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## CASE REPORT

# Spontaneous corification: a case of anomalous decomposition

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### ABSTRACT

We report a case of a natural corification of a woman found dead in her house after two years from her disappearance. The subject was a 63-year-old woman found in an apartment of a condominium located in the outskirts of Rome. Forensic autopsy showed a very well preserved corpse through a corification process with no external injuries observed. Corification is a special transformation process observed in corpses closed in metal lined coffins. This case report highlights the unusual characteristics of this special form of decomposition found in a domestic setting. The process producing this previously never encountered phenomenon is discussed.

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**Key words:** Postmortem changes.

It is known that typical transformative processes of the corpses are autolysis and putrefaction.<sup>1</sup> Particular environmental conditions, however, modify normal decomposition process. For example, under conditions of high environmental temperature, low humidity and enough ventilation, we have mummification. On the contrary, conditions of great humidity and high temperature determine the processing that goes under the name of adipocere.<sup>2</sup> A very special transformation in corpses that remained for a long time in coffins lined with heavy metals, in particular zinc or lead, has also been observed. The phenomenon was found for the first time by Dalla Volta who gave it the name of "corification".<sup>3</sup> This Author observed that corpses in these conditions

are dried differently than in a mummification; the skin takes a characteristic consistency similar to that of recent tanned leather (in Latin *corium* means leather), and its color is yellow or gray. On the contrary, mummified brownish skin reminds old leather. Later other authors have confirmed these observations.<sup>4</sup> Soft tissue and viscera may be well preserved, better than in other anomalous decompositions, so that it is possible to observe histological specimens and even ultrastructural appearance of cells.<sup>5,6</sup>

The founding of a mummified body in a domestic environment does not represent an uncommon case, in fact, in the last years, several case reports have described this phenomenon.<sup>7-10</sup> Natural mummification has also being studied for a long time,<sup>11, 12</sup> while fewer stud-

ies have been performed on corification,<sup>13,14</sup> and to our knowledge, a case of natural corification has not been published yet.

In Italy the humidity rate is usually high, so the kind of decomposition that is found in these cases is the typical and rapid liquefactive putrefaction. However, cases of natural mummification have been reported also in Italy.<sup>15, 16</sup> In this article we report the case of a natural corification of a woman found dead in her house after two years from her disappearance.

#### Case report

In an apartment located in the outskirts of Rome the body of a 63-year-old woman was discovered about two years after her disappearance. The corpse was found by the manager of condominium obliged to break open the door due to unpaid condominium bill. The entrance door was sealed with adhesive tape because of the bad smell. The body was on the floor in a supine position in a narrow space between two walls. On the floor there was abundant turbid, brownish and thick cadaveric sewage of greasy appearance. The corpse was in a good state of preservation due to the corification process.

At the external examination no traumatic lesions and no insect activity were found (Figure 1). The corpse was 175 cm long and weighed 43 kg. The skin color varied from yellow to dark brown, its consistency was hard elastic at the level of the limbs of the back and the thorax, soft and mellow at the level of abdomen, gluteus and breasts. Piliferous formations and the hair were adherent to the skin although easy to be removed. The muscular structures looked smaller and thinner; the articulations were not totally relaxed in absence of a real stiffness. The abdomen was sunken with a thinned subcutaneous fat. Radiographs highlighted only osteoporosis and a diffuse shrinkage of the organs but no traumatic fractures.



Figure 1.—The external aspect of the body showed a good state of preservation due to the corification process.

At the opening of the skull, brain was reduced to a mass of granular, dry and dark gray material (Figure 2). At the opening of the thorax, lungs appeared dark brown colored and reduced in dimensions; at cutting they showed a pasty consistency. The pericardium was preserved and contained a small amount of dark and greasy liquid. The best conserved organ was the heart appearing dark yellow, stiff and with empty cavities; cardiac valves and papillary muscles were identifiable; also the branches of coronary arteries were recognized mainly when they showed patches of calcification. In particular, the descending branch of the left coronary artery showed an obstruction.

The abdominal organs appeared less well preserved; the liver and the spleen were reduced to black and pasty masses, while the other abdominal viscera were very difficult to identify.

At the histologic analysis the best preserved tissue was the myocardium. The sections were stained with standard hematoxylin and eosin showing a substantial preservation of the connective tissue that sometimes became thicker in myocardic sclerosis areas, but typical cytoplasmatic cross striations were not visible. Small and middle caliber arterial vessels were also identifiable but the decomposition process did not allow to identify remarkable pathological processes apart from the myocardic sclerosis.

In the absence of evidence of trauma, the death was attributed to natural conditions according to the pathological finding of coronary atherosclerosis.

#### Discussion

The cadaveric decomposition determines important modifications both of the aspect and the structure of the cadaver and it can happen through typical destructive processes as the autolysis and the putrefaction, or through special transformative processes as the mummification, the maceration and the saponifica-



Figure 2.—Brain was reduced to a mass of granular, dry and dark gray material.

tion occurring only if the body lies in peculiar environmental conditions.<sup>17</sup> However there is another anomalous transformative process, frequently observed in corpses closed in metal lined coffins, stated for the first time by Dalla Volta who gave it the name of corification (from Latin *corium*, leather).<sup>3</sup>

In this transformative process the skin takes a characteristic consistency, similar to that of recent tanned leather appearing relatively soft and elastic. From a macroscopic point of view, viscera takes a pasty consistency, in part preserving the shape. The brain, remarkably reduced in volume, appears soft and grayish. The lungs appear collapsed, reduced in volume, pasty and brownish; the heart appears of a brownish color, flattened, empty but sufficiently preserved. At the bottom of the coffin usually we can find abundant brown and turbid sewage. From a chronological point of view, corification appears typically between the first and the second year of conservation in a metal lined coffin.<sup>4</sup>

In this article we have reported the case of a 63-year-old woman corpse found in an apartment, in condition of naturally occurred corification. The domestic environmental conditions, characterized by very scarce oxygen quantity, low humidity, lack of ventilation and hermetic closure of all the external accesses, have slowed down the decomposition process. Usually the liquid transudation is intense in corpses hermetically closed in metal coffins, instead in our case it occurred in a small domestic environment and in absence of air exchange. The corification process caused a marked tissue drainage by a passage of body fluids through the skin. This process is different from putrefaction because the accumulation of decomposition products inhibits further lytic bacterial actions.

Fatty acids have an important role in slowing-down the process of decomposition, in fact, these products of putrefaction, due to the particular environmental conditions, cannot be eliminated. The liquid filtering through the skin of a corified corpse are rich of fatty acids. The properties of these putrefactive liquids probably reduce the putrefaction because

they decrease the availability of substrates for microorganisms.<sup>18</sup> We can assume that in the reported case the release of fatty acids from the cadaver is similar to the one that occurs during the adipocere formation. Both the adipocere formation and the corification occur in a poor oxygen environment but, while the first one needs a wet environment, the second one occurs in scarce humidity conditions.<sup>19</sup> However, the formation of adipocere has been described also in dry environments.<sup>20</sup> It is well known, indeed, that during the formation of adipocere the fat tissue, through the hydrolysis of triglycerides into glycerine and free fatty acids, becomes fluid and passes through the surrounding tissues.<sup>21</sup> Also in a dry environment the putrefaction fluids exude from the body due to the pressure of the gas produced during the decomposition by a mechanism called "*lipophanerosis*".<sup>22</sup> In case of the adipocere formation in atypical dry environment it has been hypothesized that the amount of body water can be sufficient to allow the process of hydrolysis of the fat tissue.<sup>23</sup>

The corification differs greatly and in many aspects from the mummification, that occurs when the corpse loses liquid rapidly so that the tissues are "fixed" by dehydration. Mummification is supported by a hot or extremely cold, dry and airy environment.<sup>24</sup> In the mummification we have a more rapid drying up if compared to the corification. The mummified corpse has a brownish color of skin that reminds old leather, that has lost the characteristics of elasticity, softness and resistance.<sup>25</sup> The internal organs have a hard consistency though the soft tissues are not as well preserved as the ones of corified corpses.<sup>26</sup> Also from an histological point of view, the mummified skin differs totally from the one of corified corpses, due to the fact that the former preserves the cornified layer.<sup>27-29</sup>

### Conclusions

In literature the relationship between the formation of adipocere and the wider process of mummification is debated. For example, Aufderheide and Evans consider the adipo-

cere as a form of mummification.<sup>30, 31</sup> Thus it is possible to hypothesize that corification is a special transformative process more similar and closer in its mechanism of formation to the adipocere rather than to the mummification and it could be considered as the link of conjunction between these processes.

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