

B57 The Optimization of Superglue Fuming to Develop Fingermarks Exposed to Different Bodies of Water

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Learning Overview: After attending this presentation, attendees will learn the most effective way to recover fingermarks from wet items using superglue.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing how cyanoacrylate is not normally considered for wet items, but this research shows the potential use and effectiveness of this method, impacting evidence value of wet items.

It is important to develop techniques and methods to maximize evidence potential from a range of different environments and situations. There has been little research into the recovery of fingermarks exposed to water and how the treatment methods work. Furthermore, the application of more commonly used fingermark recovery methods has not been fully explored for wet items. The small variety of research completed in this area demonstrates the evolution of techniques and new emerging ideas that can be applied to the adverse conditions presented by an underwater crime scene.¹⁻⁷ There is a need to fully evaluate each method so that the application to underwater investigation can be understood.

There is much conjecture around what initiates the reaction with cyanoacrylate, allowing the marks to be visualized. Some research suggests water, while others investigated specific components of the fingermark.^{8,9} If water were the initiating component, it would explain the belief that superglue is a poor method for wet items, even when they have been dried before fuming. It is thought that the water in a fingermark is removed during submersion in the water. Therefore, there is only the other components left in the mark and nothing to initiate the cyanoacrylate or for the glue to adhere to. However, if the carboxylic acid group is the initiator, these components survive in water and could explain the positive results submerged fingermarks have with cyanoacrylate.⁹ Ultimately, by showing this is what the superglue adheres to, it demonstrates the application cyanoacrylate can have for items exposed to water.

During a series of experiments, testing a variety of methods, it was discovered that cyanoacrylate could efficiently recover fingermarks from knives that had been submerged in three different aquatic environments. Cyanoacrylate was in fact, the most effective method, when compared to black powder suspension, iron oxide and small particle reagent, which are recommended for wet items.¹⁰ The effect each water type has on the superglue process was observed and a variety of methodologies developed to identify the best approach for each condition. This study explores the pre-treatment and individual fuming conditions needed to recover fingermarks from knives from each water type used: Sea water, harbor water and river water. The results show variation in treatments, with salt water producing the best quality fingermarks. Further studies into the levels of salt and how the salinity effects the cyanoacrylate are needed to identify why this method is so effective. Furthermore, pre-treatments such as salt washes, may improve quality of the fingermarks across the three water types by increasing the minerals in the mark, the component that, in this study, the cyanoacrylate responds best to. Ultimately, this research will improve the value and effectiveness of forensic methods for underwater investigation by providing another method for practitioners to recover fingermarks from items found in water.

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