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Chemical Methods for Revealing Latent Fingerprints on Wooden Surfaces and in their Mass

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Abstract: Fingerprints are used since 19th century by Police forces to identify criminals and murderers. In 20th century the evolution of science contributed to develop forensic methods for revealing latent fingerprints. One of the most used chemical method for revealing latent fingerprints on documents and paper objects is made by using Ninhydrin. This substance has great results but is affecting the characteristics of ink or other scriptural substances.
In 21st century, scientists developed a new method in this field using a new discovered substance named Indandione. The new substance is more used by forensic scientists than Ninhydrin. Forensic literature has not documented the results of Ninhydrin applied on wooden surfaces. Using Ninhydrin on these surfaces, natural wood which has not applied varnish film, forensic scientists or specialists will have surprising results. On wood surfaces without varnish film, Ninhydrin acts like on the paper but the time interval from applying Ninhydrin and revealing fingerprints is longer, about one week, with daily treatments.
Treatment with Ninhydrin on wooden surfaces was not too documented by forensic scientists because, in developed countries, murders committed using wooden instruments has a small rate. In my country, majority of murders are committed in rural communities where the level of education is commonly low and people are using this kind of weapons to commit crimes (axes, pitchforks, etc.). By using Ninhydrin I achieved an identification of a murderer. This method can be successfully developed and use in forensics.

Keywords: *latent fingerprints; wooden surface; chemical method; forensics.*

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1. Introduction

The method I will explain is not new to the specialized literature in the matter of forensics, but it has been treated as a subsidiary of the procedures and chemical methods for revealing latent fingerprints in the paper mass. Thus, in the specific work procedures and doctrine, the expressions on this method take the form of "could", without practical studies being developed.

The idea of an in-depth study in this field arose as a scientific and procedural necessity to prove the guilt of the author of a murder committed using an ax, that will be a case study in the second part of the presentation (Stancu, 2015).

Cutting and blunt objects containing components with wooden surfaces used in committing crimes comes, in most cases, from the industrial, agricultural or domestic environment. These, depending on the destination and wear, presents a different stage of finishing of the wooden components, from the raw surface, then the one finished by gelling to the one covered with a varnish film.

I consider this clarification important because it shows the criteria according to which the chemical method is chosen, capable of highlighting the latent fingerprints on such surfaces.

2. Chemical substances used in forensics for revealing fingerprints on porous surfaces

The way the fingerprints are created depends on the finishing modality of the wooden surfaces (Gheorghita, 2015).

On surfaces covered by varnish film, fingerprints are created by the transfer and layering the grease and perspiration from the epidermis to the surface of the varnish film.

The traces created in this way are highlighted using physical methods, namely the treatment of the surface with forensic powders that adhere to the fat film, but, above all, the chemical method by using the cyanoacrylate vaporization installation (Toader, 2008). Such methods are established and their results are positive in most cases.



Fig. 1 Fingerprint revealed using Cyanoacrylate
Source: The Graveyard Shift (n.d.)

The lack of practice in this field appears when we are in the presence of an unvarnished wooden surface. In this case, the film of grease and perspiration is absorbed into the mass of the wood, the previously mentioned methods having no applicability. In the specialized literature and working procedures, the use of chemical methods applicable to a paper support is recommended (Work Instructions in Forensic Laboratory, National Forensic Institute, Romanian Police), but the practice is deficient.

Thus, in the case of latent fingerprints absorbed in paper, several types of chemicals are used that react with different categories of amino acids in perspiration. The most relevant are Indandione and Ninhydrin .

Indandione is a recent discovery by researchers and represents the top of the range of chemicals used in the field. It does not destroy the genetic profiles on the object and does not affect it (no stains apear on paper after using Indandione).

Fig. 2 Fingerprint revealed using Indandione
Source: Zhao et al., 2013



Ninhydrin has a very high success rate, fingerprints are highlighted in a purple color and the solvent will show on the paper (documents are affected). Therefore, by extrapolation, these two methods can be used on wooden surfaces, but the differences in the nature of the support, density, absorption capacity must be considered.



Fig. 3 Fingerprint revealed using Nynhidrin
Source: Forencic's Blog (n.d.)

Practical studies in the field have not been published, so I was facing a big dilemma when I examined an ax used to commit a murder.

3. Case study

During a crime scene investigation of a murder, an ax was identified that showed reddish-brown stains with the appearance of blood, as well as deposits of a substance similar to brain matter, in the area of the metal part and on the wooden handle, close to the metal part.



Fig. 4 Ax discovered during crime scene investigation.
Source: Author's own conception

Successive treatments with Indandione and Ninhydrin were applied, in the laboratory, on the surface of the wooden handle. After ten applications of Ninhydrin, two fingerprints were revealed. One of these led to the identification of the murderer. It was the first identification by this method in Romanian judicial practice.

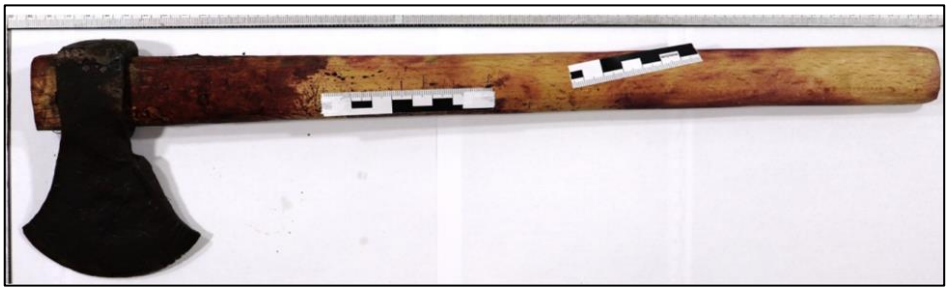


Fig. 5 Those two fingerprints revealed on woon handle.
Source: Author's own conception

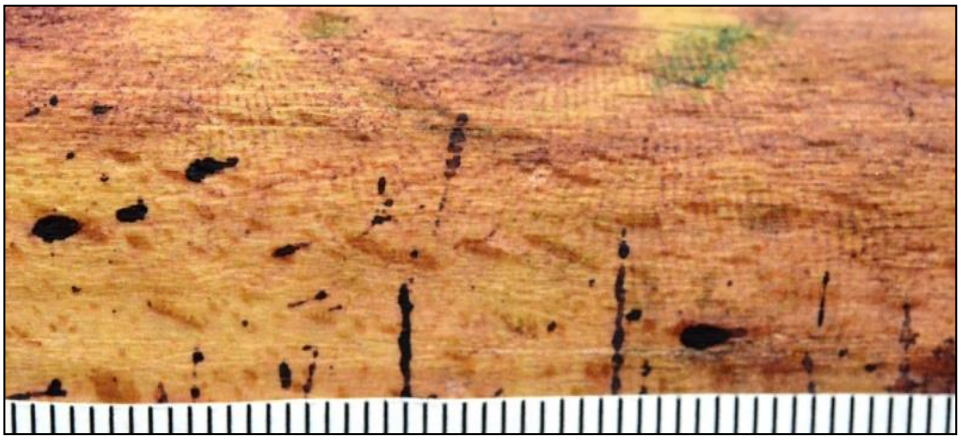


Fig. 6. The finger print wich matched the palmprint of murderer.
Source: Author's own conception

Following the dactyloscopy expertise, it was found that the fingerprint has the same source of origin as the suspect's right palmprint, strengthening the probatory against him.

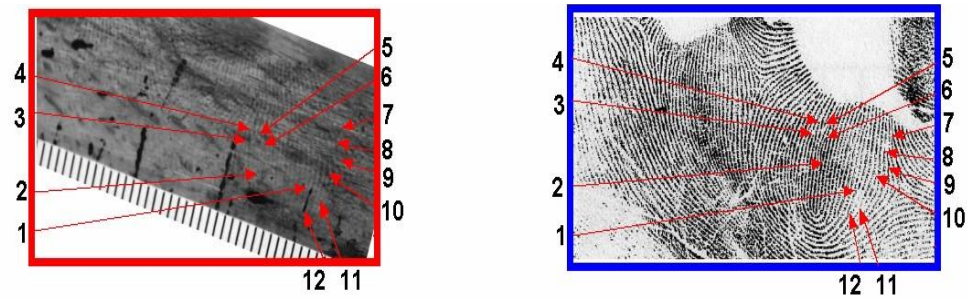


Fig. 7 Twelve matching points identified between the prints.
Source: Author's own conception

4. Conclusion

A new chapter of scientific research started in the matter of the methods of revealing fingerprints and their fields of application.

References

Forencic's Blog. (n.d.). How to search fingerprints on crime scene. Forencic's Blog. https://forensicfield.blog/how-to-search-fingerprints-on-crime-scene/

Gheorghiță, M. (2015). *Tratat de metodă criminalistică.* CEP USM.

Stancu, E. (2015). *Tratat de criminalistică. Ediția a VI-a revizuită și adăugită*. Universul Juridic

Toader, C. (2008). *Tehnică criminalistică: dactiloscopie judiciară. Curs universitar* [Forensic technique: forensic fingerprinting. University course]. Pro Universitaria.

The Graveyard Shift. (n.d.). Cyanocrylate fuming-fingerprinting with superglue. The Graveyard Shift. https://leelofland.com/cyanocrylate-fuming-fingerprinting-with-superglue/

Zhao, Y., Feng, Y., & Luo, Y. (2013). Improvement in Latent Fingermark Detection on Thermal Paper using 5,6-Dimethoxy-1,2-indandione/PVP. *Journal of Forencis Science & Criminology*. https://www.semanticscholar.org/paper/Improvement-in-Latent-Fingermark-Detection-on-Paper-Zhao-Feng/908a9fd5b0efc8c1f3c0681f5dfd96721fab3c49?p2df