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A Complicated Murder Case Solved with the Aid of Fingerprints

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ABSTRACT: Dubai Police encountered a typical murder case on the 26th of April 2016. The dead body bore the strange red marks on the nose and was found tied abruptly on the floor using different types of adhesive tapes. The main challenge, in this case, was to collect the primary evidence like fingerprints and other impressions without disturbing the crime scene. The main focus firstly was given to the fingerprints in this case, which can directly be related to an individual involved in this crime. Whereby fingerprints experts were called to the scene to collect and identify all the fingerprints from various pieces of evidence. Various methods were used to develop the fingerprints that were used, including cyanoacrylate fuming, ninhydrin, and ardrox dye. This case reflects the precision, accuracy, and reliability of the fingerprint expert to show the high efficacy of the twenty-nine fingerprints collected from the crime scene in less than twenty-four hours. The Automated Fingerprint Identification System (AFIS) served as a very useful tool in the identification of the culprit in this case.

Keywords: Fingerprints, cyanoacrtylate, Ninhydrin, Ardrox, AFIS.

I. INTRODUCTION

For more than a hundred years, fingerprints have been the benchmark for personal identification in the legal community. Fingerprints are the patterns developed on the fingertips by the elevated papillary ridges containing rows of pores connecting with sweat glands [1]. Based on the 'law of individuality,' no two people in this world can possess exactly similar fingerprint patterns in context to their characteristics called 'minutiae' [2]. Dactyloscopy is the science of using an individual's fingerprints and physical representative to identify the person [3]. Fingerprints and other frictional ridges are combined to provide police and courts with the most powerful means of personal identification. Fingerprint is known as the friction ridge impression of any part of the finger [4]. The aim of collecting fingerprints from the crime scene is generally to identify an individual. This person could be a suspect, a victim, or a witness.

In the crime scene, there are three kinds of fingerprints: latent (invisible), patent (visible), and plastic (semivisible) fingerprints [5]. There is much progress in using the softwares and computer system for automatic fingerprint interpretation, classification, and coding [6]. It is based on measurement of reflected light from a fingerprint impression and transformed into digitally coded data for further comparative research classification and preservation. With the increasing aid of computer technology AFIS (Automated Fingerprint Identification System) has been introduced years back and has been successfully used in the last two decades around the world to narrow the range of suspects from a large population [7]. The preceding steps of the Automatic Fingerprint Identification System involves fingerprint matching as the prevalent structure of the Fingerprint Identification System (FIS) [8]. The same technology has been used in the present case as well to establish the identity of the person. The main objective of this case is to show the significance of the friction ridge impressions (fingerprints) as a vital tool in crime investigation and to show the accuracy, determination, and expertise of the forensic experts at the General Department of Forensic Science and Criminology at Dubai Police.

II. BACKGROUND OF CASE

On the 26th of April 2016, Dubai police received a call regarding a dead body that was found in an apartment (Fig. 1 and 2). Through the investigations, the body with strange red marks on the nose was found to be tied to the floor with different types of adhesive tapes, along with a big bottle of water, and a piece of paper with a red powder over it beside the dead body (Fig. 3). All items were collected from the crime scene appropriately with due precautions and diligence by the crime scene experts and were send to be tested for the latent fingerprint to the fingerprint division of Dubai Police.

Fig. 1. Showing the apartment (scene of crime).

Fig. 2. Position of the body and other evidences encountered.

Fig. 3. The dead body lying on the floor, tied with different adhesive tapes with strange red marks on nose along with the water bottle kept beside.

Table 1: Shows the challenges faced by the forensic and fingerprint experts during the investigation.

Challenges	Rational
Removing the Tape from the dead body.	The primary issue was as not to destroy the tape as far as possible. The adhesive tape should not get adhere to itself or any other surface, destroying the evidence. Also, most of the dust and dirt from the floor was transferred on to the tape making it further difficult for the experts.
Transferring the Powder from the piece of paper	The powder was present in traces; therefore, much care was needed to transfer it from the alleged piece of paper to an appropriate container and to send that for further analysis.
Identify the suspects and link the crime in the provided time.	The case pressure on the experts was very high to provide the result in a short period.

A. Challenges faced in the case

There were number of challenges faced in the Capsaicin Murder Case, in order not to destroy or blur and fingerprint evidence and also due to the complexity of the crime scene. Few of the challenges have been mentioned in Table 1.

B. Enhancing, Processing, and Lifting Procedures for Fingerprint impressions

Several methods exist to detect the latent prints, and almost all of them rely on the type of surface the impression is encountered and the kind of impression i.e., patent, plastic, or latent. The initial strategy is to find the print or detect if the evidence of concern has any fingerprint or other impressions using different light sources at separate angles to locate any remaining residue of a fingerprint, this technique is known as Oblique lighting and is commonly used and accepted to be helpful for latent print detection [9].

Cyanoacrylate fuming is a common method used in the development of latent fingerprints. An item or piece of evidence is positioned in the cyanoacrylate fuming chamber throughout this method, and a few drops of superglue (chemically cyanoacrylate) are added.The moisture concentrations are adapted to allow the superglue to stick to the print and make it visible or to create an impression with more information that has already been seen stronger. This method is a crucial method for the development of latent fingerprints composed of sweat and oily body secretions [10]. There are various methods to complete the analysis and enhance the developed fingerprints after the sample has been subjected to cyanoacrylate fuming to make the print clearer and suitable for further identification and analysis. It can be done by using standard fingerprint powders, or a fluorescent dye can be used to produce the visible prints under Ultraviolet light, and then pictures from a high-definition camera or photomicrography can be taken [11].

In addition, another way to continue using cyanoacrylate is either using standard fingerprint powder or magnetic fingerprint powder depending on the characteristics of the surface being analyzed, the powders being selected [10-12].

III. MATERIAL AND METHODS

In Dubai Police Forensic lab different types of examinations were performed on the collected evidences (Figs. 4-9). One need to take care about the destructive and non-destructive techniques of fingerprint development [12]. Like most of the chemical techniques and powder methods are destructive and once they are used, no other method can be applicable over the suspected area. Firstly, cyanoacrylate, also known as super glue to disclose latent fingerprints from non-porous surfaces, was performed on the collected water bottle. Secondly, Ninhydrin, which is beneficial in detecting fingerprints from porous and absorbent surfaces, was employed.

The Ninhydrin was used on the piece of paper collected from the crime scene after carefully removing the red powder traces to preserve the fingerprint from deterioration. After that Ardrox: a florescent dye stain that is used after cyanoacrylate to stain the latent fingerprint using ultraviolet light and a digital camera were used. The sticky side of the tapes was applicated by fingerprint powder carefully over the suspected area. Finally, the Automated Fingerprint Identification System (AFIS) was utilized to compare the suspect's prints with the database to produce a match and identify them.

Fig. 4. The adhesive tape encountered on the crime scene.

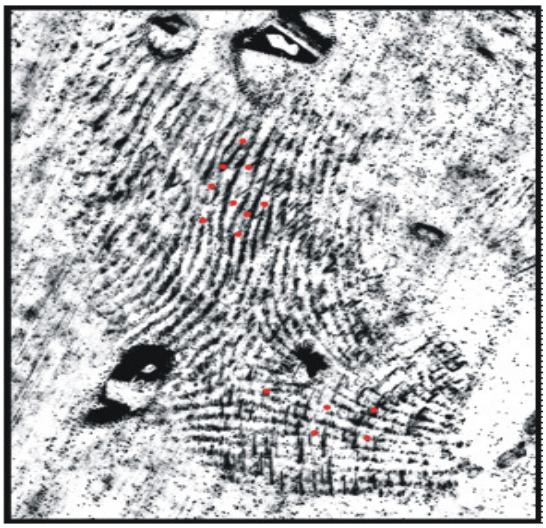

Fig. 5. Fingerprint developed on the adhesive side of the tape.

Fig. 6. Disputed document encountered at crime scene.

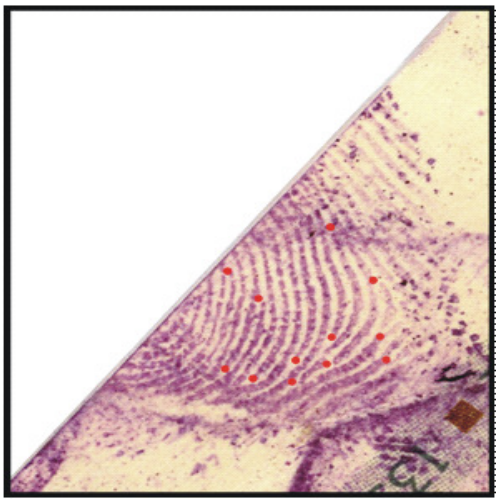

Fig. 7. Fingerprints developed by ninhydrin method on the document.

Fig. 8. Use of AFIS in the suspect identification.

Fig. 9. Use of AFIS in the suspect identification.

IV. RESULTS AND DISCUSSIONS

The quick processing of the chemical development section and the comparison section resulted in identifying the suspect in less than four hours from the time of arriving at the crime scene. Whereby, Ten fingerprints were developed from the tapes, and the bottle of water three of the fingerprints from the bottle of the water matched one of the suspects. Five fingerprints paired with another suspect, and two fingerprints from the piece of paper agreed with the third suspect. Overall, the twenty-nine fingerprints were lifted and treated from the crime scene. All twenty-nine prints were positively identified.Though it was quite puzzling to develop all the fingerprints on these challenging surfaces as discussed above, however, a careful selection of appropriate techniques will result in successful analysis.

V. CONCLUSION

The inquiry into the death scene suggested immediately examining the role of fingerprints, confirming the significance of a proper and thorough investigation into the crime scene. As per the crime scene's primary analysis, death appeared to happen inadvertently and linked homicide as per the shreds of evidence and state of the dead body [13]. Therefore, it became crucial to look for more impression evidence to timely approach the proper analysis [14]. All evidences collected from the crime scene were challenging to deal with. Mnay times fingerprints serves as a valuable tool including biometric identification [15]. However, in this particular case use of cyanoacrylate served as the best method due to the nature of the evidence surface [16-18]. All the evidences gave a clear, positive result that goes back to three main suspects involved in the case. The case was completely solved in less than twenty-four hours. Therefore, it can be concluded that it is always necessary and beneficial not to overlook the minor evidences like fingerprints in this case. The culprits were apprehended within 24 hours using the fingerprints only. Also, in many cases emerging trends of nanotechnology has supported a crucial role in the fingerprint examination and identification; else it could not have been possible this quickly [19-20].

VI. FUTURE SCOPE

The latent fingerprints can be encountered on any surfaces irrespective of their nature. The experts need to be very thoughtful while selecting the method to develop the latent. Many pieces of research have been done using nano-particles, gold-dust, etc [21]. However, more studies are required in this area when it comes to the types of surfaces involved.

Conflict of Interest. The authors whose names are listed certify that they have NO OBJECTIONS with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter or materials discussed in this manuscript.

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REFERENCES

[1]. Kovács-Vajna, Z., Rovatti, R., & Frazzoni, M. (2000). Fingerprint ridge distance computation methodologies. *Pattern Recognition*, *33*(1), 69-80.

[2]. Ashbaugh, D. (1999). *Quantitative-qualitative friction ridge analysis*. Boca Raton, Fla.: CRC Press.

[3]. EgliAnthonioz, N., & Champod, C. (2014). Evidence evaluation in fingerprint comparison and automated fingerprint identification systems—Modeling between finger variability. *Forensic Science International*, *235*, 86-101.

[4]. Indrawan, G., Sitohang, B., & Akbar, S. (2012). Review of sequential access method for fingerprint identification. *Telkomnika*, *10*(2), 335.

[5]. Soweon Yoon, Jianjiang Feng, & Jain, A. (2012). Altered Fingerprints: Analysis and Detection. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, *34*(3), 451-464.

[6]. Utzhanova, A. (2016). Fingerprint Technology and sustainable development. *European Journal of Sustainable Development*, *5*(4).

[7]. Mohamed, K., & Hussein, E. (2016). Fingerprint Recognition. *International Journal of Science and Research (IJSR)*, *5*(6), 801-802.

[8]. Ji, L., & Yi, Z. (2008). Fingerprint orientation field estimation using ridge projection. *Pattern Recognition*, *41*(5), 1491-1503.

[9]. Grieve, D. (2005). Review of:Automated Fingerprint Identification Systems (AFIS). *Journal of Forensic Sciences*, *50*(5), 1-2.

[10]. Kiran A, P. (2018). Study on Efficiency of Alternate Light Source for Detection of Latent Fingerprints. *Journal of Forensic Sciences & Criminal Investigation*, *9*(5).

[11]. Lymperopoulou, K., &Nikitakis, A. (2008). Fun with Fingerprints: Cyanoacrylate Fuming. *Journal of Chemical Education*, *85*(6), 816A.

[12]. Yasuo, N., & Sekijima, M. (2017). Development of Postprocessing Method of Protein-Ligand Docking using Interaction Fingerprint. *Biophysical Journal*, *112*(3), 452a.

[13]. Karu, K., & Jain, A. (1996). Fingerprint classification. *Pattern Recognition*, *29*(3), 389-404.

[14]. Friesen, J. (2014). Activities Designed for Fingerprint Dusting and the Chemical Revelation of Latent Fingerprints. *Journal of Chemical Education*, *92*(3), 505-508.

[15]. Patel, H., & Asrodia, P. (2012). Employee Attendance Management System Using Fingerprint Recognition. *International Journal of Electrical, Electronics and Computer Engineering*, *1*(1), 37-40.

[16]. Almog, J., & Gabay, A. (1980). Chemical Reagents for the Development of Latent Fingerprints. III: Visualization of Latent Fingerprints by Fluorescent Reagents in Vapor Phase. *Journal of Forensic Sciences*, *25*(2), 12146J.

[17]. Bumbrah, G. (2017). Cyanoacrylate fuming method for detection of latent fingermarks: a review. *Egyptian Journal of Forensic Sciences*, *7*(1).

[18]. Amata, B., Aprea, G., Chiuri, A., & Zampa, F. (2015). Fingerprint on trigger: A real case. *Forensic Science International*, *253*, e25-e27.

[19]. Berdejo, S., Rowe, M., & Bond, J. (2011). Latent Fingermark Development on a Range of Porous Substrates Using Ninhydrin Analogs-A Comparison with Ninhydrin and 1,8-Diazofluoren. *Journal of Forensic Sciences*, *57*(2), 509-514.

[20]. G. Tile, V., Suraj, H., Uday, B., & Sahana, S. (2016). Recent Trends in Nanotechnology and its Future Scope -A Review. *International Journal on Emerging Technologies*, *7*(2), 377-385.

[21]. Madhavan, A., & Sharma, B. (2019). Latent fingerprint development with biosynthesized Nano rust. In *Advances in Science and Engineering Technology International Conferences (ASET)* (pp. 1-4).

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