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A PRELIMINARY STUDY:

HOW FIRE MAY AFFECT CRIME SCENE BLOODSTAINS

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A PRELIMINARY STUDY

of

HOW FIRE MAY EFFECT CRIME SCENE BLOODSTAINS

INTRODUCTION

The body of a deceased male was found on the floor of his bedroom. He had been stabbed numerous times and the side of his throat had been cut. The culprit(s) then set the bedroom on fire by pouring an accelerant on the mattress.

The fire department attended and suppressed the fire, which had been contained to the bedroom. The firefighters removed the body from the house and did not realize that this was a homicide scene until the fire was out.

The fire had altered the general scene conditions and affected the physical appearance of several bloodstains. Projected bloodstains, which were on the wall at the head of the bed, were significantly altered in comparison to the other projected bloodstains found at the scene.

These projected bloodstains were **"faded"** and lighter in appearance than the adjacent soot covered surfaces. In some cases, there was no visual evidence of dried blood within these altered stains. The original shape of each stain was still recognizable and it was felt that the fire had affected the blood, resulting in the projected stains having a **"negative"** appearance. The darkening of stain colour and the **"sooting over"** effect commonly observed at fire scenes, was not evident on these altered bloodstains.

Subsequent bloodstain pattern analysis answered questions as to: the path of travel the victim took once he was bleeding, where he received his bloodletting blows and the locations of arterial bleeding. Swabs were obtained from the altered bloodstains and were suitable for D.N.A. typing.

INTRODUCTION

-continued-

Originally this research was conducted to duplicate the **" ghosting "** or fading image of the bloodstains in question. As the mock crime scenes were being set up, the thought of including a **" Wet vs. Dry Effects "** experiment was introduced. The objective was to identify any resulting physiological differences between the wet and dry stains, when they were subjected to fire.

This investigation also raised questions which were not fully addressed within any known bloodstain or crime scene publications.

" What factors contributed to the fading of these bloodstains? "

" Are these stains recognizable as being altered bloodstains? "

" Are these altered stains present in some or all fire scenes? "

In an endeavour to answer these questions, this study was initiated.

Note:

A chapter in **" INTERPRETATION OF BLOODSTAIN EVIDENCE AT CRIME SCENES "** by William G. ECKERT and Stuart H. JAMES, does deal with some aspects of bloodstains at fire scenes. This information was authored by David R. REDSICKER and is titled **" Recognition and Identification of Bloodstains at Fire Scenes "**.

PROCEDURE

A joint project between the Halifax Regional Forensic Support Section of the Royal Canadian Mounted Police and the Level II Arson Course of the Canadian Investigative Fire School was initiated.

An old motel was being used by the Fire School to conduct arson investigations. Two units of the motel were chosen as "crime scene" sites and were set-up as bloodletting scenes.

Human blood was deposited in the rooms to simulate realistic crime scenes. Bloodstain patterns: projected, transferred, wipes, swipes and cast-off stains were deposited at various locations within these scenes.

The rooms were then set afire and allowed to burn for approximately 10 minutes. The fire suppression teams were advised to fight the fires as normal. When they knew they had entered a crime scene, they were to be aware of any potential physical evidence.

The crime scenes were then examined by the blood stain pattern analyst, to assess the physical evidence that may have been altered by the fire or firefighters.

SCENE ONE

PURPOSE:
To duplicate altered bloodstains from the original crime scene.

APPLICATION:
A single motel unit, consisting of a bedroom and a bathroom, was the scene of a mock sexual assault, homicide and arson.

A mannequin was placed on a mattress and a beer bottle was used to strike blows to the head.

BLOODSTAINS:

The following bloodstains were deposited:
- Soaking stain on mattress at head of victim.
- Medium velocity stain on wall at the head of the bed
- Swipe mark on the wall beside the bed
- Cast-off stains on the wall, window, mirror, sink, shower and ceiling
- Transfer and dripping stains on window ledge and floor

The target surfaces included:
- painted drywall
- painted wood
- wafer style ceiling tiles
- glass
- ceramic
- fibreglass
- fabric
- vinyl flooring and carpet
- beer bottle

The bloodstains were applied to all the surfaces and were dry when the fire started. A time span of approximately 20 to 30 minutes elapsed between the bloodletting and the setting of the fire.

Lighter fluid was poured over the mattress and victim and then ignited. The fire was allowed to burn for approximately 8 to 10 minutes and was put out using standard fire suppressing techniques.

SCENE ONE

OBSERVATIONS:

SOAKING STAIN:(mattress)
- altered due to water
- diluted in appearance
- extended beyond original size
- the original outline and shape still visible

MEDIUM VELOCITY STAINS:(painted drywall)
- altered significantly by the heat
- some smaller stains disappeared
- stains may not be recognizable as a medium velocity pattern
- some dilution
- running appearance(due to water)
- darkening of stain colour

CAST-OFF STAINS:(wallpaper, walls, glass, fibreglass tub, sink)
- altered by water
- running diluted appearance
- darkening of stain colour
- some running stains(on glass) were lightened

CAST-OFF STAINS:(ceiling)
- stains on ceiling tiles bled into background
- were diluted by water
- darkened in colour
- original staining was altered by the appearance of extra stains

SWIPE MARK:(painted wall next to body)
- colour severely altered
- density of the stain diminished
- faded considerably
- width of stain diminished
- diluted running stains from swipe

SCENE ONE

OBSERVATIONS:continued:

TRANSFER AND DRIPPING STAINS:(window ledge, floor, beer bottle)

- stains on window ledge obliterated by water
- only recognizable as diluted blood

- passive dripping on floor was not effected by fire but was altered by the firefighters
- no stains on the floor altered by water damage
- no stains on floor displayed colour change from heat or smoke

- beer bottle on floor was not affected

SCENE TWO

PURPOSE:
To observe if there were any resulting physiological differences between **Wet and Dry** swipe marks, after exposure to fire.

APPLICATION:
A hotel unit, consisting of two adjoining rooms and two bathrooms, was the scene of a mock bloodletting and arson.

Bloodstains were deposited on various surfaces within the two rooms. These stains were allowed to dry and prior to setting of the fire, additional bloodstains were applied wet.

The principal purpose of scene two was to observe if there were any physiological differences between the general appearance of the dry and wet bloodstain patterns after they were exposed to a fire.

BLOODSTAINS:

The following bloodstains were deposited:
- cast-off bloodstains on walls, ceiling and glass
- soaking bloodstains on carpet, mattress and chair fabric
- pooling of blood on floor
- swipe marks on walls, chrome and glass
- projected bloodstains on painted drywall

The target surfaces included:
- cloth chair
- toaster
- paper towel
- painted drywall
- ceiling tile
- glass

The fire was set using a toaster and paper towelling, which had been soaked in alcohol. The fire was allowed to burn for approximately 13 to 15 minutes and then extinguished.

SCENE TWO

GENERAL OBSERVATIONS:

CAST-OFF BLOODSTAINS (ceiling, walls, glass)

- altered by water damage
- diluted and running
- darkened in colour
- stains on ceiling turned black

SOAKING BLOODSTAINS (chair)

- on cloth still visible
- diluted appearance
- stains on wood trim not altered

SOAKING BLOODSTAINS (paper towel)

- destroyed by fire

POOLING OF BLOOD (floor)

- not altered

SWIPE MARKS (toaster and walls close to fire)
The swipe marks were placed on a number of walls at a distance from the fire of 35cms to 4 meters.

- stain on the ignition source(toaster), darkened and had a "baked" appearance
- stains placed within close proximity to the fire, were altered significantly more than stains further away
- if stain was close to fire, it had a faded appearance. As distance increased, the only change was a darkening of stain colour and some dilution(water)

PROJECTED STAINS(wall behind ignition point)

- projected stains above the fire source, were destroyed by the fire

SCENE TWO

SPECIFIC OBSERVATIONS:

WET vs. DRY BLOODSTAINS:

Approximately 8 areas of bloodstaining were applied within 1 to 2 minutes before the ignition of the fire.

A SIGNIFICANT DIFFERENCE WAS OBSERVED in the individual appearance of these stains when they were subjected to heat and smoke:

WET BLOODSTAIN APPEARANCE:

- surface had a shiny coagulated finish
- a cracked eggshell appearance
- some retraction on the edges of the stains
- raised appearance
- the pooling at the ends of the drip marks were cracked

DRY BLOODSTAIN APPEARANCE:

- a dull flat look
- no cracking eggshell appearance
- no retraction of the edges of the stains
- flat(not raised) appearance
- the ends of the drip marks were not cracked

RESULTS:

The closer the stain to the fire, the more prevalent the physiological changes. The further away the stain, the less prevalent the changes, but these characteristics were still present.

CONCLUSIONS

The initial purpose of this research was to reproduce the "**ghosting**" or fading image of the projected bloodstains found in the original homicide investigation. Unfortunately, we were not able to duplicate these stains in these mock crime scene experiments.

It is unknown if the original altered bloodstains (crime scene) were subjected to the same physiological occurrences that the swipe marks (mock crime scene) underwent, or if these changes will occur at every fire scene.

This preliminary study did show that:

- only swiped bloodstains within close proximity(35 to 50cms) to the fire faded
- this fading was only seen on one other area of staining, the dripping stain on a piece of window glass
- stains on painted surfaces were most effect by the fading phenomena
- swiping marks situated further than 50cms from the fire darkened in colour
- all projected stains near to and at a distance from the fire, were subjected to a darkening effect
- no fading was observed on any projected stains
- the medium velocity bloodstain pattern adjacent to the bed was altered significantly

The effects of water and the actions of the fire fighting personnel accounted for a variety of physiological changes that were recognizable and explainable, except for bloodstains that were totally obliterated.

CONCLUSIONS

-continued-

As to the questions:

" What factors contributed to the fading of these bloodstains ? " It is not known specifically, what factors influence the fading of the projected bloodstains.

" Are these stains recognizable as being altered bloodstains? " Yes, the bloodstains are recognizable and if pertinent, should be used as part of the bloodstain pattern analysis. (D.N.A. typing should be conducted on any areas of staining that are being commented on)

" Are these altered stains present in some or all fire scenes? " This is unknown. Numerous factors may dictate whether bloodstains will be altered(ie: duration of fire, amount of heat, smoke or water, location of blood in relationship to the fire source, height of the stains compared to height of fire, etc.). To what degree and form the altering will take, is also an unknown.

The **"Wet vs. Dry"** experiment may prove to be the most valuable piece of information obtained from this study.

The ability to analyze the physiological characteristics observed in the **" Wet vs. Dry "** experiment, and the ability to comment on the issue: "Was the blood wet or dry when the fire was set?"; May help the bloodstain pattern analyst in reaching conclusions or opinions that were not previously obtainable.

Caution should be taken when evaluating a scene where fire has altered the physical conditions and effected the appearance of bloodstains. The bloodstain pattern analyst should be aware of the probable effects that fire may have on a bloodstain pattern. If these factors are considered in the analysis, then the rendered opinions or conclusions may be more complete.

PLEASE NOTE THAT THIS IS A PRELIMINARY STUDY - Additional experimentation is necessary. This paper is intended as a **basic introduction** into recognizing the probable effects that fire, heat and smoke may have on bloodstains.