

ASB Technical Report 194, First Edition
2026

Terminology for a Suspected Pattern of Dental Origin



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ASB Approved May 2025



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Colorado Springs, CO 80904

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Foreword

This document presents a compiled set of standardized terms and definitions intended to establish a common language for describing the appropriate terms for a suspected pattern of dental origin. It is important to note that these definitions do not assert a scientific foundation for the terms. Instead, they aim to provide clear and unambiguous descriptions for effective communication within other standards. Including these terms ensures consistent communication of both the application and limitations of these phrases and processes by both the forensic and legal communities.

The American Academy of Forensic Sciences established the Academy Standards Board (ASB) in 2015 with a vision of safeguarding Justice, Integrity and Fairness through Consensus Based American National Standards. To that end, the ASB develops consensus based forensic standards within a framework accredited by the American National Standards Institute (ANSI), and provides training to support those standards. ASB values integrity, scientific rigor, openness, due process, collaboration, excellence, diversity and inclusion. ASB is dedicated to developing and making freely accessible the highest quality documentary forensic science consensus Standards, Guidelines, Best Practices, and Technical Reports in a wide range of forensic science disciplines as a service to forensic practitioners and the legal system.

This document was revised, prepared, and finalized as a standard by the Forensic Odontology Consensus Body of the AAFS Standards Board. A draft of this standard was developed by the Forensic Odontology Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science.

Questions, comments, and suggestions for the improvement of this document can be sent to AAFS-ASB Secretariat, asb@aaafs.org or 410 N 21st Street, Colorado Springs, CO 80904.

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Keywords: *terminology, forensic odontology, patterned injury, human dentition*

Preface

Terminology documents provide clear and consistent definitions of terms. They focus on establishing a common understanding of terminology rather than prescribing specific practices or applications. Their purpose is to ensure that terms are used consistently and understood uniformly, but are not prescriptive in themselves. The ASB Forensic Odontology consensus body has decided to follow the recommendation of ISO concerning terms and definitions, which it clearly prescribes that it “...should not take the form of, or contain, a requirement or recommendation”.¹

The goal of this terminology technical report is to provide clarity to the terms commonly used to describe a suspected pattern of dental origin. Its sole focus is to establish a common terminology with unambiguous definitions and, following ISO recommendations of refraining from advocating specific practices or applications. The scope and disclaimer clearly state the goal and clarify that the document neither dictates term usage nor claims a reliable, scientifically supported methodology for applying specific terms.

Finally, the rationale behind this document is in direct response to the recommendation put forward by NIST as a first step; “if the field seeks to advance, the key takeaways provided in this report are starting points for areas needing improvement, not an exhaustive list of specific shortcomings.”²

¹ **ISO. (n.d.).** *How to write standards*. International Organization for Standardization. Retrieved September 17, 2024, from https://www.iso.org/files/live/sites/isoorg/files/developing_standards/docs/en/how-to-write-standards.pdf

² Sauerwein K, Butler JM, Reczek KK, Reed C (2023) *Bite mark Analysis: A NIST Scientific Foundation Review*. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Interagency Report (IR) NIST IR 8352. <https://doi.org/10.6028/NIST.IR.8352>

Table of Contents

1	Scope	1
2	Normative References	1
3	Terms and Definitions	1
	Annex A (informative) Suggested Terms.....	12
	Annex B (informative) Bibliography	14
	Index	15

Terminology for a Suspected Pattern of Dental Origin

1 Scope

This technical report provides terms and definitions for describing a suspected pattern impression of dental origin.

This document does not provide criteria for using these terms, nor suggest that they have a scientific basis for reliable application; their inclusion is only to ensure clarity and prevent ambiguity in other technical reports and standards.

2 Normative References

There are no normative reference documents, Annex B, Bibliography, contains informative references.

3 Terms and Definitions

NOTE to Terms and Definitions

The layout of these terms and definitions follows ISO IEC Directives Part 1 and *Consolidated ISO Supplement 2019 (10th Edition) Section 3. Terms and Definitions* recommendations are listed according to the hierarchy of the concepts (i.e., systematic order) rather than alphabetical order. An alphabetical listing is available in the index.

3.1 general terms

3.1.1 natural tooth (teeth)

oral organ consisting of enamel, dentin, cementum, and pulp

NOTE Some elements may be missing due to congenital, developmental, or structural modifications.

3.1.2 artificial tooth (teeth)

prosthesis restoring or replacing a natural tooth

3.1.3 pattern

discernable shape, form, or array appearing in or on a substrate

3.1.3.1 patterned injury

injury with a pattern that may reproduce the characteristics of the object causing the injury

3.1.3.2 patterned impression

surface alteration demonstrating the capacity to replicate the characteristics of the object causing the alteration

3.1.4

bitemark/bite mark

physical alteration in a substrate caused by the contact of the biting surfaces of opposing teeth

3.1.5

toothmark/tooth mark/teeth mark/teethmark

physical alteration in a substrate caused by contact between the substrate and a tooth or teeth that is not a result of a closure of the mouth

3.1.6

evidentiary value

information of sufficient usefulness to serve as the basis for making an empirically significant scientific determination.

3.1.7

artifact

spurious observation anomaly not intrinsically present feature not related to the source

3.1.8

suspected pattern of dental origin analysis

forensic examination, analysis, and determination of the pattern for potential links to dental origins.

3.1.8.1

bitemark assessment analysis

forensic examination that a pattern is a bitemark based on the class characteristics of a dentition

NOTE The purpose of this definition is to describe a process and is not an endorsement of its scientific validity.

3.1.8.1.1

bitemark analysis

forensic examination of class and individual characteristics of a bitemark

NOTE The purpose of this definition is to describe a process and is not an endorsement of its scientific validity.

3.1.8.1.1.1

bitemark comparison analysis

forensic examination involving comparison of a bitemark to dentitions

NOTE The purpose of this definition is to describe a process and is not an endorsement of its scientific validity.

3.1.8.1.1.1.1

bitemark individualization analysis

<deprecated>

forensic examination that identifies an individual with a specific pattern through recognition, analysis, and comparison of a bitemark

NOTE 1 The purpose of this definition is to describe a process and is not an endorsement of its scientific validity.

NOTE 2 While the deprecated term involves visual comparison, other methods, such as DNA analysis, can also be utilized; thus, specifying the individualization method used is crucial for clarity.

3.2

class characteristic (of the pattern)

feature that distinguishes items between categories

3.2.1

pattern landmark

reference feature in the pattern

3.2.1.1

cusp mark

pattern left by the most protruding portion(s) of the tooth

3.2.2

pattern shape

outline of a pattern

NOTE Suggested terms for shape are included in Table A-1 - Suggested Terms for Pattern Shape

3.2.3

pattern color (multiple iterations allowed)

hue, chroma, and value of a pattern

NOTE Suggested terms for color are included in Table A-3 - Suggested Terms for Describing the Color of a Patterned Injury

3.2.4

pattern metrics

quantitative measurement of the characteristics of the pattern

3.2.4.1

circumferential distance

curvilinear measurement between two points

3.2.4.2

linear distance

the shortest measurement between two points

NOTE measurement may need to account that pattern occurred on a curved plane

3.2.4.3

intercuspal distance

linear measurement between cuspal eminences of the same arch

3.2.5

arch characteristic (of the pattern)

curved composite structure of the dentition in a jaw

3.2.5.1

arch size

defined linear or curvilinear distance between two landmarks on the same jaw

3.2.5.2

maximum interarch distance

individual's greatest achievable opening distance between two landmarks on opposing jaws

3.2.5.3

dental midline

line drawn between the central incisors of a dental arch

3.2.5.4

arch midline

line bisecting an alveolar process

NOTE In the maxillary arch it typically passes through the incisive foramen

3.2.5.5

arch orientation

positional relationship of the arch to a fixed landmark

3.3

individual characteristic (within the pattern)

distinguishing feature within a *class characteristic*

3.3.1

diastema

interdental space between two adjacent teeth that would typically be in contact with each other

3.3.2

incisal edge shape (by tooth)

area outline of the incisal edge of a tooth

NOTE Suggested terms are included in Table A.2—Suggested Terms for Describing the Incisal Edge Shape

3.3.3

incisal edge metrics (by tooth)

quantitative assessment of the incisal edge of a tooth

3.3.3.1

incisal edge angulation

angle formed between the incisal edge of a tooth and a reference

NOTE Commonly, the reference is the incisal edge of an adjacent tooth

3.4

substrate

surface or surfaces on which a pattern appears

3.4.1

biological substrate

tissue upon which the pattern was impressed

3.4.1.1

fixed substrate

substrate firmly attached to underlying structures

3.4.1.2

mobile substrate

substrate not firmly attached to underlying structures

3.4.1.3

substrate elasticity

substrate ability to resume its resting position

3.4.2

non-biological substrate

inanimate object upon which the pattern was impressed

3.5

injury

damage to a biological organism caused by physical harm (ISO 19434:2017(en), 315)

3.5.1

patterned injury characteristics

features or qualities belonging to the *patterned injury*

3.5.1.1

abrasion

superficial scraping of the substrate

3.5.1.2

ecchymosis

extravasation of blood that causes a temporary discoloration of the skin

3.5.1.2.1

bruise

ecchymosis (3.5.1.2) from a tissue injury

3.5.1.2.1.1

contusion

bruise (3.5.1.2.1) from blunt trauma

3.5.1.3

laceration

soft tissue tear or break

3.5.1.4

petechial hemorrhage

pinpoint intradermal hemorrhages beneath the skin

3.5.1.5

avulsion

tearing away of an attached or anchored tissue

3.5.1.6

incision

cut in tissue made with a sharp object

3.5.1.7

indentation

recess on a surface

3.5.1.8

drag marks

abrasion injury induced by motion

3.5.1.9

unknown

undefined pathology

3.5.2

anatomical location (biological substrates)

site of the pattern.

Annex A (informative)

Suggested Terms

The tables in this annex provide the suggested terms that may be used in conjunction with the terms/definitions in this document.

Table A.1—Suggested Terms for Pattern Shape

round
ovoid
curvilinear
diamond
rectangular
irregular
indeterminant

NOTE indeterminant - unable to assign a definitive term to the pattern shape

Table A.2— Suggested Terms for Describing the Incisal Edge Shape of an Anterior Tooth

rectangular
circular
oval
triangular
indeterminant

NOTE 1 an individual pattern must be recognized as a tooth before assigning an edge shape.

NOTE 2 indeterminant - unable to assign a definitive term to the shape of the incisal edge

Table A.3—Suggested Terms for Describing the Color of a Pattern (Biological)

red
violet
reddish purple
bluish purple
purple
blue
violet
green
dark yellow
pale yellow
brown
black
white
multiple colors
indeterminant
unknown

NOTE 1 indeterminant - unable to definitively assign a color to the pattern due to imprecise color information.

NOTE 2 unknown - unable to definitively assign a color to the pattern due to lack of color information

Annex B (informative)

Bibliography

The following bibliography is not intended to be an all-inclusive list, review, or literature endorsement on this topic. The goal of the bibliography is to provide examples of publications addressed in the standard.

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^c Available from: <http://abfo.org/resources/abfo-manual/>

^d Available from: <https://www.iso.org/obp/ui/>

Index

A

abrasion: 3.5.1.1, 9
 anatomical location (biological substrates): 3.5.2, 10
 arch characteristic (of the pattern): 3.2.5, 7
 arch midline: 3.2.5.4, 8
 arch orientation: 3.2.5.5, 8
 arch size: 3.2.5.1, 8
 artifact: 3.1.7, 6
 artificial tooth (teeth): 3.1.2, 5
 avulsion: 3.5.1.5, 10

B

biological substrate: 3.4.1, 9
 bitemark analysis: 3.1.8.1.1, 6
 bitemark assessment analysis: 3.1.8.1, 6
 bitemark comparison analysis: 3.1.8.1.1.1, 6
 bitemark individualization analysis: 3.1.8.1.1.1.1, 6
 bitemark/bite mark: 3.1.4, 6
 bruise: 3.5.1.2.1, 9

C

circumferential distance: 3.2.4.1, 7
 class characteristic (of the pattern): 3.2, 7
 contusion: 3.5.1.2.1.1, 9
 cusp mark: 3.2.1.1, 7

D

dental midline: 3.2.5.3, 8
 diastema: 3.3.1, 8
 drag marks: 3.5.1.8, 10

E

ecchymosis: 3.5.1.2, 9
 evidentiary value: 3.1.6, 6

F

fixed substrate: 3.4.1.1, 9

I

incisal edge angulation: 3.3.3.1, 8
 incisal edge metrics (by tooth): 3.3.3, 8

incisal edge shape (by tooth): 3.3.2, 8
 incision: 3.5.1.6, 10
 indentation: 3.5.1.7, 10
 individual characteristic (within the pattern): 3.3, 8
 injury: 3.5, 9
 intercuspal distance: 3.2.4.3, 7

L

laceration: 3.5.1.3, 9
 linear distance: 3.2.4.2, 7

M

maximum interarch distance: 3.2.5.2, 8
 mobile substrate: 3.4.1.2, 9

N

natural tooth (teeth): 3.1.1, 5
 non-biological substrate: 3.4.2, 9

P

pattern: 3.1.3, 5
 pattern color (multiple iterations allowed): 3.2.3, 7
 pattern landmark: 3.2.1, 7
 pattern metrics: 3.2.4, 7
 pattern shape: 3.2.2, 7
 patterned impression: 3.1.3.2, 5
 patterned injury: 3.1.3.1, 5
 patterned injury characteristics: 3.5.1, 9
 petechial hemorrhage: 3.5.1.4, 9

S

substrate: 3.4, 8
 substrate elasticity: 3.4.1.3, 9
 suspected pattern of dental origin analysis: 3.1.8, 6

T

toothmark/tooth mark/teeth mark/teethmark: 3.1.5, 6

U

unknown: 3.5.1.9, 10



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