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## **Autopsy Findings in Saponified Humans Remains to Identify a Brutally Killed Woman.**

### **I dati autopsici in un cadavere depezzato e saponificato consentono l' identificazione della vittima di un brutale omicidio.**

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#### **Abstract**

In this paper, a case in which a young woman was brutally killed and cut into several parts by a chainsaw is reported. The parts were closed in plastic bags and buried. The dead body was found and analyzed. The conservation of the parts of the body in the plastic bags favored the saponification process that being a post-mortem conservative-transformative process made it possible to identify time, cause and means of death. In addition, DNA profiling compared to the possible parents allowed identification of the victim. Successive investigations permitted to identify the husband as the brutal killer.

**Key words:** saponification, personal identification, human rests, blunt injuries, chainsaw.

#### **Riassunto**

É riportato il caso di una giovane donna uccisa brutalmente e tagliata in varie parti con una sega circolare. Le parti del corpo furono chiuse in buste di plastica e seppellite. Il cadavere fu trovato ed analizzato. La conservazione dei resti del corpo nelle buste di plastica favorì il processo di saponificazione che essendo un processo post-mortale trasformativo-conservativo permise di identificare tempo, causa e mezzo del decesso. Inoltre, l'analisi del DNA confrontata con quella dei possibili parenti della vittima permise la sua identificazione. Le indagini successive consentirono di accertare che il brutale omicida fu il marito.

**Parole Chiave:** Saponificazione, Identificazione, cadavere, traumi contusivi, motosega.

## Introduction

Saponification consists in a qualitative transformation of the body. It occurs when the body is immersed for a long time in water or when it is buried in moist soil with considerable infiltration of water and with specific chemical characteristics. In addition, saponification can occur when the body is in an airtight container keeping inside all the slurry originated in the colliquative phase.

In these environments, the usual putrefactive processes are strongly hindered; while adipocere, a product of advanced decomposition of the body that originates from adipose tissue in the body, forms progressively<sup>1-6</sup>.

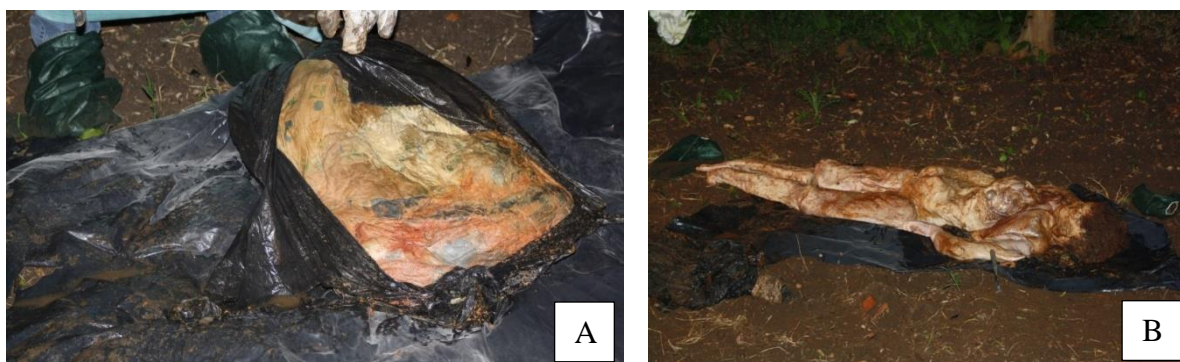
The saponification process takes place in variable time periods, usually it is completed over a period of six to twelve months<sup>7</sup>.

This paper will discuss the case study of a young woman's body which was found cut up into nine parts and buried in the Sicilian countryside.

## Case report

During excavations works in the Sicilian countryside, several strange bags were found and the Authority was informed. The bags were extracted from the soil and examined: they were black plastic bags sealed with adhesive tape and contained parts of a human body. One of these parts was wrapped in a cloth (Figure 1A).

The body had been dissected into nine parts that underwent saponification: head, upper trunk, lower trunk, right arm, left arm, right thigh, left thigh, right calf and left calf. These parts were first put back together to reconstruct the body (Figure 1B), in order to check that they were part of the same body and to exclude the presence of additional human remains.



**Figure 1.** (A) One of the plastic bags in which the body was found; (B) The reconstructed body.

The body belonged to a female subject with a normal skeletal complexion and an height of about 165 cm. The necropsy showed that the cut surfaces, in particular those of the bone tissues, were net and linear (Figure 2).



**Figure 2.** Cut surface of the right upper leg.

The head had partially preserved curly, dark-brown, medium-length hair; the profile was deformed and asymmetric. The face was altered and the nasal septum was partially recognizable. The lips and the soft parts of the nose were not preserved. The two gray-white colored cheeks, “Bichat bubbles”, were present. The eyeballs were not detectable.

On palpation of the cranial vault, the left temporal-parietal bone was fractured. The bone was broken from the left temporo-parietal region until the left orbital cavity. The parieto-mastoid and occipital-mastoid suture appeared disjointed. Several lesions were also found on the forehead.

The trunk was sectioned into two distinct segments: the upper rib cage and the abdomen and pelvis.

The exploration of pleural cavity evidenced very dehydrated internal organs.

At the opening of the abdominal cavity, the intestinal loops appeared extremely thinned and dehydrated and their morphological and structural architecture was partially preserved.

On the ventral right wrist, a well preserved tattoo was evident and useful for identification purposes. The hands were preserved and subjected to the saponification process.

The lower limbs were symmetrically sectioned into two distinct segments, at the hip joint and at the knee. The feet were preserved and saponified.

Samples were taken from tissues (brain, heart, aorta, lungs, liver, spleen, kidneys, adrenal glands and skin) for histological examination. The uterus and

the appendages were collected. Bone samples (femur) were also taken for DNA profiling.

### **Discussion**

The saponification consists of a qualitative transformation of the body that occurs when it: remains immersed for a long time in water; is buried in moist soil with considerable infiltration of water (for example in the case of superficial groundwater) or with certain chemical characteristics (soils rich in calcium, magnesium or sodium salts); is hermetically enclosed in a container capable of retaining all the slurry originated in the colliquative phase (for example in metal casing or in lots of plastic).

In these environments, the usual putrefactive processes are hindered, while adipocere, a product of advanced decomposition of the body that originates from adipose tissue, forms progressively<sup>1-6</sup>.

The formation of adipocere is started by the action of intrinsic lipases that determine the degradation of the main constituents of lipids into fatty acids<sup>8,9</sup>.

Through the hydrolysis of triglycerides into glycerol and free fatty acids, neutral fats liquefy and penetrate into the surrounding tissues. The action of bacterial enzymes determines the transformation of unsaturated fatty acids into saturated fatty acids (palmitic, stearic, myristic, lauric acid), hydroxy acids, oxyacids (ossistearic and ossipalmitic acids)<sup>10-12</sup>.

The formation of adipocere is affected by the presence of adipose tissue, hot-humid and anaerobic environment, the action of bacteria<sup>13</sup> in particular anaerobic microorganisms such as *Clostridium perfringens* (*C. Welchii*) and *Clostridium frigidicanes*<sup>1,14,15</sup>. Other authors have reported that the bacteria more involved in the process are especially Gram-negative bacteria, such as *Pseudomonas Acidovorans* and *Pseudomonas Stutzeri*<sup>16</sup>.

Generally adipocere looks like a grayish-white, soapy, crumbly mass that covers the body. It can also be more or less hard and compact, greasy and slimy to the touch, resembling lard or butter, and smelling like rancid cheese. It melts between 50 and 70 °C, is insoluble in water and soluble in alcohol.

The saponification process generally begins in the subcutaneous fat (when fatty acids of the organic decaying matter infiltrate the skin combined with calcium, sodium or magnesium salts and when alkaline bases are present in the water or in the soil). It extends deep into the perivisceral adipose tissue and progressively also into the muscle tissue and to internal organs (especially fatty liver, adiposum heart).

The saponification process can take place on the whole body or only certain areas of it. The entirely saponified corpse appears as a grayish-white, heavy and slippery mass due to the remarkable imbibition of water. Due to the expansion of adipose tissue and its densification the body in this state may be of a greater size and weight than the original one<sup>17</sup>.

Under the superficial layer of adipocere, tissues and various organs lose only part of their macroscopic and microscopic characteristics which makes the histological study<sup>18</sup> possible. However, the saponified parts are poorly hystologically visualized. By the time adipocera dehydrates it becomes cretaceous and crumbly resembling white chalk. Therefore, it becomes lighter and the detachment of body parts may occur<sup>19</sup>. The pericranic soft parts (lips and soft parts of the nose) are often lost, while the two white-gray coloured cheeks “Bichat-bubbles” are more visible.

Due to the lack of fat, saponification poorly occurs in hands and feet that can instead be skeletonized or even lost<sup>20</sup>.

The transformative process is established in different periods, depending on the environmental conditions. On average, from death, it takes from 4 to 6 weeks for the saponification of the integument, from 2 to 3 months for that of the skeletal muscles and from 4 to 5 months for that of the viscera. The transformation is normally complete within six or twelve months<sup>7</sup>, but in exceptional cases it takes place in only a few weeks.

On the basis of the autopsy findings, it was ascertained that the death of the young woman occurred due to repeated head trauma produced by a blunt instrument. The location and morphology of the bone fractures appeared compatible with the use of a blunt object with a small area, such as sticks, iron bars, hammers or sledge hammers.

The presence, in bone stumps, of regular and net cutting surfaces has enabled to establish that the killer had used another instrument, a chainsaw, in order to cut the corpse into nine parts. Their histological analysis showed that the body dissection was carried out after death.

To establish the time of death, the mode of preservation of the corpse (enclosed and buried in airtight plastic bags) and the transformative phenomenon that the corpse has undergone were considered. In this case, the state and the evolution of the saponification process and the results of the investigation, placed the time of death at about six months prior to the discovery of the cadaverous remains. The determination of the time of death was crucial for the following inquiries, in fact it addressed the investigators towards the identification of the victim, a young woman disappeared just six months before.



The identification of the victim was confirmed, besides the presence of the tattoo, by the comparison of the genetic markers of the victim with those of the putative parents.

The successive investigations permitted to identify the husband as the brutal killer.

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