IDENTIFICATION OF THE PERPETRATOR OF A HOMICIDE BASED ON BIO-TRACE ANALYSIS OF FOOTPRINTS LEFT AT THE CRIME SCENE AND SUSPECTED SHOES

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ABSTRACT

INTRODUCTION: Often in forensic practice at the crime scene are observed specific traces of biological material (usually blood) from incriminated objects associated with offenders or victims. Sometimes such traces remain of objects with specific shape of the surface, enabling their identification. Therefore a comparison analysis is needed between the object and the traces it had left. We present a case of homicide with a blunt object where two homeless men quarreled, one of them inflicted multiple hits to the other that led to dead and left the crime scene afterwards. MATERIALS AND METHODS: Crime scene investigation. Complete forensic examination of the trace evidence with experimental comparing. RESULTS: The deceased was found on a linoleum floor covered with blood. On the pieces of linoleum from the crime scene provided by the police we discovered numerous traces of blood forming complex line-ups appearing as slurs, elements of wiping, blood splatter, as well as partial prints with specific shape consisted of elements with stable configuration, without superimposing static or dynamic overlays or alterations. DISSCUTION: The analyses of the specific prints on the linoleum led to the conclusion that they were from shoe soles. The shoes of the suspect were analyzed. Crime scene and experimental traces were photographed and with the help of Adobe Photoshop ® the images were superimposed. After unification of their scales and software processing a matching between parts of the grapple pattern of the shoe sole of the left shoe of the suspect and the specific blood prints on the linoleum was discovered.

Key words: *blunt trauma, grapple patterns, traces of blood, bio-trace evidence, homicide*

INTRODUCTION

In the forensic practice specific traces of biological matter (mostly blood) are often observed at the crime scene that belong to the perpetrator or the victim. Such traces remain from objects with a specific surface, which allows the identification of the object. Such traces are caused by the impact of objects from the surrounding environment, clothing and shoes of the perpetrator and victim, specific parts of motor vehicles, etc. These facts also determine the need to carry out analyzes to compare the subject and the traces left at the crime scene. One of the methods is photo superimposition, as in the case presented below.

MATERIAL AND METHODS

We were given two pieces of linoleum with bloody imprints and a pair of male sneakers from a suspect who were described as follows:

OBJECT # 1

A piece of linoleum on the front surface with numerous traces of blood, forming complex groups with the appearance of smudges, wrinkle elements, splashes of blood, and the appearance of partial impressions with a characteristic shape (Fig. 1). Because of their overlapping character, to a greater or lesser extent, some of them only partially reflect certain elements of the surface that formed them. In the analysis of these traces, it was found that in one of them (Fig. 3, diagram 1) all elements are observed as in the other traces with stable configuration without overlapping static or dynamic changes. This trace included the following elements: - covering an area of 7.8-8 / 8-8.5 cm; - double-edged with traces of blood with the appearance of smudges, setting a relatively clear boundary; - configurations with the appearance of smudges of properly arranged striped "fishbone" like elements, the smudges being 1.5-2mm wide, separated by clear areas 2-3mm wide; - the individual arrangement of these areas was partially interrupted in the middle of the impression; - these two areas were intermittently separated from an incorrectly contaminated area, which is mediated by a clear area; - at one end, these configurations end with less pronounced partial ones, and at the other end are limited by a split-smoothed element with a 2-3 mm wide spot, followed by a free-zone with a width of 2-3 mm ; -peripheral with respect to this element, a smudge zone is established, among which correctly aligned rounded elements, with the same 5-6, 4-5 and 1 mm diameter, with a distinctive arrangement; - the total area is limited by a fairly wavy boundary.

OBJECT No. 2

A piece of linoleum - on its back surface, a complex bloody trace with partial impression configuration was present (Fig. 4, Fig. 2), including correctly arranged "fishbone"like elements, 1.5-2mm wide, separated by clear areas of 2-3mm. In the middle of these elements a trace was left corresponding to a mirror image of the number 10.

OBJECT # 3

A pair of white male sneakers with the inscription "FRANKLIN", with length of about 29.5 cm, worn out with traces of blood and muddy stains on them. The soles have a complex gradient pattern - see. FIG. 1, Schemes 1 and 2, including elements with a ribbed appearance of the overlapping "fish bone" like shapes, with a prominating element of 2-3 mm and separated by concave elements between them of 2-3 mm. In the general configuration are also included concave elements with circular shape with a characteristic arrangement, with three basic dimensions, namely, with diameters 7, 5 and 1.5 mm. In the area of the heel of the sole, the two groupings of the grafted pattern are of a "fish bone" type, separated by a convex section with a flat shape without a grafted pattern, with a slight medial sinking being present. The elements of the grapple pattern on the periphery of the sole and more pronounced in the heel area have been erased from the wearing of the shoe. On the sole, there is a round configuration of a concave curved edge with a diameter of 14 mm in relation to the outer concave portion and 12 mm relative to the protrusion of a hem which includes the figure 10 as a convex part.

Fig.1

Fig.2

The analysis of the described traces of blood on the linoleum pieces gives grounds for the following conclusions: - impressions of an object with a characteristic shape of the contact post-forming surface that has been intensely soaked with liquid blood, corresponding to the shoe soles; - The character of the reflected elements in the traces indicates that they represent negative - positive blood imprints obtained with a basic static contact mechanism of occurrence; -The available imprints contain elements that correspond to the shape the grapple configurations of the sole of the left sneaker (Fig. 1 and Fig. 2).

Photo processing is done with AdobePhotoshop®

In the first stage of forensic examination, the grapple imprint of the left shoe was mirrored in the horizontal and vertical planes to obtain an image corresponding to its surface encountering the terrain. In the second stage, the scale of the traces and the sole were equaled. In the third stage, we marked with blue marks on the tracks and with red points on the grafted pattern of the soles, the boundaries of the elements and the arrangement of the same in a general configuration, giving the most characteristic features of the surface of the sole and following the characteristic imprints 3, 4, 5 and 6).

Fig.3

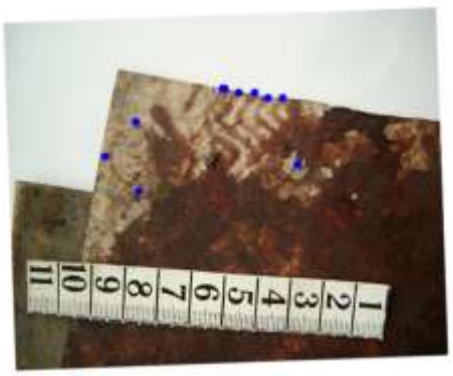

Fig.4

Fig.5

Fig.6

In the fourth stage, the above-described software-processed images were superimposed and a rotation in the two-dimensional space was carried out. Also, a comparison of the general configuration and the individual elements in the left traces and the grapple pattern was made, and the result showed correspondence between the specific pattern of the traces and the characteristics of the arrangement of the convex and concave parts of the grapple of the sneaker (Figures 7 and 8)

Fig.7

Fig.8

Also, a nearly complete matching was observed of the blue and red markings (Figures 9 and 10) mentioned above.

Fig.9

Fig.10

CONCLUSIONS

The analysis of the data indicates that the described elements in the blood traces correspond to a combined mechanism of occurrence: - the fishbone-like elements correspond to negative imprint from the recessed part of the grafts in the indicated segments obtained by the mechanism of abrupt ejection of liquid blood from the pressing contact surface of the convex portion of the graft pattern to the concave portion thereof in contact with the respective areas of the lintel pieces; - in the said segments there are also impressions of the convex part of the shoe soaked with liquid blood, circumscribing the circular shaped elements; - a characteristic feature of the smudge element between the two rib-like configurations of the track at Object No. 1 which corresponds to the respective convex portion in the area of the heel of the sneaker, with a characteristic clear center portion corresponding to the recessed area in that sole region; - a characteristic of the circular embossing with the figure 10 with a double edging formed on the object No. 2 corresponding to the same feature on the sole of the sneaker.

In the survey carried out on Object No 1 and Object No 2, one trace was observed, without any static or dynamic changes, these traces being fit for a trasological study. The analysis of these traces indicates that they are imprints with a combined negative-positive nature of liquid-stained relief (grapple pattern) on a shoe sole. The comparative study between these traces and the elements of the grapple pattern of the soles of the provided sneakers indicates that the prints present mirror images from the elements of the left sneaker's sole.

The Adobe Photoshop® trace analysis, done by comparing the mirror image of the grapple pattern with the marked featured elements, showed a coincidence in the characteristics of the blood traces and the nature of the arrangement of the convex and concave elements of the grafted pattern of the sole of the sneakers. The analysis indicated that the traces correspond to the characteristics of the sole of the left shoe of the accused.

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