

FIBRES, METAL BUTTONS, WELDING FUME PARTICLES, AND PAINT CHIP
AS INCRIMINATING EVIDENCE IN SOLVING TWO HOMICIDES
COMMITTED BY THE SAME PERSON

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Abstract: Two homicide cases which had been under investigation for five years were resolved with the help of trace evidence analysis. During the investigation collaboration between the crime laboratory and the crime scene investigators was exceptionally intense. The experience gained in this work has led to the development of a new approach to trace evidence analysis and collection of samples for trace evidence, a tedious but rewarding project.

Key words: Textile Fibres, Paints, Welding Fume Particles, Trace Evidence, Homicide

Introduction

Locard's Exchange Principle states that whenever two objects come into contact, a transfer of material will occur. Every person, item etc has a lot of adherent extraneous traces derived from their surroundings. Thus, transferred trace evidence can be used to associate objects, individuals, or locations.

In this report a forensic investigation of two alleged sexual homicide cases is described. In both cases the victims were young girls (17 and 20 years), whose backgrounds and lifestyles were similar.

The forensic investigations were in many ways unusual; in both cases the scene of crime remained unknown. Both victims were found in water, partly unclothed, but neither of them was drowned. Victim in **case 1** was found some hours after her disappearance while the victim in **case 2** was found approximately six months after she was last seen.

Methods and Investigations

CASE 1 / Pia K.

Pia K. was last seen on Friday, October 4th at about midnight. She was wearing blue jeans, blue denim jacket (borrowed from a friend) and white shirt (borrowed from her sister), black pantyhose, panties, bra and a pair of black shoes. The clothing had just been washed.

Her body was found by a fisherman next morning at seven o'clock, in the sea, close to the seashore, 70 km from the city where she was last seen. She was wearing blue jeans, blue denim jacket, white shirt and bra. Her pantyhose, panties and shoes were missing.



Fig. 1: Pia K. on the pier

The victim's clothing was dried in air. Tape lifts using Scotch 800 were performed from both inside and outside of the clothing of the victim. After taping samples were collected from the clothing by vacuuming. DNA samples, head hair and pubic hair combings were recovered.

During the next three years, a lot of investigative work was done by the police and the NBI Crime Laboratory. All other natural sources of fibres and trace evidence were excluded. No correlations between the trace evidence from the victim and from any of the initial suspects and their cars or boats were found.

CASE 2 / Pia T.

Pia T. disappeared almost exactly three years later, on Friday, September 30th. She was last seen just after midnight.

The forensic investigation was focused on the clothing and accessories worn by Pia T. when she was last seen: black jeans, black T-shirt, waist coat made of artificial leather, tailor-made red woollen coat, pair of brown leather boots, pantyhose, panties, bra and red-black handbag made of artificial leather. Her apartment was carefully investigated and plenty of informative samples (background fibres etc.) were recovered.

During these three years, several sexual assault and rape cases were reported in the region where both girls lived. A summary of these cases was made.

On January 1st the next year a suspect was taken into custody. His apartment was investigated and his car confiscated. He had bought his car 18 months prior to the first incident. He was released on January 27th due to lack of incriminating evidence.



Fig. 2: Suspect's car with the blanket on the front seat



Fig 3: The body of Pia T. on a lake islet.

Six months later, on March 26th Pia T. was found in a lake, 15 km from the city where she was last seen.

Her red woollen coat, handbag, artificial leather waistcoat and watch were missing.



Fig. 4: Red woollen coat and the handbag



Fig. 5: Waist coat

The body of Pia T. was in a very poor condition. Her jeans and T-shirt, made of cotton, were badly damaged, but panties, pantyhose and bra made of polyamide were nearly undamaged. All clothing was muddy.

All loose material was collected on petri dishes. After that the clothes were brushed with a nail brush and a toothbrush. Despite the brushing a lot of fine mud particles remained on the fabrics and between the fibres. It was impossible to take tape lifts using Scotch 800 from the clothes of the victim. Instead of taping the pantyhose and panties were washed in an ultra-sonic cleaning bath. The water was filtered; the filter and the residue were dried on petri dishes. This residue was searched for fibres and other trace evidence. DNA samples were recovered but head hair or pubic hair combings could not be taken.

Extensive publicity of these cases in the media was prominent during the investigations and proved useful. As an example, the man who had found Pia T's handbag handed it to the police after seeing the picture of the lost handbag on TV. Pia T's handbag was found in a river just one day after she was last seen, on a site 7 km from the suspect's apartment. On April 15th the suspect was taken into custody again and arrested on April 19th.

Results

CASE 1 / Pia K.

20 viscose fibres were found on the tapings taken from Pia K's clothing. These fibres were similar to the viscose fibres of the blanket found in the car of the suspect. There were two types of fibres: bright viscose and pigmented viscose. The fibres were brownish or multicoloured (brownish-yellow-white and bluish-yellow-white), and the length of the fibres was unusually long (up to 3 cm). Additionally, two grey polyamide fibres similar to the fibres of the seats of the suspect's car, and one printed green cotton fibre similar to a textile found in the apartment of the suspect were found on the victim's clothing.

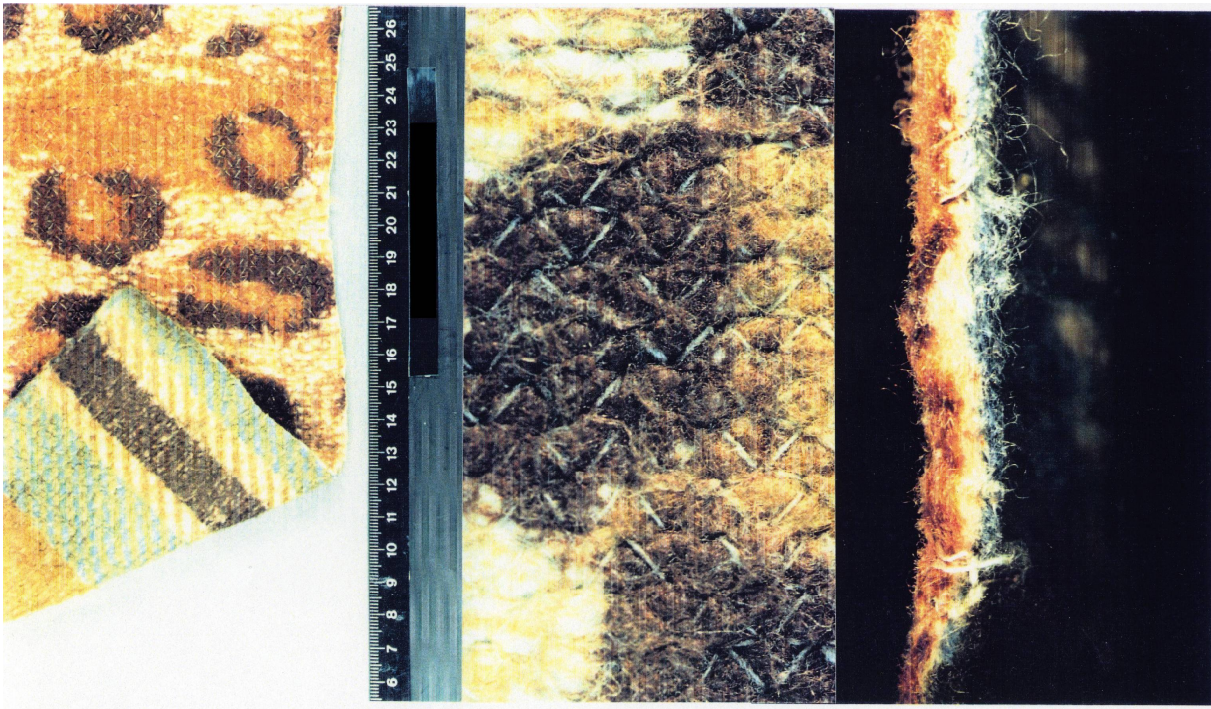


Fig. 6: The blanket

Numerous welding fume particles (metal balls ca. 0.1-1 mm in diameter) were found on the victim's clothing.

A navy-blue paint chip was recovered from Pia K's jeans and it proved to be similar in colour and chemical composition to the paint from the jack in the trunk of the suspect's car.

Oil stains were found on the victim's jeans, denim jacket and shirt.

CASE 2 / Pia T.

Single cellulose fibres degrade in six months in water. Thus, viscose fibres could not be searched on the victim's muddy clothes despite it was expected that fibres similar to the blanket on the front seat of the car of the suspect would be present.

Pia T's red woollen coat was never found. However, plenty of red wool fibres were found on her panties and pantyhose, and also on the tapings taken from other clothes and furniture in her apartment. Later the tailor of the coat delivered reference samples of various red woollen fabrics, one of which matched with the red wool

fibres found on the victim's clothes. It was concluded that these red wool fibres found on clothing of the victim originated from her red woollen coat. These red wool fibres were chosen as target fibres.

40 similar red wool fibres were found in the suspect's car. Other sources of red wool fibres in his car were excluded.

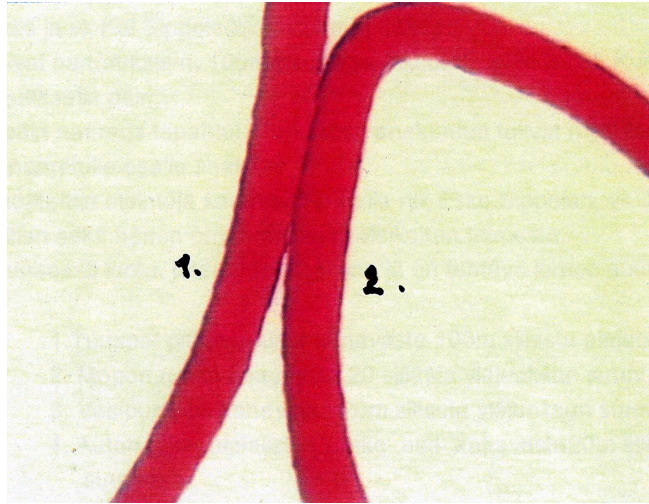


Fig. 7: Red wool fibres found from Pia T's panties (left) and from the suspect's car seat (right)

10 red wool fibres were found in the lining of the handbag found a day after Pia T. was last seen. Numerous welding fume particles similar to those found on Pia K's clothing were found on the clothes of the victim.

In the back yard of the apartment of the suspect, four partially burned brass buttons and a steel buckle were recovered from a pile of ash.



Fig. 8: Partly burned buttons and buckle

Summary of the case files

CASE 1 / Pia K.

The cause of death was strangulation.

One way fibre transfer: Viscose fibres similar to the blanket were found on the clothes of the victim.

The police confirmed that the blanket had been in the car at the time of the incident. The evidential value of these fibre findings was considered to be high. After more than three years it was not possible to look after fibres from the clothing of the victim on the car seats. In addition, the fibres from blue jeans, blue denim jacket and white shirt were not suitable to be used as target fibres.

One paint chip similar to the paint from the jack was found on the victim's jeans.

Oil stains were found on the clothes of the victim, and on a blanket and in the trunk of the suspect's car.

CASE 2 / Pia T.

The cause of death could not be determined.

One way fibre transfer: Red wool fibres found in the car of the suspect proved to be similar to the red wool fibres found on the victim's underwear, on the background samples in her apartment and in the lining of the handbag. These fibres also matched to the red wool fibres in one of the reference samples provided by the tailor. After six months in water viscose fibres from the blanket could not be searched on the muddy clothes of the victim.

Four partially burned brass buttons and a steel buckle were found in an ash pile outside of the suspect's apartment. These items proved to be similar in characteristics to the buttons and buckle of a waist coat that Pia T. was wearing at the time of her disappearance. This was confirmed by photographs from the victim's own files where she was wearing the waist coat.

Welding fume particles were found on the clothes of the both victims. Welding is a daily routine for the suspect in his job.

No DNA results were obtained.

The techniques used in the Crime Laboratory for trace evidence analysis in these cases were: stereomicroscopy, bright field microscopy, polarising microscopy, fluorescence microscopy, comparison microscopy, UV-VIS microspectrophotometry, FTIR microscopy, pyrolysis-GC, SEM/EDX

Conclusions

Fibres, metal buttons, welding fume particles, and paint chip were incriminating evidence in solving these two homicide cases committed by the same person.

The defendant denied all allegations of having had any contact with the two victims. With the forensic evidence presented by the prosecution the District Court sentenced the defendant to imprisonment for sixteen years and eight months. The Court of Appeal raised the sentence to twenty years and six months.

The Supreme Court did not grant a right to reappeal.