H43 Microscopic Residues of Bone From Dissolving Human Remains in Acids

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After attending this presentation, attendees will understand that is it possible to dispose of human remains by dissolving them in acids, but that it is nearly impossible to do so without leaving microscopic residues.

This presentation will impact the forensic science community by showing which kind of microscopic residues will remain after dissolving humain remains in acid and how these residues can be detected.

Dissolving bodies in acids is a well-known method of disposing of human remains and has been practiced throughout the years. History's most notorious case is the "acid bath murderer" John Haigh, an English serial killer during the 1940s, who was convicted and subsequently executed for murdering six people. He dissolved the bodies in concentrated sulfuric acid, believing that if the victims' bodies could not be found, then a murder conviction would not be possible.

During the last decade in the Netherlands, two cases have emerged in which human remains were treated with acid. In the first case, the remains of a burned body were treated with hydrofluoric acid. In the second case, two complete bodies were dissolved in a mixture of hydrochloric and sulfuric acid.

In the first case, a witness declared that a suspect involved in drug trafficking had killed his missing companion and burned him in an improvised incinerator. However, no remains of either the victim or the incinerator were found. Later, during another house search, an off-white concrete-like object, speckled with pink and brown spots, was found buried in a refuse bag in the suspect's garden. At first, no one had an idea what this odd-appearing material could be. After preparing a polished section of the material in question, its internal structure was revealed. The white material consisted of gypsum, and the pink and brown spots consisted of some sand and thin-walled structures containing calcium, phosphorus, and fluorine. Because of this odd composition, it was thought that these mysterious thin-walled structures were originally bone that had been almost completely dissolved by hydrofluoric acid alone or a mixture of hydrofluoric and other acids.

In order to confirm this hypothesis, a series of experiments were launched, in which cremated bone was exposed to mixtures of acids of different strengths and compositions. As the suspect was a professional welder, the experiments focused on pickling acid and pickling paste, which contain a mixture of hydrofluoric and nitric acid. The experiments revealed that it was possible to reproduce the thin-walled structures; the more diluted the acid was, the more delicate the thin-walled structures became.

In the second case, a conscientious witness declared to the police that he helped to dispose of two bodies by dissolving them in a mixture of hydrochloric and sulfuric acids in a plastic barrel. The mixture was stirred regularly and floating fatty residue was skimmed off and drained in a sink. A portion of the broth was regularly replaced by fresh acid. Solid substances from this removed broth were set apart and treated separately in a bucket of fresh acid. After two weeks, when the bodies were dissolved, the remaining fluid was poured down the drain adjacent to the witness' house.

The contents of the drain and the sewers were secured by the police and consisted of several kilograms of waste, including sand, demolition materials, and stone. After carefully sifting through the contents of the drain, one pivot tooth, a small piece of epidermis, and four residual particles with the same elemental composition as bone (calcium and phosphorus) were found. The four remnants were subjected to DNA-analysis but unfortunately it was not possible to obtain a DNA profile of one of the victims.

Apart from the macroscopic findings, in almost every sample, microscopic residues of bone were found. These microscopic residues fall into three categories: (1) bone, partly acid-digested at the edges; (2) thin-walled structures such as those described above; and, (3) recrystallized calcium phosphate. Although some may believe it is possible to dissolve a body in acid completely, at least some of the aforementioned microscopic residues will always be found.

Bone, Acid, SEM/EDX

 ** Presenting Author*