

BLOODSTAIN PATTERN ANALYSIS AS SCIENTIFIC EVIDENCE IN THE JUDICIAL PROCESS. STATE OF THE MATTER IN SPAIN AND LEGE FERENDA PROPOSAL

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SUMMARY

I. INTRODUCTION. II. BLOODSTAIN PATTERN ANALYSIS. III. EXPERT EVIDENCE. 1. Expert report. 2. Status of the matter in Spain. Analysis of jurisprudence. 3. Profile and training of the bloodstain pattern analysts in Spain. 4. Status of the matter in the U.S.A. IV. LEGE FERENDA PROPOSAL. TOWARDS A NEW BLOODSTAIN PATTERN ANALYSIS SCENARIO. V. CONCLUSIONS. VI. BIBLIOGRAPHY CONSULTED.

ABSTRACT

Bloodstain pattern analysis provides the judicial process with the opportunity to afford, study and assess truthful and unbiased evidence, which facilitates objective decision making by the jury. However, there is a lack of knowledge of the discipline and of legislative standards related to the training of experts and their reports in Spain. This complicates the development of this subject and reduces its veracity. With the intention of providing measures that facilitate its growth in a guaranteed way, legislation, related rulings, and the training standards of police officers in charge of bloodstains pattern investigations have been analyzed. In addition, an international vision has been provided with the discipline's situation in the United States, the cradle of its development. The purpose proving the value of bloodstain patterns analysis as a discipline. The importance of the auxiliary function that experts hold in this matter will be shown too through the reports presented in different judicial processes.

KEY WORDS

Bloodstain pattern analysis. Expert report. Spanish expert evidence situation.

RESUMEN

El análisis de patrones de manchas de sangre brinda al proceso judicial la oportunidad de aportar, estudiar y valorar medios de prueba veraces y sin sesgos, que faciliten la toma de decisiones del órgano juzgador de forma objetiva. Sin embargo, el desconocimiento de la disciplina y la falta de estándares legislativos relacionados tanto con la formación de los peritos como con el desarrollo del informe pericial en España, complican su desarrollo y veracidad. Con la intención de aportar medidas que faciliten su crecimiento de forma garante, se han analizado legislación y sentencias relacionadas, así como estándares de formación de los miembros policiales encargados de las diferentes investigaciones consultadas. Todo ello encaminado a demostrar la valía del análisis de patrones de manchas de sangre en las escenas criminales, así como la función auxiliar que ejercen peritos expertos en la materia a través de los informes presentados en diferentes procesos judiciales.

PALABRAS CLAVE

Análisis de patrones de manchas de sangre, Informe pericial, Situación de la prueba pericial científica en España

I. INTRODUCTION

The prevailing illiteracy related to the bloodstain pattern analysis as a forensic discipline in Spain, entails an absolute ignorance of its role as scientific evidence and in jurisprudence.

A lack of knowledge that must be eradicated if the goal is to promote the area as a scientific discipline and as a source of evidence, thus equating the research work of experts in Spain to the levels of other pioneering European countries such as France or the Netherlands¹.

Throughout the following pages, the role played by the bloodstain pattern analysis in judicial processes in Spain will be revealed, delving into its expert relevance in these procedures, in order to analyze the current situation and put forward measures that allow its development in an effective and guarantor manner.

The aim of this article is to demonstrate the lack of development of the discipline both theoretically and legislatively, since only 9 sentences that included in some way the study of blood from a criminal scene have been found, despite carrying out a search in a period of almost 15 years. It has not been possible to provide more jurisprudence due to the limited bloodstain expertise in our judicial processes.

In addition, through a systematic review of the literature regarding the situation in other coun-

tries, general but conclusive brushstrokes of the state of the issue at the international level will be given. With this, it will be understood how to move forward in our country, sustaining the need to implement the measures suggested in the lege ferenda proposal.

II. BLOODSTAIN PATTERN ANALYSIS

In an introductory way, it is convenient to briefly state what is meant by bloodstain pattern analysis, and which are the objectives and the methodology used to guarantee the achievement of its purpose.

Bloodstain pattern analysis is the forensic discipline responsible for the study of blood at the crime scene, in order to provide information that allows the reconstruction of the events that occurred, based on the evaluation of the stains generated by the presence of blood subjected to the properties of fluids².

The work of the analysts will be carried out fundamentally in the criminal scene, where they must ensure the protection of the evidence to avoid the degradation or contamination of the stains. In addition, they must proceed according to each scenario and the characteristics of the blood samples in question, following at all times the action protocols determined by each police force³.

1 Both countries have specialized laboratories for training and preparation of bloodstain pattern analysis expert reports. In Marseille, France, Philippe Esperança, Criminalist expert at the French Court of Cassation and Bloodstain Pattern Analysis expert at the International Criminal Court, directs the Forensic Analysis Laboratory: <http://l-a-c.expert/inicio/>. In Nieuw-Vennep, the Netherlands, Martin Eversdijk, the only European among the distinguished members of the International Association of Bloodstain Pattern Analysis, (IABPA), runs the Loci Forensics B.V. laboratory together with René Gelderman. They are responsible, among other milestones, for the creation of the Lumiscene reagent: <https://www.lociforensics.nl/home/>.

2 BORDBECK, S., "Introduction to bloodstain pattern analysis" in *SIAC Journal - Journal for Police Science and Practice*, vol. 2, 2012, pp. 51-57.

3 GRUPO ESPAÑOL Y PORTUGUÉS, ISFG. Recomendaciones para la recogida y envío de muestras con fines de identificación ge-

Generally speaking, bloodstain pattern analysts will focus on studying the layout and presentation of each bloodstain, with the aim of determining what type of mechanism has formed each pattern and, ultimately, establish what has happened⁴. The way in which the blood is presented in scene, the size of each of the stains, their location, direction and other aspects, will allow them to reconstruct the bloody episode and establish possible hypotheses about what happened.

In addition to the crime scene, the analysts will work in their forensic laboratories with the photographs and samples that have been previously taken, always ensuring compliance with the chain of custody⁵. Their work concludes in an expert report, in which they will capture the conclusions they have reached based on the necessary studies in each case, and which they must ratify during the oral trial phase, providing the judge with valuable and objective information on a subject which is, outside of his legal knowledge.

III. EXPERT EVIDENCE

As a way of introduction, it is convenient to tackle, in a very generic way, what is meant by evidence and how, through the expert report, the bloodstain pattern analysis is used in the judicial process.

In the words of Montero Aroca⁶, the evidence can be defined as “the procedural activity of the parties (of proving) and of the judge (of verifying), by which it is intended to achieve the psychological persuasion of the judge about the truth of data related to the proceedings”.

Moreno Catena also states⁷, “that it is a procedural activity [...] whose essential purpose is to prove the controversial facts exposed by the litigants”.

Following this thesis, Guasp defines it as “an attempt to achieve the psychological persuasion of the judge regarding the existence or non-existence, the veracity or falsity of the data itself”. De la Oliva refers to it as “that activity carried out by the parties with the court to acquire the conviction of the truth or certainty of a fact or factual statement or to establish them as true for the purposes of the process”⁸.

Sentís Melendo⁹, defends that “the evidence is the verification of statements made by the parties, relating, in general, to facts and exceptionally to legal norms, which are carried out using sources which are brought to the process by certain means.”

nética. Madeira, 2000; JAMES, STUART, KISH, PAUL, and SUTTON, T. PAULETTE. Principles of bloodstain pattern analysis: Theory and practice. Boca Ratón: CRC Press Edition, 2005; MINISTERIO DEL INTERIOR. Policía científica. 100 años de ciencia al servicio de la justicia. Comisaría General de Policía Científica, 2011; MINISTERIO DEL INTERIOR. Manual de criminalística para la policía judicial, Secretaría General Técnica del Ministerio del Interior. Madrid, 2017.

4 JAMES, STUART, KISH, PAUL, and SUTTON, T. PAULETTE. Principles of bloodstain pattern analysis: Theory and practice. Boca Ratón: CRC Press Edition, 2005.

5 FIGUEROA NAVARRO, C., and DEL AMO RODRÍGUEZ, A., “La cadena de custodia de las pruebas y los protocolos de actuación de la policía científica” in Policía científica: 100 años de ciencia al servicio de la justicia, Ministerio del Interior, Comisaría General de Policía Científica, Madrid, 2011, pp 315-330.

6 MONTERO AROCA, J. Derecho jurisdiccional III, proceso penal (27ª ed.) Tirant lo Blanch. Valencia, 2019.

7 MORENO CATENA, V., CORTÉS DOMÍNGUEZ, V., and GIMENO SENDRA, J.V. Introducción al Derecho Procesal (10ª ed.) Colex, Madrid, 2019.

8 GUASP, J., and ARAGONESES, P. Derecho procesal civil, Thomson-Civitas. Madrid, 2014.

9 SENTÍS MELENDO, S. La prueba. Los grandes temas del derecho probatorio, Ejea: Buenos Aires, 1979.

In short, the evidence is that procedural action through which the parties intend to prove a series of facts with the aim of convincing the judge of their existence; to prove reality.

It is also necessary to establish a differentiation between the definitions and characteristics of the sources of evidence and the means of evidence, thus determining their role in judicial investigations.

If the definition of the sources of evidence is addressed, it can be stated that they are principles, foundations, or points of origin from which the evidentiary facts emanate, concentrating their relevance and prominence at a time prior to the development of the oral trial, and can be categorized according to whether they emanate from an object or a person. It is those elements that exist in reality and are suitable for achieving conviction about what generates controversy.

They are, therefore, the facts that are perceived by the judge and serve him in some way to be able to deduce what is later going to be proven; what will be provided to the process as evidence in order to obtain the certainty of the person in charge of the prosecution.

On the other hand, the means of evidence are the instruments used by the parties to make possible the judicial appreciation of the object of the proof, understood as procedural acts that allow the sources of evidence to be incorporated into the process.

These are different types of activities and instruments that are used with the aim of demonstrating the certainty of certain controversial facts in the process, and are made up of things and people capable of providing empirical data that allow the verification of the hypotheses raised by the parties, thus achieving the procedural purpose of judicial evidence by granting the judge knowledge and data that allow him to understand what happened¹⁰.

Their role in the trial as part of the elements to which the defense can avail, is configured as a fundamental right, as stated in article 24.2 of the Spanish Constitution: "Likewise, everyone has the right to the ordinary Judge predetermined by law, to the defense and assistance of a lawyer, to be informed of the accusation against them, to a public trial without undue delay and with all guarantees, to use the pertinent evidence for their defense, not to testify against themselves, not to confess guilt and to the presumption of innocence".

With all this, the differentiation between both levels could be understood from a temporal point of view, as if it were a process, since the means of evidence does not exist without the source from which it emanates; nor would the source make sense without the subsequent achievement of reliable data materialized in the means of proof.

Said means of evidence may be perceived by the judge by his own intuition, in those cases in which he comes into direct and sensory contact with the object of evidence, or through transmission in cases in which other people or objects facilitate that sensory appreciation of the object

10 ACOSTA VÁSQUEZ, L. "Diferencias entre medio, fuente y objeto de la prueba" in *Cuestiones Jurídicas I*, vol. 2, 2007; ME-NESES PACHECO, C. "Fuentes de prueba y medios de prueba en el proceso civil" in *Ius Et Praxis*, num. 14 vol. 2, 2008; SENTÍS MELENDO, SANTIAGO *La prueba. Los grandes temas del derecho probatorio*, Ejea: Buenos Aires, 1979.

of the test, as occurs in the case of the expert report¹¹.

1. EXPERT REPORT

Strictly speaking, the expert report is a document that includes a study carried out by an expert in a technical, scientific, artistic or practical area about which there is controversy, being included among the means of evidence that can be presented in a judicial process, either at the request of the parties, trying to convince the judge, or at the request of the judge himself, considering it appropriate to facilitate his final decision. It is mixed evidence, personal and material, in which the expert is the source of the investigation, and the report is the means by which their knowledge is contributed to the process¹².

It is widely collected as an investigative diligence and as a necessary means of judicial assistance in articles 465 to 485 of the LECrim¹³, thus highlighting the importance of the collaboration of the figure of the expert in the process; even more so as a result of the progress that forensic sciences and their various disciplines have experienced in recent decades.

In this sense, the appearance of new subjects, together with the development of study techniques and methodologies in line with the advancement of technologies, makes it difficult for the judge to understand what happened, especially in telematic crimes or those that take place vir-

tually, manifesting the need to go to specialized personnel in each matter that can correctly assist in a judicial process the decisions that the court will make.

On these and other occasions, the facts subject to evidence may require knowledge of a scientific, artistic, technical or practical nature¹⁴, evidencing that the purpose of the expert report must be to make up for the lack of non-legal knowledge of the judge.

From all this it follows that the report will be the means used by the expert to be able to contribute his studies on that specific matter when they are required¹⁵, this aspect being included in article 456 LECrim: “the judge will agree on the expert report when, to know or appreciate some important fact or circumstance in the summary, were scientific or artistic knowledge necessary or convenient”.

Regarding the tenure of the experts, and following article 457 LECrim, the possibility of having or not having official qualifications recognized by our administration is determined, attending in any case to the specialization of the scientific or artistic knowledge of the object of study.

In the case that concerns us, and as it is a scientific discipline based on the study of the behavior of blood, a non-Newtonian fluid, for which specialized knowledge of various sciences such as physics, chemistry, biology, and mathematics, it

11 MORENO CATENA, V., and CORTÉS DOMÍNGUEZ, V. *Derecho procesal civil. parte general* (10ª ed.) Tirant Lo Blanch: Valencia, 2019.

12 MONTERO AROCA, J. *Derecho jurisdiccional III, proceso penal* (27ª ed.) Tirant lo Blanch: Valencia, 2019.

13 Criminal Procedure Law of Spain (Ley de Enjuiciamiento Criminal).

ABEL LLUCH, X., and PICÓ I JUNOY, J. *La prueba pericial*, Bosch Editor: Barcelona. 2009.

15 MONTERO AROCA, JUAN. *Derecho jurisdiccional III, proceso penal* (27ª ed.) Tirant lo Blanch: Valencia, 2019; PICÓ I JUNOY, J., and DE MIRANDA VÁZQUEZ, C. *Peritaje y prueba pericial*, J.M. Bosch Editor: Barcelona, 2017; RODRÍGUEZ GARCÍA, M. J. *Manual básico del perito judicial* (2ª ed.) DYKINSON: España, 2017.

should be assumed that the experts who were to carry out and ratify an expert report on bloodstain patterns, had official qualifications.

However, and as will be reflected below, no training of any kind is required for those experts who present and defend reports collected within the analysis of bloodstain patterns, complicating the effective development and guarantee of the discipline and blurring the figure of the expert analyst in Spain in comparison with the rest of the European countries that do regulate this figure.

2. STATUS OF THE MATTER IN SPAIN. ANALYSIS OF JURISPRUDENCE.

With the intention of knowing the reality of the status of the bloodstains patten analysis evidence expert in Spain, jurisprudence related to violent crimes has been consulted and analyzed, on the one hand, and certain profiles of members of the security forces and bodies in charge of the study of the stains in crime scenes, on the other¹⁶.

Taking this into consideration, it will be possible to have access to a detailed vision of the status of the discipline in our country, both in the field of training and related to the development of the expert evidence.

For the analysis of jurisprudence, different rulings were consulted in which the presence of blood, bloodstains, or bloody remains in criminal scenes were given a certain prominence.

Specifically, and as previously mentioned, a jurisprudential analysis was carried out in nine different sentences, both from the Supreme Court and from the Provincial Court of four different provinces (Madrid, Las Palmas de Gran Canaria, Cádiz and Huesca), occurred in a period of time between 2005 and 2019. All of them referred to the study of blood at the scene, either by experts, doctors, or police members.

In the great majority of those consulted, which will be detailed below, no further analysis is collected beyond the mere mention of the presence of blood. Nor is relevant data provided regarding the characteristics and morphological appearance of these spots or patterns. Therefore, the analysis of bloodstain patterns is not used to obtain more information, accepting as sufficient the analysis of other traces such as footprints, fingerprints or blood samples for DNA analysis.

It is true that, in several of the few cases found¹⁷, the information on the bloodstains that is collected in the minutes of the technical police visual inspection helped the court in making de-

16 Data has been taken from a study carried out on 180 members of the Spanish National Police: MORENO LOPERA, M. Análisis e interpretación de los patrones de manchas de sangre: Experiencia, conocimientos, formación y opiniones de los profesionales implicados en la investigación criminalística, Universidad de Murcia. [Tesis Doctoral] Murcia, 2015.

17 STS 755/2017, 02-03-2017. The analysis of the blood found at the crime scene is not studied. The existence of bloody footprints, a pool of blood at the scene and blood next to the victim's body and on her clothing are established. Despite this, only blood samples are studied for DNA tests.

SAP of Cádiz, 310/2016, 27-10-2016. Double homicide. The presence of blood from the two victims is recorded, both in the bedroom and in a corridor where the victims were. DNA studies are carried out, but there are no expert reports on those blood stains.

SAP of Huesca 89/2016, 12-07-2016. The presence of blood in several areas of the crime scene is described, but no expertise is carried out on these stains.

STS 4667/2017, 21-12-2017. Attempted murder case. The presence of a large pool of blood, splashes and transfer stains on several garments is recorded. However, only DNA analysis was performed on that blood. The court's decisions were based on several aspects presented in the report of the police inspection. The defendant's statements did not match with the blood

decisions during the judicial process, by assessing the possibility that the stains observed at the scene were related to the events logically described and, therefore, were the result of their commission, resorting to DNA analysis as evidence for the resolution of each case.

However, no expert report is carried out on them in a specialized way. Results are simply provided on the logical relationship between the presence of blood in certain areas of the scene and the data provided by the record of the ocular inspection and the rest of the remains.

3. PROFILE AND TRAINING OF THE BLOODSTAIN PATTERN ANALYST IN SPAIN.

In another of the studied cases¹⁸, a report is drawn up by a forensic doctor in collaboration with members of the scientific police, with the aim of determining whether there had been a homicide based exclusively on the blood found at the crime scene. Compared to previous rulings, this is the case that has included the best bloodstain pattern analysis in the procedure to date.

Even though the forensic doctor performs the analysis based on scientific literature and with the support of the members of the scientific police, it is unknown if she has the specific and specialized training necessary to take charge of

this type of reports and have access to the specific methods and techniques for the handling and treatment of blood samples and for their subsequent analysis. Had it not been like this, a specialist should have been consulted to avoid possible errors in the study and examination of these spots.

In the last of the judgments consulted¹⁹, it is stated that “based on the police inspection, the report on the victim’s clothing and effects, and the statement of the criminalistics expert, it is accepted that everything indicates that when the fatal wound took place, the defendant must have been very close to the victim.”

Unlike the previous cases, this sentence mentions the preparation of a specific expert report to determine the logic of the presence or absence of bloodstains at the crime scene, carrying out a study in which they are taken into account, both the record of the police inspection in which the presence of blood in the place was collected, as well as a subsequent analysis of the clothes that the victim was wearing at that time to reconstruct the bloody episode and determine the positions and movements of the victim and the aggressor at all times, providing objectivity and easily verifiable truthful data to the judicial process.

The role of this discipline deserves a special

disposition at the scene.

STS 136/2012, 6-03-2012. The presence of blood at the scene, and on the defendant’s clothing, is studied to aid the court’s decision-making. Both the bloody fingerprints found, as well as the small drops collected on the defendant’s shirt, were not related to the statements that he had given to the investigators. Despite this, any expert report is collected.

STS 366/2005, 28-03-2005. The defendant’s statement is annulled based on the presence of bloodstains on a garment. Neither was a specialized expert opinion carried out on the matter.

SAP de Madrid 134/2016, 17-03-2016. The presence of different bloodstains, and also bloody foot and fingerprints in the police record is established. A study of bloodstains and their location at the scene should have been carried out to avoid possible failures in their study.

18 SAP Las Palmas de Gran Canaria 27/2013, 23-04-2013.

19 STS 1/2019, 10-01-2019.

mention in the case of the double murder in Almonte, Huelva, in 2013²⁰.

The complexity of the investigation, together with the lack of new information and/or evidence that would incriminate any of the suspects in a decisive manner, led the parties to request the participation of an expert to carry out a bloodstain pattern analysis on the scene and might thereby shed some light on the stalled process²¹.

The inclusion of the expert report in which the patterns located in various rooms of the apartment were studied, provided objective data, and until now unknown. Among other aspects, five possible areas of origin of the source of bleeding were established, which made it possible to determine the positions of each victim and, therefore, of the aggressor at the moment in which he attacked them²².

In this way, it was possible to know the possible movements of the murderer and the victims in each room and at each moment of the bloody episode, by drawing a timeline that allows an objec-

tive and truthful hypothesis to be put together²³.

Likewise, the analysis of the spots observed in the scenario allowed the researchers to collect DNA samples in other objects of interest that, at first, had gone unnoticed²⁴.

However, and despite the value of this last case, and considering what was indicated above in relation to the reading and understanding of the rulings, the ignorance on the part of the investigators and the members of the courts, both of the discipline and of the effectiveness of the reports that can be developed in this area is evident. In many of the consulted cases, carrying out this expertise could have yielded new and, above all, objective information about the facts that were judged.

The main obstacle is that there is a total lack of practical and theoretical experience among professionals who work in some way in tasks related to the bloodstain pattern analysis in Spain. In fact, and as stated by Moreno Lopera²⁵ in his research: “100% of the professionals surveyed have

20 On April 27, 2013, a father and his eight-year-old daughter received more than 150 stab wounds at their home. Their bodies were discovered by a relative a few days later.

21 Bloodstain pattern analysis gives researchers the ability to figure out what happened in the scenarios by shedding new information on the different processes using the combination of different sciences. Thus, and together with the study of photographs, weapons and clothing, a reconstruction will be achieved, especially useful in complex processes. Cfr. BORDBECK, S. “Introduction to bloodstain pattern analysis” *SIAC Journal - Journal for Police Science and Practice*, 2 (2012); MORENO LOPERA, M. “Análisis e interpretación de los patrones de manchas de sangre. estudio y reconstrucción” in *Minerva, Saber, Arte y Técnica*, num. 2, vol. 2, 2018; STUART, H. J., and William, G. E. *Interpretation of bloodstain evidence at crime scenes* CRC Press. New York (1999).

22 MORENO LOPERA, M. “Análisis e interpretación de los patrones de manchas de sangre. estudio y reconstrucción” in *Minerva, Saber, Arte y Técnica*, num. 2, vol. 2, 2018.

23 Cfr. BEVEL, T., and GARDNER ROSS M. *Bloodstain Pattern Analysis with an Introduction to the Crime Scene Reconstruction*, CRC Press, 2008; JAMES, S. H., KISH, P. E., SUTTON, T. P. *Principles of bloodstain pattern analysis: Theory and practice*. CRC Press Edition Boca Ratón (2005); ROYO VILLANOVA, R. “La sangre en el lugar del suceso”, *Anuario de derecho y ciencias penales*, 20, (1967); WORTH, R., *Criminal investigations: Homicide*, Chelsea House Publications, New York (2008).

24 MORENO LOPERA, M. “Análisis e interpretación de los patrones de manchas de sangre. estudio y reconstrucción” in *Minerva, Saber, Arte y Técnica*, num. 2, vol. 2, 2018.

25 MORENO LOPERA, M. *Análisis e interpretación de los patrones de manchas de sangre: Experiencia, conocimientos, formación y opiniones de los profesionales implicados en la investigación criminalística*, Universidad de Murcia [Tesis Doctoral] Murcia, 2015.

not carried out any type of practical activity on the interpretation of bloodstain patterns”.

This lack of knowledge of the discipline is also materialized in the development of expert reports, since it is reflected that “more than 90% have not testified in a trial [...] nor do they know a colleague who has testified as an expert.”²⁶

And the same happens when applying the knowledge obtained to real cases that arise on a daily basis, in fact “more than 85% say that their unit has not used the interpretation of bloodstains in the investigation of homicides, nor has intervened in cases where these stains were studied”²⁷.

Therefore, several problems come together that increase, even more so, the difficulties that the discipline had to face in the different spheres of the investigation of a violent crime.

In addition to the lack of regulated knowledge of the police officers in charge of the analysis of the stains and the preparation of the pertinent reports, it is necessary to attend to the total absence of standards when requesting qualifications and/or demonstrable experience that allow a professional to specifically apply as an expert witness in this discipline, contrary to what happens in the Netherlands or France, countries in which the development of the expert activity is not allowed to professionals who cannot demonstrate their training and/or experience through degrees and accreditations from international associations such as the IABPA²⁸ or the IAI²⁹, among others.

In Spain, at the moment, the only regulation in this regard is contained in the LECrim, establishing in its article 458 the preference of the judges, to opt, where appropriate, for trained experts. It is understood at all times that the tenure of the expert is determined by the existence or not of official training that has been recognized by the administration.

In this specific case, and since no degree related to the analysis of bloodstain pattern analysis is recognized, it cannot legally be required of the expert in question, thereby adding a practically insurmountable obstacle to the correct development of the discipline and the related expert opinions.

In some way, and as has been verified when analyzing related rulings, if the necessary training is not regulated so that a professional can develop the expertise in some matter of the analysis of bloodstain patterns, neither can it be prevented that other specialist from other fields of knowledge such as legal medicine, are responsible for the analysis of these stains.

With this, not only is the figure of the expert in this matter not protected, but also the objectivity and integrity of the entire scientific discipline is put at risk, by not legally controlling who can provide an expert report in judicial processes. It is not verified in any way whether or not they are professionals officially trained in the analysis of bloodstain patterns and therefore whether they will provide truthful, objective and valuable data.

²⁶ Data has been taken from a study carried out on 180 members of the Spanish National Police. Cfr. MORENO LOPERA, M. *Análisis e interpretación de los patrones de manchas de sangre: Experiencia, conocimientos, formación y opiniones de los profesionales implicados en la investigación criminalística*, Universidad de Murcia [Tesis Doctoral] Murcia, 2015.

²⁷ *Ibid.*

²⁸ International Association of Bloodstain Pattern Analysis.

²⁹ International Association for Identification.

At this point, it is convenient to highlight, once again, the figure of the expert. Their work goes beyond the exposition of knowledge acquired on the matter prosecuted exclusively; it must serve as an aid to the jurisdictional function, knowing how to apply effectively and objectively their knowledge to the cases that have been assigned to them³⁰.

Among the actions that can be carried out during their work, and as stated in article 479 LE-Crim, the possible destruction or manifestations of certain evidence to be analyzed is contemplated as long as there is a part of said object in judicial provision, if possible.

It is assumed, under these circumstances, that the specialist has the necessary training and knowledge that allow him to work in a guaranteed manner, trying to avoid errors and analyze the object in question in the most cautious way possible. But as can happen in other scientific disciplines, in bloodstain pattern analysis, certain actions can lead to the total and irreversible destruction of a macula or blood trail in question.

Beyond this problem, which is greatly aggravated if expert reports are allowed to professionals without specific training, another must be faced.

During the development of the trial, the experts will ratify their report, appearing before the relevant court and answering the questions that the parties address to them (art. 724 LE-Crim). Subsequently, the court will assess the

expert reports according to the rules of sound criticism³¹, issuing a sentence after assessing, according to its conscience, the evidence taken in the trial (art. 741).

In other words, the court enjoys the necessary freedom to assess the report based on the report itself and the rest of the evidence, making an assessment as a whole. It will also attend to a series of essential aspects supported by the jurisprudence that must be weighed, such as the reasoning contained in the opinions and those expressed by the expert during the plenary session; the conclusions reached in each report; the expert operations carried out by the experts during the process as well as the means or instruments used and supported by their opinions and the professional competence of the experts³².

The court, therefore, may reject the result of a report or determine the acceptance of one instead of another, alleging that it is better founded or basing its decision on the professional competence and the circumstances related to one or another expert.

Considering once again the lack of official certification requirements for experts in the field of bloodstain pattern analysis, arises again the possibility that reports submitted may be misjudged due to malpractice on the part of the experts not specifically trained, discrediting, once again, the value and objectivity of the discipline.

30 ABEL LLUCH, X., and PICÓ I JUNOY, J. *La prueba pericial*, Bosch Editor, Barcelona. 2009.

31 Sound criticism is understood as the formula used by the legislator to assess the evidence based on logic and the experience of each judge.

32 ABEL LLUCH, X., and PICÓ I JUNOY, J. *La prueba pericial*, Bosch Editor: Barcelona, 2009; CAMERIERE, ROBERTO., LUCA, S., and NAVARRO, F. "La prueba pericial y su valoración en el ámbito judicial español", in *Revista electrónica de ciencia penal y criminología*, vol. 15, 2013; MENESES PACHECO, C., "Fuentes de prueba y medios de prueba en el proceso civil" in *Ius Et Praxis*, num. 14, vol. 2, 2008.

4. STATUS OF THE MATTER IN THE U.S.A.

To understand the dimension of the problem regarding the discipline in Spain, it is helpful to make a comparison with one of the pioneering countries that have most developed and exploited the bloodstain pattern analysis discipline: the United States.

Contrary to what is happening in our country, the US appellate courts began to accept this expertise as reliable evidence in the mid-1950s. Specifically in 1954, with the case of Sam Sheppard in Ohio in which Paul Leland Kirk, recognized criminalist at the time, provided a bloodstain report with which he managed to get the defendant acquitted of the charge of first-degree murder³³.

Years later, in 1966, a member of the police used the tools of the discipline to determine in an expert report, for the very first time, the position of a victim at a shooting scene. Thus, and during the following years, reports were presented in different judicial processes, setting a precedent, and achieving full acceptance in the states of Virginia, 1979; Iowa, 1980; Tennessee, 1982; Oklahoma, 1983; Illinois, 1984; Texas and Indiana, 1987; Minnesota, 1990; Idaho, 1991 and North Carolina, 1995³⁴.

However, despite the rapid acceptance of these reports in legal proceedings, problems began to arise related to their regulation, their content,

and the veracity of some of their results. Norms that would allow the control and systematization of their information were not required until that moment.

In fact, the Attorney General's Office of the State of North Carolina, through an audit of the forensic serology section of its crime laboratory, showed that during 1987 and 2003, 1.49% of the ratified reports on bloodstain pattern analysis, presented falsified results³⁵.

The auditors studied nearly 15,000 cases. In 269 of them, the final results of the tests issued to determine the presence of blood in a scenario have been manipulated.

These data uncovered a terrible reality: 80 of the convicts were still serving sentences at the time of the audit, 4 of them were on death row and 8 defendants had already died, 3 of them executed.

The problem was aggravated when it was shown that the sentences issued always benefited the prosecution, thus determining the intention behind these alterations.³⁶

In conclusion, the report determined that, among the possible factors that had triggered this terrible situation, there was a poorly developed policy, lack of objectivity, absence of guidelines for the writing of reports, ineffective management and a lack of supervision of the Serology Section during the studied years.

33 SMITH, L., How an Unproven Forensic Science Spread Through the Criminal Justice System, PROPUBLICA, 2018

34 Ibid.

35 RUDOLF, J. "North Carolina State Bureau of Investigation, forensics Scandal grows with new evidence of fraud", in Huff-Post <https://www.huffpost.com/entry/north-carolina-state-bureau-of-investigation-duane-deaver_n_1516328> (2012); PRISON LEGAL NEWS. Problems at North Carolina State Bureau of Investigation Crime lab, <<https://www.prisonlegalnews.org/news/2012/jan/15/problems-at-north-carolina-state-bureau-of-investigation-crime-lab/>> (2012).

36 Ibid.

For their part, Garret and Neufeld began a study in which 137 final judgments were analyzed, showing that, in 82 of them, the forensic reports provided to the process were invalidated in court as a result of errors made in the conclusions and their results, as they were not supported by sufficient empirical data or because they showed a truly dubious objectivity³⁷.

They showed that, until approximately the year 2001, there were cases in which the conviction was not objective and therefore false. They were based on a report that no certainty tests were performed following positive results from presumptive tests³⁸ used at each crime scene for the location of blood.

In these cases, and contrary to what was established in bloodstain pattern analysis, the tests were carried out only with chemical presumptive test, which, despite having a high degree of sensitivity, are not specific with blood, and much less with human blood. They can react with other elements such as vegetables, metals, cleaning products, fruits, or carbonated drinks.

Therefore, not carrying out certainty tests³⁹, which are specific for blood, but, above all, not going through a subsequent DNA test that allows each sample to individualized and identified the donor of each bloodstain, means falling in a very serious error and getting carried away by a re-

sult that is not entirely reliable and, therefore, should not be assumed as binding for the future of the investigation.

As a result of these failures in the sentences and as a first measure, the superior courts of some States took measures that regulated the language used in the reports and the techniques that should be carried out.

During the last decade, from different associations such as the AAFS-ASB (American Association of Forensic Sciences), the NIST (National Institute of Standards and Technology) and the OSAC (The Organization of the Committees of the Scientific Area of Forensic Sciences) have developed standards of action referring to the requirements of the official training that can be offered in the discipline, the way in which reports and related writings must be collected or the terminology that, since 2017, must be used to refer to the different stains and patterns .

With all these measures, it has been possible to provide guarantee and veracity, both to the reports of bloodstain patterns, as well as to the discipline itself. Also, preventing future problems from damaging its credibility, while laying the foundations for effective development of legislation, standards, and training for the rest of the countries that want to correctly develop experts in the matter.

37 Cfr. Garrett, B., and Neufeld, P., Invalid Forensic Science Testimony and Wrongful Convictions. *Virginia Law Rev.* 95, 2009.

38 These are different chemical compounds that allow blood to be distinguish a scene even if it cannot be seen with the naked eye. These tests work by an oxidation reaction now they encounter the hemoglobin present in our red blood cells. Depending on the chemical product that we have used, a color change will be produced in the sample or a chemiluminescence emission in cases in which the reaction is positive. Cfr. CASTELLÓ PONCE, A, Revisión crítica del diagnóstico de orientación en el estudio de las manchas de sangre: falsos negativos en la prueba de Adler. Una aportación de la Química Legal, Universitat de València [Tesis Doctoral], 1997.

39 There are different tests that allow determining the presence or not of blood after collecting a small sample. The reaction takes place with the hemoglobin group, and they are specific for blood, avoiding false positive results as occurs with orientation tests. In these cases, a subsequent DNA test is necessary to determine if it is human blood and rule out the possibility that it was animal blood. *Ibíd.*

III. LEGE FERENDA PROPOSAL. TOWARDS A NEW BLOODSTAIN PATTERN ANALYSIS SCENARIO. IV. CONCLUSIONS. V. BIBLIOGRAPHY CONSULTED

All the problematic aspects mentioned throughout this article, generally focused on the lack of knowledge and regularization of the discipline in the expert and judicial field, require an analysis that allows laying the foundations to start a new scenario in bloodstain pattern analysis.

The infinite ignorance towards this discipline has been vehemently emphasized, both from the police forces and from the legal field, although it is true that, in some way, the fact that we have to deal with a matter that is practically unknown and little used in our judicial processes, can favor its development.

In fact, not having a previous track record makes it much easier to create parameters and applicable regulations on the matter, as it does not have to repeal or modify previous legislation.

Furthermore, it would be achieved that the reports that began to be developed in this area would always do so with guarantees and objectivity. From its inception, quality reports would be introduced, benefiting the discipline and the judicial process as a whole.

Taking all the above into account, and especially considering the situation and the development of bloodstain pattern analysis in other European countries, we proceed to break down a series of measures that could improve the current scenario, granting it the one status it deserves in Spain both in and out of court.

Thus, in relation to training, it would be convenient to homogenize criteria with the rest of the European countries that require that their experts have completed, at least, the basic and the advanced level of the courses that are approved by the IABPA.

This always considering that the professional in question comes from branches related to forensic sciences such as criminalistics, or belongs directly to the police forces, as prior knowledge of aspects related to the treatment and collection of each vestige in criminal scenes is necessary.

Evidently, the rest of the non-official courses taught in different training laboratories, such as visualization and location of bloodstain patterns or specialization in textile supports, among others, must be taken into account when improving and increasing the specificity in the knowledge of professionals.

Lastly, and following the premise of the need to adapt and update the techniques and methods that are carried out in the discipline, the participation and presentation of research and studies in the different annual congresses organized by associations, like the IABPA, will be positively valued.

In short, it is necessary that professionals in this field have the relevant training and that, in addition, they adapt to the advances that may arise regarding techniques, methods or products over the years, thus achieving that they can add value and quality to discipline, especially if they participate in judicial processes.

In relation to the content of the report, although it is true that it is not possible to establish

a single application guide for all cases, a series of recommendations can be established that must be considered to achieve objectivity and veracity of the results, following those written by the ASB AAFS Standards Board in 2020.

Thus, in addition to a brief theoretical introduction on the aspect that should be dealt with within the discipline and the information that it throws on what happened (origin of the stains, directionality, classification of the patterns, intervention of x number of individuals...), the scientific method used during the investigation and the way in which it supports the results obtained in each specific case should always be explained.

In this sense, it is worth highlighting, once again, the importance of the professional being in continuous training, adapting to the changes that may arise in the study of macules and their applications to casuistry.

All this with the intention that the results can be reproduced by any other researcher who follows the guidelines explained in the report, thereby demonstrating the veracity and objectivity of the document and its conclusions. Thus, it is possible to guarantee the fairness of these expert tests and the usefulness of the discipline.

In short, the application of specific guidelines and standards is pursued, such as those currently being carried out in relation to the development of the study and analysis of other forensic sciences and disciplines, such as DNA analysis or ballistic comparisons.

The professional must accredit specific training for the development of the scientific subject, using a series of specific and up-to-date methods and techniques, and must know how

to write and defend a report whose results are always reproducible. Only in this way will the growth of bloodstain pattern analysis be ensured and beneficial for future research.

V. CONCLUSIONS

1. Bloodstain pattern analysis is a scientific discipline, and as such, the reports should be governed by different scientific techniques and methods.

2. Specific and detailed standards are required to adequately regulate the introduction in our country of bloodstain patterns analysis as a forensic discipline, in a fair, objective, and guaranteeing manner.

3. The figure of the expert in this matter and the training that must be associated with it for the effective performance of their functions must be regulated.

4. The creation of training centers that facilitate the specialization of police members and other professionals for the correct exercise of their expert functions is recommended.

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