Crime Scene Investigation Special Issue Anil Aggrawal's Internet Journal of Forensic Medicine & Toxicology

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Welcome

Welcome to the Crime Scene Investigation special edition of Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology.

CSI used to be the assignment that you got if you screwed up or annoyed the supervisors. It also used to be done almost exclusively by sworn police officers. In many places it still is, but more and more jurisdictions are also using civilian specialists. "CSI" is also a world wide television phenomenon, with an original program based in Las Vegas and spin off shows in Miami and New York. The crime scene work depicted bears only passing resemblance to the real thing, but millions of viewers tune in every week.

Real world CSI doesn't get nearly as much exposure, and would benefit greatly from the presentation of more case reports. There is a lot of good work being done around the world, but not much of it is ever shared with investigators from other jurisdictions. I would encourage every investigator to write up at least one case report during their career.

This Journal contains a research article on bloodstain patterns associated with knives, a case report of an unusual accidental death and an interview with Mr. Larry Ragle, the author of "Crime Scene". For more about Mr. Ragle, check his website at: http://www.crimescenetwo.com.

Daryl W. Clemens
Guest Editor, Crime Scene Special Issue
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Knife Impression Bloodstain Patterns

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Keywords: Bloodstain Pattern Analysis, Transfer Patterns, Knife Impressions, Void Patterns, Crime Scene Reconstruction.

Abstract

Crime scene investigators may have to interpret bloodstain patterns to provide potentially useful information in the reconstruction of a scene. Patterns produced from physical contact by a knife on a surface can be difficult to identify as consistent with a knife origin. A reference array of knife patterns was produced from known sources, and compared with suspected patterns from two crime scenes. Knife bloodstain patterns may contain sufficient characteristics to infer a class characteristic match to a suspected knife. The weight of a knife is most likely not sufficient to produce a void pattern in a blood soaked surface through a reverse capillary action.

Introduction

A female victim was discovered with multiple sharp force injuries. The injuries consisted of penetrating wounds to the torso, back, and neck, and cutting wounds to the hand and throat. On white bedsheets next to the victim were stain patterns that were consistent with bloodstain patterns. The bedsheets appeared to have been crumpled as if maneuvered to wipe blood from a knife. Two kitchen knifes were located at the scene. The knifes were in a pile with a telephone and other bloody cloths.

The question evolving from the bedsheet stains was that of the bloodstain patterns being consistent with cleaning of a knife(s). Did the suspect use a knife(s) from the victim's residence, clean the knife(s) after murdering the victim, and leave the knife(s) at the scene?

An elderly male was found deceased on the floor of the kitchen of his residence. He was found to have multiple sharp force injuries to his left arm, torso, right hand, and neck. Injuries to the arm and torso were consistent with penetrating puncture wounds. The wounds to the hand and neck were consistent with cutting wounds. A kitchen knife on a kitchen towel was found near the head of the victim. When crime scene investigators rolled the victim's body to the left the victim's right hand positioned over the knife on the towel. His pajama trousers had numerous stains consistent with bloodstains. The towel had a pattern that appeared to have an outline of a knife.

Two questions evolved from the crime scene investigation. The first question concerned the bloodstains on the victim's pajamas. Were they consistent with knife patterns? The second question concerned the mechanism to produce the pattern on the towel? Could the weight of a knife cause blood to vacate an area of a blood soaked towel?

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Research was conducted by covering a knife with blood and pressing it against a surface to create an array of bloodstain patterns. Additional research was conducted by introducing a knife to a towel, and introducing blood to the construction.

Literature Review

A review of the literature indicated that blood may present latent images through two distinct processes. The first process involves a blood bearing object contacting another object. The second process involves an object being placed upon a blood bearing surface.

An example of the first instance would be a blood covered knife contacting a bed sheet. A knife placed upon a blood soaked towel would be an example of the second process.

Images resulting from an interaction between objects and blood have been variously termed as pattern evidence (Lee, p.279), contact-transfer pattern (Lee, p. 293), compression marks (Fisher p. 248), and transfer flow patterns (Bunker, p. 31). A. Y. Wonder, Blood Dynamics, posits two types of transfer patterns: blockage and contact (Wonder, p. 84). In the former an object blocks the transfer of blood to a surface and the void area presents a replication of the shape of the blocking object.

It has been noted that pattern transfers may be the most overlooked evidence within a scene (Bevel and Gardner, p. 230). As a practice, when trying to make a decision if a particular object produced a pattern, it is often incumbent upon the crime scene investigator to conduct a series of experiments using a similar object as the suspected object (James, Kish, and Sutton, p. 149).

It is clear that the literature recognizes a morphologically discernable image that might result from the interaction of blood, objects, and surfaces. Herbert MacDonell, Bloodstain Patterns, cautions that blood used as a medium for transferring geometric shape may produce shapes of infinite variety (MacDonell, p. 83).

An extension of MacDonell's concept, although not discussed specifically by him, is that blood related geometric images may not readily submit to a linear categorization. The amount of possible variability in the production of bloodstain geometric patterns may give the impression that production of bloodstain patterns is more chaotic than a simple cause and effect action. As an example, it may be difficult to predict the outcome of a geometric pattern given the known facts of a knife, blood, and an additional surface. The surface may be in motion, the knife may or may not be in motion, the amount of blood may vary, time may vary, the biological state of the blood may vary and so forth. In complex systems there are many sources of complexity and numerous variables to include in the observers' perceptional abilities (Biggiero, p. 9). Hence, impression patterns may not only be variable, but they may be mixed in structure, and they may all occur within a given event.

Research Methodology

Research was conducted to attempt to answer two questions. The first question was

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"What are the images created by pressing a blood soaked knife against a substrate?" Substrate is taken to mean a given surface for contact. The second question was "Can the weight of a knife force blood from a blood soaked towel so that a void image results from the interaction of the knife, towel, and blood?"

The research questions lead to formulation of null hypotheses. The null hypothesis is defined as that explanation believed to be true by the researchers. Refutation of the null hypothesis would mean that the alternate hypothesis, designated as Ha, would be accepted as true. In essence, the alternate hypothesis is the opposite of the null hypothesis.

The research questions lead to formulation of the following null hypotheses:

1. ***H_{01}*: An array of images cannot be produced which will categorically identify unknown blood images as knife images.**
2. ***H_{02}*: A knife introduced to a blood soaked towel will cause a void area to present that is morphologically similar to the knife structure.**

The research design pertaining to each hypothesis was as follows:

H_{O1}: Knives similar in structure to those found at the two scenes were used as test objects. The knives were covered with blood and were pressed against several substrates. The handles and blades of the knives were pressed against a brown paper hand towel, a white t-shirt, and a white bed sheet. The images from these tests were compared with the images from the scene.

H_{O2}: Four knives were selected as test objects. These knives were of varying weights. The knife from the scene weighed 113.8 grams. The tests knives weighed 43.9 grams, 79.5 grams, 141.1 grams and 273.4 grams.

Each of the test knives were manipulated through four test situations: (1) placed on a blood-soaked hand towel, and allowed to rest until the blood dried, (2) placed on a dry hand towel and blood poured over the knife, and allowed to rest until the blood was dried (3) tightly wrapped in a blood-soaked towel and allowed to rest without additional restriction, (4) tightly wrapped in a hand towel and held by hand for two minutes after blood was poured around the hand and knife. The experiment knives were selected from the property and evidence of a local police agency. The hand towels were purchased off the rack from a local dry goods vendor. The towels were ninety percent cotton and ten percent synthetic material.

The results of the experiment were compared with the towel and knife from the scene.

Data

Hypothesis One: *(An array of images cannot be produced that will categorically identify unknown blood images as knife images.)*

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In the below displayed images, Figure 1 -6 are known test images. They were produced by the researchers using various knife structures and using known human blood. Note that the images are produced on paper, as shown by the brown hand towel, and on white, cotton cloth. The images in S1 and S2 are from the scene of two known events. In both cases the images were produced on fabric. S1 is an image produced on a white cotton bed sheet. S2 images were produced on blue cotton pajamas.

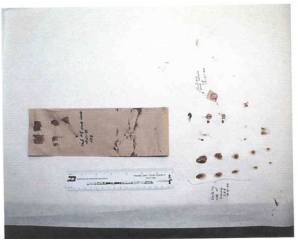

Figure 1 (test)

Figure 2 (test)

Figure 3 (test)

Figure 4 (test)

Figure 5 (test)

Figure 6 (test)

Figure S1 (scene)

Hypothesis Two: *(A knife introduced to a blood soaked towel will cause a void to present that is morphologically similar to the knife structure.)*

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Figure S2a (scene)

Figure S2b (scene)

Figure S2c (scene)

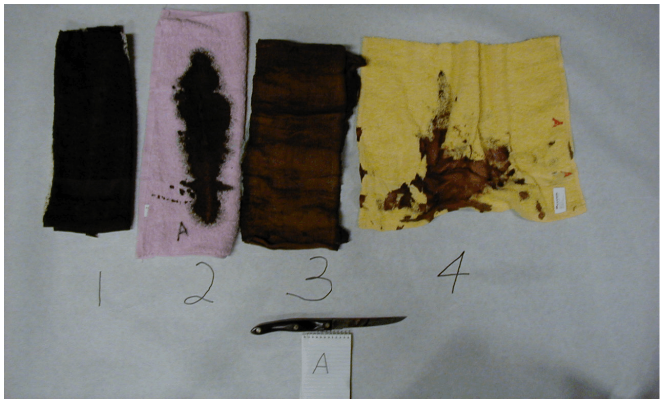

Figure 7

Knife A: The same handle style as the scene knife (79.5 grams).

1. The towel was blood soaked and the knife laid on the towel.
2. The knife was laid on the towel and blood was poured over the knife and towel.
3. The towel was blood soaked and then wrapped around the knife.
4. The towel was wrapped tightly around the knife, hand held, and blood was poured over the hand and knife.

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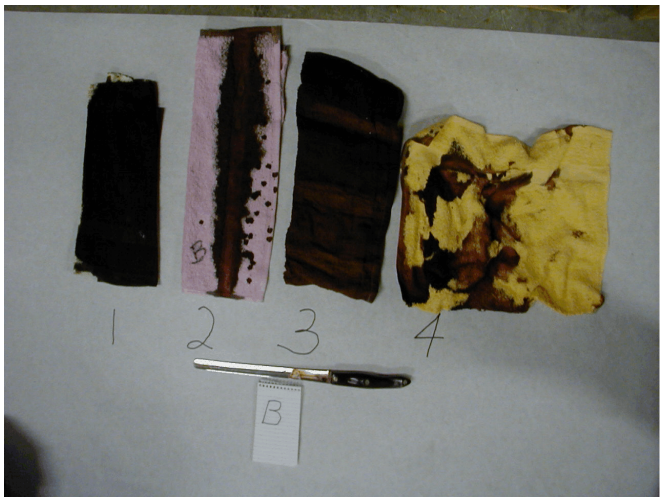

Figure 8

Knife B: 141.1 grams. All test conditions were the same as for Knife A*

Figure 9

Knife C: 273.4 grams. All test conditions were the same as those for Knife A.

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Figure 10

Knife D: 43.9 grams. All test conditions were the same as those for Knife A.

The preceding images were those resulting from the research project. The following two images are those from the scene in which the towel and knife were by the body of the victim. Hypothesis two proposed that a knife introduced to a blood soaked towel will cause a void area to present that is morphologically similar to the knife structure. The investigative question, then, relates to results from the research that is similar to the images from the scene.

Figure S2d (scene)

Figure S2e (scene)

Results

Hypothesis One:

Hypothesis One, H01: null hypothesis, stated "An array of images cannot be produced that will categorically identify unknown blood images as knife images." The concept in this hypothesis is that all bloodstain images resulting from a knife contacting a surface will be completely random in nature. That is, there is only a possible non-linear relationship that exists between the objects and contact. If the images from the research

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are such that they can be used for future reference, then the images are categorized in a body of literature of knife bloodstain images.

Figures 1 (knife end test images) and Figure 3 (knife end test images) show considerable variation in their structure. However, it can be seen that there is a general pattern that is similar to an arrowhead image. There are other images that are square and others that are like a dot.

Figure S2a through S2c manifest some similarity with the test figures. In the scene photos there are bloodstain images that are similar to the arrowhead, square and dot test images. It is possible to infer that a plausible explanation is that the bloodstain impressions in Figure S2a through S2c could have been produced from the handle end of a knife. It is not possible to infer that the images in S2a through S2c were necessarily the result of knife end contact with the bed sheet or pajama bottoms.

Figure 2, Figure 4, Figure 5 and Figure 6 show test patterns from pressing a bloody knife blade and handle against a cloth, and images from wrapping the cloth around the bloody knife handle. Figure S1, S2a, S2b and S2c are the images of bloodstains from the bed sheet and the pajama bottoms. The lower left of Figure S1 and the area above the knife in S2a present an image that suggests a possibility of a structural similarity to a knife handle and a knife blade, respectively. It is clear from a comparison of the images that there are images from the test data that are similar to images from the scene data. Figure S1, in the top center of the photo, presents patterns similar to those in Figure 2. Note the consistent parallel lines in the test and scene photos.

The results of the comparison of the test and scene photos allow refutation of hypothesis one. Hence, the alternate hypothesis, Ha: An array of images can be produced that will categorically identify unknown blood images as knife images, can be accepted as the case. That is, known geometric bloodstain images produced from a bloody knife pressed against a surface can be used as a reference to identify bloodstain images at a crime scene. The known images can be used to identify probable knife images.

A word of caution is in order concerning categorization. In some instances it may be possible to make an identity of a bloodstain and a knife. It seems that the more likely scenario is that investigative information can be obtained from an examination of bloodstains that will lead to an abductive inference that a plausible explanation is that bloodstains were produced from the surface of a knife. That is, bloodstain patterns similar to those in the test photos can be included in a category of possible knife impression patterns. The categorical concept lends itself to the use of the information for purposes of event and reconstruction activities, investigative leads, and interviewing techniques. This is not to say that the test images are sufficient for making an absolute identity or an association between a scene bloodstain image and a suspect knife. Furthermore, one cannot say that there is a statistical probability that a certain bloodstain pattern can be included as a result of an action by a certain knife. It is to say that the consilience, coming together, of the information in which the categorical status of knife bloodstain patterns contributes to the totality of information is a reasonable concept. If there are patterns, categorical patterns, like those produced by a knife and there are sharp

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force injuries to a victim, it is plausible that the victim was injured by a knife and that the patterns on a bed sheet, as an example, are those from a knife that was used to injury the victim. This is what is meant by an abductive inference.

In the examples herein, it is a reasonable inference that someone caused a bloody knife, in Scene 1 and Scene 2, to contact the surface of the respective substrates. Additional investigation would surely attempt to locate a specific knife, witnesses, suspects and other information in an attempt to corroborate the knife related actions. Specifically, one might want to know why a knife was cleaned or pressed against a substrate such as the bedsheet in a victim's room or the pajamas. One might want to measure the morphological features of a bloodstain stain and compare such data with a suspect knife. Are the width's of both sources nearly the same, and are the structural patterns nearly the same? The gathering of additional information offers the opportunity to enhance the robustness of the original inference, and to formulate new inferences that might, as an example, lead to probable personality characteristics of the suspect.

Hypothesis Two:

Hypothesis Two, HO2: null hypothesis stated "A knife introduced to a blood soaked towel will cause a void area to present that is morphologically similar to the knife structure." The concept in this hypothesis is that the weight of a knife will cause blood in a blood soaked towel to be pushed out from the area of contact of the knife so that there will be a voided area in the towel that is similar to the physical structure of the knife. If this is true, an inference could be made that a certain knife was placed on a towel after the towel had been soaked with blood.

Figure 7 through 10 suggest that an impression is possible in the case of Situation 2 (knife on towel and blood poured over knife and onto towel) and Situation 4 (towel wrapped tightly around the knife and blood poured over the knife and towel). Situation 4 (knife wrapped around the towel prior to blood introduction) presents the most distinct void area. It appears that there are some structural characteristics that relate to the structure of the knife. These are manifested as slightly lighter colored areas in the mass of the heavier bloodstain areas.

In the case of Situation 2 the weight and structure of the knife was sufficient to cause a very light voided impression in the blood soaked cloth. It did not appear as if the void impression was as visible as in Situation 4, but was visible to a degree. It was not the case that impressions were presented when a towel was blood soaked prior to introduction of a knife.

Hypothesis two can be accepted in the case of Situation 2 and Situation 4. The hypothesis is refuted in the case of Situation 1 and Situation 3. One can infer from the testing of the hypothesis that a plausible explanation is that for a void area to manifest in a hand towel that the knife must be a part of the overall structure with the hand towel prior to blood being introduced to the overall structure.

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Scene S2d (hand towel from scene) and S2e (hand towel from scene) show similar characteristics to the photos in situation two and situation four. That is, there is a void area in the towel that is similar to the physical structure of a knife. A plausible explanation, therefore, for the case in Figure S2d and S2e is that the knife was wrapped in the towel prior to introduction of blood to the area of the towel. Hence, one might investigate further the theory that the victim was or was not injured by an assailant. Would an assailant wrap a knife in a towel prior to stabbing a victim, keep the towel wrapped around the knife until the victim is on the floor, place the victim on his side, and place the towel wrapped knife in the victim's hand?

Conclusion

Theory building is critical to a successful investigation. Bloodstain pattern analysis is a tool that offers a great potential for investigative theory building. In the era of Daubert evidentiary requirements, it seems that there is a climate of sorts that requires critical thinking and analytical reasoning during an investigation. There seems to be an interest in proposing explanations that lead to inductive inferences. This is manifested in the efforts to assign probabilities to fingerprint comparisons. In fact, there seem to be some opinions that inductive proof reaches a level of probability that effectively designates information as a deductive principle

David Shum suggests that hypotheses on the relevance of the credibility and probative force of evidence must be generated by imaginative and creative thinking in the application of abductive hypothesis formulation (Schum, p. 1645). Essentially, investigators generate hypotheses, abductively, that they believe will explain observations, and then set about to generate additional information that will refute or corroborate the hypotheses. That is, following an abductive hypothesis the investigator seeks further information from scene characteristics, past events, research literature, experimentation, witnesses and suspects, as examples, to be able to test the hypothesis.

If a statistical probability can be attached to any of the information, the investigator has certainly developed some very robust information. Lacking statistical probabilities the investigator is left with plausible explanations.

Plausible explanations are viable as evidence for explanation of an event. although they may not become probative fact, at the very least they are viable as signs that might point to other probable sources of information.

The research presented in this paper should be viewed from the perspective of providing information that can aid in the abductive reasoning process that can lead to hypotheses for testing that contribute to explain of an event. It is to lead to a plausible explanation.

The bloodstains from the tests are not conclusive proof of knife bloodstains in the scene photos. They are information sources that lend themselves to hypothesis formation, but not are not significant inductive proofs. The tests are information that can lead one to

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conclude that a plausible explanation of the stains in the scene photos are knife bloodstains. By wrapping the test photos and the scene photos in a body of reference as a category of knife bloodstain patterns, and combining the information with the rest of the scene information and witness information, it is a reasonable conclusion that the most likely or most plausible explanation of some of the stains are that the stains are knife produced bloodstains. From this point, it is reasonable to hypothesize that someone cleaned the knife or knives, in the respective scenes, on the respective bed sheet and pajamas. It is a further plausible hypothesis that the scene knife, in scene 2 (knife and towel scene), was enclosed in the hand towel prior to introduction of a volume of blood to the towel and knife structure. This hypothesis directly relates to A. Wonders blockage proposition for transfer bloodstain patterns.

Further research would certainly add to the robust nature of knife bloodstain patterns. Possible research avenues could be to use different substrates and different instruments. MacDonell's observation of the infinite variability of bloodstain patterns is well taken at this point. It should not be passed by that variability does not necessarily negate explanation. Building the body of knowledge and categorization of knowledge places initial variability in increasingly discernible entities. Schum notes that initial observations using the process of abductive or insightful reasoning can generate guesses or hypotheses to explain the very first observations (Schum, 1654). These initial observations may be very primitive and general.

It is through gathering of additional information that the hypotheses gain additional power. An additional benefit to the process of proposing abductive hypotheses and testing the hypotheses is that the possibility arises of chance discovery of useful information. Taken in totality the testing creates information that can be categorized that builds the body of knowledge, that lead to further hypotheses and testing, that lead to explanations of events at hand and that contribute to an ongoing process of discovery of information. The information herein is submitted as a humble effort in contributing to the process.

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An Unusual Accidental Death

Daryl W. Clemens

Keywords: Death Investigation, Autopsy, Puncture Wound, Suspicious Circumstance.

Abstract

A report of an investigation into an unusual death scene, and determination of cause of death.

Case Report

In late 2001 Police responded to a home on a report of a dead male subject. Responding officers located the man on the floor in the kitchen area. They also located large quantities of blood in the bed room, dining room and kitchen areas. Investigators from the Police Department and Medical Examiners Office responded to the scene. Initial estimates placed the time of death at around a day prior to the discovery of the body.

Figure 1: Scene Overview

Figure 2: Victim

Records showed that there had been numerous calls for Police/Medical assistance at the residence, many due to a man coughing up blood. The resident was known to have an ulcer, and was suffering from depression. The resident was also known to have a drinking problem.

Investigators at the scene initially believed the death to be natural, and that the blood was related to the victims medical problems. The body was transported to the morgue for autopsy. On arrival at the morgue, the pathologist located a puncture wound to the victims neck.

Figure 3: Close-up of puncture wound

Investigators returned and re-examined the scene. In the bedroom closet a broken wicker basket was noted. There was blood on, in and around the basket. Several pieces of broken wicker stuck up from the basket. The basket was collected and transported to the morgue

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where the broken wicker was matched up to the wound in the victim's neck.

It would appear that the victim fell on the basket while intoxicated and punctured his neck, nicking an artery. The victim attempted to clean himself up in the kitchen sink, passed out and died due to blood loss.

The match of the wound to the basket and the victim's high blood alcohol level led to the death being ruled accidental.

Figure 4: Overview of bedroom showing basket and bloodstains

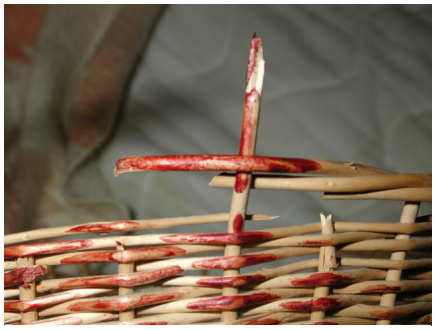

Figure 5: Close-up of broken wicker

Figure 6: Matching the basket to the wound

Figure 7: The basket

Photographs 1-3, 6-7 courtesy Mrs. Julianne Chan. Photographs 4-5 by the author.

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Controversial Death- Change of Decision from Homicide to Suicide:

A Review Opinion

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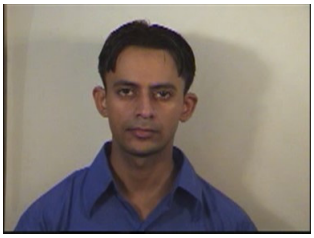
Key words: Presumption in Hanging. Homicidal Hanging. Misleading Version of Suicidal Hanging. Autopsy Criticism. Errors in Autopsy.

Abstract

If someone wondered how a change in opinion of autopsy could be brought about many months after doing the postmortem, or if they wondered how could the autopsy report be changed without having seen the body, they need only read this case. This is a case report of a four month old investigation, and the search for the killers of a victim of ligature strangulation. Homicide investigation was based on eyewitness account and autopsy report. The search ultimately ended with the realization that the hunt was unnecessary. The case was that of suicidal hanging. This report unveils the hollowness of thinking that the family members of the deceased don't lie or influence the autopsy opinion.


Dr. Saurabh Sharma


Dr. S.K. Sharma

The Death of a person with a ligature mark around his neck is usually controversial. The question raised is whether the death is due to hanging, or the result of ligature strangulation. We bring to you a case report regarding the death of a young man. The case was controversial because there was an eyewitness account that someone had killed the victim. Also, there was no indication that the deceased had been hanged, or that the body had been moved. The case was presented as that of a ligature strangulation. It was difficult to convince the investigators that the case was not a homicide.

A young man died in his own house in a small village. According to the Police report the wife of the deceased and his brothers had reportedly seen three men kill the victim in the courtyard of the house, and then flee by jumping across a wall into the neighbors house. One of the three men lived in the adjacent house, which was separated from the deceased's residence by the common wall in the courtyard. The relatives story was supported by an autopsy opinion of ligature strangulation. The initial investigation ended

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with the arrest of the neighbor and a search for the other two men.


The courtyard

The death began to raise controversy in the village when the Police began to put pressure on the villagers to hand over the remaining two men. The village held many meetings. Popular opinion created the need to re-investigate the case, as many of the villagers were unconvinced by the story that had been told to the Police. The Police investigators received some new clues, and also became convinced that they were on the wrong track. The main problem for the investigators was the clear autopsy opinion of ligature strangulation.

Three months after the actual occurrence the investigators turned to experts in forensic medicine to interpret the meaning of the autopsy photographs. The scene of the occurrence, the family members and neighbors who had visited the scene were also made available to the experts. The team spent a few hours at the scene, examining the circumstances at the time of death, and interviewing those who had been at the scene.

As a result of the examination and interviews the following items were found to be notable:

1. People were asked individually to explain what they had seen. They revealed that it was stormy night, the lights had suddenly gone off, there was occasional lightning, and it was about to rain.

2. Their observations in relation to the location of dead body were different. According to police and some others it was near the gate of the room. The relatives claimed it was in the courtyard. The position of the dead body described by them was not the same. It was found to be at three different places. The issue thus was why should the body be at three different locations in that house?

3. The village headman remembered the brother of the deceased rushed to him in his house to apprise him of the situation. He described and demonstrated the manner of the dead body being thrown across the wall, which he had seen on his visit to the scene. He also apprised of his role in stopping the brothers from doing that.

4. One of the neighbors said he had come with a torch [flashlight] on that night. He even spoke of having seen a blue colored plastic rope hanging from the fan. Where was that rope? No one knew.

5. The ceiling fan where the rope was seen was the only point of suspension in the room. One was convinced that it was possible to hang from it. It was also possible for someone to remove a person hanging from it. But a rope or some other ligature

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materials were nowhere to be seen. The relatives were suspected to have deliberately concealed them.

6. The condition of the eyes and the ligature mark in the autopsy photos were suggestive of hanging.

The team talked to doctors who did autopsy. The basis for their opinion of ligature strangulation was the ligature mark. According to them three turns were unlikely in hanging. They had diagnosed fracture & dislocation of C4 vertebrae on external examination of the body.

Conclusion

A criminal act as described by the relatives seemed unlikely. None of them could explain the precise manner of strangulation. None of them spoke of the use of a rope even in their projected story. If one was to believe their version then there should not have

Ligature marks are suggestive of hanging

been ligature mark at all. The appearance of the face of the deceased is not that expected of the victim of strangulation. The ligature mark was such that it could also have been caused in the process of hanging. A suicide thus seems to be the most probable

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hypothesis.

Investigations revealed that the deceased was short-tempered and was a daily drinker. There was a scuffle on that night over the sale of a piece of land in the village. The brothers of the deceased diffused the situation and knowing he was at fault, and under the influence of alcohol, they pushed him into the room. After bolting the room from the outside they went away. The wife of the deceased returned after some time with food for him and saw him hanging from the ceiling fan. She cried for help. Two brothers of the deceased were the first to arrive. They removed the rope and brought him down from the fan.

After placing him on the ground, one of the brothers went running to the village headman for assistance. When the headman arrived at the house he was surprised to see the brothers of the deceased were engaged in attempting to throw the body across the wall into the neighbor's house. Since the body was heavy and the wall was high they couldn't get it over. They then brought the body to where it was located when the police arrived.

The family members of the deceased wanted to throw his body across the wall on to the other side. They wanted to bring a charge of murder against their neighbors. Had they succeeded in transferring the dead body, they would have succeeded in bringing a homicidal charge on to their neighbors. After all finding the body in the house of the accused is the best proof of a crime. The family members had thus concealed the actual story of suicidal hanging and had used the occasion to project the story of strangulation. Before the police arrived the body had been moved twice.

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Prospects of Hanging Being Interpreted as Ligature Strangulation are Real

(Twist in the tale by a scene examination)

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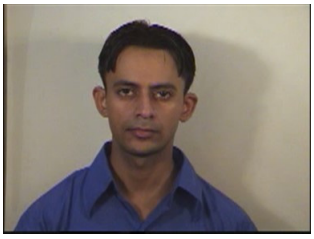
Keywords: Artifacts in hanging, suicidal hanging, postmortem injury, social aspects of hanging, death-investigation, scene-examination, suicide appearing as homicide.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Abstract

A case report points to the uncomfortable fact that a suspicion of homicide entertained on the basis of findings of sharp weapon injury on the neck and mismatching evidence provided by the relatives was misleading. The relatives attributed death to a natural cause. Medical reports (both treatment and the autopsy report) showed that the deceased had suffered a nick to his neck. There was also a mark on the neck that resembled a ligature mark. The eyewitness account appeared suspicious and led the investigators to think of homicide as a possibility. While the debate on whether the relatives concealed the theory of hanging from others out of compulsion or fear raged on, what remained irrefutable was that it was a suicidal hanging. It was thus possible to miss diagnosis of hanging on autopsy.

Introduction

Many of those involved in death investigation may not agree with the view that the "history of hanging" is an important criterion for making an autopsy diagnosis of hanging. In today's investigation, where one is free to float theories, hypothesis -- confirmed and unconfirmed, sorting out suicidal and homicidal manner of death is not easy. There has been contention over the death of a young married man. He died in his own house in the presence of his family. The closest of the relatives present in the house had immediately arranged cardio-pulmonary resuscitation (CPR). Incomplete and unverified information placed before the autopsy doctor prevented the desired autopsy outcome.


Figure 1

The deceased underwent emergency management in a

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nursing home. Those doctors who had attended him before declaring him dead had observed blood on the front of his banyan. (Fig. 1) An unexplained, tiny, incised wound was present on the left side/front of the neck. (Fig. 2) Those who did autopsy had noticed sub-conjunctival hemorrhages in both the eyes (Fig. 3), and an unexplained almost horizontal, non-grooved, pressure abrasion on the middle front of his neck. (Fig. 4) According to the family members of the deceased, this was a natural death. The incised wound and the abrasion on the neck were the creations of the doctors during their efforts of resuscitation. Doctors, who had attended and provided CPR, in response to an emergency telephonic call by his family members, however denied the same.

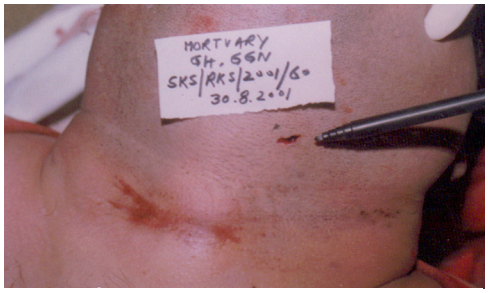

Figure 2

To the majority and to the police the projected story of natural death appeared doubtful. On the basis of the injuries on the neck police considered the death to be homicidal. According to them there was no mechanism of natural death to account for these injuries. Death was due to ligature strangulation.


Figure 3

On autopsy there was nothing suggestive of hanging, manual or ligature strangulation. The neck was not elongated. The mark was localized on the middle front of the neck with slight extension towards the left side. It was not grooved. Sub-conjunctival hemorrhages noticed in both the eyes (Fig. 3), the ligature mark and bright red extravasation of blood underneath the mark made the autopsy doctor opine that the death was due to asphyxia consequent upon mechanical pressure applied on the front and left side of the neck. The incised wound was a superficial nick and could not have caused death in the ordinary course of nature.


Figure 4

The only information that the autopsy doctor had until the completion of the autopsy was that the deceased reportedly fainted and fell on the ground in the bathroom. Subsequently his wife and the other relatives telephoned for medical assistance. Police sealed the bathroom. They also booked the death under the suitable section of causing murder. None of the family members attributed the death to any unnatural mechanism. The homicidal theory surprisingly did not have the support of the wife, or even the closest relatives. There were reportedly no eyewitnesses. Death investigators though suspicious of homicide thus were at the crossroad.

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Discussion

Figure 5

The shape of the true story became visible after a fortnight, when the family members came out with a version of events different from that at the time of the autopsy. The deceased was seen hanging in the bathroom by a saree from the ceiling fan, was the story that emerged now. It was also disclosed that scissors (Fig. 5) had to be used to cut the ligature material around the neck. Getting the victim down from the fan was the priority of the relatives. When they were unable to remove the noose manually, they cut it off. During this process the scissors used could have caused the injury on the neck. (Fig. 6). This led to a change in the perception of the entire story. The new story of suicidal hanging, confirmed by the wife of the deceased, added a totally new dimension to initial theory of homicide. Why no one had ever said, least of all the family members themselves, that the deceased was seen hanging was a mystery. It is probably this part of the story that led to complexities of the matter at the autopsy from where the homicidal suspicion took off. Autopsy observations in it were not typical of hanging. Had they revealed about death by hanging, either to the treating doctors or to those who did police inquest or even to the autopsy doctor, things would have been different.

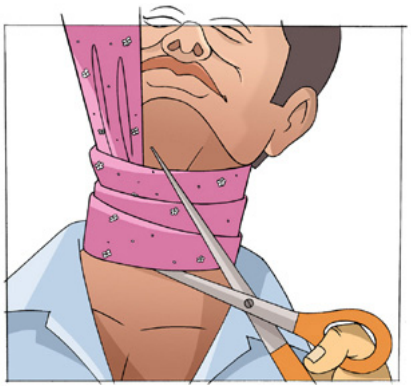
Figure 6

Case thus initially suspected to be that of homicide was found to be of suicidal hanging. The question arises that if the wife and other relatives knew about the hanging, then why did they not share the information with the treating doctors and the police? Was it that the relatives did not wish to spoil the prestige of the family? Or, did they not wish to tell the police anything which could lead to the inconvenience of an investigation into the reasons for the hanging?

Accepting the modification made in autopsy impression, police blamed the doctors for making a mistake and misguiding them. They said that the doctors first put them on the homicidal line of investigation, and then changed their opinion to suicide. Statements such as the one made by the police could put the autopsy doctor in an embarrassing situation. In fact it was the doctors ill-informed perception -- that police could furnish no explanation after examining the scene of crime, that led to their opinion of mechanical asphyxia. In seeking autopsy's help, the death investigators should not lose sight of the doctor's concern in finding out cause and manner of death. The autopsy doctor expects that the police would also view the problem of cause of death from the doctor's perspective. Just passing on the body without meaningful information in the inquest papers was misleading. Had police retrieved the true story of the circumstances surrounding the death, the results would have been different. They failed to realize that

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inadequate information would lead to an autopsy opinion of mechanical asphyxia.

The autopsy had its own limitations. Observation of ligature mark was no way suggestive of hanging. It was atypical and one could correlate it with that of hanging only after knowing that the body was hung. Moreover presence of incised wound on the neck rendered the situation of the type that it could have been elicited only after the perusal of the scene and facts relating to the occurrence. No definitive opinion about hanging could be given on the bases of only asphyxial signs coupled with confusing ligature mark. The duration of hanging was for about 5-10 minutes (victim was noticed few minutes after the occurrence). The ligature material was soft and there were two broad turns, almost covering the entire neck tightly. The portion of sari seen encircled and tied around the neck could produce the mark. The unsuccessful attempt to release the noose and the urgency to remove it by cutting brought the use of scissors. The use of the scissors inadvertently caused the superficial nick to the neck.

Conclusion

Suicidal hanging can be misinterpreted as ligature strangulation. In a death with pressure abrasion restricted to the lower front of the neck, the blood soiled front of banyan (Fig. 1) and an unexplained, fresh bleeding, tiny, incised wound on the left side front of the neck (Fig. 2) a high index of suspicion for homicidal death should be raised. While no single test is perfectly accurate, the combination of a correct history and physical examination can aid in making a prompt, accurate diagnosis. In a case where the diagnosis remains uncertain, analysis of the situation at the scene after knowing the correct version of the circumstances can be helpful. In this case a member of an affluent family remained endangered for being remanded and jailed on charges of murdering his younger brother. The family initially concealed the actual story for the fear of damaging family prestige. Later on when they made up their mind to come out with the actual story many disbelieved them.

The story of hanging from bathroom fan emerged many days after the death. It was a bathroom having a platform with a washbasin fitted in it. A shaving kit along with two scissors (Fig. 5) were the main items that lay scattered on the platform. Access from this platform to the ceiling fan was possible. Two pieces of a saree, which is a 6-metre cloth and is the Indian women's usual wear, were produced as the ligature material. Cutting open the tight noose by the use of one of these scissors, resulted in two pieces of that saree. The police, however, remained unconvinced by the clues. Police described it as a frame-up and a concocted story.

The new facts observed by the forensic experts convinced the police that the death followed hanging, and that the small mark on the neck and the wound resulted as the family members now said. After examination of the scene forensic experts opined that the dead body had been a victim of hanging.

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The Evidence that Demands to be Heard

by Satish Sekar

Introduction:

In 1987 Colin Pitchfork became the first criminal in the world to be convicted by DNA profiling. He was found guilty of two rapes and murders three years apart in Leicestershire, England. The victims, Dawn Ashworth and Linda Mann were both schoolgirls. Police conducted a DNA sweep of the area, but Pitchfork persuaded a friend to take the test for him. Initially he evaded capture, but was caught out when his friend mentioned it in a pub and the police were informed. Pitchfork eventually gave a sample for DNA profiling and this was matched to both offenses. Prior to Pitchfork's arrest the prime suspect, Richard Buckland had been charged with both rapes and murders, even though he had only confessed to one of the murders, but vehemently denied the other. This puzzled the police. They turned to Professor Sir Alec Jeffreys and his then revolutionary technique of Multi-Locus Probe (MLP) DNA profiling to resolve the conundrum. The technique proved that Buckland was innocent of all of the offenses, but that they were indeed linked. Buckland was the first person to be eliminated by DNA profiling. It should be remembered that without the crime scene samples being available for testing Jeffreys could not have demonstrated the capabilities of his technique.

Professor Jeffreys' discovery revolutionized the fight against crime. DNA profiling would help to convict many criminals. It would also eliminate many more people from police inquiries. DNA profiling would become perhaps the most important weapon in the fight against crime. However, it is important to remember that it is just one of many techniques available to investigators. The increased use of DNA profiling, especially as advances were made in terms of discriminating power and sensitivity, resulted in greater understanding of the need to protect the integrity of crime scenes and samples obtained from them. DNA profiling is not the only technique to require the integrity of crime scenes to be guaranteed. Each and every development in forensic science depends upon meticulous respect for the integrity of the crime scene and careful observation and photographing of that scene before a single sample is collected. This includes establishing environmental conditions – something of vital importance in forensic entomology. Careful attention must be paid during the collection of samples to prevent contamination of the evidence. It is necessary to scrupulously follow established procedures for collecting, packaging, storing and transportation of samples obtained from crime scenes. Observation of established procedures in such matters not only preserves the quality of the evidence, but can prevent accusations of malpractice. Respect for the integrity of crime scenes and the evidence obtained from them should be a fundamental tenet of any criminal justice system. Not only should there be stringent safeguards governing conduct

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at crime scenes, but the consequences for failing to meet these standards should be very high. The cases detailed below illustrate not only the problems that arise when crime scenes or samples obtained from them are not accorded the respect they deserve, but what is possible when they are treated with due respect.

Case Studies:

1) Mahmood Mattan:

In March 1952 Lily Volpert was the victim of a brutal murder at her shop in the Tiger Bay district of Cardiff. Her throat had been slit from ear to ear. The floor was heavily blood-stained. The priority for investigating officers was to check whether or not she was still alive. Consequently, they walked through the crime scene. This destroyed some evidence that may have helped tie the killer to his crime. Officers in 1952 were understandably not mindful of the wonders that forensic science would come to perform in cases such as this in the future. Nevertheless, lessons would be learned and crime scenes would come to be recognized as extremely important sources of evidence. South Wales Police would take over from the city police who investigated the murder of Lily Volpert and would develop a pioneering approach to crime scene evidence.

Mattan's case was very controversial. An entirely circumstantial case resulted in his execution – the last person to be hanged in Cardiff Prison in September 1952. An appeal, nearly fifty years later would reveal many causes for concern. By then, the evidence that may have tied the killer of Lily Volpert to his crime was irretrievably lost. Mattan's case is a graphic example, if one was needed, of the necessity for the highest standards at crime scenes. However, that is not the only necessity. Procedures to ensure the integrity of the evidence at crime scenes and to ensure the chain of custody of that evidence, is properly collected, packaged, transported and stored prior to testing is essential if the guilty are not to evade sanction for their crime and innocent people like Mahmood Mattan are not to be wrongfully convicted. While the Mattan case occurred over half a century ago, some crime scenes continue to cause concern decades later.

2) Gary Mills & Tony Poole:

In January 1989 an incident occurred in an apartment at 34 Conduit Street, Gloucester. As a result, a young black man named Hensley Wiltshire would subsequently lose his life due to a complicated set of circumstances. Gary Mills and Tony Poole would serve fourteen years in prison for Wiltshire's murder. This was a very complicated case that involved many issues beyond the scope of this article. At least two altercations occurred at Conduit Street involving a knife and crowbar. Wiltshire was aggressive and attacked Mills. Wiltshire came off second best. Among the serious discrepancies in the medical

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evidence were ovoid injuries to Wiltshire's shins. These injuries were referred to as 'the mystery injuries' because it was never discovered what had caused them.

Although 34 Conduit Street was a crime scene, it was not properly sealed. A friend of the deceased gained access after it should have been sealed, and it has never been established whether any evidence was removed from the apartment or not. Had the scene been sealed the questions of what weapon had caused the mystery injuries and who had caused them might have been resolved unequivocally. The convictions of Mills and Poole were quashed by the appeal court last year. A policy of sealing all crime scenes as soon as they are identified as crime scenes would prevent recurrence of the problem that occurred in this case and would have avoided the uncertainty over whether the implement that caused the mystery injuries had ever been in that crime scene.

There were other crime scene related issues in this case. For example, crime scene photographs or a visit to the flat quickly establish that an alleged eye-witness, Paul White, could not have seen what he claimed to have seen. 34 Conduit Street is on an incline and cannot be seen into from street level. A visit to the crime scene clearly establishes that White had lied. In such circumstances the Crown Prosecution Service (CPS) ought to have used its powers to review the quality of this evidence and not relied on White as a witness of truth. It has the duty to present only evidence that can be safely relied upon. White ought to have failed that test, as he had been exposed by the crime scene as a deeply flawed witness at best. The appeal court would later dismiss him as an unreliable witness, deeming it unnecessary to present crime scene related evidence regarding sight-lines to further demonstrate his unreliability. This raises the question of why prosecuting lawyers thought White reliable when they had access to the crime scene and photographs. It suggests that greater vigilance is required in applying the Code for Crown Prosecutors regarding the duty to ensure the quality of the witnesses to be relied on. The crime scene was impartial and accurate; White was neither. Witnesses can be mistaken or dishonest as in this case. Crime scenes and evidence obtained from them are likely to be both more accurate and impartial. As such they offer a better quality of evidence.

South Wales Police's Pioneering Approach:

South Wales Police would eventually confront a series of high profile miscarriages of justice that occurred since the 1980s. These cases had eroded public confidence in the force. They were determined to adopt a pioneering approach that would regain public trust. Evidence obtained from crime scenes was a central tenet of their approach to these re-opened cases. The crime scene procedures practiced by original investigating officers enabled great progress to be made in historic cases which had been unsolved or resulted in miscarriages of justice that had been resolved on appeal. This was due to the collection and retention of samples obtained from crime scenes. Sadly this did not occur to that high a standard in all of the cases.

In May 1999 they established a new unit to investigate unsolved and unresolved homicides. Their approach was to review the original investigations to ensure that

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investigative opportunities had not been missed and to utilize developments in forensic science, especially the then novel DNA testing system known as Second Generation Multiplex Plus (SGM+)[1]. It was the first such unit in the whole of Britain and would secure one of the greatest triumphs of modern policing when it became the first police force in Britain to correctly resolve a murder inquiry after a miscarriage of justice had muddied the waters. That success owed much to the development of SGM+, but it also required original investigators to treat the crime scene with due respect. They did so. Sadly other cases are more difficult to resolve.

The South Wales Cases:

1) The Phillip Saunders Inquiry:

There are several issues in the case of the Newsagent's Three – Darren Hall, Michael O'Brien and Ellis Sherwood – that are worthy of comment, but irrelevant to the purpose of this article. In 1987 a newsagent, Phillip Saunders, was viciously attacked from behind with a weapon such as a shovel outside his home in the Canton district of Cardiff. It had been raining that night and consequently some evidence was lost. That was nobody's fault. Saunders was struck in the head and subsequently died in hospital without ever regaining consciousness. A shovel was neatly placed by the wall and a half empty whiskey bottle was also at the scene of the brutal attack. The postmortem examination determined that there was no alcohol in Saunders' system and that Saunders had been struck with a sharp implement such as a shovel. The shovel discovered at the scene could not be unequivocally tied to the attack. There was no scientific evidence against the Newsagent's Three at all.

This made the whiskey bottle a potentially vital clue. It was recovered, and tested for fingerprints; but no evidence relating to the bottle was presented at trial; and the bottle was subsequently discarded. There is no evidence that the bottle was tested for saliva and consequently for DNA from sloughed cells. This is unfortunate as is the failure to retain the whiskey bottle. South Wales Police had announced the establishment of their new unit while the Newsagent's Three were on bail pending the quashing of their convictions. Twelve years had elapsed since the crime. It is unclear exactly when the bottle was discarded, and it is unfortunate that new investigators were deprived of access to it. The crime scene was properly processed and relevant evidence from it was properly obtained and stored – at least initially. It should be remembered that DNA techniques were not as sophisticated in 1987 as they are today. The decision not to test the bottle then may well have proved a blessing in disguise as such testing in 1987 would probably have used up all of the available DNA, thereby preventing more sophisticated tests from being

1 SGM+ STR typing was developed by the Forensic Science Service (FSS). It tests at ten genes or loci as well as amelogenin which detects the Y-chromosome. It was considerably more sensitive than its predecessor, which tested at six genes and amelogenin. SGM+ offers a random match statistic of 1:1000m.

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conducted later. Unfortunately, the bottle had been disposed of before DNA tests using today's sophisticated techniques could be conducted. The whiskey bottle could have offered vital clues as to the real perpetrator.

Sadly, with the exception of fingerprinting, it is unclear if any further tests were conducted on the whiskey bottle prior to it being thrown away. This is a compelling example of the need for accurate records of all samples, submitted for testing and the results of such tests to be kept both by the laboratory conducting the tests and by the force that referred the samples for testing. Had such practices been adopted by South Wales Police at the time, definitive answers could be provided to the question of what tests were conducted, if any, and equally importantly, whether the original samples were still available for testing now.

This raises the vexed issue of how long samples should be retained. Policies vary from force to force. Some retain samples for as long as twenty-five years. South Wales Police appear to have no fixed policy. The new unit has resolved cases from as far back as the early 1970s. That would not have been possible if the samples obtained from the crime scenes had not been retained. Although that occurred in an unsolved case – the suspect linked to the murders is now deceased – the police have closed the inquiries as a result. It is unfortunate that such a policy was not adopted in all cases. With the full benefit of hindsight, we now know that there were a series of miscarriages of justice that could have benefited from similar foresight. It is also important to note that the miscarriages of justice that have been corrected ought to have the same status as unsolved crimes now. The case of the Newsagent's Three was not acknowledged as a miscarriage of justice for twelve years. While some cases are obvious candidates as a miscarriage of justice – the Cardiff Three for example (see below) – others are not. Consequently, the best approach to retention of samples may be to treat all cases as unsolved and retain samples accordingly. Had that policy been adopted by South Wales police the whiskey bottle would still be available.

2) The Sandra Phillips Inquiry:

Another South Wales case illustrates the consequences of the failure to retain evidence obtained from crime scenes even more graphically. The whiskey bottle may or may not have implicated the murderer of Phillip Saunders. We will almost certainly never know. However, the case of Paul and Wayne Darvell is different; there is no doubt that evidence from the crime scene would have implicated the real culprit. The Darvell brothers were convicted of the 1985 murder of Swansea sex shop manageress, Sandra Phillips, in 1986. They served seven years in prison before having their convictions overturned. There are several issues of concern in that case, which do not impact upon this article. However, there are very serious crime scene issues that need to be addressed. The victim had been bludgeoned with a telephone receiver, and the killer's subsequent blood-stained palm-print was on a wall. It soon emerged that it did not implicate either of the brothers. Yet, the prosecution continued and all work on the print was ordered to stop. The negative and

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photograph taken of the print were also destroyed. This should never have been allowed to occur. This evidence ought to have been allowed to speak, however inconvenient that was to the case against the Darvell brothers. The consequences of this decision may prevent the real murderer of Sandra Phillips ever being brought to justice. Nevertheless, current procedures would never tolerate such practices, especially regarding samples of such obvious importance.

Both the Phillip Saunders Inquiry and the Sandra Phillips Inquiry are among the cases being investigated by the unit referred to above. To date both cases remain unresolved. To some extent the practices of the original investigation towards evidence obtained from the crime scenes has hindered the current investigations by depriving them of evidence that may have resolved these crimes correctly. A clearer policy on retention of samples in controversial cases may have assisted them. While not everyone who claims to be the victim of a miscarriage of justice actually is, some have proved true. A balance needs to be struck between providing closure and allowing those claiming to be innocent reasonable opportunity to prove it. The work of South Wales Police's unit graphically illustrates both such a need and the problems to be faced in the future where a miscarriage of justice is proved, but vital samples are no longer available. Perhaps a new independent review body, consisting of both prosecution and defence lawyers, forensic scientists and representatives of the police and victims of miscarriages of justice could be established to resolve such issues, especially in controversial cases such as those referred to previously.

3) The Second Lynette White Inquiry:

While South Wales Police have been criticized for their crime scene practices in some cases, there is at least one example where they deserve the highest commendation, both for crime scene procedures, retention of such evidence and for the superb quality of their investigation, albeit, second time round. The Lynette White Inquiry, however, represents both the gravest failing of South Wales Police and fifteen years later its greatest triumph – one that ably demonstrates what is possible when crime scenes are treated with the respect that they deserve and why retention of crime scenes and samples obtained from them is so important.

The Lynette White Inquiry, which I wrote a book about (see footnote)[2], was both the most horrific murder and dubious conviction in Welsh history; yet it was also to prove exceptional in that many years after the event forensic science was able to name the killer beyond any doubt.

In the early hours of Saint Valentine's Day 1988 Lynette was about to entertain a client. For some reason he snapped. Her throat had been slit, as had her wrists. She

2 Click here for a review of my book ***Fitted In: The Cardiff Three and the Lynette White Inquiry*** by the forensic pathologist Dr. Gyan Fernando http://www.geradts.com/~anil/ij/vol_003_no_002/reviews/pb/page006.html and an update of subsequent events in the Lynette White Inquiry http://www.geradts.com/~anil/ij/vol_003_no_002/reviews/pb/page006a.html by myself.

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sustained over fifty stab wounds, some of which were inflicted as she was dying, or even later. This was a truly appalling crime. The murderer had cut himself and he had moved the body within the flat. There was a plethora of scientific evidence to work with. This included blood that did not originate from Lynette and much more besides. None of the scientific evidence found in the flat tied any of the five men who stood trial in 1990 to the murder.

The original investigation of the murder of Lynette White was a monument to the old tactics: bash, bludgeon and bluster. After the longest murder trial in British history, the cousins John and Ronnie Actie were acquitted, but Yusef Abdullahi, Stephen Miller and Tony Paris (the Cardiff Three) were convicted. All five were and are undoubtedly innocent – a fact now accepted by South Wales Police. An investigation into possible criminal conduct by anyone involved in the original inquiry is currently proceeding. In order to avoid the possibility of prejudicing that investigation I think it would be inappropriate to detail how the miscarriage of justice that befell the Cardiff Three occurred. While the faults of the original inquiry were legion there was one area where they deserve praise: their treatment of the crime scene and of most of the samples obtained from it.

The police gathered numerous items from the crime scene, among them a piece of cellophane that donated the murderer's nickname – 'Cellophane Man'. Several of the items were tested, though none of the results, then or later, implicated the Cardiff Three, although foreign blood staining was discovered on Lynette's jeans, her sock, and in the flat.

Despite this, the extensive evidence collected and retained by the original team, facilitated the resolution of the crime; though the treatment of some items fell below these high standards. Some of the samples of blood-staining were poorly stored in a locked property cupboard, after they had been treated with ninhydrin. This could have had dire consequences as ninhydrin degrades DNA. Thankfully, degradation of these samples would eventually prove not to be the obstacle it once was and such samples will not be stored in such a fashion now. After the release of the Cardiff Three, a senior officer in a re-investigation, 1995-98, reserved the right to use the entire DNA if he thought it necessary, and the samples could have been tested to destruction. Luckily, at the request of Peggy Pesticcio, Lynette's mother, testing was suspended pending further advances in DNA testing systems. In 1999, following a significant advance in DNA testing systems the Lynette White Inquiry was re-opened again. Several items were subjected to DNA profiling, using the novel techniques. These included both items that had been tested using less sophisticated DNA testing systems and ones that had never been tested previously. To date the scientists who conducted the novel DNA tests and the officers who investigated Lynette's murder this time have taken all the plaudits. Undoubtedly they deserve to be commended for a job very well done, but Dave Barclay, a scientist/investigator at the National Crime Faculty (NCF), made an immense contribution which has been unjustly overlooked – one that relates directly to crime scenes and offers valuable lessons for other inquiries.

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Barclay visited Flat One, 7 James Street[3], where the murder took place. Although it had been decorated since, Barclay went through the apartment blind-folded, trying to replicate the moves of a murderer in the dark: the crime had occurred at night. Every place he touched was observed and noted, and subsequently tested. When the layers of paint were removed, blood was found. Close examination of the original crime scene photographs by Barclay suggested that one particular blood spot on the wall was likely to have been cast off, suggesting the offender had cut himself. This was backed up by minute contact smears which got heavier away from the body along the exit route – the opposite of what would be expected if it were Lynette's blood. Barclay also suggested that as some blood on the wall was likely to have dripped, the skirting board be removed, and more blood was recovered from between the wall and the skirting board. When this blood was tested with the remaining samples from the clothing and the items that had not been tested yet, they revealed the same DNA profile.

Following novel investigations of certain alleles in the profile on the National DNA Database Detective Constable Paul Williams was able to identify a DNA profile of interest belonging to a fourteen-year-old boy who was a close relative of the real killer of Lynette White. Cellophane Man was finally identified as Jeffrey Gafoor fourteen years after the event. Had it not been for the cooperation of the occupant of the flat in allowing police access to the crime scene the evidence Barclay located could not have been obtained. Access to crime scenes is a matter we shall return to below.

On July 4th 2003 legal history was made in Britain when Jeffrey Gafoor pleaded guilty to the murder of Lynette White. South Wales Police became the first police force in the United Kingdom to resolve a notorious miscarriage of justice with the conviction of the real murderer. Correct treatment of the crime scene and dedication of those involved to ensuring that evidence that had been silenced for fourteen years finally got the opportunity to speak contributed greatly to this historic outcome.

The contribution of Dave Barclay in solving the murder of Lynette White has been sadly overlooked. It was an integral part in making legal history in Britain and one that offers lessons for many other inquiries and police forces. The methods used by South Wales Police in this inquiry have been shared with other police forces. They are already being used in other inquiries. That is a development to be welcomed.

Had these items, which ultimately unmasked Gafoor as Lynette's real murderer, been treated in the same manner that the blood-stained palm-print or whiskey bottle had been treated in previous cases, it is unlikely the murderer would have ever been identified. That demonstrates the need for a clearly defined policy regarding retention of crime scene samples in such cases. It also raises another issue, the preservation of the crime scene itself. 7 James Street was made available to investigators in the second Lynette White Inquiry. It was a decision that assisted them considerably and enabled them to collect vitally important evidence fourteen years after the murder, but other crime scenes have been destroyed even though the cases remain unresolved.

3 This murder took place in the district of Cardiff known as Butetown. Previously it had been called Tiger Bay.

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4) The Diane Jones & Shauna and Sarah Jayne Hibberd Inquiry:

62 Marigold Close in Merthyr Tydfil, South Wales, for example, was the site of a fire that cost a young mother, Diane Jones, and her two infant children, Shauna and Sarah Jayne Hibberd, their lives. Three women – Annette Hewins, Donna Clarke and Denise Sullivan – were convicted of offences related to the fire. Hewins and Clarke were to have their convictions quashed, although a retrial was ordered in Clarke's case. After legal argument the charges were ordered to lie on the file. The murders of Diane Jones and her daughters Shauna and Sarah Jayne remain unsolved to this day.

After the successful appeals, the scene of that crime was destroyed after a forensic scientist had visited the site and taken samples. Though the house had become an eye-sore that offended the local community, it potentially still contained evidence that could one day resolve the crime. Now, any evidence that had yet to be recovered has been irretrievably lost, and any new technique discovered in the future will not be capable of performing to its potential. What would have happened if 7 James Street had met the same fate before Barclay had demonstrated his skills so ably?

The Merthyr case is one that was waiting to be reviewed and investigated by the same unit that solved the Lynette White Inquiry when the decision to allow the house to be destroyed was taken. The review has been completed. However, the case is still awaiting active investigation. While there is clearly a need to strike a balance between the wishes of the local community who wanted it destroyed and those of the women wrongfully convicted, especially Hewins, it is somewhat strange that 62 Marigold Close was destroyed while an investigation was still pending. It may be impractical to preserve crime scenes indefinitely, but this one should not have been destroyed until after the review of the original investigation and any subsequent investigation necessitated by that review had been completed. Should such a situation arise again there should be a policy that no destruction of a crime scene will occur until after the review and reinvestigation have been completed.

5) The Power Family Inquiry:

After the collapse of the Merthyr Tydfil case another infamous case grabbed the headlines in South Wales. Three generations of a Clydach family were bludgeoned to death. The target was clearly Mandy Power, but her mother and children also lost their lives. Unlike the Merthyr case South Wales Police ensured that they would not lose crime scene evidence during their investigation by purchasing the house where this tragedy occurred. It was subsequently sold. However, the decision to purchase the house preserved the crime scene and enabled evidence to be obtained from it. David Morris was eventually convicted of the murders. He protests his innocence. The case has raised an interesting precedent regarding the preservation of crime scenes – one that other forces

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would do well to adopt.

The Russell Crookes Inquiry and the case of Neil Sayers:

1) Background:

Another case worthy of mention is that of Neil Sayers. My article on the entomological aspects of this case can be seen in the forensic entomology special (see footnote)[4]. Sayers is currently in prison, protesting his innocence. Both he and co-accused Graham Wallis were students at Hadlow Agricultural College in Kent in May 1998, as was the victim, Russell Crookes. The three were said to be friends, and during the night of May 13th Crookes, Sayers and Wallis went to woods near Hadlow College, as they had done many times before to 'hang out' together. Sayers insists that they all returned to their accommodation at the college at about 4.00 a.m. He saw the light go on in Crookes' room and that was the last time that he saw Crookes alive. Two days later, Crookes was reported missing by his family and a missing person's inquiry was started. Both Sayers and Wallis made appeals for Crookes' safe return, participated in searches, and made statements to the missing person's inquiry. Sayers' account has not deviated in six years. The same can not be said for Wallis' account. His 'confession' was more an accusation against Sayers than an admission of his own guilt, but it was the crucial evidence in this case – one that could and perhaps should have been vigorously tested.

The Police relied on Wallis' account uncritically. They are allowed that option in law, which does not require them to test a confession. The CPS followed suit. It too could have demanded further evidence, but it also chose to rely uncritically on Wallis' account. Yet there was extensive physical evidence available that could have confirmed or refuted Wallis' account. It still can.

2) The Entomological Evidence:

The pathologist who collected the maggots from the cadaver, Dr. Michael Heath is currently awaiting a disciplinary hearing that could result in his Home Office status being revoked. In the Sayers case, he failed to take relevant temperatures recommended by forensic entomologists, failed to take samples from all areas of maggot infestation, and failed to guarantee that he had collected the largest maggots.

A sample of the maggots was fixed and given to a Scene of Crime Officer by Heath along with a live sample. The latter were taken to a police station and kept in the fridge, and not surprisingly died there following a lack of regular observation. Even then they were not examined by a forensic entomologist, and the best chance to establish the post-mortem-interval had been lost.

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4 Please click on the following link http://www.geradts.com/~anil/ij/vol_005_no_001/main.html to take you to the Forensic Entomology Special edited by Dr. Mark Benecke.

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The collection and chain of custody of the entomological evidence in this case reveal problems with the treatment of such evidence from the point of collection onwards. This indicates that some pathologists could benefit from better training of how to treat entomological evidence. While it may not be of assistance in many cases, there are some cases, such as this, where it could be of considerable assistance. In such cases it is essential that pathologists and scene of crime officers are fully conversant with best practices. Such advice is easily accessible. Nevertheless, specific training should be made available to all professionals working within the criminal justice system to ensure that investigative opportunities afforded by maggots are not missed, especially due to lack of familiarity with the quality of evidence that they could provide. It is also necessary to ensure that such evidence was not overlooked due to financial constraints. Even now cases where forensic entomology could be of use are comparatively rare. Sayers' case is one case where it may well have been of considerable assistance. It is unfortunate that the police chose not to utilize its potential, but that is their right.

While the police may not have thought it necessary to their case to pursue the entomological evidence due to financial considerations or simply because they did not believe it could assist, the same cannot be said of Sayers' defence at trial. Inexplicably, Sayers' original defense lawyers failed to instruct a forensic entomologist to try to obtain this information in 1998, and when in January 2003 the maggots were examined by Dr. Martin Hall and Dr. Mark Benecke they were in an extremely poor state. The species was established as the bluebottle Calliphora Vomitoria, but as the fixed sample had been thrown away, Hall and Benecke could not establish the size the maggots had attained upon discovery of the body. None of the grave-site photographs or photos of the post-mortem examination could resolve this issue accurately, and estimates were the best that could be achieved in these circumstances.

The examination of the remnants of the maggots was further complicated by the poor quality of environmental data established at the time. Hall and Benecke had to work with the average of average temperatures from the nearest meteorological office, because the necessary temperatures at the scene were not recorded. It would not have been difficult to establish a far more accurate estimate of the actual temperatures and relative humidity experienced by the cadaver, by using data-loggers over a given period and comparing the data collected with that recorded from the same meteorological office for the same period. By establishing the relationship between data from the burial scene and the office one could estimate more accurate data covering the period of the victim's disappearance than that obtained from the office alone. Such field experiments are routinely conducted to assist forensic entomologists calculate the rate of development of maggots in the body and ultimately estimate the postmortem-interval to a greater degree of accuracy than relying solely on data obtained from the nearest meteorological office.

It would appear that there was not a fixed policy to discard such evidence after a specified time as some maggots were retained while others were not. It is unfortunate that both samples of those maggots were not retained. Given the willingness to retain the maggots, it should become force policy that both sets of samples taken from crime scenes be retained. Had that occurred in this case the entomological evidence may have been

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able to resolve some of the issues in this case. Guidelines are easily accessible on how to treat entomological samples in order to obtain the most accurate results. However, greater awareness of what such evidence is capable of would be desirable.

While police officers cannot be expected to fully understand all existing techniques there are resources such as the National Crime Faculty that are available to them to ensure that investigative opportunities such as this are not lost. The NCF was established in 1995 and was available to investigators in this case. It was established to prevent repetition of the failings in the Yorkshire Ripper case. The resources were available to investigators in this case, but were not used. It should be force policy to consult the NCF in cases such as this. Had that occurred in this case, the maggots would have been treated in accordance with best practice, even if police subsequently decided that forensic entomology was not necessary. This is especially desirable as defense lawyers and experts have no choice but to rely on the evidence from crime scenes such as this being properly treated by those attending crime scenes. In this case Sayers had no input into the treatment of the maggots, but his experts were severely hindered by decisions taken by the police, pathologist and scene of crime officers.

The evidence that the maggots could have given if properly treated has been lost. Sayers had no input into that at all, but he alone pays the price. As defendants and their representatives are affected by decisions taken by investigators at crime scenes a more equitable solution on what should be done in cases such as this needs to be found. Perhaps the interpretation of such evidence most favorable to the defendant should be adopted if through no fault of his own he cannot test such evidence adequately. However, by far the best solution would be to ensure that anyone handling entomological evidence is properly trained for such a task and can ensure that such evidence is treated in accordance with best practice. Ideally such evidence should always be handled by an experienced forensic entomologist. However, that might not always be practical due to time constraints or expert availability. In such cases it should be force policy to consult with resources such as the NCF to ensure that those handling the entomological samples are knowledgeable enough to ensure that the tasks are still conducted to the highest standards. If that is adopted as force policy defendants will face no disadvantage by not having immediate access to such crime scenes.

When a body is discovered, such as occurred in this case on May 26th 1998 it could not have been known if the case would be solved or if a confession would be obtained subsequently. Consequently, nobody could have known whether the entomological evidence would be required or not. Policy should be introduced to ensure that anyone collecting entomological samples is fully conversant with best practice and follows recommended procedures carefully. Training should be provided to any scene of crime officer and pathologist who attend such scenes to ensure that such samples are properly collected, transported and stored and that environmental data is also obtained to optimum efficiency. Requisite funding for such purposes should be made available. The entomological evidence was not the only crime scene related issue in this case.

3) Fire-related Issues:

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The body of Russell Crookes had been partially burned, but little or nothing was established about the fire itself. Several items of debris were collected from the site where his body was partially burned. These included charred lumps which could have been identified by morphological analysis and if necessary chemical analysis of its constituents. This was not attempted. Again the police cannot be compelled to have this done. Nevertheless, it may have proved useful. However, there was an attempt to link Sayers to the crime by comparing the lumps with the result of burning some fuel tablets recovered from his college room, including hexamine. This experiment determined that these charred lumps had not originated from Sayers' room; it did not establish what they were. Neither the police nor Sayers' defense saw a need to do so; but, as different types of fuel (woods) burn differently, establishing what these lumps had been may have assisted in reconstructing the fire, which would have greatly assisted in testing Wallis' account on a number of issues. While the police and the Crown saw no need to do this, Sayers' defense should have done. As will be shown below, fire-related issues offered potentially useful lines of inquiry to challenge Wallis' veracity.

Numerous other items recovered from the murder scene, where the body was burnt, were tested for the presence of accelerants, in an attempt to link Sayers to the crime. No trace was found. However, Patricia Rapley, the forensic scientist instructed by the police, opined that it could have been used but burned off, though the findings were also consistent with no accelerant having been used. There was no scientific evidence at all to confirm or refute the use of an accelerant; yet Wallis' account that Pagan brand barbecue lighter fluid had been used was taken at face value. The real question is whether the accelerant would have been detected had it been used?

Somewhat surprisingly, Sayers' defense lawyers did not instruct a fire expert to consider any of these issues. Such an expert could have contributed to reconstructing the fire which could have enabled Wallis' account of the fire to be tested against the scientific evidence. The police and Sayers' defense did not consult a forensic pathologist with experience of fire damage. Nor did they consult a forensic anthropologist. It would even have been possible to estimate wind speed at the fire-site at the relevant time through experiments at the site in a similar manner to data-logging experiments. None of this was done at the time. It could still be done. Had this been done it would have assisted in reconstructing the fire.

Wallis gave more than one account of the duration of the fire. The discrepancy was never resolved. He also gave conflicting accounts of the measurements of the pyre or bonfire. One version of its dimensions was quoted by Rapley as being 1.5m in length, with the height of the wood used about 60cm tall, and the flames reaching another 60 cm higher. This suggests a fire of considerable intensity, yet the crime scene evidence and photographs are not consistent with such an account.

The scorch-pattern tails off. No actual measurements of the length and width of the scorch-pattern were taken. Nevertheless, the account quoted by Rapley implied a high temperature fire of over a couple of hours' duration. This was accepted by Sayers' lawyers

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without instructing an expert to consider these issues, even though Wallis' description of other events gives a duration of three hours and ten minutes, and the fire-site suggests a completely different story. Had they consulted a forensic anthropologist with requisite experience they would have discovered that the crime scene photographs told a completely different story. The scorch-pattern does not indicate a high temperature fire, and nor does the damage to the body. Nor does it indicate a fire of more than two hours duration. Had the fire been built to the parameters indicated by Wallis the damage sustained by the cadaver should have been far greater. This suggests that Sayers' defence in particular missed a golden opportunity to allow the evidence obtained from the crime scene to test the veracity of Wallis' claims. In these circumstances a reconstruction of the fire based on the evidence recovered from both the burn-site and the body itself could have provided an excellent method for testing Wallis' account regarding the timing of the events and other fire-related issues.

The issue of when the fire occurred is of central importance to this case. If Wallis lied about that his whole time-line is wrong as well. Wallis' account is that it began minutes after the murder. His account is uncorroborated. However, there is evidence to suggest that it occurred days later. This issue has never been resolved, even though there is a scientific technique that could have done so at the time, or even now. A forensic botanist could have been instructed to consider the issue of post-fire plant regeneration or colonization of the scorch-pattern. Identification of the plants at the scene and observation of their growth habits could have assisted investigators to establish when the fire took place. A forensic anthropologist could have been instructed to consider the extent of damage observed to the body and the parameters of the pyre. It could even have been a part of reconstruction experiments. Unfortunately, Sayers' defense did not see the value of a reconstruction. Nevertheless, the fire can still be reconstructed even now. Such experiments and analysis by experts with relevant expertise and experience appear very likely to have provided fruitful lines of inquiry for Sayers' defense. Suffice to say the crime scene in this case was rich with opportunities to test Wallis' account – opportunities that were not taken. Police were not obliged to do so, nor can they be compelled to. They may not have had the resources to do so either. They collected sufficient evidence to put before a jury and secured Sayers' conviction. That is all that is required of them.

4) Missed Opportunities An Inadequate Defense:

The performance of Sayers' defense lawyers at trial is harder to understand. There were several opportunities presented to them by the crime scene and samples obtained from it. The decision not to instruct a fire expert in such circumstances is baffling, especially as the Crown had instructed one. Had they instructed a forensic anthropologist and/or a forensic pathologist with experience of burned bodies they would have discovered a potentially devastating line of inquiry: that Wallis' descriptions of the fire is contradicted by evidence obtained from the crime scene. Furthermore, had they instructed a forensic entomologist and forensic botanist with relevant expertise and experience, they may have discovered evidence indicating that the fire occurred much later than Wallis claimed. The

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failure of Sayers' defense lawyers to do any of this indicates that they too are not fully conversant with the opportunities afforded to them by crime scenes.

Consequently, it would appear that defense lawyers could also benefit from training on crime scene issues. Such training should be provided and resources such as the NCF should also be available to defense lawyers, or a separate independent organization should be established to ensure that investigative opportunities that could assist defendants are not missed by lawyers unaware of potentially useful techniques.

5) Soil-related Issues:

Soil samples were also collected from the excavation site as was entirely proper, though they were only used to make a comparison with soil samples that Sayers had in his room in another attempt to link him to the crime scenes. Analysis only served to establish that the soil in Sayers' possession had not come from the excavation site. Sadly the soil samples were not used to best effect. They were not examined for exoskeletons; nor were the clothing and footwear of Sayers and Wallis examined for traces of this soil, even though such analysis could have indicated whether either man had been inside the grave. No soil samples were collected from the fire-site, even though this could have assisted in determining when the fire occurred.

Despite collecting some spades, these items were never tested for traces of soil from the grave or tissue from the deceased. This is particularly important in the context of the failure to establish what implement had caused the mutilation. Had this been done at the time it may have been possible to tie that implement to the perpetrator or perpetrators. Wallis never gives a coherent account of how, why and when the mutilation occurs. Despite having possible weapons of mutilation in their possession police chose not to test them as was their right. Sayers' defense also declined to do so when it might have made a difference, although there was no guarantee that such a line of inquiry would have proved useful. Consequently, it may have proved difficult to obtain legal funding to pursue such a speculative line of inquiry. That would justify their decision not to pursue this line of inquiry.

6) Further Investigative Opportunities:

Nevertheless, there were several opportunities to pursue realistic lines of inquiry from evidence obtained from the crime scenes in this case that were not pursued. Some of these techniques can still be used even now, more than six years later. The fire can be reconstructed. Data-logging and similar experiments at the fire-site and excavation site would allow experts to estimate the environmental conditions experienced by the body. Professor José Alfredo Piera y Pelliçer, a forensic entomologist at the University of Valencia has developed a revolutionary technique of artificially controlled maggot regeneration in a reconstruction chamber. Professor Piera has kindly offered to reconstruct the entomological evidence in the Sayers case.

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Professor Piera's technique is not the only possibility for obtaining scientific evidence to test the veracity of Wallis' account. Forensic botany may also have a telling contribution to make in this case. As with Piera's technique, the novel use of forensic botany requires accurate data on environmental conditions experienced by the cadaver. Both techniques need the most accurate data available on temperature, relative humidity, rainfall and light intensity, among other data. Both require the fire to be reconstructed, which means that accurate data on wind-speed at the relevant times would be needed. All of this data is obtainable even now. It will not be exactly the same as that experienced by the body, but it would be estimates that are based on scientifically validated techniques that have been accepted in courts of law. However, these techniques require access to the burn-site and excavation site. Permission to conduct the experiments on those sites was recently sought from the landowners, who happen to be Hadlow Agricultural College. Unfortunately, they refused to cooperate without a court order, which cannot be obtained solely to seek evidence.

Refusal of permission to conduct such experiments which would have been conducted discreetly is a rare occurrence, but cooperation cannot be compelled. However, if the tenant of Flat One, 7 James Street had a similar attitude to the Board of Governors of Hadlow Agricultural College, much of the evidence which ultimately secured the conviction of Jeffrey Gafoor could not have been obtained, a particularly brutal murderer may still have been at liberty and five undoubtedly innocent men would continue to have to endure a thoroughly unjustifiable whispering campaign.

Conclusion:

It is not enough to painstakingly collect evidence from crime scenes; once collected it must be stored under optimum conditions and be retained. Anyone investigating such cases must have complete unfettered access to all the evidence that may assist in solving these crimes. Before any samples are discarded or destroyed an independent review panel consisting of lawyers, forensic scientists, victims of miscarriages of justice and police should consider whether it is likely that any further useful evidence could still be obtained from such samples. After all, a seemingly open and shut case may turn out to be a miscarriage of justice.

The failure to realize these high standards in the Phillip Saunders Inquiry has cost current investigators a potentially important line of inquiry, depriving them of the chance to utilize the opportunities offered by advances in forensic science techniques that may have helped to solve the sixteen-and-an-half year old mystery of who killed Phillip Saunders. The Darvell brothers' case is clearer still. The most promising line of inquiry, the photograph and negative of the blood-stained palm-print was thrown away -- literally. That must never occur again.

The destruction of crime scenes as occurred in the Merthyr Tydfil case should never occur while investigations are still ongoing. Any decision to destroy a crime scene should

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only be taken by an independent review panel such as the one described above in order to ensure that the interests of all concerned are fully protected. The failure to utilize the crime scene to maximum effect in the Hadlow case by his own lawyers has deprived Sayers of the possibility to use forensic science to test the veracity of Graham Wallis' claims to maximum effect. It is also a matter of deep regret that the refusal of the Board of Governors of Hadlow Agricultural College to give permission to conduct data-logging experiments on its land, has not only deprived Sayers of the possibility of proving his innocence, but has hindered the testing of a revolutionary new technique in forensic science. Ironically an agricultural college is hindering the development of a new technique in the science of forensic botany!

Justice demands that evidence be allowed to speak, however inconvenient that may be to police or defendants. Crime scenes and the evidence obtained from them are and must remain impartial. The highest standards of treatment of crime scenes and preservation of evidence obtained from them must become the norm in all cases. Nothing less will suffice.

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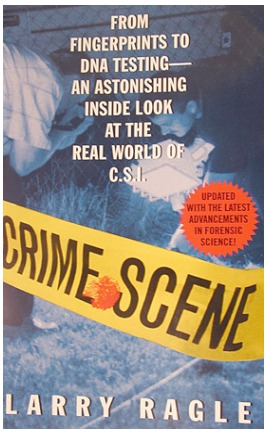
Book Review: Crime Scene

(second edition 2002)

Contents:



It's possible to spend a lot more money on a basic guide to forensic science, but you won't necessarily get more for your money. This book is an excellent introduction to the concepts of crime scene investigation, and forensic science. Each of the ten chapters breaks down a different area of evidence and each provides a case study highlighting the use of the evidence in real situations.

Early on Mr. Ragle points out the difficult decisions that often have to be made when dealing with evidence. In one case study there is a blanket contaminated with both blood and gasoline. One can preserve the item for blood testing or for flammable liquid analysis, but not both. (Unless you decide to cut the item in two, which is another possible option, with it's own difficulties)

There is a sixteen page insert in the center of the book with black and white photographs illustrating some of the concepts presented in the book. There are also a few black and white diagrams throughout the book. The diagrams and photos do a good job of illustrating the concepts presented. While one could hope for more photographs, and color photographs are to be preferred, given the cost of the book I can't really complain. (Most of the photos from the book can be found in color at the author's website at: http://www.crimescenetwo.com).

Many of the case studies presented in the book deal not only with processing the scene and it's related evidence, but also with reconstructing the crime. This is a subject which has not been well documented in the literature, although there are now a few textbooks which cover crime scene reconstruction to some degree. Being able to reconstruct the actions at a crime scene, even in small parts, is extremely helpful. It is one of the

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hallmarks of a truly good scene investigator.

This book is an excellent guide for new investigators, and the case studies make it a good reference for more seasoned personnel as well. Students of forensic science, writers and others with an interest in how forensic science is applied in the real world will also find this book to be a good purchase.

Daryl W. Clemens
Guest Editor, Crime Scene Special
Issue Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology

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An Interview with Larry Ragle

Author of "Crime Scene"

Interviewed by Daryl Clemens

D.C.: *Tell us a little about how you got started in your career as a criminalist. I understand you studied under Paul Kirk?*

L.R.: My career interest was law enforcement even before graduating from high school. All the aptitude tests pointed towards working with science and/or people. Our football coach convinced a friend and me to join the Air Force Reserves. Our unit was activated (for a year) and I ended up in the Air Police. When my tour of duty was over I learned of the program, Criminalistics, at UC Berkeley. It was exactly what I wanted to do. Kirk was the head of the program and had recently published his book, Crime Investigation. There were only 4 students in our class so we got a lot of his time. Much of his book is still state of the art, at least, philosophically.

D.C.: *In the introduction to your book, you write about the popularity of the show "CSI". Have you seen its influence on any of your cases? I know that I certainly have a lot of crime victims who are now terribly interested in what I'm doing.*

L.R. : In one of the classes I teach, at UC Irvine, a general interest course, a lot of would be writers are looking for ideas. The enrollment swelled after OJ and then again when CSI first surfaced. Now due to tax cuts, this class is in limbo.

The second ongoing class is offered by Cal State Long Beach, and is for police personnel. I teach on 4 days of a two week (80 hours) program. The class is offered 6 times a year. These students all seem to look at CSI as a joke. I don't think they see it as a role model.

D.C.: *What's been the biggest change in how we process crime scenes since you began your career?*

L.R. : First, it is the universal understanding (well almost) that a scene usually contains items that can prove or disprove that a crime has been committed. Today most police personnel are aware of the value of physical evidence. Old timers relied on eye witnesses and / or the power to obtain a confession but when Miranda (1966) came along, the emphasis switched to physical evidence. Further, the process has been formalized (or standardized) to a large extent. Certification of personnel is growing as is laboratory accreditation specific to scene investigation. I'll mention crime scene specialists below.

Second, there is a ton of portable high tech equipment to enhance the search, sketch the scene and preserve the evidence.

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D.C.: *There have been a number of challenges to fingerprint evidence recently, and a high profile mis-identification by the FBI with the so called "Madrid Print". Any comment on the state of fingerprint science?*

L.R. : It's not the science; it's the examiner's failure that is the problem. A "make" should require two qualified examiners to work the print independently and agree on the ID. It doesn't matter whether it is a numerical standard, 12 to 15 minutiae points, or the ACE-V approach. There has to be better training and more proficiency testing. Regardless of any computer technology skilled examiners should always make the final call.

D.C.: *When you started your career, most criminalists were generalists. Over the years we've seen more and more specialization. Do you think that's good or bad?*

L.R. : It's a bad situation if a generalist is not present at the scene. Ideally, before a specialist is turned loose, they should have been trained in scene investigation and evidence procedures. However, technology, DNA analysis and court presentation for example, requires knowledge far beyond that offered in any "generalist" program. Unfortunately, a specialist without an understanding of all forms of physical evidence can overlook or even unwittingly destroy significant evidence.

There should be a generalist (either a criminalist or technician) at every major scene. A generalist is defined as someone who can recognize the nature of the scene and the relative importance of the evidence, what physical evidence is present, what is missing and what additional evidence may logically be found elsewhere.

In the laboratory, the same generalist should over view the priority and sequence of the processing of all the evidence. The decision to examine the evidence must be made by the scientist, not solely by the attorney or the police investigator.

D.C.: *What new techniques or technologies do you see having an impact on the field in the next few years?*

L.R. : Re: techniques. I sense, from many of my students, even before I have a chance tell them, a far more aggressive attitude about protecting the scene from fellow officers and department brass. The use of mandatory "Order of Entrance" forms requiring a written explanation for entering the scene has limited the curious sightseer. One recent student told me when someone other than a "team member" insists on entering the scene, she writes "nosey" as the reason.

Re: technology. DNA will continue to amaze us. I made a prediction in my chapter on DNA in 1994, that within 25 years we would see a complete image of what the source of a sample might look like. It could happen sooner. Our favorite TV show is Monk. Last season, they where mocking CSI by using a device that analyzed DNA just by pointing a

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device at it. It was a lawn trimmer.

D.C.: *If we could do one thing to improve how we process crime scenes, what would it be?*

L.R. : Keep an open mind. There may be more than one logical explanation for the conditions at the scene.

D.C.: *What skills or abilities do you think are important for a crime scene investigator?*

L.R. : Common sense and curiosity. Knowledge of the probative value of all types of physical evidence and the awareness that anything that appears out of place, unusual or defies gravity needs consideration and documentation. The ability to remain impartial regardless of the nature of the suspected crime is needed.

D.C.: *What advice do you have for people seeking a career in crime scene work?*

L.R. : Before embarking on any forensic science career, check with a local agency to determine their requirements, for example education and physical requirements. Then, have a complete physical examination for color blindness, hearing, blood pressure or any other health problem that could exclude one from employment. Take a major in some form of science. Chemistry and/or molecular biology are majors to be considered, if the desire is to be a criminalist.

D.C.: *Any plans to write another book?*

L.R. : Not at the moment.

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