

Terminology for a Suspected Pattern of Dental Origin

DRAFT



ASB
ACADEMY
STANDARDS BOARD

Terminology for a Suspected Pattern of Dental Origin

ASB Approved Xxxxx 2024



410 North 21st Street
Colorado Springs, CO 80904

This document may be downloaded for free at: www.aafs.org/academy-standards-board

This document is provided by the AAFS Standards Board (ASB). Users are permitted to print and download the document and extracts from the document for personal use, however the following actions are prohibited under copyright:

- *modifying this document or its related graphics in any way;*
- *using any illustrations or any graphics separately from any accompanying text; and,*
- *failing to include an acknowledgment alongside the copied material noting the AAFS Standards Board as the copyright holder and publisher.*

Users may not reproduce, duplicate, copy, sell, resell, or exploit for any commercial purposes this document or any portion of it. Users may create a hyperlink to www.aafs.org/academy-standards-board to allow persons to download their individual free copy of this document. The hyperlink must not portray AAFS, the AAFS Standards Board, this document, our agents, associates and affiliates in an offensive manner, or be misleading or false. ASB trademarks may not be used as part of a link without written permission from ASB.

The AAFS Standards Board retains the sole right to submit this document to any other forum for any purpose.

Certain commercial entities, equipment or materials may be identified in this document to describe a procedure or concept adequately. Such identification is not intended to imply recommendations or endorsement by the AAFS or the AAFS Standards Board, nor is it intended to imply that the entities, materials, or equipment are necessarily the best available for the purpose.

Proper citation of ASB documents includes the designation, title, edition, and year of publication.

*This document is copyrighted © by the AAFS Standards Board, LLC. 2024 All rights are reserved.
410 North 21st Street, Colorado Springs, CO 80904, www.aafs.org/academy-standards-board*

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@aafs.org or 410 N 21st Street, Colorado Springs, CO 80904.

All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

ASB procedures are publicly available, free of cost, at www.aafs.org/academy-standards-board.

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 that 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 **NIST. (2023).** *An assessment of the state of forensic bite mark analysis* (NIST IR 8352). National Institute of Standards and Technology. Retrieved September 17, 2024, from <https://nvlpubs.nist.gov/nistpubs/ir/2023/NIST.IR.8352.pdf>

Table of Contents *(to be finalized prior to publication)*

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

DRAFT

1 Terminology for a Suspected Pattern of Dental Origin

2 **1 Scope**

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

5 This document does not provide criteria for using these terms or suggest that they have a
6 scientific basis for reliable application; their inclusion is only to ensure clarity and prevent
7 ambiguity in other technical reports and standards.

8 **2 Normative References**

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

11 **3 Terms and Definitions**

12 **Note to Terms and Definitions**

13 The layout of these terms and definitions follows ISO IEC Directives Part 1 and *Consolidated ISO Supplement*
14 *2019 (10th Edition) Section 3. Terms and Definitions* recommendations are listed according to the hierarchy of
15 the concepts (i.e., systematic order) rather than alphabetical order. An alphabetical listing is available in the
16 index.

17 **3.1** 18 **general terms**

19 **3.1.1**
20 **natural tooth (teeth)**
21 oral organ consisting of enamel, dentin, cementum, and pulp

22 **Note to entry** Some elements may be missing due to congenital, developmental, or structural modifications.

23 **3.1.2**
24 **artificial tooth (teeth)**
25 prosthesis restoring or replacing a natural tooth

26 **3.1.3**
27 **pattern**
28 discernable shape, form, or array appearing in or on a substrate

29 **3.1.3.1**
30 **patterned injury**
31 injury with a pattern that may reproduce the characteristics of the object causing the injury

32 **3.1.3.2**
33 **patterned impression**
34 surface alteration demonstrating the capacity to replicate the characteristics of the object causing
35 the alteration

- 36 **3.1.4**
37 **bitemark/bite mark**
38 physical alteration in a substrate caused by the contact of the biting surfaces of an opposing teeth
- 39 **3.1.5**
40 **toothmark/tooth mark/teeth mark/teethmark**
41 physical alteration in a substrate caused by contact between the substrate and a tooth or teeth that
42 is not a result of a closure of the mouth
- 43 **3.1.6**
44 **evidentiary value**
45 information of sufficient usefulness to serve as the basis for making an empirically significant
46 scientific determination.
- 47 **3.1.7**
48 **artifact**
49 spurious observation anomaly not intrinsically present feature not related to the source
- 50 **3.1.8**
51 **suspected pattern of dental origin analysis**
52 forensic examination, analysis, and determination of the pattern for potential links to dental origins.
- 53 **3.1.8.1**
54 **bitemark assessment analysis**
55 forensic examination that a pattern is a bitemark based on the class characteristics of a dentition
- 56 **Note to entry** The purpose of this definition is to describe a process and is not an endorsement of its
57 scientific validity.
- 58 **3.1.8.1.1**
59 **bitemark analysis**
60 forensic examination of class and individual characteristics of a bitemark
- 61 **Note to entry** The purpose of this definition is to describe a process and is not an endorsement of its
62 scientific validity.
- 63 **3.1.8.1.1.1**
64 **bitemark comparison analysis**
65 forensic examination involving comparison of a bitemark to dentitions
- 66 **Note to entry** The purpose of this definition is to describe a process and is not an endorsement of its scientific
67 validity.
- 68 **3.1.8.1.1.1.1**
69 **bitemark individualization analysis**
70 **<deprecated>**
71 forensic examination that identifies an individual with a specific pattern through recognition,
72 analysis, and comparison of a bitemark
- 73 **Note 1 to entry** The purpose of this definition is to describe a process and is not an endorsement of its
74 scientific validity.

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

77 **3.2**
78 **class characteristic (of the pattern)**
79 feature that distinguishes items between categories

80 **3.2.1**
81 **pattern landmark**
82 reference feature in the pattern

83 **3.2.1.1**
84 **cuspl mark**
85 pattern left by the most protruding portion(s) of the tooth

86 **3.2.2**
87 **pattern shape**
88 outline of a pattern

89 **Note to entry** Suggested terms for shape are included in Table A-1 - Suggested Terms for Pattern Shape

90 **3.2.3**
91 **pattern color (multiple iterations allowed)**
92 hue, chroma, and value of a pattern

93 **Note to entry** Suggested terms for color are included in Table A-3 - Suggested Terms for Describing the Color
94 of a Patterned Injury

95 **3.2.4**
96 **pattern metrics**
97 quantitative measurement of the characteristics of the pattern

98 **3.2.4.1**
99 **circumferential distance**
100 curvilinear measurement between two points

101 **3.2.4.2**
102 **linear distance**
103 the shortest measurement between two points

104 **Note to entry** measurement may need to account that pattern occurred on a curved plane

105 **3.2.4.3**
106 **intercuspal distance**
107 linear measurement between cuspal eminences of the same arch

108 **3.2.5**
109 **arch characteristic (of the pattern)**
110 curved composite structure of the dentition in a jaw

- 111 **3.2.5.1**
 112 **arch size**
 113 defined linear or curvilinear distance between two landmarks on the same jaw
- 114 **3.2.5.2**
 115 **maximum interarch distance**
 116 individual's greatest achievable opening distance between two landmarks on opposing jaws
- 117 **3.2.5.3**
 118 **dental midline**
 119 line drawn between the central incisors of a dental arch
- 120 **3.2.5.4**
 121 **arch midline**
 122 line bisecting an alveolar process
- 123 **Note to entry** In the maxillary arch it typically passes through the incisive foramen
- 124 **3.2.5.5**
 125 **arch orientation**
 126 positional relationship of the arch to a fixed landmark
- 127 **3.3**
 128 **individual characteristic (within the pattern)**
 129 distinguishing feature within a *class characteristic*
- 130 **3.3.1**
 131 **diastema**
 132 interdental space between two adjacent teeth that would typically be in contact with each other
- 133 **3.3.2**
 134 **incisal edge shape (by tooth)**
 135 area outline of the incisal edge of a tooth
- 136 **Note to entry** Suggested terms are included in Table A-2 - Suggested Terms for Describing the Incisal Edge
 137 Shape
- 138 **3.3.3**
 139 **incisal edge metrics (by tooth)**
 140 quantitative assessment of the incisal edge of a tooth
- 141 **3.3.3.1**
 142 **incisal edge angulation**
 143 angle formed between the incisal edge of a tooth and a reference
- 144 **Note to entry** Commonly, the reference is the incisal edge of an adjacent tooth
- 145 **3.4**
 146 **substrate**
 147 surface or surfaces on which a pattern appears

148	3.4.1
149	biological substrate
150	tissue upon which the pattern was impressed
151	3.4.1.1
152	fixed substrate
153	substrate firmly attached to underlying structures
154	3.4.1.2
155	mobile substrate
156	substrate not firmly attached to underlying structures
157	3.4.1.3
158	substrate elasticity
159	substrate ability to resume its resting position
160	3.4.2
161	non-biological substrate
162	inanimate object upon which the pattern was impressed
163	3.5
164	injury
165	damage to a biological organism caused by physical harm (ISO 19434:2017(en), 315)
166	3.5.1
167	patterned injury characteristics
168	features or qualities belonging to the <i>patterned injury</i>
169	3.5.1.1
170	abrasion
171	superficial scraping of the substrate
172	3.5.1.2
173	ecchymosis
174	extravasation of blood that causes a temporary discoloration of the skin
175	3.5.1.2.1
176	bruise
177	<i>ecchymosis</i> (3.5.1.2) from a tissue injury
178	3.5.1.2.1.1
179	contusion
180	<i>bruise</i> (3.5.1.2.1) from blunt trauma
181	3.5.1.3
182	laceration
183	soft tissue tear or break
184	3.5.1.4
185	petechial hemorrhage
186	pinpoint intradermal hemorrhages beneath the skin

- 187 **3.5.1.5**
188 **avulsion**
189 tearing away of an attached or anchored tissue
- 190 **3.5.1.6**
191 **incision**
192 cut in tissue made with a sharp object
- 193 **3.5.1.7**
194 **indentation**
195 recess on a surface
- 196 **3.5.1.8**
197 **drag marks**
198 abrasion injury induced by motion
- 199 **3.5.1.9**
200 **unknown**
201 undefined pathology
- 202 **3.5.2**
203 **anatomical location (biological substrates)**
204 site of the pattern.

DRAFT

205
206

Annex A
(informative)

207

Suggested Terms

208
209

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

210

Table A-1—Suggested Terms for Pattern Shape

round
ovoid
curvilinear
diamond
rectangular
irregular
indeterminant

211

212

Note to entry indeterminant - unable to assign a definitive term to the pattern shape

213

214

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

rectangular
circular
oval
triangular
indeterminant

215

216

Note 1 to entry An individual pattern must be recognized as a tooth before assigning an edge shape.

217

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

218

219

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

220

221

222 **Note 1 to entry** indeterminant - unable to definitively assign a color to the pattern due to imprecise color
 223 information.

224 **Note 2 to entry** unknown - unable to definitively assign a color to the pattern due to lack of color
 225 information

226

227

228
 229
 230
 231
 232
 233
 234
 235
 236
 237
 238
 239
 240
 241
 242
 243
 244
 245
 246
 247
 248

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.

- 1] American Board of Forensic Odontology, Diplomates Reference Manual.^c
- 2] Bitemark Evidence: A Color Atlas and Text, 2nd Edition, Robert B. J. Dorion, Editor, CRC Press, Boca Raton, FL, 2011.
- 3] Dental Autopsy, William E. Silver & Richard R. Souviron, CRC Press, Boca Raton, 2009.
- 4] Forensic Dentistry, 2nd Edition, David R. Senn & Paul G. Stimson, Editors, CRC Press, Boca Raton, FL, 2010.
- 5] Forensic Odontology: Principles and Practice, Thomas J. David & James M. Lewis, Editors, Academic Press, London, UK, 2018.
- 6] ISO Standards and Terms and Definitions.^d
- 7] Manual of Forensic Odontology, 5th Edition, David R. Senn & Richard A. Weems, Editors, CRC Press/Taylor & Francis, Boca Raton, FL, 2013
- 8] Wheeler's Dental Anatomy, Physiology, and Occlusion, SJ, Nelson, M Ash Jr., 9th ed., Saunders, Elsevier, St. Louis, Missouri, 2010.

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

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

249
250

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

DRAFT



ASB
ACADEMY
STANDARDS BOARD

Academy Standards Board
410 North 21st Street
Colorado Springs, CO 80904

www.aafs.org/academy-standards-board