



## Jurisprudence Section - 2013

### E45 Review of the Scientific Basis of Bitemark Comparison: Pre-NAS Report

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The goal of this presentation is to review the scientific background of bitemark analysis that existed prior to the 2009 National Academy of Sciences (NAS) Report.

This presentation will impact the forensic science community by providing a historical summary of the peer-reviewed literature for this forensic discipline.

The precedent for bitemark admissibility was mainly set in the 1970's with two landmark cases: The first was *People vs. Marx*. In this case, the methodology used in the comparison process was deemed *not novel*. That methodology consisted of the use of dental X-rays, models, and photography. In the second case, *People vs. Milone*, dental individuality, based on the process of victim ID, was incorrectly extrapolated to bitemarks.

The foundation of bitemark analysis rests on the ability to distinguish between dentitions; that is, there are features that make each person's set of teeth different. There is far more information with which to make a comparison in victim identification than in bitemark analysis, as this post-mortem identification involves examination of possible combinations of 32 decayed, missing and restored teeth, including root morphology, trabecular bone patterns and sinus morphology.

With bitemark analysis, typically only the biting surfaces of the six anterior, or front teeth of each arch impress the tissue, severely limiting the amount of information available to claim one dentition is distinct compared to another.

Furthermore, bitemark analysis is often accomplished by evaluating a wound or injury pattern in human skin and comparison of that pattern to representations of the dentition. Human skin is a notoriously poor recording medium, and prone to highly variable distortion. Given the loss of resolution of the resulting pattern due to these properties, the ability to distinguish between individuals is further compromised.

A survey of the peer-reviewed literature concerning bitemarks since the 1960's reveals interesting patterns. There are very few empirical studies that substantiate any scientific basis of bitemark analysis, or that investigate the core premises of dental individuality and transfer of the dental pattern to skin. Most of the publications consist of case reports, review papers, and technique reports on procedural issues and evidence collection.

With regard to the dental aspect of bitemark analysis; that of individuality of the dentition, there have been very few studies in six decades that have attempted to address this issue. Unfortunately, these studies suffered from inappropriate use of statistics, lack of statistics altogether, or had too small of a sample size from which to make a conclusion. With regard to properties of the skin, there have been even fewer studies in the forensic odontology literature.

With such limited scientific basis, it is valid to question how bitemark comparison has reached the level of acceptance that it has, with the serious consequence of determining the life or liberty of an individual. This question has been brought to the fore by the number of recent exonerations of those incarcerated or convicted on bitemark evidence.

#### **Bitemarks, Bitemark Research, History**