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THE FORENSIC TECHNIQUES

EDUCATIONAL MANUAL

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The textbook outlines the general provisions of forensic technology, reveals the content of individual branches of forensic technology, and examines modern approaches to working with various types of material traces.

The manual is intended for cadets, trainees, students, graduate students and professors and teachers of legal educational institutions and law enforcement officers.

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INTRODUCTION

The establishment of Ukraine as a legal and democratic state of the European model requires an effective mechanism for responding to contemporary challenges and threats, aimed at ensuring proper law and order.

One of the key conditions for protecting the rights and freedoms of citizens, as well as the interests of society and the state, is enhancing the effectiveness of crime prevention and counteraction, including through the application of forensic methods and tools.

In this regard, in recent years, there has been a noticeable trend and the creation of conditions for establishing new international connections, which, in turn, implies the involvement of foreign specialists in criminal proceedings to provide practical assistance, as well as inviting domestic experts to other countries for experience exchange and professional qualification enhancement, among other things.

Therefore, proficiency in foreign languages has become especially relevant in today's context.

The purpose of creating the "Forensic technique" manual is to provide the opportunity to master the English language as a means of communication to successfully carry out professional activities in the field of forensic support of pre-trial investigations.

The textbook systematically presents both theoretical and practical material on the classical areas of forensic technique, including: general provisions of forensic technique; forensic photography and videography; forensic analysis of traces (tracology); forensic analysis of papillary ridge traces (dactyloscopy); forensic analysis of firearms, cartridges (ammunition), and traces of their use (forensic ballistics); forensic analysis of cold weapons and traces of their use; forensic analysis of explosives, devices, and traces of their effects (forensic explosives expertise); forensic analysis of handwriting (forensic graphology); forensic vehicle identification; forensic analysis of documents; forensic analysis of human physical appearance (habitology); forensic analysis of scent traces (odorology); information

and reference support for law enforcement activities (forensic registration); information and analytical support for the activities of the National Police of Ukraine.

To enhance the practical focus of teaching forensic science, each chapter of the textbook is concluded with self-assessment questions.

The authors' scientific perspectives presented in the preparation of this textbook are based on previously published works in the fields of criminalistics, criminal procedure, forensic examination, and criminal law, as well as materials from investigative and judicial practice.

This textbook is intended for use by students, post-graduates, teaching and research staff at legal higher education institutions, law enforcement officers, judges, lawyers, and other legal professionals.

In recognizing the contributions of all scientists who dedicated their lives and careers to the development of the theoretical foundations of criminalistics in general, and to specific provisions of the discipline in particular, the authors sincerely thank the leading criminologists and practitioners who assisted in the preparation of this textbook. Comments and suggestions from readers, whether published in scientific journals or submitted to the Department of Criminalistics and Forensic Medicine of the National Academy of Internal Affairs, will be greatly appreciated.

CHAPTER I.
GENERAL PROVISIONS OF FORENSIC TECHNOLOGY

1.1. Concept, system and tasks of forensic technology.

In consideration priority of the person and citizen interests the current state of crime is evaluated by a possible hazard to the nation and required the development of new equipments and methods for crime prevention.

Stiffening of organized crime activity, arrangement, armament, technical equipment of criminals requires an appropriate level of forensic equipments, investigation and prevention of criminal offences. One of the sources of such advances in law enforcement is a separate section of forensic science, it is criminal investigation technology (forensic technology).

On the one hand, the term "forensic technology" refers to the section of forensic science and on the other hand, to a set of techniques which are used in criminal proceedings. In historical perspective, the techniques had their beginning as special tools of work, which expanded cognitive opportunities of the investigator, the officer of criminal investigation (detective), the expert. Later, they obtained the functions of material sources research, and then – the expert evaluation and presentation of evidence in criminal proceedings. Consequently, the tasks and subject of forensic technology were formed.

As a part of forensic science, forensic technology is a system of scientific provisions and references that provide with the development of technical means (devices, tools, accessories and materials), and also, with methods and ways of their use in order to investigate and prevent criminal offences. Forensic technology has still remained such dual reference.

The scientific procedures of forensic technology are based on learning and usage of regularities of engineering, natural and other sciences (physics, chemistry, biology, anthropology, etc.), and also on certain forensic theories and doctrines

(doctrine of the traces mechanisms, the theory of identification, etc.). And it's all about development of technical means, methods and ways of intent the information acquisition from material evidence for learning the occurrence of a criminal offence and establishing the truth in criminal proceedings.

Forensic technology is tightly linked to other section of forensic science, and its provisions are implemented and realized, both in tactics of conducting separate investigative (search) activities and in methodology of investigation of certain types of crimes, which generally supports successful investigation.

The tasks of forensic technology are as follows:

- development of technical equipments and methods which ensure the introduction of new sources of forensic information into the investigation process;
- detection, recording, seizing and preservation of material traces of crime;
- determination of the mechanism of trace formation and the causes of their interaction;
- determination of properties, states, group affiliation and identity of objects-sources of information;
- processing and use of forensic information for investigation and prevention of criminal offences;
- development of methods and technical means for the assessment and use of forensic information in law enforcement activities.

The system of forensic technology is a subjective classification of scientific provisions based with due regard of the types (kinds) of traces of crime, as well as the distinctions of trace-indicating objects and tasks, resolvable in their examination. This classification introduces relevant learning in the structure which cover the main elements (branches) of forensic technique. The system of forensic technology consists of two parts: general provisions of forensic technology and branches of forensic technology.

The general provisions of forensic technology include the concepts, content and sources, and its connection with some branches of forensic science and other sciences; concepts and content of its constituent elements (branches).

The branches of forensic technology include:

1) Forensic photography and video recording - a set of scientific provisions and designed photo-, video tracking (recording) means and appropriate methods intended for collection, investigation and demonstration of evidence.

2) Trace evidence or trasology (forensic processing of traces) studies the patterns and occurrence of various kinds (types) of traces; develops tools, methods and ways of detection, collection, processing of these traces with the purpose of their further usage during investigation and prevention of offences.

3) Ballistics (the processing of usage of weapons, ammunition, explosives and their traces) studies the design patterns and operation of various types of weapons and traces of their usage, as well as, develops means, methods and ways for research of such objects and traces in order to use them during investigation and prevention of criminal offences.

4) Graphology (or grapho-analysis) researches the patterns of the formation, development and functioning of written language and handwriting, develops methods of writing and handwriting in order to identify the author of the manuscript, the authorship attribution (paternity) and other information which has implications for establishment of truth during investigation of criminal offences.

5) Forensic technique of documents examination involves the learning of regularities of documents producing and methods of whole or partial forgery of them; it also develops tools, methods and ways of such objects research, for using during investigation and prevention of criminal offences.

6) The anthropometry (identification of a person by appearance) is a study of the signs of a person's appearance, their material and ideal images, the method of using such signs when establishing facts that are important during the investigation of criminal offences.

7) The phonoscopy (forensics of sounds traces) is a forensic study about designated use of recorded sounds for investigation of criminal offences.

8) The odorology (forensic study of odor traces) is a system of scientifically established methods and technology of detecting, extracting, storing and studying of odor traces for further using in solving proper tasks.

9) Forensic processing of substances, materials and artificial products.

10) Criminal registration content involves developing of means, methods and ways of registration people, animals and other objects in order to investigate and prevent criminal offences.

The specified list of branches of forensic technology as a constituent element of forensic science is not exhaustive, because in the modern conditions of the development of social relations, new directions (branches) are being formed, namely: polygraphology, that is, the study of the reactions of the human body to socially significant issues, forensic entomology - the study of the peculiarities of insects development on the corpse and the nature of the damage caused by them, etc.

1.2. The principles, forms, concepts and legal reasons of forensic technology application.

Technical and forensic means, methods and ways are applied, as a rule, by those who are directly involved in the process of investigation and prevention of criminal offences. Such subjects include: investigators, experts, forensic inspectors, detectives, since they use forensic technology and special knowledge when working with evidence.

It is essential that proper storage of objects must be tend when applying some technical means or methods, as their destruction or even change may subsequently negatively affect the results of the investigation of a criminal offence and significantly complicate the process of proof. An expert is the only person who under certain conditions can employ a method that destroys or modifies the object in processing. Other participants of processing can use only technical and forensic

means and methods which will not bring changes of appearance or destruction the object.

The use of technical and forensic means and methods in the fight against crime is primarily determined by legality, that is, by direct enshrining in the law (or other regulatory acts), or recommended by law, or does not contradict the law in its essence.

The general legal reasons for the use of forensic equipments and methods are entrenched in the Criminal procedure code (CPC) of Ukraine. The article 25 defines: "The prosecutor and investigator are obliged within the limits of their competence to begin pre-trial investigation in each case of direct detection of signs of a criminal offence as well as to take all measures envisaged by law to establish the occurrence of a criminal offence and the person who committed it". To carry out the tasks of criminal proceedings, to ensure the prompt, complete, objective and comprehensive investigation of the event it is necessary to use all statutory means, including technical ones.

In the criminal procedural law there is no special rule that would contain a clear definition of the legal basis for the application of forensic technology; but at the same time, the article 273 in the CPC of Ukraine regulates the use of means applied during the conduct of covert investigative (search) actions.

In addition, it should be noted that certain provisions of the application of forensic technology are enshrined in the relevant articles in the CPC of Ukraine and relate to the determination of techniques and means of recording material evidence in conducting of separate investigative (search) actions, providing, where appropriate, the use of certain technical means. These norms are prerequisite for the use of special knowledge and technical means in criminal proceedings depending on the specifics of proper situation of the scene of event or the specifics of conducting an investigative (search) action. That is, the investigator selects a set of scientific and technical means, technical methods and ways which are necessary for the successful conduct of a separate investigative procedure (search activity) or investigation as a whole, depending on conditions.

The procedure for the application of forensic technology and special knowledge is regulated by departmental normative acts which are aimed at ensuring the implementation of criminal procedural legislation.

Proposals on the necessity of legislative consolidation of the complete list of all scientific and technical means, methods and ways that can be used during the investigation of criminal offences, do not find their embodiment in connection with the inability to foresee by law the whole range of methods and means of work with evidential information through its constant expansion and improvement.

The facts of the use of technical means during the investigation, as well as the materials obtained as a result of their application, require a mandatory processing.

It is expedient to demonstrate forensic technology application in the protocol according to the following scheme: where, when, in connection with which objects, who, for what purpose and which scientific and technical means were used, objects or information discovered or received as a result of technical means application. The protocol necessarily states that before the use of technical means, persons who participated in conducting an investigative (search) action were notified about it.

Replenishment of an arsenal of scientific and technical means used in the fight against crime during the criminal procedure should be carried out with observance of relevant principles, which may include:

- the principle of legality, according to which the use of any means of forensic technology should not contradict the requirements of the law and be aimed at respecting rights, freedoms and legitimate interests of citizens;
- the principle of scientificity (scientific justification), i.e. the guarantee of probability, reproducibility, accuracy and reliability of the obtained results, which are based on the achievements of natural and technical sciences. For this, any new method, technical means or methodology must first be tested and recommended for use;
- the principle of profitability - if obtaining the necessary results is possible with the help of various technical and forensic means, preference is given directly to

those whose application is associated with the least expenditure of time, effort and means;

- the principle of safety determines the inadmissibility of the use of scientific and technical means that may be a threat to the life or health of participants in the criminal process;
- the principle of effectiveness is a provision regarding the rational use of such technical means and methods that ensure fast, objective, complete and comprehensive obtaining of information that is important for a successful investigation, i.e. allow to achieve the best results in the optimal time.

1.3. Classification of means of forensic technology.

Special technical means of forensic science are scientifically determined, tested experimentally and in practice effective technical means that are used by the subjects of criminal procedural, expert, investigative and administrative activity.

The purpose of the forensic technology during the investigation is to collect and process evidence. For this, a wide arsenal of scientific and technical means is used, got from various natural and technical sciences, as well as devices and methods specially developed by forensic science.

Taking into account the content of the very concept of forensic technology, among forensic scientists there is a fairly large number of views and approaches to the basics of the classification structure of technical and forensic means, primarily due to the variety of grounds and criteria for their distribution into appropriate groups. Evaluating the system of technical and forensic means as a whole, we observe a constant expansion of classification groups, which is a consequence of the creation of new technical and forensic means.

1. According to the source of origin (by field of scientific knowledge):

- technical means developed in forensic science for the collection and research of evidence (special);

- technical means getting from other sciences or fields of knowledge, but adapted for solving special forensic problems;
- technical means getting from other sciences or fields of knowledge that are used to ensure the investigation of crimes without constructive change.

2. By purpose:

- technical means used by an investigator or a forensic expert to detect, extract and record evidence;
- technical means used for the investigation of material evidence during forensic examinations;
- technical means used to record the progress and results of investigative (search) actions;
- technical means used for the prevention of offences.

3. By special purpose:

- means of photo and video recording equipment;
- means of sound recording equipment;
- means of work with material traces for the purpose of their detection, recording and further research;
- means of analytical work;
- search tools;
- means of collecting, storing and processing information;
- additional means.

4. By type of technical means:

- devices and apparatus;
- tools and equipment;
- devices and materials;
- sets of scientific and technical means.

5. By place of use the technical means:

- means of "field forensics", that is, the use of which during the investigation is provided outside the investigator's office (expert's laboratory);

- laboratory (office) equipment.

6. By subject of use:

- technical means used by investigators (technical support of the investigator, technology of the investigator);
- technical means of investigative activity;
- technical means of expert research (expert technology, specialist technology);
- technical means of forensic prevention.

6.1. The technical means used by investigators allow to solve the problems of identifying, recording, researching and demonstrating evidence. The general technical means used by the investigator include: means of illumination, measurement, recording, researching and concentration of forensic information, as well as optical means.

Means of lighting or lighting equipment are used for artificial lighting of areas, premises, objects or people during forensic and preventive activities. Such means are used as stationary and portable sources of lighting for household or special purpose. Lighting means depending on the nature of the spectrum of radiation are divided into: ordinary, ultraviolet infrared and laser.

Optical means are devices used to identify sources of information that are not perceived by the human eye. To optical means we can include magnifying glass of different multiplicity of increase and destination (fingerprinting, measuring, textile with illumination for work with tracks, binocular), microscopes (biological, metallographic, comparative, luminescent, polarizing, measuring, stereoscopic).

Means of measurement or measuring equipment are used for the following tasks: for measuring length (rulers, folding meters, measuring tapes, calipers, micrometers); for measuring angles (protractor, angle meter, angle grid); for measuring areas (metric grids); for measuring the volume of liquid materials (beakers, measures); for measuring body weight (weights of different classes); to determine elasticity of bodies (hardness gauges, manometers).

Means of recording are devices, equipment, technical kits, materials by help of which it is possible to record, copy, simulate or preserve the source of information on a material medium. In general, the concept of "means of recording" can be interpreted very widely, since the use of these means is the recording of the source. In the future, the use of recording means allows to solve identification tasks.

Means of concentration and processing of forensic information. The need to collect and concentrate information on criminal offences committed in the past to address urgent needs during the investigation arose at the stage of the origin of forensic science, since the experience of the past has always been an example for cognition of the present.

The means of concentration and processing became records and card files of various traces of crimes, of persons who had previously committed crimes, collections of means of committing crimes and objects with their traces. With the beginning of the computerization of law enforcement activities and the entire process of criminal justice, new means of collecting, storing and processing information appeared. Today, the means of processing, concentrating and storing information are also technical complexes of electronic computing equipment with software tools that allow inputting, processing and storing the original information.

6.2. Technical means of investigative activity. By purpose, they represent the mainly the means of field forensic science, that is, equipment, devices, materials and accessories that are used not only by detectives, but also by investigators during the investigation of criminal offences. The technical means of investigative activity by their essence have been divided into three types:

- Operational equipment is a system of technical means that are used in operational activities, mainly covertly.

- Special equipment is technical means, which include devices, materials and substances that serve to collect information by covert methods. Such means are characterized by small sizes, usually masked under everyday objects of the furnishings, clothes or tools, functioning remotely or in offline mode.

- Special means are rubber batons, handcuffs, light-emitting diode devices, water taps, etc.

The main difference between operational technology and forensic technology is not the qualitative characteristics of the technical means, but the procedural and methodological aspects of its use. Forensic technology, unlike operational one, is used during investigative (search) actions, and the results of its use give rise to procedural sources of evidence.

6.3. Technical means of expert research. The forensic units have laboratories of a certain profile, which is determined depending on the category of performed research. They have concentrated expert means for fingerprinting, trasology, ballistic research, forensic research of papers, manuscripts, melee weapons, etc. The profile of the laboratory is determined by the specifics of technical equipment and research methods. Technical means of expert research may be classified as follows: measuring equipment, lighting and image reproduction equipment, laboratory and microscopic equipment, technical means of research in invisible rays, microparticle and odor research tools, means of computerization and automation.

Measurement techniques are devices designed for complex and accurate measurements of solids, gaseous objects, cavities, temperatures and microscopic objects. Measuring techniques of expert laboratories is primarily characterized by the possibility of conducting measurements of any physical bodies in aggregate states.

Lighting means are fluorescent lamps, incandescent lamps, as well as sources of ultraviolet, infrared, X-ray and laser lighting. The category and power of the source of lighting are choosing depending on the specific situation and tasks solved by the expert.

Means of image reproduction provide reproduction of the researched object, its characteristics, research results. Obtaining an image involves the use of various methods, but the most traditional include photography, thermography, holography, etc.

Laboratory equipment are instruments and devices that act as auxiliary means for conducting research on objects. Laboratory equipment can include means of

packaging and storage of physical evidence, tweezers, magnifying glasses, tripods, energy sources, means of heating, modeling, etc.

Microscopic equipment is a mandatory element of any laboratory and an integral toolkit of an expert. Regardless of the research profile, expert laboratories are equipped with optical (biological, fluorescent, ultraviolet, metallographic polarizing, stereoscopic, measuring, projection), electrical, scanning and tunneling microscopes.

Technical means of research in the invisible rays of the spectrum are devices with the help of which it is possible to conduct research of material evidence in the ultraviolet, infrared and X-ray parts of the spectrum.

Means for the study of microparticles and odors are sets of optical devices and micro-instruments designed to work with micro-objects, as well as sets (an ophthalmic suitcase) for the study of odor traces using physical and chemical methods.

Means of computerization and automation is a system of technical means that allows the formation of individual and spectral data banks, obtaining background information, creating specific research methods.

It is necessary to take into account the fact that during the research the expert can use the means and methods from any branches of science and technology, the involvement of which is necessary for the full solution of the tasks set before him, therefore it is practically impossible to provide an exhaustive classification of means of expert technology.

6.4. Technical means of forensic prevention. Means of forensic prevention should be categorized according to the kinds of preventive tasks on the following groups:

- technical means used to identify facts that contributed to the commission or concealment of criminal offences;
- technical means of protection of objects against criminal encroachments;
- technical means that create the conditions for the emergence of additional traces in the scene of the commission of a criminal offence;

- technical means of obtaining information on criminal offences that are being prepared;
- technical means of exerting an active psychological influence on persons inclined to commit offences.

1.4. Methods of forensic technique.

Improvement of forensic means, expansion of scientific and technical possibilities of forensic science by attracting knowledge from other branches of science, activates the problem of identity of science. It is well-known that the effectiveness of the use of technical and forensic means of detecting, recording and researching traces during the investigation of offences from the methods of their use, as well as the level of technical literacy, is directly related.

In philosophical dictionaries, the term "method" (from the Greek methods is a way, a method of learning, tracing) is defined as a way to achieve a certain goal, a set of techniques or operations of practical or theoretical development of reality.

Technical and forensic methods are a set of methods, means and techniques, with the help of which the cognitive capabilities are expanded and material sources are investigated for the purpose of identifying information that has a certain procedural or evidential value, and are widely used in the practical activities of the investigator, operational worker and expert.

The basis of the forensic method consists of technical means (tools) and objective regulations of science and technology, on the basis of which various devices and instruments for the implementation of various types of practical activities of the investigator, detective, forensic expert. Much of forensic technology is got from various branches of science and technology and is common, and methods of using it in forensic science are not much different from the use in the maternal industries. That is, the structure of the forensic method as a mandatory element must

include the appropriate tools, on the basis of which the classification can be carried out.

In view of the constant creation and introduction of new technical and forensic tools into the procedural activity, the number of approaches to the classification criteria of methods based on them is constantly growing, updating or changing. Thus, according to the types of technical means used during the investigation, technical and forensic methods are divided into photographic, microscopic, spectrographic, and computer methods; by field of scientific knowledge: chemical, physical, biological, cybernetic; according to the tasks that are solved during the research: organoleptic, searching, analytical.

The most common among the existing classifications of technical and forensic methods is their distribution by purpose to the methods used by an investigator or detective to identify, record and previous research of material sources of information (methods of field forensic science) and research methods used by the expert during the conduct of forensic examinations (methods of laboratory forensic science).

Methods of field forensic science:

1. Organoleptic methods are methods by which the process of cognition by the subjects of the procedural activity of any information sources is initiated, with the help of the senses (sight, hearing, touch, etc.).

2. Measurement methods are methods of using measuring equipment and measurement principles to create measurement information. They are divided into organoleptic measuring and instrumental measuring methods.

2.1. Organoleptic measurement methods are methods by which an object or magnitude is matched in an imaginary way by a dimension or by a specific metric sample. The disadvantages of using such methods are, first of all, that the results obtained with their help have approximate or inaccurate values.

2.2. Instrumental measurement methods are one of the types of measurement methods and consist in comparing (comparative) the object being measured with a standard metric measure. Instrumental measurement methods are divided into three groups: contact, non-contact and combined measurement methods.

2.2.1. Contact methods of measurement: bringing the measuring instrument in direct contact with the object being measured and reading the information received (measured distance between the objects with the ruler).

2.2.2. Contactless measurement methods: the procedure of contactless measurement is reduced to a comparison of the unit of measurement (scale) with the optical image of the object being measured (an increase in the microbe is compared with the scale of the microscope's eyepiece).

2.2.3. Combined methods of measurement: the essence of such method is the use of contact and non-contact method of measurement simultaneously.

3. Photographic methods: methods of high accuracy of recording sources of information and the objectivity of their reproduction. Photographic methods are divided into storage, measuring, contrasting, signaling, color separating, stereoscopic, holographic, electrographic, thermographic, radiographic, cinematographic.

The essence of the application of laboratory methods consists in conducting a study of objects, phenomena or processes containing information about the circumstances of the commission of a criminal offense by a person who possesses scientific, technical or another special knowledge (expert).

Methods of laboratory forensic science:

1. Physical research methods are the most common methods for any laboratory. With the help of such methods, the permissible visual ability of a person to detect and investigate weakly visible or invisible features of objects increases. When applying physical methods, optical, polarizing, luminescent, measuring, spectroscopic and other instrumental means are used.

2. Chemical research methods: the objects of chemical research are substances and objects of the material world, with the aim of establishing their composition, origin, homogeneity or heterogeneity. Many chemical methods are combined with physical ones, forming physicochemical methods. Of the classic chemical methods, polarographic, chromatographic and spectral are most often used.

2.1. Polarographic methods are a variety of electrochemical methods of analyzing substances for the purpose of identifying the regularities of chemical

reactions in time, the dependence of these regularities on external conditions, as well as the mechanisms of chemical transformations.

2.2. Chromatographic methods allow to quickly and reliably determine the content of individual components in mixtures, concentrate and identify these components.

2.3. Spectral methods: the essence of the methods is to study the optical spectrum of a substance in order to determine its composition.

3. Biological methods. The objects of biological research are objects, microparticles of plant origin (wood, products from it, charcoal, plants and their parts) and animal origin (hair, wool, feathers, down and products from these materials). Biological methods include: botanical, spore-pollen, ichthyological, ornithological, virological, genetic engineering, histological, embryological, etc.

4. Microscopic methods. Research conducted with the help of such methods makes it possible to expand the visual perception of a person with the help of optical and electronic means. The objects of research of these methods are microparticles that cannot be distinguished by the human eye.

5. Research methods in ultraviolet rays. With the help of such research methods, it is possible to restore etched, washed-out texts in documents, on fabrics and other objects, to differentiate loose substances (soil, dyes), fuel and lubricant materials, biological objects (spores, seeds), blood stains, semen, saliva.

6. Methods of research in infrared rays. During research using such methods, it is possible to read texts covered with a thin layer of wood, paper, dye, permeable to infrared rays.

7. Research methods in X-rays. X-rays can penetrate objects of inorganic and biological origin; therefore, they are used to search for hiding places, reveal hiding places in suitcases, postal items, containers, etc. (with the help of special devices and installations).

8. Luminescence analysis is a modern highly sensitive method, which is based on the property of objects of the material world to luminesce when exposed to ultraviolet, infrared, X-rays and other parts of the electromagnetic spectrum.

9. Cybernetic methods: a generalized concept that combines the methods of informatics and computer technology, which are used to collect, process and store information in information databases using computers and special programs.

10. Spectral and adsorption analysis methods belong to the methods of studying the elemental composition of a substance. They are used to determine the quantitative characteristics of a substance at the level of group affiliation (ammunition, drugs, adhesives, dyes, liquids).

An important aspect of any scientific method in general, as well as technical forensic methods in particular, their integral part, is the mandatory requirement for unconditional objectivity in the application of the necessary method and the inadmissibility of further subjective interpretation of the obtained results.

Self-Assessment Questions:

1. The concept of forensic technology.
2. The task of forensic technology.
3. The structure of forensic technology.
4. Subjects, principles and legal grounds for the application of forensic technology.
5. Methods of forensic technology.

CHAPTER II.
FORENSIC PHOTOGRAPHY AND VIDEO RECORDING

2.1. General principles of forensic photography.

Forensic photography is a system of scientific principles and photographic methods, techniques and means developed on their basis, which are used in the collection and analysis of evidence for the investigation and prevention of criminal offences, search and detection of criminals.

The purpose of forensic photography during investigative (search) process is to capture objects, actions related to them, actions of participants and the environment in which investigative actions are carried out more completely. Forensic photography includes photographic methods, techniques and means.

The methodology of forensic photography is a set of rules and recommendations for the selection of photographic equipment, shooting conditions and processing of the obtained images to get photographic images that meet the purpose and requirements of capturing and examining material evidence.

Shooting technique is a set of rules and recommendations for the correct choice of shooting points, direction and distance of shooting in relation to each object of photography.

Photographic equipment includes camera equipment, accessories, software for processing photographic images, as well as materials for obtaining photographic images.

In forensic science, it is generally accepted to divide crime scene photography methods into operational forensic and forensic research methods.

Operational forensic photography is a system of scientific principles, types and techniques of shooting used during investigative (detective) process.

Typical objects of operational forensic photography are: traces that carry information about a criminal offence and identity of an offender; the situation at a

crime scene or the identification of its traces; general appearance, features and characteristics of tools of a crime and objects connected with it causally; description of a person for identification, search and registration; the process and result of investigative (search) activity.

Forensic - research photography is used in expert activities.

Typical objects of forensic photography are hidden, non-obvious features and signs of traces and physical evidence (e.g. microtraces on the cartridge case, details of handwriting, strokes of preliminary preparation during the execution of a forged signature, etc.). Research photography is often carried out with a camera attached to a special device: a microscope, a spectrograph, profilograph-profilometer, electron-optical converter. Photographic images of the forensic objects under investigation are attached to the expert opinions, substantiate and illustrate their conclusions based on the research results.

2.2. Forensic photography techniques.

1. Panoramic photography is a method of taking a photo with a change in the usual ratio between the sides of a photographic frame by increasing its length. Panoramic photography means that the subject is photographed in parts so that each next shot continues the previous one. The result is an expanded photo in which the object is captured in complete detail and at a sufficiently large scale. Depending on the objects being photographed, panoramic photography can be linear, circular, tiered or spherical panorama.

Linear panorama. The objects of this shooting are forensic objects that have significant linear sizes or are located along a certain line. Shooting is taken along a certain line parallel to the frontal plane of the objects.

Circular panorama. The objects of this shooting are forensic objects, located in space at a great distance. Here, a series of photographic frames, but unlike a linear

panorama, the shooting point remains the same, and each subsequent frame is captured after the camera is rotated by a certain angle in the horizontal plane.

Tiered panorama. The objects of this shooting are forensic objects located in space not in a straight line and not in the arc of a circle, but at different levels or shifted to the sides in relation to each other.

A spherical panorama (virtual panorama, 3D panorama) is one of the types of panoramic photography. A spherical panorama is based on an image assembled from a large number of individual frames in a spherical or cubic projection.

A characteristic feature of spherical panoramas is the maximum possible viewing angle of space (360×180°).

Technical means of panoramic shooting: ordinary or panoramic camera; tripod; panoramic head; level panoramic head.

2. Measurement (metric) photography is a system of recommendations on the techniques of photography and technical means used to obtain images, which allow you to establish the true sizes of the objects and the distances between them.

Types of measurement photography: with a linear scale; with a depth scale; with a square scale.

Photographing with a linear scale means that forensic subject is photographed simultaneously with a scale - a ruler with contrasting centimetre and/or millimetre markings.

Depth zoom photography is used when it is necessary to capture forensic objects located at different distances from the camera in depth. It allows you to restore the size of objects and the distance between them.

The depth scale is a long tape with divisions equal to the focal length of the lens. Each division should be equal to the main focal length of the lens. Square-scale photography is a type of depth-scale measuring survey. For this purpose, a square is made of cardboard with sides equal to or a multiple of the double focal length of the lens used or a multiple of the number of focal lengths, usually 50×50 cm or 1×1 m.

3. An identifying (signallet) photograph is a photograph intended to capture a person's appearance for the purpose of registration, search and identification.

According to the rules of identification photography, pictures are taken:

- persons arrested and convicted of criminal offences, to verify their identity at the stage of pre-trial investigation, trial and in places of detention, as well as to trace them in case of escape;

- detained on suspicion of committing criminal offences for the purpose of registering these persons for the further presentation of photographs for identification by victims;

- unidentified corpses - to identify the victims.

During signallet (identifying) shooting of living persons, four pictures are taken sequentially: three busts - right profile, full-face and with the head turned to the right (half profile), and a full-length full-face picture.

Identifying photography is carried out under lighting conditions that allow you to best reveal the relief of the face and its features. As a rule, combined lighting is used, which consists of one sufficiently intense light source and a screen made of white cloth or paper. A source is placed at a distance of 1.5-2 m from the person, in front and to the left of him/her, slightly above the level of the head. Place the screen to the right of the photo subject so that the reflected rays illuminate the shaded parts of the face.

All bust images of a signallet image are made on the same scale, which is 1/7 of the original size.

The purpose of the identification photograph of a corpse is to establish the identity of a deceased if it is unknown. The disfigured face of a corpse is first restored and ‘toileted’. The restoration of the face (giving it a lifelike appearance) involves stitching wounds, and the ‘toilet’ involves powdering the skin, painting the lips, etc. The face of the corpse should be photographed in front, both profiles (left and right), as well as in 3/4 of a face turn in both directions.

4. Reproductive method is a set of recommendations on techniques for taking photographs of texts, painting, diagrams, drawings, and other flat images to make photocopies.

The objects of reproductive photography are divided into two main groups according to the nature of the picture elements: stroke and halftone. Stroke documents are documents with all elements are arranged on a uniform background in the form of strokes, dots, and lines. Halftone originals are characterised by soft transformations from light to dark areas and include a gradation of tone brightness from maximum to minimum. These include photographs, paintings, and photo illustrations.

5. Macrophotography is a method of forensic photography that allows you to obtain images of small three-dimensional objects on a larger scale than in the conventional photography. This method of photography allows you to capture images with a 20x magnification of the subject. The ratio of the size of an object to its size in a photo is determined by the image scale. Scale is a ratio that shows how many times the linear dimensions of an image are larger or smaller than the linear dimensions of the object itself.

6. Microphotography is direct-magnification photography using a microscope to obtain images of small details of an object that are not perceived by the eye during normal observation.

7. Contrast photography is a method of photography that results in a photographic image with brightness or colour characteristics that are changed in relation to the object. Contrast is the relation between the brightness of individual parts of an object or image. Changing the contrast means choosing such methods of illumination of objects, camera software (graphic editors), the combination of which leads to an increase or decrease in the contrast of the obtained image in comparison with the contrast of the original.

The task of contrasting photography can be summed up as enhancing the visual contrast caused by differences in the colour of the object's details or in the brightness of monochrome details.

8. Colour-separated photography is photography that converts the colour shades of the object under study into differences in brightness or optical density in photographic images.

9. Ultraviolet photography is a method of obtaining photographic images in the ultraviolet spectrum to reveal features of objects that are not perceived visually. It is widely used to detect biological traces and fuels and lubricants, to determine differences in the characteristics of ink, paper, etc.; to restore the content of erased, faded texts, and in other cases.

10. Infrared photography is a method of taking pictures in the infrared region of the spectrum of features of various objects that are not perceived under normal conditions. This method is based on the ability of infrared rays to interact with materials and substances differently from visible ones.

2.3. Taking photographs during investigative (detective) actions.

Most often, filming techniques are used both in their entirety and in various combinations during the examination of the crime scene.

While taking photographs at the crime scene, it is necessary to record the setting in which the incident under investigation took place; the initial position and condition of objects containing information about the incident (everything that characterises the area or premises in which the offender acted or the consequences of the incident were detected; as well as the position and condition of the objects of inspection); the object that was targeted by the criminal acts (the object of the offence), its location, condition and signs that characterise the way the offender acts; traces of other actions and movements at the crime scene; the consequences of a criminal offence or event, the cause of which is being established; traces, evidences and objects that are important for clarifying and determining the nature of the incident.

Documenting everything discovered during the inspection of the crime scene requires adherence to a methodical sequence of photographs. This is achieved by performing orientation, survey, nodal and detailed photography (shooting techniques).

1. Orienting photography is photographing the scene in relation to the surrounding environment, terrain or premises. The task of such is to reflect the external conditions and circumstances of the event under investigation or its particular steps. The direction of orienting photography is chosen so that the frame includes the most important objects in the environment, possible ways of approaching and leaving the criminals. If the conditions do not allow you to capture the picture of the event in one frame, then orienting shooting is carried out using the panoramic method, making a linear or circular panorama of photographs.

2. Survey photography – is the recording of the scene itself, i.e. the area of the terrain (premises) where the event under investigation took place and where traces containing information about the event remained. The main purpose of survey photography is to record the location of objects against which criminal acts are directed, the consequences of the event, traces, material evidence and the location of objects in the scene in relation to each other. The boundaries of survey photography are the limits of the incident scene. During the survey photography, special signs in the form of plates with numbers are installed near the detected traces and objects (but the scene must first be photographed without them).

3. A nodal shooting – is a photograph of a group of objects, a single object or an area of the territory that has the greatest number of signs of material traces of an incident. Nodal images capture fragments of the crime scene environment. The objects of shooting can be broken doors during a burglary, damaged items during the destruction of property, cars at the scene of an accident, etc. The images should show the shape and location of these objects at the crime scene and in relation to each other.

4. The objects of detailed photography – are particular objects, traces: their shape, condition, structure, details and features are recorded. The scale and direction of the detailed shooting should provide for the capture and separate perception of all the features and characteristics of the subject.

First and foremost, traces and material evidence that cannot be removed from the scene for any reason or for which there is no certainty that they will not be

damaged or destroyed during removal and transport are subject to detailed photography.

Detailed photography is carried out after detection and inspection of relevant traces and material evidence. Objects and traces that may lose or change their characteristics as a result of external influences (wind, rain, snow, movement of objects, etc.) or other reasons shall be recorded immediately upon discovery or receipt of information about the location of such objects. Detailed photography is performed using the zoom method from a distance that is selected so that the subject occupies the entire viewfinder frame. This is done using the method of macro photography.

2.4. General principles of forensic video recording.

Forensic video recording - is a system of scientific provisions, technical means, methods and techniques used in the production, demonstration and storage of video films for the purpose of investigating and preventing criminal offences.

The system of forensic video recording includes technical means, imaging devices, operator and special techniques, tactics of using video recording during certain investigative (detective) activities.

The visual elements of video recording include linear composition, perspective (linear or tonal), image tonality, and lighting.

Camera techniques (static shots, vertical and horizontal panning, zooming in, zooming out, etc.) and special techniques (fast and slow motion) of video recording are necessary to achieve an illustrative effect of recording the process and results of investigative (detective) actions in dynamics.

The tactic of using video recording is chosen by the investigator, who coordinates the actions of the specialist operator depending on the specific investigative situation and investigative (detective) action.

Depending on the tasks and methods of their solution, forensic video recording is divided into:

- operational (fixing) recording;
- research (expert) recording.

In this case, it is possible to take orientation, overview, nodal and detailed shooting of objects (scene conditions, objects presented for identification, etc.).

Research recording - is carried out by an expert in a laboratory setting using special equipment and appropriate methods of researching material evidence (during an expert examination).

2.5. Imaging means, camera and special techniques of forensic video recording.

The imaging means of video recording include: linear composition, lighting, tonal and perspective resolution of the frame.

The use of imaging means and compositional elements should be aimed at accurate, consecutive and comprehensive recording of the object, as well as storage and transmission of facts of evidentiary value. Competent compositional construction of the video film as a whole and each frame separately is a guarantee of the reliability of information about the filming object.

The main camera techniques are: shooting with static shots, panning, zooming in and out.

Shooting with static shots is shooting with a still video camera, similar to photography, in separate but interconnected frames.

You can record static shots in general, medium, and close-up view. The frame boundaries are unchanged during shooting. Most often, this technique is used to capture objects, elements of the environment, and areas of the terrain. It is recommended to shoot general shots for at least 8-12 seconds, medium shots for 5-8 seconds, and close-ups for 3-5 seconds.

For better image detail, the duration of medium and especially close-ups can be increased.

Panorama (panning) is a camera technique for shooting with a video camera in motion. Panoramic shooting is most appropriate for recording large areas, enclosed spaces, and moving objects.

Two types of panning are distinguished by the way the camera moves: static (stationary) and dynamic. In addition, panning can be overview to capture the scene or the surrounding environment and accompanying to demonstrate and hold any moving objects and their actions in the frame.

Static (stationary) panning is performed by smoothly rotating the camera around the horizontal or vertical axis without changing the shooting point. Rotate the camera around the horizontal axis to get a vertical panorama, and rotate the camera around the vertical axis to get a horizontal panorama.

There is a recommendation that a video camera (with a normal lens) should be rotated every 90º when panning for 15 seconds. The panorama should have a beginning and an end, i.e. start and end with static frames lasting from 3 to 12 seconds, depending on the enlargement of the plan.

Dynamic panning is connected with changing the position of the shooting point. Tracking and tracking around an object are types of dynamic panning.

A tracking is the movement of a video camera in a direction perpendicular to the optical axis of its lens (or at a certain angle to it), which continuously brings new areas of space into view.

The tracking can be horizontal (for example, the camera travels along the street) or vertical (for example, shooting from the ground to the roof of a building). As a rule, the duration of panning in such cases is 15-18 seconds for small general plans, 10-15 seconds for medium ones, and 5-10 seconds for large ones.

Tracking around the object shooting is performed by moving the camera around the object. This technique is used to capture all information about an object (for example, damage to cars as a result of an accident).

Following panning shooting is performed while the camera and the subject are moving simultaneously. Such a panorama allows you to follow and keep within the frame the objects you want to focus on while they are moving. Following panning can be either stationary or dynamic.

Approaching and moving away a smooth transition from one shot to another. These techniques are used when changing the distance between the subject and the camera

Approaching is the movement of a video camera towards the subject in the direction of its optical axis, where the image scale of the main object is gradually enlarged and a number of elements of its surroundings are out of the frame.

Moving away - increases the distance between the subject and the camera along the optical axis of the subject. This reduces the image scale of the main subject and increases the overall image field.

Approach and move away by smoothly approaching (moving away from) the object, with the camera held firmly in hand, the plot-important detail is constantly in the centre of the frame.

During investigative (detective) actions, special video recording techniques may also be used: high-speed filming and slow-motion.

High-speed filming is a technique that allows you to shoot at a high speed of the camcorder's electronic shutter. This technique is used to record fast-moving processes or phenomena. High-speed shooting is used during investigative or forensic experiments when it is necessary to study in detail the mechanism of formation of certain traces or to understand the actions demonstrated by a suspect at a fast pace.

Slow motion is a technique that allows you to accelerate the movement of objects on the screen compared to real time. This technique is performed at a slower recording speed. When playing back such a video recording at normal speed, you can show the development of a long process in a short period of time.

2.6. Video recording during the inspection of the scene.

The necessity of using video recording during the inspection of an incident scene is caused by the numerous objects that are in complex space and time relations.

Only the most important episodes are subject to recording.

The objects of video recording during the inspection of the scene are:

- participants of the investigative (detective) action;
- location of the scene in relation to the environment;
- general view of the scene, peculiarities of the situation;
- certain areas of the scene (nodal elements) containing objects of interest to the investigation;
- certain objects, their fragments and traces.

At the beginning of the video recording, the participants in the examination should be shown: compulsory (investigator, witnesses, forensic specialist, etc.) and optional (other specialists, victim, witness, etc.).

The main part of the video is filmed after the investigator says: «The inspection of the scene has revealed...». The recording is carried out from the general to the specific: orientational, overview, nodal and detailed filming.

The location of an incident scene, especially a large one, is recorded relative to the main landmarks. It is recommended to perform orientation video recording from the upper points of the survey, distant from the incident scene.

An idea of the relative location of the elements of the scene of the incident is given by the orientation video recording. The recording is carried out in such a way that among the elements of the situation it is possible to establish the places of detection of traces, tools of a criminal offence, objects left by offenders, the location of objects in respect of which a criminal offence was committed.

During the nodal video recording, fragments of the scene and individual elements of the environment containing traces of a criminal offence, material evidence, and all changes in the environment made by the offender are recorded. The

video recording is carried out sequentially, moving from the starting point (for example, the entrance door to the premises) to other points of the investigated scene.

The objects identified during the inspection of the scene are recorded in their original (static) state. Then, the dynamic stage of the examination of the objects is filmed, and the actions of their direct confiscation are recorded.

Video recording of the general view of objects has its own peculiarities. It is carried out according to the rules of measuring shooting using two scale rulers located along adjacent sides of the frame.

While recording handprints, it is necessary to show the general view of the objects bearing these traces, the direct location of the traces on the surface of the objects, their general appearance, recorded according to the rules of large-scale photography.

Single prints are recorded according to the rules of measuring with a fixed video camera, and the track of prints is recorded using horizontal linear panning.

It is difficult to predict all the specific features of recording at the scene in advance, so typical scenario plans and schemes for the location of recording points can be adjusted directly during specific inspections.

Self-Assessment Questions:

1. The concept of forensic photography.
2. Types of forensic photography.
3. Techniques and methods of forensic photography.
4. Specific features of scene photograph
5. The concept and methods of forensic photography.
6. The concept of forensic video recording.
7. Basic camera techniques for forensic video recording.
8. Forensic video recording system.
9. Objects of video recording during the inspection of the scene.

CHAPTER III.
FORENSIC EXAMINATION OF TRACES
(TRACEOLOGY)

3.1. General provisions of traceology.

The term "traceology" comes from the French trace – trace and the Greek logos – doctrine and is understood as the doctrine (science) of traces.

Traceology is a branch of forensic technology that studies the theoretical foundations of trace formation, the patterns of occurrence of various types of traces that reflect the mechanism of a criminal offense, studies and develops technical and forensic means, techniques, methods of collecting and examining traces in order to use them for the investigation and prevention of criminal offenses.

In criminalistics, traces left after the commission of a criminal offense are studied for the purpose of its rapid disclosure, investigation and have evidentiary value for bringing the perpetrators to justice.

The traceology system consists of:

1. The doctrine of traces and the mechanism of trace formation;

2. Techniques and methods of detection, fixation and extraction of traces;

3. Examination of traces of reflections (hands, feet, teeth, clothes, burglary tools and tools, vehicles, traces of blood in their shape, etc.);

4. Examination of substances as traces of a criminal offense;

5. Study of objects as traces of a criminal offense (determination of the condition of individual items; establishment of belonging of parts to a single whole; establishment of the source of origin (party, group) by traces of production mechanisms).

Traceology is based on such scientific provisions of criminalistics doctrine, according to which:

1. Objects of the material world are individual in their external structure, regardless of any degree of similarity. Each object is individual and identical only to itself. Individualization of the object is carried out by the coincidence of general and individual features;

2. Relative stability of objects, i.e. objects of mechanical contact interaction can only be solids that have fairly stable external features;

3. The external structure of material objects is able, under certain conditions, to adequately reflect on other objects. The accuracy of the display depends on the physical properties of the trace-forming and trace-perceiving objects, the mechanism of trace formation. Based on materially fixed traces, it is possible to identify (establish the identity) of the object that left them;

4. The reflection in the trace of the external structure of the object is transformed (has the form of a negative). In the trace, the signs of the external structure of the object are predominantly mirrored.

3.2. The concept of trace in traceology. Mechanism of trace formation. Trace classification.

The commission of criminal offenses is accompanied by certain changes in the environment. Such changes are called traces of a criminal offense, which are a reflection of criminal actions, individual elements of a criminal act. In the forensic sense, the value of traces is due to the existing relationship between the criminal offense and its reflection (traces).

In modern criminalistics, the concept of a trace is considered in a broad and narrow sense. In a broad sense, traces are various material consequences, events, changes in the object and material situation that arose in connection with the preparation, commission and concealment of a criminal offense. Traces in this sense will be changes in the situation that have arisen as a result of a criminal act (the appearance of new objects, the disappearance of previously existing ones, a change in

the location of various objects); parts of destroyed objects (fragments of a knife, splinters of a headlight); remnants of any objects, things or substances (stains of substances, traces of blood); contact traces (hands, shoes, burglary tools); traces-objects (knots, locks, seals, cigarette butts), etc. Also, traces in a broad sense are whole complexes of material changes associated with a certain event (traces of a traffic accident, traces of a fire, etc.).

Traces in the narrow sense of the word are understood as reflection traces formed by direct contact (interaction) of at least two objects, and represent a materially fixed reflection on one object of the external structure of another object (for example, traces of burglary tools, feet, shoes, hands, vehicles, etc.). Reflection traces are the main subject of study in traceology.

The reason for the interaction of objects is any energy – mechanical, chemical, biological, etc. Under the influence of mechanical energy, traces are formed as a result of the movement of objects in space, the separation of a part from the whole, the separation of the whole into parts, and residual deformation.

The process that ends with the formation of a trace-reflection is called the mechanism of trace formation. The elements of the trace formation mechanism are: a trace-forming object, a trace-perceiving object, contact surfaces (areas of the surfaces of objects that they touch during the formation of a trace), trace contact (reflection of the way objects interact).

Depending on the nature of the occurrence of traces on the track-perceiving object, they are divided into three-dimensional and superficial. Volumetric traces are formed in cases when, during the contact of two objects, one of them, softer, deforms under the pressure of the other, as a result of which the trace-forming object is displayed in three dimensions (length, depth, width), reproducing its general and individual features, shape, size, surface structure. As a result of the occurrence of volumetric traces, either partial destruction of the trace-perceiving object or its deformation occurs. Such traces are: traces of shoes and wheel treads on wet ground; burglary tools – on a tree; firing pin – on the primer, cartridge case, etc.

Surface (planar) traces are formed when both objects in contact with each other either have virtually the same hardness, or one of the objects acts on the other with relatively little force. They arise as a result of the separation of particles from the surface of one of them and their adhesion to the surface of the other.

Surface traces are divided into layered traces and detachment traces. Traces-layers are formed due to the transfer of particles that are separated from the trace-forming object to the surface of the trace-perceiving object (a fingerprint on the glass). Traces-detachments, on the contrary, are formed due to the removal by the trace-forming object of particles of the substance covering the trace-receiving surface (fingerprints on a freshly painted surface, where paint particles peel off and stick to the fingers).

Superficial traces are also divided into: a) visible, which can be detected by direct visual perception; b) faintly visible (invisible), observed under certain conditions, for example, in the light or at a certain angle in side lighting; c) invisible, traces that cannot be seen without special means or devices.

Depending on the condition of the objects at the time of trace formation, static or dynamic traces appear. Static traces are formed during the contact of two objects, when at the time of trace formation they (or one of them) move in the opposite direction. During the formation of such traces, each dot on the surface of the trace-forming object leaves its corresponding reflection on the trace-perceiving object (fingerprints, shoe soles, etc.). Dynamic traces arise as a result of contact between two objects, when at the moment of trace formation they (or one of them) move parallel to each other. At the same time, each point of the trace-forming surface leaves a trace on the trace-receiving surface in the form of a line (trace) (traces of cutting, drilling, friction, etc.).

Depending on the place where changes occurred on the surface of the track-perceiving object, local and peripheral traces are distinguished. Local traces are traces formed as a result of changes that occur within the contact surface of the trace-perceiving object. Outside the contact surface, the trace-perceiving object remains unchanged. Peripheral traces arise as a result of changes that occur outside the

contact surface of the trace-receiving object (a trace of a vase on dust-covered furniture).

Traces in traceology are also classified depending on the trace-forming objects. There are four main groups of such traces:

- human traces: traces of hands (papillary patterns), gloves; traces of shoes, feet – barefoot, shod in stockings, socks; traces of teeth; nail marks; traces of body parts (lips, ears, forehead, nose areas, etc.); traces of clothing;
- vehicle tracks: track tracks of trackless vehicles; track chain tracks, etc.;
- traces of tools, tools and production mechanisms: traces of burglary tools; traces on locks and locking devices; traces on control seals and locking and sealing devices; traces of production mechanisms (tools) on products;
- animal tracks: footprints (paws, horseshoes) of animals; imprint of the brand (brand).

3.3. Footprints and shoe prints.

Footprints and shoe prints are imprints of morphological features of the structure of the feet, skin relief or relief of the sole of shoes. Footprints remain at the scene of any criminal offense, but for various reasons they are not always detected.

Footprints and shoe prints can be: static and dynamic (for example, formed when sliding on wet ground or snow); volumetric and superficial (layering and peeling); visible, faintly visible and invisible.

According to the type of trace-forming object, the traces in question are divided into human footprints, shoe prints and a track of footprints.

The footprint of a bare foot reflects the following anatomical features of the foot: toes, metatarsus, arch and heel. The structure of the skin of the sole of the foot is similar to the structure of the skin of the palms of the hands, there are also papillary lines with certain types of patterns. Footprints of bare feet have the same identification significance as handprints.

In the footprints of the feet dressed in stockings or socks, not only the general anatomical signs of the structure of the foot are reflected, but also the individual characteristics of the fabric: the nature of the weave of threads, the presence of seams, defects, etc.

A single footprint or several consecutive footprints or shoe prints may be found at the scene. When footprints are represented by one or more prints that do not reflect elements of a person's gait, they are called single. If a group of human footprints is represented, which consists of several (three or more) sequentially arranged prints of bare feet or shoes, such a combination of footprints is called a track of footprints.

Bare foot footprint measurement includes: the total length of the sole along the line running from the extreme point of the heel rounding to the intersection of a perpendicular line drawn from the extreme point of the big toe; the width of the metatarsal part of the footprint; the width of the intermediate part of the track; the width of the heel part of the footprint. The width of the metatarsal and heel parts is measured along lines perpendicular to the midline of the sole at the widest point, and the intermediate part – at the narrowest point.

The shoe footprint reflects the general features of the sole of the shoe: outsole, intermediate part, heel.

Shoe footprint measurement includes: the total length of the shoe footprint – along the line from the middle of the back edge of the heel to the middle of the front edge of the outsole; the length of the outsole is along the axis of the trace; outsole width – at the widest point; width of the intermediate part – at the narrowest point; length of the intermediate part; heel width and heel length – along the axis; the depth of the pick-up print.

The following features (elements) can be distinguished in the track of traces: 1) the line of direction of movement; 2) gait line, 3) stride width; 4) the angle of deployment of the foot. The track of footprints also has diagnostic value and allows you to draw conclusions about the direction and speed of movement, height, gender, physical condition of a person, etc.

Fixation and removal of footprints (shoes) is carried out according to the usual scheme: description in the protocol, drawing up a plan, photographing, removal of footprints together with trace-bearing objects or their copying. The seized traces are packed in compliance with the requirements that will ensure their safety during transportation.

When collecting such traces, preference should be given to their extraction in kind. Before starting any manipulations with traces, in all cases, each of them must be photographed according to the rules of large-scale photography, and the track of traces must be photographed by the method of linear panorama from above and perspective – in the direction of movement.

Three-dimensional footprints (shoes) are copied by making plaster casts. To do this, the footprint must be prepared and all foreign objects are removed from it. Depending on the condition of the soil on which there are traces, three methods of making casts are used: filled, bulk and combined.

To make an impression by pouring , gypsum powder is diluted in water to the consistency of sour cream. The resulting mass is poured into the trace with a layer of 1/3 of its depth. Then a reinforcing frame made of wire or other material is laid, to which the tag is attached, and the remaining mass is poured. The following text is applied to the tag: the place of seizure of the shoe print, date, month, year, signature of the investigator, witnesses and specialist.

With the bulk method , a layer of dry gypsum 1-2 cm thick is poured into the trace through a sieve, then the frame is laid and covered with gypsum to the edges. After that, the gypsum is moistened with a spray bottle. This method is used when water is present in the trace to be copied.

With the combined method (shoe prints left on the snow), bulk is first used, and then, after the formation of a dense crust of gypsum, the frame is laid and poured with a solution of gypsum similar in structure to sour cream. In this case, the solution should be at air temperature, and at a very low temperature, the gypsum solution is made on antifreeze (a mixture of water and alcohol). Also, in order to copy the trace in the snow, it is poured along a paper groove melted in a degreased tin jars of sulfur.

If volumetric footprints (shoes) are left on loose soil, or in loose fine substances, in such cases, the soil or substances are impregnated around the perimeter of the footprint with an adhesive substance (perchlorovinyl solution, stationery silicate glue, etc.), which firmly binds small particles of the base, after which gypsum mortar can be poured into the footprint.

The results of inspection and measurement of traces are recorded in the protocol, which should indicate: place, time of detection of traces; what surface they are on (sand, clay, asphalt, floor, etc.); type of trace (three-dimensional, superficial); shape (traces of boots, shoes, boots, bare feet); trace dimensions; individual features of the sole; measurement data of trace track elements; method of detection and fixation of the trace (surface treatment with powder, transfer to adhesive film, photographing, etc.); the method of trace extraction and its packaging.

3.4. Vehicle tracks.

Vehicle tracks are traces that reflect the external structure of vehicle parts.

All vehicle tracks can be divided into: a) undercarriage tracks (wheels, tracks, skis); b) traces of protruding parts of the vehicle (body, bumper, radiator lining) on other objects; c) objects that have separated from the vehicle (particles of headlight glass, paint, body elements); d) traces formed on the vehicle as a result of contact (various damages, layers, etc.).

Wheeled vehicles leave traces of static origin - traces of smoking, during sharp braking, traces of dynamic origin are formed - traces of braking. Traces of vehicles remain in the form of tread prints, which can be three-dimensional (on clay, snow or other soil) and surface (on concrete, asphalt).

The traces of the chassis of vehicles reflect a set of features that characterize their type, type of model and specific specimens.

The study of traces allows you to establish: track (the distance between the middle lines of wheel tracks installed on one axle), base (distance between the front

and rear axles of the car), the length of the rotation (circle) of the wheel (determined by measuring the distance between two consecutive prints in the trace of the same feature of the running part of the tire), the number of axles and wheels, the width of the treadmill.

In addition to identification tasks, the study of vehicle tracks allows you to solve diagnostic problems: to establish the direction of movement, the fact of braking, stopping, etc.

Since, for the most part, traces of vehicles cannot be removed in kind, the specialist needs to carefully record them at the place of detection.

Methods of fixing and retrieving traces of vehicles: description in the protocol; photography; making diagrams, sketches; copying (making casts).

The inspection report must include: permanent landmarks that will help to establish the location of traces; time of their detection; the nature, type and condition of the soil or road surface where the traces were found; type of traces (three-dimensional, superficial); the number of traces, their relative location; the width of each track; depth of volumetric traces relative to the road surface; track size; the shape of the tire tread pattern, their dimensions, individual characteristics; the length of the trace of one revolution of the wheel; the length of the braking distance; signs of the direction of movement; signs of the braking path and the degree of its reflection.

After photographing, surface tread marks can be copied onto specially prepared photographic paper, film or sanded sheet rubber. If traces are found on cardboard, plywood, paper, clothes of the victim, they are removed in kind.

Casts are made from three-dimensional traces of vehicles. To do this, you can use gypsum, impression pastes. Casts are made not only from those parts of the tracks that have the most special features of the tires, but also from those in which their common features are clearly reflected, that is, along the entire length of the wheel track.

In addition to tire tracks, other vehicle tracks can also be found at the scene. All items found at the scene must be photographed, described in the protocol of

inspection of the scene, collected and seized. Glass fragments are wrapped in a soft cloth or paper and packed in a box of the appropriate size.

If traces of paint layering are found at the site of the event, they are removed together with the object on which they are located, or with part of it.

3.5. Traces of burglary tools and tools.

A burglary weapon is any solid object (metal rod, crowbar, pipe, axe, etc.) that can be used to overcome obstacles. A special group of burglary tools includes tools and devices made for criminal purposes: "goosefoot", "fomka", "lockpicks", etc.

Burglary tools and tools used by burglars are generally classified into: specially manufactured for criminal purposes; adapted for hacking; common tools used for everyday needs; items that accidentally ended up in the hands of a burglar.

Depending on the mechanism of interaction with the obstacle, burglary tools are divided into: percussion (hammer, sledgehammer, ax, etc.); chiseling (crowbars, bolts, pickaxes, etc.); lever (jacks, vise, pliers); cutting, as well as tools of combined action, which can be attributed to any of the listed groups, for example, lever-slotting.

Traces of burglary tools are traces left by various means that have been used to open vaults and overcome obstacles. Traces of burglary tools are divided into the following types:

Traces of pressing (embossing) are formed during the rectilinear movement of the trace-forming object perpendicular to the trace-perceiving object, as a result of which there is destruction, deformation, layering, redistribution of parts of the substance, change and restructuring of the internal structure of the object.

Impact marks occur when window or door frames, walls are knocked out, as well as in the event of impacts.

Traces of slipping, friction are formed during pressing or impact, when at the final moment of trace formation the tip of the tool continues to move. At the same time, traces appear in the form of systems of rollers and grooves (traces), which

adequately reproduce the relief of the extreme edge of the working part of the burglary tool.

Traces of cutting are the result of the action of a blade, knife, ax, cleaver, scissors on the surface of the object, as a result of which a dynamic imprint of the cutting tool is formed - a micro-relief in the form of a unique system of traces.

Traces of sawing (sawing) occur as a result of the action of teeth of various saws and notches of files on wooden, metal, plastic objects.

Traces of drilling remain on obstacles under the action of drills of different diameters, which allow, rotating around their longitudinal axis and gradually removing the material of the obstacle with the cutting edge, to form holes.

According to the accepted classification, in trasology, all traces of mechanical impact of burglary tools are divided into static (formed under the influence of percussion, slotting, lever tools) and dynamic (sliding, cutting, biting, cutting, drilling, etc.).

Fixation of traces of burglary tools and tools is carried out by describing in the inspection protocol, drawing up drawings, diagrams. They are also carefully measured and photographed according to the rules of large-scale shooting. In the inspection report, it is necessary to indicate: their exact location on the obstacle; type (sliding, cutting, spinning, etc.); Form; relative location; the direction of each of them (horizontal, vertical, tilted); interconnectedness by the mechanism of formation; degree of severity; individual characteristics.

The best way to remove traces of burglary tools and tools is to remove the entire object with the trace, or part of it. If such removal is impossible, the traces, depending on their type, are copied. If these are surface traces – on fingerprint film, photographic paper or rubber, and from three-dimensional traces casts are made of plasticine, gypsum, dental impressions**,** special pastes "К", "У-4", "СКТН". The made casts are packed and sealed and attached to the inspection report.

The study of traces of burglary tools and tools makes it possible to find out the mechanism of burglary, to establish the group affiliation of the tool that was used, or to identify it.

Self-Assessment Questions:

1. The concept of traceology and its meaning.
2. The concept of trace in traceology.
3. Forensic Significance of Traces-Reflections and Their Classification.
4. Concepts and elements of the mechanism of trace formation.
5. Characteristics of footprints and shoes.
6. Vehicle Tracks and Their Classification
7. Methods of fixing and retrieving traces of vehicles
8. Characteristics of traces of burglary tools and tools.

CHAPTER IV.
FORENSIC DETECTION OF PAPILARY RIDGES TRACES (DACTYLOSCOPY)

4.1. General provisions of dactyloscopy.

Dactyloscopy is a sub-branch of traceology (from the Greek daktilos - finger, skopeo - examination), which studies the mechanism of formation of fingerprints, the structure of papillary patterns of the human skin, their features in order to use information of dactyloscopic origin for identification of a person.

In criminalistics, important significance is attached to handprints (footprints of bare feet), because:

1) contact of a person with any object occurs mainly with the palmar surface of the hand;

2) there are sweat-sebaceous secretions on the hand fingers and palms leaving traces of layering;

3) the skin has specific properties.

Human skin consists of three main layers. The outer layer is called the epidermis, it is followed by a connective layer known as the dermis or the skin itself, and under the skin there is another layer - subcutaneous fatty tissue (hypodermis).

The dermis, located on the subcutaneous fatty tissue (hypodermis), is formed by papillary and reticular layers. The papillary layer, which is the upper layer of the dermis plays a crucial role in the formation of papillary lines patterns on the skin surface.

The epidermis, covering the rows of papillae and elastically lining the recesses between them, precisely copies this complex relief of the papillary layer of the dermis. As a result, roller-like protrusions of the skin - papillary ridges separated from each other by valleys - are formed above even rows of papillae on the skin

surface. The configuration and mutual location of papillary ridges on some areas of the skin forms papillary patterns.

On the palmar side of the hand, in addition to papillary lines, there are also flexor (bending) lines, small skin folds (wrinkles), white lines, and pores.

Sweat glands play an important role in the skin life process; they take part in metabolism and provide body heat regulation.

Sweat glands are peculiar modifications of the epidermis.

Pores are the outlet openings of sweat gland ducts. They have different shapes and are located in the middle or at one of the edges of the papillary lines. Peculiarities of pores (their shape, size, mutual location) can be used to identify individuals.

The main role in the papillary pattern's ability to reflect its features in colorless traces is played by the trace-forming substance, the main components of which are sweat, sebum, and epithelial cells. It is customary to call the trace-forming substance sweat-sebaceous.

A papillary pattern is a complex of papillary ridges endowed with unique properties. Therefore, the forensic significance of handprints is determined not so much by their shape, but by their properties. Such properties include:

1) individuality;

2) stability (immutability);

3) renewability.

The individuality of the papillary pattern, well expressed in the external structure, allows even the naked eye to distinguish one papillary pattern from another.

The stability (immutability) of the papillary pattern is characterized by the immutability of its structure over time. The papillary pattern has a very high stability, thanks to the described skin structure characteristics. It not only remains practically unchanged throughout a person's life, but even persists for some time after his death.

The renewability of papillary patterns is characterized by their complete reproduction in case of intentional or careless damage to the upper layer of the skin (epidermis), thanks to such a biological property of the body as regeneration, that is,

the ability of destroyed tissues to self-restore in their original form. In case of deep trauma to the skin (dermis), scars with individual characteristics are formed.

Patterns of varying complexity are formed on different areas of the palmar surface of the papillary ridges.

Classification of papillary patterns is demarcation of patterns based on the structure of the central zone of the nail phalanges of the fingers. Patterns are divided into: arch, loop, whorl, undefined.

Arc (deltaless) patterns consist of one stream of papillary ridges, which starting at one finger edge goes to the other and forms bends of different steepness in the center.

Loop patterns are formed by three streams of papillary ridges - distal, central and basal and have one delta, which is used for classification purposes. The ridges of the inner pattern usually start at one edge of the finger, go up and to the center, then bend sharply (form loops) and return to the same edge of the finger. The most curved part of the papillary ridges in the center (that is, in the place of its bend) is called the head, the other part is called the legs of the loop.

Whorl patterns consist of three streams of papillary ridges: distal, central, and basal. The inner pattern is formed by papillary ridges curved in the form of circles, ovals, spirals, loops that encircle each other or form a combination of loops and circles or spirals. Whorl patterns, like loop patterns, consist of inner and outer patterns, but have two or more deltas.

Each type of papillary pattern is further divided into subtypes (varieties).

There are also so-called undefined patterns. In these patterns, the structure of the central part of the pattern is not expressed very clearly, or combines elements of different types, which leads to difficulties in determining the type of pattern.

The features of the papillary pattern structure are divided into general and specific.

General features of the papillary pattern structure include:

- size and shape of the print;
- type and variety of the papillary pattern;

- the direction and steepness of the papillary lines streams;
- the internal structure of individual parts of the papillary pattern (the position of the center in relation to the deltas, the structure and position of the deltas);
- the number of papillary lines between parts (elements) of the papillary pattern;
- the width of the streams and the frequency of papillary ridges in the streams per unit of measurement.

Some specific features of the papillary pattern structure include:

- details of the papillary pattern;
- features of pathological changes in the skin (scars, new formations of the epidermis, etc.);
- peculiarities of the structure of individual features (size, shape of the island, type of bridge, length of the fragment, etc.);
- if available – specific features of microrelief of papillary ridges.

The listed details of the papillary pattern structure are exhaustive; everything else encountered in the pattern is a combination of features.

4.2. Detection of papillary lines traces.

When palms, fingers or bare feet come into contact with any objects, papillary ridges traces usually remain on their surfaces.

Various methods are used in the process of examining trace-bearing objects in order to identify and fix traces of the papillary patterns. First of all, it is a visual examination of the objects from different viewing angles using forensic furfur in diffused and directed light, in UV rays and in the lumen. These methods do not change the properties of the trace and precede the application of physical methods based on the properties of adhesion and selective adsorption of the trace substance, as well as chemical and physic-chemical methods.

In Ukraine, as in most countries of the world, to detect handprints the device "RUVIS CYCLOPS" is used, the work of which is based on the formation of an image in reflected ultraviolet light. With the help of this device, latent handprints are detected without their preliminary processing with fingerprint powders, chemical solutions, etc. It makes it possible to detect and photograph latent handprints from a distance.

However, the most common method of detecting invisible traces of papillary patterns, which refers to physical methods, is the use of fingerprint powders.

Fingerprint powders are distinguished by:

- origin (organic, inorganic). The organic ones include: technical carbon (soot), starch, rosin, camphor. Inorganic, which are mainly crushed metals, namely iron, aluminum, copper, cobalt, barium, lead, zinc or their oxides;
- structure (fine-dispersed, coarse-dispersed);
- specific gravity (light, heavy);
- magnetic properties (magnetic, non-magnetic);
- colour (light, dark, neutral);
- composition (single-component and mixtures; luminescent).

The powder method is focused on the fat component of the sweat-sebaceous substance. On multi-coloured surfaces, it is recommended to use luminescent powders that glow in ultraviolet rays, which facilitates the subsequent fixation of fingerprints with help of making photography.

For the successful detection of handprints, the method of applying the powder to the surface of the trace-bearing objects is important. Currently, four methods are used for that:

a) sprinkling and rolling the powder over the surface;

b) coloring using a soft-bristled brush;

c) colouring with a magnetic brush;

d) use of air sprayers.

Detecting traces of papillary patterns on wet surfaces is possible with the help of titanium dioxide and molybdenum disulfide. The essence of the method is that a

solution of molybdenum disulfide or titanium dioxide settles on the fat components contained in the fingerprints. This solution is used on wet surfaces; surfaces covered with salt, dirt, grease (for example, surfaces of cars in rainy weather or objects raised from water bodies) where the use of conventional fingerprint powders can spoil the mark. Fine-dispersed suspension also works well on dry surfaces, as well as on surfaces unsuitable for powders: greasy glass, reinforced concrete, brick, stone, wood, coarse and rusty iron with galvanic coating and galvanized metals. It is recommended to use on paper, cardboard, wax coatings, plastic, metal, glass, packaging materials. If the powerful sprayer is available, solutions of molybdenum disulfide or titanium dioxide can be used under water.

The next group of methods is chemical, the action of which is based on the chemical reaction between the components of the sweat-sebaceous substance of the trace and special reagents that cause their colouring or luminescence.

One of the best chemical reagents for detecting traces of papillary patterns on porous and rough surfaces, paper and cardboard, planed and uncoloured wood, fabrics is ninhydrin.

To detect traces of papillary patterns on non-absorbent surfaces, the sticky side of transparent adhesive tapes, surfaces contaminated with greasy substances; repainting of the fingerprints detected with cyanoacrylate, it can be used crystal-violet. This reagent colours the papillary ridges purple, and gives contrast to the the fingerprints.

Luminol is an aqueous solution of 3-aminophthalic hydrazite and sodium carbonate, used to detect handprints formed by blood, vegetable and fruit juices, as well as some paints and metal powders. Surface processing is carried out by spraying in a darkened room and leads to a short-term glow of the fingerprints. It should be taken into account that when using luminol, the glow of blood or metals is not differentiated, and the possibility of further biological research of traces formed by blood is also excluded.

The physic-chemical methods are based on the complex interaction of reagents with the sweat-sebaceous substance of the fingerprints based on both physical properties and chemical reactions.

Adhesive-side Powder is used to detect papillary patterns traces on the sticky side of transparent adhesive tapes, packaging self-adhesive labels, paper-based adhesive tapes, packaging tape, double-sided tape, plastic surgical tape.

The method of fumigation with iodine vapors is based on the physical adsorption of iodine vapors on the sweat-sebaceous substance of the fingerprint and its chemical reaction with saturated fatty acids with colouring the fingerprint in brown. It is used to detect papillary patterns traces on such surfaces as paper, cardboard, wood, marble, plastics, surfaces, any painted surfaces, handprints on the skin of a corpse (up to two hours ago).

Detection of papillary patterns traces on the surfaces made of polymer (plastic) films, cellophane, plastics, various metals and alloys, polished wood, glossy cardboard, glass, paper (white, colored, glossy, copy), fabric, smooth leather substitute is carried out using cyanoacrylic acid esters. The method allows detecting both fresh fingerprints and fingerprints of considerable ancientness (up to several months).

To detect papillary patterns traces, the adhesive compositions containing cyanoacrylate are used:

– glues ("Supermoment", "Super Glue", "Sekunda", etc.);

– pure cyanoacrylate (medical and cyanoacrylate intended for the fingerprint examinations, including one in cyanoacrylic tubes).

The term "fixation of papillary ridges" means their description in the protocol of the investigative (search) action, photographing and (depending on the type of the fingerprints) copying onto dactyloscopic film or other trace-receptive material, making casts from volumetric fingerprints.

Technical methods of fixation allow to fix the appearance of detected traces of papillary ridges or to obtain their copies. They ensure the storage of detected traces and their further use as physical evidence. However, the papillary ridges traces will

be physical evidence only after their discovery is recorded in the order established by law, in advance, in the report of the crime scene search, where the following data about the traces of papillary ridges are noted:

- the name and location of the object on which fingerprints were found;
- the shape of the object, its size, individual features, surface type (polished, rough, etc.), its condition (dry, wet, dirty, etc.);
- the location of the fingerprints on the object (relatively to stationary landmarks);
- type of fingerprints (volumetric, surface, colourless, coloured; single, group);
- general signs of fingerprints (shape, size, type of papillary pattern, etc.);
- method of detection, used means;
- method of fixation, removing and type of packaging.

The second important way of fixing traces of papillary ridges is photography. The objects with the papillary ridges traces are photographed according to the rules of nodal and detailed photography.

The third method of fixing handprints is contact copying (modeling). Various sticky materials are used for copying handprints: dactyloscopic and household films: sticky tape "scotch tape" of different sizes and on different bases, polymer materials.

A type of copying traces of papillary ridges is the production of volumetric casts from them. Casts are made from the fingerprints located on uneven, rough, fibrous, plastic and loose materials, as well as from volumetric fingerprints. The duplicating agents used to make casts include a silicone mixture.

A mixture of paste with a catalyst is a universal fingerprints copying material, used on almost all surfaces (except fabrics with a long pile), and used to obtain copies from both surface (detected by powders) and volumetric fingerprints. Compounds are especially useful for copying fingerprints left on uneven surfaces.

Lifters for taking identified handprints. The lifter is a ready-made kit that includes a clear protective film and a backing, made from clear acetate or opaque black or white vinyl.

The traces of papillary ridges are taken from loose materials (dust, cement, flour, etc.) by previously fixing them on these substances. For this purpose, perlchlorvinyl resin, a solution of rosin in alcohol, as well as various types of varnishes (for hair as well) are used. The specified solutions are evenly applied to the fingerprints with a sprayer to moisten them.

Packing objects with handprints. Objects with handprints taken from the crime scene are packed in such a way that neither the objects nor the fingerprints on them are damaged during transportation and storage. It is necessary to remember that the objects are fixed in the package immovably, so that the traces of papillary ridges do not touch the packaging material.

The packaging material must be moisture- and dust-proof and strong enough so that the traces are not damaged or deformed during transportation. All objects should be individually wrapped, and fragile items should be wrapped using rubber, cotton or paper for cushioning.

On the packaging or on the tag attached to it, the following inscriptions are made: a) the name of the packaged item, b) the place from where it was taken; c) withdrawal time. All these are confirmed by the signatures of the investigator and witnesses.

4.3. Dactyloscopic examination.

Dactyloscopic examination is a type of traceological examination, which consists in research based on special knowledge of information of dactyloscopic origin to establish identity and other circumstances.

The tasks of the dactyloscopic examination are:

- detection of latent traces of papillary patterns of human hands, establishing the mechanism of their formation;
- recognition of the properties of persons being checked by traces;
- identification of a person by traces, prints (imprints) of hands.

An approximate list of questions submitted for examination decision:

Diagnostic: whether there are prints of hands (fingers, palms), feet on the object submitted for research; whether they are suitable for identification; which hand and fingers left the traces; which parts of the surface of the hand left traces; what is the age, gender and height of the person who left the traces provided for research.

Identification: whether handprints (footprints) removed in different places (on different objects) were left by the same person; whether handprints (footprints) were left by a specific person whose dactilo-card was provided for comparative research; whether the handprints of the unidentified corpse and the prints in the dactilo-card with the name of a specific person are identical.

Self-Assessment Questions:

1. The subject and the system of the dactiloscopy.
2. Forensic significance of papillary pattern traces.
3. The structure of the skin on the palmar surface of human hands.
4. Properties of papillary patterns, their types.
5. Papillary pattern. General and specific features of the papillary pattern structure.
6. Means and methods of detecting, fixing and taking traces of papillary ridges.
7. Rules for handling objects bearing traces of papillary patterns.
8. Rules for packing objects with traces of papillary patterns.

CHAPTER V.
FORENSIC EXAMINATION OF FIREARMS, CARTRIDGES (AMMUNITION) AND TRACES OF THEIR ACTION (FORENSIC BALLISTICS)

5.1. General statements of forensic ballistics.

Forensic ballistics is a sub-branch of forensic firearms science that studies small arm firearms, cartridges, their components and elements, traces of their action, as well as the patterns of display and obtaining information about such objects, and develops on this basis techniques, methods and means of collecting and examining firearms, ammunition and traces of their action in order to investigate and prevent criminal offenses.

The scientific principles of forensic ballistics include the provisions of general ballistics, information from special military sciences, as well as the system of knowledge developed within the framework of forensic ballistics about the process of shooting, the patterns of formation of traces on projectiles, shell casings and obstacles, their detection and research.

The objects of forensic ballistics, and therefore sources of forensic information, are: small arms, their parts, components and accessories; devices structurally similar to firearms (rocket launchers, starting, construction and assembly pistols, spearguns, gas and pneumatic pistols and revolvers, etc: cartridge cases, capsules, projectile charge, cartridge containers, bullets, meal, buckshot, etc.; materials, tools and other means (drawings, records) for the manufacture of weapons or ammunition and their equipment; objects with traces of firearms - damage and deposits of shot products on objects from the weapon from which the shot was fired.

The main practical (applied) tasks of forensic ballistics include:

- determination of the properties of firearms and ammunition;
- establishing the circumstances of the use of firearms;

- determination of the group affiliation of weapons and ammunition;

- identification of weapons and ammunition by traces of a shot;

- establishing the fact of the shot and the nature of the damage caused by the projectile on objects of the environment;

- development of effective forensic technologies and improvement of existing technical and forensic techniques and means of inspection, fixation, seizure and examination of firearms, ammunition and traces of their action;

- improvement of rules and recommendations for the preparation and appointment of examination of weapons and traces and the circumstances of their use in terms of the study of firearms and ammunition, development and improvement of recommendations for the investigation of criminal offenses related to the use of firearms.

5.2. Firearms and cartridges (ammunition) for them.

Firearms are specially manufactured devices structurally designed and suitable for hitting a target at a distance with a projectile that receives directional movement in the barrel due to the energy of combustion of a powder or other charge, which do not have a direct household, industrial, or special purpose. The object's belonging to a firearm is determined by the presence of a set of general forensic features.

Intended to defeat targets in the absence of direct household, industrial, or special purpose. It is determined by the presence of a set of design features characteristic of a particular type, type, model or sample of firearms.

The main design features are: the presence of a barrel, a device for locking the barrel channel (which may not be a structurally separate element of the barrel design) and a device for igniting a projectile charge.

Additional design features: presence of a trigger, firing pin mechanisms, sight, holding and control devices, and a number of other mechanisms, devices and components that increase the effectiveness of firearms use and indicate their purpose.

Suitability for hitting targets means that the object has:

- the constructive ability to fire shots with the projectiles having energy characteristics sufficient to hit the target;

- structural reliability, i.e., suitability for repeated firing without its destruction (damage).

Small arms are classified according to various criteria.

By purpose - combat, hunting and sporting.

According to the subjects of use - military, police, civilian, criminal.

Manufacturing method - industrial production; handicraft production; home-made; manufactured by home-made processing of products that were not firearms; home-made firearms.

By design features, method of operation and maintenance: standard types (weapons of historically established standard types of weapons that firearms that have certain design, dimensional, ballistic and other characteristics - pistol, revolver, shotgun, rifle, etc.), non-standard (weapons that do not correspond to standard types of weapons in some respects, for example, breeching of shotguns, rifles, etc.); atypical (weapons that do not correspond to standard types of weapons in all major respects).

Firearms can be rifled, smoothbore, and combined (smoothbore and rifled) based on the structure of the barrel channel (s).

According to the length of the barrel, firearms are divided into short-barreled, medium-barreled and long-barreled.

By caliber, firearms are divided into small-caliber (rifled weapons - up to 6,5 mm; smoothbore weapons - 24 caliber and less (28, 32), medium-caliber (rifled weapons - from 6,5 mm to 9 mm; smoothbore weapons - 20-12 caliber) and large-caliber (rifled weapons - more than 9 mm; smoothbore weapons - 10 caliber and more (8, 4).

Caliber is a value that characterizes the internal diameter of the guide part of the barrel channel. It is determined: in rifled weapons - by the distance between opposite fields of rifling, in smoothbore weapons - by the number of round balls of

equal weight cast from 1 English pound of lead, for example, 12, 20, 28, etc.; in bullets (projectiles) - by their largest cross-sectional diameter.

According to the degree of automation, firearms are divided into non-automatic (reloading of such weapons is carried out manually), semi-automatic or self-loading (in which the cartridge is sent into the barrel channel after the shot is fired automatically, but for each subsequent shot, the trigger must be pulled each time) and automatic (automatic reloading of weapons).

According to the number of cartridges loaded, firearms can be divided into single-shot and multi-shot (it has a unit for sending cartridges into the barrel channel, stored in special devices and devices (magazine, drum, tape, cassette).

Firearms are divided into single-barreled and multi-barreled firearms by the number of barrels.

According to the design features - pistols, revolvers, shotguns, rifles, submachine guns, assault rifles, machine guns.

There are many other criteria for classifying firearms, for example, by the method of loading (muzzle-loading, breech-loading), by the method of ignition (central fire, ring ignition, side fire), etc.

An important element of firearms characteristics is ammunition (small arms ammunition) intended for firing certain types of firearms.

Ammunition is a single-use device designed to fire a firearm and consists of a cartridge case, projectile, propellant charge and incendiary charge.

5.3. Traces of the use of firearms and the mechanism of their formation.

In addition to the task of establishing whether an object belongs to a firearm or ammunition, forensic ballistics methods are also used to establish the type and model of firearm, and ultimately a specific firearm.

Bullets have barrel channel marks on them. The formation of traces is influenced by the friction force of the bullet against the walls of the barrel channel,

which depends on the quality of processing during manufacture and the degree of wear. In rifled weapons, when the bullet passes through the barrel channel, it is deformed, pressed into the rifling of the barrel channel and begins to rotate. As a result, traces appear on the surface of the bullet. When firing a smooth-bore firearm, such processes do not occur, since there are no rifling in the barrel channel. In this regard, it is quite difficult to identify such weapons, and sometimes impossible.

The following traces are distinguished on a fired bullet: rifling fields - a "print" of the rifling edges and between them a trace of the surface of the rifling field; traces of the surface of the bottom of the rifling, sometimes called rifling marks.

The most informative traces on the bullet from the barrel channel are the traces of the fields cuts. In the vast majority of cases, the identification of weapons by fired bullets is based on the study of these traces.

Depending on the model of the weapon, additional marks may remain on the bullet as a result of the cartridge being in the magazine and moving into the chamber, as well as from the casing cavity.

Signs in bullet traces can be general and specific.

General signs in the traces on fired bullets are divided into two groups: signs of the firearm system and signs of barrel channel wear.

Individual (separate) signs reflect the microrelief of the surface of the barrel channel and are reflected on the surface of the fired bullets. Together with the general features, they allow for the identification of a specific firearm

According to the sequence of formation, such marks are divided into three groups:

- marks formed during charging - charging marks. Marks from the magazine bends, the lower surface of the bolt, the front cut of the bolt (bolt carrier), the chamber, and the ejector catch;

- traces formed at the time of the shot - shot marks. Traces from the firing pin, traces from the cartridge stop, the walls of the chamber and some other parts of the weapon;

- traces caused by the ejection (extraction) of the cartridge case from the weapon. Traces from the ejector catch, chamber, reflector, and casing window.

For solving practical problems, including identification, the traces of the firing pin, cartridge stop, ejector and reflector are essential.

Traces of a firearm shot on an obstacle. The external signs of gunshot marks depend on the type of weapon and ammunition used, the material of the obstacle into which the shot was fired, and the distance (range). Depending on the distance, a distinction is made between: a) a shot at close range (full point, partial point), b) a shot at close range, c) a shot at a long distance.

When a bullet or pellet collides with an obstacle, traces are created, which are divided into main and secondary traces.

The main traces of a shot are caused by the direct impact of the projectile on the obstacle. As a result, holes (through or blind holes), dents (in a hard, often metal object) and splinters, chips (in wood, on fragile obstacles) are formed. In the area of the entrance hole, a fraying belt is observed, and on human skin, a sedimentation belt.

In elastic products, the entrance hole is usually smaller than the bullet caliber or the defect is hardly noticeable (rubber products), because the elastic barrier stretches when a bullet hits it, passes the bullet, and then the hole shrinks again, forming a pinhole. The difference between the size of the exit hole and the entrance hole is more pronounced the greater the thickness of the barrier.

The main shot marks also include ricochet marks, which occur at angles of impact from 00 to 350, when the projectile loses some of its velocity and the angle of reflection is almost equal to the angle of impact when it hits an obstacle surface that has significant hardness (brick walls, concrete, metal).

Additional or concomitant gunshot marks are the effects of powder gases, their pressure, flame, etc.

Additional traces arise from the influence of factors inherent in a close shot: dynamic and thermal effects of gases generated during the shot; deposition of soot and unburned dust particles; deposition of lubricant particles from the lubrication of the weapon, recoil of the weapon when fired at close range.

Additional traces include: the absence of a part of the fabric and tears in the fabric of clothing; traces of burning, charring in the form of changes in the fibers of textile fabrics, their twisting. On the skin of the human body there are traces of burns, soot deposits, characterized by: the size of the deposition zone; color (depending on the type of gunpowder); homogeneity or heterogeneity deposits; the shape of the deposit (ring-shaped, ray-shaped, spotted); deposits of unburned dust particles, characterized by the size of the zone, the intensity of the deposit, and the type of dust particles; traces of barrel impact when firing at close range (stanzmarks); traces of barrel channel lubrication. Such traces appear around the inlet in the form of small-point splashes of oily substance. They are left when firing from a cleaned and lubricated barrel channel.

5.4. Examination of firearms, ammunition and traces of their effects.

During the inspection of the scene where firearms were used in the commission of a criminal offense, as well as during certain other investigative (detective) actions, individual pieces of weapons, bullets, shot, dust, shell casings, traces of a shot on objects and the victim's body may be found.

The purpose of such an examination is to identify, record, seize weapons, ammunition and their components, traces of a shot, and, if necessary, to examine such traces at the scene.

The detected weapon must not be moved or picked up until its position is recorded in the protocol, in photographs, or on a diagram of the scene.

Important to note note on which side the weapon is lying, where the barrel is pointing, the location of the weapon relative to two fixed objects, the position of the trigger, and the safety. If the weapon is in the hand of the corpse, it is necessary to record how it is positioned in the hand; if it is lying near the corpse, at what distance and the direction of the barrel.

Once fixed in place, the weapon is taken in such a way as not to leave any traces on it. If the weapon is loaded and is on the firing line, it must be discharged in compliance with safety measures. For objects that cannot be discharged without damaging the charging elements (for example, muzzle-loading weapons), the device for igniting the projectile charge must be brought to a safe state. In any case, it is strictly forbidden to point the weapon in the direction of people.

The weapon is then examined for handprints and micro-particles, and traces of odor are removed if possible. If there is a need to decide whether the weapon has been fired since it was last cleaned, the investigator may instruct a specialist to take samples of the substance from the surface of the barrel channel.

The following data on firearms shall be indicated in the inspection report:

- the place where the weapon was found with reference to two fixed landmarks, determining the location of the axis of the barrel channel relative to the cardinal points

- position of the trigger and safety mechanism;

- presence/absence of cartridges in the magazine and chamber, number of cartridges; sequence of placement of cartridges (cartridge cases) in the chambers of the drum;

- the presence (or absence) of powder odor in the barrel channel;

- markings and number of the weapon;

- presence and number (if any) of cuts in the barrel channel;

- the presence of layers (traces of shots) on the walls of the barrel channel;

- nature and condition of metal and non-metal parts;

- visible damage and foreign layers on the parts of the weapon.

As for the detected cartridges or their elements, the location should be recorded in the report, in photographs and diagrams, and inspected for handprints. The elements that make up the cartridge should be noted, sizes of the elements, method of attachment of the bullet in the cartridge case, design features, metal color, presence of markings, presence and nature of damage and other traces on the surface of the detected ammunition or its elements.

If possible, the projectile is removed together with the damaged object or part of it. If this is not possible, the projectile shall be removed from the obstacle by such methods and means as not to damage it. Found and examined bullets or shell casings are packaged separately from each other. Each package shall have a tag with an inscription indicating where the bullet or cartridge case was recovered.

During the examination of gunshot wounds, the following shall be recorded: the location of the object with traces of a shot with its reference to two stable landmarks; the type and properties of the obstacle; the shape of the damage on the object, its size; the nature of the edges of the damage and the presence of "minus tissue"; the relative position of several injuries, their placement on the obstacle.

If additional traces of the shot are found (soot, unburned dust particles, parts of lubricant), the report should describe: the shape, size, number of deposition zones, intensity of each zone, color of soot or dust particles, their distance from the damage, etc.

During the inspection of the scene, the location of the shot may be determined by means of the found shell casings, traces of gunshot wounds on obstacles, as well as other traces (footprints, crushed grass on the ground, etc.). If there are holes in the glass or other objects in the environment, the direction of the bullet flight and the location of the shooter can be determined by sighting. With sufficient accuracy, it is possible to determine the direction of the bullet flight and the place from which the shot was fired if there are two bullet holes in the glass. In this case, sighting can be carried out using appropriate technical means.

In addition, a preliminary examination of firearms traces on cartridge elements and obstacles can determine: whether the damage was caused by a firearm; type, system and model of weapon used; number and sequence of shots; signs indicating suicide or injury to the victim by another person; the method of manufacturing weapons and ammunition, as well as the tool used; the availability of special skills of the person who manufactured the homemade weapon or who fired the shot, etc.

Firearms, ammunition, their parts and elements, as well as objects with traces of their use, found and examined at the scene are subject to seizure. These objects

shall be packaged in accordance with the rules for packaging material evidence and sealed.

Self-Assessment Questions:

1. The definition and importance of forensic ballistics.
2. Objects of forensic ballistics.
3. The definition of firearms and general forensic features that determine whether an object belongs to a firearm.
4. Forensic significance of the classification of small arms and ammunition.
5. Criteria for the classification of firearms.
6. Traces that can be left at the scene of the incident when using firearms.
7. Traces that appear on the bullet when fired and the possibility of their use.
8. Traces formed on the cartridge case when fired.
9. Types of damage to objects caused by the use of firearms.
10. Peculiarities of conducting a crime scene examination in the event of a criminal offense involving the use of firearms.

CHAPTER VI.
FORENSIC RESEARCH OF A COLD WEAPON AND TRACES OF ITS ACTION

6.1. General provisions of the forensic research of cold weapons.

Cold weapons are quite often used by criminals to commit various criminal offenses and therefore such weapons often become the object of such a type of expertise of weapons, the traces and circumstances of their use as the research of cold weapons, the basic branch of knowledge of which is the forensic science of cold weapons.

Forensic research of cold weapons is a sub-branch of forensic weapons science that studies cold weapons and structurally similar products, traces of their use in the commission of criminal offenses and develops techniques, methods and means of detection, fixation, seizure and research of such objects for the purpose of investigation of criminal offenses.

Thus, the forensic research of cold weapons consists of the following main elements:

– forensic concept of cold weapons;

– classification systems of cold weapons;

– sets of features of each type (variety) of cold weapons;

– techniques, methods and means of detection, fixation, seizure, storage of cold weapons and products structurally similar to them, as well as traces of their action during investigative inspection, search, etc.;

– methods of forensic research of cold weapons within the framework of forensic expertise.

Objects of forensic research of cold weapons are:

1) cold weapons, their individual parts, work pieces and semi-finished weapons;

2) products structurally similar to cold weapons;

3) materials, tools and other means (drawings, records) for the manufacture of cold weapons;

4) objects with traces of cold weapons.

The subject of forensic research of cold weapons includes four groups of regularities:

1) regularities of use of cold weapons as means or tools of committing criminal offenses;

2) regularities of trace formation related to the manufacture, possession and use of cold weapons;

3) regularities related to the development of techniques, methods and means of detection, fixation and seizure of cold weapons, structurally similar products and traces of their use;

4) regularities of forensic research of cold weapons, structurally similar products and traces of their use.

6.2. Concept, classification and structure of cold weapons.

Cold weapons are objects and devices which are structurally designed and, by their properties, are suitable for repeated causing of severe (dangerous to life at the time of infliction) and fatal bodily injuries, the action of which is based on the use of human muscle power and which do not have a direct industrial or economic household purpose.

There are objects that in addition to their main purpose – causing of bodily injuries – due to the peculiarities of their design allow to perform various auxiliary operations (for example, a bayonet for AKM and AK-74 assault rifles is designed not only for hitting a live target, but also for cutting wire, that is, its secondary purpose is an engineering tool). Such items, nevertheless, are classified as cold weapons since their main purpose is not related to household or industrial purposes.

On the contrary, there are objects that are very close to cold weapons in terms of design, size and strength characteristics but they do not belong to cold weapons because they have a different purpose not related to causing of bodily injuries (for example, a diving knife is close to a dagger, a locksmith's scraper is close to a stiletto, etc.), although such objects can cause bodily injuries.

In order to establish whether an object is a cold weapon and to which kind (type) it belongs, it is necessary to know the existing classification systems of cold weapons and their structure.

According to the design and method of inflicting injuries cold weapons are divided into:

– weapons of direct action (blade, non-blade, combined);

– weapons of indirect action (throwing: simple, complex).

Blade cold weapons are items and devices whose impressive element is a blade.

Blade weapons can differ in their configuration, sizes, and ways of holding them in hand. Handled weapons: sabers, swords, daggers, knives, etc. Weapons with a shaft: pikes, spears, lances. Without a handle and shaft but which is attached to a firearm: needle and some bladed bayonets.

Blade cold weapons can be short (to 40 cm), medium (from 40 to 52 cm) and long (more than 52 cm) blade. The blade can have a straight shape or a curve: scimitars, sabers, swords, some daggers and knives.

The most common in forensic practice are examples of short-bladed weapons with a handle: daggers (military, hunting), knives (military, hunting, criminal), and bayonets.

According to the principle of action, bladed cold weapons are divided into weapons: chopping action (sabers, swords); stabbing action (dirks, stilettos, bayonets, epees, rapiers); chopping-stabbing (scimitars, broadswords, shashkas); chopping-cutting action (daggers, knife bayonets, knives).

Non-bladed (impact and crushing) cold weapons are objects and devices whose hitting element is the impact part (parts). This type of cold weapons includes bone, combat whips, brass knuckles, impact rings, maces, etc.

According to the design, sizes and nature of the use of impact and crushing cold weapons this type of weapon can be divided into three groups:

1. Cold weapons that have a straight long rod with a weight on the end (or without it) (sticks, maces, bats, pernaches).

2. A cold weapon that has a rod or loop of arbitrary length to which an impact part is attached on a special suspension (bone, combat whips, etc.).

3. Cold weapons that increase the force of the blow with an open or clenched fist (brass knuckles and impact rings, etc.).

Combined cold weapons are objects and devices where hitting elements characteristic of different types of cold weapons are combined into one structural whole (for example, a brass knuckles-knife with a blade and an impact part).

Throwing cold weapons are objects and devices designed to hit a target at a distance.

Throwing cold weapons are divided into:

– simple throwing cold weapons: throwing knives, shurikens, etc.;

– mechanical cold weapons: bows, crossbows, slings, etc.

By purpose, cold weapons are divided into combat, hunting, sports, and criminal.

Combat cold weapons include weapons that are designed and suitable for lethal damage to a target when solving combat and operational-service missions by state and other legitimate military or paramilitary formations and are or were in service with them.

Hunting cold weapons include weapons designed and suitable for lethal damage (including finishing) of an animal, in the conditions of industrial or sports (including underwater) hunting.

Sports cold weapons include weapons intended exclusively for sports competitions and training, the parameters and characteristics of which are recorded in the Competition Rules.

Criminal cold weapons include objects and devices manufactured in an artisanal or self-made way which are intended to cause bodily harm to a person and have no analogues among combat and hunting weapons.

According to the method of manufacture, cold weapons are distinguished:

a) factory-made;

b) artisanal weapons manufactured by master gunsmiths in the conditions of official business or other activities in artisanal workshops that in terms of their characteristics are close to factory weapons but in terms of the degree of quality and (or) uniformity of external design, construction and dimensions it does not meet the standards of industrial production;

c) home-made, which is made and assembled in a home-made way from components and parts of completely home-made production or with the use of individual components and parts of weapons and (or) products of other purpose of industrial or artisanal production.

Each type of cold weapons has its own set of necessary structural elements.

A bladed cold weapon usually consists of a blade, a handle and a stopper (or a guard). Knives are the most common type of bladed weapons submitted for expert examination.

The most common types of non-bladed (impact and crushing) cold weapons submitted for expert research are nunchaku and brass knuckles. A nunchaku consists of two or more rods made of solid material (wood, plastic), which are successively flexibly connected to each other and can equally perform the functions of both a handle and a fighting part. Brass knuckles, which are worn on the fingers or clamped between them or the hand, are made of hard material and has a fighting part (parts) with or without spikes.

6.3. Examination of cold weapons and traces of their action.

Cold weapons, which are the subject of a criminal offense or the means or tools of its commission, may be discovered during an inspection of the scene of the incident, an inspection of things, as well as during a search of the suspect's residence or other places.

However, regardless of whether a cold weapon was an instrument of a criminal offense or a means of committing it, it is examined in order to identify and record its characteristics in the protocol of the investigative (detective) action: shape, sizes, design, individual traits. At the same time, special attention is paid to those group features that characterize such weapons precisely as cold, and individual ones that allow this type of weapon to be distinguished from a number of similar ones.

During the examination of a cold weapon, it must be taken in such a way as not to destroy the fingerprints of the criminal and not to leave his or her own. Identified cold weapons are photographed according to the rules of nodal and detailed photography, described in the inspection protocol and their location relative to other objects is indicated on the schematic plan of the scene.

In blade cold weapons, the following are measured:

1) the total length along a straight axial line;

2) the total length of the blade;

3) the blade width;

4) the blade thickness;

5) the length of the bevel of the spine;

6) the edge length;

7) the length and width of each fuller (if any);

8) the heel length;

9) the edge sharpening width;

10) the length of the handle and its width in the middle part, as well as its largest and smallest width and thickness;

11) the length, width and thickness of the stop.

In addition to the cold weapon itself, its case (scabbard, sheath) is measured and described, while indicating: its material, total length, width and thickness, shape; the presence and dimensions of the socket, rings, eyes or chains, safety belts; the presence, location and nature of decorations, emblems, ornaments, markings, etc.

In addition, cold weapons and structurally similar products are inspected for handprints, blood, etc. At the same time, it should be borne in mind that the largest number of microparticles is stored on the base of the blade under the stop, in fullers, in places of jags and metal defects on the plane of the blade. Particular attention should be paid to the examination of the inner surface of the cover for it, where particles of blood, fibers of clothing fabric, etc. may remain.

In addition to the cold weapon itself and products structurally similar to it, traces of its action on various objects in the surrounding environment are examined, described and removed.

Traces of cold weapons on wood, metal, plastics, rubber, leather and other materials can be traces of pressure, sliding, chopping, piercing, and sometimes sawing.

On the human body, traces of cold weapons can be punctured, cut, chopped, chopping-cutting, fabric tears, sedimentation, etc. From a traceological point of view, these are traces of sliding and pressure, but due to the specifics of living tissue, they differ from traces on solid objects. In contrast to traces on hard obstacles, traces on the human body are less informative, since they often change shape and other signs after trace formation. Instead, marks on cartilage or bone tissue can sometimes identify the specific instrument used to inflict bodily harm (the dismemberment of the body was carried out). In this regard, it is important to take measures to preserve traces of damage on bones and cartilage tissue. For this purpose, traces of cuts on bones and cartilage are removed and preserved, for which forensic medical experts are involved.

Traces of metallization, contamination – particles of paint, rust may remain on the fabric and clothing material. Therefore, objects (clothing, pieces of fabric, etc.)

with such traces on their surface should be removed and sent for examination to determine the composition of micro-traces of layering.

After the examination, the cold weapon is appropriately packed and sealed, which is noted in the final part of the protocol of the investigative (detective) action.

6.4. Expertise of cold weapons and traces of their action.

One of the types of expertise of weapons and the traces and circumstances of their use is the research of cold weapons, which has its own specifics and, accordingly, a special basic field of knowledge.

The subject of this type of expertise of weapons and traces and circumstances of their use is the establishment of factual data relevant to criminal proceedings, which are established on the basis of an expert research of cold weapons or structurally similar products (devices), as well as traces of their action.

The object of expertise of cold weapons are tools and devices that correspond to standard samples or historically produced types or unusual objects, due to which a stabbing, cutting, chopping, impact or fragmentation effect is caused and are intended for attack and active defense, as well as separate parts, work pieces and semi-finished cold weapons.

The main task of a cold weapon research is to establish whether an object belongs to a cold weapon and to determine its kind and type, as well as the method of manufacture. In the case when the item does not belong to a cold weapon, it should be assigned to certain groups of household or industrial items.

Expert research of cold weapons solves the following questions:

- Is the submitted item a cold weapon?

- What type, kind, variety, model of cold weapons does this item belong to?

- What is the method of manufacture of the submitted cold weapon (factory, artisanal, home-made)?

- Is this cold weapon converted from a weapon of another type, kind, model,

which one and in what way?

- Were parts (details) of a cold weapon of another type, kind, model or object of industrial or household purpose used for the manufacture of this cold weapon, and what exactly?

- Is the item submitted for research a work piece of a cold weapon?

- Is this cold weapon national and what kind?

- Was this cold weapon always in the sheath submitted for research?

- Is the submitted cold weapon functional? If it is defective, what defects does it have, their causes, and do they affect the possibility of using this cold weapon for its intended purpose?

- Is it possible (from the technical side) to bring this cold weapon into a usable state?

Traces of the action of cold weapons on the human body and clothing can be examined comprehensively. In such a case, a forensic medical examination can be carried out in the complex together with a weapons examination, and in the case of detection of traces of such weapons on other objects – together with a traceological examination using appropriate expert methods.

Layering (particles of various materials) formed in the process of using cold weapons are examined within the scope of examination of materials, substances and products (except for layering of a forensic medical nature).

In the case that there may be handprints on the object, which for various reasons were not removed during the inspection of the scene or the search, a dactyloscopic examination is carried out first, and then a forensic examination of a cold weapon. If these handprints are formed by the layering of a substance similar to blood, a dactyloscopic examination is carried out first, then a forensic medical (biological) examination of the traces is carried out by an appropriate expert, and only after the completion of all the listed expertises, an investigation of cold weapons is carried out by conducting an expertise of weapons and traces and circumstances of their use.

Self-Assessment Questions:

1. The concept and content of the forensic science of cold weapons.

2. Concepts and signs of cold weapons.

3. Grounds for the classification of cold weapons.

4. What data can be established by researching traces of the use of cold weapons on various objects?

5. Possibilities of the cold weapon research within the scope of expertise of weapons and traces and circumstances of their use.

CHAPTER VII.
FORENSIC RESEARCH OF EXPLOSIVES, DEVICES AND TRACES OF ACTION (FORENSIC EXPLOSIVE TECHNOLOGY)

7.1. General provisions of forensic explosives.

Forensic explosive technology is a branch of forensic weapons science that studies explosive substances, explosive devices, means of detonation, traces of action and patterns of use (application) in the commission of criminal offenses, and also develops scientific and technical methods, techniques and tools for the search, examination, neutralization, inspection, documentation, seizure and analysis of explosive substances, explosive devices and explosion traces in order to investigating and preventing criminal offenses.

The subject of forensic explosive technology includes four groups of regularities: 1) using explosive devices as tools of a criminal offense; 2) formation of traces related to the production, storage and use of explosive substances, means of detonation and explosive devices; 3) development of scientific and technical methods, techniques and tools for detecting, preserving, documenting and seizing explosive substances, means of detonation, explosive devices and traces of their use; 4) forensic investigation of explosive substances, means of detonation, explosive devices and traces of it use.

The objects of forensic explosive technology are: 1) explosive substances, explosive devices, means of detonation, pyrotechnic and imitation materials, comprising elements, remnants after the explosion; 2) traces of the manufacture, storage and use of explosive substances, means of detonation and explosive devices; 3) materials, substances, tools and devices used for the manufacture or repair of explosive substances and explosive devices.

The traces of an explosion include: mechanical damage to the environment (ground or other surface material), surrounding objects, living beings from the

explosive wave (craters, fractures, chips, local deformations), from fragments (dents, scratches, penetrations); thermal damage (singeing, melting); remnants of the explosive device (metal, glass or plastic parts of the device casing, scraps of electrical wires, cord and tape fuze, part of the casing, mechanical detonator, components of a timing mechanism, etc.).

The practical tasks of forensic explosive technology are: 1) search and detection of explosive substances and objects, it neutralization; 2) determination of the type of explosive substance or explosive object including the exploded one, type and mass of the charge substance, method and means of detonation, method of activation; 3) establishment the fact of an explosion, identifying traces of explosive impact on objects of the material in the scene environment, determining the extent of damage and possible belonging of individual fragments, parts, objects to the explosive device; 4) determination of the explosion circumstances, its real and possible consequences (identification of the explosion center, location of the victims and individual scene items, determination the nature and radius of explosion impact); 5) development of effective forensic technologies and improvement of existing forensic technical and techniques for searching, examining, neutralizing, inspecting, documenting, seizing, preserving explosive substances, explosive devices, traces of their action; 6) rules and recommendations improvement for preparation and appointment of explosive examinations; 7) recommendations development for the investigation of criminal offenses related to the use of explosive substances and explosive devices.

7.2. Concept, classification and structure of explosive substances and devices.

An explosion is the rapid release of energy as a result of physical, chemical or nuclear changes in the explosive substance. During an explosion, there is always an

expansion of the initial substance or its transformation products, resulting in a very high pressure, causing destruction and movement of the environment.

Today, there are over 2 000 explosive substances, which, of course, makes it difficult to determine the individual name of a substance. In the process of expert research, questions constantly arise, the answers to which require in-depth special knowledge about the types, characteristics and properties of explosive substances, as well as their application areas.

Explosive substances are individual substances or mixtures that, as a result of a certain external influence (heating, impact, friction, explosion) are capable of rapid chemical transformation, accompanied by the release of a large amount of energy and the formation of gases. Therefore, they are suitable for an explosion, intended for use or actually used in devices that explosive energy of the.

Explosive substances can be substances of any matter state - solids, liquids, gases. The most common explosive substances are solid and liquid states (condensed). Explosive substances differ in composition, physicochemical and explosive properties and other characteristics. For example, they are divided into individual and mixed, capable and incapable detonation, powerful or low-power, sensitive or less sensitive to external action (heating, impact, friction, explosion). According to the physical condition, condensed explosives are solid monolithic (cast, pressed), granular (powdery, granulated, grainy), elastic, plastic and liquid.

Explosive substances are classified into homemade and industrially manufactured according to an approved technology. Based on the scope and conditions of use, industrial explosive substances are divided into civilian and military purposes.

Explosive devices are industrial, handicraft and homemade expendable products, designed of which provides for the creation of damaging factors or the performance of useful work by using the chemical energy explosion of an explosive substance charge or mixture.

In general, an explosive device consists of the following components: the explosive charge, the detonating device (detonator), the triggering mechanism (target sensor), the casing and masking materials (packages, boxes).

The detonation device consists directly of the detonator and its actuation mechanism. The action principle of these mechanisms can be: mechanical, electrical, chemical, electronic and combined.

Explosive devices are divided into industrial manufacture, handicraft and homemade. Likewise, industrial manufacture explosive devices are divided into military and civilian purposes.

Industrial manufacture explosive devices of military purpose include: grenades, grenade launchers, shells, mines.

Industrial manufacture explosive devices for an economic purposes include: devices for seismic exploration, explosive metal processing devices.

Homemade explosive devices have a variety of designs, which may include: clock mechanisms, electronic boards for remote explosion control, elements from household devices.

For all explosive devices, including homemade ones, there is a certain set of construction elements, part of which in whole or in remnants after the explosion can be found at the scene. In addition, the person who makes such a device must possess special knowledge and skills, necessary raw materials, components, parts, tools.

7.3. Crime scene search on the facts of criminal explosions.

Qualitative search and detection of explosion traces and objects related to the construction of the explosive device can be carried out exclusively by explosion specialists. Therefore, the search for traces should take place with their participation in any case. In order to seize and record material evidence, investigators may involve forensic technicians and other specialists, depending on the circumstances.

Features of the crime scene search of explosions include: 1) the duration and complexity of the examination process, which is associated with the large number of scene fragments and the small size of the fragments remaining after the explosion; 2) significant distances over which fragments spread during explosions in open areas; 3) possible presence of casualties requiring emergency assistance and evacuation; 4) presence of other explosive items at the explosion site; 5) urgent need for emergency recovery work; 6) possible adverse weather conditions.

General search of the explosion site. Immediately upon arrival at the scene, the leader of the investigative-operational group (investigator) takes measures to protect the scene and ensure the safety of the examination participants and subsequent work (identify dangerous areas, protect them, disconnect electrical and gas equipment).

Before the investigator search the crime scene, it is mandatory for the explosives service specialists (together with K-9 units if possible) to conduct a preliminary scene search to identify explosive items and devices (substances). If such items are found, measures are taken to neutralize them. A corresponding report is compiled based on the results of this search.

Only after that, the head of the investigative-operational group, together with the explosive specialist, can conduct a general scene search to obtain an overall understanding of the incident. According to the results of the general search, it is necessary: 1) to organize assistance to the victims while preserving the scene of the explosion as much as possible; 2) take measures to remove all unauthorized persons from the scene and assign specific tasks to each participant (for example, assisting with victims, photo, video, search of a particular areas); 3) provide instructions to the members of the investigative-operational group and other personnel in cooperation with the explosives specialist; 4) based on the gathered information, together with the explosive specialist, determine the boundaries and features of the examination; 5) establish the sequence and scope of actions related to the detection and method of searching for explosion traces.

The purpose of the general search is: 1) identify signs of explosion from the explosive device; 2) assess its power, the presence of a sturdy casing, shrapnel

elements; 3) clarify the boundaries of the search, considering previous judgments about the explosive device, the charge mass, the explosion center; 4) determine methods and techniques of detailed search in accordance with the material circumstances and available resources.

It should be noted that, for example, in explosions involving transportation, the general inspection should start with the surrounding area, since the need to free the roadway may lead to the loss of objects. In open areas, a sectoral method of examination is preferable, while a combined approach is used when objects are scattered over a large area. At the same time, the scene is divided into squares (sectors) near the explosion center (in a radius of 50-100 m) and a frontal method is used in the distant zone - examining in a chain every 1-2 m. In this scenario, members of the investigative-operational group, assigned 2-3 people per square, have the opportunity to constantly consult with an explosive specialist.

Detailed search of the explosion site. This stage involves inspection with precautions of all items and traces related to the explosion and the persons who committed it. The main thing during a detailed search is to document the location, position, individual characteristics, condition of objects (traces) at the time detection and seizure, ensuring that objective results can be obtained during subsequent expert examinations. Documentation is carried out, in addition to the protocol and schemes, using nodal and detailed photo and video recording.

Depending on the location of the crime scene, the entire territory to examination is usually divided into sectors, sections or nodes.

The sector method is used when the scene an open area. The epicenter of the explosion is taken as the center of the clockwise dial, with the hands pointing at 6-12 oriented by compass to the north and south, the location of discovered objects is indicated in accordance with the division of the clockwise dial and the distance to the explosion center (epicenter).

The sectional (planned) method is used when buildings, structures and other objects are present at the scene. The territory is divided into sections of various

shapes and sizes. When fixing the detected, constant landmarks are used inside these sections.

The nodal method, as the search method, is used in separate places of the examination site where urgent emergency and recovery work is required, necessitating a change in the material circumstances.

In explosions, it is advisable to identify four areas for locating traces (center (epicenter) of the explosion or places where the explosive device was planted – within a radius of up to 2 m; near - up to 5-10 m; middle- up to 10-50 m; far – over 50 m).

The detection, documentation and collection of explosion traces and remnants of explosive devices begin with the epicenter of the explosion. There are either funnels or depressions, faults. It is essential to clearly document shape and size using photos and videos with a large-scale ruler.

This area typically contains all signs of the explosive and thermal effects of the explosion and, as a rule, only the smallest fragments of the explosive device remain - metal, plastic, glass fragments, cardboard, fabric, leather scraps, individual fragments of clock mechanisms, electronic circuits, batteries, springs parts, wires fragments, insulating tape. There are deposits of soot on the furnishings and fragments, which contain solid explosion products and unreacted explosive material particles are found on environmental objects and fragments.

The primary method of identifying the listed items involves clearing debris, digging and sifting through soil, collecting dirt, garbage and melting snow. Soil samples are taken directly from the crater and its edge (each sample weighing between 1 to 5 kg), objects with traces of explosive or thermal impact from the area surrounding the crater are also collected.

Collected garbage, dust, dirt and other objects must be carefully examined on clean sheets of white paper using a microscope, magnifying glass, illuminated magnifiers, etc. Additionally, dissection needles, tweezers, magnets with a variable position of working surfaces, and other equipment are used.

The final search stage. At this stage, all factual data obtained that may assist the investigation are evaluated and procedurally documented. Traces and objects that can become physical evidence are collected and packaged. Plans and schemes are prepared, marking the locations of major destruction and damage to the physical environment, the location of victims, the identification of collected objects, samples and control sample locations (indicating distances relative to the explosion center). The process concludes with the preparation of an inspection report. Identified and collected items, traces and micro-objects are recorded in the report. It is important to indicate the method of their identification and collection in the description.

Preliminary explosive technical researches are conducted by explosive technicians in urgent cases. This work should be performed by an explosive specialist within the limits defined by the investigator. Based on the results of preliminary examinations, including express analyses, orientations are compiled that may contain scientifically substantiated information about the causes and circumstances of the explosion; the main characteristics and possible origin of the detonated explosive device and etc.

7.4. Explosive Technical Expertise.

The objects of explosive technical expertise include material carriers of information and materials from criminal proceedings. The variety of designs, mechanisms of explosive devices, substances capable of exploding, and their unpredictable use, makes it impossible to clearly determine the specific range of objects for this expertise.

The purpose of identification explosive technical examinations is to establish the individual identity of an object and the whole by its parts. In certain situations, issues regarding the establishment of general generic, group (species) affiliation of several objects, the common origin source of compared samples of explosive substances, initiation means and other explosive technical products may be resolved.

Questions solved by identification examinations:

1. Do the presented samples of explosive devices (explosive substances) have a common generic (group) affiliation with the explosive device (explosive substance) found at the scene?

2. Have the metal fragments (parts of a detonator, segments of detonating cord) previously presented for examination a single entity? If so, what object do they belong to and what are the shapes and sizes of this object?

Classification examinations form a separate group of tasks. The purpose is: to classify a substance or mixtures of substances into categories of explosive materials, ammunition or models of explosive devices; determine group and type; establish the method of manufacture of the explosive device and explosive substance.

The purpose of diagnostic explosive engineering expert examinations is to determine the condition and suitability of explosive substances, explosive devices and individual components for causing an explosion, assessing their destructive properties, identifying the causes and mechanisms of failure or damage.

Questions addressed by diagnostic examinations include:

1. Is the explosive device (factory-made) functional? If not, what are the reasons for its malfunction?

2. Is the explosive device (ammunition) provided for examination suitable for causing an explosion? If not, are there traces on its parts or components indicating attempts to restore lost properties?

The purpose of diagnostic explosive engineering examinations is to determine the explosion mechanism under specific circumstances, potential consequences in case of detonation of an explosive device, establish the location of the detonator at the moment of explosion, assess the real danger to people at different distances from the explosive device, etc.

Reconstruction tasks of forensic explosive engineering expertise include: reconstruction of an explosive device based on its remnants or traces on environment objects; reconstruction of the initial locations of objects and items in the surrounding material environment before the explosion.

In order to solve some of the issues listed above, it is necessary to require comprehensive research investigations involving chemists, medical professionals, and forensic experts. For instance, through comprehensive medical and explosive expertise, one can determine the blast radius of an explosive device and the mechanism of injuries sustained by victims during the explosion, the position of the explosive device relative to the victim at the moment of detonation, etc.

Self-Assessment Questions:

1. Definition of forensic explosives, its subject and tasks.
2. Definition of an explosive substance and its classification criteria.
3. Types of explosive substances based on the conditions and intended use.
4. Definition and classification of explosive devices.
5. Actions of the investigative-operational group immediately upon arrival at the scene of a criminal explosion.
6. When can the investigation of the explosion scene commence directly by the investigator?
7. Significance of preliminary research at the scene.
8. Tasks solved through explosive technical expertise.
9. Definition of situational explosive engineering research.
10. Issues resolved through/by classification explosive research.

CHAPTER VIII.
FORENSIC HANDWRITING STUDY (FORENSIC HANDWRITING)

8.1. General provisions of forensic handwriting.

Writing is a means of recording and storing a person's thoughts; it comes from sound speech and is the main means of communication between people. Since the letter is a symbolic system of language fixation, it makes it possible to fix language in time and transfer it to a segment with the help of graphic elements. Writing has two separate, although to some extent related, sides: substantive (manifested in written speech, includes the content, style and manner of expressing thoughts, vocabulary and other substantive characteristics of writing) and graphic (manifested in handwriting, is a system of produced movements that serve for displaying letters, numbers, signs). The graphic side of writing is the subject of forensic handwriting.

Forensic handwriting is a sub-branch of the forensic study of writing, which is a system of knowledge about the regularities of handwriting, as well as the patterns of its development and methods of solving the tasks of forensic handwriting examination.

Handwriting is a system of movements and other techniques recorded in the manuscript, characteristic of each person and based on their writing and movement skills, with the help of which the manuscript is executed. Handwriting depends on the level of development of a person and his writing and motor skills. The originality of handwriting is revealed in a certain combination of general and individual features.

Writing and motor skills are the sum of skills developed in the process of learning to write. Among them, the following are distinguished: a) technical skills (method of writing technique, proper posture, ability to hold writing utensils, etc.); b) graphic skills (the ability to depict letters and connect them into words); c) spelling skills (the ability to identify sounds (phonemes) and express them with written signs correctly).

In the process of formation of writing and motor skills, the main role is played by the anatomical structure of the human hand, its muscular system and sense organs. A significant role in the formation of handwriting is played by the nervous system, which helps coordinate movements.

Among the factors that influence the formation of written and motor skills can be attributed

– internal factors that are determined by the anatomical properties of a person (length of bone levers, mobility of joints, muscle development, vision characteristics, etc.) and psychophysiological properties (perception, attention, memory, type of nervous system, etc.);

– external factors that are determined by the position during writing, writing conditions, methods and techniques of teaching writing.

Throughout a person's life, handwriting develops and improves. During the learning of writing (primary school), a person only produces his individual handwriting. Further writing practice stabilizes individual characteristics, and by the end of schooling, a person acquires an individual handwriting. Such individuality is one of the main features of handwriting, which are used to identify the author of a handwritten text. Practically, it is expressed in the presence of signs that occur rarely.

Writing skills are based on temporal connections that arise in the cortex of the large hemispheres of the brain. Repeated exercises during learning to write lead to the creation of a complex and balanced functional system - a dynamic stereotype. In order to change one's handwriting completely, it is necessary to develop a new dynamic stereotype, which is practically impossible, because the specific nerve connections to a certain person's writing are produced and fixed over a long period of time, so they become quite strong, causing the formation of a number of stable features in the handwriting.

However, from this one cannot draw a conclusion about the absolute stability of a certain person's handwriting. Natural changes in handwriting are caused by its physical and mental state, the nature of work and other reasons, in particular, the specific conditions of the execution of the document (materials and accessories for

writing, the purpose of the document, the position of the body of its executor, etc.). All these deviations, even the most significant of them, are relative. The handwriting of each person, despite any changes, always remains individual; it preserves a set of signs inherent to a given person at a certain period of life, sufficient for identification.

The identification properties of handwriting include the following:

– individuality - consists in its originality, its uniqueness in different people and in specific changes, additions and reductions in relation to the standard spelling, i.e. the presence of signs that are rarely found;

– dynamic stability - it consists in the fact that in different conditions of writing, the formed writing-motor skills remain unchanged and reflect a set of features characteristic of it;

– variability is a stable change in the handwriting of one person, expressed in his manuscripts, and is a means of adaptation to different conditions of their execution;

– selective variability - the ability of writing and motor skills to transform in a specific way, that is, to change as a result of the influence of various external or internal "confounding" factors. At the same time, partial changes in handwriting are observed in the manuscripts, the nature of which depends on the type and degree of influence of "confounding" factors and individual characteristics of the writing and motor skills of the person who executed the manuscript.

Forensic handwriting pays special attention to the identification of signs and the study of signatures in order to identify their maker. A signature is a special type of handwriting that displays a person's surname in the form of letters or (and) conventional written signs, which has a certifying value. It differs from ordinary handwriting in the amount of graphic material and the peculiarity of the execution of individual signs (monogram, stroke, etc.).

A distinction is made between signatures on behalf of an existing person and on behalf of a fictitious person, signatures intentionally or unintentionally changed. The reason for the latter may be unusual writing conditions (for example, a vertical

surface, lack of visual control, excessively low temperature of the air on which the signature was done, etc.).

The study of signatures is carried out on the basis of general methods for the study of handwritten objects, taking into account the peculiarities of the handwritten material contained in them.

8.2. Signs of handwriting.

The individuality of handwriting is manifested in its features, which are divided into general and individual. General features characterize the system of movements characteristic of handwriting in general (they have a group meaning), and individual features characterize the movements during the writing of individual letters and numbers and their elements.

General signs of handwriting include signs that: a) reflect the degree and nature of the formation of writing and motor skills; b) reflect the structure of movements along their trajectory; c) characterize the spatial orientation (location) of movements.

1. General signs of handwriting, reflecting the degree and nature of the formation of writing and motor skills:

1.1. Handwriting proficiency is the level of mastery of the writing technique, which is manifested in the ability of a person to write a handwritten text at a fast pace, with steady coordinated movements in accordance with the generally accepted system of cursive writing. Its component elements are the pace and coordination of movements during the execution of written signs and their connections. Degrees of handwriting are divided into high, medium and small (intermediate gradations: higher than average, lower than average).

Writing pace is a feature of handwriting that reflects the speed of handwriting. It is divided into: the usual pace, which can be slow, medium, fast; and an unusual pace, which is either slowed down or sped up.

Coordination of movements is a feature of handwriting that reflects the consistency (accuracy) of the movements of the person performing the handwriting, and depends on the degree and quality of the development of writing and motor skills, as well as the conditions of writing. Coordination is high, medium, low and reduced (intermediate gradations: higher than average, lower than average).

1.2. The complexity of the handwriting is manifested in the configuration of the letters and their closeness to the spelling. Handwriting is distinguished: simple, simplified, complicated.

2. General signs of handwriting reflecting the structure of movements along their trajectory:

2.1. The preferred form of letters is arc, rectilinear-arc, ordinary, angular, rounded, mixed.

2.2. Letter sizes are determined by the height of lowercase letters: small (up to 2 mm), medium (from 2 to 4 mm), and large (over 4 mm). The sign is considered permanent, but the size of the letters may change slightly, not precisely for forging handwriting, but depending on the intended purpose of a certain document and the location of the graph in it.

2.3. The inclination of the letters is determined by the location relative to the vertical of the longitudinal axes of the vast majority of letters. On this basis, vertical, right-leaning, and left-leaning handwriting are distinguished.

2.3. The inclination of the letters is determined by the location relative to the vertical of the longitudinal axes of the vast majority of letters. On this basis, vertical, right-leaning, and left-leaning handwriting are distinguished.

2.4. The predominant direction of movement characterizes the handwriting in terms of the degree of roundness of the oval elements of the letters (in particular, "a", "b", "o", "p", "f", etc.), the directions of their execution, some other elements (right circular, left circular).

2.5. Handwriting spacing - characterizes the relative dimensions of the width and height of the letters. The handwriting is compressed (low acceleration) if the width of the letters and the spaces between them is less than their height. Medium-

speed handwriting assumes approximately equal height and width of letters and spaces between words. Accelerated (high acceleration) handwriting is defined if the width of letters and spaces between words is greater than the height.

2.6. The coherence of the handwriting is the continuity of the execution of a certain number of written signs without separating the writing device from the paper and the location of the gaps between the letters. Low coherence of handwriting - continuous execution of 2-3 letters, medium - 5-6 letters, high - more than 6 letters.

2.7. Pressure is the general intensity and distribution of effort on the writing instrument during the execution of the manuscript. It is determined by the degree and nature of the pressure: strong - the width of the main strokes exceeds the width of the connecting strokes by more than twice; medium - the width of the main strokes is twice the width of the connecting strokes; weak - the width of the main strokes is approximately equal to the width of the connecting strokes.

3. General signs of handwriting characterizing the spatial orientation (location) of movements (quarters) - constitute a special group of general signs. They are characterized by the placement of text elements and give a certain idea of a person's ability to use the plane of a sheet of paper when writing separate parts of the text oriented relative to each other (for example, when choosing a place on a sheet of paper to write a date, signature, etc.). These signs have significant constancy, usually do not undergo significant changes when trying to change the handwriting deliberately.

3.1. Placement of appeals, titles, dates, inscriptions, page numbering relative to the main text and the amount of spaces between them;

3.2. Availability and location of fields in the manuscript. Distinguish: left and right; in size small (up to 1 cm), medium (1–3 cm), large (over 3 cm), in configuration: straight, zigzag, with narrowing or expansion downward;

3.3. Size of intervals between words and lines;

3.4. Placement of the line of writing relative to the line of blank graphs and lined sheets;

3.5. The location, direction and shape of lines on unlined sheets of paper (horizontal, wavy, with lowering or raising);

3.6. Location of punctuation marks and superscripts relative to words, line;

3.7. Availability and size of paragraph indents: small (up to 1 cm), medium (1–3 cm), large (over 3 cm);

3.8. The location of hyphens and hyphens relative to the middle line of the letter string (on the line, above or below it, at an angle).

Separate signs of handwriting contain the most identifying information about the person who wrote the manuscript. Their totality makes up an individual handwriting. To a lesser extent than general features, they undergo changes during intentional or ordinary changes in handwriting.

Individual signs of handwriting contain the most identifying information about the person who wrote the manuscript. Their totality makes up an individual handwriting. To a lesser extent than general signs, they are aware of changes during intentional or habitual changes in handwriting.

1. Signs that reflect the degree and nature of the formation of written and motor skills:

1.1. The structure of letters by degree of complexity: simple (approaching spelling), complicated, simplified, simplified and complicated at the same time;

1.2. The structure of the letters according to the construction as a whole: printed or stylized version in cursive; writing one written sign according to the type of another; by special design.

2. Signs reflecting structural characteristics of movements:

2.1. The form of movements when writing letters and their elements: straight, arc, loop, oval, circular, winding, wavy, angular, triangular, reverse-rectilinear, reverse-arc, combination of various forms;

2.2. The form of movements with a connected letter and their elements: rectilinear, arc, loop, oval, circular, winding, wavy, angular, triangular, reverse-rectilinear, reverse-arc;

2.3. Direction of movements when performing letters and their elements, including relative;

2.4. Length of movements when writing letters and their elements: increased, decreased, the same;

2.5. Type of connection of movements when writing letters and their elements: continuous, interval;

2.6. The number of movements when writing letters and their elements: increased or decreased relative to letters;

2.7. The sequence of movements when writing the elements of letters (violation of the sequence of movements provided by the prescriptions);

2.8. The method of beginning and ending movements when writing written signs and their elements (dot; reflex stroke; reverse-straight stroke; stroke of uncertain configuration).

3. Signs reflecting the spatial orientation (relative placement) of movements used to write letters and their elements:

3.1. Placement of movements horizontally when writing letters and their elements;

3.2. Placement of movements vertically when writing letters and their elements;

3.3. Placement of the starting, ending, connecting, crossing points of movements when writing letters and their elements;

3.4. Placement of movements when writing punctuation marks.

8.3. Requirements for comparative handwriting samples.

To conduct a handwriting examination, the expert is provided with free, conditional and experimental samples of the handwriting (digital entries, signature) of the person to be identified.

Free samples are handwritten texts, handwritten records (written and digital), signatures that were authentically executed by a certain person before the start of criminal proceedings, and are not related to its circumstances; samples of handwriting and signature made by a certain person before the start of criminal proceedings, but related to its circumstances or made after the start of criminal proceedings and are both related to the circumstances of the investigated criminal offense and not related to them, are conditionally free; experimental samples of handwriting and signature are performed at the request of the person who appointed the examination.

Before attaching free and parole samples to the materials of criminal proceedings, the investigator must present them to the person to be identified. In the document, which is the basis for conducting the examination, the documents containing free, conditionally free samples of the handwriting and signature of the person are indicated.

If it is impossible to present the specified samples (death of the executor, departure, etc.), documents or other papers on which the handwritten texts (signatures) have been authentically executed by the person in relation to whom there is a question of identification as the executor of the manuscript under study should be provided as samples (for example , an application for obtaining a passport (form No. 1), a passport, various types of certificates with a personal signature, etc.).

As far as possible, free samples should correspond to the object being investigated, according to the time of execution, according to the type of writing materials (paper, pencil, ballpoint pen, etc.), according to the form of the document (bill of lading, information, etc.), according to its content and intended purpose.

If the text (signature) under examination is written in printed letters or a special font, it is necessary to provide free samples of a similar nature if possible.

It is necessary to select experimental samples of handwriting in two stages. At the first stage, the person whose handwriting is to be identified performs the text on a topic close to the research object, under usual conditions (sitting at a table, with usual writing utensils, in daylight). At the second stage, samples are selected under the dictation of a text similar in content to the one under investigation, or a specially

composed text that contains phrases, words, and numbers taken from the manuscript under investigation. At this stage, the samples are taken in conditions that are as close as possible to those in which the handwritten text under investigation was performed, that is, in the same position (lying, standing, etc.), with the same writing instruments and on the same type of paper (in terms of size, lamination , the nature of the surface, etc.), as well as the document under investigation. If it is noticed that the writer is trying to change his handwriting, the pace of dictation must be accelerated.

In the case when the texts under investigation, and especially the signatures, were executed on blanks (cash orders, receipts, postal transfers, payment information, etc.), experimental samples should be selected on the same blanks or on paper graphed according to the blank.

If the location of the signature to be examined is not determined by the nature of the document, the experimental samples are selected on separate sheets of both lined and unlined paper.

After drawing 10–15 experimental signatures, the sheets of paper should be changed.

If the handwritten text under investigation is executed in printed letters and numbers or a special font (drawing, library, etc.), the experimental samples in the second stage must also be executed in printed letters and numbers or a suitable font.

Copying from the document under investigation or from a typewritten (printed) text is inadmissible.

If there is reason to believe that the author of the handwritten text under investigation tried to change his handwriting (he wrote with his left hand, with a different slant, etc.), samples executed in the same way are additionally selected.

If the research is a handwritten text, then free and experimental samples are provided in the form of texts. When examining signatures and handwritten records limited in volume (letter and digital), free and experimental samples are provided both in the form of relevant texts (records) and in the form of signatures.

Experimental samples are certified by the body that appointed the examination. In the certification inscription, the surname, first name and patronymic of the

performer are indicated, as well as the characteristics of the sample (written with the left hand, in a special font, etc.).

It is desirable to provide both free and experimental samples of letter or digital writing on at least 15 sheets. The shorter the researched text (record), the greater the need for free samples. Free signature samples are provided on at least 15 documents if possible, experimental ones on at least 5–8 sheets.

If it is necessary to establish whether the signature was executed on behalf of a certain person by another person, free and experimental samples of the handwriting and signatures of both persons are provided. At the same time, experimental samples of the alleged executor's handwriting are additionally selected on at least 10-15 sheets in the form of records of the surname and initials of the person on whose behalf the signature is executed.

When extracting free samples of signatures of the person on whose behalf the examined signature was executed, it is necessary to search for documents with a signature variant most similar to the signature being examined. Such signatures are most often found in documents similar to the one under study.

During the selection of experimental samples of the person’s signature on whose behalf the signature is executed, it is necessary to invite him to sign with all the signature variants used by him.

If for certain reasons it was not possible to fulfill any requirements related to the selection and provision of samples, this should be indicated in the document on the appointment of the examination.

If it is necessary to examine a large number of handwriting objects, it is advisable to divide them into groups (according to the persons on whose behalf the signatures were made, episodes of criminal proceedings, types of documents, etc.) and appoint a separate examination for each group.

It is advisable to number the documents of each group (in spaces free of text), to indicate the name of the document and its serial number once in the document on the assignment of the examination, and to refer only to the serial number of the document in the future.

If there are difficulties associated with the appointment of multi-object signature examinations, it is advisable to get the advice of an expert (specialist).

It should be indicated the established special circumstances of the execution of the handwritten text in the document on the appointment of the examination, which could have affected the changes in the handwriting's features (unusual pose or unusual condition of the performer, etc.). If there is evidence that the performer is a person with impaired coordination of movements, the expert should also be informed about this. In case of execution of a handwritten text by an elderly person, it is necessary to provide information about the year of his birth and state of health at the time of possible execution of the object of handwriting under investigation.

The sufficiency and quality of the handwriting and signature samples provided for the examination are determined by the expert in each specific expert situation.

The criterion for the sufficiency of the volume of comparative material is the provision of such a quantity that it is possible to identify individuality, variability and stability of features in the researched object and samples of the handwriting (signature) of a certain performer.

8.4. Handwriting examination.

The subject of the handwriting examination is the actual circumstances of the criminal proceedings, which must be established on the basis of special knowledge in the field of forensic handwriting, which is structurally included in the section of forensic techniques.

The object of the handwriting examination is the handwritten material in which the signs of a certain person's handwriting are displayed to the extent that they can be detected to solve the tasks (handwritten texts, short records, digital records and signatures).

The main task of the handwriting examination is the identification of the performer of the handwritten text, limited by the amount of handwritten entries (letters and numbers) and the signature.

An approximate list of identification issues to be resolved by handwriting examination: which of the specified persons executed the handwritten text or its part; which of the specific persons made the digital recordings; whether the texts of different documents or different parts of this document were written by the same person; whether the signature was executed on behalf of a specific person by this person or another specific person; whether the text of the document and the signature in it were executed by the same person.

Handwriting examination also solves non-identification tasks, namely:

– establishing the fact of the execution of the handwritten text under the influence of any interfering factors (natural: disease state, chronic diseases, age changes; temporary external: unusual holding of a writing instrument, unusual posture, limitation of visual control, etc.; temporary internal: alcohol consumption drugs, pharmacological, narcotic drugs, etc.; artificial: distortion of writing with altered movements);

– determination of the performer's gender, as well as his belonging to a certain age group, etc.

An approximate list of diagnostic questions to be solved by handwriting examination: whether a certain text is suitable for research in order to identify the person of the performer; whether the manuscript was written in a deliberately altered handwriting (cursive, printed, unusual hand); whether the signature was executed with a change in its features; whether the text (signature) was executed imitating the handwriting (signature) of a certain person; whether the manuscript (signature) was made in unusual conditions; whether the person who completed the manuscript (signature) was in an unusual state; whether the person who completed the manuscript has the skills to write in special fonts; whether the disputed manuscript was executed by two persons at the same time; how much time has passed since the execution of the text and signature (with a significant gap in time).

The research methodology of all types of handwriting objects is determined by the general rules of forensic identification. It consists of the following stages: preliminary familiarization with the materials; separate study; comparative study; evaluation of the results of a comparative study and formulation of the expert's conclusions.

During the preliminary examination of the materials, a thorough review of the texts (signatures) and samples provided to the expert is carried out and the sufficiency of the latter is determined, the issues raised for the examination are studied, their completeness and correctness are determined, and traces of forgeries are detected for the purpose of further technical and forensic investigation of this document.

At the stage of a separate study, a separate study of the texts of the disputed document and samples is carried out in order to identify common signs of handwriting, individual signs of letters and their combinations, variants of writing individual signs. Special development tables are created with the marking of characteristic features of letters, their elements and combinations.

During the comparative study, the detected features are compared, and the results are entered into special joint development tables, in which the coincidences and discrepancies of the features are clearly noted. These tables form the necessary material for completing the identification process with a certain conclusion.

At the stage of evaluating the results of the comparative study and formulating the expert's conclusions, the expert evaluates the coincidence and difference of each group of handwriting features, and then the totality of all features. Coinciding signs are evaluated from the point of view of their originality, prevalence, and those that differ - mainly from the point of view of their stability (stable or appeared as a result of deliberate distortion of handwriting or its usual change, etc.).

Due to a number of reasons, handwriting undergoes normal changes. These reasons can be an unusual situation (unusual posture, writing equipment, writing material). At the same time, the handwriting does not change significantly and the identification of the author of the manuscript is possible.

The state of alcohol intoxication, physical fatigue, cold, psychophysiological state affects handwriting. In these cases, the usual changes in handwriting can be significant and complicate the study. However, in most cases this applies to only part of the signs, so identification of the person who performed the handwritten text is possible.

The handwriting of persons who are in a painful state (severe physical illness, nervous or mental diseases) changes significantly. The resulting changes in handwriting often make it difficult to identify the performer.

Examining the usual changes in handwriting, the expert establishes both coincidence and differences of these signs.

There are certain peculiarities in the study of handwriting that has undergone deliberate changes. Deliberate change, distortion of handwriting is manifested in cursive masking, execution of text imitating the printed or handwriting of another person, with the left hand, etc. In each case of research, the expert encounters signs of ordinary handwriting and signs that appeared in it because of changes (distortion or imitation). The main feature of the study is that the expert must identify all the signs that arose because of distortion and determine the method of distortion, then determine the persistent signs and evaluate them from the point of view of sufficiency for the individualization of a particular person's handwriting.

Self-Assessment Questions:

1. The concept of forensic handwriting.
2. The concept and properties of handwriting.
3. Factors that affect the formation of a person's written and motor skills.
4. Characterization of common signs of handwriting and their forensic significance.
5. Characteristics of individual features of handwriting and their forensic significance.
6. Types of handwriting samples and requirements for them.

7. Subject, objects, tasks of handwriting examination.
8. Methodology of handwriting examination.
9. Questions to be resolved by handwriting examination

CHAPTER IX.
FORENSIC AUTHORSHIP ANALYSIS

9.1. General principles of forensic authorship analysis.

Every person (author) is characterized by a certain manner of presenting text content (a personal style), a general level of literacy, grammatical peculiarities of speech, and vocabulary. All these aspects vary among individuals and, typically, cannot be changed at will of the person.

Forensic authorship analysis is a subfield of forensic handwriting examination that studies the regularities of written speech formation and develops methods to determine a specific author or their personal characteristics (such as gender, age, education, profession, etc.) based on these patterns.

The subject of forensic authorship analysis is the determination of factual data about the identity of a document's author. The direct object of expert examination is written speech and the general (lexico-phraseological, syntactic, stylistic, orthographic, punctuation) and specific (consistent language errors, use of certain linguistic devices, etc.) linguistic habits manifested in it. These studies are based on a system of scientific knowledge about the conditions and regularities of a person's linguistic behavior, information from linguistics (particularly phraseology, grammar, and other branches of knowledge about language and written speech).

Written speech is the set of linguistic tools that each person uses to convey their thoughts in writing. It involves expressing thoughts using various linguistic means (syntax, spelling, vocabulary, punctuation, and stylistics). Each person's written speech is determined by their style of presentation, vocabulary, general level of literacy, and is characterized by individuality and relative stability. Unlike handwriting analysis, authorship analysis focuses on the content of the writing rather than its graphic form.

The formation of written speech follows the general laws of skill formation. The skill of written language is developed similarly to handwriting (written-motor skills) under the influence of internal (subjective) and external (objective) factors. Internal factors include the characteristics of nervous processes, the level of intellectual development, cultural background, etc. External factors include the language environment, educational and cultural levels of teachers, family members, friends, colleagues, and the influence of mass media.

The acquisition of written speech skills and the development of a stable written language habit follow similar stages to the development of handwriting skills. Learning begins with mastering written speech based on literary language norms, i.e., a set of words and sentences recognized as correct. At this stage, the process of writing is fully controlled by consciousness.

In childhood and early adolescence, a visual and situational type of thinking and a conversational style of speech are formed. In later school years and further education, the categorical type of thinking and mastery of speech norms, including journalistic and scientific styles. At the final stage of education and personality formation, written speech habits become relatively stable, particularly in terms of complex norms, such as stylistic rules. Subsequently, written speech develops features based on one’s profession and type of activity.

The characteristics of written speech are divided into general and specific features. General features characterize written speech as a whole (proficiency in punctuation, orthographic, lexico-phraseological, syntactic, stylistic, and other skills). These include:

The degree of mastery in written speech can be high (logical consistency and depth of thought, use of various speech devices, erudition, vocabulary, etc.), medium (lower stylistic and lexical skill development, less strict thought consistency, argumentation, a smaller vocabulary, etc.), or low (even less developed stylistic and lexical skills and generally low literacy).

The overall literacy level determines the degree of command over writing rules in a particular language (the number of orthographic and syntactic errors).

The development of lexical skills is assessed by the vocabulary size, cultural and professional background, national and social conditions, etc.

The development of stylistic skills is characterized by the form of thought presentation, overall construction of written speech (architectonics), commonly used sentence types, symbolism, abbreviations, and more.

Specific features of written speech characterize the individual aspects of a person's writing style that manifest in stable lexical, stylistic peculiarities, and grammatical errors. These features form the basis for identifying the author of a particular text. Specific features include orthographic and stylistic errors, peculiar punctuation, sentence structure, and formal-logical skills in written speech, such as intellectual abilities in perceiving reality, argumentation, evaluation, emphasis, and so on.

9.2. Requirements for Comparative Samples of Written Speech.

The successful resolution of identification tasks in authorship expertise depends on the quality and amount of comparative material. Therefore, when preparing for such an examination, the investigator must collect free, conditionally free, and experimental samples of the written speech of the person for further identification

A sample of written speech is understood as a text that was undoubtedly authored by the person being identified.

Free samples of written speech are texts created by the individual subject to identification, unrelated to the criminal case in which the authorship expertise is appointed and prior to the pretrial investigation. These are the most informative, in terms of identification, comparative materials. A crucial requirement for free samples is the authenticity of their origin.

The main characteristics of free written samples are according to the:

- language of writing (the samples should be in the same language as the investigated document);

- time of performance (they should have been written approximately in the same period as the investigated text, within a five-year term);

- style and form of speech (the samples should match the style (conversational, official-business, journalistic, scientific) and form of written speech used in the investigated document);

- audience (the samples should be similar to the investigated document, as linguistic elements vary depending on the relationship (professional, personal) between the author and the addressee, as well as the duration of their interaction);

- document type (they should correspond to the nature and purpose of the document, such as a report, personal letter, complaint, etc;

- clarity of skill representation (texts edited by others or completed in a standardized format are less suitable for analysis, as the author's writing habits may be significantly distorted);

- author's condition (if it is known that the author was in an unusual state while writing the investigated text, it is preferable, if possible, to provide samples written under similar conditions.

Conditionally free samples – are texts independently written by the person being identified, connected to the criminal proceedings (e.g., explanations, complaints, applications), as well as texts created after the investigated document.

Experimental samples of written speech are texts composed by the person subject to identification at the request and in the presence of the investigator, particularly for the authorship examination.

When collecting experimental samples, the individual is asked to write a text on a freely chosen topic, similar to the investigated text in functional purpose (e.g., complaint, personal letter, official letter, etc.). Afterward, samples are taken that are functionally and thematically similar to the investigated text. For example, the person may be asked to write a complaint about the actions of an official. The minimum volume of each sample should be approximately 100 words. The total volume of

experimental samples should include at least five independently composed texts on a free topic and a topic close to the investigated text.

Oral speech samples in the form of audio recordings may also be used. The requirements for these samples coincide with those outlined above.

The investigator must label each type of sample, indicating whether it is a free, conditionally free, or experimental written speech sample of a particular individual (stating their full name) and must sign the label.

9.3. Authorship Expertise.

The subject of authorship expertise involves factual data about the author (or performer) of the text and the conditions under which the linguistic message was created. This information is determined by an expert using specialized knowledge when examining documents and other materials.

The object of authorship expertise is the text of the linguistic message or its fragment, as a realization of the linguistic skills of a person (a product of human speech activity expressed in written form).

Tasks of Authorship Expertise:

- determining (identifying) the author of a specific document (entire or part of it);

- identifying the authorship of several anonymous texts, including establishing whether multiple authors contributed to a single document or if the performer and author are different individuals.

Within the scope of identification tasks, the authorship of a text by a specific person is established, as well as the attribution of several anonymous texts to an unknown author (it may also be determined that a single document was written by several authors, or that the performer and the author of the document are different individuals). Identification tasks can be solved not only in relation to the authors of

texts but also to their performers, missing handwriting, typing and other skills of the latter.

In modern conditions of mobile communication development, electronic communication via mobile devices (phones) has become widespread. The use of short text messages (SMS) is gradually acquiring the characteristics of a separate communication genre. As a result, conducting identification studies to determine the author of such texts has become particularly relevant. The main features of SMS messages are their brevity and personal (non-public) nature. However, these characteristics make it possible to identify the author of such a short text. The individual set of speech features is established thanks to several factors:

1) the volume of an SMS message is limited, so the author must quickly figure out how to convey maximum content with a minimum number of signs;

2) consciously or subconsciously, the author selects necessary phrases, puts emphasis, and introduces key words, attempting to convey the message's content to the recipient, which individualizes the author of such an SMS.

An approximate list of identification questions resolved by authorship expertise includes:

− Is a certain individual the real author of the text provided for examination?

− Is a certain individual the real author of several different texts?

− Are the author and the performer of the text the same or different people?

− Was the given text composed by multiple authors?

For solving identification tasks, in addition to the texts under investigation, comparative samples must also be provided for authorship expertise

In the course of dealing with diagnostic tasks, the degree and nature of speech skills determine the group affiliation of the author. If the document is written in Ukrainian (or another language), the structural features of the text under investigation make it possible to determine whether Ukrainian (or another language) is the native language of the author. The presence of jargon, professional terms, and words and expressions used in a specific region, combined with other characteristics of written speech, allows determining the possible profession, place of speech skill formation of

the author, and etc. It is also possible to establish the unusual temporary psycho physiological state of the author or performer of a specific text at the time of its creation or execution, as well as whether the author has a stable pathology in speech-thinking processes without making a diagnosis. Moreover, text analysis allows diagnosing the emotional state of the author during the expression of certain thoughts, the state of operational stress due to the lack of typing skills, organizing the text under time pressure, dictation, etc. Moreover, the state of emotional tension arising in extreme situations that threaten life or health.

An approximate list of diagnostic questions addressed by authorship expertise includes:

− What traits of the author's socio-biographical profile can be established from the text?

− What is the primary language of communication of the person who authored the text?

− What was the place of formation skills of the person – the author of the text – formed (native language)?

− Are there signs in the text that indicate the author composed it under the influence of any distracting factors?

− Was the document's text composed by the person independently or under dictation, or was it rewriting?

− Was the document's text intentionally distorted in terms of written speech characteristics?

Documents for authorship expertise may be submitted in handwriting, typed, printed form, or even as copies made by any copying means. The limitations in the study of written speech apply to electronic texts if text editors that eliminate defects in written speech were used. However, even in such cases, it is not completely ruled out that a positive result of authorship analysis can be achieved.

The resolution of questions posed to authorship expertise is possible if the examined text contains approximately 100 words or more. It is also advisable to provide a socio-biographical profile of the potential author of the text (gender, age,

nationality, social status, education, profession, native language, place of residence, presence or absence of mental or other serious illnesses; presence or absence of any other condition at the time of document creation), as well as details about the possible time and conditions of its creation. If the document is addressed to a specific person, the expert should also be provided with information about this person: socio-biographical data, familiarity with the likely author, duration of acquaintance, and nature of their relationship.

Authorship expertise is not appointed if the document contains specific information about the author's age, nationality, profession, character traits, or actions, as well as information about the objects or persons with whom the author interacted, which emerge from the text's content. Obtaining comprehensive evidential information in such cases is entirely within the competence of the investigator.

The expert authorship study consists of four stages: preparatory (preliminary study); analytical (separate study); comparative; and synthesizing (evaluative).

During the preparatory stage, the expert familiarizes himself with the materials submitted for investigation, verifies their correctness, sufficient volume and quality of the text under examination, and samples, as well as the nature and scope of the task; based on the study of the examined text, he esolves the question of the feasibility of using its written speech characteristics.

At the analytical stage, the expert performs a separate analysis of the examined document's text and comparative samples, identifying general and individual features of written speech, determining the level of development and peculiarities of language skills (stylistic, syntactic), lexical-phraseological level, etc.

At this stage, attention is paid to the possibility of distortion in written speech. Deliberate distortion of written speech features is achieved through certain masking techniques: reduced literacy, simplification of presentation style, changes in vocabulary, etc. However, usually only part of the characteristics is masked, for example, words with mistakes at the beginning of the text may be written correctly by the end, due to the person's decreasing attention. All this allows concluding that intentional changes in written speech were made.

At this stage, the stability of the identified characteristics and their identification significance are also assessed. The study and comparison of written speech characteristics are often performed using the qualitative-descriptive analysis method. However, mathematical methods can also be applied, such as linguistic statistics, which allows determining the frequency of syntactically related word groups, and other methods of mathematical linguistics.

The third stage (comparative) involves comparing the identified general and individual characteristics in the examined text and samples, establishing their similarities or differences.

Researchers and expert practitioners have developed automated information retrieval systems that allow determining the personal data of an unknown author. In addition, there are ongoing developments of identification computer programs for determining a specific author.

The fourth stage (synthesizing) involves evaluating the results of the study. The authorship expertise methodology includes not only qualitative but also quantitative criteria for evaluating general and individual features. Based on this evaluation, conclusions are drawn.

It should be taken into account that a categorical conclusion of the authorship identification expertise is possible based on a limited volume of comparative material if the provided written speech samples are close to the examined document in terms of topic, purpose, addressee, stylistic affiliation, time of execution, and other characteristics of the speech situation. At the same time, it is not uncommon for an expert to be unable to reach a categorical conclusion even with significant volumes of comparative material when the written speech samples differ from the examined document according to the aforementioned characteristics.

Self-Assessment Questions:

1. What is forensic authorship analysis?
2. What are the object, subject, and tasks of forensic authorship analysis?

3. What is the system of features of written language?

4. What is the characterization of features of written language?

5. What are the tasks of written language authorship analysis?

6. What are the objects of written language authorship analysis?

7. What are samples of written language?

8. What are the types of written language samples?

9. What are the requirements for the quality and volume of written language samples?

10. What are the common mistakes in preparing for the perfoming the authorship examination?

CHAPTER X.
TECHNICAL-FORENSIC EXAMINATION OF DOCUMENTS

10.1. General provisions of technical-forensic examination of documents.

Various criminal offences are connected with forgery of documents, therefore the necessary to establish the method of making a document, the changes which have been made into it, to restore the content of a damaged document, etc. is often observed in the process of their investigation. These tasks can be solved by specialists in the field of technical-forensic examination of documents.

Technical-forensic examination of documents (hereinafter referred to as TFED) is a branch of forensic technic which studies, develops means and methods of determining the ways documents are made, identifies changes observed in them and the methods of their introduction, detects invisible records, as well as identifies objects and materials used in the creation or modification of documents.

The subject of technical-forensic examination of documents is regularities which are the characteristic features of such methods as: producing, using, and storing documents; making changes into their original contents; restoring the original contents of documents, as well as the examination of the documents which are relevant to criminal proceedings.

Objects of TFED can be classified on the ground of two criteria: their procedural nature (evidential value) and their material nature.

On the background of the procedural nature, the objects of TFED can be distinguished as: documents, objects, and substances which serve as carriers of evidential information in criminal proceedings; documents that prove certain circumstances relevant to the activities of non-judicial institutions and enterprises, as well as for individual citizens.

Among the objects of technical-forensic examination of the documents the following ones can be distinguished in accordance with the material nature:

documents; devices for producing documents or for making changes into previously produced documents; substances for the creation of documents or for making changes into previously produced documents.

All TFED objects are divided into two groups: these ones which are checked and comparative samples.

TFED is divided into the examination of documents requisites, the study of typing forms, and the study of documents materials.

Document requisites include: impressions of the printing forms (typeface, stamps, seals, etc.); handwritten texts; photos on documents; markings of composters and other markings, applied by perforation or by other means, except impressions of printing forms, or these ones which are applied by hand.

Devices for making documents (printing forms) or for making changes into previously made ones are: seals, stamps; printing devices belonging to polygraph equipment; type machines and other printing devices; tools for writing (pens, writing nodes of ballpoint pens, pencils, felt-tip pens); composters, perforators, etc.; tools for mechanical removal of strokes.

Materials of the documents are divided into: the basis of the document (paper, cardboard, etc.); dyes for strokes and prints; auxiliary substances (glue, wax, etc.); corrective substances (to correct technical errors); substances covering individual fragments of the document (stains, cross-out lines, etc.); residues of etching substances.

The main tasks of documents requisites examination are: establishing the facts and ways of making changes into the documents and identifying their original content; detection of smeared, faded and other poorly visible or invisible texts (images) on various materials, as well as texts (images) on charred and burned documents, under the condition that the paper on which they are made has not been turned into ashes; establishment of the type and identification of writing tools by strokes; determination of the relative antiquity of the document or its fragments' creation as well as the sequence of applying intersecting strokes; setting the whole document by parts; establishment of the document produced by mounting with the

use of duplicating, coping and computer equipment; identification of the person who typed the typewritten text, produced the image of the seal impression according to the features of the performer's skills.

The main tasks of the printing forms' examination are: establishment of the features of printing means (forms) production and their display in prints; establishing of the letters belonging to a certain set of fonts; establishment of the type, system, brand, model and other classification categories of printing equipment, identification of these means by imprints of their signs; establishment of the change in the original text of the document created on a type machine; establishment of the type and identification of the computer and duplicating equipment on the basis of the material documents made with their help; identification of seals, stamps, facsimiles, etc. by their impressions, establishment of the method and the time of their application.

The main tasks of documents' materials identification are: establishment of the kind, type (other classification category) of materials on which and with the help of which the document was executed (made) (paper, dyes, adhesives, etc.), and their common (different) generic (group) affiliation; determining the absolute time of execution of strokes of handwritten notes in documents.

10.2. The notion and the classification of documents in forensic science.

A document is a material object that contains information in a fixed form and is specially designed for its transmission in time and space.

In the legal sense, a document is an act which is constructed in order which is prescribed by law, which confirms something or has an official character, or which reflects thoughts and facts through language signs.

In forensic science, a document is understood as a material object where the information about some facts which have occurred or expected were fixed. The materially fixed information as in symbolic form (in the form of manuscripts, printed letters, numbers, symbols, graphic lines, drawings, etc.) so in images of another form

(photo, video images, sound recording, computer (electronic) document etc.) is expressed in it.

A document is considered as a complex object where information is combined with a material carrier. The information in the document can be perceived without changing the conditions of its observation (a written document, an image on metal or wood), or with the use of special equipment (an audio document, a video document, a document on a computer (electronic) media, etc.).

In the criminal proceeding aspect, the document is considered as a source of evidence, which has the following characteristics: a) it is a material object; b) it reflects information about events and facts that have criminal proceeding significance in a fixed form; c) the information in it is laid out with the help of signs that can be read by a person on his own or by using technical means; d) a person's opinion is transmitted or interpreted in the form of images or oral language; e) is created by a certain person, enterprise, institution, organization; e) is received in the prescribed manner by pre-trial investigation bodies or a court; g) is added to the materials of the criminal proceedings.

Documents differ in form (size, presence of certain requisites, protective means, impressions of seals and stamps, material) and content and are classified according to the following criteria:

According to the method of material fixation of information: written; graphic; photo, phono and video documents; machine or electronic documents.

According to the source of origin: official and private.

Official documents must have certain requisites (information fixed in the document for its identification, organization of circulation and (or) giving it a legal force), which are established by legislation or by-laws. Document’s requisites are divided into two groups - the first is a set of necessary markings (a text, impressions of seals and stamps, number, a photo card, etc.), the second is a set of data that individualizes the document (a name, number, date of issue, an organization and a person which or who issued it, a surname, a name and a patronymic of the owner, an amount, etc.).

According to procedural significance: documents as an independent source of evidence; documents as physical evidence; documents as samples for comparative examination.

Documents as an independent source of evidence are important for criminal proceedings only due to their content and are not the subject of the forensic examination themselves and therefore, they can be replaced by duplicates and copies.

Documents as material evidence are divided into those which: a) are means of committing criminal offenses (for example, sheets for the issuance of wages indicating fictitious persons); b) are keeping traces of criminal offenses on them (for example, a certificate with erased date numbers); c) were the subjects of a criminal offenses (for example, a stolen passport); d) were means of concealing criminal offenses (for example, the murderer staged a suicide by falsifying a suicide letter).

According to the legal nature: genuine and forged documents.

Real documents are divided into valid and invalid. Valid ones are those which have legal force at the present moment. Invalid documents are completely correct documents, but their validity period, which is indicated in the document itself, has expired, and the document has lost its legal force.

10.3. Types of documents' forgery and methods of their detection.

Forgery of documents is divided into two main types: intellectual and material. Intellectual forgery is lying in the creation of a document which is correct on the formal side (the presence and correctness of all requisites, the usage of original materials), but the data specified in it are beforehand known to be false. Material forgery of documents is divided into two types: complete and partial.

A complete forgery of a document is lying in its production by a complete imitation of the genuine one, starting with the form and ending with the input of the relevant data. In this way, paper money signs, vehicle registration certificates, certificates etc. are forged.

The characteristic features of such kind of forgeries are: the images are formed from small drops; lack of gloss of the dye in the strokes of the images (if ordinary (not with a special coating) paper is used); the dye can be absorbed on the reverse side of the paper (if ordinary paper without coating is used), and depending on the quality of the paper, it is absorbed by the surface layer of the paper and forms blurs along the fibers of the paper; microtexts and other small images are poorly reproduced; the dye dissolves in water (a characteristic of most common inkjet printers) and is resistant to the high temperature; strong adhesion of dye and paper (dye does not peeled off); the edges of the strokes in the images are fuzzy.

These signs are revealed by an expert with the help of microscopic examination, as well as in different lighting modes.

The most dangerous way of the forms' complete forgery is the use of polygraph techniques, materials and means similar to those which are used for the production of genuine documents.

Partial forgery of documents is lying in making changes in the content of the genuine document. Methods of partial falsification of documents: cleanups; text etching and washing; postscript and reprinting; replacement of separate parts of the document (including pasting of photo cards).

Cleanups is a method of changing the original content of a document by mechanical removing texts and images. During cleanups the text is erased (with an eraser) or scraped with a sharp object (blade, needle, etc.).

Signs of cleanups are breaches of the upper layer of paper; reduction of paper thickness, damage to graph lines or protective grid; remnants of cleaned strokes; splashes of dye in the strokes of the new text. The indicated signs of forgery can be detected by examining the document visually or under magnification in oblique light and on the lumen.

An addendum is a method of changing the original content of a document by adding new words, phrases or individual written signs to the handwritten text. Signs of postscript are uneven spaces between lines, words, letters in the middle of words; reduced size and acceleration of the handwriting of a certain part of the text; unequal

inclination of the same name signs strokes; drawing strokes of the main text; differences in the intensity, shades of the dye of strokes and their copying properties.

For overprinting of the texts in documents, the following elements are characteristic: the difference in the saturation and shade of the color of the coloring matter; different sizes and configuration of letters and numbers of the same name; uneven intervals between letters and lines; uneven row lines; the presence of double imprints of signs; differences in individual characteristics of the printing device, etc. Methods of comparative measurement, microscopic examination, color discrimination using light filters, adsorption-luminescence method, etc. are used to detect overprinting.

Etching is a method of changing the original content of a document, when the text is removed with the help of chemical reagents which produce the reaction to the dye of the strokes and discolor it. Some acids and alkalis are substances used for etching. Signs of etching are the presence of characteristic spots from the action of a chemical substance; breach of paper gloss; change of the color of the paper; discoloration of lining and protective net; surface roughness; appearance of paper damage in the form of small cracks; increasing paper fragility; the presence of dye residues of etched strokes; splashes of dye new strokes.

With the help of washing, the substance of the text's strokes is removed from the surface of the document by using solvents. All of them are multi-component and contain surface-active substances, bleaches, solvents, that is why the discoloration of strokes is achieved due to both the etching and washing processes. Signs of change in documents are detected with the help of magnifying devices and ultraviolet emitters, as well as physical and chemical research of the paper material that was subjected to etching.

Replacement of the document's parts consists of replacing separate sheets of the document, fragments or pasting a photo card. Signs of sheets replacement are: inconsistency in the numbering order of pages; differences in the graphic features of the printing font, the pattern of the protective net, the shape and dimensions of the

lining; inconsistency of sheets in size or paper quality; additional punctures in the places of attachment of sheets, etc.

Signs of pasting a photo card are the absence of a seal impression on the photo card; differences in the graphic signs of the letters in parts of the print on the photo card and the document; the presence of a cut on the photo card; the presence of an external adhesive substance, etc. These features are detected by different methods depending on the definite method the document parts' replacement.

10.4. Preparation of materials for expert examination.

Technical examination of documents (hereinafter - TED) is carried out after the establishment (person) which/who appointed it provides all the necessary and appropriately executed documents. The forensic institution (forensic expert) is provided with: a document which grounds the carrying of the examination, objects, samples for comparative analysis and, on the expert's request, criminal proceeding's materials.

The initiator of the examination at his/her own discretion can choose the expert institution in which the study will be conducted. These can be scientific-research and other institutions of forensic examinations of the Ministry of Justice of Ukraine; expert services of the Ministry of Internal Affairs of Ukraine and the Ministry of Defense of Ukraine.

The document on the assignment of expertise all the objects which are sent for a forensic examination are listed, indicating the exact name, quantity, series and numbers, if available, and other distinctive unique features.

Objects of the examination are sent to a forensic institution (a forensic expert) in a package that ensures their preservation, and are certified by a person in accordance with the procedure prescribed by law. Physical evidence and comparative samples are packed separately.

Documents-evidence require special rules for their handling, namely:

- documents must be stored in separate envelopes (packages), without bounding to the materials of criminal proceeding. All inscriptions on the envelope are made before placing the document into it. The documents can be folded only along the existing lines;

- it is prohibited to make notes in the document;

- the documents must be protected from exposure to light, moisture, and high temperature in order to avoid significant changes in their properties;

- during examination tweezers must be used in order not to contaminate documents and leave fingerprints;

- a fragile or torn document is removed with the help of a rubber bulb or electrified objects, then placed between two layers of glass or between transparent membranes and edged with an adhesive tape, an adhesive plaster or insulating tape;

- special care should be taken while handling burned documents, as such objects are easily destroyed. Charred documents can be moved using an electrified sheet of celluloid or a glass tube connected to a rubber bulb. Before transportation, burned documents must be treated in order to give elasticity with a 15% solvent of glycerin in water or mineral oils, or a mixture of these oils and gasoline.

It is important to remember that if during the conducting of the expertise an object may be damaged or destroyed (for example, by the method of wet copying, etc.), the document for the examination's appointment must contain permission for its damage or destruction.

Self-Assessment Questions:

1. The concept and the classification of documents.
2. The concept of technical-forensic examination of documents.
3. The subject and the objects of technical-forensic examination of documents.
4. What are document requisites, printing forms and document materials?
5. Tasks of technical-forensic examination of documents.
6. Types of documents' forgery.

7. Methods of partial falsification (forgery) of documents and their features.
8. Instructions for handling documents-evidence.
9. Issues resolved by the technical examination of documents.
10. Requirements for comparative samples for identification examination.

CHAPTER XI.
FORENSIC EXAMINATION OF PHYSICAL CHARACTERISTICS OF HUMANS (HABITOLOGY)

11.1. General terms of habitology.

Habitology is a branch of forensic technology that studies the patterns of development and changes in human appearance, develops technical and forensic means and methods of collecting, recording, researching and using information about human appearance in order to search for and identify persons who have committed criminal offences.

The beginning of development of the forensic doctrine of physical characteristics of humans was initiated in the publications of the French forensic scientist Alphonse Bertillon.

The subject of habitology is the regularities of development and changes in physical characteristics of humans, the classification of these characteristics, and their use for identification purposes.

The objects of forensic habitology are both the human appearance itself and its various reflections of an objective and subjective nature.

The objectives of habitology are to study the regularities that characterise the nature of human appearance; to develop requirements for methods and means of collecting, researching and using data on human appearance for the purpose of investigating criminal offences; to study the regularities of development of the doctrine in connection with the logic of the process of progressive movement of scientific knowledge.

Habitology includes the following components such as scientific foundations or prerequisites for identifying a person by physical characteristics; a system of elements and physical characteristics of humans used to identify a person; types of displays of physical characteristics of humans that are carriers of forensically

significant information; methods and means of collecting, researching and using data on a person's appearance for the purpose of identification; basics of portrait examination.

The scope of application of habitology is to develop methodological recommendations for the search for unknown persons who have disappeared from the scenes of criminal offences; to facilitate the search for known persons hiding from investigation and court; to develop recommendations for the search for missing persons; to identify living persons and corpses; to develop scientific foundations for forensic portrait examination.

11.2. Characteristics of human appearance.

Human appearance is a set of parts of the human body, elements, their details and characteristic features due to the peculiarities of the anatomical structure and functions of the body, items of clothing or things worn by a person, which create a single individually defined object.

Human appearance consists of body parts, elements, their details and features. Forensically significant elements of a human appearance are also details of clothing and wearable items, observable functional expressions (gait, facial expressions, etc), general physical data (gender, age, etc).

A body part is a large anatomical unit of the human body (torso, head, arm).

An element of appearance is any part of a person's body selected for study and observation, detail, expression of the functions of his or her body or clothing and other items that a person wears.

A detail of an element of appearance is a component part of an element (the nose, its components, the back of the nose, the tip of the nose, the base of the nose, the wings of the nose, etc).

A feature of an element of appearance is a specific expression of a characteristic of an element of appearance (high forehead, blue eyes, low eyebrows, etc).

Elements of appearance are characterised by the following features as: a) shape; b) size; c) position; d) colour; e) presence; f) degree of symmetry; g) degree of expression; h) absence; i) quantity.

Shape is a feature that is determined visually in two positions in full face and profile, by comparing it with known geometric shapes (circle, oval, square, rectangle, triangle), as well as with the shapes of known objects (almond-shaped, pear-shaped, etc). In the profile, the contour of the element is determined by comparing it with the shape of the lines (straight, wavy, convex, concave, angular). For example, the general shape of a face can be round, triangular, oval, square, and the profile can be convex, straight, concave.

Size is a quantitative characteristic of an element expressed not in absolute values (m, cm, mm), but in relative values, compared to the features that are located nearby. Therefore, the height of the forehead is not measured with a scale ruler, but is compared with other parts of the face, having previously divided it into equal parts (frontal, nasal and oral). If the frontal part is larger than the other two, the forehead is considered high, and if it is smaller, it is considered low, and if the three parts are approximately equal, it is considered medium. The dimensional characteristics of an element include height, width, depth, length, internal and external proportions.

Three size grading systems are used to determine the size of an element: a) three-part; b) five-part; c) seven-part.

The three-part gradation uses three terms: small, medium, large.

The five-part gradation operates with five terms: very small, very large, small, medium, large.

Two more terms have been added to the seven-part gradation: below average and above average.

Position is the location of a particular element of appearance within other elements. For example, a wrinkle on the cheek is relative to the sides of the element

(right, left, frontal, occipital etc), or to the conditional horizontal and vertical lines (vertical or horizontal wrinkle, inclined to the left or right etc).

Colour is a spectral characteristic of a surface element.

Presence is a feature that is important in the establishment of a temporary or artificial element of appearance.

A degree of symmetry is a derived feature that reflects the degree of similarity of even elements of appearance.

A degree of expression is a derived feature used when there is an understanding of the norm of a given element of appearance.

Absence is a feature that is important for establishing a necessary, natural element of appearance.

Quantity is a feature characterised by the elements of appearance of the same name, the number of which is not constant (cicatrices, scars, birthmarks, warts etc).

A separate group of appearance features consists of: a) distinguishing characteristics; b) striking features.

Distinguishing characteristics are rarely seen external features that represent deviations from the common morphological structure. They can be congenital or acquired (shortened legs, fused fingers, curvature of the spine, smallpox traces, eyes of different colours, strabismus, eyesore etc).

Striking features of appearance located on exposed parts of the body are relatively rare, easy to detect under normal conditions and quickly remembered, catching the eye (large ears, short stature, large mouth etc).

The striking features also include the following:

– tattooing is drawing a picture by puncturing and rubbing ink under the skin (women correct their facial features by injecting ink under the skin, changing the shape of eyebrows, lips, eyeliner, etc);

– piercing is pricking of the skin on the ears, wings of the nose, lips, eyebrows, on the tongue with the subsequent insertion of objects into the hole ("earring", "barbell", "navel", "twists", "labret" - lip piercing etc);

– scarring is a special application of incisions to the skin of a given shape and size, which result in scars in the form of drawings or patterns after healing;

– branding is an application of thermal, chemical, and sometimes electrical burns to the skin, which carry a certain pattern or design.

All elements and features of human appearance can be divided into two broad groups: personal and accompanying:

a) personal are inherent in a person as an anatomical and biological substance, taking into account his or her vital activity: general physical elements are the physical type of a person (gender, age, anthropological type); anatomical (morphological) elements and features of the external structure of the human body, its parts and surfaces (figure as a whole, head as a whole, hair, face as a whole, forehead, eyebrows, eyes, nose, mouth, lips, teeth, chin, ear, neck, shoulders, legs, arms, back, chest, etc); functional elements and features are expressions of the of the human body functions, which ensures certain aspects of its vital activity and interaction with the environment (posture, gait, gestures, facial expressions, speech, mannerisms, behaviour, customs, etc);

b) accompanying are inherent in clothing and objects worn by a person. These are the items of clothing (hats, shoes, etc); various things that people carry with them (bags, briefcases, watches, pencils, notebooks, jewellery, insignia, etc), as well as items that compensate for physical disabilities (crutches, canes, glasses, hearing aids, etc).

11.3. Verbal portrait.

A verbal portrait is a forensic method of describing a person's appearance according to a certain system, using special terminology, for the purpose of forensic registration, search and identification of living persons and corpses.

A verbal portrait is used in all types and forms of establishing, searching for and identifying a person by his or her appearance.

The description of appearance using the verbal portrait method is based on certain principles:

– reliability – it is necessary to describe only those elements and details that are undoubtedly perceived by the senses (it is impossible to include in the description elements, details and signs that were not seen);

– completeness of description includes a comprehensive study of body parts, elements, details, features of a person's appearance in full face and profile (elements are described in three-, five-, seven-part gradation, by features and their characteristics);

– specificity – when describing, it is necessary to avoid general names (external features, facial features, appearance etc), to specify a body part, element, detail, feature and their characteristics;

– the use of special terminology and common concepts – regardless of who conducts the study of a person's appearance (an operational unit employee, investigator, forensic expert, specialist etc), it is necessary to use generally accepted terminology and common concepts to avoid disagreements and misunderstandings;

– scientific character – when establishing, recording or examining features of appearance, it is advisable to use modern scientific achievements (computer, laser technologies), replacing time-consuming, expensive means, thus facilitating these actions.

A description using the verbal portrait method is carried out in accordance with the following rules:

1. The determination of features of appearance should be carried out in accordance with the normal position of the head and body of a person.

2. The description is carried out sequentially from the general to the specific (special, individual), first describing the elements of appearance as a whole, and then their parts.

3. The characteristics of individual elements are described in a top-down manner.

4. The position of the feature is determined relative to the conventional vertical and horizontal lines, planes, sides of the body, points, as well as other elements interconnected by this feature.

5. Movements are described with regard to speed, consistency, symmetry.

6. Elements of appearance are characterised in both full-face and profile views.

7. The accompanying elements are characterised by their production and operational characteristics.

8. Distinguishing characteristics and striking features in human appearance are allocated.

The sequence of description of the elements and features of human appearance should be as follows:

a) general physical elements – gender, age, anthropological type;

b) anatomical elements – figure as a whole, head as a whole, hair, face as a whole, forehead, eyebrows, eyes, nose, mouth, lips, teeth, chin, ear, neck, shoulders, legs, arms, back, chest;

c) functional elements – posture, gait, gestures, articulation, facial expressions, speech, mannerisms, habits;

d) clothing, jewellery and other items.

11.4. Subjective portrait.

A subjective portrait is a materialised image of a person's face and figure, made in accordance with the eyewitness's perception of the subject's appearance.

Subjective portraits are divided into three main types: 1) painted; 2) painted and composite; 3) photographic and computer-generated composite.

A painted subjective portrait is a stroke or halftone drawing of a person's face or figure. The basis of a painted portrait is the idea of a person's appearance, reproduced with a certain degree of accuracy.

Painted and composite portraits are made from pre-prepared, standardised drawings of facial elements collected in special sets. The images of facial elements from the set are selected and added to the portrait at the direction of the eyewitness. The completed painted composite portrait looks like a line drawing.

Photo composition portraits are the production of subjective portraits from fragments of photographs of different people using technical editing devices. This method was proposed in the 50s of the last century.

Computer-generated composite portraits. Modern computer systems are designed to automate the process of creating subjective portraits by composing images of elements from a relevant database on a monitor. These systems use graphic editors and modifiers to transform images of facial elements as required to create the final version of a subjective portrait. In addition, the aforementioned computer systems for automating the process of creating subjective portraits are designed for use in computer systems for accounting based on appearance features.

The following recommendations should be followed when making subjective portraits:

a) to make subjective portraits in a timely manner (within 2-3 days after the commission of a criminal offence, when working with children - up to 1 day);

b) to take into account the role of the eyewitness in the event that gave rise to the subjective portrait (witness, victim, accomplice);

c) to take into account the specifics of the type of criminal offence (fraud, robbery, murder, road accident);

d) to carefully analyse the objective and subjective factors of formation and preservation of a mental image (time of contact, distance, weather conditions, imagination, visual memory, thinking);

e) to establish and maintain psychological contact with the eyewitness;

f) to create favourable conditions for communication with the eyewitness;

g) to involve other specialists (teacher, psychologist), if necessary, in the work on drawing up a subjective portrait;

h) it is unacceptable to draw up a subjective portrait with the participation of several eyewitnesses at the same time.

There are three types of wanted notices:

1) with a photograph of a known person;

2) with a subjective portrait of the wanted person;

3) with only a text description of the wanted person's appearance.

11.5. Portrait examination.

Portrait examination is carried out with the aim of identifying a person by the physical characteristics reflected in objective and material objects (photographs and video recordings) using specially developed methods and techniques.

The subject of a portrait examination is the factual data relevant to the investigation and relating to the regularities of the structure of physical characteristics of humans, their changes during life and after death.

The main object of portrait examination is the appearance of a person, his or her qualities, a system of elements and characteristics.

The main task of a portrait examination is to identify a person (corpse) from a photograph (photo card, negative) and video recording.

An indicative list of issues to be resolved by a portrait examination:

– does this photograph depict the person (surname, name, patronymic) whose photographs are provided as samples?

– is the same or different person depicted in the photographs?

– does the photograph of the unidentified corpse depict the person (surname, name, patronymic) whose photographs were provided as samples?

Comparative materials for identifying a person from a photograph may include reliable photographs and video recordings of that person (amateur, professional, and experimental). It is advisable that the comparative samples include photographs that

are close to the one under investigation in terms of time of shooting and angle of the image.

The identification of a corpse is carried out by comparing a photograph of the corpse with the ante-mortem photographs. Photographs of the corpse itself should be taken not only in full-face or profile, but also from several other angles, as there may be no samples among the ante-mortem photographs in which the person is depicted in full-face or profile. To conduct a portrait examination of a corpse, the corpse should be prepared before taking photographs (wash off layers of dirt and blood from the skin, and do the hair).

Experimental comparison samples should not be retouched.

Self-Assessment Questions:

1. The concept, object, subject, tasks and content of forensic habitology.
2. The concept and system of features of human appearance.
3. Characteristics of the features of human appearance elements.
4. Types of elements and features of human appearance.
5. Qualities of features of human appearance.
6. The concept of a verbal portrait.
7. Principles of describing human appearance using the method of verbal portrait.
8. Rules for describing a person's appearance using the verbal portrait method.
9. The concept and types of subjective portraits.
10. The main stages of making subjective portraits.

CHAPTER XII.
FORENSIC EXAMINATION OF ODOR TRACES (ODOROLOGY)

12.1. General statements of odorology.

Odorology is a branch of forensic technology that studies the nature and mechanism of formation of odor traces, means and methods of their collection and use in the investigation of criminal offenses.

An odor is a kind of invisible trace in the form of particles (molecules) of a substance that are released into the environment by objects and substances that carry odors, causing specific irritation of the nerve endings of the olfactory organs in living organisms.

All objects emit odors, especially biological ones (people, animals, plants).

The physical properties of odor should be distinguished from the properties of odor traces in the forensic sense. The physical properties of odor include:

- volatility – the ability of a substance to evaporate, i.e. to change from a liquid or solid to a gaseous state;

- solubility – the ability of gaseous (odorous) substances to dissolve on the cells of the olfactory organ of a person or animal and cause a sense of smell;

- adsorption – the absorption of odorous substances from a gaseous medium by the surface layer of another substance;

- dilution – a change in the concentration of a substance that leads to the formation of a new odor quality;

- diffusion – the interpenetration of particles of one substance into another.

Based on the physical properties of odor, the forensic properties of odor traces are determined:

- continuity of the formation mechanism – in the presence of a source and appropriate external conditions, an odor trace is formed continuously – as long as the source of the odor (object, substance) exists;

- structure mobility – characterizes the internal state of the trace substance and indicates that there is no connection between its particles (molecules), they are in chaotic motion and constantly mix with each other and particles of the environment in which the trace is formed;

- dispersibility is the property of an odor trace to disperse in a closed volume or in space and thus reduce the amount of odorous substance per unit volume;

- divisibility of odor traces – the substance that forms the odor trace is in a gaseous state, this trace can be divided into parts, and each of them will retain the quality characteristics of the whole;

- preservation of traces and samples of human odor in sealed packaging – the possibility of complete preservation of all individual qualitative and quantitative characteristics of human odor and the odor of other material sources of information when moving them to the appropriate sealed packaging;

- individuality of traces and samples of human odor – the main qualitative and quantitative parameters of the odor of each particular person are unique, inherent only to him/her, and therefore he/she (the person) can be identified by smell; relative stability of odor traces – i.e., the invariability of the chemical structure of odor molecules in environmental conditions, which allows them to be collected and examined to determine the source of origin after a certain period of time;

- relative invariability of human odor samples – the main individual qualitative and quantitative parameters of a particular person's odor remain unchanged throughout his or her life, while other qualitative and quantitative characteristics of his or her odor are constantly changing under the influence of drugs and alcohol, the presence of bad habits (smoking, etc.), physical or mental stress, etc.

Given these properties of odor traces, it is appropriate in forensic terms to create a classification of the relevant traces, taking into account the mechanism of their formation and sources of origin.

General classification of odor traces of any material sources by origin:

1. Traces of the material source's own odor, the composition of which is determined by the processes of vital activity for living beings and internal properties for material sources of inanimate nature.

2. Traces of the acquired odor of a material source, which, in turn, are divided into: traces of the acquired odor of a material source of a temporary nature, from which this source can be freed under certain conditions; traces of the acquired odor of a material source of a permanent nature, from which it can no longer be freed.

3. Traces of the aggregate odor of a material source, which are represented by a combination of all or part of the named types of odor traces.

4. Traces of background odor, i.e. traces of the odor of other material sources surrounding the carriers of odor traces.

5. Traces of the final odor of a material source, which consist of all or part of the above odor traces and are ultimately subject to investigation.

Special classification of traces and samples of human odor by origin:

1. Traces of local individual human odor, which are determined by the peculiarities of the functioning of the skin, sweat, sebaceous and endocrine glands in the area of individual organs or tissues of the human body.

2. Traces of a person's total individual odor, which consist of all or part of the traces of local individual odors of a particular person.

3. Traces of accompanying human odors, among which can be distinguished:

- traces of odor from clothing, including shoes and other items in constant contact with the human body;

- traces of odor resulting from functional changes (illness, medication, physical activity);

- traces of household odors, i.e. traces of odors caused by the living conditions of a particular person: traces of odors of toiletries; food; odors caused by bad habits; odors of housing, etc;

- traces of professional odors, i.e. traces of odors acquired by a person in the course of performing labor functions outside of the home;

- traces of odors in public places (public transport, air environment of the area of residence, commuting to work, entertainment venues, shops and other places that are not the person's place of work);

- traces of situational odors, i.e. traces of odors, the formation of which is situational for a given person (traces of the smell of dirt, paint, oil products and other substances with which a person has accidentally become contaminated).

4. Traces of a person's cumulative general odor, which consists of all of the above odor traces and odor traces that a person possesses at the time of odor trace formation or obtaining odor samples from him/her.

5. Traces of a person's background odor, i.e., the odor of objects in the environment in which trace formation occurs and the finding of the total general odor of a person until it is properly preserved during the collection of traces or obtaining odor samples.

6. Traces of the final human odor, which consist of all parts of the above traces or odor samples and are ultimately subject to laboratory or non-laboratory odorological research.

Classification of odor traces by the mechanism of formation:

- Odor source traces - various material objects, such as mothballs, gasoline, perfume, cheese, insects, plants, animals, people, i.e. material objects that evaporate under certain conditions and form odor traces.
- Odor traces are gas formations, a cloud of air mixed with odorous molecules, if there is no direct source of odor in a given place.

12.2. Use of odorological information in the investigation of criminal offenses.

The most common source of odor is a person. The source of human odor is volatile metabolites, which are genetically determined by composition, constantly created by the body and found in the body fat and blood.

Even a short time spent by a criminal at the scene of a criminal offense results in odor traces remaining where he or she stood, sat, or lay. The possibility of their extraction and further investigation depends on the intensity of trace formation, the properties of the object carrying the trace, meteorological conditions and other factors.

In closed rooms, human odor can persist for up to a day. During a short-term stay of a person (within 15-30 minutes) in an enclosed space of no more than 20 m2, an odor trace is formed.

Human odor traces are usually divided into three types according to their preservation time: fresh, normal, and old. Fresh traces include traces that have been left no more than an hour since their formation. Traces are considered normal if they were left no more than three hours ago. If more than three hours have passed since the trace was left, the scent is considered old. The division is conditional, and applies primarily to traces formed on objects of temporary contact with the human body (matches, pencils, random objects used as tools of a criminal offense), as well as traces of hands, feet and other parts of the human body.

Odor is retained by the surface of objects with which a person has come into contact. It individualizes a person, is highly persistent and immutability. The identification value of odor traces is similar to that of handprints, and the advantage is that the former are not controlled by humans, i.e., they cannot be destroyed and cannot help but be left.

Woolen fabrics, shoes, hats, wooden objects, wet soil, snow, and grass adsorb human odor better and retain it longer. Odor retains worse on smooth surfaces, rocky soil, asphalt surfaces, and metal products.

Typical objects carrying traces of human odor are: dry blood stains, hair, nails, tissue particles (retain odor for decades); personal belongings, clothing, shoes, cigarette butts (retain odor for up to several months); objects that have been in contact with a living person's body for at least half an hour, including criminal instruments, door handles, locks with traces of sawing (retain odor for up to 60 hours); footprints, footwear (retain odor for up to 10 hours, in winter - for a day).

When conducting an odorological examination, the dog's sense of smell is used as an analyzer of odorous substances. The olfactory abilities of specialized biodetector dogs are more often used to detect and investigate odor information. Dogs are quite accurate in making samples based on odor samples. The essence of sampling is for the dog to find among several odors the one that was perceived as a sample. This physiological activity of the dog is similar to the work of a modern technical device that identifies an object - the source of the odor - from a set of similar objects. In the course of a methodically correct odorological study, a detection dog focuses on the individual basis of a person's odor, abstracting from the effects of many endogenous and exogenous factors.

Sampling is carried out in a special room separated by a glass partition from the persons present; the sampling objects must be the same material - a carrier of odor, for example, flannel napkins, activated carbon fabric, similar things - carriers of odor.

During the sampling, only an expert with a detection (sniffer) dog is present in the room where the required objects are located. As a rule, the sample is taken three or four times, and the wanted odor is selected from 5-6 samples. It is also recommended to use not one, but two or three dogs to ensure the reliability of the sampling results.

To work with odor information at the scene, a specialized investigator's suitcase is used - an odorological suitcase.

The kit contains a set of technical means used to search for, collect and preserve odor traces at the scene of an incident for further laboratory identification.

The choice of the method and means of working with odor information depends on the place of its detection, the properties of the trace-receiving surface and the time of contact of the latter with the source of the odor.

The main ways to extract odor traces are to remove the adsorbent that has absorbed the odor, to remove the carrier object itself, or in a combined manner - to remove the carrier object that is in contact with the adsorbent.

Odor traces are sampled by contacting the adsorbent (sterile flannel or gauze wipes) with the carrier object.

When working with sources of odor information, it is mandatory to use rubber gloves, tweezers, clamps, etc.

The objects from which odor traces are collected are recorded by overview and nodal photography - before the adsorbent is applied and during adsorption. The locations of odor trace sampling should be marked on the plan.

It is necessary to take into account the complex nature of trace formation, so before collecting odor traces, the object is inspected for the presence of micro objects, hand and footprints, etc., and then the odor is collected.

Collecting odor traces from door handles or other spherical surfaces. If a handprint suitable for extraction and further identification is found on a door handle, the odor must first be extracted from it, since a handprint treated with reduced iron powder and copied onto a fingerprint film will be unsuitable for further work with it as a source of odorological information. The adsorbent is removed from the container and applied to the trace, i.e., the door handle where the handprint was found. The top of the adsorbent is covered with a plastic bag, the edges of which are pressed against the door and attached with adhesive tape or adhesive plaster.

The contact time between the adsorbent and the primary odorant is 30 minutes or more, depending on how much time has passed since the trace was formed.

If the trace is unsuitable for fingerprinting, then only the odor is collected. It is effective to collect odor with a vacuum cleaner or a special vacuum device.

After the odor is collected on an adsorbent napkin, the latter is carefully removed from the door handle with tweezers and placed in a container for preserving the collected odor, which is hermetically sealed. A tag with a description is attached to it. The investigator and witnesses sign the tag.

Collecting odor from hand or footprints left on the ground, sand, and other loose surfaces. Collecting odor samples from a trace left on loose surfaces is best done with an absorbent wipe by direct contact with the trace, since when using a vacuum cleaner or air intake device, microsubstances of the substance (gypsum,

flour, etc.) will be deposited on the absorbent wipe along with the odor molecules. The adsorbent napkin is removed with tweezers from the container in which it was stored and, when unfolded, is placed on the trace, and an aluminum foil or plastic bag (film) is placed on top, pressing it down with a load. After the necessary contact, the adsorbent is transferred with tweezers to the canning container; the container is closed, sealed, and its contents are described.

When collecting scent traces in an apartment or other enclosed space where dogs are kept, it should be borne in mind that the samples taken may contain and usually predominate dog scent molecules. In such a case, the sample may lead to a negative result.

Collecting odor traces from small objects and micro-objects. Odor carriers such as various small objects belonging to the suspect and microsubstances of the human body, such as epidermal microparticles from the palm surface of the hand, a broken off part of a nail, torn hair, etc., are also important.

If odor carriers are detected in the form of particles that have directly separated from the human body or human clothing, they must be described in the protocol, as well as photograph the place of detection and the object itself, and then placed in a glass container with tweezers. If this is not possible, an odor sample is taken from the source of the odor and preserved. To do this, it is sufficient, for example, to put a piece of a cut nail or skin into a test tube with several sterile pieces of flannel cloth and leave it hermetically sealed for some time (up to a day).

Collecting odor from traces of blood. Odor from blood traces is collected by contacting the odor carrier with an adsorbent or by cryogenic condensation. The latter is more effective because it ensures a more complete extraction of volatile components from such objects, which is especially important when working with odor carriers in the form of various kinds of microsubstances.

When using the contact method, a dry bloodstain is pre-moistened and then brought into contact with a piece of standard adsorbent - a flannel cloth. If blood scrapings are submitted for testing, they are ground before being moistened.

The time of contact between moistened blood and the adsorbent usually does not exceed 10 minutes. For the purpose of storing the odor trace, the adsorbent together with the odor carrier (dry blood) can be preserved in a glass jar. To avoid decay of the blood, the jar should be stored in a freezer, which will ensure that the odor trace can be identified within a year.

Collecting traces of odor from hair. The hair is placed on a small piece of adsorbent, moistened with a few drops of water, immediately wrapped tightly, and then wrapped in foil (hair, like blood samples, is transferred to the adsorbent using tweezers). The foil-wrapped adsorbent with the hair is placed in a glass jar for a day, which is hermetically sealed. The adsorbent freed from the foil with the odor collected on it is preserved in a hermetically sealed glass jar. Odor in the concentration required for odorological sampling can be collected from hair, the total length of which should be at least 20-30 cm.

During the crime scene inspection, odor-carrying substances such as traces of semen, saliva, oral and nasal secretions, and other secretions associated with human physiological activity may be encountered. If there are sufficient quantities of these substances and some of them can be removed, they are transferred to a sterile napkin, which is placed in a test tube or other hermetically sealed container. The container is sealed and the contents are described.

Collection of odor traces from objects and things in constant contact with the human body. Objects and things that are in constant contact with the human body, such as clothing, footwear, toiletries, and related objects, usually carry the odor of their owner.

If the odor is collected from a shirt, it is best to do so from the sleeve armhole on the inside by directly contacting the absorbent wipe with the odor carrier.

Odor collection from shoes is carried out by placing an absorbent wipe inside the shoe. After that, the shoe is covered with a plastic bag to create a microclimate that promotes greater evaporation of odor molecules and their adsorption onto the wipe.

Odor is removed from bedding, handkerchiefs, scarves, and similar objects by direct contact of the adsorbent with the odor carrier or by using a vacuum cleaner or air extraction device.

Collection of drug odor from suspected carrier objects. The odor of narcotic drugs, in particular those of plant origin, is collected either by applying an adsorbent to the suspected carrier or by vacuuming the air from an object that has been or could be in contact with narcotic substances, such as a bag or suitcase. If the size of the object allows, it can be placed directly into a hermetically sealed container, where the odor will be adsorbed onto the adsorbent fabric, which can be stored for a long time after preservation.

The high temperature, wind, dry weather, dense surface layer of the odor carrier (rocky soil, metal, plastic, glass and similar dense objects), delayed collection, primarily preservation, and referral of probable carriers of odor traces for examination significantly reduce the preservation time of traces of individual human odor, their concentration required for identification.

Self-Assessment Questions:

1. The definition and physical properties of odor.
2. Forensic properties of odor traces.
3. General classification of odor traces of material sources by origin.
4. Special classification of traces and samples of human odor by origin.
5. Classification of odor traces by the mechanism of formation.
6. Characterization of objects-carriers of human odor traces.
7. The main ways of using odorological information in the investigation of criminal offenses.
8. The main methods of collecting and preserving odor traces.
9. Technical and forensic means of working with odor traces.
10. Factors and conditions that contribute to the preservation of odorological information.

CHAPTER XIII.
INFORMATION AND REFERENCE SUPPORT OF LAW ENFORCEMENT ACTIVITIES (FORENSIC REGISTRATION)

13.1. General Provisions of Forensic Registration.

In order to prevent, detect and investigate criminal offences, as well as to increase the level of information support for expert research, forensic records are maintained and function in the bodies that are part of the system of the Ministry of Internal Affairs of Ukraine. These records form a system that is defined as forensic registration in forensic science.

Forensic registration as a branch of forensic technology is knowledge about the organization and functioning of forensic records, as well as the use of information contained in them during the investigation and prevention of criminal offences.

Forensic records are a scientifically developed set of information retrieval systems that are created and function in law enforcement agencies in order to provide the process of investigating criminal offences with certain information about objects and their identification features.

The legal basis for the functioning (formation, maintenance and use) of forensic records is the Constitution of Ukraine, laws of Ukraine, normative legal acts of the President of Ukraine and the Cabinet of Ministers of Ukraine, departmental normative acts of the Ministry of Internal Affairs of Ukraine.

The sources of forensic records are objects (their copies, images) and (or) information about them received from operational units, pre-trial investigation bodies, prosecutor's offices, courts, as well as from the Ministry of Health of Ukraine, the Ministry of Justice of Ukraine, other executive bodies, as well as the National Bank of Ukraine.

Forensic records of the expert service function at two levels (before the reform of the Ministry of Internal Affairs of Ukraine - at three levels – central, regional (oblast) and local):

– central – in the State Scientific Research Forensic Center of the Ministry of Internal Affairs of Ukraine (hereinafter referred to as the SSRFC), where the central collections are kept;

– territorial – in the territorial scientific research forensic centers (hereinafter referred to as the SRFC), where regional collections are maintained.

Depending on the tasks to be solved, forensic records consist of operational and search and (or) information and reference collections.

Operational-and-search collections are designed to obtain information about a person involved in the commission of a criminal offence; to identify a person, an instrument of a criminal offence (vehicle, weapon, equipment, etc., which were used during the commission of a criminal offence); to establish the common type (group) affiliation of materials and substances; to establish other factual data that indicate the commission of criminal offences by a particular person; to obtain other information about the criminal offences committed and to prevent them.

Information-and-reference collections are intended for the use of objects included in them during expert research, creation of scientific-research and research-experimental developments, updating the methodological and regulatory framework of forensic examination, preparation of orientation information, generalization of information about the causes and conditions of criminal and other offences in order to prevent them.

The methods by which forensic records are created and filled in and methods of proper forensic registration performing are: 1) descriptive method; 2) fingerprinting method; 3) photographic method; 4) collectioning method; 5) graphical method; 6) mixed methods.

The main forms of concentration of information in forensic records are the following: 1) cards; 2) card indexes; 3) collections; 4) albums; 5) magnetic tapes;

6) disks; 7) video libraries, photo libraries; 8) trace files; 9) data banks, including automated data banks.

Forensic records can be operated using computer equipment and software agreed with the State Forensic Examination Centre. In order to prevent the loss of information (failure of computer equipment, software failures) entered into automated forensic records, its constant duplication on optical media (CD/DVD) is ensured.

Forensic records are divided into:

– trace record;

– fingerprinting record;

– ballistic record;

– melee/cold steel weapons record;

– banknotes, forms of documents, securities and plastic payment cards record;

– record of persons on the basis of appearance;

– record of explosives;

– fire-and-technical record;

– record of narcotic, psychotropic substances, their analogues and precursors;

– record of the genetic characteristics of a person;

– record of voices and speeches of persons;

– record of vehicle identification marks and details of documents (signatures, seals, stamps);

– record of materials, substances and products.

13.2. Forensic Records.

Trace record functions at the central and territorial levels.

Trace record consists of the following collections:

a) operational-and-search collections of prints of shoes, gloves, burglary tools, vehicles. It is formed from carrier objects with traces, copies or images of shoe prints,

gloves, burglary tools, vehicles seized during crime scene search (CSS), other investigative (search) actions, operational measures;

b) information-and-reference collections of samples of burglary tools, locking and sealing devices (their copies, images or information about them), as well as information about footwear, vehicles. It is formed from samples of burglary tools, locking and sealing devices, parts of vehicles (tires, headlights, etc.), mass-produced products (or images and information about them).

Fingerprint record functions at the central and territorial levels and consists of:

a) AFIS (automated fingerprinting identification system) "DACTO-2000" fingerprint files:

– fingerprint cards of unidentified corpses;

– fingerprint cards of persons who have been subjected to fingerprinting;

b) trace files (registration cards of handprints seized during crime scenes searching on the facts of unsolved criminal offences and missing persons).

Ballistic record functions at the central and territorial levels and consists of:

a) operational-and-search collections:

– bullets, cartridges and cartridge cases with traces of weapons (formed from bullets, cartridges and cartridge cases with traces of weapons, their copies and images seized during the crime scene search, other investigative actions and operational measures;

– bullets and cartridge cases experimentally fired from seized, found and voluntarily surrendered weapons;

– bullets and cartridge cases experimentally fired from service weapons that are in service in law enforcement agencies, authorized bodies of state power;

– bullets and cartridge cases experimentally fired from weapons registered at the objects of the permission system;

– bullets and cartridge cases experimentally fired from weapons owned by citizens;

– information about samples of improvised weapons;

– cartridge cases of lost smoothbore firearms;

– information about criminal offences committed with the use of firearms and the facts of their withdrawal from illicit trafficking;

b) information-and-reference collections:

– weapons (full-scale samples, parts, mechanisms, blanks, tools and information about them);

– ammunition (full-scale samples of ammunition or their parts, information about them);

– bullets and cartridge cases with traces of weapons (bullets and cartridge cases experimentally fired from samples of firearms).

The central operational-and-search collection consists of:

– bullets, cartridge cases and cartridges with traces of weapons seized during inspections of crime scenes, other investigative actions, operational measures;

– bullets and cartridge cases experimentally fired from seized, found and voluntarily surrendered weapons;

– bullets and cartridge cases previously experimentally fired from stolen (lost) weapons stored and used in the Armed Forces of Ukraine, bodies included in the system of the Ministry of Internal Affairs of Ukraine, other law enforcement agencies, at the objects of the permit system, as well as from rifled, gas weapons, pistols and revolvers designed to shoot cartridges equipped with rubber or similar in properties bullets of non-lethal action (hereinafter referred to as "non-lethal weapons"), that were in the personal use of citizens;

– information on crimes committed on the territory of Ukraine with the use of firearms and the facts of withdrawal of such weapons from illicit trafficking;

– cartridge cases of lost smoothbore firearms;

– information about samples of improvised weapons.

Record of melee/cold steel weapons functions at the central and territorial levels and consists of an information and reference collection of melee weapons and products structurally similar to them.

Record of banknotes, forms of documents and securities functions at the central and territorial levels and consists of:

a) operational-and-search collections of counterfeit banknotes, forms of documents, securities, plastic payment cards (their images), etc., and (or) information about them;

b) information-and-reference collections of samples of banknotes, forms of documents, securities, plastic payment cards (their images), etc., and (or) information about them.

Record of persons on the basis of appearance functions at the territorial level and consists of operational-and-search collection of subjective portraits of persons suspected of committing criminal offences.

In case of identification of the person for whom the subjective portrait was compiled, the officer of the police operational unit who is the initiator of its production, submits a photo of the detained person to the Scientific Research Forensic Center (SRFC).

Record of explosives functions at the central and territorial levels and consists of:

a) operational-and-search collection of explosive devices and their remnants;

b) information-and-reference collection of explosive devices.

Fire-technical record functions at the central and territorial levels and consists of information-and-reference collections, which include improvised incendiary devices and their remains, seized during investigative actions and operational-and-search activities, as well as reconstructed during forensic examinations. Collections should include improvised incendiary devices, in which the incendiary composition is replaced by an inert (not capable of combustion) substance.

Record of synthetic and semi-synthetic narcotic and psychotropic substances functions at the central and territorial levels and consists of:

a) central operative-and-search catalogue of information on semi-synthetic and synthetic narcotic and psychotropic substances;

b) central and territorial information-and-reference collections.

Samples of substances withdrawn from illicit circulation and sent to the State Forensic Examination Center for inclusion in the Catalogue are provided in the

following quantities: 5 pcs. (in the form of tablets, capsules, ampoules, stamps), 0.5 g (in the form of powdery substances, which are taken into disposable sterile plastic tubes).

Record of genetic characteristics of a person. Automated record of human genetic traits functions at the central and territorial levels. It consists of operational-and-search collections, which are maintained in the State Forensic Examination Center and the Scientific Research Forensic Center, respectively.

Record of human voices and speech functions at the central and territorial levels.

Information-and-search collections are formed from:

- voices and speech, which are formed from recordings of voices and speech of persons who send messages (including knowingly false ones) about threats to the safety of citizens and other socially dangerous acts (anonymous announcers);

- voices and speech of persons in respect of whom the facts of sending of messages (including knowingly false ones) about a threat to the safety of citizens and other socially dangerous acts (identified persons) have been established.

Record of vehicle identification marks and details of documents (signatures, seals, stamps) functions at the central and territorial levels and consists of information and reference collections of images (if possible, full-scale samples), namely:

- identification numbers of vehicles of different brands, models and years of manufacture, which are not in the existing collection;

- changed vehicle identification numbers;

- signatures and seals of officials of the centers for the provision of services related to the use of motor vehicles and experts in the comprehensive examination of vehicles.

Record of materials, substances and products functions at the central and territorial levels. Central and territorial information-and-reference collections are formed from full-scale samples (information) about them, namely:

- fibers and fibrous materials;

- explosives;
- paints and varnishes;
- metals and alloys;
- alcoholic beverages;
- special chemicals;
- animal hair.

Self-Assessment Questions:

1. The concept and essence of criminal registration.
2. Sources of formation of forensic records.
3. Levels of functioning of forensic records and the units in which they are kept.
4. What collections do forensic records consist of, depending on the tasks to be solved?
5. Types of forensic records.
6. Forms of forensic records.
7. Levels of functioning of trace record and its objects.
8. Objects of record of human genetic characteristics, record of human voices and speech, and record of persons on the basis of appearance.
9. Levels of functioning of record of banknotes, forms of documents and securities and its collection.

CHAPTER XIV.
INFORMATION AND ANALYTICAL SUPPORT FOR THE ACTIVITIES OF THE NATIONAL POLICE OF UKRAINE

14.1. Objects and forms of maintaining information and analytical systems of the National Police of Ukraine.

Today, information has become one of the most important resources, and accounting and information systems have become essential tools in almost all areas of activity, including the investigation of criminal offenses.

An information system is an organized set of arrays of information about certain objects, as well as information technologies, including modern computer hardware, software and communication networks that ensure the processes of entering, processing and issuing information to the user.

During the investigation of criminal offenses, information retrieval systems (accounting) are mostly used to collect, store and provide information at the user's request.

Accounting should be understood as information systems that provide input, search, generalization, storage, accumulation and issuance of information on certain objects and phenomena.

The basis of the IIRS functioning system are territorial nodes that operate directly in district and city police departments (offices) with connection via dedicated or dial-up communication channels to the information resources of regional (oblast) IIRS nodes. The resources of the central IIRS node are formed by combining the information resources of the IIRS information subsystems of the regional (oblast) nodes. The objects of accounting (information resources) of the IRS are information on events, offenses, persons, things, documents, valuables and other property subject to accounting.

Access to the information resources of the central and regional (oblast) levels of IP IIRS is limited. Only authorized users of IIRS have the right of direct access to IP IIRS information records solely within the framework of their functional responsibilities and the level of access to the relevant information systems.

Information from IP IIRS is provided in the form of extracts only upon official requests from courts, prosecutor's offices, pre-trial investigation, operational police units of other regions (oblasts), public authorities (officials), law enforcement agencies of other states in connection with the exercise of their powers under the applicable law.

The Information Portal of the National Police of Ukraine (ITS IPNP) is a set of hardware and software tools designed to process information generated in the course of the National Police of Ukraine and its information and analytical support.

The main tasks of the ITS IPNP are: information and analytical support of the activities of the NPU; ensuring the filling and maintenance of information resources of databases (banks); supporting the activities of police bodies in the field of labour, financial, management and document management relations; ensuring electronic interaction with the MIA and other public authorities.

Information resources of the ITS IPNP are information generated in the course of police activity and used to form temporary data sets created in the course of police activity and used to fill and keep up-to-date databases (banks) of data on:

1) persons in respect of whom police officers carry out preventive work;

2) detected criminal and administrative offences and persons who committed them; accused persons whose indictment has been sent to court;

3) search for suspects, accused (defendants) persons evading serving a sentence or court verdict;

4) search for missing persons;

5) identification of unidentified corpses and persons who cannot provide any information about themselves due to illness or minor age;

6) criminal or administrative offences, events threatening personal or public safety, emergencies registered with the bodies of the National Police;

7) persons detained on suspicion of committing offences (administrative detention, detention on orders of law enforcement agencies, detention by pre-trial investigation bodies, administrative arrest, house arrest);

8) persons who have committed administrative offences, proceedings in which are carried out by the police;

9) recodered criminal and administrative corruption offences, perpetrators and results of consideration of these offences in courts;

10) foreigners and stateless persons detained by the police for violation of certain rules of stay in Ukraine;

11) stolen numbered items, valuables and other property with characteristic features for identification or items related to the commission of offences, in accordance with applications of citizens;

12) stolen (lost) documents at the request of citizens;

13) found, seized items and things, including prohibited or restricted items, as well as documents with signs of forgery that have individual (serial) numbers;

14) stolen vehicles that are wanted in connection with the missing person, found ownerless vehicles, as well as stolen, lost number plates;

15) issued permits in the field of road safety and permits for the movement of certain categories of vehicles;

16) weapons in the possession and use of individuals and legal entities that have been granted permission to purchase, store, carry, transport weapons;

17) stolen, lost, seized, found weapons, as well as voluntarily surrendered weapons from among those that were illegally stored;

18) databases formed in the course of operational and investigative activities in accordance with the law.

The National Police of Ukraine is the manager of the ITS IPNP, the administrator is the Department of Information and Analytical Support (DIS) of the National Police of Ukraine, and the users are officials of police bodies (units) who are granted the right to access information in this system in accordance with the established procedure.

The information is provided and processed in the ITS IPNP in accordance with the general rules for filling in the details of electronic cards and paper accounting documents of the IIRS information subsystems.

The existing information system "Operational and Reference File" (ORF) contains information on persons who have been sentenced by courts to any punishment for a criminal offence; are suspected of committing a criminal offence; information on whom is available in archived criminal files; and Ukrainian citizens convicted by courts of other states.

The Automated Fingerprint Identification System (Dakto 2000) records information on fingerprint cards of persons detained on suspicion of committing offences, people who are unable to provide information about themselves due to health, age or other circumstances, and unidentified corpses.

To support the operational and investigative activities of the operational units of the criminal police of the National Police of Ukraine, the Automated Information System for Operational Purposes (AIS OP) operates. The AIS OP records information on persons in respect of whom operational investigative cases have been initiated, obtained: from persons who cooperate confidentially with operational units; in the course of operational investigative activities within operational investigative cases.

14.2. Rules for filling in the details of electronic cards of information subsystems and paper accounting documents.

When entering information about a person, electronic cards of information subsystems and paper records must contain the person's personal data indicated in the nominative case. When indicating the person's place of birth, the country where the person was born and the settlement (if any) shall be indicated. When specifying a person's citizenship, the country of citizenship or nationality of the person must be indicated. When entering information about a passport or other official identity

document, full details must be provided: type of document, series, number, date of issue, issuing authority; information about the place of registration and/or residence of the person – the addresses at which the person is registered and/or resides in Ukraine.

When entering information about firearms, the following are the basic and identifying data: the brand of the weapon, its model and/or modification; the calibre of the weapon is indicated in the metric or inch system in accordance with the data of the manufacturer or the conclusions of the results of the examination.

When entering information on cold steel weapons, the following are the basic and identifying data: blade length, year of manufacture, series and individual (serial) number of the weapon are entered separately in accordance with the marking and/or passport of the manufacturer's weapon, expert opinion.

Electronic cards of information subsystems shall contain the following information: full name of the police body; number and date of registration of the material, as well as the decision and date of decision; number and date of registration of the object by the executor; grounds for registration (deregistration) of the object; registration number of the electronic card of the relevant IP; position and surname of the executor – employee of the structural unit (service) of the police body who provided information for entering (adding, deregistering) to the IP; position and surname of the authorised user.

14.3. Purpose and formation of separate information subsystems of the National Police of Ukraine.

The IIRS integrates the following information subsystems:

"Unified Record" contains information on applications and reports of criminal offences and other events set out in applications (reports, notifications) and registered with the police duty office.

"Crime" means information on unsolved criminal offences committed in the territory of the police service.

"Detained and delivered" – information on cases of detention of persons by police officers, as well as information on the provision of free secondary legal aid to detained persons.

"Person" records persons who have committed an offence and in respect of whom preventive work is carried out by police officers.

"Wanted" – information about persons hiding from the authorities, evading serving a sentence, or missing persons is subject to registration.

"Recognition" – information about missing persons, unidentified corpses, persons who cannot provide information about themselves due to illness or minor age, and other categories of wanted persons.

"Thing" – contains information about stolen, seized with signs of forgery, prohibited or restricted items, mismanaged items, found or seized from the storage rooms of railway stations, ports, airports and handed over to the police, including mobile phones.

"Antiques" – contains information about stolen, seized cultural property that belongs to objects of material and spiritual culture and has artistic, historical, ethnographic and scientific significance.

"Stolen (lost) documents" means information on stolen, lost documents (forms of documents), passport documents of deceased citizens of Ukraine not submitted to the State Migration Service of Ukraine (hereinafter referred to as the SMS), passport documents declared invalid, passport documents of wanted persons with individual factory (serial) numbers.

"Auto theft" – contains data on wanted vehicles, on identified ownerless vehicles (including stolen and lost state vehicle number plates).

"Criminal weapon" means information about weapons stolen, lost, found, handed over to the police, seized by police officers from among those illegally stored, which have individual factory (serial) numbers or part numbers.

"Registered weapon" means information about weapons that have individual serial numbers and are in use by citizens, enterprises, institutions, organisations that have been granted permission to purchase, store, carry or transport them in accordance with the law.

"Administrative offence" means information on administrative offences registered with the police, based on which the police officers authorised to do so have drawn up reports on administrative offences.

"Migrant" – information about foreigners and stateless persons who have violated the rules of entry, exit, stay in Ukraine and transit through its territory established by law, as well as citizens of Ukraine who have violated the rules of entry of foreigners and stateless persons into Ukraine, their departure from Ukraine and transit through its territory established by law.

Unified State Register «USR» – information on legal entities of all forms of ownership and business forms, separate subdivisions of legal entities located in Ukraine, as well as separate subdivisions of legal entities of Ukraine located abroad.

«Corruption» – information on corruption or corruption-related offences, perpetrators and the results of court proceedings is recorded.

«Investigation: the order» – information on submission and execution of investigators' orders to conduct investigative (detective) actions in criminal proceedings initiated is recorded.

"Criminal statistics" – information on criminal offences, persons who committed or are suspected of committing them, pre-trial investigation of which is carried out by police investigators, is subject to registration.

"Home arrest" – information about persons in respect of whom the police execute decisions of an investigating judge or court to impose a preventive measure in the form of home arrest and to change a previously imposed preventive measure to a preventive measure in the form of house arrest and in respect of whom police officers monitor their behaviour is subject to registration.

The ITS IPNP will integrate the following information subsystems:

"Administrative offence - fines" – information on the payment of fines for administrative offences in the field of road safety is to be recorded automatically.

"Person (Traffic)" records information on persons involved in human trafficking and illegal migration, indicating the characteristics of the criminal offences committed by them.

«Harpoon» - information on vehicles of all types and licence plates of vehicles wanted within criminal, enforcement, administrative offence proceedings, operational and search activities, as well as by order of an investigating judge or court, are subject to registration.

«Warehouse» – information on letterhead products used in the bodies and units of the National Police of Ukraine is subject to registration.

«Road traffic accident» – information about road traffic accidents with the coordinates and photo and video images of the event is recorded.

«Cybercrime» – information on criminal offences in the field of information technology and the persons who committed them, methods and means for spreading malicious viruses, cracking passwords, stealing bank card numbers and other bank details, phishing, dissemination of illegal information (slander, pornographic materials, materials inciting interethnic and interreligious hatred, etc.) on the Internet, as well as data on illegal interference with the operation of various systems via computer networks, is recorded.

"Road traffic permit" – information on permits for the movement of certain categories of vehicles, including dangerous and oversized cargo, is subject to accounting.

"Drager" – information on special technical equipment used to test vehicle drivers for alcohol intoxication (Drager), as well as information on the persons being tested and their results is recorded.

"Detained Vehicles" – information about vehicles evacuated to a special site or car park based on an act of inspection and temporary detention of a vehicle drawn up by a police officer is subject to registration.

"ITT-Custody Records" records information on the operation of temporary detention centres and persons held in them.

"Human Rights" – information on human rights violations by police officers (units), including employees of temporary detention centres in relation to persons held there, is subject to recording.

"Mass events" – information about mass events and their participants, planned and carried out within the state, is subject to registration.

"Child Search" – provides for sending information about wanted children to Kyivstar PrJSC for SMS-sending about a missing child according to a certain georeferenced location.

"Service vehicles" – information on service vehicles in the National Police of Ukraine system, as well as data on the performance of existing service vehicles are recorded.

"Computer equipment" – information on computer equipment and computer programs used in the bodies and units of the National Police of Ukraine is subject to accounting.

"SIM card" – information about SIM cards used in police tablet devices is recorded.

"Video cameras" – information on installed video cameras is subject to registration.

"Business trips" – information on official business trips of police officers within Ukraine is recorded for the purpose of generating reporting tables and statistical forms, etc.

"Tsunami" – provides management of the forces and means of police bodies and units to respond to reports of offenses and other events.

"102" ensures acceptance, recording, processing and registration of reports to the "102" line about offences and other events, and transmitting information about them to the relevant operational dispatch services to organise response to such reports.

"HotLine" – provides acceptance, recording, processing and registration of citizens' appeals to the telephone hotline: 0800-500202 - Call-centre of the National Police on issues related to police activities (reference data, complaints about actions or inaction of police officers and reports of offences).

14.4. Criminal analysis.

One of the newest tools facilitating the rapid and effective investigation of criminal offences is modern criminal analysis systems.

Criminal analysis is a methodical search and identification of links between data directly or indirectly related to a criminal offence, their evaluation, interpretation and forecasting of the development of the events under investigation for the purpose of using them during pre-trial investigation and operational search activities, as well as for the development of tactical and strategic measures to combat crime.

Criminal analysis, in particular, is used in multi-episodic criminal proceedings that: cover a large territory; involve a significant number of events or subjects; are characterised by a complex structure of criminal connections, in which traditional methods of tracking and associating facts do not work.

In specific operational and investigative cases or criminal proceedings, operational criminal analysis is carried out to collect, evaluate, process and analyse data on individuals, groups of individuals, organised groups or criminal organisations, tools and means of committing a crime, traces of a crime or objects obtained by criminal means, and other information, the basis for which is a criminal proceeding or operational and investigative case.

14.5. Unified and state registers of the information network of the Ministry of Justice of Ukraine.

In the process of investigation, information systems, regardless of their purpose and departmental affiliation, help in finding useful information about certain objects or facts, etc. For example, the Integrated Interagency Information and Telecommunication System (IIITS Arkan), the Interpol I-24/7 Information and Telecommunication System, the Unified Register of Pre-trial Investigations, the Unified State Register of Court Decisions, the Unified Register of Advocates of Ukraine, the Unified and State Registers of the Information Network of the Ministry of Justice of Ukraine, which consist of the following systems: Automated System of Enforcement Proceedings; State Register of Civil Status Acts; State Register of Certified Court Experts and others. There are also Unified State Registers (databases) of other state institutions on the activities of individuals or legal entities, etc., which will provide new information about the event, objects or facts of a criminal offence.

Self-Assessment Questions:

1. The concept of an information system.
2. Objects of accounting (information resources) of an integrated information retrieval system.
3. Objects of accounting (information resources) of the information and telecommunication system "Information Portal of the National Police of Ukraine".
4. General rules for filling in the details of electronic cards of information subsystems and paper records.
5. Information subsystems of the integrated information retrieval system.
6. Information subsystems of the information and telecommunication system "Information Portal of the National Police of Ukraine".
7. The concept and essence of criminal analysis.

List of used and recommended literature:

- Конституція України : від 28.06.1996 № 254к/96-ВР : станом на 1 січ. 2020 р. URL: https://zakon.rada.gov.ua/laws/show/254к/96-вр#Text (дата звернення: 11.02.2025).
- Про Національну поліцію : Закон України від 02.07.2015 № 580-VIII : станом на 16 серп. 2024 р. URL: https://zakon.rada.gov.ua/laws/show/580-19#Text (дата звернення: 11.02.2025).
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- Кримінальний процесуальний кодекс України : Кодекс України від 13.04.2012 № 4651-VI : станом на 26 груд. 2024 р. URL: https://zakon.rada.gov.ua/laws/show/4651-17#Text (дата звернення: 11.02.2025).
- Криміналістика : підручник / [В. В. Пясковський, Ю. М. Чорноус, А. В. Самодін та ін.] ; за заг.ред. В. В. Пясковського. – 2-ге вид., перероб. і допов. – Київ : Філія вид-ва «Право», 2020. – 752 с.
- Криміналістика у питаннях та відповідях : Навчальний посібник [Текст] / [А.В. Іщенко, В.В. Пясковський, А.В. Самодін, Ю.М. Чорноус та ін.]. – К. : ТОВ «Видавництво «Центр учбової літератури», 2016. – 118 с.
- Про затвердження Інструкції про призначення та проведення судових експертиз та експертних досліджень та Науково-методичних рекомендацій з питань підготовки та призначення судових експертиз та експертних досліджень : Наказ М-ва юстиції України від 08.10.1998 № 53/5 : станом на 30 жовт. 2024 р. URL: https://zakon.rada.gov.ua/laws/show/z0705-98#Text (дата звернення: 11.02.2025).
- Програмний продукт «Мультимедійний підручник «Криміналістика» / [Алеєксєєв О.О., Арешонков В.В., Атаманчук В.М. та ін.]. – Свідоцтво про реєстрацію авторського права на твір № 65883 (Дата реєстрації 06.06.2016).
- The basics of criminalistic: practical manual / Myrovska A., Samodin A., Tsymbaliuk T., Piaskovskyi V. and other; under the general editorship of A. Myrovska. Kyiv, 2021. 148 p.

List of recommended information resources:

Офіційне інтернет-представництво Президента України	http://www.president.gov.ua
Офіційний портал Верховної Ради України	http://rada.gov.ua
Урядовий портал	http://www.kmu.gov.ua
Міністерство внутрішніх справ України	http://mvs.gov.ua
Національна поліція України	https://www.npu.gov.ua
Національна академія внутрішніх справ	http://www.naiau.kiev.ua
Criminalists congress	http://crimcongress.com/guide