Organizational Principles Of The Use Of Forensic DNA Analysis In The Investigation Of Criminal Offenses

This article studies organizational principles of forensic DNA analysis as the area of practical activities in the field of detection and investigation of criminal offenses. The author defined the list of organizational principles of forensic DNA analysis, disclosed their content, and determined the conditions for implementation in Ukraine. It was established that such principles are the legality, the exclusively procedural form of using DNA analysis in criminal proceedings, the functioning of forensic accounting of human genomic information, the formation of DNA analysis as a separate section of forensic technology, its organizational and technical support.

Keywords: criminalistics, forensic science, criminal proceedings, investigation of criminal offenses, DNA analysis, forensic technology.

Research Problem Formulation. Since the mid-1980s of the last century, DNA analysis technologies have firmly entered the arsenal of forensic science around the world. This branch of forensic science has demonstrated remarkable results in the case of human identification based on biological material, providing law enforcement officers with effective methods of searching for unknown criminals, identifying unrecognizable corpses, etc. The arsenal of tools and methods of forensic DNA analysis is constantly expanding.

In Ukraine, the relevant technologies have been used in the practice of forensic examination institutions since the 1990s. However, comprehensive scientific research in this direction has not been conducted until now. In fact, there are still no clear ideas about the possible directions of using DNA analysis in the detection and investigation of criminal offenses, the limits of permissible interference in the personal and family life of citizens during forensic DNA research, the rules for handling biological traces and samples, the peculiarities of evaluating the conclusions of molecular genetic examination and their use in proof. Therefore, identifying and defining the main organizational aspects of the use of forensic DNA analysis in the detection and investigation of criminal offenses is an urgent scientific problem.

Analysis of Recent Researches and Publications. In recent years, scientific research in the field of forensic DNA analysis has significantly intensified in Ukraine. However, scientists mainly analyze the problems of legal regulation of this area, increasing the efficiency of the national DNA database and certain methodological aspects of conducting molecular genetic research. In turn, the organizational aspects of the use of DNA analysis at the stage of pretrial investigation of criminal offenses were only partially considered by R. L. Stepaniuk, V. V. Ionova, M. H. Shcherbakovskyi, V. O. Husieva, S. I. Perlin, V. V. Kikinchuk, B. M. Hamaliuk, I. T. Khodyrieva, P. Davydiuk, I. Peleshok, M. Yakymchuk, I. O. Kostenko, K. V. Kyrychova.
and other authors in the context of the problems of appointment of molecular genetic examination, including in wartime conditions1.

Article Purpose is the analysis of the organizational principles of the use of forensic DNA analysis in the activity of uncovering and investigating criminal offenses. To solve this goal, the following tasks were set: to determine the list of organizational principles of forensic DNA analysis, to reveal their content, and to determine the conditions for their implementation in Ukraine.

Main Content Presentation. It is widely known that investigators and prosecutors use specific expertise in criminal proceedings in two forms - organizational and procedural. The organizational form is not regulated by the norms of criminal procedural legislation, and therefore it is often called non-procedural, while the procedural form has the appropriate legal regulation and is primarily expressed in the involvement of a specialist in the conduct of certain procedural actions and the involvement of a court expert.

The capabilities of DNA analysis significantly exceed most other fields of forensic technology and forensic examination, which is primarily due to the fundamental scientific basis for determining the accuracy of DNA identification results and the extraordinary effectiveness of searching for unknown suspects by biological traces, provided a high-quality forensic DNA database is available. But in this area there are also significant problems related to legal and ethical considerations regarding the interference of law enforcement officers in a person’s private life, overestimation by investigators, prosecutors, and judges of the probative value of the results of DNA analysis, failure to take into account factors that in practice can lead to erroneous results, etc.

Currently, forensic molecular genetic examination is rapidly developing in Ukraine, the need for which has increased significantly with the beginning of hostilities2. Domestic scientists tried to assess the current state of the use of Ukraine, the need for which has increased significantly with the beginning of hostilities, and is primarily expressed in the involvement of a specialist in the conduct of certain procedural actions and the involvement of a court expert.

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remove biological traces during the inspection of the scene of the incident, appointing molecular genetic examination examinations and evaluate their conclusions. In addition, the uncertainty of the status of rapid DNA testing was stated, and insufficient capacities of existing molecular genetic examination laboratories. Such problems prevent the proper use of the possibilities of forensic DNA analysis in the practice of Ukrainian law enforcement officers. Therefore, it is considered urgent to define the organizational principles of this direction of practical activity, the observance of which will contribute to the improvement of its general condition in Ukraine.

The first principle, in our opinion, is to ensure the legality of all actions of law enforcement officers and expert institutions related to DNA research, storage and use of biological material and genomic information.

The principle of legality can be implemented provided that proper legal regulation of social relations related to DNA analysis for judicial purposes is established in Ukraine, which does not yet exist, with the exception of the Law of Ukraine “On State Registration of Human Genomic Information” introduced in 2023. But this law alone seems to be insufficient, since the following are also necessary: harmonization of the legislation of Ukraine in the field of forensic expert activity with the norms of the European Union; revision of current legal norms regarding the collection of biological material for conducting examinations; improvement of the mechanisms for the protection of the rights of the subjects of molecular genetic examination; creation of legal mechanisms for the formation of national databases of human DNA; revision of the procedure for using the results, adaptation of national accounting standards and maintenance of human DNA databases to international standards; improvement of the institutional management system, etc.

The introduction of legal norms that will ensure the observance of human rights, first of all, the right to respect for private and family life, when using DNA analysis in criminal proceedings will make it possible to clearly define and continue to observe the principles of the rule of law, humanism, and protection of personal data in this field. In this matter, it is worth supporting researchers who emphasize the need to harmonize domestic and European legislation in the field of forensic DNA analysis and take into account at least minimum European standards.

The next principle, as it seems to us, is the determination of the procedural form of using DNA analysis in criminal proceedings. In our opinion, in connection with the increased social sensitivity of human DNA research issues and the need to protect personal rights in criminal proceedings,
preference should be given to the procedural form of using specific expertise in the field of molecular genetics.

Currently, in Ukraine, the relevant technologies are used in two procedural forms, namely: 1) involvement of a forensic specialist and/or a biologist in conducting procedural actions related to the collection of biological traces and samples, primarily inspection of the scene, search and obtaining samples for examination; 2) conducting a forensic molecular genetic examination. At the same time, other methods of using DNA analysis in the detection and investigation of criminal offenses are becoming more and more relevant, the form of which is not defined in Ukrainian legislation, which on the one hand hinders their active implementation, and on the other can lead to a violation of a person’s right to respect for private and family life in connection with the processing of her DNA.

This is primarily about rapid DNA testing technologies (Rapid-DNA), which in the current conditions of the active phase of the war are particularly relevant in solving the tasks of identifying the dead, but also in peacetime can be useful for quickly checking individuals for the coincidence of their genetic characteristics with traces from the scene of an unsolved crime or with a DNA database.

Scientists propose to use the approach of Germany and other countries where the procedures for conducting mass rapid DNA tests are enshrined in the Criminal Procedure Code, thus giving them a procedural form. We support such proposals, but it is worth noting that the current difficult conditions of the active phase of the war led to the emergence of new large-scale tasks related to the need for DNA identification of a large number of unidentified victims, and therefore, there is a need to define the rules for rapid DNA identification — profiles of a large number of relatives of the dead and missing persons with the help of Rapid-DNA devices, which have already been provided to Ukrainian law enforcement officers and testify to high efficiency in this direction. In connection with the procedural problems, when the results obtained with the help of such devices are not recognized as appropriate for comparison with the DNA profiles of the remains of the bodies, there is an additional need to give a procedural form to the verification of forensic studies.

Moreover, the need to solve this problem is also dictated by the real prospects of expanding the search capabilities of forensic DNA analysis in the detection and investigation of criminal offenses, which are already being implemented in foreign countries. Such technologies as forensic phenotyping (establishment of a person’s biogeographical origin and features of their appearance by DNA), and investigative genetic genealogy (search for relatives in DNA databases) have demonstrated notable results in establishing the identity of unknown criminals. There are no opportunities to use them in Ukraine yet, but in the near future it is quite possible, therefore it is necessary to decide on the appropriate form of using specific expertise, which can also be a verification study.

The next important basis is the functioning of forensic accounting of human genomic information. Forensic records of human genetic features have been functioning in Ukraine for quite some time, but until now it was filled very slowly due to the lack of specific legislation. There is hope that the situation will improve in connection with the introduction of the relevant law, which took place in February 2023, but “legal support for the technical de vérification ; intensifier la recherche scientifique dans le domaine de la criminalistique en direction de l’analyse de l’ADN et introduire des sujets pertinents dans les programmes d’études pour la formation des avocats et des agents chargés de l’application des lois ; coordonner les travaux des différents laboratoires d’analyses d’ADN dans le cadre de leur accréditation, de leur équipement technique avec des équipements compatibles et de la formation du personnel.


Conclusions. L’analyse des dispositions théoriques, des normes juridiques, des besoins modernes, des opportunités et de l’état de l’application pratique des technologies d’analyse ADN criminalistique en Ukraine donne des raisons de souligner plusieurs principes organisationnels de ce domaine de la criminologie et de l’examen criminalistique, dont le respect augmentera l’efficacité de la pratique policière dans ce sens. Ces principes sont : 1) la légalité, c’est-à-dire le strict respect des exigences des actes juridiques réglementaires de toutes les actions des agents chargés de l’application des lois et des institutions expertes liées à la recherche sur l’ADN, au stockage et à l’utilisation du matériel biologique et des informations génomiques ; 2) détermination de la forme exclusivement procédurale de l’usage de l’analyse ADN dans les procédures pénales ; 3) le fonctionnement de la comptabilité juridique des informations génomiques humaines ; 4) la formation de l’analyste ADN dans le domaine de l’utilisation efficace des technologies d’analyse ADN médico-légale,

The Use Of The Profiling Method In The Investigation Of Criminal Offenses Related To Air Transport Security Breaches

Stepaniuk Daria

ZASady ORGANiZACYjNE WYKORZYSTANIA KRYMiNALNEJ ANALiZY DNA W SLEdzTWiE PRZESTĘPSTw

W artykule zbadano zasady organizacyjne kryminalistycznej analizy DNA jako dziedziny praktycznej działalności w zakresie wykrywania i ściegania przestępstw. Autor zdefiniował listę zasad organizacyjnych kryminalistycznej analizy DNA, ujawnił jej treść oraz określił warunki wdrożenia na Ukrainie. Ustalono, że zasadami tymi są: legalność, czystość, przestrzeganie wymogów prawa na wszystkich etapach gromadzenia i badania materiału biologicznego, wykorzystywania i przechowywania informacji genetycznych, a także procedurą formowania analizy DNA w postępowaniu karnym; właściwe funkcjonowanie kryminalistycznej księgowości informacji o ludzkim genomie; utworzenie analizy DNA jako odrębnej sekcji technologii kryminalistycznej; jego wsparcie informatyczne; odpowiednia proceduracja DNA, które polega przede wszystkim na akredytacji laboratoriów.

Criminologists emphasized the insufficient level of scientific development and educational and methodological support of the issues of forensic DNA analysis in Ukraine and the absence of a corresponding section in the system of forensic technology, in connection with which the need for its formation was substantiated and the corresponding theoretical foundations were laid11. It seems to us that maintaining an appropriate level of training of subjects participating in the criminal process, in the context of forming knowledge and skills in handling biological material, obtaining a general idea of expert technologies, understanding the principles of evaluating the results of DNA analysis in judicial proceedings, is an important prerequisite for a successful functioning of this field of forensic science and forensic examination as a whole. Mistakes at the stage of material collection for molecular genetic examination and during its storage can lead to significant expert errors, and incorrect assessment of the probative value of the expert’s conclusions can lead to investigative and judicial errors. The extreme sensitivity of modern means and methods of forensic DNA analysis, which allow establishing a DNA profile from only a few cells, in addition to the positive consequences for the investigation of criminal offenses, requires an extremely serious
approach to the observance of measures to prevent contamination (pollution) of biological material.

Organizational and technical support of forensic DNA analysis also appears to be a strong foundation of this branch of forensic technology.

Currently, in Ukraine, forensic molecular genetic examinations are conducted exclusively in state expert institutions. This is due to the fact that this type of examination is assigned to the class of biological examination as a separate expert specialty of index 9.5 by regulatory and legal acts. In turn, biological examination is included among the forensic ones, and therefore, according to part 3 of Art. 7 of the Law of Ukraine “On Forensic Examination” it cannot be conducted outside of specialized state institutions.

This approach of the legislator and the executive authorities can be agreed, given many factors, including the importance of maintaining confidentiality, the destructive methods of expert research, the extremely high cost of error, etc. In specialized state institutions, the appropriate level of technical equipment, quality control, and the level of labor discipline is ensured.

The European standard for the organization of forensic DNA analysis is to involve exclusively expert laboratories that are accredited according to EN ISO/IEC 17025 standard12, which in Ukraine as a whole is carried out through the appropriate accreditation of domestic molecular genetic research laboratories. However, another organizational condition recognized in forensic genetics is the use of compatible equipment by laboratories to avoid difficulties in comparing the results of DNA analysis. In this regard, it is worth noting that a network of expert molecular genetic research laboratories has been created in Ukraine within the system of the Expert Service of the Ministry of Internal Affairs. Also, relevant laboratories function in some Forensic Medical Examination Bureaus and National Scientific Center «Hon. Prof. M. S. Bokarius Forensic Science Institute». In addition, after the start of the war, the units of technical and forensic support of the pre-trial investigation of the National Police received ANDE rapid DNA testing devices.

In such conditions, in our country, ensuring the compatibility of equipment and used research methods is seen as a particularly relevant organizational aspect of forensic DNA analysis. This also applies to personnel support, as not only forensic geneticists are involved in the work, but also police forensic specialists, who must be trained to use the appropriate devices and software and strictly adhere to methodological recommendations to ensure against contamination and other errors.

Conclusions. The analysis of theoretical provisions, legal standards, modern needs, opportunities, and the state of the practical application of forensic DNA analysis technologies in Ukraine gives reasons to single out several organizational principles of this field of criminology and forensic science, compliance with which will increase the effectiveness of law enforcement practice in this area. These principles are: 1) legality, which means strict compliance with the requirements of regulatory legal acts of all actions of law enforcement officers and expert institutions related to DNA research, storage and use of biological material and genomic information; 2) determination of the exclusively procedural form of using DNA analysis in criminal proceedings; 3) functioning of forensic accounting of human genomic information; 4) formation of DNA analysis as a separate section of forensic technology and its corresponding scientific and methodical support; 5) its organizational and technical support.

The implementation of these principles in Ukraine necessitates the adoption of a number of regulatory and organizational measures to ensure

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The Use Of The Profiling Method In The Investigation Of Criminal Offenses Related To Air Transport Security Breaches

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ORGANISATORISCHE GRUNDSÄTZE FÜR DEN EINSATZ FORENSISCHER DNA-ANALYSE BEI STRAFTATSCHRIFTEN

Der Artikel untersucht die Organisationsprinzipien der forensischen DNA-Analyse als Richtung der praktischen Tätigkeit im Bereich der Aufdeckung und Aufklärung von Straftaten. Der Autor definierte die Liste der Organisationsprinzipien der forensischen DNA-Analyse, legte deren Inhalt offen und legte die Bedingungen für die Umsetzung in der Ukraine fest. Es wurde festgestellt, dass diese Bedingungen folgende sind: Legalität, d. h. strikte Einhaltung der gesetzlichen Anforderungen in allen Phasen der Sammlung und Erforschung biologischen Materials sowie der Nutzung und Speicherung genomischer Informationen; eine ausschließlich prozessuale Form der Nutzung der DNA-Analyse im Strafverfahren; ordnungsgemäßes Funktionieren der forensischen Erfassung menschlicher Geninformations; Bildung der DNA-Analyse als eigenständiger Bereich der forensischen Technik; seine organisatorische und technische Betreuung, die vor allem die Akkredierung forensischer Genetiklabore nach europäischem Qualitätsstandard und die Einhaltung der Auflagen zur technischen Ausstattung und personellen Betreuung umfasst. Es wird begründet, dass die Umsetzung dieser Bedingungen die Notwendigkeit erfordert, auf nationaler Ebene eine Reihe regulatorischer und organisatorischer Maßnahmen zu ergreifen, um zumindest die Mindestbedingungen für den effektiven Einsatz forensischer DNA-Analysetechnologien sicherzustellen, nämlich: die Verbesserung der Rechtsnormen zumindest im Hinblick auf die Regulierung von Verfahren zur Gewinnung von biologischem Material, zur Verwaltung von DNA-Datenbanken und zum Schutz genomischer Informationen; bestimmen ausschließlich die Verfahrensform des Einsatzes von DNA-Analysen im Strafverfahren und regeln neben der molekulargenetischen Untersuchung auch Überprüfungsstudien; die wissenschaftliche Forschung auf dem Gebiet der Kriminalistik in Richtung DNA-Analyse zu intensivieren und relevante Themen in Bildungsprogramme für

at least minimum conditions for the effective use of forensic DNA analysis technologies, namely: 1) improvement of legal norms regarding the use of DNA analysis in criminal proceedings, at least in the aspect of regulation of procedures for obtaining biological material, management of DNA databases and protection of genomic information as a type of personal data; 2) improvement of the form of use of various technologies of DNA analysis in the criminal process, by regulating, in addition to molecular genetic examination, verification studies; 3) activation of scientific research in the field of criminalistics in the direction of DNA analysis and the introduction of relevant topics into educational programs for the training of lawyers and law enforcement officers; 4) coordination of the work of various DNA analysis laboratories in the context of their accreditation, technical equipment with compatible equipment and personnel training.

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