



A quantitative method for the forensic evaluation of bitemarks.

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A. PREFACE

1. Declaration

This thesis is the report of original work and the results presented have not been submitted for the award of any other degree or diploma in any other University. To the best of my knowledge, this thesis does not contain any material previously published or written by another person, except where due reference is made in the text. The research described in this thesis represents the unaided work of the candidate, except where otherwise acknowledged. I consent to this thesis, if accepted for the award of the degree, being made available for photocopying and loan.

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3. Abstract

The fundamental principle in any forensic investigation is based on the simple axiom, "any contact leaves a trace". The study of marks or artefacts left at the scene of a crime has always been an important means of proving or eliminating the presence of an offender. Bitemarks left on human tissue and bitten material have become an important aspect of the scientific evidence used for the conviction of a suspect. In the majority of cases, only qualitative evaluation of the bitemarks are involved. In these situations, the forensic dentist compares the morphological aspects of the offender's teeth with the bitemark present. The parameters used are features associated with the dental arch, such as the tooth morphology, position, number and distance between the teeth with those revealed by the marks. Even though bitemark analysis based on such comparisons is accepted widely by courts, the fundamental validity and scientific basis for its use as evidence has frequently been challenged. Expert opinion has often been based on associative comparisons rather than metrical analysis and many agree that there is a need to use additional comparative tests to achieve unbiased objectivity.

In this study, an interactive shape analysis program has been employed in an attempt to derive experimentally a quantitative comparison, in the form of a Similarity Index, between the "offender's" teeth and the bitemarks produced on a standard flat wax form. Similarity Index values obtained using the shape-fit program in ideal bitemark situations were evaluated and then these data were compared with those from studies of bitemarks produced on curved surfaces. Subsequently, the reliability of identifying bites in foodstuffs and on human skin, under experimental conditions, was assessed using the program.

The use of this Similarity Index is recommended as a simple, accurate and objective means of comparing bitemarks in forensic analyses.