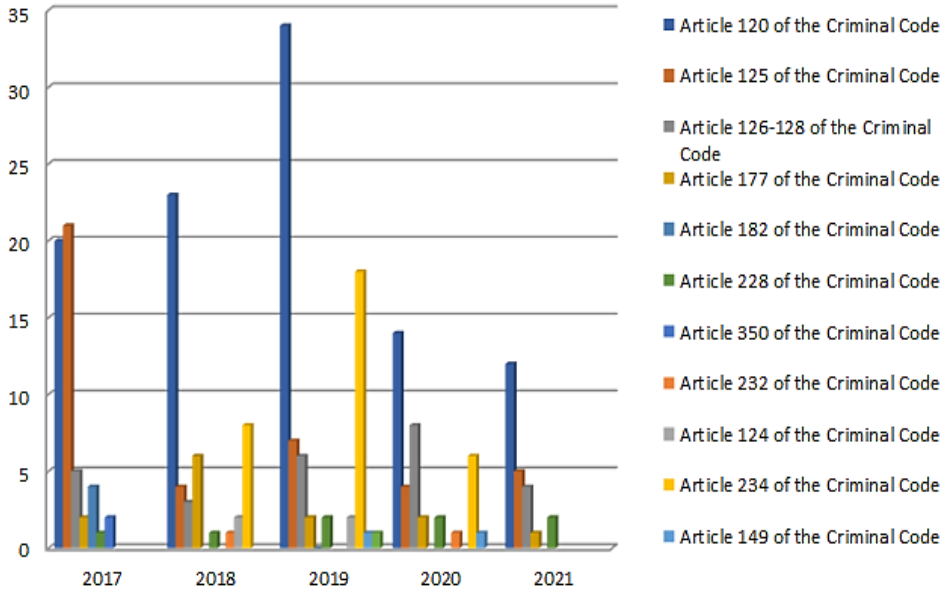
Complete forensic dactyloscopy research depend on the process of properly taking and packaging material evidence, fully preparing the materials for examination and timely presenting by investigative officials. It should be noted that the objects of forensic dactyloscopy examination include dactyl lents, dactyl films, photographs of traces taken by a specialist from the scene of the crime, and objects that are likely to leave traces. Therefore, special attention should be paid to

forensic dactyloscopy examination objects, and objects that may leave traces should be properly packaged for further investigation.

The purpose of a crime scene examination is to identify, record and seize traces of the crime. Traces relevant to the investigation are used as evidence. Therefore, inspection of the crime scene according to the rules of criminalistic tactics and criminalistic technology is an important stage in investigative and expert activities. The effectiveness of crime scene examination, efficiency of detection and seizure of physical evidence depends on the tactical techniques selected, technical means used, and general professional and organizational-technical preparation of the investigator (Vilks & Kipane, 2018).

The main condition for a successful examination is compliance with the rules developed by forensic techniques, as well as the rules of technical means. However, the results of collecting and examining items that can leave new traces at a crime scene or leave evidence of a crime undetected are not considered to be successful. The generalization shows that forensic dactyloscopy examination is mainly assigned to the following criminal cases (Figure 1).

Figure 1: Criminal cases in which fingerprint examinations are appointed



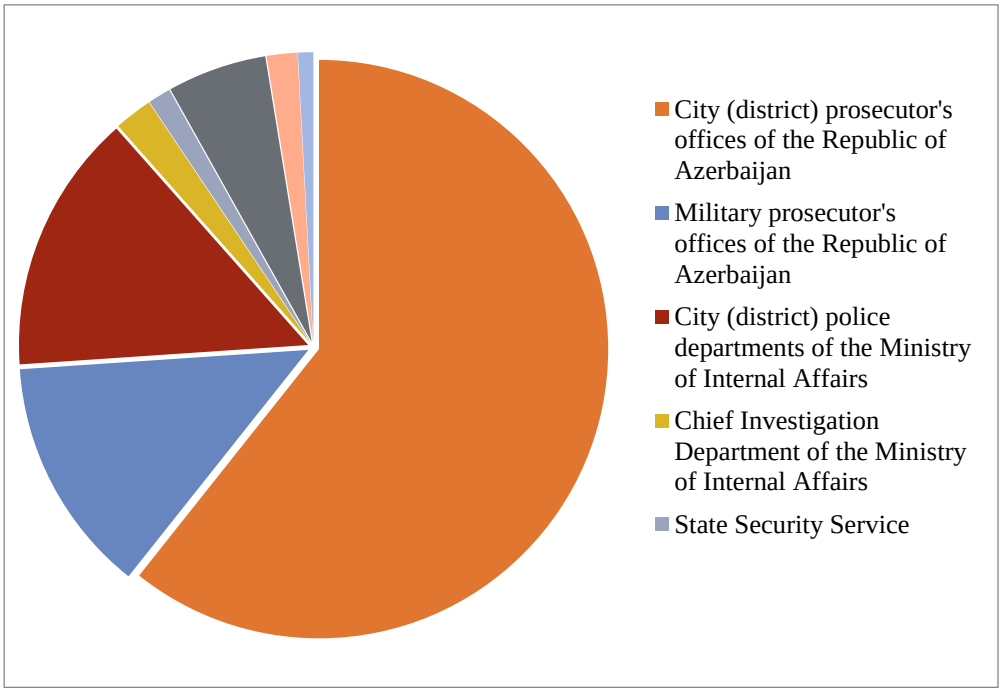
It should be noted that in the territory of Azerbaijan during the period from 2017 to 2021, the largest number of crimes was committed in the following categories of cases (Barnes, 2014):

– deliberate murder (Article 120.1 of the Criminal Code) – in 103 cases;

– bringing to suicide (Article 125 of the Criminal Code) – on 41 cases;
– injury to health (Articles 126-128 of the Criminal Code) – in 21 cases;
– Extortion (Article 182 of the Criminal Code) – in 4 cases;
– theft (Article 177 of the Criminal Code) – in 13 cases;
– illegal acquisition, sale, storage, transportation, carrying of weapons, their components ammunition, explosives and devices (Article 228 of the Criminal Code) – in 8 cases;
– infringement of rules on manipulation with a weapon and subjects representing an increased danger to associates (Article 350 of the Criminal Code) – in 2 cases;
– illegal manufacture, production, storage, transportation, transfer or sale of drugs, psychotropic substances or their precursors (Article 234 of the Criminal Code) – in 32 cases;
– extortion or threat of firearms, ammunition, explosives, and devices (Article 232 of the Criminal Code) – in 2 cases;
– rape (Article 149 of the Criminal Code) – in 2 cases.

From the data collected, it can be determined that the investigative bodies, and also the courts, prescribe forensic dactyloscopy examinations to detect fingerprints on objects in the investigation of criminal cases with a high degree of public danger. The main purpose of appointing a forensic examination for law enforcement agencies and the courts is to identify important evidence that will help to reveal the mechanism of the crime (Cherniavskyi et al., 2020). Forensic dactyloscopy examination, in turn, is of great importance in determining the motive of the crime, solving practical diagnostic and identification issues, and most importantly, determining the identity of the perpetrator. At the same time, forensic dactyloscopy examination allows determining the accuracy or falsity of witness statements by identifying handprints on objects and limiting the number of suspects to law enforcement based on individual traces not restored in the traces (Figure 2).

Figure 2: Law enforcement agencies in the process of appointing fingerprint examinations



Reviewing the generalization, it is clear that forensic dactyloscopy examination of subjects is mostly appointed by the following investigative bodies:

- Prosecutor's offices of Azerbaijan– in 142 cases;
- Military prosecutor's offices of Azerbaijan – in 31 cases;
- Police departments of the Ministry of Internal Affairs – in 34 cases.

Forensic dactyloscopy examination is appointed to identify fingerprints and papillary patterns on objects in the investigation of criminal cases with a high degree of public danger (Tatsiy et al., 2019). Since the bodies investigating this category of crimes are known, it is understandable in this part of the generalization that the result is obtained in this form. As a result of the generalization, it should be noted that the Center received 339 subjects with 234 decisions on the appointment of forensic dactyloscopy examination (several subjects were included in one decision) (Barnes, 2014).

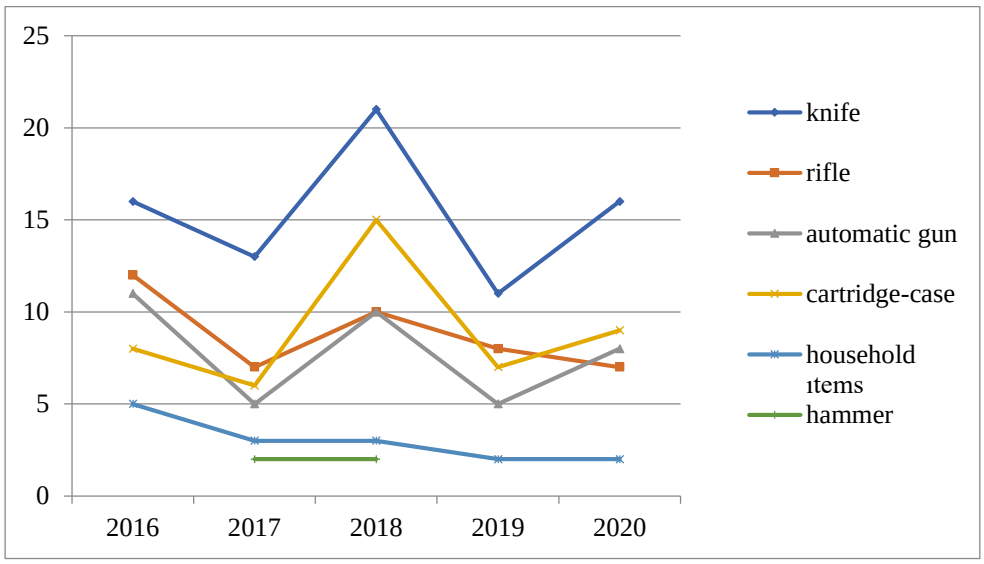
Material evidence that may leave fingerprints and papillary patterns on objects should be sent for examination as soon as possible. The duration of traces on objects is influenced by the nature of the object, in the case of the crime committed outdoors, temperature, humidity, dust, atmospheric sediments, quality

and quantity of human sweat, in which chapter the crime was committed, the circumstances of the event and other conditions.

According to the generalization for the relevant period, the Center received the following objects related to forensic fingerprinting (Figure 3), for example:

- knives – in 77 criminal cases;
- rifles – in 44 criminal cases;
- automatic weapons – in 39 criminal cases.

Figure 3: Objects of expert research



During forensic dactyloscopy examinations, when a knife is the object of investigation, experts are commonly asked about the presence of fingerprints and papillary patterns. Typically, they are inquired about these features on the handle of the knife. In certain cases, additional questions are raised regarding the presence of fingerprints and patterns on both the handle and blade of the knife. The decision should take into account the dynamic movement of the person's palm on the support when asked by the investigator whether there are traces on the handle of the knife. If the objects of research are rifles or automatic weapons, the expert is often asked whether there are fingerprints and papillary traces on the trigger, butt, case, and sometimes on the surface of the weapon.

Defects in the packaging of research objects

The packaging of forensic objects is of particular importance when identifying fingerprints on them. Objects for examination are received either in

envelopes, wrapped in newspaper sheets, or wrapped in plastic bags and sealed with tape. Rifles and automatic weapons are sent in cotton cloth, most often in cloth bags, sometimes in paper boxes.

Objects for research should be properly packaged to keep traces on them undamaged and to obtain positive results from the research to be conducted. It should be noted that the packaging of products should not allow the following defects:

1. The gun should not be put in any bag and the sides of the bag should not be taped. If doing so, the bag may cause the traces on the gun to be removed.

2. Household items (e.g., glasses, sugar bowls, bottles) should not be wrapped with adhesive tape. In this case, high humidity, moisture, and touching may remove the traces from the objects.

3. The knives as objects of research should not be wrapped in newspaper pieces and fastened with adhesive tape. In this case, the traces on the surface of the knife will disappear as a result of contact with the paper.

4. Leather bags, documents, wallets as objects of research should not be wrapped in plastic bags and adhesive tape. Moisture and friction can make traces disappear (Mammadli et al., 2005).

One of the features allowing to identify human fingerprints and palm prints is their ability to be reflected on various objects. This is due to the sweat glands in the nipple layer of the human fingers. Sweat glands are a peculiar variability of the epidermis, located at the edge of the subcutaneous sebaceous glands of the skin. The main components of sweat are water - 97.7% - 99.6% and inorganic substances fluctuate between 2.3 - 0.4% (Barnes, 2014). Sweat contains inorganic substances such as ammonia, potassium phosphate, calcium, sodium chloride, uric acid from organic substances, and fatty volatile acids. Therefore, when a human hand touches an object, the papillary patterns on the fingers are transferred to the surface of the object as a result of sweat and other substances.

More than a century of fingerprint history has established important methods and tools for detecting papillary patterns. In the special literature, trace detection methods are divided into physical, chemical, physicochemical, and microbiological methods (Yaremchuk, 2019). The methods to be used in detecting fingerprints on the objects entering the center are freely chosen by experts. However, expert experience shows that two groups of methods are distinguished by their decisive ability to detect fingerprints and papillary patterns on objects (Javadov et al., 2002):

– methods of high displacement of the edges of the papillary lines –thermo vacuum powder, iodine, soot method, etc.;

– methods detecting solvents at the level of papillary lines – most powders, chemical methods.

Experts are free to choose the method of processing the surface of research objects to detect traces. However, the individual characteristics of the subjects included in the study, as well as the probable duration of the formation of traces play a decisive role in the selection of the method to be applied by the expert (Stasiuk, 2022).

It should be noted that the factors determining the use of physical methods to detect fingerprints and fingerprint patterns on objects include the following:

– if the surface of the subjects of the study is oily, dirty, contaminated with blood and other substances;

– the surface of the objects sent for research consists of composite materials (for example, if the blade support is made of leather, wood or metal);

– in case of detection of traces on the subjects included in the study for up to 1 month.

Application of chemical methods in detecting fingerprints and papillary patterns on objects that cannot absorb the surface:

– when treated with cyan acrylic solution, traces of the object are covered with a white layer;

– this detection is carried out in special chambers (cabinets);

– larger objects are placed on the cameras during dactyloscopic examinations;

– rifles, automatic weapons, gun bearings, combs and sleeves are mostly placed in the MVC-3000 evaporator chamber in the dactyloscopic surveys to detect traces on the surface;

– when detecting traces longer than 6 months in the subjects of the study, more chemical methods should be applied.

In many countries of the world, cyan acrylic ester is used to detect handprints on objects. Although the substance used in this method is poisonous, the camera's security system only allows the door to be opened after proper filtration.

The research results and the importance of the traces detected for identification

When objects are chemically treated, areas with fingerprints and papillary patterns are detected on a white background as a result of the reaction of cyanoacrylate and water under a vacuum. When objects are processed physically, light-colored powders are used on dark-colored objects, and dark-colored powders are used on light-colored objects. This is when the anatomy phase of forensic

dactyloscopic studies begins. After processing the surface of the objects included in the study, the model "Crime-lite® ML PRO" is examined with an electric magnifying glass. At this stage, the permission form, its coordinates, the direction of papillary line flows, and the pattern types are determined.

According to the results of the examination, fingerprints, and papillary patterns were detected on 40 items received by the Center, which makes this result "positive". Fingerprints and papillary patterns were not found on other subjects for various reasons. There are two main reasons for the "negative" results of subject research:

- absence of traces on objects;
- no traces detected on objects (expert research).

Reasons for not reflecting traces on objects in special literature are grouped as follows (Morgan, 2023):

- poor ability to trace the surface of the objects submitted for research (for example, leather wallets, lighters, etc.);
- the area requested in the decision is too small (for example, a gun trigger);
- weak sweat secretion of the object (person) leaving a trace.

Thus, expert experience shows that, according to the research, the reasons for the absence of traces on the objects can be attributed to the following factors:

- sending the object of research for examination after a significant period of time after the crime was committed;
- inadequate packaging of objects found at the crime scene when they were sent for examination.

Sometimes a positive result for research is not as important as a positive solution for the investigation. Thus, the detection of traces on objects during the research, although considered a positive result of the study, is not relevant to the investigation, as no identification was carried out. For this reason, after checking the quality of the traces on the objects, the quantitative category of those traces should be checked.

This quantitative criterion of the dactyloscopy definition was calculated in the early twentieth century by the French criminalist V. Baltazar, and in modern times it was proposed to call these criteria dactyloscopy standards. V. Baltazar determined 12 quantitative standards of dactyloscopy with his research. Quantitative criteria equal to 12 have long been used in the practice of judicial and expert institutions in many countries (Barnes, 2014). Currently, 12 units are taken as a quantitative criterion for identifying traces in Azerbaijan, Australia, and several other countries.

The insufficient productivity of experts in the field of criminology responsible for the study of fingerprints, and the increase in the assignment of forensic dactyloscopy examinations are one of the factors contributing to the need for generalizations and the development of methodological recommendations in this area.

Recommendations for taking and packing research samples for forensic dactyloscopic examination during on-site inspection

The purpose of preparing recommendations for taking and packaging research samples for examination at the crime scene is to ensure a positive solution to the diagnostic and identification expert examination by protecting the traces from distortion and damage. Thus, the purpose of preparing recommendations for the seizure and packaging of samples for examination at the crime scene is to ensure a positive decision of diagnostic and identification examination by protecting traces from distortion and damage.

To obtain a positive result of forensic fingerprinting conducted to detect hand traces on objects found during the inspection of the scene, it is recommended the following be done:

1. Objects taken from the crime scene should be sent for investigation as soon as possible;

2. The items sent for forensic dactyloscopic examination should be packed appropriately, considering the characteristics of the surface. To obtain a positive result during the investigation of the dactyloscopic examination, the following rules should be followed to ensure the quality of fingerprints and papillary patterns when sent for expertise:

a) when items that are likely to leave a trace are sent for dactyloscopic examination, they should not be packaged together with any other items;

b) the surface of these objects should be kept in space, ensuring that the space is narrow and doesn't affect the surface packed;

c) tools, cold steel, pistols and shotguns should be placed on specially designed supports, then placed in a box and fixed in several places so that the items don't move;

d) packaged items should be placed in boxes and cases, tied with string, sealed, and attached with appropriate notes.

3. If possible, the possibility of taking traces at the crime scene should be considered by experienced experts on the objects found at the crime scene.

4. When asking about the trace area, the characteristics of the reflection of the trace on the object should be taken into account (for example, the formation of traces during dynamic or statistical movement).

5. During the on-site inspection, the investigator should invite an expert to remove fingerprints on the object of the crime and other objects likely to leave traces (for example, in addition to a knife, it is recommended that traces be taken on surrounding objects that the perpetrator could touch before the conflict).

Discussion

Investigation of crimes is a dynamic process that requires more effective use of special knowledge. Criminalistics as a science is designed not to leave any crime unattended. The more diverse and individual a crime is, the more unique the traces thereof will be. Special scientific knowledge is applied in the detection, seizure, and packaging of traces of crime, so it shall be applied in forensic activities. In the legal and special literature, scientific knowledge is defined as a system of scientifically grounded experience and information relating to a particular area of human activity, and this information is obtained as a result of interaction between theory and practice in a specialized professional activity in certain areas. The content of specific knowledge includes professional experience, habits, and skills (Javadov et al., 2002).

According to Law of the Republic of Azerbaijan No. 758-IQ "On forensic activity" (1999), forensic examination is defined as a study conducted based on special scientific knowledge of material objects, events, and processes that contain information about the case under investigation by the preliminary investigation body or the court (judge). Based on the essence of both concepts, one can conclude that a forensic examination is a procedural form of application of special scientific knowledge in criminal cases (Vapniarchuk et al., 2021). However, it should be noted that the procedural application of specific scientific knowledge is also possible with the participation of a specialist. This issue is also reflected in the legislation. However, unlike experts, the specialists don't conduct research on objects, but assist law enforcement agencies in matters related to their expertise (Bakishev et al., 2019).

The main type of examination conducted at the center is the forensic dactyloscopy examination. Due to the large number of research objects of this examination, various methods are used to resolve the issues raised thereby. Dactyloscopy is the study of the structure and properties of papillary patterns covering the human hand, finger, and palm for identification, registration, and search for criminals. Dactyloscopy has a very broad scientific, theoretical, and legal basis and is almost one of the first types of examination.

Fingerprint identification dates back to ancient China, where thumbprints on clay seals as a means of recording business transactions were used. Dactyloscopy has more than a century of history and has a high level of

development of theoretical and practical problems of forensic investigation of hand traces, identification, and registration of persons by mapping papillary patterns (Khanov et al., 2016). The history of the dactyloscopy method dates back by several centuries. In 14th century Persia, a physician noticed that among all the fingerprints recorded on various government documents, no two were the same.

W. Herschel (1880) created his file cabinet, where he recorded the fingerprints of many people. As a result of regular and painstaking work, it was discovered that the fingerprints of one person never coincide with the fingerprints of another, as the papillary lines always form a unique pattern. W. Herschel (1880) later became convinced that fingerprints remain unchanged over time, which eventually made him realize the practical significance of his discovery.

In parallel and independently with W. Herschel (1880), the problem of studying finger patterns was the Scottish missionary physician H. Faulds (1880; 1922). H. Faulds (1880) identified a man suspected of drinking from a hospital locker by analyzing a greasy fingerprint. H. Faulds also recommended the use of printer ink to record fingerprints because they dry quickly and are permanent. After H. Faulds (1880) managed to identify the fingerprints found at crime scenes with those of criminals, it became apparent that a "method of proof" that would change the way the police work had been discovered.

A special role in the development of fingerprinting science belongs to E. Henry (1900), Inspector General of the Bengal Police in India. Inspired by F. Galton's (1892) work and having communicated with the author, E. Henry (1900) came to the problem of the practical implementation of fingerprinting. E. Henry (1900) is the creator of the classification, based on the identification of the five main patterns of fingerprints, only a magnifying glass and a needle were used for identification, designed to facilitate the search for fingerprint patterns.

J. Morgan (2023) examined 732 wrongful convictions associated with false or misleading forensic evidence. A typology was developed to categorize factors related to forensic errors, including misstatements, classification errors, testimony issues, trial-related problems, and evidence handling/reporting issues based on fingerprints, among other things. In turn, T. Ward (2020) proposes that the reliability test should be similar to the one used in the law of hearsay, where expert evidence must be potentially safely reliable in the context of all the evidence presented. The author considers fingerprinting to be one aspect of the reliability of the verdict, as this type of examination is a rather important piece of evidence that gives the possibility to pass a fair verdict.

U.U. Deshpande et al. (2020) propose an end-to-end fingerprint matching system for Automatic Latent Fingerprint Identification Systems (AFIS). The system aims to enhance the quality of poor fingerprint images and extract reliable

minutiae to improve matching results. The proposed Frequency Enhanced Minutiae Matcher (FEMM) algorithm calculates a matching score based on the extracted minutiae. Experimental results on various fingerprint databases show significant improvements in precision, recall, and F1 scores. The system achieves a high Rank-1 identification rate of 100% for certain databases and outperforms state-of-the-art AFIS systems.

According to M.O. Ezegbogu and Ph. Iko-Ojo Omede (2023), while fingerprints are considered unique and persistent, they have been criticized for occasionally leading to wrongful convictions. Errors in fingerprint analysis can be attributed to cognitive bias, non-conforming regulatory standards, and ethical misconduct. The article examines the types and causes of these errors about the common law requirement in Nigeria and other Commonwealth countries to prove criminal charges beyond a reasonable doubt. Additionally, it addresses the challenges of using forensic fingerprint analysis in developing countries criminal justice systems and explores potential solutions to these issues.

Conclusions

The practical and technical problems of the detection of fingerprints by forensic experts on the objects of research in the example of Azerbaijan were considered. The article proposed the use of innovative methods, tools, and modern technology in the process of detecting fingerprints on the objects of investigation, as they proved to be effective for fingerprint examinations.

As a result of scientific research, the reasons for the absence of traces on the objects of investigation during the forensic fingerprinting examination were revealed, the efficiency of methods used during such examinations was evaluated, and recommendations for experts and law enforcement officers were given.

Nevertheless, the investigators do not make full use of forensic methods and means when working with traces of the crime. Therefore, materials sent for examination turn out to be of poor quality, incomplete, and improperly packaged. In some cases, traces and objects are improperly seized or discarded during the seizure due to ignorance of the rules of seizure and the packaging of physical evidence by investigators. Improper seizure and packaging of items that may leave traces at the crime scene will destroy latent traces (i.e., invisible or weakly visible traces). Thus, the analysis of errors by investigators, forensic experts, and specialists is of particular importance in the process of providing evidence-based recommendations for practice.

Therefore, constant analysis of investigative and expert practice in the appointment of fingerprint examinations is a prerequisite for the effective work of law enforcement agencies and experts. Further scientific research should focus on

innovative technologies in the detection, fixation, and seizure of fingerprints at crime scenes, as well as in the process of fingerprint examinations.

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