methodical, consistent examinations, based on the scientific methods in the necessary field, appropriate for solving the objectives of the expertise.

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Acceptance of Forensic Evidence — Are there Standards?

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This paper will present a proposal for the introduction of standards in order to apply forensic methods in the judiciary. A proposal for the application of forensic methods in the United States of America will be presented, as a good practice for its implementation in European countries. This mostly refers to the Fray standards from 1923 and finally the Dauber standard from 1993, which is still used in the United States of America, as a reliable method for verifying the application of forensic methods in the judiciary.

Keywords*: forensic methods; standardization in forensics; Fray's rule; Dauber's rule.*

Прийняття судових доказів — які стандарти існують?

Александар Іванович, Наталія Філіпенко

Висвітлено пропозицію щодо впровадження стандартів для застосування судово-експертних методів у судовій системі. Представлено пропозицію щодо імплементації судово-експертних методів, запозичених у Сполучених Штатах Америки, як приклад вдалої практики, гідної впровадження в європейських країнах. Здебільшого це стосується стандартів Фрая (1923) та Даубера (1993), які до сьогодні використовують у США як надійний метод для перевірки застосування судово-експертних методів у судовій системі.

Ключові слова*: судово-експертні методи; стандартизація у судовій експертизі; правило Фрая; правило Даубера.*

At the end of the twentieth century, the foundations were laid for the modern understanding of the acceptance of forensic sciences in the judiciary. Judicial proceedings are becoming more and more diverse and require specific and sophisticated knowledge, and scientists as forensic experts, protected by the authority of science, give statements that judges, prosecutors, lawyers and interested parties in the proceedings simply cannot understand. A legitimate question arises, who and how can determine the reliability of the method used by the forensic expert in a particular case?

In the legal systems of individual countries, there are certain restrictions on the application and use of forensic findings, that is, scientific evidence. Judges are relatively free to evaluate any evidence that is relevant to the resolution of real-factual issues in a particular case and procedure. The majority of courts in individual countries traditionally require that the proposer of scientific testimony (forensic expertise) must prove that this

testimony-forensic expertise is based on a scientific method that is generally accepted within the relevant scientific community. In certain legal systems, scientific testimony-forensic evidence was treated as some form of «expert opinion».

Rule of Friars

A good example of the method of acceptance and recognition of scientific evidence in the form of forensic expertise is the so-called Fry rule in the United States of America. The Frey rule dates back to 1923, based on the case Frey v. United States, 293 F. 1013, D.C. Cir 1923. The defense of the accused Fraj, who was convicted of murder in the federal court in Washington, offered (then for the first time) proof that Fraj was not guilty, an examination based on the forerunner of the modern polygraph (lie detector). The evidence was based on the examination of Fraj's systolic blood pressure and was based on the periodic reading of the value through an ordinary blood pressure cuff, during the interview with the accused about his alleged crime. The prosecutor complained about the evidence presented by the defense. The court accepted the appeal of the prosecutor, and the defense of Fraj offered to conduct the aforementioned test (the forerunner of the modern polygraph-lie detector) in the presence of the jury. This proposal was rejected. The reasoning given in this case by the Court of Appeals of the United States of America becomes a general rule that refers to the way scientific evidence is accepted in court proceedings. This rule is also known as «The Friar's Test». The «Fray's test» referred not only to polygraph evidence, but to all new evidence presented in judicial proceedings:

It is difficult to define where the boundary is between the experimental and evidentiary level of a scientific principle and discovery. Somewhere in this twilight zone must be found the probative force of the principle, and although it will take a long time for the courts to accept expert testimony derived from a generally accepted scientific principle or discovery, the basis on which the conclusion is reached must be sufficiently corroborated to be generally accepted in its areas.

The majority of courts traditionally require that the proposer of scientific testimony must prove that the testimony (in the form of providing findings and opinions, that is, expert testimony) is based on a scientific method that is already generally accepted within the scientific community. So, proof of the general acceptance of the scientific method is a prerequisite for the acceptance of scientific evidence in a judicial dispute! This way of accepting scientific testimony-expert testimony in court enables decision-making about the possibilities of evidence in the scientific community. Namely, the proponent of the evidence must prove that the majority of experts within the relevant scientific discipline accept that theory. Furthermore, the acceptance of the «Fraj test» is justified for the reason that scientific witnesses-experts, forensic experts can, as a rule, impress the participants in the judicial process who, of course, do not have knowledge and experience in the scientific fields from which certain expertises originate. These are judges, prosecutors and lawyers who are laymen from non-legal fields, so there is a justified fear that the forensic expert can impress the participants in the judicial process with his scientific interpretation of the evidence and thus cause them to overestimate the probative value of the forensic expert's testimony. The «Fray test» in such cases leads to certainty in the application of scientific evidence, because judges, prosecutors and lawyers expect scientific testimony by forensic experts to be reliable and valuable evidence. This means that the «Fray test» as the only permitted scientific testimony implies that which justifies such expectations.

Although the «Fray Test» has been a common position of American courts, it has been a central topic of criticism for just as long. It is a generally accepted opinion that in deciding on the acceptance of evidence on the scientific method, the court considers certain assessments of methods among experts. However, the «Fray's test» goes beyond the acceptance of certain methods among scientists and scientific associations (chambers). The rule derived from the Fraja case can influence scientists' decisions. In this way, critics of the «Fray test» prove that the test represents the exclusion of judicial responsibility for the rendered judgment. Similarly, critics attack other arguments for the application of the «Fray

test», concluding that scientific evidence will intimidate judges, prosecutors and lawyers who are inexperienced in the field of forensic science.

Criticisms of the «Fray Test» began to be applied in practice in the eighties of the last century. In 1975, the United States Congress enacted a comprehensive set of rules of evidence for federal courts. It is a document called Federal rules of evidence. Article 7 of the aforementioned rules allows a number of liberal standards that enable the application of scientific evidence-forensic expertise. The term «general acceptance», which was the basis of the «Fray test» and, according to many experts, prevented the application of certain scientific testimonies-forensic expertise in the judiciary, does not appear anywhere in the mentioned article. The omission of the phrase «general acceptance» from Article 7 becomes the most important item in order to apply Federal Regulations 402 on evidence. This regulation generally determines that all types of logically relevant evidence are admissible, unless there is a basis to exclude some rules based on the law. Regarding the application of the aforementioned rule, the court will, without hesitation, when making a decision consider the extent to which a forensic method is already accepted within the existing scientific field. If a large number of experts in the field in question reject the applied theory, the court will stop the proceedings before allowing the testimony of the forensic expert. However, after the adoption of the Federal Rules of Evidence, there are no longer any firm rules that would oblige the court to exclude any scientific testimony-forensic expertise, as well as any testimony of a forensic expert that is based on some new scientific method. Which means that the application of the testimony of the forensic expert is directed directly towards the scientific value of the testimony itself, presented by the findings and opinion of the forensic expert.

Dauber's rule

A new approach, or a turning point in the direction of accepting scientific evidence in the form of testimony of forensic experts in the United States of America, is the Dauber Case, which replaced the «Fray test» in 1993. It is the case of Daubert v. Mereel Dow Pharmaceuticals. In the aforementioned case, the plaintiffs were the parents and children of the Daubert family, and the defendant was a pharmaceutical company that, among other things, produced the drug Bendectin.

Namely, during her pregnancy Mrs. Daubert used the medicine Bendectin produced by Mereel Dow Pharmaceuticals. Her children were born with serious limb deformities, and the prosecutors blamed the deformities of their children, citing as the main and only reason the influence of the drug Bendectin, which is normally recommended to relieve nausea during pregnancy! The defendant company Mereel Dow Pharmaceuticals asked the defendants to present their claim, namely that the drug Bendectin causes deformity of the fetus during pregnancy, through the scientific testimony of a forensic expert. In response to the requested circumstances, the defendants present the testimony of eight experts who conclude that Benedectin can cause damage to the fetus during pregnancy. The conclusions of the mentioned experts are based on research carried out on animal cells, then on individual pharmacological studies and even on published epidemiological studies. However, at the trial, the company Mereel Dow Pharmaceuticals presents the testimony, that is, the findings of Dr. Steven Lam, a physician and epidemiologist, as an experienced expert in the field of studying various chemical substances, including medicines. Dr. Lam's testimony referred to 30 published studies on the impact of Benectin on the human body. The mentioned studies included about 130,000 patients and from them he concluded that Benectin cannot cause fetal defects. How should the court act now, when it has two different opinions from experts-experts, who were hired by the prosecutor and by the defendant? The court accepts the then valid «Fraj test» in connection with the recognition of scientific testimony. This means that the key evidence presented in the Dauber case can only be accepted if the principle on which it is based is generally accepted in the scientific field to which it belongs and ultimately concludes that the applicants (prosecutors) did not meet this standard («Fray test»). In a word, in order for some expert claim to be accepted as evidence in court, it

must be generally accepted as reliable in the relevant scientific community! The further explanation of the court was that the epidemiological studies cited by the prosecutor were not accepted for the reason that they were not published in relevant peer-reviewed scientific journals.

After the Dauber case, the Supreme Court of the United States of America agreed that from that case (1993), the provisions of the Rules of Evidence (Federal Rules of Evidence) should be applied to the acceptance of scientific testimony in court, and not the «Fry test». Thus, after a full 70 years, the «Fraj test» is replaced by the rule that the evidence presented in a particular case must meet the following five conditions:

1. Can the theory or technique on which the critical scientific testimony is based be verified;
2. Does the technique in question have a known error rate in its application. The professional term for the aforementioned is measurement uncertainty, and it implies the percentage of error in the performance of individual forensic tests, analysis and expertise;
3. Whether the theory or technique in question has been discussed in professional circles and whether it has been published in the form of a peer-reviewed book and/or in the form of a peer-reviewed scientific paper;
4. What is the level of acceptance of the theory or technique in the relevant scientific community;
5. To what extent are there standards for determining the acceptable use of the technique in question.

The sixth condition was added in 1997, and after the case of Joiner v. General Electric CO. Namely, Robert Joiner worked as an electrician maintaining electrical transformers in the aforementioned company. The company General Electric CO used mineral-based diametric liquid as a means of cooling the transformer. During work, Robert Joiner often had to keep his hands in the liquid for cooling the transformer, and often this liquid would come into contact with his clothes and there was a high probability that he would inhale tiny drops of the liquid into his lungs! In 1983, the presence of a PCB substance was discovered, which was considered dangerous to human health and was banned for production and sale in 1978. The plaintiff in this case, Robert Joyner, was diagnosed with lung cancer and accused the company he worked for, General Electric CO, of being responsible for his illness. This is due to the fact that during work he was exposed to the PCB substance and its derivatives, which are dangerous for human health. The lawsuit that was filed against the company General Electric CO is supported by four expert studies, which indicate that the PCB substance caused Robert Joiner's lung cancer. However, the defendant (General Electric CO) points out in his statement that the studies in question are nothing more than scientific speculation, emphasizing the absence of any expert scientific epidemiological study. They also add that the expert testimony offered by the prosecutor is based on unrelated studies performed on laboratory animals. The first-instance court agreed with the position of the defendant (General Electric CO) and did not support the position of the experts hired by the prosecutor, thus ruling that the PCB substance did not cause lung cancer in Robert Joiner. After the verdict of the first-instance court, the prosecutor appealed to the competent District Court, which stated the following in the verdict, regarding the admissibility of expert evidence:

In trials, sometimes it will be necessary to give subtle and sophisticated determinations about scientific methodology and their relationship with the conclusions of experts. This will be especially necessary in cases involving an area of science that is uncertain or uncertain, or in cases where epidemiological or laboratory testing is not generally accepted as evidence in court.

In connection with this case, the competent scientific community announced itself through its scientific and professional magazine New England Journal of Medicine, with the following statement:

The judge will fulfill his duty better if he has the help of scientists. Judges should be encouraged to use more and more experts from relevant scientific organizations, such as the National Academies of Sciences, associations for the advancement of science...

Thus, the sixth condition that must be met by the evidence presented in court (which arose from the case of Joiner v. General Electric CO, 1997), reads:

Relevance, which implies testing the validity of conclusions drawn between theoretical analyzes and practical examples on the given problem.

This rule is also interpreted in such a way that the judge must reject the conclusions reached by the expert, which are not accepted by the relevant scientific community.

The new method of accepting scientific testimony foresees that none of the factors mentioned above be rigidly applied, and that the questioning during the testimony be flexible with constant awareness of the need to not present unreliable pseudoscientific evidence before the court, and that the courts remain open to new scientific achievements. This means that the rigid, exclusive attitude imposed by the «Fray test» that was accepted until then is no longer justified and a new type of analysis of scientific testimony is needed based on the Dauber case. A legitimate question arises here, whether certain evidence will mislead and confuse judges, prosecutors and lawyers, as persons who do not understand scientific and professional fields such as toxicology, biology, chemistry, ballistics, graphology, dactyloscopy and others? The question is justified for the reason that judges, prosecutors and lawyers are simply not capable of rationally considering the testimony of experts from various fields of science, who would be surrounded by «an aura of infallibility, similar to the ancient prophetesses from Delphi». However, abandoning the «Fry test» in Dauber v. Mereel Dow Pharmaceuticals, this argument is rejected with the following rationale:

The Court expresses its fear that abandoning «general acceptance» as the sole requirement for guilty pleas will have the effect of «permission-for-all» in which judges and prosecutors may be confused by absurd and irrational pseudo-scientific claims. The appropriate means of combating shaky but admissible evidence would be vigorous cross-examination by the court, the prosecutor, and counsel, the presentation of contrary evidence, and the careful presentation of all evidence.

As stated in the previous text, with the development of science, technique and technology (this mostly refers to the development of information technologies), judicial procedures become more complex and complicated. Almost every branch of science got its forensic dimension. In judicial proceedings, there was a need to engage forensic experts of various specializations, who apply modern, specific and sophisticated methods in their work. By applying this forensic science, the question arises as to how and in what way the courts should determine the scientific reliability of the applied forensic methods. This paper presents a proposal for the introduction of a standard, which is applied in the United States of America. It was stated in the paper that in order for a forensic method to be accepted by the court, it should meet the conditions of verifiability, measurement uncertainty, i.e. the percentage of error in its application, whether it has been published as a scientific and/or professional work in publications that include reviews, what is the level of acceptance of the subject method in the relevant professional and scientific community, whether there are standards and which ones for the application of the subject phoresic method and the relevance of the method, i.e. the relationship between theoretical analyzes and practical examples of the subject method.

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Mass Graves Constitute a Unique Niche for Forensic Biological Traces

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Mass graves constitute a unique depositional environment. Each individual human body introduces its own diversity of biological traces in the form of microscopic invertebrates, mites being the most prevalent. The probative value of these mites as forensic evidence has not yet been appreciated.

Keywords*: mass burials; grave pits; arthropods; insects; mites; Acari; micropalaeontology; pollen; biotaphonomy.*

Братські могили — унікальна ніша для криміналістичних біологічних слідів

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Братські могили — це унікальне середовище для осаду мікроорганізмів. Кожен людський організм додає своє різноманіття біологічних слідів у вигляді мікроскопічних безхребетних, серед яких найпоширенішими є кліщі. Доказова цінність цих кліщів як судових доказів дотепер не оцінено.

Ключові слова*: масові поховання; могильні ями; членистоногі; комахи; кліщі; Акарі; мікропалеонтологія; пилок; біотафономія.*

Modern mass graves, grave pits, and sites of mass burials are investigated widely [1, 2]. Examples of the survey of historical mass grave sites carried out by Ukrainian researchers range from the late Roman time near Komariv in Middle Transnistria [3], the Netaylovka cemetery of the Saltovo-Mayatskoe culture of the 8th and 9th Centuries [4], to the early medieval necropolis of Shestovytsia in Chernigov, Ukraine [5].

Recent studies are showing that mass graves are in many ways different from single graves. The increasing use of simulated mass graves including ones containing human remains, is driving research that reveals these differences. Geophysical imaging using ground penetrating radar (GPR), electrical resistivity tomography (ERT), and electromagnetics (EM) show that physical properties of the soil differ between mass graves and individual burials [6—9]. ERT showed still differences to the surrounding environment after 8 years of burial in southwestern Nigeria [10]. Thermal imaging detects mass graves in arid environments for 7 months [11]. The dynamics of gases emitted by mass graves causes changes in soil