



### H27 The Collaboration of Forensic Sciences in a Particular Case of Murder

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After attending this presentation, attendees will understand the necessity of cooperation between different forensic science disciplines in order to: (1) estimate the time of death; (2) determine the cause, mechanism, and manner of death; and, (3) provide information to the investigation authorities to reconstruct the course of events defining the type of offense committed.

This presentation will impact the forensic science community by presenting medicolegal difficulties in a murder case, especially when circumstantial information is limited and the corpse is in an advanced stage of decay. A multidisciplinary approach requires the use of entomological, radiological, and toxicological analyses, combined with autopsy and histological findings because, in cases with inconsiderable and discordant circumstantial information and in the event of tissue destruction due to putrefactive processes and maggots, the autopsy and histological analysis could provide very little data.

A 70-year-old man disappeared from his own home in Ferrara, Italy; the forensic examination of the house revealed signs of a fight and bloodstains in the dining room, so as to exclude a voluntary disappearance. The putrefied corpse of the man was found 12 days later in an abandoned cottage in the countryside of northern Italy. On-site forensic examination revealed a body in an advanced state of decomposition, with the head and thorax skeletonized by feeding insects. The corpse was found in a prone position, with an adhesive tape wrapped on the head and inserted inside the mouth and a T-shirt tied to the occipital region that caused a mechanical occlusion of the mouth. Moreover, supination movement was impossible because the upper limbs and hands were tied behind his back as well as the lower limbs being tied together.

Before completing an external and internal examination, a computed tomography scan of the body was performed and samples of maggots were taken to perform an entomological analysis. Histological analysis with Hematoxylin-Eosin (HE) and immunohistochemistry of the heart, lungs, and muscles were performed.

The entomological analysis found the presence of larvae of *Chrysomia albiceps*, *Lucilia sericata*, *Calliphora vicina*, and *Protophormia terranova*. The data obtained, considering environmental data such as air temperature and relative humidity, revealed that the corpse had been colonized by feeding insects for 11-12 days, the exact time of disappearance. Entomological findings supplemented with a description of the stage of decomposition facilitated the estimation of time of death, which would later be confirmed by circumstantial evidence.

The attackers stated they had hit the victim on the head with a blunt object and the head colonization of maggots served as physical evidence of a wound in that body region.

Before completing an external and internal examination, a computed tomography scan of the body was performed and fractures to the rib cage and left fibula were found; this excluded the presence of skull fragmentation.



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External examination revealed the occlusion of the external respiratory orifices and bruises on the lower limbs. Internal examination did not provide any information due to a macroscopic alteration of the tissues caused by putrefaction processes. The histological sections of the heart and lungs revealed intense putrefaction changes, such as cardiomyocyte disintegration, alveolar overdistension accompanied by alveolar rupture, and absence of macrophages. Immunohistochemically negative reactions were observed with C5b9, NP57, and CD65. The histological examination of bruises revealed the presence of hemorrhage in soft tissue without any sign of granulocyte invasion. The toxicological analysis revealed a low concentration of ethanol, probably a consequence of a postmortem production.

The cooperation of several forensic scientists permitted the estimation of the time of death and they correlated these data with the day of his disappearance to confirm that the death occurred after the seizure.

Radiological findings (fractures to the rib cage and left fibula) and the presence of contusions to the soft tissues of the legs suggested that the death had been violent, providing information about the modality of the aggression.

External and internal examination resulted in smothering as cause of death (presence of adhesive tape and t-shirt occluded respiratory orifices), to the exclusion of haemorrhages, vascular disease, and positional asphyxia, without any macroscopic and microscopic signs of asphyxia.

In a complicated case of murder, these elements provided information to the investigating authorities to determine the course of events, the conduct of the attackers, and the felony committed.

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### **Murder, Forensic Radiology, Forensic Entomology**